

CORROSION CONTROL PROGRAM LEAD SERVICE LINES

2019 Annual Report

March 31, 2020
File: WT 7500-2



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1.0 Introduction

The Water Security Agency (WSA) requested the City of Saskatoon (City) to commence a lead 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.

The purpose of this report is to present the results from the 2019 Lead Monitoring Program.

2.0 Background

The federal government has undertaken substantial measures to address the presence of lead in Canadian drinking water. In 1992, lead content limits were established in the Guidelines for Canadian Drinking Water Quality². The federal maximum acceptable concentration (MAC) of lead in drinking water is 0.005 mg/L based on health effects in children.

The Province of Saskatchewan also adopted this MAC in 1992³. For communities with populations exceeding 5,000, regulation came into effect December 2008.

In 2009, Health Canada produced a guidance document⁴ to assist communities with addressing lead corrosion in municipal drinking water distribution systems. Saskatchewan has adopted these guidelines; the WSA has indicated that it expects voluntary or mandatory (permit based) lead surveys in accordance with this corrosion control document.

The guidance document 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.

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, 2012, *Guidelines for Canadian Drinking Water Quality: Summary Table*. Water, Air and Climate Change Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, ON.

³ Saskatchewan Environment, 2002, *Saskatchewan's Drinking Water Quality Standards and Objectives (summarized)*. EPB 207.

⁴ 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.

Secondary (lead profile) sampling would only occur if more than 10% of the results exceeded the Health Canada Action Limit (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.

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 actions to mitigate public health impacts. Corrective actions can include:

- Altering treatment: System-wide approach to reduce corrosion by changing the chemistry of the drinking water.
- Physical removal: replacing mains, service connections, etc.
- 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 actions are in place, follow-up sampling is recommended to assess effectiveness and to assist with optimization for corrosion control.

3.0 Monitoring Program 2019

The purpose of the 2019 Lead Sampling Program (outlined in Appendix A), was to review the baseline established in 2014, review performance over the years leading up to 2019, and develop an ongoing sampling program that accurately represents the effectiveness of the Lead Service Line Replacement Program (Replacement Program). Each year, this program was reviewed to increase our knowledge of corrosion control in Saskatoon.

This program is in accordance with the Health Canada Guidelines for residential lead service lines (LSL). Priority was given to residential sites as there are few non-residential lead services, and previous sampling efforts in 2009 and 2010 indicated that lead levels at non-residential sites did not typically exceed the HCAL of 0.015 mg/L.

3.1 Residential Sampling Program

The 2019 sampling protocols included 65 residential sampling sites. This falls within the Health Canada Guidelines for a reduced annual monitoring program. Sample collection sites included four control sites with no history of LSL, 51 sites with active LSL, and ten sites with LSL replaced within the previous year (see Appendix A for results).

In 2019, all sampling sites were sampled and analyzed in accordance with the program. Data was analyzed to provide information about what materials in the distribution 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 control measures can be optimized.

3.2 Sampling Protocols

The sampling protocol (*2019 Corrosion Control Lead Sampling Program*) can be found in Appendix A. Letters requesting voluntary participation in the study were sent to 219 residents who had recently replaced their LSL, those that had previously participated in the program, and new addresses with LSL in the database; 51 agreed to participate. 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.

Note that six invitees agreed to participate but did not return samples or sampling supplies.

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. Laboratory staff analyzed and recorded pH and alkalinity for each sample.

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

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.

3.3 Results

Sample results are summarized in Table 1 and illustrated in graphs found in Appendix A.

1. 38 LSL sites exceeded the HCAL of 0.015 mg/L.
2. 46 LSL sites exceeded the MAC of 0.010 mg/L.
3. None of the control samples exceeded either the MAC or the HCAL. This indicates that lead is not an issue where there is no LSL.
4. Sampling was also done on recently replaced LSL.

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. The first litre collected is expected to contain most of the lead contributed by the tap, and the first and second litres likely include the amount contributed from leaded solder inside the residence. Depending on flow rate and interior plumbing conditions, the second, third, and fourth litres likely contain lead from the LSL.

There is no specific knowledge of the interior plumbing conditions at any of the sampling locations; therefore, this report will focus only on general trends in the information collected.

- All four samples were typically collected within one to five minutes of turning on the tap.
- Lead values in the first litre were typically lower than in subsequent litres. This indicates that lead is present from taps and interior plumbing in amounts exceeding the HCAL, but these may not be the largest source of lead.
- Lead values typically peaked in the second or third litre, which may indicate that lead inside the home and/or the LSL is a key source of lead.
- The majority of sites where the LSL were replaced show lead levels below the Health Canada Guideline MACs; however, three exceptions were in the case of recent replacements, which showed higher levels of lead in the samples. One of these exceptions coincide with industry results; whereby, lead levels could be elevated for a period of up to six months following replacement, allowing any debris to be flushed out of the system.
- Given this finding, the 2019 homeowner literature included an educational component on flushing internal plumbing following replacement work, an example of this can be found in Appendix B.

3.4 Distribution System Conditions

The following table summarizes the conditions within the distribution system, during the months of June to September 2019, when 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 Tier I and II sample sites (where available).

Table 3-1: Summary of Distribution System Conditions, June 1 to September 30 2019

Location		pH	Temperature (°C)	Alkalinity (mg/L as CaCO ₃)	Saturation Index	Total Chlorine (mg/L)
Leaving WTP	Min.	8.0	14.4	120	0.15	1.7
	Avg.	8.2	17.9	124	0.23	1.9
	Max.	8.3	22.5	130	0.32	2.2
West Distribution Sites	Min.	8.1	11.3	120	0.12	0.9
	Avg.	8.2	14.3	125	0.19	1.7
	Max.	8.3	16.1	130	0.24	2.2
East Distribution Sites	Min.	8.1	14.3	116	0.12	1.1
	Avg.	8.2	15.3	125	0.22	1.7
	Max.	8.3	16.6	132	0.31	2.1
Lead Sites 1 st Litre	Min.	7.9	13.5	106	Not available	n/a
	Avg.	8.1	20.4	119		
	Max.	8.2	25.5	126		
Lead Sites 2 nd Litre	Min.	7.9	13.2	104	Not available	n/a
	Avg.	8.1	19.3	120		
	Max.	8.2	25.1	125		
Lead Sites 3 rd Litre	Min.	8.0	12.7	104	Not available	n/a
	Avg.	8.1	17.9	120		
	Max.	8.2	25.8	126		
Lead Sites 4 th Litre	Min.	8.0	11.3	104	Not available	n/a
	Avg.	8.1	16.3	119		
	Max.	8.2	26.1	125		
Lead Sites Replaced 1 st Litre	Min.	7.9	17.6	112	Not available	n/a
	Avg.	8.1	20.3	121		
	Max.	8.2	23.9	128		
Lead Sites Replaced 2 nd Litre	Min.	8.0	17.2	118	Not available	n/a
	Avg.	8.1	19.7	121		
	Max.	8.2	22.9	124		
Lead Sites Replaced 3 rd Litre	Min.	8.0	16.0	112	Not available	n/a
	Avg.	8.1	18.1	120		
	Max.	8.2	22.1	126		
Lead Sites Replaced 4 th Litre	Min.	8.0	13.5	118	Not available	n/a
	Avg.	8.1	16.9	121		
	Max.	8.2	21.7	124		
Control Sites 1 st Litre	Min.	8.0	17.4	118	Not available	n/a
	Avg.	8.1	19.7	119		
	Max.	8.2	21.9	120		
Control Sites 2 nd Litre	Min.	8.1	16.1	118	Not available	n/a
	Avg.	8.2	18.4	119		
	Max.	8.2	22.0	120		
Control Sites 3 rd Litre	Min.	8.2	15.3	118	Not available	n/a
	Avg.	8.2	17.4	119		
	Max.	8.2	19.7	120		
Control Sites 4 th Litre	Min.	8.2	15.2	118	Not available	n/a
	Avg.	8.2	16.2	119		
	Max.	8.2	17.2	120		

The average temperature of samples was 20.3°C for the first litre sampled and dropped down to 16.4°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.

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.

Additionally, pH and alkalinity were analyzed in the distribution system and at the sampling sites. Alkalinity leaving the WTP was determined to be relatively stable between 120 and 130 mg/L as CaCO₃, and pH was also stable between 8.0 and 8.3. In general terms, lead corrosion is expected to decrease with increasing pH and alkalinity.

The Langlier Saturation Index had a low value due to a low pH reading in September. The pH is usually approximately 8.3, but fell to 7.9 which impacts the Langlier Saturation Index with negative values, although the results were temporary.

4.0 Action Plan 2019

The 2019 Action Plan was based on the results of sampling programs that were carried out from 2008 to 2018, as previously reported.

4.1 Public Education

A formal Communication Plan was developed to address health concerns of lead. Education materials in 2019 were similar to 2018 and focused on telling citizens how they could reduce the potential for exposure to lead. Key messages included:

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

This information was distributed to the public via the City's website and a direct mailing to approximately 2,554 owners, 668 occupants of properties with LSL, 117 commercial occupants, and 155 owners of multiple properties (514 total affected addresses). Communication materials are included in Appendix B.

4.2 Treatment Adjustments

Treatment adjustments for corrosion control purposes were not carried out in 2019, as previous investigations and reports 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 from 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 roadway programs or when emergency repairs must be made. These replacements are performed in addition to those specifically funded by the voluntary Replacement Program.

In 2019, a total of 373 LSL were replaced as part of various programs, such as water main replacement, resurfacing contracts, and emergency service line replacements. It is estimated that approximately 2,600 LSL remain in use in Saskatoon.

4.4 Point of Use Devices

Point of use devices were not distributed in 2019.

4.5 Public Feedback

Feedback from the public increased in 2019; most calls were related to health concerns and followed the media report regarding lead in municipal water. There was a large influx of calls that were received by the water lab and the customer service lines. Information was coordinated with Communications and distributed to the public. The City does not yet have the capacity to easily track the number of calls, especially because there were calls to both the lab and the customer service line. The number of calls received in 2019 were much higher than 2018 over the year.

4.6 High Risk Areas

In 2015 the City assessed connections to all high risk areas including registered daycares, schools, care homes, and hospitals. Our records still indicate that there are no LSL in these high risk areas. Other buildings, such as schools, whether privately or otherwise owned, are responsible for their internal plumbing in consultation with the Saskatchewan.

5.0 Proposed Action Plan 2020

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 2020 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 actions to the distribution system. Activities may include:

- Conducting sampling at sites where lead service connections have been fully replaced, preferably at locations where previous sampling has been conducted. This will provide valuable information regarding the lead contributed by taps and interior plumbing, versus the lead contributed by the service connection. This will also provide information on the effectiveness of the Replacement Program in reducing exposure to lead.
- Re-sampling locations from previous studies where flushing for five minutes did not result in a decrease of lead below the HCAL or MAC.
- Monitoring the impacts of the new ultraviolet disinfection process on pH, alkalinity, and saturation index in the distribution system.

5.2 Public Education

The public education program for 2020 will continue to include information about the Replacement Program.

5.3 Treatment Adjustments

Treatment adjustments for corrosion control purposes are not proposed for 2020.

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 2020, the City plans to replace approximately 423 LSL as part of planned projects at an estimated cost of \$4.09 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 2020.

6.0 Closure

The 2019 Monitoring Program is intended to review the baseline established in 2014 and continue to gather relevant data and closely follow the guidance document provided by

Health Canada, for lead in the distribution system. Results still indicate that interior plumbing and lead service connections are the main sources of lead in drinking water. Currently, full replacement of LSL are still seen to be the most effective corrective action 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 2027.

Respectfully,



Dustyn Gaddess

Interim Manager, Water Treatment Plant
Saskatoon Water

On behalf of the Corrosion Control Program Committee:

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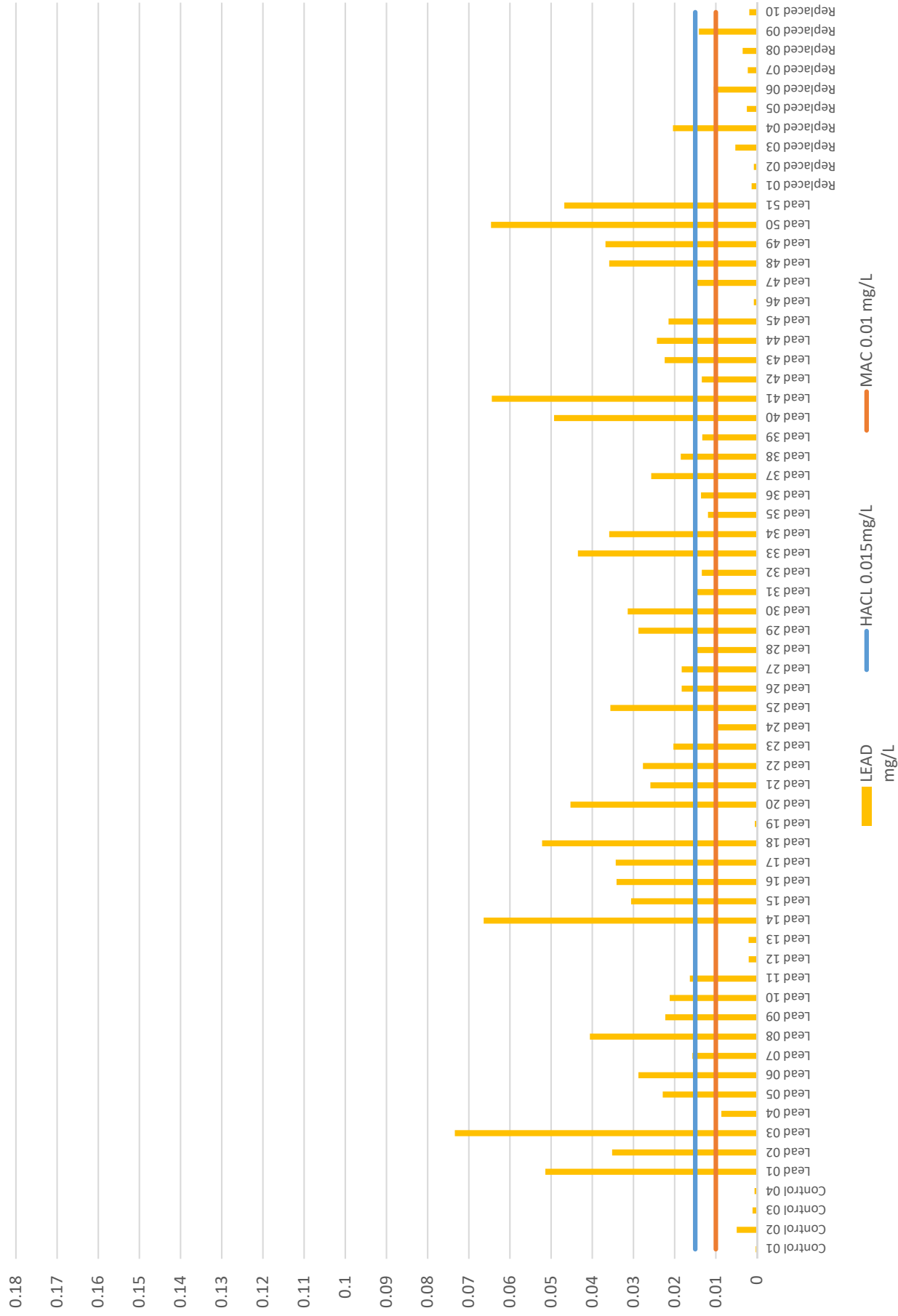
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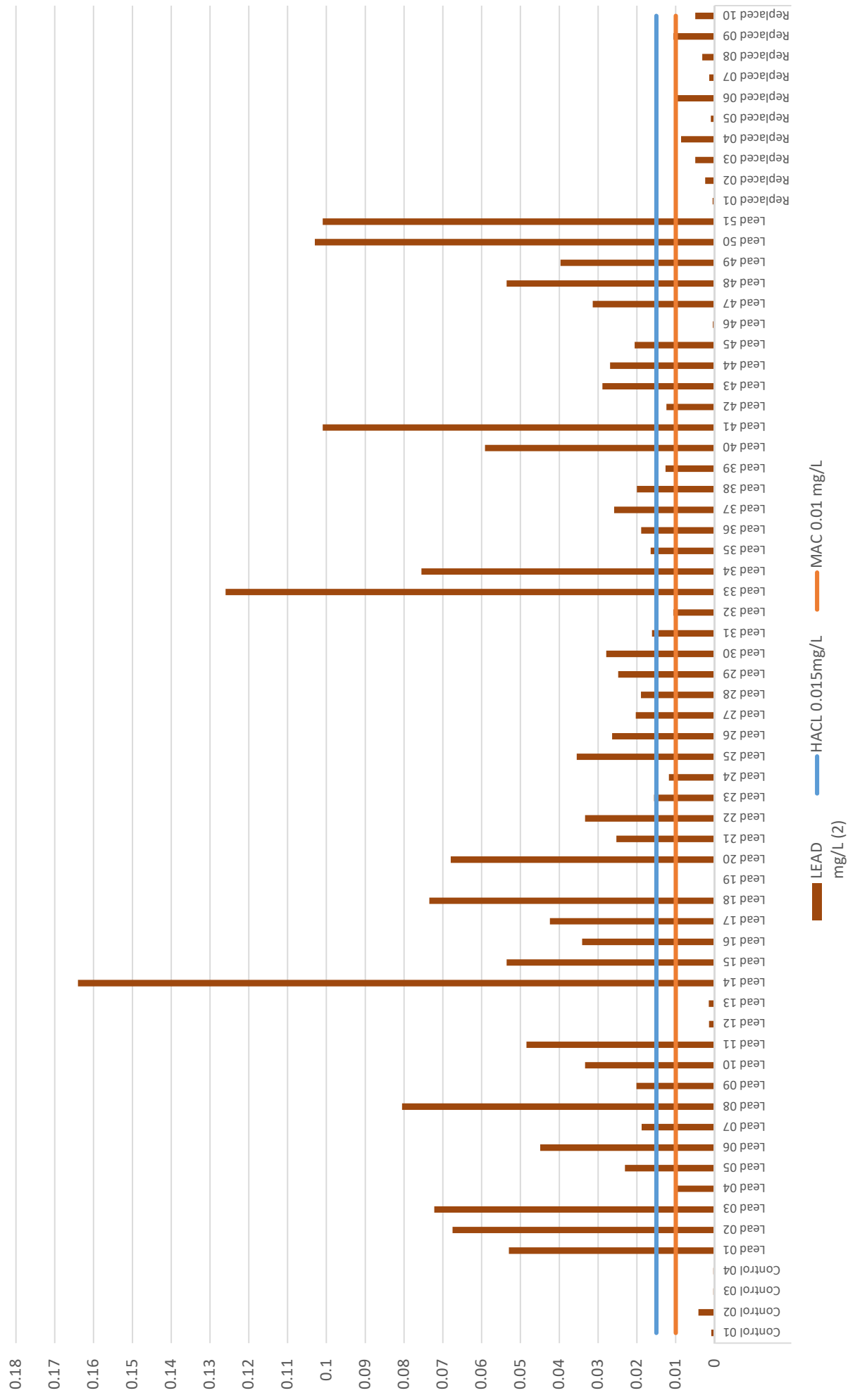
Appendix A: Monitoring Program

Sample Type	Sample Date	Date Replaced	1ST LITRE				2ND LITRE				3RD LITRE				4TH LITRE			
			Temp °C	ALKALINITY mg CaCO3/L	LEAD mg/L	pH	Temp °C	ALKALINITY mg CaCO3/L	LEAD mg/L	pH	Temp °C	ALKALINITY mg CaCO3/L	LEAD mg/L	pH	Temp °C	ALKALINITY mg CaCO3/L	LEAD mg/L	pH
Control 01	5-Sep		20.3	120	0.00315	8.1	19	120	0.00871	8.2	17.7	120	0.00178	8	17.2	120	0.00188	8.2
Control 02	6-Sep		21.9	118	0.00493	8	22	118	0.00419	8.1	19.7	118	0.00256	8	16	118	0.00104	8.2
Control 03	4-Sep		19	118	0.001	8.2	16.1	118	0.00315	8.2	15.3	118	0.00231	8	15.2	118	0.00232	8.2
Control 04	29-Aug		17.4	114	0.0062	8.2	16.3	114	0.00301	8.2	16.7	114	0.00257	8	16.5	114	0.00245	8.2
Lead 01	28-Jul		18.4	114	0.0514	8.2	16.3	114	0.0053	8.1	15.6	114	0.0048	8	15.6	116	0.0481	8.1
Lead 02	28-Jul		18.6	106	0.0352	8.2	16.3	104	0.0675	8.1	14.1	104	0.0651	8	13.1	104	0.0572	8.1
Lead 03	28-Jul		13.5	120	0.0734	8	13.5	120	0.0722	8.1	13.2	118	0.079	8	12.2	120	0.0505	8
Lead 04	16-Aug		21.3	126	0.0064	8.1	19.3	125	0.0103	8.1	17.6	125	0.0109	8	16.5	125	0.0113	8.1
Lead 05	21-Jul		19	121	0.0226	8.1	17.3	121	0.0231	8.1	15.3	120	0.0237	8	14.9	120	0.0198	8
Lead 06	7-Aug		20.3	125	0.0286	8	19.4	125	0.0449	8	18	125	0.0567	8	16.4	125	0.0544	8
Lead 07	11-Aug		17.8	120	0.015	8	18	120	0.0188	8	17.9	122	0.0177	8	17.9	122	0.0209	8.1
Lead 08	31-Jul		22	122	0.0406	8.1	17.4	122	0.0805	8.1	17.3	122	0.0891	8	13.9	122	0.0849	8.1
Lead 09	24-Jul		17.6	112	0.0223	8	15.6	112	0.0201	8	15.5	112	0.0209	8	15.3	112	0.0241	8
Lead 10	22-Aug		20.4	122	0.0212	8.2	18.1	122	0.0334	8.2	17	122	0.0574	8	15.2	124	0.0513	8.2
Lead 11	24-Jul		23.8	116	0.0163	8.2	23.6	116	0.0485	7.9	19.3	114	0.0966	8	15.1	116	0.0918	8.1
Lead 12	25-Jul		24.2	116	0.0202	7.9	20.9	115	0.0143	8	20.6	114	0.0052	8	18.3	116	0.0036	8
Lead 13	29-Jul		20.1	122	0.0205	8	18.9	122	0.0149	8	14.7	120	0.0052	8	11.4	120	0.00393	8
Lead 14	1-Aug		22.6	120	0.0664	8.1	19.6	120	0.164	8.1	17.5	120	0.145	8	15.8	120	0.122	8.1
Lead 15	1-Aug		22.4	120	0.0306	8.1	20.4	120	0.0536	8.1	17.3	120	0.149	8	14.1	120	0.135	8.1
Lead 16	22-Jul		21	122	0.034	8	21.4	122	0.0341	8.1	19.3	124	0.0368	8	17.8	122	0.0365	8
Lead 17	31-Jul		21.3	121	0.0346	8	19.6	120	0.0424	8.1	17.6	120	0.0951	8	15.5	120	0.0873	8
Lead 18	20-Aug		20	122	0.0522	8.2	17.9	124	0.0735	8.2	16.3	123	0.0749	8	14.9	124	0.0845	8.2
Lead 19	14-Aug		17.4	124	0.00542	8.1	14.9	124	0.00143	8.1	14.6	122	0.00143	8	14.7	124	0.00122	8.2
Lead 20	31-Jul		22.7	122	0.0453	8	21.7	122	0.068	8	17.2	120	0.12	8	14.3	122	0.132	8.1
Lead 21	28-Jul		18.9	114	0.0259	8.1	18.9	116	0.0253	8.1	18.5	114	0.0373	8	17.5	114	0.0642	8.1
Lead 22	30-Jul		17.3	120	0.027	8.1	17.3	120	0.0334	8.1	15.3	120	0.0715	8	13.3	120	0.12	8
Lead 23	9-Aug		25.5	124	0.0203	8	25	125	0.0196	8	24	120	0.0905	8	20.8	124	0.0748	8
Lead 24	12-Aug		18.7	122	0.0103	8.1	15.6	122	0.0117	8.1	14.4	120	0.0917	8	13.8	121	0.0864	8.1
Lead 25	26-Jul		20.1	114	0.0356	8	20.2	116	0.0355	8.1	19.3	114	0.0366	8	15.1	116	0.0462	8.1
Lead 26	12-Aug		20.2	123	0.0183	8.1	17.6	122	0.0264	8.1	16.6	120	0.0284	8	15.9	123	0.0271	8
Lead 27	24-Jul		21.4	110	0.0183	8	21	110	0.0203	8	19.3	110	0.0469	8	17.3	110	0.0662	8
Lead 28	22-Jul		19.9	122	0.0146	8	19.3	122	0.019	8	17.6	122	0.0317	8	15.7	121	0.039	8
Lead 29	16-Aug		21	122	0.028	8.1	19.3	122	0.0248	8.2	17.6	122	0.0123	8	17.5	124	0.015	8.2
Lead 30	1-Aug		20.7	120	0.0314	8	23.5	120	0.0279	8.1	25.8	120	0.0253	8	26.1	120	0.0225	8.1
Lead 31	26-Jul		20.5	116	0.0148	8.1	20.5	116	0.0161	8.1	20.4	116	0.0259	8	19.9	116	0.0426	8.1
Lead 32	16-Aug		24.7	124	0.0134	8.1	19.7	124	0.0106	8.2	16.9	120	0.0118	8	16.6	120	0.0124	8.2
Lead 33	23-Jul		17.9	115	0.0435	8	16.4	114	0.126	8.1	14.1	114	0.0936	8	12.6	113	0.0339	8.1
Lead 34	8-Aug		18.6	124	0.0359	8.1	17.6	124	0.0755	8.1	14.3	120	0.17	8	13.7	124	0.11	8
Lead 35	26-Aug		17.8	20	0.0119	8.2	17.3	22	0.0165	8.2	15.9	22	0.0204	8	14.7	21	0.02	8.2
Lead 36	21-Aug		19.6	120	0.0136	8.2	19.2	120	0.0189	8.2	17.3	120	0.0312	8	15.6	118	0.0267	8.2
Lead 37	23-Jul		21.2	122	0.0257	8.1	21.6	120	0.0259	8	19.6	120	0.0745	8	15.9	119	0.0723	8.1
Lead 38	26-Jul		15.1	114	0.0186	8.1	13.9	114	0.02	8.1	12.8	114	0.0199	8	13.1	114	0.0174	8.1
Lead 39	22-Jul		20.5	120	0.013	8	20.8	120	0.0126	8.1	20.6	121	0.0146	8	19.9	120	0.0145	8
Lead 40	24-Jul		22.3	106	0.0493	8.1	21.1	114	0.0591	8.1	20.1	116	0.0904	8	15.9	114	0.102	8
Lead 41	30-Jul		18.1	120	0.064	8.1	16	120	0.101	8.1	12.7	120	0.105	8	11.3	120	0.0977	8.1
Lead 42	15-Aug		20.8	124	0.0134	8	21.3	124	0.0124	8.1	20.9	124	0.0133	8	20.4	124	0.0319	8.1
Lead 43	9-Aug		23	124	0.0224	8.1	23.2	124	0.0289	8.1	23.2	124	0.0425	8	23.2	124	0.0699	8.1
Lead 44	8-Aug		20.3	121	0.0243	8	19.7	122	0.0269	8.1	19.2	121	0.0406	8	17.2	123	0.077	8.1
Lead 45	21-Aug		18.9	120	0.0215	8	16	120	0.0206	8.2	15.4	120	0.0211	8	15.7	120	0.0229	8.2
Lead 46	25-Jul		23.4	116	0.00766	8.1	23.9	118	0.00461	8.1	23	118	0.00183	8	20.7	116	0.00306	8
Lead 47	19-Jul		21.1	118	0.015	8	21.2	116	0.00461	8.1	20.3	117	0.0393	8	17.8	116	0.0542	8.1
Lead 48	31-Jul		23.1	120	0.0359	8	22.6	120	0.0536	8	22.2	120	0.0762	8	20.8	120	0.0848	8.1
Lead 49	22-Jul		19.5	119	0.0368	8	18.9	120	0.0397	8	17.3	119	0.0636	8	15.1	120	0.0405	8
Lead 50	22-Aug		19	122	0.064	8.2	19.3	122	0.103	8.2	18.9	122	0.0489	8	18.9	122	0.039	8.2
Lead 51	22-Jul		23	119	0.0468	8.1	20.4	120	0.101	8.1	18.9	120	0.106	8	17.2	119	0.0705	8
Replaced 01	1-Aug	11/21/2018	22.7	120	0.00132	8.1	21.8	120	0.00502	8.1	20	120	0.00286	8	18.1	120	0.00182	8.1
Replaced 02	14-Aug	11/16/2018	19.5	124	0.00759	8.1	19.1	124	0.0024	8.1	18.4	124	0.00548	8	17.5	124	0.00167	8.1
Replaced 03	13-Aug	1/24/2019	18.5	122	0.00527	8.1	18.3	122	0.00497	8.2	18	122	0.00505	8	16.6	120	0.00196	8.2
Replaced 04	9-Aug	10/3/2018	17.6	128	0.0204	7.9	17.2	124	0.00866	8	16.7	122	0.0213	8	15.7	122	0.00644	8
Replaced 05	20-Aug	1/16/2019	18	124	0.00246	8.2	18.5	124	0.00939	8.2	16.9	126	0.00863	8	17	124	0.00763	8.2
Replaced 06	25-Jul	12/12/2018	20.7	112	0.0105	8	20.7	118	0.00986	8	19.7	116	0.0297	8	18.4	118	0.00713	8
Replaced 07	19-Jul	1/23/2019	20.4	116	0.00224	8.1	18.6	120	0.00141	8.1	16.5	112	0.00111	8	14.7	118	0.00091	8.1
Replaced 08	2-Aug	11/23/2018	17.7	120	0.00346	8	17.8	120	0.00318	8.2	17.1	120	0.00283	8	15.6	120	0.00877	8.2
Replaced 09	21-Aug	6/4/2019	23.6	120	0.014	7.9	22.7	120	0.0106	8	22.1	120	0.012	8	21.7	120	0.0117	8
Replaced 10	31-Jul	10/10/2018	23.9	122	0.0018	8.1	22.9	122	0.00483	8.1	16	122	0.00603	8	13.5	122	0.000763	8.1

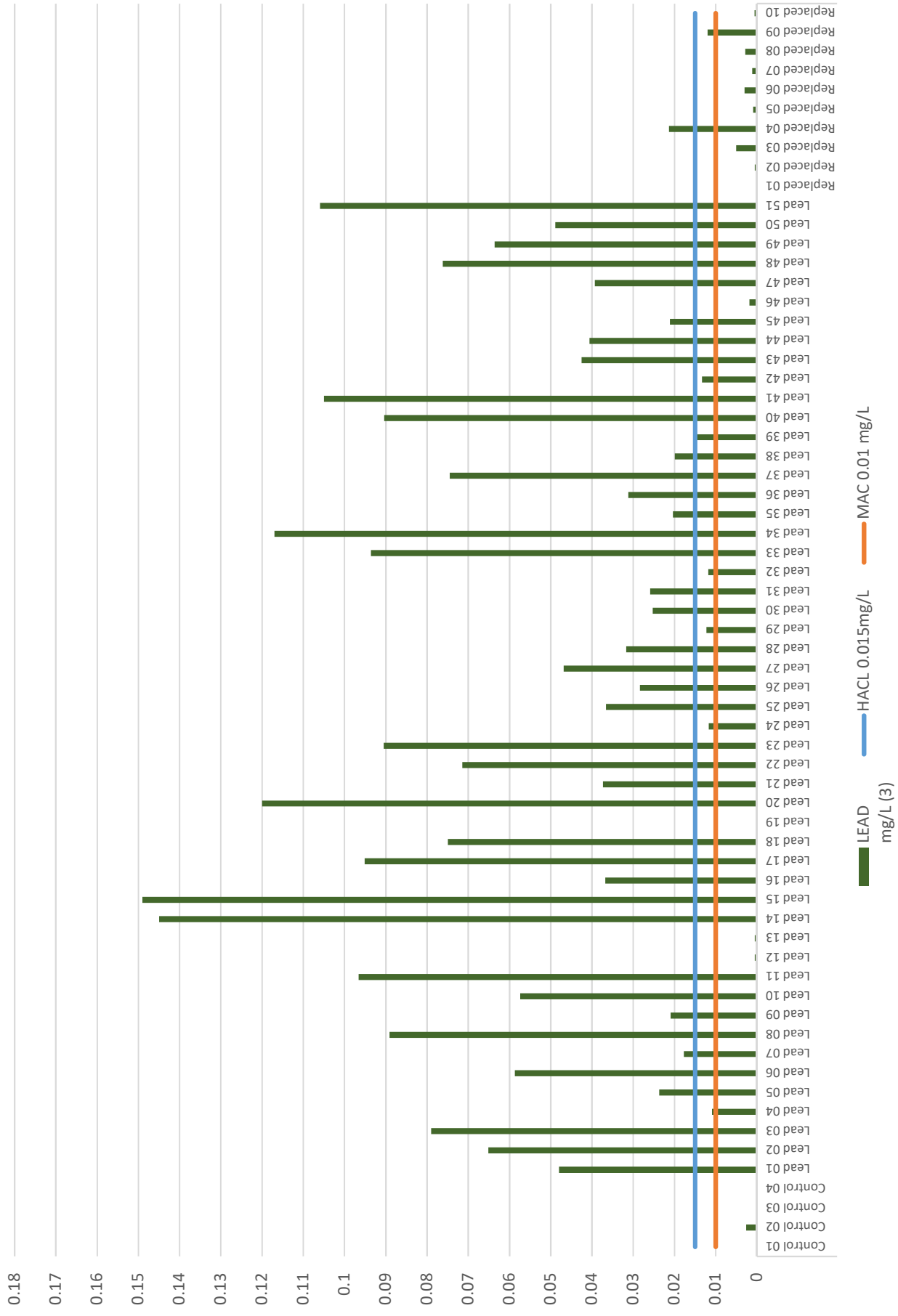
1st Litre



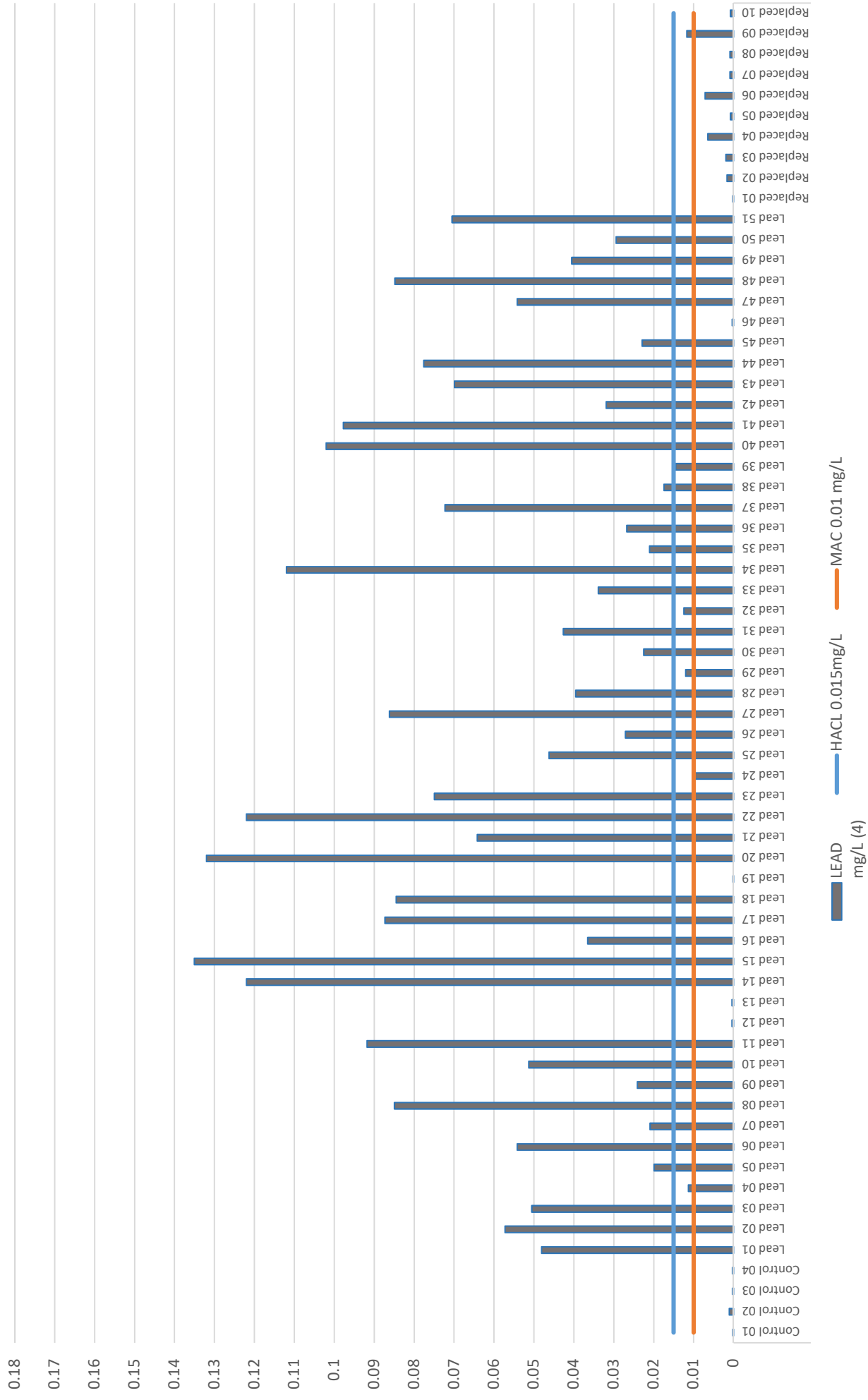
2nd Litre



3rd Litre



4th Litre



June 27, 2019

Homeowner Name
Address
Saskatoon, SK Postal Code

Dear Homeowner:

The City of Saskatoon Water Lab is conducting a study during 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 six 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.**

If you are interested in participating, please reply to me before July 12, 2019. Email cleo.jahraus@saskatoon.ca or call 306-975-2539 with any questions or to enroll in the study.

Sincerely,



Cleo Jahraus
Water Lab Coordinator
Saskatoon Water

June 27, 2019

Homeowner Name
Address
Saskatoon, SK Postal Code

Dear Homeowner:

The City of Saskatoon Water Lab is conducting a study during 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 six 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.**

If you are interested in participating, please reply to me before July 12, 2019. Email cleo.jahraus@saskatoon.ca or call 306-975-2539 with any questions or to enroll in the study.

Sincerely,



Cleo Jahraus
Water Lab Coordinator
Saskatoon Water

June 27, 2019

Homeowner Name
Address
Saskatoon, SK Postal Code

Dear Homeowner:

The City of Saskatoon Water Lab is conducting a study during 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 October. 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 six 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.**

If you are interested in participating, please reply to me before July 12, 2019. Email cleo.jahraus@saskatoon.ca or call 306-975-2539 with any questions or to enroll in the study.

Sincerely,



Cleo Jahraus
Water Lab Coordinator
Saskatoon Water

October 31, 2019

Homeowner Name
Address
Saskatoon, SK Postal Code

Dear Homeowner:

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 six months of replacement.

When interpreting your results, Health Canada states that the current drinking water guideline for lead is 0.010 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	«M_1__LEAD_mgL»
Second Litre	«M_2__LEAD_mgL»
Third Litre	«M_3__LEAD_mgL»
Fourth Litre	«M_4__LEAD_mgL»

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

Sincerely,



Cleo Jahraus
Water Lab Coordinator
Saskatoon Water

October 30, 2019

Homeowner Name
Address
Saskatoon, SK Postal Code

Dear Homeowner:

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.

When interpreting your results, Health Canada states that the current drinking water guideline for lead is 0.010 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 within the home plumbing fixtures and the service connection.

SAMPLE DATE: «Sample_Date»

Lead Concentration	mg/L
First Litre	«M_1__LEAD_mgL»
Second Litre	«M_2__LEAD_mgL»
Third Litre	«M_3__LEAD_mgL»
Fourth Litre	«M_4__LEAD_mgL»

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

Sincerely,



Cleo Jahraus
Water Lab Coordinator
Saskatoon Water

Thank you for your participation in the City of Saskatoon Lead 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 and returned to the lab by August 23, 2019.**

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 (306)975-2567 to arrange pickup between 7:15 am and 3:00 pm, 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

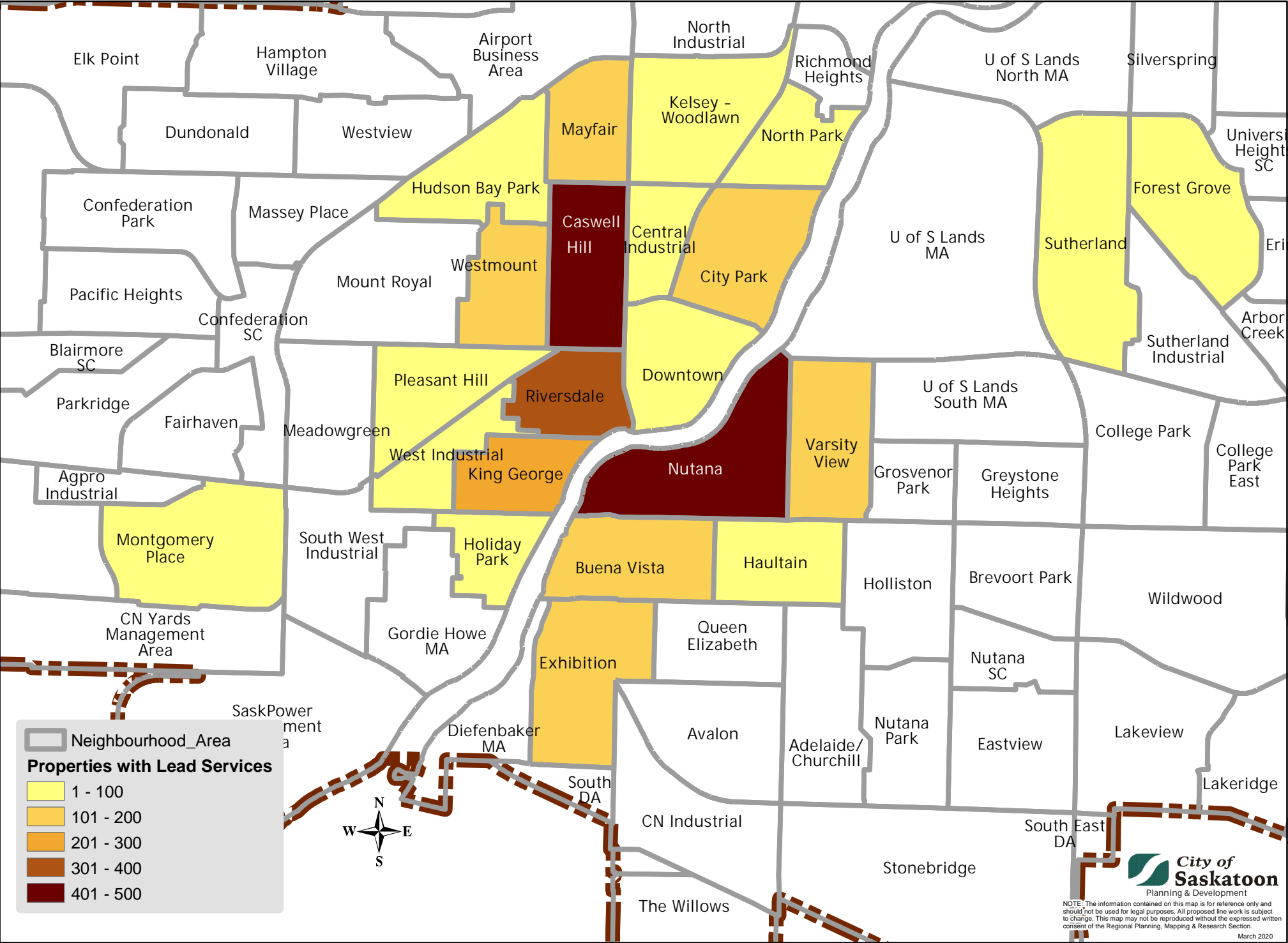
TIME LAST SAMPLE COMPLETED: _____ am/pm

NAME OF PERSON COLLECTING SAMPLE: _____

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

Appendix B: Public Education

Figure A-1: Corrosion Control Monitoring, Residential Lead Services 2019





Saskatoon Water
1030 Avenue H South
Saskatoon SK S7M 1X5

saskatoon.ca/lead
customercare@saskatoon.ca
tel (306) 975-2476

December 9, 2019

<<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.

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.
- We will contact you in the winter prior to the construction season when replacement work is planned for your address and guide you through the process. A full replacement schedule for all remaining lead pipe properties will be available in late 2020.
- 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

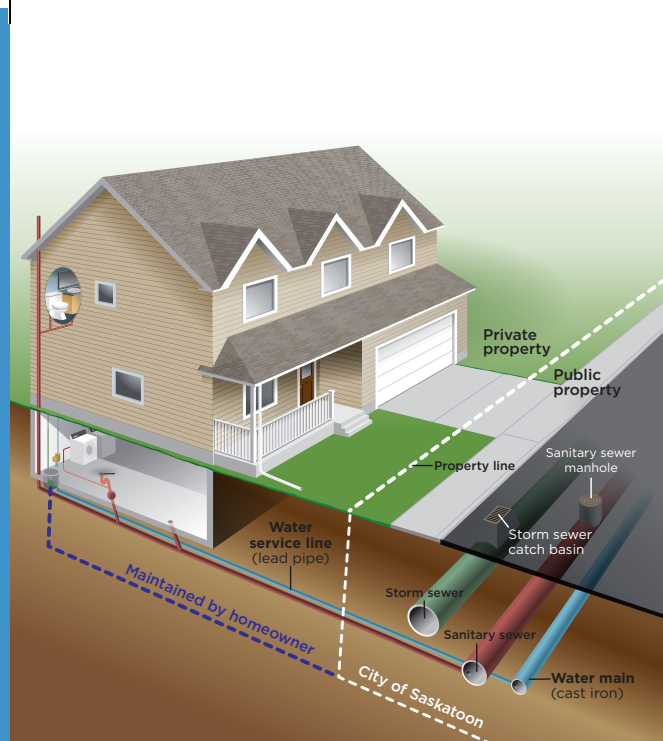
The City is aggressively replacing lead pipes used for water service lines and will be in contact when your area is scheduled.

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
customercare@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>