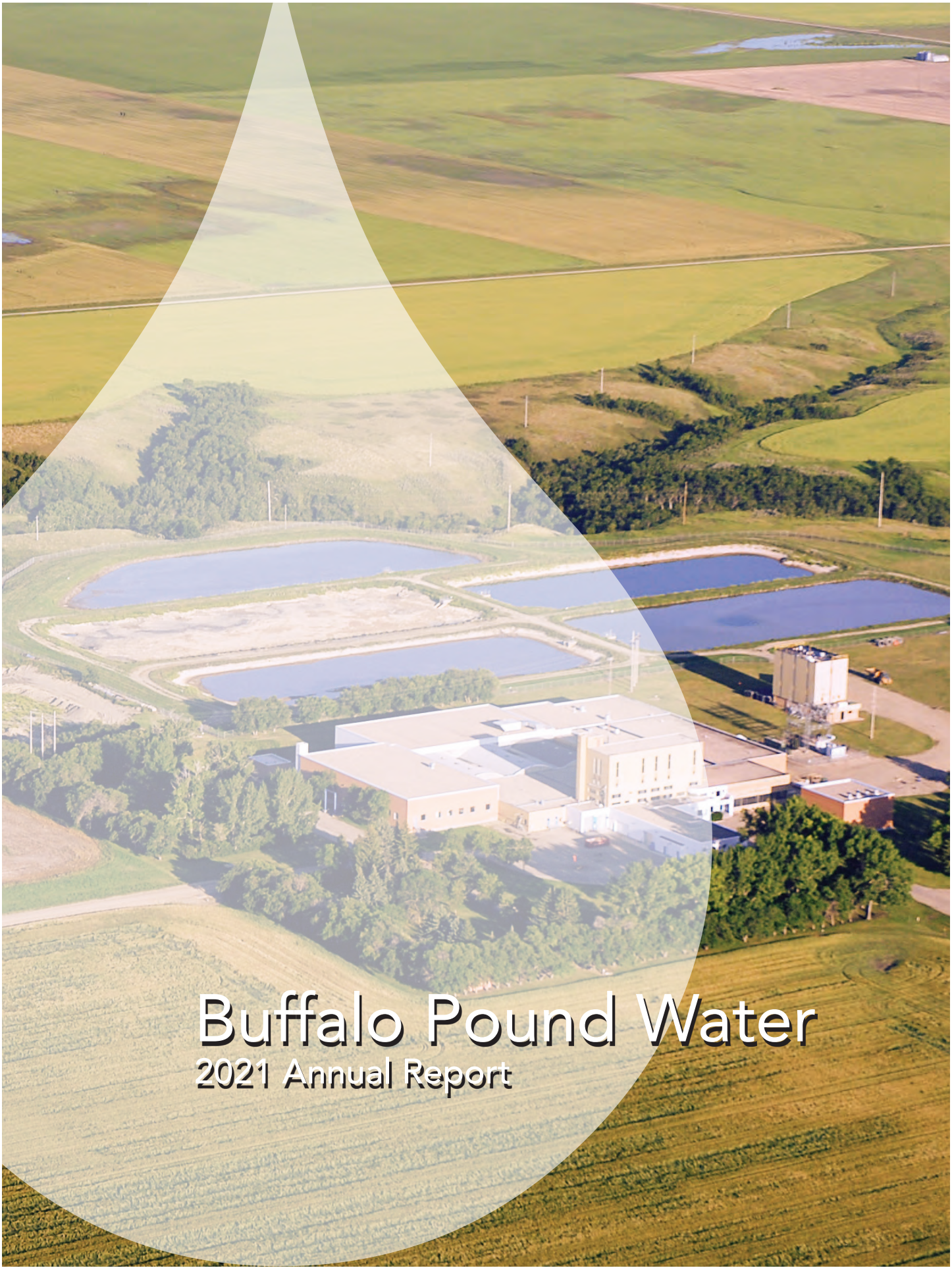

Buffalo Pound Water

2021 Annual Report

BUFFALO POUND WATER
OUT OF SCOPE STAFF

The Buffalo Pound Water Treatment Plant is located approximately 30 kilometres northeast of the City of Moose Jaw, Saskatchewan, on Highway No. 301, 17 kilometres north of the intersection with Highway No. 1.

The Plant's mailing address is PO Box 944, Moose Jaw, Saskatchewan, S6H 2V2.

The telephone number is 306-694-1377.

Information about the Buffalo Pound Water Treatment Plant is also available from the Corporation's website. This may be accessed by going to:

http://www.buffalopoundwtp.ca

Plant management staff may be reached by e-mail at the following addresses:

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Operations and Safety Manager
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Harry Gahra
Maintenance and Engineering Manager
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Blair Kardash
Laboratory and Research Manager
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Laurie Wilkinson
Office and Board Support Manager
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2021
ANNUAL REPORT

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INTRODUCTION

ABOUT THIS REPORT

This report summarizes the activities and major events of the Buffalo Pound Water Treatment Corporation (the "Corporation") for the operations of the Buffalo Pound Water Treatment Plant (the "Plant") during 2021. The report outlines the Mission and Goals, achievements and areas of concern. It is intended as an information source for City administration personnel, elected officials and the general public. This report also contains the Drinking Water Quality and Compliance Report required by provincial regulations and the Audited Financial Statements.

ABOUT US

The Buffalo Pound Water Treatment Corporation is a non-profit corporation, governed by an independent Board of Directors. The Corporation was formed in January 2016 through the Unanimous Membership Agreement by the Cities of Regina and Moose Jaw, which have jointly owned the Plant since 1951.

The Corporation's mission is to provide a reliable and affordable supply of safe, high-quality drinking water which meets the needs and expectations of consumers. The Buffalo Pound Water Treatment Plant provides water to approximately 260,000 customers in the Cities of Regina, Moose Jaw and surrounding regions. Additional water customers include SaskWater and the Buffalo Pound Provincial Park.

Construction of the Plant began in 1951 following extensive work with the federal and provincial governments, and the Cities of Regina and Moose Jaw. It began producing water in 1955. The plant draws water from Buffalo Pound Lake, a shallow reservoir constructed on the Qu'Appelle River. Water levels in Buffalo Pound Lake are maintained by the release of water from the Qu'Appelle Dam on Lake Diefenbaker.

The Plant has been a leader in the delivery of safe, high-quality drinking water over the past 30 years. It has received numerous Water Quality Awards and has made significant progress in improving the quality of water provided to its customers. In fact, it was one of the first plants to pioneer the use of the Granular Activated Carbon filtration process for the removal of algae-produced taste and odour in the 1980's. The Corporation's quality water successes are due in large part to the water treatment expertise of its employees.

While a past leader in the delivery of high quality water, the Buffalo Pound Water Treatment Corporation has exceeded the projected life of water treatment plants, and is now in need of upgrading and renewal to ensure the continued delivery of sufficient high quality water to its customers.

The Corporation began planning a Plant Renewal Project which will augment or replace the existing water treatment processes and the physical plant in 2017 with the development and approval of a business case. The Project will: help to address the increasing challenges faced in treating the lake water; ensure the Plant can meet current and future regulatory requirements; ensure the long-term viability of the Buffalo Pound Water Treatment Plant; and, ensure a reliable supply of potable water long into the future.

By addressing aging infrastructure issues the Renewal project will fulfill the Corporation's mandate for generations to come.

The Plant is located approximately thirty kilometres northeast of the City of Moose Jaw, Saskatchewan, on Highway No. 301, seventeen kilometres north of the intersection with Highway No. 1.

MANDATE, MISSION, GOALS AND VALUES

MANDATE

The Corporation will reliably and efficiently provide safe, high quality and affordable drinking water to the Cities.

MISSION

To provide for the Cities of Regina and Moose Jaw, a reliable and affordable supply of safe, high-quality drinking water which meet the needs and expectations of consumers.

GOALS

- Treated water that meets the quality expectations of the citizens of Moose Jaw and Regina, as well as meeting, or exceeding, all government regulated parameters.
- Operational practices and controls that ensure a continuous and safely-treated supply of water within an environmentally-responsible and cost-efficient operation.
- Judicious monitoring of the treated water from the Plant to the end of the Cities' distribution systems. Appropriate monitoring of the water in Buffalo Pound Lake, the Upper Qu'Appelle River and Lake Diefenbaker to identify long-term trends and areas of concern to protect the water supply.
- Water quality research to identify possible chemical and microbiological contaminants and to test and implement the best available treatment technologies, thus ensuring that the Water Treatment Plant can meet current and future expectations for regulated parameters.

VALUES

Safety | Team Culture | Process Driven | Innovation
Continuous Improvement | Operational Excellence

VISION

Buffalo Pound Water (BPW) is an expertly operated, independent, and trusted entity, that will be positioned to provide sustainable and reliable water as a critical service for generations to come.

BUFFALO POUND WATER
BOARD OF DIRECTORS

The Buffalo Pound Water Board of Directors (the "Board") was created in 2016 by the Unanimous Membership Agreement (UMA), which replaced the previous Buffalo Pound Water Administration Board from 1951. The UMA is an Agreement between the Cities of Regina and Moose Jaw (the "Owners") and the Corporation.

The Board is responsible to oversee the management of the Buffalo Pound Water Treatment Corporation and to take reasonable steps to ensure the Plant achieves the objectives identified in the Cities of Moose Jaw and Regina Unanimous Membership Agreement.

The Board delegates responsibility of day to day operations of the Plant to the President & CEO of the Buffalo Pound Water Treatment Corporation.

Major areas of Board responsibility include: strategy and budgets; human resources (including the mandate for collective bargaining); risk management; financial information; system and internal controls; material commitments; monitoring and reporting; code of conduct and conflict of interest; communications; the corporation's material corporate policies; and board effectiveness.

The Board is accountable to the Cities of Regina and Moose Jaw and reports to the Cities on a semi-annual basis. The Board of Directors is currently made up of 7 members.

The Board typically meets 6 times per year or at the call of the Chair. During 2021, a total of 11 meetings were held by the Board. This included 6 regular Board Meetings; 2 Special Board Meetings; Board Retreat and the Annual General Meeting and Mid Year Meetings with the Cities of Regina and Moose Jaw. The Board members are provided with meeting material in advance. As a standing agenda item, the Board has the option to hold in-camera sessions without management present where all Board members can participate. Board members receive remuneration that is in line with the Provincial Crown Investments Corporation Tier 2 salary schedule.

BOARD TENURE

Board Member	Position	Term on Board
Dale Schoffer	Board Chair	July, 2016 – April 2022
Judy May	Board Member	July, 2016 – April, 2022
Dave Richards	Board Member	July, 2016 – April, 2024
Ben Boots	Board Member	April, 2017 – April, 2023
Daryl Posehn	Board Member	April, 2017 – April, 2023
Grant Ring	Board Member	April, 2018 – April, 2024
Patricia Warsaba	Board Member	April, 2020 – April, 2023

BOARD COMMITTEES

The Board of Directors has 4 Standing Committees; namely:

- Finance & Audit Committee, which is comprised of 3 Board members. This Committee regularly meets 1 week prior to the regular Board or at the call of the Committee Chair, as required.
- Capital Projects Committee, which is comprised of 3 Board members. This Committee regularly meets 4 times per year or at the call of the Committee Chair, as required.
- Human Resource Committee, which is comprised of 3 Board members. This Committee meets at the call of the Committee Chair, as required.
- Nominating Committee, which is comprised of 2 Board members. This Committee meets at the call of the Committee Chair, as required.

Dale Schoffer
Board Chair

Judy May
Board Member

Dave Richards
Board Member

Ben Boots
Board Member

Daryl Posehn
Board Member

Grant Ring
Board Member

Patricia Warsaba, Q.C.
Board Member

DALE SCHOFFER FCPA, FCA, C.DIR

BOARD CHAIR'S LETTER

On behalf of the Board, I am pleased to present the Buffalo Pound Water Treatment Corporation's (Corporation) 2021 Annual Report.

The COVID-19 pandemic continued throughout the year thus providing ongoing challenges for the Corporation. As in 2020, the staff and Management Team were diligent in promptly implementing evolving procedures and process changes required to meet or exceed all public health protocols in relation to COVID-19. I want to commend the Corporation's staff and Management Team for their ongoing commitment to providing a safe, clean, and reliable source of drinking water to more than 260,000 Saskatchewan consumers throughout the year and for their continued support to customers.

I am very pleased to report that despite the challenges posed by this extraordinary year, the Corporation was able to achieve a number of significant milestones in 2021.

The Board implemented an initiative on the board evaluation and reappointment process for current board members. The goal of the new approach was to streamline the reappointment process by including an internal evaluation component which was not a part of the original recruitment process. The modified Board Evaluation Process was reviewed and accepted by the Cities in April, 2021.

The Board and Management Team identified the need for an Environmental Strategic Plan that: establishes the environmentally conscious Vision, Mission and Values of the Corporation; sets strategic goals and priorities and develops supporting performance targets and operational tactics. The Environmental Strategic Plan was approved by the Board in June, 2021.

Significant work continued to be undertaken on the Plant Renewal Project which will ensure that Buffalo Pound Water Treatment Plant is a going concern for generations to come. In 2021, design reviews involving both the Joint Venture and Corporation teams continued to move the design development along. The Joint Venture team, with further collaboration with BPWTP staff, reached a preliminary GMP (Guaranteed Maximum Price) submission in November 2021. The submission is under review. The Board looks forward to the evolution of this Project in 2022.

As a Board, we continue to be guided by the Corporation's vision that we set, which is to be an expertly operated, independent, and trusted entity, that will be positioned to provide sustainable and reliable water as a critical service for generations to come. This vision is the basis for the Corporate strategic plan, which ensures the ongoing focus on capital investment, staffing, processes, financial stability, risk management and governance.

While 2021 remained challenging for the Corporation, it has also been a very successful one. The successes achieved by the Corporation this year are due entirely to the skilled, diligent, and dedicated staff of the organization, under the leadership of President & CEO Ryan Johnson and his Management Team. I want to say a special thank-you to each and every employee of the Corporation for their commitment to, and support of, the Corporation and the many consumers we serve.

Dale Schoffer, FCPA, FCA, C.Dir

RYAN JOHNSON CD, M.A.SC., P.ENG

PRESIDENT & CEO'S LETTER

On behalf of the Buffalo Pound Water Treatment Corporation's Management Team and staff, I am very pleased to present the 2021 Annual Report.

The COVID-19 pandemic continued to be the dominant news story in 2021. Staff persevered during the year to minimize the impact of COVID by having a 100% double vaccination rate with no staff contracting COVID during the year. Enhanced safety procedures and restrictions remained in place for third parties with the Corporation continuing to follow SHA orders. I want to thank the Buffalo Pound Water Management Team and Staff for their collective hard work and dedication to ensure that the Corporation met its regulatory requirements, mandate and objectives during these challenging conditions.

The Corporation as a critical and essential service, continued providing safe drinking water to over 260,000 people in Moose Jaw, Regina and the surrounding region, without incident. Throughout the year, the Plant met all regulatory requirements and criteria in the production of safe drinking water and the Corporation met its obligations under the Unanimous Membership Agreement and Mandate established by the Cities of Regina and Moose Jaw.

Issues experienced by the Plant were mainly due to loss of power, changes in raw water conditions and equipment failure. Regulatory concerns remain with the operations of the Plant's process waste ponds discharging higher levels of total suspended solids and chlorine residuals back into the environment than what is acceptable under the Permit to Operate. Short term adjustments continue to be made to processes and procedures to improve that operation. However, the Plant Renewal Project will satisfactorily address these deficiencies in the long term.

Operations at the Plant resulted in a surplus of $0.15 Million in 2021. Water sales generated $13.29 Million in revenue and expenses were $13.14 Million.

Revenues were $0.29 Million over budget and expenses were $0.14 over budget.

The Capital Budget started the year with $37.26 Million in reserves. Over the course of 2021, the Capital Water Rate generated $8.76 Million from water sales; grant funds received $4.46 Million; proceeds from the $60.00 Million loan and interest earned of $0.28 Million for a total of $73.51 Million. Capital Project expenditures totalled $20.21 Million.

The majority of focus in 2021 was placed on the Plant Renewal Project. The Plant Renewal Project will ensure the long-term viability of the Buffalo Pound Water Treatment Plant by:

- Ensuring a safe and secure water supply for the citizens of Regina and Moose Jaw
- Addressing the lack of redundancy in treatment processes
- Updating dated water treatment technologies used to increase efficiencies and effectiveness in treatment processes
- Mitigating risks related to the failure of treatment processes due to aging infrastructure
- Meeting Environmental Regulatory requirements such as process waste discharges
- Meeting Occupational Health & Safety and Hazardous Substance Storage Regulations requirements related to chlorine gas and storage
- Increasing capacity to meet future demands to the year 2050 for residential, commerical and industrial economic growth in the region serviced by the Corporation
- Enhanced Environmental Sustainability by:
  - Reducing the carbon footprint and building to LEED and Envision standards
  - Using energy efficient construction and retrofits with modern equipment
  - Using on site renewable solar energy with a target of 2 MW by 2027

The Project achieved several major milestones and will be ready for the final cost proposal in early 2022. If accepted, and financing is confirmed, construction can commence shortly thereafter.

Similar to 2021, the main focus for the Corporation, in 2022, will be the Plant Renewal Project as it continues to progress.

I would again like to express my gratitude to the Board of Directors for their continued insight and input they provide to ensure the Corporation is able to meet its mandate and mission as well as the staff for delivering on the Corporation's mandate.

I invite you to read this Annual Report to gain full appreciation of the accomplishments achieved by the Buffalo Pound Water Treatment Corporation in 2021.

Ryan Johnson, CD, M.A.Sc., P.Eng.

2021 - 2023
CORPORATE STRATEGIC PLAN

BUFFALO POUND WATER 2021 - 2023 STRATEGY MAP

MISSION (Why we exist)	To provide for the Cities of Regina and Moose Jaw, a reliable and affordable supply of safe, high-quality drinking water which meets the needs and expectations of consumers.
VALUES (How we operate)	SAFETY | TEAM CULTURE | PROCESS-DRIVEN | INNOVATION CONTINUOUS IMPROVEMENT | OPERATIONAL EXCELLENCE
VISION (Where we are going)	BPW is an expertly operated, independent, and trusted entity, that is positioned to provide sustainable and reliable water as a critical service for generations to come.
3 YEAR BUSINESS PLAN	By 2023, Plant Renewal construction is underway and environmental stewardship is an enhanced practice.

CORE SERVICES	**WATER QUALITY** Regulatory requirements and customer expectations met 100% of the time		**WATER QUANTITY** Meet customer demands 100% of the time	
KEY PROJECT (CPC)	**PLANT RENEWAL**	**DESIGN 2020 -2021** **FINANCING 2020 -2021**	**CONSTRUCTION 2021 - 2025**	**COMPLETE 2025**
PEOPLE	**SAFETY CULTURE** • Safety Management System Growth	**OPERATIONAL READINESS & EMPLOYEE DEVELOPMENT** • Internalize the Values • Succession Plan • Employee Training: ongoing improvement to maintain & operate plant	**RENEWAL COMMUNICATION & CHANGE** • External Communications • Internal Communications • Effective Change Management	**BOARD GOVERNANCE** • Bylaws & Policies • Board Education • Succession Plan
FINANCIAL & RISK MANAGEMENT	**FUNDING SOURCES** • Good Stewardship of Financial Position • Grants & Loans	**FINANCIAL OPERATING PERFORMANCE** • Budget Variance	**QMS MANAGEMENT** • Business Continuity • SOPs	**ASSET MANAGEMENT** • Risk-based Management • Environmental Stewardship

The Corporation's Strategic Plan for 2021 -2023 is above. The Plant's KPIs use targets that are set by the Board through the Strategic Plan's Balanced Scorecard. These are reviewed by the Board and the targets adjusted accordingly at the Annual Board Retreat.

All of the targets in the Strategic Plan were met at year end with the exception of:

(i) The Customer Service Agreements between the Corporation and Cities of Regina and Moose Jaw. It is anticipated the Agreements will be completed in 2022.

There have been no revisions to the Strategic Plan since its implementation in January, 2021.

THE YEAR IN REVIEW

Conceptual drawing of the renewed Plant.

WATER SOURCE

Water for Regina and Moose Jaw is taken from Buffalo Pound Lake, a shallow reservoir in the Qu'Appelle Valley which is a part of the Upper Qu'Appelle River. The lake is 29 km long, 1 km wide but has an average depth of only 3 metres. The surface area of Buffalo Pound Lake is 2900 hectares inferring it has a capacity of 90 million cubic metres at the "full supply level" of 509.3 metres above sea level. Water levels in Buffalo Pound Lake are controlled by the Saskatchewan Water Security Agency and maintained by the release of water from the Qu'Appelle Dam on Lake Diefenbaker. The mean annual water release from Lake Diefenbaker ranged from 1.8 to 5.3 m^3/sec in recent years. Rain, snow melt and flood waters from the Moose Jaw River have compromised water quality. The lake water is potentially affected by discharges from point sources (upstream cities) and non-point sources (agricultural and recreational).

Buffalo Pound Lake is generally free of industrial pollution but is naturally rich in nutrients (phosphate, nitrogen and dissolved organic carbon) which encourage the growth of phytoplankton (typically diatoms in the winter and green algae or cyanobacteria in the summer). Weed growth can also be extensive. Algae and weeds pose many treatment challenges such as high chemical demands and undesirable tastes or odours. The lake and watershed appear to also be impacted by ground waters and surface runoff infusing minerals.

PLANT TREATMENT

Raw water from Buffalo Pound Lake passes through a series of treatment stages designed to remove impurities such as algae, bacteria, clay particles and dissolved organic materials. The objective of this treatment is to produce water that is clear, colorless, odor free, aesthetically pleasing and safe to drink.

The treatment process consists of seven stages: chlorination, cascade de-gasification, coagulation/ flocculation, clarification, filtration, carbon adsorption and disinfection.

Lake water enters a pumping station located on the south east shore of Buffalo Pound Lake through two submerged intakes. Raw water is pumped to the Plant via two pipelines connecting the pumping station to the main treatment Plant. The pipelines are 1.05 and 1.35 metres in diameter, extend a distance of approximately 3,000 metres and rise 82 metres. After reaching the Plant, water is initially divided into two streams, each of which has cascade de-gasification, coagulation/flocculation and clarification. The streams are then recombined for the final stages of treatment, including filtration, carbon adsorption, disinfection through ultra violet radiation and chlorination.

Cascade operation is used to remove excessive dissolved gas levels in the raw lake water. Excessive dissolved gases are most commonly produced by photosynthetic cyanobacteria and algae. During cascade de-gasification, the water falls over a series of steps which releases excess dissolved gases and prevents the formation of gas bubbles in later treatment processes. Clarification and filtration processes could be impeded by gas bubbles that attach to particles of floc, causing them to float, rather than sink, and by causing air binding in the filters.

If conditions warrant, Powdered Activated Carbon (PAC) is added to reduce taste and odour. The use of PAC, while relatively infrequent, is occasionally necessary when granular activated carbon contactors are off-line or to temporarily reduce the odour loading when the contactors are on-line.

Coagulation and flocculation are the next steps in treatment. Aluminum sulphate (alum), for the summer season, and polyaluminum chloride (PACl), for the winter season, is vigorously mixed with the water. In the process of coagulation, the alum and PACl neutralize surface charges colloidal and dissolved organic particulate matter contained in the water which results in the formation of fluffy precipitate (floc) that entraps suspended materials such as algae and clay particles. The water is then stirred slowly in flocculation tanks to allow floc particles to become larger and denser prior to their removal.

The floc-bearing water then enters clarifiers, where most (more than 95%) of the floc with its entrapped impurities settles out by gravity while clear water is constantly removed from the top. Settled floc is removed from the bottom of the clarifiers as sludge and is pumped to holding lagoons where it is further separated into clear water (returned to the lake) and solid sludge (removed for disposal).

Any floc that was not removed by clarification is removed in the filtration stage. Water is passed through mixed-media filters consisting of a top layer of coarse anthracite followed by successive layers of fine silica sand, and even finer garnet sand. The floc that is trapped by the filters eventually accumulates and is removed by backwashing with clean water. The filtration step completes the removal of particulate impurities.

The removal of dissolved organic impurities, which are responsible for taste and odour, is accomplished next in the carbon adsorption stage of treatment. Large rectangular tanks (contactors) contain Granular Activated Carbon (GAC) to a depth of 3 metres. Water is lifted by Archimedes

screw pumps from the bottom of the filters and taken to the top of the contactors where it is allowed to flow by gravity down through the GAC. GAC contains many microscopic pores which adsorb dissolved organic impurities. Water is in contact with the GAC for 10 to 20 minutes, depending on flow rates, and emerges freed of the dissolved organic materials which cause objectionable taste and odour caused by cyanobacteria and algae. GAC filtration is normally in operation from May through December.

The final water treatment process has the water going to two stages of disinfection. The first stage is ultraviolet disinfection which inactivates protozoa. In the second stage, chlorine is added to inactivate bacteria and viruses.

All stages of water treatment are now essentially complete. Prior to delivery by pipeline to the consumers, chlorine levels are adjusted, if necessary, to provide adequate disinfection and to counteract any possible contamination encountered during its travel to the cities' reservoir and distribution systems. Water delivered to the City of Moose Jaw is also fluoridated during pumping.

The carbon used in the contactors retains its effectiveness for taste and odour reduction up to seven (7) months, after which time it must be regenerated or replaced. It was found to be cost effective as well as environmentally responsible to regenerate the spent GAC rather than to discard it and purchase new. Regeneration is accomplished by heating the spent GAC to 850°C in an oxygen-free atmosphere contained in a fluidized bed gas-fired furnace. Spent GAC is transferred by pipeline as a slurry from the contactors to the furnace, regenerated to process specifications, and returned to the contactors for reuse. Carbon regeneration is usually performed at the Plant from mid-November to mid-April.

RECOMMISSIONING OF RECYCLE

On September 15th, 2021, the recycle system originally installed in the 1980s was placed back into service. This was done to reduce process wastewater entering the environment from the Plant and reduce hydraulic loadings on the sludge lagoons. Backwash and filter to waste water from the mixed media filters and filter to waste water from GAC contactors make up the bulk of volume that enters the clean side section of the recycle system. This water is then pumped back into the raw water pipeline and is retreated. For the last quarter of 2021, process wastewater entering the environment has been reduced from 6.6% to 3.7% of total plant production volume.

An amended Permit to Operate was issued by WSA on September 7th, 2021 with defined requirements for recycle operation. The maximum volume of process wastewater that can be recycled cannot exceed 10% of total raw water flow. Quarterly testing for Giardia & Cryptosporidium and daily monitoring of turbidity must also be done.

ENVIRONMENTAL PROTECTION AND CONSERVATION

The Plant, like any large industrial facility, has the potential to affect the environment. The Plant has facilities in place to handle all process wastes including alum sludge, off gases from the carbon regeneration facility, laboratory wastes, various solid wastes generated by Plant operations, and sewage. The Plant uses a considerable quantity of electrical energy in its operation; conservation efforts give returns in the form of reduced demands on the environment and lower operating costs.

A series of sludge lagoons is used in the treatment of the alum sludge waste stream. This form of sludge management can be very effective in ensuring that the sludge is not released to the environment. Sludge is exposed to a natural freeze-thaw cycle that dewaters it to produce a nearly dry granular material which is transported to a landfill site. Buffalo Pound is one of the few water treatment plants in Canada with the ability to manage waste sludge in this manner.

The natural gas-fired furnace in the carbon regeneration facility produces off gases which are thoroughly scrubbed before released to the atmosphere.

Waste disposal agencies are contracted to handle laboratory wastes and solid wastes generated by the Plant. As it becomes necessary, firms specializing in hazardous waste disposal are contracted to dispose of chemical wastes.

The Plant recycles fiber-based materials and metals.

Sewage generated by the Plant is pumped to treatment and evaporation lagoons located on Plant property. The primary lagoon has a geotextile fabric and bentonitic clay liner to prevent seepage.

Due to the environmental impact of the Plant's operations, an Environmental Strategy was developed to consider the entire operation for future operational budgets to reduce the Corporation's impacts on the environment.

ENVIRONMENTAL STRATEGY MAP

VISION	As an essential service provider, BPW is committed to protecting the environment and public health through the provision of responsible potable water generation. We strive to exceed regulated standards, minimize our carbon footprint and stand as a leader in sustainable water treatment.
MISSION	BPW will minimize our carbon footprint and treatment process waste by optimizing plant operations, and land and water use. We are committed to innovation and continual improvement.
MANDATE	The corporation will reliably and efficiently provide safe, high quality and affordable drinking water to the Cities.

VALUES

Safety	Team Culture	Accountability	Process Driven	Innovation	Continuous Improvement
We are pro-active in our approach towards avoiding ecological contamination and environmental damage.	Through education, documentation, and engagement, we foster understanding and commitment from all staff to be environmentally sustainable.	We ensure proper, efficient & effective usage or resources to operate a sustainable entity with the environmental impacts considered.	We optimize plant processes to maximize water recycling, "right-size" lake water withdrawals, and minimize wastewater production.	We improve our environmental footprint through innovative designs that maximizes process effectiveness and utilize green technologies.	We improve environmental performance through effective measurement and development of KPIs.

GOAL	TARGET	TACTIC
Use 100% renewable power.	All electricity used in the plant, administration building, pumping stations and outbuildings come from carbon-free sources.	Utilize Solar Power and purchase SPC "Green" power to supplement demand.
Increase energy independence and decarbonize emergency backup systems through renewable and low-carbon energy sources.	Phase 1: Invest in 2.2 megawatt solar array providing up to 10% of total electricity needs of the entire plant. Phase 2: Double solar capacity 4.5 megawatts. Phase 3: Invest in battery storage and backup diesel generator bio-fuel conversion.	Seek opportunities for grants and utility provider incentives to fund expansion of on-site renewable energy production and storage. Identify mechanical, storage and cost requirements to convert back up diesel generators.
Develop resource conscious maintenance and operations program and procedures.	Ensure that equipment purchases are highly energy efficient, operate as efficiently as possible, and achieve expected useful life.	Purchase energy efficient equipment. Install energy monitoring system track usage and predict equipment failure. Maximize the service life of equipment providing replacement parts are still available. Recycle decommissioned equipment at the end of service life.
Minimize water content of sludge/solids disposal to landfill.	Water treatment process solid waster to contain less than 50% water content before diverting to landfill.	Stockpile sludge until the solids content exceeds 50%. Freezing of lagoon sludge in winter and adequate drying (draining/evaporation) in summer. Utilize new drying technologies and processes as they become commercially available.
Be recognized as a leader in low-carbon emissions and wastewater discharge.	Plant ranked above 50% of peers according to national benchmarking targets as set by nationalbenchmarking.com	Optimize use of renewable energy. Maximize water recycling process in design of new plant to minimized wastewater discharge. Continual technical process improvements for water recycling controls.
Encourage public engagement and education about sustainable water management and resource conservation.	Develop public training, education, and promotion programs.	Work with municipal stakeholders to encourage promotion of the plant's sustainable operations through civic communications and inclusion of plant performance in Annual Reports. Collaborate with local school boards to develop a program that would be beneficial to their students. Engage with universities on research, training, internship and education opportunities. Promote public education through news releases, web content and public tours of the plant.

STRATEGIC ENVIRONMENTAL PLAN

The Board and Management Team identified the need for an Environmental Strategic Plan that: establishes the environmentally conscious Vision, Mission and Values of the Corporation; sets strategic goals and priorities and develops supporting performance targets and operational tactics.

In 2020, Praxis Consulting was commissioned to undertake the preparation of the Plan to facilitate the Management Team in developing a strategy for the Board's consideration.

The intent was to develop a Plan to supplement the Board's 2021-2023 Strategic Plan and guide the Corporation relating to its operational and capital investment decisions.

The Strategy Map echoes the Corporation's Strategic Map acknowledging that these documents are supplemental to one another. The Plan is broken out into 6 Goals with associated targets and tactics being utilized in achieving those goals. As with all plans, it is a living document and will be adjusted over time, as required, and will be reviewed quarterly by the Management Team and annually by the Board.

The eVision and eMission are consistent with the Corporation's Strategic Plan and the eValues are similar but have been expanded upon relating to the environment. The 6 Goals with their associated Targets and Tactics are:

1. Design, build and operate the new administration building to achieve a net zero electrical energy balance.
2. Invest in increasing energy resiliency and use of renewable electricity.
3. Develop resource conscious maintenance and operations program and procedures.
4. Minimize water content of sludge/solids disposal to the landfill.
5. Be recognized as a leader in low-carbon emissions and wastewater discharge.
6. Encourage public engagement and education about sustainable water management and resource conservation.

The Corporation approved the BPWTC Environmental Sustainability Plan in June, 2021.

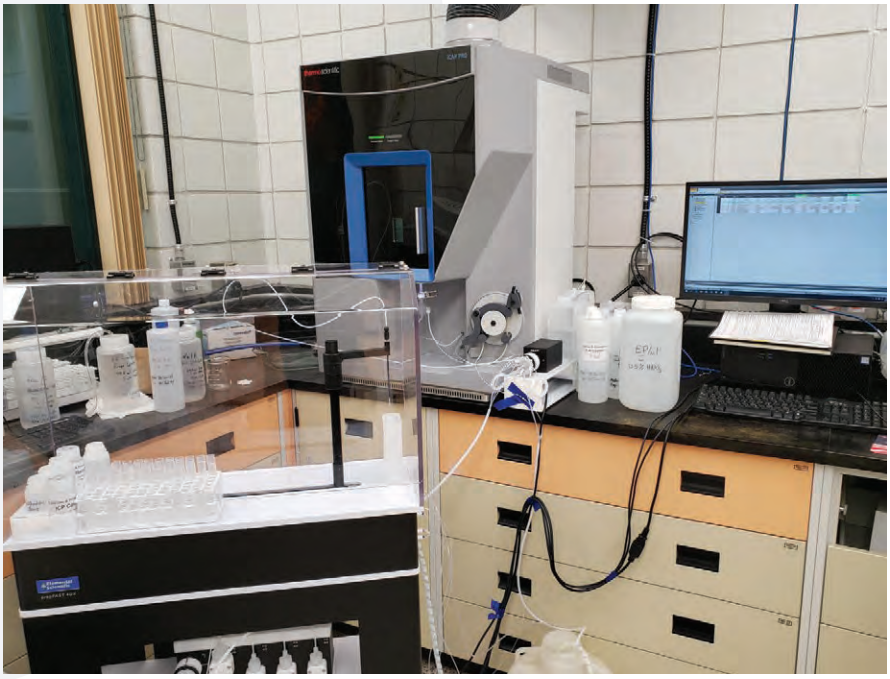
WATER QUALITY MONITORING

A well-equipped accredited laboratory is located on site and used to monitor the quality of raw and treated water as well as water quality at several intermediate steps in the treatment process. Major process control parameters (turbidity, pH, chlorine residual, particle counts, dissolved oxygen and temperature) are monitored continuously by instrumentation communicating with the Plant process computer system. Analyses are performed in-house for parameters regulated on a daily to monthly schedule; for other parameters required less frequently (most trace-level organics and metals) samples are sent to commercial laboratories. Analytical results are compared to Canadian Federal guidelines and to Water Security Agency objectives.

Analyses for a wide variety of physical, chemical, and microbiological parameters are performed in the Buffalo Pound Laboratory. Some 65 different constituents are routinely determined. The 2021 clearwell and raw water analytical results are summarized in Appendix 1. Further details on raw water and watershed quality monitoring can be found in the section "ADDITIONAL WATER QUALITY MONITORING". Over the course of the year, those analyses exceeded 4,000 in number.

The quality of the regenerated granular activated carbon is monitored by Plant staff for a variety of physical and chemical parameters.

A vigorous in-house quality control program is maintained to ensure data generated by the Plant Laboratory is valid. The laboratory is accredited by the Canadian Association for Laboratory Accreditation (CALA) to ISO/IEC 17025 for 23 chemical and 6 bacteriological parameters.



PLANT OPERATIONS AND MAINTENANCE

WATER PRODUCTION AND SALES

Water Production and sales (in megalitres) were as shown in Table 1. (See also related Graphs 1 and 2.) Total sales to the Cities in 2021 were 29,618.54 ML to Regina and 5,143.84 ML to Moose Jaw. Sales to Regina increased 0.22% from 2020 and sales to Moose Jaw increased 1.17%.

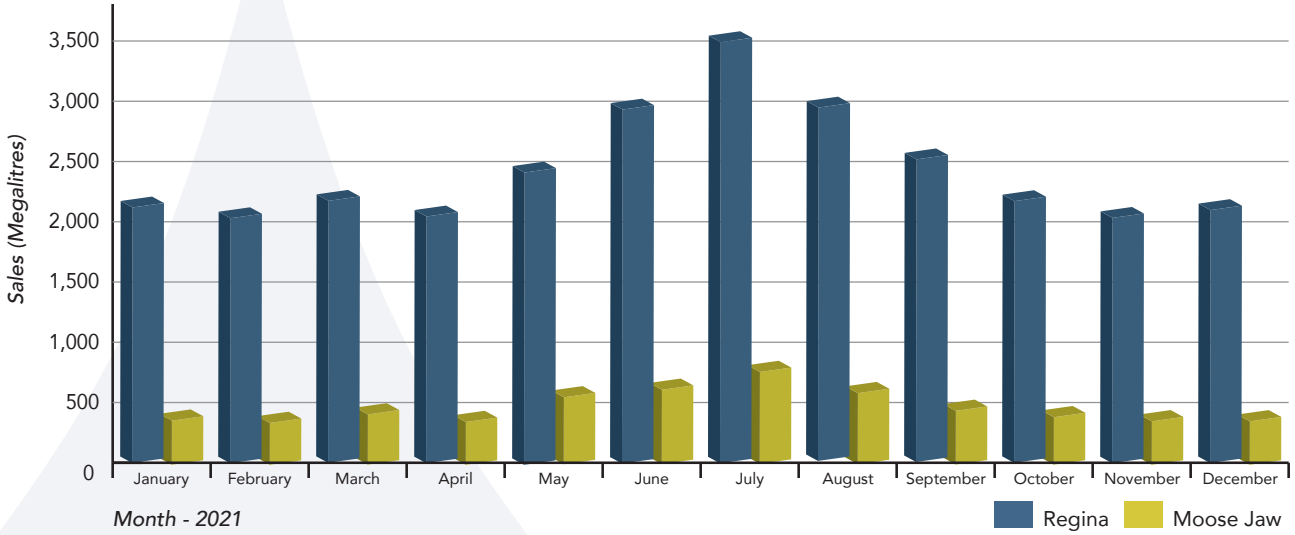
Sales to SaskWater Corporation in 2021 decreased by 1.10%, to 219.11 ML. Sales to SaskWater represent less than one percent of the Plant's production.

Graph 3 shows annual water production by year since the Plant began operation in 1955.

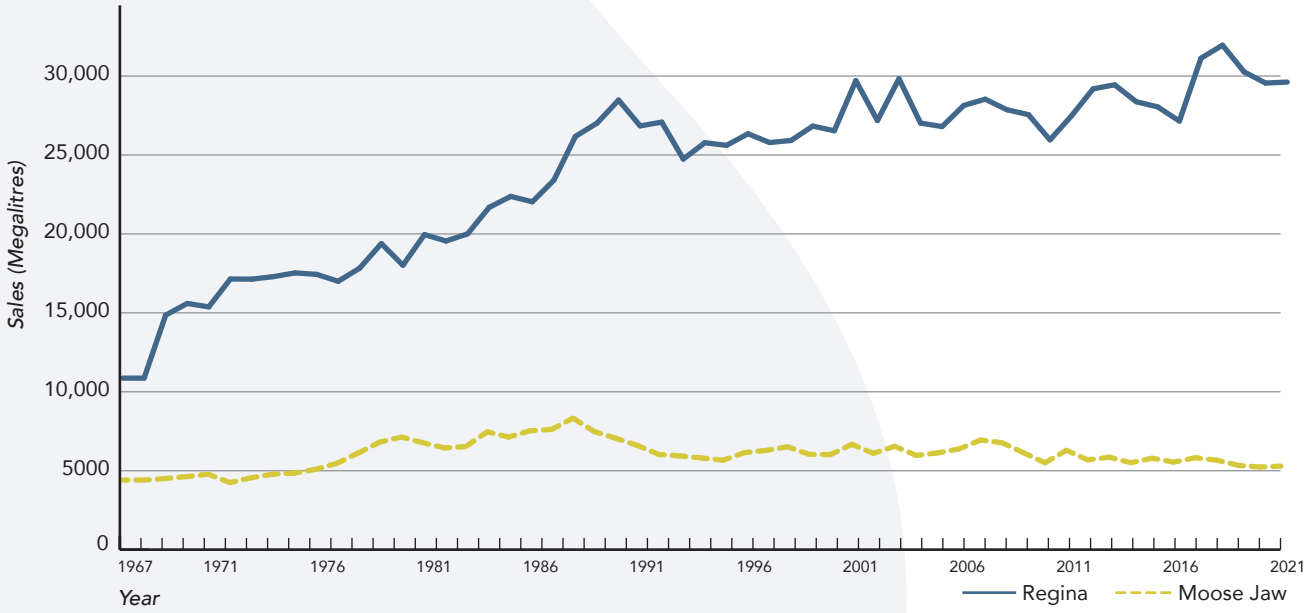
TABLE 1 • 2021 WATER SALES (TREATED) IN MEGALITRES (ML)

MONTH	REGINA	MOOSE JAW	SASK WATER CORP.	TOTAL
January	2168.93	337.91	15.20	2522.04
February	2079.50	320.76	14.87	2415.13
March	2224.22	384.76	16.68	2625.66
April	2093.90	327.71	18.37	2439.98
May	2481.57	513.30	22.74	3017.61
June	3005.58	569.96	23.25	3598.79
July	3544.84	703.71	25.45	4274.00
August	2999.95	544.55	19.63	3564.13
September	2568.95	411.67	16.55	2997.17
October	2221.57	363.83	15.80	2601.20
November	2082.26	332.74	15.04	2430.04
December	2147.26	332.95	15.53	2495.74
	29618.52	5143.85	219.11	34981.49

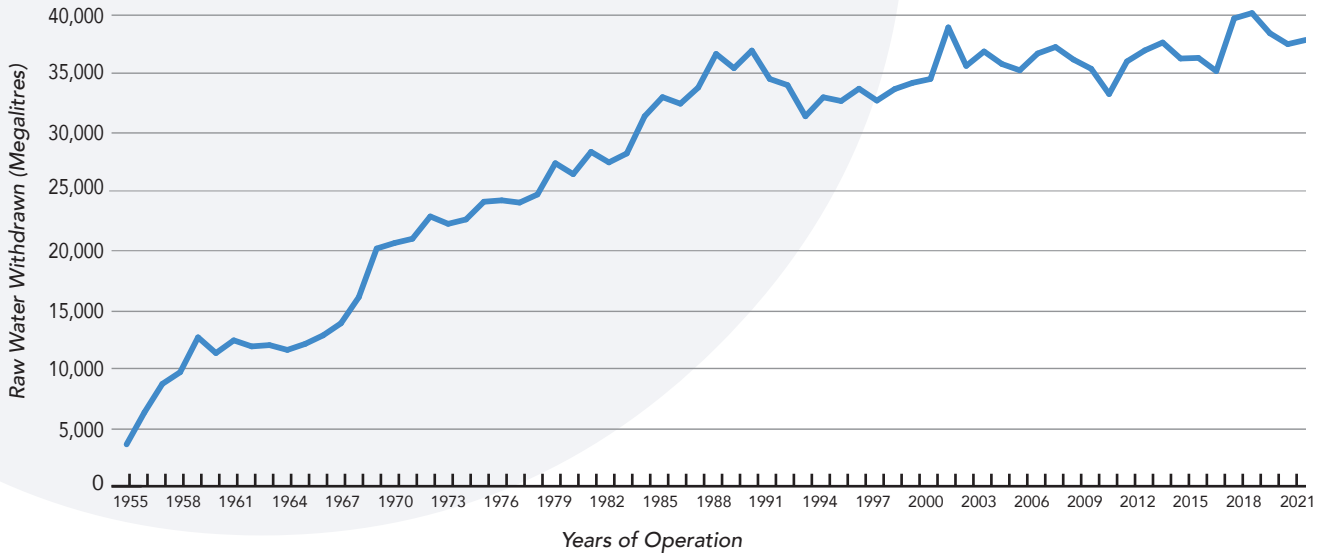
GRAPH 1 • 2021 WATER SALES TO REGINA AND MOOSE JAW (MEGALITRES)



GRAPH 2 • ANNUAL POTABLE WATER SALES TO REGINA & MOOSE JAW 1967 - 2021



GRAPH 3 • ANNUAL RAW WATER WITHDRAWN FROM BUFFALO POUND LAKE 1955 - 2021



PLANT OPERATIONS

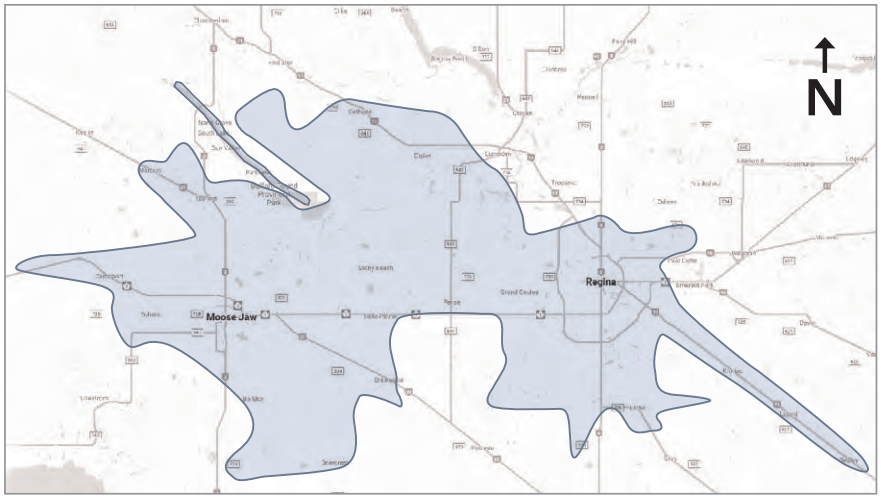
The processes employed at the Plant are modified during the year as required by changing water quality in Buffalo Pound Lake. Ice came off of Buffalo Pound Lake on April 9th. The lake froze over November 17th.

Since 2015, lake water quality continued to improve in terms of mineral content as measured by Total Dissolved Solids (TDS). Dissolved organic carbon (DOC) has also decreased but has stabilized for the past three years. 2015 had some of the highest concentrations of organics and minerals in the history of Buffalo Pound Lake. A full discussion of lake water quality can be found in the section "ADDITIONAL WATER QUALITY MONITORING".

The reduction in lake DOC concentration since 2015 combined with periodic elimination of prechlorination over the past two years, has resulted in a continued reduction in the production of trihalomethanes (THMs) in the treated water. In 2021, the Plant's clearwell THM concentration averaged 23 µg/L as compared to 78 µg/L annual average in 2015. A discussion of efforts to reduce trihalomethanes by the elimination of prechlorination can be found at "APPLIED RESEARCH, Process Development – TTHM Reduction".

The granular activated carbon contactors (GAC) were put into operation May 19th & 20th. They remained in service until December 20th, 2021.

Cold water temperatures bring about different problems for water treatment. The kinetics of alum coagulation is much slower in cold water and so the Plant used a Polyaluminum Chloride (CPAC-180) coagulant from January 1st to February 28th. Polyaluminum Chloride forms a better floc that settles and filters more effectively than alum. However, a long term accumulation of CPAC-180 precipitate within its pump



Buffalo Pound Regional Water System Service Area
A map representing the Region where over 260,000 people obtain their potable water from the Buffalo Pound Water Treatment Plant.

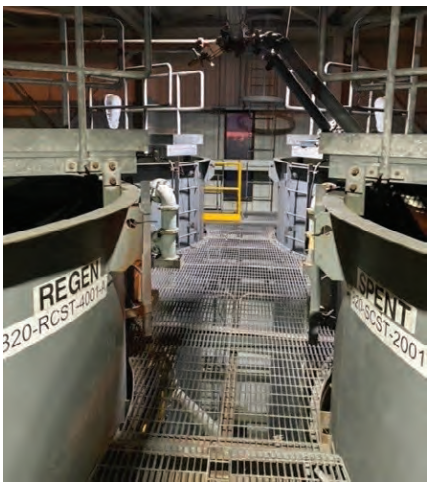
reservoir reduced the coagulant's pumping capacity and as a result, alum was used exclusively until May 4th. On May 4th, CPAC-180 was returned to service in Train A while alum remained treating Train B until year end.

Another benefit of Polyaluminum Chloride use is that the finished water is of higher pH and so is less corrosive. The Plant Renewal Project will include a pH adjustment process that adds sodium hydroxide (NaOH) to increase the pH of the water leaving the plant. However, sodium hydroxide addition is expensive and could potentially add over $1M to annual operational costs. In addition, CPAC-180 has not been tested for performance to produce high quality water at full scale in warm water conditions nor during cyanobacterial blooms. From May 4th through October 31st, a full-scale study was done comparing alum and CPAC-180 in warm water (>10°C). The most important objectives of the study were 1) to compare treatment effectiveness and quality of water produced and 2) estimate the amount and cost of sodium hydroxide required to obtain noncorrosive potable water. The study concluded that CPAC-180 produces comparable water quality as alum but requires substantially less sodium hydroxide to obtain a non-corrosive higher pH. Details of the study are in section "Process Development – Using CPAC-180 (Polyaluminum Chloride) to Reduce Future Treatment Costs".

A cationic polymer was added as a flocculent aid at doses that ranged 0.05 – 0.15 mg/L. This treatment is done to strengthen floc interbridging and resist zones of high shear within treatment equipment and clarifier short-circuiting.

There were no production events that impacted the Corporation's ability to meet the Owners' demands.

The peak day of demand was 172.0 ML on June 5th.



CARBON REGENERATION FACILITY

The carbon is regenerated during the winter so that it can be used to remove taste and odour from the water the following summer. The 2020/2021 regeneration season was from November 17th, 2020 to March 23rd, 2021. The 2021/2022 regeneration season commenced November 17th, 2021.

PROCESS WASTEWATER FACILITY

The clarifier underflow removes particulate matter (alum sludge) from the raw water. The effluent stream is directed to sludge lagoons where the sludge is deposited and the clear water overflow returns to Buffalo Pound Lake. The sludge from the stockpile location was removed to the Moose Jaw landfill. The sludge from the lagoon was excavated to the stockpile location.

MAINTENANCE AND CAPITAL PROJECTS

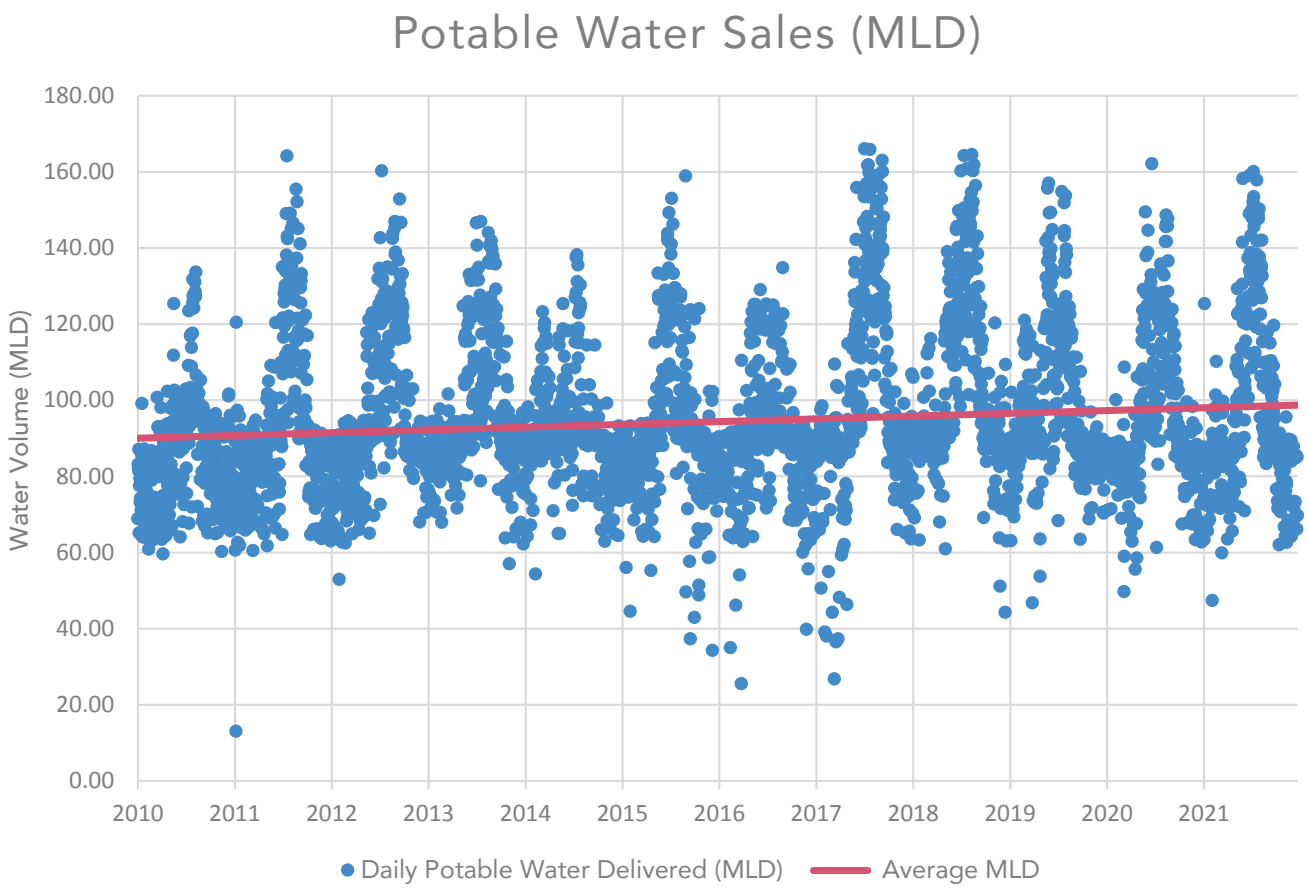
Effective maintenance plays a key role in keeping the Plant running efficiently and producing high quality water. All vessels are drained, cleaned and inspected at least annually. All critical Plant equipment is inspected, tested and maintained at least annually to help ensure satisfactory operation during peak flow demands. All water quality monitoring instruments are checked or calibrated in accordance with the Board's Quality Assurance/ Quality Control Policy. The results from major on-line instruments are compared to laboratory instruments.

PLANT CAPACITY

The Buffalo Pound Water Treatment Plant (BPWTP) distributes water to the City of Regina, the City of Moose Jaw, SaskWater, Buffalo Pound Provincial Park and the Buffalo Pound Water Treatment Plant Truck Fill. The Plant Demand is the total water taken by these users, though it is largely the volume sent to the City of Regina and the City of Moose Jaw. SaskWater, Buffalo Pound Provincial Park and the Buffalo Pound Water Treatment Plant Truck Fill currently represent only a very small portion of total flow – less than one percent.

Water treatment plants are rated based on two primary measurements of Plant Capacity: Large facilities, such as BPWTP, measure these in megalitres per day, or MLD. Firm Capacity is the maximum capacity of the smallest process operation and does not include the use of any redundant/ backup equipment. Redundant/ backup equipment replaces the capacity of main equipment when the equipment is being serviced. Total Capacity is equal to the Firm Capacity plus any additional capacity that can be added if redundant/backup equipment is activated while the main equipment is also in operation (this is not available in the current plant operation).

A review done on an equipment-by-equipment basis of the existing plant arrived at the current Buffalo Pound Water Treatment Plant Capacity of 205 ML/d (Firm and Total are the same with current operations). With the Plant Renewal Project, the plant design will increase the Firm Capacity to 220 MLD and the Total Capacity to 250 MLD and will also improve the water treatment technologies



targeted specifically to deal with the known and anticipated treatment requirements of Buffalo Pound Lake.

As the Potable Water Sales graph shows, the daily average flows increase considerably throughout the spring and summer months and decrease during the fall and winter periods. Overall, as an annual average, the current water demand has been increasing slightly, at a rate of about 1 MLD per day per year. While it seems to show that there is considerable excess capacity, daily average flows do not show peak demand requirements within the day, or the daily fluctuations of plant operations. Thankfully, these diurnal fluctuations are mitigated using large water reservoirs within each city to provide an equalization volume, or buffer. The equalization volumes available in these systems allow daily average flows to be reasonable indicators of Plant Capacity.

As population increases and water demand from regional industrial users grow, the daily capacity will be increasingly utilized, requiring the plant capacity growth targeted in the Plant Renewal Project. Even so, efforts of each City and their respective water use and conservation strategies will continue to be important factors for long term operational stability.

CAPITAL PROJECTS

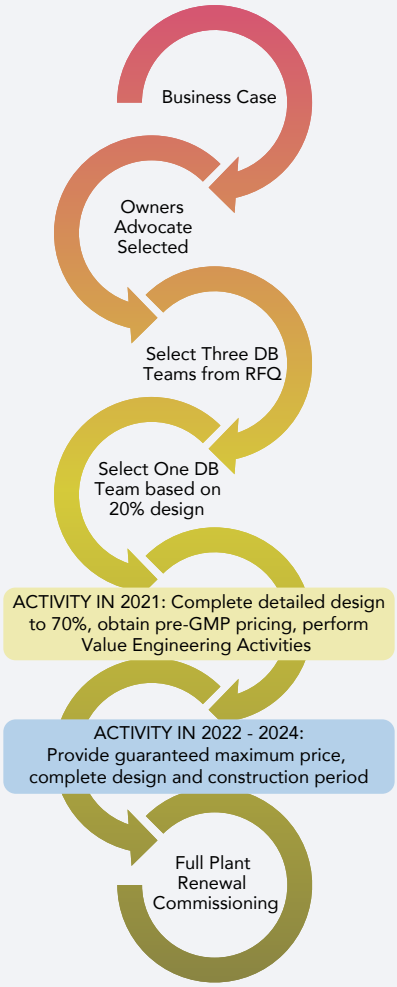
Capital Projects are infrastructure projects that increase capacity, improve performance, or renew the life cycle of an asset or group of assets. These projects are typically undertaken when the scope cannot be performed with internal staffing and resources. For the most part, the recent and current capital projects are interrelated in their focus towards a complete plant renewal. The Board of Directors maintains a committee to oversee these Capital Projects at the portfolio level. In 2021, the Capital Project Committee oversaw the progress of detailed design for the Plant Renewal Project, DCS Controls Upgrade and UV Corrective Actions. The Committee also monitored the final construction works involving new pump installation for the Lake Pump Station Renewal and activities with several smaller capital projects.

PLANT RENEWAL PROJECT

Over the past decade, external engineering assessments and analysis have identified a growing body of risks and costs to maintain the existing water treatment plant. The identified list of needs has been tackled through some significant additions and renewals in areas of the plant near the front or back end of the process – installation of UV treatment area, addition of backup power generators, renewal of supply water Lake Pump Station, and replacement of electrical power

supply power lines and substations (for both main plant and Lake Pump Station). The City of Moose Jaw also renewed their distribution pump system located at Buffalo Pound during this time. Now, however, the principal treatment facility and support service areas (especially maintenance, laboratory, and equipment storage areas) are nearing the end of their useful life or do not meet the needs and must be renewed and/or expanded sufficiently to meet requirements for the next 25 years. Doing this work in smaller packages was not cost effective when compared to a full facility renewal, so the Plant Renewal Project was initiated.

Plant Renewal Project Process



The Corporation applied the completed Business Case provided by CH2M Hill Canada Ltd. (CH2M) (now Jacobs) to identify approximate costs for the renewal project and proceeded with the recommended Progressive Design Build (PDB) procurement method, allowing the market to identify the best renewal options. Jacobs (with KGS and Carollo) was retained to provide technical consulting services as the Owner's Advocate to oversee procurement of the PDB team, assist the Corporation in overseeing the design, construction, and commissioning of the Plant Renewal, and to perform several preparatory activities necessary to obtain grant funding and align the renewal project goals with long term facility needs and requirements. This work has been progressed by an integrated team of Corporation staff with the Owner's Advocate and supported by a Legal Advisor (Aird & Berlis) and Fairness Advisor (RFP Solutions).

The Graham-Aecon Joint Venture Team was the successful Progressive Design Build proponent with their predesign proposal. The designers on this team are Stantec and Associated Engineering. They were provided with a notice to proceed with engineering design in June 2020 and were able to proceed to their final Preliminary Design Report (PDR) in late December 2020. BPWTC provided the funds to fully cover the design development and advisory support requirements for a total of $30.0M.

The proposal's main efforts increased overall treatment capacity, add redundancy increased capacity of the plant process waste treatment, and changed the older style clarification process to the more robust DAF clarification. In addition, it added ozonation, changed the GAC filters into BAC filters, provided a new administration building for maintenance, equipment storage, laboratory, offices, and related personnel requirements, and provided a general renewal of the remaining plant processes.

From the beginning of 2021, design reviews involving both the joint venture and BPWTC teams continued to move the design development to the Initial Design Development (IDD) stage. The design team progressed the design and updated pricing at this submission in early March 2021. Once we had the IDD package, the first Value Engineering (VE) process was initiated. The VE process adjusted the design to maintain the critical components and eliminated some costly 'nice to have' elements. With these design changes, the Joint Venture team further progressed design in collaboration with BPWTP staff to reach a preliminary GMP (Guaranteed Maximum Price) submission in November 2021. At each of these steps more detailed design work and a correspondingly tighter cost certainty was provided. As 2021 ended, a final VE process was undertaken between the Corporation and the Graham-Aecon Joint Venture teams in which additional subtrades have become involved to find innovative designs with improved costs.

The final GMP submission, along with the Construction Services Proposal, should be provided in March 2022. Before this arrives, current work continues to address finer details on the design and to progress early procurement opportunities so that construction can proceed smoothly when it begins. The Corporation could accept the GMP and commence construction, or the Corporation can reject the GMP and complete the project as a Design Bid Build. If the GMP and Construction Services Proposal is accepted, construction activities are anticipated to commence summer, 2022.

This project has sought substantial grant funding through the Federal and Provincial Governments since the start of the Progressive Design Build Process and has been fortunate to receive ICIP (Investing

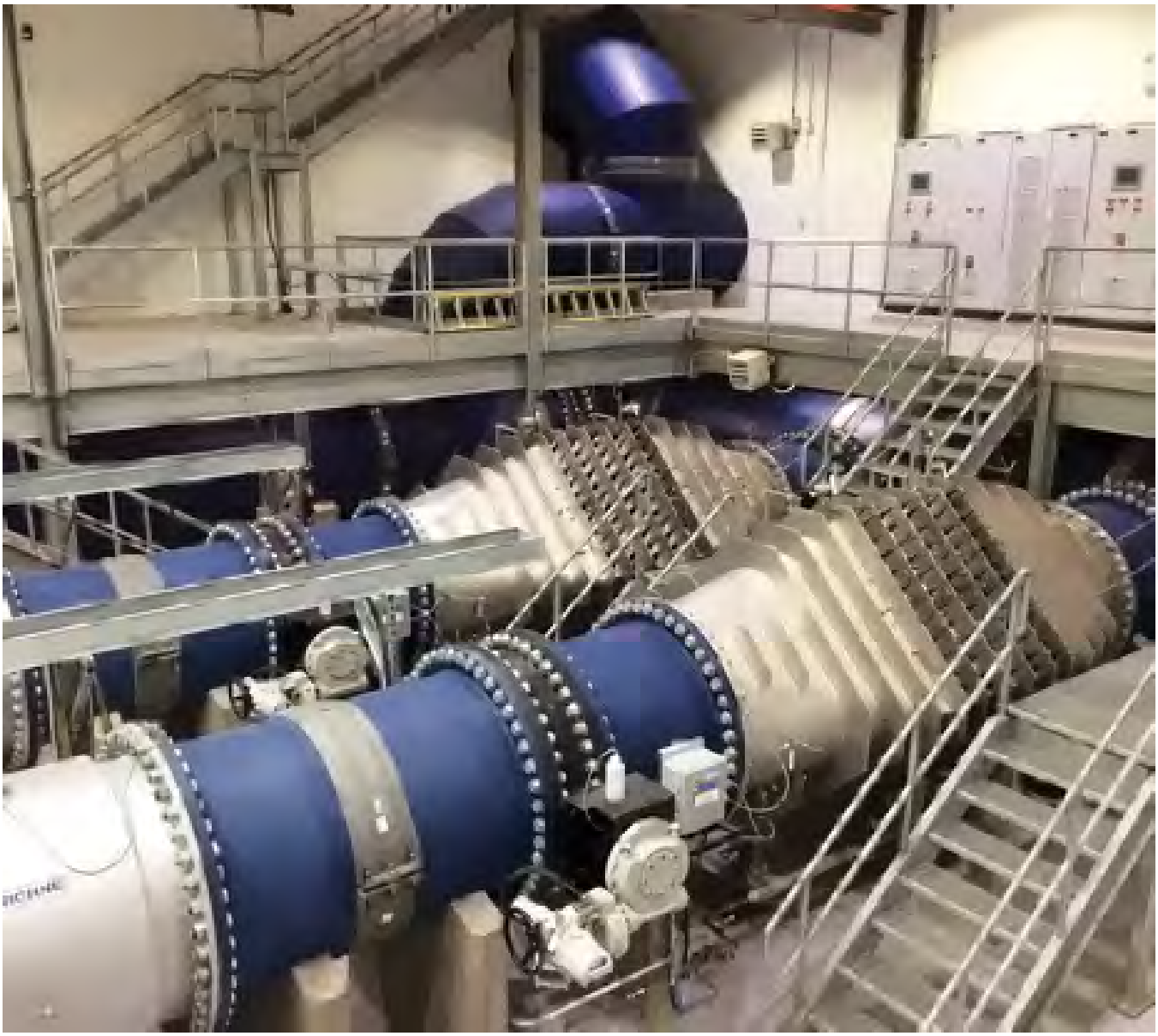
in Canada Infrastructure Program). This was announced in 2021 for a total government grant (Federal and Provincial) of $163.4M. This funding requires BPWTC to cover at least $60.0M in additional funds, which has been confirmed through a loan supported by both Regina and Moose Jaw.

CONTROL SYSTEM UPGRADE

The Equipment Supply procurement process for the Control System Upgrade Project was started in 2019, with Spartan-Lakeside Controls competitively selected and the contract signed in June 2020. The Equipment Supply procurement will be novated to the Plant Renewal Project and will be designed to match the needs of the final plant design. This was a change from the initial idea of installing a new control system in advance of the upgrade and will more easily be incorporated into the new plant design and construction. Considerable design work involving both SNC Lavalin (original project) and Stantec (Plant Renewal Project) has taken place throughout 2021, with a common design standard and method. The installation of this system will be completed through the Plant Renewal Project contractors. The existing control system has been assessed and adjusted to allow it to continue functioning until the new DCS system is implemented with Plant Renewal.

UV CORRECTIVE ACTIONS

After the original UV Facility work was completed, numerous deficiencies left by an under performing contractor remained to form an additional small capital project. These items were carefully reviewed with many of the items covered by the scope of the Plant Renewal Project and the general facility renewal. Of the items remaining, a RFP was issued late in 2021 with the successful proponent being selected - Westridge



Construction. About half of the work addresses small building components such as floors, walls, and railings with minimal work on process items. The other half of the work is to install an UPS system that will allow short power failures (until our backup generators kick in) to have no effect on the functioning of the UV reactors and allow 100% treatment. This work will occur early in 2022. Some of the work is necessary for the new plant renewal design (the UPS is sized sufficiently to provide backup power for the new control system). It is expected this work will be completed in the summer of 2022.

LAKE PUMP STATION RENEWAL

The Lake Pump Station Renewal construction contract was awarded to Westridge Construction in February 2019 with site work starting in April 2019. A significant portion of the work for this project was completed before 2021, with the major components being upgrades to the pumping system. In part due to the impact of COVID-19 to supply chains, this project has seen several delays, but the system is now largely operational with only the backup pumping system remaining to be commissioned early in 2022. Through the construction in 2021, additional system improvements to the pump area air conditioning system, improvements to the generator air intake system, and improved raw water intake valve controls have been identified. This work will continue in 2022 but will not interfere with the Plant Renewal Project as the work is in an area outside the work zone.

GREEN ENERGY UTILIZATION AND CONSERVATION

Additional to the Plant Renewal Project, there has been an effort made to improve the energy usage footprint of the water plant. Due to the significant water volume being moved and treated and sent to customers in Regina and Moose Jaw, electricity usage is considerable. To improve the facility's green footprint, several actions have been taken. As part of the Plant Renewal Project, the administration building area will have LEED building requirements incorporated in the design. In the process area, there is an increased capacity to reduce waste stream water through a recycle system that will reduce the flow of water heading to our treatment lagoons. To manage the electrical load, the Corporation is looking to add solar panels on the existing BPWTP property that should provide at least 10% of the power requirements. In the future, the Corporation will continue working with SaskPower to support their efforts to develop electrical generation that is greener than current operations.

PLANT SAFETY

The Safety Management System (SMS) continued to maintain its Certificate of Recognition (COR) and functioned effectively within the organization. The COVID 19 pandemic continued to have an influence on all Plant functions including how the SMS would operate. The Buffalo Pound Water Treatment Corporation developed an effective communication strategy to ensure that all staff remained informed. Many enhanced measures were established to protect the staff's health which allowed the Corporation to go through 2021 with no major disruption from the pandemic. The staff of the Buffalo Pound Water Treatment Corporation did an excellent job in mitigating the risk posed by the pandemic.

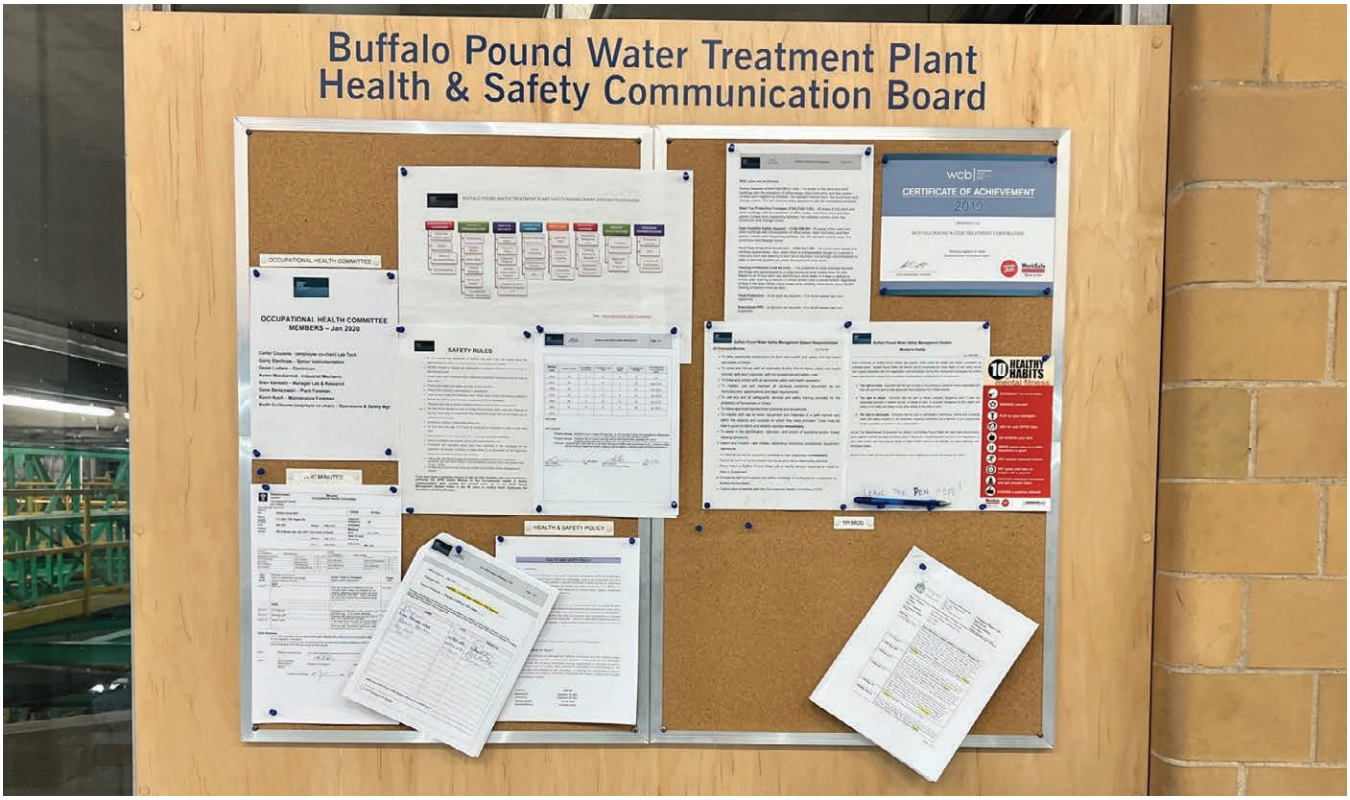
The Occupational Health Committee met five times through 2021 and is functioning well; meeting approximately every 10 weeks.

The Corporation continued to have Weekly Tool Box meetings either in person or electronically depending on the state of the pandemic. In total, 48 weekly meetings were held covering various safety topics and challenges within the Corporation.

In person bi-monthly staff meetings continued to be suspended in 2021. Communication and connection with the staff in 2021 continued primarily through electronic means and through the use of the monthly use of the EZine staff newsletter.

The Safety Association of Saskatchewan Manufacturers (SASM) remained the safety association with whom the Corporation has an active membership. This membership provides the Corporation with valuable training, resources and guidance in the continued development of the Safety Management System. The internal audit for 2021 was completed and submitted on time. The required external audit to maintain certification for 2021 was given a 1-year extension by SASM due to the pandemic and will take place in the spring of 2022.

The Corporation reported 0 lost time incidents, 0 near misses and 3 no lost time incidents (2 property damage and 1 first aid incident). All 3 incidents followed the SMS Incident Investigation Procedure and corrective action was implemented.



RISK REVIEW

The Corporation operates within a complex environment and is exposed to a variety of risks that can impact the ability of the Plant to achieve its mandate. The Corporation's Board and Management Team manages risk through a formal risk management framework. The Corporation's risk management framework is designed to address the top business and asset risks that could arise from internal and external sources.

The Corporation implements the risk management framework through a risk management process to identify, analyze, evaluate and treat risk. The Management Team is responsible for identifying, analyzing and evaluating risks. The Board is responsible for reviewing the top risks and determining if the appropriate controls and mitigations are in place and evaluating the effectiveness of the risk management framework.

The Corporation risk assessment process considers the entire system from the source water to the customer boundary. The following is a description of the types of risks the Corporation manages.

Aging Infrastructure

Since the Plant was first constructed and started operating in 1955 there have been combinations of expansions and upgrades. As the Plant and infrastructure age, there is a risk of increased failure that could cause service impacts, compromise regulatory compliance or increase operations and maintenance costs.

Regulatory Changes

The supply of drinking water requires strict compliance with health, safety and environmental regulations. Federal and Provincial regulators continually review and update regulations and there is a potential for changes in regulations to require investment in new or upgrades to existing infrastructure and increase operation and maintenance costs.

Third Party Influences

Damages or other negative influences are a consistent source of risk for water supply organizations. A power supply interruption, damages to infrastructure and contamination of the watershed could cause service impacts, compromise regulatory compliance or increase operations and maintenance costs.

Climate and Weather

Extreme and even more modest changes in climate and weather conditions are potential sources of risk. An increase in frequency or intensity of such events could cause service impacts, compromise regulatory compliance, increase investment in infrastructure resiliency, or increase in operations and maintenance costs.

General Business

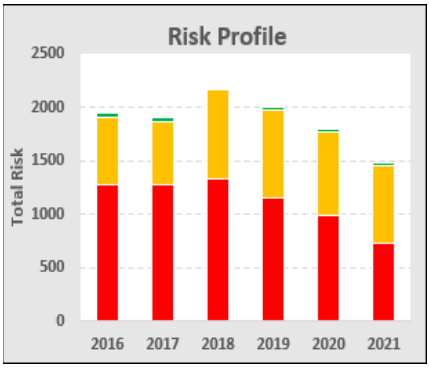
There are several types of risks that could arise that the Corporation views as part of its general business. These include, general economic conditions, human resource management, reputation, purchasing and information systems. While the cause and impacts for each are different, there is the potential for any of these risks to have financial and non-financial impacts on the Corporation.

In addressing risks that arise, the Corporation uses several strategies that include:

- Capital Investments
- Operations Procedures
- Enhanced Maintenance
- Emergency Response Plans
- Communication with Third Parties
- Transfer of Risk

For 2021, there were 36 active risks. However, many of these risks will be mitigated through the Board's actions relating to Capital Investment; Operational Procedures, Enhanced Maintenance, Emergency Response Plans, Communications and Risk Transference.

The Risk Profile decreased from 1802 in 2020 to 1485 in 2021. The decrease is mainly from the mitigation of high profile risks related to the electrical system vulnerabilities.



ASSET MANAGEMENT

Asset management is the coordinated activities of an organization to achieve its strategic objectives using robust decision-making processes that balance cost, opportunities, and risks with the desired performance of assets throughout the procurement, operation, maintenance, and disposal phases of the life cycle. In 2021, the Corporation formalized its Asset Management Policy, Framework and the Road Map. The Asset management strategy was developed using principles of ISO 55000 standard and will ensure that BPWTP realizes value from its new assets, which will be implemented as part of Plant renewal project, and continue delivering on its mission of reliable, affordable and high-quality drinking water to its customers. When considered as part of the Corporation's wider strategic framework, the Asset Management Policy and Strategy align with and directly support successful delivery of the Vision, Mission, Values and Objectives.

From a level of service perspective, a key focus for the Corporation is Water Quality and Water Quantity performance. This is currently tracked and reported in the Corporate balanced scorecard.

ASSET MANAGEMENT STRATEGIC FRAMEWORK

VISION

BPW is an expertly operated, independent and trusted entity, that will be positioned to proved sustainable and reliable water as critical service for generations to come

MISSION

To provide a reliable and affordable supply of safe, high quality drinking water which meets the needs and expectations of consumers for the cities of Regina and Moose Jaw.

VALUES

- SAFETY
- TEAM CULTURE
- ACCOUNTABILITY
- PROCESS DRIVEN
- INNOVATION CONTINUAL IMPROVEMENT
- OPERATIONAL EXCELLENCE

ASSET MANAGEMENT POLICY

- Customer Focused
- Compliant
- Systemic
- Cost Effective
- Collaborative
- Risk Based
- Capable
- Knowledgeable
- Sustainable
- Continually Improving

ASSET MANAGEMENT STRATEGY

Strategy & Planning | Decision Making | Life Cycle Delivery | Risk & Review | Asset Information | Organization & People

ASSET MANAGEMENT OBJECTIVES (LEVELS OF SERVICE)

NATIONAL WATER AND WASTEWATER BENCHMARKING INITIATIVE (NWWBI)

The NWWBI is the national standard for Canadian water, wastewater and storm water utilities to benchmark and report on goal-based outcomes across financial, environment and social "bottom lines". Although the participation in NWWBI is voluntary but due to the corporation's strong desire to continuously improve its operations, the Corporation has been participating in the NWWBI since 2014. The data collected by NWWBI provides a strategic operations management model to compare Buffalo Pound results to similar pan-Canadian water treatment utilities and to improve the Plant's operational performance.

Due to its national reach, it takes considerable amount of time to process the data and report back on the data to the utilities. The performance data for 2019 was received in early 2021 and was reported to the stakeholders.

In the NWWBI system, the operational data is collected around 6 categories of Goals: Ensure Adequate Capacity, Meet Service Requirement with Economic Efficiency, Protect Public Health and Safety, Protect the Environment, Provide Safe and Productive Workplace and Provide Reliable Service and Infrastructure. Each of these goals comprises several sub measures and it is left up to the utilities to determine what goals and sub measures to focus on. The Key Performance Indicators established under each goal have been defined in manner such that like-for-like comparison can be made among the utilities.

Following is the summary of each goal

Ensure Adequate Capacity

The goal consists of several sub measures

1. Average Day Demand/Existing License Capacity
2. Days Plant Operated above 90 % Capacity
3. Days Plant Operated above 100 % Capacity

In 2019, the average daily demand was 29% of the existing licensing capacity and the Plant operated well below 90% capacity demonstrating that it has enough licensing and production capacity should the demand increase rapidly in the near future

Meet Service Requirements with Economic Efficiency

The goal consists of the following sub measures.

1. Chemical Cost
2. Energy Consumed
3. FTEs relative to Volume Treated
4. O&M Cost + Capital Reinvestment Cost
5. O&M Cost relative to volume Treated

In 2019, the Chemical cost, Energy consumed, and FTE measures were similar to previous years. The Capital Reinvestment Cost was higher due to increased capital spending. In 2019, the O&M costs were similar to 2018 but the O&M Cost relative to volume treated measure inched upwards due to lower water sales compared to 2018.

Protect Public Health and Safety

The goal consists of several sub measures.

1. Average Treated Water Nitrates
2. Average Treated Water Turbidity
3. Days over Group Nitrate Target of 10 mg/L for Treated Water
4. Raw Water Dissolved Carbon
5. Raw Water Total Organic Carbon
6. Total Coliform Occurrence in Treated Water
7. Treated Water Dissolved Carbon
8. Treated Water Total Organic Carbon

Collectively these measures characterizes the raw water and treated water quality. The lake water quality continues to improve in terms of Dissolved Organic Content and its character. In 2019, the average DOC concentration in lake water quality declined to 5.5 mg/L from 6.0 mg/L & 7.6 mg/L in 2018 and 2017 respectively

Protect the Environment

The goal consists of three sub measures.

1. GHG Emissions form Energy Consumed/ML Treated
2. Water Wasted During Treatment Process
3. Percentage of Backwash Waste Treated

The Green House Gas (GHG) generated by the Corporation remains stable but is higher than other similar utilities due to the amount of electrical energy used to bring the water to the Plant

from the lake and the amount of natural gas used to regenerate the granular activated carbon. The calculation of GHG emissions also factors in the Province in which the energy originates. As SaskPower utilizes a significant amount of coal in power generation, the Provincial Factor is very high. Currently, the Corporation is working with SaskPower and exploring options to transition from using fossil fuel generated power to environmentally-friendly energy sources.

Much of the wasted water is generated during the Filter/ GAC backwash and Clarifier sludge blow down process. The wasted water fluctuates year to year and is somewhat dependent upon the incoming water quality, clarified water quality and the filter performance. In 2019, wasted water was 7.8% but remains in line with previous years and comparable to the similar utilities. The Corporation has recently re-commissioned the water recycling process which should improve this measure significantly in future years

Provide a Safe and Productive Workplace

The goal consists of three sub measures.

1. Total Overtime Hours /Total Paid O&M Hours
2. Cost of Overtime Hours
3. Field Accidents with Lost Time
4. Lost Hours due to Field Accidents
5. Sick Days Taken
6. Unavailable O&M Hours/Total Paid O&M Hours

The total overtime hours and sick days taken remains stable and is not statistically different from the other similar utilities. Zero Accidents and Lost Hours demonstrate the strength of the Corporation's Safety Management System.

The unavailable O&M Hours measure includes sick, vacation, training, LTD and union hours and remains within the trend

Provide Reliable Service Infrastructure

1. Capital Reinvestment/ Replacement Value
2. Reactive Maintenance Hours/ Total Maintenance Hours
3. Total Maintenance Hours
4. Unit Filter Run Volume
5. Number of Unplanned Hours that Plant could not operate at rated capacity

The completion of the Main Substation Electrical project led to significant improvement to this measure in 2019. The Corporation expects to see further improvements in this measure in 2020 and beyond due to completion of the existing projects.

Reactive maintenance strategy is beneficial when the assets have a shorter life span and are not critical to the operations. In the context of the Plant Renewal Project, the Corporation is focusing on maintaining only critical pieces of equipment. The reactive maintenance hours jumped in 2019 due to random failure of equipment but did not pose risk to operations as the failures were minor in nature and a few of them were results of the power failures.

Higher Unit Filter Run Volume is the result of the Corporation's ongoing efforts to improve performance. Further improvements are anticipated in this measure due to the number of filter improvements completed in the recent past.

In 2019, the Plant had three service interruptions due to thermal gradients and power failures resulting in 23 hours of the Plant not being to able to meet required water demand.

2021 KEY PERFORMANCE INDICATORS

BALANCED SCORECARD (BSC): CORE SERVICES

Objectives	Measures (Core Outcomes of Strategy)	2021	Status at December 31, 2021	2022	2023	Initiatives (RACI)
CORE SERVICES						
Water Quality: Objective – Meets regulatory requirements and customer expectations 100% of the time	% Regulatory requirements met. Taste and odor quality met.	100%	100%	100%	100%	**Quality:** a) Ensure regulatory monitoring according to Permit to Operate; Annual Report Appendix 1 (Lab) b) Taste and odor of water leaving the Plant less than 8 TON (Threshold Odor Number) (Operations & Lab)
Water Quantity: Objective - To deliver water that meets customer demand 100% of the time	% Customer demand met without compromising Quantity	100%	**100% Reliability (Customer Demands)** • 99.823% Reliability (Plant Production - Unanticipated Downtime) • 0.5 hours - January 13 - SaskPower outage, SCADA was down • 2 hours - February 28 - PACL Coagulant Crystalized • 10 mins - March 22 - SCADA Down on UV System • 4.5 hours - April 26 - PLC Failure on UV System • 5 hours - September 1 - Power Outage - LPS Gen Set Communication Fault • 1.5 hours (MJ) - October 17 - Communication Failure with SaskTel • 0.25 hours (MJ) - October 22 - Communication Failure with SaskTel • 1.5 hours - December 5 - Power Blip Damaged Power Conditioner	100%	100%	**Quantity:** Reliability (Operations, Maintenance) including e.g. immediate reporting of failure of critical assets (Maintenance)
KEY PROJECT: PLANT RENEWAL						
Design 2020 - 2021	Milestones established in project plan	Complete	Completed. September 17 Drawings & Specs received at 60-70%. November 15 Financial Submission received.			Oversight by the Capital Projects Committee (CPC) Complete 60% stage (Mgr Maint. & Eng., PM) GMP 60% (Mgr Maint. & Eng., PM)
Financing 2020 - 2021	Milestones established in project plan	Financing acquired	Completed for $225M of construction. $60M was transferred on December 1. Shortfall from PreGMP Submission underdevelopment.			Oversight by the Finance & Audit Committee Finance strategy adopted by Cities (President & CEO) Obtain Council approval for financing shortfall (President & CEO)
Construction 2021 - 2025	Milestones established in project plan	Construction commences pending financing	Construction Scheduled to Commence for Q2 2022.		Complete 2025	Oversight by the Capital Projects Committee (CPC) Project management and oversight by Mgr. Maint. & Eng. and PM Commissioning 2024 Project close out & warranty 2025+ * accountabilities cascade to Managers' objectives

Objectives	Measures (Core Outcomes of Strategy)	2021	Status at December 31, 2021	2022	2023	Initiatives (RACI)
SAFETY CULTURE						
To achieve growth in the Safety Management System	a) Loss time b First Aid c) Near Miss d) Property Damage e) Audit - internal f) Audit - extern g) % of incidents reported	0 0 0 0 Annual Bronze 100%	0 1 0 2 Completed Deferred to 2022 due to COVID 100%	0 0 0 0 Annual 100%	0 0 0 0 Annual Silver 100%	External audit: 2021 Maintain bronze: 2023 Prepare to earn silver Encourage reporting of all incidents
OPERATIONAL READINESS & EMPLOYEE DEVELOPMENT						
Internalize the values.	Development milestones of initiative.	Build values into HR practices starting with Managers' PDEs first	Completed.			2021: Build values into HR practices including recruitment processes, job descriptions, employee development plans, employee performance plans
Enhance the succession plan.	Renewed, updated, monitored - Y/N	Y	Completed. Draft Updated with HR Committee's Comments.	Y	Y	Renew/update succession plan & org chart for all Plant staff (President & CEO) Develop Diversity Policy (President & CEO)
Keep improving employees' skills to maintain and operate the Plant.	Align Milestones with Renewal Project Plan - Y/N	Y	Completed		Y	Renew/update succession plan & org chart for all Plant staff (President & CEO)
RENEWAL COMMUNICATION & CHANGE						
Development an inaugural External Communications Strategy	Milestones established - Y/N	Y	Completed and Implemented			Engage external strategic communications consultant
Develop an Internal Communications Strategy	a) Response Rate for Employee Engagement Surveys every 2 years b) Action plans	Implement 2020	Completed and Implemented	67% Develop & begin implementation	Implement	Align with external communications strategies Employee Engagement Surveys & Action Plans Communication is always a key theme to show progress and areas for growth
Continue effective Change Management Practice	% of major projects with Organizational Change Management Plans	100%	Completed and Integrated with Daily Operations.	100%	100%	Align to development milestones for the Capital and Plant Renewal Projects
BOARD GOVERNANCE						
Board to complete objectives for Bylaws, Policies, Board Education & Succession	(to be set by the Board)		Policies planned for 2021 are completed. Board Reappointment & Board Evaluation Completed. 2021 Board Evaluation Process Completed.			Annual review of Bylaws, Policies, Governance Manual, etc.

Objectives	Measures (Core Outcomes of Strategy)	2021	Status at December 31, 2021	2022	2023	Initiatives (RACI)
FUNDING SOURCES						
Run operations based on good stewardship of financial position	a) Rate stability: Year to year rate comparable	TBD	Completed.	TBD	TBD	
Acquire grants & loans to fully fund the Plant Renewal	b % of critical projects funded	100%	Completed for $225M of construction. $60M was transferred on December 1. ICIP Grant Funding Agreement Executed. Shortfall from PreGMP underdevelopment.	100%	100%	Links to Key Projects objectives
FINANCIAL OPERATING PERFORMANCE						
Meet budget variance targets	Sum of O & M budget under management control within 5%	5%	~1.0% surplus forecasted	5%	5%	
QMS MANAGEMENT						
Develop a Business Continuity Plan	a) Development milestones achieved	Plan developed	All plans are completed with the exception of the IT which is in progress.			Links to risk registry
Ensure effective SOPs	b) % of all procedures documented, compliance ensured, training followed	100%	Lab Completed Operations Major Items Complete Maintenance Major Items Complete	100%	100%	For each area: Operations, Maintenance & Lab
ASSET MANAGEMENT						
Complete the risk-based management phase	a) Development milestones achieved	Asset Management Policy, Objectives and Governance Framework development	First Draft of Policy, Objectives and Framework Completed.	Onboarding Plant Renewal assets; develop Asset Management plans	Onboarding Plant Renewal assets; develop Asset Management plans	
Develop an Environmental Stewardship Strategy	b) Development milestones achieved		Completed.	Strategy developed		

REGULATORY AND GOVERNMENTAL AFFAIRS

The Water Security Agency conducted two routine inspections of the Plant first on March 10th and the second on September 21st.

One requirement of the regulations is that the laboratory analytical work required by a Water Treatment Plant's Permit to Operate must be done by an accredited laboratory. The Corporation's laboratory fulfilled all requirements to maintain accreditation from the Canadian Association for Laboratory Accreditation (CALA). The laboratory participates in four sets of proficiency test samples each year.

The Water Regulations require that the Corporation submit results of the weekly bacteriological, monthly trihalomethane and quarterly major ion analyses promptly to The Water Security Agency and that a Drinking Water Quality and Compliance Report be published annually.

The required Drinking Water Quality and Compliance Report is provided in the Appendix. The Plant met all sample submission requirements of the Plant's operating permit. The Plant is in full compliance with the Permit to Operate a Waterworks.

Plant operations are subject to the Federal National Pollutant Release Inventory (NPRI) Legislation, Canadian Nuclear Safety Commission (CNSC), as well as the Environmental Emergency Regulations. The required inventory submissions were made to the NPRI program. Radioactive substances are used in the laboratory's electron capture detectors. Although the license requirements for electron capture detectors have been terminated by the CNSC, swipe tests are still conducted as part of the general maintenance program. Swipe tests, ensuring the integrity of these detectors, were sent to SK Research Council for analysis; no leakage above the guidelines was detected.

GRANT FUNDING

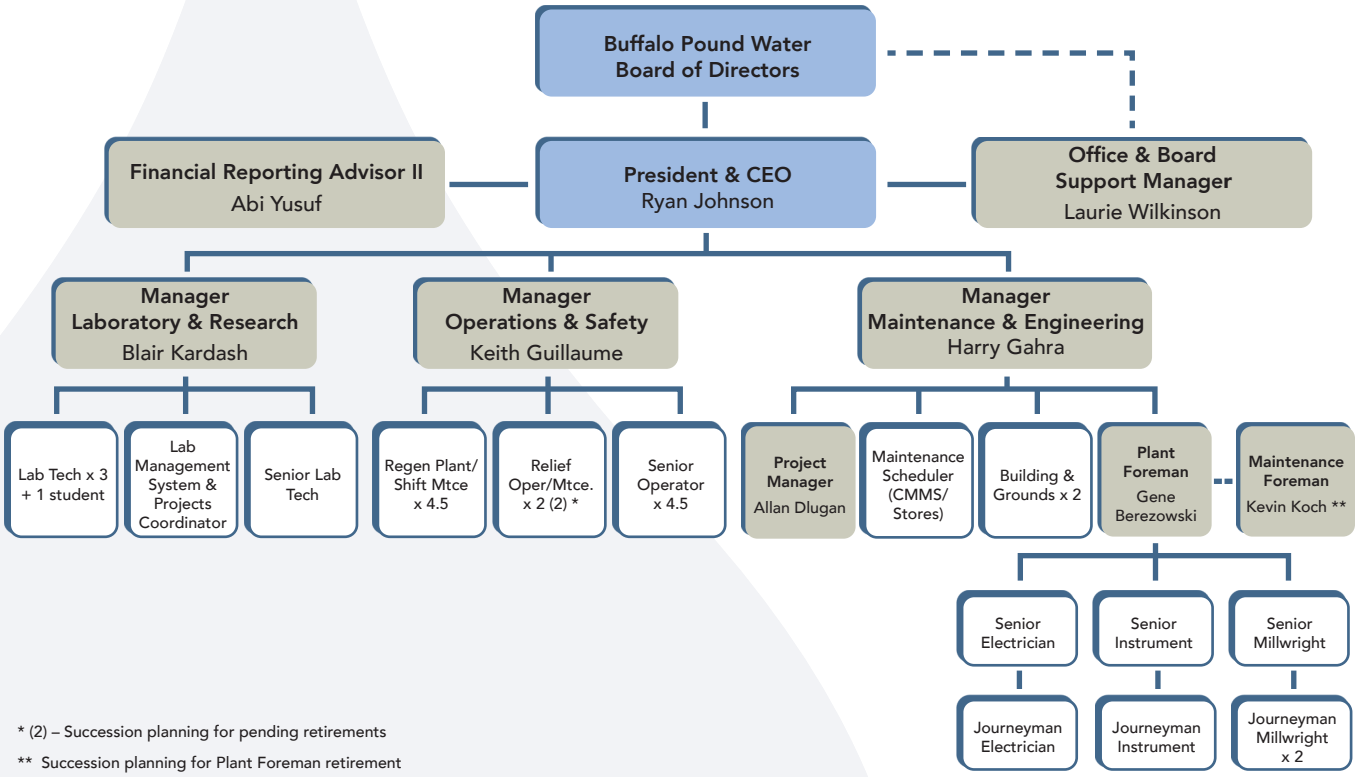
BPWTC worked collaboratively with each of the Cities to complete a financing strategy for the Plant Renewal Project using the following sources:

1) ICIP Grant Funding – With the approval of the Cities, BPWTC submitted an ICIP Grant application to the Federal and Provincial Governments based on the recommended predesign construction costs of $222.8 million. The application for grant funding was approved for an amount of funding equal to $163.4 million which is 73.33% of the anticipated construction cost.

The Cities of Regina and Moose Jaw authorized the Corporation to obtain the shortfall of $60.0 million with a 20-year interest rate swap loan. This was completed in December 2021 and the project is now funded for $222.8 million in construction.

HUMAN RESOURCES

Buffalo Pound Water Organizational Chart



* (2) – Succession planning for pending retirements

** Succession planning for Plant Foreman retirement

In 2021, the Plant employed a total permanent staff of 36, consisting of eight (8) out-of-scope staff, nine (9) operating staff, five (5) laboratory technologists, seven (7) journeyman maintenance persons, five (5) maintenance persons, and two (2) buildings and grounds staff. The Plant also employed one (1) temporary student lab technician.

The UNIFOR Local No. 595 Collective Agreement is in place for a five (5) year term effective January 1st, 2021 to December 31st, 2025.

There were 2 staff retirements in 2021 and 1 staff member resigned to accept employment elsewhere.

Staff at the Plant participate in the Regina Civic Employees Pension Plan.

ADMINISTRATION SUPPORT

The Administration Services agreement for the purchased service support between the Corporation and City of Regina was amended by adding a Financial Analyst. This position will provide internal financial support to the Corporation ranging from auditing services, business case development to financial reporting.

COMMUNICATION STRATEGY

The Corporation's first Communication's Strategy was developed and implemented. This was to cover a broad range of communications both internally and externally.

WATERSHED PROTECTION

The Corporation continues to be involved in consultation processes dealing with watershed protection in the Upper Qu'Appelle River and Buffalo Pound Lake.

MISCELLANEOUS

The President & CEO; Maintenance & Engineering Manager and Project Manager attended a BPWTC Plant Renewal Project meeting in Calgary, AB.

The President & CEO; Maintenance & Engineering Manager and Laboratory & Research Manager attended the SWWA Conference in Saskatoon. Both the President & CEO and Laboratory & Research Manager presented at the conference.

Brian Hoppenreys, Senior Operator, was named SWWA's Operator of the Year in 2021.

RESEARCH AND ANALYTICAL PROGRAM PROCESS DEVELOPMENT

APPLIED RESEARCH

Process Development – TTHM Reductions

Extensive research was done from 2015 through 2018 to determine the best strategy to reduce Total Trihalomethane (TTHM) formation in treated water from the BPWTP and within the distribution systems of Regina and Moose Jaw. The research investigations concluded that elimination of prechlorination was most effective considering simplicity and cost; not only for the existing Plant but also for Plant Renewal. As a result, and for the first time in the Plant's history, chlorine addition at the lake pumping station (process known as prechlorination) was discontinued in February 2020 with the intent of making it a permanent process change. As predicted from research work done in the previous years, substantial reductions in TTHMs did occur. For the 10 months in 2020, TTHM concentrations in the Plant's clearwell and cities were reduced by an astounding 69% and ~45% respectively compared to the same 10 months in 2019 when prechlorination was used.

The successful TTHM reductions in 2020 resulted in extending the discontinuation of prechlorination into 2021. However, in late May and into June, a chronic rise in clarifier effluent turbidity caused by cyanobacteria[1], necessitated the return of prechlorination to process to kill off the photosynthetic bacteria. Prechlorination was reinstated on June 19th and was used continuously until the cyanobacteria bloom season ended in late October. Despite using prechlorination for ~18 weeks in 2021, TTHM reductions were still impressive as compared to 2019 – the last time prechlorination was used for a full year. Clearwell TTHMs declined by 29% while the Cities of Regina and Moose Jaw declined by 15% and 19% respectively. Figures 1, 2 and 3 show the TTHM concentrations for each location from 2019 through 2021.

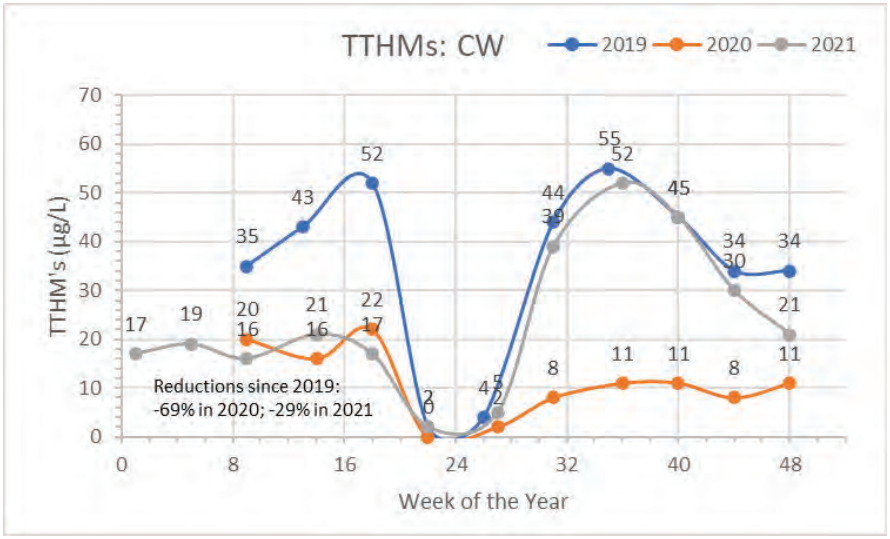


Figure 1: Clearwell TTHMs

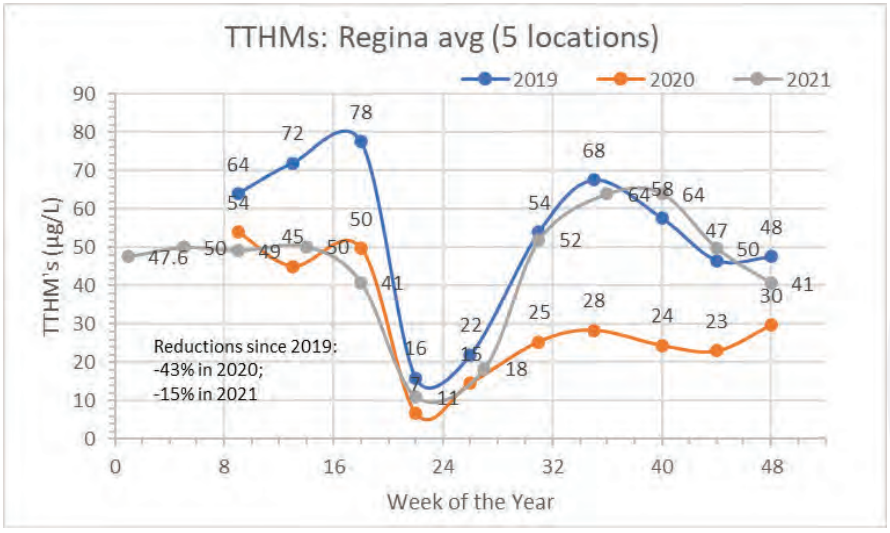


Figure 2: Regina TTHMs

The concentration of Natural Organic Matter (NOM) as measured by Dissolved Organic Carbon (DOC) changed little over the 3 year period of comparison. In both 2020 and 2021, there was an 8% reduction in the humic characterization of NOM

[1] Refer to the "Process Development – Lesson Learned: Prechlorination is Sometimes Necessary with Existing Plant Process During Cyanobacteria Blooms" section for additional details.

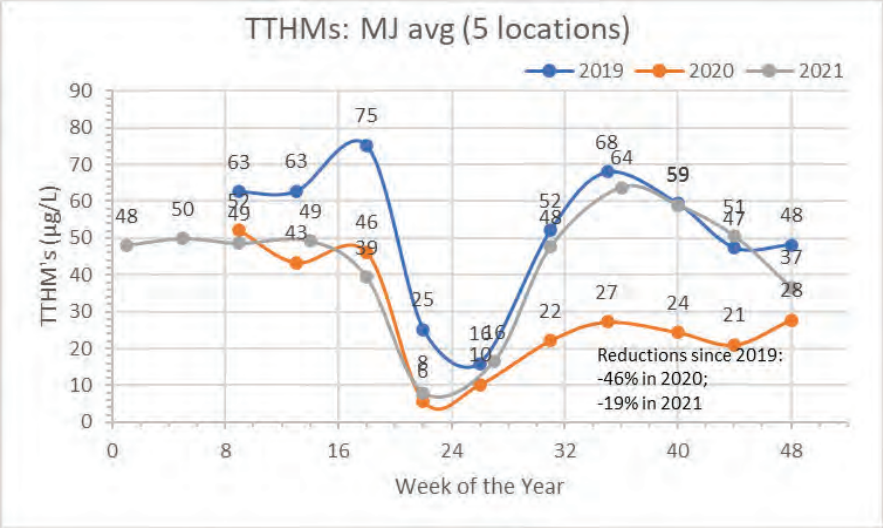


Figure 3: Moose Jaw TTHMs

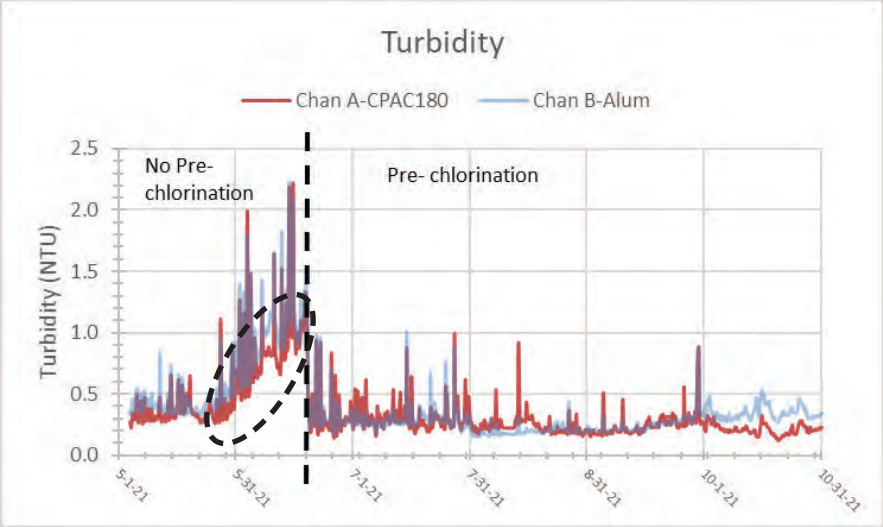


Figure 4: Clarifier Effluent Turbidity

as measured by Specific UV Absorbance (SUVA) as compared to 2019. Historically, when chlorine reacts with raw water DOC that has a higher humic portion, it results in higher TTHM formation for treated water leaving the plant and in the cities. Despite the small decrease in humic character over the comparison periods, the data suggests that elimination of prechlorination is the single most important factor contributing to decreases in TTHM concentrations over the past two years.

Process Development – Lesson Learned: Prechlorination is Sometimes Necessary with Existing Plant Process During Cyanobacteria Blooms

In 2021, discontinuing prechlorination to reduce TTHM formation could not be done for the entire year. In late May through mid-June, there was a substantial rise in baseline turbidity in the effluents of all the clarifiers. As baseline clarifier turbidity rose, performance of the mixed media filters began to deteriorate creating concerns for maintaining water quality requirements and meeting production demand. An investigation was initiated to find the root cause of the rise in turbidity. Microscopic analysis revealed that floc particles carrying over from the clarifiers to the filters were interlaced with significant amounts of three types of cyanobacteria normally present in Buffalo Pound Lake. With the assistance of limnologists at the University of Saskatoon, a published literature search was done, and it was discovered that the three types of cyanobacteria interwoven in the floc have a physiological ability to regulate their buoyancy. The ability of these cyanobacteria to regulate their buoyancy explained why the floc would not settle normally in the clarifiers. The oval illustration in Figure 4 shows the substantial rise in turbidity in the two clarifier effluent channels without the prechlorination process in operation. As a result of this discovery, the prechlorination process was reinstated on June 19th. Within hours and as shown to the right of the vertical dashed line in Figure 4, clarifier turbidity rapidly declined and returned to have a normal baseline of <0.50 NTU. The addition of chlorine at the lake pumping station killed off the cyanobacteria removing their ability to keep buoyant and prevent floc from adequately settling in the conventional gravity clarifiers. The prechlorination process was turned off on October 25th as bloom season came to an end.

In 2020, prechlorination was not used at any time during the cyanobacteria bloom season as there was no increase in clarifier effluent baseline turbidity. Cyanobacteria concentrations were much less than in 2021. The experience gained in 2020 and 2021 provides clear evidence that cyanobacterial genera identification and counts in the raw water must be closely monitored and prechlorination be returned to process if a sustained rise of clarifiers effluent baseline turbidity occurs.

The Plant Renewal's clarifier design is Dissolved Air Flotation (DAF). DAF should be resistant to cyanobacteria's ability to regulate its buoyancy. Make-up water supersaturated with air will be injected at the base of each DAF unit causing massive amounts of strategically sized air bubbles to be released into the flocculated water. The bubbles physically and electrostatically attach to the floc enmeshed with cyanobacteria and other contaminants within the unit to make their way to the water's surface. Skimmers remove the floating sludge containing the buoyant cyanobacteria to waste. As a result, prechlorination should not have to be used during bloom season after the DAF units are operational.

Process Development – Using CPAC-180[2] (Polyaluminum Chloride) to Reduce Future Treatment Costs

The Plant Renewal Project will include a pH adjustment process that adds sodium hydroxide (NaOH) to the water leaving the plant to increase pH and reduce the potential corrosiveness of lead and copper in the homes of consumers most vulnerable. However, sodium hydroxide addition is expensive and could potentially add over $1M to operational costs.

For most of the Plant's history, alum[3] has been used as the sole coagulant under all source water conditions and for the most part has reliably produced high quality drinking water. Since November 2015, CPAC-180 has been used exclusively in cold water conditions. Several comparison studies between alum and CPAC-180 done in cold water conditions, prior to November 2015, concluded that the latter has better treatment performance which results in higher water quality. An added advantage of CPAC-180 is that it consumes less source water alkalinity resulting in a higher pH of the treated water. This suggests that less sodium hydroxide should be required to obtain a less corrosive water leaving the plant if CPAC-180 were to be used year round. However, CPAC-180 has not been tested for performance to produce high quality water at full scale in warm water conditions nor during cyanobacterial blooms.

From May 4th through October 31st, a full-scale study was done comparing alum and CPAC-180 in warm water (>10°C). Alum was used in treatment Train B and CPAC-180 in treatment Train A. There were three primary objectives of the study: 1) treatment effectiveness and quality of clarified and filtered water produced; 2) determine corrosiveness of treated water produced by each as calculated by common water corrosion indicators pH, Langelier Index (LI)[4] and Calcium Carbonate Precipitation Potential (CCPP)[5], and 3) estimate the amount and cost of sodium hydroxide required to obtain a noncorrosive (near neutral and non-dissolving of calcium carbonate environment as measured by pH, LI and CCPP) for conventionally treated water (coagulation, flocculation, settling, and filtration).

For the source water quality treated during the study, the conclusions were as follows (chemical doses and costs/savings summarized in Table 1 also):

1) Both coagulants produced similar quality of clarified effluent and high-quality filtered water which met all regulatory requirements. It took slightly more CPAC-180 to do so. Overall, $100,673 or 21.8% more was spent on CPAC-180 than alum.
2) As expected, CPAC-180 produced less corrosive filtered water as measured by pH, LI, and CCPP.
3) A proprietary water quality modeling program (WaterProTM) from Stantec[6], estimated that it would require approximately 13 mg/L (111.6%) less NaOH to obtain a noncorrosive water treated with CPAC-180 as compared to alum. The models non corrosive target points were pH 7.8 ± 0.1 and LI & CCPP values at precipitating calcium carbonate levels. In dollar terms, 13 mg/L less NaOH would amount to a savings of $203,086.
4) Overall estimated net costing suggests that using CPAC-180 and adjusting to pH 7.8 ± 0.1 is the most economical combination. Coagulant and sodium hydroxide costs were estimated to be $102,413 or 15.9% less with CPAC-180 then alum.
5) If CPAC-180 or alum was used exclusively from May 4th to October 31st, coagulant and sodium hydroxide would have cost ~$1.16 million or ~$1.42 million. Using CPAC-180 with pH adjustment to obtain noncorrosive water would save the Corporation ~$259,500 or 20.1% over 6 months. Cost savings for sodium hydroxide alone using CPAC-180 is estimated to be $420,000 over the six month study.

2 ClearPAC® 180 is a high alumina (Al_2O_3) content (Dry Alum Equivalent as $Al_2(SO_4)_3 \bullet 14H_2O$, ~100%) and medium basicity (~40%) polyhydroxyl aluminum chloride (PAC) coagulant. Manufactured and supplied by ClearTech, Edmonton AB.

3 Dry Alum Equivalent as $Al_2(SO_4)_3 \bullet 14H_2O$, ~48.5 %. Manufactured and supplied by Chemtrade, Saskatoon SK.

4 Langelier Index (LI) is an approximate indicator of the degree of saturation of calcium carbonate in water. A negative LSI indicates

5 Calcium Carbonate Precipitation Potential (CCPP) is the amount of calcium carbonate ($CaCO_3$) that needs to precipitate or dissolve from water in order to reach equilibrium with CaCO3. A target CCPP of ~5mg/L is typically required to promote formation of protective calcium carbonate deposits.

6 BPWTP Train A and Train B Sodium Hydroxide Modeling Analysis by Design Build Team (D-D2MEM-0003), 06-Dec-21.

TABLE 1: COAGULANT DOSES, ESTIMATED NAOH DOSES AND CHEMICAL COSTS

	CPAC-180		ALUM	
	Actual	Estimated - Only Coagulant used for 6-month trial	Actual	Estimated - Only Coagulant used for 6-month trial
Volume of Treated Water (ML):	10,585	20,948	10,363	20,948
Ave. Coagulant Dose (mg/L DAE[7]):	75		68	
Total Coagulant Used (MT):	1,620	3,241	1,456	2,975
Unit Cost of Coagulant per MT:	$620		$283	
Total Coagulant Cost:	$513,115	$1,004,707	$412,442	$842,556
Est. NaOH dose to pH 7.8 (mg/L):	5		18	
Est. Total NaOH Used (MT):	212	415	746	1,524
Unit Cost of NaOH per MT:	$380.00		$380.00	
Est. Total Cost NaOH:	$ 80,446	$ 157,518	$ 283,532	$ 579,211
Est. Total Cost of Coagulant and NaOH:	$ 593,561	$ 1,162,224	$ 695,974	1,421,767
Est. Overall Cost Savings Using CPAC-180:	$ 102,413	$ 259,543		

The comparison study will continue through the cold water season (November 2021 through April 2022). A final report and recommendation of the primary coagulant to use for operations going forward and for Plant Renewal will be done in mid 2022.

ADDITIONAL WATER QUALITY MONITORING

Raw Water

The analyses required in the Permit to Operate on treated water represent only a portion of those carried out at the Plant. Staff also carry out regular monitoring of raw water quality as this would provide early warning of contaminants that could impact treated water quality. This work was contracted out to a laboratory capable of providing analyses as low as parts per trillion. Ninety-two (92) pesticide and herbicide compounds were tested for. Most of those are without Health Canada Guidelines. Various anthropogenic compounds (48 in total) associated with human use such as pharmaceuticals and personal care products were also tested for. The Plant's laboratory also conducts regular analyses throughout the year for benzene, toluene, xylenes and ethylbenzene that would indicate spilled gasoline or diesel fuels. Thus far, Buffalo Pound Lake does not seem impacted to any level of concern for the above suites of chemical pollutants.

Routine raw water quality testing (done bimonthly and monthly) continues to show broad based improvements in lake quality since 2015 due to sufficient water flows from Lake Diefenbaker and releases from Buffalo Pound Lake. In addition, at or below average rainfall since 2017 has also reduced dissolved mineral and allochthonous (soil derived) organic matter accumulations from erosion of the watershed surrounding Buffalo Pound Lake and the Upper Qu'Appelle River System. Total Dissolved Solids (TDS) decreased by 9% over the past year. Dissolved Organic Carbon (DOC) has remained steady since 2019.

Compared to 2015 (one of the worst years of raw water quality on record with respect to dissolved minerals and organic matter), TDS and DOC have decreased by 52% and 45% respectively. From 2015 to 2021, annual average discharges through the Qu'Appelle Dam from Lake Diefenbaker increased by 194% (1.8 to 5.3 m^3/s) as illustrated in Figure 5. The improvements in raw water quality as represented by the yearly average concentrations of TDS and organic carbon are summarized in Figures 5 and 6 respectively. The reduction in organic carbon and the partial elimination of prechlorination in 2021 has resulted in a 71% decrease in trihalomethanes at the Plant since 2015. TTHMs averaged 23 µg/L in 2021 and 78 µg/L in 2015.

7 DAE = Dry Alum Equivalent

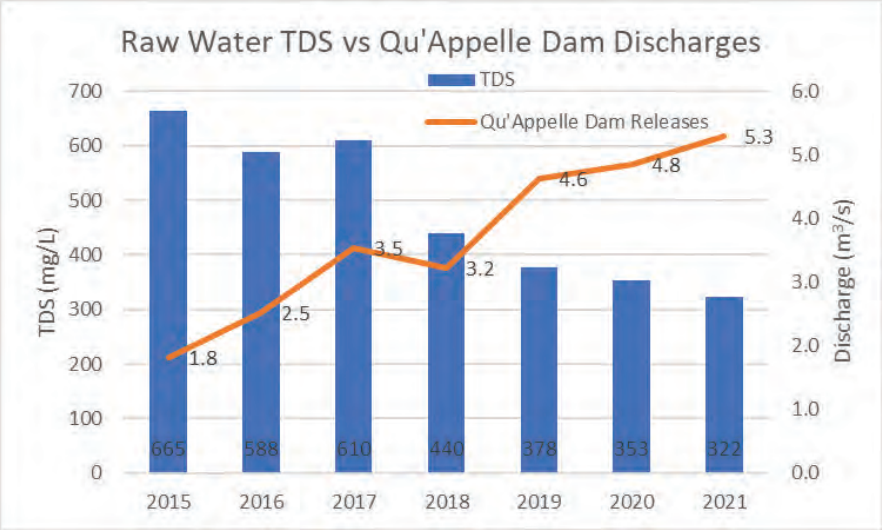


Figure 5: Raw Water TDS vs Qu'Appelle Dam Releases

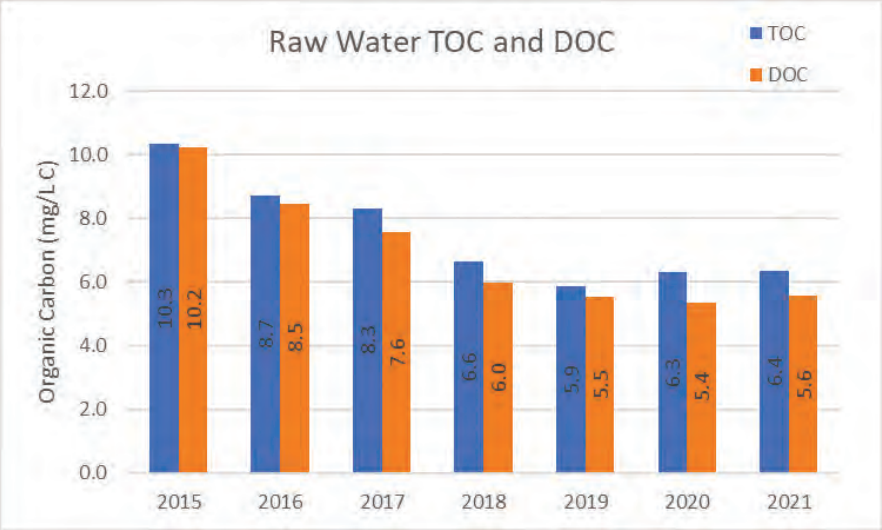


Figure 6: Raw Water TOC/DOC

Residuals Treatment Lagoons

Solids recovered from the clarification processes are settled out in lagoons and ultimately taken to the Moose Jaw landfill for disposal. The lagoons were designed and constructed over 30 years ago when Plant flows were lower. Regulatory limits of effluent quality also did not apply. With the introduction of the regulatory monitoring and compliance schedule in 2017, the liquid effluent passing out of the lagoons is monitored weekly for Total Suspended Solids (TSS) and free & combined chlorine. Total and dissolved aluminum are also measured monthly. Twice a year samples are sent for acute toxicity evaluation. Results of these analyses are reviewed by the Water Security Agency.

The liquid effluent samples did not demonstrate acute trout toxicity in 2021. Without using prechlorination from January to mid June, and November through to the end of the year, free and combined chlorine were not detected in lagoon discharge. With prechlorination in use from June 19th to October 2021, combined chlorine was detected. Overall compliance rate for free and combined chlorine was 100% and 73% respectively. There was a 71% compliance rate for solids residuals exiting the lagoon overflow. As history has demonstrated, liquid exiting the lagoons does not always meet the existing quality requirements. The causes include solids and hydraulic overloading, poor overflow design of existing structures, no underdrains and no control for wind effects. The deficiencies in residuals handling have been recognized in engineering studies.

The designs for lagoon performance improvements have nearly been completed in the Plant Renewal Project. Two new summer lagoons will be added, and the existing lagoons will be strategically combined to vastly increase waste storage volume and allow full wastewater containment. There will be no continuous overflow which will allow sufficient time for decay of all forms of chlorine and eliminate problems from wind. Each lagoon will be equipped with an underdrain system. In the main Plant, process wastewater will be substantially reduced to prevent lagoon hydraulic overloading. Clarifier sludge will undergo a thickening process to further reduce water volume sent to the lagoon in operation, there will be recycling and retreatment of all BAC backwash water, and a GAC regeneration facility will no longer be in existence to produce wastewater. Draining of lagoons during their non-filling stage will be done through the underdrain system. Each underdrain will be lined with geotextile material, drain rock and gravel to filter out most solids from the drain water and provide consistently improved water quality leaving the lagoons. After initial drainage of free water is complete, the sludge will be frozen and redrained after thawing. The freeze-dried sludge will be excavated and transferred to another area for further drying or be sent directly to landfill for disposal. To reduce landfill tipping fees, the moisture content of sludge is to be ≤ 50% before disposal.

Figure 7: Upper Qu'Appelle Sampling Locations

Watershed Monitoring

Monitoring of the Upper Qu'Appelle River watershed, including Buffalo Pound Lake, is typically carried out on an annual basis. In 2021, one sampling episode was done to examine expected changes in water quality as the water travelled from Lake Diefenbaker, through the Qu'Appelle Dam and down the Upper Qu'Appelle River through Buffalo Pound Lake. Six (6) sites were sampled in the collection period. As shown in Figure 7, the sites included Q1 - Lake Diefenbaker via the Riverhurst Ferry, four locations throughout the reach of the Upper Qu'Appelle River (Q2 - Qu'Appelle Dam, Q3 - Eyebrow, Q4 - Keeler & Q5 - Marquis), and Q7 - Plant's raw water intake. The Q6 - west arm of Buffalo Pound Lake site could not be accessed due to heavy rain prior to sampling. The survey was done on August 23rd and 24th.

Releases from the Qu'Appelle Dam were highest for the year from approximately April 12th to June 7th and ranged between 10 and 11 m^3/sec. Releases were reduced starting the week of June 14th and during collection were 7.2 m^3/sec. Generally, for each location, overall water quality as measured by total suspended solids (TSS) and total dissolved solids (TDS) were either near or noticeably below historical levels. TSS was highest at Q4 and Q5 but less than detection at Q7. Historically, TSS decreases dramatically in Q6 - west arm of Buffalo Pound Lake which functions as a solids settling area (inset within Figure 7). Total phosphorus (TP) levels were below historical average from Q1 through Q5 and above at Q7. Normally, high flow rates within the Upper Qu'Appelle River cause progressively higher levels of TSS and total phosphorus due to erosion of light soils in the river channel and as water travels through the Qu'Appelle Dam to Buffalo Pound Lake. As the survey's water quality results indicate, erosion of the Upper Qu'Appelle River channel and its inflowing tributaries that drain the surrounding watershed were below historical levels. Phosphorus is a nutrient that promotes the growth of cyanobacteria.

Sampling for various anthropogenic compounds (pharmaceuticals, herbicides, pesticides, and other miscellaneous) was also carried out during the August survey. A variety of herbicides, used for broad leaf weed control, were detected at Q2, Q5, and Q7. The regulated herbicides 2,4-D, atrazine, and MCPA were detected from Q2 through to Q7 and the average concentrations were 18 parts per trillion (ppt), 2 ppt, and 7 ppt, respectively. The three herbicides were at concentrations far below drinking water guidelines and none were detected in the plant's treated water (refer to the Compliance Report).

Several other compounds were found at very low levels and they are not currently regulated in drinking water in Saskatchewan.

At this point in time detection of these compounds are a result of enhanced analytical capabilities but don't represent a health concern. The fungicides Azoxystrobin and Propiconazole were detected at ppt concentrations at each location and averaged 5 ppt and 8 ppt respectively. There were several compounds associated with wastewater that were also detected at each site. Carbamazepine, an anticonvulsant medication to treat epilepsy and N,N-diethyl-meta-toluamide, better known as the insect repellent called DEET, were detected at concentrations of 6 ppt and 64 ppt respectively. An antibiotic called Sulfamethoxazole was detected at Q2 and Q5 averaging 16 ppt.

For the eighth consecutive year, the Formbloom project buoy was deployed near the lake pumping station's east intake. The buoy is owned by the University of Saskatchewan and is managed by a limnology research team led by Dr. Helen Baulch and Dr. Jason Venkiteswaran of the Global Institute for Water Security. The buoy is a forecasting tool containing a weather station and various sensors designed to monitor and help understand key environmental factors that drive cyanobacteria bloom onset, duration, and cessation while also evaluating the impact blooms have on ecosystem services such as treating water from Buffalo Pound Lake. Since the Buffalo Pound Water Treatment Corporation is a significant stakeholder of Buffalo Pound Lake, the Corporation has supported the work of the research team since 2014. In addition to receiving published research papers, managers and operators use real time weather and water quality data from the buoy to monitor rapid changes in water quality parameters. The real time data aids Plant operators to be proactive in minimizing treatment process upsets when light winds, rapid increases in daytime temperatures, and high concentrations of cyanobacteria are occurring at the intakes.

After the 2021 bloom season, the buoy which has been in service since 2014 reached the end of its useful life. A combination of structural deterioration and several sensors that stopped working and can't be replaced has necessitated a replacement. In support of Dr. Baulch's continued research and the need to have real time monitoring of rapid changes in raw water quality to assist operations, the BPWTC Board of Directors approved the purchase of a replacement buoy which has been nicknamed "Superbuoy". The new buoy will have the same functionality as the previous, but it will come with several enhancements that include cameras to monitor bloom scum formation, more accurate carbon dioxide sensors, and a winter hardy apparatus to provide year round monitoring. Superbuoy is expected to arrive and be deployed prior to the start of the 2022 cyanobacteria bloom season. Dr. Baulch and her team will continue to operate and maintain Superbuoy. Visit the following links for more information on the Corporation's partnership with the research team:

- https://news.usask.ca/ - USask researcher's cutting-edge buoy aims to secure water source for Regina and Moose Jaw.
- Research Impact Profiles - Global Water Futures - University of Saskatchewan (usask.ca).

The laboratory at the Plant has been analyzing many components of raw and treated water over the years. The database of Buffalo Pound Lake water quality extends from 1969 to the present. The database of the Upper Qu'Appelle River Watershed, which includes Lake Diefenbaker, covers the years from 1980 to the present. These long-term databases prove very useful to various government agencies including the Water Security Agency and university researchers that request to use them. The Joint-Venture (JV) team has recently used the data to assist in the design of various processes for the Plant Renewal Project. Work is ongoing to defragment the various spreadsheet data files by programming and integrating them into a MS-SQL relational database management system for more efficient retrieval of past and addition of future information.

OPERATIONS BUDGET

FINANCIAL HIGHLIGHTS		YEAR ENDED DEC 31, 2020	YEAR ENDED DEC 31, 2021	% CHANGE
WATER RATES (ML)				
CITIES		$355.00	$360.00	1.41%
SASK WATER		$355.00	$360.00	1.41%
CAPITAL WATER RATES (ML)				
CITIES		$ 215.00	$ 250.00	16.28%
SASK WATER		$ 311.39	$ 386.68	24.18%
POWER				
CITIES		$ 0.11799	$ 0.1179	0%
SASK WATER		$ 0.12979	$ 0.12979	0%
OPERATIONS TOTAL REVENUE	**($ MILLIONS)**	**13.19**	**13.29**	**0.78%**
TOTAL EXPENDITURES		12.17	13.14	7.95%
Surplus (Deficit)		1.02	0.15	-84.89%
Operating Reserve		2.00	2.13	6.50%
CAPITAL TOTAL REVENUE	**($ MILLIONS)**	**20.65**	**73.51**	**255.97%**
TOTAL EXPENDITURES		30.91	20.16	-34.60%
Surplus (Deficit)		-10.26	53.29	-6.19
Capital Reserve		37.26	90.56	143.05%

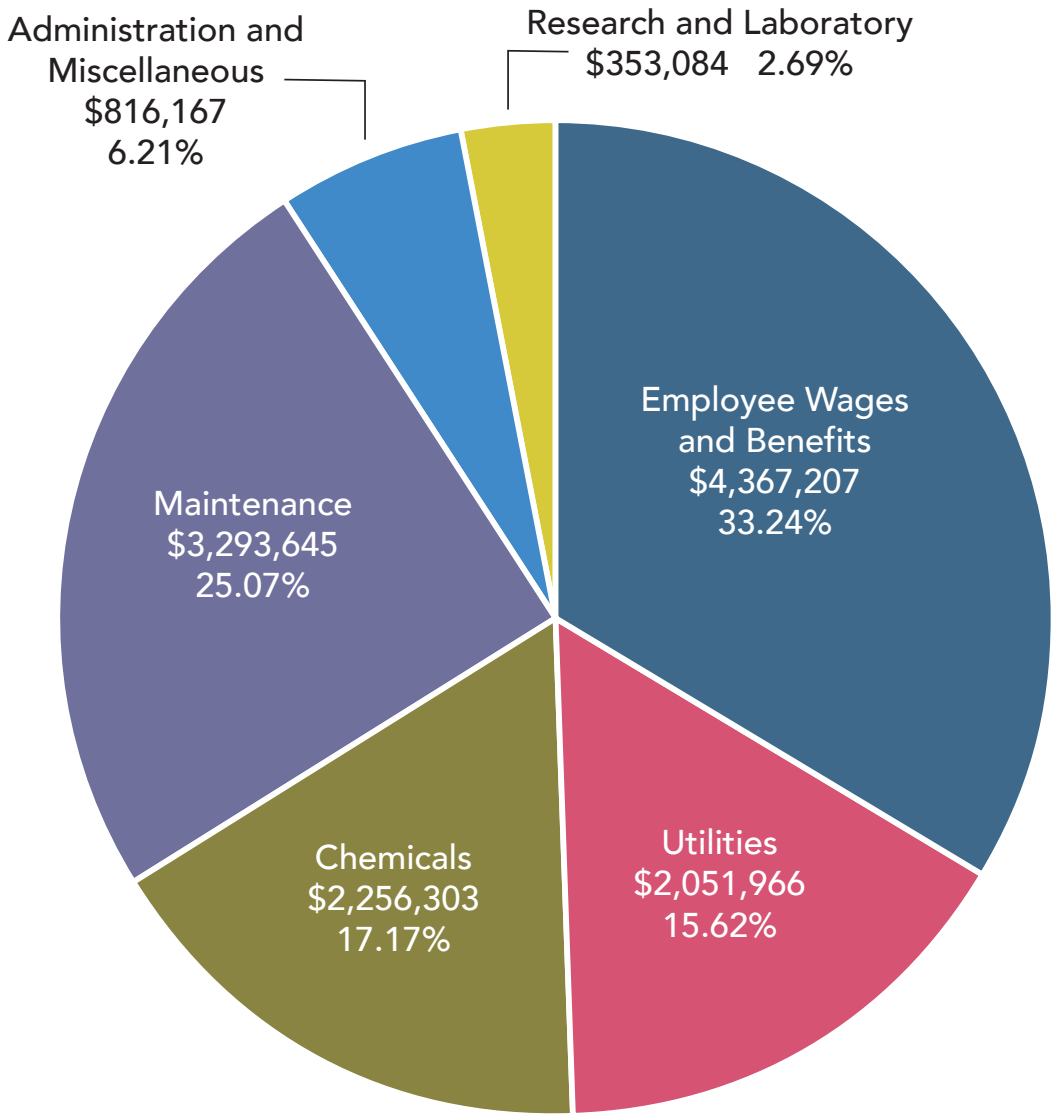
WATER SALES (ML)	FORECASTED (2020)	ACTUAL	FORECASTED (2021)	ACTUAL	% Change (2021)
REGINA	30,000.00	29,554.15	29,300.00	29,618.54	1.09%
MOOSE JAW	5,350.00	5,084.60	5,075.00	5,143.84	1.36%
SASK WATER	215.00	221.55	200.00	219.11	9.56%

NOTES:

1. The Operating Reserve is intended to offset the impact of wet years or years with low water sales.
2. The Capital Reserve is intended to complete projects that are in progress with the bulk of it to fund the generational Plant Renewal Project and fund emergency repairs.
3. The Capital Revenue of $73.51M in 2021 included a $60M loan for the Plant Renewal Project.

Audited financial statements start on page 57.

Graph 4 • Expenses for 2021 as a Percent of the Total Budget.



WATER QUALITY AND COMPLIANCE REPORT FOR 2021

INTRODUCTION

The Water Security Agency requires each Permittee to monitor water quality as stipulated under its Permit to Operate a Waterworks. Permittees are also required to prepare an annual report to their customers and the Saskatchewan Water Security Agency summarizing the analytical results of the monitoring in a report entitled "Drinking Water Quality and Compliance Report."

For more information about the meaning and type of sample refer to the Water Security Agency's "Municipal Drinking Water Quality Monitoring Guidelines, or the associated website http://www.saskh2o.ca/DWBinder/epb205.pdf.

The guidelines for Canadian Drinking Water Quality are developed by the Federal – Provincial-Territorial Committee on Drinking Water and are published by Health Canada. The province of Saskatchewan utilizes the guidelines in issuing Permits to Operate for regulated water works. Guidelines for chemical and physical parameters are either:

1. Health based and listed as a Maximum Acceptable Concentration (MAC);
2. Based on aesthetic considerations and listed as an Aesthetic Objective (AO); or
3. Established based on operational considerations and listed as an Operational Guidance value (OG).

Throughout this document the analytical values are reported as well as the units of measure. Many parameters are not detectable in the treated water. Wherever the "less than sign" (<) is used it is followed by the method detection limit. This means that the parameter was not detected at or above the level indicated.

The Buffalo Pound Water Treatment Plant was fully compliant with the requirements for sample submission as defined in our Permit to Operate a Waterworks No. 00050083-07-01.

Water Quality Standards – Bacteriological Quality

According to its Permit to Operate a Waterworks the Buffalo Pound Water Treatment Plant is required to analyze one sample every week from the treated water for Bacteriological Quality. Results of that sampling follow. All required samples were submitted over the year, none of which had detectable coliform or background organisms.

Parameter	Limit	Number of Samples Submitted	Number of Samples Exceeding Limit
Total Coliforms	0 per 100 ml	53	0
Background Organisms	<200 per 100 ml	53	0

Water Quality Standards – Filter Turbidity

The Buffalo Pound Water Treatment Plant is required to monitor the effluent turbidity from all twelve filters on a Continuous Basis. The turbidity from each individual filter shall be less than 0.3 NTU, 95% of the time. The turbidity shall not exceed 0.3 NTU for more than 12 consecutive hours and shall never exceed 1.0 NTU. If, on those occasions when the monthly average of the source water turbidity is less than 1.5 NTU, the water turbidity levels from each filter must be less than 0.2 NTU, 95% of the time, the turbidity shall not exceed 0.2 NTU for more than 12 consecutive hours and shall never exceed 1.0 NTU.

This Plant's SCADA Control System automatically generates an alarm if a filter effluent turbidity exceeds 0.3 NTU. If the turbidity exceeds 0.4 NTU at any time, the Plant's SCADA Control System automatically closes the filter effluent valve, turning off the filter. The plant's operating permit requires on-line turbidity monitoring on the effluent of each of its twelve filters. A problem with the turbidity monitor or data transfer system to the plant's SCADA requires a shutdown of the affected filter. To address this possibility the plant has a second independent turbidimeter on each filter so that continuous monitoring can be maintained even if the first turbidimeter fails. A fault condition on any one turbidimeter will also generate an alarm.

By maintaining these turbidity requirements, the water treatment plant receives a credit of 2.0 log inactivation of viruses and 3.0 log inactivation/removal of giardia cysts and cryptosporidium oocysts.

Water Quality Standards – Fluoride

The Buffalo Pound Water Treatment Plant did not add fluoride to the water pumped to the City of Moose Jaw in 2021 as a result of equipment failure in October in 2018. A new liquid fluoride feed system was installed in 2021. It is expected to be commissioned and put into service in January 2022.

Water Quality Standards – Disinfection

To ensure adequate disinfection, the Buffalo Pound Water Treatment Plant must monitor both ultraviolet (UV) dose and chlorine residual of the treated water on a continuous basis. The UV dosage and UV transmittance must be greater or equal to 5.8 mJ/cm^2 and 85% respectively for the plant to receive a minimum 2.0 log Cryptosporidium inactivation credit. In addition, free chlorine residual in the treated water is normally kept in a range of 1.1 to 1.4 mg/L thereby insuring a minimum credit of 2.0 log inactivation of viruses. At no time can the free chlorine residual be less than 0.1 mg/L in the water entering the distribution systems.

In the event that the UV system fails, the SCADA activates an alarm of the condition and a minimum 0.5 log removal and/or inactivation of Giardia disinfection requirement must then be obtained. Operators add additional free chlorine above the normal operating range of 1.1 to 1.5 mg/L leaving the clearwells to achieve the temporary disinfection requirement. The amount of additional free chlorine residual required depends on flow rates, pH, and water temperature. Operators use contact time (CT) tables within applicable Standard Operating Procedures (SOPs) and/or spreadsheet calculator to determine the minimum free chlorine residual and maximum plant flow required. When the UV system is returned to service, the facility again receives a minimum 2.0 log Cryptosporidium inactivation credit. Free chlorine residual of the treated water is returned to the normal range and is sufficient to achieve a minimum 2.0 log inactivation of viruses. Plant flows are also returned to normal to meet full demand.

When the UV and chlorine systems are working normally, the SCADA control system will automatically shut off pumping to the Cities if the free chlorine residual exiting the clearwells is less than 0.6 or 0.9 mg/L depending on seasonality. If the UV system becomes inoperable, the low chlorine residual setpoint to automatically shutoff pumping to the cities is adjusted by operators as outlined in the applicable SOPs depending on maximum flow rate, pH and water temperature. This ensures that the minimum disinfection requirements are met in the treated water.

Water Quality Standards – Chemical – General

As part of the plant's "Permit to Operate" a general chemical analysis is required once in every three month period from the treated water. Only two of these parameters have an established Maximum Acceptable Concentration (MAC). Eight others have an Aesthetic Objective (AO) which is desirable but has no impact on human health. Four analytes have no MAC or AO but are collected upon the request of the Water Security Agency.

Parameter (mg/L) unless stated	Feb. 8	May 10	Aug. 9	Nov. 8	MAC	No. of Samples Exceeding MAC or AO
Nitrate	0.07	0.14	0.33	1.17	45	0
Fluoride	0.13	0.10	0.10	0.11	1.5	0
					AO	
Alkalinity	171	141	78	133	500	0
Chloride	40.1	25.2	30.8	24.6	250	0
Hardness	234	200	139	195	800	0
Magnesium	26.4	21.2	18.6	20.7	200	0
pH (pH units)	7.58	7.42	7.06	7.44	7.0 to 10.5	0
Sodium	47	36	35	34	300	0
Sulphate	116	111	96	106	500	0
Total Dissolved Solids	350	314	262	310	1500	0
Carbonate	ND	ND	ND	ND	None*	
Calcium	52	47	28	44	None*	
Conductivity (uS/cm)	661	558	453	542	None*	
Bicarbonate	208	172	95	162	None*	

ND – Not Detected
None* No MAC or AO but requested by the WSA

Water Quality Standards – Chemical – Health

The Buffalo Pound Water Treatment Plant is required to sample the treated water for the following parameters once in every six-month period. Sixteen of these parameters have an established MAC. Three parameters have guideline values which establish a target that could be expected from well-functioning water treatment plants or are aesthetic objectives for the taste or appearance of treated water. Silver is included here upon the request of the Water Security Agency.

Parameter (mg/L)	May 10	Nov. 15	MAC	Number of Samples Exceeding MAC
Antimony	<0.0002	<0.0002	0.006	0
Arsenic	0.0006	0.0003	0.010	0
Barium	0.055	0.055	1.0	0
Boron	0.04	0.03	5.0	0
Bromate	<0.005	<0.005	0.01	0
Cadmium	<0.00001	<0.00001	0.005	0
Chlorate	<0.05	<0.05	1.0	0
Chlorite	<0.05	<0.05	1.0	
Chromium	<0.0005	<0.0005	0.050	0
Copper	0.0008	<0.0002	2.0	0
Cyanide	<0.001	0.002	0.200	0
Lead	<0.0001	<0.0001	0.010	0
Manganese	<0.0005	<0.0005	0.12	0
Mercury	<0.000001	<0.000001	0.001	0
Selenium	0.0003	0.0002	0.010	0
Uranium	0.0004	0.0004	0.020	0
			Operational Guidance Value or Aesthetic Objective	Number of Samples Exceeding Guideline
Aluminum	0.028	0.015	0.1 (annual average)	0
Iron	<0.0005	<0.0005	0.3	0
Silver	<0.00005	<0.00005	None*	0
Zinc	<0.0005	<0.0005	5.0	0

*Health Canada has not established a guideline as drinking water is not a significant source of silver.

Water Quality Standards – Pesticides

Once per year the Buffalo Pound Water Treatment Plant is required to have the treated water analyzed for the following pesticides. The fourteen of the parameters listed below have an established MAC or IMAC (interim MAC).

Highlighted chemicals may be withdrawn from the Canadian Drinking Water Quality Guidelines.

Parameter (mg/L)	Aug. 30	MAC	IMAC	Number of Samples Exceeding Limit
Atrazine	<0.0001		0.005	0
Bromoxynil	<0.00010		0.005	0
Carbofuran	<0.00050	0.09		0
Chlorpyrifos	<0.00010	0.09		0
Dicamba	<0.00010	0.12		0
2,4-D	<0.00010		0.1	0
Diclofop-methyl	<0.00010	0.009		0
Dimethoate	<0.00010		0.02	0
Glyphosate	<0.00020	0.28	0.28	0
Malathion	<0.00010	0.19		0
MCPA	<0.00010	0.10		0
Pentachlorophenol	<0.00050	0.06		0
Picloram	<0.00010		0.19	0
Trifluralin	<0.00010		0.045	0

Water Quality Standards – Disinfection By-Product – Total Trihalomethanes

As part of the plant's "Permit to Operate" an analysis for total trihalomethanes (TTHMs) is required once per month from the treated water. The MAC is 0.1 mg/L, or, 100 µg/L (parts per billion) for the sum of four trihalomethanes on an annual average. The annual average of total trihalomethanes was 23 µg/L which is well below the MAC and down substantially from 35 µg/L in 2019 – the last full year prechlorination was used. In 2021, prechlorination was necessary from mid June to the end of October to relieve floc settling problems caused by buoyancy of cyanobacteria. However, when prechlorination was not used, disinfection byproduct precursors were removed prior to adding chlorine which resulted in significant reductions in THMs consumed by customers.

Parameter (µg/L)	Jan 11	Feb 8	Mar 15	Apr 12	May 17	Jun 14
Chloroform	12	12	11	9	12	2
Bromodichloromethane	5	4	4	3	6	<1
Dibromochloromethane	1	1	1	<1	2	<1
Bromoform	<1	<1	<1	<1	<1	<1
Total Trihalomethanes	18	17	16	12	20	2
	July 12	Aug 9	Sept 13	Oct 12	Nov 8	Dec 6
Chloroform	9	37	43	34	30	16
Bromodichloromethane	1	5	8	7	11	5
Dibromochloromethane	<1	<1	<1	<1	2	<1
Bromoform	<1	<1	<1	<1	<1	<1
Total Trihalomethanes	10	42	51	41	43	21

Water Quality Standards – Disinfection By-Product – Haloacetic Acids (HAA5s)

The Buffalo Pound Water Treatment Plant is obligated to sample for Haloacetic Acids every three months. The annual average of quarterly samples was <10 µg/L and well below the MAC of 80 µg/L which is also based on an average of four samples. The 2021 results are as follows:

Parameter (µg/L)	Feb 8	May 10	Aug 10	Nov 15	Annual Average	MAC (Average)
HAA5	10	11	<10	<10	<10	80

Water Quality Standards – Synthetic Organics

The Buffalo Pound Water Treatment Plant is required to submit one (1) sample per year for analysis for various organics originating from industrial activities.

Parameter	Aug 30 (mg/L)	MAC (mg/L)	IMAC (mg/L)	Number of Samples Exceeding Limit
Benzene	<0.00050	0.005		0
Benzo(a)pyrene	<0.000050	0.00001		0
Carbon Tetrachloride	<0.00050	0.005		0
Dichlorobenzene 1,2	<0.00050	0.200		0
Dichlorobenzene 1,4	<0.00050	0.005		0
Dichloroethane 1,2	<0.00050		0.005	0
Dichloroethylene 1,1	<0.00050	0.014		0
Dichloromethane	<0.0010	0.050		0
Dichlorophenol 2,4	<0.0003	0.900		0
Ethylbenzene	<0.00050	0.14		0
Monochlorobenzene	<0.00050	0.08		0
Perflourooctanesulfonate	<0.00001	*		0
Perfluorooctanoic Acid	<0.00001	*		0
Tetrachloroethylene	<0.00050	0.01		0
Tetrachlorophenol 2,3,4,6	<0.0005	0.1		0
Trichloroethylene	<0.0010	0.05		0
Trichlorophenol 2,4,6	<0.0005	0.005		0
Vinyl Chloride	<0.00050	0.002		0
Xylenes	<0.00050	0.09		0

*under development by Health Canada.

Highlighted chemicals may be withdrawn from the Canadian Drinking Water Quality Guidelines.

Water Quality Standards – Radiological

The Buffalo Pound Water Treatment Plant is required to submit one (1) sample per year for the measurement of gross alpha and gross beta activity. Should those measures exceed the MACs, an additional larger sample must be submitted for the estimation of contributions to activity from various individual radioisotopes. Additional analyses were not necessary as the gross alpha and gross beta activity were both less than the MAC.

Parameter	Sept 20	MAC
Gross Alpha (Becquerel/L)	<0.22	0.5
Gross Beta (Becquerel/L)	0.12 ± 0.02	1.0

Water Quality Standards – Microcystin

The Buffalo Pound Water Treatment Plant is required to submit monthly samples from May through October for Microcystin LR or Total Microcystin toxins from both the raw and treated water. Microcystins may be produced by various cyanobacteria. The microcystin MAC for drinking water is 1.5 µg/L. Microcystin was not detected in the treated water.

	Microcystin (µg/L)	
Date	Raw Water	Treated Water
May 3	<0.1	<0.1
June 14	0.38	0.04
July 12	0.2	<0.1
August 9	0.4	<0.1
September 13	<0.1	<0.1
October 25	<0.1	<0.1

Raw Water Analysis Giardia and Cryptosporidium

Although not a regulated water quality parameter the Buffalo Pound Water Treatment Plant is required to sample the raw water on a quarterly basis for the presence of *Giardia* spp. and *Cryptosporidium* spp. which are waterborne protozoa. The filter cartridges are limited by particulates in the raw water so the volumes actually filtered can vary substantially. *Cryptosporidium* oocysts and *giardia* cysts were not detected in the four raw water samples.

Date	Giardia (cysts per 100L)	Cryptosporidium (oocysts per 100L)
February 22	<2.0	<2.0
May 17	<2.0	<2.0
September 20	10	<10
December 6	<4.8	<4.8

Water Security Agency (WSA) Inspection Finding and Corrective Action

A WSA inspection completed in September 2021 revealed that the UV reference sensor, used to verify dose measurements of each duty UV sensor in an active UV reactor, was not calibrated within the past year. A misinterpretation of the wording WSA used in the Permit to Operate regarding UV sensor calibration was the root cause.

Despite the misunderstanding, plant maintenance staff were always performing verification of duty sensors with a calibration sensor at a higher frequency than the reactors' manufacturer's recommendation. During the inspection's closing meeting, management and WSA discussed the calibration requirement and came to a mutual understanding of what was required. Management immediately implemented the required corrective action. At all times, the active UV reactor's UV dose was compliant with requirements and in no way was public health compromised.

LABORATORY ANALYTICAL DATA

2021 - BUFFALO POUND WATER QUALITY DATA: RAW LAKE WATER

PARAMETERS	UNITS	JAN AVG	FEB AVG	MAR AVG	APR AVG	MAY AVG	JUN AVG	JUL AVG	AUG AVG	SEP AVG	OCT AVG	NOV AVG	DEC AVG	YEAR AVG	YEAR MIN	YEAR MAX
PHYSICAL																
Colour (Apparent)	Pt/Co	5	9	8	4	5	5	10	19	10	8	3	3	8	3	30
Conductivity	µS/cm	605	658	657	539	542	485	456	433	462	512	524	571	546	426	675
Bench Diss. Oxygen	mg/L	10.8	9.5	13.4	10.8	9.4	9.6	6.9	8.9	7.4	8.7	11.5	14.4	10.2	6.9	14.4
Bench Diss. Oxygen	%	85.0	73.2	111.5	89.2	93.0	103.8	80.2	96.9	76.7	79.1	88.0	107.0	90.9	65.8	118.2
ON-LINE Diss. Oxygen	%	107.3	90.7	123.9	114.0	103.8	119.1	112.6	93.2	85.7	89.3	101.8	123.4	106.0	75.2	153.6
Odour	T.O.N.	18	25	36	55	70	80	115	175	80	40	8	14	59	10	200
pH	pH units	8.40	8.13	8.34	8.36	8.41	8.63	8.60	8.88	8.39	8.31	8.40	8.58	8.45	8.03	9.03
Temperature	° C	4.6	4.5	6.5	7.4	14.3	18.7	23.8	20.7	18.1	10.1	3.1	2.7	11.2	1.7	24.4
Turbidity	NTU	1.1	1.3	1.6	1.5	1.7	3.4	5.9	7.2	3.6	6.0	4.4	4.5	3.5	0.8	17.1
TDS	mg/L	392	374	437	324	309	287	274	267	290	318	291	348	322	250	450
TSS	mg/L	0	0	0	0	0	6	7	6	6	0	6	0	3	0	12
Langelier Saturation Index	pH units (calc)	0.36	0.20	0.54	0.30	0.59	0.66	0.67	0.69	0.24	0.46	0.19	0.66	0.46	0.11	0.82
MAJOR CONSTITUENTS																
Alkalinity (p)	mg/L CaCO3	<DL	<DL	2	<DL	3	5	4	4	1	<DL	<DL	4	2	<DL	7
Alkalinity (total)	mg/L CaCO3	184	203	208	171	168	140	129	116	142	161	166	181	162	115	210
Bicarbonate	mg/L	224	247	249	207	199	160	148	132	170	197	200	211	193	124	256
Carbonate	mg/L	<DL	<DL	2	<DL	3	6	5	5	1	<DL	<DL	5	2	<DL	9
Calcium	mg/L	50	55	56	47	48	37	33	28	37	42	47	50	44	27	57
Magnesium	mg/L	25	27	27	22	21	19	19	19	19	20	21	22	22	19	28
Hardness (total)	mg/L CaCO3	224	248	249	203	202	178	161	143	161	188	196	219	201	140	257
Sodium	mg/L	42	47	48	36	34	33	32	35	33	36	33	37	38	32	49
Potassium	mg/L	5.1	5.5	5.5	4.3	4.4	3.8	3.8	4.2	4.2	4.5	4.4	4.6	4.6	3.8	5.7
Sulphate	mg/L	108	119	118	92	93	86	81	78	87	90	93	102	95	77	121
Chloride	mg/L	17.9	19.8	19.5	15.1	14.6	13.1	13.0	16.5	14.1	15.0	14.7	15.8	15.7	12.9	20.1
TRACE CONSTITUENTS																
Aluminum (dissolved 0.45µ)	µg/L	20	8	15	<DL	92	80	17	171	15	18	13	58	53	<DL	301
Aluminum (Total)	µg/L	17	17	10	35	241	131	141	79	66	94	44	216	91	10	241
Ammonia N	mg/L N	<DL	<DL	0.04	<DL	<DL	<DL	<DL	0.11	<DL	0.07	<DL	<DL	<DL	<DL	0.22
BOD (5-day)	mg/L	7.2	2.1	4.7	3.4	2.0	3.8		6.9	4.4	3.3	2.5	5.7	4.2	2.0	7.2
Bromide	mg/L					<DL								<DL	<DL	<DL
Chlorophyll a	µg/L	20	27	16	5	3	31	28	52	26	10	3	24	21	3	96
Fluoride	mg/L	0.20	0.20	0.19	0.17	0.16	0.16	0.17	0.16	0.17	0.18	0.17	0.17	0.18	0.16	0.20
Iron (dissolved)	mg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Iron (Total)	mg/L												0.10	0.10	0.10	0.10
Manganese (dissolved)	mg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Manganese (Total)	mg/L												<DL	<DL	<DL	<DL
Nitrate	mg/L	0.05	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	0.18	<DL	<DL	<DL	0.25
Organic N	mg/L N	<DL	0.55	0.60	0.45	0.40	0.60	0.70	0.55	0.80	0.80	<DL	<DL	0.51	<DL	1.00
Raw TOC	mg/L C (UV)	6.1	6.5	6.7	5.7	5.2	5.5	6.8	7.7	8.2	6.4	5.3	5.7	6.4	5.0	10.0
Raw DOC (GF diss)	mg/L C (UV)	5.7	5.9	5.9	5.3	4.8	4.8	5.5	6.4	6.6	5.7	4.9	5.1	5.6	4.5	8.0
UV absorbance @ 254nm	Abs 10cm	0.888	0.948	0.938	0.780	0.730	0.736	0.885	0.956	0.977	0.861	0.754	0.792	0.854	0.686	1.036
SUVA	L / mg m	1.568	1.608	1.595	1.463	1.525	1.546	1.550	1.554	1.476	1.508	1.544	1.541	1.540	1.115	1.880
PreFM UV abs @ 254nm	Abs 10cm						0.689	0.708	0.801	0.796	0.686			0.744	0.613	0.923
Phosphate (ortho)	µg/L P	4	2	2	3	6	<DL	14	13	7	10	21	4	7	<DL	21
Phosphate (total)	µg/L P	43	39	36	33	37	49	78	113	88	58	49	41	55	33	122
Silica (SiO3)	mg/L	3.9	3.8	2.7	1.4	0.8	0.3	1.7	3.1	4.3	5.4	4.1	2.0	2.8	0.3	5.4

2021 - BUFFALO POUND WATER QUALITY DATA: RAW LAKE WATER

PARAMETERS	Units	JAN AVG	FEB AVG	MAR AVG	APR AVG	MAY AVG	JUN AVG	JUL AVG	AUG AVG	SEP AVG	OCT AVG	NOV AVG	DEC AVG	YEAR AVG	YEAR MIN	YEAR MAX
TRACE CONSTITUENTS																
PreFM (chlorinated raw water)																
TTHMs (total)	µg/L(calc)							52	64	47	32			49	27	68
Chloroform	µg/L							41	51	39	26			39	22	55
Bromodichloromethane	µg/L							10	11	8	6			9	5	11
Chlorodibromomethane	µg/L							<DL	2	<DL	<DL			1	<DL	9
Bromoform	µg/L							<DL	<DL	<DL	<DL			<DL	<DL	<DL
BIOLOGICAL																
Blue Green Algae (x10^3)	per litre	78	50	320	133	356	4,618	9,611	8,639	3,956	1,300	617	838	2,534	<DL	21,111
Green Algae (x10^3)	per litre	3,283	5,375	13,502	6,322	5,339	10,573	16,056	26,222	5,262	331	331	920	7,775	156	38,667
Diatoms (x10^3)	per litre	167	417	3,267	1,133	867	818	2,222	1,083	942	103	483	682	1,047	22	4,667
Flagellates (x10^3)	per litre	178	144	271	233	622	1,198	4,667	3,361	1,102	44	83	131	978	<DL	8,889
Crustaceans	per litre	5	<3	<3	7	7	34	8	19	4	31	30	6	13	<3	77
Nematodes (x10^3)	per litre	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	44
Rotifers (x10^3)	per litre	<DL	<DL	<DL	22	<DL	22	56	83	44	<DL	<DL	<DL	19	<DL	333
Other (x10^3)	per litre	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Total Green & B-G	per litre	3,361	5,425	13,822	6,456	5,694	15,191	25,667	34,861	9,218	1,631	947	1,758	10,310	256	51,333
BACTERIOLOGICAL																
Total Coliforms (mEndo)	per 100 ml	<DL	4	<DL	<DL	30	100	500	3,250	200	<DL	55	<DL	324	<DL	6,000
Total Coliforms (background, mEndo)	per 100 ml	141	88	146	535	2,460	5,720	36,500	36,875	39,375	3,300	1,498	180	10,065	22	75,500
Total Coliforms (MPN)	per 100 ml	5	11	14	37	83	362	4,701	4,634	3,112	384	136	34	995	3	8,164
E. coli (MPN)	per 100 ml	<DL	<DL	<DL	<DL	3	<DL	1	10	60	3	1	<DL	7	<DL	122
Standard Plate Count	per 1 ml	7	6	7	18	88	219	1,293	1,063	4,496	203	115	83	697	2	18,810
CHEMICAL DOSES																
Alum	mg/L			99	83	70	76	65	75	68	53	55	58	71	45	100
Alum\Raw DOC	ratio			16.83	15.46	14.63	16.06	11.35	12.20	10.28	9.17	11.29	11.29	12.93	8.52	21.37
Alum-DOC Stoich	ratio			1.36	1.25	1.19	1.30	0.92	0.99	0.83	0.74	0.92	0.92	1.05	0.69	1.73
Chlorine-pre	mg/L						3.6	5.0	7.6	5.0	3.7			5.2	2.6	8.0
Chlorine-intermed	mg/L	1.5	1.4	1.1	0.9	0.9	1.4					1.5	0.8	1.2	0.6	3.2
Chlorine-post	mg/L	1.5	1.5	1.5	1.4	1.5	1.5	1.5	1.4	1.5	1.4	1.6	1.6	1.5	0.8	1.8
Plant Flow	MLD	86.3	96.5	93.0	93.5	96.8	141.0	143.8	126.3	115.2	89.5	80.5	82.4	104.0	60.0	153.0
Qu'Appelle Dam Flow	cu m/s	1.80	1.78	1.84	8.85	10.65	9.54	7.23	6.80	7.34	1.50	1.90	2.02	5.05	0.0	11.0
Fluoride (Set Point for MJ)	mg/L															
Powdered Carbon	mg/L															
CPAC Train A	mg//L	34.3	38.8			37.5	38.9	35.0	41.9	39.5	30.6	35.0	33.5	36.5	25.0	50.0
CPAC Train B	mg//L	32.8	37.3											35.0	32.0	41.0
Total Chlorine dose	mg/L (Calc)	3.0	3.0	2.6	2.2	2.4	3.3	6.5	9.0	6.5	5.1	3.1	2.4	4.1	2.0	9.2
Date GAC`s ON														19-MAY		
Date GAC`s OFF														20-DEC		
Date Ice ON Lake														17-NOV		
Date Ice OFF Lake														09-APR		
Date PAC ON																
Date PAC OFF																
CHLORINE RESIDUALS EXIT PLANT (week avg.)																
Free Chlorine (CW)	mg/L (calc)	1.28	1.42	1.31	1.33	1.32	1.34	1.23	1.28	1.28	1.24	1.29	1.30	1.30	1.19	1.71
Combined Chlorine (CW)	mg/L (calc)	0.32	0.35	0.29	0.25	0.19	0.10	0.15	0.18	0.17	0.17	0.17	0.22	0.21	0.06	0.39

2021 - BUFFALO POUND WATER QUALITY DATA: TREATED WATER

PARAMETERS	UNITS	JAN AVG	FEB AVG	MAR AVG	APR AVG	MAY AVG	JUN AVG	JUL AVG	AUG AVG	SEP AVG	OCT AVG	NOV AVG	DEC AVG	YEAR AVG	YEAR MIN	YEAR MAX
PHYSICAL																
Colour (Apparent)	Pt/Co	<DL	<DL	<DL	3	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	3
Conductivity	µS/cm	620	661	683	548	558	514	475	453	482	528	542	586	554	453	683
Diss. Oxygen	mg/L	12.0	14.4	12.6	12.5	11.1	7.6	6.4	6.4	8.3	8.9	12.1	12.7	10.4	6.4	14.4
% Sat. Diss. Oxygen	%	91.3	110.0	96.9	97.4	101.1	80.7	75.4	73.6	86.6	80.5	93.2	93.4	90.0	73.6	110.0
Odour(Dechlorinated)	T.O.N.	5	6	8	8	6	1	<1	2	2	1	2	3	3	<1	10
PreGAC Odour	T.O.N.					8	5	7	53	44	11	5	5	18	4	80
Odour Removal by Coagulation and Filtration	%	72.5%	73.8%	74.0%	85.4%	89.0%	94.0%	93.5%	66.3%	46.3%	70.8%	57.5%	62.0%	73.4%	25.0%	95.0%
Odour Removal Overall	%	72.5%	73.8%	74.0%	85.4%	91.9%	99.0%	99.7%	98.6%	97.7%	97.1%	86.3%	77.0%	87.7%	40.0%	100.0%
PreFM pH	pH units						8.58	8.20	8.03	7.93	7.86			8.06	7.75	8.70
Coagulation pH - Channel 1	0	7.53	7.45	7.08	7.12	7.43	7.38	7.26	7.10	7.18	7.51	7.44	7.56	7.33	7.03	7.91
Coagulation pH - Channel 2	pH units	7.52	7.46	7.09	7.14	7.19	7.06	6.98	6.86	6.96	7.18	7.27	7.33	7.17	6.79	7.56
Clearwell pH	pH units	7.64	7.56	7.29	7.31	7.40	7.34	7.23	7.04	7.10	7.32	7.41	7.50	7.34	6.98	7.67
Temperature	°C	3.7	3.7	5.4	6.5	12.8	18.7	24.0	20.8	16.3	10.1	2.9	2.5	10.6	1.2	24.8
Turbidity	NTU	0.09	0.11	0.11	0.09	0.09	0.09	0.10	0.08	0.09	0.08	0.07	0.10	0.09	0.06	0.12
Total Dissolved Solids	mg/L	388	350	442	296	318	295	270	262	292	317	292	344	314	246	442
Total Suspended Solids	mg/L	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.0
Turbidity Log Removal	(calc)	1.12	1.10	1.15	1.20	1.28	1.53	1.76	1.93	1.60	1.68	1.54	1.54	1.45	0.98	2.39
Langelier Saturation Index	pH units (calc)	-0.40	-0.43	-0.80	-0.91	-0.53	-0.62	-0.88	-1.19	-1.01	-0.69	-0.76	-0.59	-0.74	-1.19	-0.40
MAJOR CONSTITUENTS																
Alkalinity(p)	mg/L CaCO3	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Alkalinity(total)	mg/L CaCO3	160	175	159	130	139	108	99	81	107	133	137	151	129	78	179
Bicarbonate	mg/L	195	214	194	158	169	131	120	98	130	161	167	184	157	95	219
Carbonate	mg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Calcium	mg/L	50	52	56	45	47	37	32	27	36	43	46	49	41	26	56
Magnesium	mg/L	25	26	27	22	21	19	19	19	19	20	21	23	22	19	27
Hardness (total)	mg/L CaCO3	223	234	251	197	200	177	160	139	160	188	195	218	195	139	251
Sodium	mg/L	43	47	49	37	36	33	33	35	34	37	34	37	38	33	49
Potassium	mg/L	5.2	5.4	5.6	4.3	4.3	3.8	3.9	4.3	4.3	4.6	4.4	4.7	4.5	3.8	5.6
Sulphate	mg/L	107	117	170	129	111	106	96	95	104	105	107	117	110	94	170
Chloride	mg/L	35.0	38.2	22.3	16.7	25.0	25.7	25.2	29.5	27.6	27.4	24.7	24.4	26.7	16.7	38.2
TRACE CONSTITUENTS																
CLEAR WELL																
Aluminum (dissolved 0.45µ)	µg/L Chart	22	25	27	21	28	18	39	20	17	17	11	14	22	11	39
Aluminum (total)	µg/L Chart	42	37	32	21	30	20	43	21	18	19	11	17	26	11	43
Aluminum (total 12 mo avg)	µg/L	22	23	24	23	23	23	26	26	27	27	27	26			
Aluminum (particulate)	µg/L (Calc)	20	12	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	20
MIXED MEDIA FILTER A																
Aluminum (total)	µg/L	39	47	45	25	39	50	92	48	43	41	26	29	43	25	92
MIXED MEDIA FILTER L																
Aluminum (total)	µg/L	40	28	31	73	30	19	50	29	33	43	31	55	38	19	73
PREGAC																
Aluminum (dissolved)	µg/L						23	60	31	22	28	19	23	29	19	60
Aluminum (total)	µg/L Chart						30	70	36	28	36	25	33	37	25	70
Ammonia N	mg/L N	<DL	<DL	<DL	0.06	0.10	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	0.10
Bromide	mg/L					<DL								<DL	<DL	<DL
Fluoride	mg/L	0.14	0.13	0.10	0.08	0.10	0.09	0.12	0.10	0.09	0.12	0.11	0.12	0.11	0.08	0.14
Fluoride (MJ dose by ISE)	mg/L (wk avg)															
Iron (dissolved)	mg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Iron (total)	mg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Manganese (dissolved)	mg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Manganese (total)	mg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL

PARAMETERS	UNITS	JAN AVG	FEB AVG	MAR AVG	APR AVG	MAY AVG	JUN AVG	JUL AVG	AUG AVG	SEP AVG	OCT AVG	NOV AVG	DEC AVG	YEAR AVG	YEAR MIN	YEAR MAX
PREGAC CONTINUED																
Nitrate	mg/L N	0.06	<DL	<DL	<DL	<DL	<DL	<DL	0.08	0.08	0.06	0.18	0.06	0.06	<DL	0.26
Organic N	mg/L N	0.20	0.20	0.20	0.20	0.20	<DL	0.10	<DL	0.10	0.10	<DL	<DL	0.11	<DL	0.20
CW TOC	mg/L C	3.7	3.9	3.7	3.4	2.5	0.9	1.6	1.9	2.3	2.5	2.4	3.0	2.6	0.6	4.2
CW DOC (GF diss)	mg/L C	3.7	3.9	3.8	3.4	2.5	0.9	1.6	1.9	2.2	2.5	2.5	3.1	2.7	0.6	4.1
PreGAC TOC (GF diss)	mg/L C					3.0	3.0	3.5	3.6	3.7	3.7	3.1	3.4	3.4	2.7	4.1
PreGAC DOC (GF diss)	mg/L C					3.0	3.0	3.4	3.6	3.7	3.7	3.1	3.4	3.4	2.7	4.0
TOC Removal by Coagulation & Filtration	% Removal	39.0%	40.3%	44.4%	39.8%	41.0%	45.7%	48.9%	51.7%	54.5%	41.2%	41.8%	39.2%	44.2%	31.3%	60.3%
DOC Removal by Coagulation & Filtration	% Removal	34.0%	34.3%	35.9%	36.0%	35.8%	36.8%	37.3%	42.3%	44.2%	35.0%	35.7%	32.2%	36.8%	27.7%	49.5%
DOC Removal by GAC Filtration	% Removal					80.0%	71.5%	53.5%	48.9%	39.0%	31.8%	21.1%	15.9%	42.3%	13.6%	80.0%
TOC Removal by GAC Filtration	% Removal					80.3%	71.8%	53.5%	47.9%	38.4%	32.5%	21.4%	15.9%	42.3%	10.0%	80.4%
CW Organic Carbon (diss @ 254nm)	Abs 10cm	0.456	0.495	0.466	0.382	0.277	0.044	0.109	0.164	0.202	0.232	0.256	0.339	0.284	<0.5	0.505
PreGAC Organic Carbon (diss @ 254nm)	Abs 10cm					0.378	0.347	0.407	0.448	0.446	0.468	0.414	0.450	0.422	0.276	0.516
Conventional SUVA	L / mg m	1.219	1.277	1.235	1.118	1.164	1.149	1.189	1.218	1.209	1.265	1.319	1.299	1.222	1.015	1.414
CW SUVA	L / mg m	1.219	1.277	1.235	1.118	1.081	0.479	0.741	0.874	0.900	0.917	1.035	1.104	0.993	0.043	1.360
Phosphate(ortho)	µg/L P	0	0	0	0	0	5	5	4	0	0	0	0	1	0	5
Phosphate(total)	µg/L P	9	6	6	6	5	6	<DL	6	<DL	4	6	4	5	<DL	9
Silica (SiO3)	mg/L	3.6	3.5	2.8	<DL	<DL	<DL	1.6	2.8	3.8	4.7	3.9	1.9	2.6	<DL	4.7
CLEARWELL																
TTHM's (total)	µg/L (calc)	18	17	17	16	14	2	15	43	48	40	25	19	23	1	52
Chloroform	µg/L	12	12	11	11	9	2	13	37	40	33	20	14	18	1	44
Bromodichloromethane	µg/L	5	5	4	4	4	<DL	2	6	8	7	5	5	4	<DL	9
Chlorodibromomethane	µg/L	<DL	1	1	1	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	2
Bromoform	µg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
CHANNEL																
TTHM's (total)	µg/L (calc)	4	4	3	3	5	20	54	63	49	42	3	4	11	2	63
Chloroform	µg/L	4	4	3	3	4	15	40	50	38	32	3	3	9	2	50
Bromodichloromethane	µg/L	<DL	<DL	<DL	<DL	<DL	4	12	12	10	9	<DL	<DL	2	<DL	12
Chlorodibromomethane	µg/L	<DL	<DL	<DL	<DL	<DL	1	2	1	1	1	<DL	<DL	<DL	<DL	2
Bromoform	µg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
PREGAC																
TTHM's (total)	µg/L (calc)					10	24	52	59	47	36	10	9	34	8	61
Chloroform	µg/L					7	17	40	47	37	28	8	7	26	6	50
Bromodichloromethane	µg/L					3	6	11	11	10	8	2	2	7	2	11
Chlorodibromomethane	µg/L					<DL	<DL	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	1
Bromoform	µg/L					<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
BIOLOGICAL																
Blue Green Algae	per litre	<DL	<DL	<DL	<DL	<DL	22,222	<DL	<DL	<DL	<DL	11,111	<DL	2,778	<DL	22,222
Green Algae	per litre	66,666	55,555	<DL	22,222	44,444	<DL	11,111	<DL	11,111	33,333	33,333	<DL	23,148	<DL	66,666
Diatoms	per litre	<DL	<DL	<DL	11,111	<DL	<DL	22,222	<DL	<DL	<DL	<DL	<DL	2,778	<DL	22,222
Flagellates	per litre	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Crustaceans	per litre	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Nematodes	per litre	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Rotifers	per litre	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Other	per litre	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
BACTERIOLOGICAL																
Total Coliforms (mEndo)	per 100 ml	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Total Coliforms (background, mEndo)	per 100 ml	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Total Coliforms (MPN)	per 100 ml	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
E. coli (MPN)	per 100 ml	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Standard Plate Count	per 1 mL	<DL	<DL	0.2	<DL	<DL	<DL	<DL	0.5	<DL	<DL	<DL	<DL	0.1	<DL	1.0

*Note: Faecal Coliforms analyzed ONLY if Total Coliforms Detected.

BUFFALO POUND WATER TREATMENT CORPORATION

AUDITED FINANCIAL STATEMENTS

Independent Auditor's Report

To the Chair and Members of the Board of Directors of the Buffalo Pound Water Treatment Corporation:

Opinion

We have audited the financial statements of Buffalo Pound Water Treatment Corporation (the "Organization"), which comprise the statement of financial position as at December 31, 2021, and the statements of operations, changes in net financial liabilities and cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Organization as at December 31, 2021, and the results of its operations, changes in its net financial assets and its cash flows for the year then ended in accordance with Canadian public sector accounting standards.

Basis for Opinion

We conducted our audit in accordance with Canadian generally accepted auditing standards. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the Organization in accordance with the ethical requirements that are relevant to our audit of the financial statements in Canada, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with Canadian public sector accounting standards, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the Organization's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Organization or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Organization's financial reporting process.

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Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Canadian generally accepted auditing standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with Canadian generally accepted auditing standards, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Organization’s internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Organization’s ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Organization to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Regina, Saskatchewan

March 30, 2022

MNP LLP

Chartered Professional Accountants

MNP

Buffalo Pound Water Treatment Corporation

STATEMENT OF FINANCIAL POSITION

[in dollars]

As at December 31

	2021	2020
FINANCIAL ASSETS		
Cash and cash equivalents (Note 3)	**94,878,535**	49,738,489
Accounts receivable		
City of Regina	**1,362,526**	-
City of Moose Jaw	**412,492**	408,268
GST receivable	**1,250,266**	1,690,570
Other	**20,925**	11,255
	97,924,744	51,848,582
FINANCIAL LIABILITIES		
Accounts payable and accrued liabilities	**5,244,956**	12,741,983
Employee benefit obligations (Note 4)	**799,639**	811,004
Long term debt (Note 7)	**100,139,000**	41,418,000
	106,183,595	54,970,987
Net financial liabilities	**(8,258,851)**	(3,122,405)
NON-FINANCIAL ASSETS		
Inventory of chemicals	**128,452**	224,048
Prepaid expenses	**19,119**	-
Tangible capital assets (Note 5)	**106,210,567**	90,890,613
Accumulated surplus (Note 6)	**98,099,287**	87,992,256

See accompanying notes.

SIGNED ON BEHALF OF THE BOARD

Board of Director Chair

Board Member-Chair of Finance and Audit Committee

SIGNED ON BEHALF OF THE CORPORATION

President and CEO

Buffalo Pound Water Treatment Corporation

STATEMENT OF OPERATIONS

[in dollars]

For the year ended December 31

	Budget	**2021**	**2020**
REVENUE			
Operating contributions			
City of Regina	10,548,000	**10,650,793**	10,491,959
City of Moose Jaw	1,827,000	**1,851,784**	1,805,033
Sask Water	72,000	**78,836**	78,649
Capital contributions			
City of Regina	7,325,000	**7,396,384**	6,354,143
City of Moose Jaw	1,268,800	**1,285,961**	1,093,189
Sask Water	77,300	**83,616**	68,988
	21,118,100	**21,347,374**	19,891,961
Power charges	551,100	**673,340**	783,459
Miscellaneous revenue	9,000	**37,370**	29,506
Interest	300,000	**280,046**	596,143
Government contributions (Note 9)	16,340,100	**4,461,767**	12,533,729
	38,318,300	**26,799,897**	33,834,798
EXPENSES			
Employee wages and benefits (Schedule 1)	4,270,500	**4,213,572**	4,216,932
Amortization of tangible capital assets	-	**2,945,123**	3,219,659
Utilities (Schedule 1)	2,530,000	**2,051,966**	2,457,223
Chemicals (Schedule 1)	2,070,000	**2,256,304**	2,313,250
Equipment maintenance (Schedule 1)	2,742,000	**2,277,931**	1,667,294
Miscellaneous (Schedule 1)	512,000	**650,599**	563,785
Laboratory supplies and research (Schedule 1)	360,000	**353,085**	314,397
Building and ground maintenance (Schedule 1)	171,000	**89,809**	146,760
Administration (Schedule 1)	340,000	**397,956**	305,382
Interest expenses and bank charges (Schedule 1)	3,636,200	**1,456,521**	1,406,140
Reimbursement (Schedule 1)	-	**-**	5,736,685
	16,631,700	**16,692,866**	22,347,507
Excess of revenue over expenses	21,686,600	**10,107,031**	11,487,291
Accumulated surplus, beginning of year		**87,992,256**	76,504,965
Accumulated surplus, end of year		**98,099,287**	87,992,256

See accompanying notes.

Buffalo Pound Water Treatment Corporation

STATEMENT OF CHANGE IN NET FINANCIAL LIABILITIES

[in dollars]

For the year ended December 31

	2021	2020
Excess of revenue over expenses	**10,107,031**	11,487,291
Acquisition of tangible capital assets	**(18,265,077)**	(22,761,363)
Amortization of tangible capital assets	**2,945,123**	3,219,659
Consumption of inventory of chemicals	**2,256,304**	2,313,250
Acquisition of inventory of chemicals	**(2,160,708)**	(2,376,179)
Acquisition of prepaid expenses	**(19,119)**	-
Increase in net financial liabilities	**(5,136,446)**	(8,117,342)
Net financial assets, beginning of year	**(3,122,405)**	4,994,937
Net financial liabilities end of year	**(8,258,851)**	(3,122,405)

See accompanying notes.

Buffalo Pound Water Treatment Corporation

STATEMENT OF CASH FLOWS

[in dollars]

For the year ended December 31

	2021	2020
OPERATING ACTIVITIES		
Excess of revenue over expenses	**10,107,031**	11,487,291
Non-cash item		
Amortization of tangible capital assets	**2,945,123**	3,219,659
Net change in non-cash working capital balances		
in accounts receivable	**(936,116)**	203,438
in accounts payable and accrued liabilities	**(7,497,027)**	1,392,904
in employee benefit obligations	**(11,365)**	41,313
in inventory of chemicals	**95,596**	(62,929)
in prepaid expenses	**(19,119)**	-
Cash provided by operating activities	**4,684,123**	16,281,676
CAPITAL ACTIVITIES		
Acquisition of tangible capital assets	**(18,265,077)**	(22,761,363)
FINANCING ACTIVITIES		
Payment of long-term debt	(1,279,000)	(1,235,000)
Advances of long-term debt	60,000,000	-
Cash provided from financing activities	**58,721,000**	(1,235,000)
Increase (decrease) in cash position	**45,140,046**	(7,714,687)
Cash and cash equivalents, beginning of year	**49,738,489**	57,453,176
Cash and cash equivalents, end of year	**94,878,535**	49,738,489

See accompanying notes.

Buffalo Pound Water Treatment Corporation
NOTES TO THE FINANCIAL STATEMENTS
[in dollars]

For the year ended December 31, 2021

1. BASIS OF OPERATIONS

Buffalo Pound Water Treatment Corporation (the "Corporation") was incorporated under *The Non-Profit Corporations Act*, *1995* on January 1, 2016. The City of Regina owns 74 Class A voting memberships and the City of Moose Jaw owns 26 Class A voting memberships of the Corporation. The City of Regina and the City of Moose Jaw entered into a Unanimous Membership Agreement effective January 1, 2016.

The Corporation is responsible for reliable and efficient provision of safe, high quality and affordable drinking water to the City of Regina and the City of Moose Jaw. The Corporation is a not-for-profit organization, and is not subject to either federal or provincial income taxes.

Impact of Covid-19

In March of 2020, there was a global outbreak of COVID-19 (Coronavirus), which had a significant impact on businesses through the restrictions put in place by the Canadian, Provincial and Municipal Governments regarding travel, business operations and isolations/quarantine orders. At this time, the extent of the impact of COVID-19 outbreak had and will have on the organization is minimal as there was no significant decrease in revenues and no additional funding was received as a result of COVID-19. In addition, the pandemic did not cause any closure of the business

2. SIGNIFICANT ACCOUNTING POLICIES

The financial statements of the Corporation are the representation of management and have been prepared in accordance with Canadian public sector accounting standards.

The significant accounting policies used in the preparation of these financial statements are summarized below:

Use of estimates

The preparation of financial statements in conformity with Canadian public sector accounting standards requires management to make estimates and use assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the year. Actual results could differ from those estimates. Significant estimates include the amortization of tangible capital assets and employee benefits obligations.

Employee benefit obligations

Employee benefit obligations relating to severance or retirement benefits are recognized to the extent that they are vested and could be taken in cash by an employee on termination. The obligations have been determined on an actuarial basis using the projected benefit method prorated on services. Experience gains/losses are amortized over the estimated average remaining life of the employee group.

Pension benefit obligations

The Corporation is one of the sponsors of a multi-employer defined benefit pension plan. The Corporation follows defined benefit accounting under which pension expense is limited to the Corporation's contributions to the plan.

Inventory of chemicals

Inventory of chemicals are valued at the lower of net realizable value and average cost.

2. SIGNIFICANT ACCOUNTING POLICIES (Continued)

Contributions

Contributions are considered government transfers and are recognized in the financial statements as revenues and expenses in the period in which events giving rise to the transfer occur, providing the transfers are authorized, eligibility criteria have been met and reasonable estimates of the amounts can be made.

Operating and capital contributions for water consumed based upon the following established rates:

	2021	2020
General water rate, $ per megalitre	**360.00**	355.00
Electricity rate, $ per kilowatt hour	**0.11799**	0.11799

	2021	2020
Capital water rate, $ per megalitre	**250.00**	215.00

Financial Instruments

Financial instruments are any contracts that give rise to financial assets of one entity and financial liabilities or equity instruments of another entity. The Corporation recognizes a financial instrument when it becomes a party to the contractual provisions of a financial instrument. Financial instruments of the Corporation include cash and cash equivalents, accounts receivable, accounts payable and accrued liabilities, long term debt and associated derivatives.

Credit Risk

Credit risk is the risk of financial loss to the Corporation if a customer or counterparty to a financial instrument fails to meet its contractual obligations. The Corporation’s credit risk is primarily attributable to accounts receivable. This risk is limited as accounts receivable is due mainly from the City of Regina and the City of Moose Jaw.

Liquidity Risk

Liquidity risk is the risk that Corporation will not be able to meet its financial obligations as they become due. The City of Regina staff on behalf of the Corporation manages liquidity risk by continually monitoring cash flow requirements to ensure that it has sufficient funds to meet obligations when they become due. The Corporation has established operating and capital rates which are calculated using a full cost recovery model that will generate sufficient revenues to cover the operating costs and capital investments.

Interest Rate Risk

Interest rate risk is the risk that value of a financial instrument might be adversely affected by a change in interest rates. Changes in market interest rates may have an effect on the cash flows associated with some financial assets and liabilities, known as cash flow risk, and on the fair value of the other financial assets and liabilities, known as price risk.

Exposure on the Company's long term debt is managed by using declining balance interest rate swaps. The Corporation entered into interest rate swap agreements to fix the interest rates on its respective term loans which are disclosed in Note 7.

2. SIGNIFICANT ACCOUNTING POLICIES (Continued)

Tangible Capital Assets (TCA)

Tangible capital assets are recorded at cost which includes all amounts that are directly attributable to acquisition, construction, development or betterment of the asset. The cost, less residual value, of the tangible capital assets are amortized on a straight-line basis over their estimated useful lives as follows:

General	
Vehicles and equipment	6 to 20 years
Office and information technology	10 to 15 years
Infrastructure	
Plants and facilities	5 to 40 years
Roads	15 years

Assets under construction are not amortized until the asset is available for productive use.

Tangible capital assets received as contributions are recorded at their fair value at the date of receipt and also are recorded as revenue.

3. CASH AND CASH EQUIVALENTS

Cash and cash equivalents comprise cash on hand, demand deposits and a banker's acceptance at a fixed rate of 2.1% with original maturities of three months or less that are readily convertible into to known amounts of cash and which are subject to an insignificant risk of changes in value.

4. EMPLOYEE BENEFIT OBLIGATIONS

The employee benefit obligations accrued at year end are as follows:

	2021	2020
Vacation pay	**506,639**	464,004
Vested termination payments	**293,000**	347,000
	799,639	811,004

Based upon an agreement with UNIFOR Local 595, termination payments for union employees vest after 10 years of service and upon retiring with unreduced pension. The amount payable on termination after vesting is 20 hours pay for each completed year of service.

In 2017, the Board of Directors approved a decision to end the vesting of termination payments for out-of-scope employees as of December 31, 2017. Out-of-scope employees were provided the option to have their severance paid out on December 31, 2017 or to elect to defer the payment until they leave the Corporation. For employees who elected to defer, the payment will neither increase nor decrease from the December 31, 2017 assessment.

An actuarial valuation of vested sick leave and severance payments was completed using the projected benefit method at December 31, 2021. The actuarial valuation was based on assumptions about future events including employee turnover and mortality, wage and salary increases, sick leave usage and interest rates. These rates are consistent with superannuation plan. The discount rate used to determine the unfunded employee benefit was 2% and the inflation rate was 2.25%. Compensation rates for employees are assumed to increase at an average rate of 3.25% per annum plus merit and promotion thereafter.

4. EMPLOYEE BENEFIT OBLIGATIONS (Continued)

The Corporation is a member of the City of Regina Civic Employees' Superannuation and Benefit Plan (the Plan), which is overseen by its own Administrative Board. All eligible permanent and probationary employees of the Corporation are members of the Plan. This multi-employer Plan provides defined retirement benefits and is integrated with the Canada Pension Plan (CPP). The Plan provides a lifetime monthly pension based on an employee's years of service and the average of the best three consecutive years of earnings for service before 2016. For service after 2015, a best-five-years average is used. For 2021 employees contributed 8.80% (2020 - 8.80%) of their earnings below the CPP maximum and 13.10% (2020 - 13.10%) of earnings above the CPP maximum. The Corporation's contribution rates were set as 9.80% (2020 - 9.80%) of their earnings below the CPP maximum and 14.60% (2020 - 14.60%) of earnings above the CPP maximum.

Financial statements as at December 31, 2020 indicate the Plan had a surplus of net assets of - $147,960,000 (2019 ($108,185,000).

The Plan is a multi-employer defined benefit plan; therefore neither benefits nor contributions are segregated by employer. The Plan has been accounted for using the method appropriate for defined contribution plans and, as such, the amount of pension expense is equal to the contributions required for the year. Pension costs of $377,939.38 (2020 - $333,543) based on employer contributions were expensed during 2021

The Corporation is a member of the Regina Civic Employees' Long-term Disability Plan (the Disability Plan). Financial statements as of December 31, 2020 indicate a surplus of net assets available for benefits of $32,547,000 (2019 - $31,502,000).

The Long-Term Disability Plan is a multi-employer plan and consequently, identification of individual employer's assets is not available from the Disability Plan managers. Accordingly, no portion of the surplus has been recognized as an asset or expense reduction in the financial statements. For all permanent employees, disability benefits are based on 75% of the member's salary and will be paid either throughout the duration of the disability until recovery, until the member elects voluntary early retirement, reaches age 65 or upon death, whichever occurs first. The Disability Plan has been accounted for using the method appropriate for defined contribution plans and, as such, the amount of benefit expense is equal to the contributions required for the year. Member contributions are made to the Plan at a rate of 0.46% with the employer matching contributions.

As well, the Corporation provides for additional coverage to its employees through the Out-Of-Scope Employment and Benefits policy and the Collective Bargaining Agreement. The Corporation guarantees full salary for out-of-scope employees (those employed before January 1, 2015) for the first two (2) years of such a disability and thereafter 90% of such employee's salary less benefit payments from all other sources. The Corporation guarantees 70% of an in-scope employee's salary through Article 30 less benefit payments from all other sources. The Corporation recorded disability premium costs for 2021 of $14,606 (2020 - $14,535). Dental and medical plans are also provided for most employees and are paid by the Corporation.

5. TANGIBLE CAPITAL ASSETS

	Net Book Value	
	2021	2020
General		
Land	**253,869**	88,535
Vehicles and equipment	**585,889**	306,042
Office and information technology	**10,462**	14,435
Infrastructure		
Plants and facilities	**48,628,588**	48,762,173
Roads	**347,352**	377,555
Assets under construction	**56,384,407**	41,341,873
	106,210,567	90,890,613

6. ACCUMULATED SURPLUS

	Unappropriated Surplus	Capital replacement reserve	Investment in Tangible Capital Assets	2021	2020
,					
Opening balance	**2,048,354**	**4,085,254**	**81,858,648**	**87,992,256**	76,504,965
Excess of revenue over expenses	**13,052,154**	**-**	**(2,945,123)**	**10,107,031**	11,487,291
Tangible capital assets investment	**(18,265,077)**	**-**	**18,265,077**	**-**	-
Transfer from operations (Note i)	**(5,060,772)**	**-**	**5,060,772**	**-**	-
Transfer of surplus from operations	**(13,507,774)**	**13,507,774**	**-**	**-**	-
Expenditures from reserve for replacement of capital assets	**17,478,967**	**(17,478,967)**	**-**	**-**	-
Accumulated surplus (deficit)	**(4,254,148)**	**114,061**	**102,239,374**	**98,099,287**	**87,992,256**

i. In 2017, the City of Regina and the City of Moose Jaw approved the Corporation to enter into a non-revolving term loan with Bank of Montreal. As disclosed in Note 7, the purpose of this advancement of these funds was to finance the Electrical Upgrade Capital Project with any remaining funds for the Plant Renewal Project. In 2021, management had a net repayment of debt of $5,060,772 (2020-net utilization of $9,031,965) relating to this term loan financing towards its investment in Tangible Capital Assets. Accordingly, this portion of the loan repayments were transferred from unappropriated surplus to investment in tangible capital assets.

ii In 2021, the City of Regina and the City of Moose Jaw also approved the Corporation to enter into a term loan with Toronto - Dominion Bank. As disclosed in Note 7, the purpose of this advancement is to finance the Plant Renewal Project commencing in 2022.

6 ACCUMULATED SURPLUS (Continued)

Capital replacement reserve

The Board of Directors of the Corporation approved the establishment of capital replacement reserve. The primary objective of the capital replacement reserve is to promote financial stability and flexibility and smooth water rates to prevent fluctuations.

During the year, the Board of Directors approved the transfer of $13,507,774 from operations to the Capital Replacement Reserve. In addition, the Board of Directors approved the following expenditures from the capital replacement reserve:

LPS 138kV Transmission Line	**11,476**
Plant Renewal Project	**12,141,149**
UV Corrective Action (Deficiency)	**76,287**
LPS Pump and Electrical Upgrades	**4,798,984**
SCADA Upgrade	**425,480**
QMS	**25,591**
	17,478,967

7. LONG TERM DEBT

	2021	2020
1. Term loan payable to Bank of Montreal in monthly principal payments ranging from $105,000 to $108,000 based on a 25-year mortgage style amortization with interest rate fixed at 3.46% through an interest rate swap. The term loan is non-revolving and is subject to renewal on November 30, 2027. The term loan is guaranteed by the City of Regina and the City of Moose Jaw.	40,139,000	41,418,000
2. Toronto-Dominion bank term loan advanced as a single draw facility of $60M payable in a monthly principal payments ranging from $181,000 to $186,000 based on a 20-year mortgage style amortization with an interest rate fixed at 3.090% through an interest rate swap. The term loan matures on December 1, 2041.The term loan is guaranteed by the City of Regina and the City of Moose Jaw.	60,000,000	-
	100,139,000	41,418,000

In 2017, the City of Regina and the City of Moose Jaw approved the Corporation to enter into a non-revolving term loan with Bank of Montreal for the purpose of financing the Electrical Upgrade Capital Project (EUCP) with any remaining funds for the Plant Renewal Project. The Corporation entered into an interest rate swap agreement for a 25 year term.

In 2021, the City of Regina and the City of Moose Jaw approved the Corporation to enter into a single draw term loan with Toronto-Dominion Bank for the purpose of undertaking the construction and commissioning of a renewed water treatment Plant. The Corporation entered into an interest rate swap agreement for a 20-year term.

7. LONG TERM DEBT (Continued)

Principal repayments on long term debt in each of the next five years for the two loans are estimated as follows:

	Electrical Upgrade	Plant Renewal	Total
2022	1,324,000	2,202,640	**3,526,640**
2023	1,371,000	2,271,674	**3,642,674**
2024	1,418,000	2,342,872	**3,760,872**
2025	1,469,000	2,416,300	**3,885,300**
2026	1,520,000	2,492,031	**4,012,031**

8. CONTRACTUAL OBLIGATIONS

The Corporation entered into an agreement with Jacobs (formerly CH2M Hill Canada Ltd) to serve as the Owner advocate for the Water Treatment Plant Renewal Project. The remaining contract is valued at $3,269,608 before tax and will cover the services up to August 2026.

The Corporation entered a construction contract on January 28, 2019 with Westridge Construction for the Lake Pump Station Electrical and Pumping Upgrades. The remaining contract is valued at $1,292,442 before tax and will cover the services to complete the project in 2022.

The Corporation entered into an agreement with Graham - Aecon Joint Venture on June 1, 2020, for the design services for the Plant Renewal Project. The remaining value as of December 31, 2021 is $2,498,519.

The Corporation entered into a supply agreement contract on June 2020 with Spartan-Lakeside for the supply of control systems for the SCADA Upgrade Project. The remaining value as of December 31, 2021 is $2,624,476.

The Corporation entered two construction services variations with Graham - Aecon Joint Venture in November 2021 for the supply of dissolved Air Flotation Equipment for the Plant Renewal Project. The remaining value as of December 31, 2021 is $6,074,371.

9. CONTRACTUAL RIGHTS

The Corporation entered into an agreement in November 2018 with the Minister of Infrastructure and Communities of the Government of Canada as part of a program entitled the New Building Canada Fund - Provincial - Territorial Infrastructure Component - National Regional Projects (the "Program"). Under this agreement, the Corporation has a contractual right to receive contributions for eligible expenditures up to a maximum of $10,291,000 by March 31, 2024.

The Corporation also entered into an agreement in January 2019 with the Minister of Government Relations of the Province of Saskatchewan as part of the Program. Under this agreement, the Corporation has a contractual right to receive contributions for eligible expenditures up to a maximum of $10,291,000 by March 31, 2022. The Corporation will use these funds for the electrical capital upgrade projects commenced in 2019. Up until December 31, 2021, the Corporation has claimed total $9,309,607 from each of the Federal and the Provincial governments.

The Corporation entered into an agreement with the Government of Canada and Province of Saskatchewan in March 2021 as part of Investing in Canada Infrastructure Program. Under this agreement, the Corporation has a contractual right to receive contributions for eligible expenditures to fund the Plant Renewal Project up to a maximum of $74,269,329 from the Province of Saskatchewan and $89,132,108 from the Government of Canada up until March 31, 2026. No contributions have been received as of December 31, 2021.

10. RELATED PARTY TRANSACTIONS

The following related party transactions with the City of Regina and City of Moose Jaw as part of the normal course of operations and valued of fair market value.

City of Regina	**2021**	2020
Accounts Receivable	1,362,526	-
Accounts Payable	-	7,804,638
Revenue	18,683,309	17,558,898
Expenses	266,828	5,896,945

City of Moose Jaw	**2021**	2020
Accounts Receivable	412,492	408,268
Revenue	3,186,259	2,959,218
Expenses	840,098	142,505

11. SUBSEQUENT EVENT

The Corporation sent a Notice of Acceptance in December 2021 with Westridge Construction for the UV Corrective Action (deficiency) Project. The contract was awarded at $980,738 plus 10% contingency and the remaining value as of December 31, 2021 is $980,738.

Buffalo Pound Water Treatment Corporation **Schedule 1**

SCHEDULE OF EXPENDITURES

[in dollars]

For the year ended December 31

	Budget	**2021**	2020
EMPLOYEE WAGES AND BENEFITS			
Wages - permanent employees	3,361,000	**3,393,119**	3,412,683
Employee benefits - permanent employees	666,100	**623,383**	613,006
Overtime wages - permanent employees	150,000	**92,464**	72,385
Premium pay - permanent employees	40,000	**42,983**	23,960
Car allowance	11,400	**9,726**	11,362
Clothing and boot allowance	6,000	**3,521**	5,632
Wages and benefits - casual employees	-	**19,254**	-
Employee benefits - vacation, sick and termination	-	**(11,365)**	41,313
Employee awards and gifts	5,000	**3,532**	5,263
Other compensation	3,000	**4,507**	4,667
Health spending account	28,000	**32,448**	26,661
	4,270,500	**4,213,572**	4,216,932
UTILITIES			
Electricity	2,250,000	**1,851,087**	2,192,172
Natural gas	280,000	**200,879**	265,051
	2,530,000	**2,051,966**	2,457,223
CHEMICALS			
Alum	1,550,000	**1,799,684**	1,905,975
Granular activated carbon	325,000	**257,453**	283,338
Chlorine	160,000	**178,251**	117,194
Polymer	35,000	**20,916**	6,743
	2,070,000	**2,256,304**	2,313,250
EQUIPMENT MAINTENANCE			
Filtration plant	355,000	**249,002**	413,282
Wastewater system	1,300,000	**1,251,702**	897,348
Regeneration plant	140,000	**78,225**	83,482
Lake pump station	90,000	**(48,163)**	1,130
Computer and communications	75,000	**164,817**	112,463
High power electrical	43,000	**62,705**	41,027
Pipeline	21,000	**77,221**	28,972
Maintenance and repair	682,000	**417,828**	76,558
Maintenance equipment	36,000	**24,594**	13,032
	2,742,000	**2,277,931**	1,667,294

Buffalo Pound Water Treatment Corporation **Schedule 1**

SCHEDULE OF EXPENDITURES (CONTINUED)

[in dollars]

For the year ended December 31

	Budget	**2021**	2020
MISCELLANEOUS			
Insurance	110,000	**121,628**	90,206
General supplies	44,500	**61,980**	57,997
Telephone	26,000	**31,024**	30,563
Professional and membership fees	24,000	**36,603**	29,064
Travel and conventions	27,000	**4,812**	7,839
Fuel and gas	40,000	**65,849**	35,696
Stationery and office supplies	35,000	**30,256**	25,249
Contracted services	100,000	**194,967**	201,774
Advertising	10,000	**142**	2,393
Education and training	50,000	**39,878**	50,667
Reception and meetings	10,000	**4,841**	3,216
Other purchase	5,000	**9,770**	9,462
Vehicle license and registration	4,500	**4,625**	1,361
Software maintenance	26,000	**44,251**	17,959
Foreign exchange (gain)/loss	-	**(27)**	339
	512,000	**650,599**	563,785
LABORATORY SUPPLIES AND RESEARCH			
Laboratory supplies	100,000	**101,469**	98,760
Research	175,000	**176,121**	140,228
Laboratory equipment maintenance	51,000	**49,053**	47,555
Contract analytical	16,000	**12,040**	10,902
Accreditation	18,000	**14,402**	16,952
	360,000	**353,085**	314,397
BUILDING AND GROUND MAINTENANCE			
Filtration plant	135,000	**70,692**	138,866
Regeneration plant	11,000	**11,218**	1,473
Lake pump station	25,000	**7,899**	6,421
	171,000	**89,809**	146,760
ADMINISTRATION			
City of Regina administration	75,000	**145,200**	64,607
Board expenses	225,000	**212,296**	210,777
Audit services	40,000	**40,460**	29,998
	340,000	**397,956**	305,382
INTEREST EXPENSES AND BANK CHARGES			
Banking services	1,200	**1,715**	1,194
Interest	3,635,000	**1,454,806**	1,404,946
	3,636,200	**1,456,521**	1,406,140

Buffalo Pound Water Treatment Corporation **Schedule 1**

SCHEDULE OF EXPENDITURES (CONTINUED)

[in dollars]

For the year ended December 31

	Budget	**2021**	2020
REIMBURSEMENT			
Reimbursement	-	**-**	5,736,685
	-	**-**	5,736,685

Buffalo Pound Water Treatment Corporation **Schedule 2**

SCHEDULE OF TANGIBLE CAPITAL ASSETS

[in dollars]

For the year ended December 31

	General				Infrastructure				
	Land	Land Improvements	Vehicles and Equipment	Office and Information Technology	Plants and Facilities	Roads	Assets Under Construction	**2021**	2020
Cost									
Beginning of year	88,535	11,373	1,329,478	113,922	117,341,304	455,389	41,341,885	**160,681,886**	137,920,522
Add:									
Additions during year	165,334	-	351,775	-	280,477	-	17,467,491	**18,265,077**	22,761,363
Transfers from assets under construction	-	-	-	-	2,424,969	-	-	**2,424,969**	17,792,578
Less:									
Disposals during year	-	-	-	-	-	-	2,424,969	**2,424,969**	17,792,578
End of the Year	253,869	11,373	1,681,253	113,922	120,046,750	455,389	56,384,407	**178,946,963**	160,681,885
Accumulated amortization									
Beginning of year	-	11,373	1,023,435	99,487	68,579,146	77,832	-	**69,791,273**	66,571,613
Add:									
Amortization	-	-	71,929	3,973	2,839,016	30,205	-	**2,945,123**	3,219,659
Less:									
Accumulated amortization on disposals	-	-	-	-	-	-	-	**-**	-
End of year	-	11,373	1,095,364	103,460	71,418,162	108,037	-	**72,736,396**	69,791,272
Net Book Value	**253,869**	**-**	**585,889**	**10,462**	**48,628,588**	**347,352**	**56,384,407**	**106,210,567**	90,890,613

BUFFALO POUND WATER

2021 ANNUAL REPORT