



STAFF REPORT ACTION REQUIRED

Lead in Drinking Water Mitigation Strategy

Date:	January 5, 2011
To:	Budget Committee
From:	General Manager, Toronto Water
Wards:	All
Reference Number:	P:\2011\Cluster B\TW\bc11001

SUMMARY

This report provides information on the status of existing City programs directed at addressing concerns about lead in drinking water from individual properties and recommends the adoption of a new multi-faceted Lead in Drinking Water Mitigation Strategy.

The new Strategy recommends the continued replacement of the City-owned portion of lead water service connections to individual properties in conjunction with the City's planned infrastructure renewal projects, but limits the number of priority replacements of individual connections completed within any given year and only if the request for replacement meets prescribed criteria. It also recommends that the existing Faucet Filter Program (which provides free faucet mounted lead removal filters to high risk and low income households) be expanded by providing a one time only free faucet filter to households following the replacement of the City-owned section of the water service. The new Strategy also incorporates the implementation of a City-wide Corrosion Control Plan, as prescribed by Regulation, through the Ontario Ministry of the Environment.

In addition, it is recommended that a Public Education and Communication Program be developed to support the proposed new Lead in Drinking Water Mitigation Strategy, and that it be developed and implemented jointly by Toronto Water and Toronto Public Health. It is recognized that a comprehensive Communication Program is required to help better educate the public on the need to replace both the City-owned and privately-owned sections of lead water service connections to gain the maximum benefit and risk reduction of lead in drinking water.

RECOMMENDATIONS

The General Manager of Toronto Water recommends that:

1. The Water Service Replacement Program be modified as proposed in this report, to target the replacement of 5,000 substandard water service connections per year, through planned infrastructure renewal programs, emergency responses and priority replacements;
2. Emergency replacement of the City-owned section of the water service will be provided in cases where:
 - a) The water service is broken; or
 - b) If the water service cannot deliver the minimum flow of seven litres per minute measured at the first entry point to the house for single-family, duplex or triplex residential properties; and where
 - c) The seven litre per minute criterion does not apply to non-residential properties (including mixed use of residential and non-residential properties) where the owners of these properties must apply and pay for an upgraded new service if the existing service does not meet its minimum flow requirements;
3. Priority replacements of the City-owned section of lead water service connections, shall be capped at 1,500 replacements per year, and will only be undertaken in cases where:
 - a) The City owned section is lead; and
 - b) The property owner replaces the privately-owned section of the lead service connection prior to, or at the same time, the City owned section is replaced;
4. The City-owned sections of substandard water service connections will be replaced with:
 - a) a 19 mm copper service, in accordance with the City's current standard, when the existing City section of the service connection is 19 mm in diameter or smaller, at no cost to the property owner; or
 - b) the same size connection in cases where the existing City section of the service connection is greater than 19 mm, at no cost to the property owner;
 - c) a larger diameter copper service, as may be requested by the property owner, subject to charges, paid for by the property owner, Effective March 1, 2011, of:
 - i) a \$500 flat fee for 25 mm services; or
 - ii) the actual replacement cost plus 15% administration fee for services greater than 25 mm.
5. Drinking water quality testing for lead continue to be provided at no cost to the property owner;
6. The existing Faucet Filter Rebate Program be expanded to provide:
 - a) One free NSF-053 certified faucet mounted lead removal filter per year to the property owner, until the Corrosion Control Plan takes effect, and where:

- i) there is a child under six (6) years old and/or a pregnant woman living in the home; and
 - ii) the home is a single family, duplex or triplex building; and
 - iii) the annual household income is less than \$50,000; and
 - b) A one-time free NSF-053 certified faucet mounted lead removal filter to the property owner along with a door-hanger immediately following the replacement of City-owned section of the water service;
7. Pending approval of the Corrosion Control Plan submitted by Toronto Water to the Ontario Ministry of the Environment, Toronto Water undertakes to completing the necessary studies to finalize the design of works/measures in accordance with the schedule and requirements prescribed by the Ontario Ministry of the Environment;
 8. A Public Education and Communication Program supporting the City's new Lead in Drinking Water Mitigation Strategy be developed to include:
 - a) A public communication strategy to provide information to residents regarding the City's strategy to address lead concerns in drinking water;
 - b) A user-friendly website that will provide residents up-to-date information about the City's comprehensive strategy featuring content provided by and approved by Toronto Water and Toronto Public Health; and
 - c) A public notification protocol for all water service replacement construction projects, which includes the use of advance notification letters and post-replacement public education material to allow residents sufficient time to plan and prepare for possible replacement of the privately-owned portion of the lead water service, as well as advise them of the necessary post-replacement actions they must take to further reduce their exposure to lead from drinking water;
 9. The necessary amendments be made to Municipal Code Chapter 441, Fees and Charges, and Municipal Code Chapter 849, Water and Sewage Services and Utility Bill, and any other necessary Municipal Code Chapters as may be required, to give effect to Recommendations (4) above;
 10. Authority be granted to the City Solicitor to introduce any necessary Bills required to implement these recommendations, subject to any necessary refinements, including stylistic, format and organization, as may be identified by the City Solicitor, the Deputy City Manager & Chief Financial Officer and General Manager, Toronto Water; and
 11. The appropriate City officials be authorized and directed to take the necessary action to give effect thereto.

FINANCIAL IMPACT

The cost for the new Lead in Drinking Water Mitigation Strategy described herein is an estimated \$18 million per year and a \$7.275 million one time capital investment, by 2013, with an annual estimated operating cost of about \$1.25 million per year, thereafter.

The new Water Service Replacement Program targets the replacement of 5,000 water services annually, reduced from the existing 11,000 annual target. At an average cost of \$3,500 per service, the annual capital cost of the proposed Water Service Replacement Program is \$17.5 million, reduced from an expected \$38.5 million.

The expanded Faucet Filter Program is estimated to cost \$300,000 annually, which includes the provision of one free NSF-053 certified faucet mounted lead removal filter (i.e. at an estimated \$50 per unit cost) per household which has the lead water service connection replaced by the City; and the provision of a free NSF- 053 certified faucet mounted lead removal filter per year until the Corrosion Control Plan takes effect to the household where there is a child under six (6) years old and/or a pregnant woman living in the home and the annual household income is less than \$50,000.

These costs have been incorporated in Toronto Water's proposed 2011 to 2020 Capital Budget.

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

DECISION HISTORY

The Public Works and Infrastructure Committee at its meeting on May 2, 2007, requested the General Manager of Toronto Water, in consultation with the Medical Officer of Health to report on the status of lead in Toronto's drinking water, and on policies and actions being taken by Toronto Water to reduce the health risks of lead for Toronto residents. A copy of the Committee Decision Document related to this request (see Item PW5.6) is available at: <http://www.toronto.ca/legdocs/mmis/2007/pw/decisions/2007-05-02-pw05-dd.pdf>

City Council, at its July 16, 17, 18 and 19, 2007 meeting, adopted a new Lead Water Service Connection Replacement Program (LWSRP) to accelerate the replacement of the City owned section (ie. from the watermain to the water shut-off valve at the property line) of the estimated 65,000 lead water services within 9 years starting in 2008. A copy of the Council Decision Document (see Item PW7.8) is available at: <http://www.toronto.ca/legdocs/mmis/2007/cc/decisions/2007-07-16-cc11-dd.pdf>

On November 28, 2007 staff reported back to Public Works and Infrastructure Committee on potential Options for Financing the Replacement of Private Portion (from the shut-off valve at the property line to the house) Lead Water Services. That report recommended to not finance the replacement of the privately owned section of lead

services (ie. from the shut-off valve at the property line to the home). This report can be viewed at: <http://www.toronto.ca/legdocs/mmis/2007/pw/bgrd/backgroundfile-8875.pdf>

On April 8, 2009, the Public Works and Infrastructure Committee adopted a report by the General Manager, Toronto Water, and the Medical Officer of Health titled “Establishment of a Toronto Water Lead Content Mitigation Rebate Program”. This filter rebate program offers an annual maximum \$100 rebate to qualified “at-risk” residents for the purchase of an NSF/ANSI-053 certified faucet mounted lead removal filter. This report can be viewed at: <http://www.toronto.ca/legdocs/mmis/2009/pw/bgrd/backgroundfile-20066.pdf>.

On February 2, 2010, the Public Works and Infrastructure Committee adopted a report by the Treasurer and the General Manager of Toronto Water titled “Options for Financing the Replacement of Private Lead Water Service Connections”. This report considered the policy and financial impacts to the City of providing a loan to private homeowners interested in replacing the private side of the lead water service. Notwithstanding Toronto Water and Toronto Public Health’s strong support encouraging full replacement (both private and public sides) of lead service connections, to reduce the health risk from exposure to lead in drinking water within individual homes, a loan program was not recommended for a number of practical, financial, administrative and policy reasons.

In considering the report, the Committee requested the General Manager, Toronto Water, to report to this Committee in December 2010 on the results of the improved notice program for lead pipe replacement with take up statistics as compared to the previous three years. The report can be viewed at: <http://www.toronto.ca/legdocs/mmis/2010/pw/bgrd/backgroundfile-26348.pdf> ; and the associated Public Works and Infrastructure Committee Decision Document can be viewed at <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2010.PW30.1>

BACKGROUND

Sources of Lead in Drinking Water

The primary sources of lead exposure to Toronto residents are food, soil and dust. Lead seldom occurs naturally in water sources such as rivers and lakes. However, lead is occasionally detected in drinking water sampled within older buildings, primarily as a result of the corrosion or wearing away of materials containing lead that may be found in water service lines (i.e. supplying water to the building, from the City’s watermain) and internal plumbing. The most common sources are lead water services (which were generally used to service homes built before 1955), lead-based solder used to join copper pipe within the house plumbing (a common practice until the late 1980s but now prohibited under the Province of Ontario’s Plumbing Code), and fixtures/faucets made of brass and chrome-plated brass.

Health Canada has established a maximum acceptable concentration (MAC) of lead in drinking water of 10 ppb (parts per billion) in a free flowing sample of water. The

Province of Ontario has adopted this limit as the Ontario Drinking Water Quality Standard for lead.

The City's drinking water supply consistently meets or surpasses all Ontario Drinking Water Quality Standards. Water is tested on a quarterly basis at the output of the four water treatment plants and results of such tests are typically non-detectable for lead.

Lead Testing within Individual Properties

i) Non-Regulated Testing

Toronto Water provides water quality testing for lead in drinking water, at no charge, to property owners with lead water services or where there is reason to believe that lead levels may be elevated. The samples are collected from the kitchen faucet after flushing for five minutes. This is done to determine the effect of the lead water service on the quality of drinking water supplying the home, and is consistent with the sampling procedure indicated in the Chief Drinking Water Inspector's Order. Toronto Water monitors and tracks the results of these tests, termed "non-regulated", to support the development of its multi-year Capital Watermain and Water Services Infrastructure Renewal Programs.

Property owners living in older homes can have their water tested for lead by picking up a sample kit at a number of Toronto Public Health locations at the reception desk and dropping it off after collecting a water sample from their home.

Water quality testing results found to exceed the Ontario Drinking Water Quality Standards are reported to the Ministry of Environment's Drinking Water Inspector in Toronto, Toronto Public Health and the property owner. The results are also conveyed to Toronto Water's District Operations staff so that priority can be given for the replacement of the City-owned portion of the lead water service.

Table 1 presents a summary of drinking water quality results from 16,500 non-regulated lead test results collected from 2005 to the present. The Table shows that since 2005, 2,098 samples (12.7%) exceeded the Ontario Drinking Water Quality Standard for lead.

Table 1. Non-Regulated Lead Testing Results Summary (2005 to Present)

Year	Lead Concentration (ppb)			Total # of Samples	Number of Samples > 10 ppb	Percentage (%) of Samples > 10 ppb
	Max	Min	Ave			
2005	233*	0	6.9	121	17	14
2006	26	0	3.1	205	12	5.9
2007	282	0	4.4	4,362	554	12.7
2008	530**	0	5.3	4,696	531	11.1
2009	476	0	5.5	5,256	655	12.5
2010***	438	0	7.9	1,860	329	17.7
Total	530**	0	5.4	16,500	2,098	12.7
* Note: This location was re-sampled and provided a result of 9.2 ppb.						
** House idle for 30 years- not occupied.						
Could not be re-sampled due to water being shut off						
*** As of Nov 16, 2010						

ii) Regulated Testing

On May 23, 2007, the Ontario Ministry of the Environment’s Chief Drinking Water Inspector, issued an Order to 36 municipalities, including the City of Toronto, requiring the municipalities to collect samples from 20 private residences and five hydrants from areas known to have lead services. These samples were to be tested for lead, pH and temperature and the results reported to the Ministry by June 6, 2007. All of the City’s samples were collected by May 30, 2007. As expected, the results from samples collected from fire hydrants, representing the quality of water within the City’s distribution system, were all well below 10 parts per billion (ppb), the Ontario Drinking Water Quality Standards for lead. However, of the 20 homes sampled, 2 (10%) exceeded this level with lead levels of 13 ppb and 11 ppb, respectively.

In response to the Chief Drinking Water Inspector’s Order and in anticipation of imminent provincial regulatory changes addressing lead in drinking water, City Council, at its meeting on July 16, 17, 18 and 19, 2007, approved a new Water Service Replacement Program. This Program accelerated the replacement of the City-owned portion of lead water service connections across the City (i.e. from the watermain to the water shut off valve at the property line). At that time, it was estimated that 65,000 lead water service connections remained across the City and they would be replaced within a nine year period, at an estimated cost of \$236 million.

On July 26, 2007, amendments to O.Reg 170/03 under the Safe Drinking Water Act, 2002, to reduce the potential for elevated levels of lead in drinking water at the tap came into effect. The new regulation required municipalities to implement a mandatory Regulated Lead Testing Program, under which municipalities were required to collect and analyze drinking water quality samples in areas where the plumbing is suspected of

being connected to lead water services, and submit a formal report to the Ontario Ministry of the Environment (MOE).

Based on population, the regulation required the City of Toronto to collect and analyze samples from 100 private residences, 10 public facilities and 20 points within the distribution system. Samples were to be collected in two separate “seasonal” testing periods: June to October; and December to April, each year over a two year period.

In the first round (December 15, 2007 to April 15, 2008) of regulated lead testing results, six percent of the residential locations exceeded the Provincial Drinking Water Quality Standard for lead. There were no exceedances from the distribution system or the non-residential locations.

In the second round (June 15 to October 15, 2008) of regulated lead testing results, 52 percent of the residential locations exceeded the standard. There were no exceedances from the distribution system or the non-residential locations.

In the third round (December 15, 2008 to April 15, 2009) of regulated lead testing results, seven percent of the residential locations exceeded the standard. There were no exceedances from the distribution system or the non-residential locations.

In the fourth round (June 15 to October 15, 2009) of regulated lead testing results, 18 percent of the residential locations exceeded the standard. There were no exceedances from the distribution system or the non-residential locations.

The noted MOE regulation stipulates that if any two of three consecutive rounds of regulated testing more than 10% of the residential drinking water quality samples exceed the Ontario Drinking Water Quality Standard for lead of 10 ppb, the municipality must develop a Corrosion Control Plan, to mitigate the corrosion of lead from pipes, plumbing and fixtures, in contact with drinking water.

As a result of the two rounds (the second and the fourth) where more than 10% of the residential samples exceeded the standard 10 ppb, the regulation required the City of Toronto to submit its Corrosion Control Plan to the MOE, by October 15, 2010, for review and approval, prior to implementation, and that the Plan include:

- a) an analysis of how corrosion may be causing the lead water quality exceedances;
- b) an analysis that measures how to reduce the potential for lead in drinking water;
- c) preferred measure(s) for corrosion control;
- d) an implementation schedule; and
- e) a program for monitoring the effectiveness of the preferred measure(s).

Toronto Water complied with the regulatory requirements and submitted a Corrosion Control Plan to the MOE, by the prescribed deadline.

Lead Water Service Replacement Program

City Council, at its July 16, 17, 18 and 19, 2007 meeting, adopted a new Water Service Replacement Program to accelerate the replacement of the City-owned portion of lead services estimated at 65,000 connections within a 9 year period starting in 2008, at a total program cost estimated at \$236 million.

A complete water service connection includes the City-owned portion within the public road allowance extending from the watermain to the water shut-off valve located at property line; and a privately-owned portion extending from the shut-off valve to the interior of the building. The City is responsible for the repair or replacement of the City-owned portion of the water service connection. The individual property owner is responsible for the repair or replacement of the privately-owned portion of the water service connection.

As shown in Table 2, the City has replaced approximately 24,200 substandard water service connections since the start of this program. Substandard water service connections are defined as those made of non-copper (lead or galvanized iron) material, a pipe diameter less than 19 mm, and those providing a flow rate of less than 15 litres per minute. It is estimated that about two thirds (or 16,133) of the services replaced over the past three years were lead service connections.

Table 2. Water Services Replaced Under the Existing Water Service Replacement Program

Year	2008	2009	2010	Total
Water Services Replaced	6,200	8,000	10,000	24,200
(Estimated 2/3 Replaced Are Lead Services)	(4,133)	(5,333)	(6,667)	(16,133)

Although it was estimated that there were 65,000 lead services in 2007, the precise number of lead services is not certain, given the lack of data records, particularly in older parts of the City. It is recognized that any house built prior to the mid-1950s may have a lead water service connection.

Toronto Water has been replacing lead water services in three ways; namely on a planned basis, on an emergency basis and on a priority basis. Planned replacements are completed through watermain and water services renewal programs that are coordinated with other City Divisions to minimize disruption to local communities and for cost efficiencies. Emergency replacements are completed if there is either a broken or leaky service connection. Priority replacements are completed if water quality testing confirms high lead results or where there is minimal flow to the residence (i.e. less than 7 litres per minute). Together, Toronto Water targets the replacement of about 11,000 water services per year: 9,000 planned and 2,000 unplanned. A typical annual split in the target number of services replaced, by program type, is presented in Table 3.

Table 3. Breakdown of Targeted Water Service Replacements, by Program Type

Water Service Replacement Program Components		Targeted Number of Water Service Replacement		
		Existing Program	Modified Program	
Planned Water Service Replacement on a Street-by-Street Basis	Watermain Replacement	4,000	Planned	3,000
	Watermain Structural Lining			
	Road Reconstruction Only			
	Arterial Road Resurfacing Only			
	Sewer Reconstruction	5,000		0
	1-Year Ahead of Local Road Resurfacing			
	Stand-Alone Coordinating With Water Metering Program			
Un-planned Water Service Replacement on an Address-by-Address Basis	Emergency	500	Emergency	500
	High Lead (On-Demand)	1,500	Priority	1,500
	Low Flow (On-Demand)			
Total		11,000	5,000	

Health Concerns Regarding Partial Lead Water Service Replacements

Toronto Water and Toronto Public Health have worked jointly in the preparation and dissemination of public education material espousing the need for the full (public and private portion) replacement of lead water service connections to gain the maximum benefits and reduction of risk of lead in drinking water. This has included:

- information postcard delivered to over 200,000 households in the areas of the City presumed to have lead pipes;
- enhanced messaging (featuring information from both Toronto Water and Toronto Public Health) included with the do-it-yourself lead test kits and the adverse results package issued by Toronto Water;
- lead and drinking water factsheets from both Toronto Water and Toronto Public Health, available on the City website, distributed at community events, public education displays, consumer shows, etc. and as requested via email/phone;
- information brochures about the Water Service Replacement Program (WSRP) and the Faucet Filter Rebate Program, have also been distributed via the channels mentioned above;
- enhanced messaging in the WSRP's construction notification letters;
- editorial content in the Our Toronto householder newsletter; similar content made available to Councillors for inclusion in their constituency newsletters;
- presentations and open houses in wards at Councillor's requests;

- improved messaging and training for the 311 knowledge base and staff; and
- comprehensive information featured on both the Toronto Water and Toronto Public Health websites.

Despite this education program, the majority of lead service connections are only partially replaced as it is estimated only 15 to 30% of property owners whose services are upgraded by the City have the privately-owned portion upgraded as well. This estimate was determined based on field observations, community contact and contractor feedback as Toronto Water does not maintain a database of privately-owned service connections.

In January 2010 the CDC (Centers for Disease Control and Prevention in Atlanta, Georgia) announced the finding of an unpublished epidemiologic study suggesting a relationship between elevated blood levels in children and partial lead service replacements (i.e. only the public side). A notice published on the agency's website <http://www.cdc.gov/nceh/lead/waterlines.htm> advises public health managers that customers should be informed when lead services are only partially replaced so they can take steps such as flushing taps and cleaning aerators after service disruption to reduce the risk of lead exposure. At the time of the announcement, the manuscript of the study was undergoing peer review in a scientific journal. In October, 2010, the study was published in the Journal of Environmental Research http://media.washingtonpost.com/wp-srv/metro/documents/cdc_dc_water12012010.pdf?sid=ST2010120107897 which concludes that partially replacing lead water service may not decrease the risk of elevated blood lead levels associated with lead water services.

Existing Faucet Filter Rebate Program

Currently, the City's Faucet Filter Rebate Program provides a financial rebate to eligible Toronto residents for the purchase of an NSF-053 certified faucet – mounted lead removal filter and/or replacement cartridges.

Toronto Public Health recommends the use of an NSF-053 certified faucet – mounted lead removal filter in homes where:

- A child under the age of six (6) years old or a pregnant woman lives; and
- The water service is made of lead; or
- A partial or full lead service replacement has recently been completed.

Even after the full lead service replacement, Toronto Public Health still recommends at least one cycle use of an NSF-053 certified faucet – mounted lead removal filter because of the concerns that lead particulates may become dislodged from the service connection into the house plumbing for a short period of time following the installation of the new service connection.

Toronto Public Health also recommends continued use of an NSF-053 certified faucet – mounted filter in homes where only partial replacement occurred, and until the full replacement is completed.

The following eligibility criteria must be met to qualify for the rebate:

- Have a child under six (6) years old and/or a pregnant woman living in the home;
- Live in a single-family, duplex or triplex home; and
- Have an annual household income of less than \$50,000

A \$100 per year rebate is provided for residents living in homes where the City-owned portion of the water service is made of lead and has not yet been replaced; and a \$50 one-time only rebate is provided for residents of homes where the City-owned portion of the water service was made of lead and has been replaced within the past six (6) months.

There has been no uptake of this program to date.

Capital Budget Pressures

Since the adoption of the Lead Water Service Replacement Program in 2007, Toronto Water has faced increasing budget pressures in light of increased construction costs due to market conditions, and multiple competing priorities regarding infrastructure renewal, capacity growth and system enhancement needs.

In 2007, the average unit cost for the replacement of lead water services was in the range of \$2,500 to \$3,000 per connection. Present average unit costs have increased to about \$3,500 per connection including typical road and pavement restoration costs. At the annual replacement rate for the current Program (noted in Table 3), this represents an expenditure estimated at \$38.5 million annually and is beginning to compete with other priorities such as basement flooding protection works and infrastructure renewal projects (sewers, watermains and wastewater treatment facilities, and surface water quality improvement projects dealing with the City's combined sewer overflows).

COMMENTS

Given the above, and the Ontario Ministry of the Environment's regulations which now require the City of Toronto to develop and implement a Corrosion Control Plan to provide maximum overall protection from lead leaching out of lead water service connections, plumbing and fixtures of individual residences, an integrated multi-phase strategy is proposed.

The proposed new Lead in Drinking Water Mitigation Strategy provides as follows:

- a) a concerted effort to remove lead water service connections, through the City's Watermain Infrastructure Renewal Program, which over time will eliminate all lead pipe elements owned by the City;
- b) on a priority basis, for the replacement of City-owned lead water service connections when property owners replace the privately-owned lead water service connections prior to or at the same time as the City-owned replacement, when the supply flow to the home is measured at seven litres per minute or less, and when there is a leak or a break in the lead service connection;

- c) subject to the Ontario Ministry of the Environment's approval, proceeding with the implementation of the City's proposed Corrosion Control Plan, which will seek to reduce the corrosivity of the City's water supply and thereby reduce the potential for leaching of lead from existing lead service connections, lead solder joints in home plumbing and from brass fixtures within the home; and
- d) improving public education on the subject of lead in drinking water and advising on measures/practices which individual residents can implement to reduce the risk of lead exposure in drinking water.

Lead Water Service Replacement Program

A modified Lead Water Service Replacement Program described herein, and summarized in Table 3, replaces the existing Program and consists of the following elements:

1. Planned replacement of water services on the City-owned portion, on a street by street basis, to be coordinated with other City infrastructure renewal programs including:
 - Watermain replacement;
 - Watermain structural lining;
 - Road reconstruction; or
 - Sewer reconstruction;where the existing water services are lead or galvanized pipes, smaller than 19 mm in diameter, or the original services have never been replaced, and deemed to be at the end of their service life;
2. Emergency water service replacement of the City-owned portion, on an address specific basis, where:
 - the water service is broken; or
 - if the water service cannot deliver the minimum flow of seven litres per minute measured at the first entry point to the house for single-family, duplex or triplex residential properties. The seven litres per minute criteria does not apply to non-residential properties. Non residential properties (including mixed use of residential and non-residential properties) must apply and pay for an upgraded new service if the existing service does not meet the minimum flow requirements for that building type;
3. Priority water service replacement of the City owned section, on an address specific basis, capped at 1,500 replacements per year, and only if the:
 - City side is lead; and
 - The property owner replaces the private side of the lead service, prior to or at the same time the City owned section is replaced;

Water services replaced through the above programs will be replaced with 19 mm copper services, in accordance with the City's current standard, and at no cost to the property owner. If the existing water service is greater than 19 mm, it will be replaced with the same size at no cost to the property owner. In cases where the property owner wants to

have a larger than 19 mm service installed, or one that is larger than the existing, the property owner must:

- Upsize the private portion of the service to the same size as the City side; and
- Pay a compensating fee for this upsizing request, according to the fee schedule in Table 4.

Table 4. Water Service Upsizing Fee Schedule for the Replacement of Substandard Services

Upsizing Diameter D	Upsizing Fee
D= 25 mm	Flat Rate: \$500
> 25 mm	Actual Cost + 15% Admin Fee

Recognizing that full water service replacement (i.e. includes the public and private portions) is preferable to partial replacement (i.e. the City-portion alone) in minimizing the risk of lead in the drinking water of an individual home, the City is committed to removing all lead pipe services, through various infrastructure renewal programs, but unfortunately has limited ability to force private property owners to replace the private portion of the service connection.

To this end, the implementation of a Corrosion Control Plan, represents the foundation of the City's Lead in Drinking Water Mitigation Strategy, and will ultimately seek to reduce the risk of lead in drinking water in the shorter term.

Complementing the above, it is proposed that every effort is made to encourage full lead water service replacement, whenever lead water services are replaced through the City's planned infrastructure renewal programs. It is expected that an enhanced communication strategy, described below, will help promote and increase the rate of private side replacements.

On an as needed basis, where the property owner has agreed to replace the private portion of their lead water service connection, it is proposed that the City replace the City-owned portion on a priority basis.

Based on an annual replacement rate of 5,000 services per year, where two thirds are expected to be made of lead, it is expected that it will take another 15 years to replace the estimated 49,000 remaining lead water service connections. This represents an annual investment estimated at \$17.5 million.

Expanded Faucet Filter Program

It is proposed that the existing Faucet Filter Rebate Program be expanded to provide:

- a) one free NSF-053 certified faucet mounted lead removal filter per year to the property owner along with a door-hanger until the Corrosion Control Plan is implemented, where:
 - there is a child under six (6) years old and/or a pregnant woman living in the home;
 - the home is a single family, duplex or triplex building; and
 - the annual household income is less than \$50,000;
- b) a one-time only free NSF-053 certified faucet mounted lead removal filter to the property owner along with a door-hanger immediately following the replacement of the City-owned portion of the water service.

As the existing Faucet Filter Rebate Program has had no uptake so far, this expanded Faucet Filter Program is directed at proactively addressing public health concerns in the high risk households until the Corrosion Control Plan is implemented, as well as, addressing the possible short term increase in drinking water lead levels immediately following a partial or full replacement. The free NSF-053 filter would be provided with a door-hanger informing the homeowner of the steps to take, such as flushing taps and cleaning aerators, to minimize lead exposure following the replacement of the service connection. The estimated \$50 cost of the filter is a relatively small incremental cost in comparison to the estimated \$3,500 construction cost for the replacement of only the City-owned portion of the service connection.

Corrosion Control Plan

The Corrosion Control Plan, as submitted to the MOE, proposes the addition of orthophosphate using phosphoric acid as a preferred alternative for corrosion control. This recommendation is based on the successful use of orthophosphates by other water utilities within the Great Lakes Basin such as Detroit and Chicago; and other cities such as Washington DC and Winnipeg. This type of treatment is expected to reduce the corrosivity of the City's drinking water, reducing the potential for lead leaching from lead water services, internal plumbing and brass fixtures, and thereby reducing lead levels and the health risk from exposure to lead in drinking water within individual homes.

Orthophosphate works by forming a protective coating inside water pipes. This coating helps reduce corrosion and the leaching of lead from surfaces in contact with drinking water. In the water treatment plants, orthophosphate is typically added in small doses in the form of food-grade phosphoric acid, which is a clear, odourless liquid. This would represent only a small fraction of the phosphate in the Canadian diet, where phosphate is found in many foods, including dairy and meat products and soft drinks (i.e. you would need to drink more than 300 glasses of tap water to get the same amount of phosphoric acid that you would get in one glass of 2% milk).

However, prior to system-wide full-scale implementation, the Corrosion Control Plan recommends additional testing that includes what is known as a pipe loop study and/or a

full-scale demonstration to confirm the performance of the preferred corrosion control measure. In addition the testing will ascertain the need for any additional chemical for pH adjustment, assess potential secondary impacts, and establish design dosages and other operating parameters. This work would be undertaken within the first year of receiving approval from the MOE.

Subject to approval from the MOE, it is anticipated that the Corrosion Control Plan will be fully implemented by 2013. The estimated capital cost to implement corrosion control (new infrastructure) at all four water treatment plants is \$7.275 million with an annual estimated operating cost of about \$1.25 million per year. In order to reduce the risk of lead in drinking water, it is likely that corrosion control will be a permanent measure as small amounts of lead may continue to leach from private side lead pipes that have not been replaced, internal plumbing containing lead solder joints and brass fixtures.

Public Education and Communication

An enhanced Public Education and Communication Program will be developed, building on material already developed and in use, regarding the issue of lead in drinking water and ways those individual property owners and residents can reduce the risk of exposure to lead from drinking water. Particular emphasis will be placed on older areas of the City that may have homes serviced by lead water services. There will be a clear focus on educating homeowners on the need and merits of replacing the private side of the water service connection.

The major component of the Public Education and Communication Program is the development of a user-friendly, customer-centric and information/accessibility driven sub website on the City of Toronto public website, that will provide residents up-to-date information about the City's comprehensive strategy, featuring content provided by and approved by Toronto Water and Toronto Public Health. Furthermore, this website will be enhanced by the dynamic web content management system that is part of the City's web "re:Brand initiative". A "one-window" dynamic City webpage, instead of multiple static divisional web pages will provide the public easy access and consistent information they need, aimed at enhancing public participation in the City's overall Lead in Drinking Water Mitigation Strategy and ultimately improving customer service.

Currently, Toronto Public Health, Toronto Water and 311 all have their own web pages on information and City programs related to lead. The content of those web pages are static and there is a high risk of having inconsistent and outdated content.

Toronto Water and Public Health carry out public education regarding lead in drinking water. This includes providing information on flushing practices (removing standing water from residential plumbing each morning by taking a shower or running the water for five minutes, etc.); using cold water for drinking, cooking or preparing baby formula; requesting water quality testing; and publishing the Water Service Replacement Program schedule. The messages are provided to residents via a number of mass media methods.

Additionally, there are a number of low-cost communication methods that can be utilized to increase residents' awareness of the lead issue and the City's new comprehensive Lead in Drinking Water Mitigation Strategy. They are as follows:

- Public education materials developed and distributed at all Community Environment Days, Access Toronto counters, public education displays;
- Messaging developed for outreach staff at these events, to engage residents (including some criteria to help staff identify residents affected by the lead issue);
- Articles provided to Councillors for use in their constituency newsletters (targeting Councillors in older areas of the City); and
- Advertisements discussing the lead issue and the City's comprehensive strategy in local community newspapers.

Finally, on those streets where lead water services are scheduled to be replaced, each property owner will receive advance notice from the City describing the program and encouraging them to replace their lead private water service pipes at the same time. It is expected that with this notification protocol, in advance of the construction works replacing the City-owned portion of the water service, the property owner will have sufficient time to prepare and plan for the replacement of privately-owned portion of the lead water service, ideally in conjunction with or in advance of the City's construction.

The Public Education and Communication Program will also include public notification in regards to the City's Corrosion Control Plan, and consultation with industrial and institutional customers which be affected by changes in water quality. It is also recommended that York Region, as a system that purchases water from Toronto Water, be consulted.

This report has been prepared in consultation with the Medical Officer of Health.

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