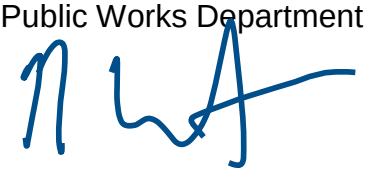
CITY OF HAMILTON
PUBLIC WORKS DEPARTMENT
Hamilton Water Division

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	September 20, 2021
SUBJECT/REPORT NO:	Water Treatment Plant Coagulant Single Source Supply (PW21052) (City Wide)
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Deborah Goudreau (905) 546-2424 Ext. 4606
SUBMITTED BY: **SIGNATURE:**	Nick Winters Director, Water and Wastewater Operations Public Works Department 

RECOMMENDATION

That a single source procurement and standardization be approved, pursuant to Procurement Policies #11 – Non-competitive Procurements and #14 Standardization, for the supply and delivery of chemical coagulant Sternpac70 for the Woodward Drinking Water Treatment Plant for a period of no more than five (5) years and that the General Manager, Public Works Department be authorized to negotiate, enter into and execute a Contract and any ancillary documents required to give effect thereto with the manufacturer, Kemira Water Solutions Canada Inc., in a form satisfactory to the City of Hamilton Solicitor.

EXECUTIVE SUMMARY

The Woodward Drinking Water Treatment Plant (WTP) uses a chemical coagulant to enhance the removal of particles and organic matter from raw water during the treatment process. Coagulation is a critical step within the treatment process and effective treatment of Hamilton's drinking water would not be possible without a well performing chemical.

The current coagulant used at the WTP is Sternpac70, a proprietary chemical supplied by Kemira Water Solutions Canada Inc. (Kemira). The Contract, C11-17-19 is for the Supply and Delivery of Coagulant Product for the WTP and expired on August 31,

2021. The Contract was recently extended pursuant to Procurement Policy #11 – Non-competitive Procurements to allow time for Report PW21052 to be prepared and presented to the Public Works Committee.

In 2020, Hamilton Water staff undertook a study to identify and evaluate alternative coagulants that could be used at the WTP (with performance equal to or better than Sternpac70), in preparation for a competitive procurement process for a new coagulant supply contract. A total of seven (7) coagulants, including Sternpac70, were tested using Hamilton's raw water during both cold and warm water conditions. The results of the testing indicated that while several of the alternative coagulants were competitive under warm water conditions, only the Sternpac70 performed acceptably under cold water conditions. The current configuration of the coagulant dosing system at the WTP will not allow for different chemicals to be used seasonally without substantive capital modifications including additional tankage. As a result, it is recommended that continuation of the use of Sternpac70 continue until such modifications can be completed.

Staff intend to undertake additional coagulant trials in 2022 and to begin the design process to allow for seasonal coagulant dosing. In the interim, a single-source contract with Kemira for the supply of Sternpac70 is required to ensure the effectiveness of the WTP.

Alternatives for Consideration – See Page 5

FINANCIAL – STAFFING – LEGAL IMPLICATIONS

Financial: Expenditures for the current chemical coagulant vary based on the volume of water treated and are in the order of $500,000 annually.

Staffing: There are no attributed staffing impacts associated with this recommendation.

Legal: N/A

HISTORICAL BACKGROUND

The Woodward Water Treatment Plant (WTP) draws raw water from Lake Ontario and uses a conventional water treatment process (consisting of coagulation, flocculation, sedimentation, filtration, and disinfection), to provide safe drinking water to the residents, businesses, and institutions of Hamilton. The coagulation process enhances the removal of particles and organic matter from the water. The chemical coagulant, once mixed with the water, binds together small particles into larger 'flocs' which then either settle out or are filtered to remove them from the water.

In 2019, the City awarded C11-17-19 for the Supply and Delivery of Coagulant Product for the WTP to Kemira Water Solutions Canada Inc. (Kemira). While the procurement process was undertaken competitively, the performance standards and raw water characteristics detailed by the City resulted in only one (1) bid submission, that of Kemira for the Sternpac70 coagulant. In 2020, in an attempt to avoid a repeat of the 2019 procurement, staff retained CH2M HILL Canada Limited (CH2M HILL), an engineering consulting firm, to provide technical assistance in the identification and evaluation of a variety of chemical coagulants suitable for use at the WTP. The goal of the study was to identify alternative coagulants that perform similarly to or better than Sternpac70, thus promoting a competitive procurement process.

CH2M HILL solicited vendors active in provision of chemical for water and wastewater systems. Seven (7) coagulants (including Sternpac70), from six (6) different vendors underwent bench-scale testing that mimicked full-scale treatment processes, in both cold water and warm water scenarios. During bench-scale testing four (4) of the six (6) alternative coagulants had comparable performance and availability to Sternpac70 and were carried forward to full-scale testing. The full-scale test included the use of separate treatment trains within the WTP to ensure the evaluation was fair and repeatable.

Performance objectives of the study included:

- Settled water turbidity < 1.5 NTU
- Filter effluent turbidity < 0.5 NTU
- Filter run volume > 200 m^3/m^2 or comparable
- Filter run time > 24 hrs at design capacity and > 60 hrs at average day demand
- Residual aluminium ≤ 50 µg/L or comparable
- Settled water UV Transmittance > 95%

The four (4) alternative coagulants all produce lower residual aluminium concentrations in the treated drinking water than the Sternpac70, but in all other parameters Sternpac70 outperformed all alternatives by a wide margin. This performance discrepancy was most clearly observed in filter run times and filter effluent turbidity. The performance of the alternatives was so poor that CH2M Hill recommended against the use of any of them under cold water conditions.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

The City's Procurement Policy By-law No. 20-205, Policies #11 and #14 allow for non-competitive procurement and standardization.

The effective performance of the chemical coagulant used in the water treatment process is a critical step in meeting the requirements of the *Safe Drinking Water Act* and

O.Reg. 170/03. Ensuring that the water treatment process is robust and aligned with the provincial multi-barrier approach is a requirement of Hamilton's Municipal Drinking Water System License and Drinking Water Works Permit.

RELEVANT CONSULTATION

Procurement, Corporate Services has provided guidance as to adherence to the Procurement Policy.

ANALYSIS AND RATIONALE FOR RECOMMENDATION

The full-scale testing of the different coagulants included testing at current average day demand (ADD) of the filters, and also at the ultimate design capacity to assess performance under peak conditions. The results of run time in hours and volume filtered are shown in the table below. On average, the Sternpac70 outperformed the alternatives by a margin of two (2) to three (3) times. Having filter run times less than 24 hours with an associated run volume less than 200 m^3/m^2 would severely limit the Water Treatment Plant's ability to produce water, increase costs associated with electricity usage and result in more water wasted during more frequent filter backwashing.

Coagulant	Sternpac70		Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Peak	ADD	Peak	ADD	Peak	ADD	Peak	ADD	Peak	ADD
Run Time (hrs)	45	60	10	26	19	28	9	27	13	28
Run Volume (m^3/m^2)	532	418	114	179	219	192	111	186	153	228

It should be noted that the full-scale testing was completed in March 2021 under cold water conditions. It is expected that the alternative coagulants would perform better under warm water conditions, but the current configuration of the coagulant dosing system at the Water Treatment Plant (WTP) will not allow for different chemicals to be used seasonally. Staff plan to further investigate whether implementing a seasonal dosing strategy would be viable at the Woodward WTP as it would require the installation of additional storage tanks and associated appurtenances and building refurbishment to accommodate those works. A seasonal coagulant strategy is a common practice in WTPs drawing raw water from Lake Ontario.

Currently, the aluminium concentrations produced by the Sternpac70 during warm weather is managed through the addition of ortho-phosphate upstream of the filters to assist with aluminium removal. This allows the WTP to meet the performance objective for dissolved aluminium in the treated drinking water. While this practice is acceptable it

does result in higher chemical usage and therefore higher costs. Implementing a seasonal coagulant strategy could have the added benefit of reducing aluminium residuals without the need for ortho-phosphate addition.

The performance of the alternative coagulants did not meet the stated performance requirements by a substantial margin. Negotiating a new coagulant supply contract with Kemira under a single-source process will allow staff and Kemira to develop mutually agreeable terms and conditions associated with the provision of Sternpac70 while staff pursue a seasonal coagulant strategy.

ALTERNATIVES FOR CONSIDERATION

An alternative to the recommendations contained within this report is to proceed with a competitive procurement process. However, given the raw water characteristics and the necessary performance standards, it is unlikely that more than one (1) bid submission would be received and terms and conditions including price would be fixed.

ALIGNMENT TO THE 2016 – 2025 STRATEGIC PLAN

Healthy and Safe Communities
Hamilton is a safe and supportive City where people are active, healthy, and have a high quality of life.

Built Environment and Infrastructure
Hamilton is supported by state-of-the-art infrastructure, transportation options, buildings and public spaces that create a dynamic City.

APPENDICES AND SCHEDULES ATTACHED

None