

COUNCIL REPORT

M&C No.	2018 - 031
Report Date	January 26, 2018
Meeting Date	January 29, 2018
Service Area	Saint John Water

His Worship Mayor Don Darling and Members of the Common Council

SUBJECT: West Water

OPEN OR CLOSED SESSION

This matter is to be discussed in open session of Common Council.

AUTHORIZATION

Primary Author	Commissioner/Dept. Head	City Manager
<i>J. Brent McGovern</i>	<i>J. Brent McGovern</i>	<i>Jeff Trail</i>

RECOMMENDATION

It is recommended that Common Council receive and file this report.

EXECUTIVE SUMMARY

n/a

PREVIOUS RESOLUTION

n/a

STRATEGIC ALIGNMENT

This report aligns with Council's Priority for Valued Service Delivery by investing in sustainable City services and municipal infrastructure.

REPORT

Background

In the fall of 2013, The City of Saint John drilled a production well in the South Bay area of the West Side. In January of 2014, hydraulic testing (pumping) began on the production scale well and it continued for one year. After several months of pumping and data collection, the source of ground water showed considerable promise. In 2014, two additional production-scale wells were drilled and hydraulic testing began on these wells mid November 2014 and continued until early 2015. The total withdrawal from the three wells during the hydraulic testing along with the some modelling concluded the three production size test wells would have the ability to supply the west side with drinking water.

Water samples were collected from the production-scale wells for water quality testing at a contract lab and the samples from the production wells met the maximum acceptable concentrations (MAC) and aesthetic objectives (AO) set out in the Guidelines for Canadian Drinking Water Quality. The lab testing and engineering analysis concluded that the only treatment required on the ground water recovered from South Bay Well Field was the addition of chlorine to meet the requirements set out in the City's Approval to Operate water treatment and distribution facilities. As the project was being developed thought was also being given to the potential impact the new water chemistry might have on infrastructure, and discussions were held with industry experts regarding the impact the new water chemistry might have and experts advised that due to the chemical composition of the well water, the risk of negative impact to infrastructure was low.

The decision to switch from surface water to well water was made at a meeting of Common Council in 2014. This change resulted in a significant scope change and a significant reduction in cost, which improved the likelihood of the City's Safe, Clean Drinking Water Project being able to proceed. Council endorsed the plan to move forward with the Safe, Clean Drinking Water project based on ground water being the source of the west side's drinking water and the Spruce Lake Watershed becoming the industrial water supply as well as the backup to the drinking water supply (should there ever be the need).

Water Quality and Regulatory Requirements

The City of Saint John operates its water system under the authority granted to it via an Approval to Operate that is issued by the Minister of Environment and Local Government, and which stipulates conditions that must be met when operating under same (ref. M&C 2017-252 at October 2, 2017 Meeting of Council). The condition that relates to water quality states *"The Approval Holder shall ensure that the drinking water supplied to the users meets the New Brunswick Maximum Acceptable Concentrations, for the parameters listed in the Sampling Plan, approved under the Potable Water Regulation 93-203."*

When drinking water was being supplied to customers from Spruce Lake prior to the commissioning of the wells the drinking water did not meet the New Brunswick Maximum Acceptable Concentrations (MACs) for some parameters listed in the Sampling Plan. This is a main driver of the Safe, Clean Drinking Water Project.

As of September 14, 2017 the west side drinking water system has been supplied with ground water from the three new production wells located in the new South Bay Wellfield (located behind Island View School, at the end of Gaelic Drive).

Since the commissioning of the new groundwater wells the water quality has met the New Brunswick Maximum Acceptable Concentrations (MACs), for the parameters listed in the Sampling Plan.

From a public health perspective, the change in water quality has had numerous immediate positive impacts on the customer's water quality. More importantly, the water is now filtered and the public health risk of a giardia or cryptosporidium outbreak has been eliminated. Other significant water quality improvements relate to the disinfection by-products (DBPs) known as Trihalomethanes (THMs) and Haloacetic Acids (HAAs). As well, the pH has increased (water is less acidic) and colour (clearer), iron content and dissolved organic carbon have all significantly decreased.

Public health is now protected from waterborne disease and The City of Saint John is now meeting its requirements under its Approval to Operate as issued by the Minister of Environment and Local Government.

Groundwater is traditionally of better quality than surface water because it is filtered through the soil. Groundwater however is more mineralized than surface water because of the contact time with the aquifer materials which results in higher hardness.

Hardness

Groundwater is harder than surface water due to the minerals it picks up as it passes through the ground. Those minerals are primarily calcium and magnesium. Water hardness is an aesthetic parameter of water quality as it can leave spots on dishes, in dishwashers and on bathtubs but this spotting or film is simply minerals in the water and it is not harmful to public health.

In the Guidelines for Canadian Drinking Water Quality there are no MACs for hardness nor is there an Aesthetic Objective (AO) that has been set (as can be seen on page 16 of 31 of the attached Guidelines). Instead, Health Canada states *"Although hardness may have significant aesthetic effects, a guideline has not been established because public acceptance of hardness may vary considerably according to local conditions; major contributors to hardness – calcium and magnesium – are not of direct public health concern"*. It further goes on to state *"Hardness levels between 80 and 100 mg/L (as CaCO₃) provide acceptable balance between corrosion and incrustation; where a water softener is used, a separate unsoftened supply for cooking and drinking purposes is recommended"*.

Saint John's water hardness in the west water distribution system has varied since the commissioning of the wells between 119mg/L to 233mg/L with an average of 206mg/L and as of mid-November until now we have seen hardness levels of 197mg/L to 233mg/L with an average of 220mg/L. The maximum hardness observed in the distribution system to date is 233mg/L. Hardness has

increased slightly since commissioning of the wells. Water hardness can vary throughout the year as water may move differently through underground aquifers.

Noted below is a list of other Canadian Public Water Systems with similar or greater hardness. The following are levels of hardness that would be delivered to customers.

New Brunswick

Fredericton = 120mg/L to 150mg/L

Grand Falls = 180 = 190 mg/L*

- Grand Falls has 4 wells, 3 of which have hardness that is around 180 – 190 mg/L. Their fourth well has a hardness greater than 300mg/L and that is the only well that they treat (soften). Treating the water from the fourth well brings the hardness of that well from above 300mg/L down to 180 – 190mg/l.

Ontario

Guelph = wide range of 300mg/L – 500mg/L

Kitchener = approximately 300mg/L

Brantford = range of 240mg/L to 310mg/L

Waterloo Region = 400mg/L

Saskatchewan

Regina = 215mg/L

Saskatoon = 160 – 180mg/L

Alberta

Calgary = 165mg/L

Prince Edward Island

Charlottetown = 140 – 150mg/L

There are 17 Cities in Canada with hardness > 500mg/L (ref. Health Canada – Guidelines for Canadian Drinking Water Quality; Guideline Technical Document – Hardness) and more than 85% of American homes (ref. Wilson, Amber; Parrott, Kethleen; Ross Blake (June 1999) Household Water Quality – Water Hardness) have hard water. The above is not intended to be an exhaustive list but instead it is intended to show that the **water hardness on the west system is very similar in nature to what a large population of Canadian citizens would see.**

In summary, the change in water quality, particularly hardness levels is an adjustment for some citizens but I would emphasize that our drinking water on the West system **now meets drinking water quality standards and public health is now protected from waterborne disease.**

Treating Hardness

With respect to treating of hardness in drinking water, municipalities look to Health Canada for guidance as they are the authoritative body in Canada. Health Canada has a Technical Paper that provides guidance (see attached).

In summary the paper states that waters with hardness levels greater than 200 mg/L of CaCO₃ (Calcium Carbonate) can be tolerated without treatment. Those with a hardness greater than 500mg/L (approximately 2.5 times greater than Saint John's hardness) are considered unacceptable and require treatment.

- By way of standard practice the Drinking Water industry does not treat drinking water for hardness until the hardness is **greater than 300mg/L** of CaCO₃ and treatment if done is only to reduce hardness to between 150mg/L to 200mg/L.
- The cost for Saint John to treat for hardness would be in the many millions of dollars and would take at least two years to design and construct. Also this would be setting a precedent as to our knowledge no other municipality in Canada with water hardness level the same or even close to west Saint John treats (softens) the water.
- Some citizens may choose to purchase or rent and have installed water softeners, however, that is a personal choice as public acceptance of hardness varies considerably. For any hardness deposits in an appliance such as a kettle, coffee maker or iron can be cared for with simple household vinegar from time to time to eliminate any build-up of deposits. Agents like jet dry and finish also help to reduce deposits in the dishwasher.

Customer Concerns

Hardness (Aesthetics)

Initially there were hardness concerns relating to spotting of dishes and vehicles after they are washed. Other comments included a reduction in soap lather and different feeling on the skin and hair after bathing.

Hardness (Equipment Impacts)

Equipment impacts that have been reported as a result of the level of hardness in the water have been primarily been related to water at commercial establishments that is heated causing issues with specialized equipment, however, as of very recently there have been anecdotal reports of dishwashers and kettles having been impacted.

Saint John Energy has also reported an issue with hot water heaters. The issue seems to be amplified by the fact that the water heaters on the west side are customized heaters that have served the needs of the Spruce Lake water very well. However, these heaters operate at much higher temperatures (180F vs. 140F for a standard hot water heater) which increases the deposit (precipitation) of minerals on the heater elements and we continue to work with Saint John Energy in determining appropriate action.

Pipe Leakage

Towards the end of 2017, businesses and residents began to report some leaks in their piping and that has increased anecdotally during the month of January 2018. Leaks have been on copper piping and there have been instances of multiple failures.

Actions Being Taken

Increased Sampling and Monitoring

In September 2017, at the time of the switch from lake water to well water, Saint John Water significantly increased its sampling and monitoring of water quality and that monitoring has continued and is evolving based on experiences and feedback from the community.

Copper Corrosion

Regarding residential copper (plumbing) corrosion in west Saint John, Saint John Water is working to fully understand the issue and after monitoring the situation, and having had discussions with residents and with industry experts, the current understanding is that the increased number of copper plumbing leaks is as a result of pipes that had previously been near the point of failure before the switch from lake water to well water. Once the piping experienced the change in water chemistry, the scale buildup that had accumulated on the pipes was disrupted and the inside wall of the piping which was previously weakened began to leak. It is presumed that the increased rate of pipe failures is short-term and that this phenomenon should stabilize as a new equilibrium is established within the piping network. Once the new equilibrium is established, and possibly a new scale is established, it is expected that the issue will decrease and return to a normal state once again. To scientifically analyze this theory Saint John Water is teaming up with Dalhousie University and CBCL Engineers on specific copper corrosion testing as it relates to the new well water. This testing will assess copper corrosion as it relates to the new well water. This testing is scheduled to be completed within the next 1 – 2 months.

Communication

While information has been prepared for citizens on the Saint John website and posted in the fall of 2017 and shared with local media,

additional information is being compiled for communication with the public.

SERVICE AND FINANCIAL OUTCOMES

n/a

INPUT FROM OTHER SERVICE AREAS AND STAKEHOLDERS

Saint John Water has worked closely with Department of Health and Department of Environment during the conversion of the west side drinking water from Spruce Lake surface water to South Bay ground water and discussions have been ongoing since the conversion. Saint John Water staff will continue to have frequent interactions with these regulators.

ATTACHMENTS

Health Canada – Guidelines for Canadian Drinking Water Quality; Guideline Technical Document - Hardness

Guidelines for Canadian Drinking Water Quality – Summary Tables

City of Saint John Website – Hardness Information