

CORROSION CONTROL PROGRAM LEAD SERVICE LINES

2020 Annual Report

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1.0 Introduction

The Water Security Agency (WSA) requested the City of Saskatoon (City) commence a lead (Pb) monitoring program in November 2013. The monitoring program was to follow Health Canada recommendations for a community with a population greater than 100,000, as outlined in *Guidance on Controlling Corrosion in Drinking Water Distribution Systems*.¹

On May 30, 2020, the City was issued a renewed Permit to Operate a Waterworks by the WSA, pursuant to Section 28(1)(h) of *The Environmental Management and Protection Act*, 2010. The Permit specifically requires the City to “conduct a corrosion control program that will monitor the effects the potable water has within the [City’s] distribution system. This program shall continue to conform to the information provided in the Health Canada document...”¹

The purpose of this report is to present the results from the City’s 2020 Lead Monitoring Program and Action Plan, as well as outline the proposed Action Plan for 2021. The report’s format and results are presented in a manner consistent with previous annual reports.

2.0 Background

The federal government has undertaken substantial measures to address the presence of lead in Canadian drinking water. The federal maximum acceptable concentration (FMAC) of lead in drinking water is 0.005 mg/L based on health effects in children.² This was reduced in 2019, down from 0.010 mg/L. The Province of Saskatchewan has adopted a provincial maximum acceptable concentration (PMAC) of 0.010 mg/L.³

Health Canada’s guidance document¹ outlines monitoring procedures for lead in residences and in non-residences. In both cases, a two-tiered sampling program is recommended. Initial sampling is to occur throughout the distribution system; the sample size would depend on the population of the community. At least 50% of these locations should be serviced with a lead connection.

Secondary (lead profile) sampling would only occur if more than 10% of the results exceeded the Health Canada Action Level (HCAL) for lead. For residential locations, the HCAL is 0.015 mg/L and for non-residential locations, the HCAL is 0.020 mg/L.

¹ Health Canada, 2009, *Guidance on Controlling Corrosion in Drinking Water Distribution Systems* (ISBN 978-1-100-14193-0). Water, Air, and Climate Change Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, ON.

² Health Canada, 2020, *Guidelines for Canadian Drinking Water Quality – Summary Table*. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, ON.

³ Saskatchewan Environment, 2020, *Saskatchewan’s Drinking Water Quality Standards and Objectives (Summarized)*. EPB 507.

The intent of the sampling program is to help communities determine the sources of lead in drinking water. This information can then be used to develop corrective measures to mitigate public health impacts. Corrective measures can include:

1. **Altering treatment:** system-wide approach to reduce corrosion by changing the chemistry of the drinking water.
2. **Physical removal:** replacing distribution system components; mains, service connections, etc.
3. **Point-of-use devices:** installing treatment at individual taps.

Municipal authorities are also encouraged to develop an inventory of monitoring sites where leaded materials are likely to be present.

Once corrective measures are in place, follow-up sampling is recommended to assess effectiveness and to assist with optimization for corrosion control.

3.0 Monitoring Program 2020

The purpose of the 2020 Lead Monitoring Program was to review the baseline established in 2014, review performance over the years leading up to 2020, and develop an ongoing sampling program that accurately represents the effectiveness of the Lead Service Line (LSL) Replacement Program (Replacement Program). Each year, this program is reviewed to increase the knowledge of corrosion control in Saskatoon.

This program is in accordance with the Health Canada guidelines for residential LSL. In alignment with past sampling programs, priority was given to residential sites as they have the majority of LSL, and previous sampling efforts in 2009 and 2010 indicated that lead levels at non-residential sites did not typically exceed the HCAL of 0.020 mg/L.⁴ In addition, non-residential sites with known LSL are issued the annual educational information.

3.1 Residential Sampling Program

Letters requesting voluntary participation in the study were sent to 143 residents. This included those who had recently replaced their LSL, those that had previously participated in the program, and new addresses with LSL in the City's database. Fifty-two (52) agreed to participate. Note that one invitee agreed to participate but did not return samples or sampling supplies. One participant did not understand the instructions, so that site data has been excluded from the report. Additionally, one site was previously identified in the City's database as having a LSL; however, further investigation revealed this was not the case.

⁴ City of Saskatoon, 2015, *Corrosion Control Program – Lead Service Lines – 2014 Annual Report*. File CP-7900-2

Initial control sites were obtained by random recruitment and have been retained yearly in order to assess continuing absence of lead in the distributed water. One initial control site was replaced with a neighboring location, and one additional new control site was added.

As a result, the 2020 residential sampling program included 55 residential sampling sites. This falls within the Health Canada Guidelines for a reduced annual monitoring program, which was implemented by the City in 2015.⁵ Sample collection sites included six control sites with no history of LSL, 42 sites with active LSL, and seven sites with LSL replaced within the previous year.

In 2020, all sites were sampled and analyzed in accordance with the program. Data was analyzed to provide information about what materials in the distribution system are contributing to lead in drinking water. Results will continue to help shape the Action Plan so the best corrective measures can be selected and optimized.

3.2 Residential Sampling Protocols

Copies of letters and sampling instructions presented to residents can be found in Appendix A.

Participants were asked to ensure that a minimum stagnation period of six hours had passed before obtaining a sample at their kitchen tap. Aerators and screens were not to be removed, and the sample was to be obtained at a flow rate consistent with typical household use.

All participants were provided with four, one litre sample bottles and a thermometer. They collected four sequential samples and reported the time and temperature at the beginning and end of sample collection. All four samples were typically collected within one to five minutes of turning on the tap. Laboratory staff analyzed and recorded pH and alkalinity for each sample.

As per the previous programs, the intention was to obtain samples of water from the LSL to determine if the service line is an important source of lead that is detected in the sample from the tap. There is no specific knowledge of the interior plumbing conditions at any of the sampling locations.

3.3 Residential Sampling Results

Sample results are outlined in Table 3, Along with Figures 1 through 4 located in Appendix A. A summary of results is as follows:

1. None of the six control samples exceeded the FMAC of 0.005 mg/L.
2. One of the seven replaced LSL sites exceeded in the FMAC of 0.005 mg/L in one of

⁵ City of Saskatoon, 2016, *Corrosion Control Program – Lead Service Lines – 2015 Annual Report*. File WT-7500-2

the four samples collected (0.00720 mg/L). Note that the 2019 homeowner literature was updated to include an educational component on flushing internal plumbing following replacement work. An example of this can be found in Appendix B. Three of these sites were part of the 2019 sampling program, prior to the replacement of their LSL. In all cases, their lead levels decreased in 2020.

3. Thirty-seven (37) (88%) LSL sites exceeded the FMAC of 0.005 mg/L in at least one of the samples.
4. Thirty-five (35) (83%) LSL sites exceeded the PMAC of 0.010 mg/L in at least one of the samples.
5. Thirty-two (32) (76%) LSL sites exceeded the HCAL of 0.015 mg/L in at least one of the samples.
6. Eighteen (18) LSL sites who participated in the 2019 program, also participated in the 2020 program. There was no clear trend year-to-year, as some results revealed lead level decreases, while others revealed increases.
7. The maximum lead value recorded in a single sample was 0.127 mg/L, which was lower than the maximum recorded in 2019 (0.164 mg/L) and 2018 (0.130 mg/L). The highest lead value recorded in a single sample in the 2014 report was 0.120 mg/L.

The Health Canada guidance document indicates that the collection of four sequential samples provides a profile of the lead originating from the tap, the interior household plumbing, and all or a portion of the LSL.

Results were provided to all participants. Regardless of results, those with a LSL were advised to continue flushing their water lines after a period of stagnation.

3.4 Distribution System Conditions

Table 1 summarizes the conditions within the distribution system, through the months of June to September 2020, during which sampling was conducted. Conditions are presented for the water leaving the Water Treatment Plant (WTP), for two routine distribution sampling sites on the west and east sides of the City, and for sample sites (where available).

The average temperature of all samples was 21.6°C for the first litre sampled and dropped down to 17.6°C for the fourth litre sampled. This is typical, reflecting the higher temperature of the lines in the home and dropping as more water is pulled from the cooler distribution pipes in the street.

Alkalinity leaving the WTP was determined to be relatively stable between 124 and 140 mg/L as CaCO₃, and pH was also stable between 8.2 and 8.3. In general terms, lead corrosion is expected to decrease with increasing pH and alkalinity.

The Langlier Saturation Index is calculated based on several parameters and indicates the tendency of the water to deposit hardness onto pipes in the distribution system. A positive value was calculated for all samples showing a tendency to cause deposition, reducing the corrosive effect of the water on a lead service line.

Table 1. Summary of Distribution System Conditions, June 1 to September 30, 2020.

Location		pH	Temperature (°C)	Alkalinity (mg/L as CaCO ₃)	Saturation Index	Total Chlorine (mg/L)
Leaving WTP	Min.	8.2	16.1	124	0.21	1.67
	Avg.	8.2	17.1	135	0.29	1.92
	Max.	8.3	18.9	140	0.35	2.17
West Distribution Sites	Min.	8.1	16.1	124	0.21	1.25
	Avg.	8.1	18.3	133	0.26	1.72
	Max.	8.2	20.7	140	0.31	2.08
East Distribution Sites	Min.	8.1	8.0	130	0.09	1.11
	Avg.	8.2	11.9	136	0.17	1.69
	Max.	8.2	15.4	142	0.24	2.12
Lead Sites 1 st Litre	Min.	7.9	15.3	114	Not available	n/a
	Avg.	8.0	21.8	128		
	Max.	8.2	26.9	146		
Lead Sites 2 nd Litre	Min.	7.9	12.5	116	Not available	n/a
	Avg.	8.1	20.8	128		
	Max.	8.2	28.3	146		
Lead Sites 3 rd Litre	Min.	8.0	11.8	116	Not available	n/a
	Avg.	8.1	19.3	128		
	Max.	8.2	29.0	146		
Lead Sites 4 th Litre	Min.	8.0	11.2	116	Not available	n/a
	Avg.	8.1	17.7	128		
	Max.	8.2	28.1	138		
Lead Sites Replaced 1 st Litre	Min.	8.0	18.8	116	Not available	n/a
	Avg.	8.1	21.1	125		
	Max.	8.2	24.5	130		
Lead Sites Replaced 2 nd Litre	Min.	8.0	16.2	114	Not available	n/a
	Avg.	8.1	19.7	125		
	Max.	8.2	23.0	130		
Lead Sites Replaced 3 rd Litre	Min.	8.0	16.2	114	Not available	n/a
	Avg.	8.1	17.7	124		
	Max.	8.1	22.2	132		
Lead Sites Replaced 4 th Litre	Min.	8.0	13.2	112	Not available	n/a
	Avg.	8.1	16.4	124		
	Max.	8.1	21.9	132		
Control Sites 1 st Litre	Min.	7.9	19.2	122	Not available	n/a
	Avg.	8.1	21.8	129		
	Max.	8.2	24.3	136		
Control Sites 2 nd Litre	Min.	8.0	19.3	124	Not available	n/a
	Avg.	8.1	20.9	132		
	Max.	8.2	22.4	148		
Control Sites 3 rd Litre	Min.	8.0	19.5	124	Not available	n/a
	Avg.	8.1	20.4	131		
	Max.	8.2	21.2	144		
Control Sites 4 th Litre	Min.	8.0	17.8	124	Not available	n/a
	Avg.	8.1	19.4	129		
	Max.	8.2	20.3	140		

4.0 Action Plan 2020

The 2020 Action Plan was based on the results of sampling programs that were carried out up to 2019, as previously reported.

4.1 Public Education

A formal Communication Plan was developed to address health concerns of lead. Education materials in 2020 were similar to 2019 and focused on informing citizens how they could reduce the potential for exposure to lead. Key messages included:

1. Flushing for a minimum of five minutes after periods of stagnation.
2. Using cold water only for drinking and cooking.
3. Installing and maintaining a point of use filter.
4. The importance of modernizing the plumbing system in older homes.
5. Replacement of lead service connections.

This information was distributed to the public via the City's website and direct mailing to 3,793 affected stakeholders. Informational letters and brochures were sent to stakeholders as identified in Table 2. For reference, communication materials are included in Appendix B.

Table 2. 2020 Lead Education Materials Mailed.

Stakeholder	Quantity
Residential Owner	2,459
Residential Occupant	996
Commercial Owner	108
Commercial Occupant	67
Owner of Multiple LSL Property	163 letters re: 520 sites
Total mailed:	3,793

4.2 Treatment Adjustments

Treatment adjustments for corrosion control purposes were not carried out in 2020, as previous investigations and proved that treatment adjustments did not affect lead levels in the distribution system and reduce disinfection effectiveness.

4.3 Lead Service Line Replacement Program

Replacement of the LSL is still seen to be the best option for managing lead corrosion in the distribution system.

The City subsidizes approximately 60% of the total cost of replacement from the water main to the outside wall of the residence. Partial replacements of LSL are not allowed because of the elevated lead levels that may occur; therefore, the City also performs full replacement of LSL when they are encountered during water main replacement programs, roadway resurfacing programs, or when emergency repairs must be made.

In 2020, a total of 59 LSL were replaced. Because of COVID-19 restrictions all non-critical pre-planned LSL replacements were deferred to 2021 and only critical replacements and emergency replacements were performed. It is estimated that 2,777 LSL remain in use in Saskatoon.

4.4 Point of Use Devices

Point of use devices were not distributed in 2020 as part of the corrosion control program.

4.5 Public Feedback

Following an influx of public inquiries in 2019 which resulted from media reports, the number of inquiries in 2020 were relatively lower and anecdotally aligned with pre-2019 levels. The City does not have the capacity to track the number of inquiries, particularly because they are received through various forums.

4.6 High Risk Areas

In 2015 the City assessed connections to all high-risk areas including registered daycares, schools, care homes, and hospitals.⁵ The City's records still indicate that there are no LSL in these high-risk areas.

5.0 Proposed Action Plan 2021

The WSA has included requirements for a Corrosion Control Program in the Permit to Operate for the WTP. An annual report is to be submitted to the WSA each year regarding the program. Proposed activities for the 2021 Action Plan are outlined below.

5.1 Monitoring Program

The City will continue to follow the Health Canada guidance document with a sampling program designed to monitor current conditions and the impacts of corrective measures to the distribution system.

5.2 Public Education

The public education program for 2021 will be similar to that developed for 2020 and will continue to include information about the Replacement Program.

5.3 Treatment Adjustments

Treatment adjustments for corrosion control purposes are not proposed for 2021.

5.4 Lead Service Line Replacement Program

In 2017, the City discontinued the homeowner requested Replacement Program and moved to a strategic replacement program that will align LSL replacements with water main upgrades and planned road preservation work. The goal of this new strategy is to replace all remaining LSL by 2027.

In 2021, the City plans to replace approximately 692 LSL as part of planned projects at an estimated cost of \$7.37 million. An additional \$0.83 million has been budgeted for

replacing LSL on an emergency basis. There are typically 60 to 80 emergency LSL failures per year.

5.5 Point of Use Devices

There are no plans to distribute point of use devices in 2021.

6.0 Closure

The 2020 Monitoring Program was intended to continue to gather relevant data and closely follow the guidance document provided by Health Canada, for lead in the distribution system.

Currently, full replacement of LSL is still seen to be the most effective corrective measure that the City can take to mitigate health risks for the long term. Public education is seen to be most effective in the short term only. The City will work towards the goal of full replacement by January 1, 2027.

Respectfully,



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Special Projects Manager, Saskatoon Water

On behalf of the Corrosion Control Program Committee:

Stephen Wood, P.Eng., Water and Sewer Asset Preservation Manager, Major Projects and Preservation

Sohrab Khan, P.Eng., Senior Project Engineer, Construction and Design

Rob St. Pierre, P. Eng., Senior Process Engineer, Saskatoon Water

Cleo Jahraus, B.Sc., Water Lab Coordinator, Saskatoon Water

Mike Halstead, Communications Consultant, Strategy and Transformation

Appendix A: Monitoring Program

Table 3. Monitoring Program Sampling Data.

Sample ID	Sample Date (2020, unless noted)	Date Replaced	1st LITRE				2nd LITRE				3rd LITRE				4th LITRE			
			LEAD (mg/L)	pH	Temp (°C)	ALKALINITY (mg CaCO ₃ /L)	LEAD (mg/L)	pH	Temp (°C)	ALKALINITY (mg CaCO ₃ /L)	LEAD (mg/L)	pH	Temp (°C)	ALKALINITY (mg CaCO ₃ /L)	LEAD (mg/L)	pH	Temp (°C)	ALKALINITY (mg CaCO ₃ /L)
Control 01	8-Aug	N/A	0.000316	8.0	23.0	132	0.000228	8.1	21.2	132	0.000115	8.0	20.6	132	0.000101	8.1	20.3	132
Control 02	17-Aug	N/A	0.000521	8.2	21.4	128	0.000501	8.1	21.4	126	0.00111	8.2	20.8	128	0.000224	8.2	17.8	126
Control 03	11-Aug	N/A	0.000955	8.1	20.8	124	0.00112	8.2	20.7	130	0.000443	8.2	20.3	128	0.000317	8.2	19.0	130
Control 04	28-Jul	N/A	0.000646	7.9	22.3	122	0.000238	8.0	20.5	124	0.000217	8.0	20.2	124	0.000215	8.0	19.6	124
Control 05	13-Aug	N/A	0.000341	8.1	19.2	136	0.000413	8.1	19.3	148	0.000572	8.1	19.5	144	0.000572	8.1	19.5	140
Control 06	11-Aug	N/A	0.00100	8.1	24.3	132	0.00124	8.2	22.4	130	0.000388	8.2	21.2	128	0.000447	8.2	20.3	124
Lead 01	10-Jul	N/A	0.0200	8.1	18.0	128	0.0235	8.1	16.4	128	0.0593	8.1	15.6	128	0.0701	8.1	14.7	126
Lead 02	15-Jul	N/A	0.0192	8.2	21.1	128	0.0421	8.1	24.1	128	0.0983	8.1	16.9	128	0.109	8.1	13.2	128
Lead 03	15-Jul	N/A	0.00233	8.0	26.9	128	0.00114	8.1	28.3	126	0.000886	8.1	29.0	126	0.000738	8.1	28.1	128
Lead 04	13-Jul	N/A	0.0240	7.9	21.6	122	0.0431	8.0	21.4	126	0.0562	8.1	20.4	124	0.0626	8.1	18.9	126
Lead 05	10-Jul	N/A	0.0261	8.0	20.7	126	0.0283	8.1	20.2	128	0.0677	8.1	19.2	128	0.0758	8.1	17.0	126
Lead 06	14-Aug	N/A	0.0140	8.1	25.5	146	0.0149	8.1	24.8	146	0.0410	8.1	24.3	146	0.0697	8.1	21.1	132
Lead 07	21-Jul	N/A	0.0379	8.0	21.5	120	0.0386	8.1	21.1	116	0.0397	8.1	20.6	116	0.0372	8.1	17.2	116
Lead 08	17-Jul	N/A	0.0175	8.1	20.7	128	0.0237	8.1	18.6	128	0.0244	8.1	17.2	128	0.0226	8.1	15.9	130
Lead 09	10-Jul	N/A	0.0157	8.0	20.2	126	0.0176	8.0	20.2	128	0.0273	8.1	18.7	126	0.0338	8.1	16.8	128
Lead 10	14-Jul	N/A	0.0324	7.9	20.0	126	0.0342	8.0	20.2	126	0.0395	8.0	19.5	128	0.0427	8.1	19.0	128
Lead 11	16-Jul	N/A	0.0353	8.1	21.1	126	0.0664	8.1	19.6	128	0.112	8.1	15.8	128	0.107	8.1	14.6	128
Lead 12	13-Jul	N/A	0.0221	8.1	20.5	128	0.0369	8.1	21.1	130	0.0743	8.1	19.1	126	0.0660	8.2	15.1	126
Lead 13	15-Jul	N/A	0.0648	8.0	18.6	128	0.107	8.1	16.2	128	0.102	8.1	12.8	130	0.0960	8.1	11.5	128
Lead 14	15-Jul	N/A	0.0316	8.0	22.5	128	0.0545	8.0	22.1	128	0.0724	8.1	21.5	128	0.0720	8.1	20.4	128
Lead 15	13-Jul	N/A	0.0451	8.0	24.9	128	0.0928	8.1	22.5	130	0.117	8.1	19.9	130	0.0789	8.1	18.3	130
Lead 16	21-Jul	N/A	0.0135	8.1	22.7	118	0.0144	8.1	21.9	118	0.0138	8.1	21.5	118	0.0119	8.1	19.7	120
Lead 17	13-Jul	N/A	0.00224	8.1	21.9	130	0.00169	8.1	21.1	130	0.000579	8.1	16.4	130	0.000459	8.1	12.4	130
Lead 18	14-Jul	N/A	0.0255	8.0	19.7	128	0.0318	8.1	19.5	128	0.0357	8.1	19.1	128	0.0413	8.1	18.7	128
Lead 19	21-Jul	N/A	0.0113	8.1	25.3	114	0.0143	8.1	20.2	116	0.0156	8.1	17.1	118	0.0175	8.1	16.5	116
Lead 20	17-Jul	N/A	0.0114	8.1	20.8	130	0.0138	8.1	16.7	130	0.0130	8.1	14.4	130	0.00870	8.1	13.5	130
Lead 21	27-Jul	N/A	0.00129	8.0	21.6	120	0.00120	8.1	22.3	122	0.00103	8.1	21.4	120	0.000374	8.1	19.1	124
Lead 22	22-Jul	N/A	0.0143	8.0	22.0	118	0.0205	8.1	21.1	118	0.0226	8.1	19.9	116	0.0240	8.1	18.8	118
Lead 23	10-Jul	N/A	0.0254	8.1	19.5	126	0.0236	8.1	15.1	126	0.0230	8.1	15.1	126	0.0228	8.1	15.1	126
Lead 24	10-Jul	N/A	0.0218	8.0	22.9	128	0.0216	8.1	22.3	126	0.0651	8.1	19.8	124	0.0577	8.1	17.4	124
Lead 25	13-Jul	N/A	0.0386	8.0	20.3	134	0.0714	8.0	19.1	128	0.0917	8.0	17.2	128	0.0688	8.0	14.8	128
Lead 26	13-Jul	N/A	0.0448	8.0	22.0	130	0.0436	8.1	23.4	130	0.0466	8.2	22.3	132	0.0603	8.1	21.2	132
Lead 27	13-Jul	N/A	0.0116	8.1	23.1	130	0.0120	8.1	22.2	126	0.0121	8.1	21.4	130	0.0124	8.1	20.5	128
Lead 28	10-Aug	N/A	0.0263	8.1	19.9	140	0.0258	8.1	19.6	142	0.0450	8.2	19.1	138	0.0667	8.2	18.4	138
Lead 29	13-Jul	N/A	0.00559	8.1	24.9	130	0.00616	8.1	24.5	130	0.00743	8.1	22.4	130	0.00710	8.1	20.5	130
Lead 30	13-Jul	N/A	0.0233	8.1	24.0	132	0.0369	8.1	24.5	132	0.0433	8.2	22.9	130	0.0431	8.2	20.5	130
Lead 31	10-Jul	N/A	0.0161	8.0	21.1	132	0.0206	8.0	19.5	130	0.0224	8.1	18.4	130	0.0236	8.1	17.4	120
Lead 32	13-Jul	N/A	0.0315	8.1	26.1	132	0.0342	8.1	25.8	130	0.0518	8.2	24.5	126	0.0677	8.2	21.8	126
Lead 33	14-Jul	N/A	0.0252	8.1	22.2	136	0.0413	8.1	22.3	134	0.0898	8.1	21.9	136	0.0729	8.2	19.9	136
Lead 34	15-Jul	N/A	0.0490	8.1	15.6	128	0.0667	8.1	12.9	128	0.0377	8.1	12.4	128	0.0237	8.1	12.6	128
Lead 35	13-Jul	N/A	0.00717	8.1	22.7	128	0.00899	8.2	19.2	130	0.00872	8.1	17.8	128	0.00879	8.1	16.8	130
Lead 36	13-Jul	N/A	0.0236	8.1	22.5	130	0.0253	8.1	22.3	130	0.0247	8.1	22.1	130	0.0230	8.1	21.7	130
Lead 37	9-Jul	N/A	0.000842	8.1	20.7	128	0.000287	8.1	18.1	128	0.000250	8.0	15.5	130	0.000245	8.0	14.0	130
Lead 38	14-Jul	N/A	0.0240	8.0	21.9	130	0.0366	8.1	21.5	130	0.0790	8.1	19.0	130	0.0791	8.1	15.5	130
Lead 39	15-Jul	N/A	0.00120	8.0	21.1	128	0.000774	8.1	20.9	128	0.000399	8.1	20.0	128	0.000391	8.1	19.5	128
Lead 40	17-Jul	N/A	0.0539	8.1	24.7	130	0.0668	8.1	23.5	130	0.0861	8.1	20.9	130	0.0825	8.1	18.4	130
Lead 41	14-Jul	N/A	0.0992	8.1	15.3	128	0.127	8.1	12.5	128	0.105	8.1	11.8	128	0.111	8.1	11.2	128
Lead 42	20-Jul	N/A	0.0243	7.9	22.0	128	0.0291	7.9	22.1	128	0.0521	8.0	22.1	128	0.0493	8.0	21.1	128
Replaced 01	15-Jul	20-Jan-20	0.00720	8.2	19.6	128	0.00231	8.2	19.4	128	0.00214	8.1	16.2	128	0.00119	8.1	13.7	128
Replaced 02	20-Jul	5-Dec-19	0.000807	8.0	19.3	120	0.000432	8.0	18.3	118	0.000360	8.0	17.8	120	0.000358	8.0	17.8	120
Replaced 03	10-Jul	18-Jun-19	0.00323	8.0	22.2	128	0.00436	8.0	21.1	128	0.00112	8.0	17.1	126	0.000599	8.0	13.2	126
Replaced 04	30-Jul	23-Oct-19	0.00395	8.1	19.8	124	0.00201	8.1	16.2	124	0.00116	8.1	16.2	120	0.000983	8.1	16.5	122
Replaced 05	13-Jul	4-Jun-19	0.00342	8.0	23.6	130	0.00235	8.1	23.0	130	0.00248	8.1	22.2	132	0.00274	8.1	21.9	132
Replaced 06	23-Jul	5-Feb-20	0.00413	8.1	24.5	116	0.00239	8.1	21.3	114	0.00112	8.1	17.5	114	0.000950	8.1	15.2	112
Replaced 07	15-Jul	17-Oct-19	0.000445	8.0	18.8	130	0.000394	8.0	18.8	130	0.000463	8.1	17.1	128	0.000236	8.1	16.4	128

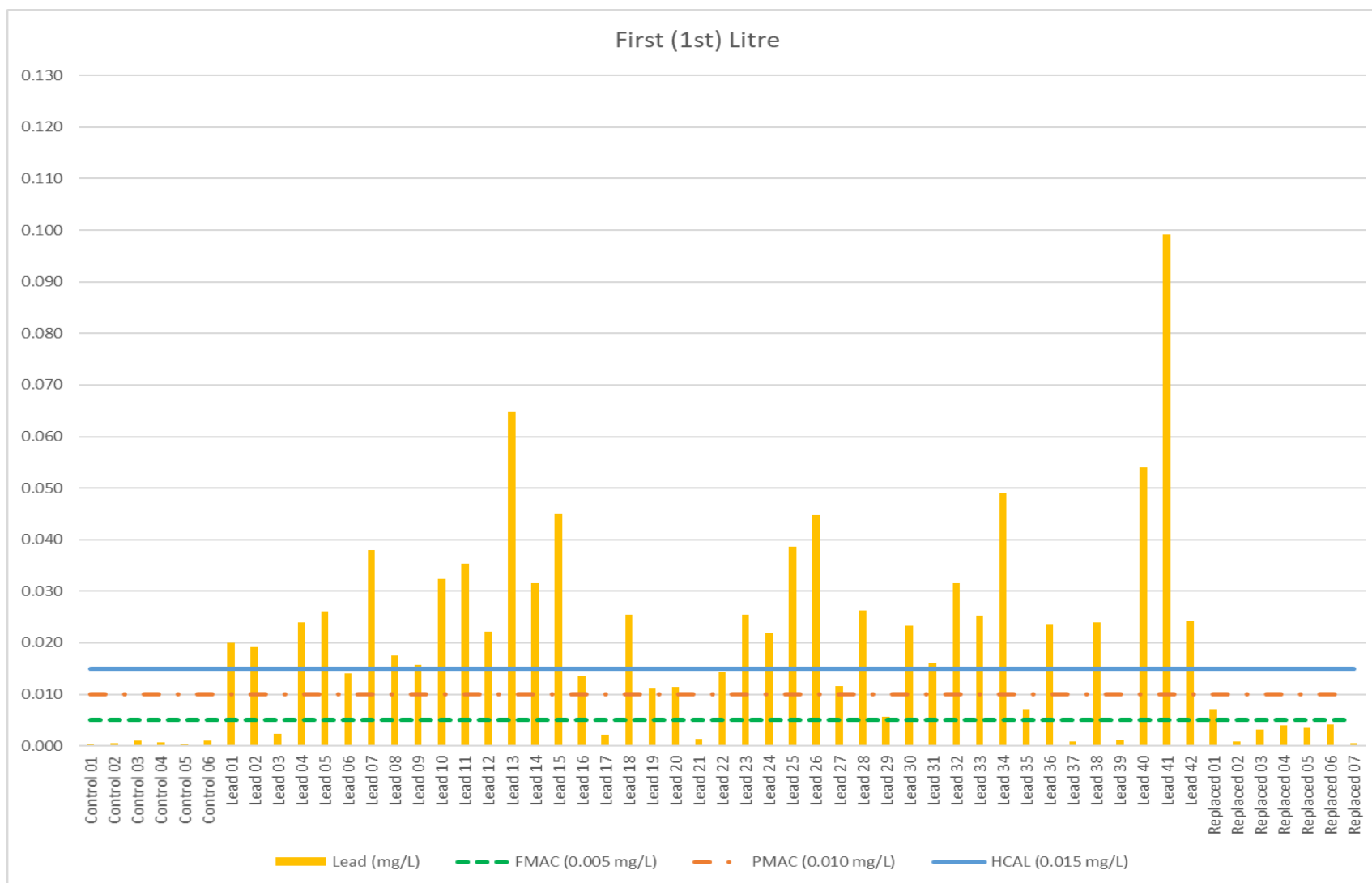


Figure 1. First (1st) Litre, Lead (Pb) Concentration.

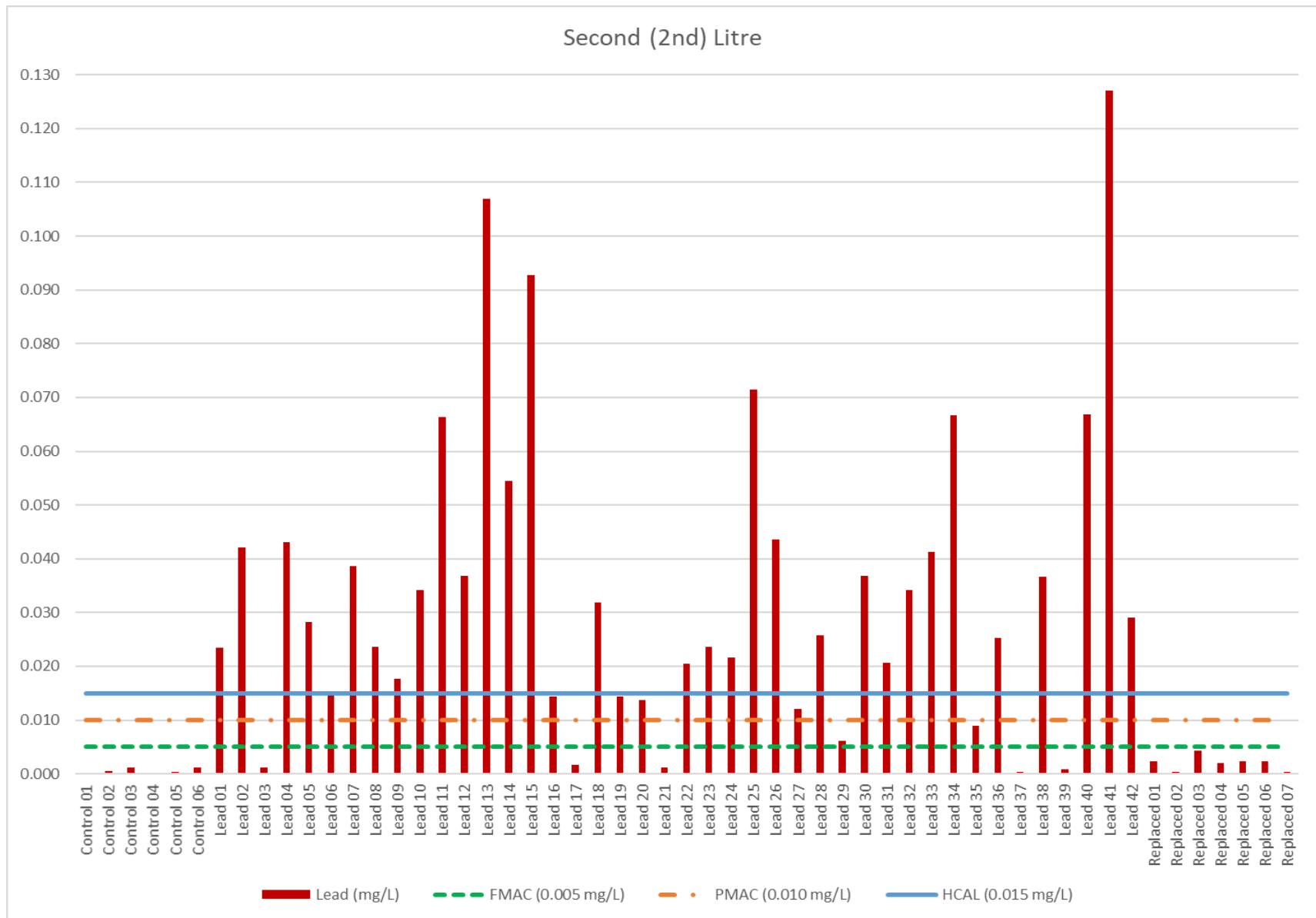


Figure 2. Second (2nd) Litre, Lead (Pb) Concentration.

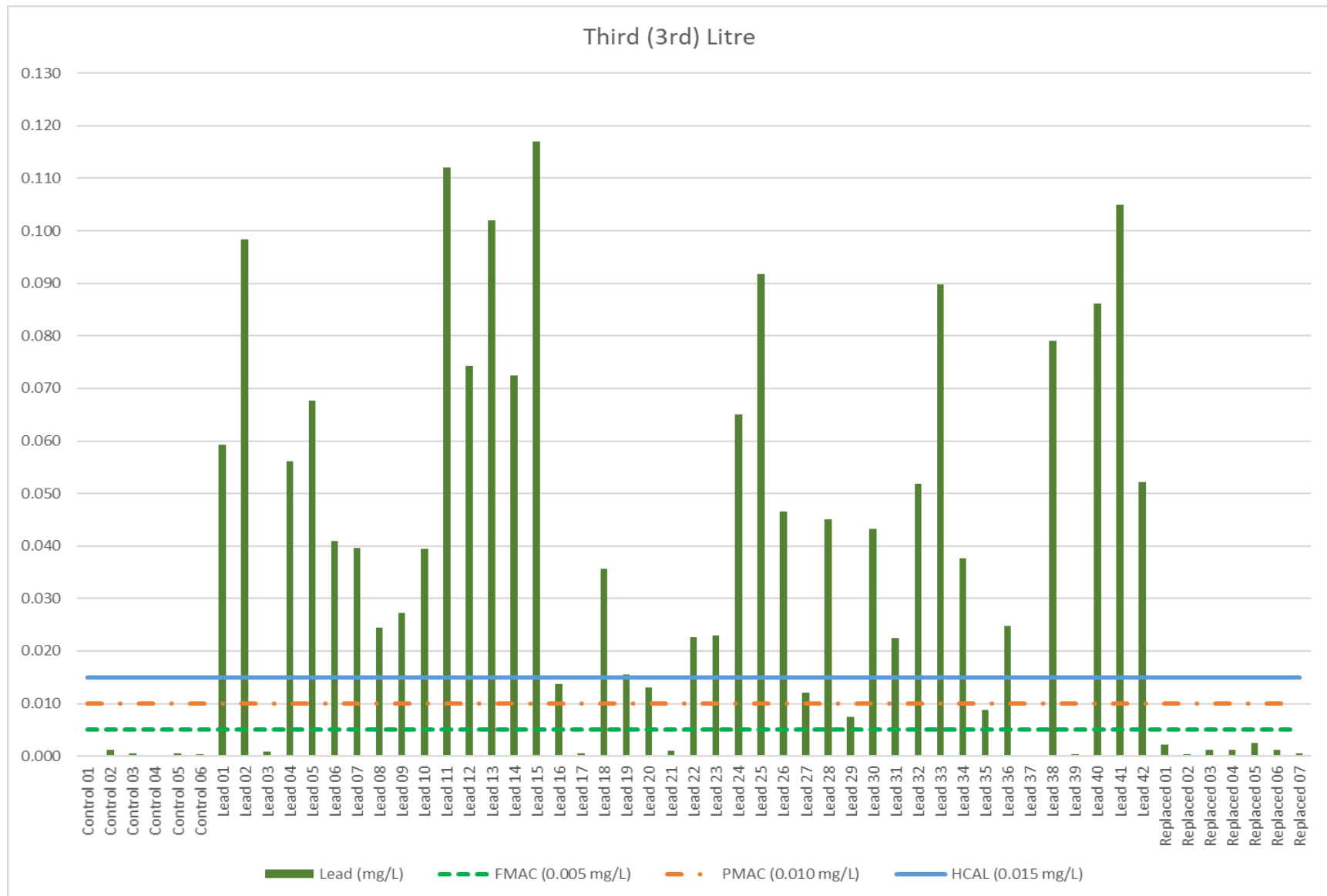


Figure 3. Third (3rd) Litre, Lead (Pb) Concentration.

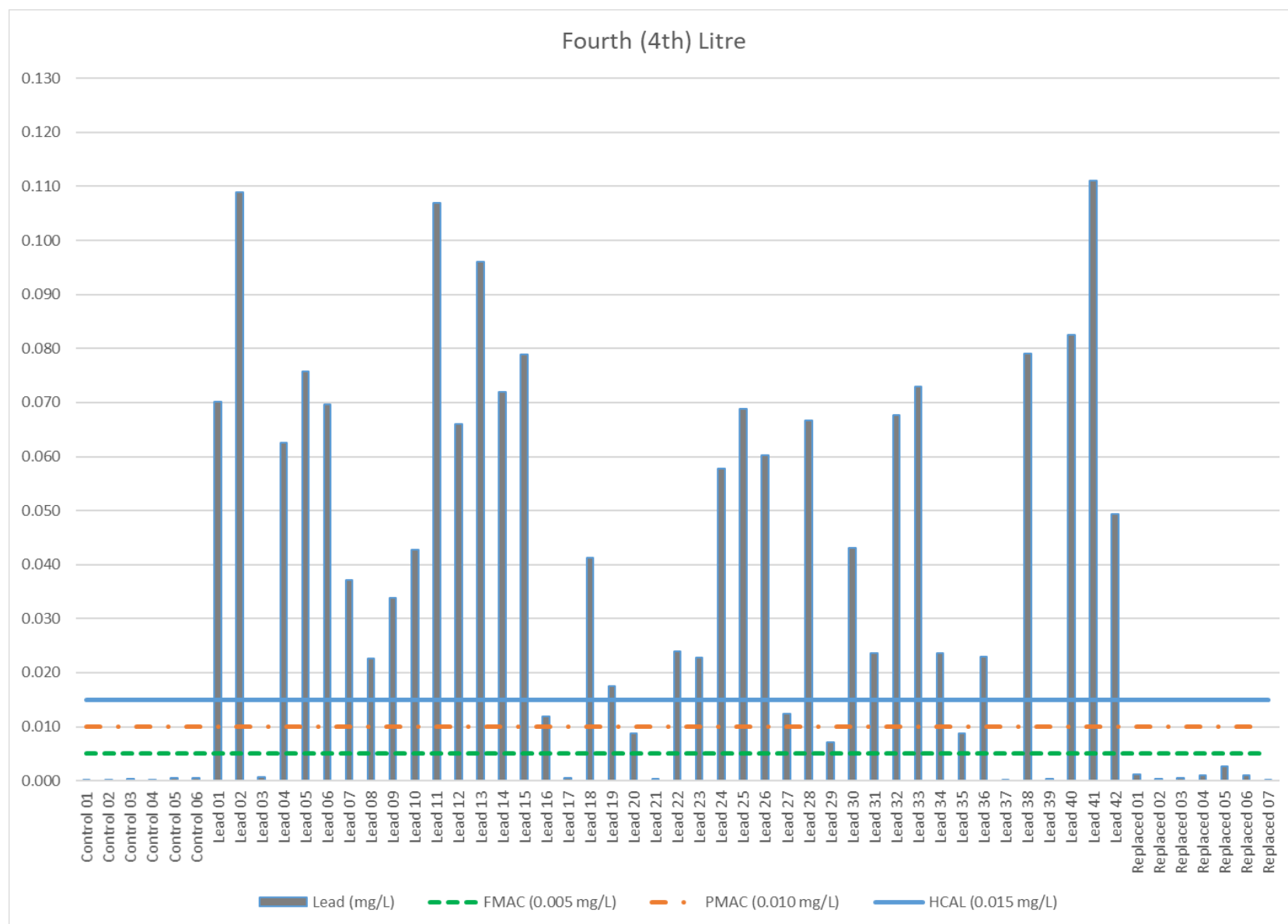


Figure 4. Fourth (4th) litre, Lead (Pb) Concentration.



Date

Homeowner Name

Address

Saskatoon SK Postal Code

Dear Homeowner:

The City of Saskatoon Water Lab conducts a study every July and August to assess lead in drinking water. The drinking water leaving the Water Treatment Plant contains no measurable amount of lead; however, homes serviced by lead service lines may experience lead leaching from their pipes into the drinking water.

As our records indicate your home may be serviced by a lead service line, we would like to invite you to participate in this study. Participation is entirely voluntary and there is no charge for the testing. The results for your property will be shared with you once the study has been completed in the fall. If your lead service line has been replaced, please disregard this notice.

Participation in the study will require you to collect four consecutive 1-Litre samples from the cold water line of your primary drinking water tap. Water must pass through the cold water line only – not through the hot water tap or through any filters or water softeners. The samples will need to be collected after the water has sat in the lines for a minimum of 6 hours (usually first thing in the morning), prior to water being used for any other purpose (e.g. flushing toilets, showers, sprinklers, laundry, etc.). **We will provide all of the bottles and instructions for sample collection and will pick up the samples from your home on a pre-arranged collection day.**

Please note that your tap water sample results will be shared with the Water Security Agency as part of required reporting under this program. Your personal information, such as name and address, will not be shared. By providing your tap water sample(s), you are consenting to this collection, use and disclosure.

If you are interested in participating, please reply before July 10, 2020, to cleo.jahraus@saskatoon.ca or call 306-975-2539.

Sincerely,

A handwritten signature in black ink, appearing to read 'Cleo Jahraus', with a long horizontal flourish extending to the right.

Cleo Jahraus

Water Lab Coordinator



Date

Homeowner Name

Address

Saskatoon SK Postal Code

Dear Homeowner:

The City of Saskatoon Water Lab conducts a study every July and August to assess lead in drinking water. The drinking water leaving the Water Treatment Plant contains no measurable amount of lead; however, homes serviced by lead service lines may experience lead leaching from the pipes into the drinking water.

As a participant in last year's study, your property is a good candidate for this study. We would like to invite you to participate in the study again this year so we may obtain follow-up data. Participation is entirely voluntary and there is no charge for the testing. The results for your property will be shared with you once the study has been completed in the fall.

Participation in the study will require you to collect four consecutive 1-Litre samples from the cold water line of your primary drinking water tap. Water must pass through the cold water line only – not through the hot water tap or through any filters or water softeners. The samples will need to be collected after the water has sat in the lines for a minimum of 6 hours (usually first thing in the morning), prior to water being used for any other purpose (e.g. flushing toilets, showers, sprinklers, laundry, etc.). **We will provide all of the bottles and instructions for sample collection and will pick up the samples from your home on a pre-arranged collection day.**

Please note that your tap water sample results will be shared with the Water Security Agency as part of required reporting under this program. Your personal information, such as name and address, will not be shared. By providing your tap water sample(s), you are consenting to this collection, use and disclosure.

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Cleo Jahraus

Water Lab Coordinator



Date

Homeowner Name

Address

Saskatoon SK Postal Code

Dear Homeowner:

The City of Saskatoon Water Lab conducts a study every July and August to assess lead in drinking water. The drinking water leaving the Water Treatment Plant contains no measurable amount of lead; however, homes serviced by lead service lines may experience lead leaching from the pipes into the drinking water.

Our records indicate that your home has recently had lead lines replaced, and as such, is a good candidate for this study. We would like to request you to participate in this study. Participation is entirely voluntary and there is no charge for the testing. The results for your property will be shared with you once the study has been completed in the fall.

Participation in the study will require you to collect four consecutive 1-Litre samples from the cold water line of your primary drinking water tap. Water must pass through the cold water line only – not through the hot water tap or through any filters or water softeners. The samples will need to be collected after the water has sat in the lines for a minimum of 6 hours (usually first thing in the morning), prior to water being used for any other purpose (e.g. flushing toilets, showers, sprinklers, laundry, etc.). **We will provide all of the bottles and instructions for sample collection and will pick up the samples from your home on a pre-arranged collection day.**

Please note that your tap water sample results will be shared with the Water Security Agency as part of required reporting under this program. Your personal information, such as name and address, will not be shared. By providing your tap water sample(s), you are consenting to this collection, use and disclosure.

If you are interested in participating, please reply before July 10, 2020, to cleo.jahraus@saskatoon.ca or call 306-975-2539.

Sincerely,

A handwritten signature in black ink, appearing to read 'Cleo Jahraus', with a long horizontal flourish extending to the right.

Cleo Jahraus

Water Lab Coordinator

DATE

«Name»

«Address»

«Saskatoon» «SK» «Postal_Code»

Dear «Name»:

Thank you for participating in the Lead Line Study recently conducted by the City of Saskatoon Water Lab. The results for your property are shown below.

As a reminder, the drinking water leaving the Water Treatment Plant contains no measurable amount of lead; however, homes serviced by lead service lines may experience lead leaching from the pipes into the drinking water.

Your results should be considered a guideline, as they are specific for the date and time the sample was drawn. The concentration of lead may vary depending on a variety of factors, including season and usage. For this reason, you are encouraged to continue to flush the lines for five minutes before using the water for drinking and cooking. Previous study results have shown that flushing will significantly reduce the lead concentration in the water. Additional information can be found on our webpage:

<https://www.saskatoon.ca/services-residents/power-water/water-wastewater/drinking-water/lead-pipes-drinking-water>

When interpreting your results, Health Canada states that the current drinking water guideline for lead is 0.005 mg/L. When collected as directed, the volume of the four litres sampled is not enough to bring fresh water into your home from the main. It is reflective of the lead contributed from within the home plumbing fixtures and the service connection.

SAMPLE DATE: «Sample_Date»

Lead Concentration	mg/L
First Litre	«LEAD_mgL»
Second Litre	«LEAD_mgL1»
Third Litre	«LEAD_mgL2»
Fourth Litre	«LEAD_mgL3»

If you have any further questions, please contact me at cleo.jahraus@saskatoon.ca or 306-975-2539.

Sincerely,



Cleo Jahraus
Water Lab Coordinator



DATE

«Name»

«Address»

«Saskatoon» «SK» «Postal_Code»

Dear «Name»:

Thank you for participating in the Lead Line Study recently conducted by the City of Saskatoon Water Lab. The results for your property are shown below.

As a reminder, the drinking water leaving the Water Treatment Plant contains no measurable amount of lead; however, homes serviced by lead service lines may experience lead leaching from the pipes into the drinking water. Your home is not serviced by lead lines, and as such is a good control sample for the purpose of this study.

Your results should be considered a guideline, as they are specific for the date and time the sample was drawn.

When interpreting your results, Health Canada states that the current drinking water guideline for lead is 0.005 mg/L. When collected as directed, volume of the 4 litres sampled is not enough to bring fresh water into your home from the main, so values are reflective of internal plumbing and the service line.

SAMPLE DATE: «Sample_Date»

Lead Concentration	mg/L
First Litre	«LEAD_mgL»
Second Litre	«LEAD_mgL1»
Third Litre	«LEAD_mgL2»
Fourth Litre	«LEAD_mgL3»

If you have any further questions, please contact me at cleo.jahraus@saskatoon.ca or 306-975-2539.

Sincerely,

Cleo Jahraus
Water Lab Coordinator



DATE

«Name»

«Address»

«Saskatoon» «SK» «Postal_Code»

Dear «Name»:

Thank you for participating in the Lead Line Study recently conducted by the City of Saskatoon Water Lab. The results for your property are shown below.

As a reminder, the drinking water leaving the Water Treatment Plant contains no measurable amount of lead; however, homes serviced by lead service lines may experience lead leaching from the pipes into the drinking water.

Your results should be considered a guideline, as they are specific for the date and time the sample was drawn. The data from the samples collected from all sites indicate that replacement of the lead service lines is effective in reducing lead concentration in drinking water to levels below the guideline value specified by Health Canada within about six months of replacement. Additional information can be found on our webpage:

<https://www.saskatoon.ca/services-residents/power-water/water-wastewater/drinking-water/lead-pipes-drinking-water>

When interpreting your results, Health Canada states that the current drinking water guideline for lead is 0.005 mg/L. When collected as directed, volume of the four litres sampled is not enough to bring fresh water into your home from the main. It is reflective of the lead contributed within the home plumbing fixtures and the service connection.

SAMPLE DATE: «Sample_Date»

Lead Concentration	mg/L
First Litre	«LEAD_mgL»
Second Litre	«LEAD_mgL1»
Third Litre	«LEAD_mgL2»
Fourth Litre	«LEAD_mgL3»

If you have any further questions, please contact me at cleo.jahraus@saskatoon.ca or 306-975-2539.

Sincerely,

Cleo Jahraus
Water Lab Coordinator

Thank you for your participation in the City of Saskatoon Lead in Drinking Water Study. Please find below the directions for sample collection. If you have any questions, please call the lab at (306)975-2539. Results of testing will be mailed out in October, once the study is complete. **Please have samples collected as soon as possible after you have received the package.** The study closes August 21, 2020, so sample packages received after that date will not be processed.

Sample Collection:

- Fill all four bottles on **same** day. Use **cold tap only**.
- Fill all 4 bottles, in numerical order, one right after the other.
- Do not run tap before or between bottles.
- Sample bottles need to be filled after a period of minimum 6 hours where *no* water has been used on the premises. This includes dishwashers, sprinklers, laundry machines, toilets, showers, etc. First thing in the morning usually works best.
- Water should be collected from the primary tap used for drinking/cooking and should not be connected to a water softener or filter. Use a rate of flow similar to filling a glass of water – not too slow, not too fast.

- Use thermometer provided to determine temperature (remove cap).

Record temperature in table on reverse.

Please do not collect on Saturday, Sunday or STAT Holidays, as we are not able to pick up samples on these days. Sample bottles must be collected by the lab as soon as possible on the day of collection.

Call or text (306)270-2250 to between 7:00 am and 3:00 pm to arrange pickup, Monday to Friday.

Leave sample package in accessible location out of direct sunlight.

Return form, thermometer and sample bottles in bag provided.

PROVIDE THE FOLLOWING CRITICAL INFORMATION:

DATE SAMPLES COLLECTED: _____

TIME FIRST SAMPLE STARTED: _____am/pm

TIME LAST SAMPLE COMPLETED: _____am/pm

NAME OF PERSON COLLECTING SAMPLE: _____

SAMPLE BOTTLE	TEMPERATURE (°C)	LAB USE ONLY	LAB USE ONLY
1			
2			
3			
4			

All four bottles are to be filled in numerical order on the same day.

Appendix B: Public Education

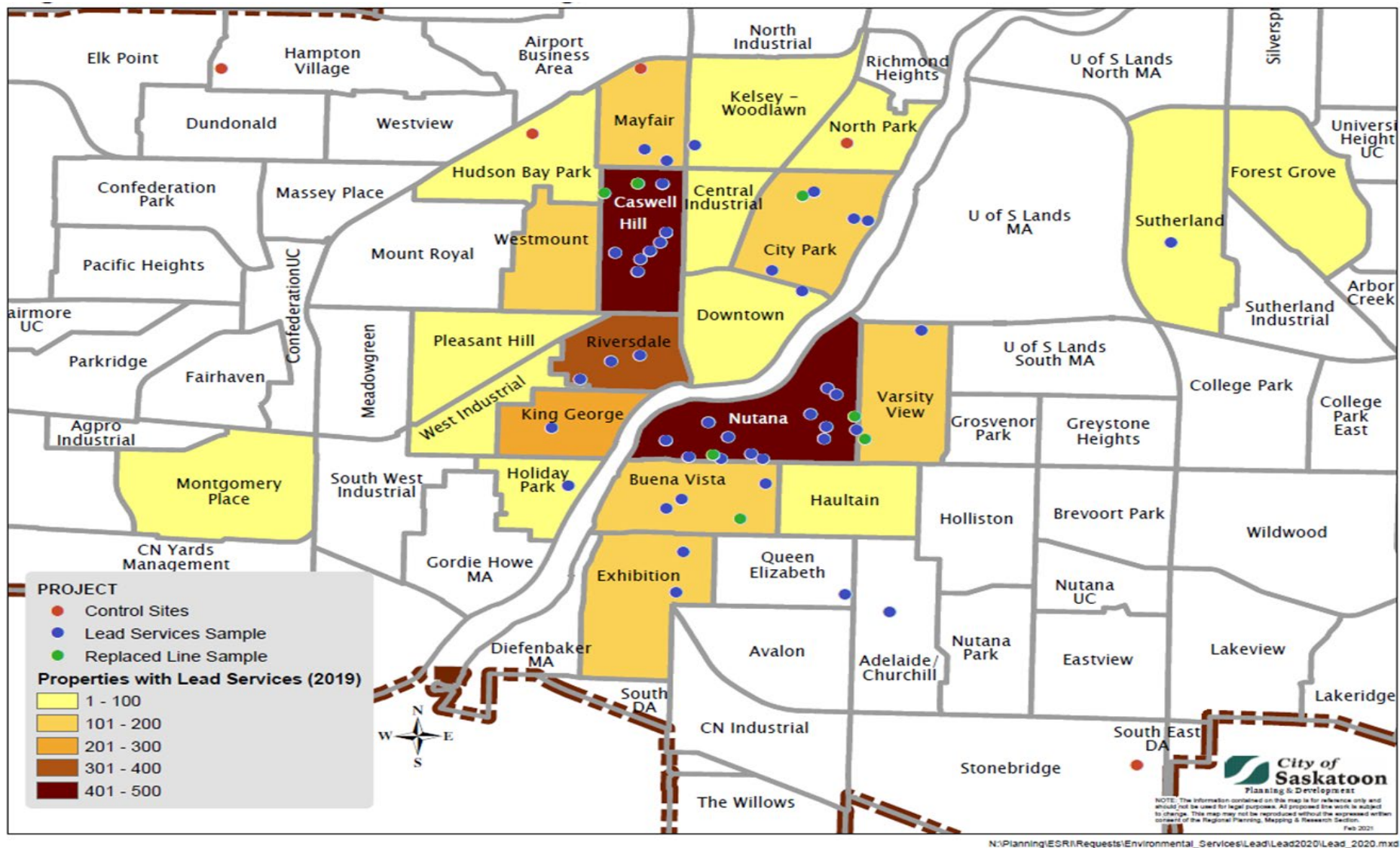


Figure 5. Corrosion Control Monitoring, Residential Lead Services 2020.

December xx, 2020

<<OWNER>>

<<ADDRESS>>

<<CITY>> <<PROVINCE>> <<POSTAL CODE>>

Dear Homeowner or Current Resident:

Every year we send important health information to homes where lead pipes are still used for water service lines to ensure new occupants are informed, and as a reminder for everyone.

In order to support our continuing commitment to reach those potentially affected, this year we will also start sending letters to tenants of a business.

According to our records for <<ADDRESS>>, Saskatoon, SK, the pipe that connects the plumbing from your home to the water main in the street may contain lead, which can leach into your drinking water. Testing has found that when drinking water sits unused in lead pipes, lead levels are likely to be higher than recommended. As this is a potential health risk, the City encourages you to take some precautions before drinking water at this address.

What you can do:

- **Review the enclosed brochure “Reduce lead in drinking water”.**
- Run the cold water faucet for about five minutes before drinking or cooking to draw in clean, fresh water from the water main.
- Refer to the Saskatchewan Health Authority and Health Canada websites for current information about health risks associated with lead exposure.
- If the lead pipes at this address were replaced, contact us at leadpipes@saskatoon.ca or 306-975-2476 so we may review our records.

What to expect from us:

- The City is aggressively replacing lead pipes in areas across Saskatoon built prior to 1950, to be completed by 2026.
- A projected replacement schedule for all remaining properties with lead pipes has been made. Homes that will have replacement work completed in 2021 will be contacted early in the year. Homeowners can contact the Customer Care Centre for more information.
- As part of our goal to manage the City in a smart, sustainable way, City Council adjusted funding in 2017 to reduce the thirty-year replacement plan for lead pipes to ten years.

For more information, please visit saskatoon.ca/lead, email customercare@saskatoon.ca, or call our 24/7 Customer Care Centre at 306-975-2476.

Replacing lead pipes

ACCELERATED REHABILITATION

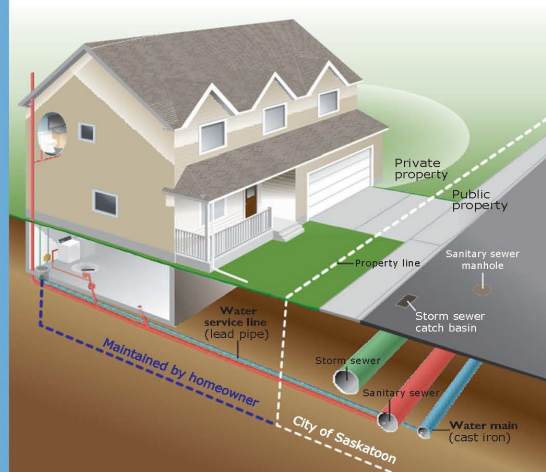
The City is aggressively replacing lead pipes used for water service lines and will be in contact when your area is scheduled.

THE CITY'S ROLE

- Lead pipe replacement will be coordinated with necessary water main and road upgrades.
- You will be notified of scheduled work two to three months in advance.
- Once your area is scheduled, you will receive an information package to guide you through the process with ongoing support by City staff.

THE HOMEOWNER'S ROLE

- When the city is replacing lead pipes, it must include both public (white dotted line in diagram on the back page) and private (blue dotted line) portions of the service line.
- The homeowner is responsible for 40% of the total cost.
- The homeowner is also responsible for any other cost associated with internal plumbing issues. Ask a licensed plumber for a cost estimate.
- You may replace your service line immediately at your own cost. Visit saskatoon.ca/lead for reimbursement details, including payment options.
- The City does not allow partial replacement of a service line because of the increased risk to public health.



WATER MAIN AND SERVICE LINE

- The City is responsible for the water main (made of cast iron) and the portion of the service line located on public property.
- The Homeowner is responsible for the portion of the water service line located on private property.

FOR MORE INFORMATION:

saskatoon.ca/lead
customer care@saskatoon.ca
 Phone: 306-975-2476



Reduce lead in your drinking water

For homes with lead pipes



Is there lead in my water?

SASKATOON WATER IS SAFE TO DRINK

Strict monitoring procedures are in place to ensure City of Saskatoon water is among the safest drinking water in the world.

While the lead level content in the City's drinking water when it enters the water distribution system is well below the Health Canada allowable limit, testing has found that when drinking water sits unused in lead pipes, lead levels are likely to be higher than recommended.

NEIGHBOURHOODS OLDER THAN 1950

Properties within city neighbourhoods built before 1950 may still have lead pipes. The City is actively working with homeowners to replace these pipes.

TEST YOUR WATER FOR LEAD

If you are concerned about lead in your drinking water, you can have your tap water tested by a private, accredited licensed laboratory.

What can I do to reduce my exposure to lead?

1. RUN TAP BEFORE YOU DRINK

Lead can enter your drinking water when it sits in household lead pipes between uses. Flushing toilets, doing laundry, and running showers all help keep your drinking water fresh. Run the cold water faucet for about five minutes before drinking or cooking.

This water does not have to be wasted—it is safe to use for cleaning or watering plants.

Keep a container of drinking water in your refrigerator so you don't have to run water every time you want a drink. Remember that boiling water does not remove lead.

2. REMOVE AND CLEAN YOUR TAP SCREEN

Most household taps have an aerating screen attached to the end. Calcium carbonate can build up on the screen and absorb lead. Make it a habit to remove the screen and clean off any build up every month.

3. INSTALL A CERTIFIED WATER FILTER

Young children and pregnant women should consume drinking water from an alternate source or use a filter certified for lead removal. Look for a National Sanitation Foundation certified filter marked with NSF-053 that attaches to your fridge, ice maker, drinking water tap or comes as a separate water pitcher. It's important to follow the manufacturer's recommendations for replacing filters.

4. MODERNIZE YOUR PLUMBING

The most effective way to remove lead in drinking water is to remove brass fittings and pipes containing older lead solder and replace them with material certified for contact with drinking water. Remember, even after replacement work is complete, lead levels can remain high in drinking water for a short time. Drinking water precautions should continue for a minimum of six months after lead pipes are replaced.

A licensed plumber can determine if your home has internal lead plumbing, lead solder or lead pipe fittings. The City will advise you if you have a lead service line.

After Lead Water Pipe Replacement – When is Water Lead Free?

Your home has recently had the lead water service connection replaced from the city water main to your water meter. With a little more work, most homes can soon expect to have lead free water. Recent studies have shown small particles of lead can remain in your home's internal plumbing after lead water service connection replacement work is complete. It is suggested the frequent flushing of your home's internal plumbing (as was done before replacement work was complete) can speed up the removal of these particles. This flushing process includes **running cold water taps before you consume water** (remember to only use cold tap water for **drinking** or cooking, since hot water increases the leaching of lead and other metals from your plumbing); **remove and clean tap screens** (after lead water service connection replacements it is recommended this be done more frequently as more lead particles may have broken free during replacement work); there is also some benefit seen from draining hot water heaters to remove accumulated sediment which may contain lead.

For more information on flushing visit our website at Saskatoon.ca/leadpipes.
saskatoon.ca/sites/default/files/documents/lead_in_drinking_water_brochure_december_14.pdf

The length of time it takes to remove residual lead from your home's internal plumbing depends on two main factors, the length of your water service connection, and the frequency of flushing. Longer lead water service connections have more opportunity to leach lead than shorter lead water service connections. Running cold water taps to flush your home's internal plumbing will help remove lead particle built up. Thus, the more flushing that is done and the shorter the water service connection, the sooner flushing will be complete.

The average time frame has been estimated to be 2 to 3 months (source HealthCanada.ca).
www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/lead-plomb-eng.php

If you are concerned about lead in your drinking water or to determine when your drinking water is lead free, you can have your tap water tested by a private, accredited licensed laboratory. Although your lead water service connection has been replaced, and water provided by the City is virtually lead free, some homes may still have lead in their internal plumbing:

*"The most significant source of lead in drinking water is usually from lead service lines (water pipes that link the house to the main water supply), **although leaching can also occur from lead solder in plumbing, or from fittings such as faucets made of brass.**"* Health Canada tips to reducing exposure to lead from drinking water (October 11/16) <http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/lead-plomb-eng.php>