

May 24, 2019
File No. 04219001.02

Mr. Keith Johnston
Tacoma-Pierce County Health Department
Source Protection Program
3629 South D Street
Tacoma, Washington 98418-6813

**Subject: First Quarter 2019 Monitoring Report
LRI Landfill, Pierce County, Washington**

Dear Keith:

Please find enclosed the First Quarter 2019 Monitoring Report for the LRI Landfill. Activities this quarter included monitoring the volume and specific conductance of water pumped from the leak detection/collection system, quarterly groundwater monitoring, monthly landfill gas monitoring, and weekly surface water monitoring.

If you have any questions regarding the monitoring results, please call me at (425) 289 5447.

Sincerely,



Kevin Lakey, PE, LHG
Vice President / Project Director
SCS ENGINEERS



Sam Graber
Staff Scientist
SCS ENGINEERS



Mr. Keith Johnson

May 24, 2019

Page 2

Attachments: Attachment A: Groundwater Flow Map
Attachment B: Groundwater Data Summary Tables
Attachment C: Field Sampling Documentation
Attachment D: Statistical Calculations
Attachment E: Trilinear Diagrams
Attachment F: Analytical Data Validation Report
Attachment G: Groundwater and LDCS Time Trend Plots
Attachment H: LDCS Pumping Records and Conductivity Measurements
Attachment I: Surface Water Data
Attachment J: Landfill Gas Data

cc: Peter Lyon, Ecology (email)
Eugene Radcliff, Ecology (email and hard copy)
George Duvendack, LRI (email and hard copy)
Jim Crandall, LRI (email and hard copy)
Jody Snyder, LRI (email)
Olivier Moi, LRI (email)
Maria Finley, LRI (email and CD)

First Quarter 2019 Monitoring Report

LRI Landfill

Graham, Washington

Pierce County Recycling, Composting
& Disposal, LLC dba LRI
17925 Meridian Street East
Puyallup, Washington 98375



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04219001.02 | May 24, 2019

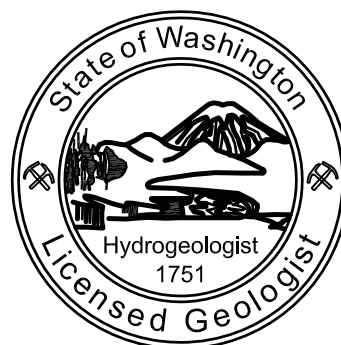
2405 140th Avenue NE, Suite 107
Bellevue, WA 98005
425-746-4600

This Quarterly Monitoring Report for the LRI Landfill located in Graham, Washington, was prepared by Sam Graber and Kevin Lakey, LHG and was reviewed by Dan Venchiarutti, LHG, of SCS Engineers.

May 24, 2019



Kevin Lakey, PE, LHG,
Project Director
SCS ENGINEERS



Kevin G. Lakey



Daniel A. Venchiarutti, LG, LHG
Project Director
SCS ENGINEERS

GROUNDWATER MONITORING

First Quarter 2019 groundwater samples were collected from March 11 through March 12, 2019. Water level elevations were measured on March 12, 2019. Nine monitoring wells (MW-1A, MW-2A, MW-3, MW-4, MW-5A, MW-6, MW-7, MW-9, and MW-10) were sampled this monitoring period. Field quality control samples consisted of one field blank and one duplicate sample collected at MW-1A. Sampling procedures followed the LRI Landfill Groundwater Monitoring Plan (GWMP), dated March 10, 2014.

Groundwater samples were obtained using low-flow purging and sampling techniques with dedicated pumps at all monitoring wells with the exception of MW-4, where a non-dedicated QED Sample Pro pump was deployed. Samples for laboratory analyses were submitted to TestAmerica, Inc. of Denver, Colorado for the parameters listed in Appendix I and II of WAC 173-351-990. The sample collected from the LDCS-4B on April 5 was sent to the TestAmerica Inc. Seattle location. The groundwater sampling locations are shown on Figure 1.

A groundwater surface elevation map for the First Quarter monitoring event is included as Figure 1 in Attachment A. The average groundwater gradients and flow directions calculated for the quarter remain similar to those previously reported at the facility, with a flow rate of about 45 feet per year towards the northwest for horizontal groundwater movement within the uppermost aquifer (assuming a horizontal hydraulic conductivity of 1×10^{-3} centimeters per second and an effective porosity of 30 percent).

Field measurements and analytical results for groundwater, leak detection/collection system (LDCS), and quality control samples are summarized on the following tables included in Attachment B: Groundwater Level Elevations, Field Parameters, Inorganic Parameters, Appendix I Metals, Appendix II Metals, Volatile Organic Compounds, Cation-Anion Balance, and Duplicate Sample Results.

Copies of the Field Sampling Data Sheets are included in Attachment C. Statistical calculations, including summary tables for indicator parameters, are included in Attachment D. Trilinear (Piper) plots of groundwater and LDCS sample results are included in Attachment E. Data validation results are summarized in Attachment F. Copies of the laboratory reports were submitted to the TPCHD under separate cover.

A nonparametric inter-well prediction limit approach was used to evaluate the water quality results for Appendix I parameters listed in WAC 173-351-990 (15 total metals and nitrate). Prediction limits were generated using background data for nitrate and eight rounds of quarterly sampling conducted in 2014 and 2015 for the fifteen total metals. Using this procedure, the highest concentration of each parameter in the data set was selected as the prediction limit for that parameter. In addition, the prediction limit data set includes ongoing water quality results from background (upgradient) wells MW-9 and MW-10. Appendix I total metal and nitrate concentrations measured at the downgradient monitoring wells were less than or equal to prediction limit values at all of the wells monitored this quarter.

Groundwater time-trend plots for inorganic parameters and metals are included in Attachment G. The following four plots are provided for each monitoring well:

- Plot 1 — ammonia, nitrate, chloride, TOC
- Plot 2 — alkalinity, sulfate, TDS
- Plot 3 — calcium, magnesium, sodium, potassium
- Plot 4 — iron, manganese, zinc, arsenic

Time trend plots show that concentrations of metals and inorganic parameters remained generally consistent with previously measured values during the First Quarter, except for an increase in total dissolved solids (TDS) measured at MW-3 (880 mg/L). The remaining field and laboratory results for the sample collected at MW-3 are within typical concentrations. Primary leachate indicator parameters (acetone and 2-butanone) were non-detect, and secondary leachate indicator parameter concentrations (ammonia and chloride) remained low. Therefore, the elevated TDS concentration for MW-3 appears to be an anomalous result that may be related to field or laboratory contamination.

Reported detections of inorganic parameters and metals measured at downgradient monitoring wells were less than or equal to the ground water quality criteria listed in WAC 173-200-040, with the exceptions shown in Table 1. The highest concentrations of chloride and nitrate in the uppermost aquifer continue to be observed in background well MW-10.

Table 1. Groundwater Results Greater Than WAC 173-200-040 Criteria

Parameter	Groundwater Quality Criteria	MW-1A	MW-2A	MW-3	MW-4	MW-5A	MW-6	MW-7
Arsenic, Total	0.00005	**	**	**	0.0097	0.0057	0.0073	0.0053
Iron, Dissolved	0.30	1.7	0.62	*	*	*	*	*
Manganese, Dissolved	0.05	0.28	0.28	0.32	0.23	0.20	0.17	0.21
Total Dissolved Solids	500	*	*	880	*	*	*	*
Notes: Concentrations listed as mg/L = milligrams per liter ** = Not detected above the method reporting limit (MRL), but the MRL exceeded WAC 173-200-040 GW Quality Criteria * = Reported value was less than WAC 173-200-040 Groundwater Quality Criteria								

With the exception of the TDS detection at MW-3, the values listed in Table 1 are typical of previous results (see time-trend plots in Appendix G), are interpreted to be within natural background variation, and are less than or equal to the background levels used to establish prediction limits. The method reporting limit (MRL) for arsenic is 0.005 milligrams per liter (mg/L), which is greater than the WAC 173-200-040 criteria of 0.00005 mg/L. Therefore, arsenic results reported as non-detect are considered to be greater than the WAC 173-200-040 criterion.

The measured value for pH at background well MW-10 (6.12 SU) was below the WAC 173-200-040 criteria of 6.5 during the First Quarter monitoring event. Since MW-10 is a background (upgradient) monitoring well, the low pH value is interpreted to be representative of natural groundwater quality at the site.

Low-level detections of ammonia (<0.19 mg/L) were reported at monitoring wells MW-3, MW-4, MW-5A, MW-6 and MW-7 during this monitoring event. Similar low-level ammonia detections have been reported during the previous several quarters, including at background well MW-10 during the Second Quarter 2018 monitoring event. Therefore, the low-level ammonia concentrations appear to be due to site-wide aquifer chemistry.

The cation-anion balance evaluates the difference in the sum of cations and anions (in milliequivalents per liter [meq/L]) within a water sample to determine if it is electroneutral (balanced cation and anion charges). Consistent with WAC 173-350-430(5), a threshold of ten percent difference is used if the total cation-anion sum is less than 5.0 meq/L, and a threshold of five percent difference is used if the total cation-anion sum is greater than or equal to 5.0 meq/L. Cation-anion balance evaluations slightly exceeded the appropriate threshold for monitoring wells MW-3 (6.2 percent versus a threshold of 5.0 percent) and MW-7 (5.1 percent versus a threshold of 5.0 percent). The calculated ion balances do not appear to be due to either analytical error or poor well conditions. Since background water quality data at MW-10 have displayed cation-anion balance ratios greater than 10 percent in the past, and there were no detections of leachate indicator parameters at MW-3 or MW-7, the elevated balance ratios are likely due to natural groundwater conditions.

Graphical plots of the monitoring well water quality results are presented on trilinear (piper) diagrams in Attachment E. These plots demonstrate the inherent water quality differences between groundwater from the monitoring wells, shallow groundwater from the LDCS, and leachate (collected annually in December).

No volatile organic compounds (VOCs) were detected in groundwater samples collected from monitoring wells this quarter.

LEAK DETECTION/COLLECTION SYSTEM (LDCS) MONITORING

LDCS Daily Monitoring. Daily monitoring of the LDCS sumps for volume of water pumped, liquid level, and specific conductance (conductivity) was performed by using a programmable logic controller (PLC) and through direct measurements by LRI site personnel. Rainfall data were recorded manually using an on-site rain gauge. The combined field and PLC data, as well as time series plots of the data, are included in Attachment H.

New flow meters were installed at LDCS-1 and LDCS-3A on February 21, 2019. Conductivity probes at LDCS-2B and LDCS-3A were recalibrated by LRI staff on December 14, 2018. Following recalibration, recorded conductivity values more closely reflected readings taken in the field. Conductivity data from the LDCS sumps trended within typical historical levels during the First Quarter of 2019.

LDCS Quarterly Monitoring. LDCS samples were collected from the leak detection sumps with disposable bailers at LDCS-1, LDCS-2A, and LDCS-2B, and with dedicated QED Sleeper Pumps at LDCS-3A, LDCS-4A, LDCS-4B, LDCS-5, and LDCS-6. Samples for laboratory testing were submitted to TestAmerica of Denver, Colorado. Field and laboratory data results are included on the groundwater summary tables in Attachment B.

LDCS time trend plots for inorganic parameters and dissolved metals are included in Attachment G. The following four plots are provided for each leak detection sump:

- Plot 1 — ammonia, nitrate, chloride, TOC
- Plot 2 — alkalinity, sulfate, TDS
- Plot 3 — calcium, magnesium, sodium, potassium
- Plot 4 — iron, manganese, zinc, arsenic

The sample collected from LDCS-4B had reported concentrations of primary leachate indicator parameters acetone (16 µg/L) and 2-butanone (11 µg/L). In addition, an elevated concentration of TOC (24 mg/L) was reported. For the secondary leachate indicator parameters, ammonia remained low (0.32 mg/L) and chloride was within levels recently observed (30 mg/L). LDCS-4B was resampled on April 5, 2019 and the sample was submitted to the TestAmerica laboratory in Fife, Washington. No VOCs were detected in the resample. The TOC concentration decreased to a more typical level (4.3 mg/L), the concentration of ammonia was nearly unchanged, and the concentration of chloride decreased slightly.

Acetone and 2-butanone are common laboratory contaminants recognized by the USEPA. In addition, sporadic detections of acetone, and to a lesser extent 2-butanone, have been reported in leak detection samples as well as in field blank samples in the past. Therefore, since the results of the reanalysis were non-detect for acetone and 2-butanone, it appears that the initial first quarter LDCS-4B detections of acetone and 2-butanone represented laboratory artifacts.

Acetone was also reported present in the sample collected from LDCS-1 at a concentration of 11 µg/L. However, 2-butanone and ammonia were non-detect, and chloride was reported at a low concentration (5.3 mg/L). Therefore, this reported detection of acetone is also considered to represent a laboratory artifact.

No other VOC detections were reported present in the LDCS samples this quarter.

At LDCS-5, ammonia and chloride were detected at concentrations of 1.4 mg/L and 34 mg/L, respectively. These concentrations are greater than historic trends (see Attachment G). However, since the primary leachate indicator parameters acetone and 2-butanone were non-detect, and the concentrations of ammonia and chloride have remained relatively low, the ammonia and chloride concentrations do not appear to indicate a new leachate leak at LDCS-5. As discussed in the 2018 Annual Monitoring Report, changes in water quality noted at LDCS-5 may be due to remnant effects from the leachate force-main leak that occurred at this location in 2016. This could result from flushing of the LDCS gravel during periods of higher groundwater elevations. Groundwater withdrawn from LDCS 5 continues to be directed to the leachate collection system as a precautionary measure.

Graphical plots of the LDCS water quality results are presented on trilinear (piper) diagrams in Attachment E. These plots demonstrate the inherent water quality differences between groundwater from the monitoring wells, shallow groundwater from the LDCS, and leachate (collected annually in December).

SURFACE WATER MONITORING

Surface water monitoring was performed on a weekly basis consistent with NPDES Construction General Permit WAR 002603C, and a surface water sample was collected on January 10, 2019 consistent with NPDES Industrial General Permit WAR-002557. Surface water monitoring results were reported to Ecology on a monthly (Construction Permit) and quarterly (Industrial Permit) basis.

using Discharge Monitoring Reports (DMRs). Copies of the First Quarter DMR's are included in Attachment I. No benchmark values or effluent limits were exceeded this quarter.

LEACHATE MONITORING

No leachate samples were collected this quarter (leachate samples are collected for all cells annually in December).

Leachate volumes were monitored using the automated PLC system and through direct measurements by LRI site personnel. Collected leachate was truck-hauled to the pretreatment facility at the Hidden Valley Landfill where it was discharged to the Pierce County sewer system in accordance with Pierce County Utilities Department Industrial Discharge Permit Number PC03096, and to the City of Tacoma Wastewater Treatment Plant for proper disposal. A summary of year to date leachate volume data based on volumes truck-hauled off site is provided on Table 2.

Table 2. 2019 Leachate Volume Data

Month	Leachate Trucked Offsite for Proper Disposal (gallons)	Monthly Rainfall (inches)
January	2,352,863	2.89
February	2,293,109	3.44
March	2,366,050	1.78
Totals	7,012,022	8.11
Notes: Leachate was trucked off-site for proper disposal. Leachate volumes were determined by trucking records kept on a daily basis.		

LANDFILL GAS MONITORING

Monthly monitoring of the landfill gas performance probes was conducted on January 18, February 20, and March 26 using a Landtec GEM2000 portable gas monitor. Methane measurements were less than the lower explosive limit (LEL) of five percent by volume during the First Quarter except at performance probes GP-1, GP-2, GP-10, GP-10P, and GP-12 (see Table 3). Previous barhole monitoring surveys have shown that similar methane levels at these probes does not result in the migration of landfill gas to the property line.

Indoor air was tested for the presence of methane on February 20. The office, maintenance building, scale house, and work shed located next to the stormwater treatment ponds were tested with a portable flame ionization detector (MicroFID). No detectible methane was recorded.

Field records for gas probe and indoor air monitoring are included in Attachment J.

Table 3. 2019 Landfill Gas Probe Monitoring Summary (Percent Methane)

Monitoring Date	GP-1	GP-2	GP-3	GP-4	GP-9	GP-10	GP-10P	GP-11	GP-12	GP-13	GP-14	GP-15
January 18	6.6	18.2	0.0	0.0	0.0	0.1	27.1	0.0	23.1	1.2	0.0	0.0
February 20	6.1	16.9	0.0	0.0	0.0	19.8	14.8	0.3	23.8	1.1	0.0	0.0
March 26	1.8	17.0	0.0	0.0	0.0	1.9	19.6	0.0	26.0	1.3	0.0	0.0
Notes: All values are reported as percent methane by volume. Methane measurements at or above the lower explosive limit of 5.0% by volume are shown in bold .												

LANDFILL GAS EXTRACTION WELL CONSTRUCTION

No new landfill gas extraction wells were installed this quarter.

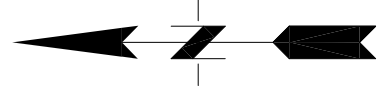
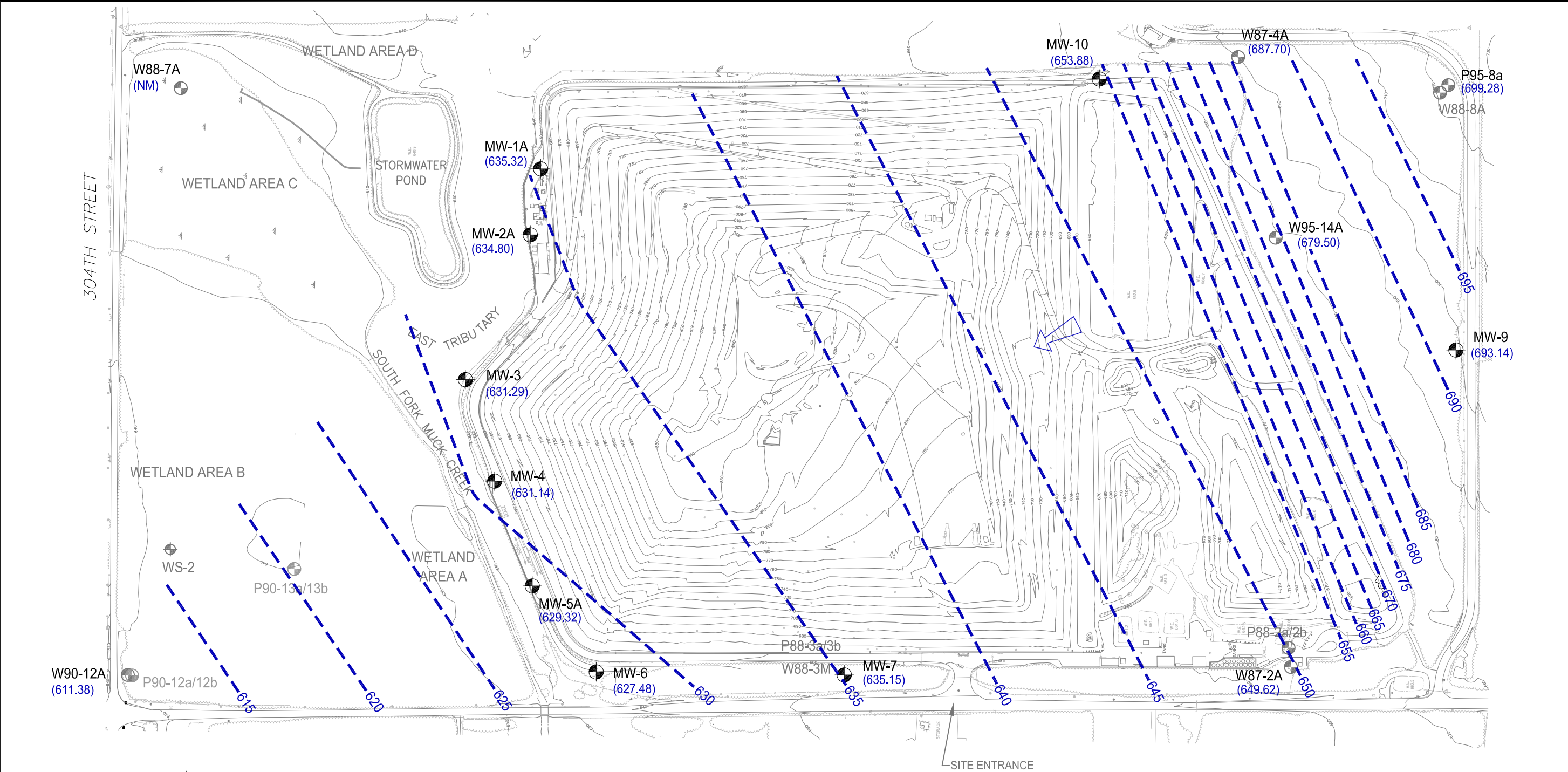
GROUNDWATER MONITORING WELL CONSTRUCTION AND MAINTENANCE

No well construction or significant well maintenance activities were performed this quarter.



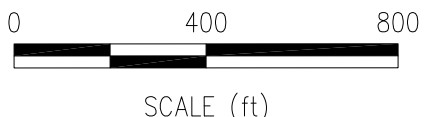
Appendix A

Groundwater Flow Map



NOTES:
VERTICAL DATUM - BASED ON
PIERCE COUNTY BENCH NO. 112-28,
ELEVATION 660.29 NGVD29

- LEGEND:
- MW-1A MONITORING WELL
 - W87-2A CHARACTERIZATION WELL/ PIEZOMETER
 - (649.62) GROUNDWATER ELEVATION (IN FEET ABOVE MSL)
 - INFERRED GROUNDWATER FLOW DIRECTION
 - * WATER LEVEL ELEVATION NOT USED IN CONTOURING



SCS ENGINEERS Environmental Consultants and Contractors 2405 140th Avenue NE, Suite 107 Bellevue, Washington 98005 (425) 746-4600 FAX: (425) 746-6747			PROJECT NO.	04219001.02	DES BY	SG	POTENTIOMETRIC SURFACE CONTOUR MAP MARCH 12, 2019 LRI LANDFILL 30919 MERIDIAN STREET E. GRAHAM, WASHINGTON	DATE	MAY 2019
			SCALE	AS SHOWN	CHK BY	KGL		FIGURE	1
			CAD FILE	FIGURE 1	APP BY	KGL			



Appendix B

Groundwater Data Summary Tables

**Table 1. Groundwater Level Elevations
March 12, 2019
LRI Landfill, Pierce County, Washington**

Location	Well Casing Elevation (ft)	Depth to Water (ft)	Water Level Elevation (ft, NGVD29)
Wells			
W87-2A	664.01	14.39	649.62
W87-4A	693.29	5.59	687.70
W88-3M	658.11	11.91	646.20
W88-7A	632.51	NM	--
W88-8M	721.05	40.38	680.67
W90-12A	640.84	29.46	611.38
W95-14A	680.49	0.99	679.50
MW-1A	652.57	17.25	635.32
MW-2A	651.93	17.13	634.80
MW-3	637.41	6.12	631.29
MW-4	652.37	21.23	631.14
MW-5A	655.55	26.23	629.32
MW-6	635.71	8.23	627.48
MW-7	656.03	20.88	635.15
MW-9	701.77	8.63	693.14
MW-10	673.87	19.99	653.88
Piezometers			
P13-14A	665.96	19.34	646.62
P88-2A	663.96	NM	--
P88-2B	663.48	NM	--
P88-3A	656.20	14.94	641.26
P88-3B	655.98	17.25	638.73
P95-8A	722.07	22.79	699.28
P90-12A	640.79	2.70	638.09
P90-12B	640.73	4.33	636.40
P90-13A	645.19	NM	--
P90-13B	643.63	NM	--
GP-1P ^a	652.00	16.65	635.35
GP-2P ^a	658.61	18.05	640.56
GP-3P ^a	658.51	11.57	646.94
GP-4P ^a	662.01	9.36	652.65
GP-9P ^a	674.03	11.68	662.35
South Creek			
SWSC-1	632.68	1.02	631.66
SWSC-2	629.98	5.95	624.03
Leak Detection System			
LDCS-1 ^u	657.26	25.58	631.68
LDCS-2A ^u	659.24	29.14	630.10
LDCS-2B ^u	661.70	26.08	635.62

Notes:

NM= not measured

-- = not applicable

Measurements taken on 3/12/2019 unless otherwise noted

a = Measurement taken on 3/26/2019

b = Measurement taken on 3/11/2019

Table 2. Field Parameters
First Quarter 2019
LRI Landfill, Pierce County, Washington

Location	Sample Number	Sample Date	Sampling Method	pH	Conductivity	Temperature
Units				(SU)	(μS/cm)	(°C)
WAC 173-200 Criteria				6.5-8.5	700 ^b	—
Monitoring Wells						
MW-1A	304-031219-16	3/12/2019	DP	6.51	186	12.5
MW-2A	304-031119-01	3/11/2019	DP	6.75	250	12.2
MW-3	304-031119-03	3/11/2019	DP	6.90	391	9.9
MW-4	304-031219-13	3/12/2019	SP	7.47	328	12.4
MW-5A	304-031119-07	3/11/2019	DP	7.18	377	12.0
MW-6	304-031119-05	3/11/2019	DP	7.18	303	10.1
MW-7	304-031119-09	3/11/2019	DP	7.22	352	10.2
MW-9	304-031119-11	3/11/2019	DP	6.61	136	9.7
MW-10	304-031219-14	3/12/2019	DP	6.12	270	9.8
Leak Detection System						
LDCS-1	304-031119-10	3/11/2019	DB	6.08	374	20.3
LDCS-2A	304-031119-08	3/11/2019	DB	6.98	797	21.2
LDCS-2B	304-031119-06	3/11/2019	DB	6.87	739	20.2
LDCS-3A	304-031119-04	3/11/2019	DP	6.39	749	19.4
LDCS-4A	304-031119-02	3/11/2019	DP	6.25	772	19.4
LDCS-4B	304-031219-17	3/12/2019	DP	6.32	911	27.0
LDCS-4B (Resample)	304-040519-01	4/5/2019	DP	6.29	951	21.5
LDCS-5	304-031119-12	3/11/2019	DP	6.30	757	17.3
LDCS-6	304-031219-19	3/12/2019	DP	6.83	1,145	9.5

Notes:

WAC 173-200 GW Quality Criteria Exceedances are shown in **bold**.

b = Secondary Drinking Water Standard

DB = disposable bailer

DP = dedicated pump

GB = grab sample

SP = submersible pump

μS/cm = microsiemens per centimeter

°C = degrees celcius

Table 3. Inorganic Parameters
First Quarter 2019
LRI Landfill, Pierce County, Washington

Parameter	Alkalinity, Total	Ammonia	Chloride	Nitrate	Sulfate	Total Dissolved Solids	Total Organic Carbon	Total Suspended Solids
MRL	10	0.10	0.2 - 3.0	0.50	0.2 - 1.0	10	1.0	4.0
WAC 173-200 Criteria	—	—	250	10	250	500	—	—
Prediction Limit	—	—	—	6.4	—	—	—	—
Monitoring Wells								
MW-1A	97	*	2.5	* H	3.6	160	*	*
MW-2A	120	*	3.5	*	6.8	180	*	*
MW-3	170	0.13	4.0	*	28	880	1.0	*
MW-4	160	0.15	3.7	* H	10	230	*	*
MW-5A	180	0.14	3.6	*	18	230	*	*
MW-6	140	0.12	5.4	*	7.2	200	*	*
MW-7	190	0.19	3.4	*	3.7	220	*	*
MW-9	70	*	1.9	*	1.7	110	*	*
MW-10	96	*	8.7	4.4 H	7.1	210	*	*
Leak Detection System								
LDCS-1	190	*	5.3	*	7.1	240	3.2	—
LDCS-2A	410	*	4.6	*	25	460	2.5	—
LDCS-2B	320	*	4.7	*	70	440	1.9	—
LDCS-3A	340	*	5.2	*	71	450	1.8	—
LDCS-4A	340	*	22	*	57	500	4.1	—
LDCS-4B	340	0.32	30	* H	95	590	24	—
LDCS-4B (Resample)	340	0.33 J	24	*	110 B	550	4.3	—
LDCS-5	310	1.4	34	*	77	500	3.9	—
LDCS-6	420	*	9.9	* H	170	680	3.7	—

Notes:

All sample units are milligrams per liter (mg/L)

Groundwater (monitoring well) concentrations greater than prediction limits or WAC 173-200 criteria are shown in **bold**

Analyses performed by TestAmerica of Denver, Colorado

Method Reporting Limit (MRL) is typical and may be elevated for some samples

* indicates the sample result was not reported at or above the MRL

— = not applicable or not performed

B = Compound found in the blank and the sample

H = Sample was prepped or analyzed beyond the specified holding time

J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value

Table 4. WAC 173-351 Appendix I Metals
First Quarter 2019
LRI Landfill, Pierce County, Washington

Parameter	Antimony-D	Antimony-T	Arsenic-D	Arsenic-T	Barium-D	Barium-T	Beryllium-D	Beryllium-T	Cadmium-D	Cadmium-T	Chromium-D	Chromium-T	Cobalt-D	Cobalt-T	Copper-D	Copper-T	Lead-D	Lead-T	Nickel-D	Nickel-T	Selenium-D	Selenium-T	Silver-D	Silver-T	Thallium-D	Thallium-T	Vanadium-D	Vanadium-T	Zinc-D	Zinc-T
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MRL	0.05	0.05	0.005	0.005	0.005	0.005	0.001	0.001	0.001	0.001	0.005	0.005	0.001	0.001	0.01	0.01	0.002	0.002	0.02	0.02	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.01	0.01
WAC 173-200 Criteria	—	—	—	0.00005	—	1.0	—	—	—	0.01	—	0.05	—	—	—	1.0	—	0.05	—	—	—	0.01	—	0.05	—	—	—	—	—	5.0
Prediction Limit	—	0.05	—	0.011	—	0.091	—	0.005	—	0.005	—	0.011	—	0.01	—	0.063	—	0.042	—	0.020	—	0.005	—	0.01	—	0.005	—	0.016	—	0.290
Monitoring Wells																														
MW-1A	—	*	—	*	—	0.023	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*
MW-2A	—	*	—	*	—	0.012	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*
MW-3	—	*	—	*	—	0.013	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*
MW-4	—	*	—	0.0097	—	0.016	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	0.016
MW-5A	—	*	—	0.0057	—	0.014	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*
MW-6	—	*	—	0.0073	—	0.012	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*
MW-7	—	*	—	0.0053	—	0.014	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*
(BG) MW-9	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	0.014	—	*
(BG) MW-10	—	*	—	*	—	0.013	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*
Leak Detection System																														
LDCS-1	*	—	0.0094	—	0.020	—	—	—	—	—	*	—	*	—	*	—	*	—	*	—	—	—	—	—	—	—	*	—	*	—
LDCS-2A	*	—	0.0068	—	0.019	—	—	—	—	—	*	—	*	—	*	—	*	—	*	—	—	—	—	—	—	—	*	—	*	—
LDCS-2B	*	—	0.0051	—	0.016	—	—	—	—	—	*	—	*	—	*	—	*	—	*	—	—	—	—	—	—	—	*	—	*	—
LDCS-3A	*	—	*	—	0.014	—	—	—	—	—	*	—	*	—	*	—	*	—	*	—	—	—	—	—	—	—	*	—	*	—
LDCS-4A	*	—	0.0082	—	0.034	—	—	—	—	—	*	—	0.0024	—	*	—	*	—	*	—	—	—	—	—	—	—	*	—	*	—
LDCS-4B	*	—	0.0110	—	0.041	—	—	—	—	—	*	—	0.0017	—	*	—	*	—	*	—	—	—	—	—	—	—	*	—	*	—
LDCS-4B (Resample)	0.00013 J	—	0.0110	—	0.035	—	—	—	—	—	0.0003 J	—	0.0012	—	*	—	*	—	0.0038	—	—	—	—	—	—	—	0.0013 J	—	*	—
LDCS-5	*	—	0.0054	—	0.047	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—
LDCS-6	*	—	*	—	0.024	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—

Notes:
All sample units are milligrams per liter (mg/L).
WAC 173-200-040 Table 1 Groundwater Quality Criteria are for total metals.
Groundwater (monitoring well) concentrations greater than prediction limits or WAC 173-200 criteria are shown in **bold**.
Parameter concentrations for monitoring wells are total (T) metals.
Parameter concentrations for LDCS sumps are dissolved (D) metals.
Analyses performed by TestAmerica of Denver, Colorado.
Method Reporting Limit (MRL) is typical and may be elevated for some samples.
* indicates result was not reported at or above the MRL
— = not applicable or not performed
BG = Background
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Table 5. WAC 173-351 Appendix II Metals (Dissolved)
First Quarter 2019
LRI Landfill, Pierce County, Washington

Parameter	Calcium	Iron	Magnesium	Manganese	Potassium	Sodium
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MRL	0.20	0.10	0.10	0.005	2.0	1.0
WAC 173-200 Criteria	—	0.30	—	0.050	—	—
Monitoring Wells						
MW-1A	14	1.7	9.2	0.28	3.7	12
MW-2A	17	0.62	9.5	0.28	2.8	13
MW-3	34	*	15	0.32	3.6	13
MW-4	29	*	16	0.23	5.4	11
MW-5A	27	*	11	0.20	4.1	30
MW-6	27	*	12	0.17	4.3	10
MW-7	27	0.14	19	0.21	4.8	12
(BG) MW-9	8.9	0.22	6.1	*	*	7.3
(BG) MW-10	24	*	10	*	2.1	13
Leak Detection System						
LDCS-1	32	0.31	13	1.6	4.5	16
LDCS-2A	78	*	30	0.09	8.7	28
LDCS-2B	80	*	28	0.04	6.8	20
LDCS-3A	77	*	33	0.62	5.2	19
LDCS-4A	68	1.8	40	1.9	5.6	21
LDCS-4B	91	1.7	45	1.8	7.3	29
LDCS-4B (Resample)	90	1.4	47	1.3	7.0	29
LDCS-5	73	*	36	1.1	6.6	26
LDCS-6	120	*	50	0.19	4.0	32

Notes:

All sample units are milligrams per liter (mg/L).

WAC 173-200-040 Table 1 Groundwater Quality Criteria are for total metals.

Groundwater (monitoring well) concentrations greater than WAC 173-200 criteria are shown in **bold**.

Analyses performed by TestAmerica of Denver, Colorado.

Method Reporting Limit (MRL) is typical and may be elevated for some samples.

* indicates result was not reported at or above the MRL.

— = not applicable or not performed

BG = Background

Table 6. Volatile Organic Compounds (µg/L)
First Quarter 2019
LRI Landfill, Pierce County, Washington

Parameter	2-Butanone (MEK)	Acetone	Methylene Chloride
Units	µg/L	µg/L	µg/L
MRL	6.0	10.0	2.0
WAC 173-200 Criteria	—	—	5.0
Monitoring Wells			
MW-1A	*	*	*
MW-2A	*	*	*
MW-3	*	*	*
MW-4	*	*	*
MW-5A	*	*	*
MW-6	*	*	*
MW-7	*	*	*
(BG) MW-9	*	*	*
(BG) MW-10	*	*	*
Leak Detection System			
LDCS-1	*	11	*
LDCS-2A	*	*	*
LDCS-2B	*	*	*
LDCS-3A	*	*	*
LDCS-4A	*	*	*
LDCS-4B	11	16	*
LDCS-4B (Resample)	*	*	*
LDCS-5	*	*	*
LDCS-6	*	*	*
Field Blank	*	*	9.6

Notes:

Analyses performed by TestAmerica of Denver, Colorado.

* = not reported at or above the MRL

— = not applicable or not performed

BG = Background

Table 7. Cation-Anion Balance
First Quarter 2019
LRI Landfill, Pierce County, Washington

Cations	mg/L				meq/L				% of Total				
	Ca	Mg	K	Na	Total	Ca	Mg	K	Na	Total	Na+K	Ca	Mg
MW-1A	14	9.2	3.7	12	38.9	0.70	0.76	0.08	0.52	2.06	29	34	37
MW-2A	17	9.5	2.8	13	42.3	0.85	0.78	0.06	0.57	2.26	28	38	35
MW-3	34	15	3.6	13	65.6	1.23	1.23	0.08	0.57	3.58	18	47	35
MW-4	29	16	5.4	11	61.4	1.45	1.32	0.12	0.48	3.36	18	43	39
MW-5A	27	11	4.1	30	72.1	1.35	0.91	0.09	1.31	3.65	38	37	25
MW-6	27	12	4.3	10	53.3	1.35	0.99	0.10	0.44	2.87	19	47	34
MW-7	27	19	4.8	12	62.8	1.35	1.56	0.11	0.52	3.54	18	38	44
MW-9	8.9	6.1	2.0	7.3	24.3	0.44	0.50	0.05	0.32	1.31	28	34	38
MW-10	24	10	2.1	13	49.1	1.20	0.82	0.05	0.57	2.63	23	45	31
LDCS-1	32	13	4.5	16	65.5	1.60	1.07	0.10	0.70	3.46	23	46	31
LDCS-2A	78	30	8.7	28	144.7	3.89	2.47	0.20	1.22	7.78	18	50	32
LDCS-2B	80	28	6.8	20	134.8	3.99	2.30	0.15	0.87	7.32	14	55	31
LDCS-3A	77	33	5.2	19	134.2	3.84	2.72	0.12	0.83	7.50	13	51	36
LDCS-4A	68	40	5.6	21	134.6	3.39	3.29	0.13	0.91	7.73	13	44	43
LDCS-4B	91	45	7.3	29	172.3	4.54	3.70	0.16	1.26	9.67	15	47	38
LDCS-4B (Resample)	90	47	7.0	29	173	4.49	3.87	0.16	1.26	9.78	15	46	40
LDCS-5	73	36	6.6	26	141.6	3.64	2.96	0.15	1.13	7.89	16	46	38
LDCS-6	120	50	4.0	32	206	5.99	4.12	0.09	1.39	11.59	13	52	36

Anions	mg/L				meq/L				% of Total				Total Ions (meq/L)	Cation - Anion Balance	Applicable Ratio (%)	Ratio Exceedance	
	Alk	Cl	NO ₃	SO ₄	Total	Alk	Cl	NO ₃	SO ₄	Total	Cl	Alk					SO ₄
MW-1A	116	2.5	0.5	3.6	123	1.91	0.07	0.008	0.07	2.06	3	93	4	4.12	0.0	10	O
MW-2A	144	3.5	0.5	6.8	154.8	2.36	0.10	0.008	0.14	2.61	4	90	5	4.87	7.2	10	O
MW-3	204	4.0	0.5	28	236.5	3.35	0.11	0.008	0.58	4.05	3	83	14	7.63	6.2	5	Exceeds
MW-4	192	3.7	0.5	10	206.2	3.15	0.10	0.008	0.21	3.47	3	91	6	6.83	1.5	5	O
MW-5A	216	3.6	0.5	18	238.1	3.54	0.10	0.008	0.37	4.03	3	88	9	7.68	4.9	5	O
MW-6	168	5.4	0.5	7.2	181.1	2.76	0.15	0.008	0.15	3.07	5	90	5	5.93	3.3	5	O
MW-7	228	3.4	0.5	3.7	235.6	3.74	0.10	0.008	0.08	3.92	2	95	2	7.46	5.1	5	Exceeds
MW-9	84	1.9	0.5	1.7	88.1	1.38	0.05	0.008	0.04	1.47	4	93	2	2.78	6.0	10	O
MW-10	115	8.7	4.4	7.1	135.4	1.89	0.25	0.071	0.15	2.35	10	80	6	4.99	5.6	10	O
LDCS-1	228	5.3	0.5	7.1	240.9	3.74	0.15	0.008	0.15	4.04	4	92	4	7.51	7.7	5	Exceeds
LDCS-2A	492	4.6	0.5	25	522.1	8.07	0.13	0.008	0.52	8.73	1	92	6	16.50	5.8	5	Exceeds
LDCS-2B	384	4.7	0.5	70	459.2	6.30	0.13	0.008	1.46	7.89	2	80	18	15.21	3.8	5	O
LDCS-3A	408	5.2	0.5	71	484.7	6.69	0.15	0.008	1.48	8.32	2	80	18	15.82	5.2	5	Exceeds
LDCS-4A	408	22	0.5	57	487.5	6.69	0.62	0.008	1.19	8.51	7	79	14	16.23	4.8	5	O
LDCS-4B	408	30	0.5	95	533.5	6.69	0.85	0.008	1.98	9.52	9	70	21	19.19	0.8	5	O
LDCS-4B (Resample)	408	24	0.2	110	542.2	6.69	0.68	0.003	2.29	9.66	7	69	24	19.44	0.6	5	O
LDCS-5	372	34	0.5	77	483.5	6.10	0.96	0.008	1.60	8.67	11	70	18	16.55	4.7	5	O
LDCS-6	504	9.9	0.5	170	684	8.27	0.28	0.008	3.54	12.09	2	68	29	23.67	2.1	5	O

Notes:

mg/L = milligrams per liter

meq/L = milliequivalents per liter

Total alkalinity concentration, reported as calcium carbonate (CaCO₃), is converted to the bicarbonate (HCO₃⁻) ion by multiplying by a factor of 1.2.

— = not applicable or not performed

The MRL was used for analytes that were non-detect

A 10% difference threshold is used if the total cation-anion sums are < 5.0 meq/liter.

A 5% difference threshold is used if the total cation-anion sums are > or = 5.0 meq/liter.

Table 8. Duplicate Sample Results
First Quarter 2019 Monitoring Report
LRI Landfill, Pierce County, Washington

Parameter	MRL	MW-1A	MW-1A (Duplicate)	RPD (%)
Volatile Organic Compounds (µg/L)				
No Detections	-	-	-	-
Inorganic Parameters (mg/L)				
Alkalinity, Bicarbonate (as CaCO ₃)	10	97	100	3.0
Chloride	0.2	2.5	2.4	4.1
Sulfate	0.2	3.6	3.3	8.7
Total Dissolved Solids	10	160	170	6.1
Dissolved Metals (mg/L)				
Calcium	0.2	14	15	6.9
Iron	0.1	1.7	1.8	5.7
Magnesium	0.1	9.2	9.3	1.1
Manganese	0.005	0.28	0.27	3.6
Potassium	2.0	3.7	3.8	2.7
Sodium	1.0	12	12	0.0
Total Metals (mg/L)				
Barium	0.005	0.023	0.022	4.4

Notes:

Analyses performed by TestAmerica of Denver, Colorado.

VOCs not listed were not present at concentrations exceeding the Method Reporting Limit (MRL).

RPD = relative percent difference.

µg/L = micrograms per liter.

mg/L = milligrams per liter.

* = the sample results were not reported at or above the MRL

The MRL was used to calculate the RPD for analytes where one sample was non-detect.



Appendix C

Field Sampling Documentation

March 13, 2019
File No. 04219001.02

Subject: **First Quarter 2019 Groundwater Monitoring Event**
LRI Landfill, Pierce County, Washington

NOTES/SAMPLE DECODING:

Event Dates: March 11-12 & April 5, 2019
Field Staff: Sam Graber and Travis Berndahl

- LDCS-4B was resampled on April 5, 2019.
- Dedicated pumps were used for purging and sampling wells MW-1A, MW-2A, MW-3, MW-5A, MW-6, MW-7, MW-9, MW-10, and leak detection/collection system points LDCS-3A, LDCS-4A, LDCS-4B, LDCS-5, and LDCS-6.
- Disposable bailers were used to sample leak detection/collection system points LDCS-1, LDCS-2A, and LDCS-2B.
- A non-dedicated Sample Pro pump was used for purging and sampling well MW-4.
- A round of water level measurements was completed on March 12th, 2019.
- Multiparameter field meters were calibrated daily, prior to sampling.
- Source water for the field blank was lab-grade deionized water (VOC-free) provided by TestAmerica in Tacoma, Washington.

Sample Number	Well Number
304-031119-01	MW-2A
304-031119-02	LDCS-4A
304-031119-03	MW-3
304-031119-04	LDCS-3
304-031119-05	MW-6
304-031119-06	LDCS-2B
304-031119-07	MW-5A
304-031119-08	LDCS-2A
304-031119-09	MW-7
304-031119-10	LDCS-1
304-031119-11	MW-9
304-031119-12	LDCS-5
304-031219-13	MW-4
304-031219-14	MW-10
304-031219-15	Field Blank
304-031219-16	MW-1
304-031219-17	LDCS-4B
304-031219-18	MW-1 (Duplicate)
304-031219-19	LDCS-6
304-040519-01	LDCS-4B (Resample)

SCS ENGINEERS

2405 140th ave NE #107

Bellevue, WA 98005

(425) 746-4600

Groundwater Sampling Data Sheet

Project #: 04219001.02
 Site: LRI 304th
 Well ID: MW-2A
 Sample ID: 304-03 1119-01
 Date: 3/11/19
 Weather: sunny

Sampling Method: DTW
 Meter: MP-20
 YSI

CONTROL SETTINGS:
 1.75" QED SamplePro
 Bail
 1 ft water = 0.62L
 One Well Volume (liters)
 8
 7
 25
 300ml/min
 Discharge
 Pressure
 Flow
 Other: Flow Setting:

Peristaltic
 Grab
 Other

Filtered? ☒ N
 Locked? ☒ N
 Water in Protector? ☒ N
 Damage? ☒ N

Sample Containers:
 1000 ml Poly
 500 ml HNO3 x2
 500 ml H2SO4 x2
 125 ml NaOH

250 ml Poly
 40 ml VOA x3 x6
 125 ml Poly
 1000 ml Amber

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
935		11.48	302	10.11	5.58	332.0		
940		12.31	257	0.70	6.35	230.5		
943		12.24	253	0.47	6.51	134.4		
946		12.43	251	0.37	6.62	62.2		
949		12.42	250	0.32	6.67	27.7		
952		12.21	251	0.30	6.70	13.4		
955		12.22	250	0.28	6.75	-1.7	0.45	

Notes / Observations (color, odor, anomalies, etc):

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

SAMPLER:

Travis Berndahl

Printed Name

Signature

On 6

SCS ENGINEERS

2405 140th ave NE #107

Bellevue, WA 98005

(425) 746-4600

Groundwater Sampling Data Sheet

Project #: 04219001.02
 Site: LRI 304th
 Well ID: LDCPS-4A
 Sample ID: 304-03114-02
 Date: 3/11/19
 Weather: Sunny
 Filtered? ☒ N
 Locked? ☒ N
 Sample Containers: 1000 ml Poly 500 ml HNO3 x2 500 ml H2SO4 x2 125 ml NaOH
 500 ml Poly 40 ml VOA x3 x6 125 ml Poly 1000 ml Amber
 125 ml NaOH

Sampling Method: DTW TOS Intake BOS Total Depth
 Meter: MP-20 YSI
 Dedicated 1.75" QED SamplePro Bail 1 ft water = 0.62L
 CONTROL SETTINGS: Refill 12 Discharge 3 Pressure 35 Flow 250 ml/min
 One Well Volume (liters) Total Volume Bailed (liters)
 Peristaltic Grab Other
 1L = 0.26 gallons
 Other: Flow Setting:

Notes / Observations (color, odor, anomalies, etc):
 LDCPS level at 10:05 upon turning pump on.
 water to surface within 2 minutes.
 LRF had generator running nearby,
 next to wheel wash water pond, emitting
 slight gasoline odor.

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q/Vol.
955		12.4	673	7.12	6.45	309.5		
1000		14.2	685	4.81	6.37	111.8		
1003		16.4	694	3.71	6.29	10.2		
1006		18.1	751	1.43	6.26	-2.5		
1009		18.9	765	0.49	6.28	36.0		
1012		19.1	766	0.89	6.25	46.5	5.92	
1015		19.4	772	0.77	6.25	56.5	1.44	795

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

SAMPLER: Sam Barber
 Printed Name
 Signature

SCS ENGINEERS

2405 140th ave NE #107

Bellevue, WA 98005

(425) 746-4600

Groundwater Sampling Data Sheet

Project #: 04219001.02

Site: LRI 304th

Well ID: MW-?

Sample ID: 304-031119-03

Date: 3/11/19

Weather: Sunny

Filtered? ☒ Y ☐ N

Sample Containers: 1000 ml Poly 500 ml HNO3 x2 500 ml H2SO4 x2 125 ml NaOH

Locked? ☒ Y ☐ N

Water in Protector? ☒ Y ☐ N

Water in Poly 500 ml Poly 250 ml Poly 40 ml VOA x3 x6 125 ml Poly 1000 ml Amber

Sampling Method: Dedicated

Meter: MP-20

DTW: 6.12

TOS: /

Intake: /

BOS: /

Total Depth: /

CONTROL SETTINGS: 1.75" QED SamplePro Bail

1L = 0.26 gallons

One Well Volume (liters): 9

Discharge: 6

Pressure: 35

Flow: 400 ml/min

Other: /

Peristaltic: /

Grab: /

Other: /

Notes / Observations (color, odor, anomalies, etc):

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1020		9.94	326	4.79	6.55	189.6		
1025		9.97	386	0.44	6.60	178.0		
1028		10.23	384	0.35	6.75	164.8		
1031		9.81	386	1.52	6.83	134.8		
1034		9.90	390	0.78	6.85	128.6		
1037		9.91	391	0.58	6.88	124.1		
1040		9.91	391	0.49	6.90	119.1	0.45	

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

SAMPLER: Travis Berndahl

Printed Name

Signature

SCS ENGINEERS

2405 140th ave NE #107

Bellevue, WA 98005

(425) 746-4600

Groundwater Sampling Data Sheet

Project #: 04219001.02

Site: LRI 304th

Well ID: UDCS-3

Sample ID: 304-031119-04

Date: 3/11/19

Weather: Sunny

Filtered? ☒ N

Locked? ☒ N

Sample Containers: 1000 ml Poly, 500 ml HNO3, 500 ml H2SO4, 125 ml NaOH

Water in Protector? ☒ N

Water in Poly: 500 ml Poly, 500 ml H2SO4

DTW: 11.5

TOS: 3.5

Intake: 250 ml

BOS: 35

Total Depth: 35

Meter: MP-20

Control Settings: Refill, Discharge, Pressure, Flow

1.75" QED SamplePro

Bail

Peristaltic

Grab

Other

1 ft water = 0.62L

One Well Volume (liters)

Total Volume Bailed (liters)

Flow Setting

Notes / Observations (color, odor, anomalies, etc):

UDCS level at 10.00 upon turning pump on. Water to surface right away.

* reading from panel taken 3/12/19 @ 1500

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1103		13.0	811	9.40	7.92	134.7		
1108		15.2	808	8.61	7.52	154.6		
1111		17.0	805	7.72	7.24	170.4		
1114		17.8	752	4.05	6.53	174.4		
1117		18.7	751	1.91	6.45	126.3		
1120		19.2	750	1.32	6.40	149.8		
1123		19.4	749	1.15	6.39	150.6	0.36	765*

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

SAMPLER:

Sam Graber

Printed Name

Signature

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Bellevue, WA 98005

(425) 746-4600

Groundwater Sampling Data Sheet

Project #: 04219001.02
 Site: LRI 304th
 Well ID: MW-6
 Sample ID: 304-03119-05
 Date: 3/11/19
 Weather: Sunny

Filtered? ☒ N
 Sample Containers:
 1000 ml Poly
 500 ml HNO3 x2
 125 ml NaOH

Locked? ☒ Y
 Water in Protector? ☒ Y
 500 ml Poly
 500 ml H2SO4 x2
 125 ml NaOH

Sampling Method: Dedicated
 Meter: MP-20
 (YSI)

CONTROL SETTINGS:
 Refill: 10
 Discharge: 5
 Pressure: 30
 Flow: 300 ml/min

1.75" QED SamplePro
 Bail
 1 ft water = 0.62L
 One Well Volume (liters)
 Total Volume Bailed (liters)

Peristaltic
 Grab
 Other
 1L = 0.26 gallons
 Other:
 Flow
 Setting:

Notes / Observations (color, odor, anomalies, etc):

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1115		9.99	312	3.07	6.56	182.9		
1120		10.03	304	0.35	6.75	172.8		
1123		10.05	305	0.24	7.00	163.5		
1126		10.06	305	0.22	7.05	161.2		
1129		10.07	305	0.21	7.13	155.9		
1132		10.08	305	0.20	7.16	153.5		
1135		10.08	303	0.19	7.18	151.1		

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

SAMPLER:

Travis Berndahl

Printed Name

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Groundwater Sampling Data Sheet

Project #:	LRI 04219001.02	Sampling Method :	Dedicated	1.75" QED SampleProc	Bail	Peristaltic	Grab	Other
Site	LRI 304th	Meter:		1L = 0.26 gallons				
Well ID:	boxes-2B	MP-20		One Well Volume	(liters)		Other :	
Sample ID:	304-031114-06	YSI		Total Volume Bailed	(liters)		Flow Setting:	
Date:	3/1/19							
Weather:	cloudy							
Filtered?	Y N							
Locked?	Y N							
Sample Containers:								
	1000 ml Poly							
	500 ml HNO ₃	x2						
	125 ml NaOH							
	500 ml H ₂ SO ₄	x2						
	40 ml VOA	x3						
	250 ml Poly	x6						
	Water in Protector?	Y N						
	500 ml Poly							
	125 ml Poly							
	Damage?	Y N						
	1000 ml Amber							
	Notes / Observations (color, odor, anomalies, etc):							

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Gr Vol.
1230		20.2	739	6.19	6.87	173.3	2.76	642.1

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb $\pm 10\%$ or ≤ 5

SAMPLER:

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Groundwater Sampling Data Sheet

Project #: 04219001.02
 Site: LRI 304th
 Well ID: MW-5A
 Sample ID: 304-031119-07
 Date: 3/11/19
 Weather: Sunny
 Filtered? ☒ N
 Locked? ☒ N
 Sample Containers: 1000 ml Poly, 500 ml HNO3, 500 ml H2SO4, 125 ml NaOH
 Water in Protector? ☒ N
 500 ml Poly, 40 ml VOA, 125 ml Poly, 1000 ml Amber
 Sampling Method: DTW
 Meter: MP-20
 Dedicated: ☒ CONTROL SETTINGS: 1.75" QED SamplePro
 Bail: 1 ft water = 0.62L
 One Well Volume (liters): 9
 Discharge: 6
 Pressure: 40
 Flow: 300 mL/min
 Total Volume Bailed (liters):
 Other:
 Flow Setting:
 Peristaltic
 Grab
 Other

Notes / Observations (color, odor, anomalies, etc):

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1230		11.89	297	4.42	6.83	234.0		
1235		11.91	386	0.36	6.80	211.0		
1238		12.02	379	0.23	7.03	159.0		
1241		12.01	373	0.26	7.10	164.6	5.76	
1244		12.03	374	0.27	7.14	67.4	5.24	
1247		12.02	374	0.28	7.16	48.4	2.35	
1250		11.99	377	0.25	7.18	27.6	2.20	

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

SAMPLER:

Travis Berndahl

Printed Name

Signature

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Groundwater Sampling Data Sheet

Project #: 04219001.02
 Site: LRI 304th
 Well ID: 1.DGS-2A
 Sample ID: 304-031119-08
 Date: 3/11/19
 Weather: cloudy

Filtered? ☒ Y ☐ N
 Sample Containers: 1000 ml Poly
 500 ml HNO3 x2
 125 ml NaOH

Water in Protector? ☒ Y ☐ N
 500 ml Poly
 500 ml H2SO4 x2
 125 ml NaOH

Sampling Method: DTW
 Meter: MP-20
 YSI

29.14
 TOS
 Intake
 BOS
 Total Depth

CONTROL SETTINGS:
 Refill
 Discharge
 Pressure
 Flow

1.75" QED SamplePro
 Bail
 1 ft water = 0.62L
 One Well Volume (liters)
 Total Volume Bailed (liters)

Peristaltic
 Grab
 Other

1L = 0.26 gallons

Notes / Observations (color, odor, anomalies, etc):

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q/Vet.
1315		21.2	797	6.67	6.98	166.4	9.51	736

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

SAMPLER:

Sam Barber

Printed Name

Signature

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Groundwater Sampling Data Sheet

Project #: 04219001.02

Site: LRI 304th

Well ID: MW-7

Sample ID: 304-03 1119-09

Date: 3/11/19

Weather: Sunny Cloudy

Filtered? (Y/N) Y

Sample Containers: 1000 ml Poly 500 ml HNO3 x2 125 ml NaOH

Water in Protector? (Y/N) Y

Water in Protector? (Y/N) Y

500 ml Poly 500 ml H2SO4 x2 125 ml NaOH

Sampling Method: DTW

Meter: MP-20

CONTROL SETTINGS: 1.75" QED SamplePro Bail 1L = 0.26 gallons

Peristaltic Grab Other

1 ft water = 0.62L

One Well Volume (liters) 10

Other: Flow Setting:

Discharge 5

Pressure 40

Flow 300 ml/min

Total Volume Bailed (liters)

Notes / Observations (color, odor, anomalies, etc):

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1320		10.47	359	4.59	6.53	179.8		
1325		10.28	364	0.38	6.99	144.2		
1328		10.26	361	0.46	7.14	53.5		
1331		10.25	361	0.41	7.16	22.0		
1334		10.22	361	0.31	7.19	1.9		
1337		10.23	362	0.28	7.21	-10.8		
1340		10.21	352	0.26	7.22	-16.8	0.68	

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

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Groundwater Sampling Data Sheet

12000 250

Notes / Observations (color, odor, anomalies, etc):

Lots of excited men coming out of pump Spigot.

Signature

Groundwater Sampling Data Sheet

Project #: 04219001.02
Site: LRI 304th
Well ID: MW-9
Sample ID: 304-031117-11
Date: 3/11/19
Weather: Partly Cloudy
Filtered? ☒ Y ☐ N
Sample Containers: 1000 ml Poly Locked? ☒ Y ☐ N
500 ml HNO3 x2 500 ml H2SO4 x2 125 ml NaOH
Water in Protector? ☒ Y ☐ N
500 ml Poly 250 ml Poly 40 ml VOA x3 x6 125 ml Poly 1000 ml Amber

Sampling Method: Dedicated
Meter: MP-20
CONTROL SETTINGS: Refill 9 Discharge 6 Pressure 40 Flow 300 mL/min.
DTW 8.78 TOS Intake BOS Total Depth
1L = 0.26 gallons
One Well Volume (liters)
Total Volume Bailed (liters)

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1435		9.23	140	5.56	6.77	212.7		
1440		9.74	136	3.88	6.70	214.4		
1443		9.72	136	3.72	6.70	213.4		
1446		9.67	137	3.65	6.67	213.7		
1449		9.69	135	3.63	6.65	214.2		
1452		9.69	136	3.60	6.62	215.4		
1455		9.68	136	3.58	6.61	216.5	0.77	

Notes / Observations (color, odor, anomalies, etc):

CO2 ran out on the half bottle
(Nitric Acid / 250 mL) @ the 250 mL mark.
Some headspace in bottle.
Air escaping from pressure connection

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

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Groundwater Sampling Data Sheet

Project #: 04219001.02
 Site: LRI 304th
 Well ID: LDCS-5
 Sample ID: 304-031119-12
 Date: 3/11/19
 Weather: Cloudy
 Filtered? ☒ Y ☐ N
 Sample Containers: 1000 ml Poly
 500 ml HNO3 x2
 125 ml NaOH
 Locked? ☒ Y ☐ N
 Water in Protector? ☒ Y ☐ N
 500 ml Poly
 500 ml H2SO4 x2
 125 ml NaOH
 Sampling Method: Dedicated
 Meter: MP-20
 DTW
 TOS
 Intake
 BOS
 Total Depth
 CONTROL SETTINGS:
 Refill 11
 Discharge 4
 Pressure 35
 Flow 200 mL/min
 Bail
 1 ft water = 0.62L
 One Well Volume (liters)
 Total Volume Bailed (liters)
 Peristaltic
 1L = 0.26 gallons
 Grab
 Other
 Flow
 Setting

Damage? ☒ Y ☐ N
 125 ml Poly
 1000 ml Amber
 40 ml VOA x3 x6
 250 ml Poly
 40 ml H2SO4 x2
 125 ml NaOH

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	QTY
1440		12.3	660	6.50	6.71	237.1		0.450L
1445		14.1	665	4.71	6.58	236.0		
1448		15.4	671	3.50	6.47	234.2		
1451		16.3	672	1.67	6.34	210.3		
1454		16.8	673	1.09	6.31	173.3		
1457		17.0	703	0.74	6.30	137.0		
1500		17.3	757	0.56	6.30	144.2	8.70	720

Notes / Observations (color, odor, anomalies, etc):

level at 13.9, water right away

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

SAMPLER:

Sam Graber

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Groundwater Sampling Data Sheet

Project #: 04219001.02
 Site: LRI 304th
 Well ID: NW-4
 Sample ID: 304-031219-13
 Date: 3/12/19
 Weather: rainy
 Filtered? ☒ N
 Locked? ☒ N
 Sample Containers: 1000 ml Poly 500 ml HNO3 x2 500 ml H2SO4 x2 125 ml NaOH
 Water in Protector? ☒ N
 500 ml Poly 250 ml Poly 40 ml VOA x3 x6 125 ml Poly 1000 ml Amber
 Sampling Method: DTW
 Meter: MP-20
 CONTROL SETTINGS: Refill Discharge Pressure Flow
 1.75" QED Sampler Pro
 1 ft water = 0.62L
 One Well Volume (liters)
 Total Volume Bailed (liters)
 1L = 0.26 gallons
 Other

TIME	DTW	Temp.	Sp.Cond.	DO	pH	Eh	Turbidity	Q / Vol.
9:46		Turned pump on						
9:45								
10:05		12.3	334	0.82	7.30	38.0	52.7	
10:15		12.4	329	0.37	7.45	-25.0	6.14	
10:20		12.4	328	0.30	7.45	-33.1		
10:23		12.4	328	0.28	7.45	-36.8		
10:26		12.4	328	0.28	7.46	-37.5		
10:29		12.4	328	0.26	7.46	-40.1		
10:32		12.4	328	0.24	7.47	-42.8		
10:35		12.4	328	0.23	7.47	-44.4	4.15	

Notes / Observations (color, odor, anomalies, etc):

21.22 @ 9:15
 21.22 @ 9:30

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

SAMPLER:

Sam 6/16/19

Printed Name

Signature

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(425) 746-4600

Groundwater Sampling Data Sheet

Project #: 04219001.02
 Site: LRI 304th
 Well ID: MW-10
 Sample ID: 304-03-219-19
 Date: 3/12/19
 Weather: Raining

Filtered? Y N
 Sample Containers: 1000 ml Poly 500 ml Poly 500 ml HNO3 x2 500 ml H2SO4 x2 125 ml NaOH

Water in Protector? Y N
 1000 ml Poly 500 ml Poly 500 ml H2SO4 x2 125 ml NaOH

Sampling Method: DTW
 Meter: MP-20
 YSI

CONTROL SETTINGS:
 Refill
 Discharge
 Pressure
 Flow

1.75" QED SamplePro
 Bail
 Peristaltic
 Grab
 Other

1 ft water = 0.62L
 One Well Volume (liters)
 Total Volume Bailed (liters)

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
920		9.33	255	8.62	5.19	331.5		
925		9.80	272	2.54	5.78	334.7		
928		9.81	272	2.07	6.02	332.2		
931		9.80	272	1.97	6.05	331.8		
934		9.77	270	1.83	6.10	331.5		
937		9.80	268	1.79	6.11	331.5		
940		9.80	270	1.74	6.12	331.4	0.23	

Notes / Observations (color, odor, anomalies, etc):

Stabilization Parameters: pH/DO ± 0.2, SpC ± 10%, Temp ± 0.5°C, Turb. ± 10% or ≤ 5

SAMPLER: Travis Berndahl

Printed Name

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Bellevue, WA 98005

Groundwater Sampling Data Sheet

Notes / Observations (color, odor, anomalies, etc):

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb $\pm 10\%$ or ≤ 5

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Groundwater Sampling Data Sheet

Project #: 04219001.02

Site: LRI 304th

Well ID: MW-1

Sample ID: 304-03 219-16

Date: 3/12/19

Weather: Raining

Filtered? ☒ N

Locked? ☒ Y

Water in Protector? ☒ N

Sample Containers: 1000 ml Poly 500 ml Poly 500 ml HNO3 x2 125 ml NaOH

Sampling Method: DTW

Meter: MP-20

CONTROL SETTINGS: Refill 8 Discharge 7 Pressure 2.5 Flow 30 ml/min

Dedicated 1.75" QED SamplePro Bail

Peristaltic Grab Other

1L = 0.26 gallons

One Well Volume (liters)

Total Volume Bailed (liters)

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1015		12.55	201	5.24	6.39	344.9		
1020		12.59	72	3.72	5.93	338.4		
1023		12.53	104	1.55	5.90	332.5		
1026		12.55	191	1.26	6.04	328.6		
1029		12.52	164	0.04	6.21	262.2		
1032		12.45	177	0.85	6.38	133.5		
1035		12.48	186	0.71	6.51	56.2	0.01	

Notes / Observations (color, odor, anomalies, etc):

Dup collected @ 1040

304-031219-18

Water in the monument was nearly to TOC.

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

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Groundwater Sampling Data Sheet

Project #: 04219001.02

Site: LRI 304th

Well ID: LDCS-4B

Sample ID: 304-031219-17

Date: 3/12/19

Weather: Partly Sunny / Rain

Filtered? ☒ Y ☐ N

Locked? ☒ Y ☐ N

Sample Containers: 1000 ml Poly 500 ml HNO3 x2 500 ml H2SO4 x2 125 ml NaOH

Water in Protector? ☒ Y ☐ N

500 ml Poly 500 ml H2SO4 x2 40 ml VOA x3 x6 125 ml Poly 1000 ml Amber

Sampling Method: DTW TOS Intake BOS Total Depth

Meter: MP-20 YSI

CONTROL SETTINGS: Refill 15 Discharge 5 Pressure 40 Flow 350 ml/min

1.75" QED SamplePro Bail 1 ft water = 0.62L One Well Volume (liters) Total Volume Bailed (liters)

Peristaltic Grab Other

1L = 0.26 gallons

Notes / Observations (color, odor, anomalies, etc):

LDCS level 2 + 3.

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	QX-Vol.
1213	Turned pump on							
1220	Water to surface							
1225		25.6	899	0.52	6.39	-30.5		880
1230		26.4	907	0.29	6.33	-67.4		
1233		26.5	903	0.27	6.34	-72.4		
1236		26.6	910	0.24	6.34	-79.0		
1239		26.7	910	0.23	6.33	-81.0		
1242		26.8	910	0.22	6.32	-82.7		
1245		27.0	911	0.21	6.32	-84.1	0.82	

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

Sam Graber

SAMPLER:

Printed Name

Signature

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Groundwater Sampling Data Sheet

Project #: 04214001.02

Site: LRI 304th

Well ID: LDGS-6

Sample ID: 304-031219-19

Date: 3/12/19

Weather: cloudy

Filtered? ☒ N

Locked? ☒ N

Sample Containers: 1000 ml Poly 500 ml Poly 500 ml H2SO4 x2 500 ml HNO3 x2 125 ml NaOH

Water in Protector? ☒ N

DTW 7

TOS 7

Intake 7

BOS 7

Total Depth 7

Meter: MP-20

CONTROL SETTINGS: YSI

Refill 16.5

Discharge 3.5

Pressure 40

Flow 100 ml/min

1.75" QED SamplePro

Bail

1 ft water = 0.62L

One Well Volume (liters)

Total Volume Bailed (liters)

Peristaltic

Grab

Other

Notes / Observations (color, odor, anomalies, etc):

LDGS level at 4.5 upon turning pump on.

water very gaudy

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q/Vol.
1325		9.0	1150	10.60	7.40	44.6		
1340		8.0	1151	9.82	7.22	115.9		919
1345		8.1	1150	7.00	7.08	120.7		
1348		8.2	1147	5.63	6.89	124.9		
1351		8.4	1146	5.26	6.87	129.4		
1354		8.5	1146	4.99	6.85	134.9		
1357		8.9	1146	4.65	6.81	139.4		
1400		9.5	1145	4.36	6.83	142.6	1.22	917

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

SAMPLER:

Sam Grabar

Printed Name

Signature

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Bellevue, WA 98005

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Groundwater Sampling Data Sheet

Project #: DW219001.02 Site: LPI 304th Well ID: LDGRS-4B Sample ID: 204-040519-01 Date: 4/5/19 Weather: overcast

Filtered? ☒ N Locked? ☒ N 1000 ml Poly 500 ml HNO3 x2 125 ml NaOH

Sample Containers: 1000 ml Poly 500 ml H2SO4 x2 125 ml NaOH

Sampling Method: Dedicated 1.75" QED SamplePro Bail 1 ft water = 0.62L One Well Volume (liters) 4 Total Volume Bailed (liters) 40 Flow 200 ml/min

CONTROL SETTINGS: Refill 16 Discharge 4 Pressure 0

Meter: MP-20 YSI

DTW / TOS / Intake / BOS / Total Depth /

Water in Protector? ☒ N 250 ml Poly 40 ml VOA x3 x6 125 ml Poly 1000 ml Amber

Damage? ☒ Y ☒ D

Notes / Observations (color, odor, anomalies, etc):

Turned LDGRS pump off at 10:15

Leachate level = 11 LDGRS level = 2

levels upon sampling Leachate = 11 LDGRS = 3 spec = 922

Did not notice anything out of the ordinary at sampling location. No odor or changes in visual appearance of samples

SPC panel

TIME	Temp.	Sp Cond.	DO	pH	Eh	Turbidity	Q / Vol.
10:30	began purge, water to surface in 2 minutes.						
11:10	922						
11:35	20.77	920	1.49	5.91	306.8		
11:45	21.20	950	0.94	6.27	99.6		
11:48	21.24	950	0.95	6.28	78.4		
11:51	21.30	951	0.97	6.29	52.3		
11:54	21.37	951	1.00	6.29	42.6	0.53	
11:57	21.38	951	1.03	6.29	37.5		
12:00	21.46	951	1.08	6.29	34.2	0.61	

Stabilization Parameters: pH/DO ± 0.2 , SpC $\pm 10\%$, Temp $\pm 0.5^\circ\text{C}$, Turb. $\pm 10\%$ or ≤ 5

SAMPLER: Sam Graber Printed Name

[Signature] Signature



Appendix D

Statistical Calculations

Groundwater Prediction Limits (mg/L)
Appendix I Parameters, First Quarter 2019
LRI Landfill, Pierce County, Washington

	MRL (typical)	Prediction Limit	MW-1/ MW-1A	MW-2/ MW-2A	MW-3	MW-4	MW-5/ MW-5A	MW-6	MW-7	MW-9	MW-10
Antimony	0.050	0.050 L	0.050 L	0.050 L	0.050 L	0.050 L	0.050 L	0.050 L	0.050 L	0.050 L	0.050 L
Arsenic	0.005	0.011	0.005 L	0.005 L	0.005 L	0.011	0.008	0.008	0.006	0.005 L	0.005 L
Barium	0.005	0.091	0.030	0.018	0.015	0.091	0.036	0.014	0.016	0.0057	0.016
Beryllium	0.005	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.001 L	0.005 L	0.001 L	0.005 L
Cadmium	0.005	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L
Chromium	0.005	0.011	0.005 L	0.005 L	0.005 L	0.011	0.005	0.005 L	0.005 L	0.005 L	0.005 L
Cobalt	0.010	0.010 L	0.010 L	0.010 L	0.010 L	0.004	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L
Copper	0.010	0.063	0.010 L	0.010 L	0.010 L	0.063	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L
Lead	0.002	0.042	0.002 L	0.002 L	0.002 L	0.042	0.002 L	0.002 L	0.002 L	0.002 L	0.002 L
Nickel	0.020	0.020 L	0.020 L	0.020 L	0.020 L	0.020 L	0.020 L	0.020 L	0.020 L	0.020 L	0.020 L
Selenium	0.005	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L
Silver	0.010	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L
Thallium	0.005	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L
Vanadium	0.010	0.016	0.010 L	0.010 L	0.010 L	0.014	0.010 L	0.010 L	0.010 L	0.016	0.010 L
Zinc	0.01	0.290	0.032	0.010 L	0.010 L	0.290	0.010	0.010 L	0.010 L	0.043	0.011
Nitrate as Nitrogen	0.50	6.40	0.500 L	0.500 L	0.500 L	0.500 L	0.500 L	0.500 L	0.500 L	0.500 L	6.40

Notes:

Prediction Limits are shown in bold.

Prediction Limits for metals are for total metals.

L = not reported at or above the MRL (Method Reporting Limit).

mg/L = milligrams per liter.

Statistical Summary of Total Metals Groundwater Data
Appendix I Parameters, First Quarter 2019
LRI Landfill, Pierce County, Washington

Location ID	Antimony (Sb)		Arsenic (As)		Barium (Ba)		Beryllium (Be)		Cadmium (Cd)		Chromium (Cr)		Cobalt (Co)		Copper (Cu)		Lead (Pb)		Nickel (Ni)		Selenium (Se)		Silver (Ag)		Thallium (Tl)		Vanadium (V)		Zinc (Zn)		Nitrate (NO ₃)			
Monitoring Date	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.		
MW-1																																		
3/24/2014	0.002	L 0.001	0.005	L 0.0025	0.022	0.022	0.001	L 0.0005	0.005	L 0.0025	0.002	L 0.001	0.01	L 0.005	0.002	L 0.001	0.001	L 0.0005	0.002	L 0.001	0.005	L 0.0025	0.01	L 0.005	0.001	L 0.0005	0.01	L 0.005	0.01	L 0.005	0.01	L 0.005	0.5	L 0.25
6/24/2014	0.002	L 0.001	0.005	L 0.0025	0.02	0.02	0.001	L 0.0005	0.005	L 0.0025	0.002	L 0.001	0.01	L 0.005	0.002	L 0.001	0.001	L 0.0005	0.002	L 0.001	0.005	L 0.0025	0.01	L 0.005	0.001	L 0.0005	0.01	L 0.005	0.01	L 0.005	0.01	L 0.005	0.5	L 0.25
9/17/2014	0.05	L 0.025	0.005	L 0.0025	0.024	0.024	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.01	L 0.005	0.01	L 0.005	0.002	L 0.001	0.02	L 0.01	0.005	L 0.0025	0.01	L 0.005	0.005	L 0.0025	0.01	L 0.005	0.02	0.02	0.5	L 0.25		
12/16/2014	0.05	L 0.025	0.005	L 0.0025	0.03	0.03	0.001	L 0.0005	0.001	L 0.0005	0.005	L 0.0025	0.001	L 0.0005	0.01	L 0.005	0.002	L 0.001	0.02	L 0.01	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.032	0.032	0.5	L 0.25		
3/23/2015	0.05	L 0.025	0.005	L 0.0025	0.02	0.02	0.001	L 0.0005	0.001	L 0.0005	0.005	L 0.0025	0.001	L 0.0005	0.01	L 0.005	0.002	L 0.001	0.02	L 0.01	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.01	L 0.005	0.5	L 0.25		
6/8/2015	0.05	L 0.025	0.005	L 0.0025	0.022	0.022	0.001	L 0.0005	0.001	L 0.0005	0.005	L 0.0025	0.001	L 0.0005	0.01	L 0.005	0.002	L 0.001	0.02	L 0.01	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.01	L 0.005	0.5	L 0.25		
9/16/2015	0.05	L 0.025	0.005	L 0.0025	0.021	0.021	0.001	L 0.0005	0.001	L 0.0005	0.005	L 0.0025	0.001	L 0.0005	0.01	L 0.005	0.002	L 0.001	0.02	L 0.01	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.01	L 0.005	0.5	L 0.25		
12/14/2015	0.05	L 0.025	0.005	L 0.0025	0.024	0.024	0.001	L 0.0005	0.001	L 0.0005	0.005	L 0.0025	0.001	L 0.0005	0.01	L 0.005	0.002	L 0.001	0.02	L 0.01	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.01	L 0.005	0.5	L 0.25		
Number Analyzed	8		8		8		8		8		8		8		8		8		8		8		8		8		8		8		8			
Number Detected	0		0		8		0		0		0		0		0		0		0		0		0		0		0		2		0			
Minimum Concentration		0.001		0.0025		0.02		0.0005		0.0005		0.001		0.0005		0.001		0.0005		0.001		0.0025		0.0025		0.0005		0.0025		0.005		0.25		
Maximum Concentration		0.025		0.0025		0.03		0.0025		0.0025		0.0025		0.005		0.005		0.001		0.01		0.0025		0.005		0.0025		0.005		0.032		0.25		
Average Concentration		NC		NC		0.02288		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		
Variance		NC		NC		1.1E-05		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		
Standard Deviation		NC		NC		0.0033		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		
oefficient of Variation (%)		NC		NC		14.2974		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		
Standard Error		NC		NC		0.00116		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		
MW-2																																		
3/24/2014	0.002	L 0.001	0.005	L 0.0025	0.014	0.014	0.001	L 0.0005	0.005	L 0.0025	0.002	L 0.001	0.01	L 0.005	0.002	L 0.001	0.001	L 0.0005	0.002	L 0.001	0.005	L 0.0025	0.01	L 0.005	0.001	L 0.0005	0.01	L 0.005	0.01	L 0.005	0.01	L 0.005	0.5	L 0.25
6/26/2014	0.002	L 0.001	0.005	L 0.0025	0.015	0.015	0.001	L 0.0005	0.005	L 0.0025	0.002	L 0.001	0.01	L 0.005	0.002	L 0.001	0.001	L 0.0005	0.002	L 0.001	0.005	L 0.0025	0.01	L 0.005	0.001	L 0.0005	0.01	L 0.005	0.01	L 0.005	0.01	L 0.005	0.5	L 0.25
9/16/2014	0.05	L 0.025	0.005	L 0.0025	0.018	0.018	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.01	L 0.005	0.01	L 0.005	0.002	L 0.001	0.02	L 0.01	0.005	L 0.0025	0.01	L 0.005	0.005	L 0.0025	0.01	L 0.005	0.01	L 0.005	0.01	L 0.005	0.5	L 0.25
12/16/2014	0.05	L 0.025	0.005	L 0.0025	0.014	0.014	0.001	L 0.0005	0.001	L 0.0005	0.005	L 0.0025	0.001	L 0.0005	0.01	L 0.005	0.002	L 0.001	0.02	L 0.01	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.01	L 0.005	0.01	L 0.005	0.5	L 0.25
3/23/2015	0.05	L 0.025	0.005	L 0.0025	0.012	0.012	0.001	L 0.0005	0.001	L 0.0005	0.005	L 0.0025	0.001	L 0.0005	0.01	L 0.005	0.002	L 0.001	0.02	L 0.01	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.01	L 0.005	0.01	L 0.005	0.5	L 0.25
6/8/2015	0.05	L 0.025	0.005	L 0.0025	0.013	0.013	0.001	L 0.0005	0.001	L 0.0005	0.005	L 0.0025	0.001	L 0.0005	0.01	L 0.005	0.002	L 0.001	0.02	L 0.01	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.01	L 0.005	0.01	L 0.005	0.5	L 0.25
9/16/2015	0.05	L 0.025	0.005	L 0.0025	0.013	0.013	0.001	L 0.0005	0.001	L 0.0005	0.005	L 0.0025	0.001	L 0.0005	0.01	L 0.005	0.002	L 0.001	0.02	L 0.01	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.01	L 0.005	0.01	L 0.005	0.5	L 0.25
12/14/2015	0.05	L 0.025	0.005	L 0.0025	0.014	0.014	0.001	L 0.0005	0.001	L 0.0005	0.005	L 0.0025	0.001	L 0.0005	0.01	L 0.005	0.002	L 0.001	0.02	L 0.01	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.005	L 0.0025	0.01	L 0.005	0.01	L 0.005	0.5	L 0.25
Number Analyzed	8		8		8		8		8		8		8		8		8		8		8		8		8		8		8		8			
Number Detected	0		0		8		0		0		0		0		0		0		0		0		0		0		0		0		0			
Minimum Concentration		0.001		0.0025		0.012		0.0005		0.0005		0.001		0.0005		0.001		0.0005		0.001		0.0025		0.0025		0.0005		0.0025		0.005		0.25		
Maximum Concentration		0.025		0.0025		0.018		0.0025		0.0025		0.0025		0.005		0.005		0.001		0.01		0.0025		0.005		0.0025		0.005		0.005		0.25		
Average Concentration		NC		NC		0.01413		NC		NC																								

Statistical Summary of Total Metals Groundwater Data
Appendix I Parameters, First Quarter 2019
LRI Landfill, Pierce County, Washington

Location ID	Antimony (Sb)			Arsenic (As)		Barium (Ba)		Beryllium (Be)		Cadmium (Cd)		Chromium (Cr)		Cobalt (Co)		Copper (Cu)		Lead (Pb)		Nickel (Ni)		Selenium (Se)		Silver (Ag)		Thallium (Tl)		Vanadium (V)		Zinc (Zn)		Nitrate (NO ₃)									
Monitoring Date	Result	Conc.		Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.	Result	Conc.								
MW-4																																									
3/24/2014	0.002	L	0.001	0.0074	0.0074	0.012	0.012	0.001	L	0.0005	0.005	L	0.0025	0.002	L	0.001	0.01	L	0.005	0.002	L	0.001	0.005	L	0.0025	0.01	L	0.005	0.001	L	0.0005	0.01	L	0.005	0.5	L	0.25				
6/25/2014	0.002	L	0.001	0.0086	0.0086	0.012	0.012	0.001	L	0.0005	0.005	L	0.0025	0.002	L	0.001	0.01	L	0.005	0.002	L	0.001	0.005	L	0.0025	0.01	L	0.005	0.001	L	0.0005	0.01	L	0.005	0.5	L	0.25				
9/17/2014	0.05	L	0.025	0.0099	0.0099	0.013	0.013	0.005	L	0.0025	0.005	L	0.0025	0.005	L	0.0025	0.01	L	0.005	0.002	L	0.001	0.02	L	0.01	0.005	L	0.0025	0.01	L	0.005	0.01	L	0.005	0.5	L	0.25				
12/16/2014	0.05	L	0.025	0.0076	0.0076	0.011	0.011	0.001	L	0.0005	0.001	L	0.0005	0.005	L	0.0025	0.001	L	0.0005	0.002	L	0.001	0.02	L	0.01	0.005	L	0.0025	0.005	L	0.0025	0.005	L	0.0025	0.01	L	0.005	0.5	L	0.25	
3/24/2015	0.05	L	0.025	0.0079	0.0079	0.013	0.013	0.001	L	0.0005	0.001	L	0.0005	0.005	L	0.0025	0.001	L	0.0005	0.002	L	0.001	0.02	L	0.01	0.005	L	0.0025	0.005	L	0.0025	0.005	L	0.0025	0.01	L	0.005	0.5	L	0.25	
6/9/2015	0.05	L	0.025	0.0094	0.0094	0.013	0.013	0.001	L	0.0005	0.001	L	0.0005	0.005	L	0.0025	0.001	L	0.0005	0.002	L	0.001	0.02	L	0.01	0.005	L	0.0025	0.005	L	0.0025	0.005	L	0.0025	0.01	L	0.005	0.5	L	0.25	
9/18/2015	0.05	L	0.025	0.0094	0.0094	0.017	0.017	0.001	L	0.0005	0.001	L	0.0005	0.005	L	0.0025	0.001	L	0.0005	0.002	L	0.001	0.02	L	0.01	0.005	L	0.0025	0.005	L	0.0025	0.005	L	0.0025	0.014	0.014	0.5	L	0.25		
12/15/2015	0.05	L	0.025	0.011	0.011	0.091	0.091	0.001	L	0.0005	0.001	L	0.0005	0.011	0.011	0.0039	0.0039	0.063	0.063	0.042	0.042	0.02	L	0.01	0.005	L	0.0025	0.005	L	0.0025	0.005	L	0.0025	0.014	0.014	0.29	0.29	0.5	L	0.25	
Number Analyzed	8			8		8		8		8		8		8		8		8		8		8		8		8		8		8		8		8		8		8		8	
Number Detected	0			8		8		0		0		0		1		1		1		1		0		0		0		0		1		2		0		0		0		0	
Minimum Concentration		0.001			0.0074		0.011		0.0005			0.0005			0.001			0.0005			0.001			0.0005			0.001			0.0025			0.005			0.25			0.25		
Maximum Concentration		0.025			0.011		0.091		0.0025			0.0025			0.011			0.005			0.063			0.042			0.01			0.0025			0.005			0.14			0.25		
Average Concentration		NC			0.0089		0.02275		NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC		
Variance		NC			1.6E-06		0.00076		NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC		
Standard Deviation		NC			0.00125		0.02763		NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC		
oefficient of Variation (%)		NC			14.0465		121.469		NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC		
Standard Error		NC			0.00044		0.00977		NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC		
MW-5																																									
3/24/2014	0.002	L	0.001	0.0072	0.0072	0.032	0.032	0.001	L	0.0005	0.005	L	0.0025	0.002	L	0.001	0.01	L	0.005	0.002	L	0.001	0.005	L	0.0025	0.01	L	0.005	0.001	L	0.0005	0.01	L	0.005	0.5	L	0.25				
6/25/2014	0.002	L	0.001	0.0067	0.0067	0.033	0.033	0.001	L	0.0005	0.005	L	0.0025	0.0036	0.0036	0.0061	0.0061	0.001	L	0.005	0.0043	0.0043	0.005	L	0.0025	0.01	L	0.005	0.001	L	0.0005	0.01	L	0.005	0.5	L	0.25				
9/16/2014	0.05	L	0.025	0.0059	0.0059	0.036	0.036	0.005	L	0.0025	0.005	L	0.0025	0.0051	0.0051	0.01	L	0.005	0.01	L	0.005	0.002	L	0.001	0.02	L	0.01	0.005	L	0.0025	0.01	L	0.005	0.01	L	0.005	0.5	L	0.25		
12/16/2014	0.05	L	0.025	0.0055	0.0055	0.022	0.022	0.001	L	0.0005	0.001	L	0.0005	0.005	L	0.0025	0.001	L	0.0005	0.002	L	0.001	0.02	L	0.01	0.005	L	0.0025	0.005	L	0.0025	0.005	L	0.0025	0.01	L	0.005	0.5	L	0.25	
3/23/2015	0.05	L	0.025	0.008	0.008	0.03	0.03	0.001	L	0.0005	0.001	L	0.0005	0.005	L	0.0025	0.001	L	0.0005	0.002	L	0.001	0.02	L	0.01	0.005	L	0.0025	0.005	L	0.0025	0.005	L	0.0025	0.01	L	0.005	0.5	L	0.25	
6/8/2015	0.05	L	0.025	0.0075	0.0075	0.02	0.02	0.001	L	0.0005	0.001	L	0.0005	0.005	L	0.0025	0.001	L	0.0005	0.002	L	0.001	0.02	L	0.01	0.005	L	0.0025	0.005	L	0.0025	0.005	L	0.0025	0.01	L	0.005	0.5	L	0.25	
9/18/2015	0.05	L	0.025	0.005	L	0.0025	0.014	0.014	0.001	L	0.0005	0.001	L	0.0005	0.005	L	0.0025	0.001	L	0.0005	0.002	L	0.001	0.02	L	0.01	0.005	L	0.0025	0.005	L	0.0025	0.005	L	0.0025	0.01	L	0.005	0.5	L	0.25
12/14/2015	0.05	L	0.025	0.0072	0.0072	0.021	0.020																																		

Statistical Summary of Total Metals Groundwater Data Appendix I Parameters, First Quarter 2019 LRI Landfill, Pierce County, Washington

Location ID	Antimony (Sb)			Arsenic (As)			Barium (Ba)			Beryllium (Be)			Cadmium (Cd)			Chromium (Cr)			Cobalt (Co)			Copper (Cu)			Lead (Pb)			Nickel (Ni)			Selenium (Se)			Silver (Ag)			Thallium (Tl)			Vanadium (V)			Zinc (Zn)			Nitrate (NO ₃)		
Monitoring Date	Result	Conc.		Result	Conc.		Result	Conc.		Result	Conc.		Result	Conc.		Result	Conc.		Result	Conc.		Result	Conc.		Result	Conc.		Result	Conc.		Result	Conc.		Result	Conc.		Result	Conc.		Result	Conc.		Result	Conc.				
MW-9	3/25/2014	0.002	L 0.001	0.005	L 0.0025		0.0047	0.0047		0.001	L 0.0005		0.005	L 0.0025		0.002	L 0.001		0.01	L 0.005		0.002	L 0.001		0.001	L 0.0005		0.002	L 0.001		0.005	L 0.0025		0.01	L 0.005		0.001	L 0.0005		0.016	0.016		0.01	0.01		0.5	L 0.25	
	6/24/2014	0.002	L 0.001	0.005	L 0.0025		0.0045	0.0045		0.001	L 0.0005		0.005	L 0.0025		0.002	L 0.001		0.01	L 0.005		0.002	L 0.001		0.001	L 0.0005		0.002	L 0.001		0.005	L 0.0025		0.01	L 0.005		0.001	L 0.0005		0.016	0.016		0.01	L 0.005		0.5	L 0.25	
	9/18/2014	0.002	L 0.001	0.005	L 0.0025		0.0057	0.0057		0.001	L 0.0005		0.005	L 0.0025		0.002	L 0.001		0.01	L 0.005		0.002	L 0.001		0.001	L 0.0005		0.002	L 0.001		0.005	L 0.0025		0.01	L 0.005		0.001	L 0.0005		0.014	0.014		0.014	0.014		0.5	L 0.25	
	12/17/2014	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.014	0.014		0.01	L 0.005		0.5	L 0.25	
	3/24/2015	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.013	0.013		0.01	L 0.005		0.5	L 0.25	
	6/9/2015	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.014	0.014		0.01	L 0.005		0.5	L 0.25	
	9/18/2015	0.05	L 0.025	0.005	L 0.0025		0.005	0.005		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.014	0.014		0.01	L 0.005		0.5	L 0.25	
	12/16/2015	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.014	0.014		0.042	0.042		0.5	L 0.25	
	3/22/2016	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.014	0.014		0.028	0.028		0.5	L 0.25	
	6/8/2016	0.05	L 0.025	0.005	L 0.0025		0.005	0.005		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.014	0.014		0.023	0.023		0.5	L 0.25	
	9/16/2016	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.015	0.015		0.043	0.043		0.5	L 0.25	
	12/6/2016	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.014	0.014		0.01	L 0.005		0.5	L 0.25	
	3/29/2017	0.05	L 0.025	0.005	L 0.0025		0.0056	0.0056		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.014	0.014		0.01	L 0.005		0.5	L 0.25	
	6/22/2017	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.014	0.014		0.01	L 0.005		0.5	L 0.25	
	9/26/2017	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.012	0.012		0.01	L 0.005		0.5	L 0.25	
	12/13/2017	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.013	0.013		0.01	L 0.005		0.5	L 0.25	
	3/21/2018	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.016	0.016		0.01	L 0.005		0.5	L 0.25	
	6/19/2018	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.013	0.013		0.01	L 0.005		0.5	L 0.25	
	9/19/2018	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.013	0.013		0.01	L 0.005		0.5	L 0.25	
	12/4/2018	0.05	L 0.025	0.005	L 0.0025		0.0051	0.0051		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.014	0.014		0.01	L 0.005		0.5	L 0.25	
	3/11/2019	0.05	L 0.025	0.005	L 0.0025		0.005	L 0.0025		0.001	L 0.0005		0.001	L 0.0005		0.005	L 0.0025		0.001	L 0.0005		0.01	L 0.005		0.002	L 0.001		0.02	L 0.01		0.005	L 0.0025		0.005	L 0.0025		0.005	L 0.0025		0.014	0.014		0.01	L 0.005		0.5	L 0.25	
Number Analyzed	21			21			21			21			21			21			21			21			21			21			21			21			21			21			21			21		
Number Detected	0			0			7			0			0			0			0			0			0			0			0			0			21			6			0					
Minimum Concentration		0.001			0.0025			0.0025			0.0005			0.0005			0.001			0.0005			0.001			0.0005			0.001			0.0025			0.0005			0.012			0.005			0.25				
Maximum Concentration		0.025			0.0025			0.0057			0.0005			0.0025			0.0025			0.005			0.005			0.001			0.01			0.0025			0.005			0.0025			0.016			0.043			0.25	
Average Concentration		NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			0.01405			NC			NC				
Variance		NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			1E-06			NC			NC				
Standard Deviation		NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			0.00102			NC			NC				
oefficient of Variation (%)		NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			7.28616			NC			NC				
Standard Error		NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			NC			0.00022			NC			NC				
MW-10	3/25/2014	0.002	L 0.001	0.005	L 0.0025		0.014	0.014		0.001	L 0.0005		0.005	L 0.0025		0.002	L 0.001		0.01	L 0.005		0.002	L 0.001		0.001	L 0.0005		0.002	L 0.001		0.005	L 0.0025		0.01	L 0.005		0.001	L 0.0005		0.01	L 0.005		0.01	L 0.005		6.4	6.4	
	6/25/2014	0.002	L 0.001	0.005	L 0.0025		0.014	0.014		0.001	L 0.0005		0.005	L 0.0025		0.002	L 0.001		0.01	L 0.005		0.002	L 0.001		0.001	L 0.0005		0.002	L 0.001		0.005	L 0.0025		0.01	L 0.005		0.001	L 0.0005		0.01	L 0.005		0.01	0.01		5.8	5.8	
	9/16/2014	0.05	L 0.025	0.005	L 0.0025																																											

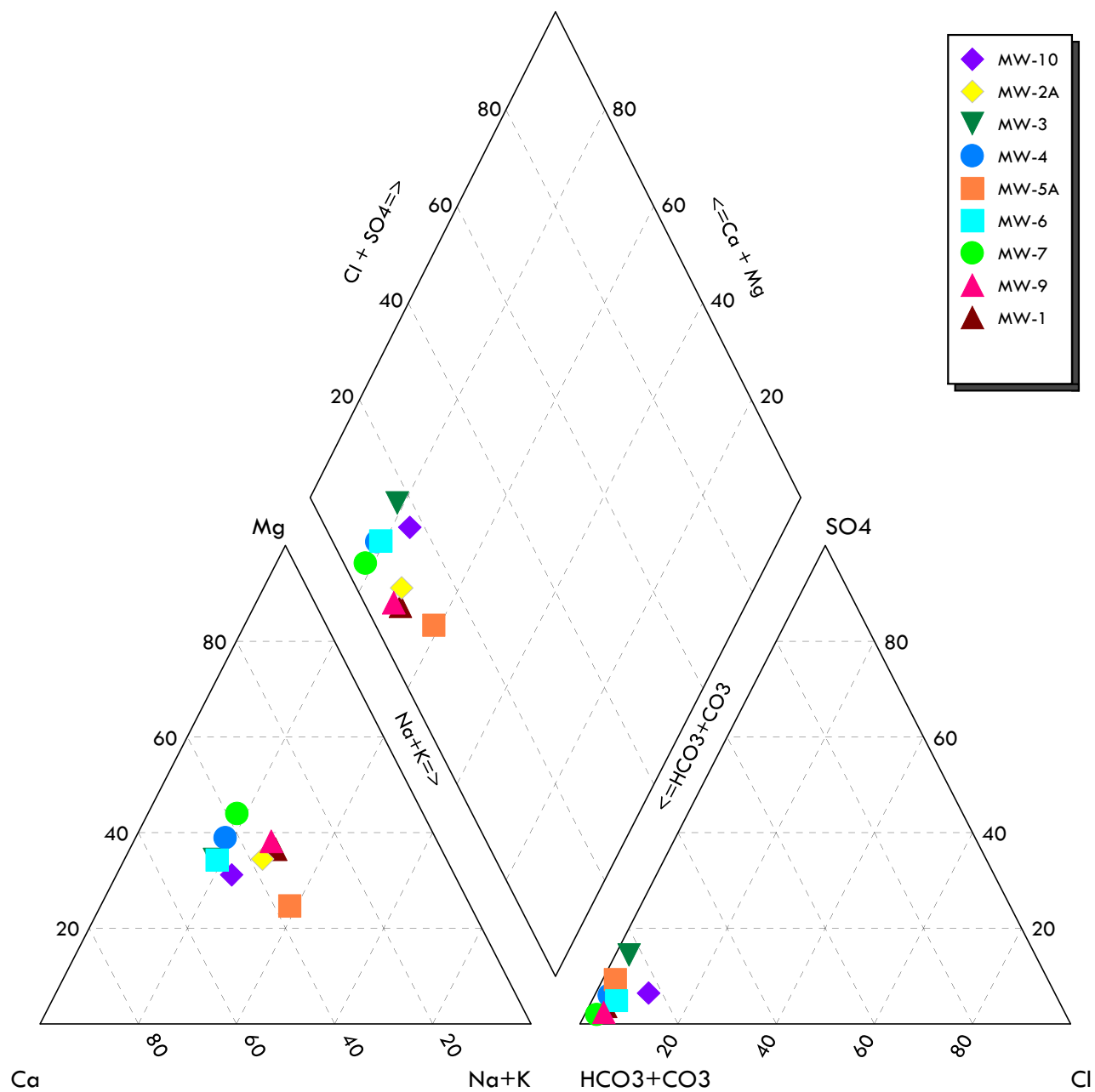
Notes: Metals results are for total metals.
mg/L = milligrams per liter.
L = not reported at or above the MRL (Method Reporting Limit).
One-half the MRL value used for statistical calculations when concentrations not reported at or above the MRL
NC = not calculated due to insufficient number of reported detections.



Appendix E

Trilinear Diagrams

First Quarter 2019, Groundwater Monitoring Wells



DESCRIPTION: LRI LF 1Q19 Groundwater Piper Diagram

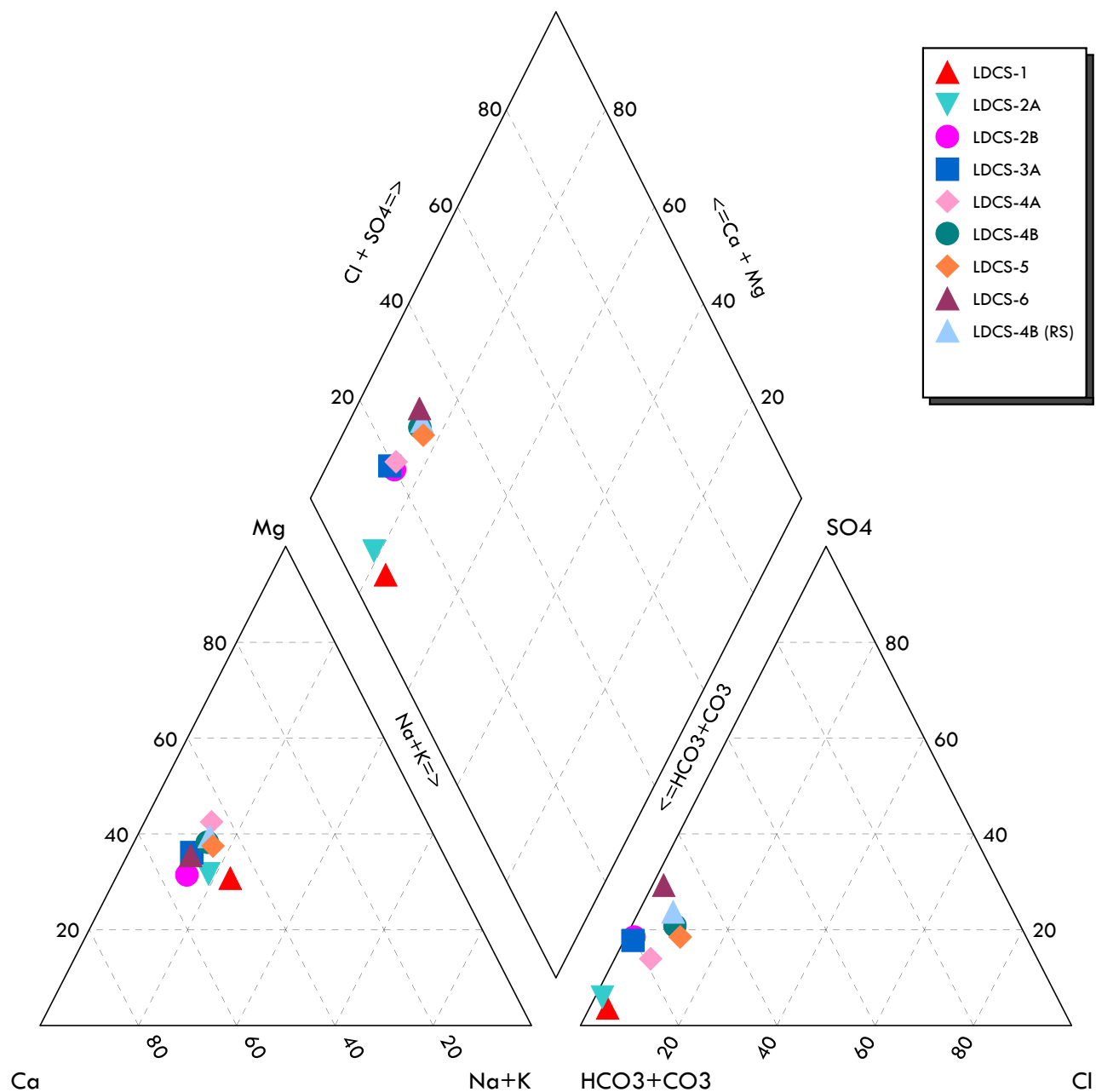
PROJECT: LRI Landfill

PROJECT NO: 04219001.02

CLIENT: LRI, Inc.

DATE: May 2019

First Quarter 2019, Leak Detection Collection Recovery System



DESCRIPTION: LRI LF 1Q19 LDCRS Piper Diagram

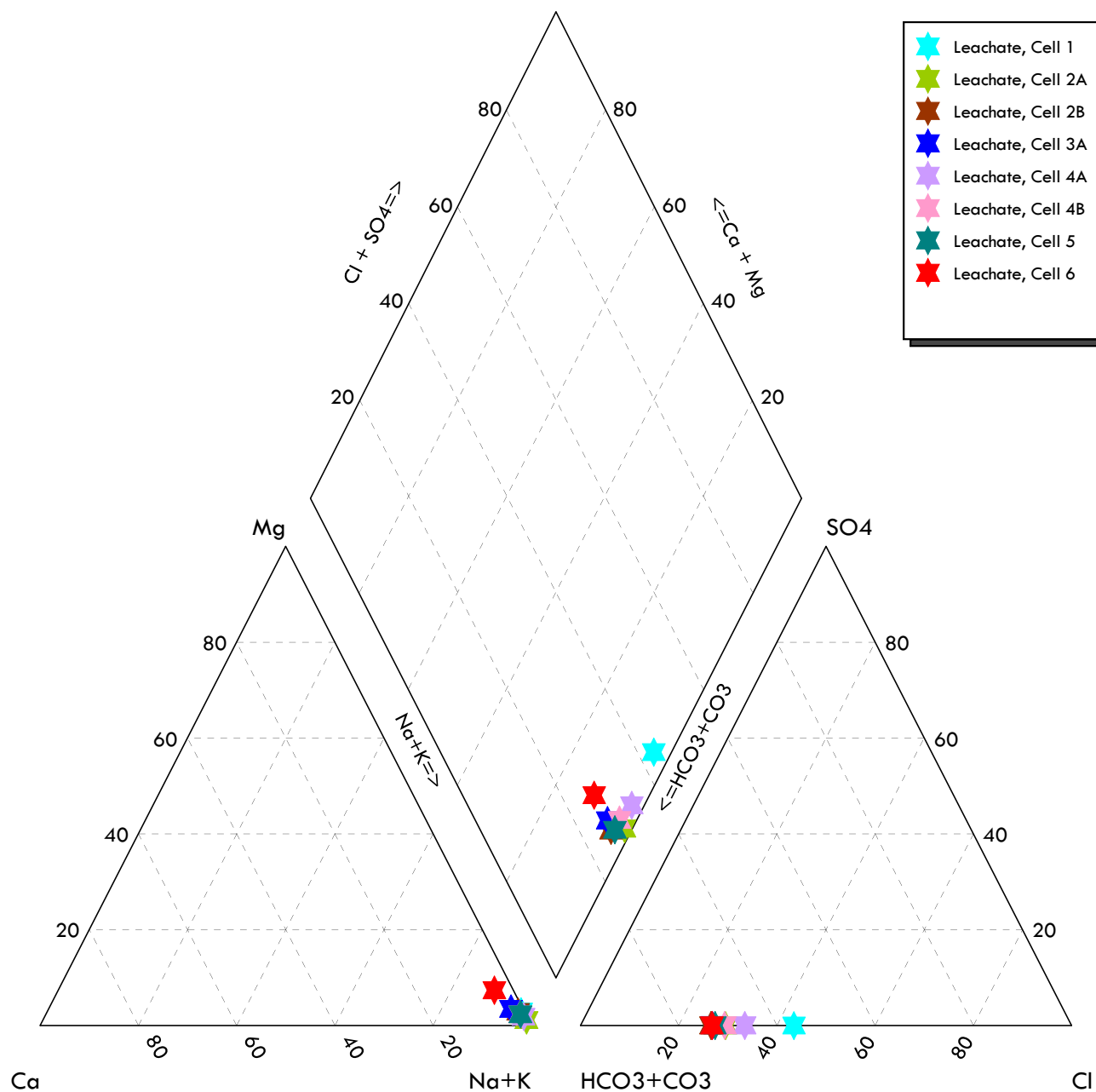
PROJECT: LRI Landfill

PROJECT NO: 04219001.02

CLIENT: LRI, Inc.

DATE: May 2019

LRI Landfill Fourth Quarter 2018, Leachate



DESCRIPTION: LRILF Leachate 4Q18 Piper Plot

PROJECT: LRI Landfill

PROJECT NO: 04219001.02

CLIENT: LRI, Inc.

DATE: March 2019



Appendix F

Analytical Data Validation Report

FIRST QTR. 2019 DATA VALIDATION REPORT – LRI LANDFILL

Project Details

Project No.	04219001.02	Site Name	LRI 304 th Street LF
Data Validator	Sam Graber	Data Level	Level 2
Date	4/25/19	DV Tier	Tier 1
QA Document	LRI Landfill Groundwater Monitoring Plan, March 10, 2014		

Sample Login Summary

Sample Group	Sample Login Comments	Analytical Lab (Primary)
280-121035-1	No comments.	TestAmerica, Denver, CO
280-121039-1	No comments.	TestAmerica, Denver, CO
280-121121-1	Samples received within holding time for Nitrate but due to power outage at lab the samples were analyzed outside of holding time.	TestAmerica, Denver, CO
280-121123-1	Samples received within holding time for Nitrate but due to power outage at lab the samples were analyzed outside of holding time.	TestAmerica, Denver, CO
580-85216-1	No comments.	TestAmerica, Seattle, WA

Analytical Summary

Sample Group	Analyses					
	TDS/Alk/NO3	Metals	NH4/TOC	VOCs	Anions	TSS
280-121035-1	X	X ¹	X	X	X	--
280-121039-1	X	X ²	X	X	X	X
280-121121-1	X	X ¹	X	X	X	--
280-121123-1	X	X ²	X	X	X	X
580-85216-1	X	X ¹	X	X	X	--

Notes:

1. Dissolved metals analysis performed (field filtered)
2. Dissolved and Total metals analysis performed
3. Total Metals analysis performed



Laboratory Quality Assurance Samples

Lab QA Samples	Results	Comments
Method Blank	Acceptable.	Sulfate was detected in method blank at concentration above the method detection limit but below the reporting limit. Data have been qualified and reported (280-85216-1).
LCS/LCSD	Acceptable.	See case narrative (280-121123-1).
MS/MSD	Acceptable.	Some matrix interference and results that were below or above control limits. No corrective action necessary. See case narrative for more details (280-121035-1, 280-121039-1, 280-121121-1, 280-121123-1).
Duplicates	Acceptable.	See case narrative (280-121123-1).
Organics	Acceptable.	Due to major storm, TA Denver lost power and it is likely some of the samples exceeded the storage requirement of 6 degrees C. TA Denver does not believe it had any impact on validity of reported results. (280-121035-1, 280-121039-1). Samples "-14", "-16", and "-18" were analyzed with significant headspace for method 8260B (280-121123-1).
General Comments	Acceptable.	No comments.
Metals	Acceptable.	See case narrative (280-121035-1, 280-121039-1)

Field Quality Assurance Samples

Field QA Samples	Sample Group	Analytes	Notes
QC-FB	280-121123-1	Methylene chloride (9.6 ug/L) Total Dissolved Solids (16 ug/L)	
QC-TB	280-121035-1	Carbon disulfide (2.9 ug/L) Toluene (0.60 ug/L)	
QC-TB	280-121039-1	None.	
QC-TB	280-121123-1	None.	
QC-TB	280-85216-1	None.	

Lab Quality Flags

Flag	Sample Groups	Comments
B	580-85216-1	Compound was found in the blank and sample.
E	280-121035-1, 280-121039-1	Result exceeded calibration range.
F1	280-121035-1, 280-121039-1, 280-121123-1, 580-85216-1	MS and/or MSD recovery exceeds the control limits.
F2		MS/MSD RPD exceeds control limits.

F3	280-121123-1	Duplicate RPD exceeds the control limit.
F5		Duplicate RPD exceeds limit, and one or both sample results are less than 5 times the RL. Data considered valid because the absolute difference is less than the RL.
H	280-121121-1, 280-121123-1	Sample was prepped or analyzed beyond specified holding time.
J	280-121035-1, 280-121039-1, 280-121121-1, 280-121123-1, 580-85216-1	Result is <RL, >MDL and concentration is approximate value.
X		Surrogate is outside control limits.
4	280-121035-1, 280-121039-1, 280-121121-1, 280-121123-1	MD, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration. Therefore, the control limits are not applicable.
^	280-121035-1, 280-121039-1	ICV, CCV, ICB, CCB, ISA, ISB, CRI, CRA, DLCK, or MRL standard: instrument related QC is outside acceptance limits.
*	280-121123-1	LCS or LCSD is outside acceptance limits.

Duplicate Evaluation

Analyte	Units	MW-1A (304-031219-16)	MW-1A DUP (304-031219-18)	RPD (%)
Alkalinity, Total	mg/L	97	100	3.0
Barium, Total	mg/L	0.023	0.022	4.4
Calcium, Dissolved	mg/L	14	15	6.9
Chloride	mg/L	2.5	2.4	4.1
Iron, Dissolved	mg/L	1.7	1.8	5.7
Magnesium, Dissolved	mg/L	9.2	9.3	1.1
Manganese, Dissolved	mg/L	0.28	0.27	3.6
Potassium, Dissolved	mg/L	3.7	3.8	2.7
Sodium, Dissolved	mg/L	12	12	0.0
Sulfate	mg/L	3.6	3.3	8.7
Total Dissolved Solids	mg/L	160	170	6.1

U = Non-detection. Reporting limit (RL) used for calculation of RPD.

Additional Data Flags

Flag	Description
U	Not detected above the method reporting limit.

Qualified Data and Usability

Lab qualifiers are noted. All data, as qualified, are acceptable for use.

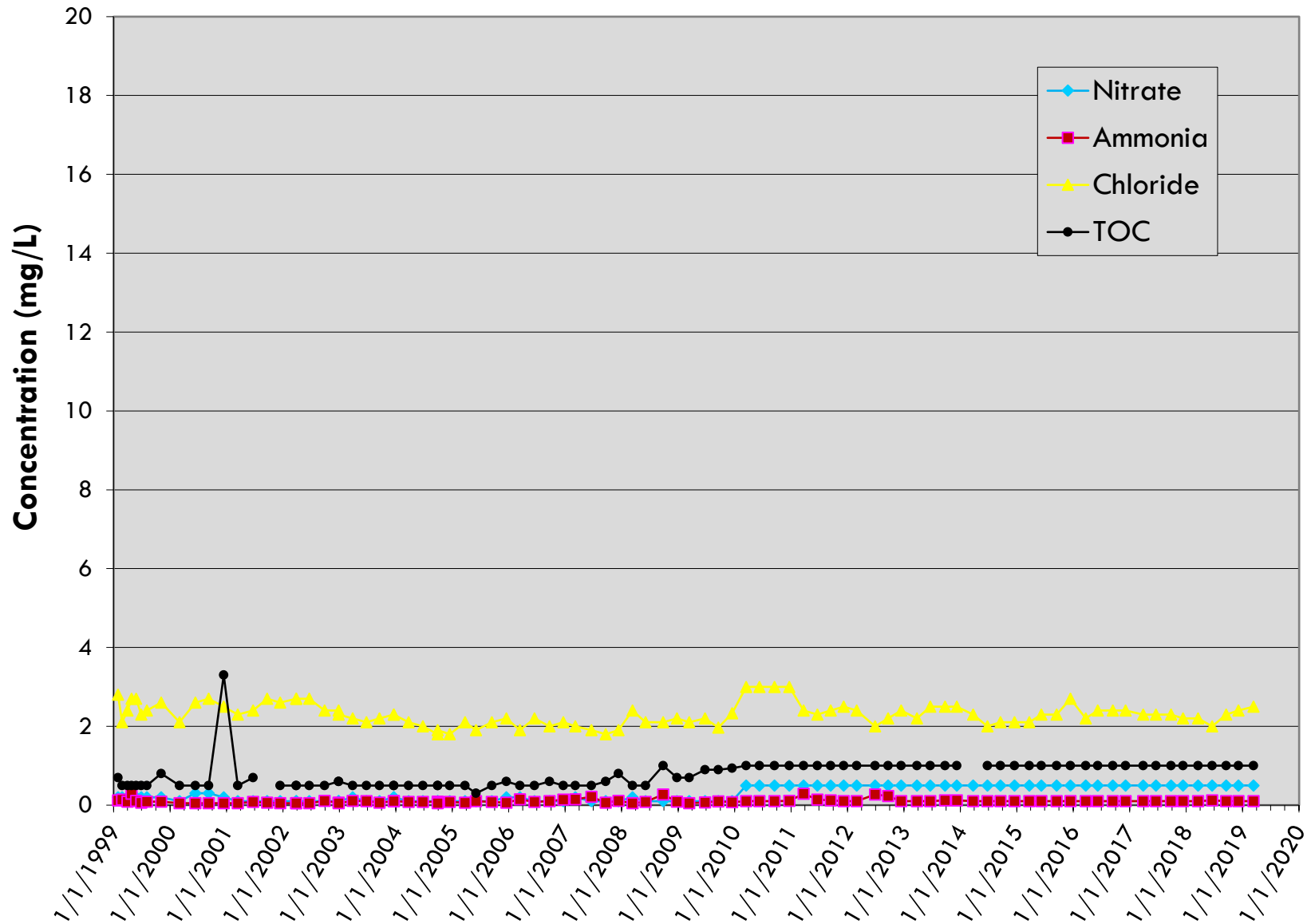


Appendix G

Groundwater and LDCS Time Trend Plots

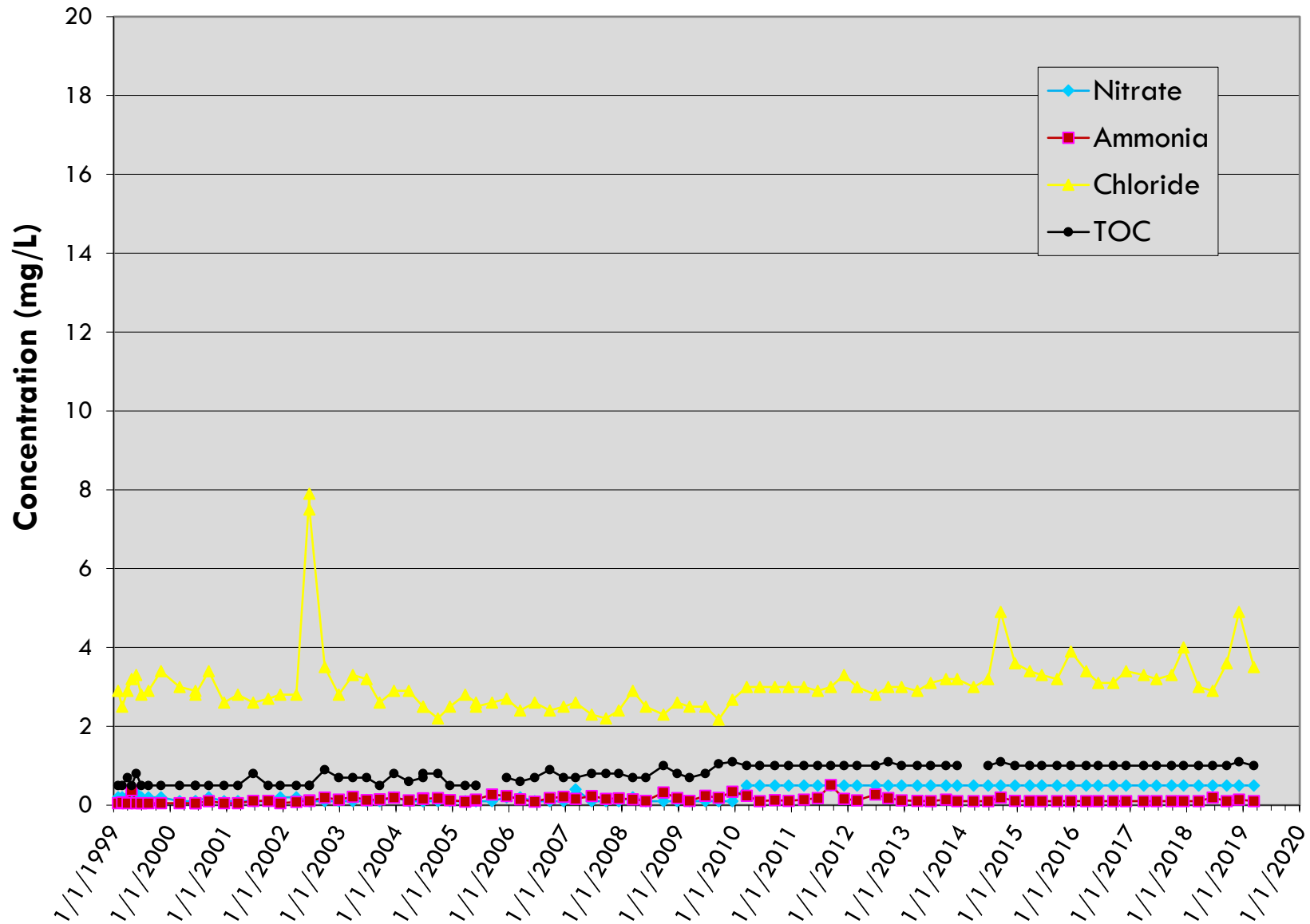
MW-1A

LRI Landfill, Pierce County, Washington



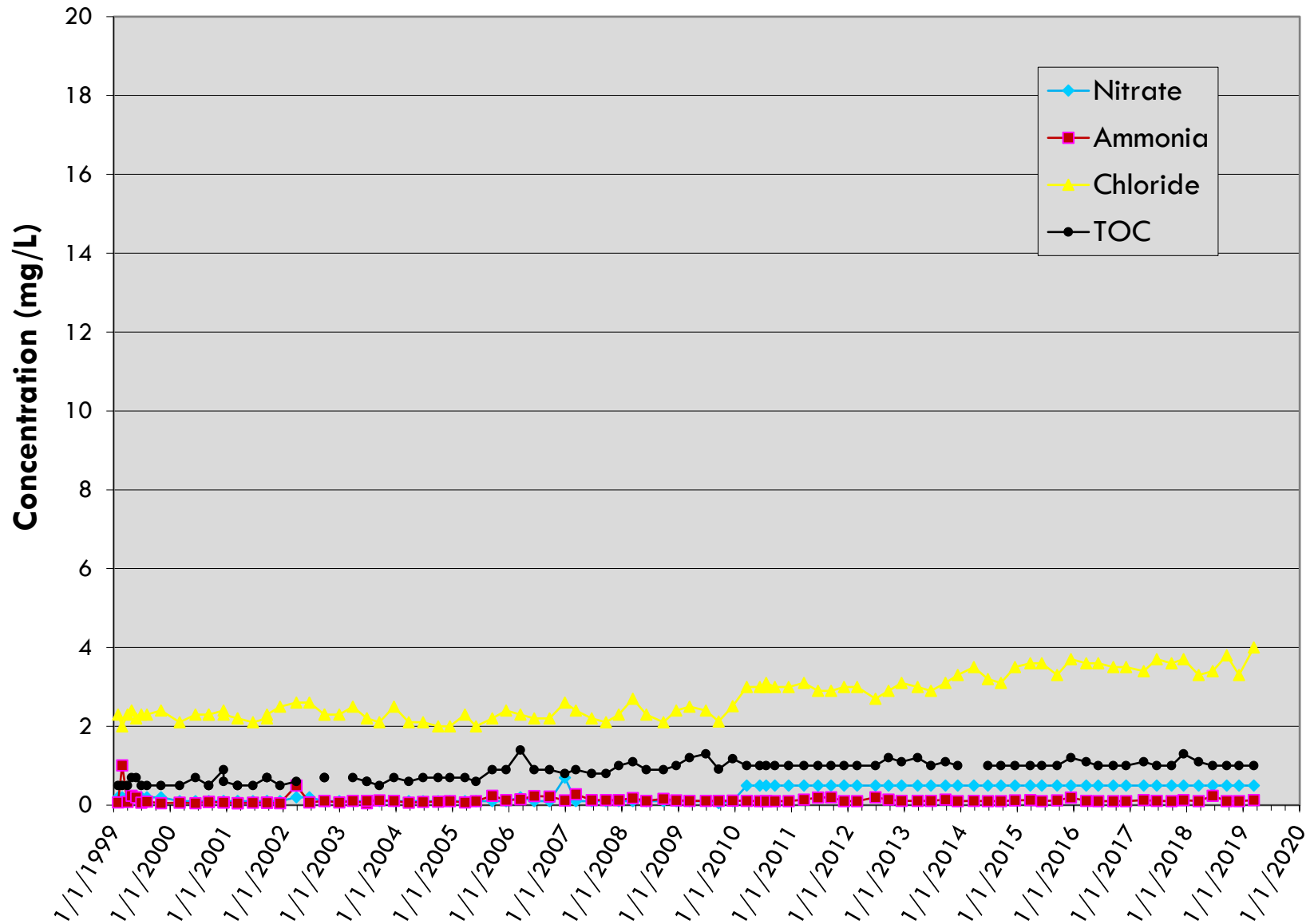
MW-2A

LRI Landfill, Pierce County, Washington



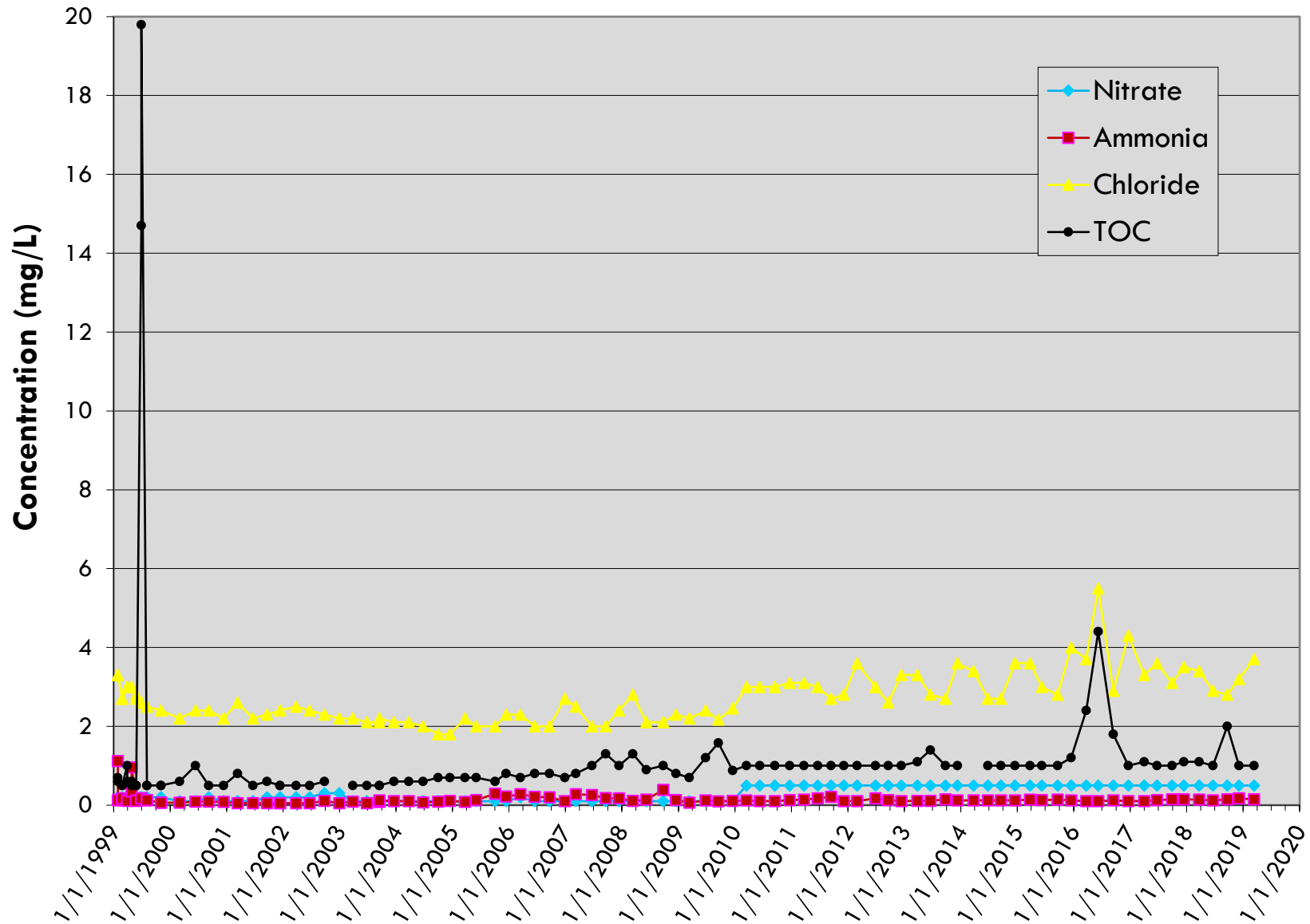
MW-3

LRI Landfill, Pierce County, Washington



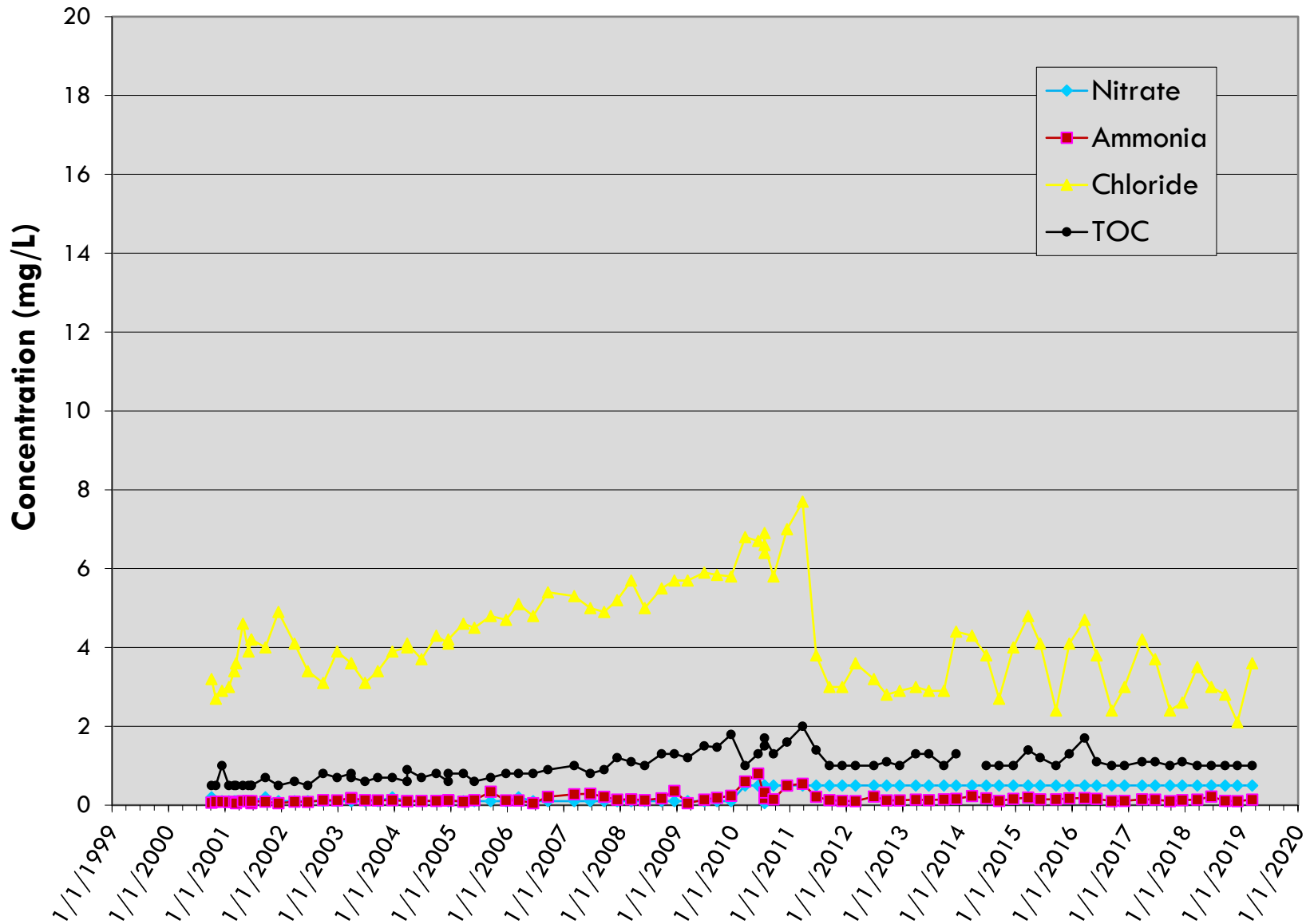
MW-4

LRI Landfill, Pierce County, Washington



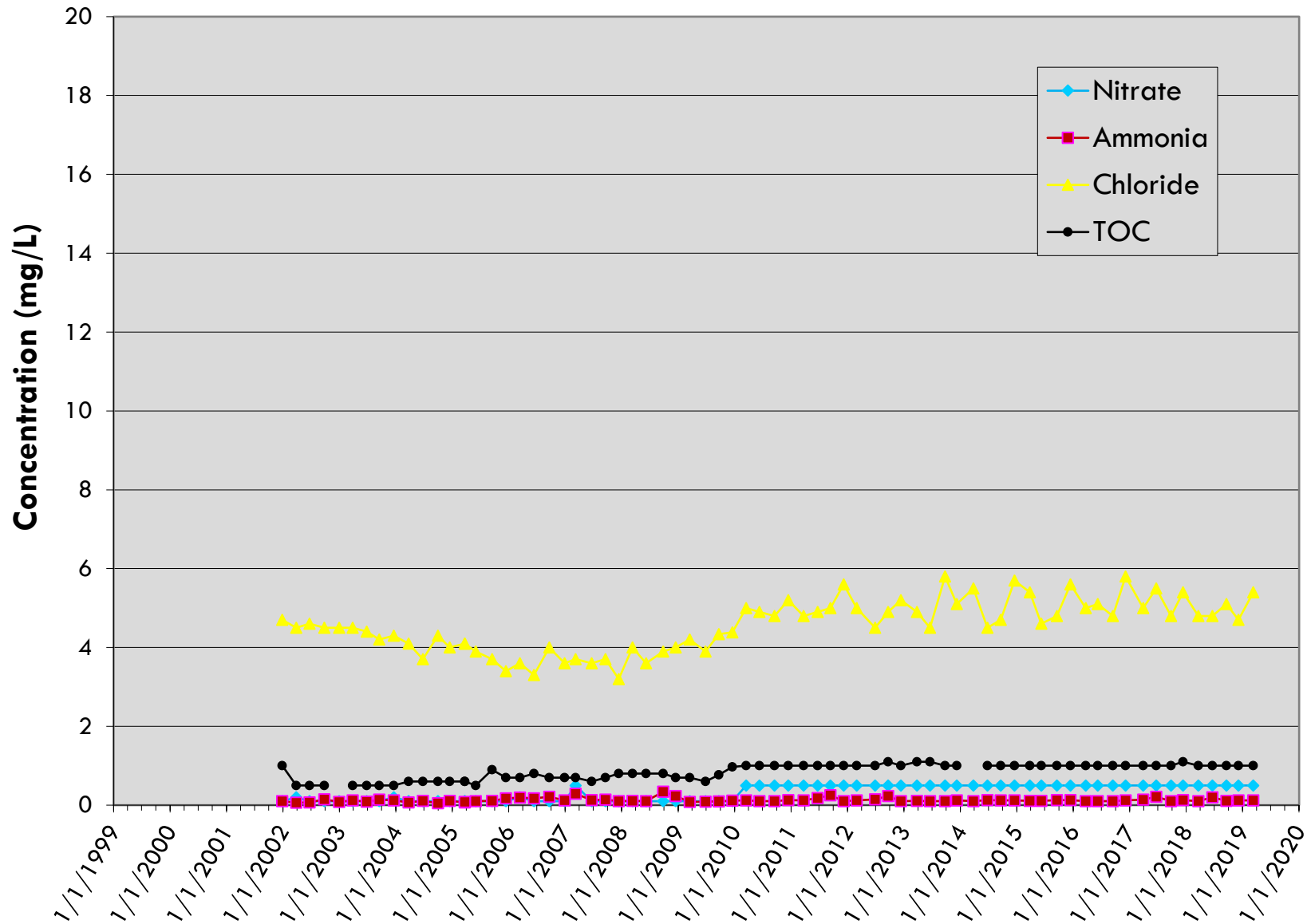
MW-5A

LRI Landfill, Pierce County, Washington



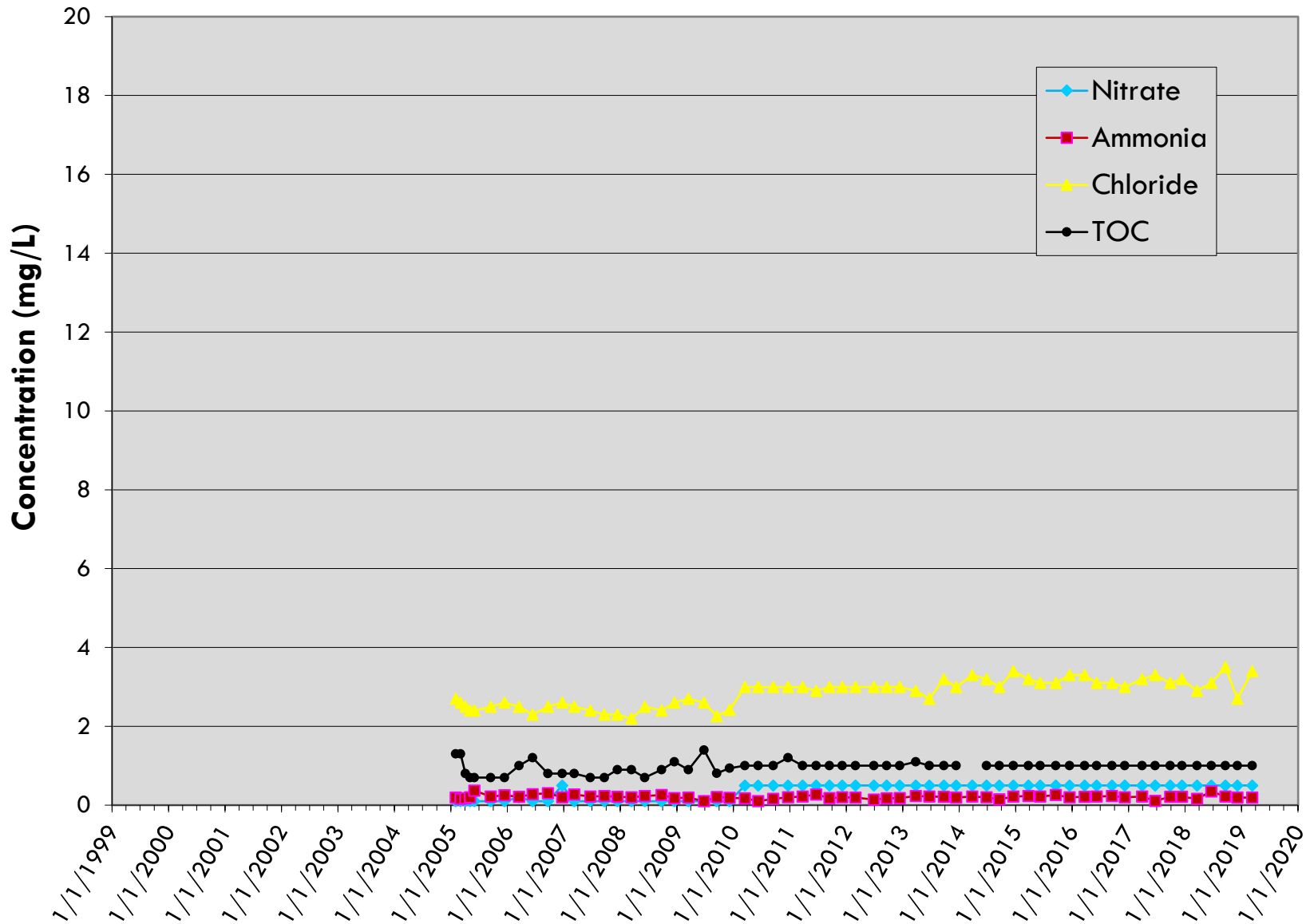
MW-6

LRI Landfill, Pierce County, Washington

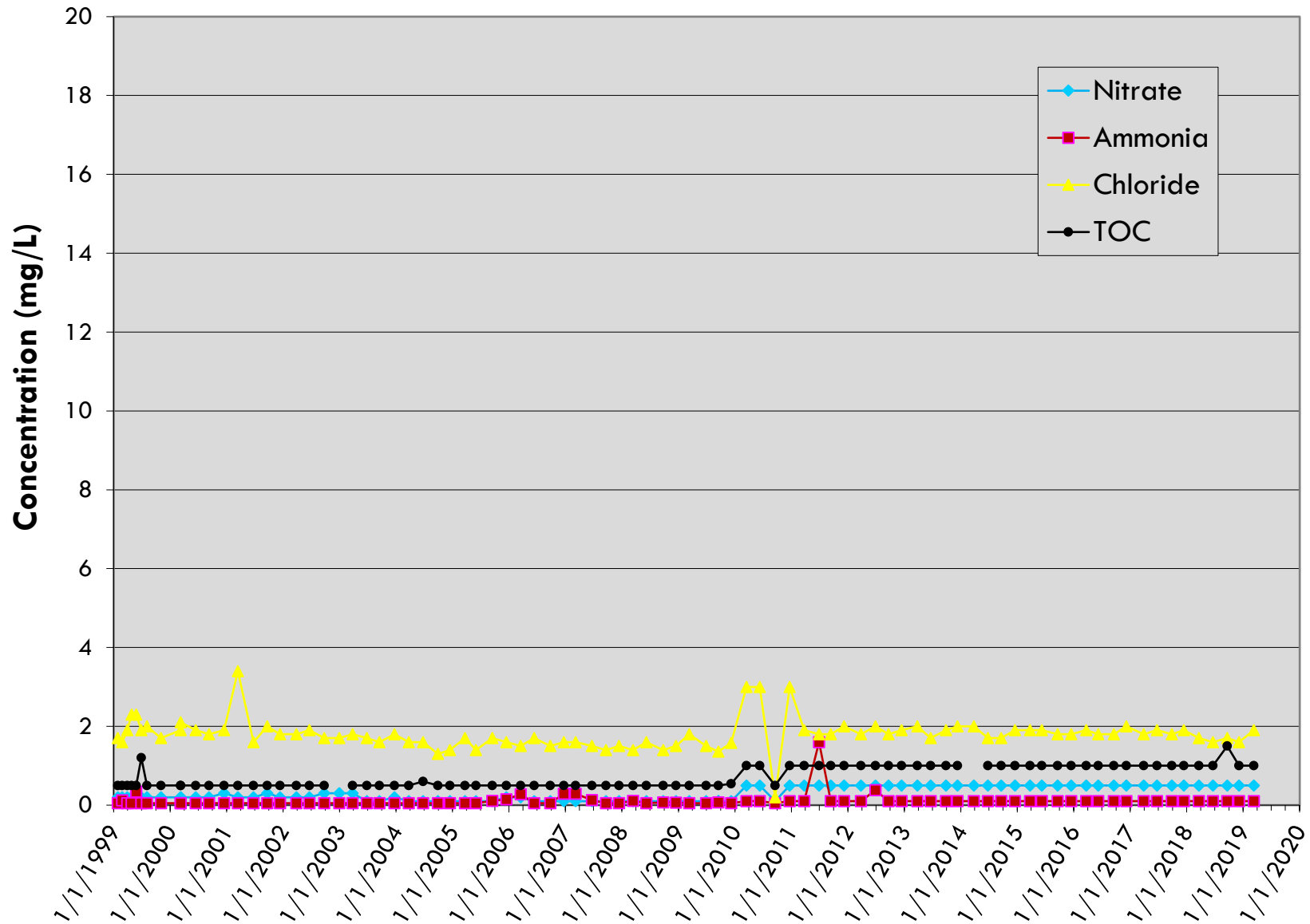


MW-7

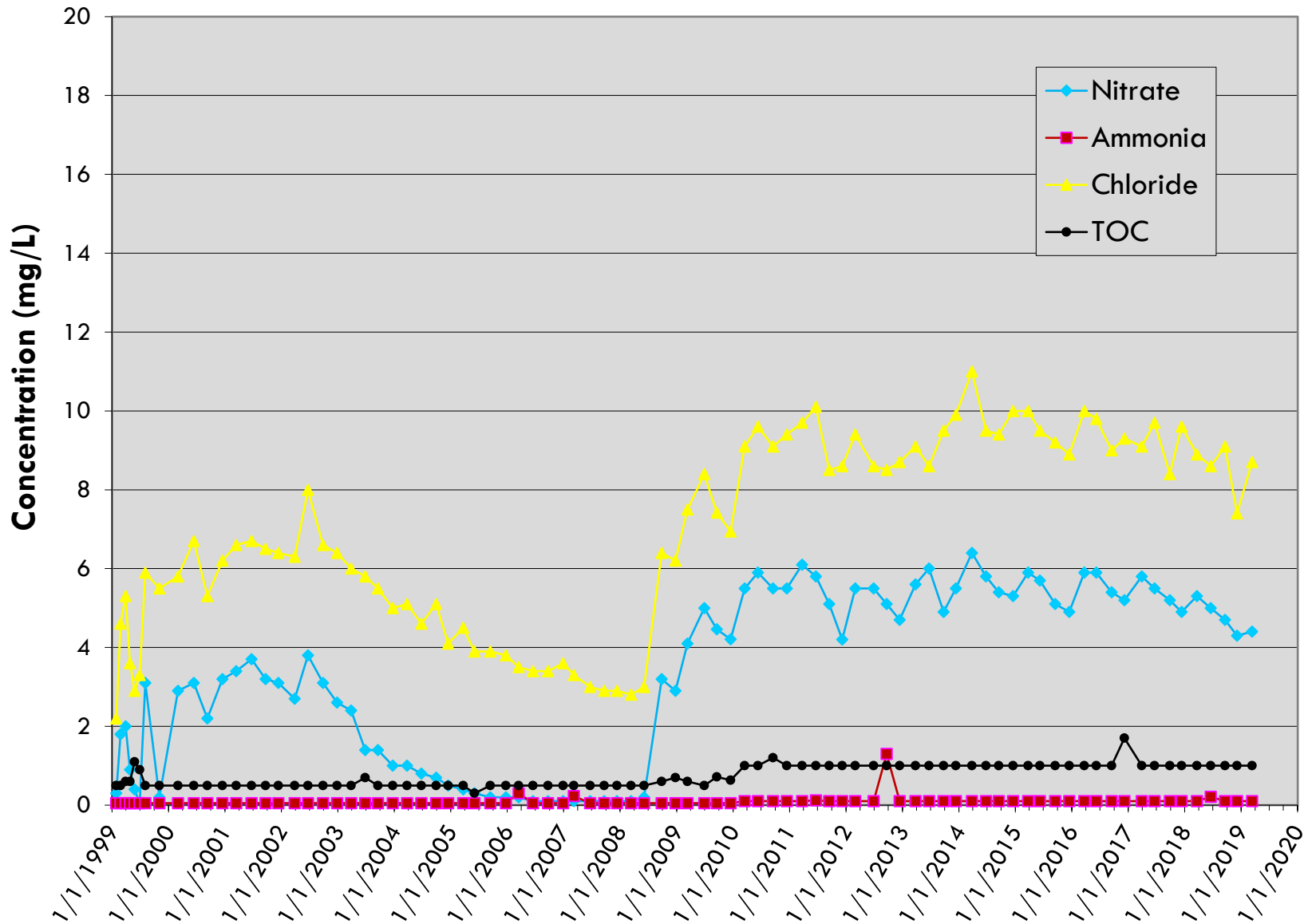
LRI Landfill, Pierce County, Washington



MW-9 (Background) LRI Landfill, Pierce County, Washington

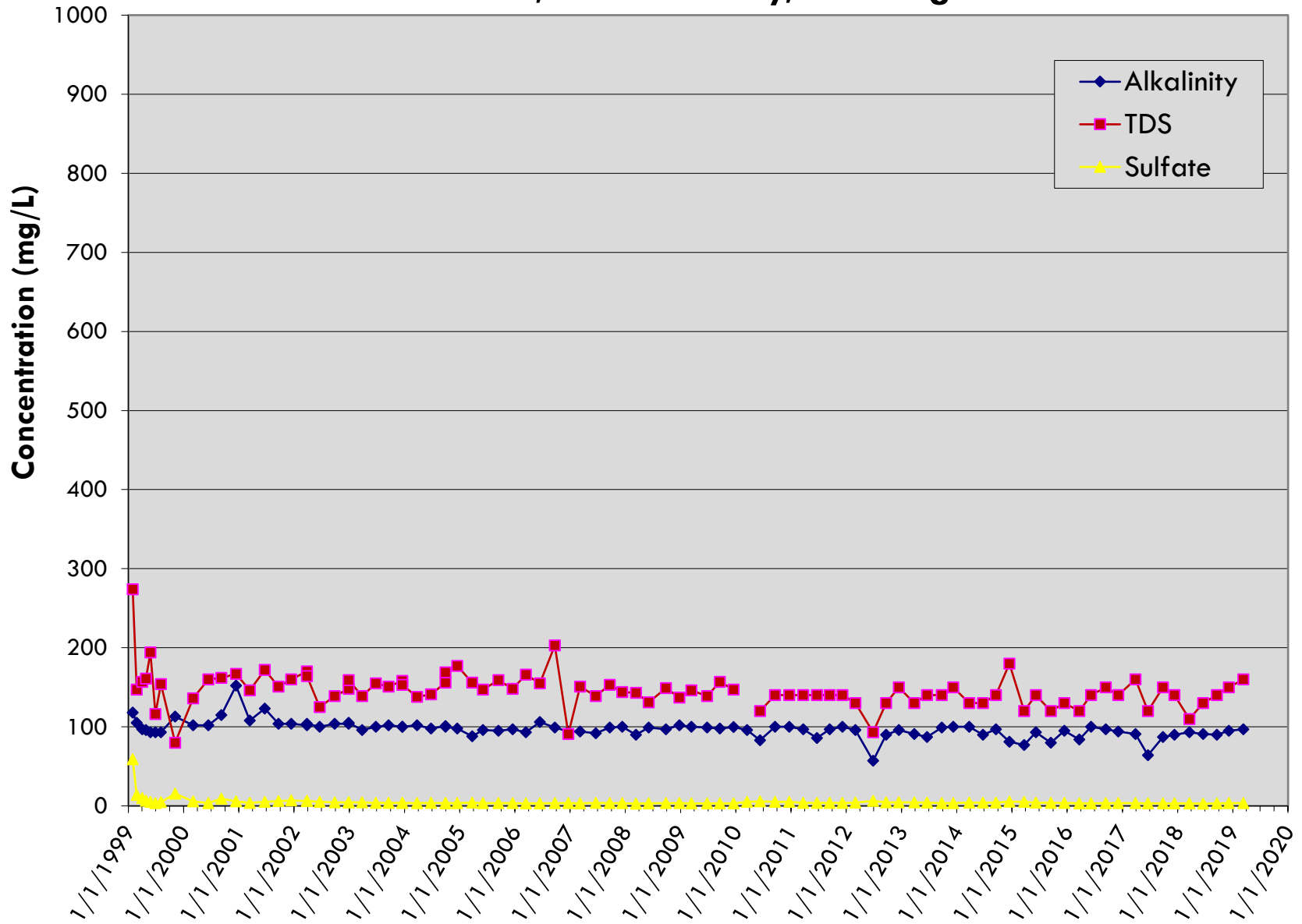


MW-10 (Background) LRI Landfill, Pierce County, Washington

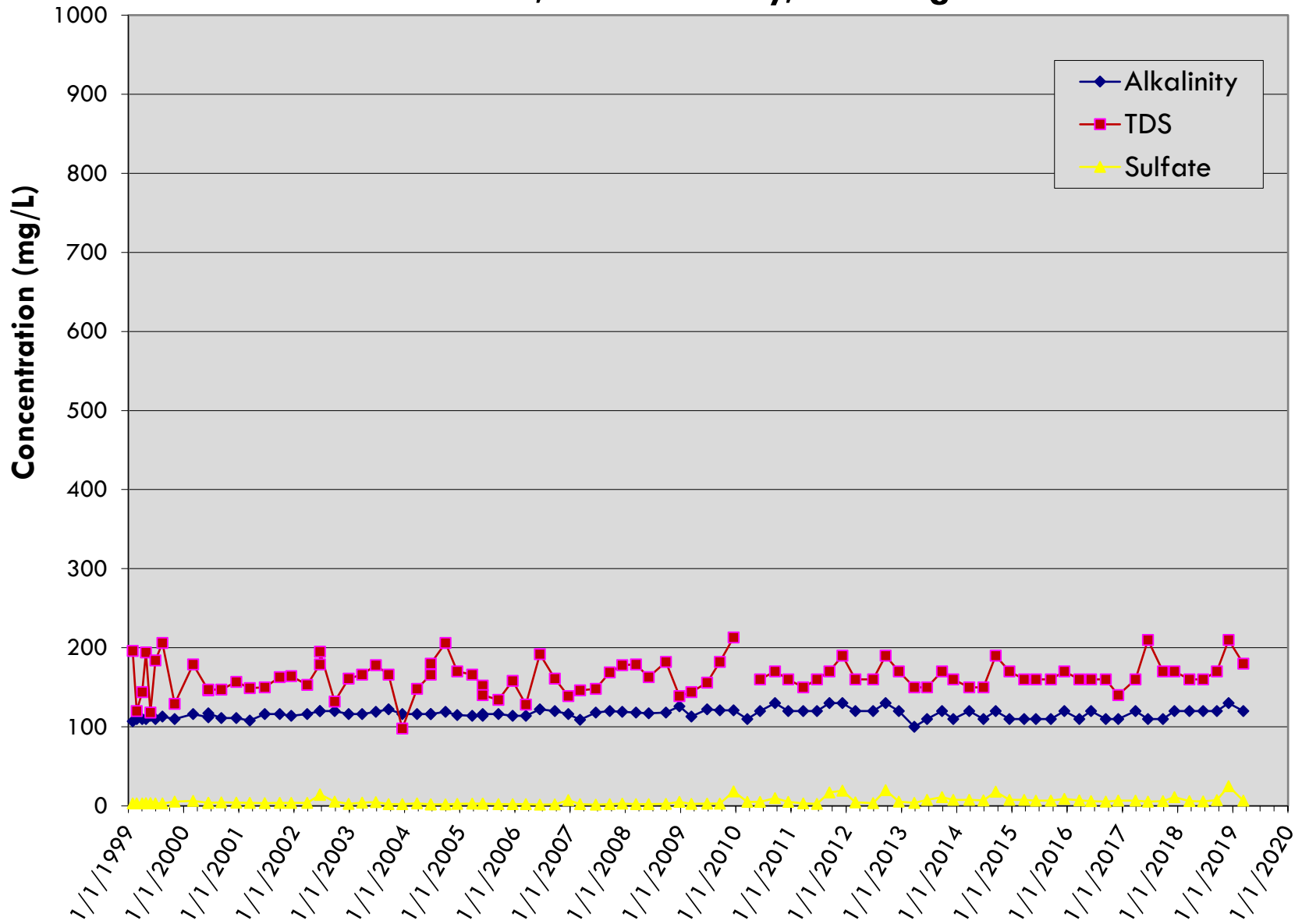


MW-1A

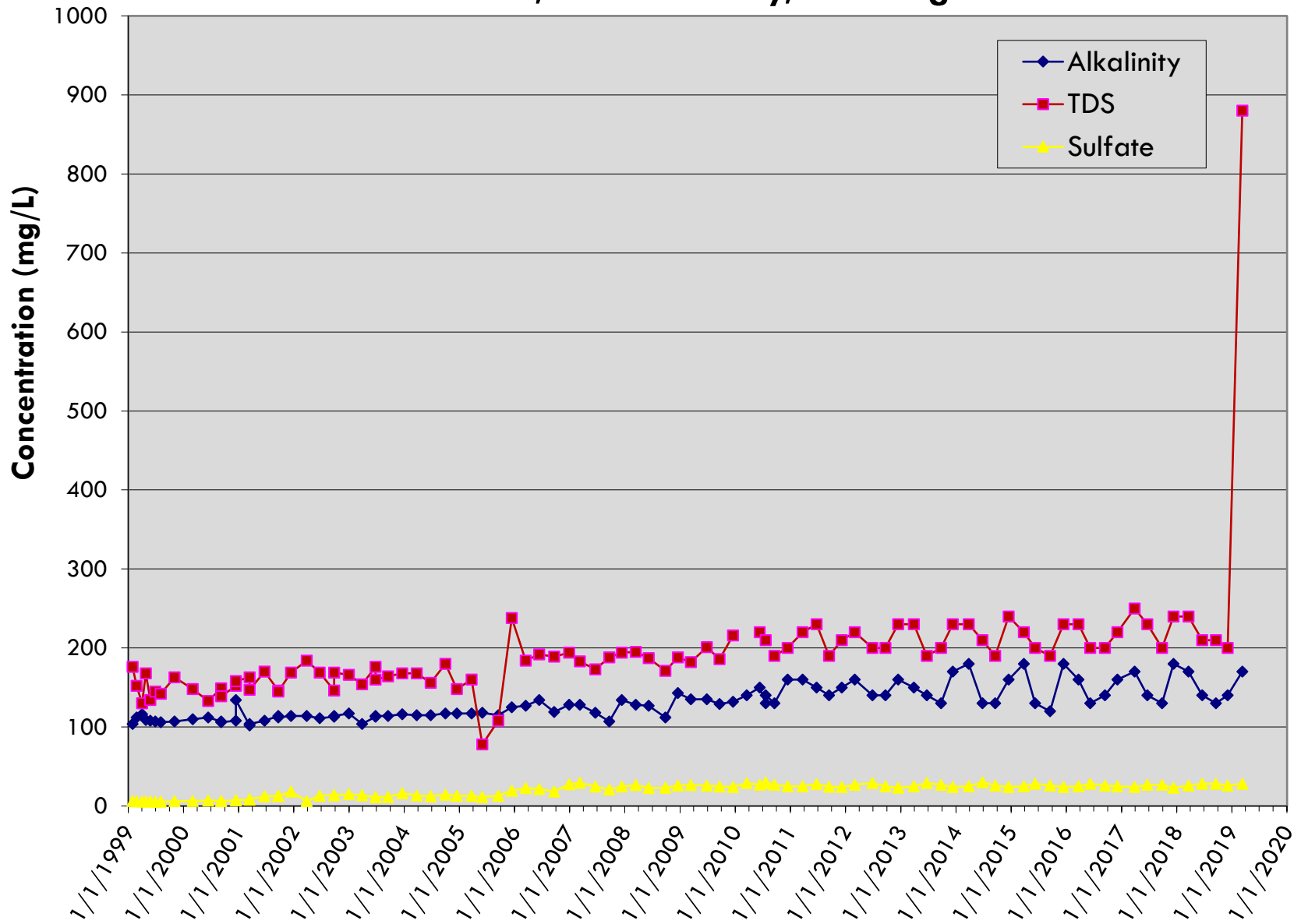
LRI Landfill, Pierce County, Washington



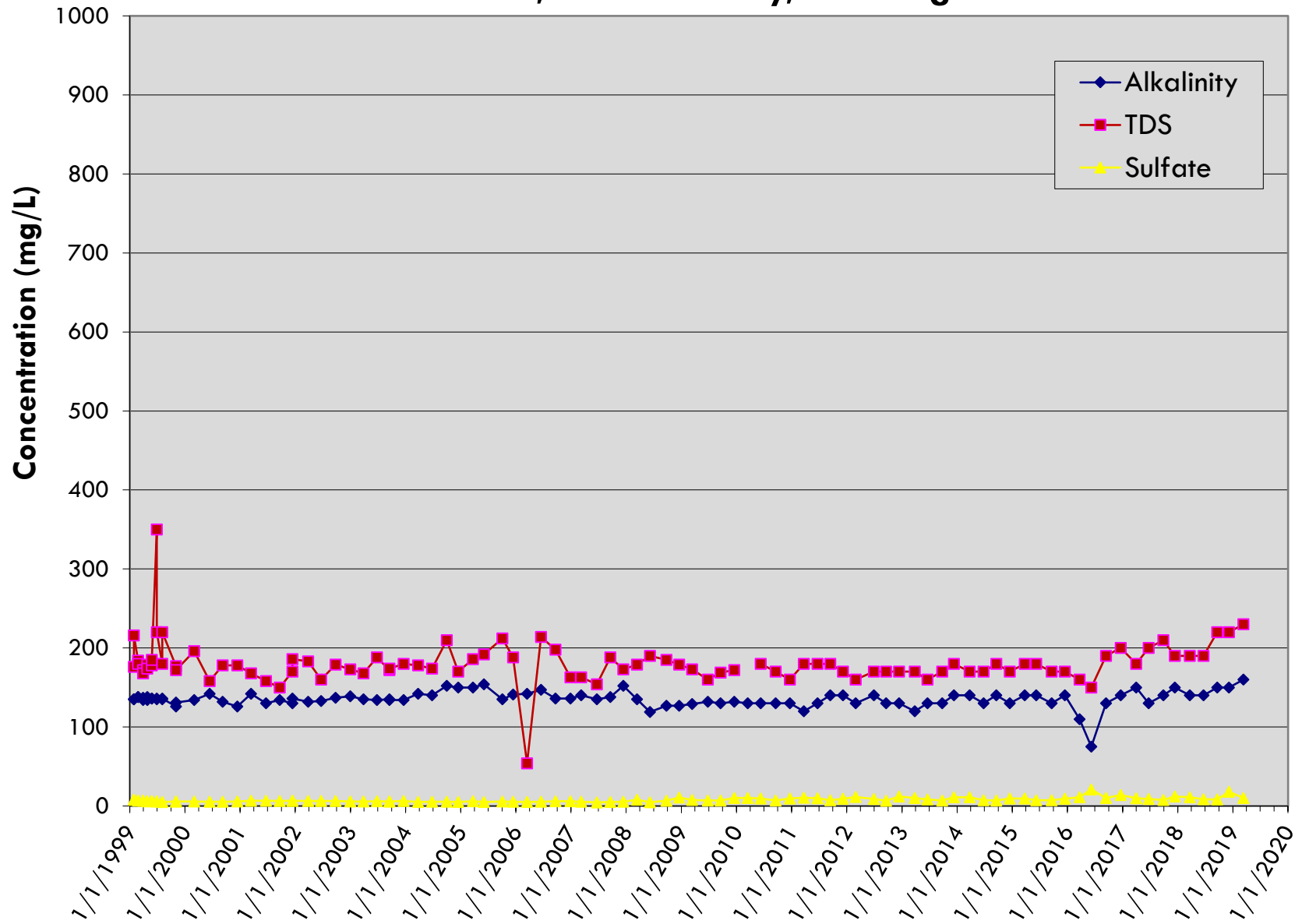
MW-2A
LRI Landfill, Pierce County, Washington



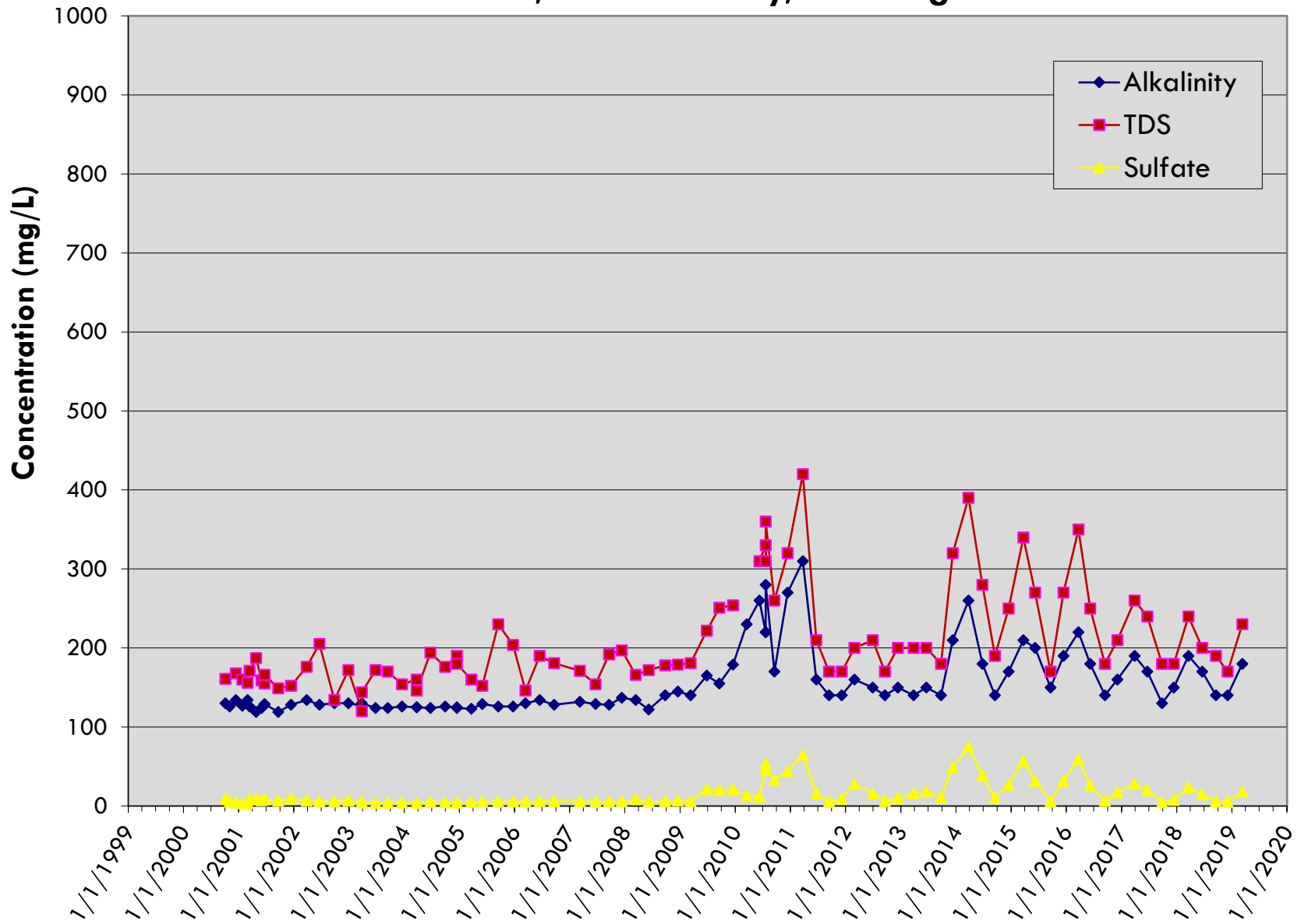
MW-3
LRI Landfill, Pierce County, Washington



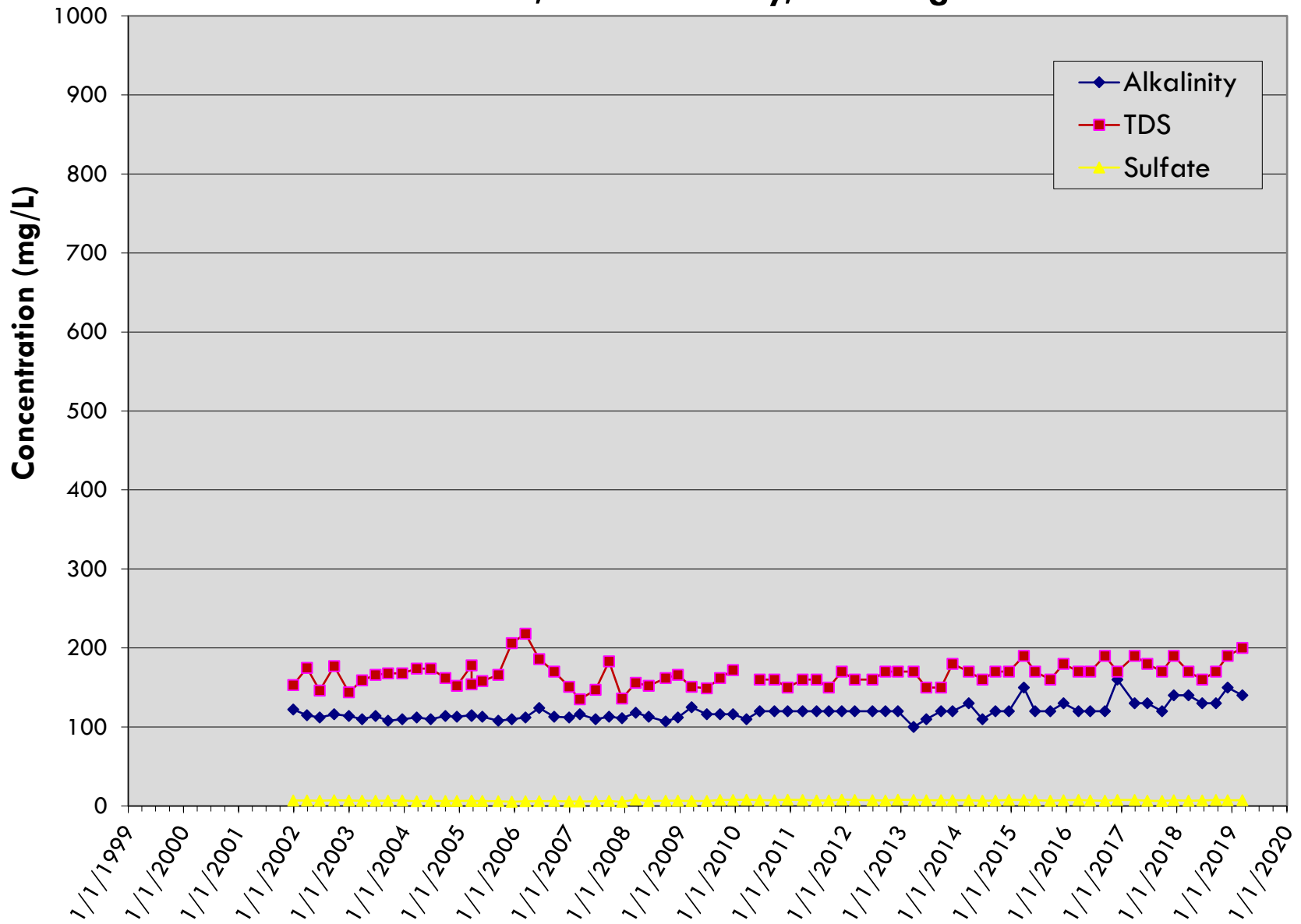
MW-4
LRI Landfill, Pierce County, Washington



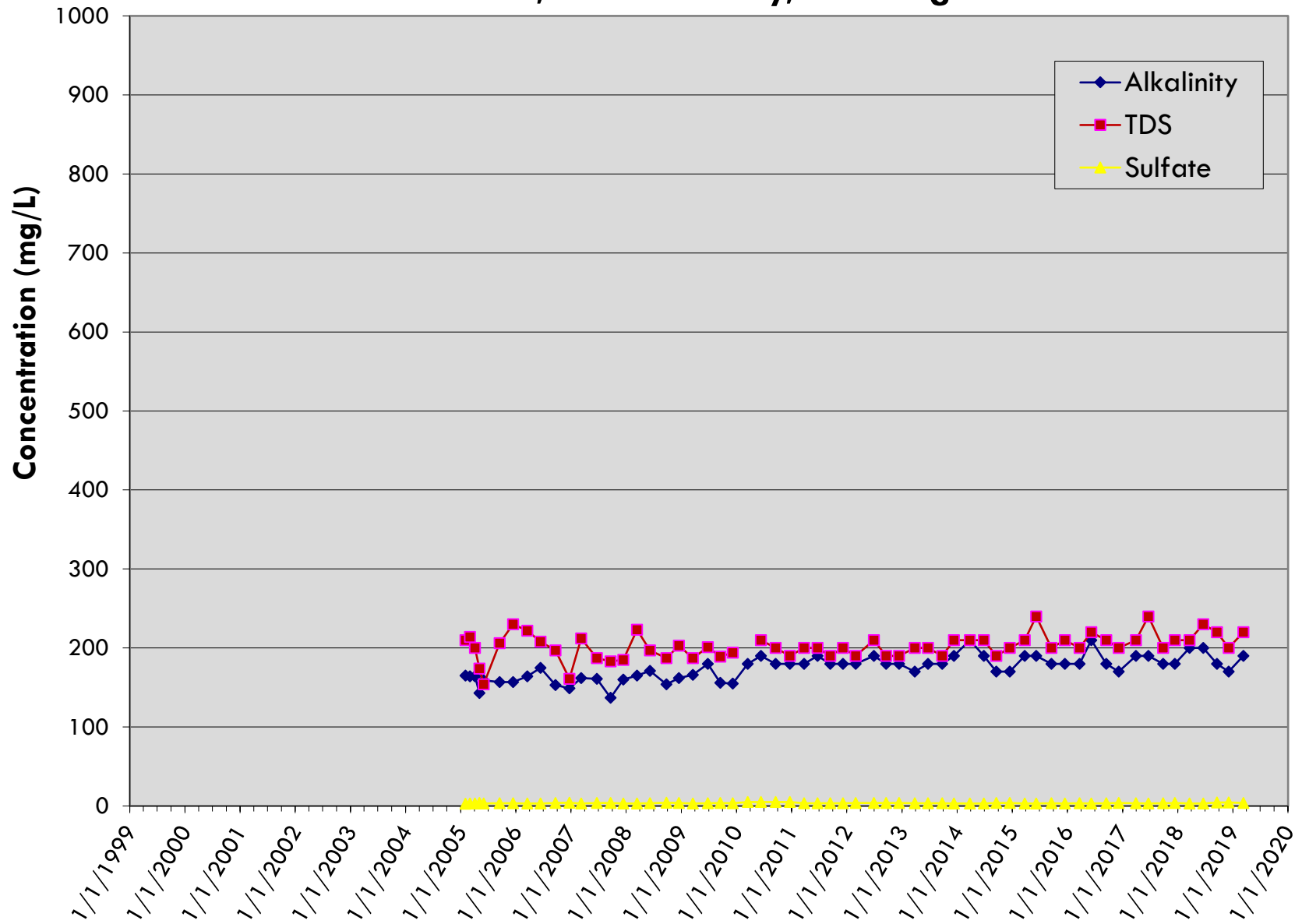
MW-5A
LRI Landfill, Pierce County, Washington



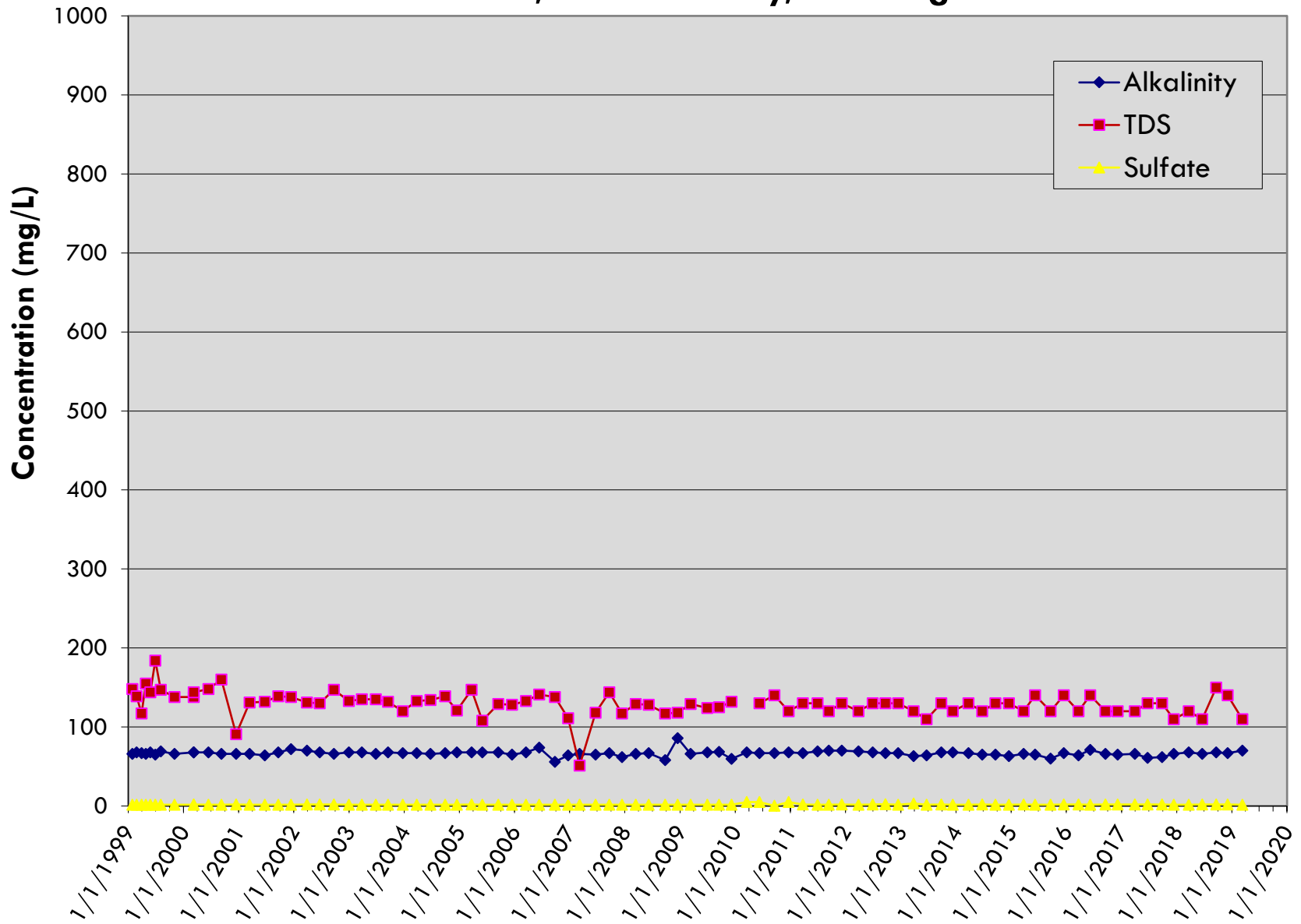
MW-6
LRI Landfill, Pierce County, Washington



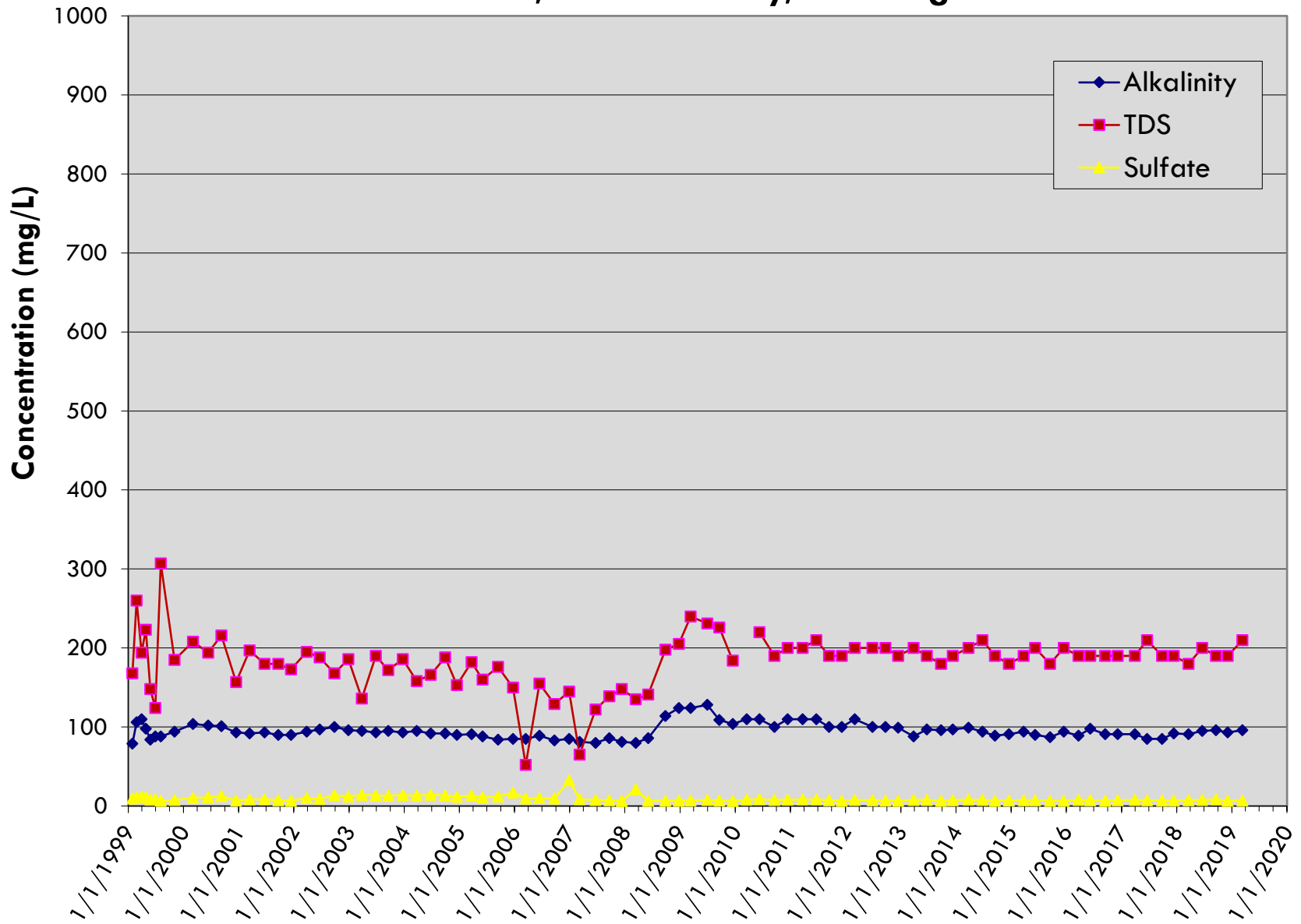
MW-7
LRI Landfill, Pierce County, Washington



MW-9 (Background)
LRI Landfill, Pierce County, Washington

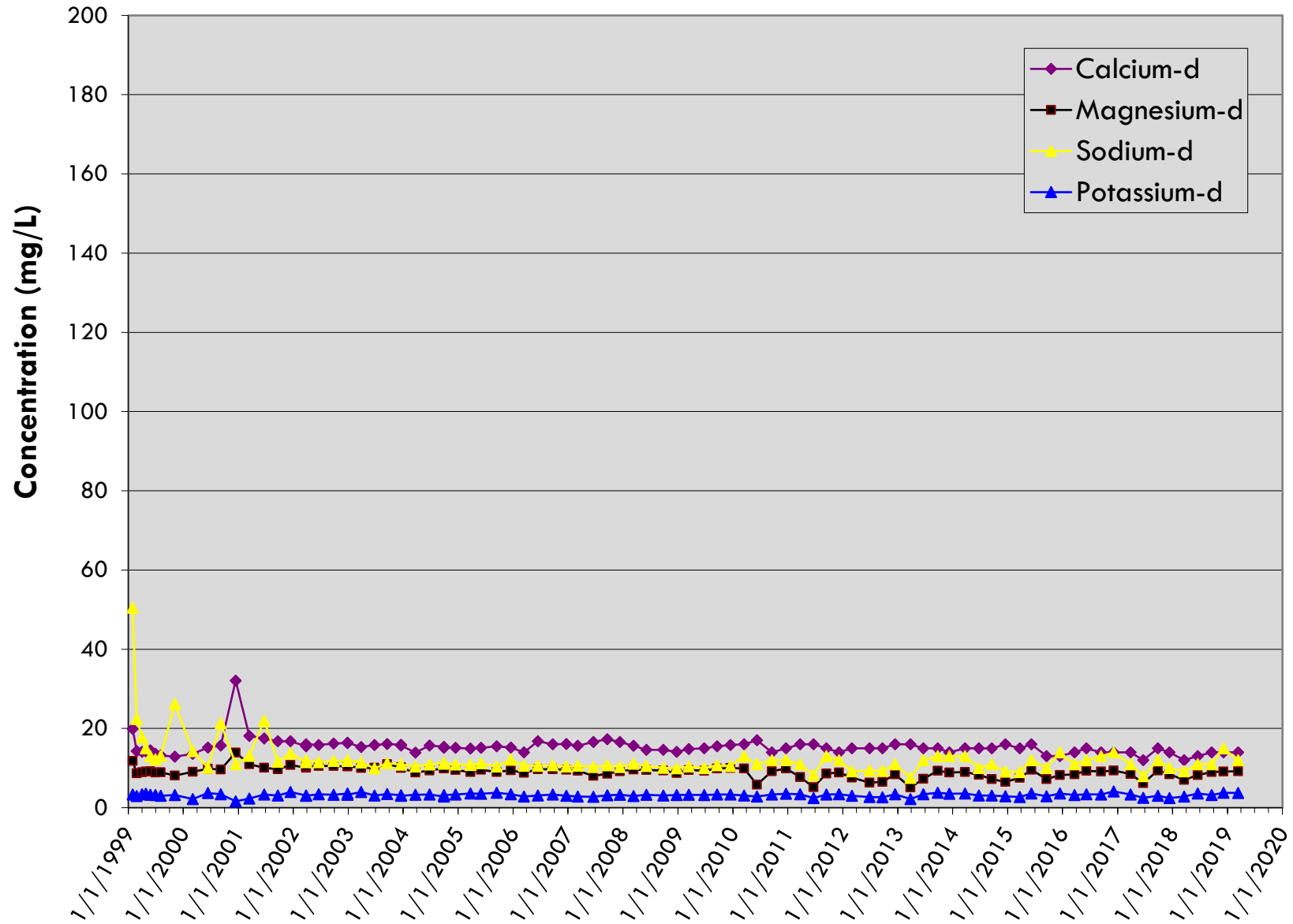


MW-10 (Background)
LRI Landfill, Pierce County, Washington

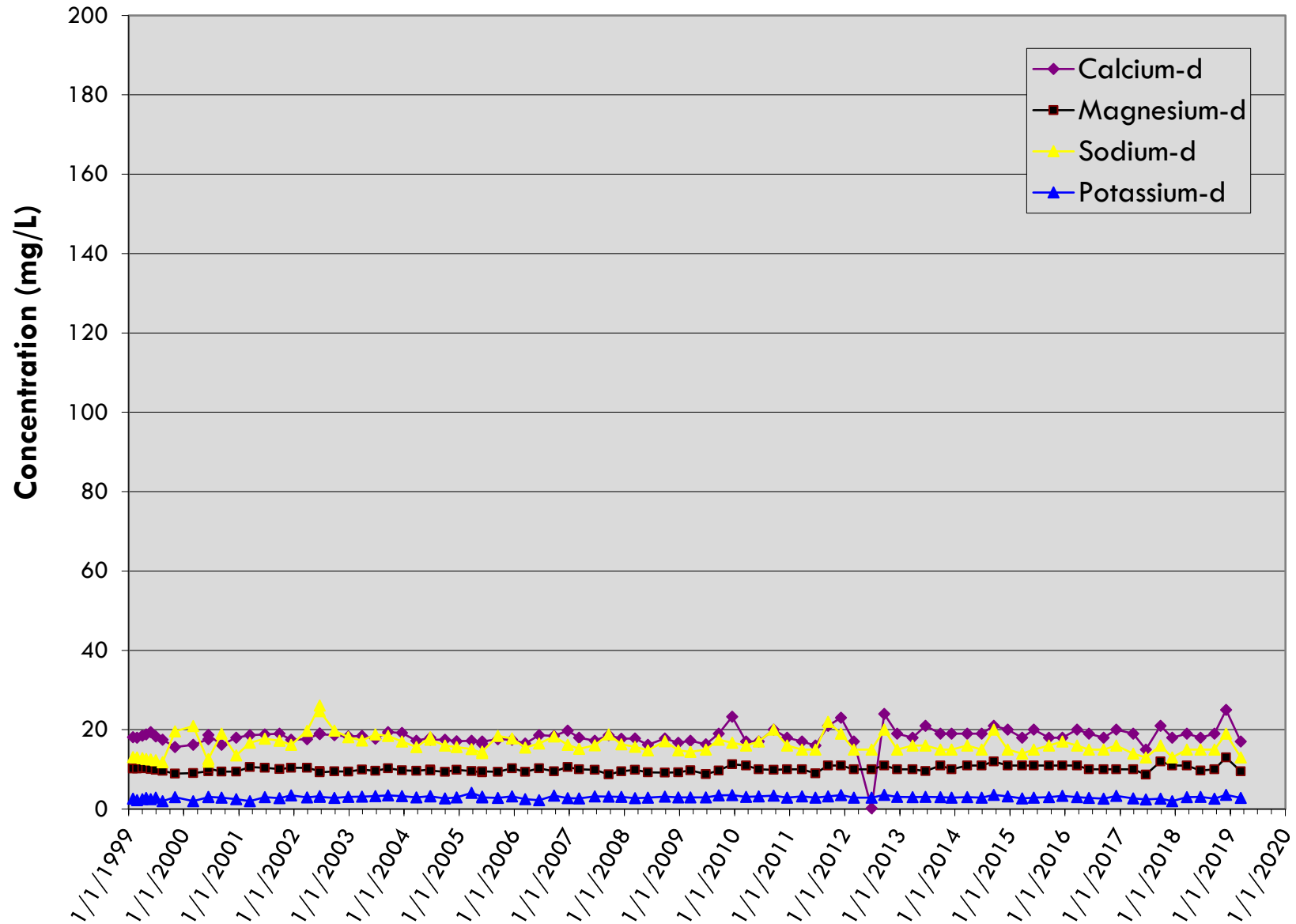


MW-1A

LRI Landfill, Pierce County, Washington

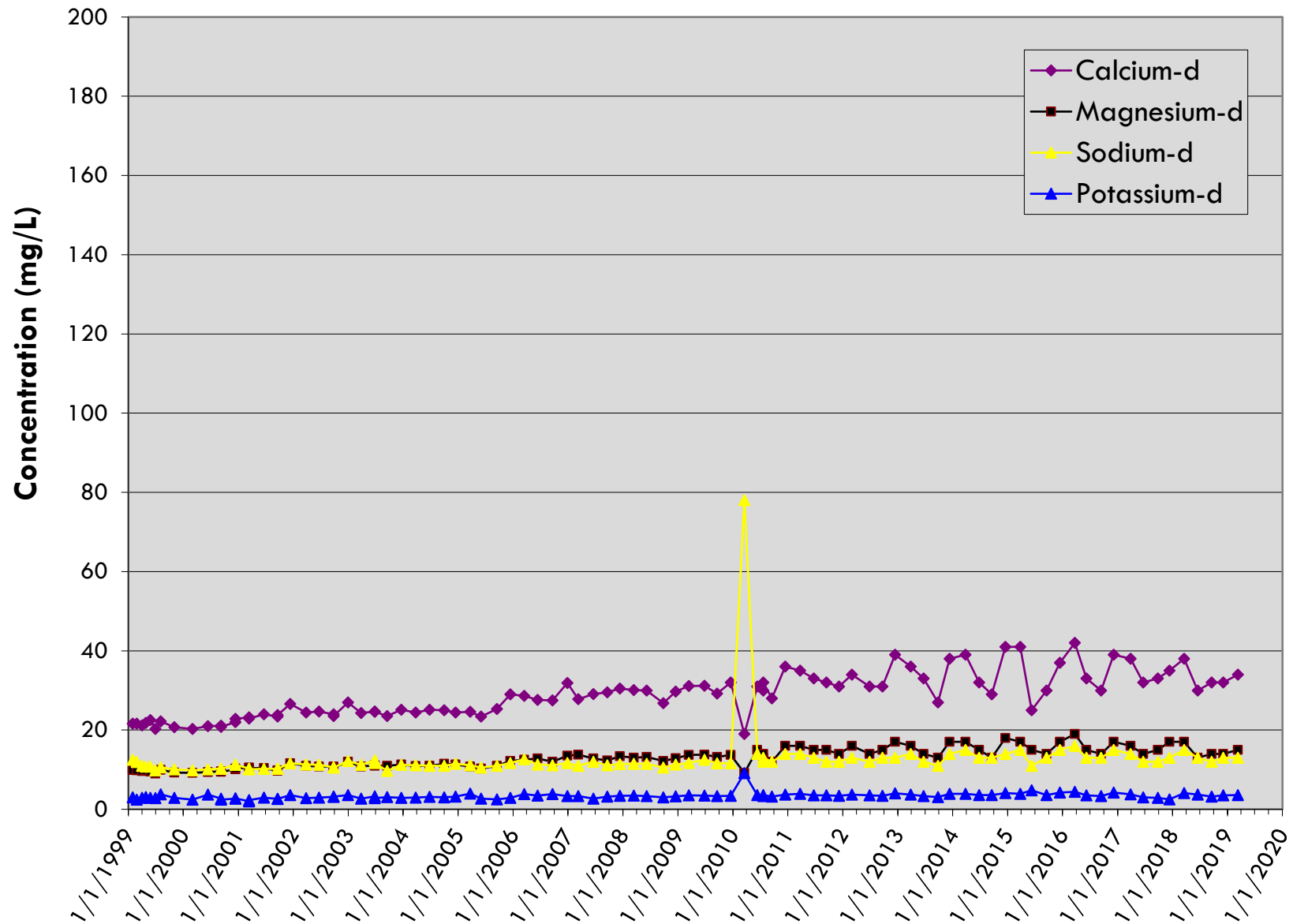


MW-2A
LRI Landfill, Pierce County, Washington



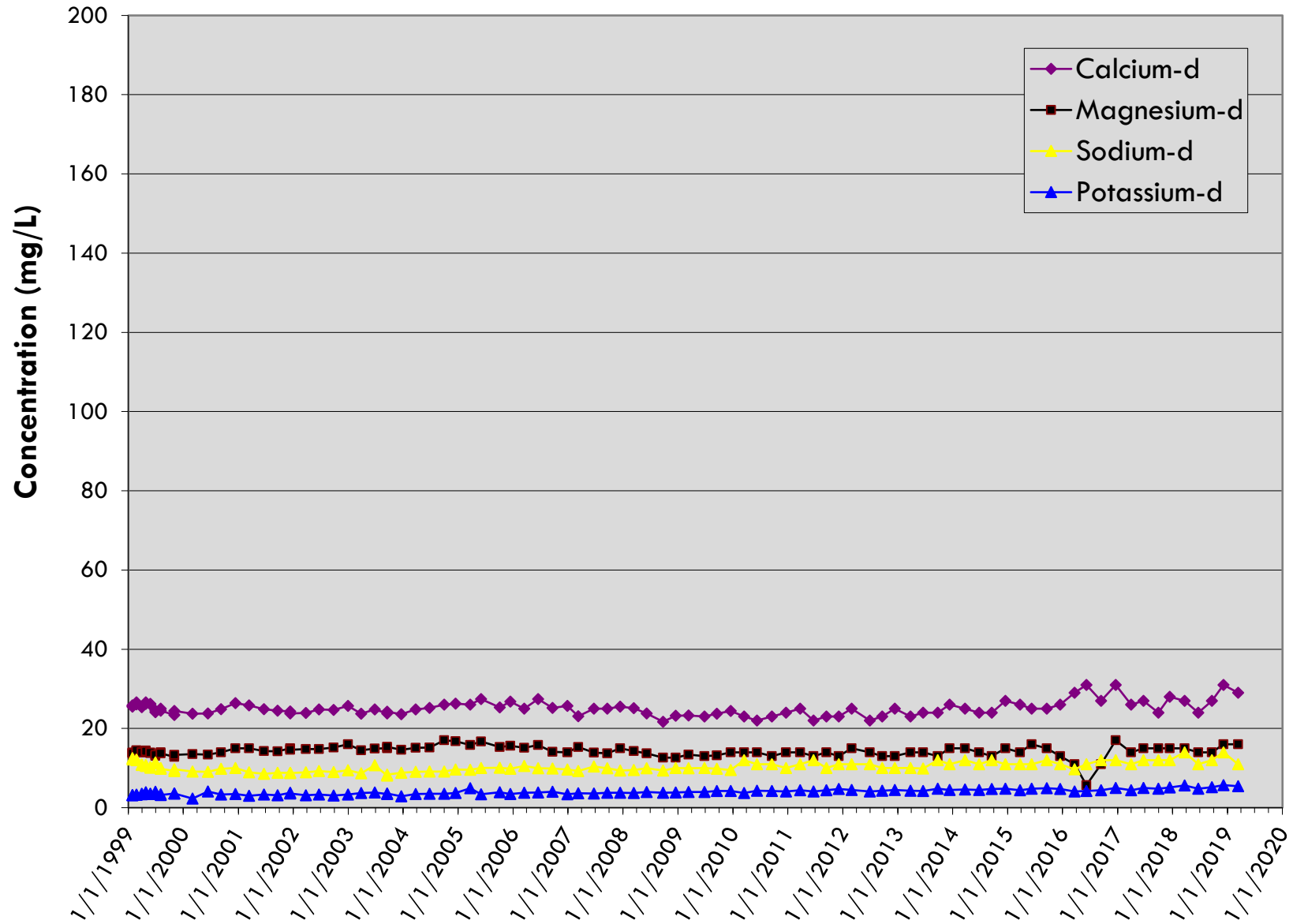
MW-3

LRI Landfill, Pierce County, Washington



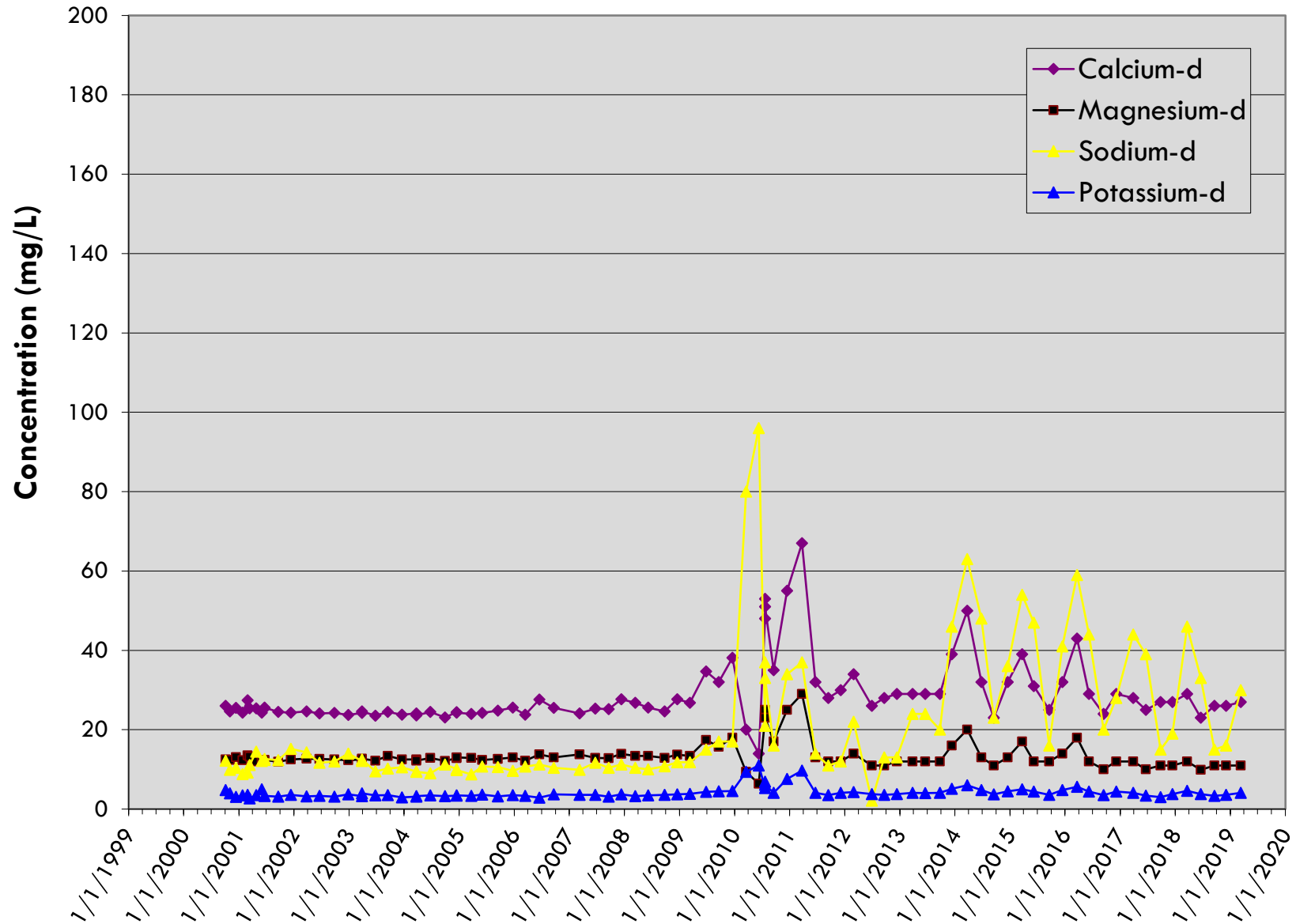
MW-4

LRI Landfill, Pierce County, Washington



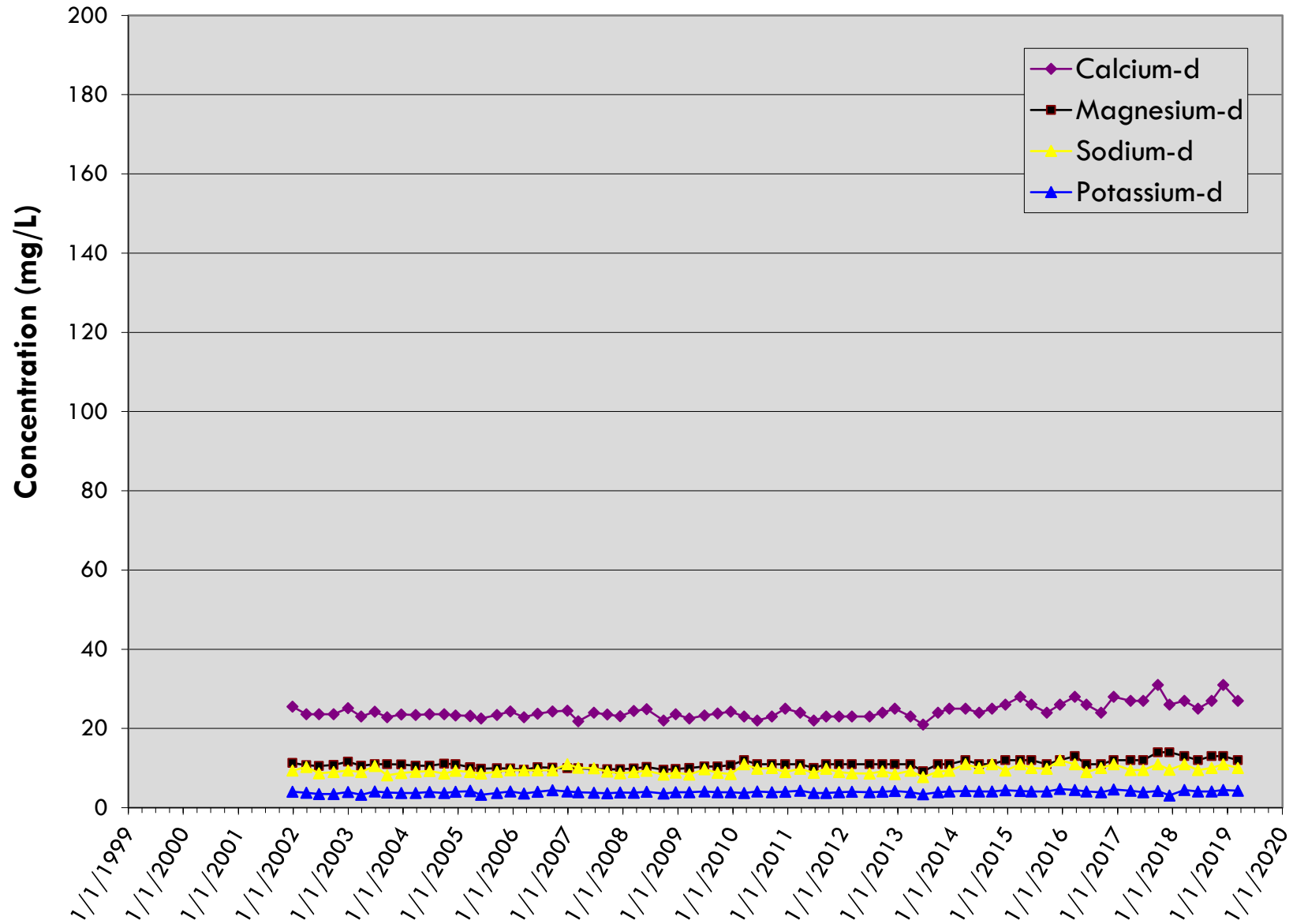
MW-5A

LRI Landfill, Pierce County, Washington

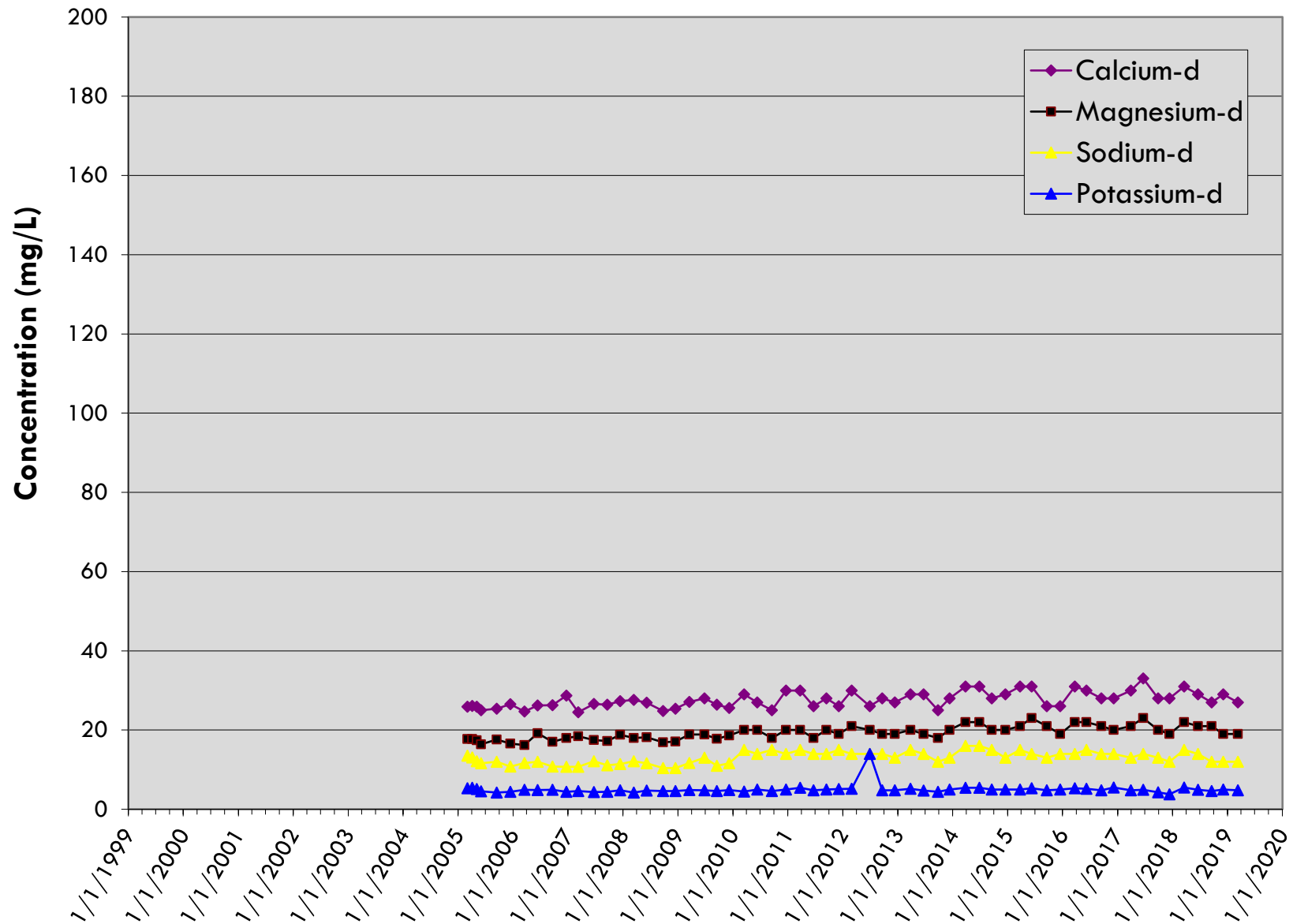


MW-6

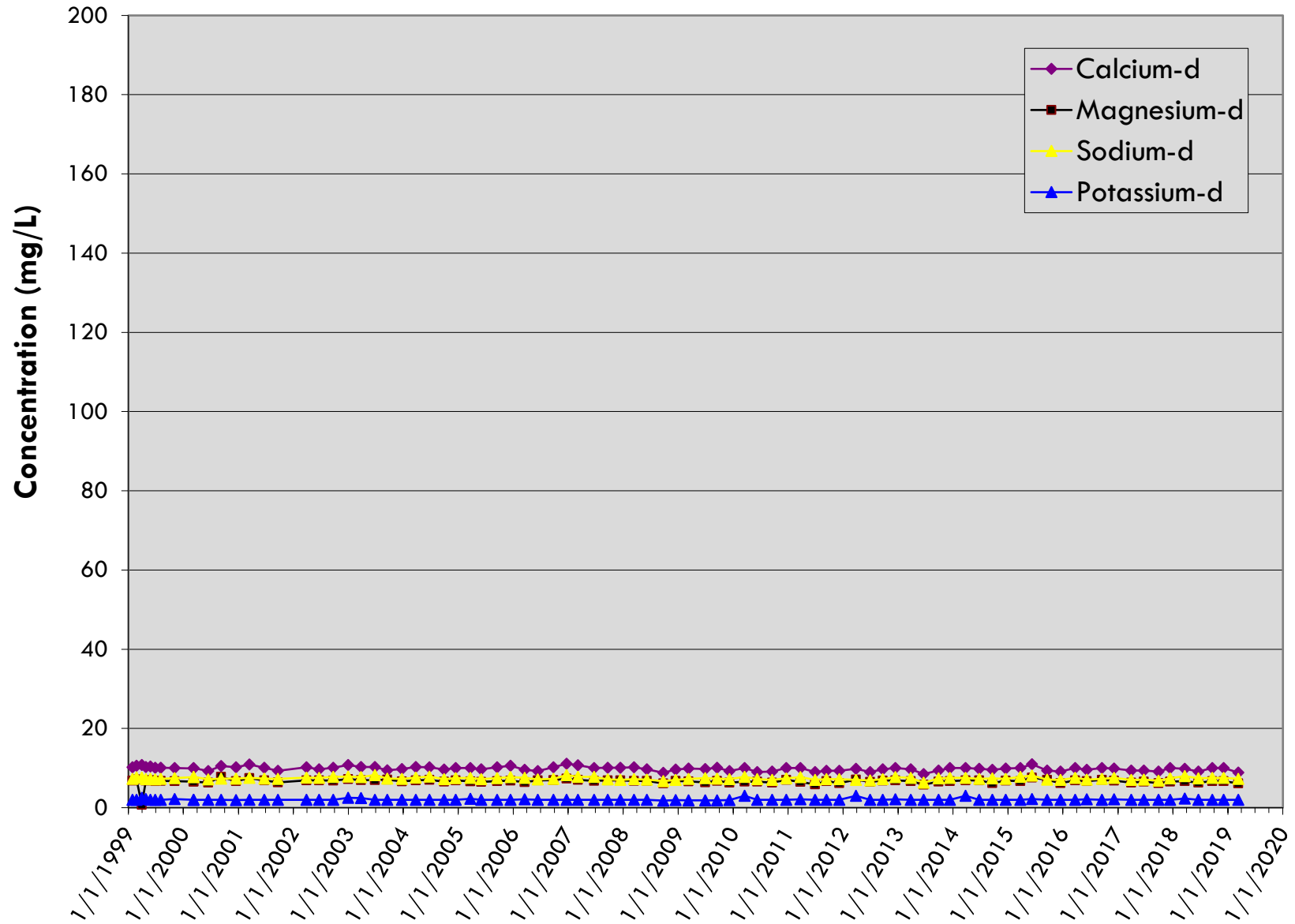
LRI Landfill, Pierce County, Washington



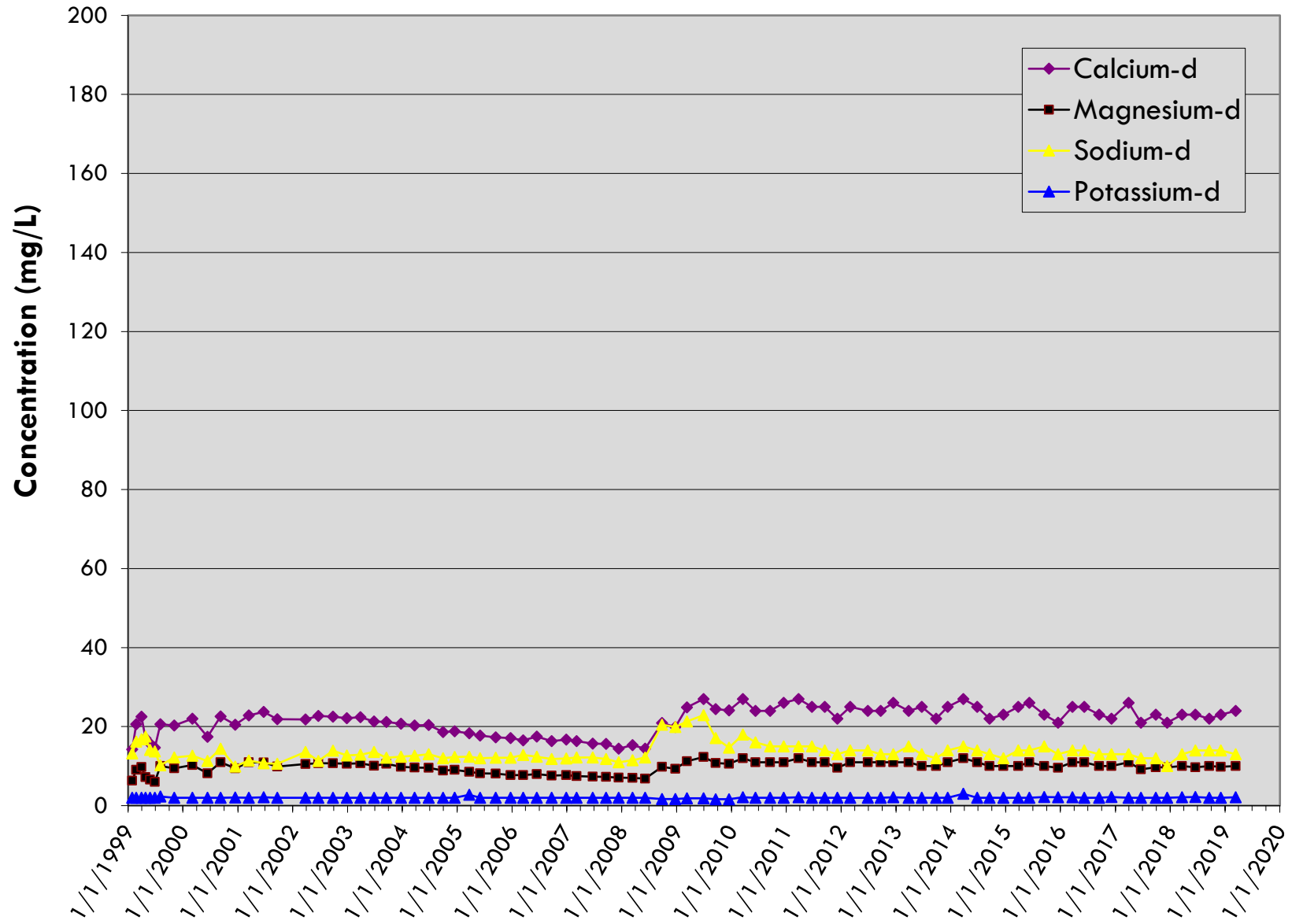
MW-7
LRI Landfill, Pierce County, Washington



MW-9 (Background)
LRI Landfill, Pierce County, Washington

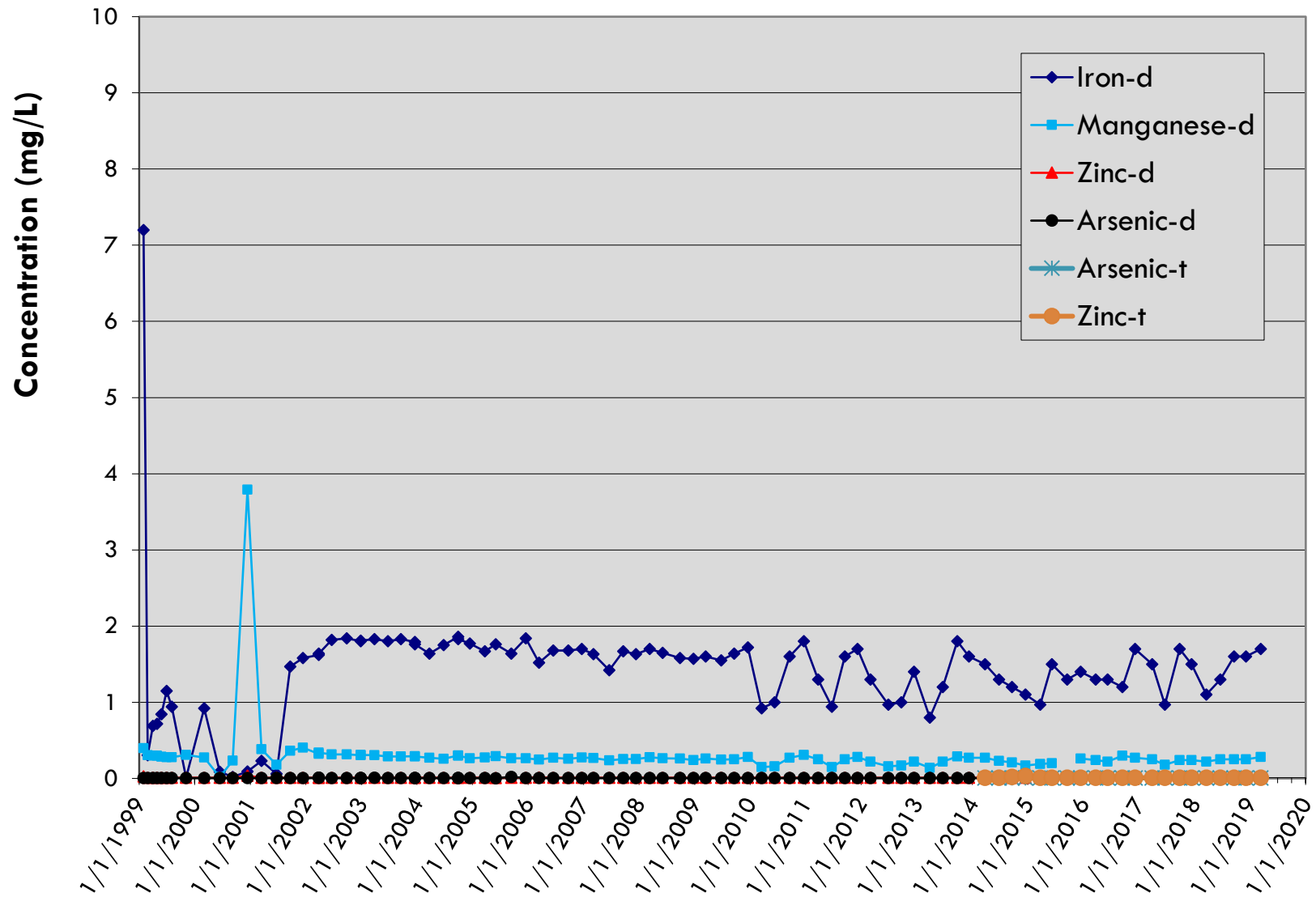


MW-10 (Background) LRI Landfill, Pierce County, Washington



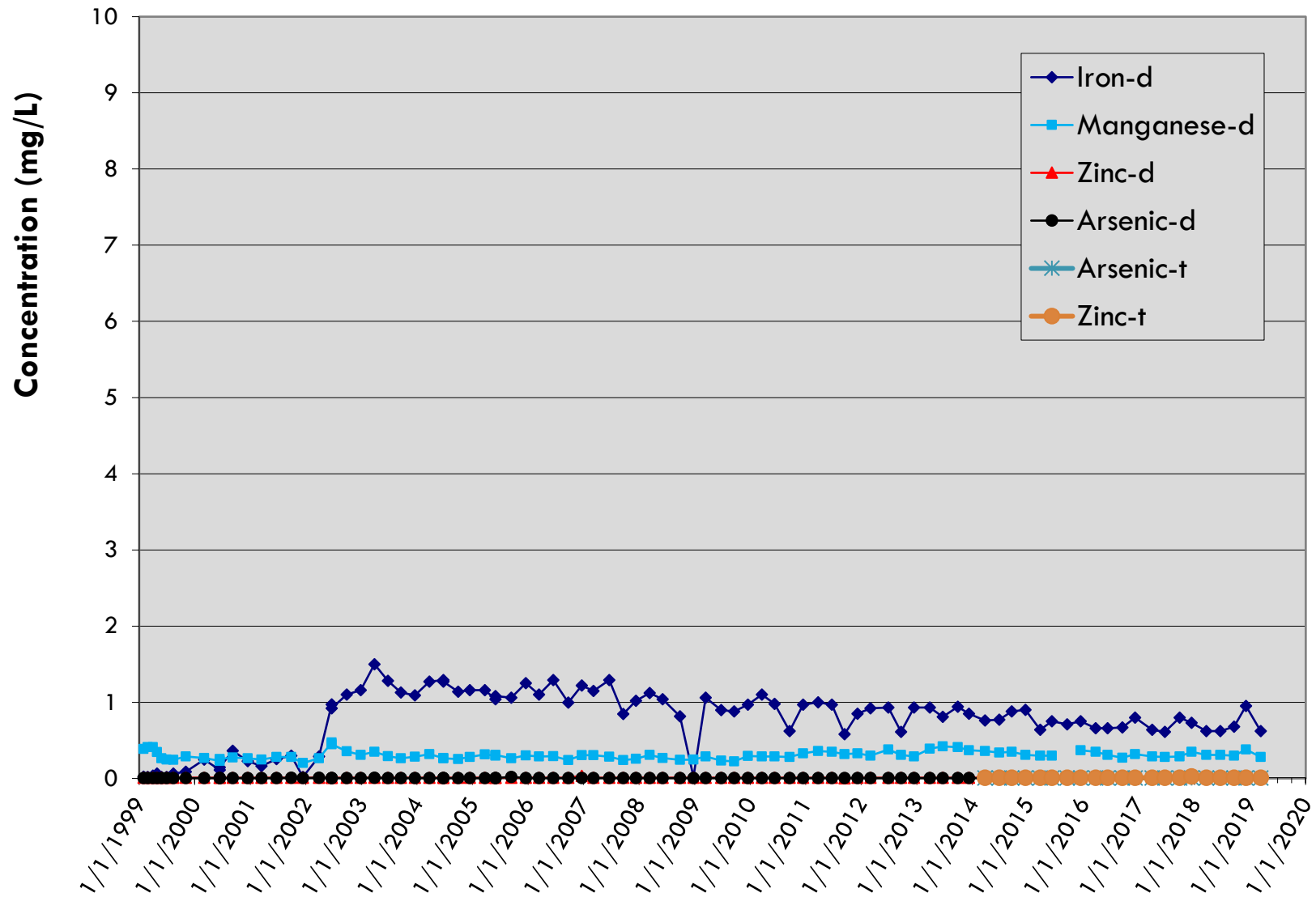
MW-1A

LRI Landfill, Pierce County, Washington



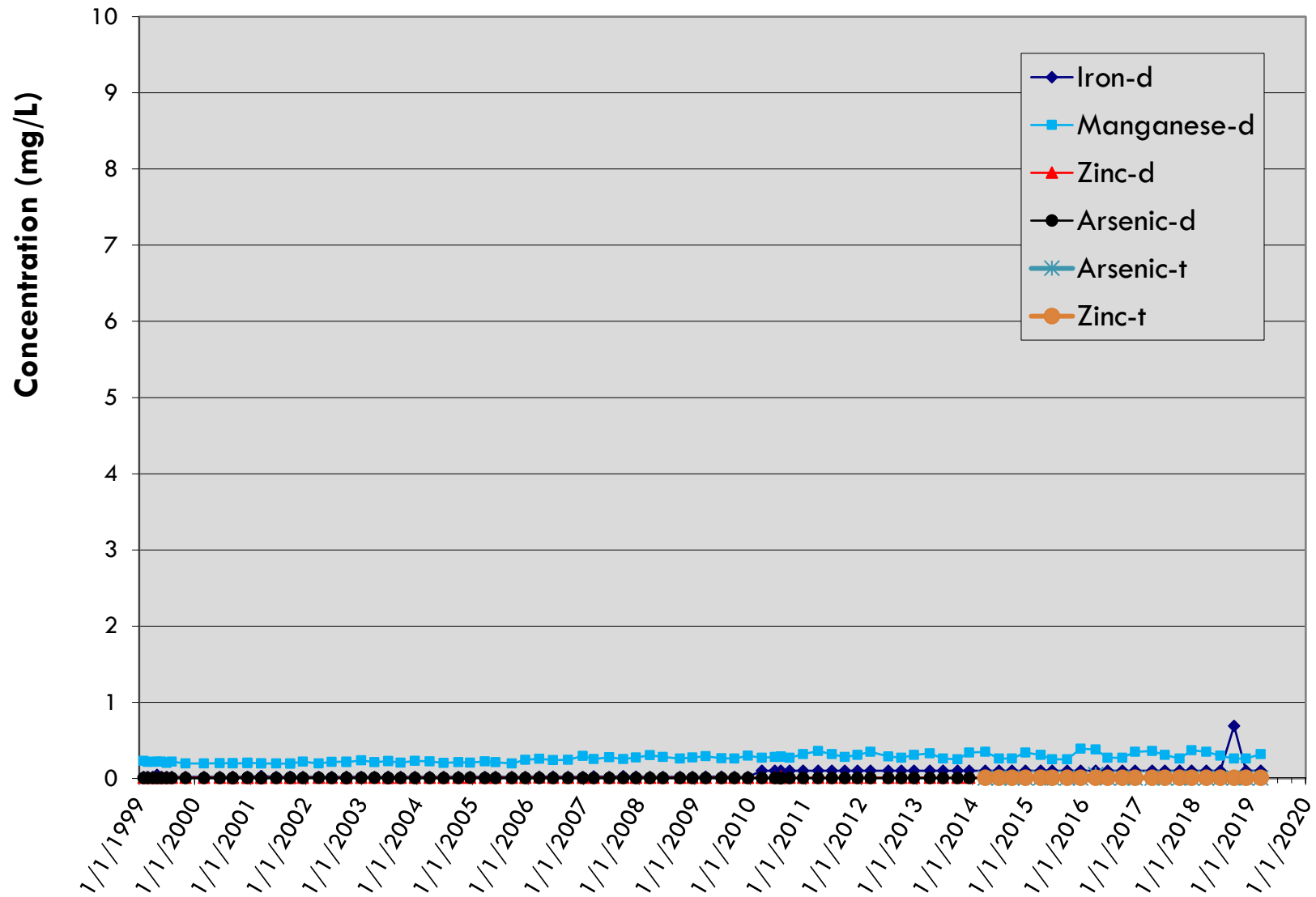
MW-2A

LRI Landfill, Pierce County, Washington

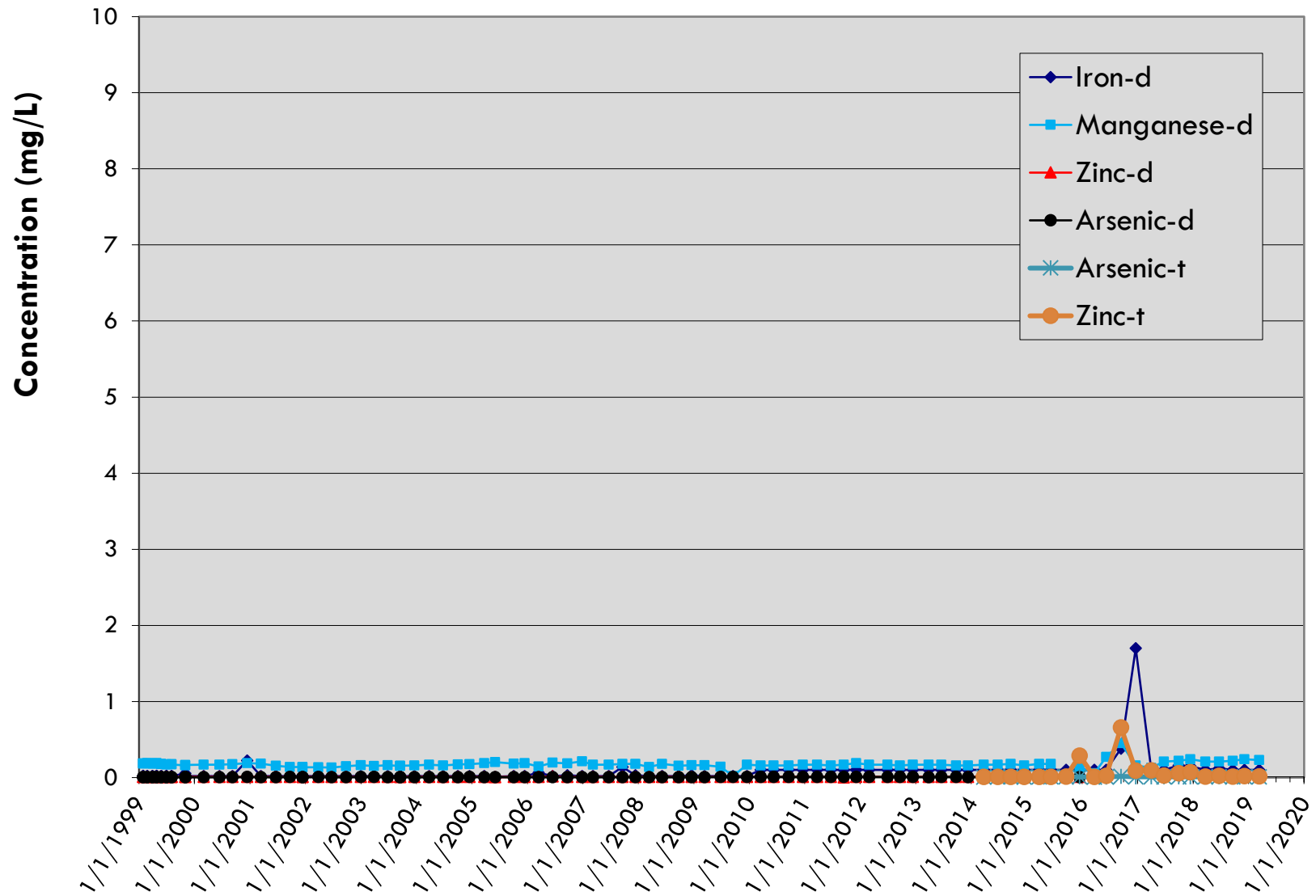


MW-3

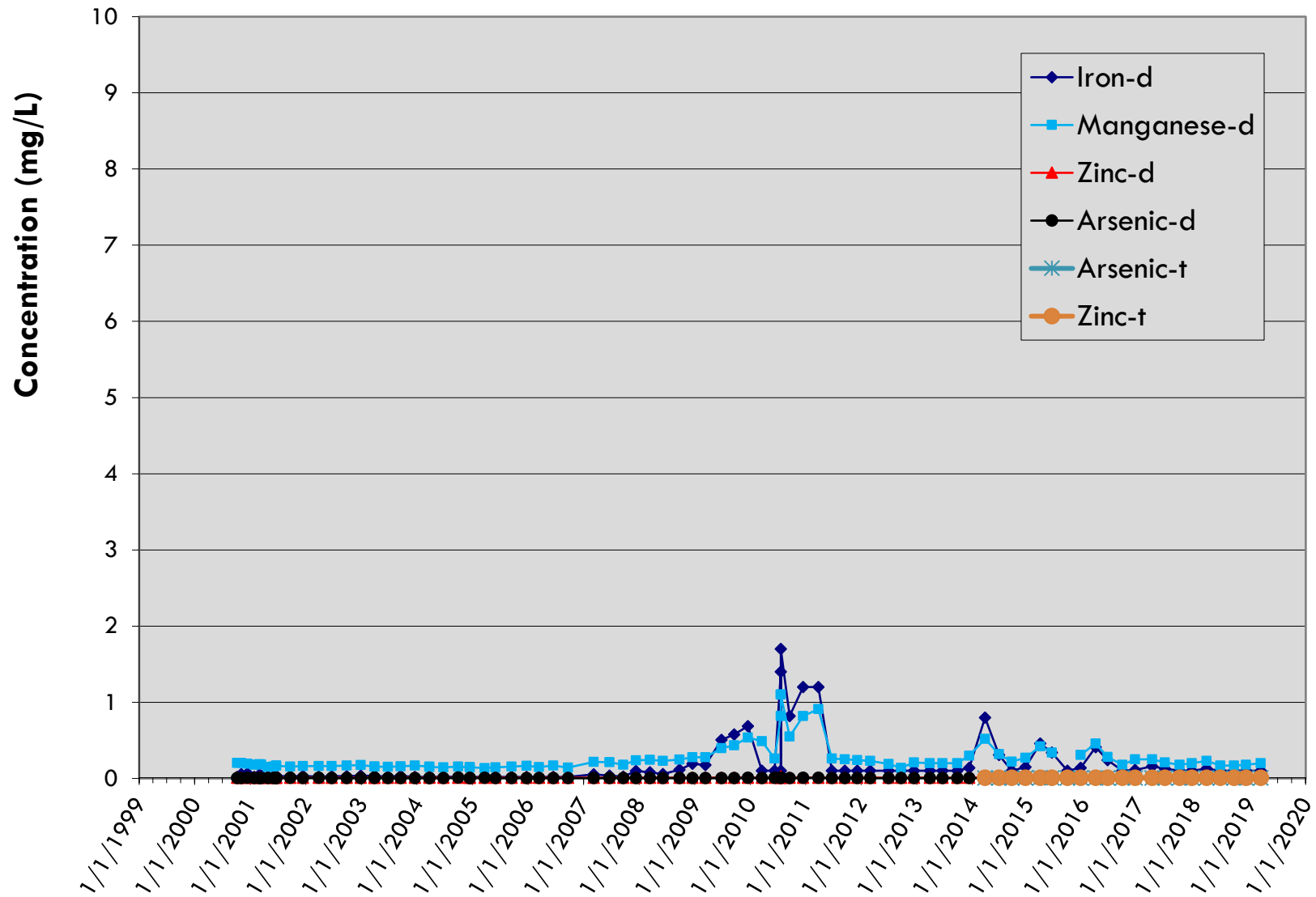
LRI Landfill, Pierce County, Washington



MW-4
LRI Landfill, Pierce County, Washington

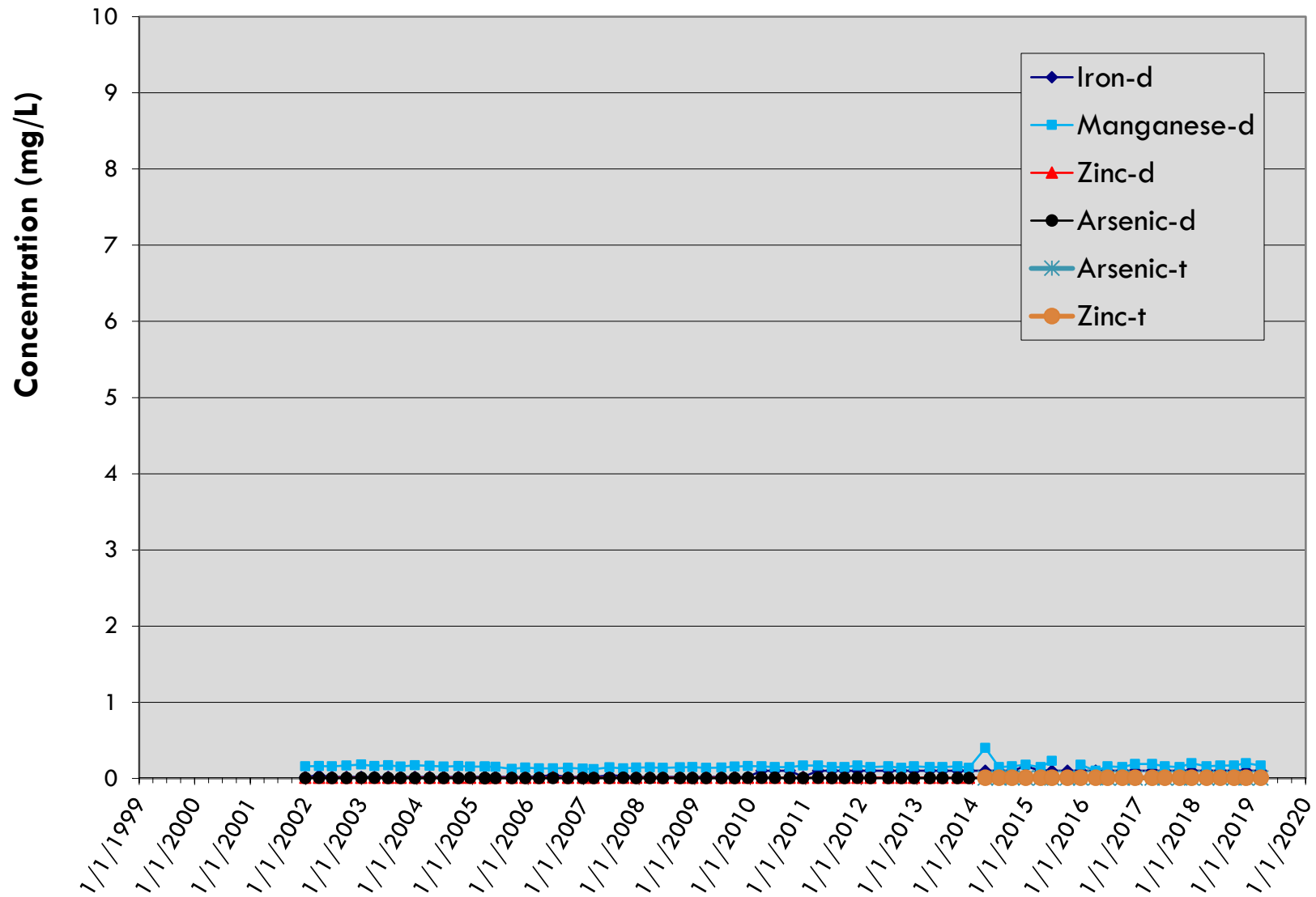


MW-5A
LRI Landfill, Pierce County, Washington

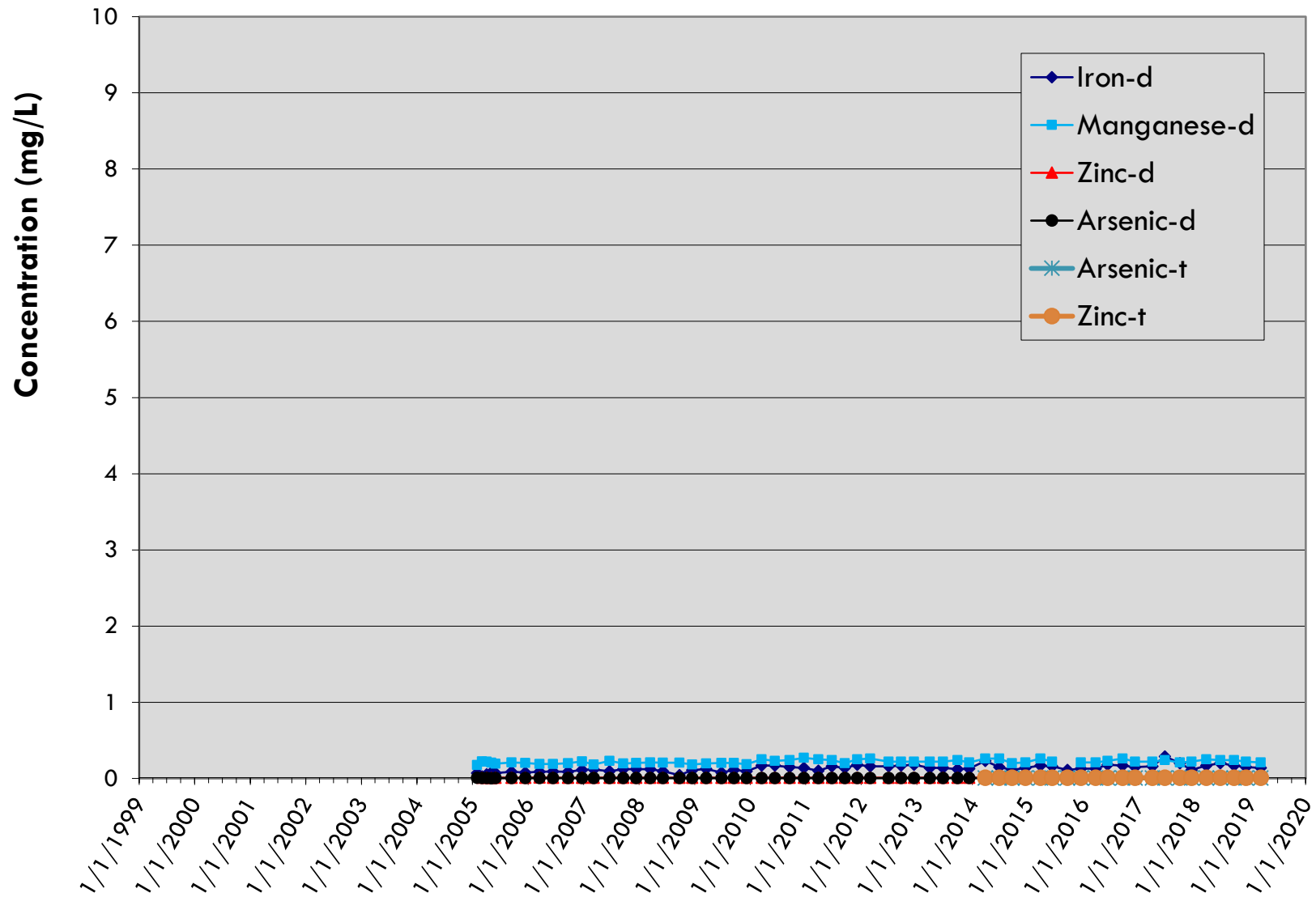


MW-6

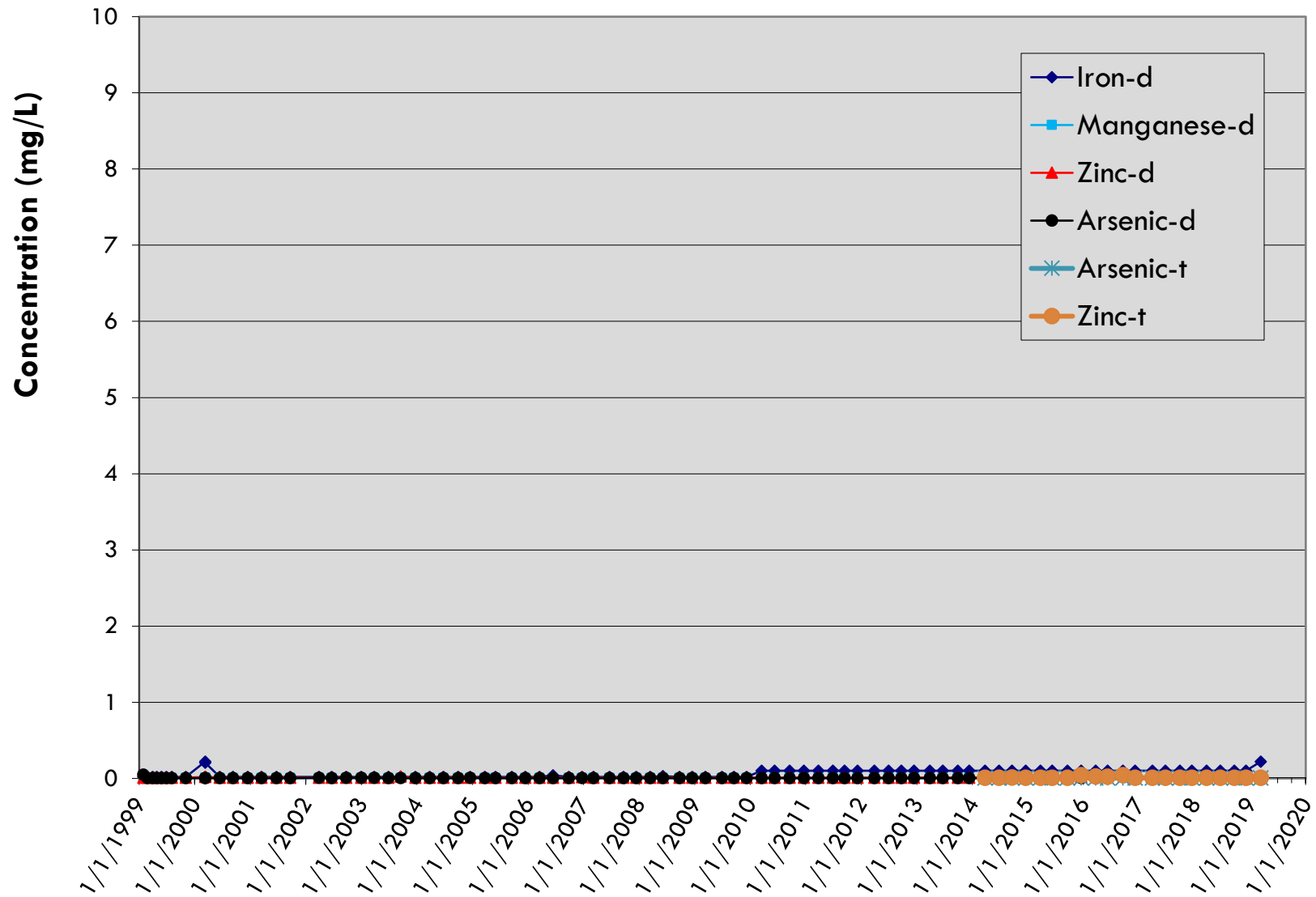
LRI Landfill, Pierce County, Washington



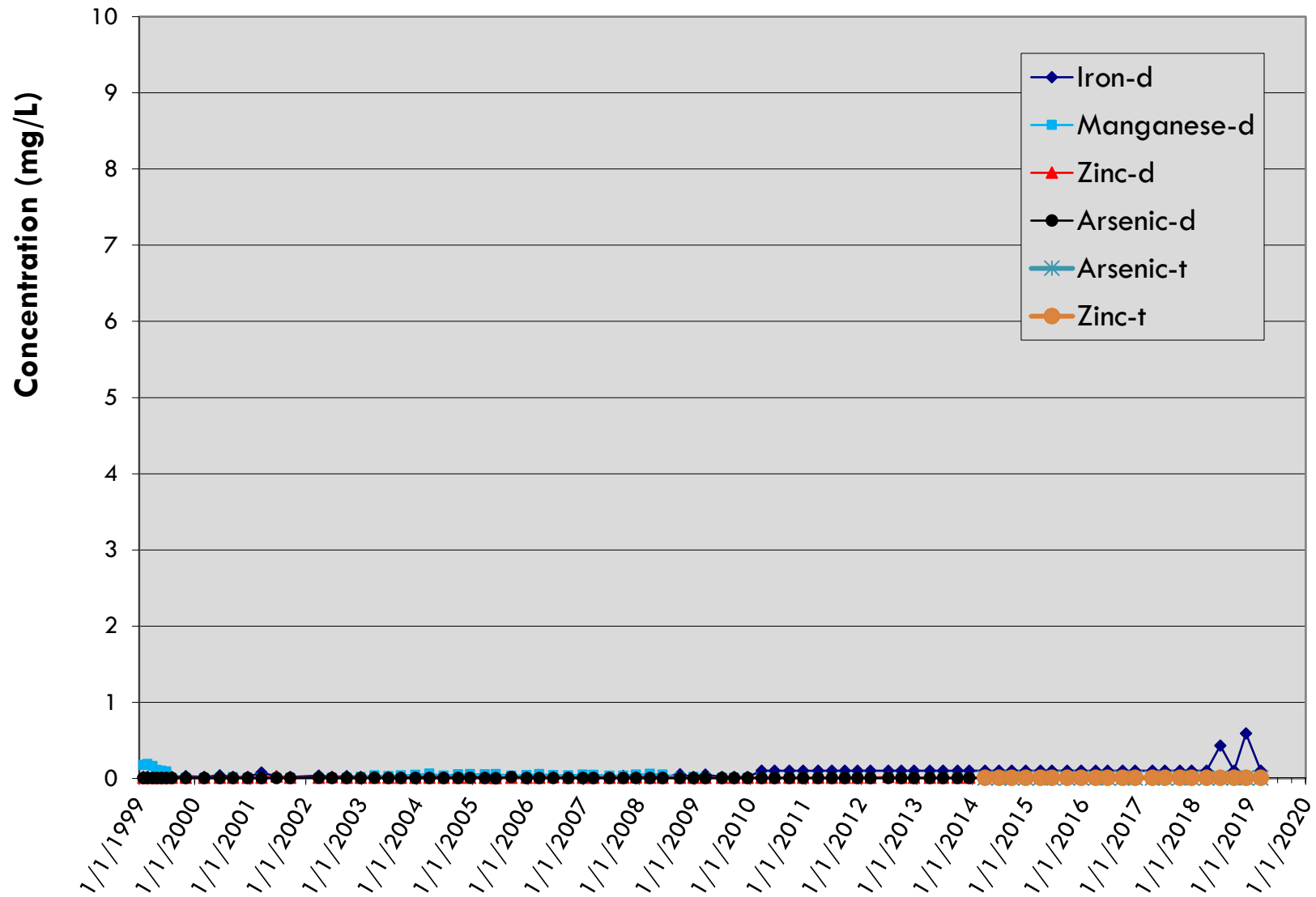
MW-7
LRI Landfill, Pierce County, Washington



MW-9 (Background) LRI Landfill, Pierce County, Washington

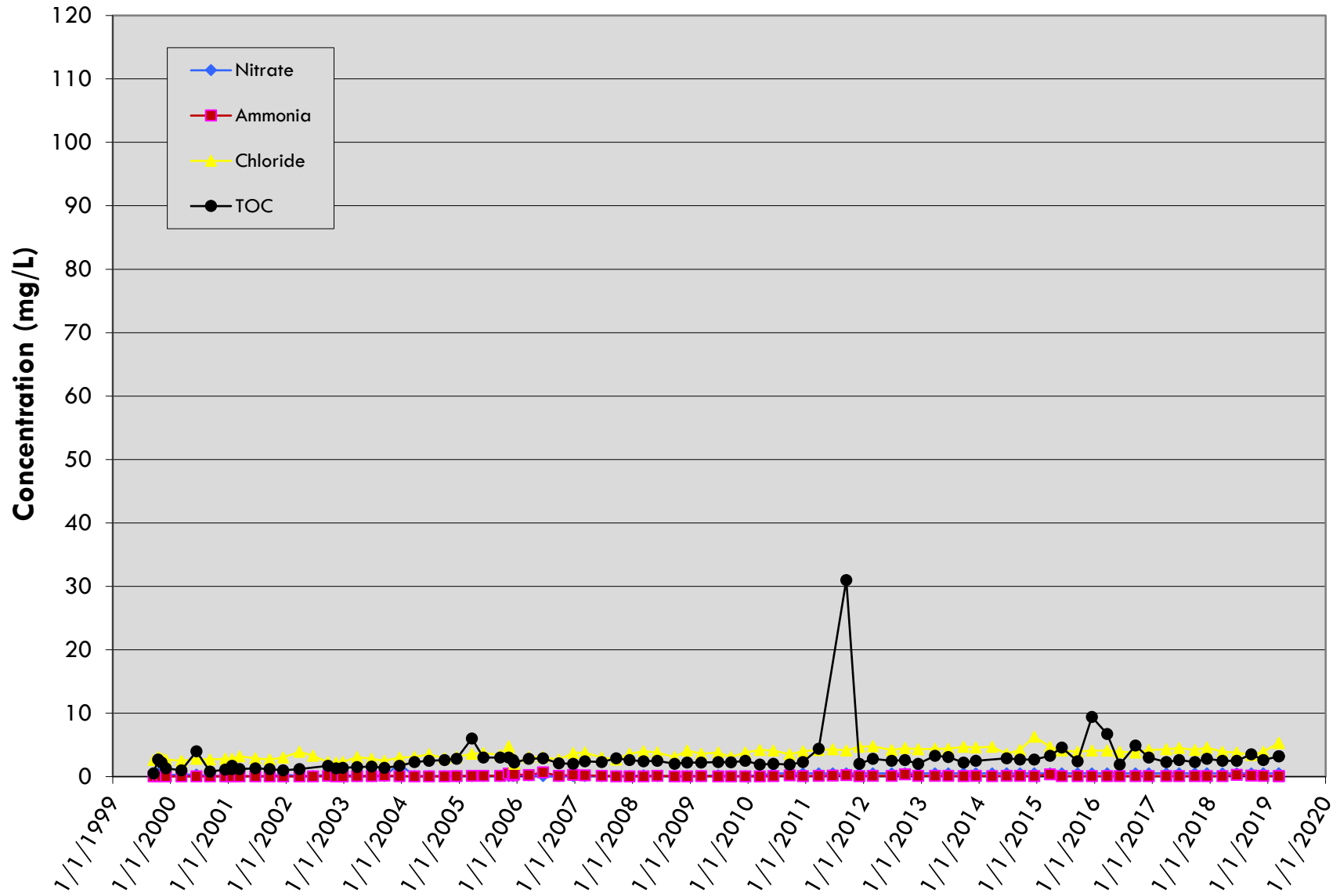


MW-10 (Background) LRI Landfill, Pierce County, Washington



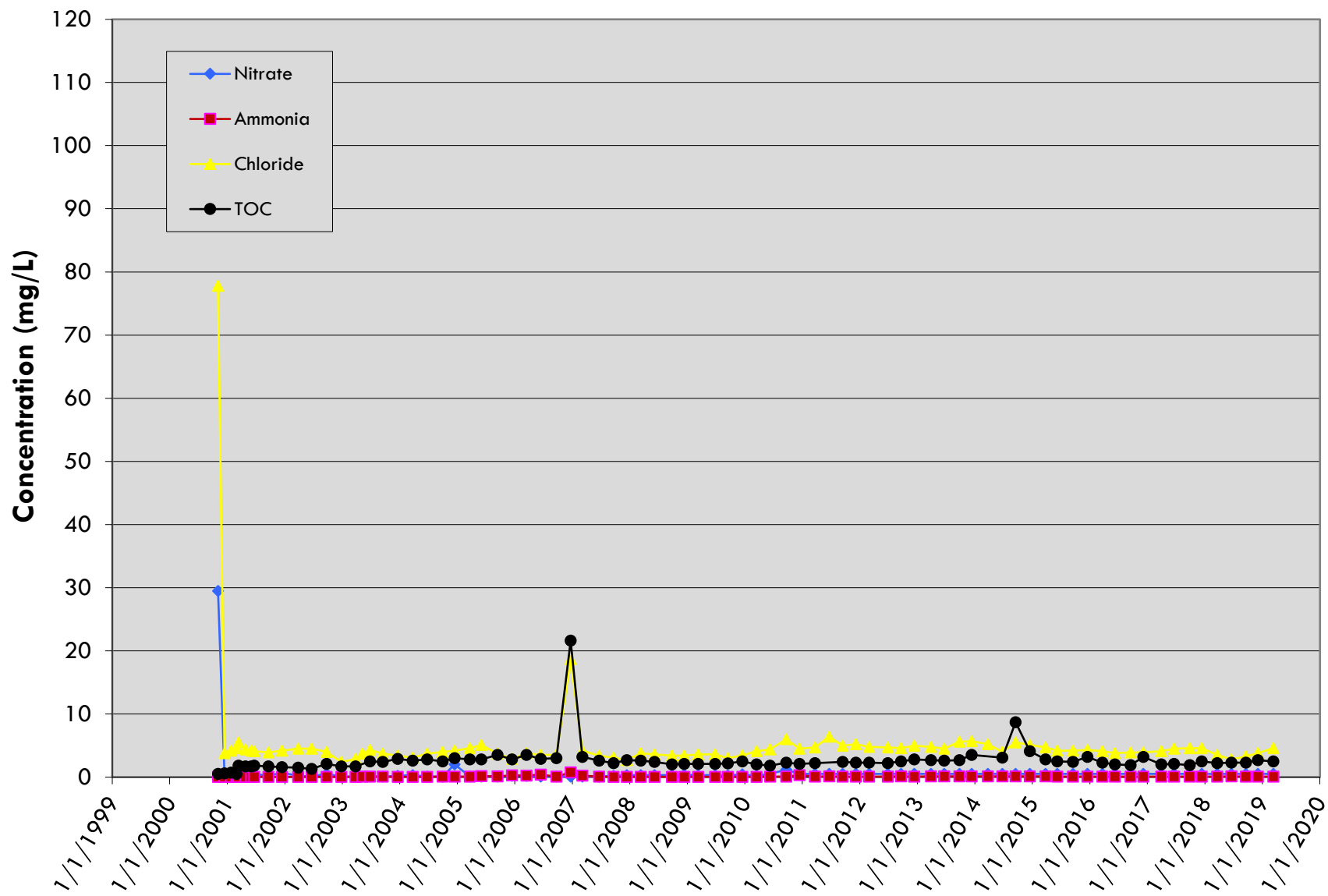
LDCS-1

LRI Landfill, Pierce County, Washington



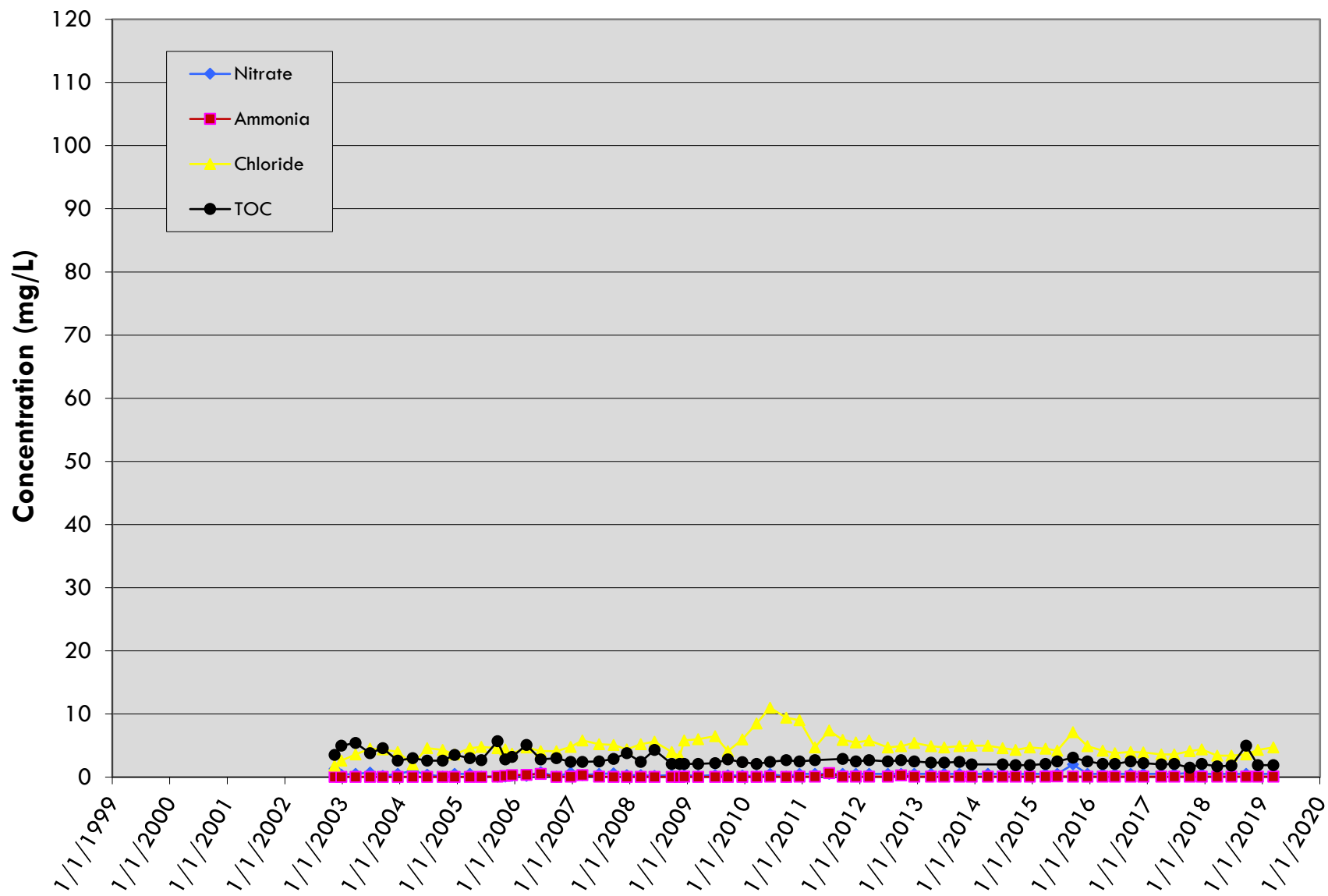
LDCS-2A

LRI Landfill, Pierce County, Washington



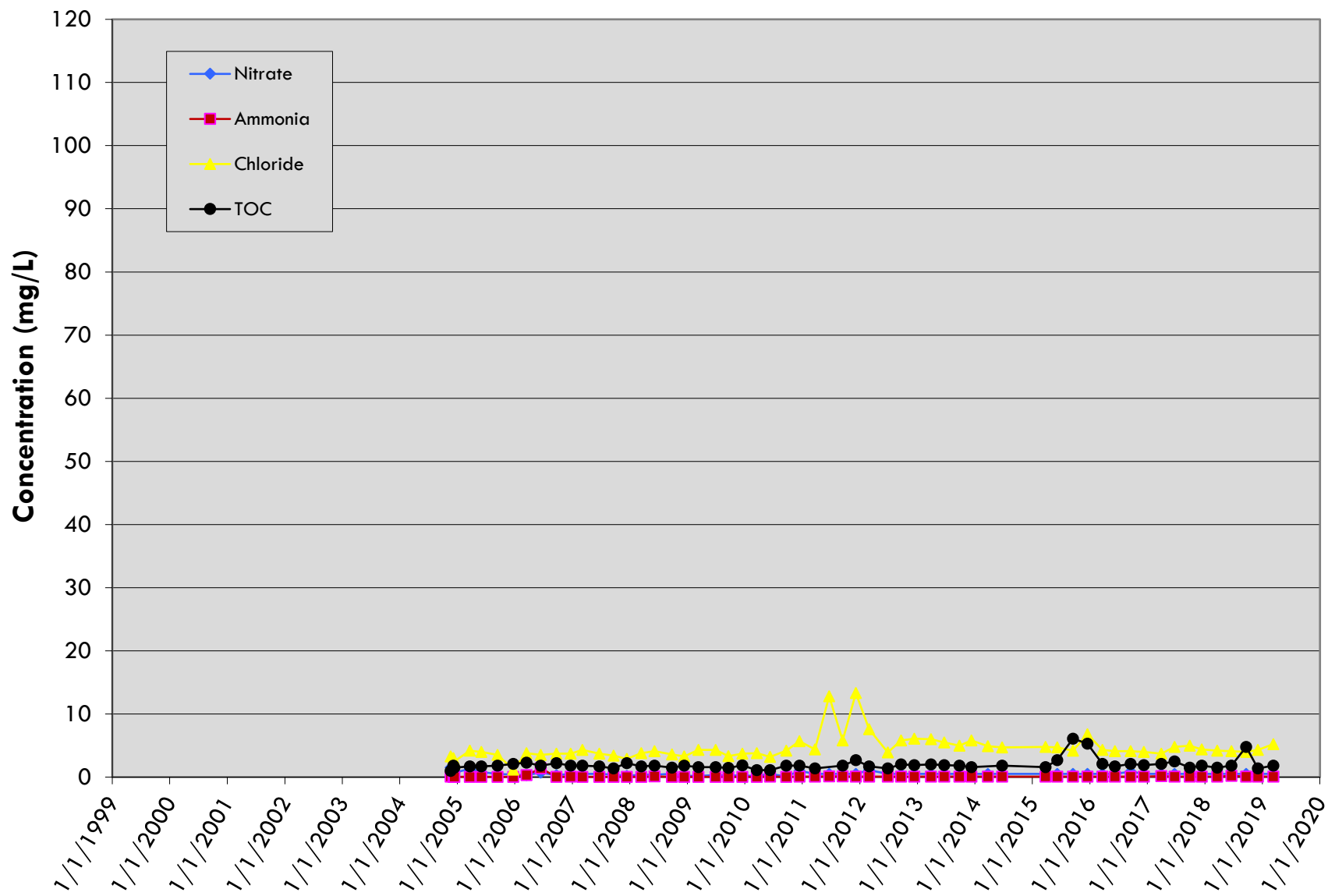
LDCS-2B

LRI Landfill, Pierce County, Washington



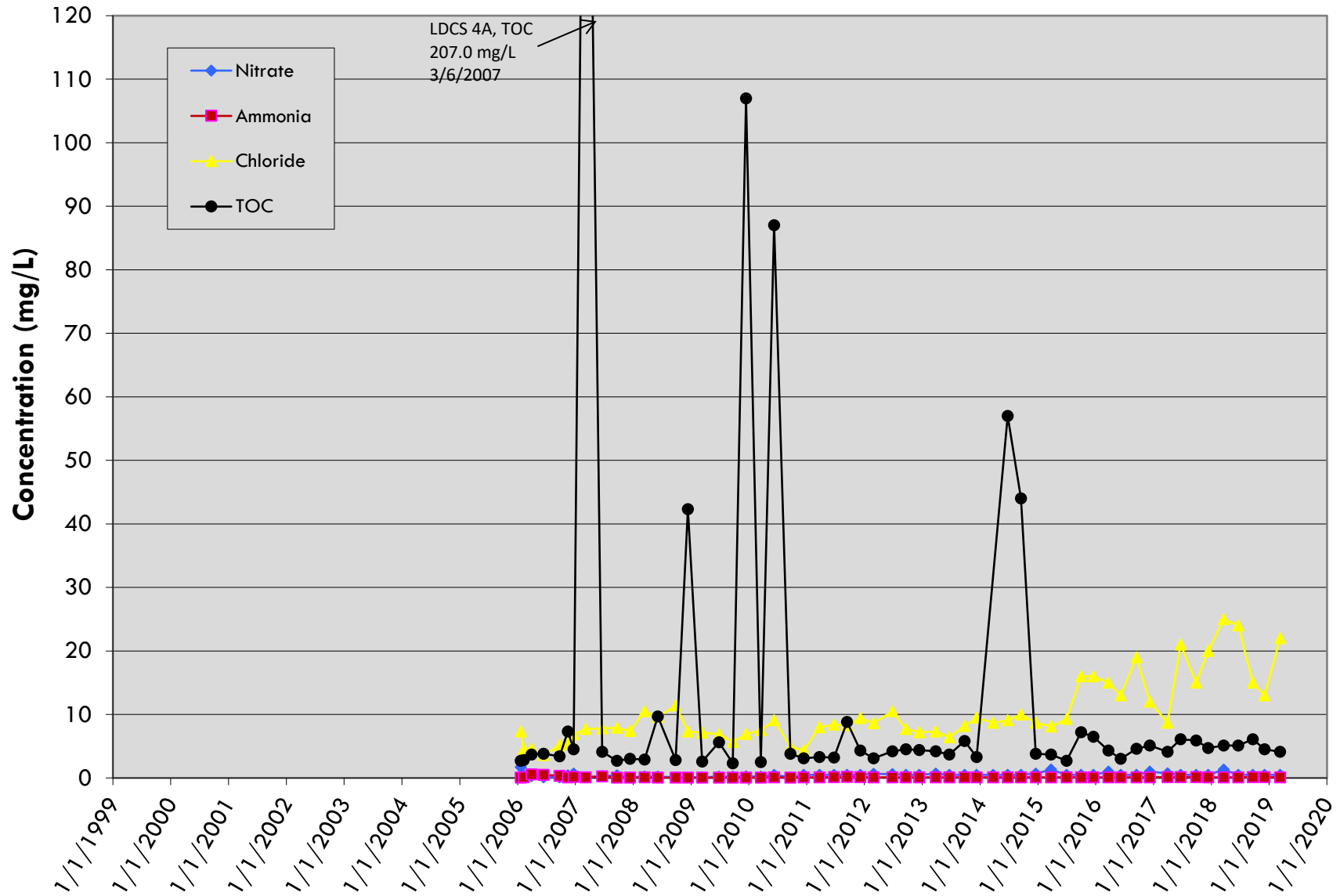
LDCS-3A

LRI Landfill, Pierce County, Washington



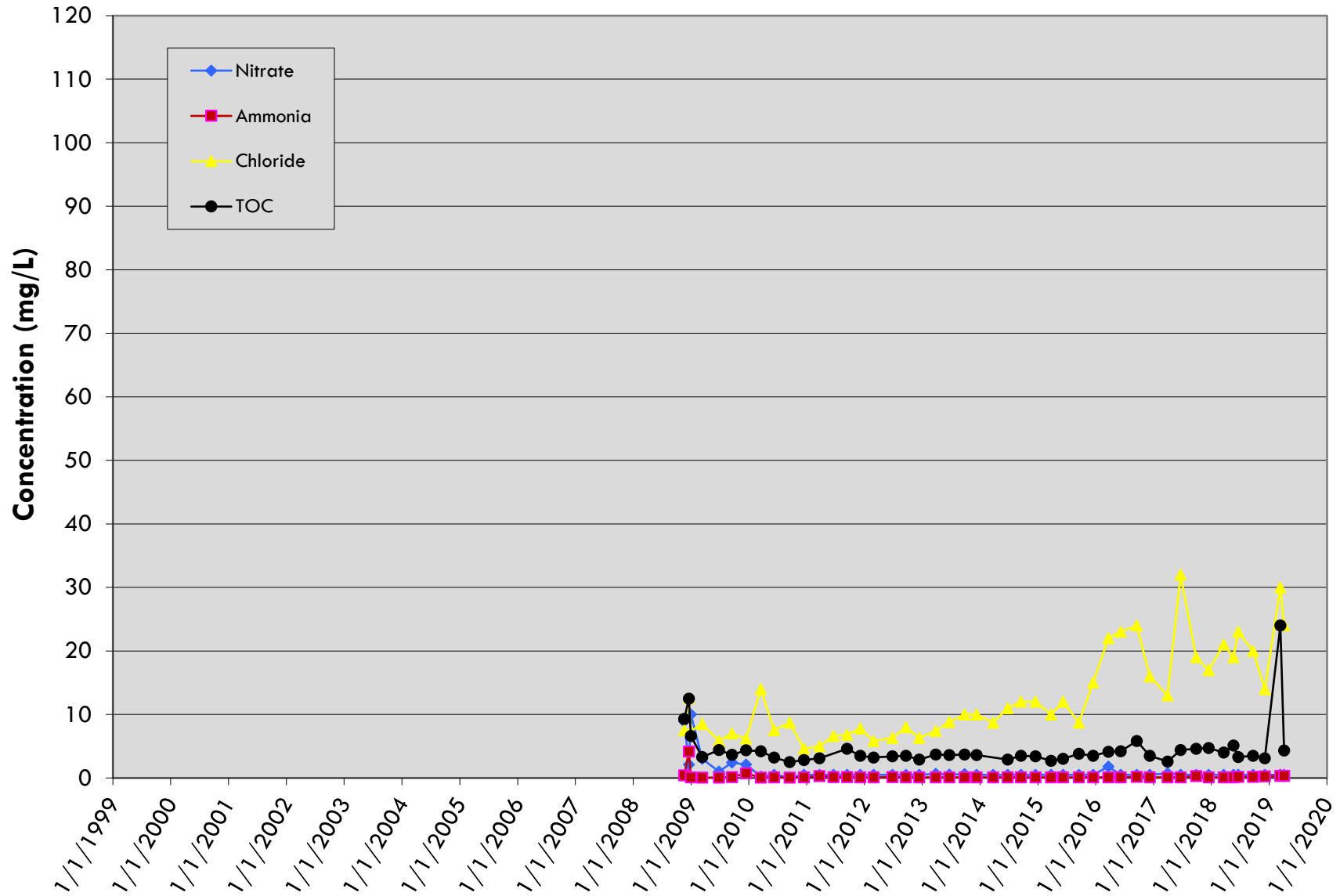
LDCS-4A

LRI Landfill, Pierce County, Washington



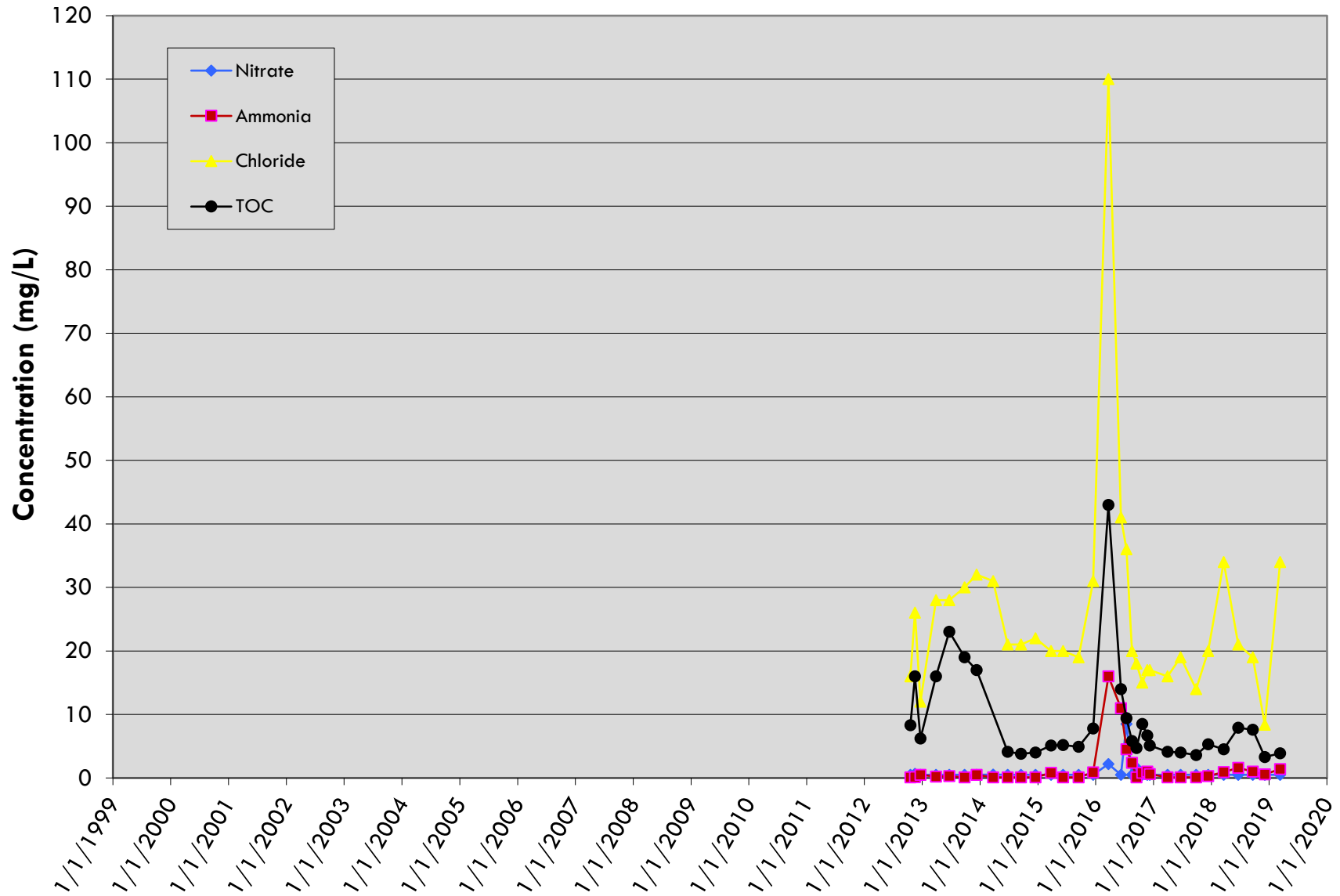
LDCS-4B

LRI Landfill, Pierce County, Washington



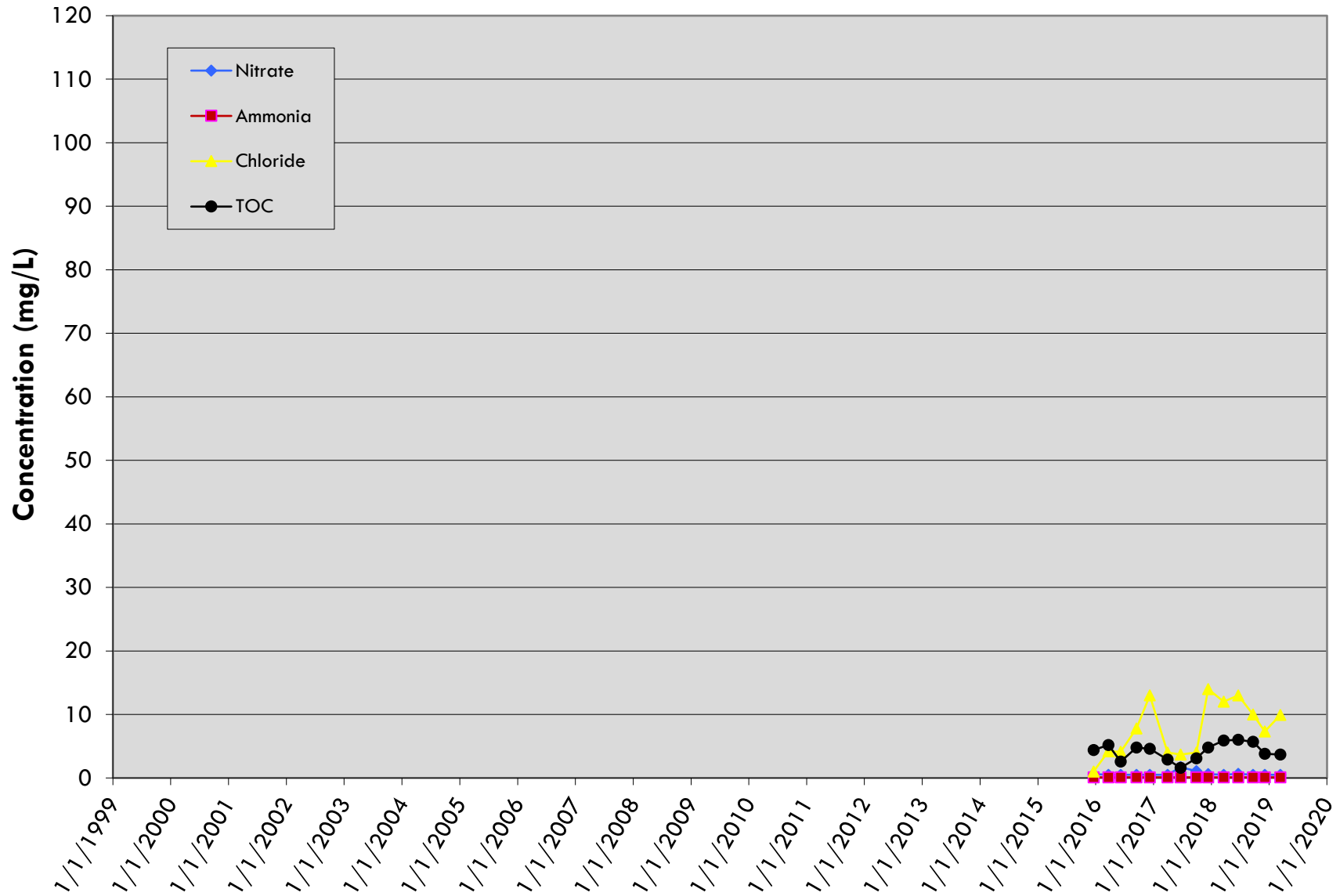
LDCS-5

LRI Landfill, Pierce County, Washington



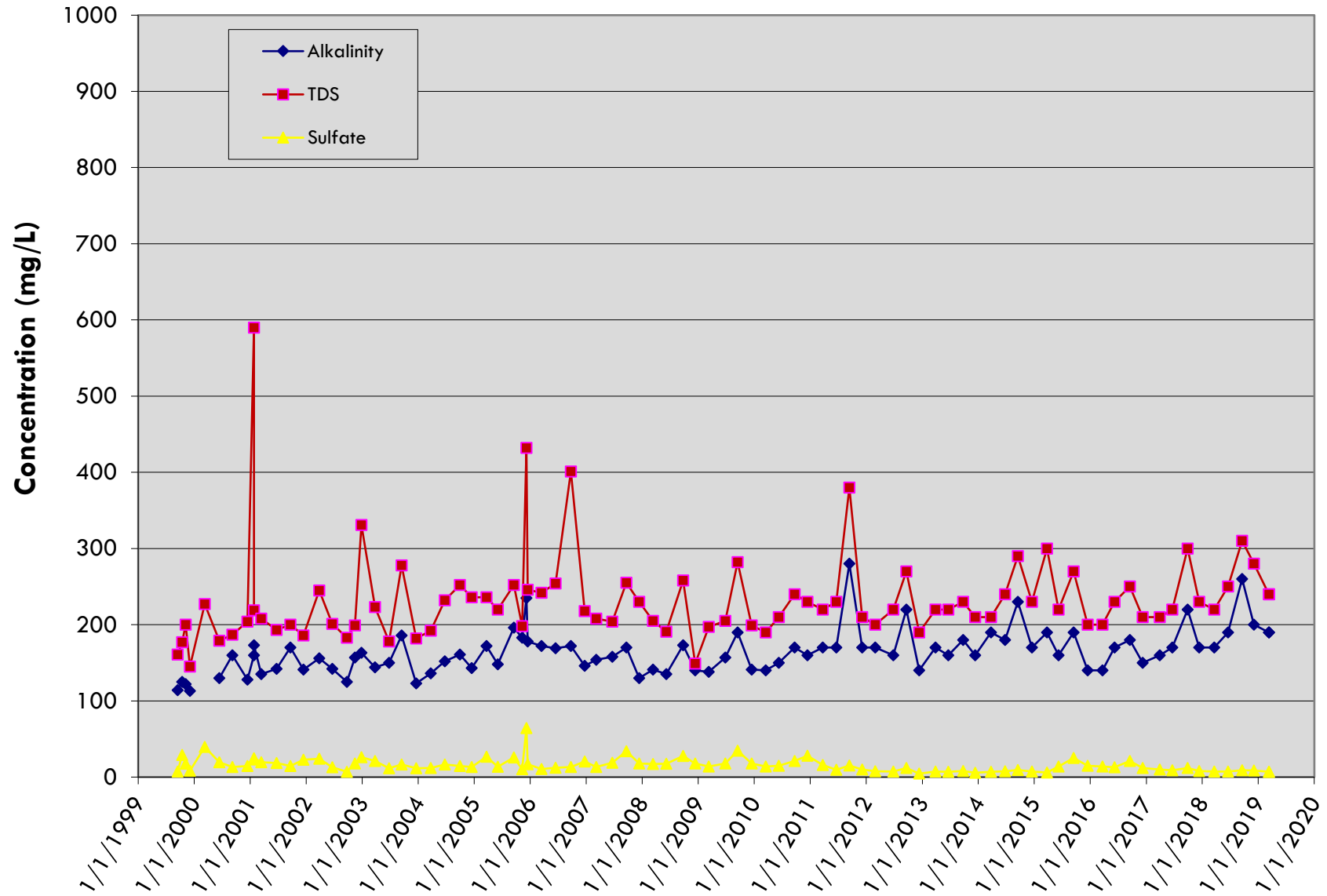
LDCS-6A

LRI Landfill, Pierce County, Washington



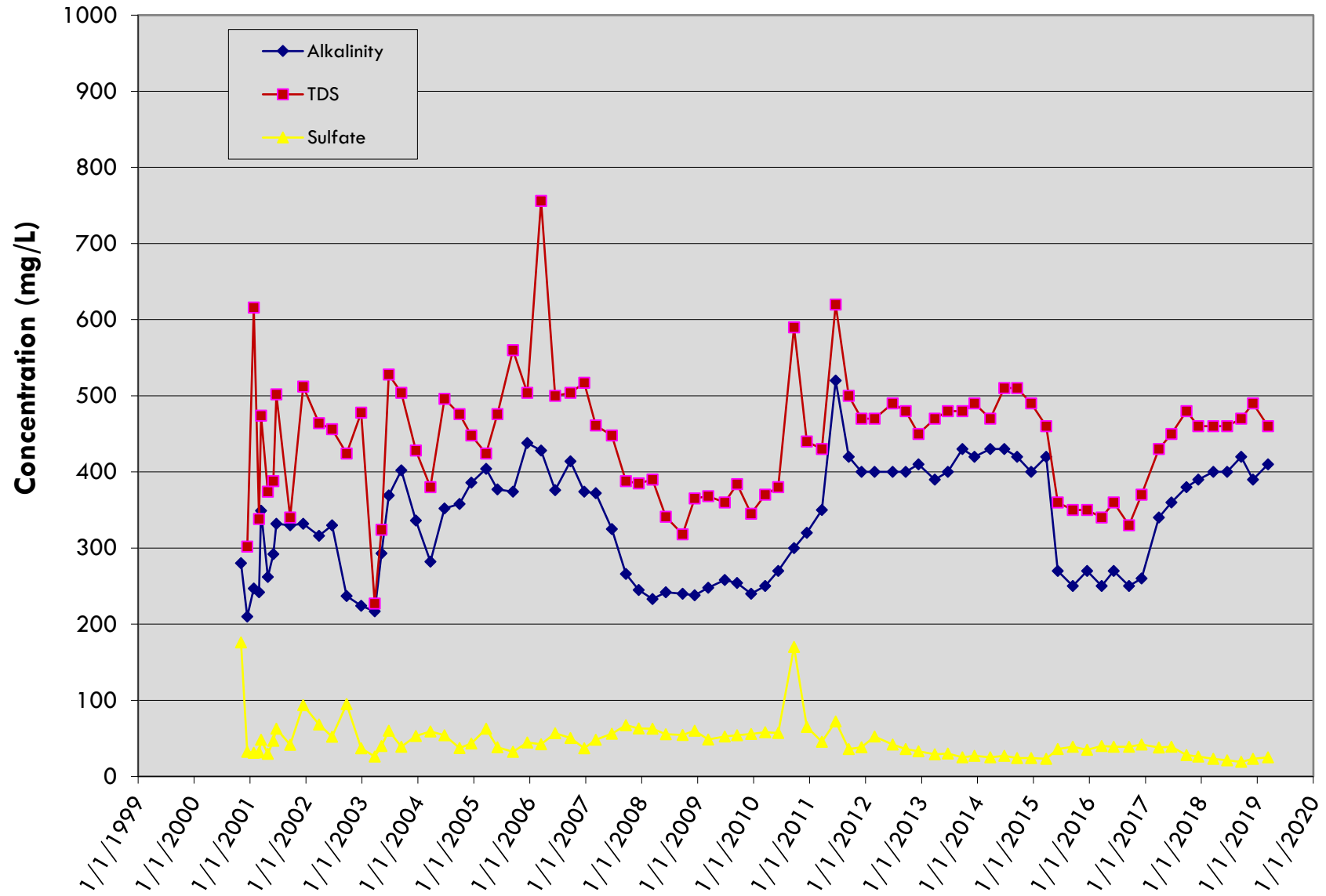
LDCS-1

LRI Landfill, Pierce County, Washington



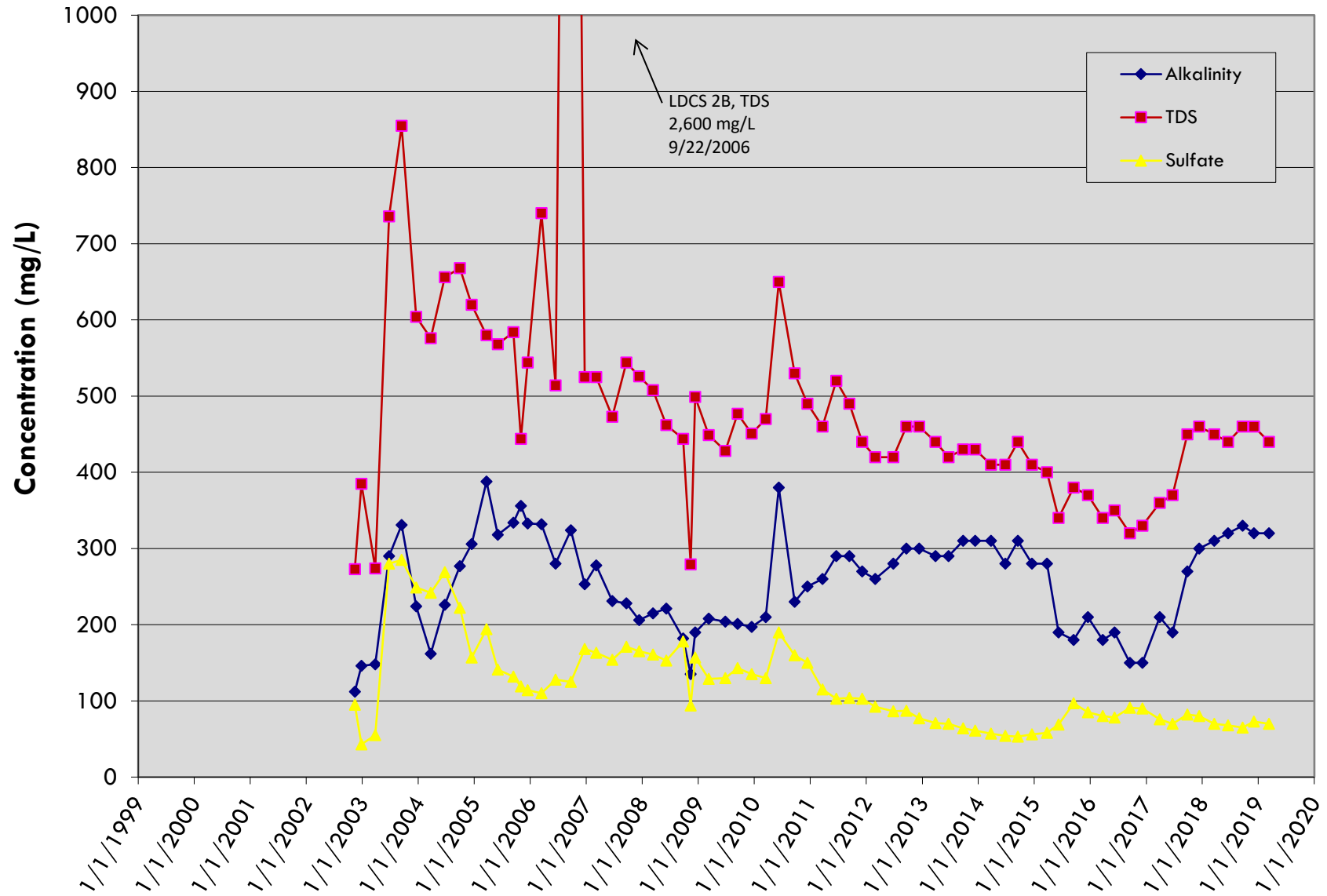
LDCS-2A

LRI Landfill, Pierce County, Washington



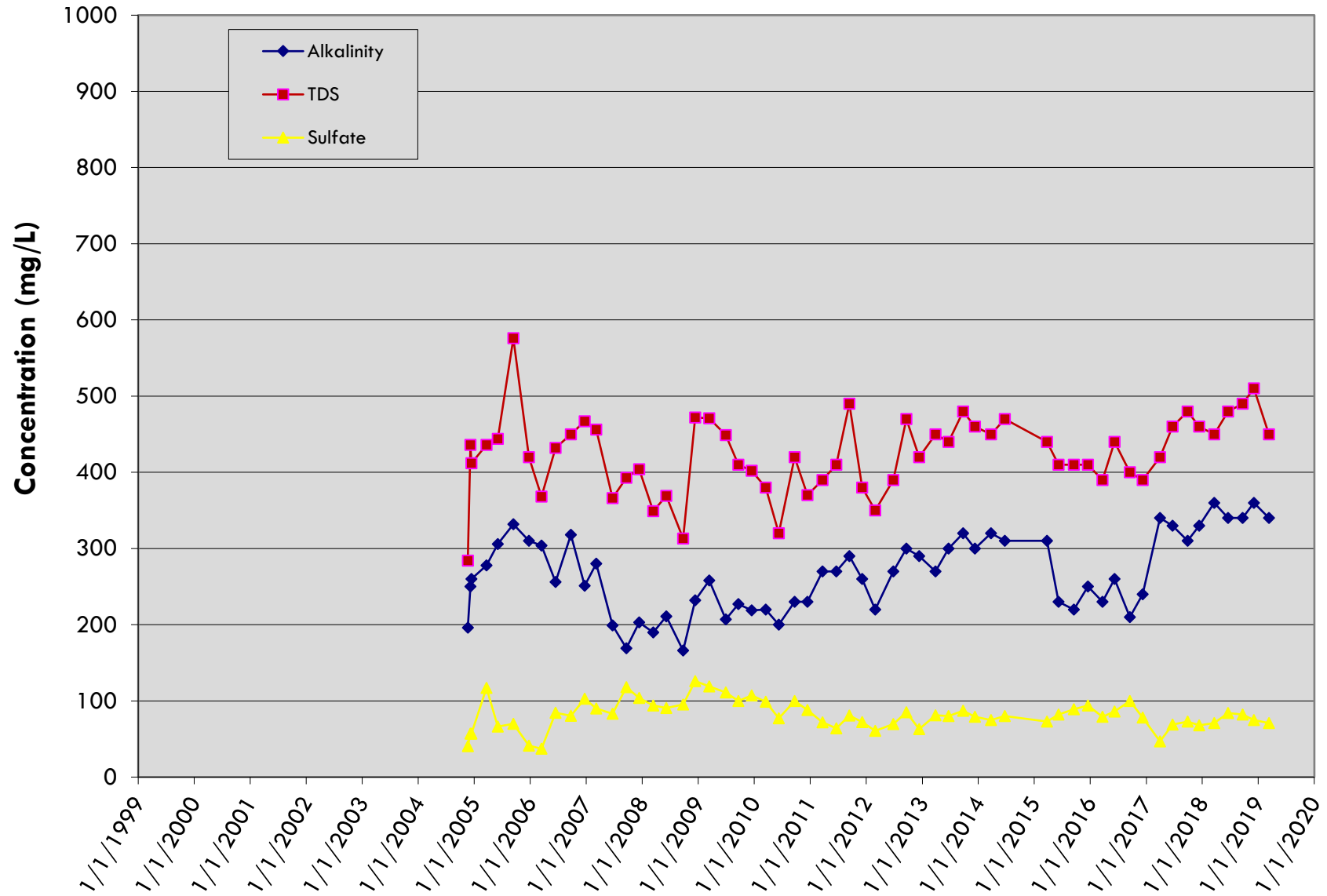
LDCS-2B

LRI Landfill, Pierce County, Washington



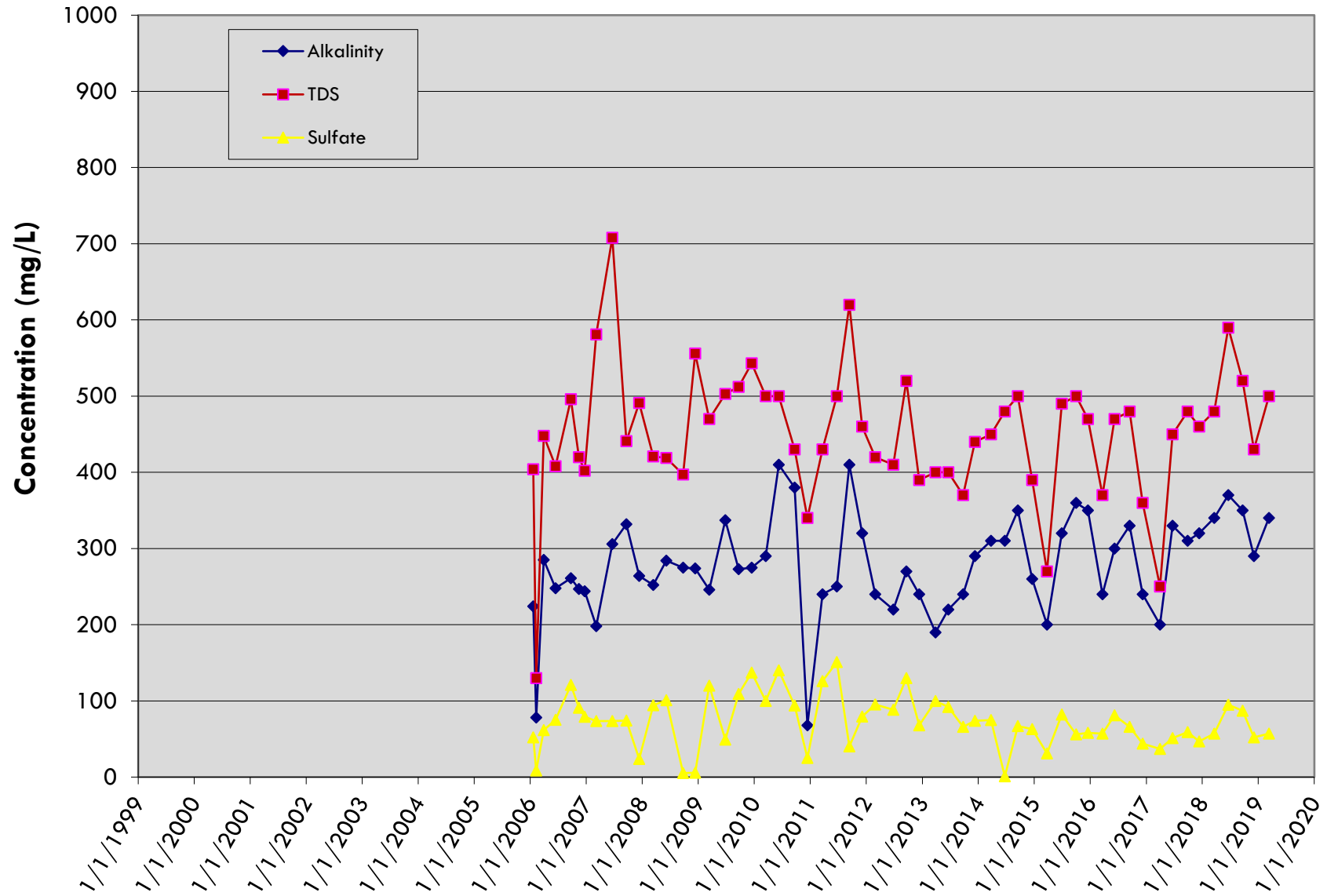
LDCS-3A

LRI Landfill, Pierce County, Washington



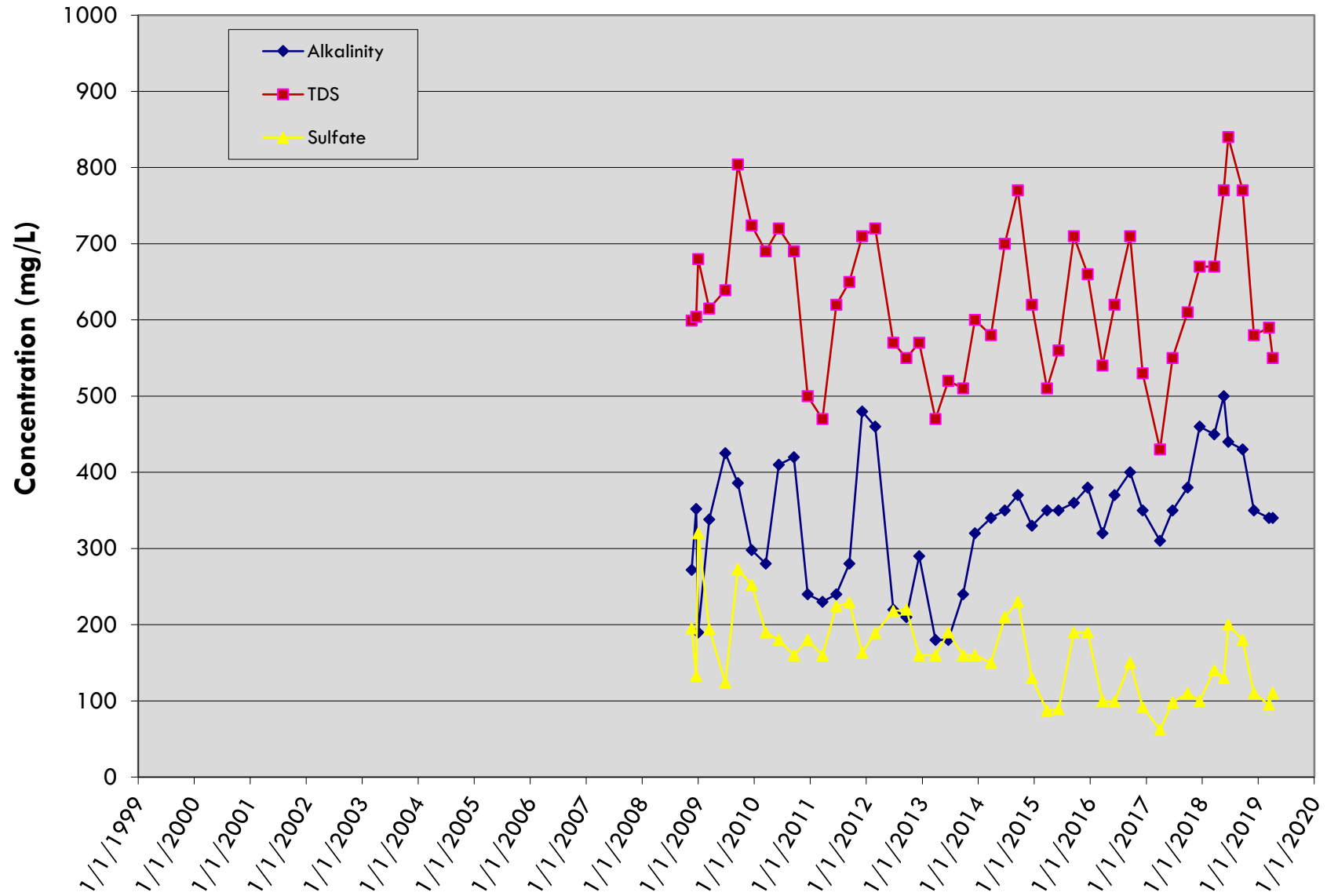
LDCS-4A

LRI Landfill, Pierce County, Washington



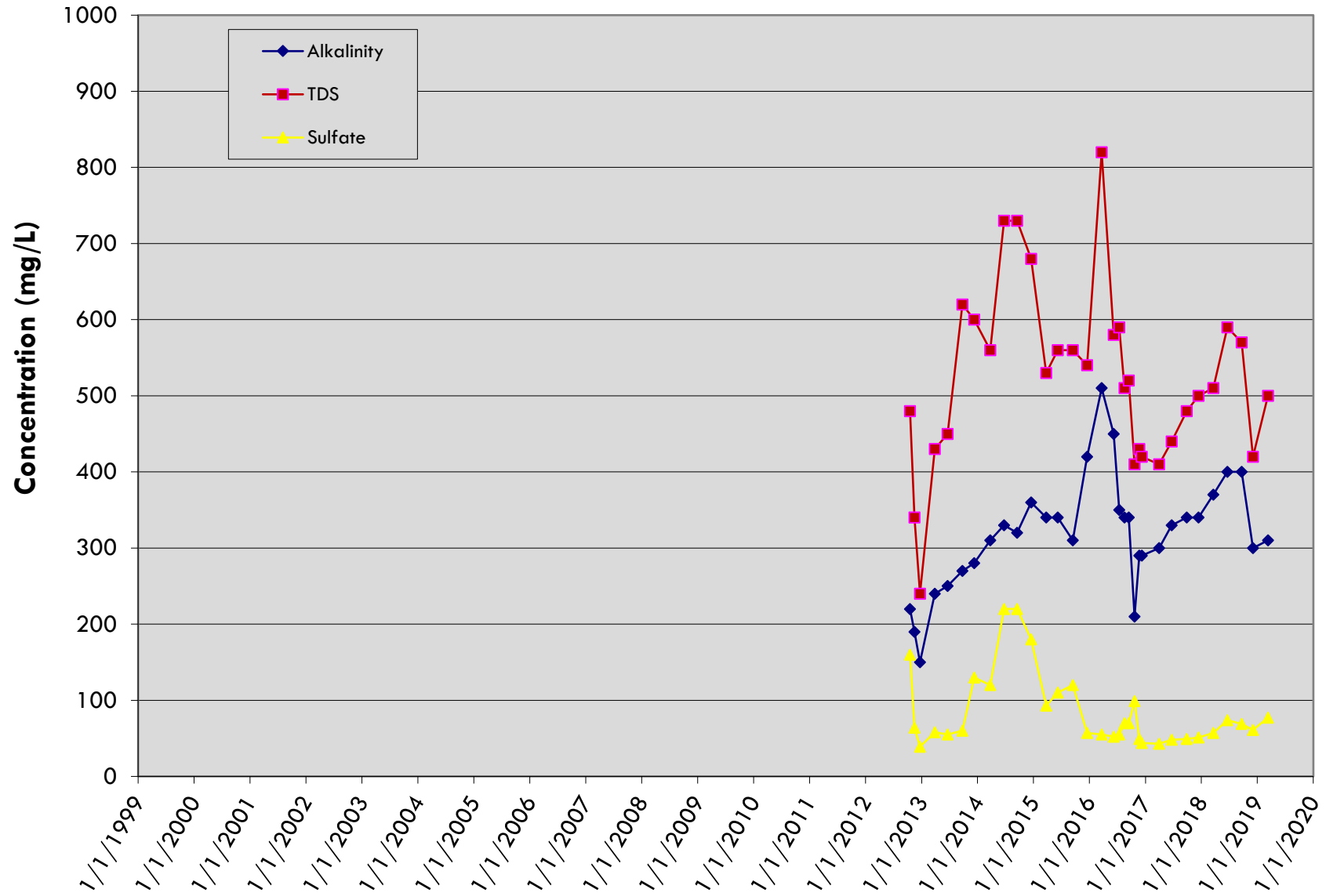
LDCS-4B

LRI Landfill, Pierce County, Washington



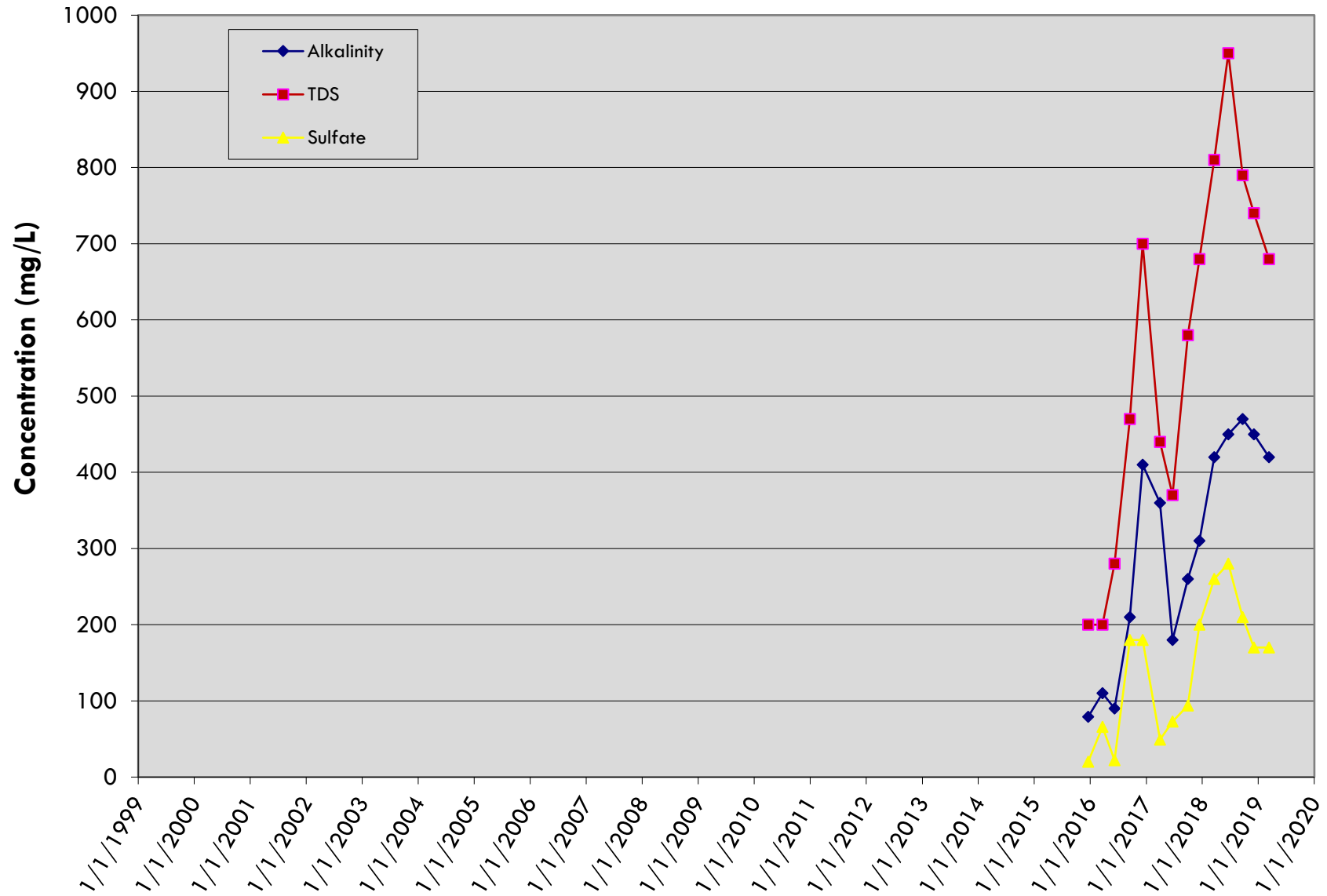
LDCS-5

LRI Landfill, Pierce County, Washington



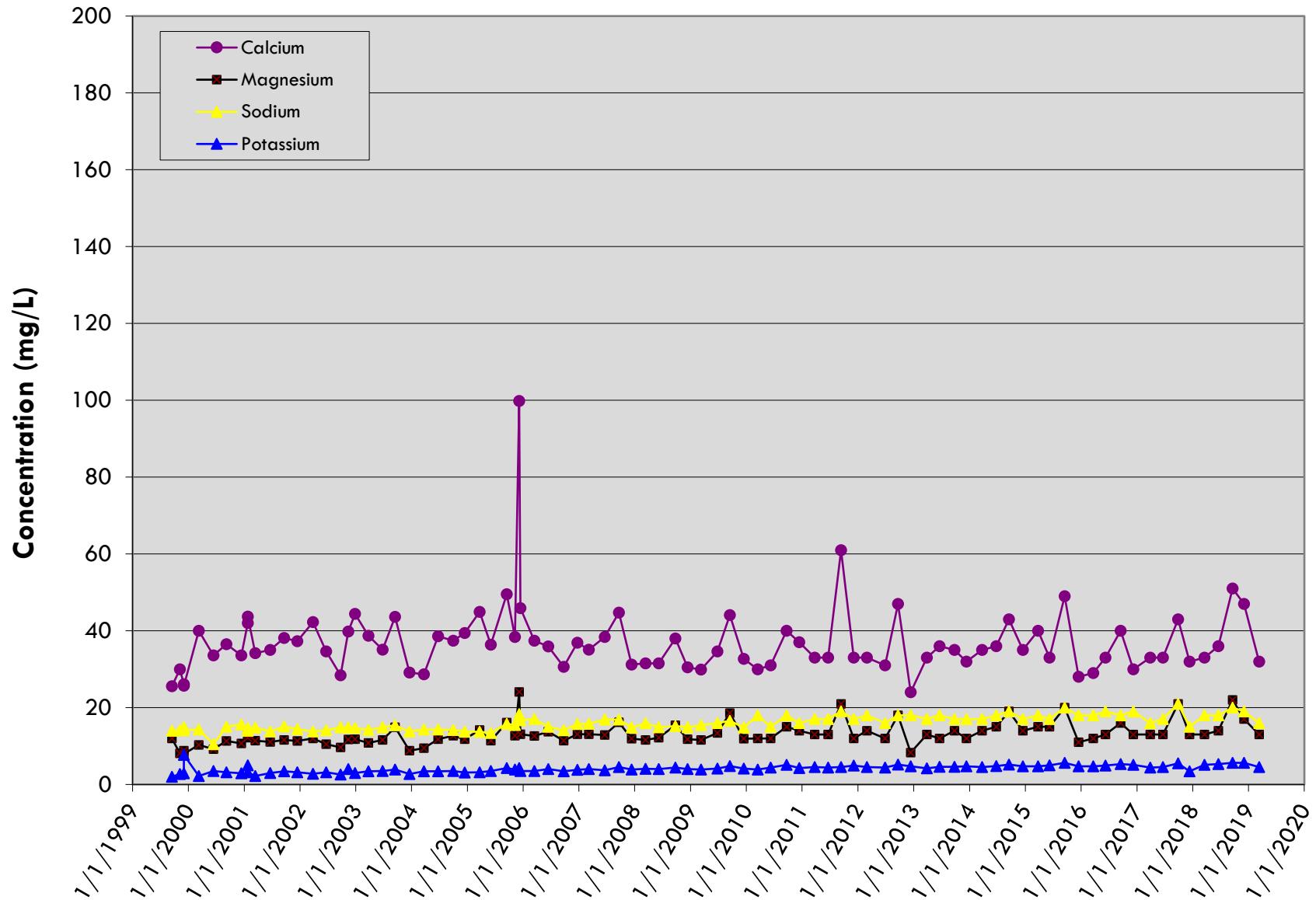
LDCS-6A

LRI Landfill, Pierce County, Washington



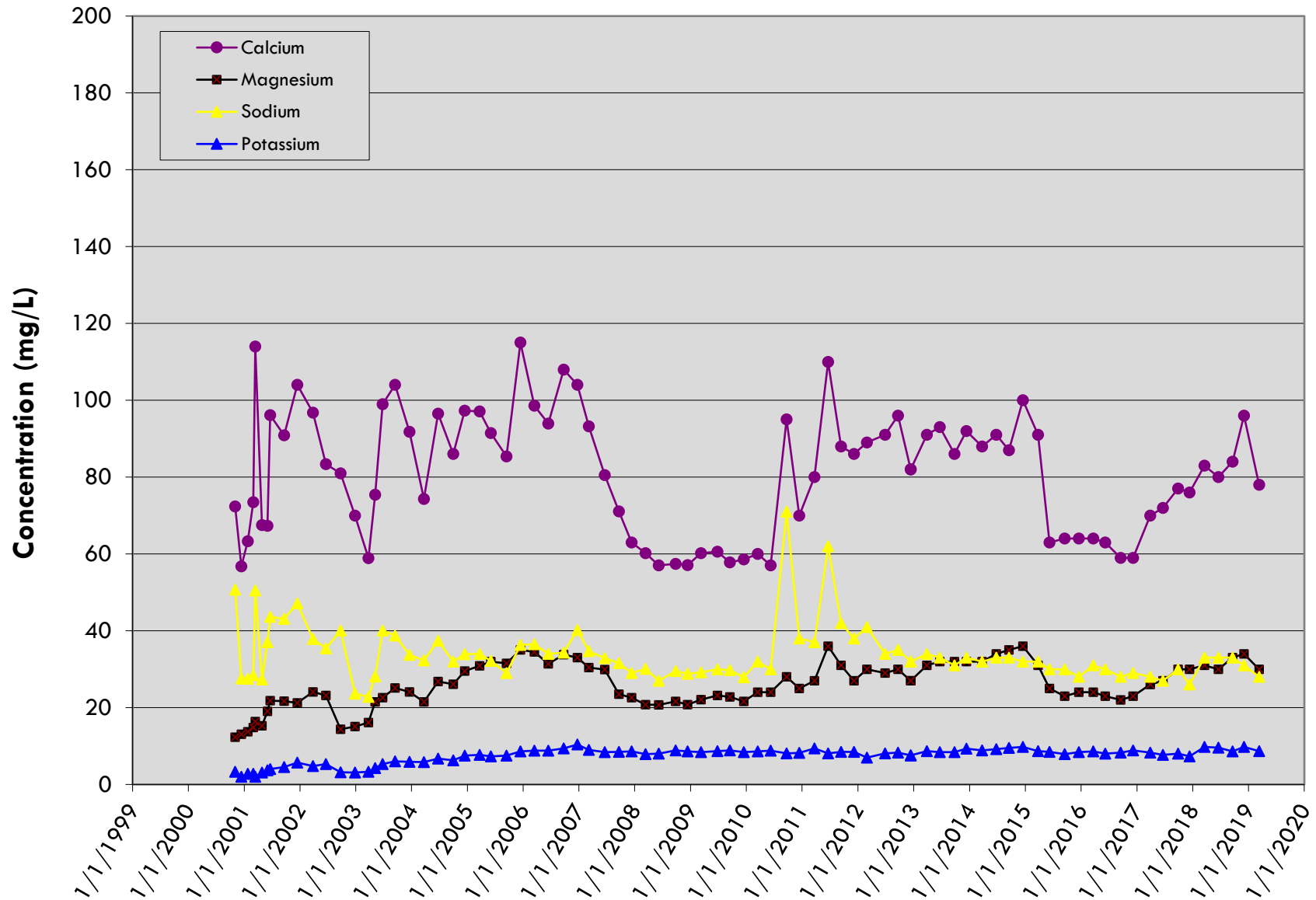
LDCS-1

LRI Landfill, Pierce County, Washington



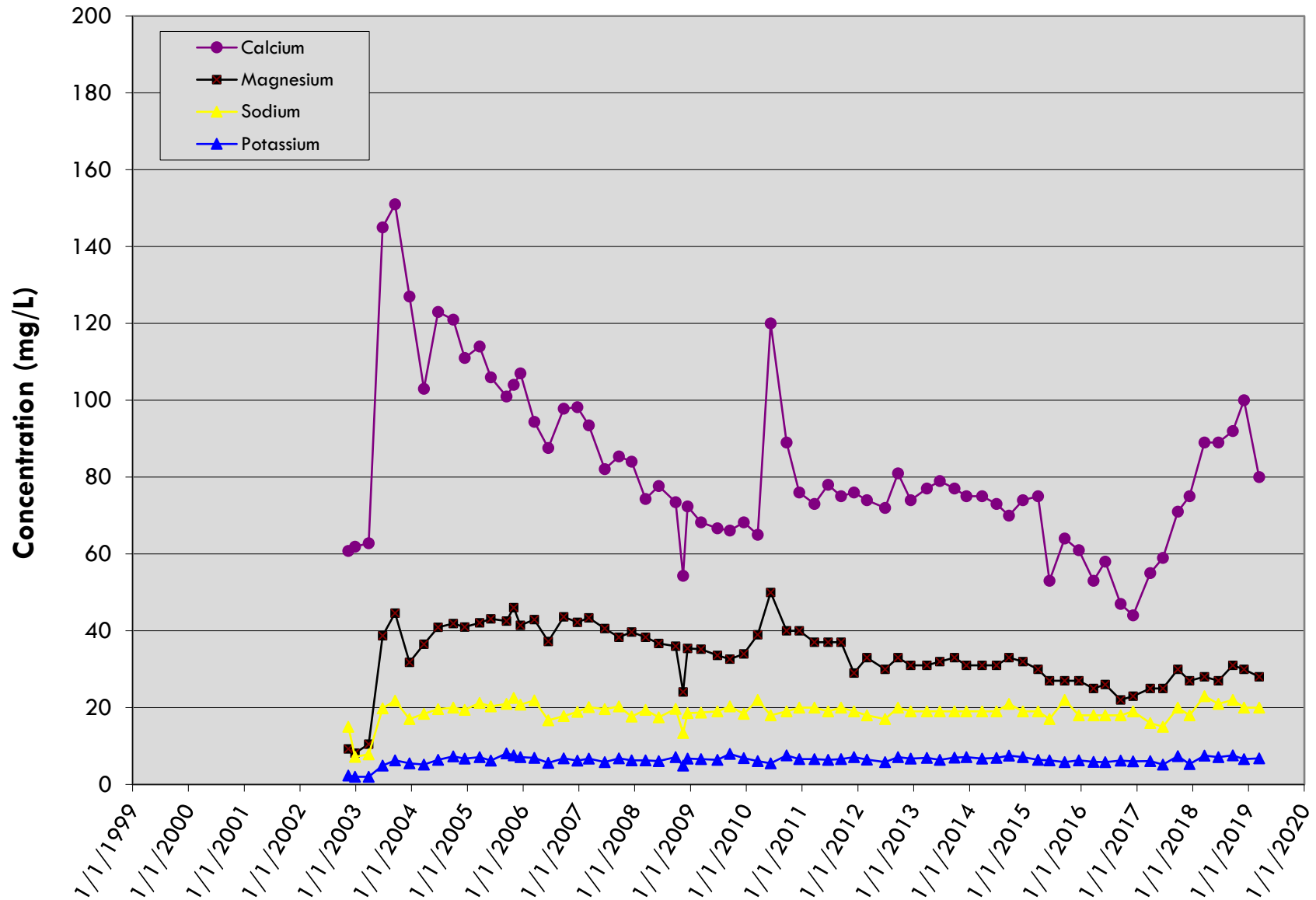
LDCS-2A

LRI Landfill, Pierce County, Washington



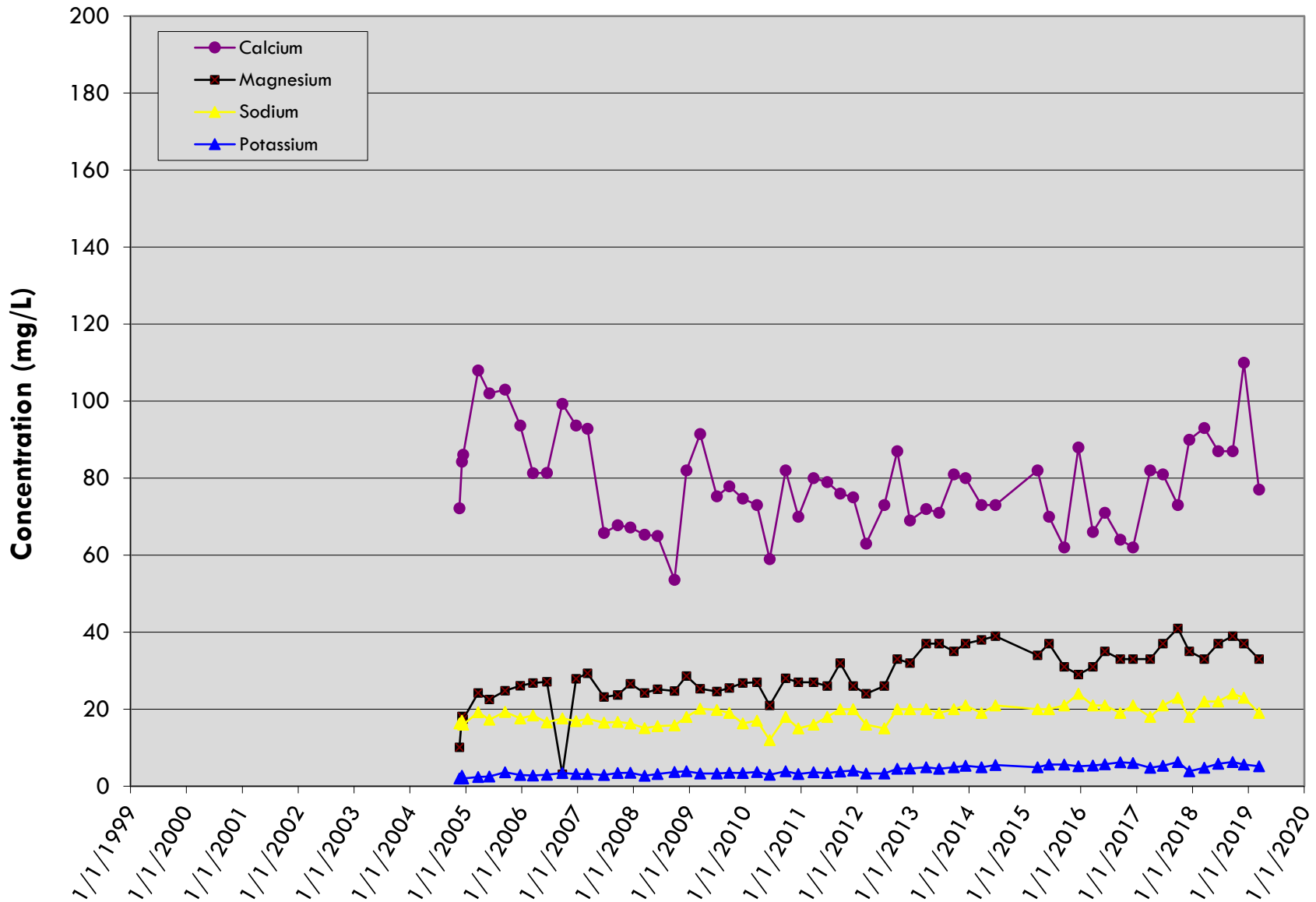
LDCS-2B

LRI Landfill, Pierce County, Washington



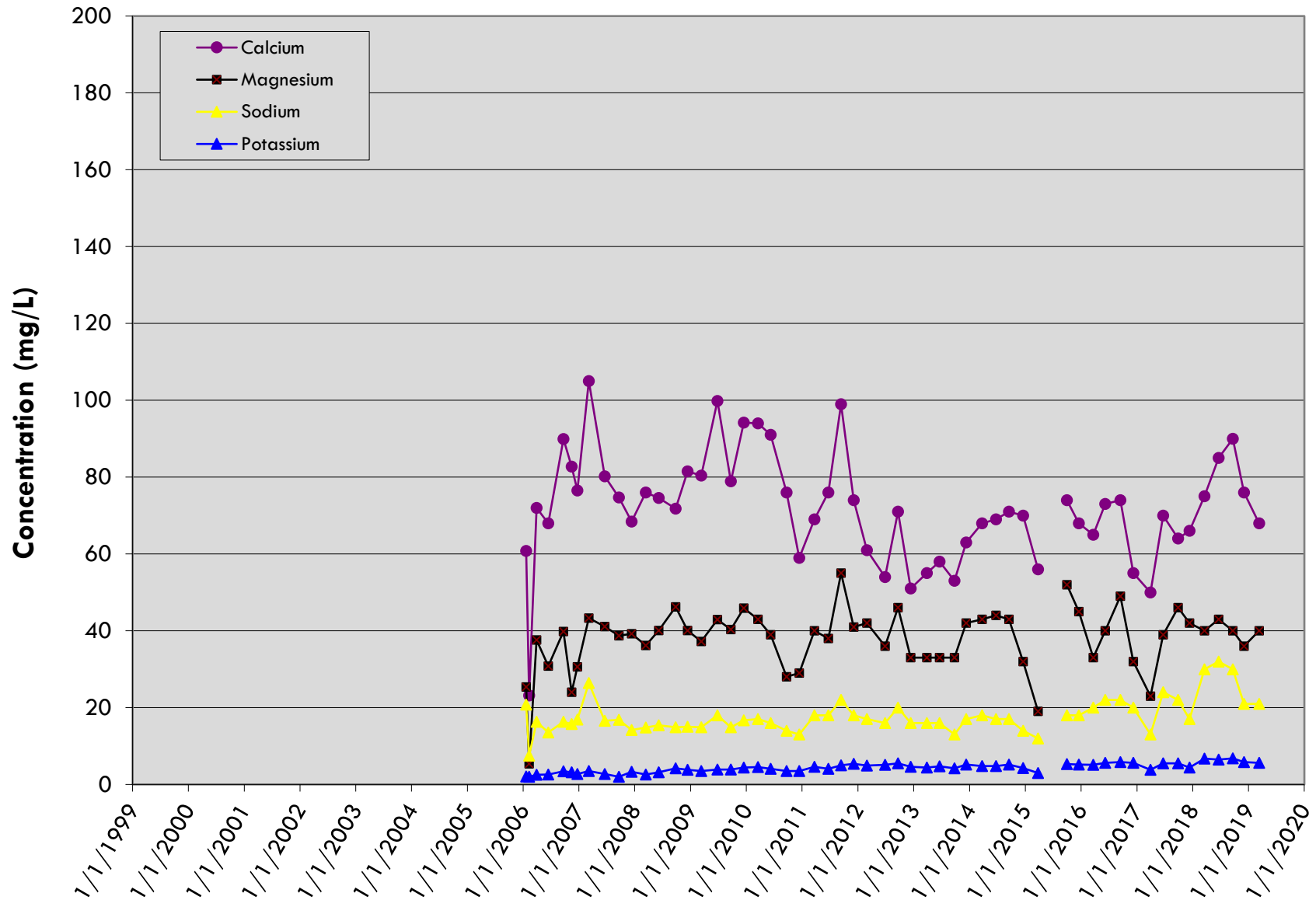
LDCS-3A

LRI Landfill, Pierce County, Washington



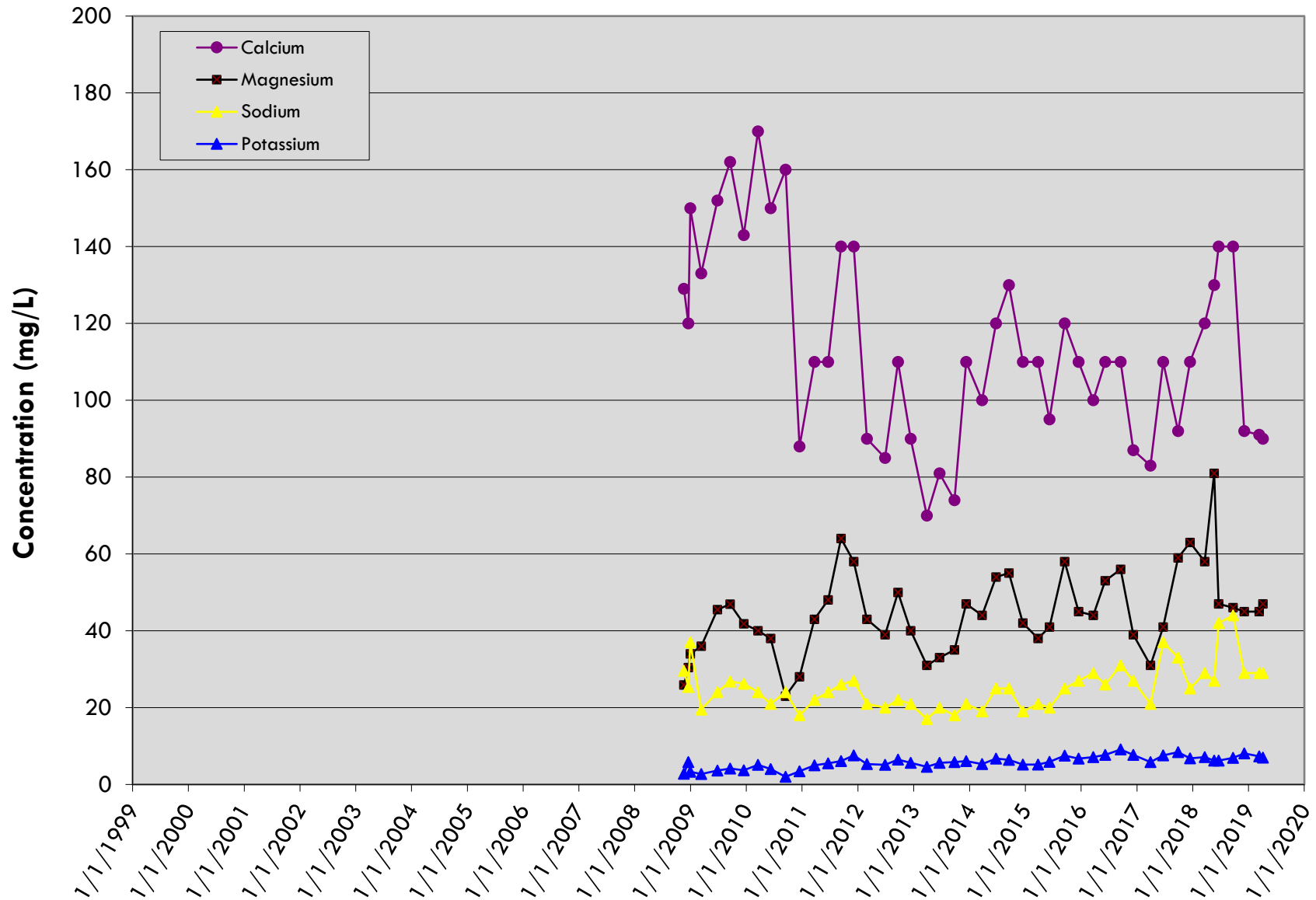
LDCS-4A

LRI Landfill, Pierce County, Washington



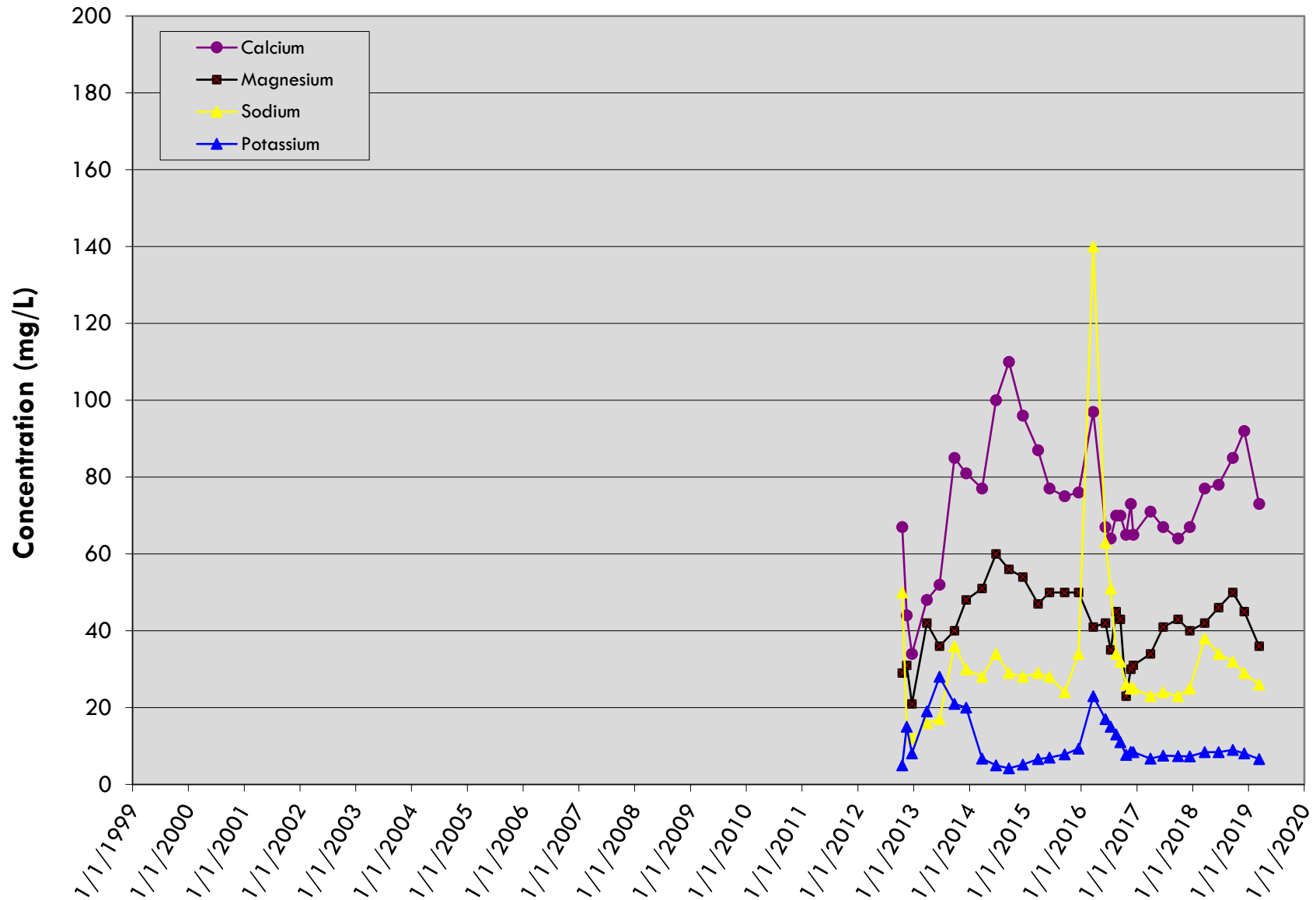
LDCS-4B

LRI Landfill, Pierce County, Washington



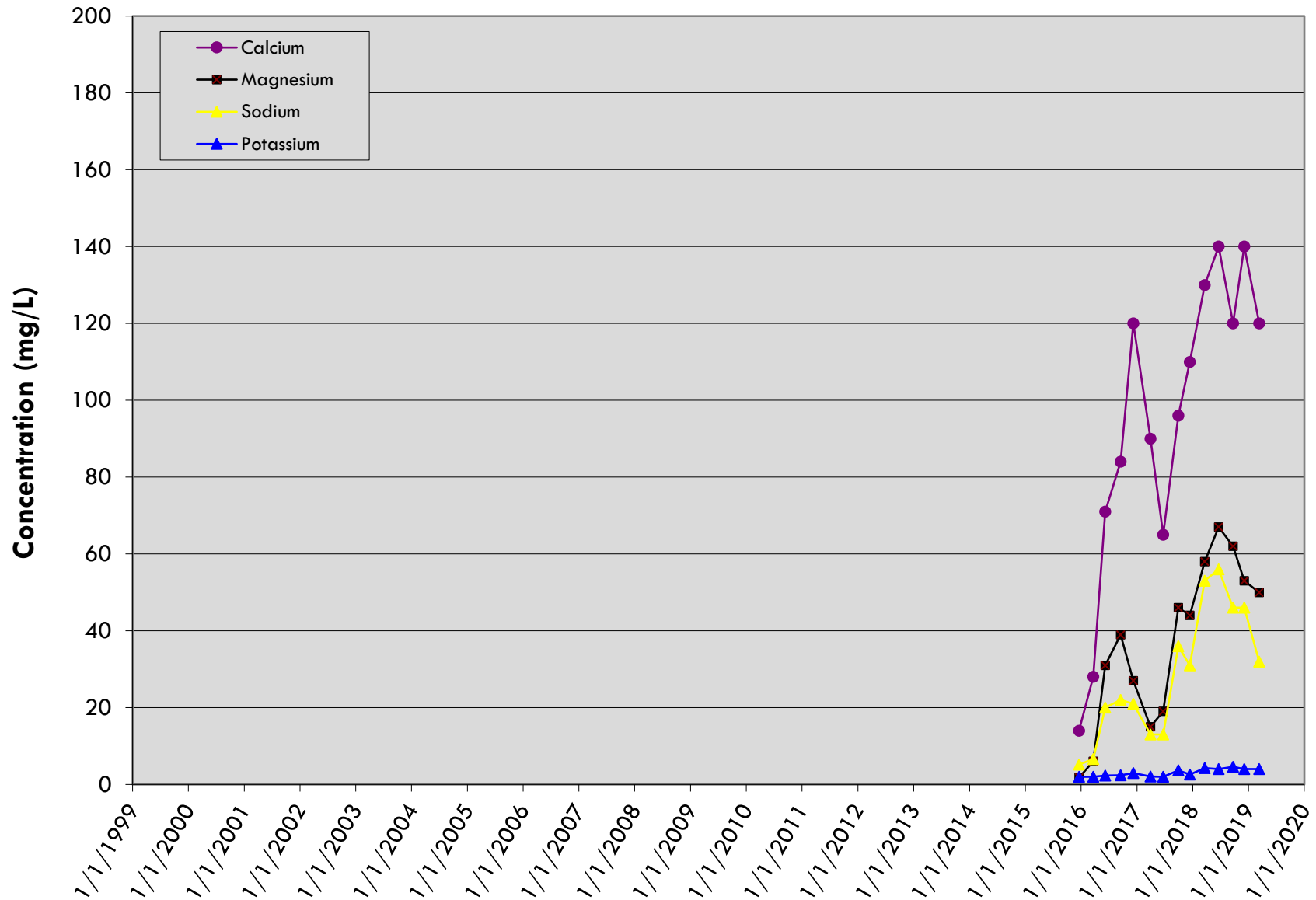
LDCS-5

LRI Landfill, Pierce County, Washington



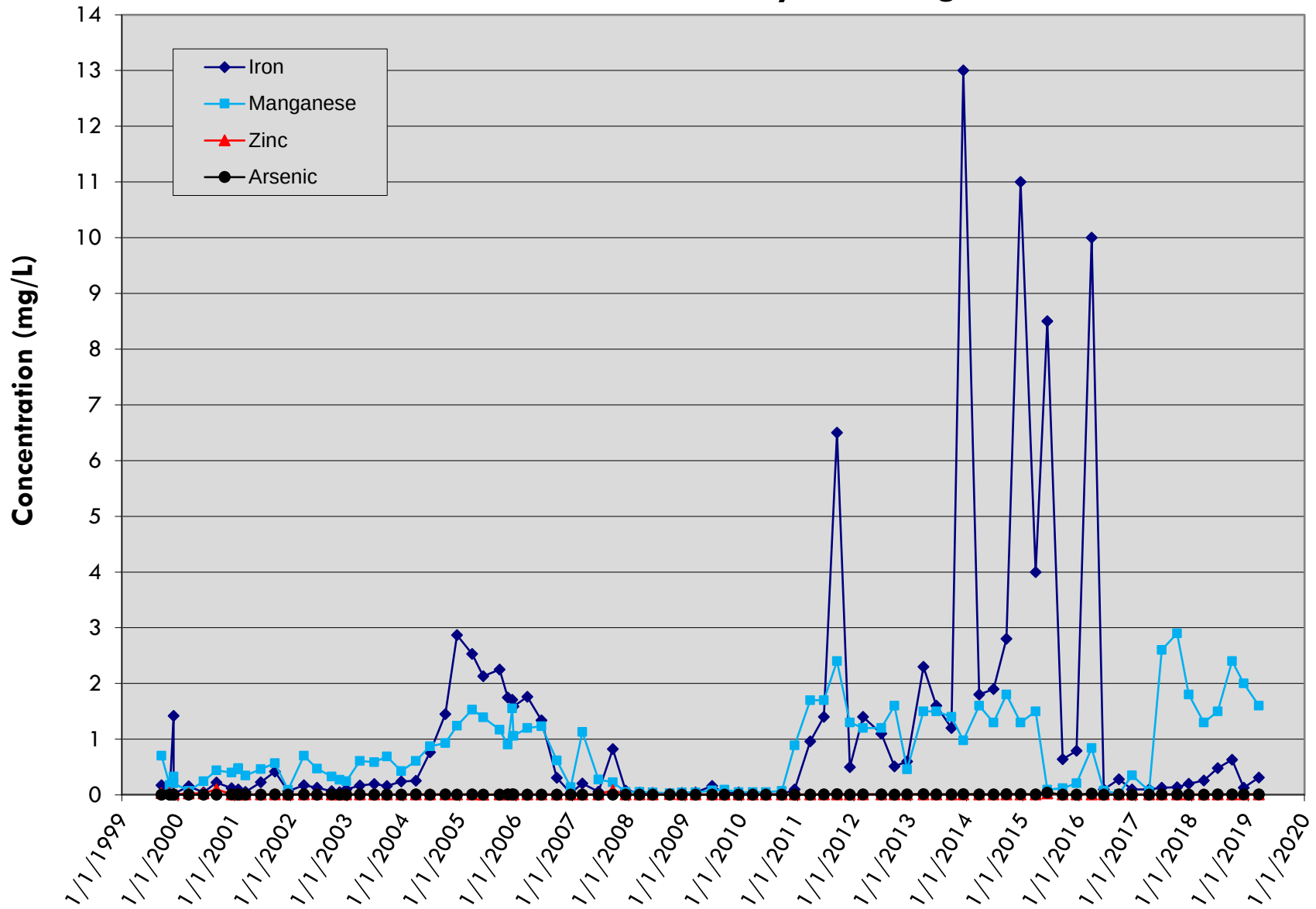
LDCS-6A

LRI Landfill, Pierce County, Washington



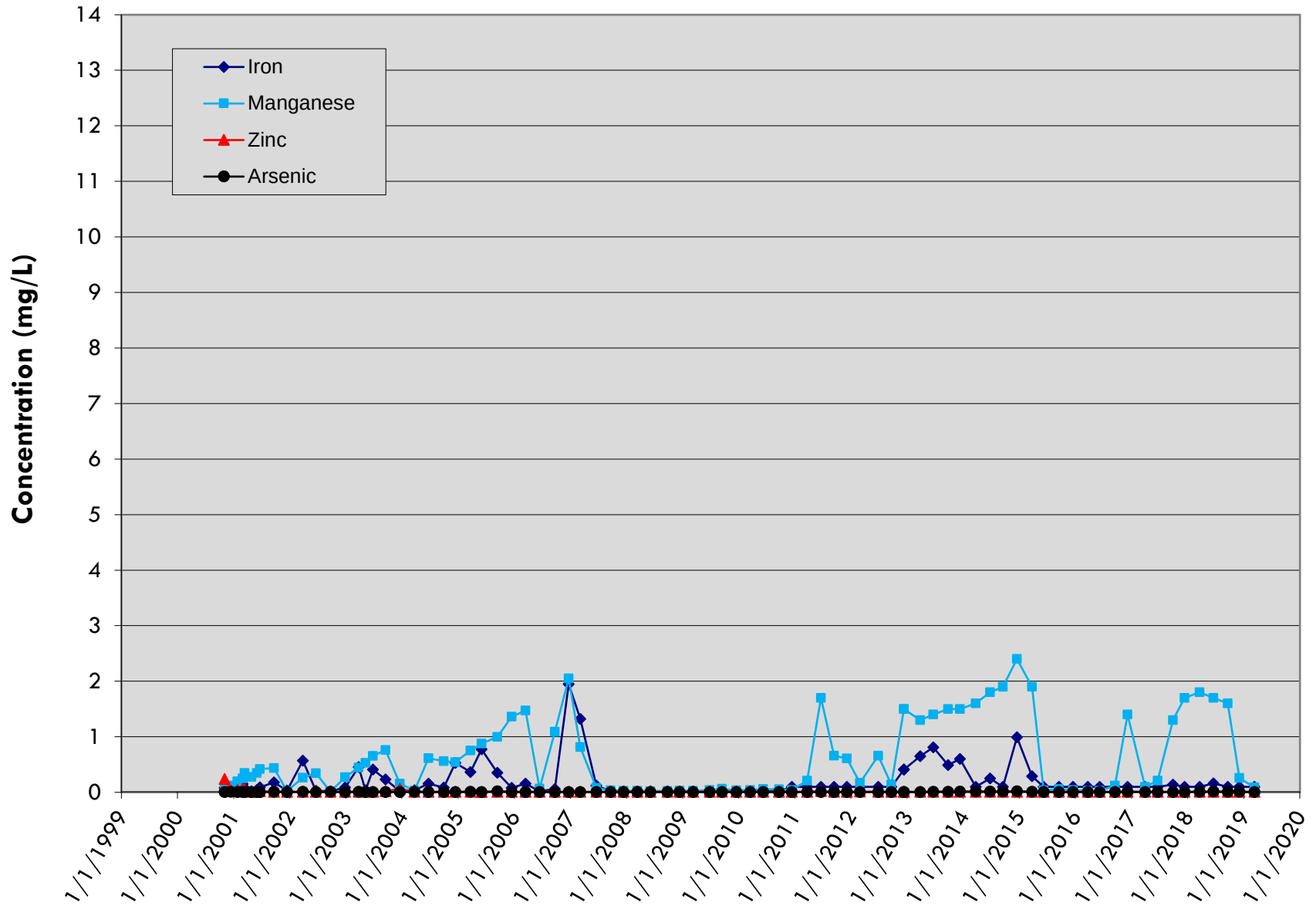
LDCS-1

LRI Landfill, Pierce County, Washington



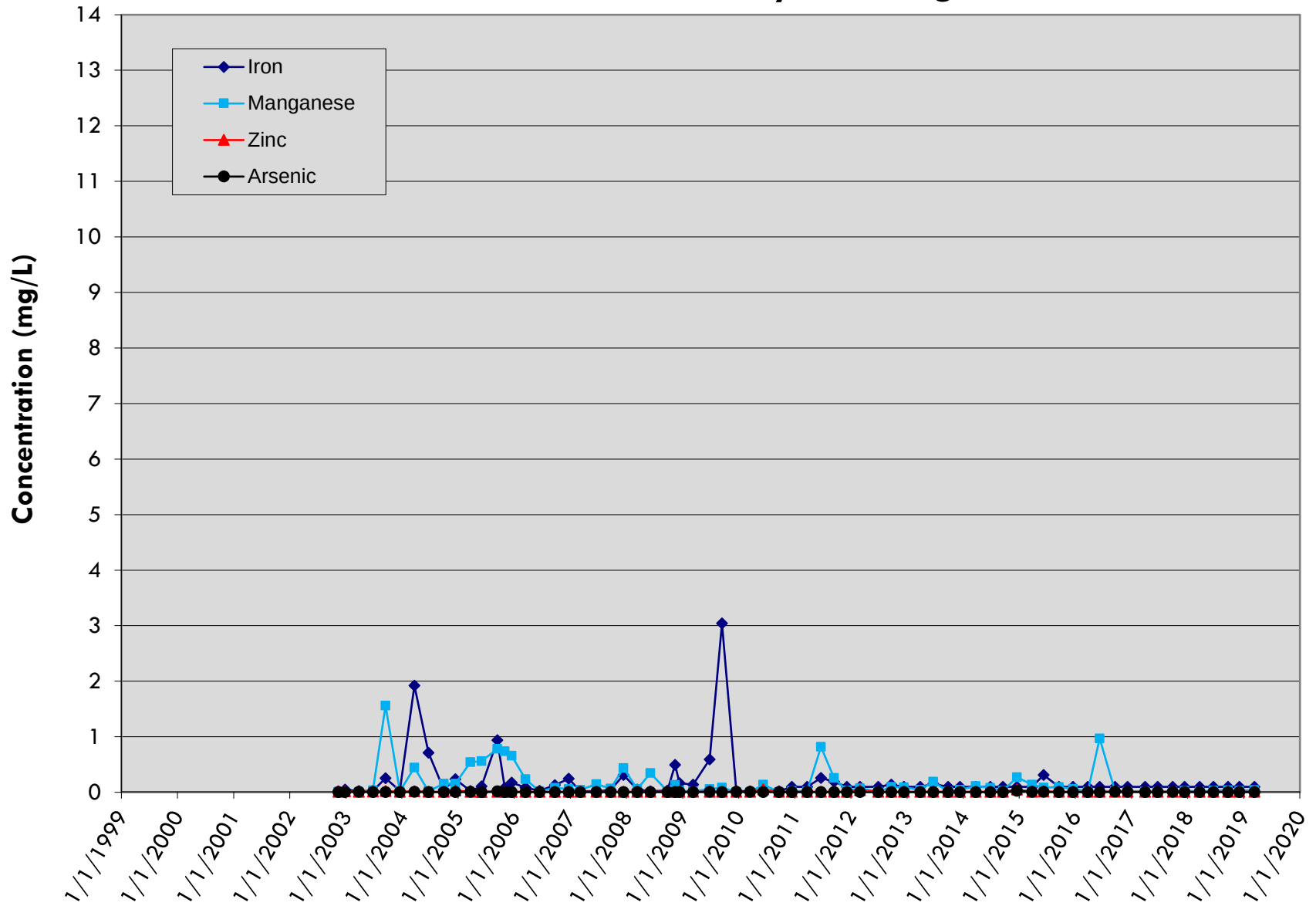
LDCS-2A

LRI Landfill, Pierce County, Washington



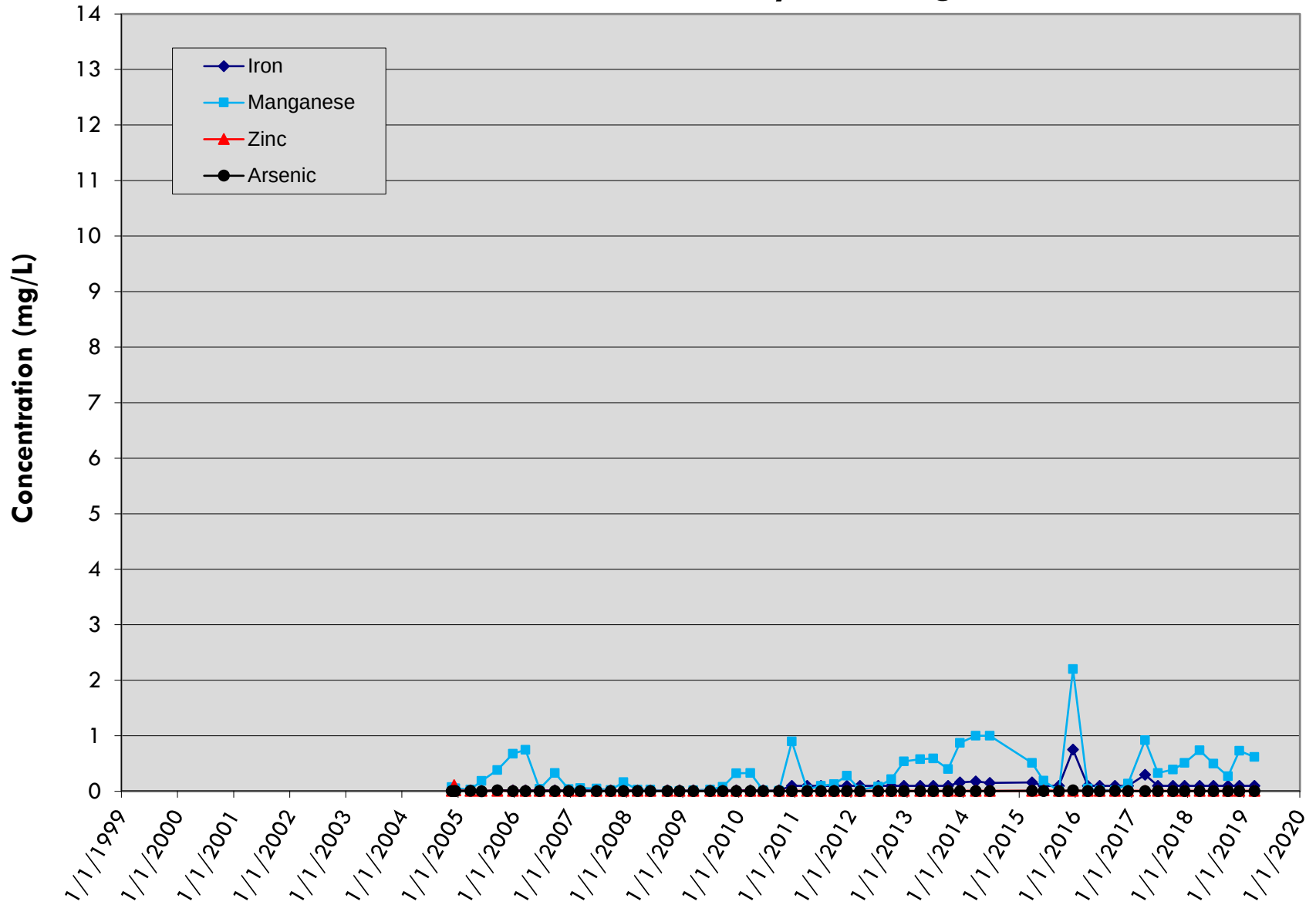
LDCS-2B

LRI Landfill, Pierce County, Washington



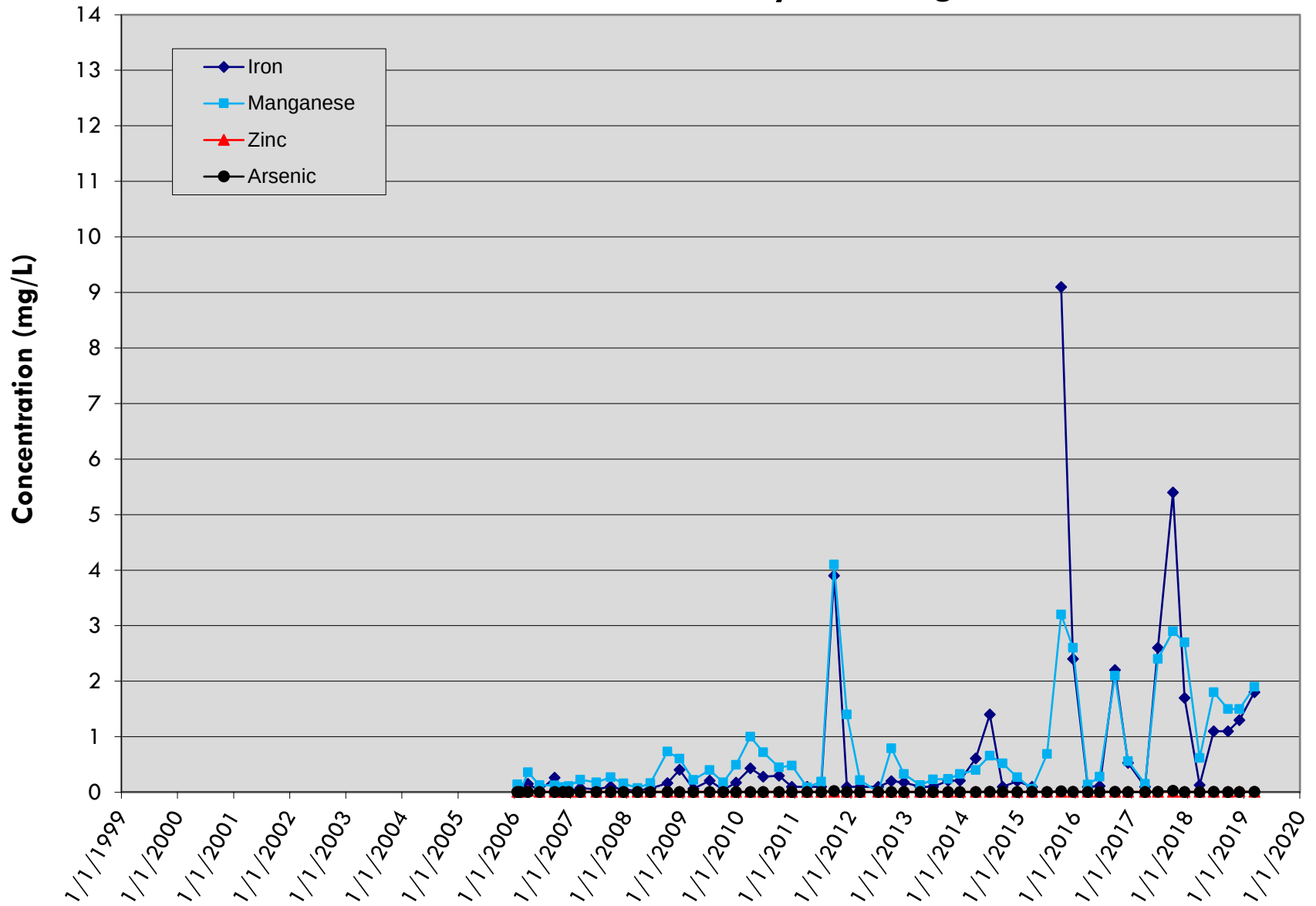
LDCS-3A

LRI Landfill, Pierce County, Washington



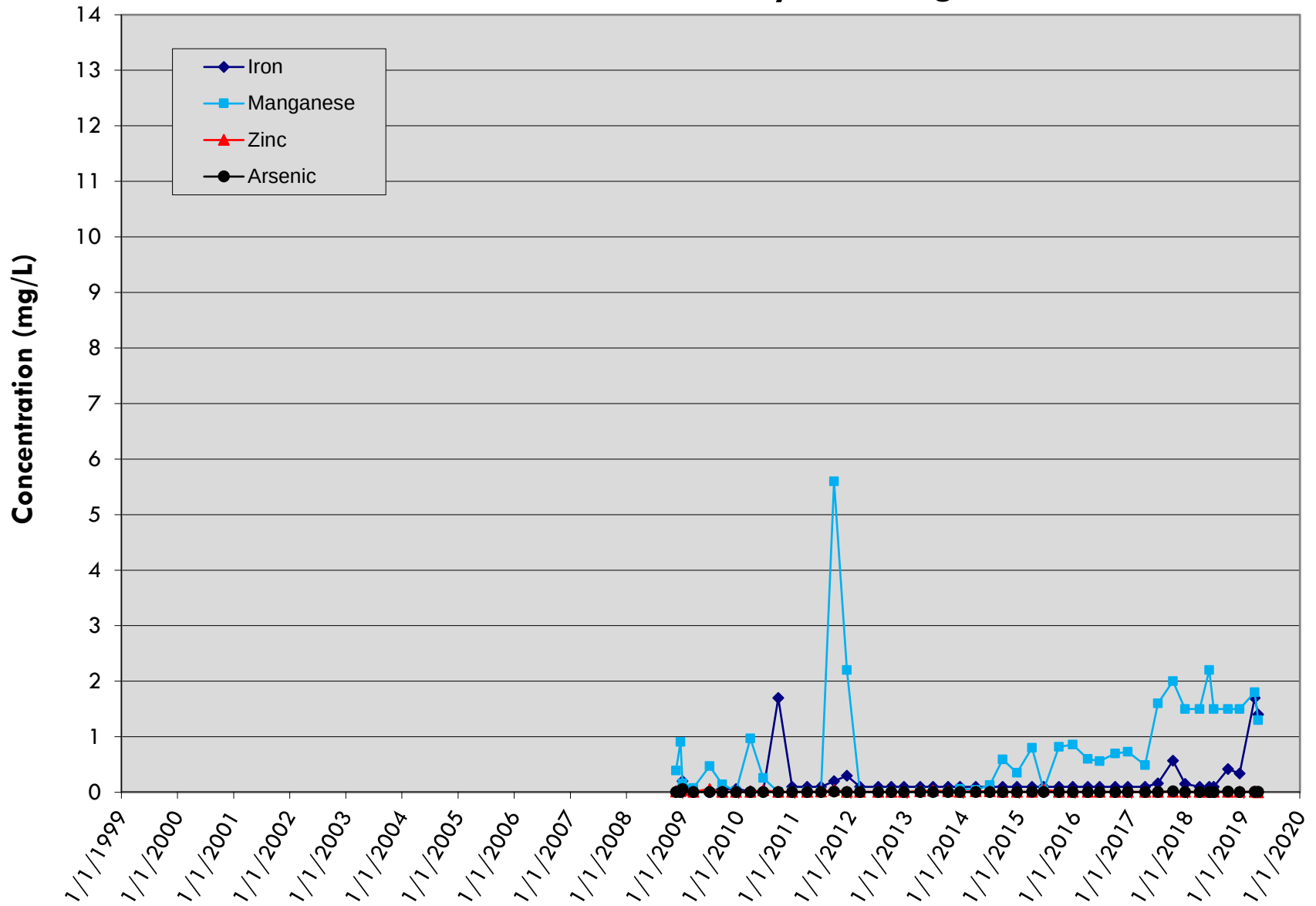
LDCS-4A

LRI Landfill, Pierce County, Washington



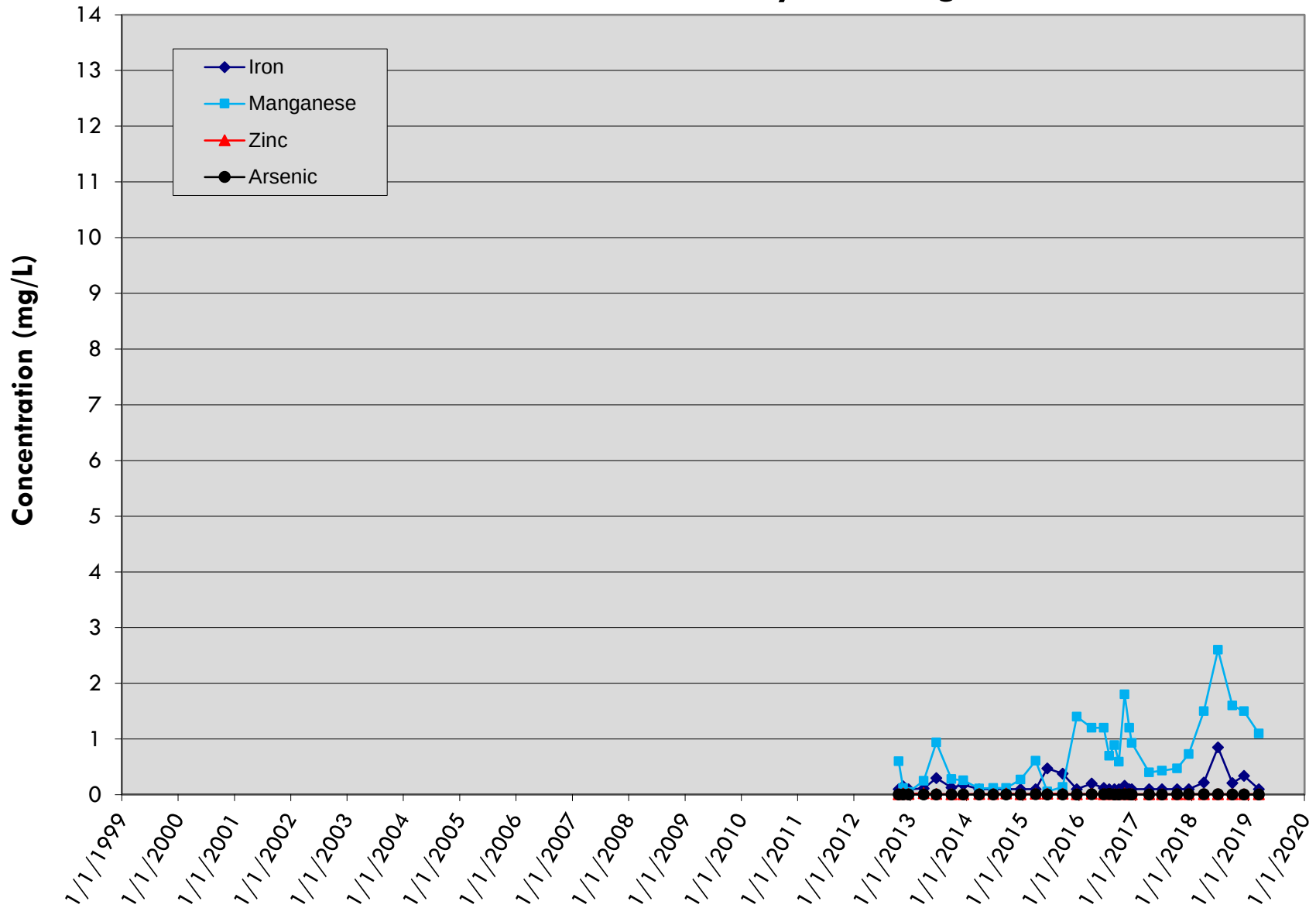
LDCS-4B

LRI Landfill, Pierce County, Washington



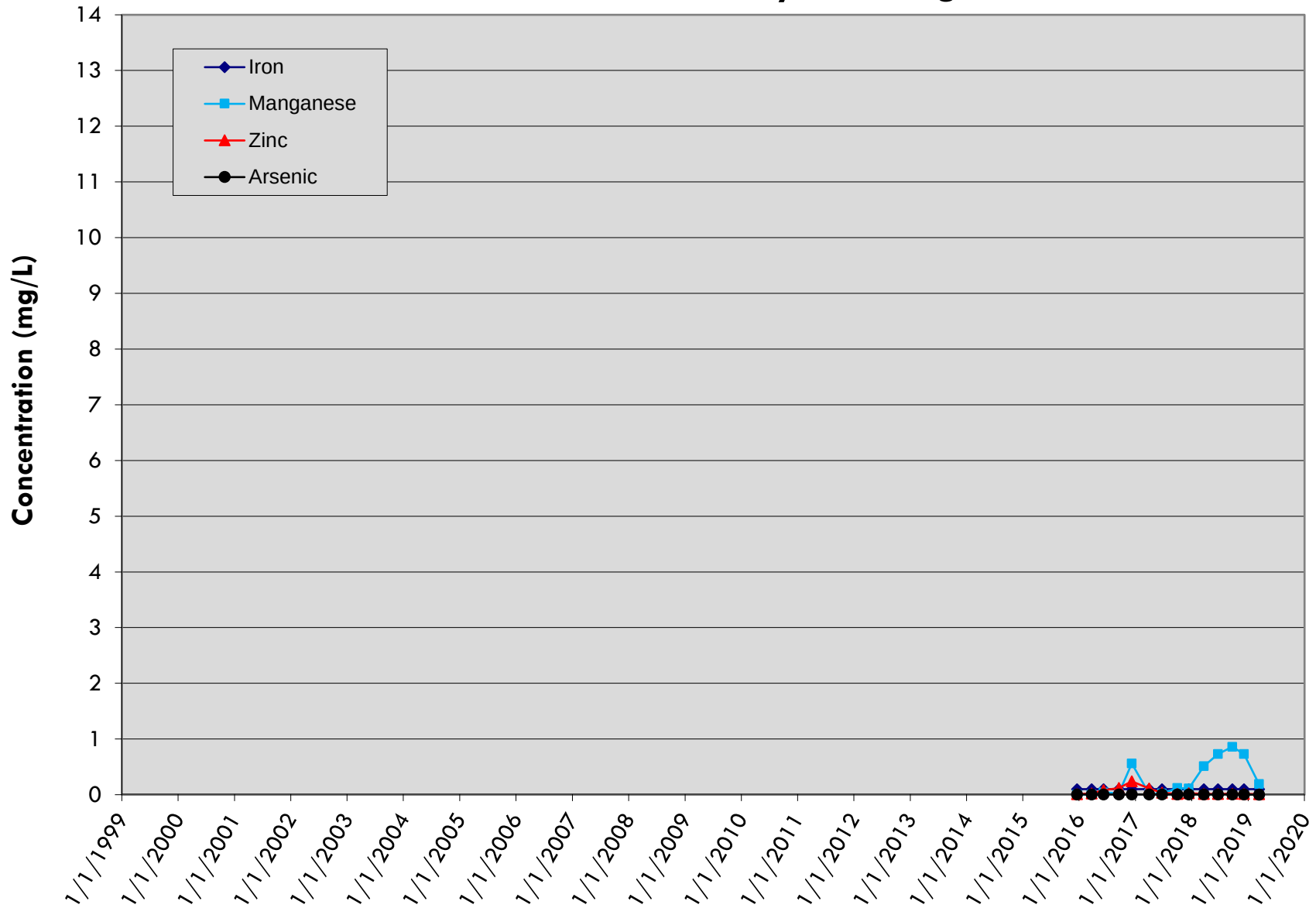
LDCS-5

LRI Landfill, Pierce County, Washington



LDCS-6A

LRI Landfill, Pierce County, Washington





Appendix H

LDCS Pumping Records and Conductivity Measurements

Summary of LDCS Volumes Pumped and Conductivity Data
First Quarter 2019
LRI Landfill, Pierce County, Washington

Date	Rainfall	LDCS-1 Vol. (Gal.)	LDCS-1 Cond. (µS/cm)	LDCS-2A Vol. (Gal)	LDCS-2A Cond. (µS/cm)	LDCS-2B Vol. (Gal)	LDCS-2B Cond. (µS/cm)	LDCS-3A Vol. (Gal)	LDCS-3A Cond. (µS/cm)	LDCS-4A Vol. (Gal)	LDCS-4A Cond. (µS/cm)	LDCS-4B Vol. (Gal)	LDCS-4B Cond. (µS/cm)	LDCS-5 Vol. (Gal)	LDCS-5 Cond. (µS/cm)	LDCS-6 Vol. (Gal)	LDCS-6 Cond. (µS/cm)
1/1/2019	0.01	*	--	560	--	800	659	*	827	1,410	671	2,900	787	220	650	2,198	961
1/2/2019	0.00	*	392	610	757	750	659	*	821	1,400	345	3,098	803	219	679	2,198	966
1/3/2019	0.30	*	411	630	764	750	668	*	814	1,780	467	4,769	810	717	691	2,002	973
1/4/2019	0.03	*	399	590	768	900	675	*	811	1,570	601	3,872	805	375	680	1,999	972
1/5/2019	0.00	*	--	600	--	850	672	*	810	1,730	650	3,611	806	249	682	1,935	977
1/6/2019	0.40	*	--	350	--	450	202	*	--	430	205	813	815	94	704	1,935	--
1/7/2019	0.00	*	363	520	755	900	534	*	663	1,320	559	8,136	836	1,885	694	1,935	984
1/8/2019	0.09	*	381	540	759	750	595	*	746	1,250	638	2,999	840	438	686	2,348	989
1/9/2019	0.01	*	381	590	760	850	637	*	787	1,390	692	3,577	844	442	684	1,993	895
1/10/2019	0.04	*	--	540	--	800	653	*	807	1,410	717	3,591	845	540	669	2,050	945
1/11/2019	0.00	*	373	540	755	750	650	*	443	1,410	724	3,261	842	313	661	1,979	963
1/12/2019	0.00	*	--	600	--	850	649	*	533	1,690	725	2,746	837	314	670	0	974
1/13/2019	0.00	*	--	540	--	800	642	*	713	1,440	721	2,967	844	282	677	0	980
1/14/2019	0.00	*	374	540	752	750	643	*	778	1,560	721	3,469	850	250	684	0	984
1/15/2019	0.01	*	375	590	751	850	649	*	799	1,420	723	2,952	854	329	697	1,731	988
1/16/2019	0.09	*	377	610	752	850	649	*	805	2,550	726	5,188	859	437	711	1,726	992
1/17/2019	0.07	*	391	670	757	900	651	*	806	2,550	728	5,401	866	684	723	1,671	995
1/18/2019	0.58	*	368	540	752	750	649	*	811	2,240	732	5,564	869	1,189	723	1,673	994
1/19/2019	0.40	*	--	540	--	850	652	*	815	2,750	736	5,013	858	1,792	712	1,836	985
1/20/2019	0.00	*	--	530	--	750	651	*	816	2,690	731	6,094	844	657	700	1,836	976
1/21/2019	0.00	*	364	590	744	800	648	*	817	2,500	729	5,337	840	503	703	1,836	974
1/22/2019	0.59	*	365	530	749	850	644	*	821	2,950	736	5,225	844	1,361	706	1,790	976
1/23/2019	0.26	*	--	540	754	750	659	*	818	3,570	723	6,137	834	1,746	679	1,828	969
1/24/2019	0.00	*	--	550	746	750	657	*	821	2,740	698	6,883	805	951	654	2,094	951
1/25/2019	0.00	*	--	550	749	900	648	*	822	2,880	696	6,048	793	626	653	2,191	953
1/26/2019	0.00	*	--	540	--	750	640	*	820	3,050	700	5,909	793	657	660	1,975	958
1/27/2019	0.00	*	--	600	--	850	646	*	817	3,060	700	5,664	800	656	670	1,975	964
1/28/2019	0.00	*	--	600	--	800	646	*	814	3,150	701	5,923	817	688	682	1,975	971
1/29/2019	0.00	*	--	580	750	850	647	*	809	2,790	709	5,501	837	688	696	1,832	976
1/30/2019	0.00	*	387	670	747	850	646	*	806	2,720	720	5,501	846	721	712	1,734	982
1/31/2019	0.01	*	392	600	753	850	644	*	804	2,730	729	6,243	853	657	730	1,784	988
2/1/2019	0.53	*	391	680	764	900	647	*	802	3,320	738	5,775	858	2,540	747	1,733	995
2/2/2019	0.01	*	391	680	764	850	648	*	801	3,500	745	4,224	860	1,500	732	2,222	972
2/3/2019	0.03	*	391	670	764	850	649	*	801	3,070	742	4,224	860	1,074	719	2,222	967
2/4/2019	0.00	*	380	680	755	850	648	*	803	3,580	740	4,224	860	1,602	709	2,222	959
2/5/2019	0.16	*	360	630	746	900	642	*	808	2,560	733	4,961	860	1,119	703	2,612	946
2/6/2019	0.02	*	358	610	740	750	632	*	814	2,380	734	6,201	860	817	708	2,502	945
2/7/2019	0.00	*	369	470	741	750	624	*	818	1,380	490	5,241	860	469	714	2,468	943
2/8/2019	0.03	*	377	600	750	850	407	*	816	0	63	5,355	935	624	782	2,235	943
2/9/2019	0.09	*	377	680	750	900	397	*	810	2,880	449	5,180	848	3,021	808	2,529	942
2/10/2019	0.07	*	377	610	750	750	559	*	810	2,910	643	5,180	848	1,299	784	2,529	931
2/11/2019	0.86	*	371	600	745	850	615	*	810	4,080	712	5,180	840	4,138	772	2,529	940
2/12/2019	0.62	*	388	0	750	0	641	*	802	0	740	10,605	804	6,154	637	4,470	1,037
2/13/2019	0.07	*	392	600	753	1750	639	*	810	4,310	727	24,940	973	1,250	654	13,564	947
2/14/2019	0.07	*	403	660	759	850	645	*	801	3,560	729	10,014	999	884	642	6,219	872
2/15/2019	0.04	*	363	660	735	950	650	*	739	2,910	737	4,217	998	947	642	3,828	893
2/16/2019	0.06	*	363	650	735	750	643	*	667	3,400	746	6,809	998	955	640	2,773	893
2/17/2019	0.00	*	363	610	735	900	633	*	633	2,900	747	6,809	998	820	640	2,773	705
2/18/2019	0.04	*	371	540	733	750	628	*	630	2,910	745	6,809	941	534	638	2,773	822
2/19/2019	0.32	*	380	610	746	850	644	*	402	4,120	745	5,259	940	1,423	646	2,213	871
2/20/2019	0.15	*	389	230	743	400	661	*	409	2,060	739	6,795	875	1,003	645	2,138	886
2/21/2019	0.00	2,432	370	*	731	*	654	1382	588	*	700	7,464	869	1,464	641	2,522	893
2/22/2019	0.16	3,291	373	*	742	*	640	1809	675	*	711	5,968	899	728	652	2,399	904
2/23/2019	0.02	*	373	*	742	*	640	1658	716	*	711	6,346	899	736	652	2,168	917
2/24/2019	0.09	*	373	*	742	*	640	1658	742	*	711	6,346	899	736	652	2,168	924
2/25/2019	0.00	9,420	379	580	739	*	652	1658	752	2,910	720	6,346	874	736	668	2,168	931
2/26/2019	0.00	8,220	372	650	728	850	651	1659	765	2,570	722	5,308	870	599	671	2,226	937
2/27/2019	0.00	8,530	380	590	740	950	653	1502	778	2,430	727	5,462	870	473	679	2,040	947
2/28/2019	0.00	8,070	372	660	727	850	394	1345	789	2,400	734	4,783	872	475	691	2,026	953

**Summary of LDCS Volumes Pumped and Conductivity Data
First Quarter 2019
LRI Landfill, Pierce County, Washington**

Date	Rainfall	LDCS-1 Vol. (Gal)	LDCS-1 Cond. (µS/cm)	LDCS-2A Vol. (Gal)	LDCS-2A Cond. (µS/cm)	LDCS-2B Vol. (Gal)	LDCS-2B Cond. (µS/cm)	LDCS-3A Vol. (Gal)	LDCS-3A Cond. (µS/cm)	LDCS-4A Vol. (Gal)	LDCS-4A Cond. (µS/cm)	LDCS-4B Vol. (Gal)	LDCS-4B Cond. (µS/cm)	LDCS-5 Vol. (Gal)	LDCS-5 Cond. (µS/cm)	LDCS-6 Vol. (Gal)	LDCS-6 Cond. (µS/cm)
3/1/2019	0.00	7,780	373	590	731	850	397	1335	793	2,260	745	5,154	876	443	698	1,896	960
3/2/2019	0.00	7,790	374	600	728	850	556	1092	792	2,410	755	4,928	877	412	703	1,684	966
3/3/2019	0.00	7,730	378	590	734	800	619	1092	791	2,260	762	5,065	880	443	705	1,684	970
3/4/2019	0.00	7,650	390	540	744	850	640	1092	789	2,400	768	5,118	881	442	704	1,684	973
3/5/2019	0.00	8,270	377	640	726	850	649	895	786	2,420	771	5,400	884	472	708	1,622	975
3/6/2019	0.22	8,890	390	600	744	950	656	1099	782	2,920	774	4,630	885	1,029	718	1,608	978
3/7/2019	0.10	8,040	377	590	726	900	654	979	778	2,750	778	4,887	886	919	722	1,828	970
3/8/2019	0.03	7,920	378	670	734	850	645	1488	776	2,900	780	5,720	887	724	726	1,889	959
3/9/2019	0.01	7,750	378	590	734	850	638	738	777	2,670	783	5,555	887	661	726	1,864	958
3/10/2019	0.00	7,190	378	540	734	750	637	738	778	2,440	786	4,969	889	504	722	1,864	961
3/11/2019	0.24	5,900	378	550	753	800	638	738	780	2,470	787	4,260	892	472	718	1,864	967
3/12/2019	0.57	10,010	391	580	743	850	651	896	779	4,630	779	4,618	892	2,939	727	2,138	966
3/13/2019	0.01	7,710	375	540	725	800	654	1037	779	2,620	762	2,269	892	854	742	2,387	946
3/14/2019	0.00	7,530	370	540	727	850	646	886	784	2,440	761	4,597	899	559	755	2,238	941
3/15/2019	0.00	7,800	405	490	744	750	644	949	784	2,440	766	4,848	903	497	769	2,046	944
3/16/2019	0.00	7,950	385	540	736	800	653	865	781	2,450	769	5,035	903	547	777	1,926	953
3/17/2019	0.00	8,060	379	710	731	900	651	865	780	2,600	769	4,697	901	589	781	1,869	964
3/18/2019	0.00	8,020	380	540	729	850	653	865	779	2,620	769	4,185	899	589	784	1,823	971
3/19/2019	0.00	8,190	387	540	729	850	656	748	779	2,760	770	4,008	899	560	792	1,790	977
3/20/2019	0.00	8,330	393	600	728	850	656	870	779	2,740	773	3,650	900	529	801	1,780	981
3/21/2019	0.00	7,930	393	640	727	900	654	900	781	2,460	776	3,967	901	498	810	1,671	985
3/22/2019	0.24	--	385	--	736	--	648	723	774	--	781	3,968	893	528	821	1,717	986
3/23/2019	0.01	7,840	387	600	729	850	653	540	785	2,440	782	3,467	904	721	823	1,573	988
3/24/2019	0.00	7,800	374	540	730	750	647	540	789	2,440	789	3,729	903	467	824	1,506	984
3/25/2019	0.17	8,210	373	540	734	850	650	540	790	2,600	794	3,144	902	527	828	1,530	984
3/26/2019	0.07	8,130	378	540	733	900	656	1487	791	3,170	801	2,755	902	960	830	1,726	966
3/27/2019	0.11	8,410	386	540	734	950	655	887	796	2,950	806	3,087	898	623	827	1,829	954
3/28/2019	0.00	7,910	386	540	732	850	653	887	800	2,790	807	3,259	898	719	822	1,845	956
3/29/2019	0.00	7,560	379	540	730	850	647	886	803	2,870	805	4,316	899	498	814	1,790	956
3/30/2019	0.00	7,470	375	540	730	850	640	0	803	2,950	800	4,258	902	435	809	1,695	963
3/31/2019	0.00	8,200	376	540	733	900	651	0	799	2,790	797	4,129	905	402	807	1,644	971

- = No data collected

* = Meter malfunction

Summary of Leachate Volume and Depth Data
First Quarter 2019
LRI Landfill, Pierce County, Washington

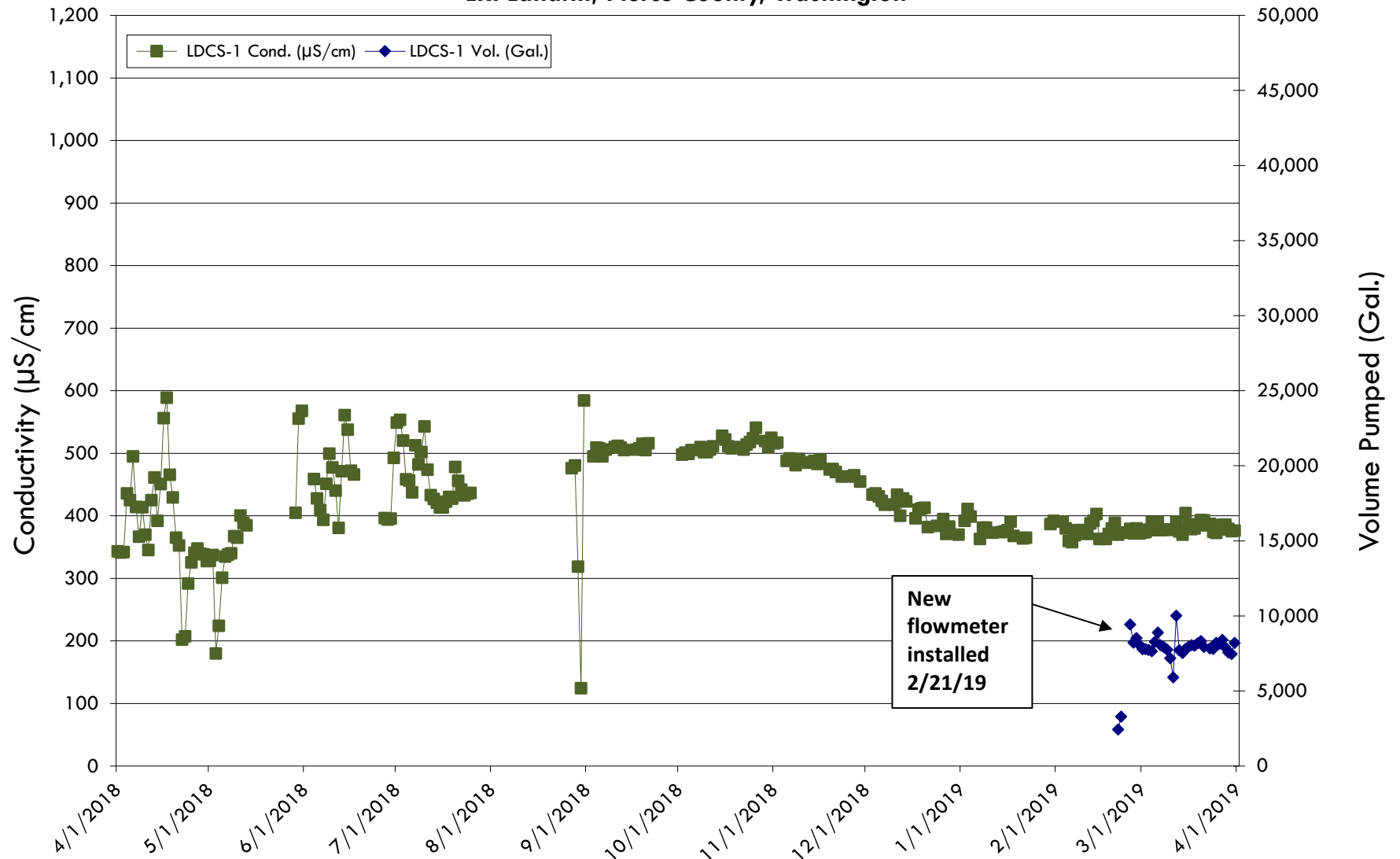
Date	Cell 1 Leachate Volume (GPD)	Cell 1 Leachate Level (in.)	Cell 2A Leachate Volume (GPD)	Cell 2A Leachate Level (in.)	Cell 2B Leachate Volume (GPD)	Cell 2B Leachate Level (in.)	Cell 3A Leachate Volume (GPD)	Cell 3A Leachate Level (in.)	Cell 4A Leachate Volume (GPD)	Cell 4A Leachate Level (in.)	Cell 4B Leachate Volume (GPD)	Cell 4B Leachate Level (in.)	Cell 5 Leachate Volume (GPD)	Cell 5 Leachate Level (in.)	Cell 6 Leachate Volume (GPD)	Cell 6 Leachate Level (in.)
1/1/2019	2,389	10.8	0	10.9	0	8.5	--	10.0	6,946	7.0	0	9.2	0	14.7	0	11.0
1/2/2019	5,556	9.7	8,092	6.7	7,932	8.6	--	9.8	10,843	8.6	19,586	10.4	3,072	15.0	17,350	11.0
1/3/2019	4,259	10.3	0	8.3	3,697	8.6	--	9.5	7,878	7.8	19,462	10.4	28,938	15.2	10,515	10.7
1/4/2019	1,082	10.9	0	9.4	4,594	8.4	--	9.2	10,959	8.1	31,284	9.6	15,496	15.2	14,965	11.2
1/5/2019	7,304	9.8	0	10.3	3,533	8.4	--	9.0	11,532	8.4	17,997	9.8	12,150	15.0	11,451	11.2
1/6/2019	0	10.8	0	7.2	3,533	8.6	--	9.1	5,549	9.2	17,997	8.5	10,154	15.0	11,451	10.9
1/7/2019	2,868	9.9	7,900	8.1	3,533	8.6	--	9.5	7,108	7.5	17,997	11.2	10,154	15.7	11,451	11.1
1/8/2019	2,983	10.8	0	9.6	5,616	8.6	--	10.1	11,221	8.0	30,388	9.0	40,022	15.9	9,518	11.5
1/9/2019	4,355	10.8	21	9.0	3,293	9.0	--	9.5	7,920	7.4	6,300	10.1	24,644	15.8	10,431	10.8
1/10/2019	3,373	10.1	8,078	6.4	3,312	8.4	--	9.4	7,047	7.3	23,610	9.6	20,276	15.4	14,258	11.0
1/11/2019	2,725	10.5	0	7.6	3,465	8.6	--	10.3	9,377	8.5	19,216	9.7	23,438	15.0	7,189	11.7
1/12/2019	1,131	10.9	0	8.6	3,947	8.7	6,751	9.6	7,502	7.5	14,037	9.8	19,800	15.2	10,322	11.2
1/13/2019	2,166	10.9	0	10.4	3,947	8.5	6,751	9.0	6,541	7.0	14,037	8.8	5,622	15.5	10,322	11.0
1/14/2019	6,626	9.6	18	9.3	3,947	8.5	6,751	8.8	11,415	8.9	14,037	10.8	5,622	15.8	10,322	11.2
1/15/2019	2,180	10.4	8,310	6.8	3,563	8.4	9,008	9.9	8,417	7.8	24,258	9.2	33,866	15.5	8,587	11.1
1/16/2019	7,225	9.6	0	8.5	4,390	8.9	7,194	10.1	4,450	11.1	9,326	10.7	20,586	15.0	10,224	11.5
1/17/2019	3,542	9.2	0	10.0	4,160	8.2	7,164	9.8	22,778	13.8	3,880	11.7	27,834	15.1	10,002	10.9
1/18/2019	106	10.5	7	9.8	3,422	9.3	8,696	9.4	18,346	14.2	42,318	9.1	19,350	15.4	10,483	11.2
1/19/2019	916	10.8	0	6.3	3,545	8.4	7,478	8.9	16,423	7.2	19,564	10.3	0	15.0	12,961	10.8
1/20/2019	2,219	10.7	0	8.0	3,545	8.6	7,478	9.6	13,145	7.2	19,564	8.3	0	15.8	12,961	10.9
1/21/2019	2,361	10.4	7,930	9.0	3,545	9.3	7,478	9.0	12,774	8.5	19,564	10.7	13,254	15.5	12,961	11.4
1/22/2019	2,297	11.0	0	9.6	4,355	8.3	8,338	9.2	13,527	7.9	25,114	9.2	40,068	15.4	9,283	10.9
1/23/2019	2,659	10.4	8,018	6.2	3,389	9.1	5,932	9.5	11,562	8.3	19,026	10.8	22,950	14.9	14,569	11.3
1/24/2019	1,272	10.8	0	7.7	3,805	8.9	11,302	9.0	19,814	9.0	33,232	9.4	21,970	14.5	11,394	11.0
1/25/2019	2,245	10.8	0	9.1	3,781	8.8	4,610	9.5	7,945	9.0	17,922	8.9	22,508	14.7	11,319	11.0
1/26/2019	1,043	11.1	0	10.5	3,590	8.6	6,447	9.8	13,063	8.8	6,132	10.3	21,150	14.5	9,760	11.3
1/27/2019	2,266	11.0	0	8.1	3,590	9.0	6,447	9.3	13,873	9.2	6,132	11.4	0	15.0	9,760	10.9
1/28/2019	3,643	10.6	7,167	8.1	3,590	8.6	6,447	9.9	17,397	8.8	6,132	14.3	10,404	15.0	9,760	11.3
1/29/2019	3,668	10.5	0	9.5	3,485	9.2	12,240	9.9	10,576	10.9	0	16.0	30,092	14.9	8,691	11.3
1/30/2019	1,550	10.9	22	10.8	3,937	8.7	7,274	9.4	14,600	8.7	41,614	10.4	19,350	14.7	10,656	11.2
1/31/2019	4,366	10.4	7,801	7.4	3,707	8.7	10,356	9.7	13,944	9.7	26,728	9.5	26,290	14.4	10,128	11.4
2/1/2019	2,977	10.8	1,916	8.1	3,609	9.1	9,212	9.4	16,600	10.6	19,990	9.9	29,870	13.5	10,340	11.0
2/2/2019	2,257	10.8	1,916	9.6	3,881	8.6	10,533	10.6	16,116	7.1	27,024	11.0	20,427	13.2	13,883	11.0
2/3/2019	3,424	10.4	1,916	11.1	3,881	8.5	10,773	9.3	14,738	6.0	27,024	11.0	20,427	13.3	13,883	10.9
2/4/2019	511	11.2	1,916	6.7	3,881	10.1	7,501	11.1	6,063	9.9	27,024	11.0	20,427	14.0	13,883	12.0
2/5/2019	3,954	10.4	3	7.9	1,028	12.3	10,278	13.9	12,475	13.3	6,078	11.0	10,050	14.9	3,870	12.9
2/6/2019	1,973	10.6	11	9.1	4,235	10.3	10,276	11.3	13,978	13.7	14,826	11.0	10,050	14.5	14,872	12.7
2/7/2019	1,857	10.8	0	10.5	5,059	8.6	5,797	9.4	2,686	11.0	37,488	11.0	10,050	14.0	14,960	11.2
2/8/2019	1,876	9.2	7,820	7.6	4,520	5.2	10,148	9.4	10,048	9.3	7,822	10.6	17,550	14.2	11,408	10.7
2/9/2019	1,204	10.8	0	7.5	3,875	8.8	8,478	9.7	13,999	7.4	19,710	10.0	1,330	15.0	12,234	10.7
2/10/2019	2,621	10.6	0	9.2	3,875	8.5	8,115	9.5	15,457	8.5	19,710	10.0	1,330	15.5	12,234	10.3
2/11/2019	2,600	10.6	292	10.7	3,875	11.2	9,072	11.0	10,270	10.2	19,710	10.0	1,330	15.6	12,234	13.9
2/12/2019	2,600	-	27	-	2,661	-	7,854	-	9,984	-	12,654	-	27,946	-	4,277	-
2/13/2019	2,300	10.7	8,658	7.3	4,098	11.3	8,865	11.8	11,678	11.4	14,680	10.0	28,350	15.6	15,718	22.1
2/14/2019	3,537	10.4	0	8.8	5,134	9.4	10,762	12.8	16,684	10.4	43,394	10.0	33,194	15.4	8,975	24.0
2/15/2019	2,172	10.5	0	9.5	2,962	8.6	11,898	8.9	16,717	8.8	38,586	10.0	17,752	15.4	1,239	27.3
2/16/2019	1,271	10.7	0	10.9	3,341	8.8	10,656	9.7	8,523	9.8	20,643	10.0	16,779	15.0	24,301	21.1
2/17/2019	2,869	10.3	0	9.3	3,341	9.9	4,145	9.7	5,955	14.8	20,643	10.0	16,779	15.1	24,301	13.7
2/18/2019	3,490	10.1	7,121	7.4	3,341	12.6	8,748	14.8	12,995	17.0	20,643	10.0	16,779	15.1	24,301	14.4
2/19/2019	1,454	10.9	3,771	7.3	6,808	9.0	5,479	9.4	20,047	7.7	33,044	10.0	33,300	14.8	17,055	10.8
2/20/2019	1,082	10.8	0	8.0	3,749	9.2	6,968	10.4	1,174	9.2	46,792	10.0	20,600	15.0	12,800	10.9
2/21/2019	2,104	-	0	-	4,064	--	7,243	9.3	16,932	--	29,160	--	22,050	--	12,771	10.8
2/22/2019	1,718	-	0	-	3,982	--	9,882	9.3	8,256	--	9,666	--	23,400	--	11,236	10.6
2/23/2019	2,854	-	0	-	4,476	--	5,438	9.6	15,729	--	19,404	--	16,059	--	12,025	10.9
2/24/2019	2,854	-	0	-	4,476	--	10,691	9.4	15,729	--	19,404	--	16,059	--	12,025	10.9
2/25/2019	1,516	10.5	7,883	10.0	4,476	7.8	6,350	8.8	11,564	6.7	15,860	10.2	16,059	14.0	12,025	11.4
2/26/2019	3,387	10.3	13	10.6	4,176	8.5	6,023	9.9	16,318	7.8	19,848	10.5	24,300	14.1	12,777	11.0
2/27/2019	2,330	10.7	7,753	7.1	3,597	8.8	9,642	9.8	9,310	7.3	13,902	8.4	21,386	14.3	10,953	10.8
2/28/2019	2,174	10.7	0	7.4	4,248	8.5	5,925	9.2	17,969	7.3	21,880	10.3	20,248	14.3	11,933	10.8

Summary of Leachate Volume and Depth Data
First Quarter 2019
LRI Landfill, Pierce County, Washington

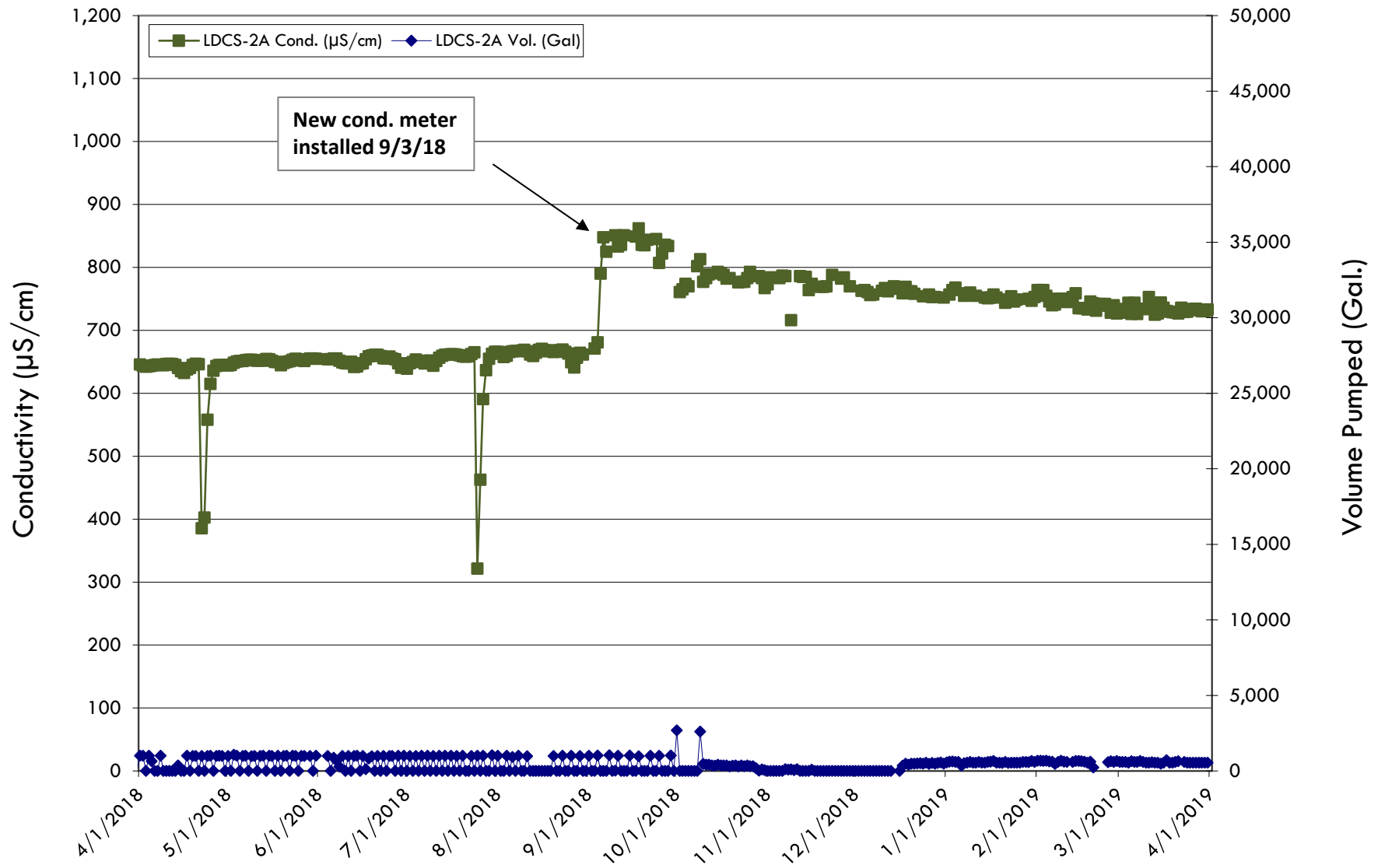
Date	Cell 1 Leachate Volume (GPD)	Cell 1 Leachate Level (in.)	Cell 2A Leachate Volume (GPD)	Cell 2A Leachate Level (in.)	Cell 2B Leachate Volume (GPD)	Cell 2B Leachate Level (in.)	Cell 3A Leachate Volume (GPD)	Cell 3A Leachate Level (in.)	Cell 4A Leachate Volume (GPD)	Cell 4A Leachate Level (in.)	Cell 4B Leachate Volume (GPD)	Cell 4B Leachate Level (in.)	Cell 5 Leachate Volume (GPD)	Cell 5 Leachate Level (in.)	Cell 6 Leachate Volume (GPD)	Cell 6 Leachate Level (in.)
3/1/2019	2,366	10.8	0	8.6	3,261	8.8	5,431	9.5	12,442	8.2	144	9.8	20,328	14.5	11,680	10.9
3/2/2019	2,037	11.0	0	9.9	4,400	8.6	8,834	9.0	9,402	8.2	18,286	9.2	6,001	15.0	11,462	10.7
3/3/2019	3,780	10.7	7,554	10.9	3,546	8.4	6,208	9.7	14,235	8.4	20,394	9.5	6,001	15.1	11,462	10.8
3/4/2019	1,604	11.1	367	6.6	3,712	8.8	6,992	9.6	24,114	10.3	16,694	9.6	6,001	15.4	11,462	10.9
3/5/2019	3,730	10.9	0	8.4	3,774	8.8	7,951	9.3	14,161	8.0	4,538	9.5	30,094	15.0	11,588	11.0
3/6/2019	2,882	10.5	0	9.5	3,499	8.8	7,813	9.1	13,621	7.4	18,808	8.9	36,590	15.0	11,595	10.9
3/7/2019	2,780	10.7	0	10.2	4,245	8.8	10,413	9.6	11,665	7.0	15,904	10.4	15,856	15.4	13,190	11.0
3/8/2019	3,215	10.5	7,918	9.3	3,429	8.4	5,546	9.6	12,029	7.1	20,438	9.0	18,446	15.6	11,470	11.3
3/9/2019	1,492	10.9	0	7.0	3,597	8.9	9,358	8.9	13,426	7.4	22,294	10.2	12,394	15.5	11,818	10.8
3/10/2019	2,138	11.0	0	8.4	3,237	8.8	8,201	9.4	11,329	7.0	0	9.8	12,394	16.0	11,775	10.9
3/11/2019	3,723	10.8	22	10.4	3,426	8.7	5,166	9.6	12,747	7.3	21,460	10.3	12,394	16.0	11,770	11.4
3/12/2019	2,882	10.8	0	11.0	3,955	9.5	6,690	9.7	11,713	8.1	23,220	10.0	22,304	16.0	15,327	11.7
3/13/2019	2,384	10.6	8,218	10.0	12,292	8.9	6,463	10.8	10,786	7.0	14,696	9.0	40,052	15.7	11,729	11.6
3/14/2019	2,721	10.7	0	7.5	3,657	8.6	6,812	9.7	10,601	6.9	22,838	10.1	38,630	15.4	12,000	11.3
3/15/2019	2,849	10.7	0	8.7	2,780	9.1	7,224	10.4	10,830	7.5	0	9.8	28,480	14.5	11,830	11.6
3/16/2019	1,230	11.1	0	10.0	3,341	8.7	5,477	9.5	16,094	8.4	12,864	10.2	26,033	13.4	12,056	11.2
3/17/2019	3,118	10.8	7,052	10.9	3,465	8.4	5,364	10.1	11,980	7.0	19,204	8.9	26,033	13.8	11,919	10.9
3/18/2019	6,307	10.0	10	6.7	14,981	12.8	7,163	12.5	11,416	8.3	13,302	10.9	26,033	13.1	11,915	11.7
3/19/2019	1,198	10.8	0	8.4	3,906	8.6	4,455	9.4	11,952	7.2	5,720	9.3	48,986	12.4	12,139	11.4
3/20/2019	4,047	10.6	0	9.6	3,964	9.6	6,850	10.0	14,435	8.7	26,782	10.0	26,200	11.7	12,613	11.6
3/21/2019	1,199	10.9	0	10.6	3,223	8.7	9,371	9.1	12,327	7.5	4,576	9.7	36,470	10.6	11,301	11.4
3/22/2019	2,493	0.0	0	0.0	3,385	0.0	4,992	0.0	11,468	0.0	12,410	0.0	30,334	0.0	11,651	0.0
3/23/2019	2,560	10.6	0	6.7	3,738	9.0	5,974	9.9	10,479	7.8	18,620	9.6	19,698	8.9	10,965	12.1
3/24/2019	954	11.0	0	8.4	3,241	8.6	4,607	9.4	11,411	7.4	0	9.6	19,698	9.2	11,566	11.7
3/25/2019	3,334	10.7	17	10.2	3,786	8.9	6,714	11.2	10,356	8.5	23,514	10.8	19,698	8.4	11,899	11.9
3/26/2019	2,595	10.9	7,934	9.7	3,154	8.6	6,400	10.3	10,284	7.7	10,220	9.5	42,354	5.7	12,019	12.1
3/27/2019	3,353	10.5	0	6.8	3,512	8.6	5,605	10.1	11,333	7.4	6,492	9.5	38,314	3.8	12,184	11.4
3/28/2019	1,467	11.0	0	7.8	2,514	8.6	9,048	9.1	13,482	8.0	22,432	10.3	23,394	3.4	11,406	11.6
3/29/2019	1,973	10.8	0	8.6	2,686	8.8	4,753	9.1	11,762	6.4	4,042	9.2	32,958	3.6	10,862	11.2
3/30/2019	2,067	10.9	0	10.3	3,346	8.6	4,537	9.4	13,771	7.2	23,866	10.2	13,161	3.5	11,087	11.3
3/31/2019	5,658	10.2	8,011	9.4	3,301	8.5	5,396	9.6	11,435	7.0	0	9.5	13,161	5.4	11,373	11.1

- = No data collected, meter not functioning properly

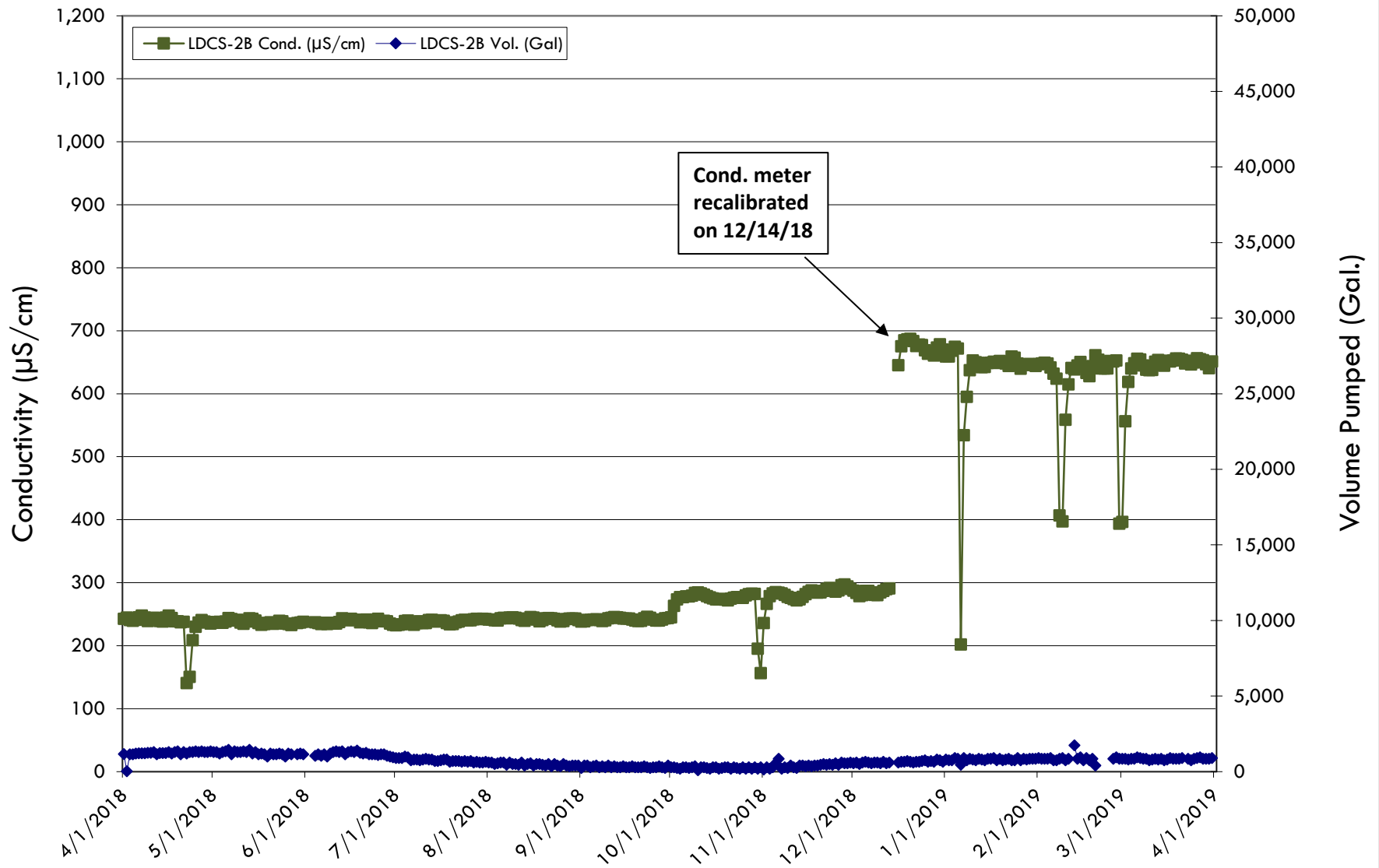
LDCS-1 (DailyTotals)
Conductivity vs Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



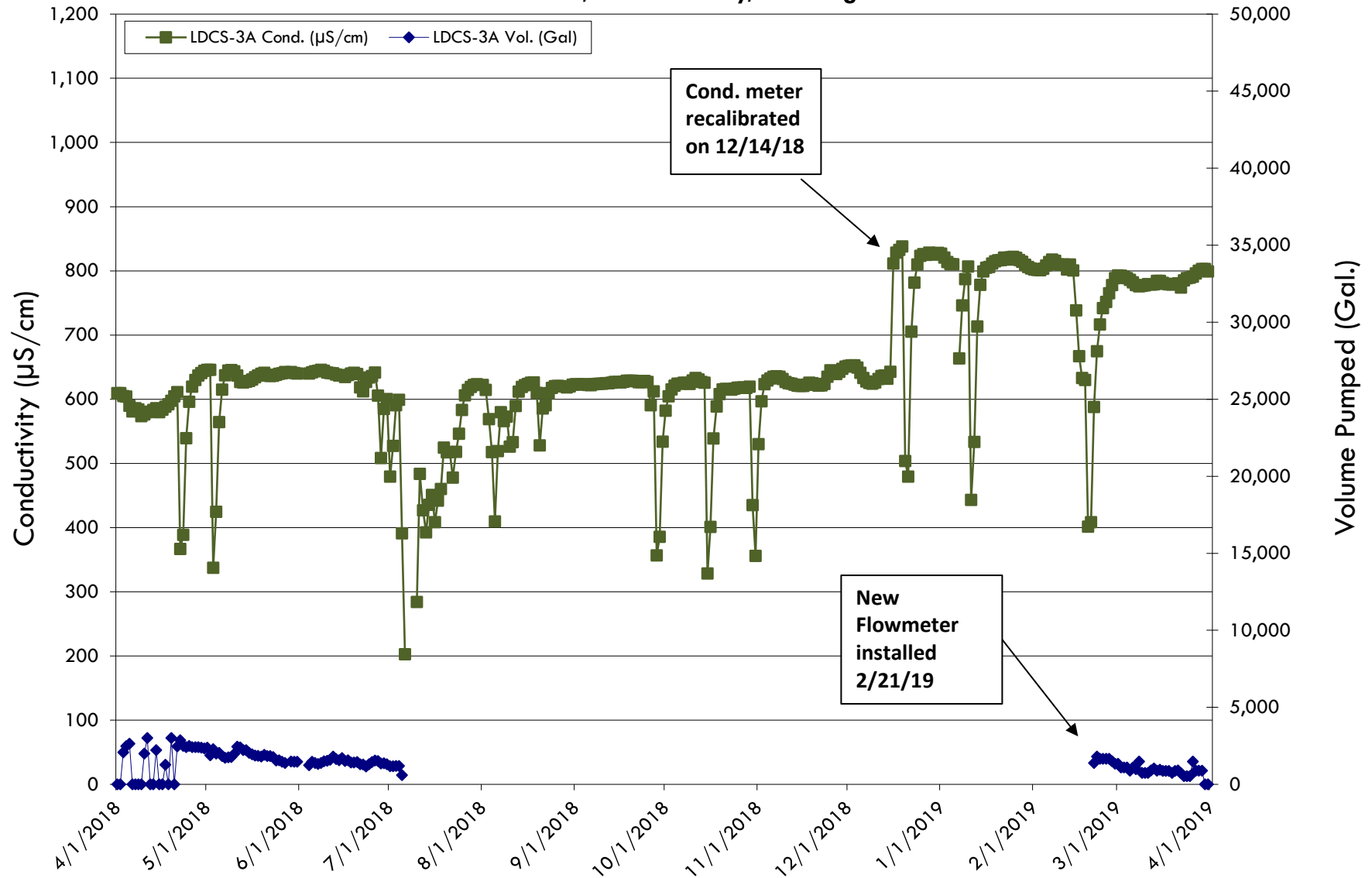
LDCS-2A (Daily Totals)
Conductivity vs Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



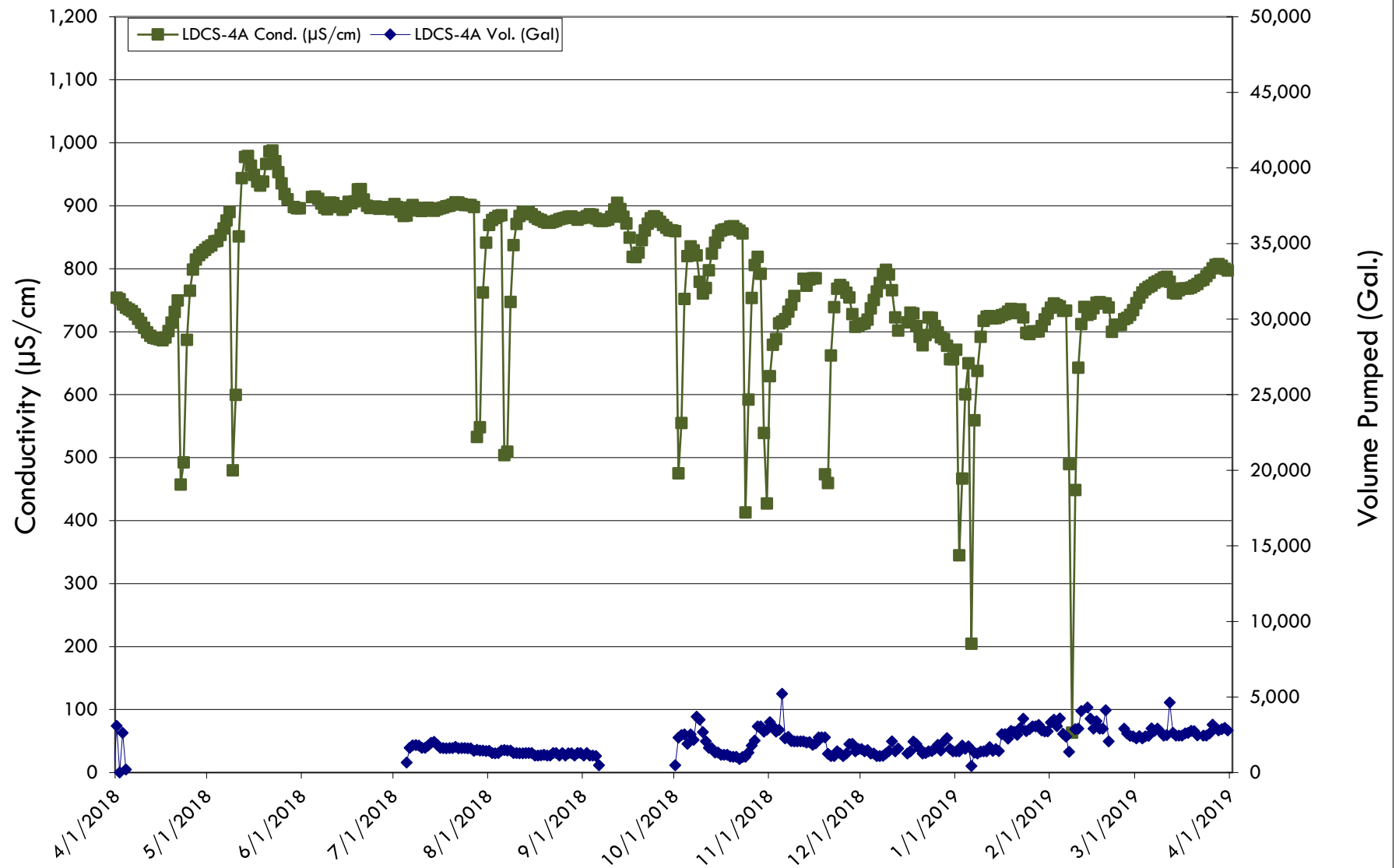
LDCS-2B (Daily Totals)
Conductivity vs Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



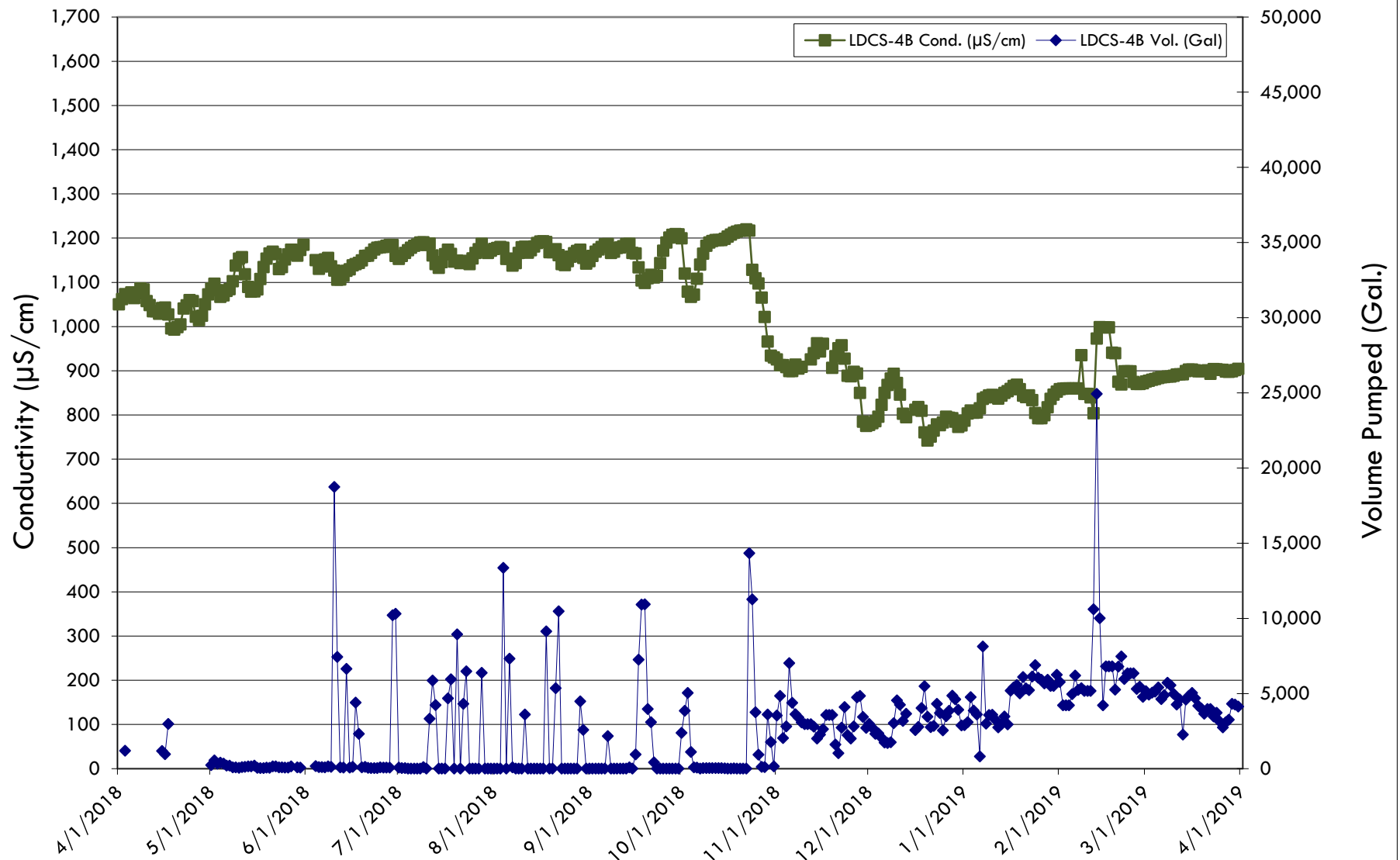
LDCS-3A (Daily Totals)
Conductivity vs Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



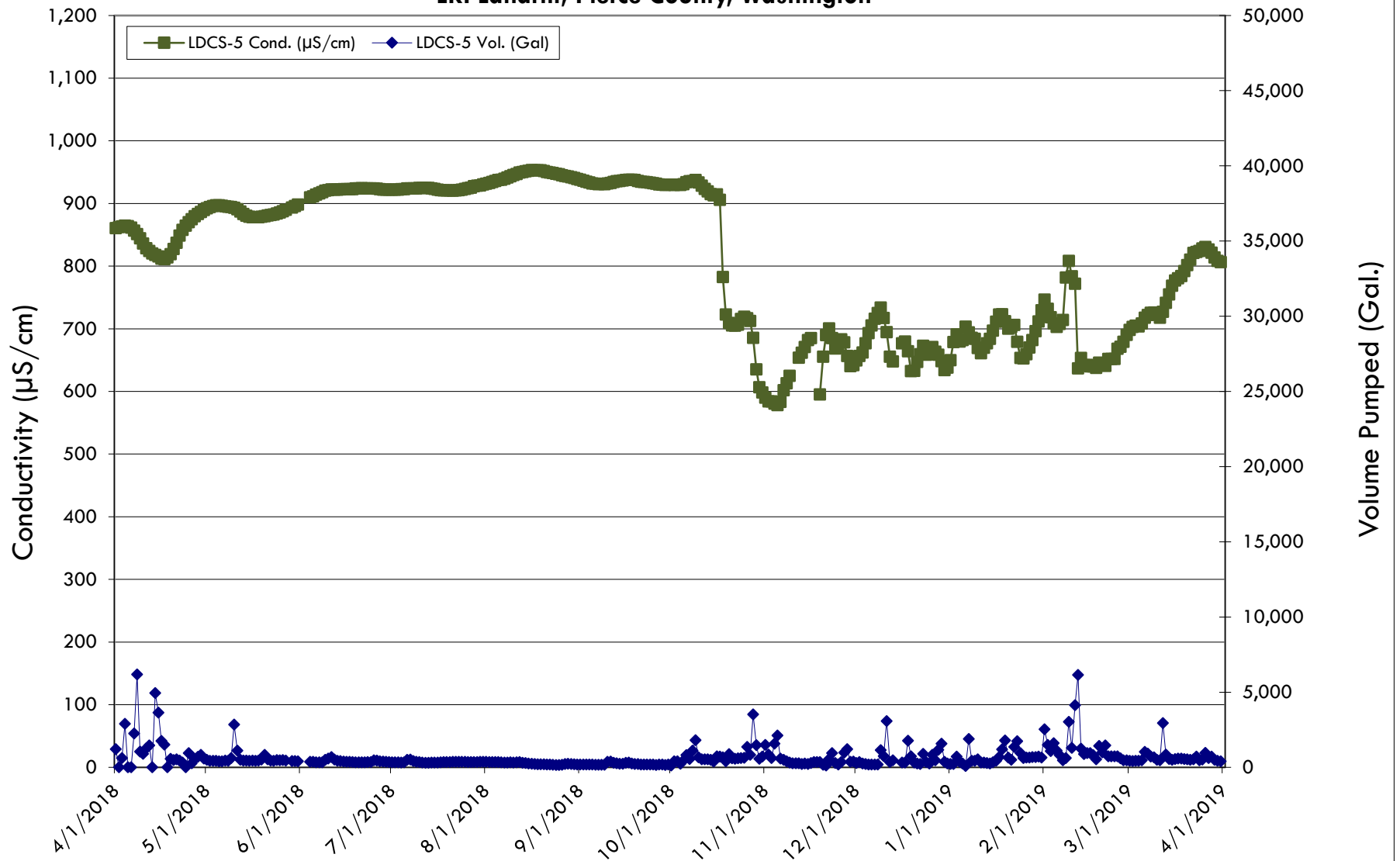
LDCS-4A (Daily Totals)
Conductivity vs Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



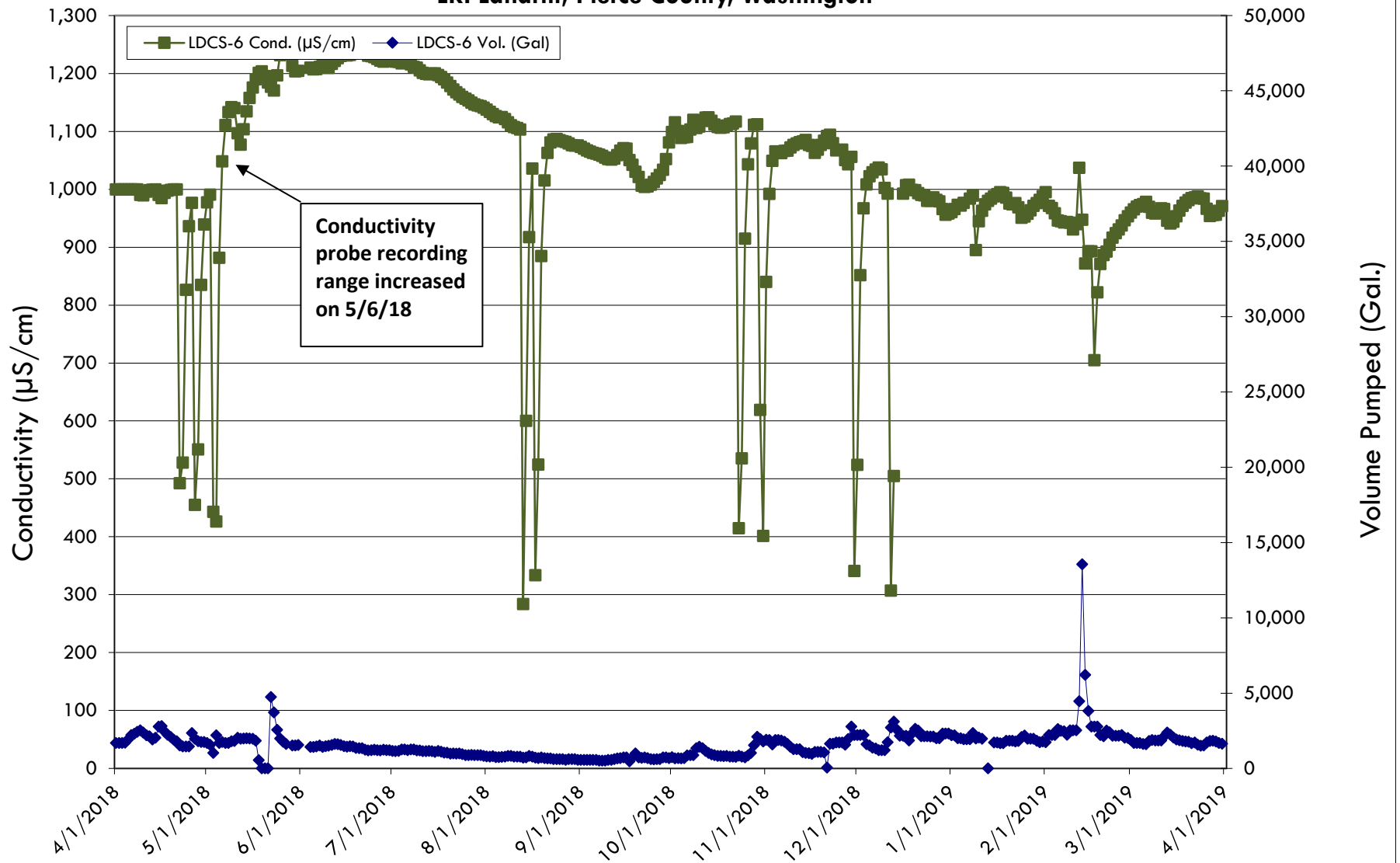
LDCS-4B (Daily Totals)
Conductivity vs Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



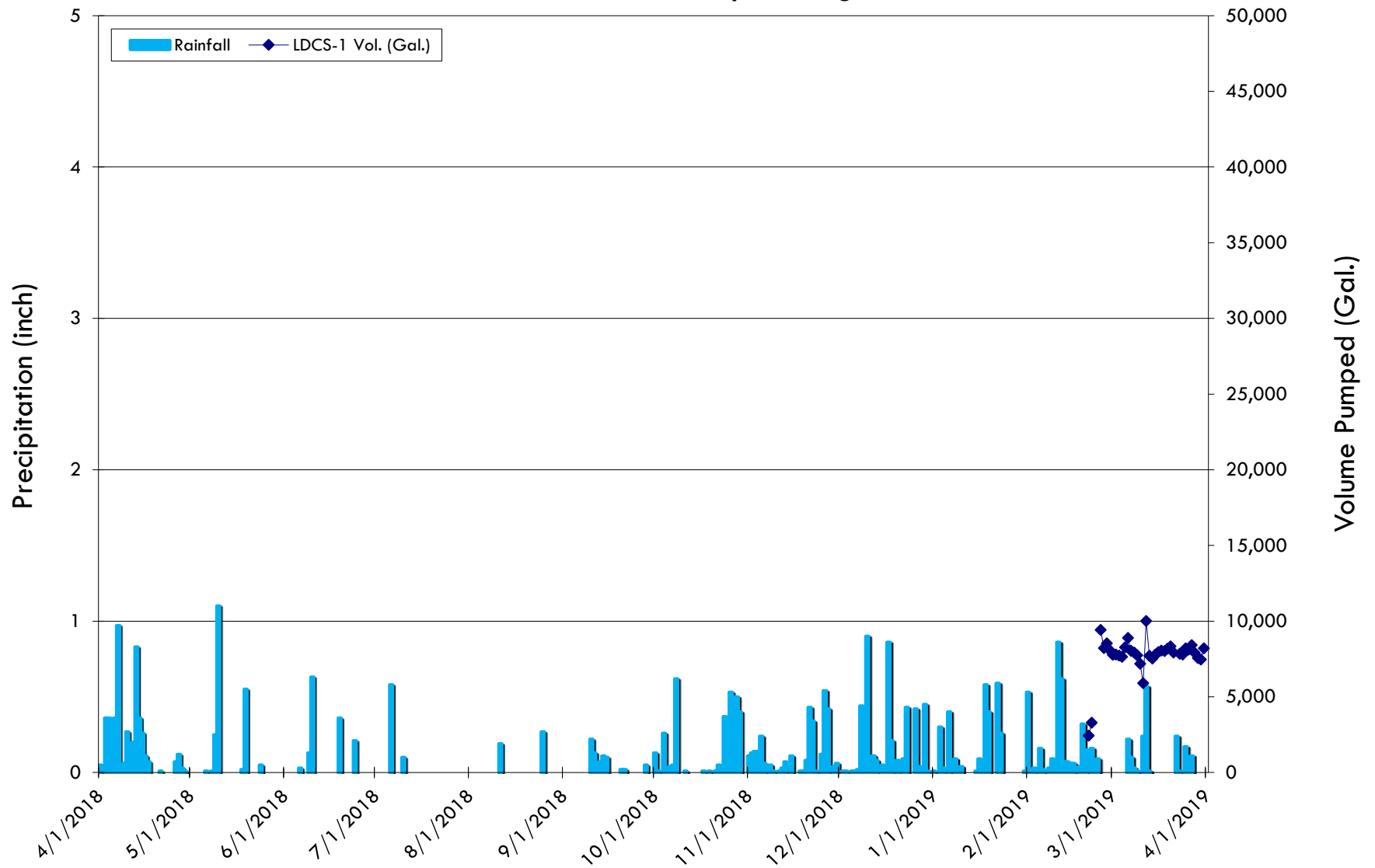
LDCS-5 (Daily Totals)
Conductivity vs Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



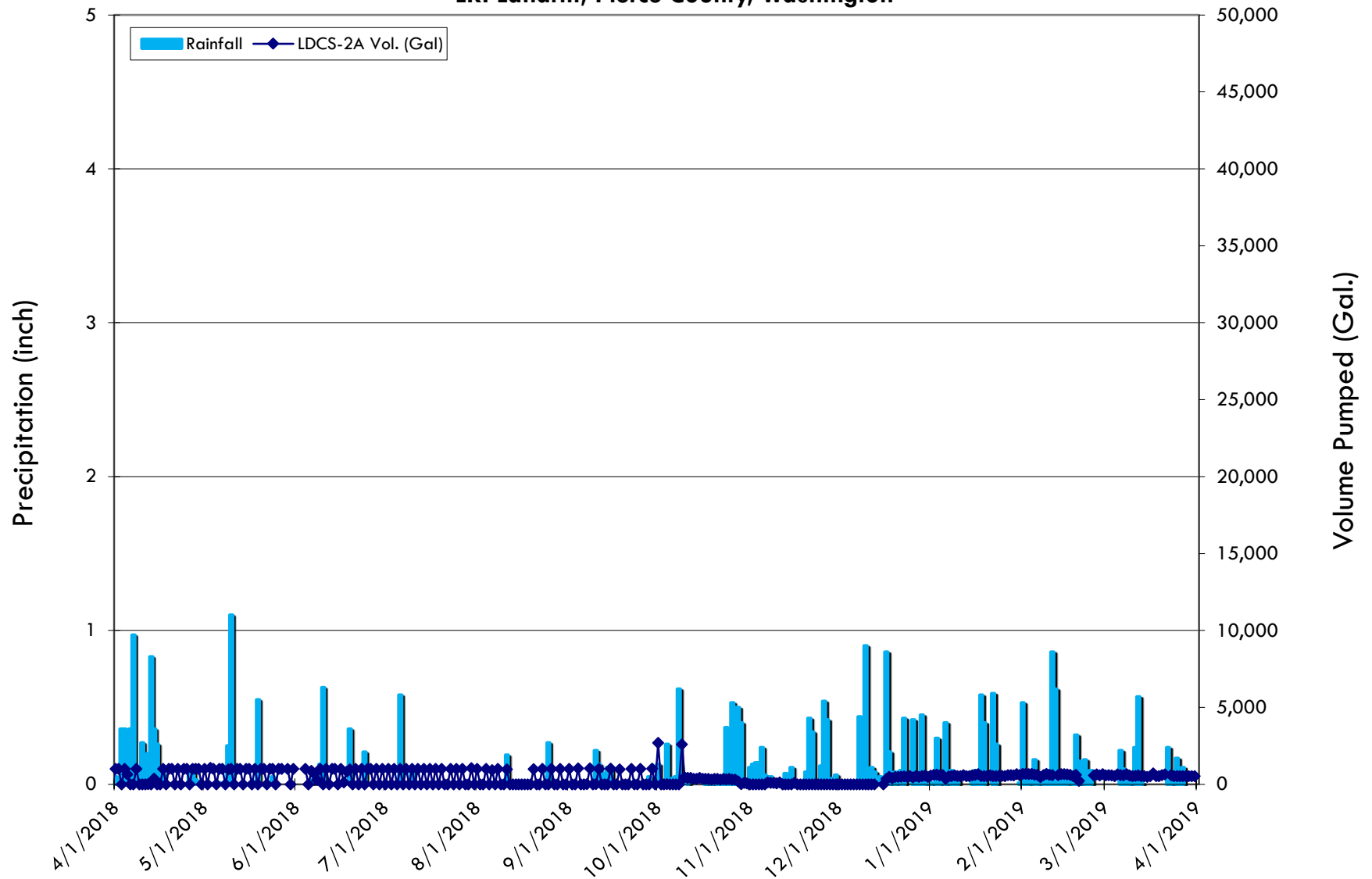
LDCS-6 (Daily Totals)
Conductivity vs Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



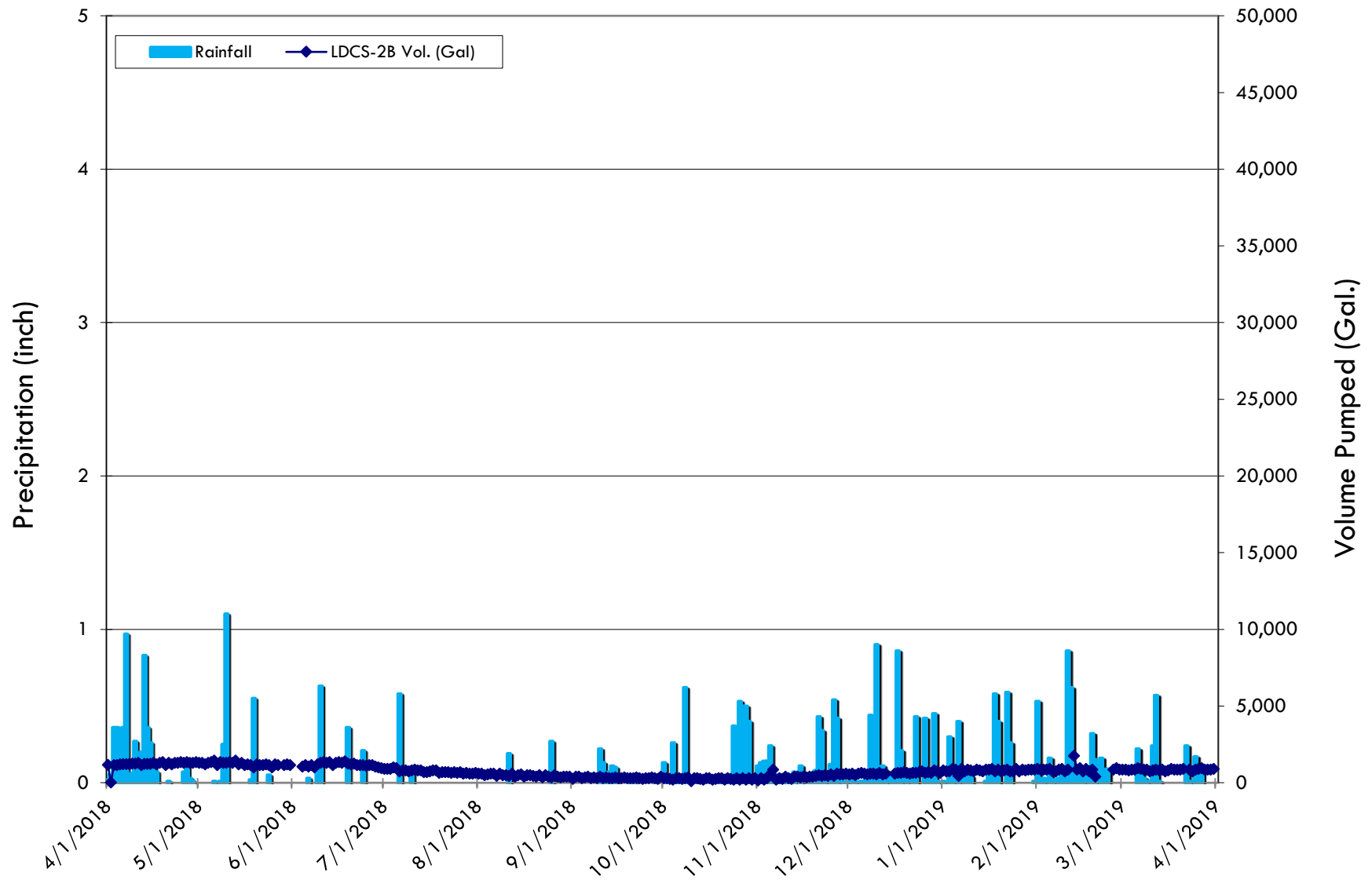
**LDCS-1 (Daily Totals)
Volume Pumped vs Precipitation
First Quarter 2019
LRI Landfill, Pierce County, Washington**



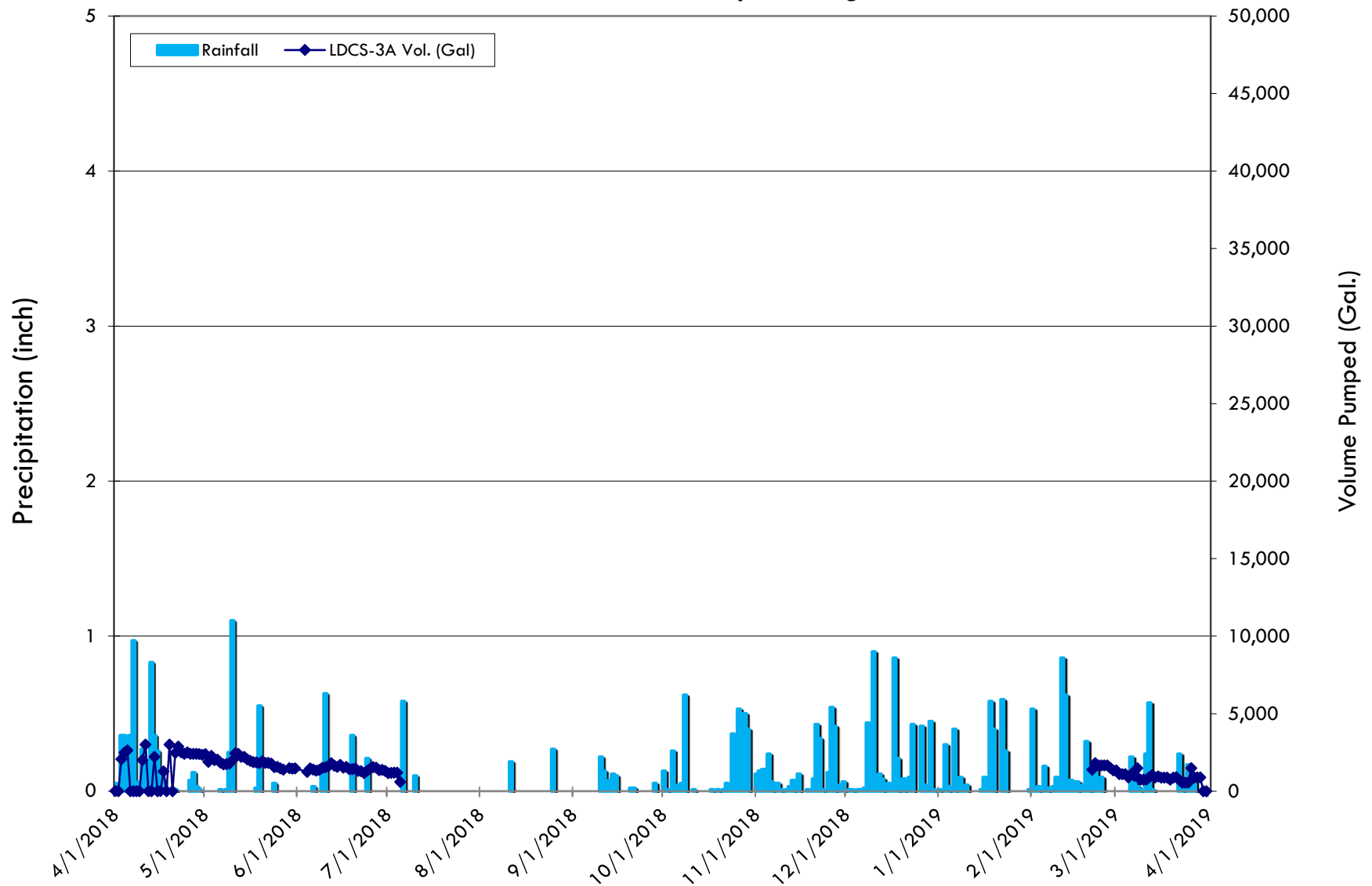
LDCS-2A (Daily Totals)
Volume Pumped vs Precipitation
First Quarter 2019
LRI Landfill, Pierce County, Washington



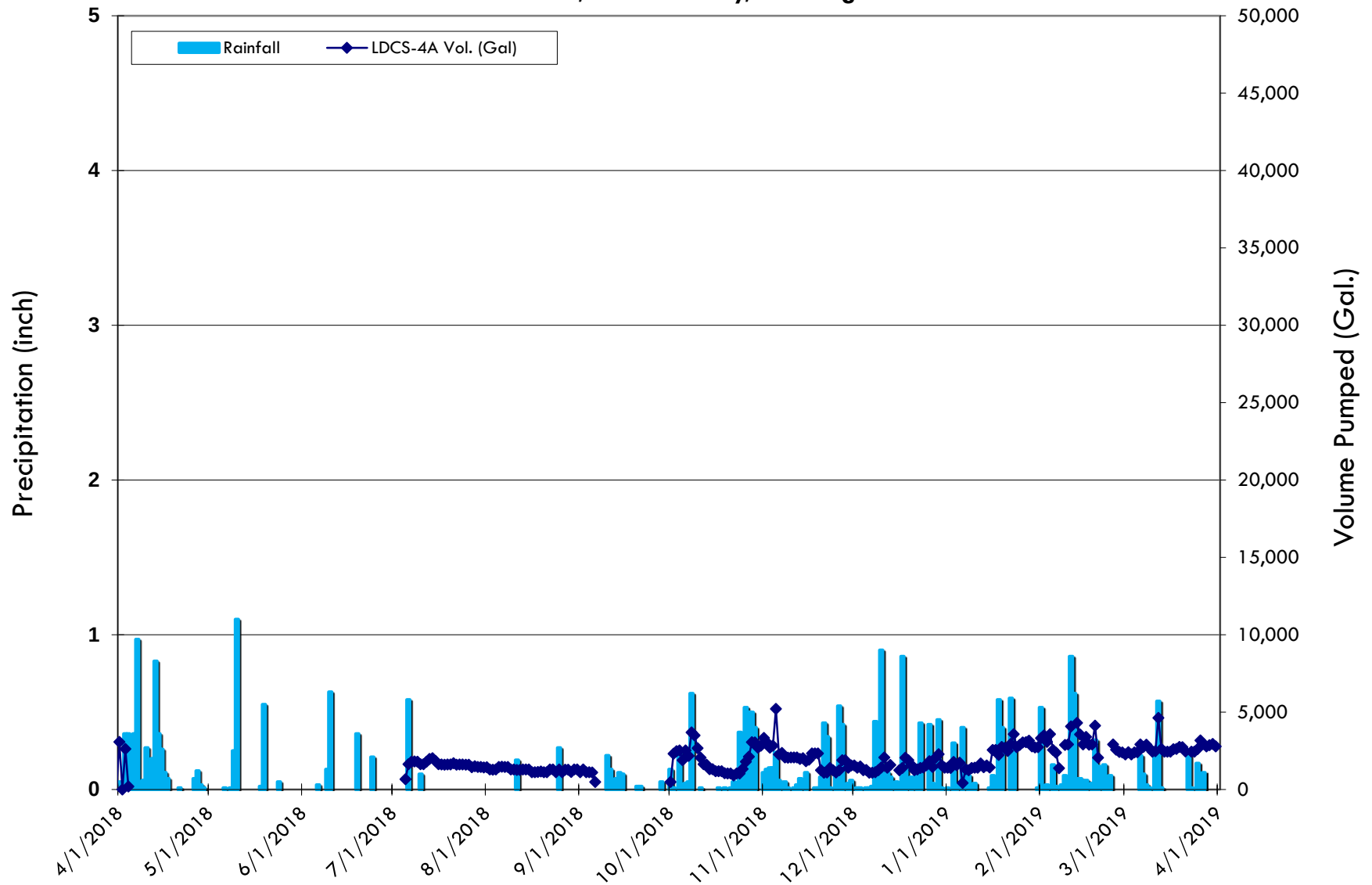
**LDCS-2B (Daily Totals)
Volume Pumped vs Precipitation
First Quarter 2019
LRI Landfill, Pierce County, Washington**



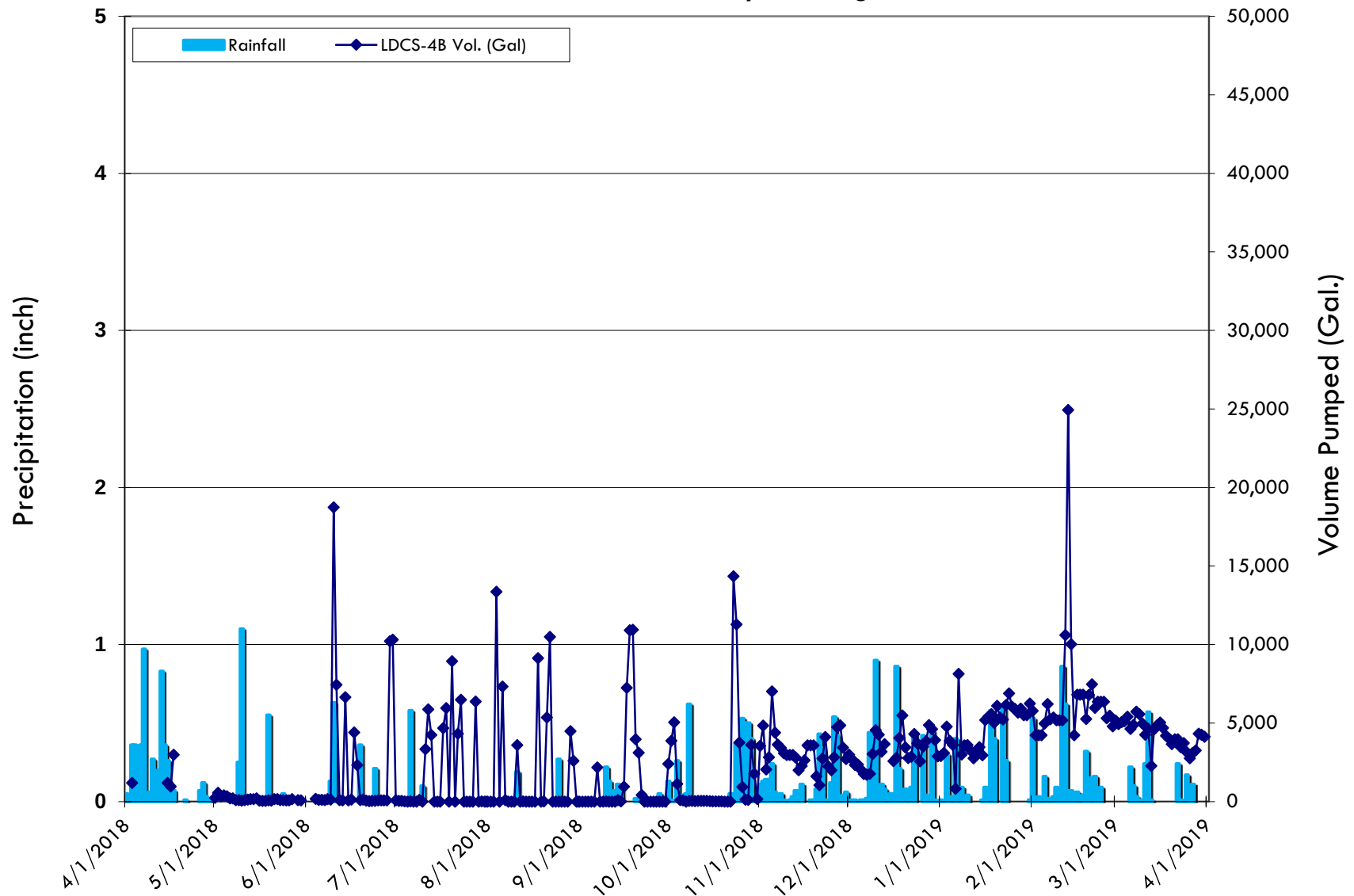
LDCS-3A (Daily Totals)
Volume Pumped vs Precipitation
First Quarter 2019
LRI Landfill, Pierce County, Washington



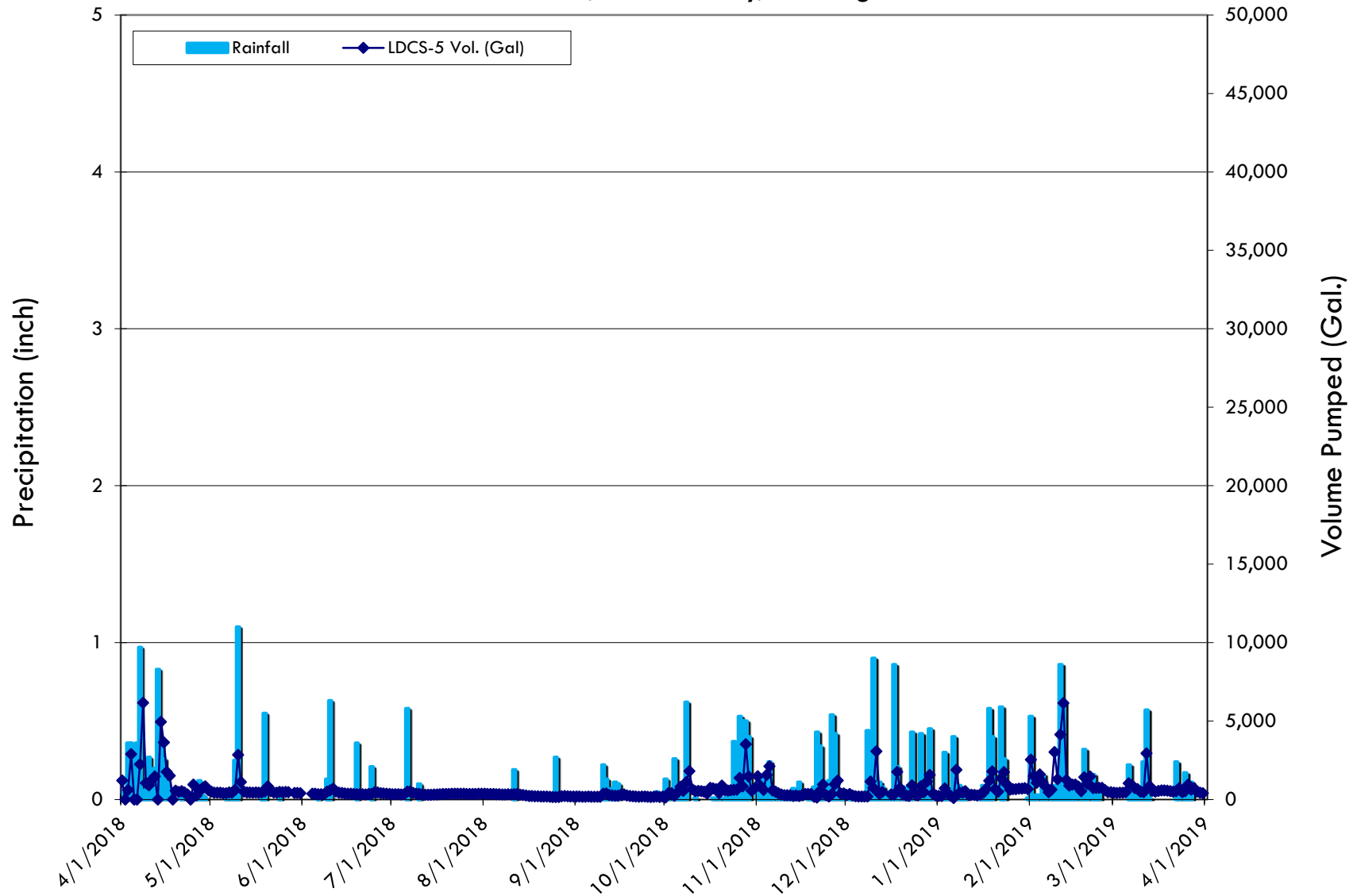
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Volume Pumped vs Precipitation
First Quarter 2019
LRI Landfill, Pierce County, Washington



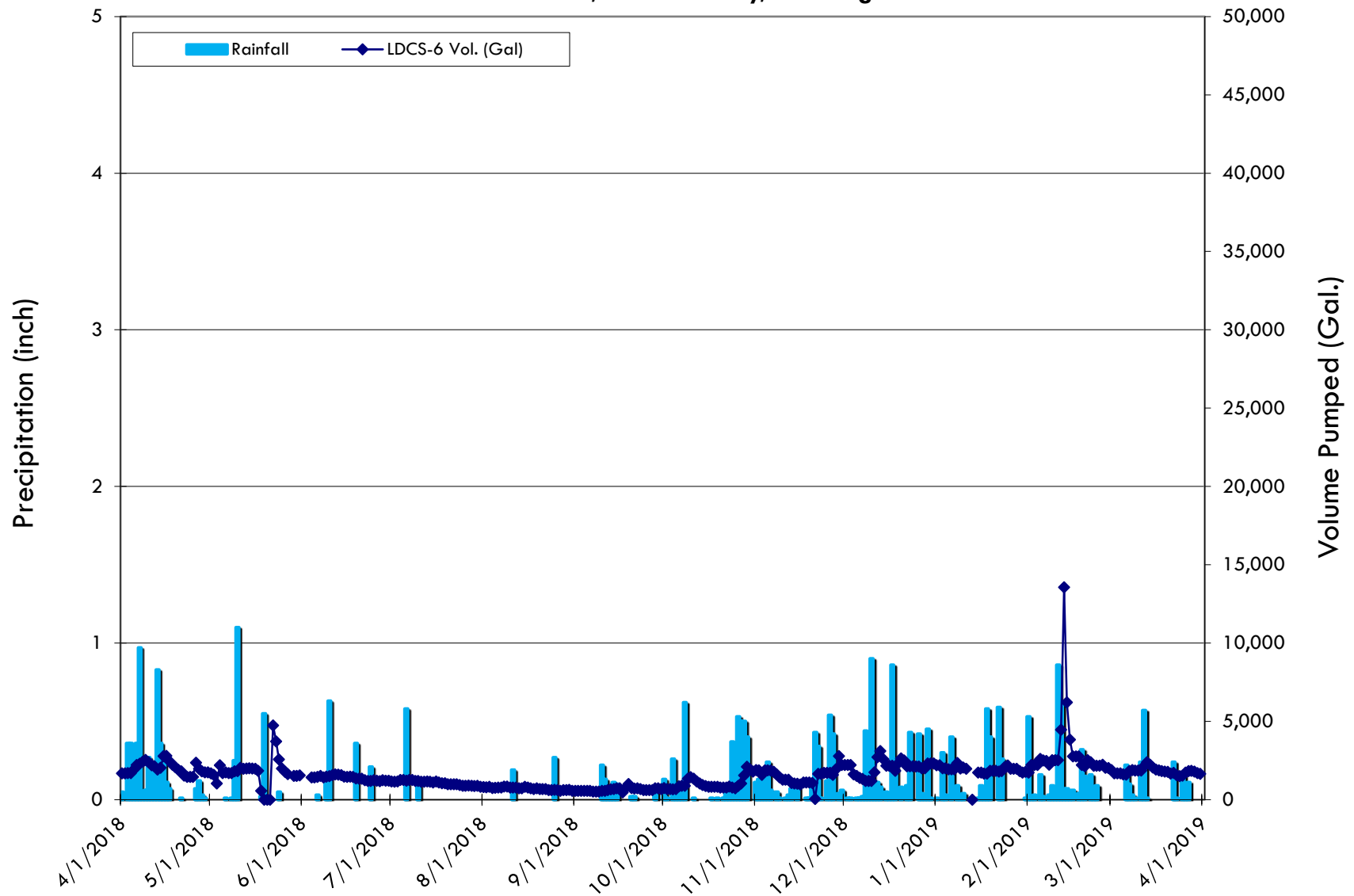
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Volume Pumped vs Precipitation
First Quarter 2019
LRI Landfill, Pierce County, Washington



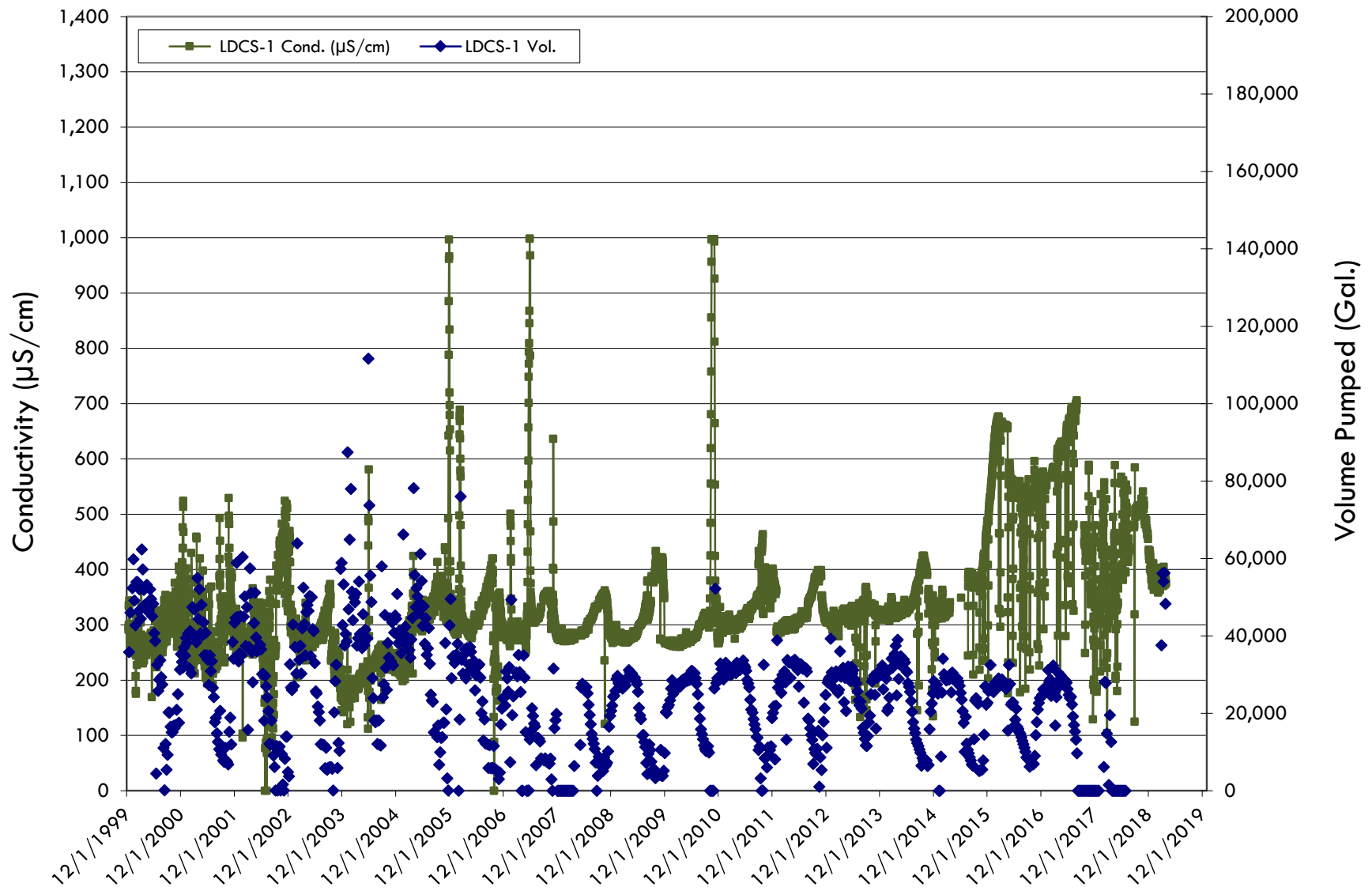
LDCS-5 (Daily Totals)
Volume Pumped vs Precipitation
First Quarter 2019
LRI Landfill, Pierce County, Washington



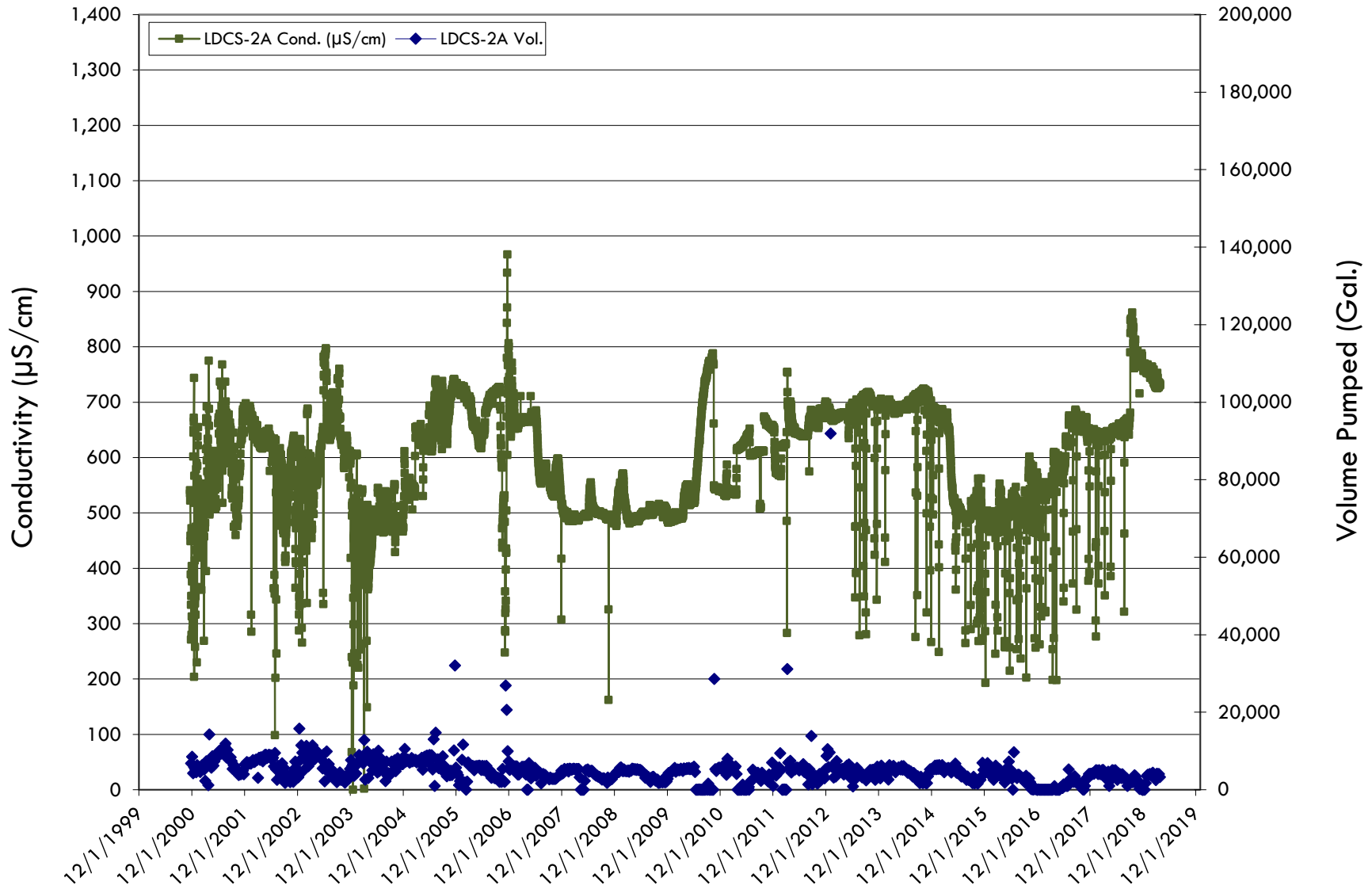
LDCS-6 (Daily Totals)
Volume Pumped vs Precipitation
First Quarter 2019
LRI Landfill, Pierce County, Washington



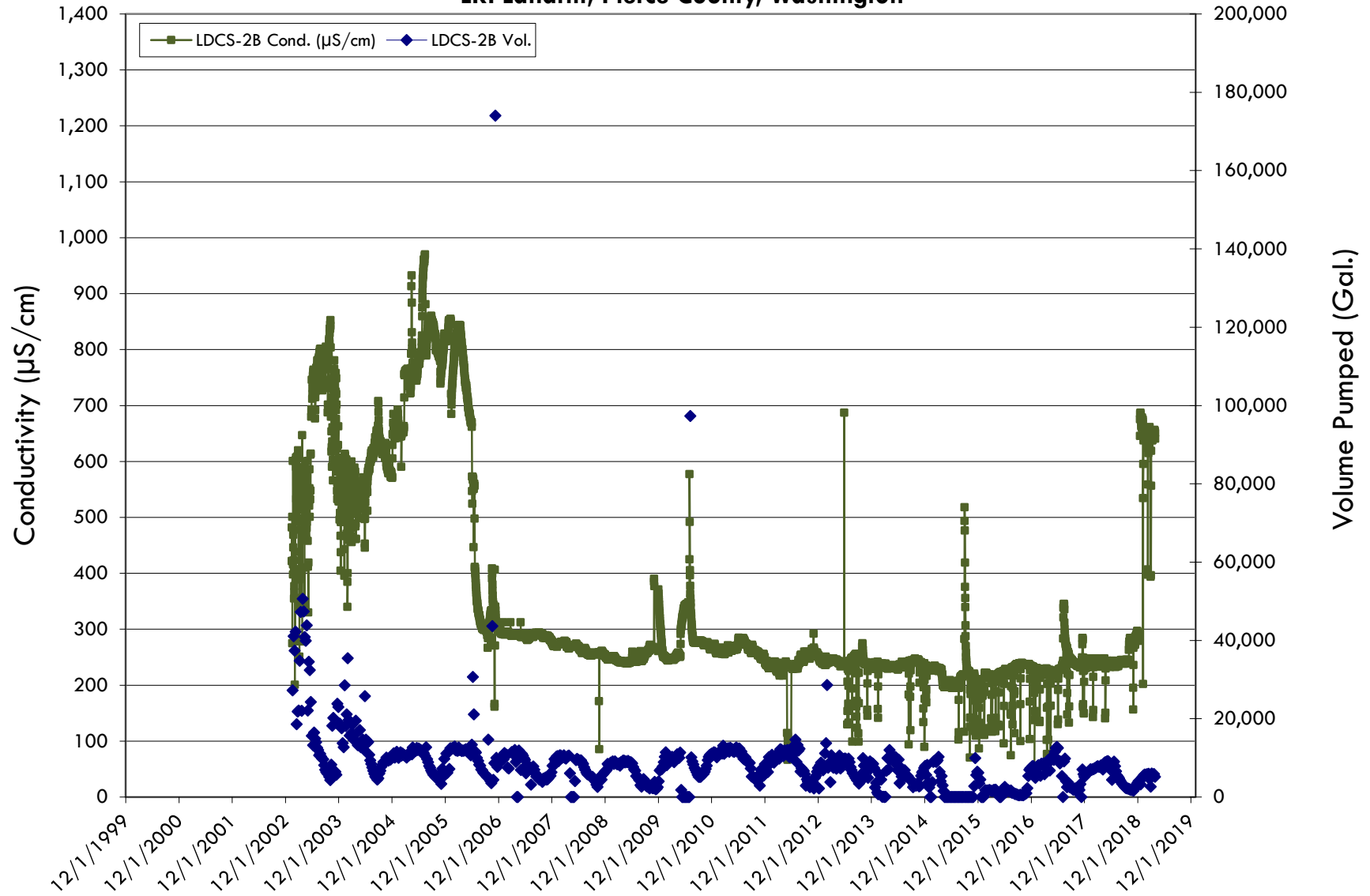
LDCS-1
Daily Conductivity vs Weekly Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



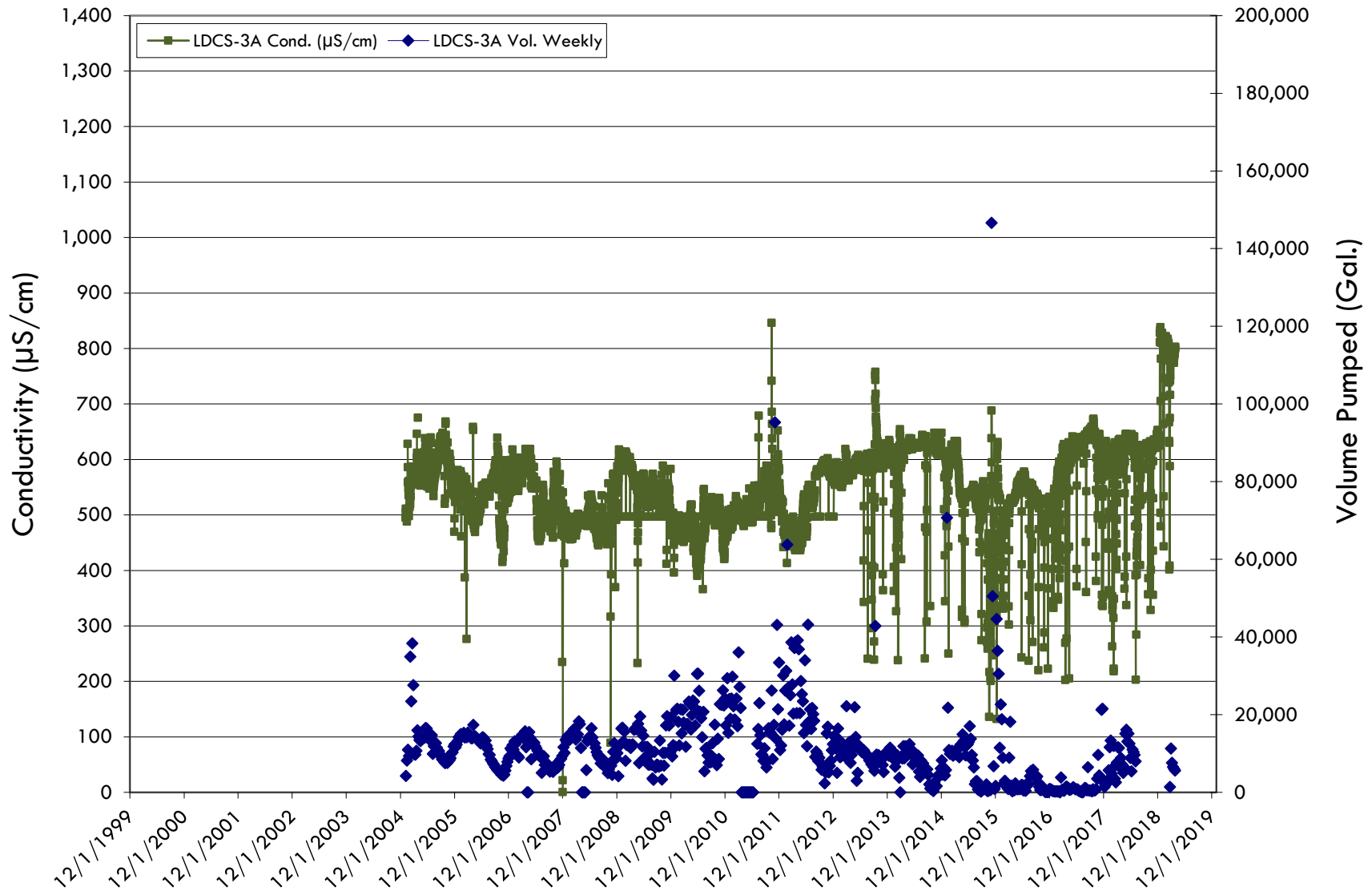
LDCS-2A
Daily Conductivity vs Weekly Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



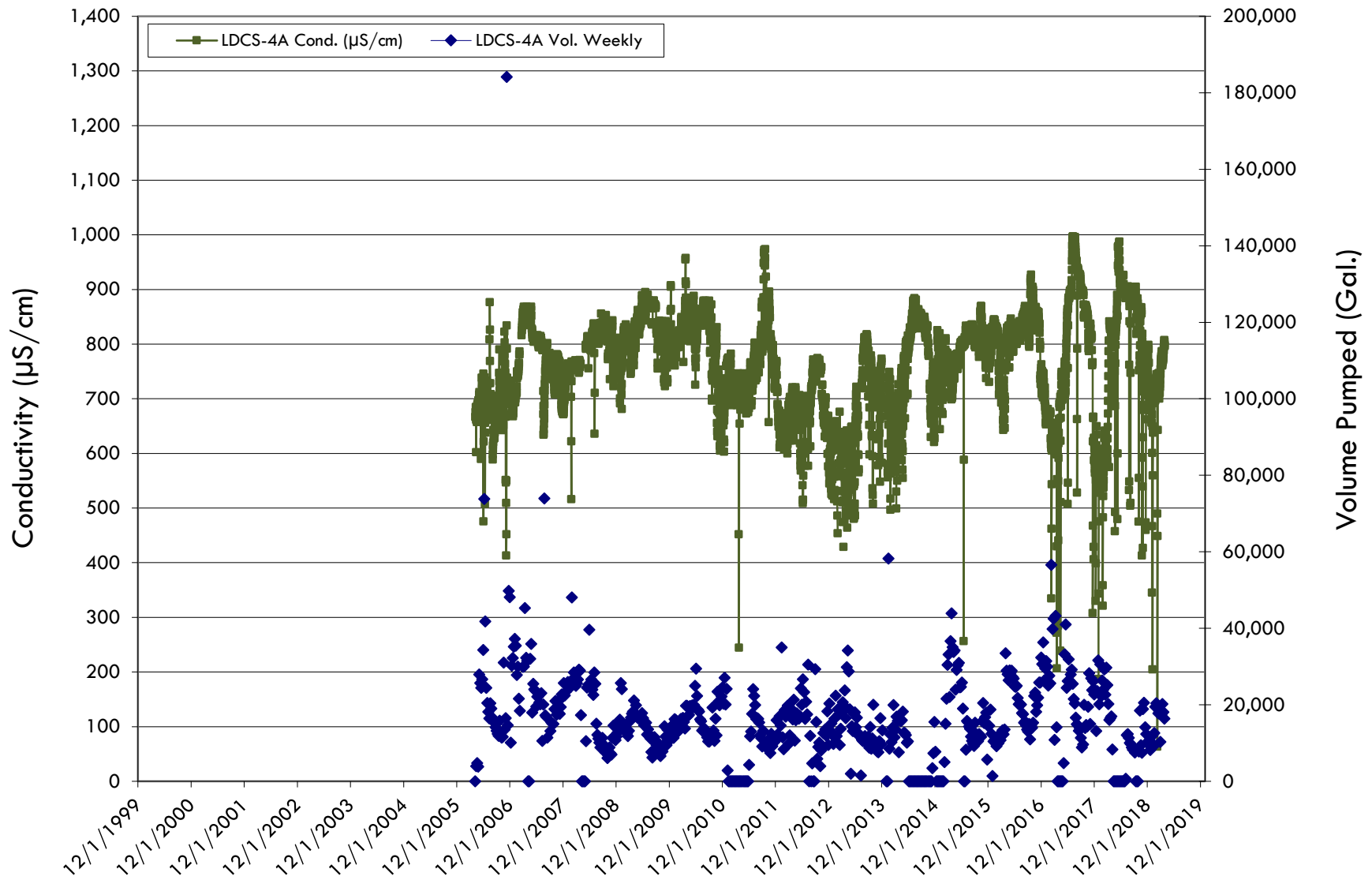
LDCS-2B
Daily Conductivity vs Weekly Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



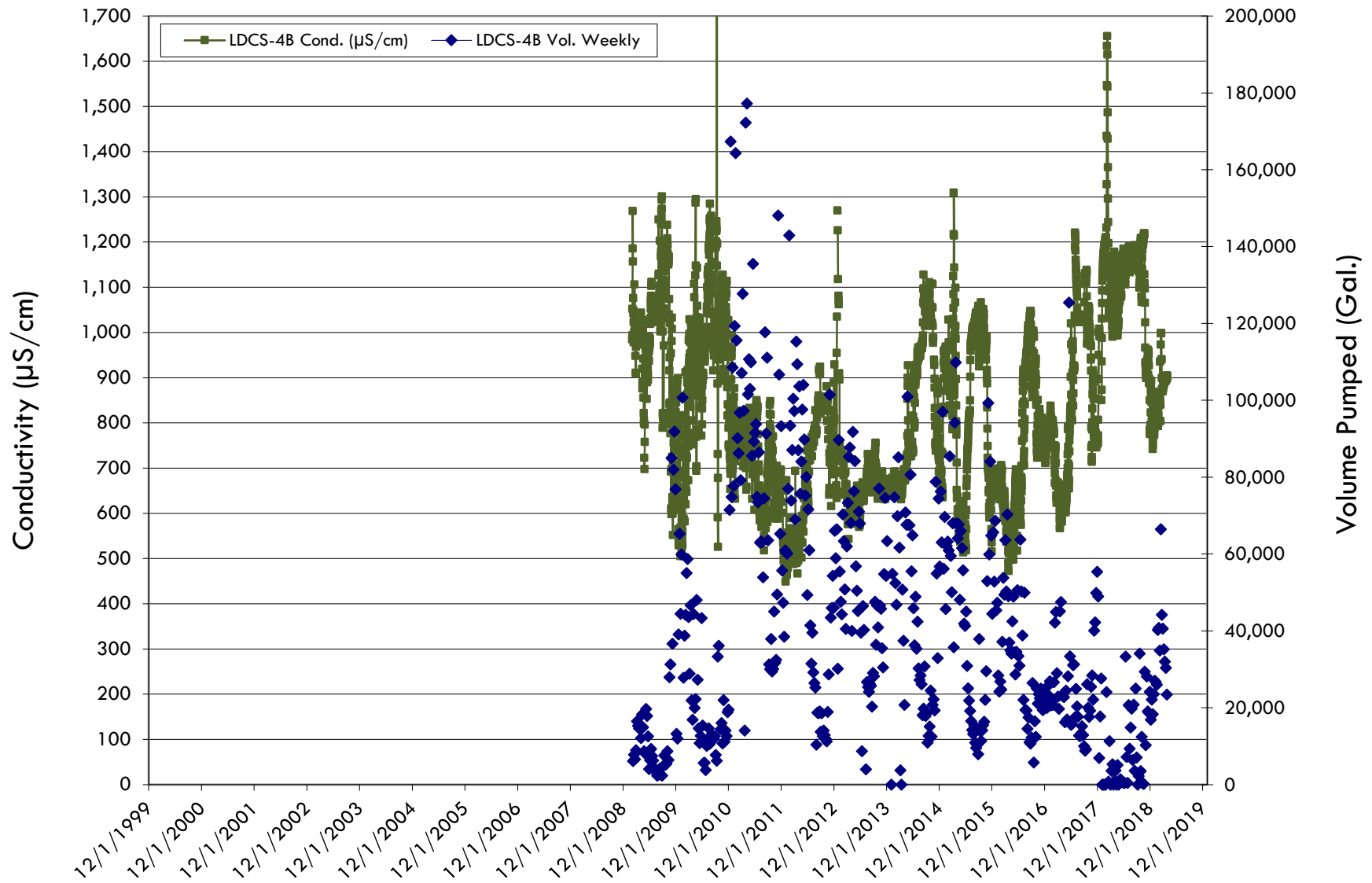
LDCS-3A
Daily Conductivity vs Weekly Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



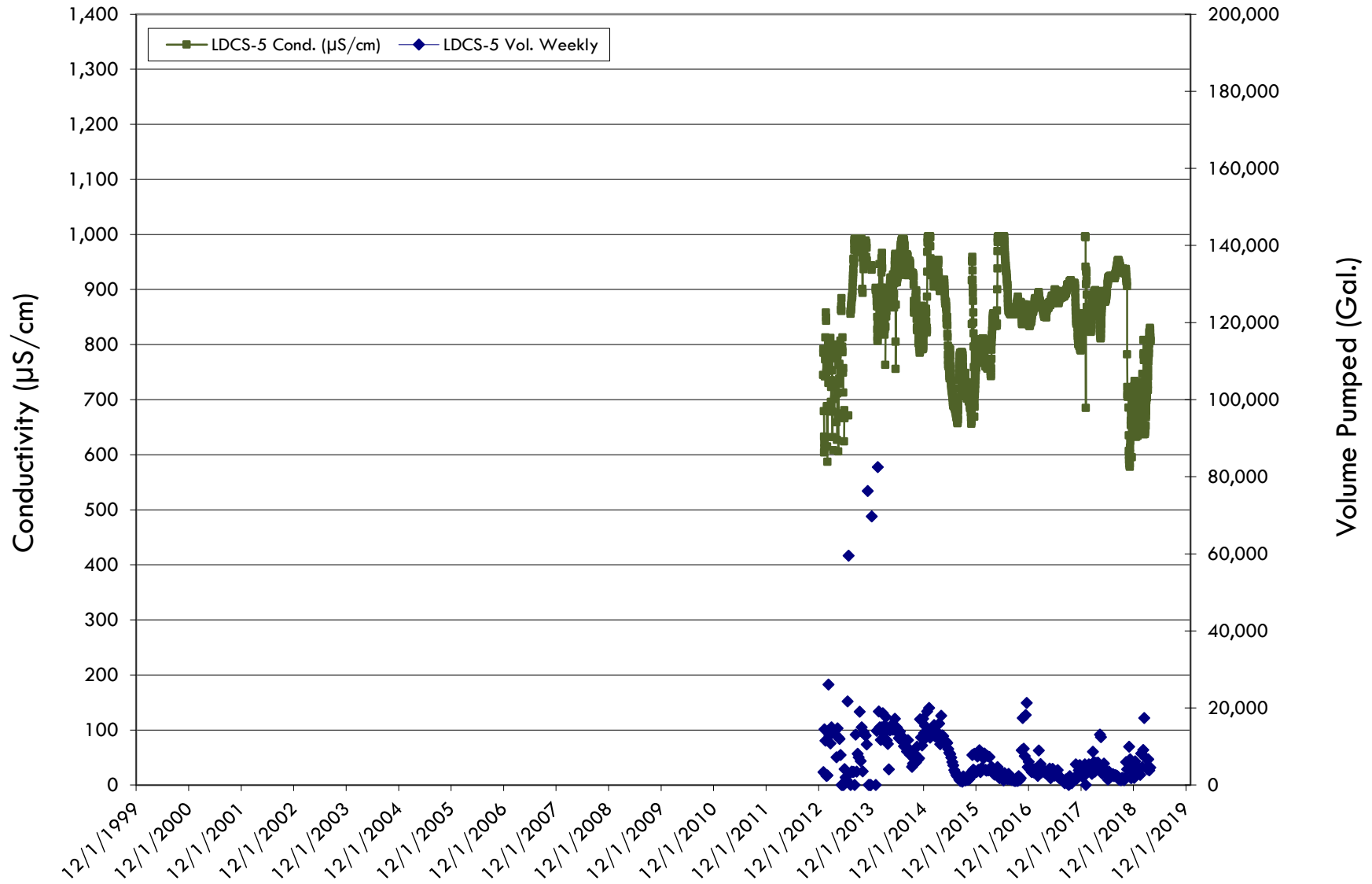
LDCS-4A
Daily Conductivity vs Weekly Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



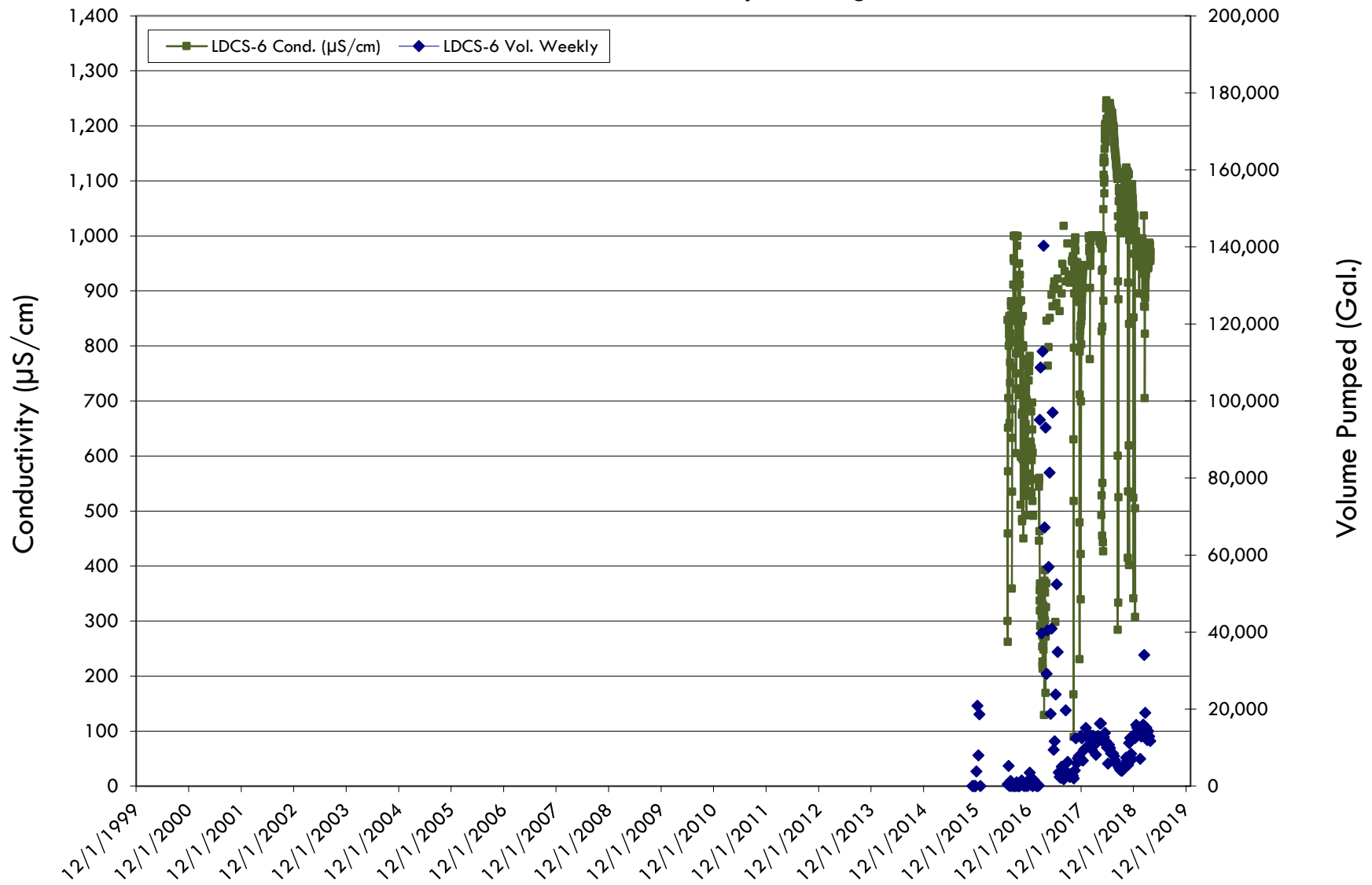
LDCS-4B
Daily Conductivity vs Weekly Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



LDCS-5
Daily Conductivity vs Weekly Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington



LDCS-6
Daily Conductivity vs Weekly Volume Pumped
First Quarter 2019
LRI Landfill, Pierce County, Washington





Appendix I

Surface Water Monitoring Data



Permit Number: WAR002557

Permittee: Pierce County Recycling - 304th Street L

Facility County: Pierce

Receiving Waterbody: South Creek

Monitoring Period: 01/01/2019 - 03/31/2019

Outfall: NEWB - NEWB 2

Version: 1

Week	Monitoring Point	Turbidity (NTU) Measured NTU Quarterly Grab	pH Standard Units Quarterly Grab	Oil & Grease Yes/No Quarterly Visual Observation	Copper Total Micrograms/L (ug/L) Quarterly Grab	Zinc Total Micrograms/L (ug/L) Quarterly Grab	Total 50 D5 Total Milligrams/L (mg/L) Quarterly Grab	Solids (Residue) Total suspended (TSS) Milligrams/L (mg/L) Quarterly Grab	Ammonia Total Milligrams/L (mg/L) Quarterly Grab	Alpha-terpineol (3-Cyclohexene-1-methanol, alpha, alpha, trimethyl-) Micrograms/L (ug/L) Quarterly Grab	Benzoic Acid Micrograms/L (ug/L) Quarterly Grab	p-Cresol (4-methylphenol) Micrograms/L (ug/L) Quarterly Grab
		NEWB	NEWB	NEWB	NEWB	NEWB	NEWB	NEWB	NEWB	NEWB	NEWB	NEWB
Limit Set		ISGP Western WA - 2015 Permit	ISGP Western WA - 2015 Permit	ISGP Western WA - 2015 Permit	ISGP Western WA - 2015 Permit	ISGP Western WA - 2015 Permit	ISGP Non-Haz Waste Landfill (40CFR part 445 subpart B)- 2015 permit	ISGP Non-Haz Waste Landfill (40CFR part 445 subpart B)- 2015 permit	ISGP Non-Haz Waste Landfill (40CFR part 445 subpart B)- 2015 permit	ISGP Non-Haz Waste Landfill (40CFR part 445 subpart B)- 2015 permit	ISGP Non-Haz Waste Landfill (40CFR part 445 subpart B)- 2015 permit	ISGP Non-Haz Waste Landfill (40CFR part 445 subpart B)- 2015 permit
1-F	1/4/19	10	7.1									
2-Th	1/10/19	3	6.7	No	2.3	J 5.5	B 2.0	B 2.0	0.079	B 9.8	B 59	B 10.0
3-Th	1/17/19	6	6.9									
4-M	1/21/19	10	7.1									
5-W	1/30/19	8	7.0									
7-W	2/13/19	18	6.9									
8-T	2/19/19	9	6.8									
9-T	2/26/19	5	6.9									
10-W	3/6/19	6	6.8									
11-T	3/12/19	8	6.9									
12-F	3/22/19	8	7.0									
13-W	3/27/19	9	6.8									
Minimum			6.7 BM: >= 5.0 (RO)									
Average		8.3 BM: <= 25			2.3 BM: <= 14	J 5.5 BM: <= 117						
Maximum			7.1 BM: <= 9.0 (RO)									
Month 1 Average							B 2.0 <= 37	B 2.0 <= 27	0.079 <= 4.9	B 9.8 <= 16	B 59 <= 71	B 10 <= 14
Month 2 Average							B 2.0 <= 37	B 2.0 <= 27	0.079 <= 4.9	B 9.8 <= 16	B 59 <= 71	B 10 <= 14
Month 3 Average							B 2.0 <= 37	B 2.0 <= 27	0.079 <= 4.9	B 9.8 <= 16	B 59 <= 71	B 10 <= 14

Reporting Codes Used: B - Below Detection Limit/No Detection, J - Estimated Value/Below Quantitation Limit



Week	Monitoring Point	Phenol Micrograms/L (ug/L) Quarterly Grab	Zinc Total Micrograms/L (ug/L) Quarterly Grab	pH Standard Units Quarterly Grab
Limit Set		ISGP Non-Haz Waste Landfill (40CFR part 445 subpart B)- 2015 permit	ISGP Non-Haz Waste Landfill (40CFR part 445 subpart B)- 2015 permit	ISGP Non-Haz Waste Landfill (40CFR part 445 subpart B)- 2015 permit
1-F	1/4/19			7.1
2-Th	1/10/19	B 9.8	J 5.5	6.7
3-Th	1/17/19			6.9
4-M	1/21/19			7.1
5-W	1/30/19			7.0
7-W	2/13/19			6.9
8-T	2/19/19			6.8
9-T	2/26/19			6.9
10-W	3/6/19			6.8
11-T	3/12/19			6.9
12-F	3/22/19			7.0
13-W	3/27/19			6.8
Minimum				6.7
				>= 6.0 (RO)
Average				
Maximum				7.1
				<= 9.0 (RO)
Month 1 Average		B 9.8	J 5.5	
		<= 15	<= 110	
Month 2 Average		B 9.8	J 5.5	
		<= 15	<= 110	
Month 3 Average		B 9.8	J 5.5	
		<= 15	<= 110	



I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

George Duvendack

5/13/2019 12:55:42 PM

Signature

Date



Permit Number: WAR002603

Permittee: LRI 304th Street Landfill

Facility County: Pierce

Receiving Waterbody:

Monitoring Period: 01/01/2019 - 01/31/2019

Outfall: 001 - NEWB 2

Version: 1

Week	Monitoring Point	Turbidity (NTU) Measured NTU Optional Grab	Turbidity (cm) Measured Centimeters Optional Grab	pH Standard Units Optional Grab
		001	001	001
1-F	1/4/19	10		7.1
2-Th	1/10/19	3		6.7
3-Th	1/17/19	6		6.9
4-M	1/21/19	10		7.1
5-W	1/30/19	8		7.0
Minimum			BM: >= 33 (RO)	BM: >= 6.5 (RO)
Maximum		BM: <= 25 (RO)		BM: <= 8.5 (RO)

Overall DMR Notes/Comment

Listed BMP's were in operation for the entire month.

BMPs

Monitoring Point	Week	BMP
001		Check Dams
001		Other
001		Sediment Trap
001		Silt Fence
001		Straw Wattles

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

George Duvendack

2/14/2019 8:04:06 AM

Signature

Date



Permit Number: WAR002603

Permittee: LRI 304th Street Landfill

Facility County: Pierce

Receiving Waterbody:

Monitoring Period: 02/01/2019 - 02/28/2019

Outfall: 001 - NEWB 2

Version: 1

Week	Monitoring Point	Turbidity (NTU) Measured NTU Optional Grab	Turbidity (cm) Measured Centimeters Optional Grab	pH Standard Units Optional Grab
		001	001	001
2-F	2/8/19	FC		FC
3-W	2/13/19	18		6.9
4-T	2/19/19	9		6.8
5-T	2/26/19	5		6.9
Minimum				6.8
			BM: >= 33 (RO)	BM: >= 6.5 (RO)
Maximum		18		6.9
		BM: <= 25 (RO)		BM: <= 8.5 (RO)

Reporting Codes Used: FC - Frozen Conditions/Unsafe conditions

Overall DMR Notes/Comment

Listed BMP's were in operation for the entire month.

BMPs

Monitoring Point	Week	BMP
001		Check Dams
001		Other
001		Sediment Trap
001		Silt Fence
001		Straw Wattles

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

George Duvendack

Signature

3/8/2019 1:19:04 PM

Date



Permit Number: WAR002603

Permittee: LRI 304th Street Landfill

Facility County: Pierce

Receiving Waterbody:

Monitoring Period: 03/01/2019 - 03/31/2019

Outfall: 001 - NEWB 2

Version: 1

Week	Monitoring Point	Turbidity (NTU) Measured NTU Optional Grab	Turbidity (cm) Measured Centimeters Optional Grab	pH Standard Units Optional Grab
		001	001	001
2-W	3/6/19	6		6.8
3-T	3/12/19	8		6.9
4-F	3/22/19	8		7.0
5-W	3/27/19	9		6.8
Minimum				
			BM: >= 33 (RO)	BM: >= 6.5 (RO)
Maximum				
		BM: <= 25 (RO)		BM: <= 8.5 (RO)

Overall DMR Notes/Comment

Listed BMP's were in operation for the entire month.

BMPs

Monitoring Point	Week	BMP
001		Check Dams
001		Other
001		Sediment Trap
001		Silt Fence
001		Straw Wattles

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

George Duvendack

Signature

4/10/2019 8:35:39 PM

Date



Appendix J

Landfill Gas Monitoring Data

LRI Landfill

04219001.04

January-19

[illegible]

Normal Operating Range:

(min)			-		0.3	0.3	-				20.0	
(max)			5.00		5.0	5.0	20.3				90.0	

Perimeter Gas Probes

GP-1	1/18/2019	8:14	0.1	7.4	6.6	5.5	7.0	80.9	16.9	9.9	100.0	
GP-2	1/18/2019	8:21	0.0	19.2	18.2	19.8	0.0	62.0	16.3	9.3	100.0	
GP-3	1/18/2019	8:27	0.0	--	0.0	10.3	6.3	83.4	11.6	7.6	100.0	
GP-4	1/18/2019	8:32	0.0	--	0.0	2.5	18.6	78.9	9.6	5.6	100.0	
GP-9	1/18/2019	8:42	-0.1	--	0.0	9.2	5.1	85.7	11.6	0.0	0.0	
GP-10	1/18/2019	8:06	0.0	4.9	0.1	6.4	15.6	77.9				
GP-10P	1/18/2019	8:02	0.2	28.3	27.1	34.7	0.0	38.2				
GP-11	1/18/2019	7:54	0.8	0.5	0.0	4.3	18.1	77.6				
GP-12	1/18/2019	7:47	0.0	25.6	23.1	68.3	0.0	8.6				
GP-13	1/18/2019	7:41	0.2	1.4	1.2	28.0	0.0	70.8				
GP-14	1/18/2019	9:17	0.5	--	0.0	0.1	20.4	79.5	11.6	0.0	0.0	
GP-15	1/18/2019	9:10	0.3	--	0.0	0.2	20.5	79.3	9.4	0.0	0.0	

General Data:	
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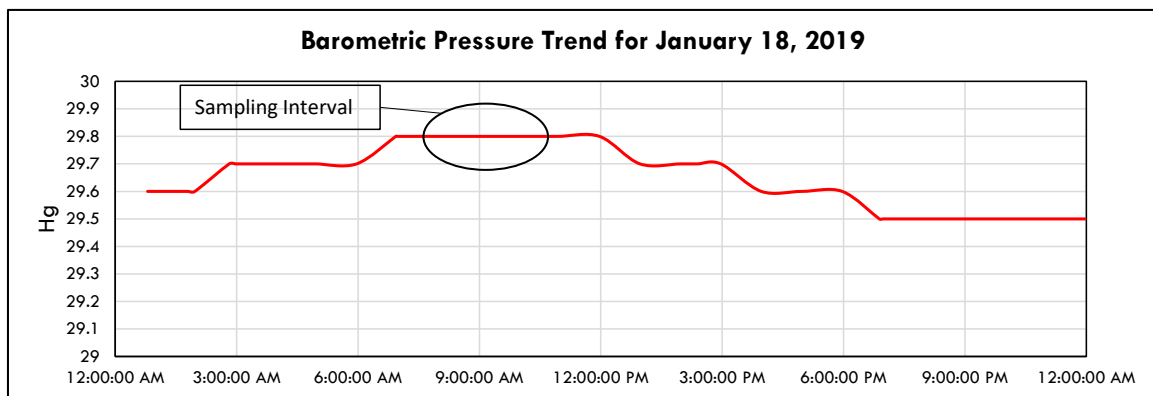
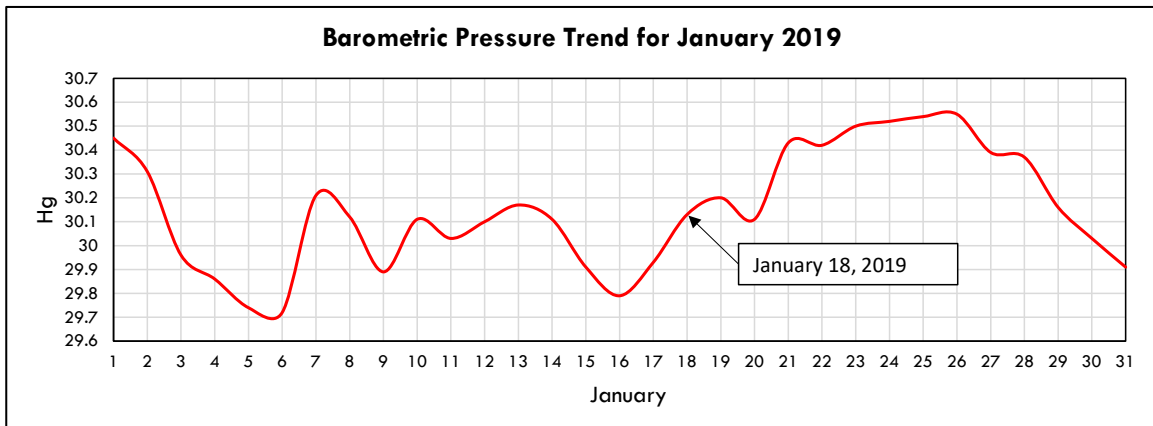
	Beginning	Ending	Average	Starting Date:	1/18/2019
Weather:	Cloudy	Cloudy	Cloudy	Starting Time:	7:41
Temperature, T (deg C):	45	48	46.5	Finishing Date:	1/18/2019
Wind Speed (kmh):	8	0	4	Finishing Time:	9:17
Wind Direction:	180	0	90	Monitored by:	T. Berndahl
Barometric Pressure, P (in Hg):	29.7	29.8	29.75	Instruments:	GEM 2000
24hr Baro.Trend (rising / falling / steady / unsteady)	-			Calibration Date:	1/18/2019

Headings:

Notes:

P _(well)	Relative Pressure	1.	Measurement for spike concentrations of CH ₄ and CO ₂ are recorded as a comment if observed during sampling.
CH ₄	Methane	2.	Water level measurements made where gas probe monitoring port allows for measurement, or where there is an adjacent measurement piezometer.
CO ₂	Carbon Dioxide		
O ₂	Oxygen	3.	Exposed Perforation = perforated pipe section not submerged by liquid.
H ₂ O	Water Vapor	4.	GP-10P added in January 2018. Monitoring performed at water level piezometer installed in the same boring as GP-10.
N ₂	Nitrogen		
TOC	Top of Casing		

Barometric Pressure Trend - January 2019
LRI Landfill, Pierce County, Washington



Source: Pierce County - Thun Field Station
Lat: 47.1 Long: 122.29 Elev: 538 ft-AMSL

Data Source: <https://www.wunderground.com/history/daily/us/wa/puyallup/KPLU/date/2019-1-18>

SCS Engineers

04219001.04

February-19

[illegible]

Normal Operating Range:	
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(min)			-		0.3	0.3	-				20.0	
(max)			5.00		5.0	5.0	20.3				90.0	

Perimeter Gas Probes

GP-1	2/20/2019	10:16	0.0	4.2	6.1	5.8	2.2	85.9	16.7	9.7	100.0	
GP-2	2/20/2019	10:28	1.9	18.5	16.9	18.1	0.0	65.0	15.8	8.8	100.0	
GP-3	2/20/2019	10:36	0.1	--	0.0	8.7	8.3	83.0	11.6	7.6	100.0	
GP-4	2/20/2019	10:40	0.0	--	0.0	1.4	19.2	79.4	9.0	5.0	99.2	
GP-9	2/20/2019	10:44	-0.1	--	0.0	8.3	6.1	85.6	10.7	0.0	0.0	
GP-10	2/20/2019	10:08	0.1	17.2	19.8	24.5	0.0	55.7				
GP-10P	2/20/2019	10:05	0.3	17.4	14.8	29.4	0.0	55.8				
GP-11	2/20/2019	9:53	0.6	1.1	0.3	19.7	2.4	77.6				
GP-12	2/20/2019	7:57	0.0	27.7	23.8	60.6	0.0	15.6				
GP-13	2/20/2019	7:49	0.1	1.3	1.1	25.3	0.0	73.6				
GP-14	2/20/2019	11:03	0.3	--	0.0	0.1	20.1	79.8	10.4	0.0	0.0	
GP-15	2/20/2019	10:57	0.5	--	0.0	0.3	20.0	79.7	8.8	0.0	0.0	

General Data:

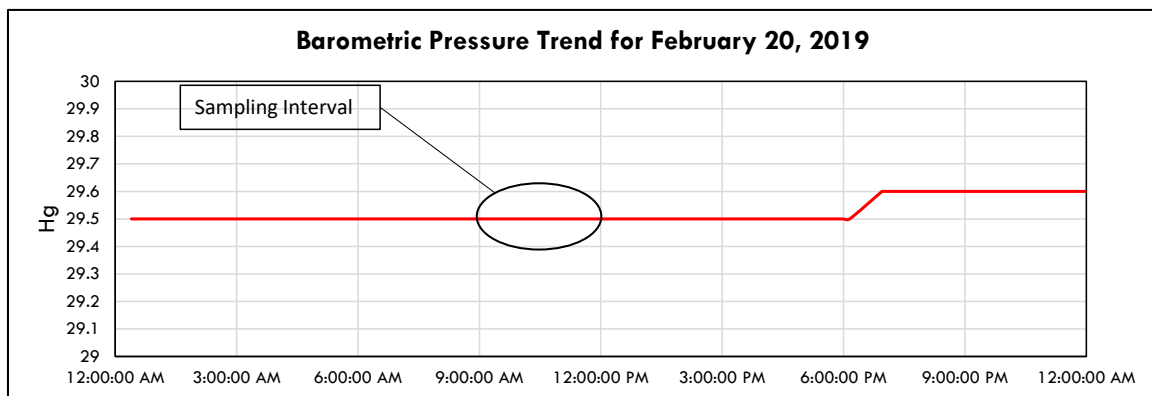
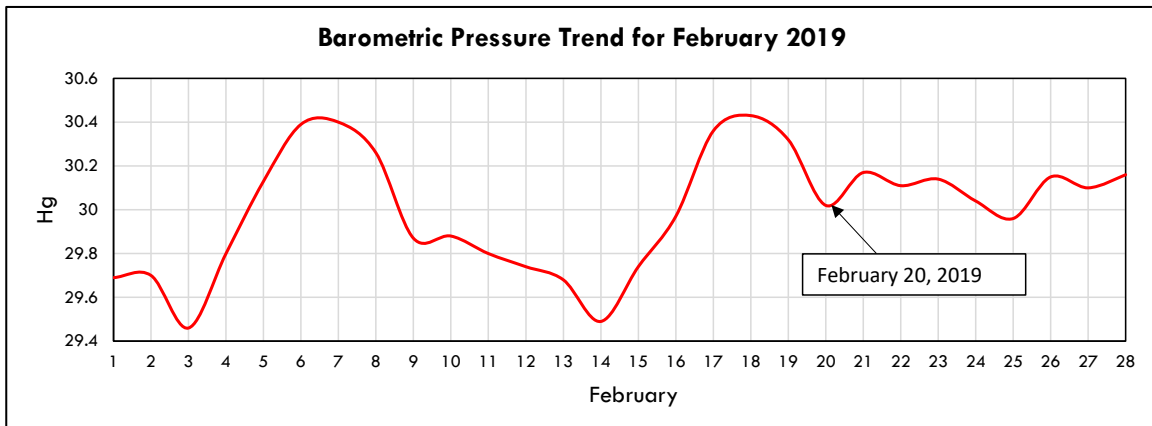
			Beginning	Ending	Average		
Weather:			Cloudy	Light Rain	Cloudy	Starting Date:	2/20/2019
Temperature, T (deg F):			35	39	37	Starting Time:	7:49
Wind Speed (mph):			0	0	0	Finishing Date:	2/20/2019
Wind Direction:			0	0	0	Finishing Time:	11:03
Barometric Pressure, P (in Hg):			29.50	29.50	29.50	Monitored by:	T. Berndahl
24hr Baro.Trend (rising / falling / steady / unsteady)			-			Instruments:	GEM 2000
						Calibration Date:	2/20/2019

Headings:

Notes:

P _(well)	Relative Pressure	1.	Measurement for spike concentrations of CH ₄ and CO ₂ are recorded as a comment if observed during sampling.
CH ₄	Methane	2.	Water level measurements made where gas probe monitoring port allows for measurement, or where there is an adjacent measurement piezometer.
CO ₂	Carbon Dioxide		
O ₂	Oxygen	3.	Exposed Perforation = perforated pipe section not submerged by liquid.
H ₂ O	Water Vapor	4.	GP-10P added in January 2018. Monitoring performed at water level piezometer installed in the same boring as GP-10.
N ₂	Nitrogen		
TOC	Top of Casing		

Barometric Pressure Trend - February 2019
LRI Landfill, Pierce County, Washington



Source: Pierce County - Thun Field Station
Lat: 47.1 Long: 122.29 Elev: 538 ft-AMSL

Data Source: <https://www.wunderground.com/history/daily/us/wa/puyallup/KPLU/date/2019-2-20>

SCS Engineers

04219001.04

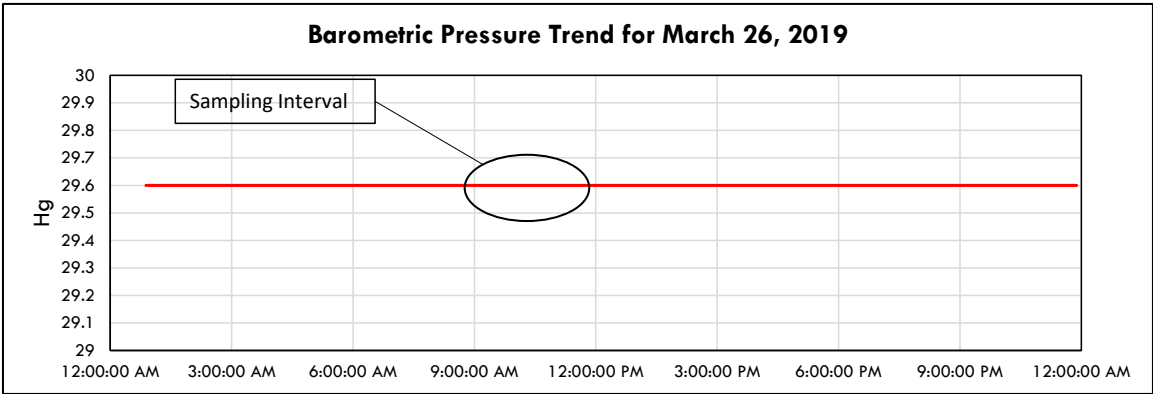
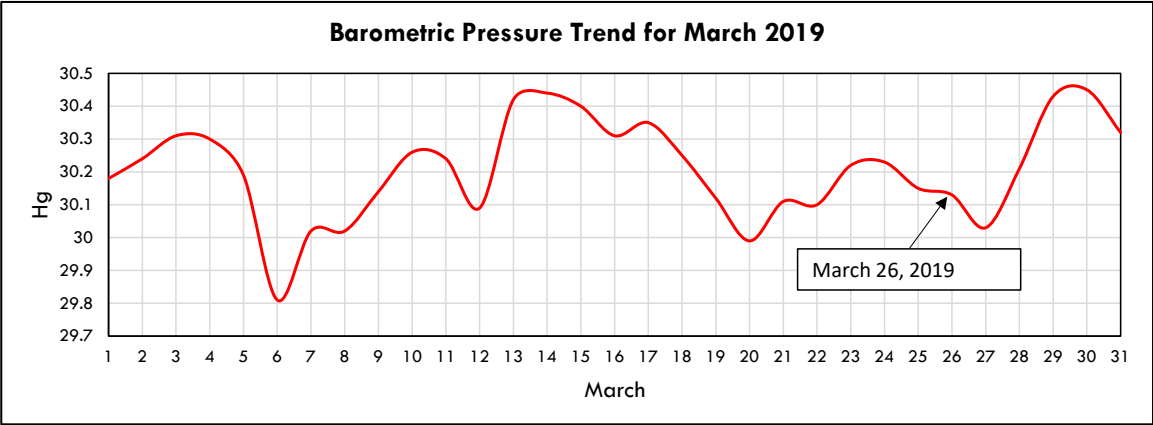
March-19

General Data:

	Beginning	Ending	Average	Starting Date:	3/26/2019
Weather:	Light rain	Sunny	Sunny	Starting Time:	7:48
Temperature, T (deg F):	44	45	44.5	Finishing Date:	3/26/2019
Wind Speed (mph):	10	8	9	Finishing Time:	9:39
Wind Direction:	180	180	180	Monitored by:	T. Berndahl
Barometric Pressure, P (in Hg):	29.60	29.60	29.60	Instruments:	GEM 2000
24hr Baro.Trend (rising / falling / steady / unsteady)	-			Calibration Date:	3/26/2019

Headings:		Notes:
P _(well)	Relative Pressure	1. Measurement for spike concentrations of CH ₄ and CO ₂ are recorded as a comment if observed during sampling.
CH ₄	Methane	2. Water level measurements made where gas probe monitoring port allows for measurement, or where there is an adjacent measurement piezometer.
CO ₂	Carbon Dioxide	
O ₂	Oxygen	3. Exposed Perforation = perforated pipe section not submerged by liquid.
H ₂ O	Water Vapor	4. GP-10P added in January 2018. Monitoring performed at water level piezometer installed in the same boring as GP-10.
N ₂	Nitrogen	
TOC	Top of Casing	

Barometric Pressure Trend - March 2019
LRI Landfill, Pierce County, Washington



Source: Pierce County - Thun Field Station
Lat: 47.1 Long: 122.29 Elev: 538 ft-AMSL

Data Source: <https://www.wunderground.com/history/daily/us/wa/puyallup/KPLU/date/2019-3-26>

LRI 304th Street Landfill
Landfill Gas Monitoring of On-site Buildings

Project Number: 04219001.04

Date: 2/20/19

Weather Conditions: Cloudy

Instrument: Micro FID

Measured By: Travis Berndahl

The atmosphere inside buildings at the landfill were monitored for possible intrusion of methane gas. Per WAC 173-351, concentrations of methane in on-site structures must not exceed 25% of the lower explosive limit (LEL). If off-site gas migration is suspected, concentrations of methane in off-site structures must not exceed 100 ppm methane.

The areas monitored included:

- The general overall work area
- Floor drains
- Underground conduit protrusions
- Closed areas where landfill gas could collect, such as under cupboards and inside closets

The gas detection instrument must be calibrated using calibration gas containing methane equal to 50 % LEL. Calibration must be performed before and after the survey is completed.

Checked boxes indicate that the survey revealed **no detectable methane**.

- ☒ Main Office - individual office spaces, storage areas and within open crawl-space area.
- ☒ Repair Shop – survey atmosphere conditions throughout (lower height levels).
- ☒ Pay/Scale Booth – interior of building.
- ☒ Work Shop - interior of shed adjacent to stormwater ponds.

Background (Main Office)

Upwind → 2.4 ppm

Downwind → 2.7 ppm



Signature