TORONTO

STAFF REPORT
ACTION REQUIRED

Update on Toronto Water Implementation of New Federal Wastewater Systems Effluent Regulations

Date:	March 25, 2014
To:	Public Works and Infrastructure Committee
From:	General Manager, Toronto Water
Wards:	All
Reference Number:	P:\2014\Cluster B\TW\pw14001

SUMMARY

The purpose of this report is to update Council on initiatives taken in response to Environment Canada's Federal Wastewater Systems Effluent Regulations introduced in 2012. The regulations impact the City's wastewater treatment plants as well as the combined sewer system.

Toronto Water has developed and is implementing an action plan to address the new federal Fisheries Act Wastewater Systems Effluent Regulations.

RECOMMENDATIONS

The General Manager, Toronto Water, recommends that:

1. City Council receive this report for information.

Financial Impact

Financial impacts remain as per the February 28, 2013 Staff Report. A summary and status update is as follows:

Activity	Estimated Cost	Budget Allocation
Design and construction of a new effluent disinfection system at the Ashbridges Bay Wastewater Treatment Plant	$205.4 million	Funded in the 2014 Capital Budget and 2015 to 2023 Capital Plan – CWW039-01 and CWW039-02

Activity	Estimated Cost	Budget Allocation
Increase in annual operating costs for additional hydro costs to eliminate the effects of ammonia toxicity in the Ashbridges Bay Wastewater Treatment Plant effluent	$1 million/year	Incorporated in Toronto Water's 2014 Operating Budget
Increase to Toronto Water's annual Operating Budget, associated with the requisite wastewater treatment plant monitoring and reporting requirements	$0.2 million/year	Incorporated in Toronto Water's 2014 Operating Budget
Installation and maintenance of 10 CSO flow meters at the 2013 top 10 CSO locations according to CSO volume	$0.25 million	Contained in Toronto Water's approved 2014 Capital Budget – CWW452-04
Increase to Toronto Water's annual Operating Budget, associated with the requisite combined sewer overflow reporting requirements, including update of Toronto Water's InfoWorks Collection System (CS) computer model	$0.2 million	Incorporated in Toronto Water's 2014 Operating Budget

The Deputy City Manager and Chief Financial Officer has reviewed this report and agrees with the financial impact information.

DECISION HISTORY

At its meeting of April 3, 2013, City Council in considering of a February 28, 2013 Staff Report from the General Manager, Toronto Water titled *"Impact of New Federal Wastewater Systems Effluent Regulations on Toronto Water"* directed staff to report to the Public Works and Infrastructure Committee in the first quarter of 2014 in regards to status of meeting the Federal Wastewater Systems Effluent Regulations compliance requirements. As well, Council requested the City Manager include in Federal Infrastructure Funding requests, funding for Toronto Water projects of an amount no less than the additional infrastructure costs attributed to the new Federal Wastewater Systems Effluent Regulation. A link to these documents is as follows: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2013.PW21.8

ISSUE BACKGROUND

New Federal Regulatory Requirements

On July 28, 2012, the *Wastewater Systems Effluent Regulations*[1] were published in the Canada Gazette. The Regulations, made under the *Fisheries Act*[2], impose additional

[1] http://laws-lois.justice.gc.ca/eng/regulations/SOR-2012-139/index.html
[2] http://laws-lois.justice.gc.ca/eng/acts/F-14/index.html

regulatory requirements beyond those already imposed by the Ontario Ministry of the Environment (MOE).

With respect to wastewater treatment plants, the new Regulations impose:

a) Strict limits for final effluent quality, which were not previously regulated by the MOE, related to:
   i) un-ionized ammonia;
   ii) acute lethality testing; and,
   iii) total residual chlorine
b) Methods for testing effluent quality;
c) Flow monitoring;
d) Record keeping; and,
e) Reporting.

As well, the regulations contain requirements for annual reporting of Combined Sewer Overflow (CSO) discharges within the City.

For the City of Toronto, Table 1 summarizes the mandatory compliance dates of various aspects of the new Regulations.

Table 1: Federal Wastewater Systems Effluent Regulations Compliance Dates

Compliance Requirement	January 1, 2013	May 15, 2013	February 15, 2014	January 1, 2015
1. Enhanced effluent sampling	■			
2. Wastewater treatment plant flow monitoring	■			
3. CSO Recording	■			
4. All record-keeping requirements	■			
5. Identification Report for wastewater systems in operation on January 1, 2013		■		
6. First Monitoring Report is due. After the 1st report, Monitoring Reports must be submitted quarterly.		■		
7. First CSO report is due, reporting on 2013 data. Subsequent reports are due every February 15 for the previous year's data.			■	
8. Compliance with all final effluent limits (including total residual chlorine, un-ionized ammonia & acute lethality)				■
9. Acute lethality testing begins				■
10. Requirement for Temporary Bypass and Transitional Authorizations				■

COMMENTS

Status of Initiatives Resulting from the Regulations

Wastewater Treatment Plant Reporting:

At present, the City of Toronto Wastewater Treatment Plants are in full compliance with all monitoring and reporting aspects of the new Federal Regulations that have come into effect. Enhanced effluent sampling, flow monitoring and record keeping were implemented in advance of the January 1, 2013 deadline. Identification Report for Wastewater Systems and the first Quarterly Monitoring Report were submitted before the May 15, 2013 deadline. Subsequent Quarterly Reports were submitted on August 15, 2013, November 15, 2013 and February 15, 2014. Internal processes are in place to sustain future reporting needs.

Chlorine Residual Limits:

Over the past century, the use of chlorine has become the most common method of disinfecting wastewater treatment plant effluents, and all City plants were originally designed to use chlorine to disinfect their effluent. However, residual chlorine has been shown to have a negative environmental impact, and the new federal Regulations impose a limit of 0.02 mg/l on the amount of total residual chlorine that can be discharged to the environment through the wastewater treatment plant effluent.

As indicated in the February 28, 2013 Staff Report, the necessary capital works at the Humber, Highland Creek and North Toronto Treatment Plants were completed in 2010 and 2011. For the Ashbridges Bay Treatment Plant, the necessary upgrades were delayed for the reasons reported in the February 28, 2013 Staff Report.

In early 2012 Toronto Water retained the engineering consulting firm AECOM to develop a conceptual design for Ultra Violet (UV) disinfection of ABTP plant effluent and chlorination/dechlorination of plant secondary by-pass flows.

The conceptual design was completed in November 2012 and relies on a new (next generation) UV lamp technology that is more efficient than conventional UV lamps and provides several advantages:

- Consumes less energy;
- Require**s** fewer lamps than traditional UV technology,
- Allows for a smaller facility footprint, and thereby resolves a number of operational and hydraulic constraints at the ABTP.

Several full scale installations using this new UV lamp technology are under construction in several other large facilities across North America. Staff intend to monitor the progress of these installations and tour one or more of these facilities as they are commissioned.

A Request for Proposals for the detailed design of the ABTP disinfection system was issued on March 1, 2013. The engineering assignment was awarded to AECOM on July 10, 2013 and detailed design commenced in September 2013. The revised current schedule to complete design, construct and commission the new ABTP disinfection system is as follows:

Complete Detailed Design	February 2016
Construction tender	March 2016
Start of Construction	September 2016
Commissioning	Mid 2019

The original 1997 ABTP Environmental Assessment for the disinfection project contemplated that the new disinfection system would be built together with new outfall pipes to achieve an optimal design solution and eliminate the shore based seawall gate discharge of plant by-pass flows, during wet weather conditions. However, due to the high costs (estimated at $350 million) and timeline associated with the construction of a new outfall, coupled with the pressing timelines imposed by the new federal Regulations, construction of the new outfall was deferred. The new outfall is fully funded within the 2014 to 2023 Toronto Water ten (10) year Capital Plan with a project plan as follows:

Complete Modelling and Conceptual Design	June 2014
Geotechnical Investigations	2015-2016
Design of Outfall	2016-2018
Construction	2018-2023

Plant Effluent Acute Lethality Testing

Monthly reporting on prescribed laboratory based acute lethality testing (i.e. using rainbow trout fingerlings) of wastewater treatment plant effluent is a new regulatory requirement that comes into effect on January 1, 2015 for the City of Toronto. The City has been testing for acute lethality since early 2011 to prepare for the Regulations. Early results indicated that the requirement could be consistently achieved at both the Humber Treatment Plant and the Highland Creek Treatment Plant. Further testing, including operational modifications, were required at the North Toronto and Ashbridges Bay Treatment Plants, where, despite meeting the new un-ionized ammonia limits, intermittent failed tests seemed due to elevated ammonia levels.

Operational changes at North Toronto were implemented in 2013 and the plant effluent has since consistently passed the Acute Lethality Testing. The operational cost of these changes is minor and easily absorbed within the existing plant budget.

More significant operational changes were required at the Ashbridges Bay Treatment Plant. These changes were completed in October 2013 and the plant effluent has passed the last five (5) Acute Lethality Tests conducted since then. The changes have reduced the ammonia levels and although monthly testing continues, it is believed that the new mode of operation can be sustained without the need for added capital upgrades. As

indicated in the February 28, 2013 Staff Report, the operational changes have increased the estimated annual operating cost by approximately $1 million. This cost is included in the Toronto Water 2014 operating budget. Further plant testing and sampling in 2014 will confirm these costs and the reliability of the new mode of operational.

Combined Sewer Overflow (CSO) Reporting

The City complied with the May 15, 2013 deadline for the one-time Identification Report for CSO Locations. Toronto reported 309 CSO locations including: 28 locations in Humber Treatment Plant sewershed; 8 locations in North Toronto Treatment sewershed; and 273 in Ashbridges Bay Treatment Plant sewershed. Note that all of these locations are internal to the sewer system and most share common outfalls with other CSO's and storm sewers. There are a total of 84 outfalls that could potentially contain CSO.

For each of the reported CSO locations, the Regulations require an annual report with estimates of total number of days CSOs occurred and total volume of CSOs on a monthly basis. The annual report was due on February 15th.

The City submitted its annual report for 2013 in time for the February 15, 2014, reporting deadline. Toronto Water used the InfoWorks Collection System (CS) computer model to estimate total number of days CSOs occurred and total volume of CSOs for the non-winter months (April to October) using data obtained from the City's 31 rain gauges. The InfoWorks CS computer model has been calibrated and validated to estimate trunk sewer flows, CSO events, volumes and duration in a number of EA studies. This approach was discussed and agreed to with officials from Environment Canada. Unless otherwise notified by Environment Canada, the City will continue the same approach to comply with the CSO reporting requirements imposed by the Regulations. The cost to update the InfoWorks Collection System (CS) computer model, generate results, and prepare the annual CSO report as prescribed by the Regulations is estimated to be $200,000 per year.

To further increase the confidence level of the above approach, Toronto Water plans to install flow meters at the 10 CSO locations with the greatest volume in 2014 if technically possible. The additional CSOs flow monitoring data will be used to further calibrate and validate Toronto Water's InfoWorks Collection System (CS) computer model. The cost to install and maintain 10 CSO flow meters is estimated at $250,000 per year.

A summary of the City's 2013 CSO reporting is presented in Table 2.

Table 2: Summary of 2013 CSO Events

Sewershed	Humber TP	North Toronto TP	Ashbridges Bay TP	Total
# of CSO Locations in the Identification Report	28	8	273	309

# (%) of CSO Locations CSOs did not Occur	7 (25%)	1 (13%)	83 (30%)	91 (29%)
# (%) of CSO Locations CSOs did Occur	21 (75%)	7 (87%)	190 (70%)	218 (71%)
% of CSO Locations CSOs Occurred Between 1 and 10 Days	39%	38%	35%	36%
% of CSO Locations CSOs Occurred Between 11 and 20 Days	14%	25%	9%	10%
% of CSO Locations CSOs Occurred Between 21 and 30 Days	4%	0%	8%	8%
% of CSO Locations CSOs Occurred Between 31 and 40 days	0%	0%	7%	6%
% of CSO Locations CSOs Occurred More Than 40 Days	18%	25%	10%	11%
Total CSOs Volume (m3)	**1,134,800**	**271,300**	**3,695,000**	**5,101,100**

Of the 218 CSO locations where CSOs did occur in 2013, Western Beach's Tunnel overflow at the Parkside outlet had the largest volume followed by Hillary Combined Trunk Sewer at Manhole 005 east of Rockcliffe on the south bank of Black Creek.

The City continues to hold the position that annual CSO reporting provides little insight into the City's real progress in managing CSOs, as the frequency and volume of CSOs is weather dependent. Last year was a particularly wet year with approximately 60% more CSOs volume than in a typical year. Over two thirds (2/3) of the total reported CSOs volume in 2013 occurred in July, due in part to the extreme storm on July 8.
The City continues to aggressively implement projects identified in Toronto's Wet Weather Flow Master Plan, which will lead to water quality improvements, swimmable waterfront beaches and the virtual elimination of CSOs. At its most recent March 4, 2014 meeting, the Public Works and Infrastructure Committee approved the contract award for the professional engineering services for the Design and Construction Administration of the Wet Weather Flow System to Control CSO Discharges to the Don River and Central Waterfront – the most significant CSO control project by far in Canada – to clean-up Toronto's Don River and Inner Harbour, and contribute to the delisting of Toronto and Region as an Area of Concern.

CONCLUSION

Toronto Water has developed and is implementing an action plan to address the new federal Fisheries Act Wastewater Systems Effluent Regulations.

CONTACT

Frank Quarisa, B.Eng., MBA, P.Eng.
Director, Wastewater Treatment
Toronto Water
Tel: (416) 392-8230
Fax: (416) 397-0908
E-mail: fquaris@toronto.ca

Ted Bowering
Acting Director, Water Infrastructure Management
Toronto Water
Tel: (416)338-5473
Fax: (416)338-2828
E-mail: tbowerin@toronto.ca

SIGNATURE

_____

Lou Di Gironimo
General Manager
Toronto Water