

January 8, 2020
File No. 04219001.02

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

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

Dear David:

Please find enclosed the Third 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, weekly surface water monitoring, and the installation of fifteen new landfill gas extraction wells between July 24, 2019 and August 12, 2019.

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. David Bosch
January 8, 2020
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)
Kevin Green, LRI (email)
Jody Snyder, LRI (email)
Olivier Moi, LRI (email)
Maria Finley, LRI (email and CD)

Third Quarter 2019 Monitoring Report

LRI Landfill

Graham, Washington

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



SCS ENGINEERS

04219001.02 | January 8, 2020

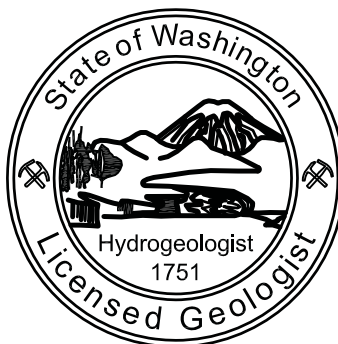
2405 140th Avenue NE, Suite 107
Bellevue, WA 98005
425-746-4600

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

January 8, 2020



Kevin Lakey, PE, LHG,
Project Director
SCS ENGINEERS



Kevin G. Lakey



Sam Graber
Staff Scientist
SCS ENGINEERS

GROUNDWATER MONITORING

Third Quarter 2019 groundwater samples were collected from September 23 through September 26, 2019. Additional samples were collected from LDCS-5 on July 12 and August 23, and background water quality samples were collected from LDCS-7 on August 29 and September 25. Water level elevations were measured on September 26, 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-5A. 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 Attachment I and II of WAC 173-351-990. The groundwater sampling locations are shown on Figure 1.

A groundwater surface elevation map for the Third 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, Attachment I Metals, Attachment 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 Attachment 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 fifteen (15) 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. Attachment 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 Third Quarter. The total dissolved solids (TDS) concentration at MW-3 that was previously elevated during the First Quarter monitoring event, decreased to levels consistent with historic trends during the Second and Third Quarter monitoring events (220 mg/L and 200 mg/L, respectively).

Reported detections of inorganic parameters and metals measured at downgradient monitoring wells were less than or equal to the groundwater 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	**	**	**	0.0093	**	0.0068	0.0054
Iron, Dissolved	0.30	1.5	0.75	*	*	*	*	*
Manganese, Dissolved	0.05	0.24	0.34	0.27	0.23	0.16	0.19	0.22
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								

The values listed in Table 1 are typical of previous results (see time-trend plots in Attachment G), are interpreted to be within natural background variation, and in the case of total arsenic, are less than or equal to the background level used to establish the prediction limit (prediction limits are not applicable for dissolved iron and manganese). 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 values for pH at background wells MW-9 and MW-10 (6.26 SU and 6.15 SU, respectively) were below the WAC 173-200-040 criteria of 6.5 during the Third Quarter monitoring event. Since MW-9 and MW-10 are background (upgradient) monitoring wells, the low pH values are interpreted to be representative of natural groundwater quality.

Low-level detections of ammonia (<0.18 mg/L) were reported at select downgradient monitoring wells 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 were below the appropriate threshold for all of the monitoring wells during this monitoring event.

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 Maintenance. The vaults and riser pipes at LDCS-4A and LDCS-4B were cleaned and pressure washed on September 17, 2019. DrainPro was hired to perform the work. The inside areas of the surface vaults were cleaned by using a vactor truck. The riser pipes and buried vaults were also cleaned with a vactor truck and were pressure-washed using potable water. The pumps and water-level transducers were temporarily removed to perform the work, pressure washed using potable water, and re-installed at completion. Some rocks were removed from the riser pipe of LDCS-4A. Silty water was removed from both riser pipes.

LDCS-7 Background Water Quality Data. The first two background water quality samples were collected at LDCS-7 on August 29 and September 25, 2019. The samples were collected from the discharge piping (lay-flat PVC discharge hose w/camlock couplings) from a temporary dewatering pump (2-inch diameter electric submersible pump, purchased new) provided by the Cell 7 general contractor, Scarsella Brothers. The temporary dewatering pump was connected to the discharge hose with glued Sch. 40 PVC pipe. During this time, operation of the dewatering pump occurred manually. Additional background water quality samples were collected on October 18, November 25, and December 13, 2019. The summary of the initial results were provided to the TPCD and Ecology in a letter report dated November 22, 2019 and in a follow-up email dated December 6, 2019. A complete summary discussion of background water quality at LDCS-7 will be included in the 2019 Annual Report.

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.

Conductivity values at LDCS-4A were somewhat sporadic during the Third Quarter. LRI staff replaced the conductivity probe at this location on November 1, 2019. Since then, the conductivity has decreased to levels consistent with historic data.

As discussed in the Second Quarter monitoring report, conductivity values at LDCS-4B displayed an increase in early June of 2019. Since then, values have generally remained stable and consistent with historic trends.

Conductivity values at LDCS-5 trended downwards during the Third Quarter. See below for additional discussion regarding water quality at LDCS-5.

The conductivity probe at LDCS-6 was recalibrated in early September. However, the field reading during the Third Quarter monitoring was less than the panel reading, and therefore, this probe likely should be recalibrated again.

Conductivity data from the remaining LDCS sumps trended within typical historical levels during the Third 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. Additional samples were collected from LDCS-5 on July 12 and August 23, 2019 to monitor water quality trends. 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 (except LDCS-7):

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

A low-level detection of 1,4-Dichlorobenzene was reported in the sample collected from LDCS-1 (0.58 µg/L). However, the primary leachate indicator parameters of acetone and 2-butanone were non-detect and the secondary indicator parameters of chloride and ammonia remained low. Therefore, the detection does not appear to be the result of leachate impact. No other VOC detections were reported in the LDCS samples this quarter.

The sample collected from LDCS-2B displayed an elevated concentration of total iron during the Third Quarter monitoring event (1.3 mg/L). However, leachate indicator parameters were non-detect or remained low. Therefore, the elevated iron concentration does not appear to be the result of leachate.

The sample collected from LDCS-4A displayed an elevated concentration of total iron (4.1 mg/L) and a slightly elevated concentration of ammonia (0.42 mg/L). However, the primary leachate indicator parameters, acetone and 2-butanone, were non-detect and secondary leachate indicator parameter, chloride, remained stable. Therefore, the results do not appear to indicate a leachate impact.

Elevated concentrations of iron, ammonia, and total organic carbon noted at LDCS-4B during the Second Quarter monitoring event decreased during the Third Quarter monitoring event. The improvement in water quality may be associated with cleaning the vault and riser pipe as discussed

earlier in this report. As a precautionary measure, water from LDCS-4B was discharged into the leachate collection system during the third quarter (beginning on July 26).

Water quality samples collected from LDCS-5 in July, August and September have displayed fluctuating, but still elevated concentrations of secondary leachate indicator parameters ammonia and chloride, as well as alkalinity, iron, manganese, sodium, potassium, TDS, and TOC (see summary tables in Attachment B and time trend plots in Attachment G). Primary leachate indicator parameters acetone and 2-butanone have not been detected at LDCS-5 in 2019. However, elevated concentrations of the inorganic parameters and metals listed above are indicative of a potential leachate leak.

Therefore, the two leachate forcemains that are present in front of the leachate riser pipes at Cell 5 were exposed for observation. This area experienced a leachate forcemain leak in 2016. Liquids observed in the excavation had a brownish color and displayed a conductivity range from 920 $\mu\text{S}/\text{cm}$ to 4,400 $\mu\text{S}/\text{cm}$. However, cycling of the two leachate forcemains did not indicate a forcemain leak. Therefore, additional investigation is needed to determine the source of leachate. Groundwater withdrawn from LDCS-5 continues to be directed to the leachate collection system, as it has been since May, 2016, and is not being discharged through the concrete channel.

Manganese was detected in the sample collected from LDCS-6 at a concentration of 2.2 mg/L. However, leachate indicator parameters were non-detect or remained low. Therefore, the elevated manganese concentration does not appear to be the result a leachate impact.

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 per the requirements of NPDES Construction Stormwater General Permit (CSWGP) WAR 002603C and NPDES Industrial Stormwater General Permit (ISGP) WAR 002557. Consistent with the requirements of Agreed Order 16272, CSWGP stormwater treatment using Chitosan Sand Enhanced Filtration (CESF) began in September. In addition, the construction of an ISGP stormwater treatment system began in September. Construction stormwater was treated and discharged into the 36-inch diameter drainage pipe that leads to the stormwater detention pond. No discharge from the detention pond occurred during the Third Quarter Stormwater Discharge Monitoring Reports (DMR's) were submitted to Ecology on a monthly (Construction Permit) and quarterly (Industrial Permit) basis. Copies of the Third Quarter DMR's are included in Attachment I.

LEACHATE MONITORING

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 and City of Salem Wastewater Treatment Plants 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
April	2,321,189	1.37
May	2,152,277	1.05
June	2,185,958	1.15
July	2,357,911	1.20
August	2,336,023	0.76
September	2,618,234	3.88
Totals	20,983,614	17.52
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 July 18, August 23, and September 25 using a Landtec GEM2000 portable gas monitor. Methane measurements were less than the lower explosive limit (LEL) of five percent by volume during the Third 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.

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
April 25	1.7	16.1	0.0	0.0	0.0	16.1	20.4	0.0	28.6	1.5	0.0	0.0
May 29	1.5	15.9	0.0	0.0	0.0	13.7	23.2	0.0	29.9	0.4	0.0	0.0
June 12	2.4	16.0	0.0	0.0	0.0	23.5	15.4	0.0	29.4	0.0	0.0	0.0
July 18	4.9	15.8	0.0	0.0	0.0	7.6	12.1	0.0	21.6	0.0	0.0	0.0
August 23	8.2	16.7	0.0	0.0	0.0	1.3	14.7	0.0	26.9	0.5	0.0	0.0
September 25	6.9	18.1	0.0	0.0	0.0	6.9	21.1	0.0	23.6	0.7	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 .												

Indoor air was tested for the presence of methane on August 23. 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.

LANDFILL GAS EXTRACTION WELL CONSTRUCTION

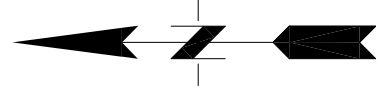
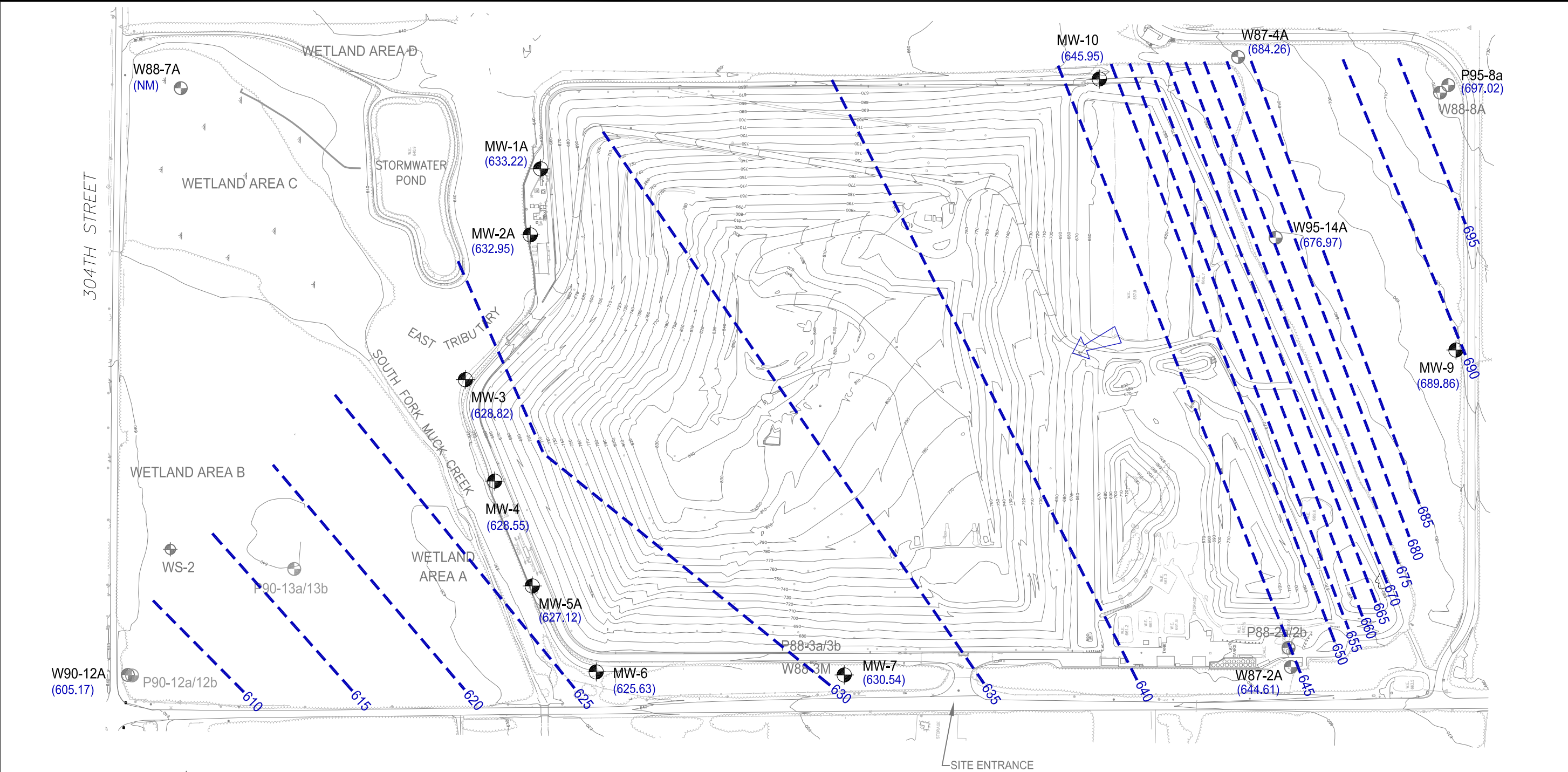
Fifteen (15) new landfill gas extraction wells were installed between July 24, 2019 and August 12, 2019. A copy of a letter report describing the well installation activities is included with this report in Attachment J.

GROUNDWATER MONITORING WELL CONSTRUCTION AND MAINTENANCE

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

Attachment 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
-  (643.62) GROUNDWATER ELEVATION (IN FEET ABOVE MSL)
-  INFERRED GROUNDWATER FLOW DIRECTION
-  * WATER LEVEL ELEVATION NOT USED IN CONTOURING



SCALE (ft)

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 SEPTEMBER 26, 2019 LRI LANDFILL 30919 MERIDIAN STREET E. GRAHAM, WASHINGTON	DATE	DECEMBER 2019
			SCALE	AS SHOWN	CHK BY	KGL		FIGURE	1
			CAD FILE	FIGURE 1	APP BY	KGL			

Attachment B

Groundwater Data Summary Tables



**Table 1. Groundwater Level Elevations
September 26, 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	19.40	644.61
W87-4A	693.29	9.03	684.26
W88-3M	658.11	16.43	641.68
W88-7A	632.51	NM	--
W88-8M	721.05	40.87	680.18
W90-12A	640.84	35.67	605.17
W95-14A	680.49	3.52	676.97
MW-1A	652.57	19.35	633.22
MW-2A	651.93	18.98	632.95
MW-3	637.41	8.59	628.82
MW-4	652.37	23.82	628.55
MW-5A	655.55	28.43	627.12
MW-6	635.71	10.08	625.63
MW-7	656.03	25.49	630.54
MW-9	701.77	11.91	689.86
MW-10	673.87	27.92	645.95
Piezometers			
P13-14A	665.96	23.39	642.57
P88-2A	663.96	NM	--
P88-2B	663.48	NM	--
P88-3A	656.20	19.81	636.39
P88-3B	655.98	22.03	633.95
P95-8A	722.07	25.05	697.02
P90-12A	640.79	4.25	636.54
P90-12B	640.73	6.35	634.38
P90-13A	645.19	NM	--
P90-13B	643.63	NM	--
GP-1P ^a	652.00	18.58	633.42
GP-2P ^a	658.61	18.01	640.60
GP-3P ^a	658.51	12.32	646.19
GP-4P ^a	662.01	13.45	648.56
GP-9P ^a	674.03	13.38	660.65
South Creek			
SWSC-1	632.68	1.50	631.18
SWSC-2	629.98	6.27	623.71
Leak Detection System			
LDCS-1 ^b	657.26	27.05	630.21
LDCS-2A ^b	659.24	29.80	629.44
LDCS-2B ^b	661.70	27.15	634.55

Notes:

NM= not measured

-- = not applicable

Measurements taken on 9/26/2019 unless otherwise noted

a = Measurement taken on 9/25/2019

b = Measurement taken on 9/24/2019

Table 2. Field Parameters
Third 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	304-092319-01	9/23/2019	DP	6.53	192	13.3
MW-2A	304-092319-02	9/23/2019	DP	7.05	345	12.8
MW-3	304-092319-03	9/23/2019	DP	7.01	343	10.3
MW-4	304-092519-16	9/25/2019	SP	7.17	332	13.6
MW-5A	304-092319-04	9/23/2019	DP	7.20	299	12.2
MW-6	304-092319-06	9/23/2019	DP	7.16	322	10.4
MW-7	304-092319-07	9/23/2019	DP	7.34	358	10.4
MW-9	304-092619-18	9/26/2019	DP	6.26	137	10.6
MW-10	304-092519-14	9/25/2019	DP	6.15	295	10.2
Leak Detection System						
LDCS-1	304-092419-11	9/24/2019	DB	6.01	512	20.8
LDCS-2A	304-092419-10	9/24/2019	DB	6.73	817	20.3
LDCS-2B	304-092419-09	9/24/2019	DB	6.55	718	18.6
LDCS-3A	304-092419-08	9/24/2019	DP	7.07	780	18.2
LDCS-4A	304-092419-12	9/24/2019	DP	6.36	910	24.6
LDCS-4B	304-092419-13	9/24/2019	DP	6.33	1,071	25.0
LDCS-5^ (7/12/19)	304-071219-01	7/12/2019	DP	6.68	1,389	28.3
LDCS-5^ (8/23/19)	304-082319-01	8/23/2019	DP	7.35	1,074	28.2
LDCS-5 (9/25/19)	304-092519-17	9/25/2019	DP	6.46	838	22.8
LDCS-6	304-092619-19	9/26/2019	DP	6.66	1,113	18.8
LDCS-7 (8/29/19)	304-082919-01	8/29/2019	GB	6.20	866	18.4
LDCS-7 (9/25/19)	304-092519-15	9/25/2019	GB	6.40	1,395	17.7

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

^ = Additional samples collected from LDCS-5 to monitor water quality trends.

Additional samples collected from LDCS-7 to establish background water quality.

Table 3. Inorganic Parameters
Third 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	0.1-2.2	0.2-3.0	0.50	0.2-2.5	10.0	1-35	4.0
WAC 173-200 Criteria	—	—	250	10	250	500	—	—
Prediction Limit	—	—	—	6.4	—	—	—	—
Monitoring Wells								
MW-1A	93	*	2.2	*	3.1	140	*	*
MW-2A	140	0.15	5.0	*	25	210	1.2	*
MW-3	150	*	4.1	*	28	200	1.0	*
MW-4	160	0.13	3.3	*	11	190	*	*
MW-5A	150	*	2.3	*	5.3	160	*	*
MW-6	150	*	5.4	*	7.0	190	1.0	*
MW-7	180	0.17	3.1	*	4.1	200	*	*
(BG) MW-9	69	*	1.8	*	1.7	130	*	*
(BG) MW-10	110	*	8.8	4.2	7.4	200	*	12
Leak Detection System								
LDCS-1	270	0.17	4.5	*	8.5	300	3.9	—
LDCS-2A	450	*	4.8	*	16	490	2.3	—
LDCS-2B	330	*	4.9	*	54	420	2.3	—
LDCS-3A	360	*	4.9	*	75	480	1.6	—
LDCS-4A	390	0.42	25	*	57	530	6.8	—
LDCS-4B	410	0.58	30	*	130	660	4.5	—
LDCS-5^ (7/12/19)	510	16.0	48	*	20	610	16	—
LDCS-5^ (8/23/19)	510	13.0	37	*	17	660	14	—
LDCS-5 (9/25/19)	410	6.8	23	*	12	500	9.5	—
LDCS-6	490	*	9.1	*	130	660	3.5	—
LDCS-7 (8/29/19)	380	*	9.7 H	*	87 H	560	4.0	—
LDCS-7 (9/25/19)	560	*	32	0.77	180	900	930	—

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

H = Analyzed past holding time due to lab error.

^ = Additional samples collected from LDCS-5 to monitor water quality trends.

Additional samples collected from LDCS-7 to establish background water quality.

* = 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 5. WAC 173-351 Appendix II Metals (Dissolved)
Third 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	13	1.5	7.9	0.24	3.1	11
MW-2A	25	0.75	13	0.34	3.7	20
MW-3	31	*	14	0.27	3.5	13
MW-4	28	*	15	0.23	5.4	13
MW-5A	25	*	10	0.16	3.5	16
MW-6	29	*	13	0.19	4.3	9.9
MW-7	27	0.14	19	0.22	4.7	11
(BG) MW-9	10	*	6.7	*	2.0	7.6
(BG) MW-10	24	*	11	*	2.0	15
Leak Detection System						
LDCS-1	45	0.10	20	2.1	5.1	17 B
LDCS-2A	86	*	35	0.021	8.9	29 B
LDCS-2B	72	1.3	27	0.71	5.6	16 B
LDCS-3A	82	*	36	0.73	5.8	21 B
LDCS-4A	74	4.1	43	2.4	6.4	30 B
LDCS-4B	100	*	49	1.1	7.9	35 B
LDCS-5^ (7/12/19)	80	1.4	44	1.7	17	73
LDCS-5^ (8/23/19)	83	0.10	49	1.6	14	50
LDCS-5 (9/25/19)	65	0.72	38	1.4	12	38
LDCS-6	120	*	54	2.2	4.7	38
LDCS-7 (8/29/19)	110	*	22	0.30	3.5	42
LDCS-7 (9/25/19)	190	*	26	0.64	3.6	82

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.

B = Compound found in the sample and the blank.

^ = Additional samples collected from LDCS-5 to monitor water quality trends.

Additional samples collected from LDCS-7 to establish background water quality.

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

— = not applicable or not performed

BG = Background

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

Parameter	1,4-Dichlorobenzene	Carbon Disulfide	Chloroform	Methylene Chloride
Units	µg/L	µg/L	µg/L	µg/L
MRL	0.5	0.5	0.5	2.0
WAC 173-200 Criteria	4.0	—	7.0	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	0.58	*	*	*
LDCS-2A	*	*	*	*
LDCS-2B	*	*	*	*
LDCS-3A	*	*	*	*
LDCS-4A	*	*	*	*
LDCS-4B	*	*	*	*
LDCS-5^ (7/12/19)	*	*	*	*
LDCS-5^ (8/23/19)	*	*	*	*
LDCS-5 (9/25/19)	*	*	*	*
LDCS-6	*	*	*	*
LDCS-7 (8/29/19)	*	1.1	*	*
LDCS-7 (9/25/19)	*	*	*	*
Quality Control Sample				
Field Blank	*	*	0.50	10.0

Notes:

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

Analyses performed by TestAmerica of Denver, Colorado.

^ = Additional samples collected from LDCS-5 to monitor water quality trends.

Additional samples collected from LDCS-7 to establish background water quality.

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

— = not applicable or not performed

BG = Background

Table 7. Cation-Anion Balance
Third 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	13	7.9	3.1	11	35	0.65	0.65	0.07	0.48	1.85	30	35	35
MW-2A	25	13	3.7	20	61.7	1.25	1.07	0.08	0.87	3.27	29	38	33
MW-3	31	14	3.5	13	61.5	1.55	1.15	0.08	0.57	3.34	19	46	34
MW-4	28	15	5.4	13	61.4	1.40	1.23	0.12	0.57	3.32	21	42	37
MW-5A	25	10	3.5	16	54.5	1.25	0.82	0.08	0.70	2.85	27	44	29
MW-6	29	13	4.3	9.9	56.2	1.45	1.07	0.10	0.43	3.04	17	48	35
MW-7	27	19	4.7	11	61.7	1.35	1.56	0.11	0.48	3.50	17	39	45
MW-9	10	6.7	2.0	7.6	26.3	0.50	0.55	0.05	0.33	1.43	26	35	39
MW-10	24	11	2.0	15	52.0	1.20	0.91	0.05	0.65	2.80	25	43	32
LDCS-1	45	20	5.1	17	87.1	2.25	1.65	0.12	0.74	4.75	18	47	35
LDCS-2A	86	35	8.9	29	158.9	4.29	2.88	0.20	1.26	8.63	17	50	33
LDCS-2B	72	27	5.6	16	120.6	3.59	2.22	0.13	0.70	6.64	12	54	33
LDCS-3A	82	36	5.8	21	144.8	4.09	2.96	0.13	0.91	8.10	13	51	37
LDCS-4A	74	43	6.4	30	153.4	3.69	3.54	0.14	1.31	8.68	17	43	41
LDCS-4B	100	49	7.9	35	191.9	4.99	4.03	0.18	1.52	10.72	16	47	38
LDCS-5^ (7/12/19)	80	44	17	73	214.0	3.99	3.62	0.38	3.18	11.17	32	36	32
LDCS-5^ (8/23/19)	83	49	14	50	196.0	4.14	4.03	0.32	2.18	10.67	23	39	38
LDCS-5 (9/25/19)	65	38	12	38	153.0	3.24	3.13	0.27	1.65	8.29	23	39	38
LDCS-6	120	54	4.7	38	216.7	5.99	4.44	0.11	1.65	12.19	14	49	36
LDCS-7 (8/29/19)	110	22	3.5	42	177.5	5.49	1.81	0.08	1.83	9.21	21	60	20
LDCS-7 (9/25/19)	190	26	3.6	82	301.6	9.48	2.14	0.08	3.57	15.27	24	62	14

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	111.6	2.2	0.5	3.1	117.4	1.83	0.06	0.008	0.06	1.96	3	93	3	3.81	3.1	10	O	
MW-2A	168	5.0	0.5	25	198.5	2.76	0.14	0.008	0.52	3.42	4	80	15	6.70	2.3	5	O	
MW-3	180	4.1	0.5	28	212.6	2.95	0.12	0.008	0.58	3.66	3	81	16	7.00	4.5	5	O	
MW-4	192	3.3	0.5	11	206.8	3.15	0.09	0.008	0.23	3.48	3	91	7	6.80	2.3	5	O	
MW-5A	180	2.3	0.5	5.3	188.1	2.95	0.06	0.008	0.11	3.14	2	94	4	5.98	4.8	5	O	
MW-6	180	5.4	0.5	7.0	192.9	2.95	0.15	0.008	0.15	3.26	5	91	4	6.30	3.4	5	O	
MW-7	216	3.1	0.5	4.1	223.7	3.54	0.09	0.008	0.09	3.72	2	95	2	7.22	3.2	5	O	
MW-9	82.8	1.8	0.5	1.7	86.8	1.36	0.05	0.008	0.04	1.45	3	94	2	2.88	0.9	10	O	
MW-10	132	8.8	4.2	7.4	152.4	2.16	0.25	0.068	0.15	2.63	9	82	6	5.44	3.1	5	O	
LDCS-1	324	4.5	0.5	8.5	337.5	5.31	0.13	0.008	0.18	5.63	2	94	3	10.37	8.5	5	Exceeds	
LDCS-2A	540	4.8	0.5	16	561.3	8.86	0.14	0.008	0.33	9.33	1	95	4	17.97	3.9	5	O	
LDCS-2B	396	4.9	0.5	54	455.4	6.49	0.14	0.008	1.12	7.76	2	84	14	14.40	7.8	5	Exceeds	
LDCS-3A	432	4.9	0.5	75	512.4	7.08	0.14	0.008	1.56	8.79	2	81	18	16.89	4.1	5	O	
LDCS-4A	468	25	0.5	57	550.5	7.68	0.71	0.008	1.19	9.57	7	80	12	18.25	4.9	5	O	
LDCS-4B	492	30	0.5	130	653	8.07	0.85	0.008	2.70	11.63	7	69	23	22.35	4.0	5	O	
LDCS-5^ (7/12/19)	612	48	0.5	20	681	10.04	1.35	0.008	0.42	11.81	11	85	4	22.99	2.8	5	O	
LDCS-5^ (8/23/19)	612	37	0.5	17	667	10.04	1.04	0.008	0.35	11.44	9	88	3	22.11	3.5	5	O	
LDCS-5 (9/25/19)	492	23	0.5	12	528	8.07	0.65	0.008	0.25	8.98	7	90	3	17.27	3.9	5	O	
LDCS-6	588	9.1	0.5	130	728	9.64	0.26	0.008	2.70	12.61	2	76	21	24.80	1.7	5	O	
LDCS-7 (8/29/19)	456	9.7	0.5	87	553	7.48	0.27	0.008	1.81	9.57	3	78	19	18.78	1.9	5	O	
LDCS-7 (9/25/19)	672	32	0.77	180	885	11.02	0.90	0.012	3.74	15.68	6	70	24	30.95	1.3	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.

^ = Additional samples collected from LDCS-5 to monitor water quality trends.

Additional samples collected from LDCS-7 to establish background water quality.

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 = to 5.0 meq/liter.

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

Parameter	MRL	MW-5A	MW-5A (Duplicate)	RPD (%)
Volatile Organic Compounds (µg/L)				
No Detections	-	-	-	-
Inorganic Parameters (mg/L)				
Alkalinity, Bicarbonate (as CaCO ₃)	10	150	150	0.0
Chloride	0.2	2.3	2.4	4.3
Sulfate	0.2	5.3	5.4	1.9
Total Dissolved Solids	10	160	160	0.0
Dissolved Metals (mg/L)				
Calcium	0.2	25	25	0.0
Magnesium	0.1	10	11	9.5
Manganese	0.005	0.16	0.16	0.0
Potassium	2.0	3.5	3.5	0.0
Sodium	1.0	16	16	0.0
Total Metals (mg/L)				
Barium	0.005	0.0099	0.01	1.0

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

Attachment C

Field Sampling Documentation



September 27, 2019
File No. 04219001.02

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

NOTES/SAMPLE DECODING:

Event Dates: September 23-26, 2019
Field Staff: Sam Graber

- 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 grab sample was taken from LDCS-7.
- A round of water level measurements was completed on September 26, 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
304-092319-01	MW-1
304-092319-02	MW-2
304-092319-03	MW-3
304-092319-04	MW-5A
304-092319-05	MW-5A (Duplicate)
304-092319-06	MW-6
304-092319-07	MW-7
304-092419-08	LDCS-3
304-092419-09	LDCS-2B
304-092419-10	LDCS-2A
304-092419-11	LDCS-1
304-092419-12	LDCS-4A
304-092419-13	LDCS-4B
304-092519-14	MW-10
304-092519-15	LDCS-7
304-092519-16	MW-4
304-092519-17	LDCS-5
304-092619-18	MW-9
304-092619-19	LDCS-6
304-092619-20	Field Blank

Additional Samples

Sample Number	Well Number
304-071219-01	LDCS-5^
304-082319-01	LDCS-5^
304-082919-01	LDCS-7*

Notes:

^ = Additional samples collected from LDCS-5 to monitor water quality trends.

* = Additional sample collected from LDCS-7 to establish background water quality.

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-1

Sample ID: 304-092319-01

Date: 9/23/19

Weather: Cloudy

Filtered? ☒ N

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

Locked? ☒ N

Water in Protector? ☒ N

Water in Protector? ☒ N

Sampling Method: DTW

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

300 mL/min

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
957		15.40	195	8.50	5.90	267.1		
1002		14.81	186	3.21	6.11	258.3		
1005		13.54	181	0.64	6.20	253.3		
1008		13.46	176	1.07	6.30	194.2		
1011		13.42	180	1.18	6.39	126.5		
1014		13.37	186	1.12	6.48	74.3		
1017		13.34	192	1.05	6.53	46.3	1.65	

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:

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: 8 MW-2

Sample ID: 304-092319-02

Date: 9/23/19

Weather: Cloudy

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 125 ml Poly

Sampling Method: DTW

Meter: MP-20

CONTROL SETTINGS: 1.75" QED SamplePro

1 ft water = 0.62L

One Well Volume (liters)

One Well Volume (liters)

Discharge

Pressure

Flow

Total Depth

Total Volume Bailed (liters)

Flow

Peristaltic

Grab

Other

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1045		15.32	244	8.50	6.68	162.8		
1050		12.94	360	0.48	6.92	28.9		
1053		12.40	358	0.42	6.95	10.1		
1056		12.87	354	0.39	6.98	-7.5		
1059		12.81	349	0.35	7.02	-26.4		
1102		12.81	347	0.34	7.03	-33.5		
1105		12.80	345	0.35	7.05	-37.7	1.48	

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:

Sam Gabel

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-3

Sample ID: 304-092319-03

Date: 9/23/19

Weather: Cloudy

Filtered? ☒ Y ☐ N

Sample Containers: 1000 ml Poly 500 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 1000 ml Amber

Sampling Method: Dedicated

Meter: MP-20

CONTROL SETTINGS: 1.75" QED SamplePro Bail 1 ft water = 0.62L One Well Volume (liters) 9 6 35 300 mL/min

Refill Discharge Pressure Flow

Intake BOS Total Depth

DTW 8.77

TOS

1L = 0.26 gallons

Peristaltic Grab Other

Flow Setting:

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

TIME	DTW	Temp.	Sp.Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1135		11.63	352	8.50	7.00	168.0		
1140		10.48	347	1.89	6.38	183.8		
1143		10.40	343	0.91	6.70	167.0		
1146		10.37	343	0.70	6.84	157.9		
1149		10.36	343	0.55	6.92	147.0		
1152		10.34	343	0.47	6.98	137.5		
1155		10.34	343	0.44	7.01	132.4	1.12	

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

SAMPLER:

Sam Gaber

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-5A	Sample ID:	304-092319-04	Date:	9/23/19	Weather:	cloudy	Filtered?	Y N	Locked?	Y N	Water in Protector?	Y N	Sample Containers:	1000 ml Poly 500 ml HNO3 x2 125 ml NaOH	500 ml Poly 500 ml H2SO4 x2 125 ml NaOH	250 ml Poly 40 ml VOA x6 1000 ml Amber	Sampling Method:	DTW	28.58	Dedicated	1.75" QED SamplePro	Bail	1 ft water = 0.62L	Peristaltic	Grab	Other
CONTROL SETTINGS:																															
Meter: MP-20																															
Refill																															
Discharge																															
Pressure																															
Flow																															
Total Depth																															
Total Volume Bailed (liters)																															
Flow 200 mL/min																															

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

DUP taken at 304-092319-05

@ 1300

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1228		12.49	243	2.43	6.87	193.8		
1233		12.18	293	1.23	6.98	176.5		
1236		12.19	294	0.81	7.05	158.7		
1239		12.20	298	0.86	7.10	145.2		
1242		12.18	298	0.52	7.12	139.0		
1245		12.18	298	0.43	7.16	118.0		
1248		12.18	299	0.37	7.20	96.9	2.42	

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

SAMPLER:

Sam Gaber

Printed Name

Signature

(425) 746-4600

Groundwater Sampling Data Sheet

Project #: 04219001.02		Sampling Method: <u>Dedicated</u>		1.75" QED SamplePro	Bail	Peristaltic	Grab	Other
Site	LRI 304th	DTW	Meter:	CONTROL SETTINGS:				
Well ID:	mw-6	TOS	MP-20	Refill	One Well Volume	Other:		
Sample ID:	304-09 2319-06	Intake	<u>YSI</u>	Discharge	(liters)	Flow		
Date:	9/23/19	BOS		Pressure	Total Volume Bailed	Setting:		
Weather:	cloudy	Total Depth			(liters)			
Filtered? <u>(Y)</u> N	Locked? <u>(Y)</u> N	Water in Protector? <u>(Y)</u> N	Damage? <u>(Y)</u> N					
Sample Containers:		500 ml Poly	125 ml Poly					
		500 ml HNO3	40 ml VOA	x3	x6	Notes / Observations (color, odor, anomalies, etc):		
		125 ml NaOH	1000 ml Amber					

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1335		12.00	308	5.80	7.12	190.2		
1340		10.44	321	0.47	7.03	178.1		
1343		10.46	322	0.45	7.07	175.8		
1346		10.48	323	0.42	7.10	172.3		
1349		10.45	322	0.36	7.13	168.2		
1352		10.45	323	0.34	7.15	165.6		
1355		10.44	322	0.31	7.16	163.6	1.53	

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

Sm
6/29

SAMPLER: _____

Signature

(425) 746-4600

Groundwater Sampling Data Sheet

Project #:	04219001.02	Sampling Method:		Dedicated	1.75" QED SamplePro	Bail	Peristaltic	Grab	Other
Site	LRI 304th	Meter:		MP-20	1 ft water = 0.62L				
Well ID:	304-092319-07	DTW		25.65	One Well Volume (liters)				
Sample ID:	304-092319 MW-7	TOS		/	Other:				
Date:	9/23/19	Intake		/	Flow Setting:				
Weather:	cloudy	BOS		/	Total Volume Bailed (liters)				
Filtered?	Y N	Total Depth		/	Flow 300 mL/min				
Sample Containers:	1000 ml Poly	Water in Protector?		Y N	Damage?				
	500 ml HNO3	x2			125 ml Poly				
	125 ml NaOH	x2			40 ml VOA				
		x6			1000 ml Amber				
Notes / Observations (color, odor, anomalies, etc):									

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1430		11.28	391	8.50	7.29	208.1		
1435		10.49	363	1.75	6.67	210.1		
1438		10.47	360	1.10	6.91	178.7		
1441		10.45	357	0.59	7.01	154.0		
1444		10.41	358	0.42	7.23	67.6		
1447		10.42	358	0.38	7.29	38.7		
1450		10.43	358	0.34	7.34	10.6	1.55	

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

SAMPLER: _____

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:	LD65-3	Sample ID:	304-092414-08	Date:	9/24/19	Weather:	cloudy	Filtered?	Y (N)	Sample Containers:	1000 ml Poly	500 ml HNO3	x2	500 ml H2SO4	x2	125 ml NaOH	Water in Protector?	Y (N)	DTW	TOS	Intake	BOS	Total Depth	250 ml Poly	40 ml VOA	x3	x6	125 ml Poly	1000 ml Amber																																		
Project #:		04219001.02		Site:		LRI 304th		Well ID:		LD65-3		Sample ID:		304-092414-08		Date:		9/24/19		Weather:		cloudy		Filtered?		Y (N)		Sample Containers:		1000 ml Poly		500 ml HNO3		x2		500 ml H2SO4		x2		125 ml NaOH		Water in Protector?		Y (N)		DTW		TOS		Intake		BOS		Total Depth		250 ml Poly		40 ml VOA		x3		x6		125 ml Poly		1000 ml Amber	
Project #:		04219001.02		Site:		LRI 304th		Well ID:		LD65-3		Sample ID:		304-092414-08		Date:		9/24/19		Weather:		cloudy		Filtered?		Y (N)		Sample Containers:		1000 ml Poly		500 ml HNO3		x2		500 ml H2SO4		x2		125 ml NaOH		Water in Protector?		Y (N)		DTW		TOS		Intake		BOS		Total Depth		250 ml Poly		40 ml VOA		x3		x6		125 ml Poly		1000 ml Amber	
Project #:		04219001.02		Site:		LRI 304th		Well ID:		LD65-3		Sample ID:		304-092414-08		Date:		9/24/19		Weather:		cloudy		Filtered?		Y (N)		Sample Containers:		1000 ml Poly		500 ml HNO3		x2		500 ml H2SO4		x2		125 ml NaOH		Water in Protector?		Y (N)		DTW		TOS		Intake		BOS		Total Depth		250 ml Poly		40 ml VOA		x3		x6		125 ml Poly		1000 ml Amber	

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q (Wet)
930		16.49	551	1.87	6.08	247.7		
935		17.58	786	1.81	7.11	252.7		825
938		17.58	791	1.85	7.21	258.1		
941		17.58	792	1.74	7.22	259.8		
944		17.64	792	1.77	7.21	261.8		
947		17.80	792	1.79	7.19	263.4		
950		18.17	780	1.61	7.07	266.6	1.30	826

CONTROL SETTINGS:	1.75" QED SamplePro	Bail	Peristaltic	Grab	Other
Refill	11.5	One Well Volume (liters)			Other:
Discharge	2.5				Flow
Pressure	40	Total Volume Bailed (liters)			Setting:
Flow	125 ml/min				

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

LD65 level at 7:00 upon turning pump on. water to surface 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

Printed Name

Signature

(425) 746-4600

Groundwater Sampling Data Sheet

Project #:	04219001.02	
Site	LRI 304th	
Well ID:	605-2B	
Sample ID:	304-09-2419-09	
Date:	9/24/19	
Weather:	sunny	
Filtered?	☒ Y ☐ N	
Sample Containers:	1000 ml Poly Locked? Y ☒ N 500 ml HNO3 x2 500 ml H2SO4 x2 125 ml NaOH	



27.15

DTW _____

TOS _____

Intake _____

BOS _____

Total Depth _____

Meter: _____

MP-20 _____

☒ YSD _____

Sampling Method :	Dedicated	1.75" QED SamplePro	Peristaltic	Grab	Other
CONTROL SETTINGS:					
Refill			1L = 0.26 gallons		
Discharge		One Well Volume (liters)		Other :	
Pressure		Total Volume Bailed (liters)		Flow Setting :	
Flow					

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

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q/Vol.
1045		18.60	718	1.07	6.55	243.3	2.93	740

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

Brown particulates in sample.

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

SAMPLER: Sam Baber
Printed Name

Signature

(425) 746-4600

Groundwater Sampling Data Sheet

Project #:	04219001.02		Sampling Method:		Dedicated	1.75" QED SamplePro (Bail)	Peristaltic	Grab	Other
Site	LRI 304th		DTW	Meter:	CONTROL SETTINGS:				
Well ID:	1065-2A		TOS	MP-20	1 ft water = 0.62L				
Sample ID:	304-092419-10		Intake	YSI	One Well Volume (liters)				
Date:	9/24/19		BOS		Total Volume Bailed (liters)				
Weather:	sunny		Total Depth		Flow				
Filtered? ☒ Y ☐ N	Locked? ☐ Y ☒ N		Water in Protector? ☒ Y ☐ N	Damage? ☐ Y ☒ N					
Sample Containers:	1000 ml Poly		500 ml Poly	125 ml Poly					
	500 ml HNO3		500 ml H2SO4	1000 ml Amber					
	125 ml NaOH								
Notes / Observations (color, odor, anomalies, etc):									

TIME	DTW	Temp.	Sp Cond.	DO	pH	Eh	Turbidity	Q+Vol
1130		20.27	8.7	0.99	6.73	239.6	1.57	746

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:

Printed Name

Signature

Bellevue, WA 98005

Groundwater Sampling Data Sheet

Sample Containers:	1000 ml Poly	500 ml Poly	250 ml Poly	125 ml Poly	Notes / Observations (color, odor, anomalies, etc):
	500 ml HNO3	x2	500 ml H2SO4	x2	
	125 ml NaOH		40 ml VOA	x3	
			1000 ml Amber		

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



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: LDCS-41A

Sample ID: 304-092419-12

Date: 9/24/19

Weather: Sunny

Filtered? ☒ N

Locked? ☒ N

Water in Protector? ☒ N

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

Sampling Method: DTW TOS Intake BOS

Meter: MP-20 YSI

CONTROL SETTINGS: Refill 12 Discharge 3 Pressure 40 Flow 150 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

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1230	started pump up							
1240		21.27	821	3.90	5.95	-255.6		
1245		22.26	893	0.86	6.23	106.6		Not working
1248		23.01	903	0.50	6.30	38.7		
1251		24.08	911	0.26	6.76	-19.3		
1254		24.21	909	0.24	6.35	-24.5		
1257		24.39	910	0.22	6.36	-28.8		
1300		24.56	910	0.20	6.36	-31.6	29.5	

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

SAMPLER:

Printed Name

Sam Graber

Signature

[Signature]

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

LDCS level = 18.00

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: LDORS-41B Sample ID: 304-092-119-13 Date: 9/24/19

Weather: Sunny Filtered? ☒ Y ☐ N Locked? ☒ Y ☐ N

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

Sampling Method: DTW TOS Intake BOS Total Depth Water in Protector? ☒ Y ☐ N Damage? ☒ Y ☐ N 125 ml Poly 1000 ml Amber

Meter: MP-20 YSI Refill Discharge Pressure Flow 1.75" QED SamplePro Bail Peristaltic Grab Other

CONTROL SETTINGS: 11 4 40 125 mL/min 1 ft water = 0.62L One Well Volume (liters) Total Volume Bailed (liters) Other: Flow Setting: 1L = 0.26 gallons

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

LDORS level = 12

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q/Vol.
1335								
1345								
1347		26.35	509	8.30	6.94	171.0		
1352		25.88	1012	1.11	6.52	161.2		
1355		24.86	1069	0.77	6.37	150.5		
1358		24.62	1072	0.63	6.35	143.6		1100
1401		24.90	1071	0.56	6.34	140.7		
1404		24.93	1072	0.53	6.34	139.3		
1407		24.98	1071	0.51	6.33	138.1	6.93	1100

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

SAMPLER:

Printed Name

Sam Gruber

Signature



SCS ENGINEERS

2405 140th ave NE #107

Bellevue, WA 98005

(425) 746-4600

Groundwater Sampling Data Sheet

Project #:	04219001.02	Sampling Method:	Dedicated	1.75" QED SamplePro	Bail	Peristaltic	Grab	Other
Site	LRI 304th	Meter:	MP-20	1 ft water = 0.62L		1L = 0.26 gallons		
Well ID:	MW-10	TOS		Refill	8	One Well Volume (liters)	Other:	
Sample ID:	304-092514-14	Intake		Discharge	7		Flow	
Date:	9/25/19	BOS		Pressure	40	Total Volume Bailed (liters)	Setting:	
Weather:	Sunny	Total Depth	86.65	Flow	300 mL/min			
Filtered? ☒ N	Locked? ☒ N	Water in Protector? ☒ N	Damage? ☒ N					
Sample Containers:	1000 ml Poly	500 ml Poly	125 ml Poly					
	500 ml HNO ₃ x2	500 ml H ₂ SO ₄ x2	1000 ml Amber					
	125 ml NaOH							

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

* Bare deploying pump

pump lasted 3.5'

86.65 - 7.5 = 79.15'

Redeployed dedicated pump at well
bare sampling

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1030		11.17	325	8.5	5.51	287.7	214	
1045		10.31	305	1.91	6.17	288.7	32.6	
1107		10.23	295	1.57	6.15	283.1	8.91	
1110		10.24	295	1.53	6.15	282.5		
1113		10.25	295	1.51	6.15	282.4		
1116		10.22	295	1.44	6.15	281.8	7.18	

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

(425) 746-4600

Groundwater Sampling Data Sheet

Project #: 04219001.02		Dedicated		1.75" QED SamplePro		Bail		Peristaltic		Grab		Other	
Site: LRI 304th		Sampling Method:		Meter:		1 ft. water = 0.62L		1L = 0.26 gallons					
Well ID: 0005-7		DTW		MP-20		Refill		One Well Volume (liters)		Other:			
Sample ID: 304-092519-15		TOS		YSI		Discharge				Flow			
Date: 9/25/19		Intake				Pressure		Total Volume Bailed (liters)		Setting			
Weather: sunny		BOS				Flow							
Filtered? ☒ N		Total Depth		Damage? ☒ N									
Sample Containers:		Water in Protector? ☒ N		125 ml Poly									
1000 ml Poly		250 ml Poly		125 ml Poly									
500 ml HNO3 x2		40 ml VOA x3		1000 ml Amber									
125 ml NaOH													
Notes / Observations (color, odor, anomalies, etc):													

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1100	Sample collected							
1130		17.66	1395	1.38	6.40	273.4	2.03	

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

SAMPLER:

Sum
Graber

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-4 Sample ID: 304-092519-16 Date: 9/25/19 Weather: Sunny

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

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

Sampling Method: DTW TOS Intake BOS Total Depth 77.75

Meter: MP-20 (YSI) Refill 8 Discharge 7 Pressure 40 Flow 300 ml/min

CONTROL SETTINGS: 175" QED SamplePro Bail 1 ft water = 0.62L One Well Volume (liters) Total Volume Bailed (liters)

Peristaltic Grab Other

1L = 0.26 gallons

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1300		14.30	322	3.41	7.30	140.0	54.9	
1325		13.76	330	0.55	6.98	142.9	8.98	
1330		13.65	331	0.37	7.09	90.4		
1333		13.66	331	0.33	7.10	78.8		
1336		13.70	332	0.32	7.13	66.1	4.82	
1339		13.68	332	0.29	7.14	50.7		
1342		13.53	332	0.28	7.16	43.0	4.52	
1345		13.60	332	0.26	7.17	35.1		

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

Sam Barber

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

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: LDCS-5
 Sample ID: 304-092514-17
 Date: 9/25/19
 Weather: Sunny

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

Water in Protector? ☒ N
 1000 ml Poly 500 ml Poly 250 ml Poly 125 ml Poly

40 ml VOA x3 x6 1000 ml Amber

Sampling Method: DTW TOS Intake BOS Total Depth
 Meter: MP-20 YSI
 Dedicated: 1.75" QED SamplePro Bail
 1 ft water = 0.62L
 One Well Volume (liters) 12
 Discharge 3
 Pressure 50
 Flow: 0.00000

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

Notes / Observations (color, odor, anomalies, etc):
 LDCS level @ 15.1, water right away

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	-Q/Vol-
1437								
1438		20.70	1040	4.27	6.77	179.2		
1443		21.58	1061	1.11	6.69	173.2		
1446		22.23	1073	0.69	6.62	170.0		
1449		22.33	1089	0.39	6.62	114.8		760
1452		22.54	1097	0.28	6.61	76.2		
1455		22.56	1099	0.26	6.60	54.1		
1458		22.61	1075	0.30	6.58	54.9		
1501		22.63	1068	0.32	6.57	48.7		
1507		22.63	894	0.21	6.50	50.8		
1510		22.64	865	0.20	6.49	49.1		
1513		22.76	843	0.19	6.47	42.4		
1516		22.65	840	0.18	6.47	39.2		
1519		22.77	839	0.18	6.46	36.8		
1522		22.81	838	0.18	6.46	34.3	7.39	760

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

SAMPLER: Sam Grab
 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-9 Sample ID: 304-092614-18 Date: 9/26/19 Weather: Sunny / Fair

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

Sample Containers: 1000 ml Poly 500 ml Poly 500 ml HNO₃ x2 125 ml NaOH 500 ml H₂SO₄ x2 40 ml VOA x3 125 ml Poly 1000 ml Amber

Sampling Method: DTW TOS Intake BOS Total Depth: 11.91

Meter: MP-20 YSI

CONTROL SETTINGS: Refill 9 Discharge 6 Pressure 40 Flow 250 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):

replaced quick connect apparatus.

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q/Vol.
955		11.06	140	8.5	5.35	796.0		
1000		10.85	139	5.97	5.89	291.8		
1003		10.61	138	4.59	6.05	205.6		
1006		10.59	137	4.35	6.21	282.6		
1009		10.66	138	4.32	6.23	202.1		
1012		10.63	138	4.31	6.25	283.1		
1015		10.60	137	4.28	6.26	283.4	1.42	

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

SAMPLER:

Sam Baker

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: LD5-6 Sample ID: 304-092614-19 Date: 9/26/19 Weather: Cloudy

Sampling Method: Dedicated 1.75" QED SamplePro Bail 1L = 0.26 gallons One Well Volume (liters) 16.5 Total Volume Bailed (liters) 40 Flow 100 ml/min

CONTROL SETTINGS: Refill 16.5 Discharge 3.5 Pressure 40

Meter: MP-20 YSI

DTW / TOS / Intake / BOS / Total Depth /

Water in Protector? Y N Damage? Y N

Sample Containers: 1000 ml Poly 500 ml HNO₃ x2 500 ml H₂SO₄ x2 500 ml H₂O x2 125 ml NaOH

TIME	DTW	Temp.	Sp.Cond.	DO	pH	Eh	Turbidity
1155		18.90	1050	1.36	6.90	263.9	
1200		18.93	1069	1.42	7.22	258.7	
1203		18.97	1083	1.44	7.43	254.6	
1206		18.98	1093	1.39	7.49	253.6	
1209		18.88	1085	1.42	7.51	253.5	
1212		18.77	1085	1.38	7.40	259.0	
1215		18.71	1101	1.35	7.13	263.9	
1221		18.72	1114	1.26	6.75	266.1	
1221		18.71	1114	1.25	6.72	263.6	
1227		18.73	1114	1.27	6.69	264.9	
1230		18.91	1113	1.21	6.66	264.2	4.82
							1500

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

SAMPLER:

Sam Baker

Printed Name

Signature

d R

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

LD5 level at 100, water 1500 away

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

Printed Name _____

Signature _____

SCS ENGINEERS

2405 140th ave NE #107

Bellevue, WA 98005

(425) 746-4600

Groundwater Sampling Data Sheet

Project #: D4219001.02

Site: LRIS 301th

Well ID: LDLRS-5

Sample ID: 301-07219-01

Date: 7/12/19

Weather: cloudy

Filtered? ☒ N

Locked? ☒ N

Water in Protector? ☒ N

Sample Containers:

1000 ml Poly	500 ml Poly	500 ml H2SO4	x2	125 ml NaOH

Sampling Method: DTW

Meter: MP-20

CONTROL SETTINGS:

Refill	11.5
Discharge	3.5
Pressure	4.0
Flow	75 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):

sample appearance - off white.

No odor

LDLRS had ~~to~~ upon turning pump on 6.5.

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1020		Started						
1045		25.75	1422	1.95	6.63	-28.7		
1048		25.98	1437	1.03	6.71	-68.9		
1051		25.98	1431	0.69	6.70	-68.7		
1054		25.83	1423	0.53	6.69	-69.6		
1057		25.95	1433	0.43	6.63	-72.9		
1100		26.02	1437	0.36	6.67	-74.0		
1103		26.16	1438	0.23	6.63	-80.7		
1106		28.27	1389	0.26	6.63	-84.3	1.45	

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

SAMPLER:

Sam Gaber

Printed Name

Signature

[Signature]

SCS ENGINEERS

2405 140th ave NE #107

Bellevue, WA 98005

(425) 746-4600

Groundwater Sampling Data Sheet

Project #: 04219001.02 Site: LRI 304 Well ID: LUCS-5 Sample ID: 304-082319-01 Date: 8-23-19 Weather: Sunny

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

Sample Containers: 1000 ml Poly 500 ml H2SO4 x2 500 ml Poly 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 11.5 Discharge 3.5 Pressure 40 Flow 100 ml/min

1.75" QED SamplePro Bail 1 ft water = 0.62L One Well Volume (liters) 11.5 Total Volume Bailed (liters) 40

Peristaltic Grab Other

1L = 0.24 gallons

Other: Flow Setting:

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

LDCRS level @ 8.1 when pump

Conductivity @ meter = 897

Sample time of 1136

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1112		Turned pump on						
1116		23.57	956	1.67	6.99	271.6		
1121		25.55	980	1.30	7.10	264.1		
1124		26.24	990	0.91	7.14	256.0		
1127		26.57	1002	1.02	7.17	250.3		
1130		27.24	1021	0.66	7.21	190.8		
1133		27.47	1034	0.47	7.29	118.5		
1136		27.90	1062	0.33	7.41	23.1	1.12	
1139		28.11	1070	0.32	7.44	12.0		
1142		28.21	1074	0.30	7.35	9.2		

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]
Signature

Bellevue, WA 98005

Groundwater Sampling Data Sheet

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

Purged here for 2 min.

TIME	DTW	Temp.	Sp. Cond.	DO	pH	Eh	Turbidity	Q / Vol.
1030		18.4	866 $\frac{\mu S}{cm}$	4.58	6.20	188.5	6.89	

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 _____

GROUNDWATER SAMPLING INSTRUMENT CALIBRATION DOCUMENTATION FORM

Conductivity	pH4	pH 7	DO	Turbidity	Comments/Exceptions
Date	9/23/19				
Time	0725				
Weather (sky or precip, temp)	partly cloudy				
Type of Calibration	Standard	Standard	Standard	Standard	
Standard Value	1413	4.01	7.00	100% or ~8.5 1000, 10, 0.2 800, 100, 20, <0.1	
Pre-Cal Reading	1400	3.88	6.92		
Post Cal Reading	1413	4.01	7.00	8.5	
Discrepancy	No				
Calib. Successful?	yes				
Calibration by	SAB				
Instrument Type, ID	MP20	/	YSI 556	MicoTPW / HACH2000	
Calibration Location	304th				

* If Direct Reading is Unavailable, Assume pressure = 760 mm - 2.5 (altitude in ft/100)

GROUNDWATER SAMPLING INSTRUMENT CALIBRATION DOCUMENTATION FORM

Conductivity	pH4	pH 7	DO	Turbidity	Comments/Exceptions
Date	9/20/19				
Time	900				
Weather (sky or precip, temp)	partly cloudy				
Type of Calibration	Standard	Standard	Standard	Standard	
Standard Value	1413	4.01	7.00	100% or ~8.5	1000, 10, 0.2 800, 100, 20, <0.1
Pre-Cal Reading	1398	6.91	6.95		
Post Cal Reading	1413	4.01	7.00	8.5	
Discrepancy	No				
Calib. Successful?	yes				
Calibration by	Seb				
Instrument Type, ID	MP20	/	YSI 556	MicoTPW / HACH2000	
Calibration Location	304th				

* If Direct Reading is Unavailable, Assume pressure = 760 mm - 2.5 (altitude in ft/100)

GROUNDWATER SAMPLING INSTRUMENT CALIBRATION DOCUMENTATION FORM

Conductivity	pH4	pH 7	DO	Turbidity	Comments/Exceptions
Date	9/25/19				
Time	900				
Weather (sky or precip, temp)	Sunny				
Type of Calibration	Standard	Standard	Standard	Standard	
Standard Value	1413	4.01	7.00	100% or ~8.5 1000, 10, 0.2 800, 100, 20, <0.1	
Pre-Cal Reading	1400	3.90	6.91		
Post Cal Reading	1413	4.01	7.00	8.5	
Discrepancy	No				
Calib. Successful?	Yes				
Calibration by	SEB				
Instrument Type, ID	MP20	/	YSI 550	MicoTPW / HACH2000	
Calibration Location	30th				

* If Direct Reading is Unavailable, Assume pressure = 760 mm - 2.5 (altitude in ft/100)

GROUNDWATER SAMPLING INSTRUMENT CALIBRATION DOCUMENTATION FORM

Conductivity	pH4	pH 7	DO	Turbidity	Comments/Exceptions
Date	9/26/19				
Time	830				
Weather (sky or precip, temp)	raining				
Type of Calibration	Standard	Standard	Standard	Standard	
Standard Value	1413	4.01	7.00	1000, 10, 0.2 100% or ~8.5 800, 100, 20, <0.1	
Pre-Cal Reading	1401	4.07	6.84		
Post Cal Reading	1413	4.01	7.00	8.5	
Discrepancy	N/A				
Calib. Successful?	yes				
Calibration by	SEB				
Instrument Type, ID	MP20	/	YST 550	MicoTPW/HACH2000	
Calibration Location	204th				

* If Direct Reading is Unavailable, Assume pressure = 760 mm - 2.5 (altitude in ft/100)

GROUNDWATER SAMPLING INSTRUMENT CALIBRATION DOCUMENTATION FORM

Conductivity	pH4	pH 7	DO	Turbidity	Comments/Exceptions
Date	7/12/19				
Time	1015				
Weather (sky or precip, temp)	cloudy				
Type of Calibration	Standard	Standard	Standard	Standard	
Standard Value	1413	4.01	7.00	100% or ~8.5 1000, 10, 0.2 800, 100, 20, <0.1	
Pre-Cal Reading	14130	4.03	7.00		
Post Cal Reading	1413	4.01	7.00	800, 100, 20, 0.1	
Discrepancy	No				
Calib. Successful?	yes				
Calibration by	Seb				
Instrument Type, ID	MP20 / YSI 556		MicoTPW / HACH2000		
Calibration Location	LRI 304th				

* If Direct Reading is Unavailable, Assume pressure = 760 mm - 2.5 (altitude in ft/100)

GROUNDWATER SAMPLING INSTRUMENT CALIBRATION DOCUMENTATION FORM

Conductivity	pH4	pH 7	DO	Turbidity	Comments/Exceptions
Date	8-23-19				
Time	1050				
Weather (sky or precip, temp)	Sunny				
Type of Calibration	Standard	Standard	Standard	Standard	
Standard Value	1413	4.01	7.00	1000, 10, 0.2 800, 100, 20, <0.1	
Pre-Cal Reading	1489	3.91	7.01	3.44	
Post Cal Reading	1413	4.01	7.00	795, 100, 20, 4.034	
Discrepancy	No				
Calib. Successful?	Yes				
Calibration by	Travis B.				
Instrument Type, ID	MP20 / YSI 556		MicoTPW / HACH2000		
Calibration Location	LRI 304				

* If Direct Reading is Unavailable, Assume pressure = 760 mm - 2.5 (altitude in ft/100)

Attachment D

Statistical Calculations



Groundwater Prediction Limits (mg/L)
Appendix I Parameters, Third 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, Third 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	0.5	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	0.5	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	0.5	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	0.5	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	0.5	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		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC				

Statistical Summary of Total Metals Groundwater Data
Appendix I Parameters, Third 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			0.0025		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		0.014		0.29				0.25			
Average Concentration			NC		0.0089		0.02275			NC			NC		NC			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		NC		NC		NC	
Standard Deviation			NC		0.00125		0.02763			NC			NC		NC			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		NC		NC		NC	
Standard Error			NC		0.00044		0.00977			NC			NC		NC			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	0.01	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	0.0005	0.0043	0.0043	0.005	L	0.0025	0.01	L	0.005	0.001	L	0.0005	0.01	L	0.005	0.01	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																		

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

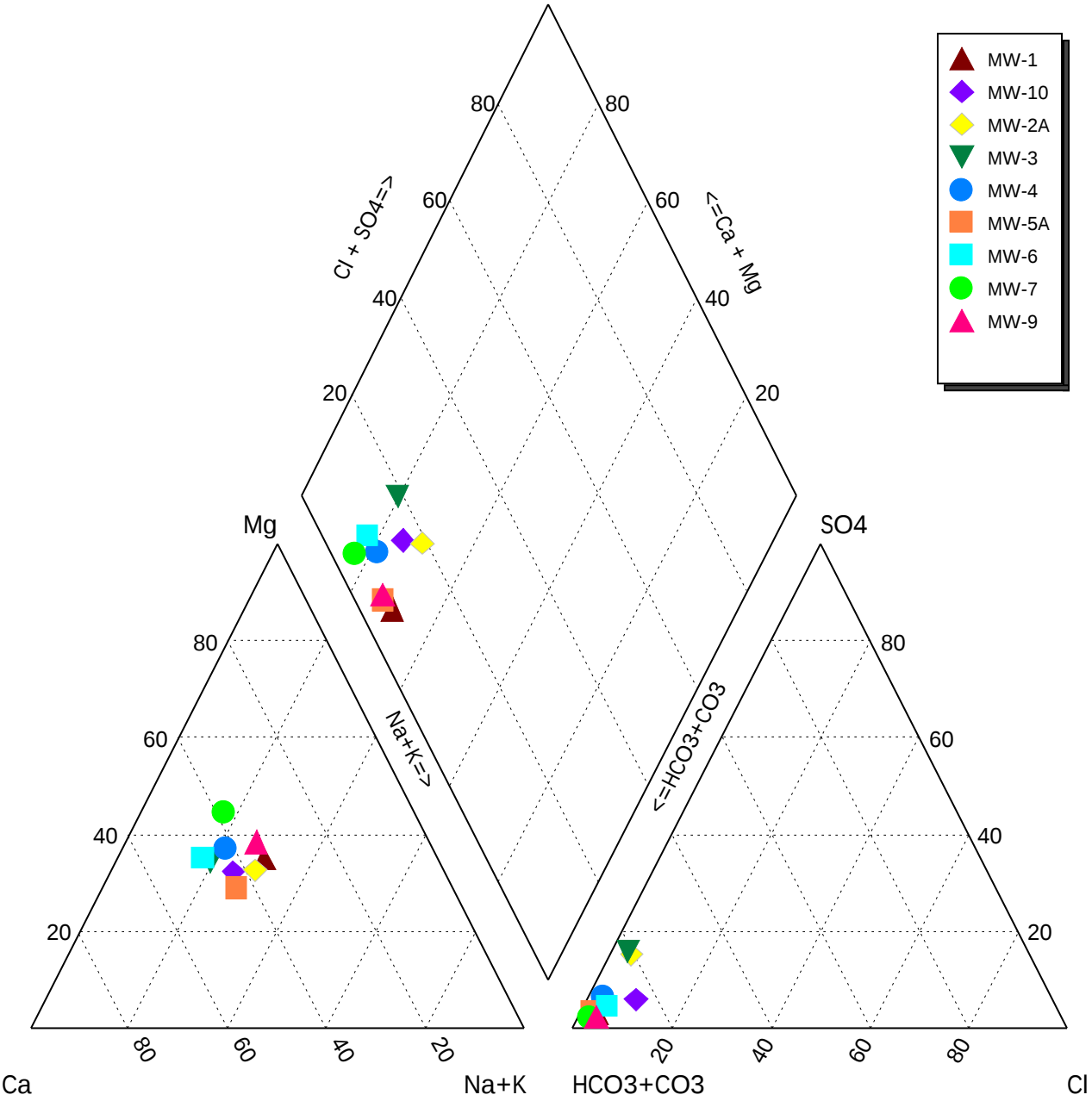
Location ID	Antimony (Sb)			Arsenic (As)			Barium (Ba)			Beryllium (Be)			Cadmium (Cd)			Chromium (Cr)			Cobalt (Co)			Copper (Cu)			Lead (Pb)			Nickel (Ni)			Selenium (Se)			Silver (Ag)			Thallium (Tl)			Vanadium (V)			Zinc (Zn)			Nitrate (NO ₃)		
Monitoring Date	Result	Conc.		Result	Conc.		Result	Conc.		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	0.002	L	0.001	0.002	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			
	3/24/2015	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	0.005	L	0.0025	0.001	L	0.0005	0.005	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																				

Attachment E

Trilinear Diagrams



Third Quarter 2019, Groundwater Monitoring Wells



DESCRIPTION: Piper Diagram - Groundwater - 3Q19

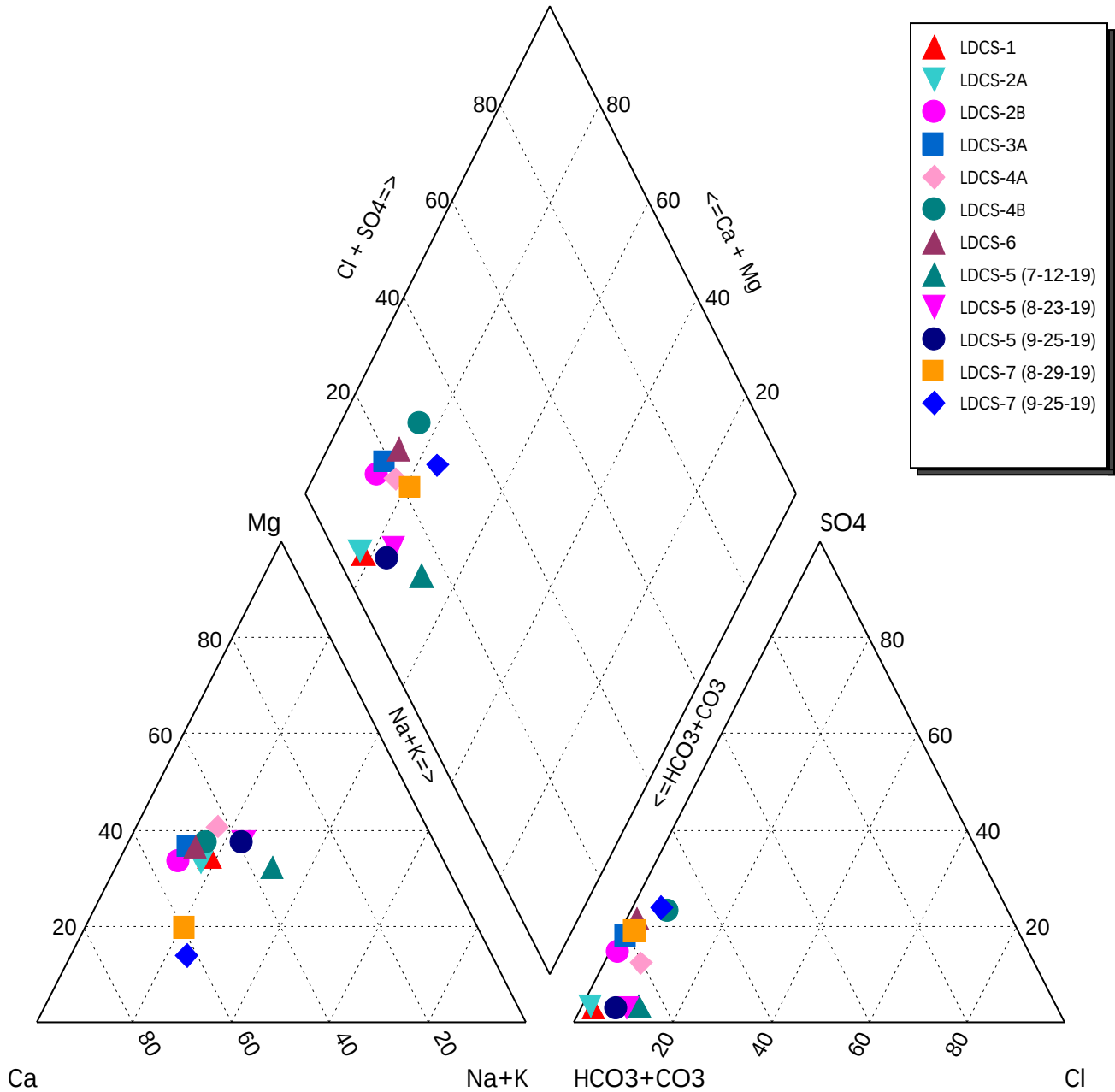
PROJECT: LRI Landfill

PROJECT NO: 04219001.02

CLIENT: LRI, Inc.

DATE: November 2019

Third Quarter 2019, Leak Detection Collection Recovery System



DESCRIPTION: Piper Diagram - LDCRS - 3Q19

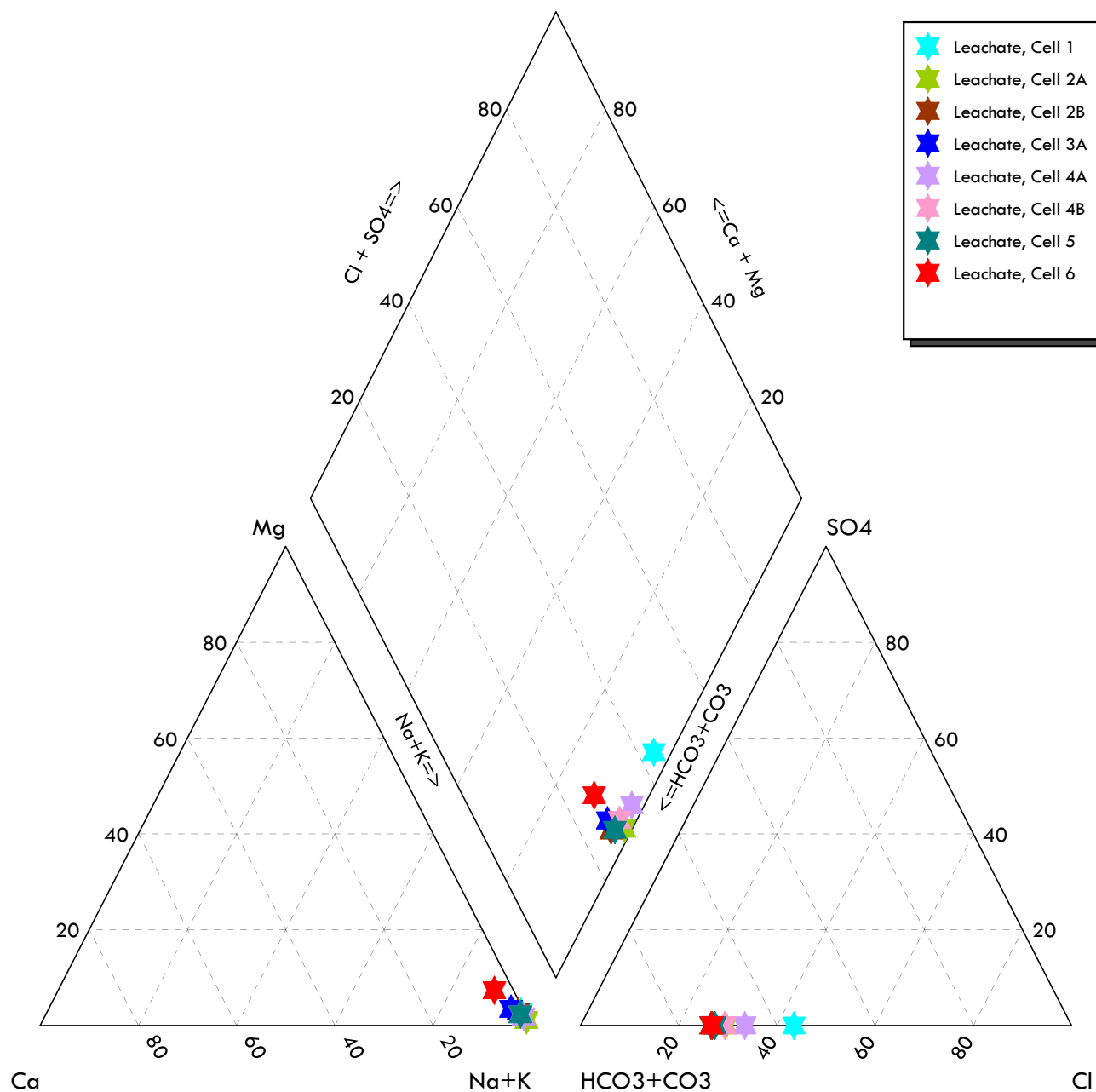
PROJECT: LRI Landfill

PROJECT NO: 04219001.02

CLIENT: LRI, Inc.

DATE: November 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

Attachment F

Analytical Data Validation Report



THIRD 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	11/27/2019	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)
280-128667-1	No comments.	TestAmerica, Denver, CO
280-128717-1	No comments.	TestAmerica, Denver, CO
280-128777-1	No comments.	TestAmerica, Denver, CO
280-128779-1	No comments.	TestAmerica, Denver, CO
280-128826-1	No comments.	TestAmerica, Denver, CO
280-128827-1	No comments.	TestAmerica, Denver, CO
280-127627-1	No comments.	TestAmerica, Denver, CO
280-127829-1	Original Chloride and Sulfate volume sent to TA-St. Louis spilled out and all volume was lost. Due to PM error, replacement volume was sent past 28-day holding time.	TestAmerica, Denver, CO

Analytical Summary

Sample Group	Analyses					
	TDS/Alk/NO3	Metals	NH4/TOC	VOCs	Anions	TSS
280-128667-1	X	X ²	X	X	X	X
280-128717-1	X	X ¹	X	X	X	--
280-128777-1	X	X ²	X	X	X	X
280-128779-1	X	X ¹	X	X	X	--
280-128826-1	X	X ²	X	X	X	X
280-128827-1	X	X ¹	X	X	X	--
280-127627-1	X	X ¹	X	X	X	--
280-127829-1	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.	No corrective action necessary. See case narrative (280-128717-1)
LCS/LCSD	Acceptable.	No corrective action necessary. See case narrative (280-128667-1, 280-128777-1, 280-128779-1, 280-128826-1, 280-128827-1, 280-127627-1, 280-127829-1)
MS/MSD	Acceptable.	No corrective action necessary. See case narrative (280-128667-1, 280-128717-1, 280-128777-1, 280-128779-1, 280-128826-1, 280-128827-1, 280-127627-1, 280-127829-1)
Metals	Acceptable.	Dissolved Sodium was detected in a blank sample. Associated samples were not reanalyzed because they contained dissolved sodium greater than 10x the result found in the blank. (280-127627-1, 280-128717-1)
Duplicates	Acceptable.	No corrective action necessary. See case narrative (280-128826-1)
General Chemistry	Acceptable.	No corrective action necessary. See case narrative (280-128667-1, 280-128826-1, 280-128827-1)
General Comments	Acceptable.	See case narratives.

Field Quality Assurance Samples

Field QA Samples	Sample Group	Analytes	Notes
QC-FB	280-128826-1	Chloroform (0.5 ug/L) Methylene Chloride (10 ug/L) Dissolved Calcium (0.57 mg/L) Dissolved Sodium (1.2 mg/L)	
QC-TB	280-128667-1	None.	
QC-TB	280-128717-1	None.	
QC-TB	280-128779-1	None.	
QC-TB	280-128826-1	None.	

Lab Quality Flags

Flag	Sample Groups	Comments
*	280-128667-1, 280-128777-1, 280-128779-1, 280-128826-1, 280-128827-1, 280-127627-1, 280-127829-1	RPD of the LCS and LCSD exceeds the control limits.
4	280-128667-1, 280-128717-1, 280-128777-1, 280-128779-1, 280-128826-1, 280-128827-1,	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

	280-127627-1, 280-127829-1	
B	280-128717-1	Compound was found in the blank and sample.
E		Result exceeded calibration range.
F1	280-128667-1, 280-128717-1, 280-128777-1, 280-128779-1, 280-128826-1, 280-128827-1, 280-127627-1	MS and/or MSD recovery exceeds the control limits.
F2	280-128717-1, 280-128826-1	MS/MSD RPD exceeds control limits.
F3	280-128826-1	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	280-127829-1	Sample was prepped or analyzed beyond specified holding time.
J	280-128667-1, 280-128717-1, 280-128777-1, 280-128779-1, 280-128826-1, 280-128827-1, 280-127627-1, 280-127829-1	Result is <RL, >MDL and concentration is approximate value.
X		Surrogate is outside control limits.
^	280-128667-1, 280-128826-1, 280-128827-1	ICV, CCV, ICB, CCB, ISA, ISB, CRI, CRA, DLCK, or MRL standard: instrument related QC is outside acceptance limits.

Duplicate Evaluation

Analyte	Units	MW-5A (304-092319-04)	MW-5A DUP (304-092319-05)	RPD (%)
Alkalinity, Total	mg/L	150	150	0.0
Barium, Total	mg/L	0.0099	0.01	1.0
Calcium, Dissolved	mg/L	25	25	0.0
Chloride	mg/L	2.3	2.4	4.3
Magnesium, Dissolved	mg/L	10	11	9.5
Manganese, Dissolved	mg/L	0.16	0.16	0.0
Potassium, Dissolved	mg/L	3.5	3.5	0.0
Sodium, Dissolved	mg/L	16	16	0.0
Sulfate	mg/L	5.3	5.4	1.9
Total Dissolved Solids	mg/L	160	160	0.0

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.

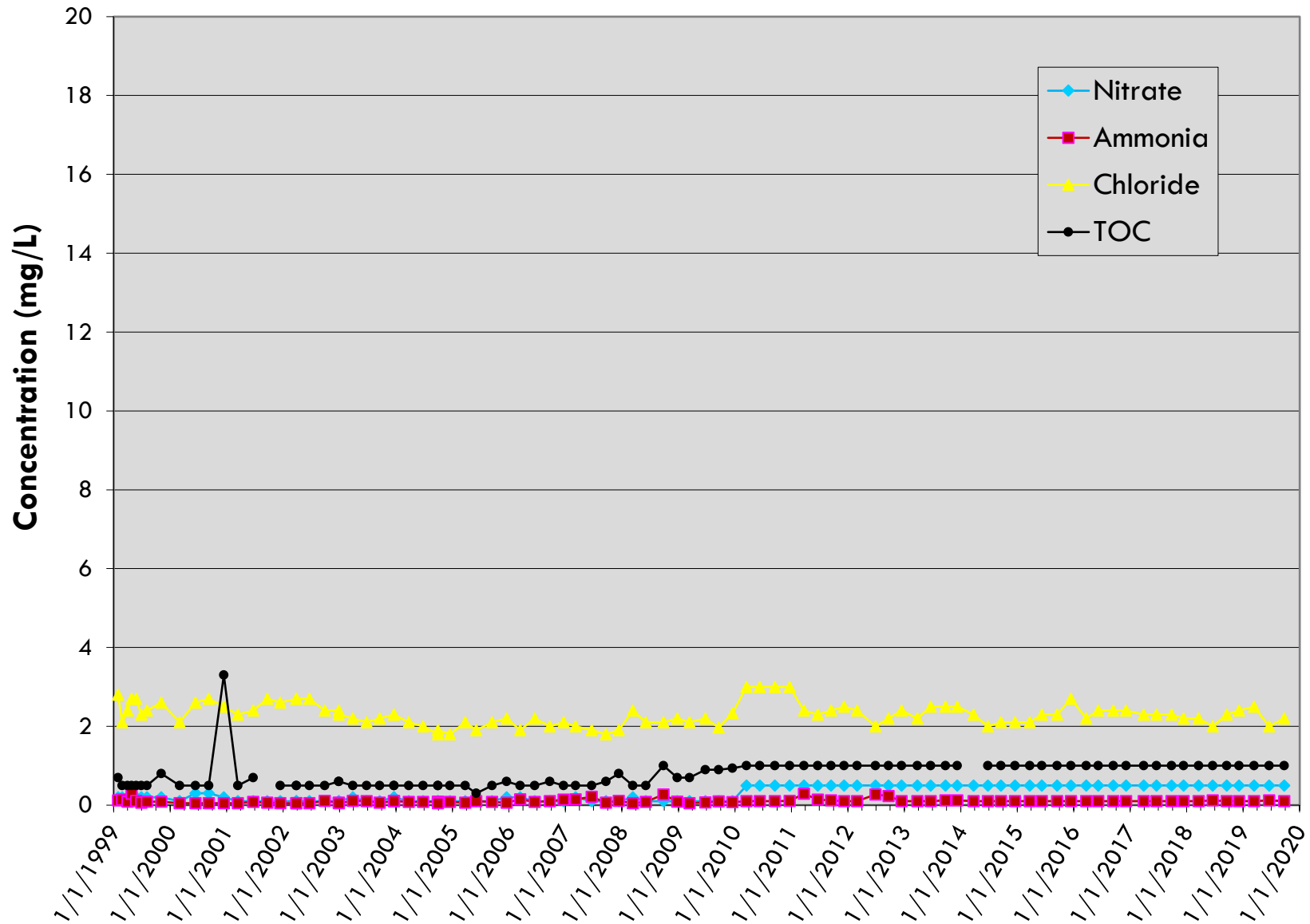
Attachment G

Groundwater and LDCS Time Trend Plots



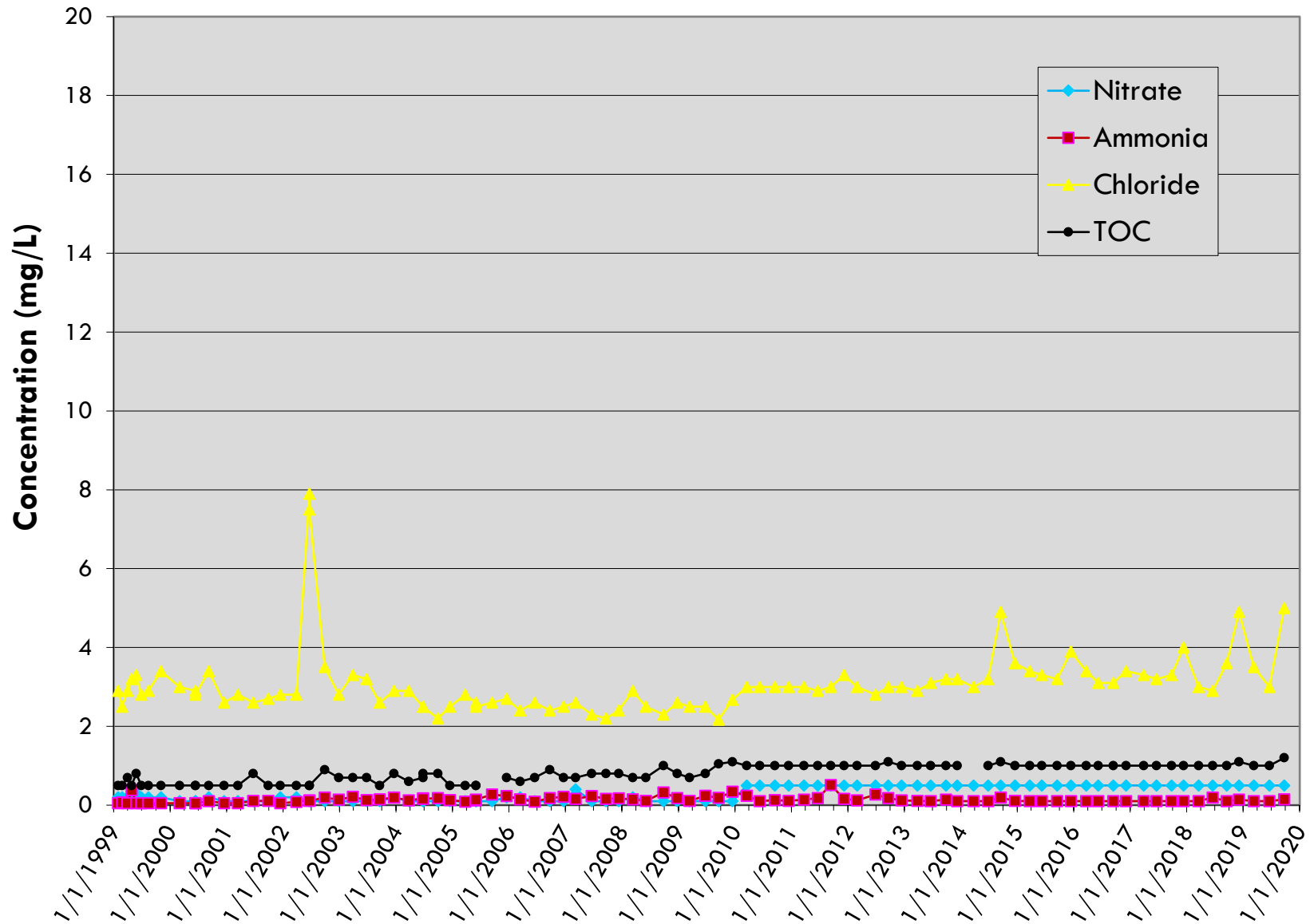
MW-1A

LRI Landfill, Pierce County, Washington



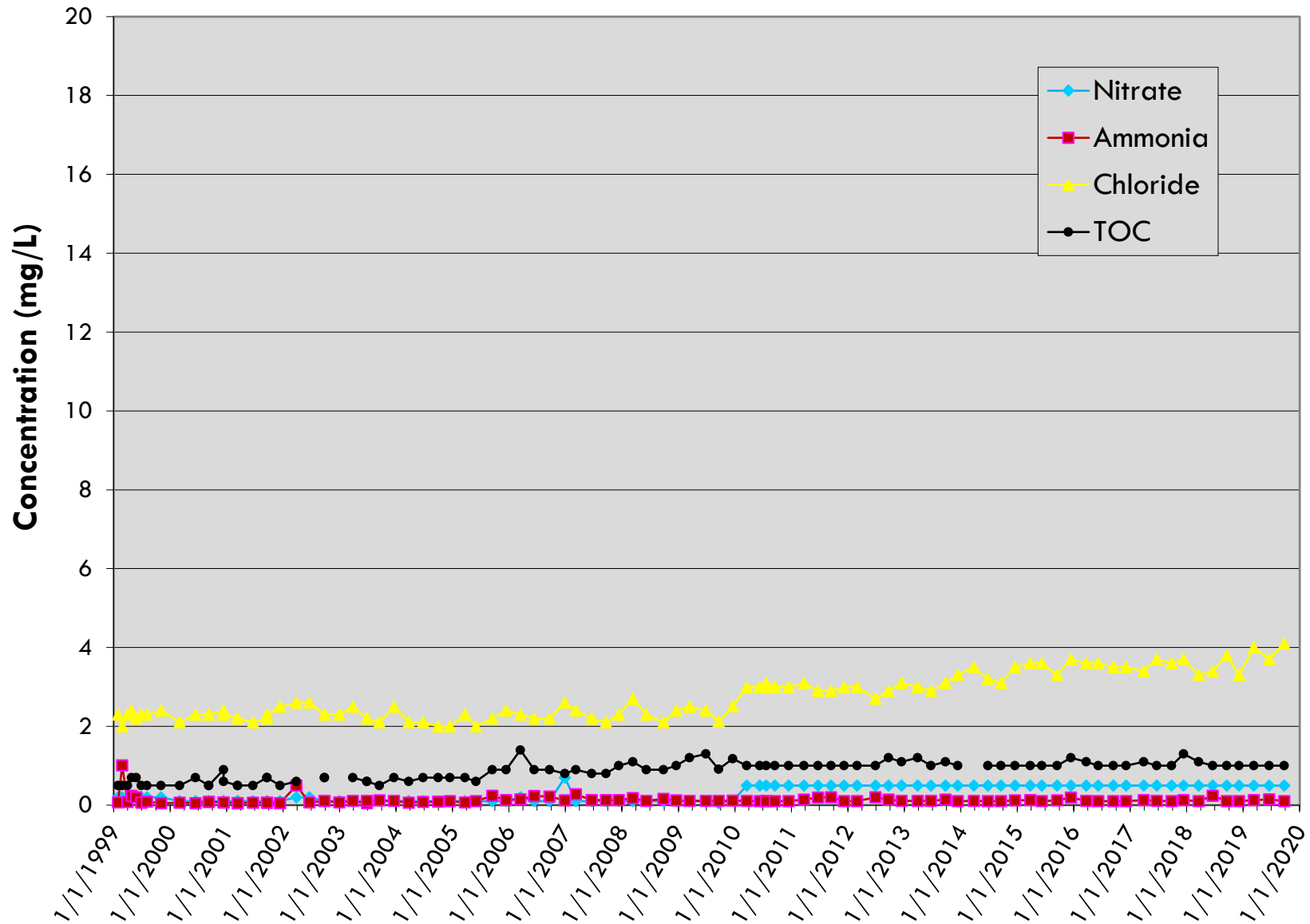
MW-2A

LRI Landfill, Pierce County, Washington



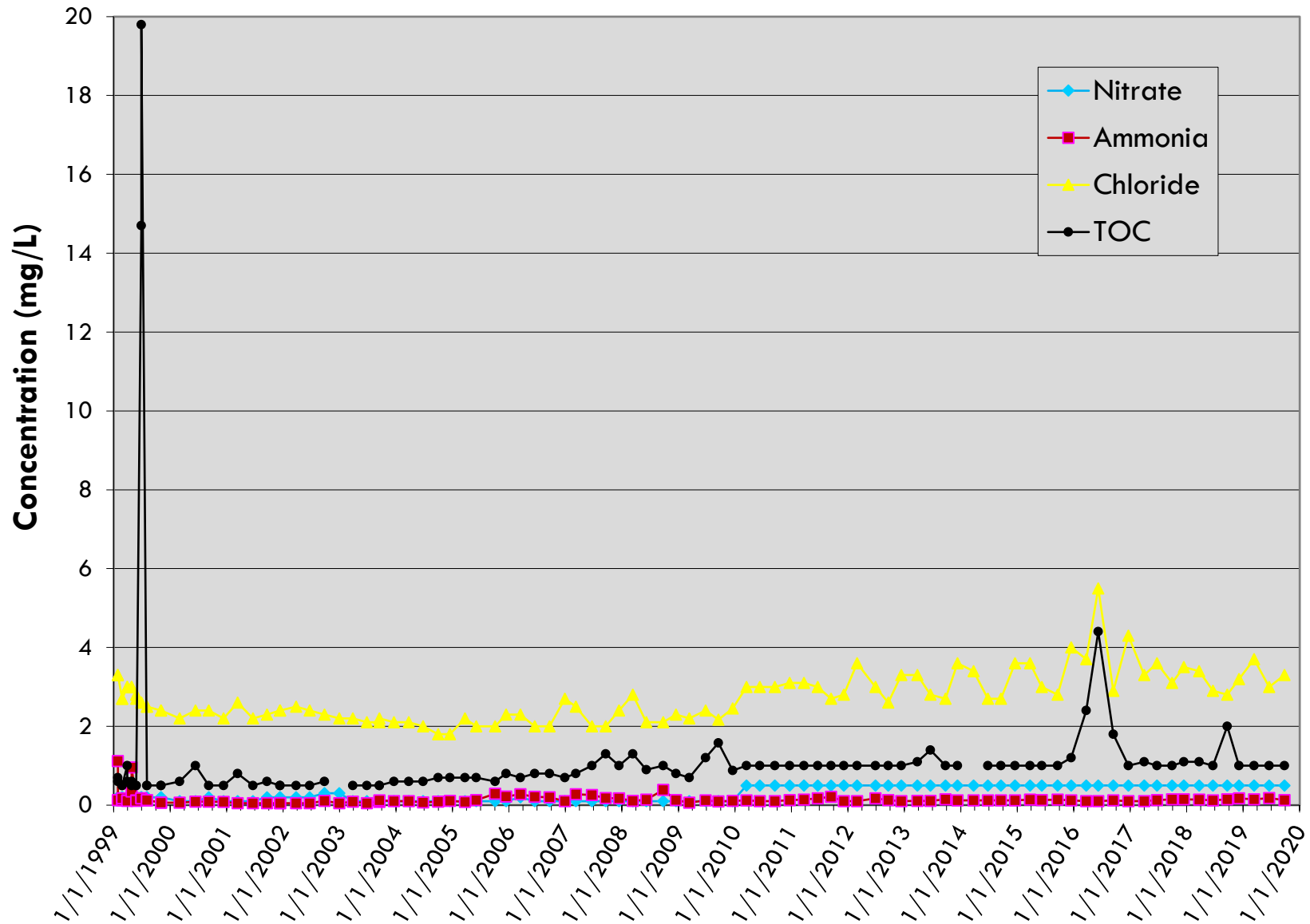
MW-3

LRI Landfill, Pierce County, Washington



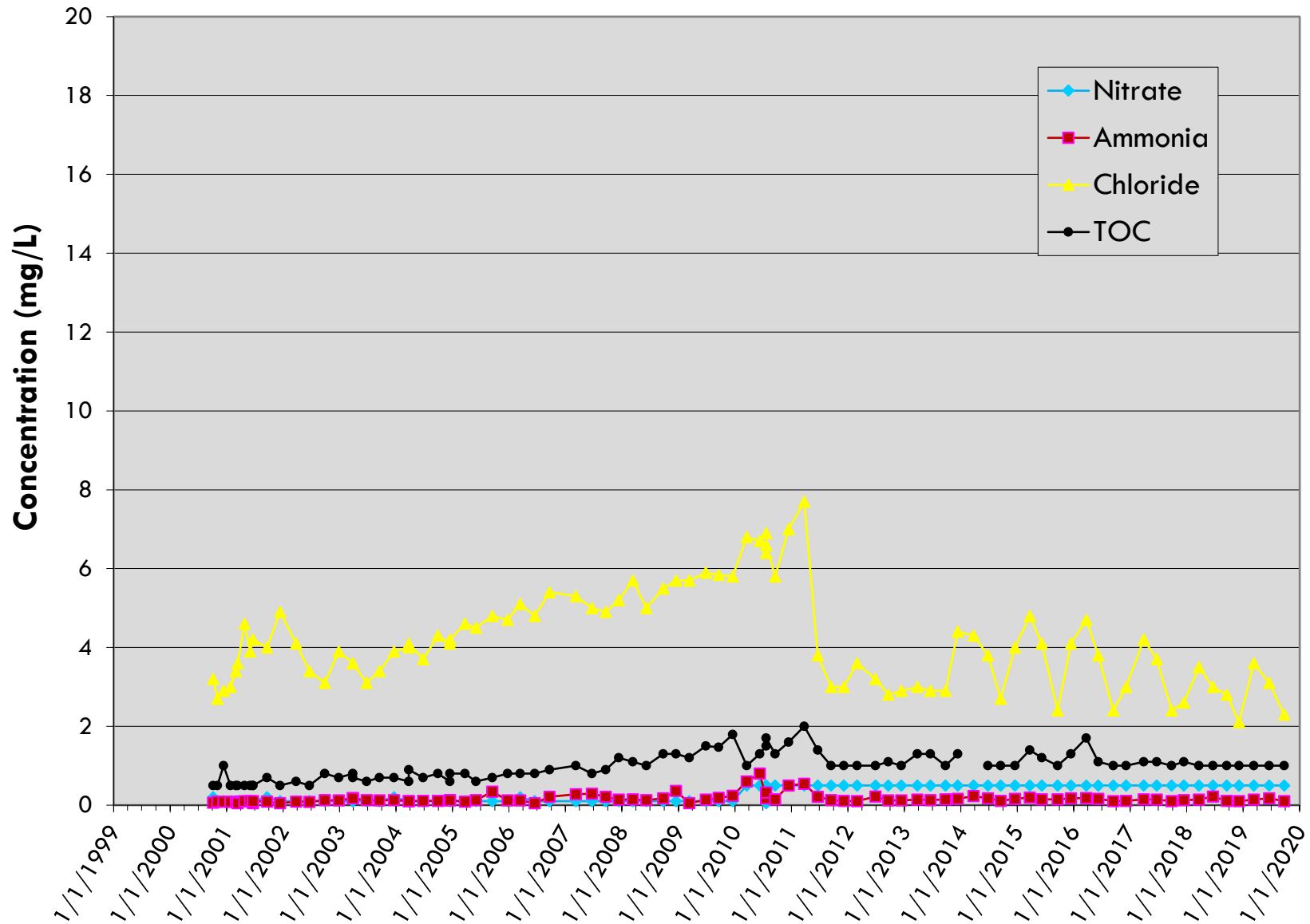
MW-4

LRI Landfill, Pierce County, Washington



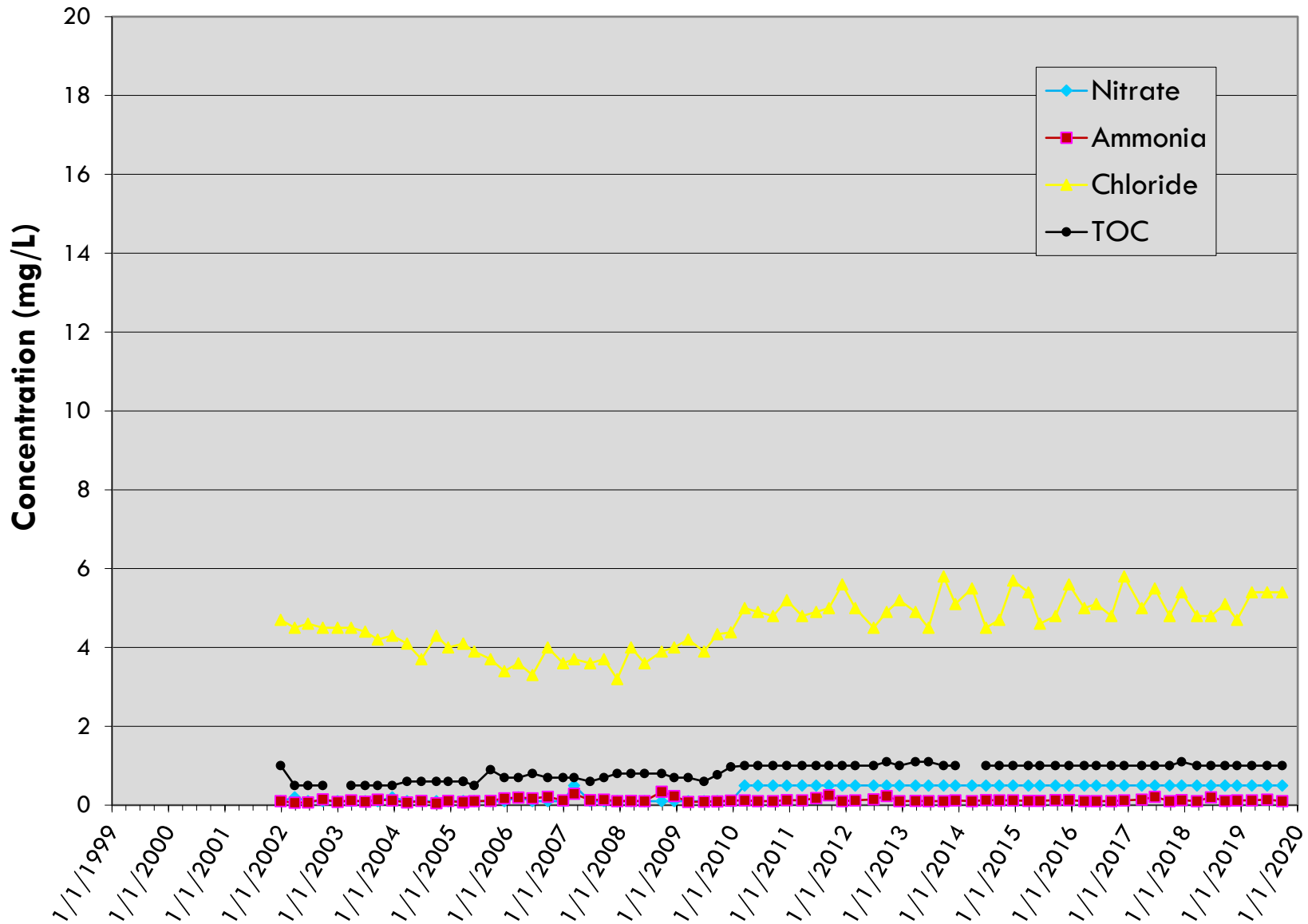
MW-5A

LRI Landfill, Pierce County, Washington



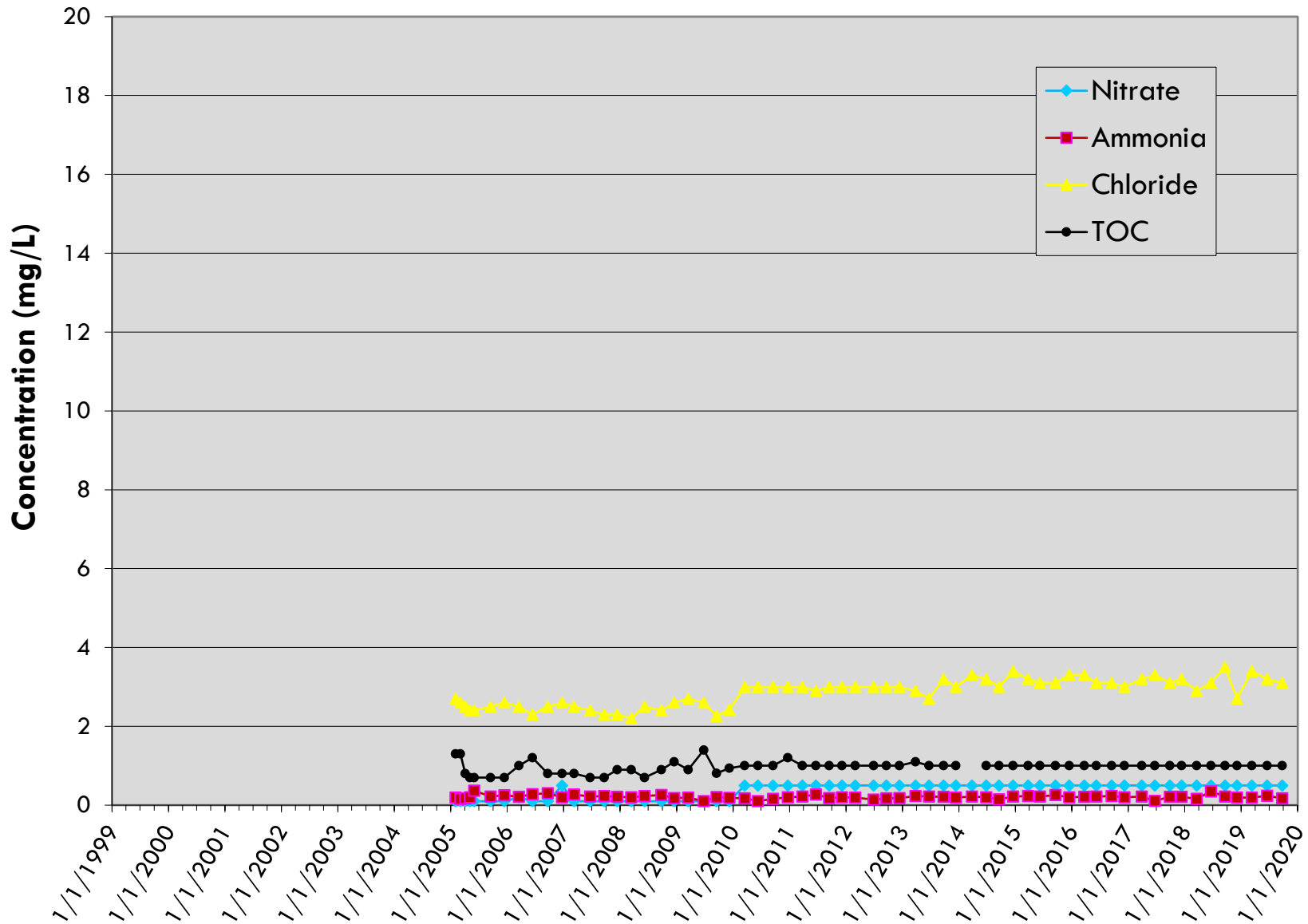
MW-6

LRI Landfill, Pierce County, Washington

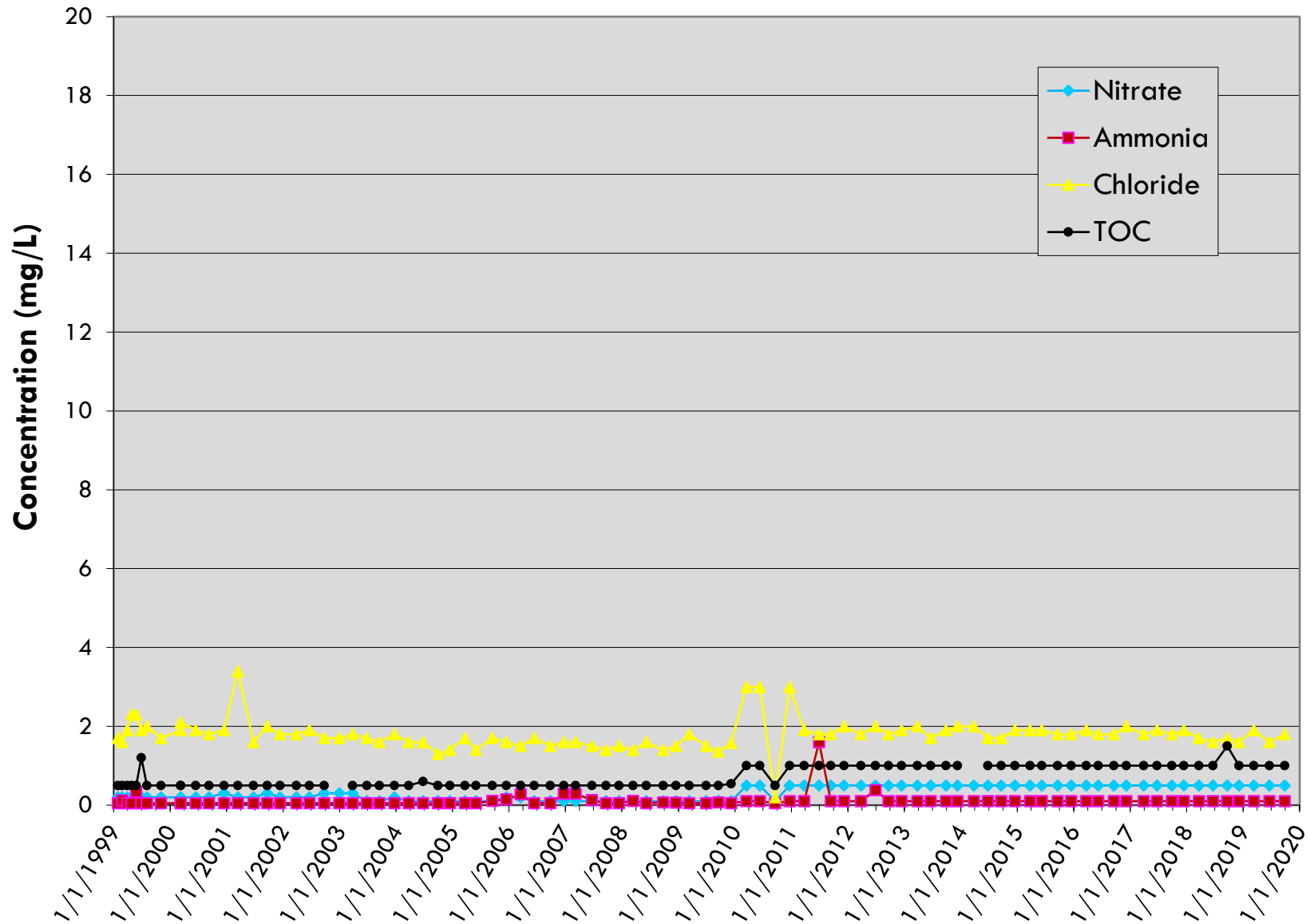


MW-7

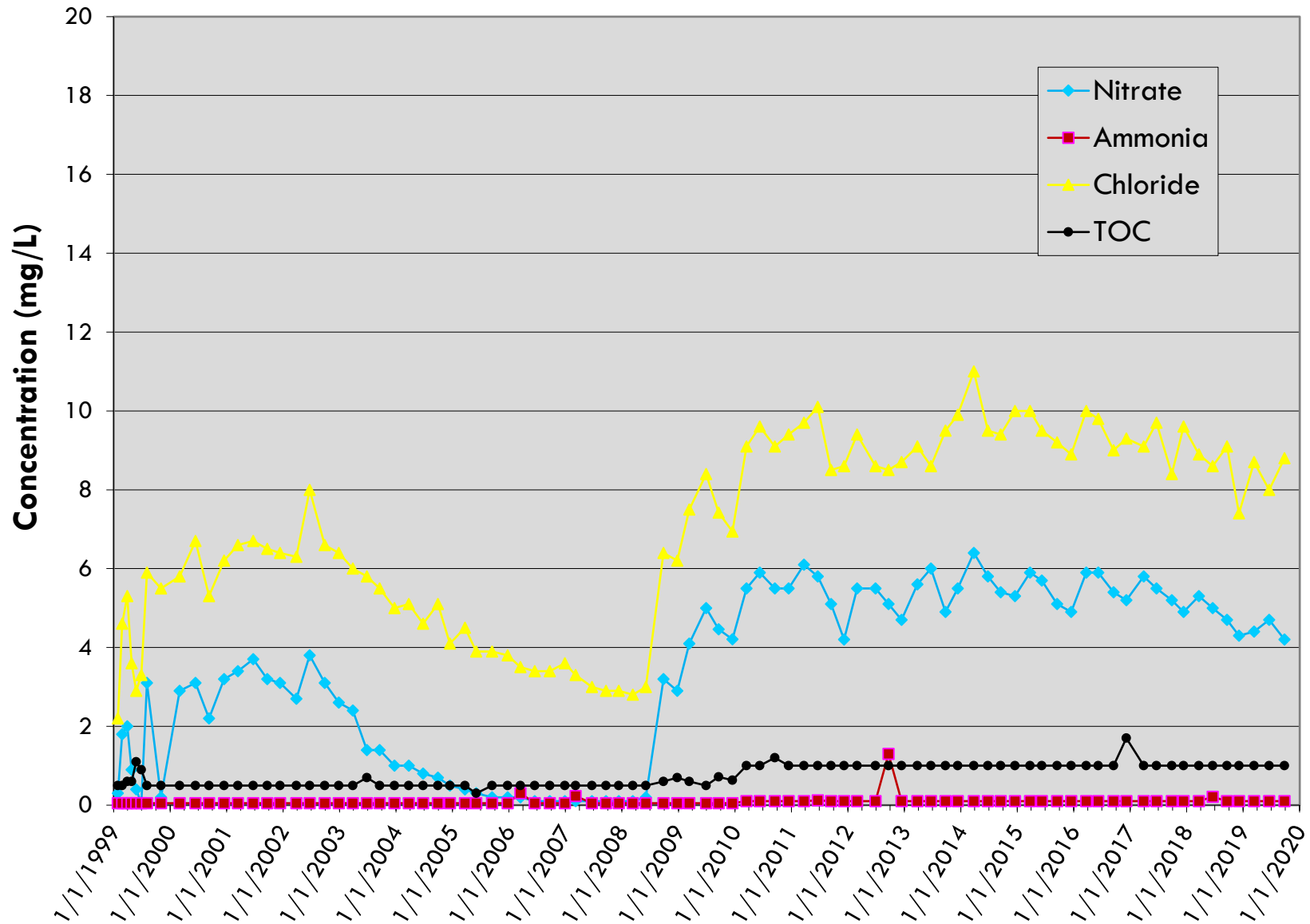
LRI Landfill, Pierce County, Washington



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

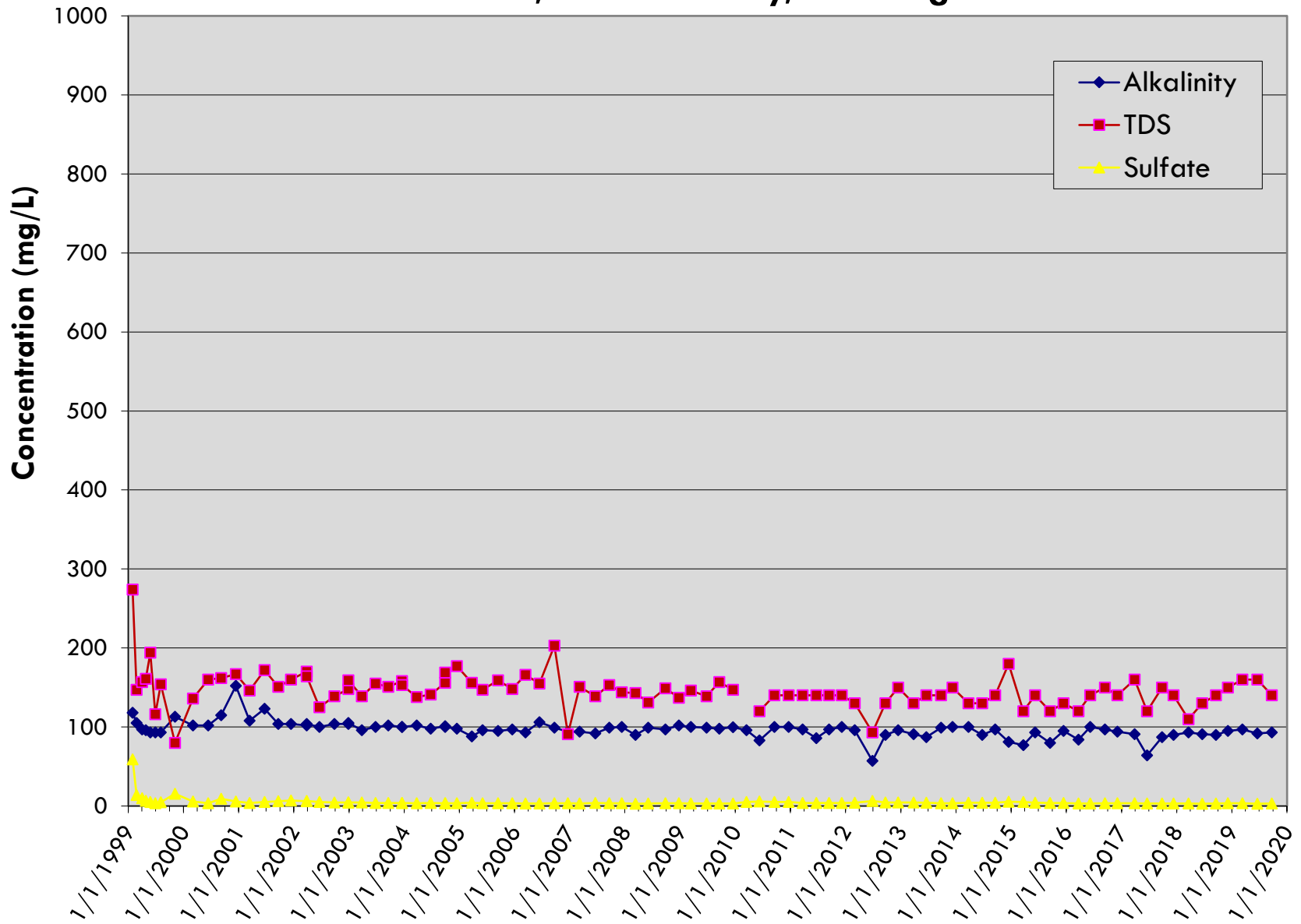


MW-10 (Background) LRI Landfill, Pierce County, Washington

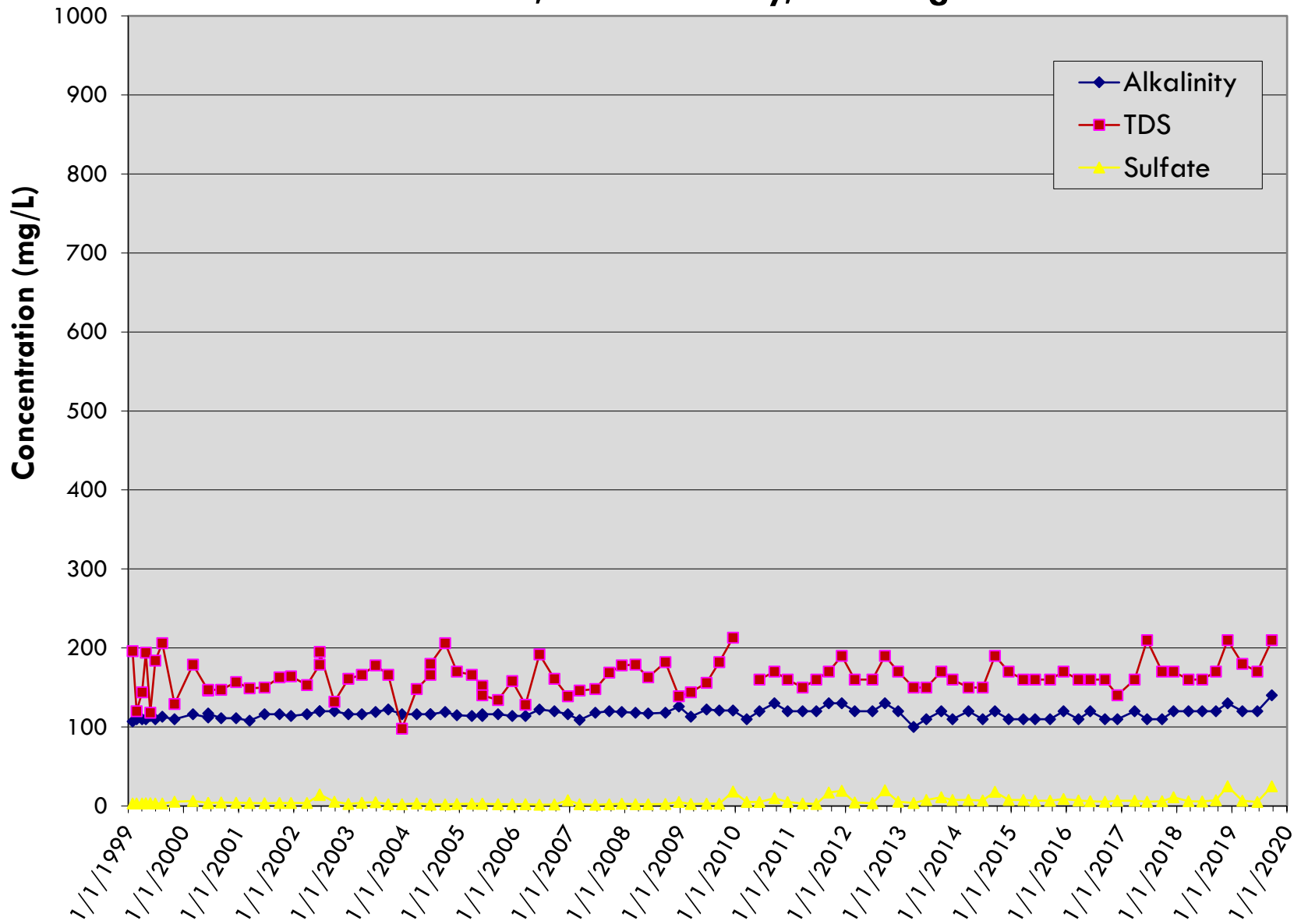


MW-1A

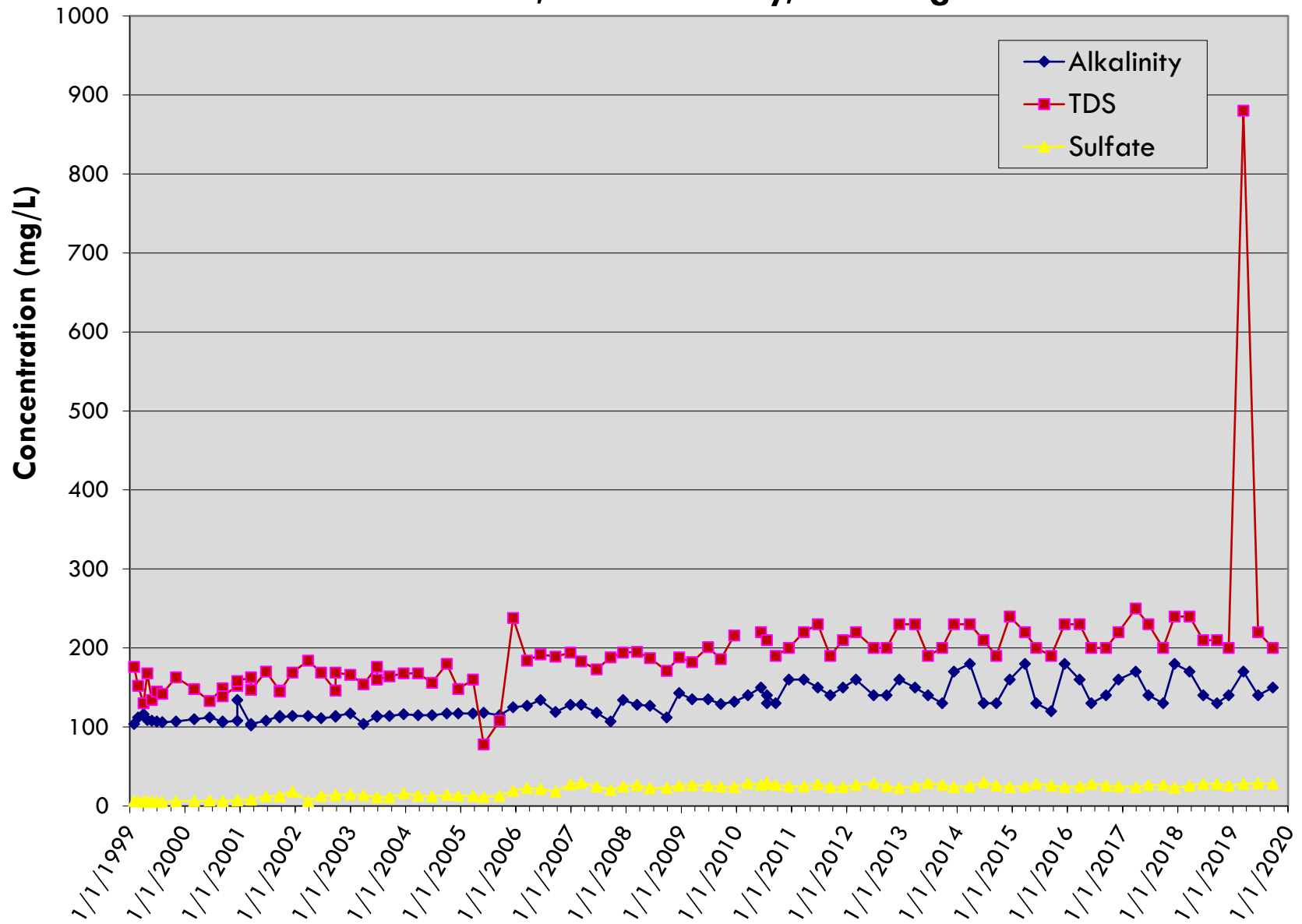
LRI Landfill, Pierce County, Washington



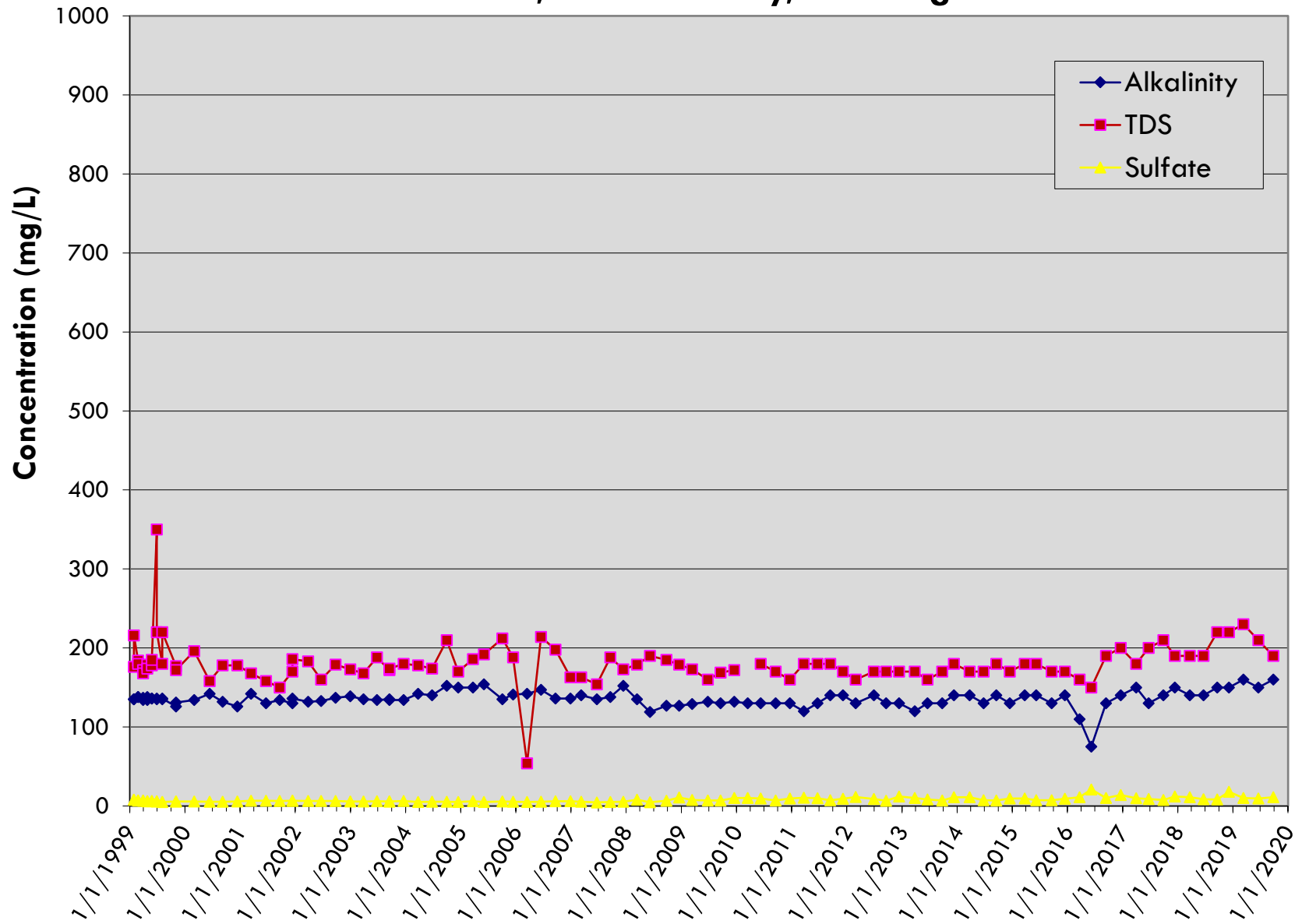
MW-2A
LRI Landfill, Pierce County, Washington



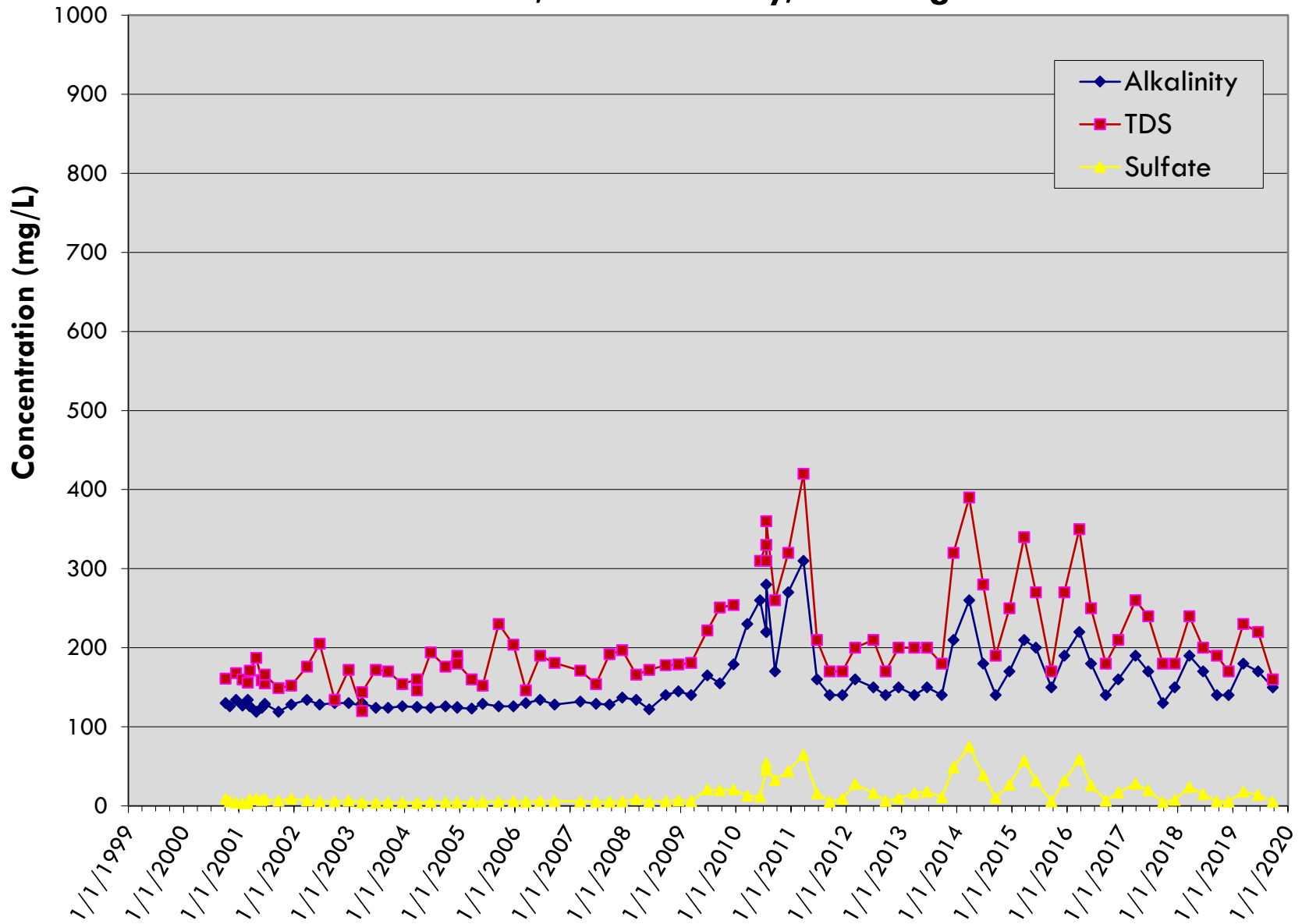
MW-3
LRI Landfill, Pierce County, Washington



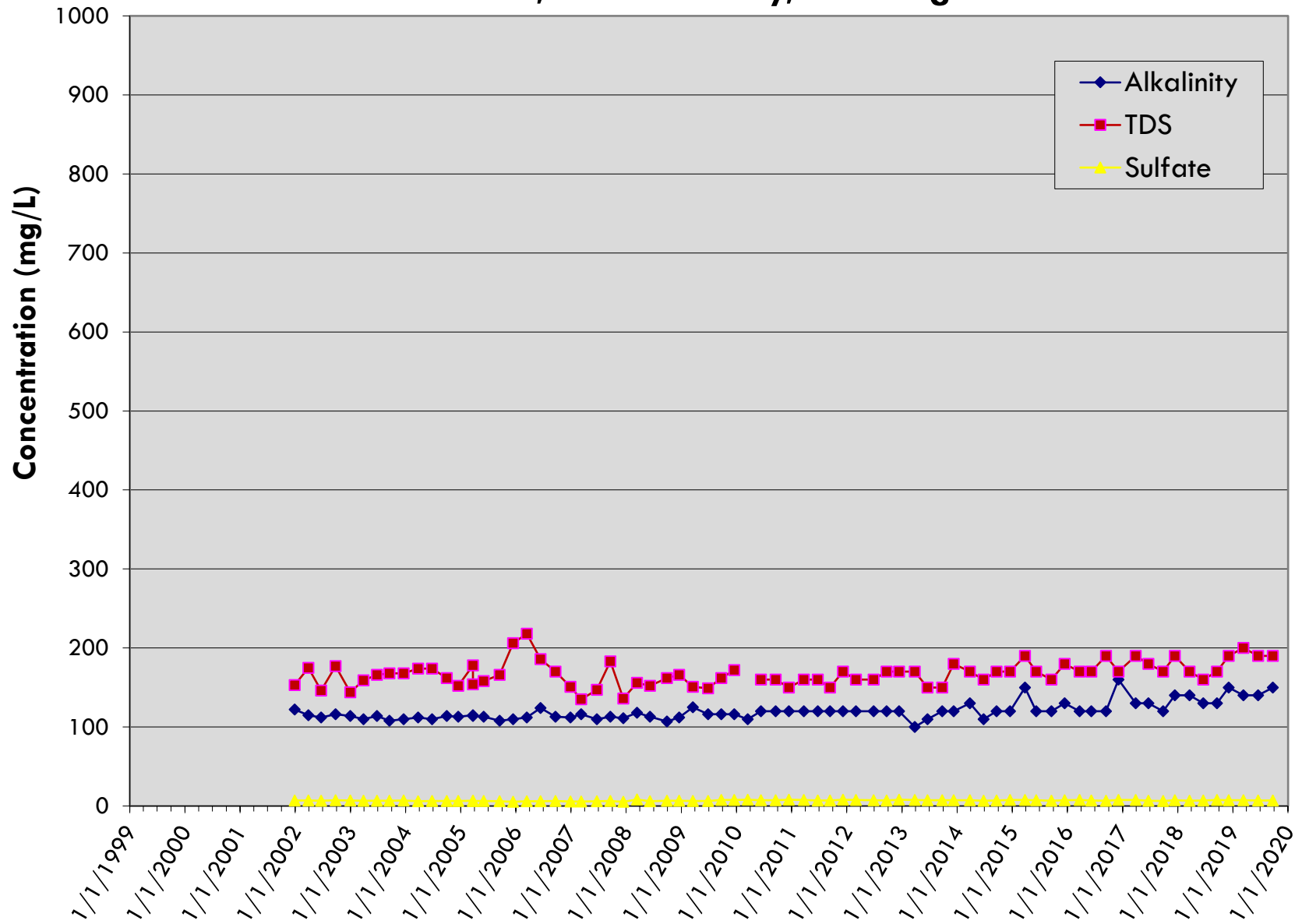
MW-4
LRI Landfill, Pierce County, Washington



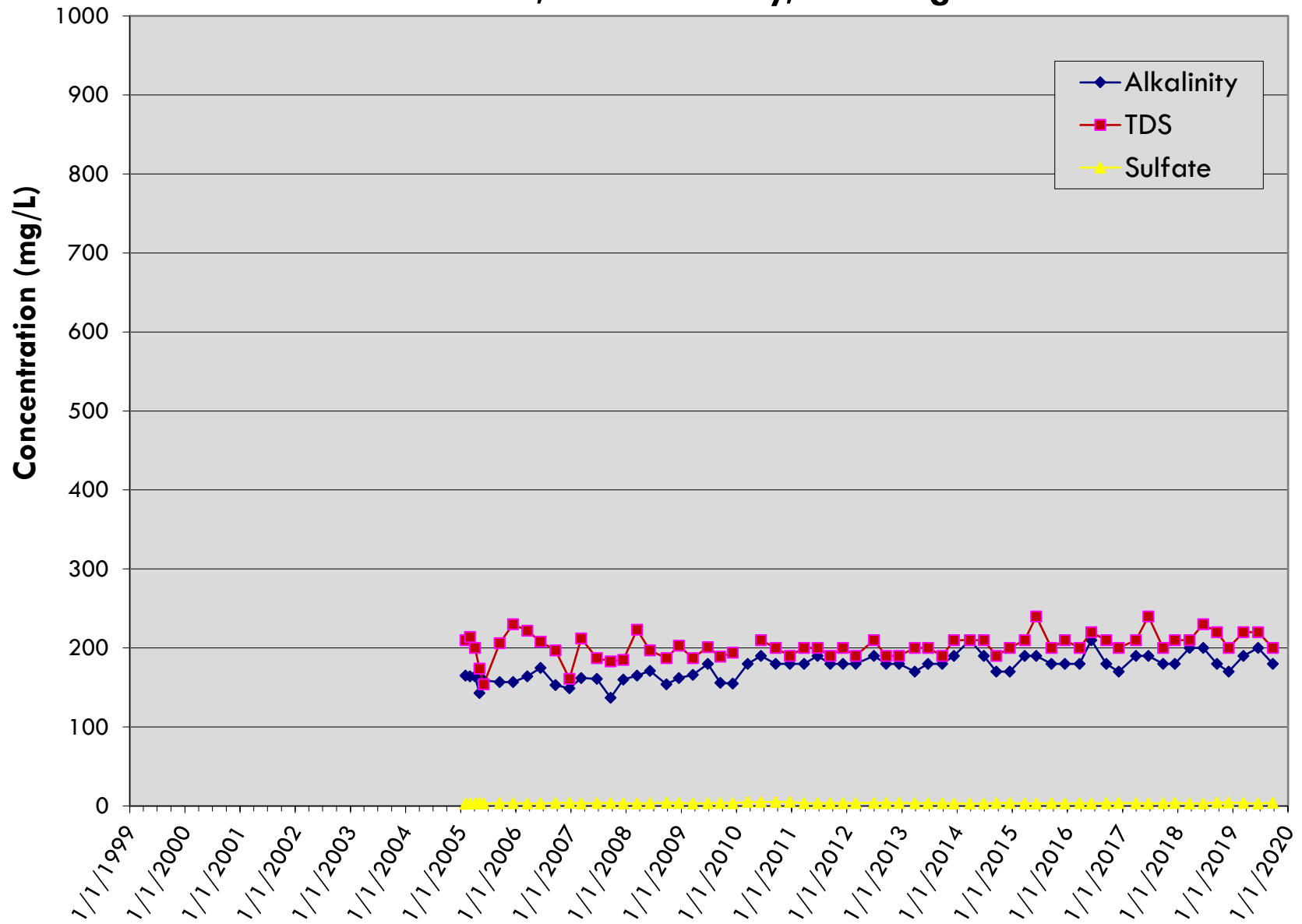
MW-5A
LRI Landfill, Pierce County, Washington



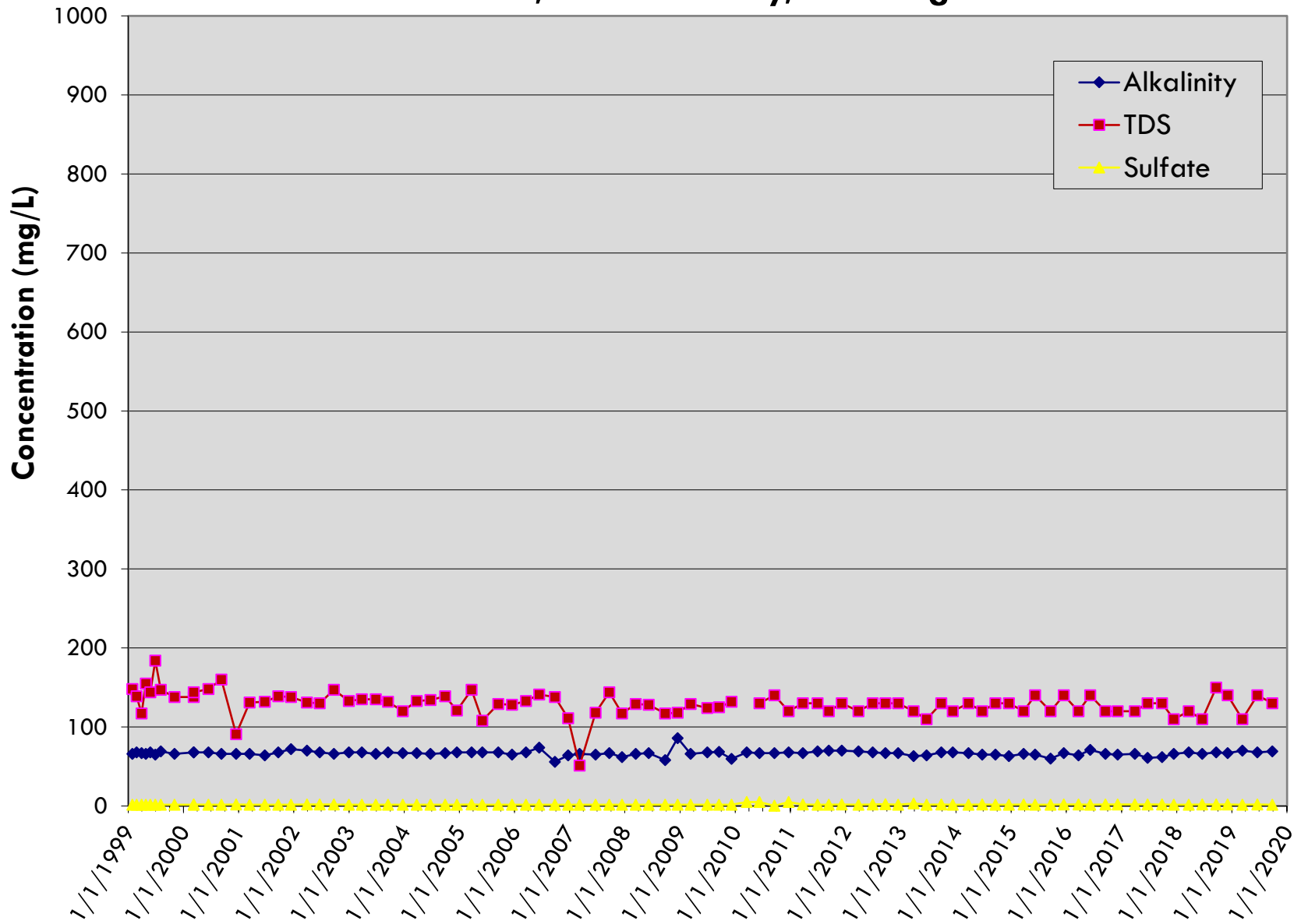
MW-6
LRI Landfill, Pierce County, Washington



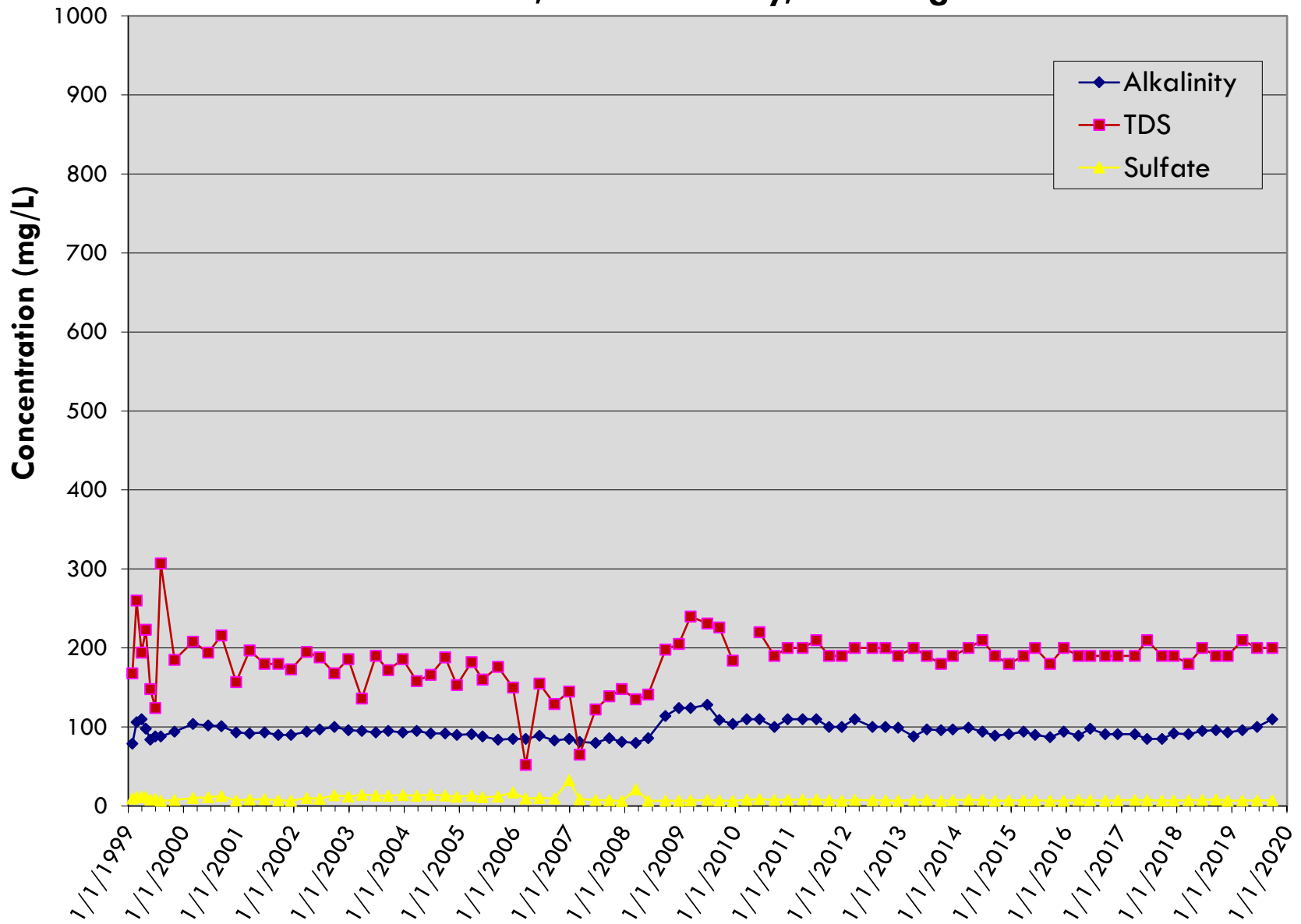
MW-7
LRI Landfill, Pierce County, Washington



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

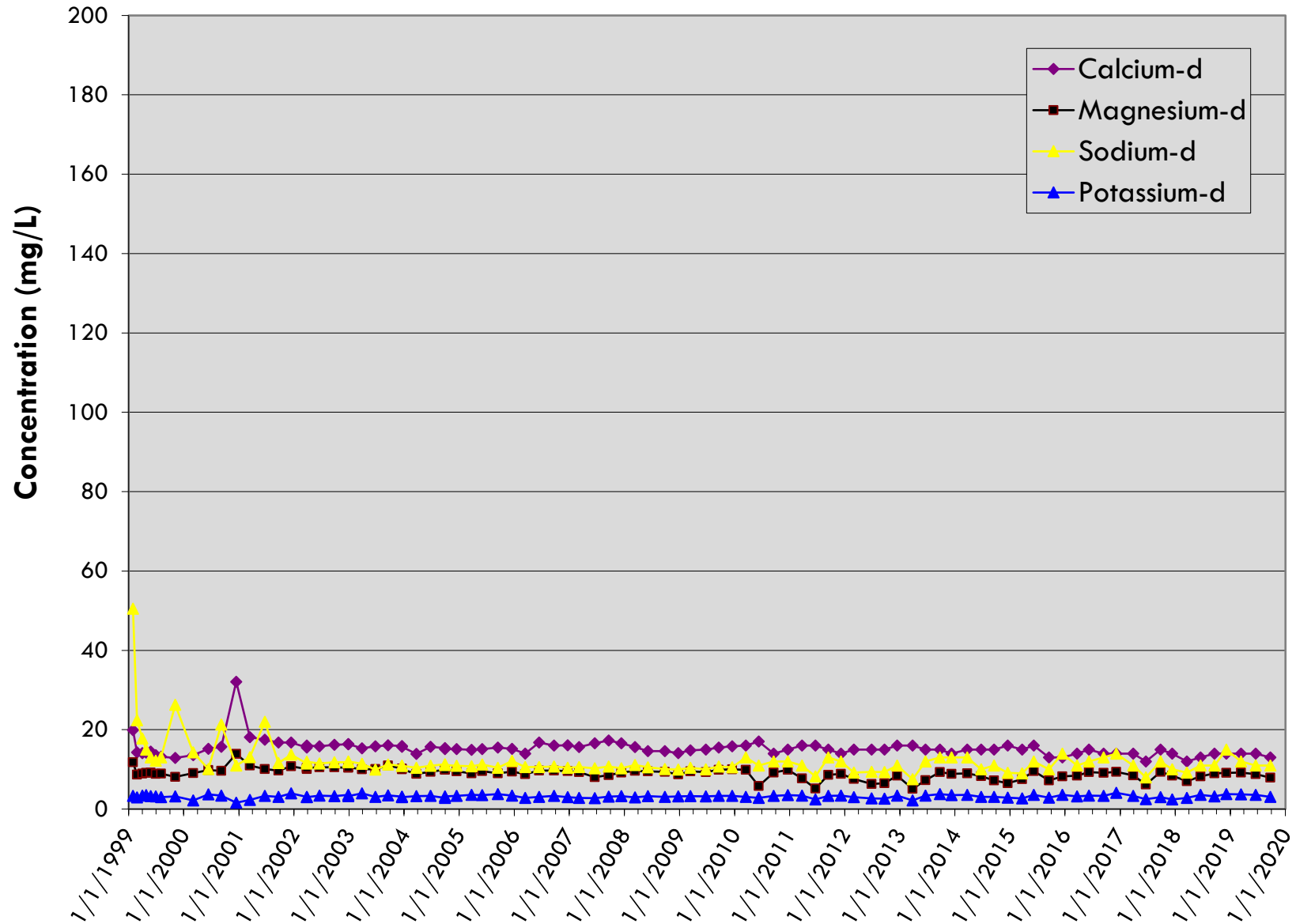


MW-10 (Background)
LRI Landfill, Pierce County, Washington

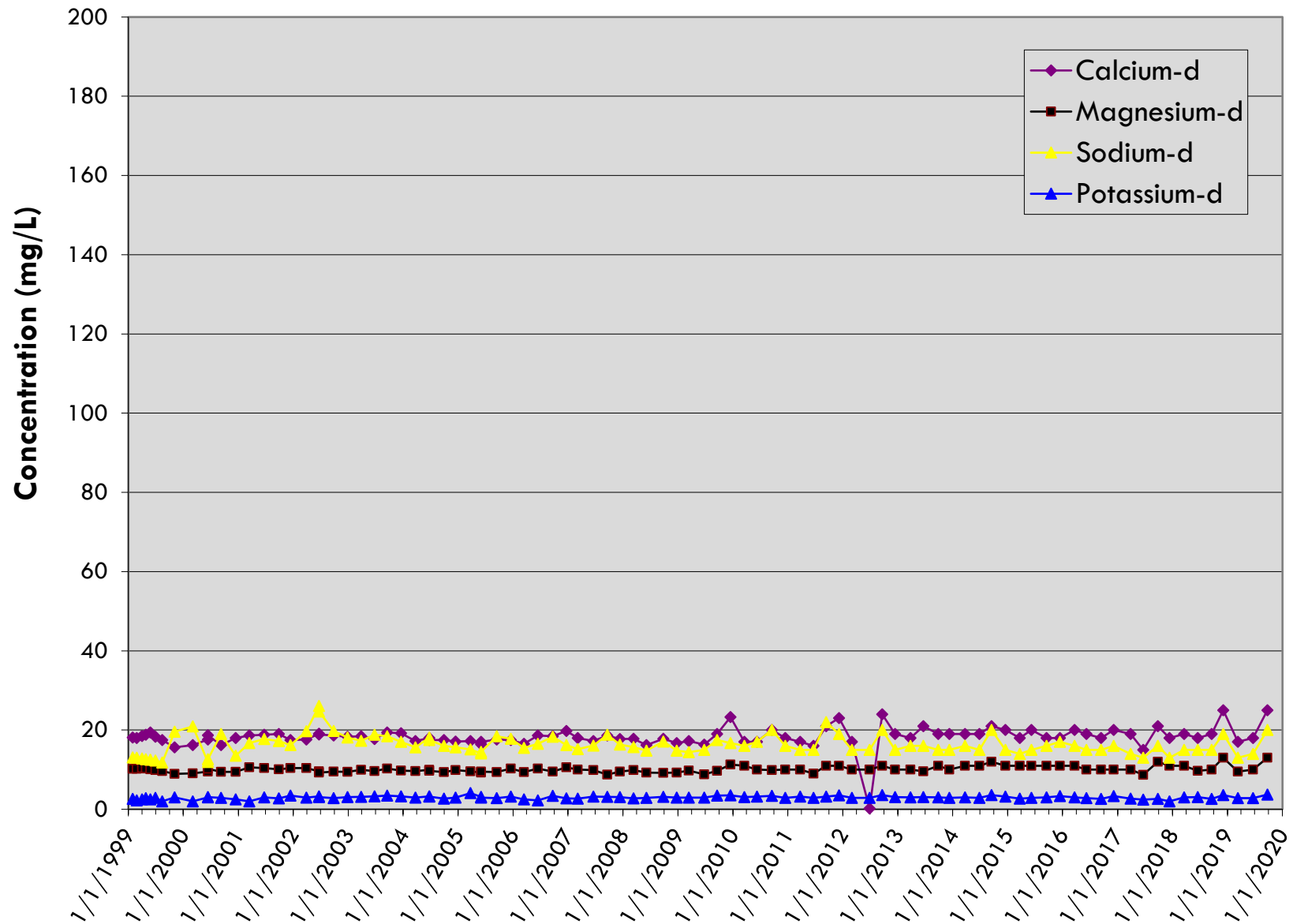


MW-1A

LRI Landfill, Pierce County, Washington

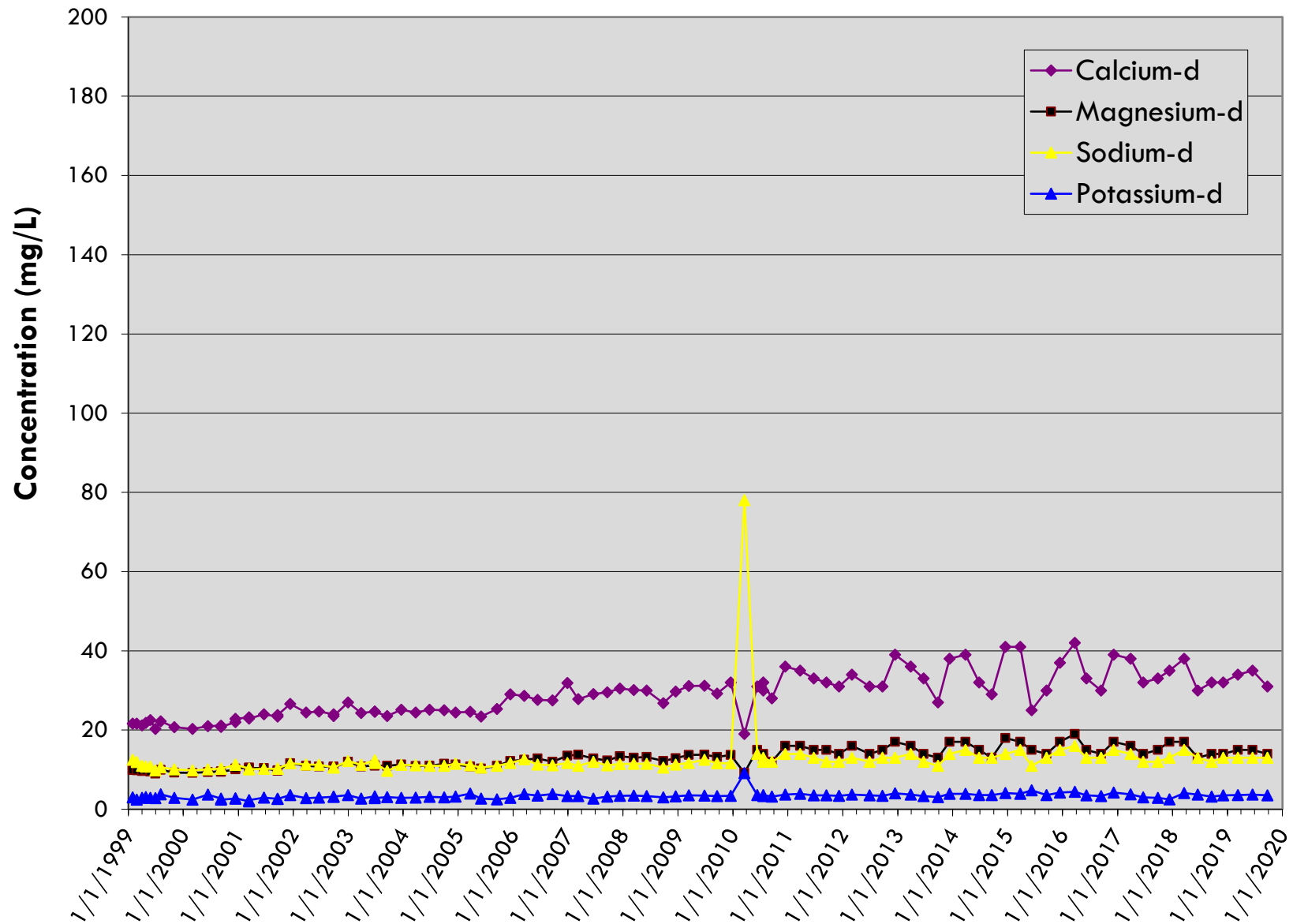


MW-2A
LRI Landfill, Pierce County, Washington



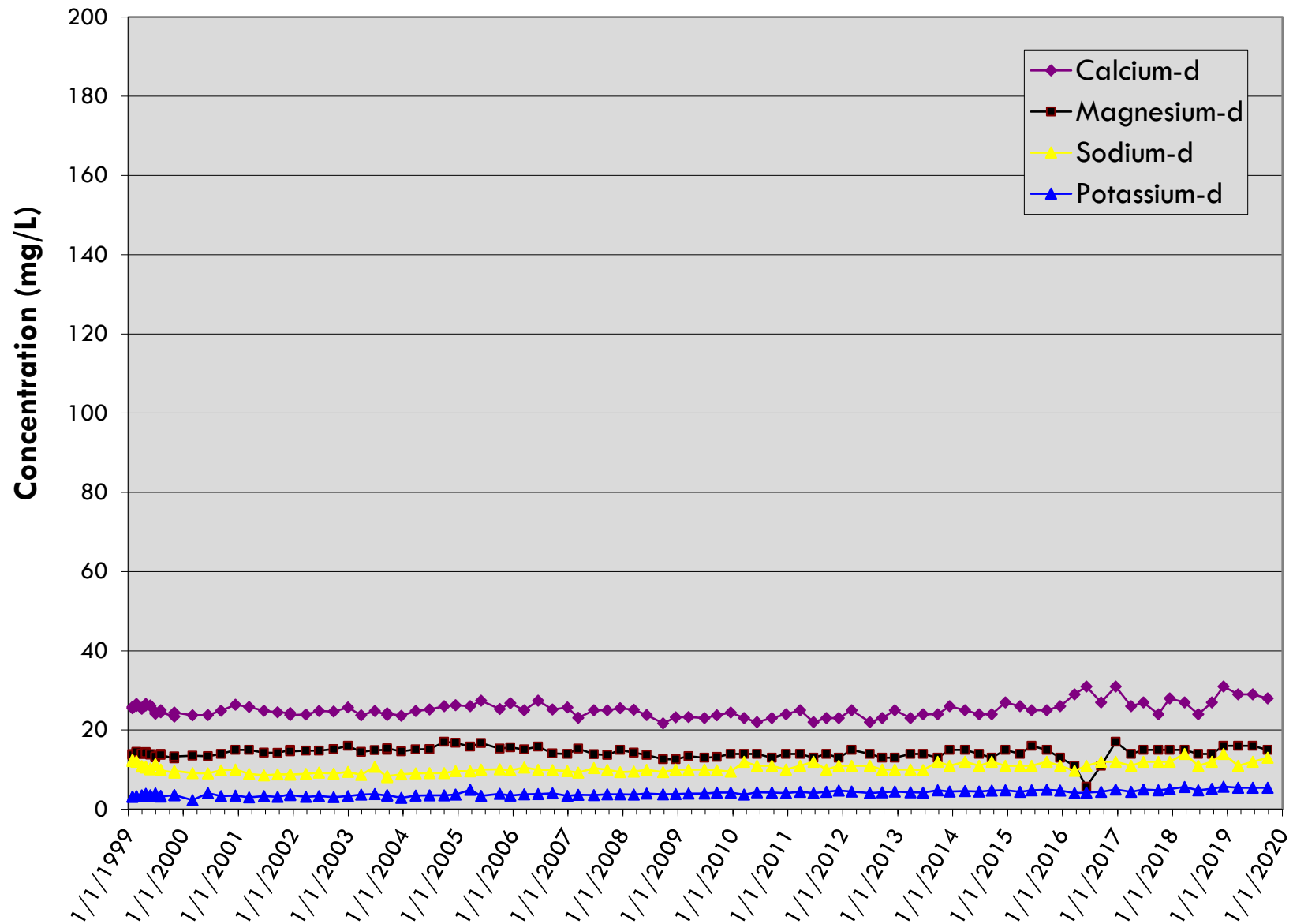
MW-3

LRI Landfill, Pierce County, Washington



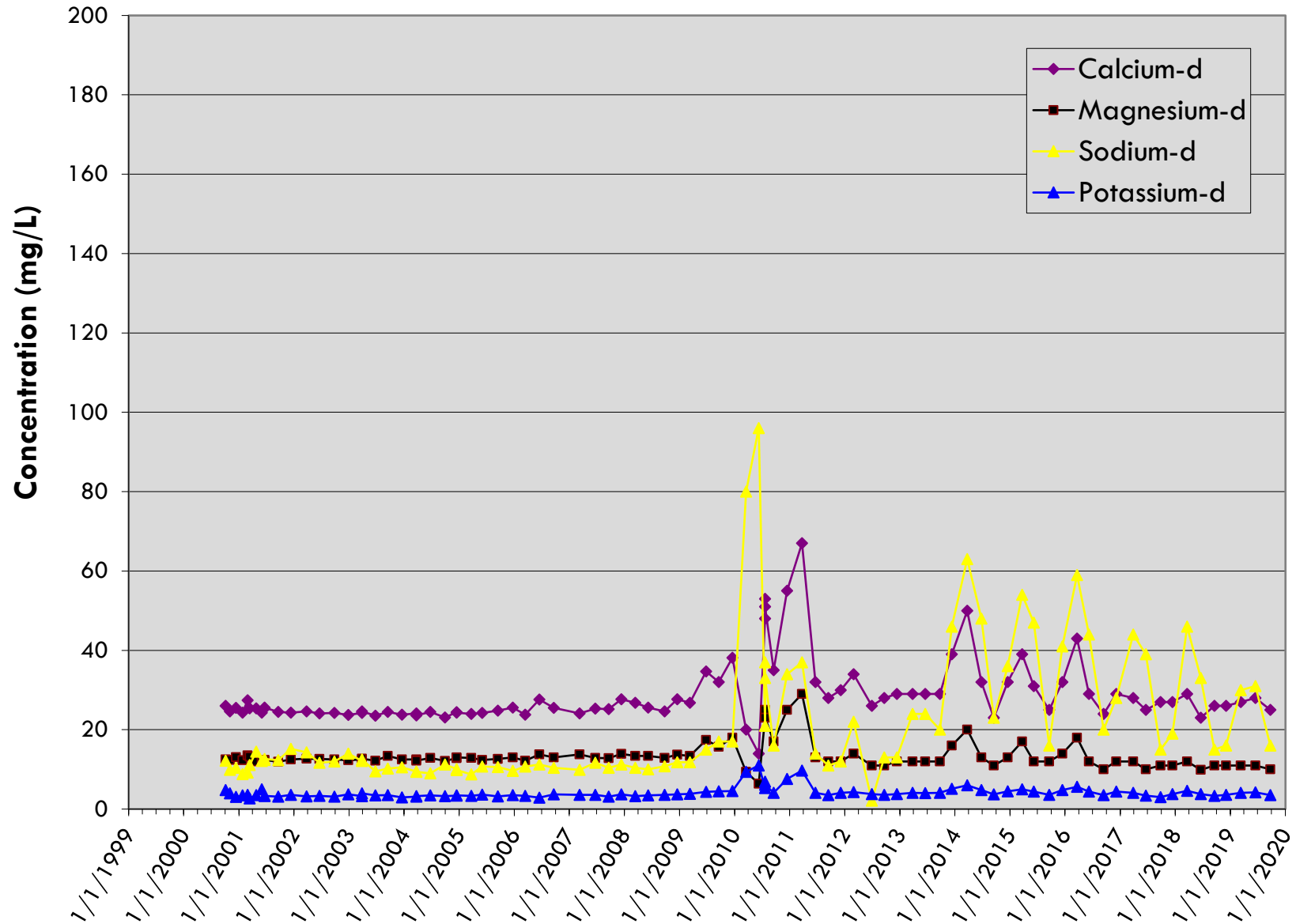
MW-4

LRI Landfill, Pierce County, Washington



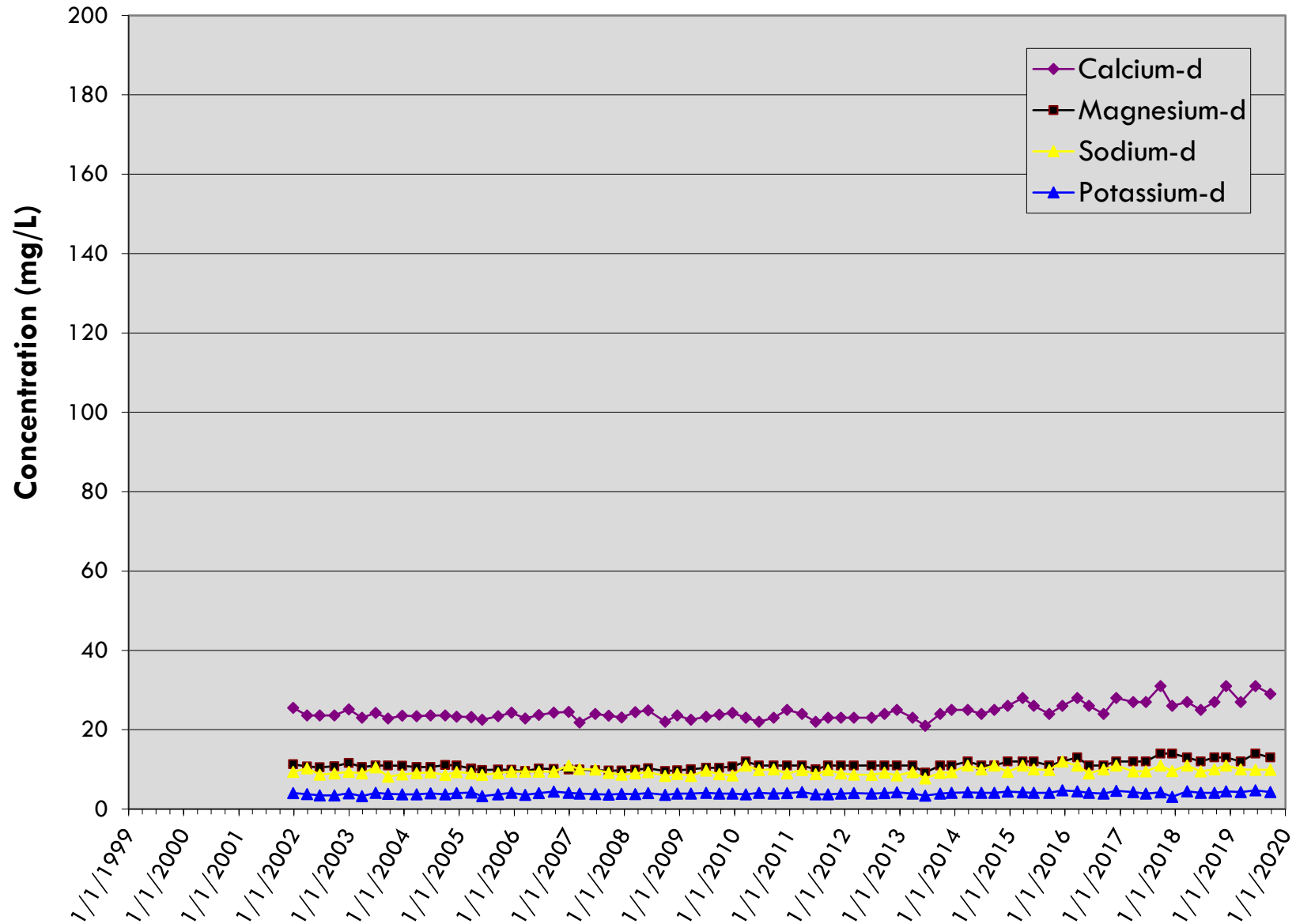
MW-5A

LRI Landfill, Pierce County, Washington

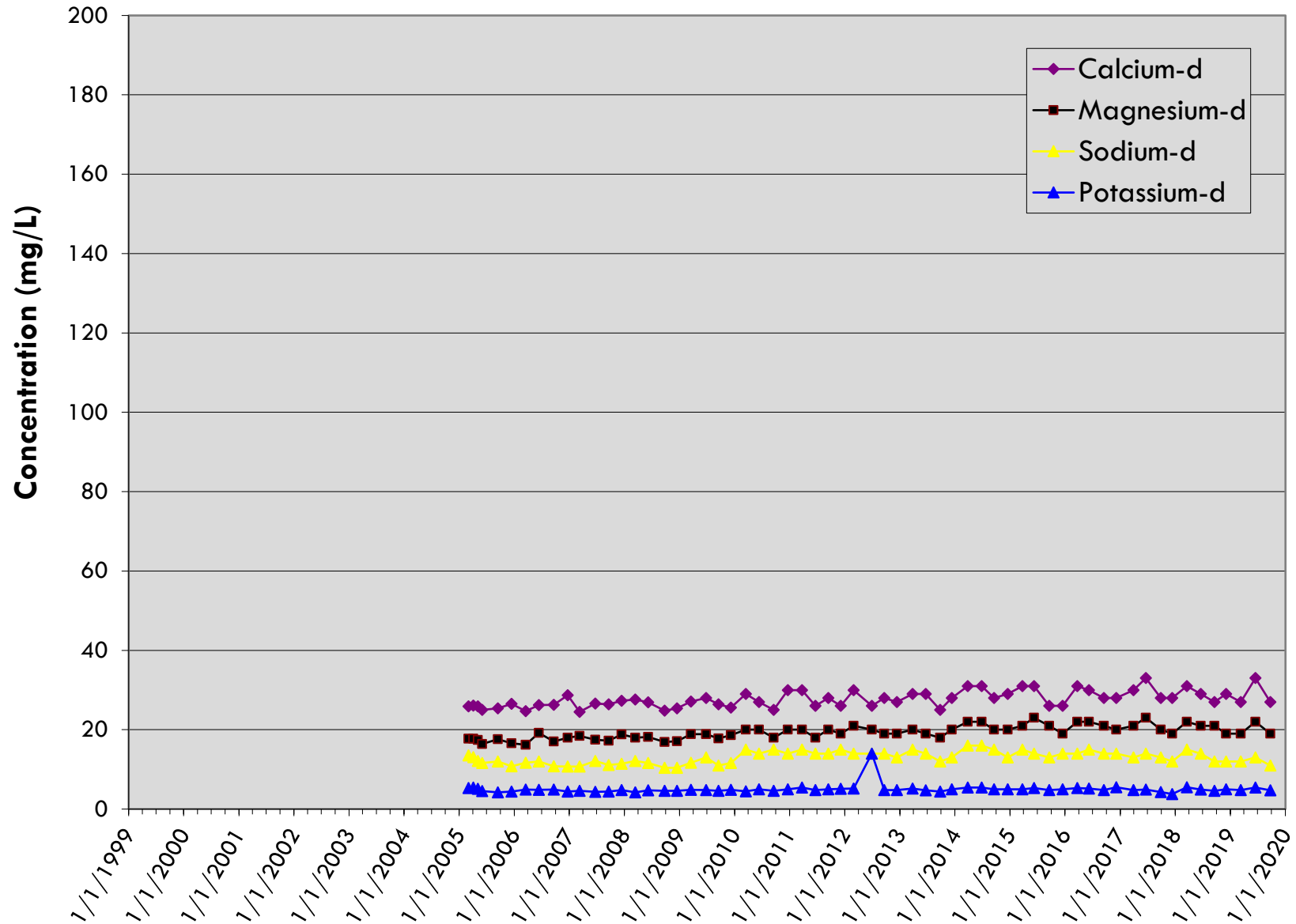


MW-6

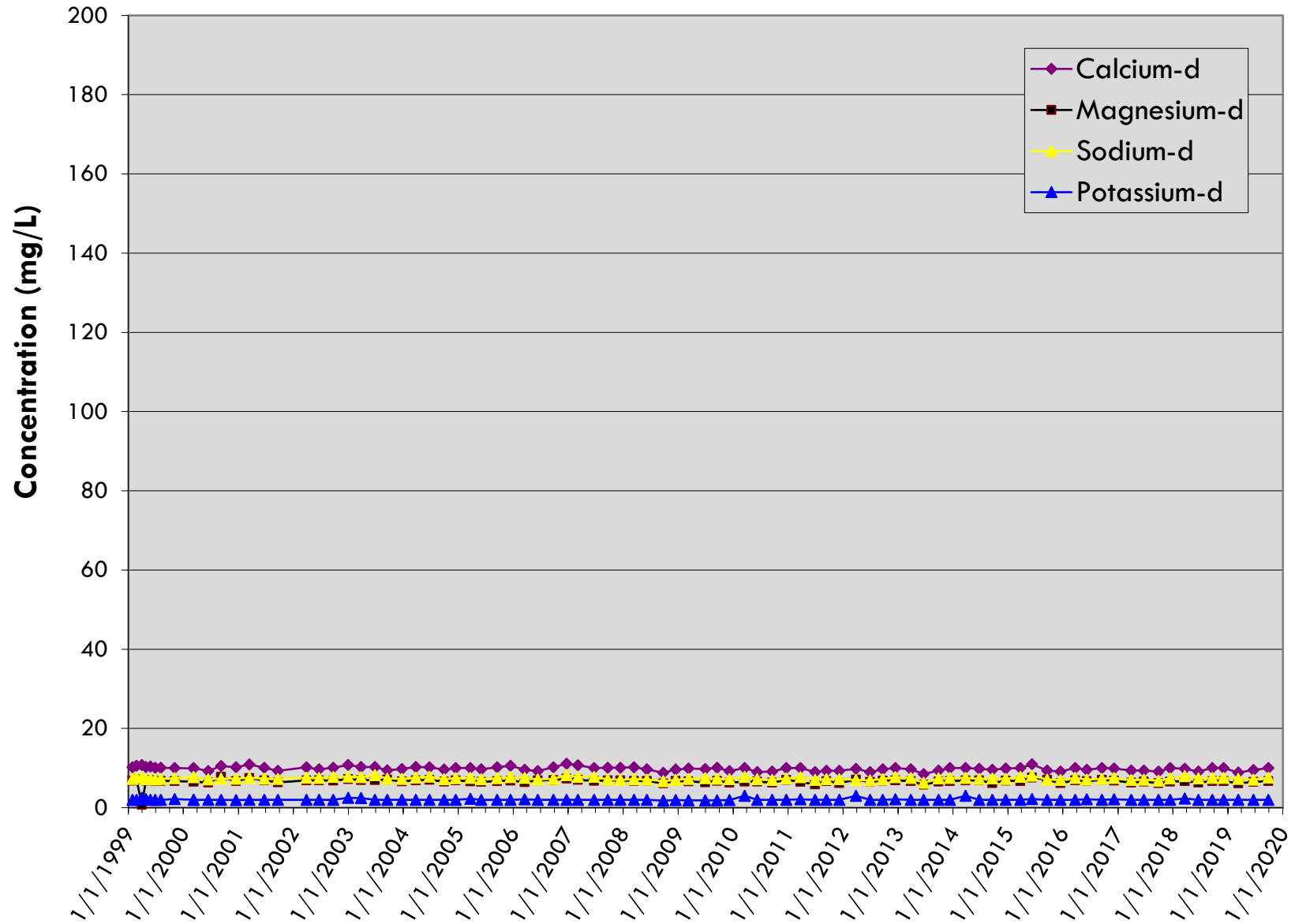
LRI Landfill, Pierce County, Washington



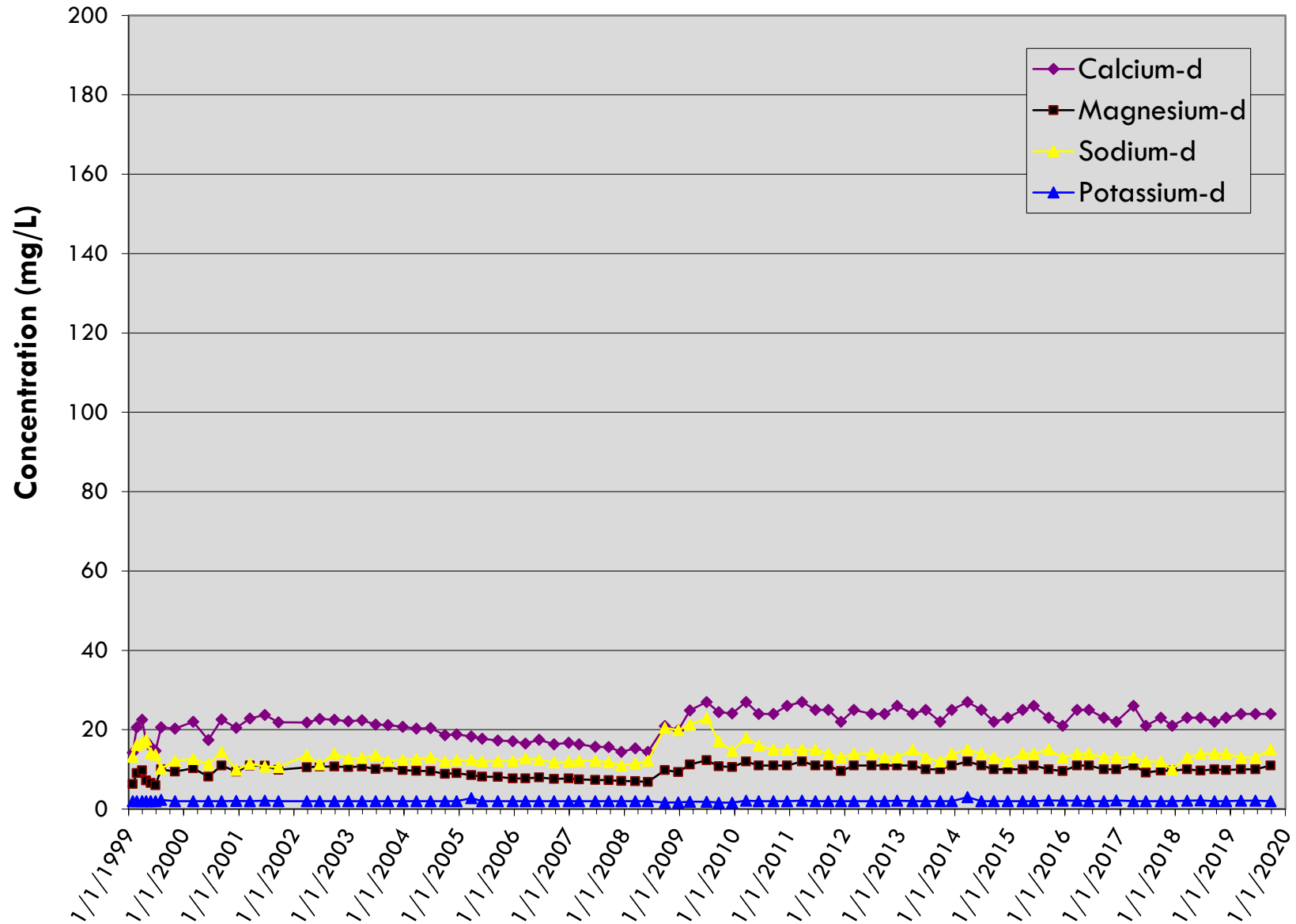
MW-7
LRI Landfill, Pierce County, Washington



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

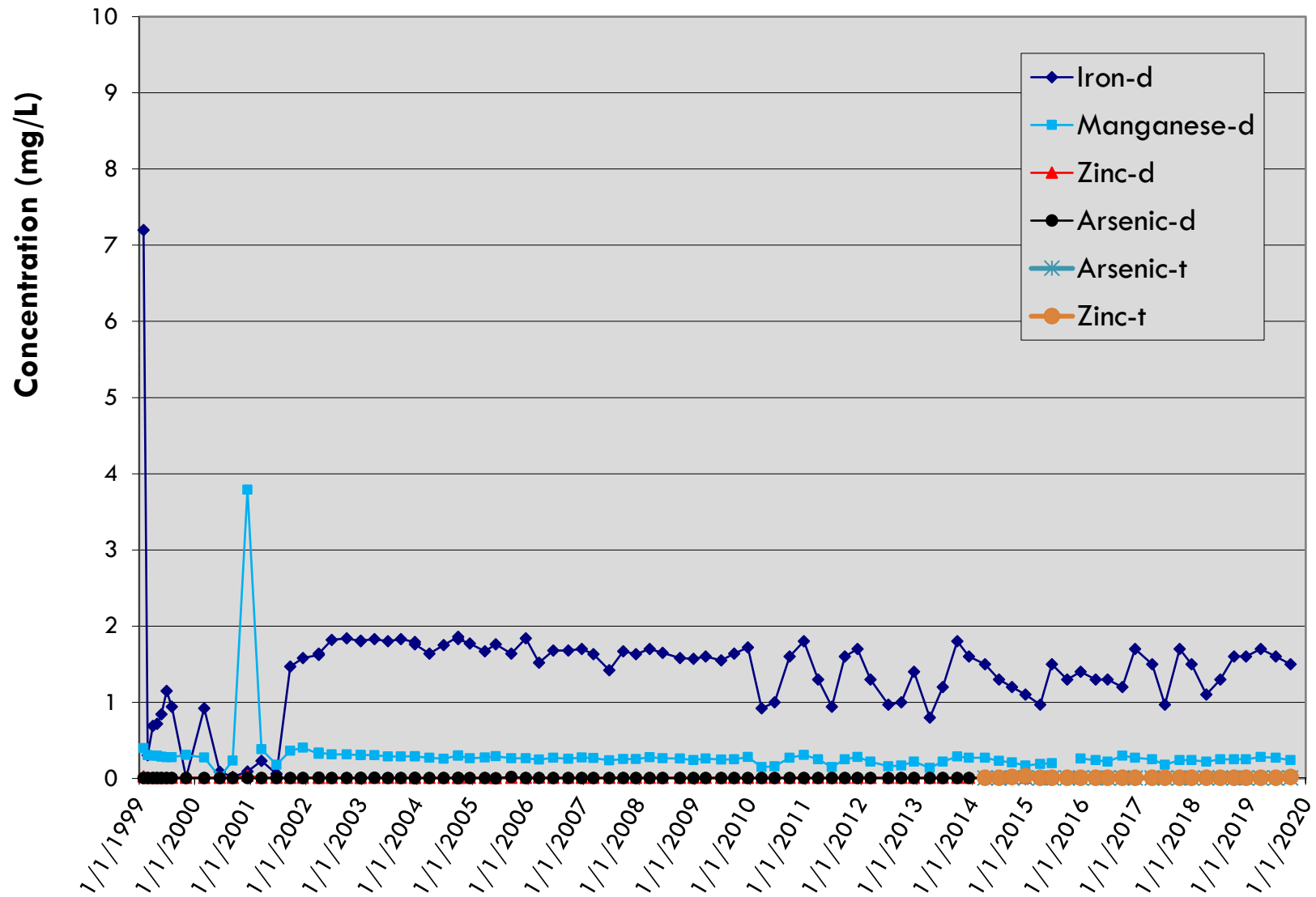


MW-10 (Background)
LRI Landfill, Pierce County, Washington



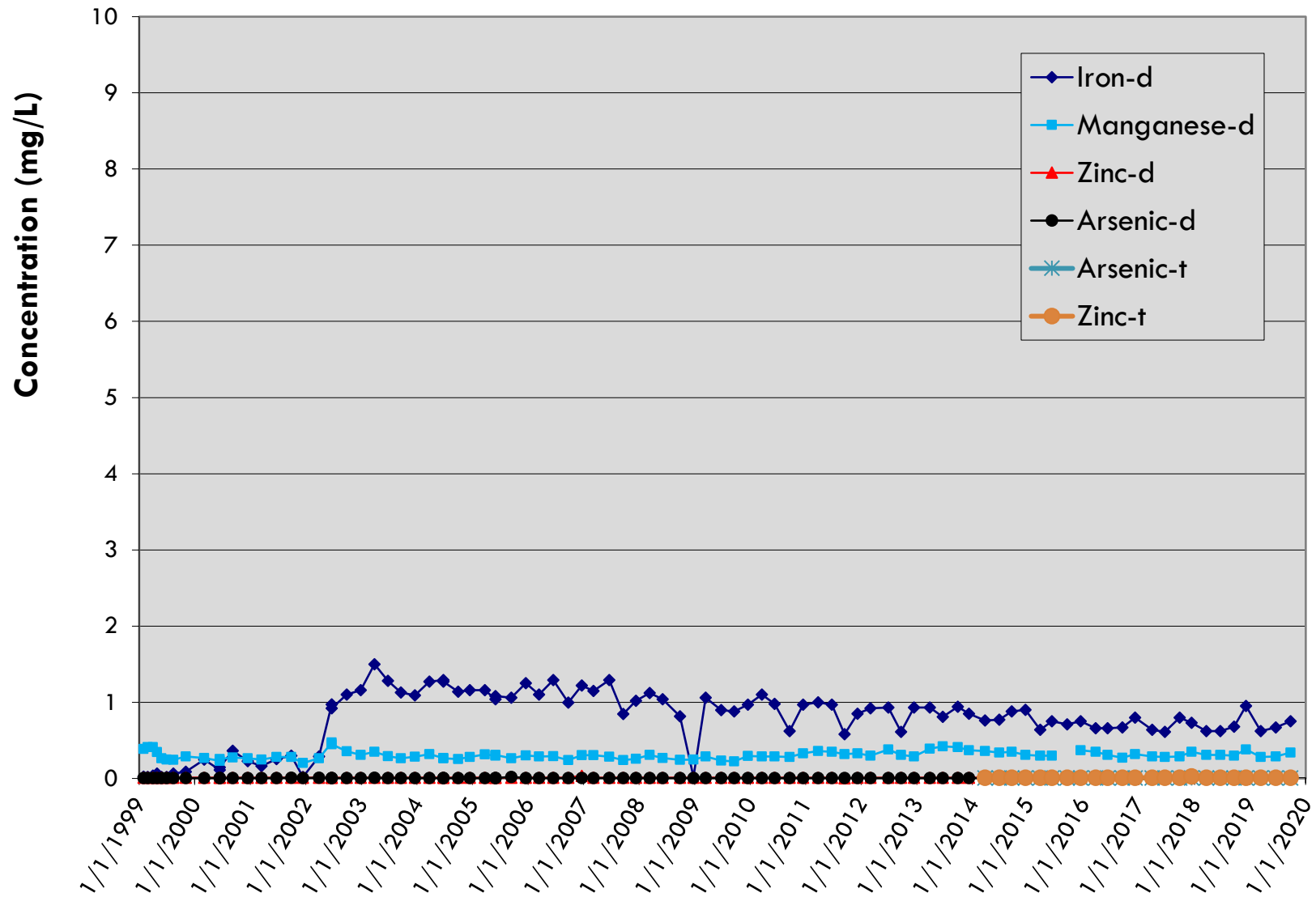
MW-1A

LRI Landfill, Pierce County, Washington



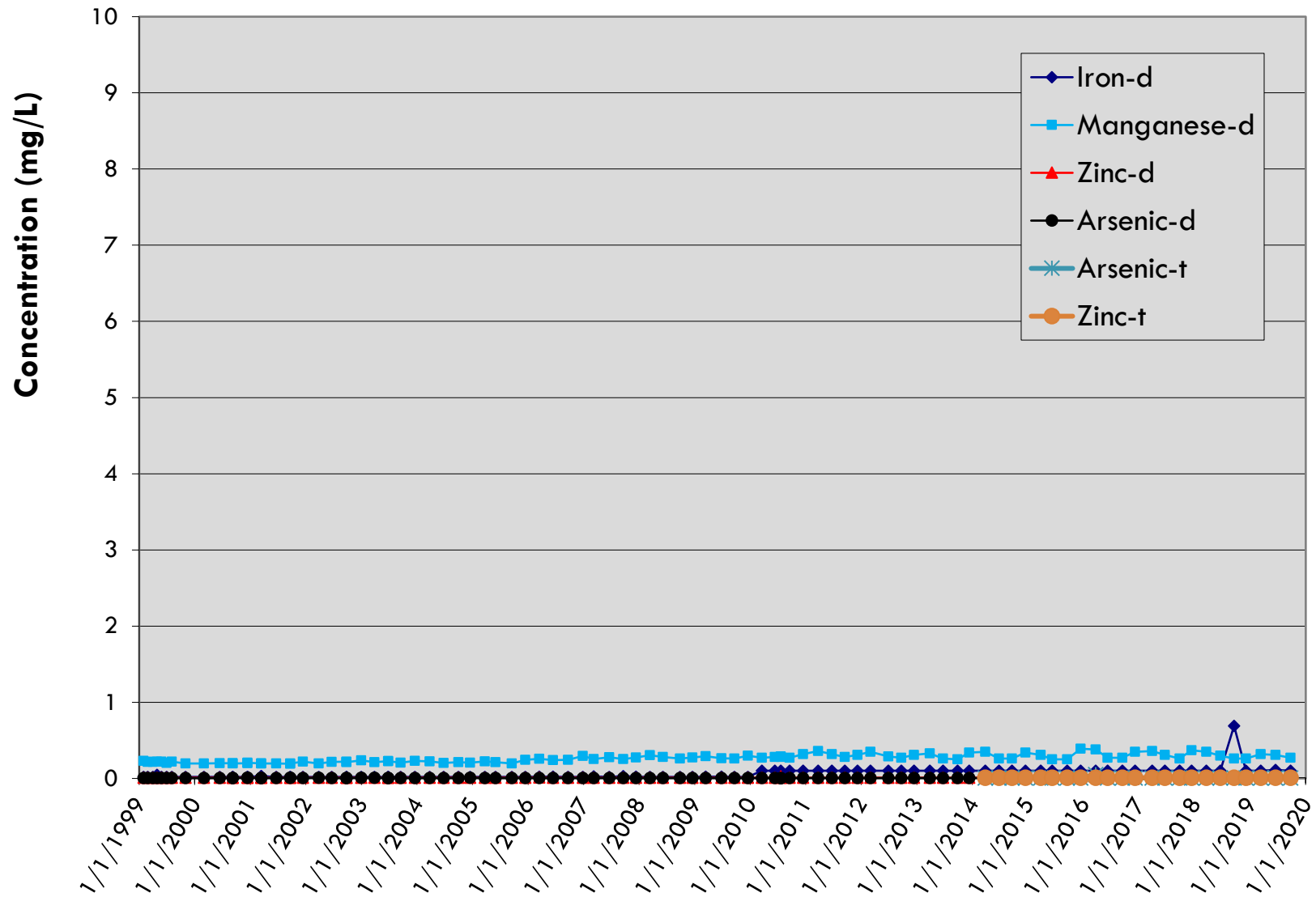
MW-2A

LRI Landfill, Pierce County, Washington



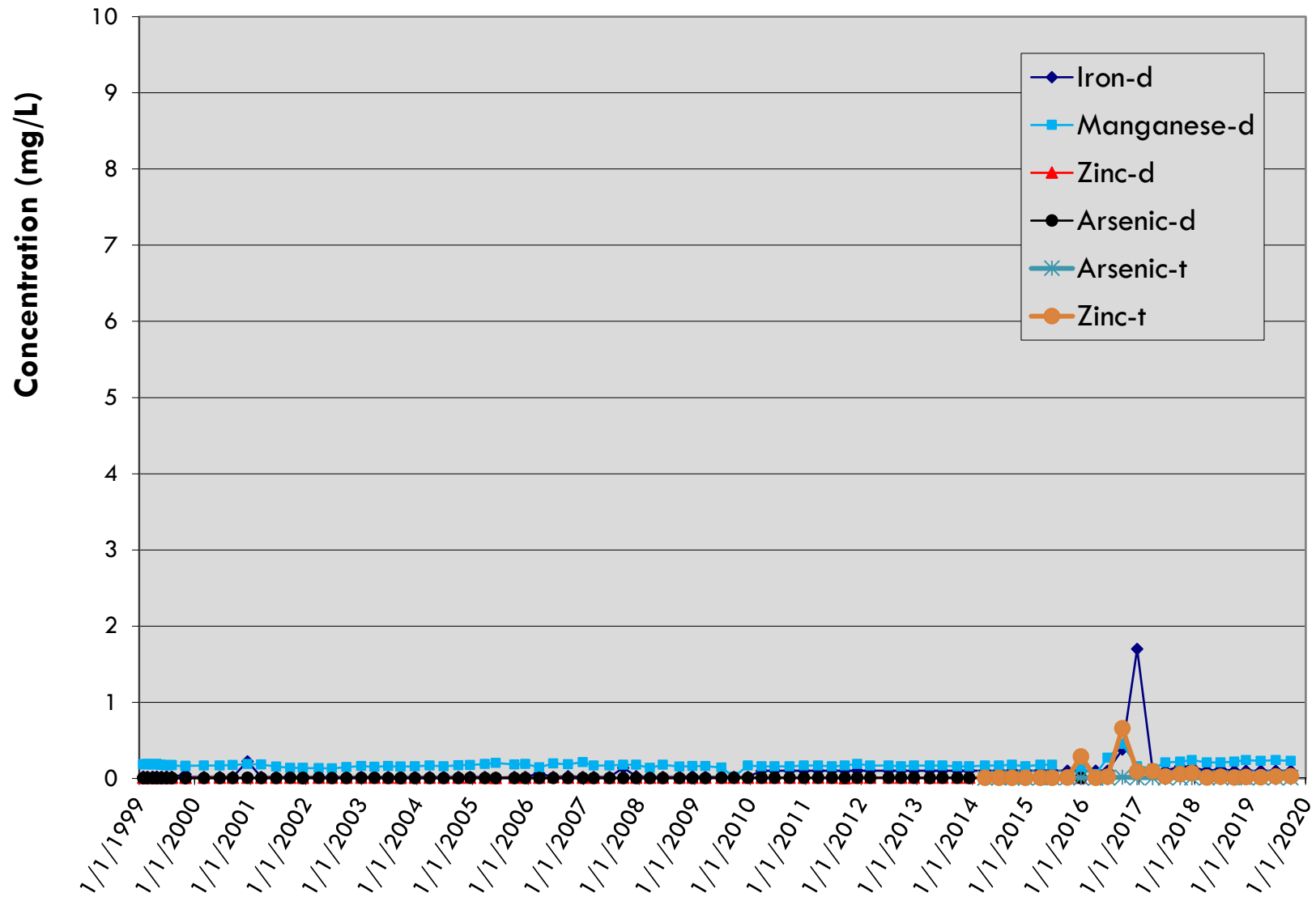
MW-3

LRI Landfill, Pierce County, Washington



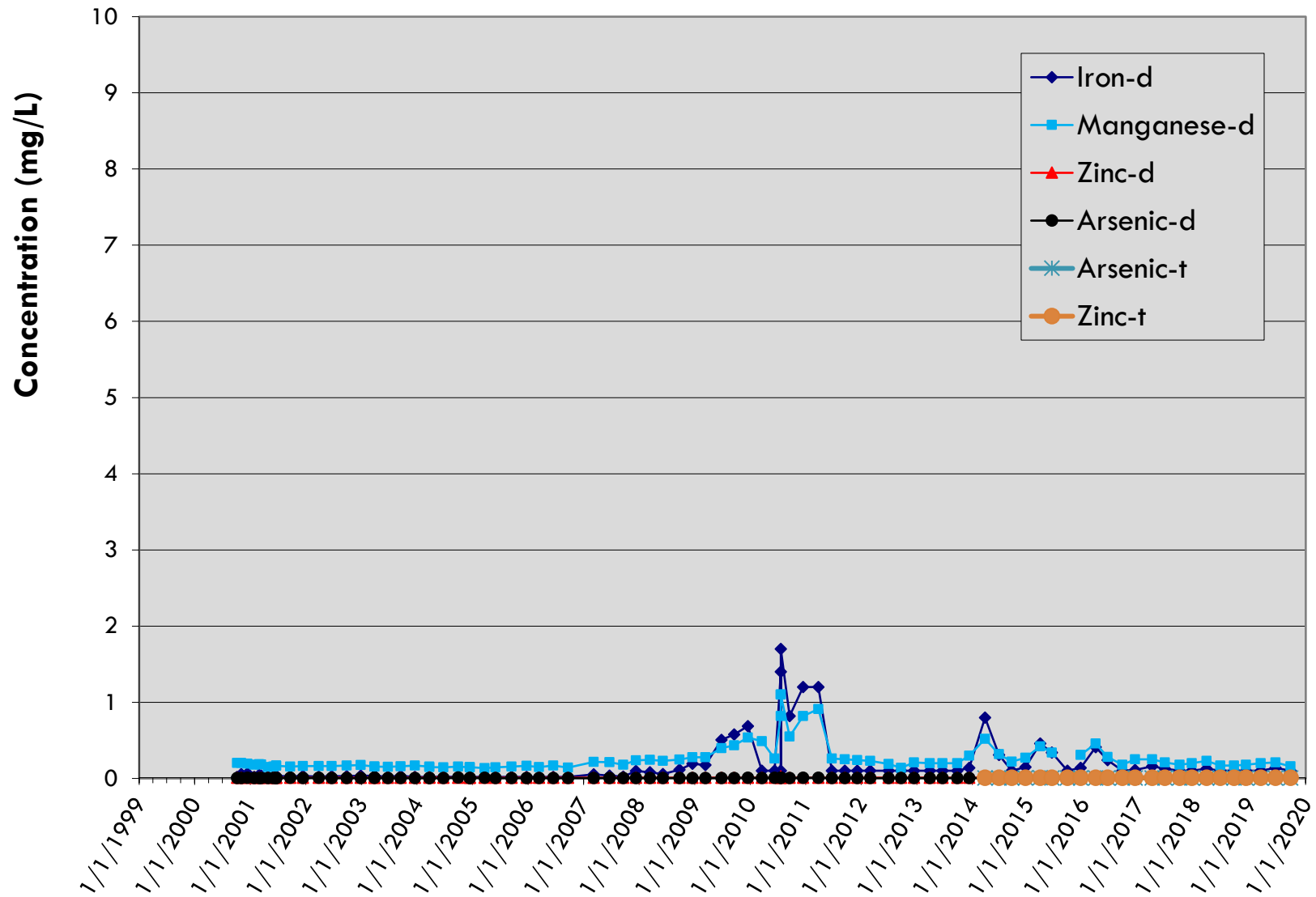
MW-4

LRI Landfill, Pierce County, Washington



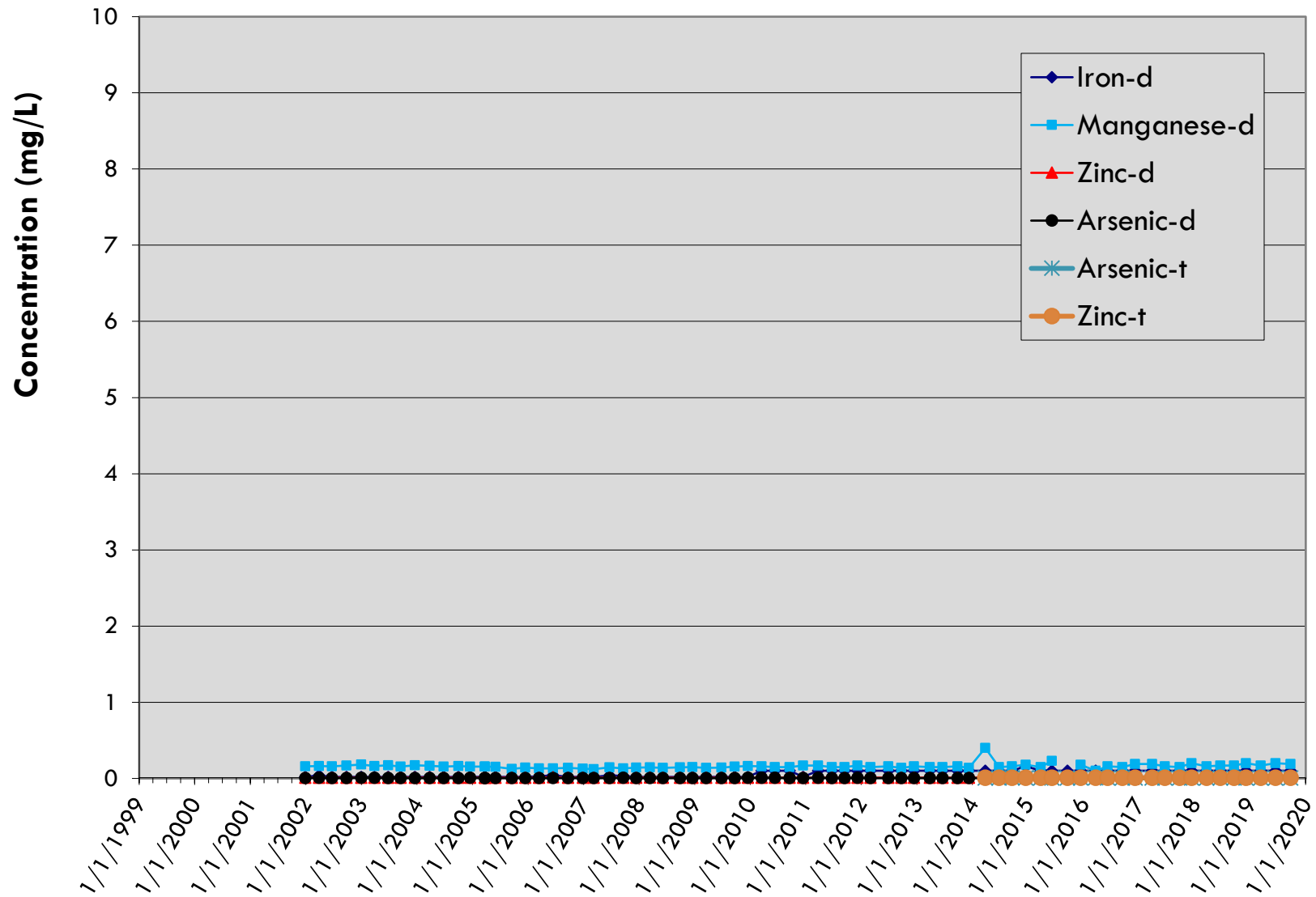
MW-5A

LRI Landfill, Pierce County, Washington

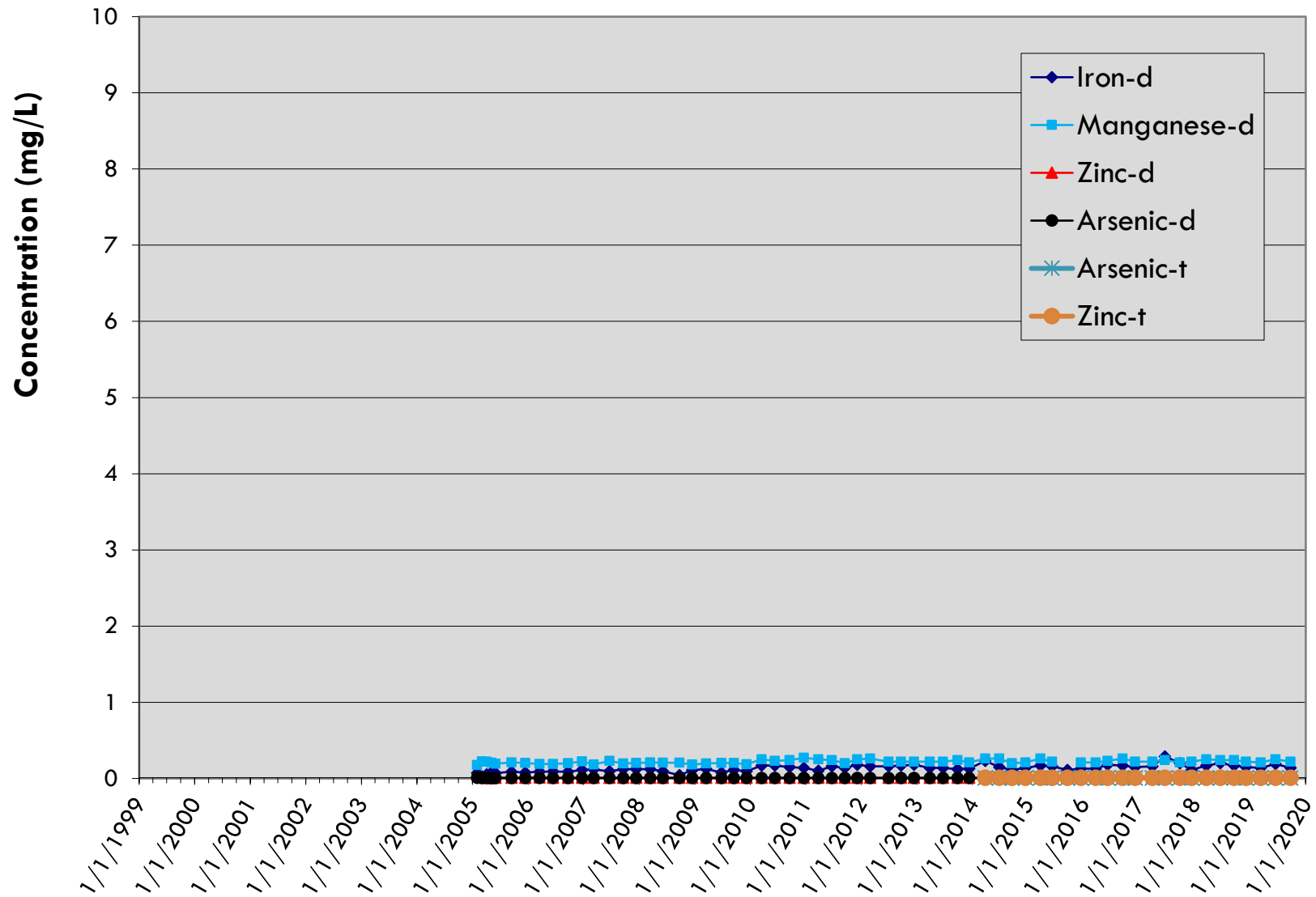


MW-6

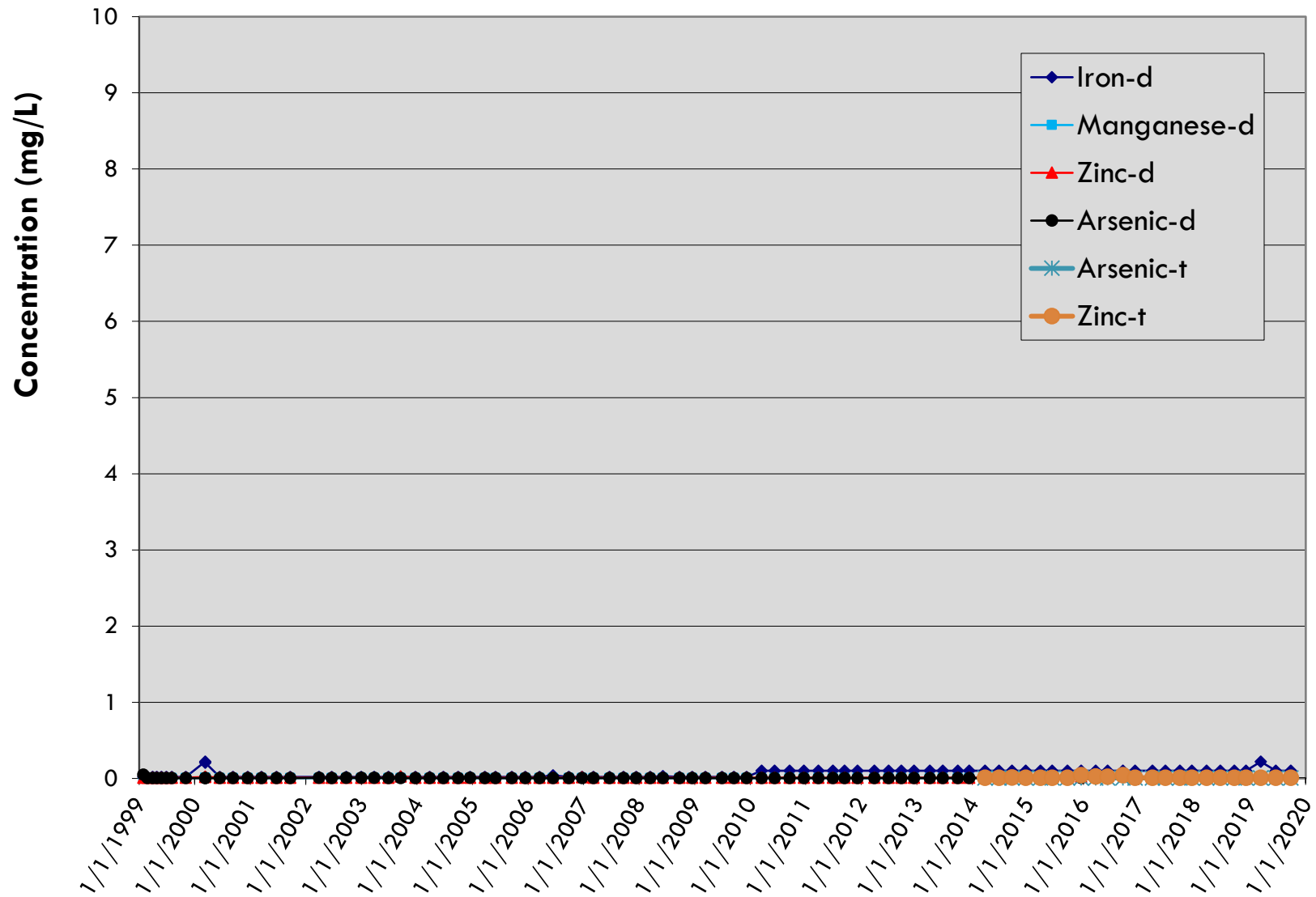
LRI Landfill, Pierce County, Washington



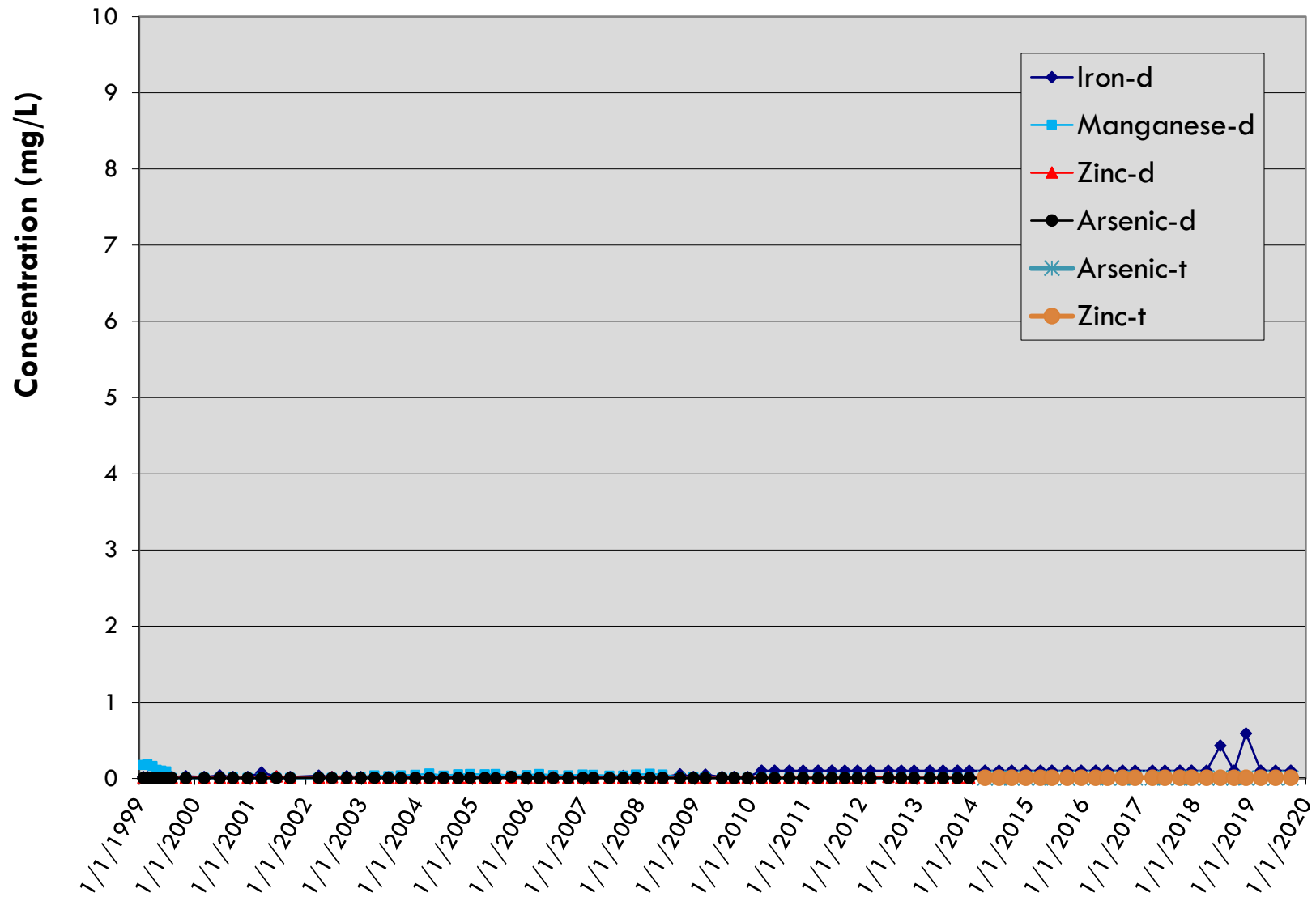
MW-7
LRI Landfill, Pierce County, Washington



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

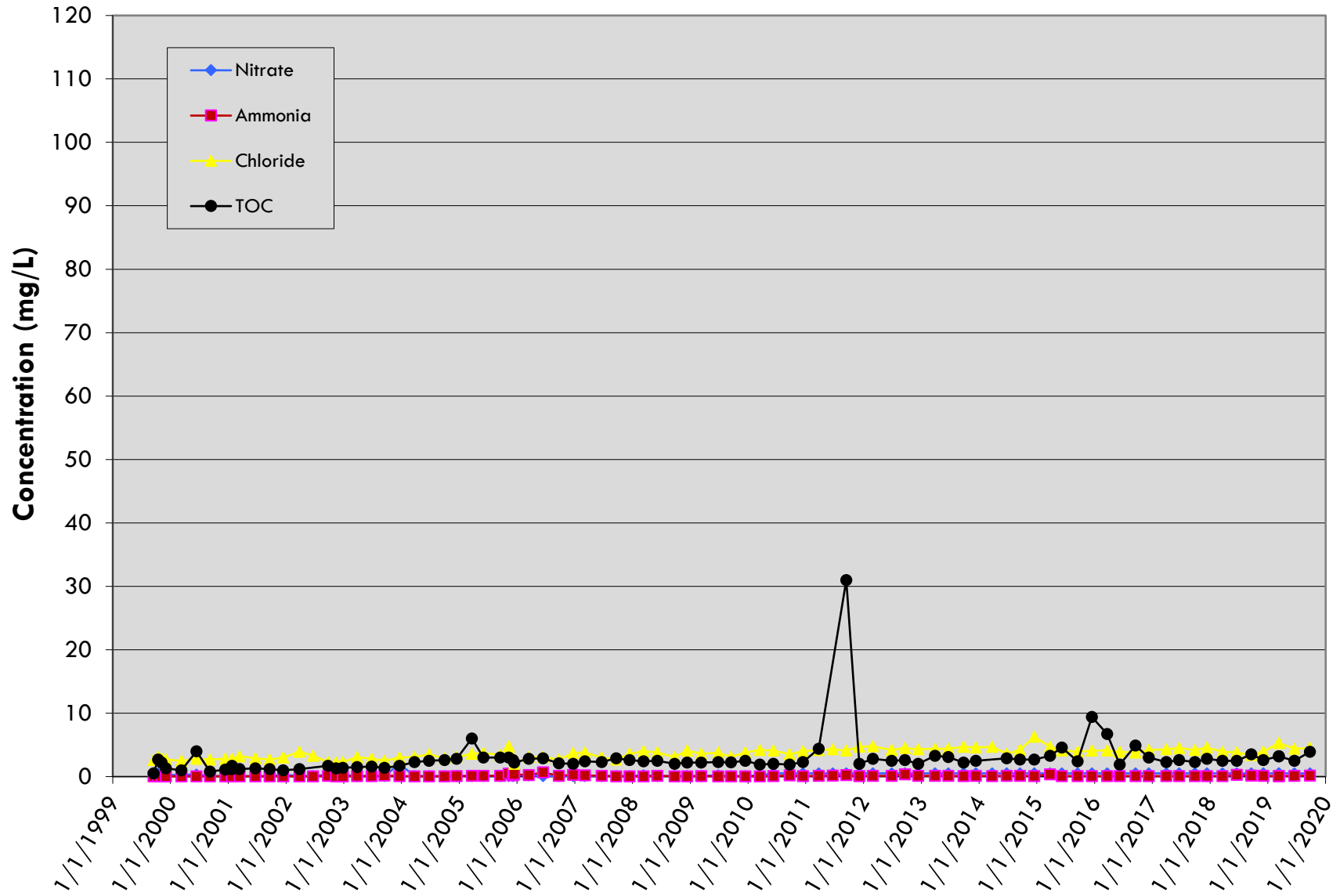


MW-10 (Background)
LRI Landfill, Pierce County, Washington



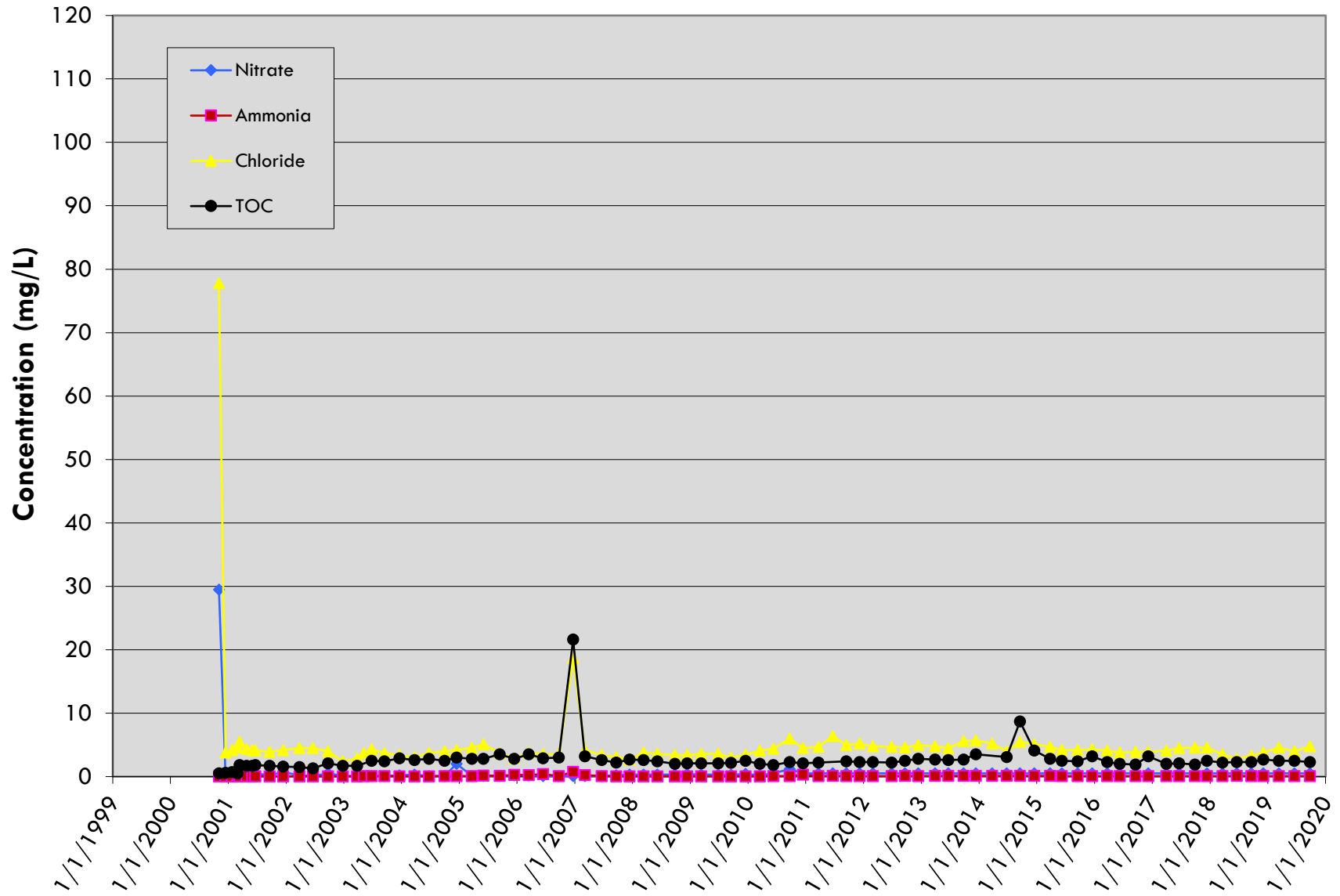
LDCS-1

LRI Landfill, Pierce County, Washington



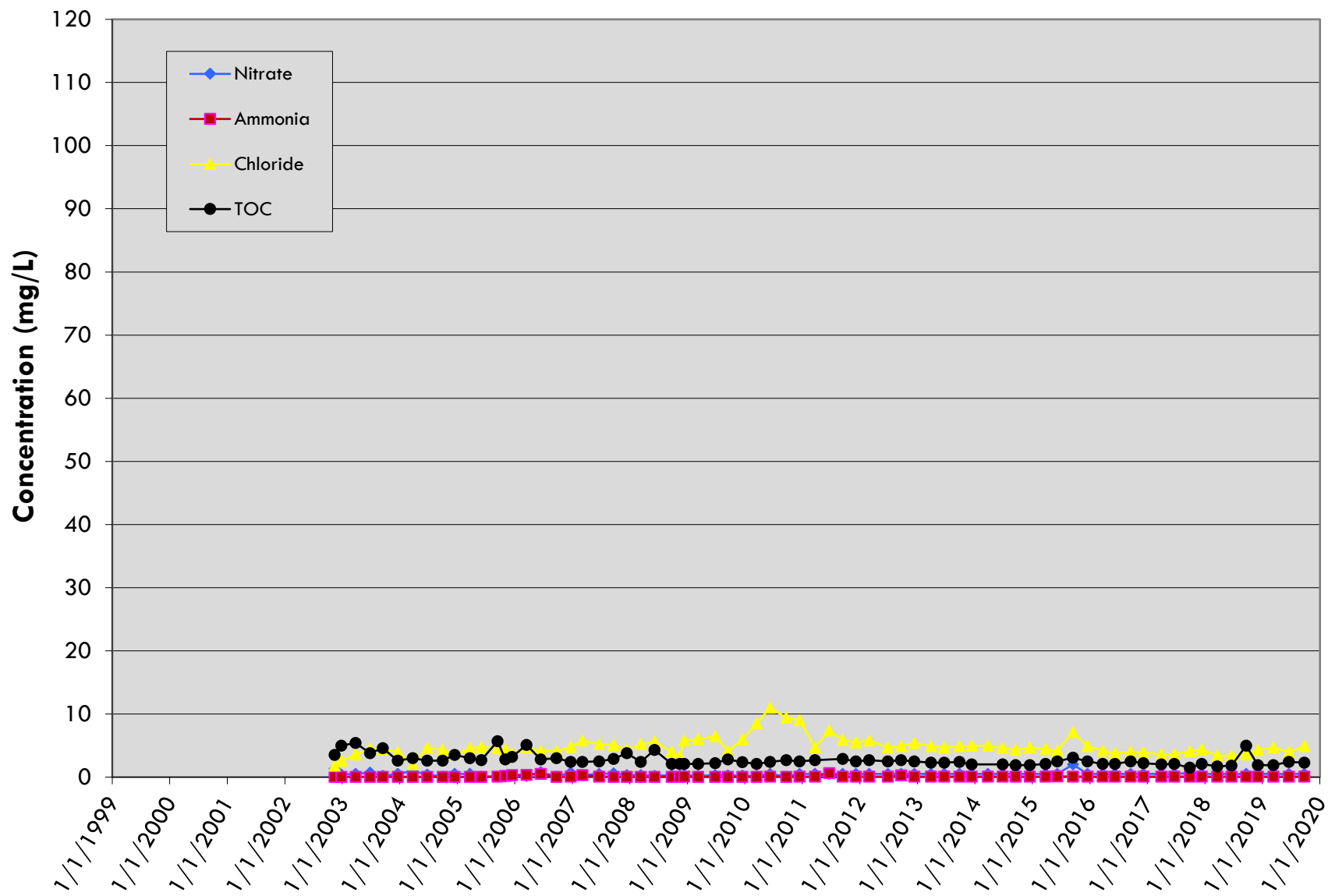
LDCS-2A

LRI Landfill, Pierce County, Washington



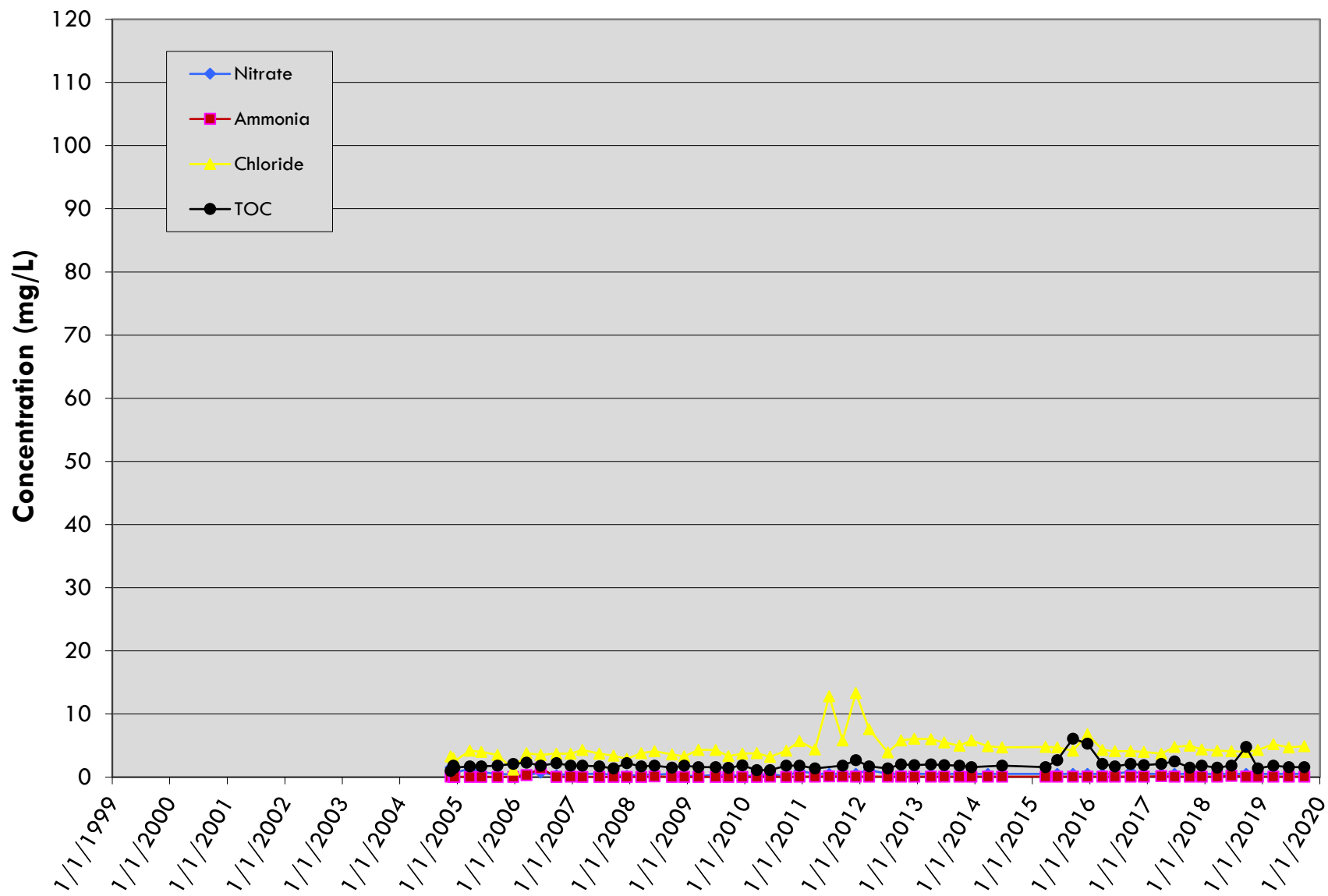
LDCS-2B

LRI Landfill, Pierce County, Washington



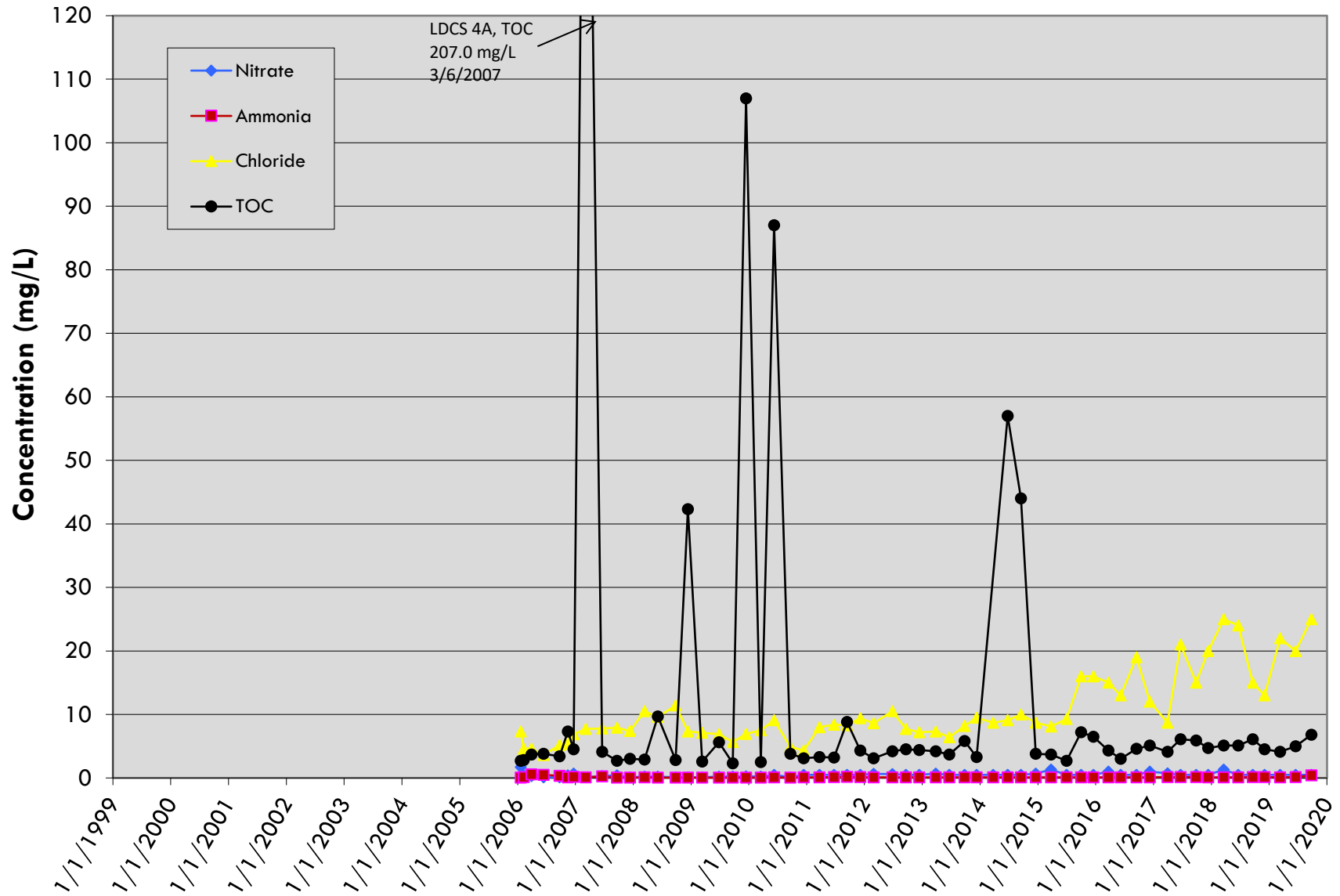
LDCS-3A

LRI Landfill, Pierce County, Washington



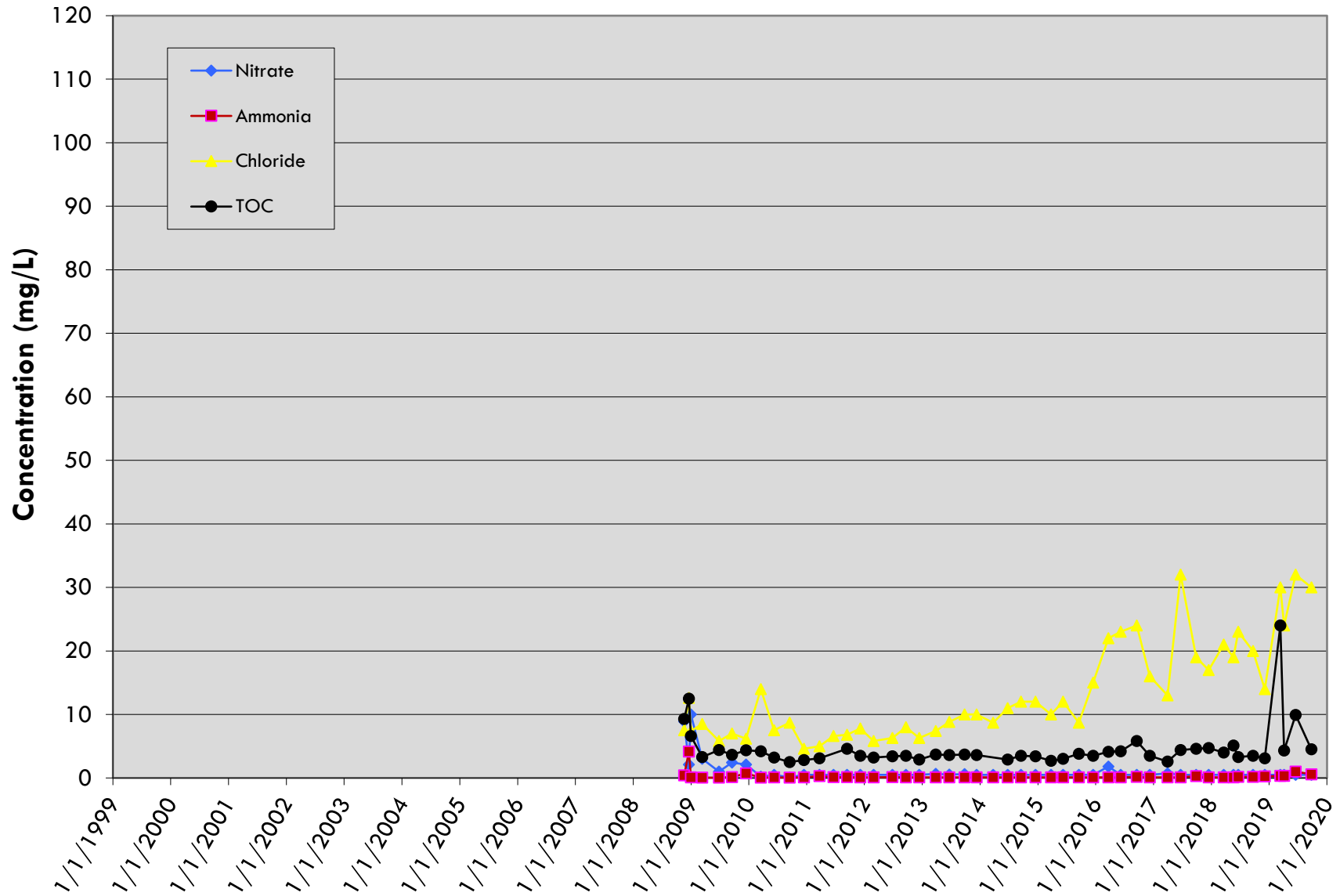
LDCS-4A

LRI Landfill, Pierce County, Washington



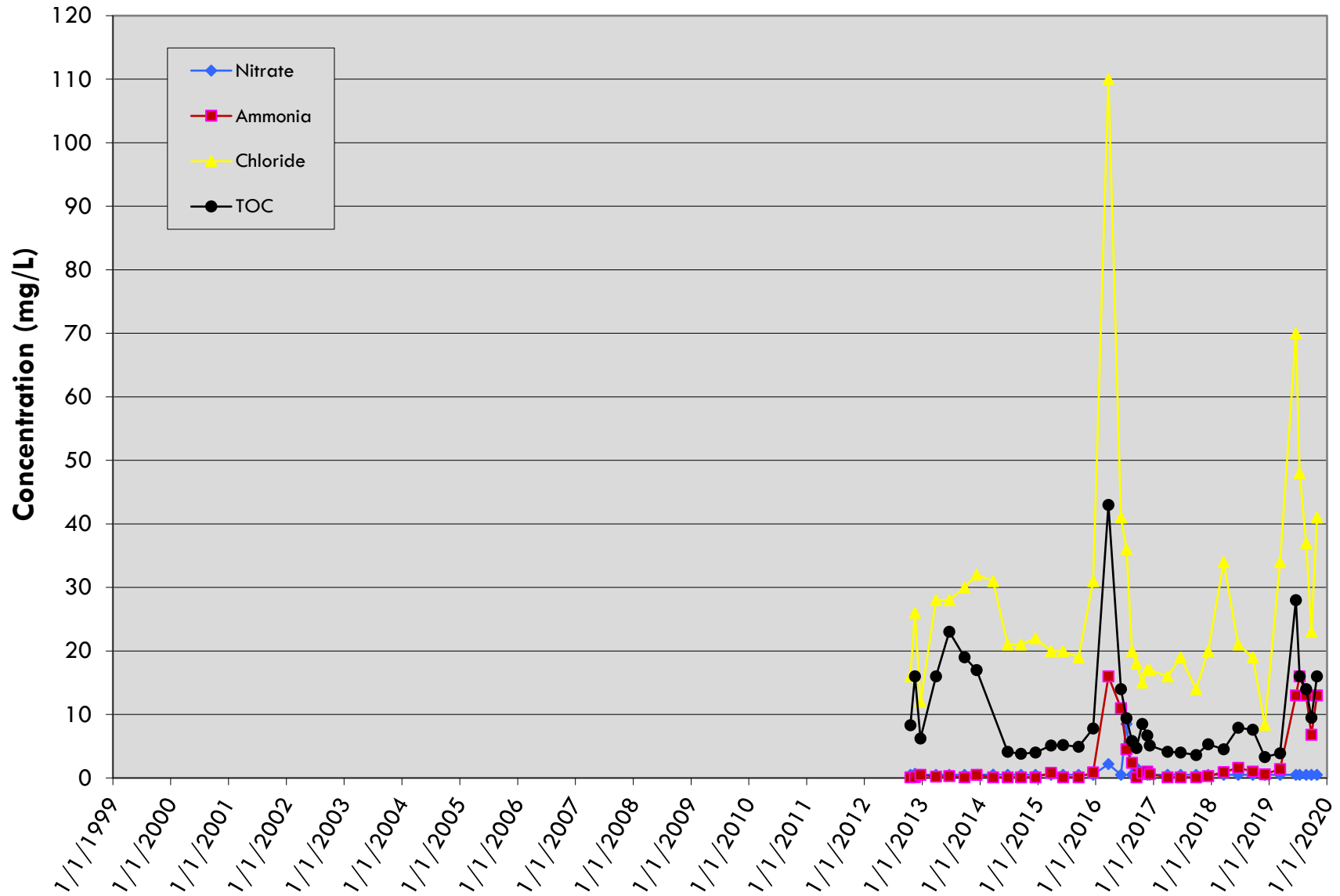
LDCS-4B

LRI Landfill, Pierce County, Washington



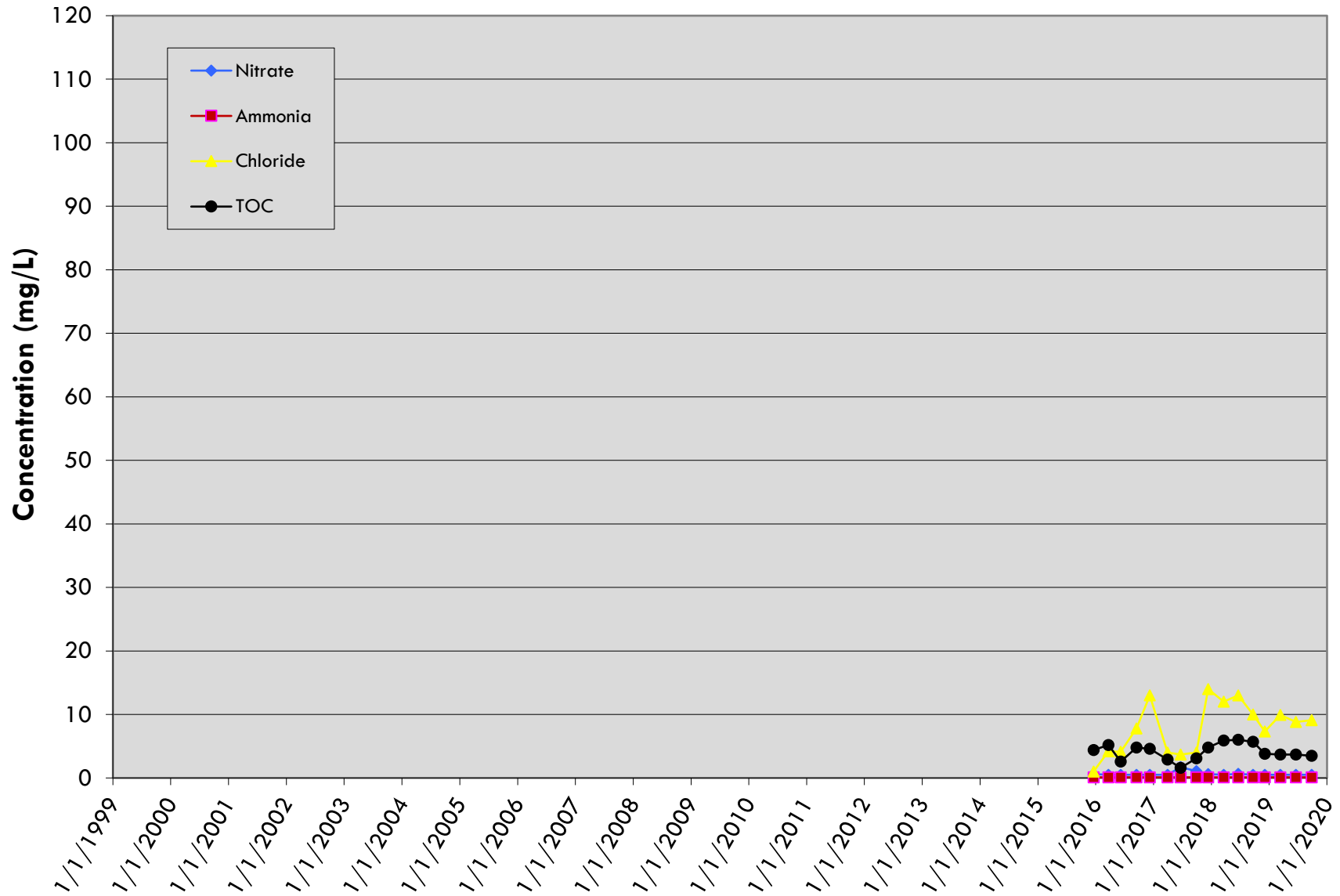
LDCS-5

LRI Landfill, Pierce County, Washington



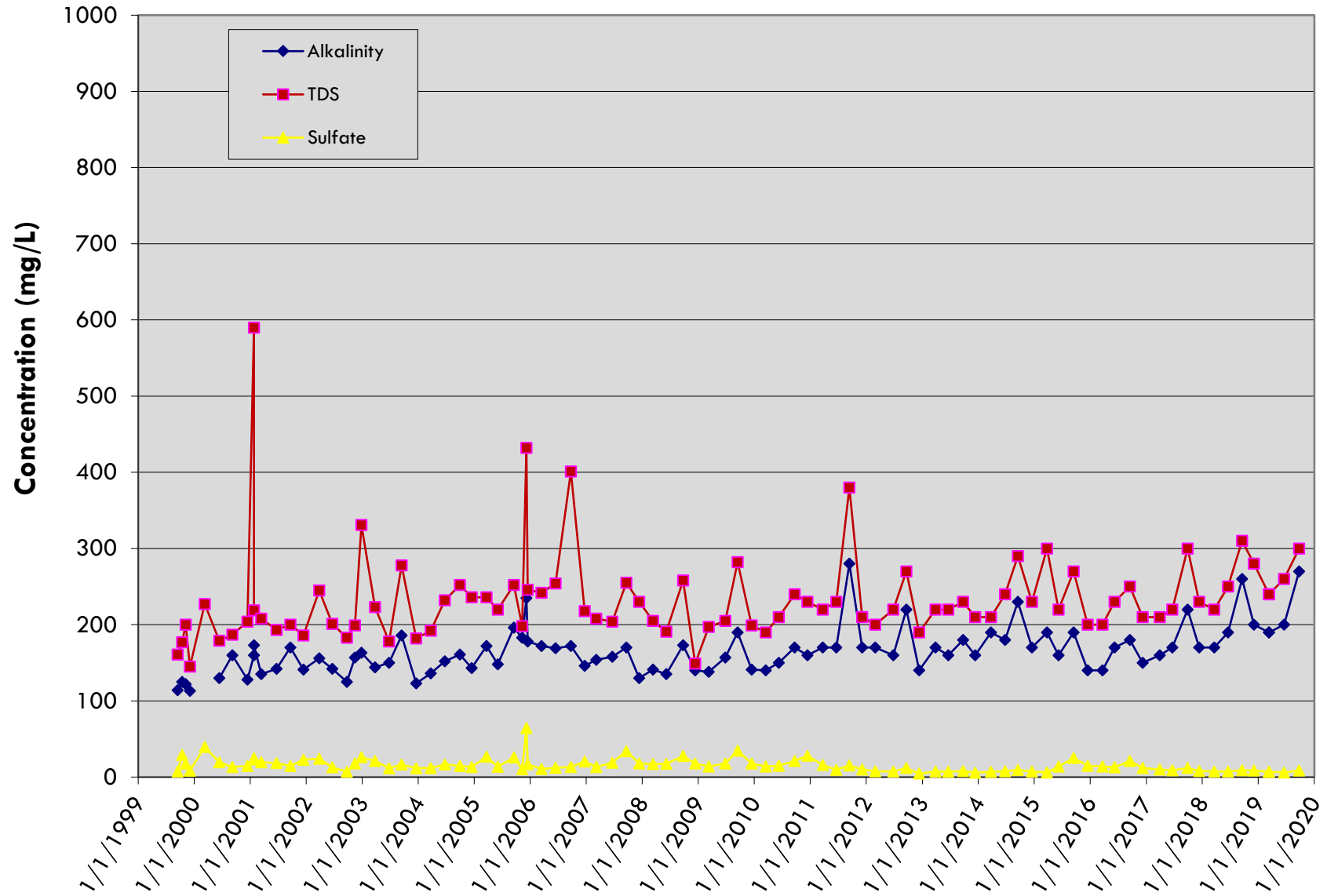
LDCS-6A

LRI Landfill, Pierce County, Washington



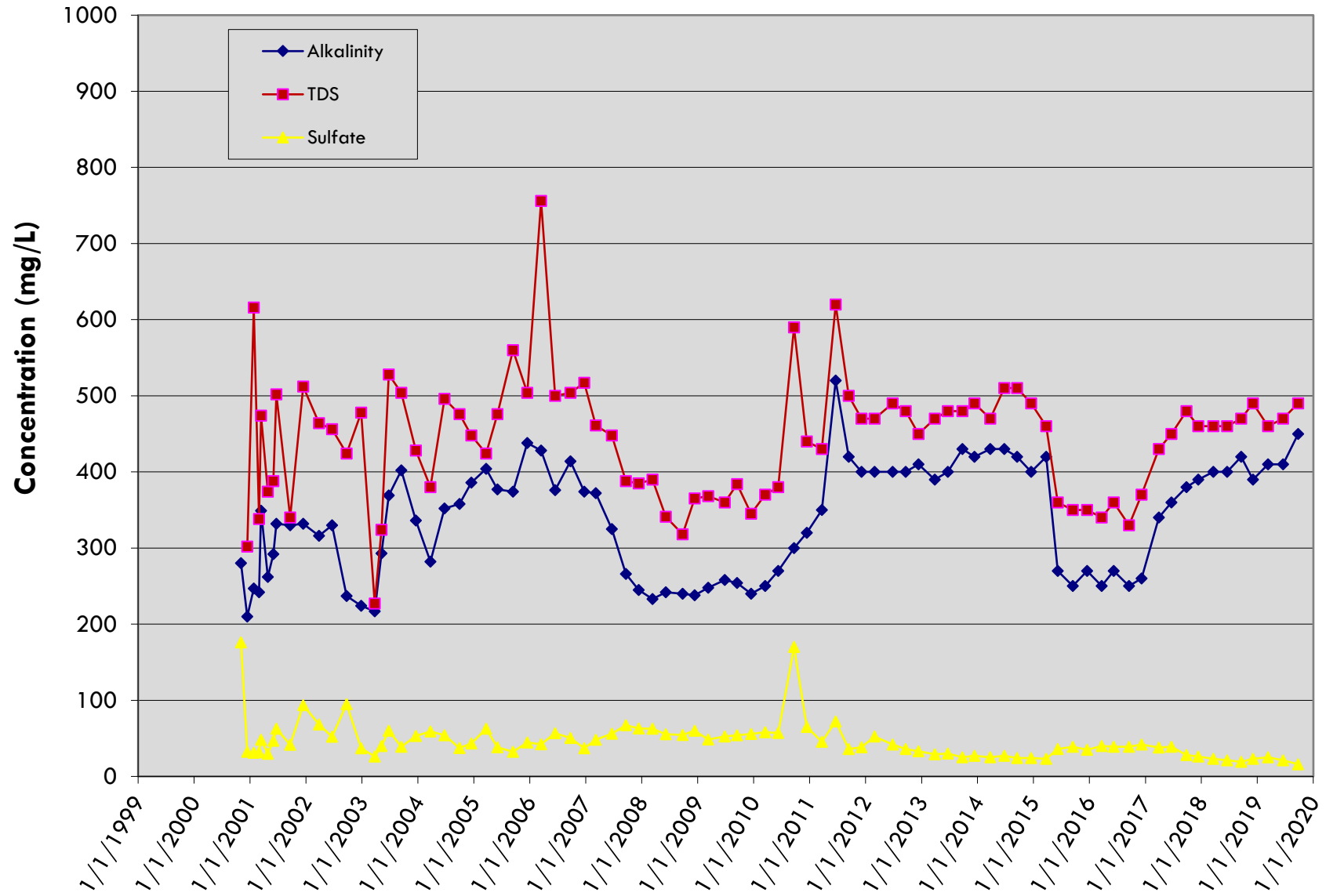
LDCS-1

LRI Landfill, Pierce County, Washington



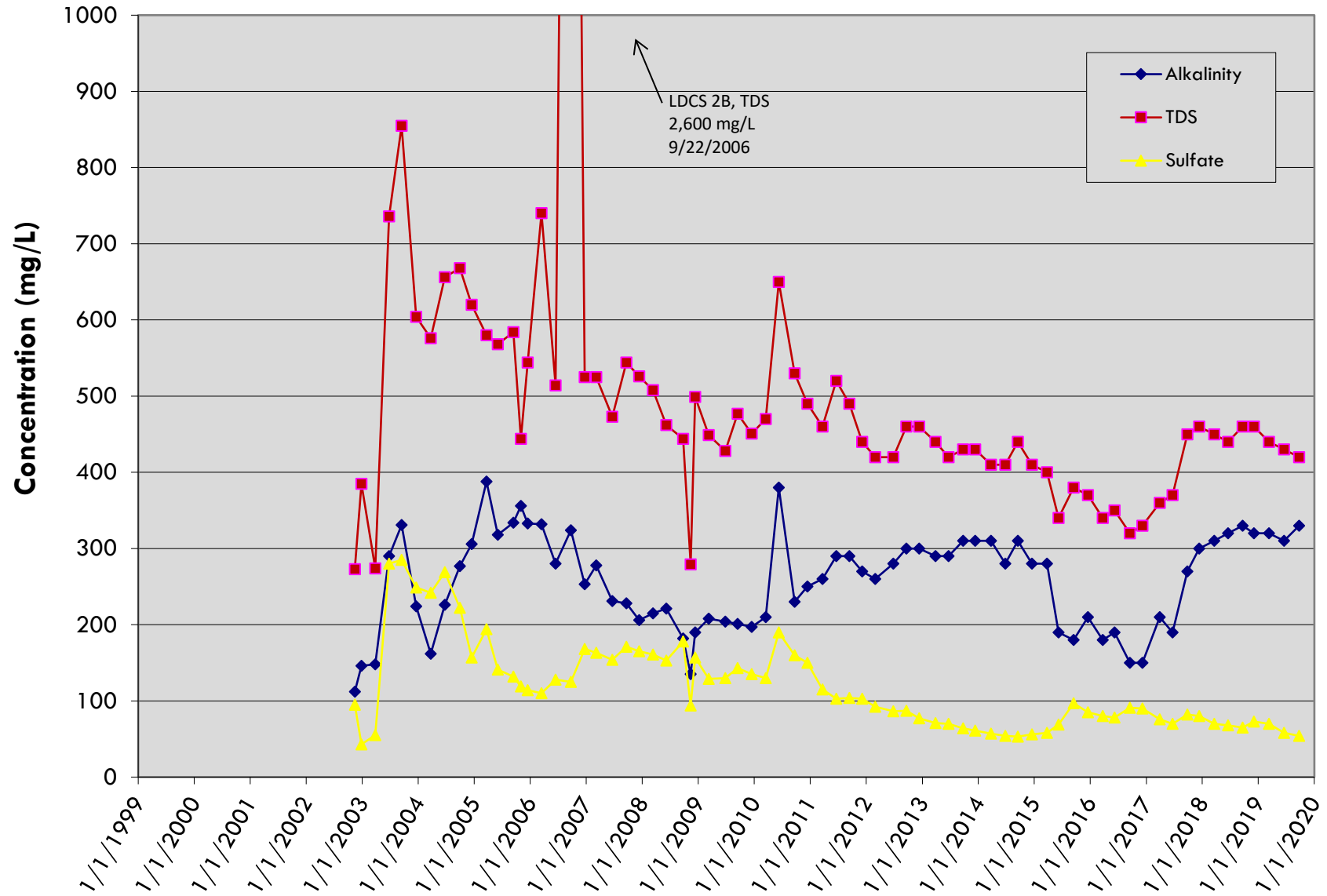
LDCS-2A

LRI Landfill, Pierce County, Washington



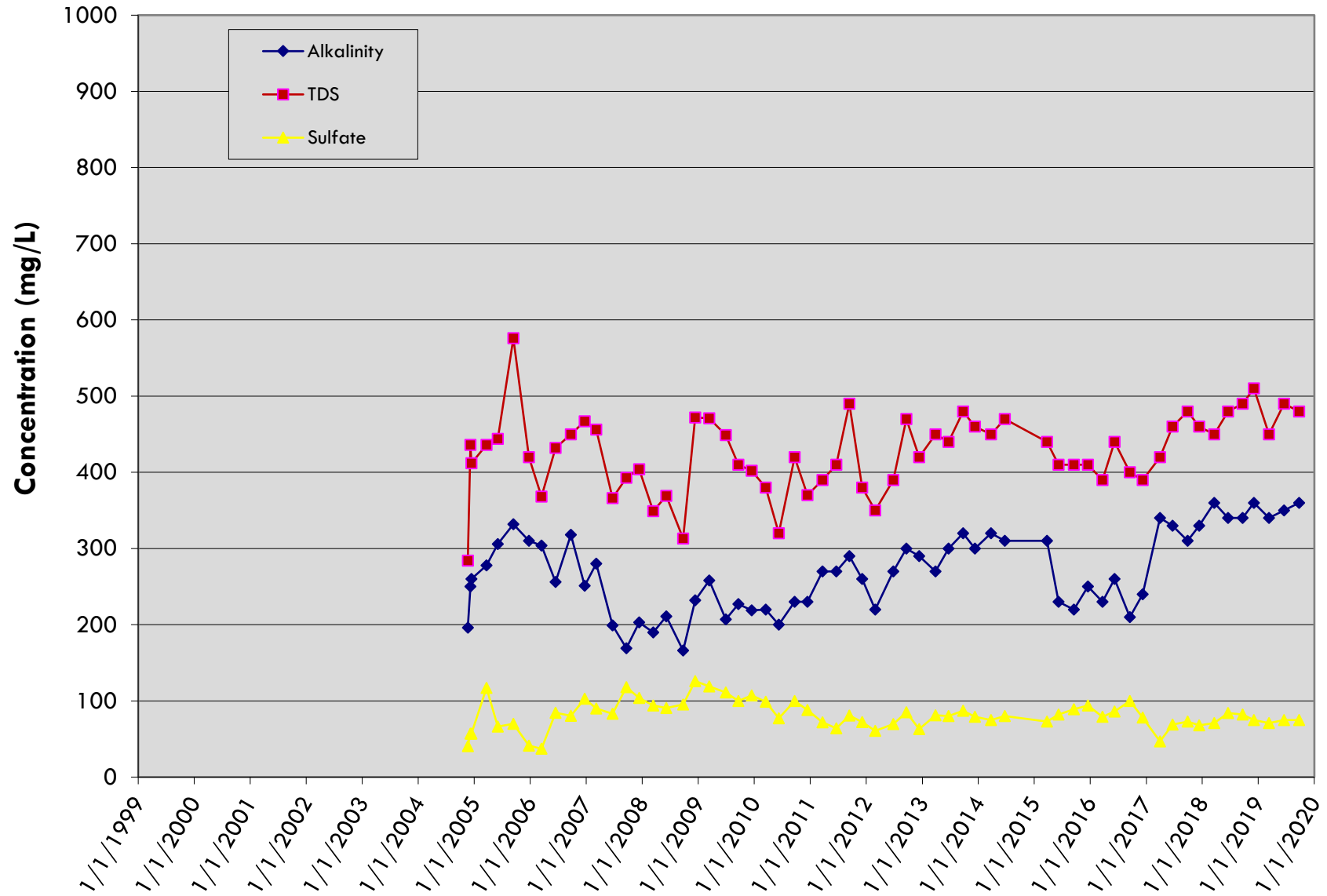
LDCS-2B

LRI Landfill, Pierce County, Washington



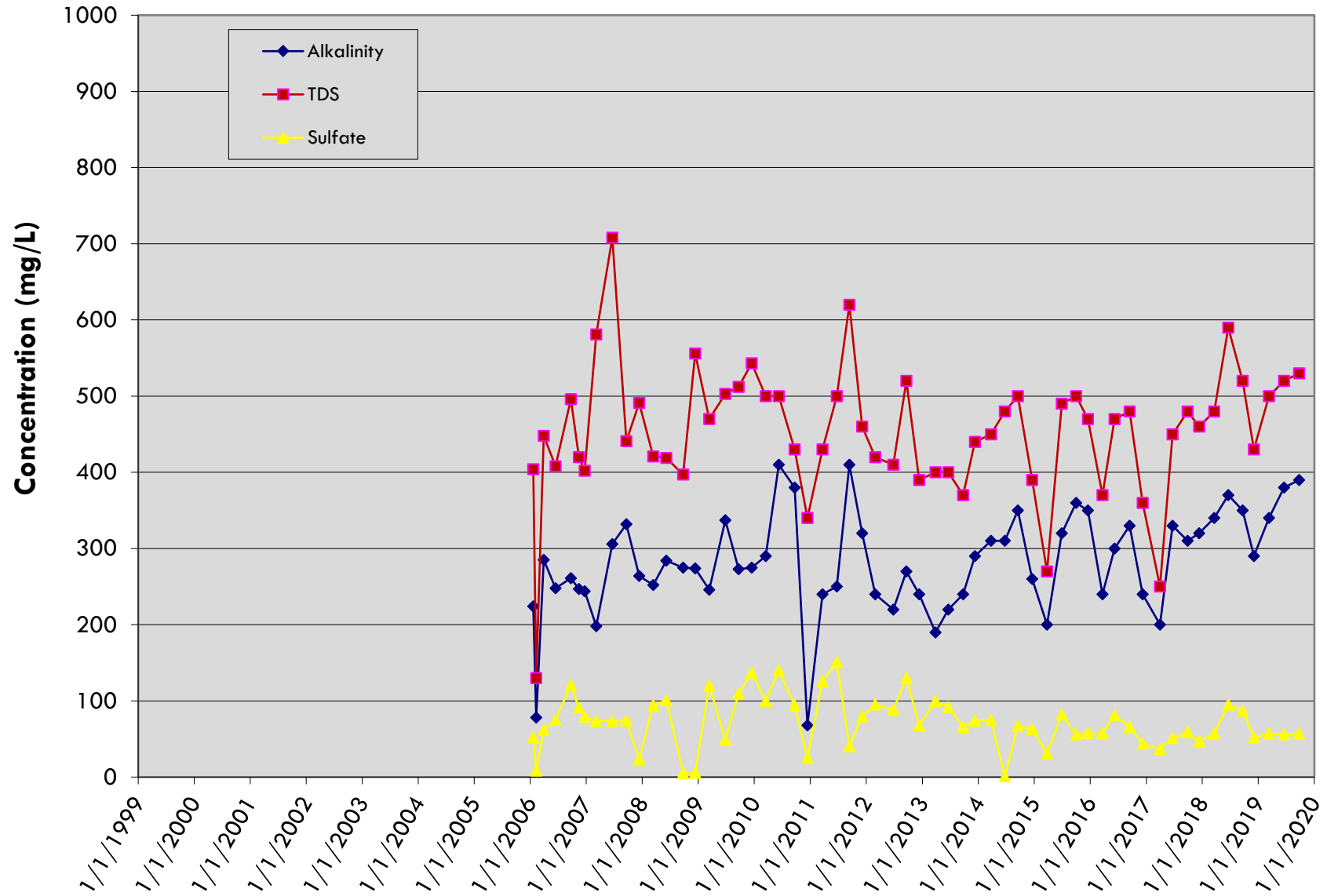
LDCS-3A

LRI Landfill, Pierce County, Washington



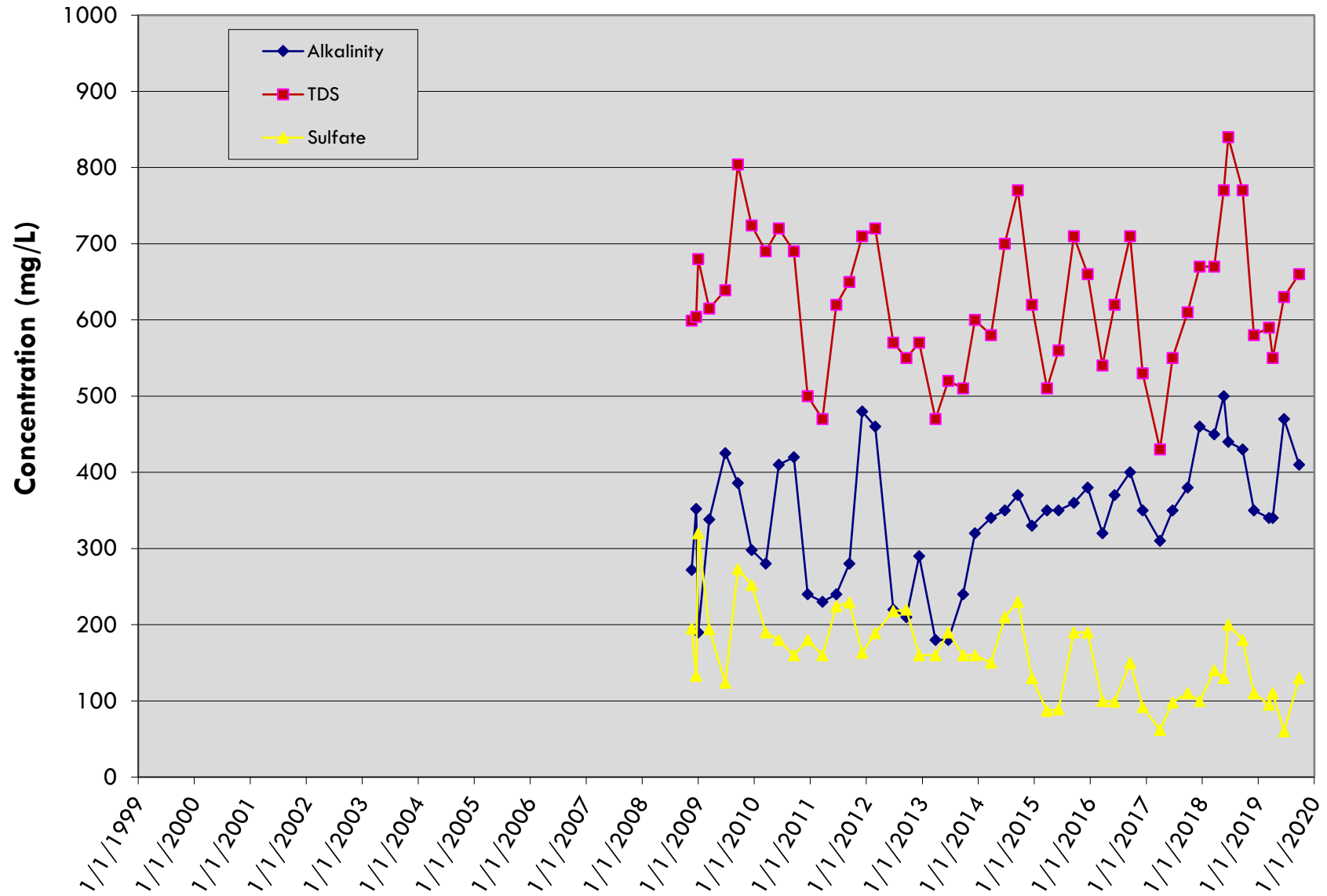
LDCS-4A

LRI Landfill, Pierce County, Washington



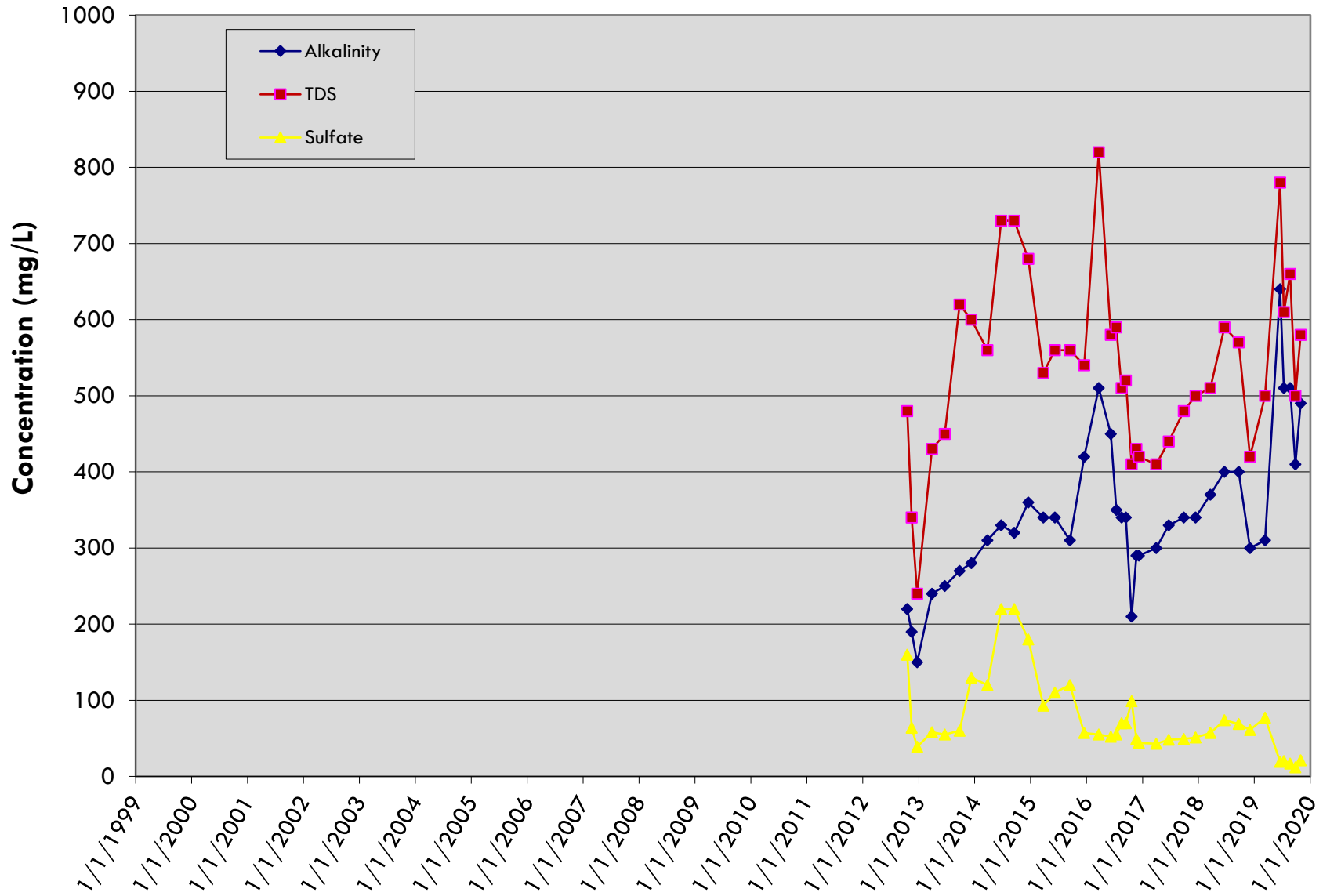
LDCS-4B

LRI Landfill, Pierce County, Washington



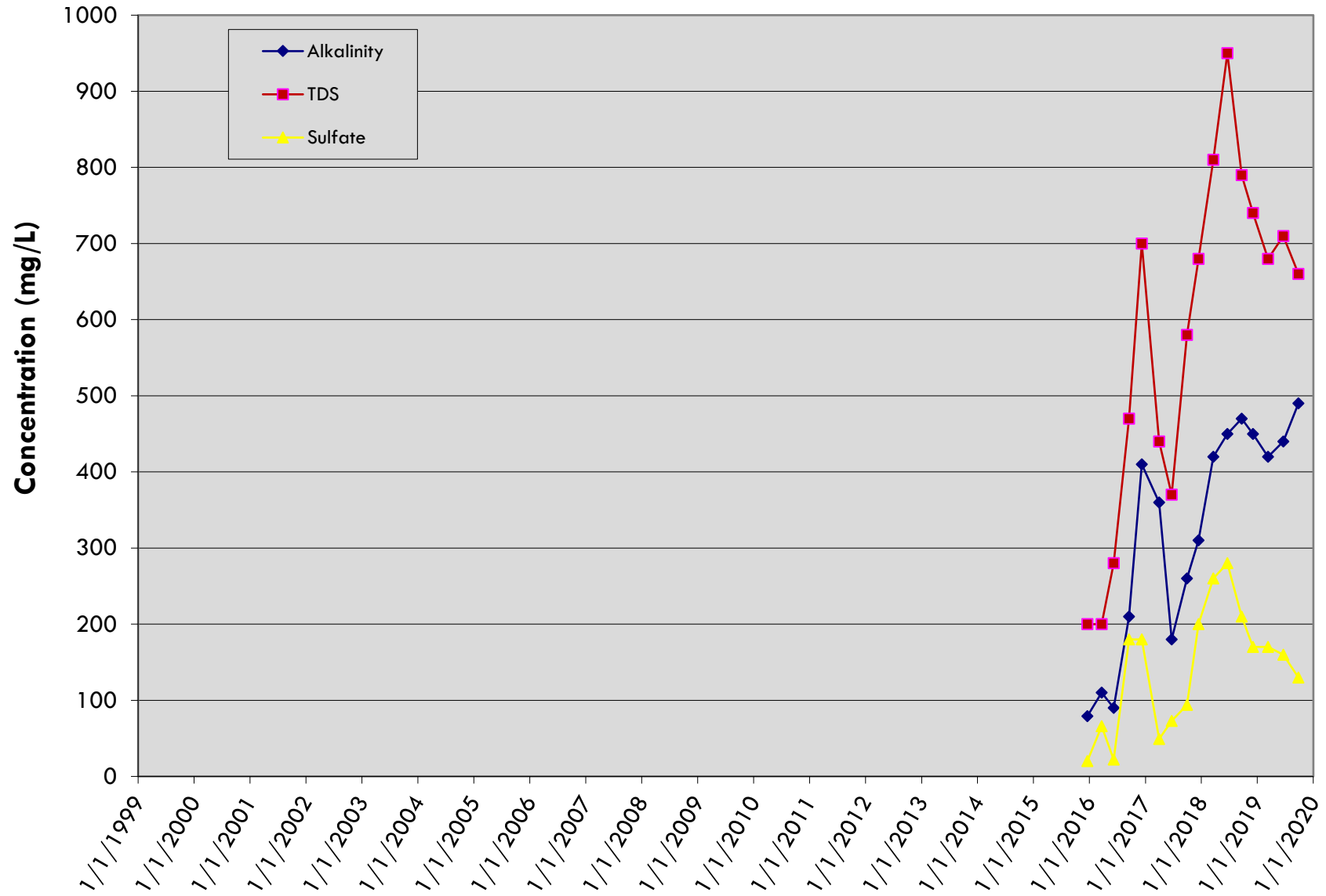
LDCS-5

LRI Landfill, Pierce County, Washington



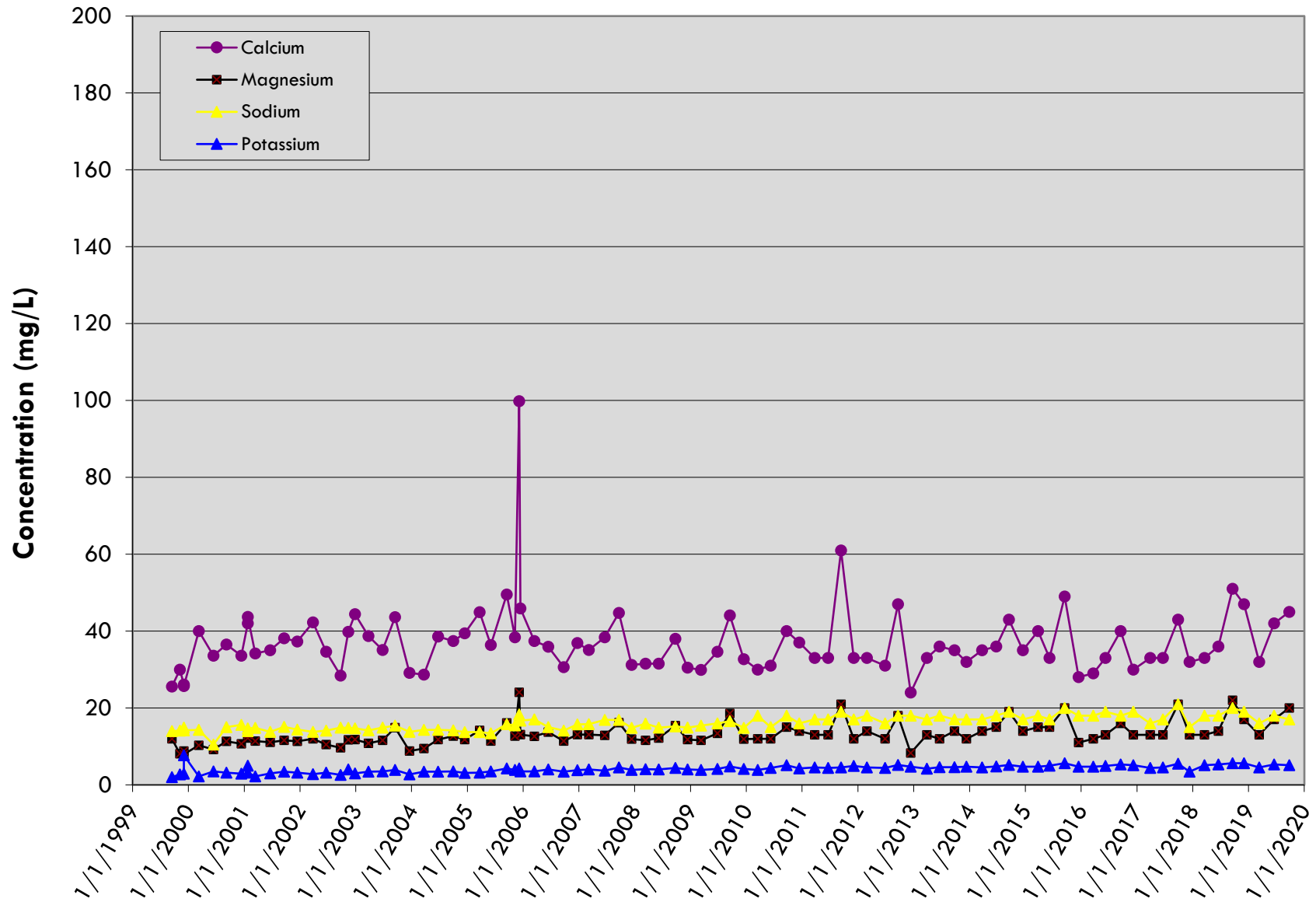
LDCS-6A

LRI Landfill, Pierce County, Washington



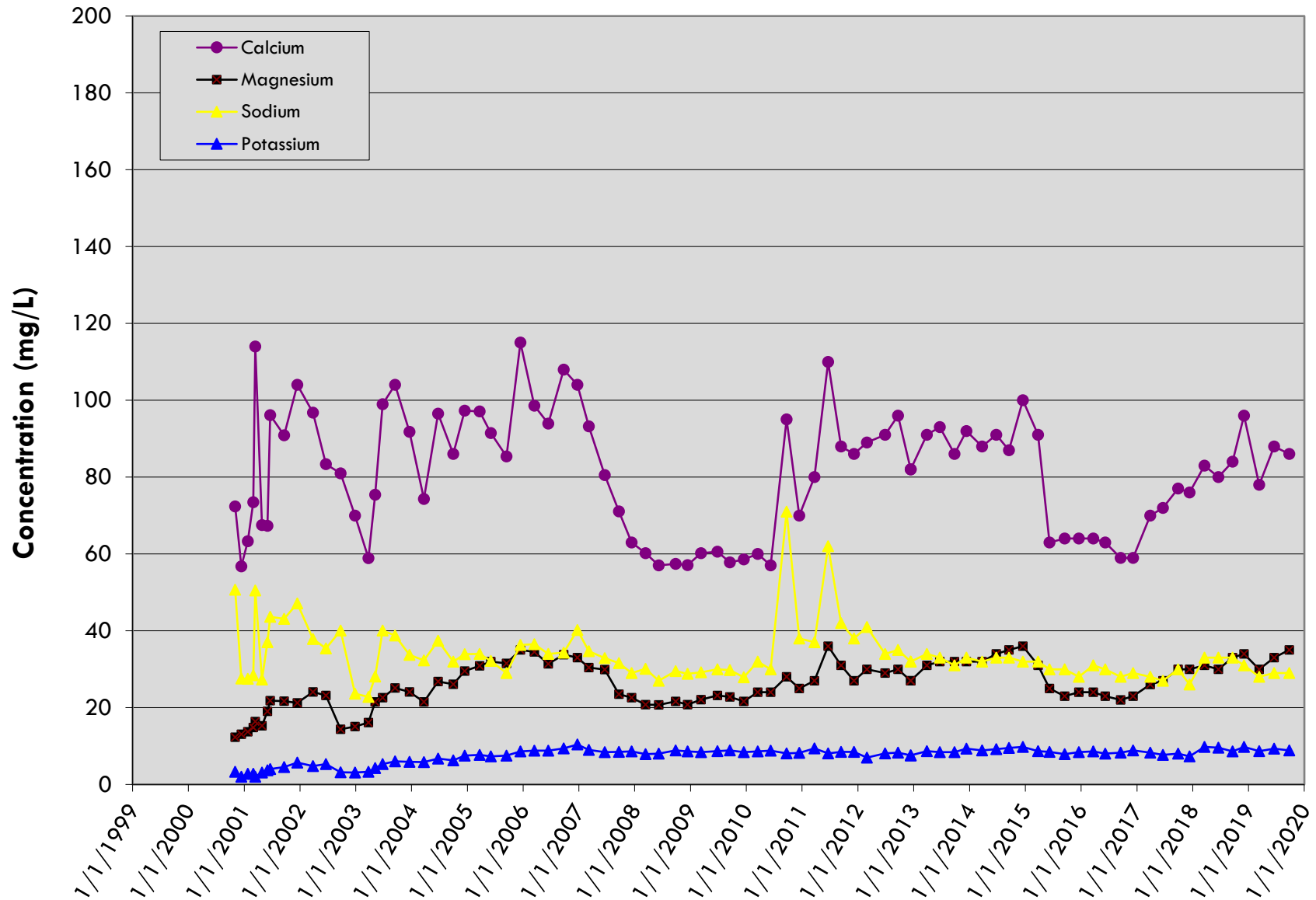
LDCS-1

LRI Landfill, Pierce County, Washington



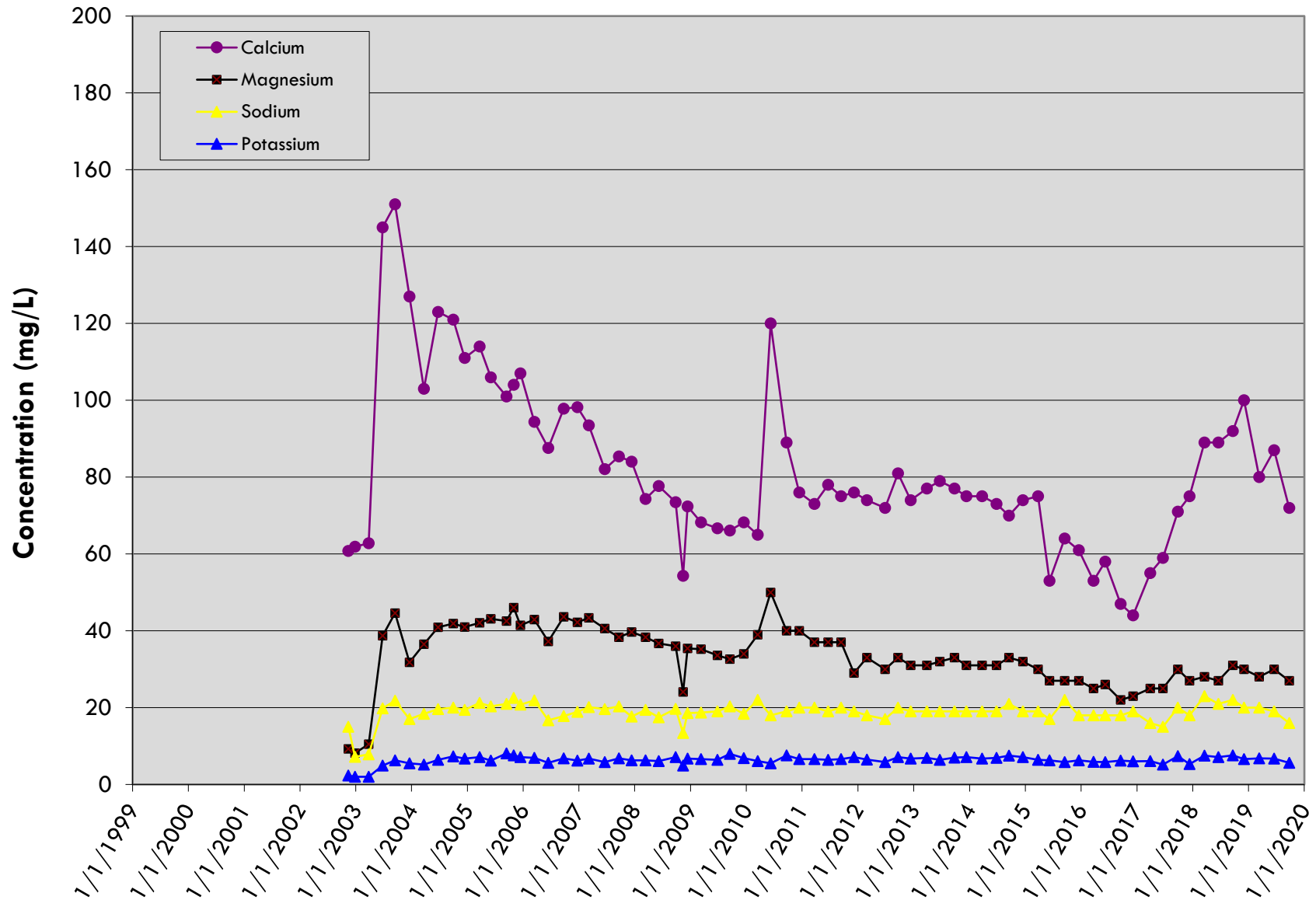
LDCS-2A

LRI Landfill, Pierce County, Washington



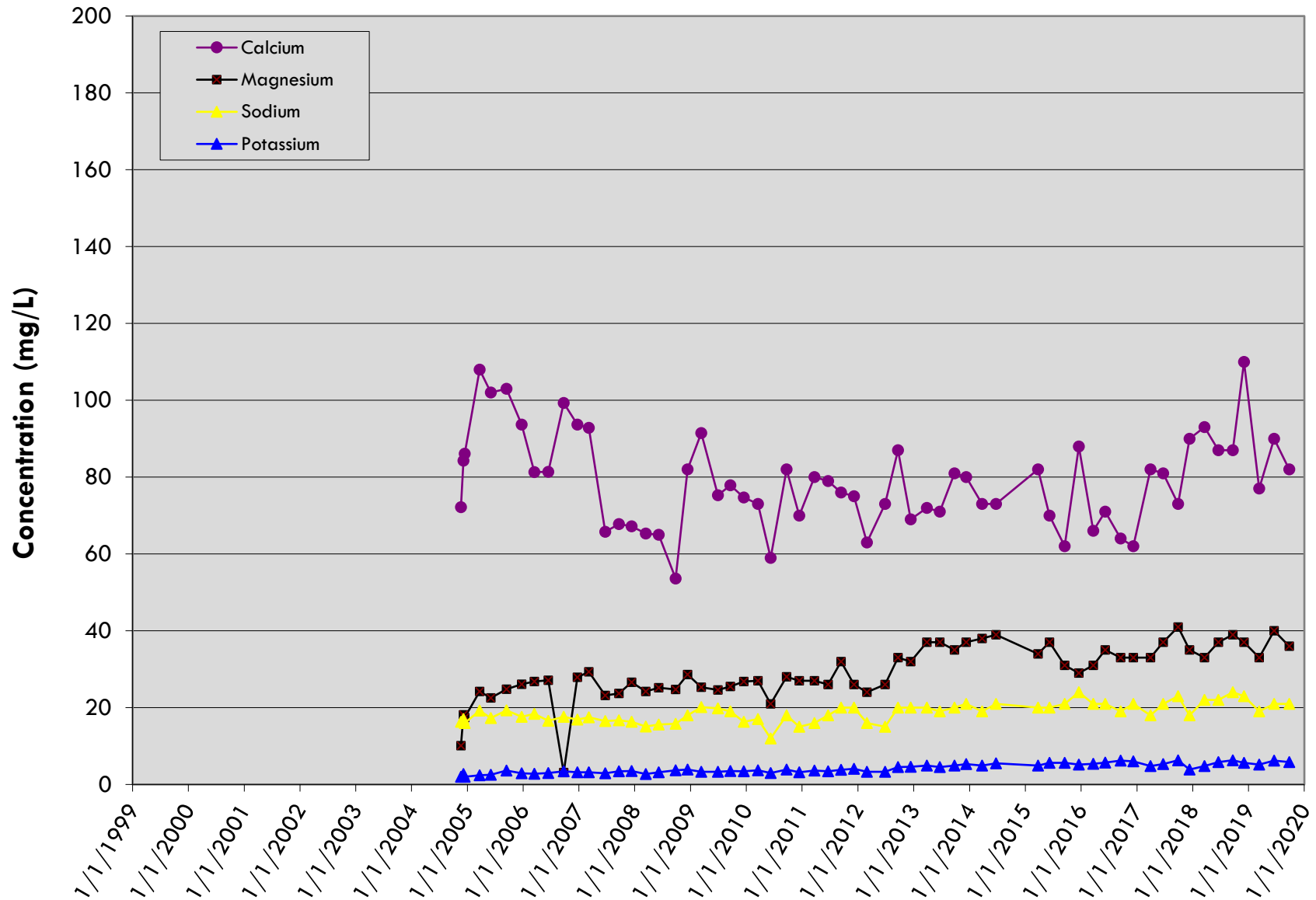
LDCS-2B

LRI Landfill, Pierce County, Washington



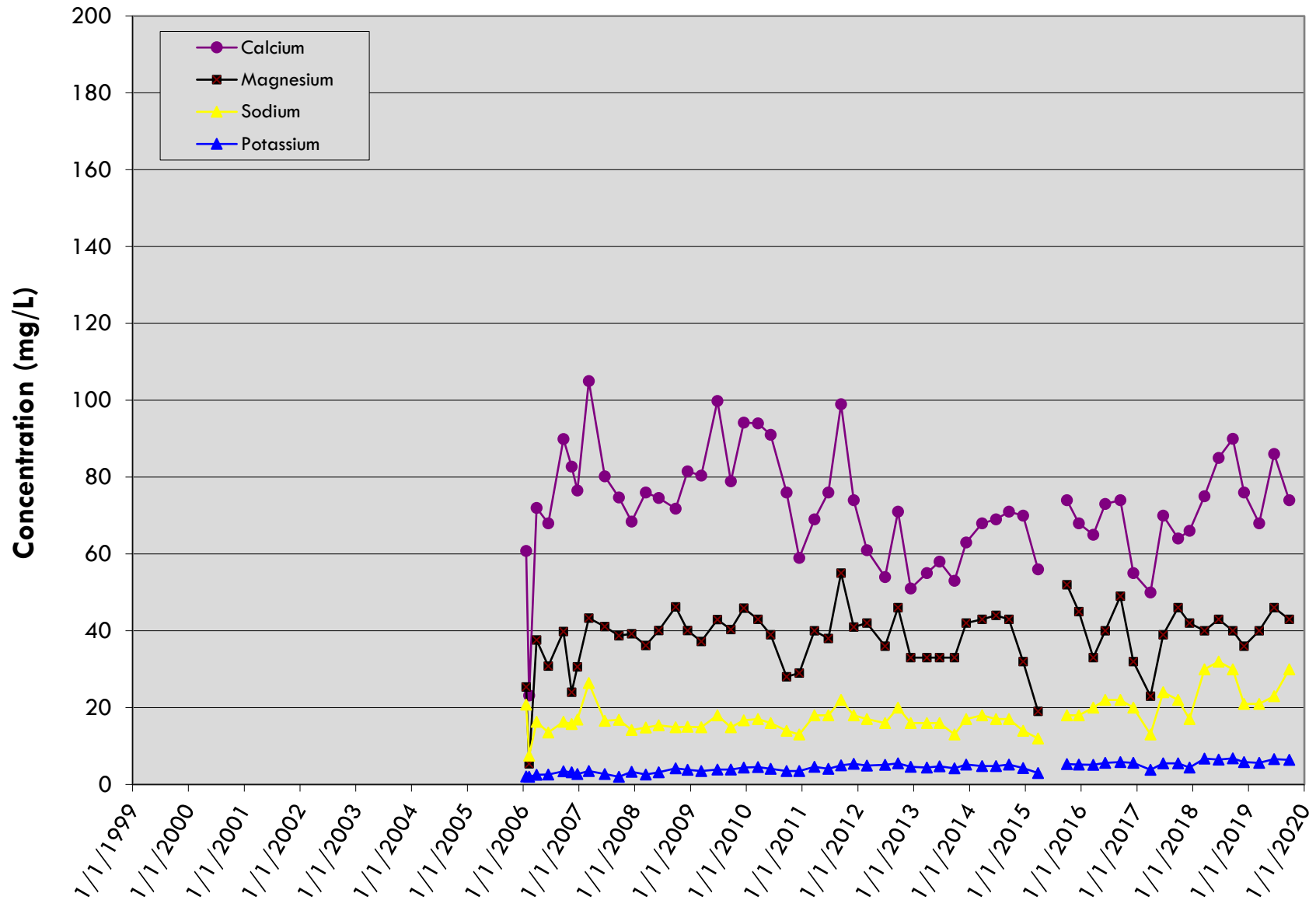
LDCS-3A

LRI Landfill, Pierce County, Washington



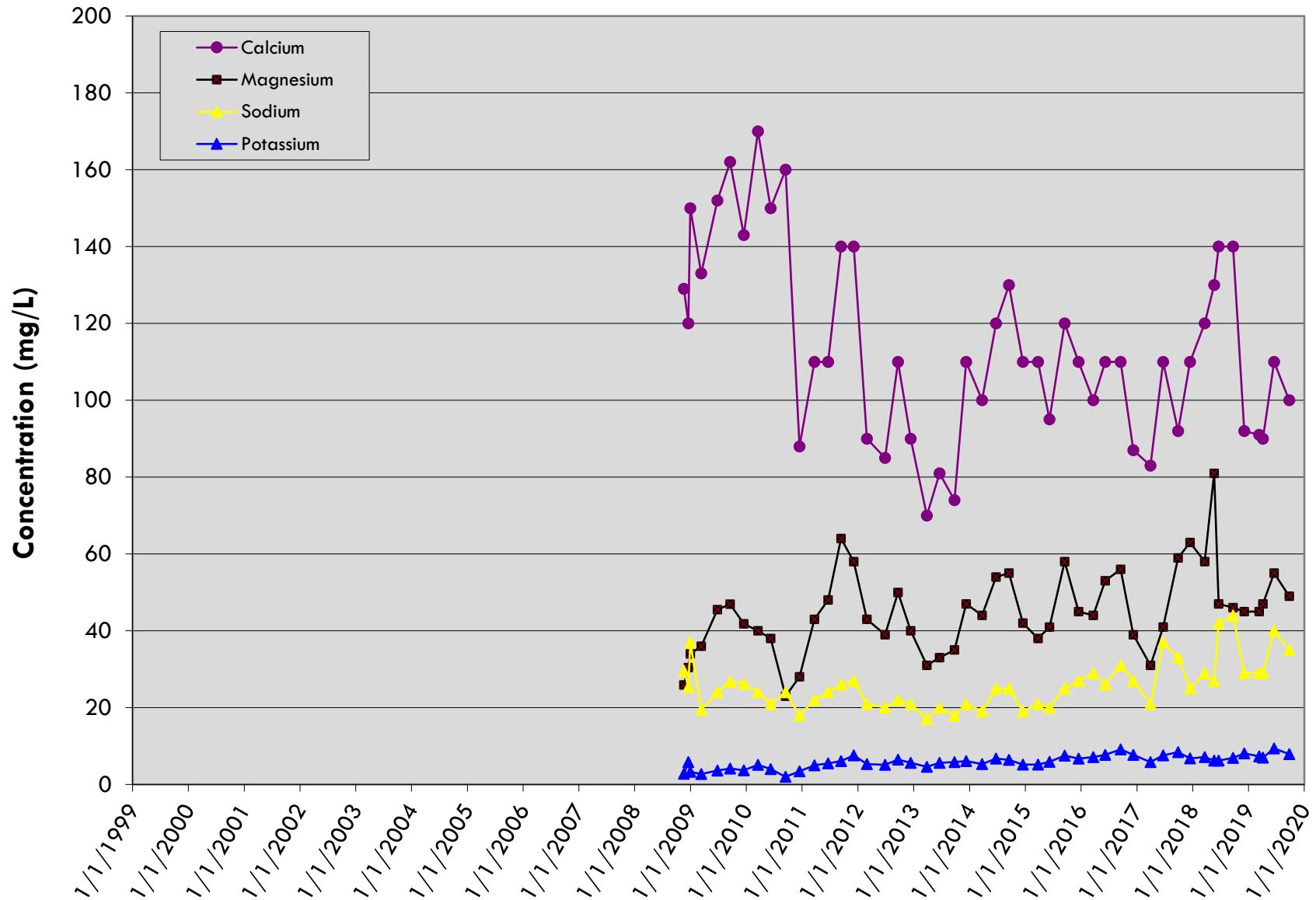
LDCS-4A

LRI Landfill, Pierce County, Washington



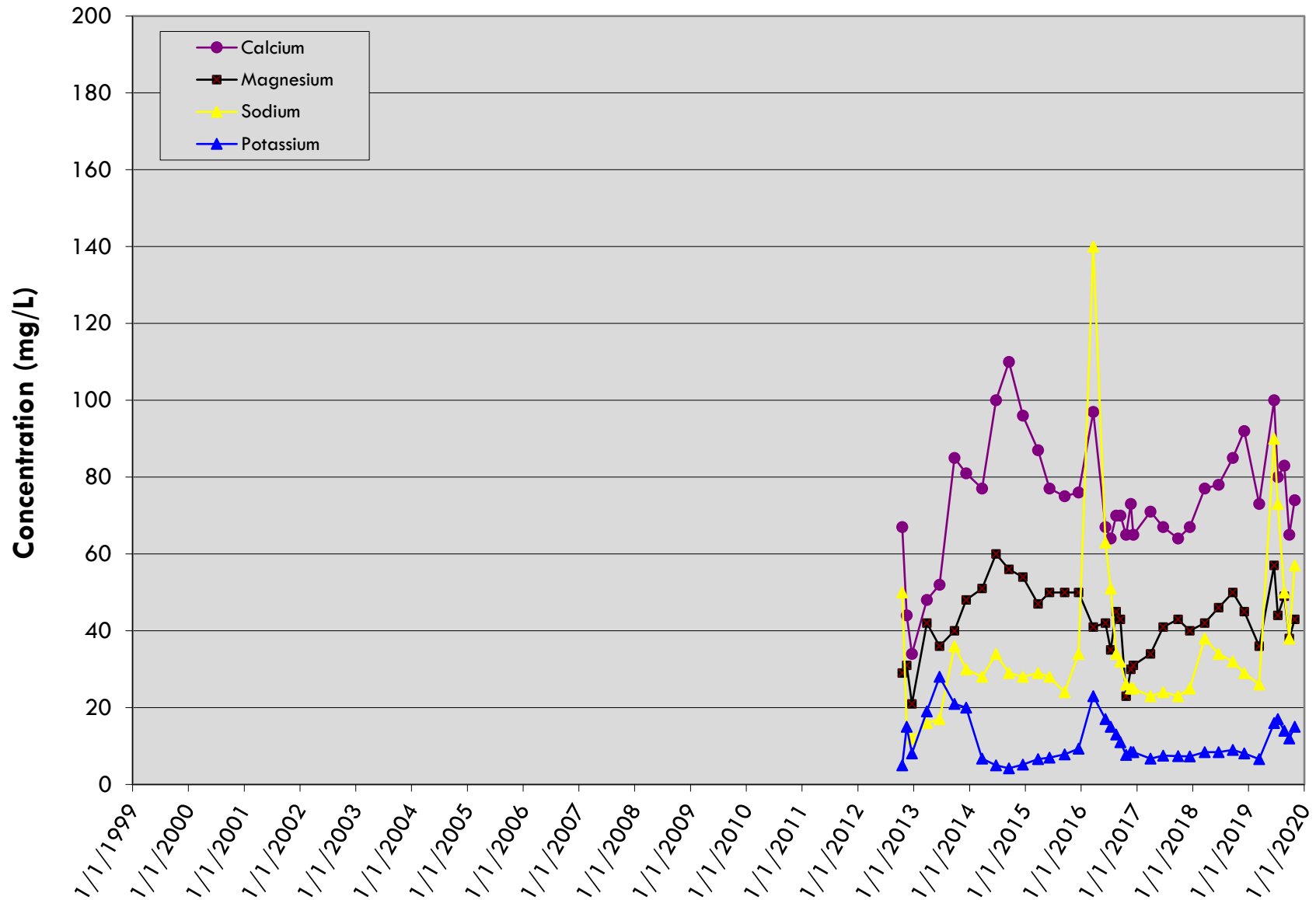
LDCS-4B

LRI Landfill, Pierce County, Washington



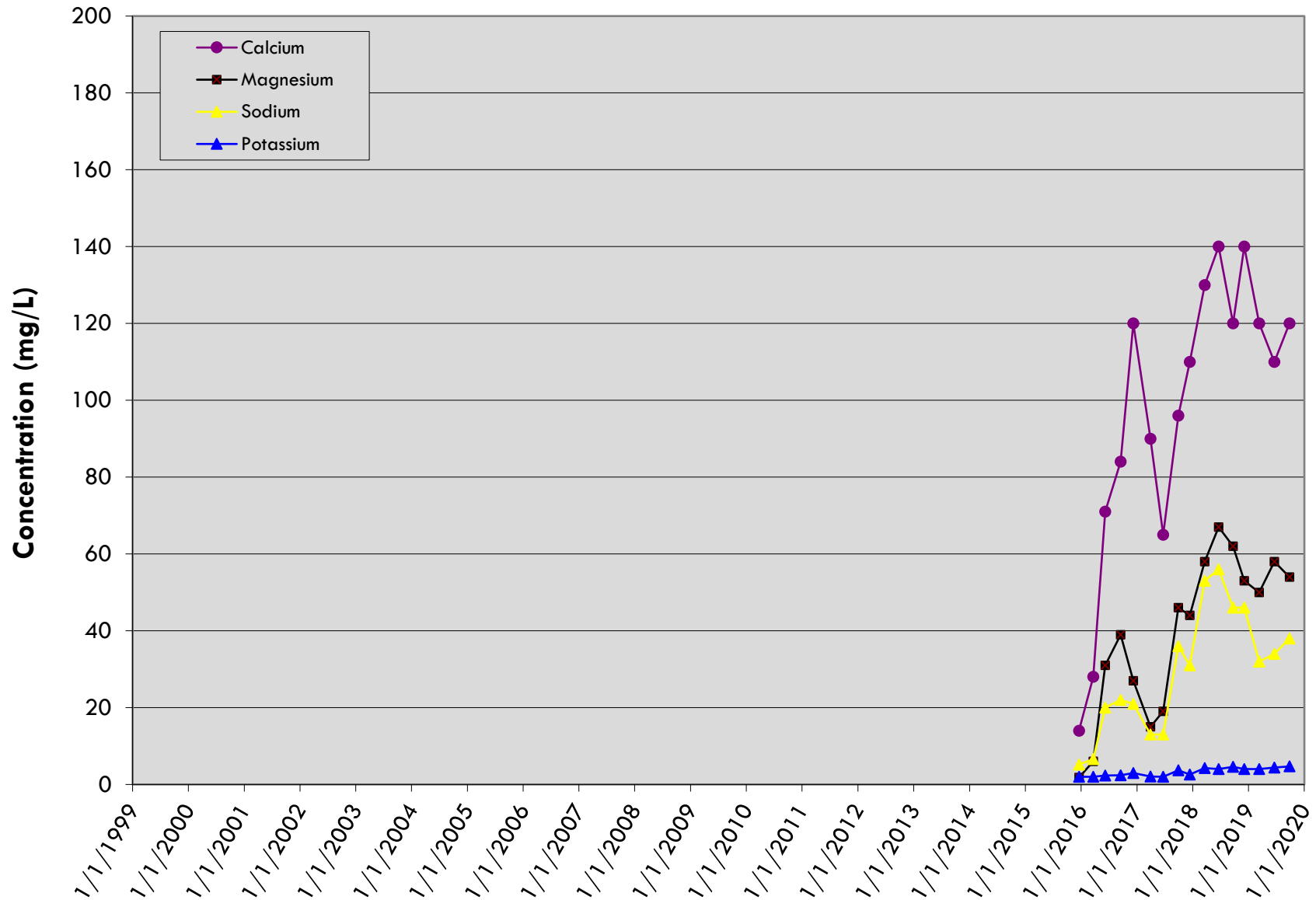
LDCS-5

LRI Landfill, Pierce County, Washington



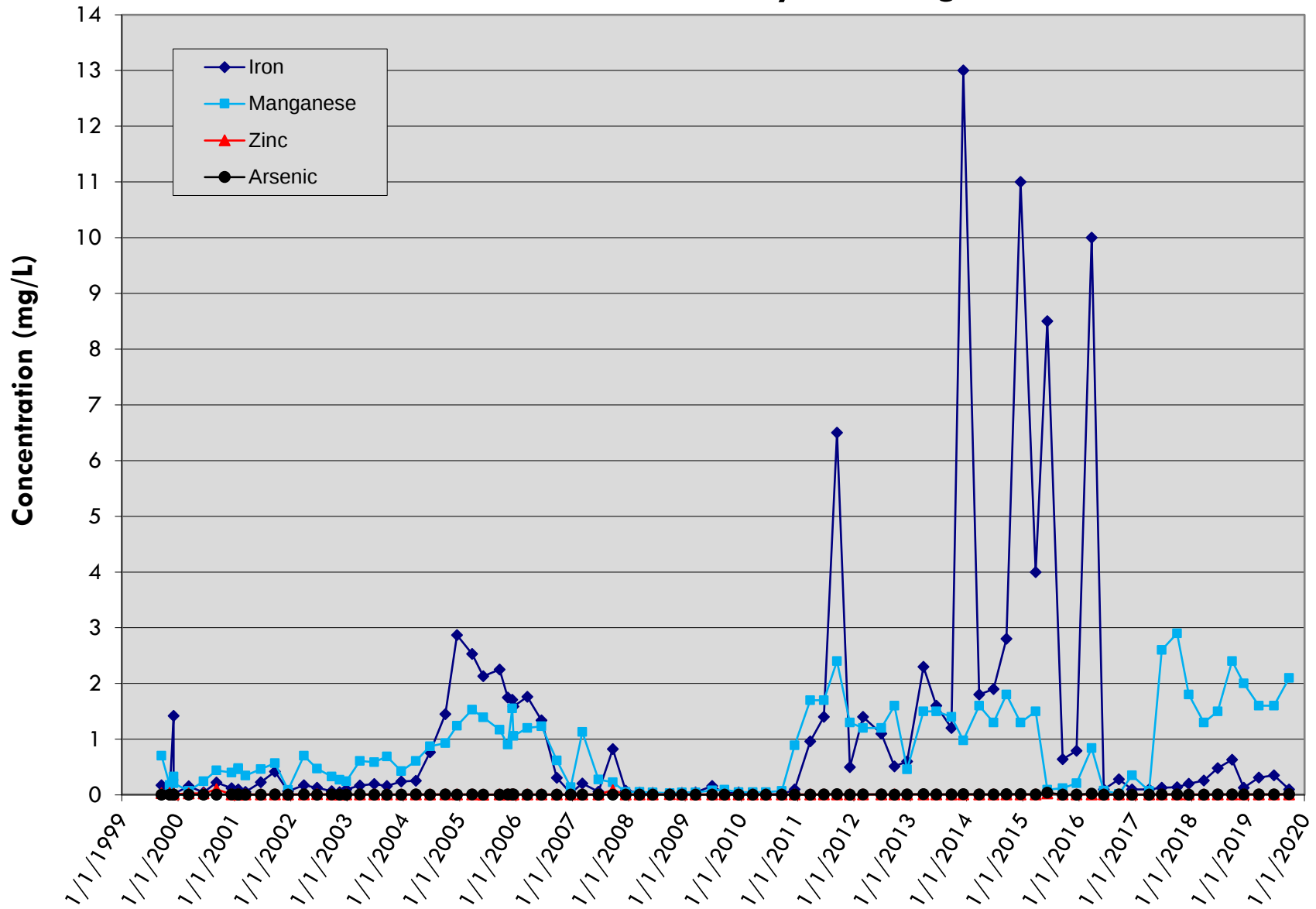
LDCS-6A

LRI Landfill, Pierce County, Washington



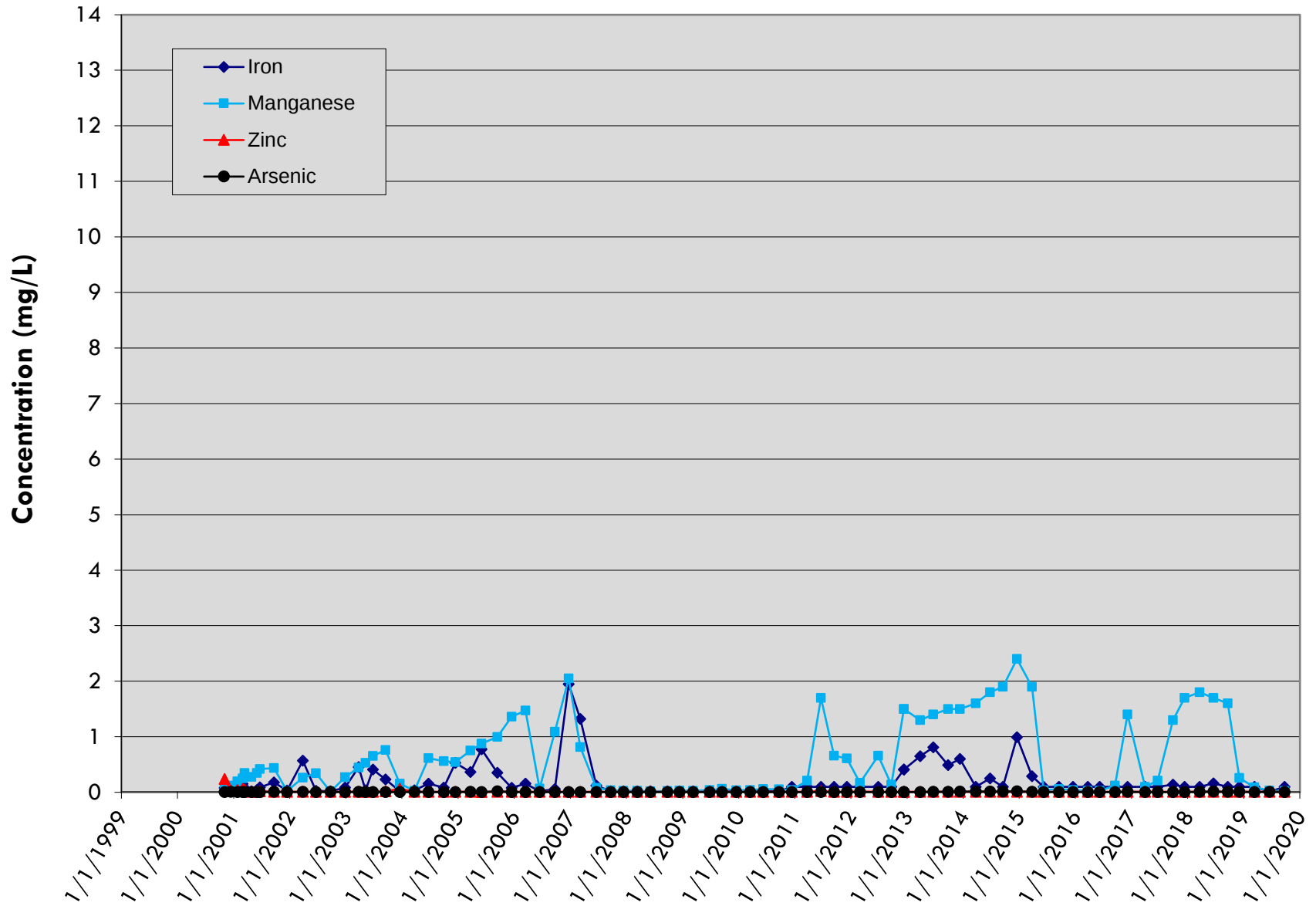
LDCS-1

LRI Landfill, Pierce County, Washington



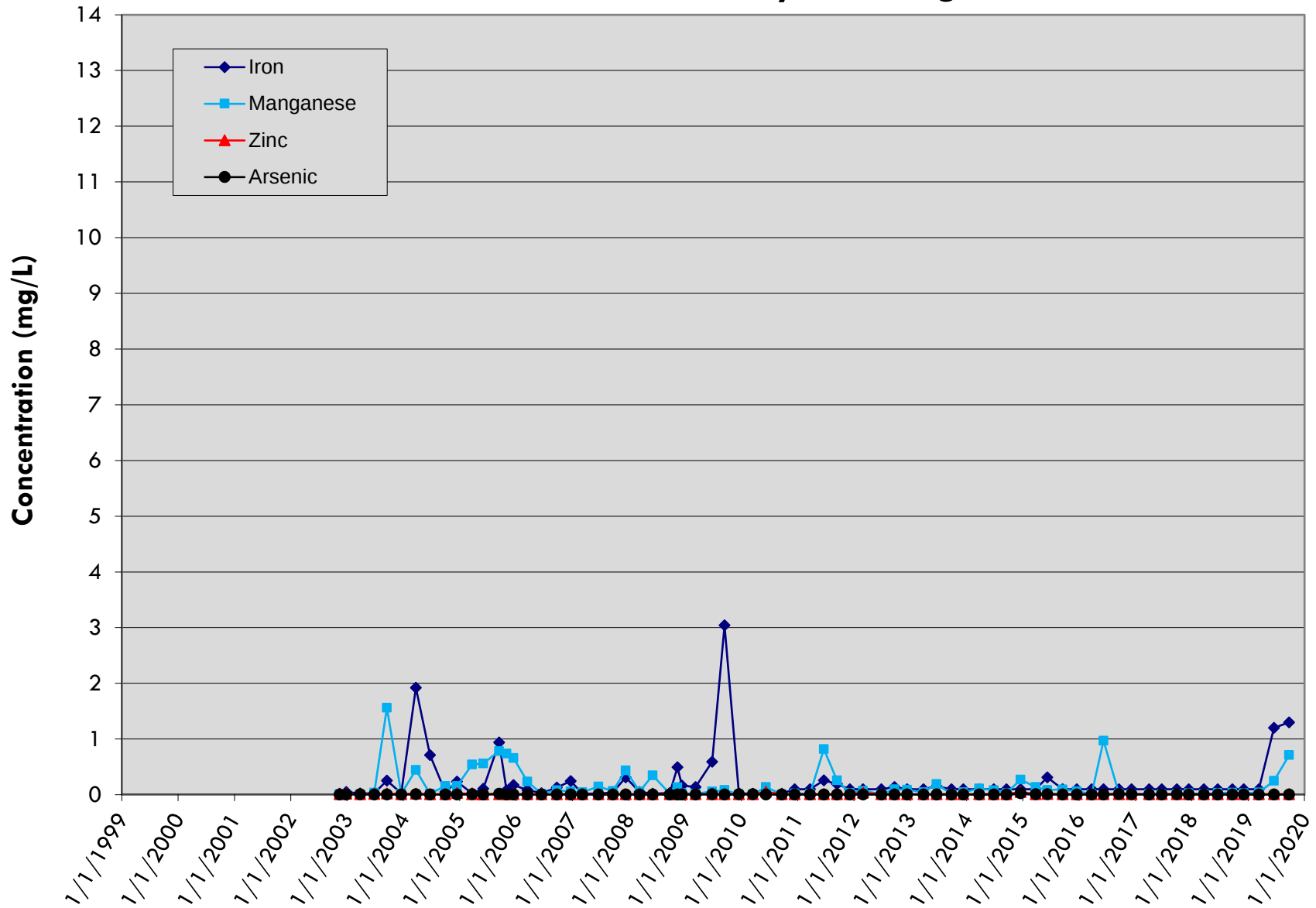
LDCS-2A

LRI Landfill, Pierce County, Washington



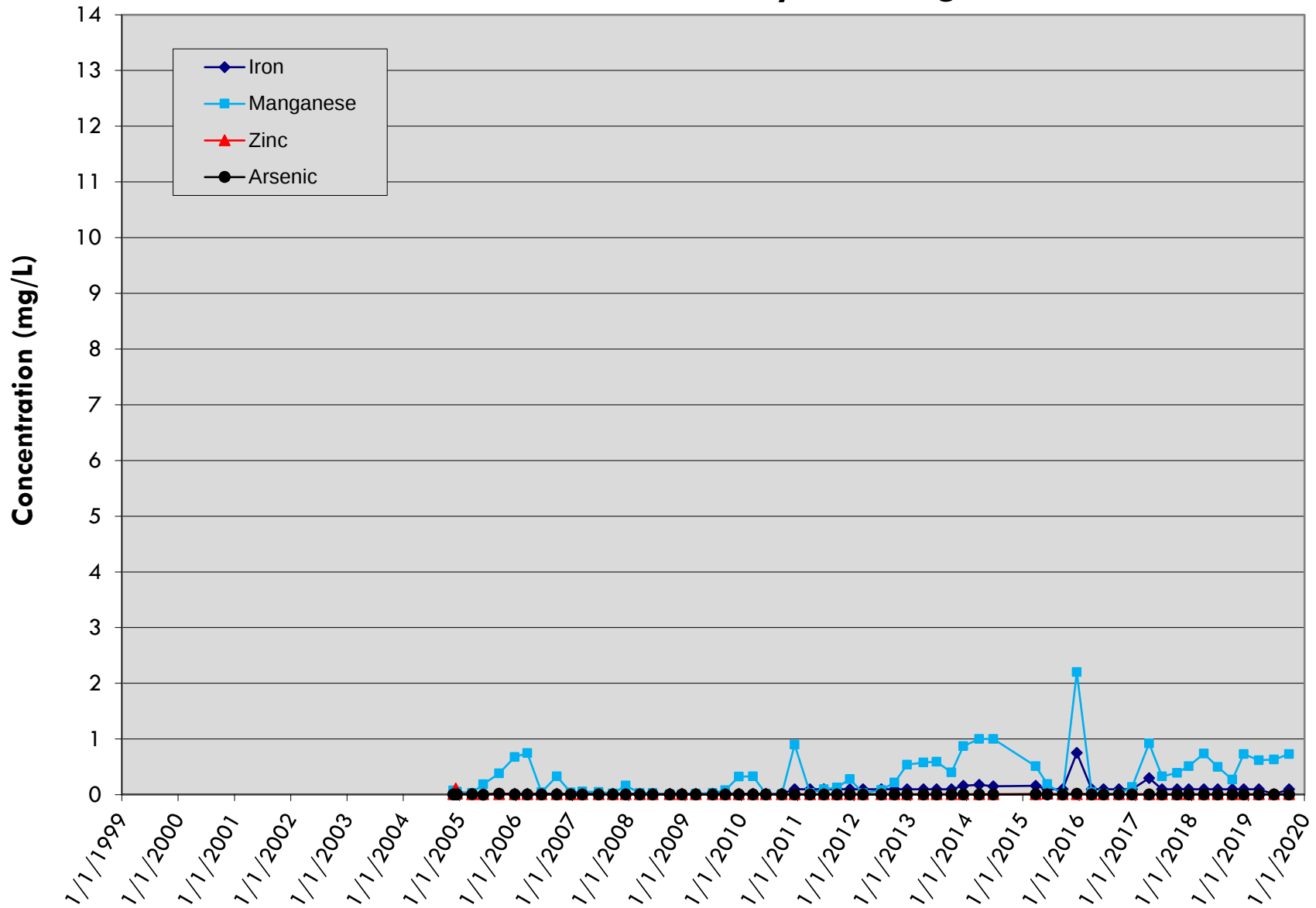
LDCS-2B

LRI Landfill, Pierce County, Washington



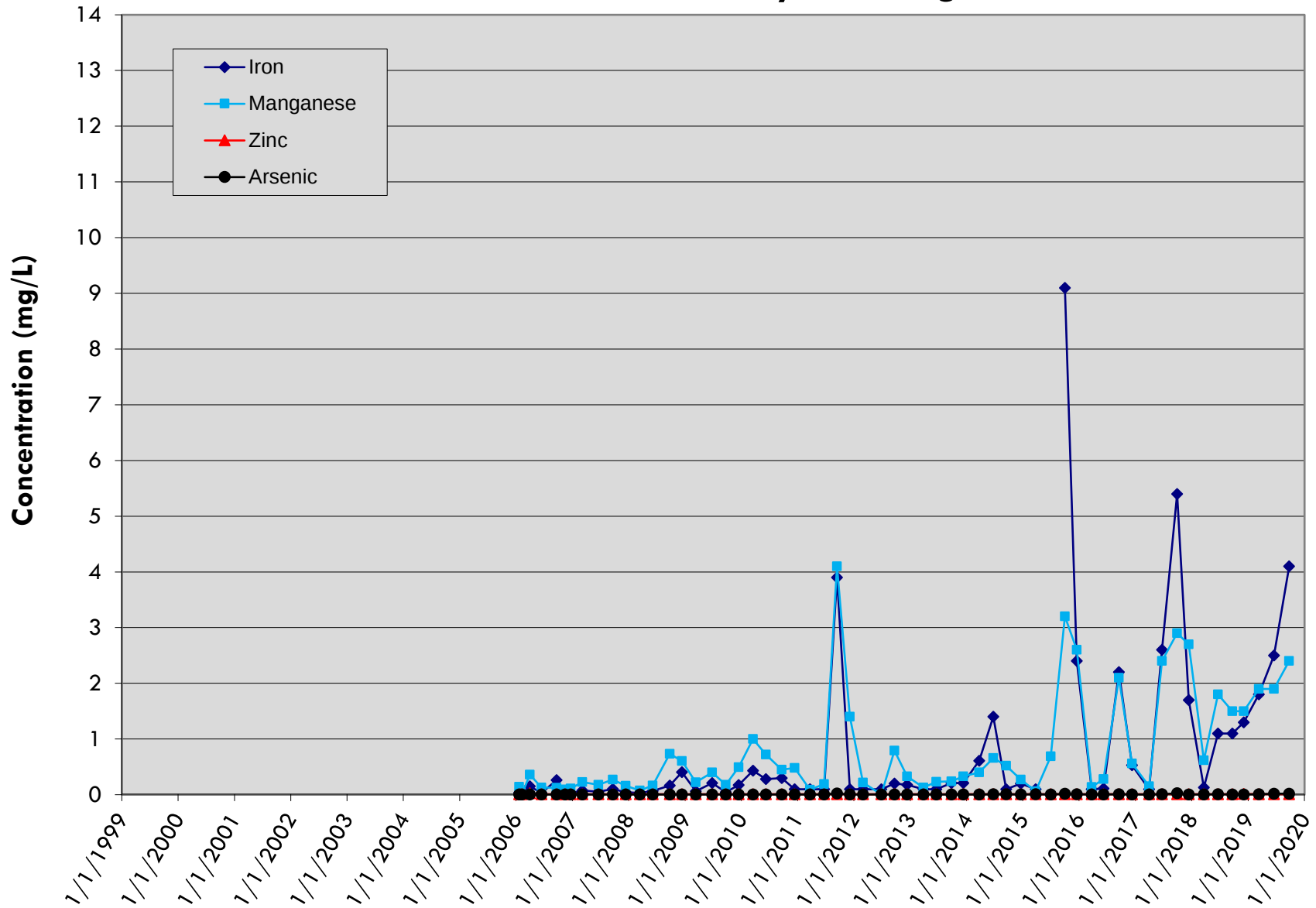
LDCS-3A

LRI Landfill, Pierce County, Washington



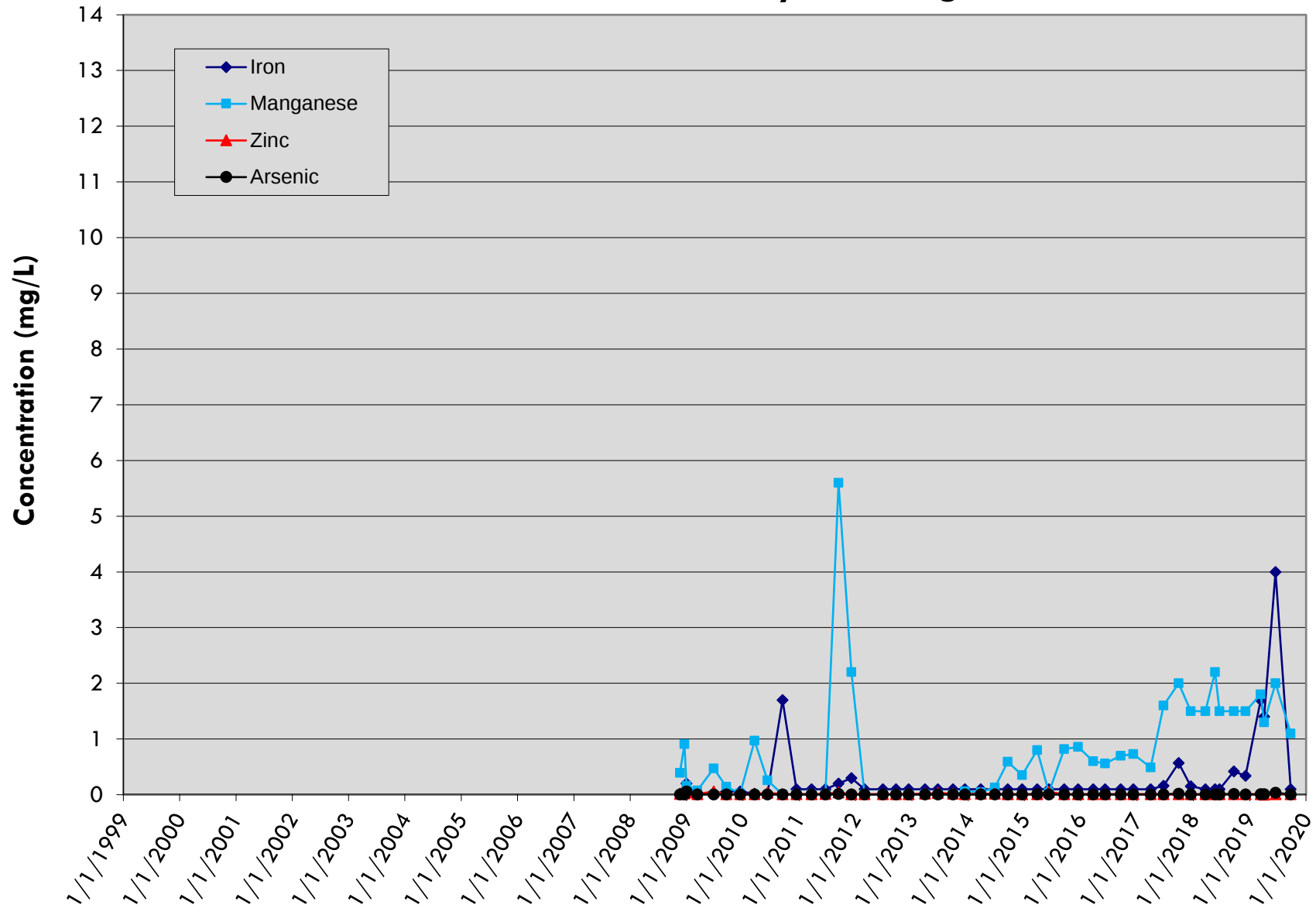
LDCS-4A

LRI Landfill, Pierce County, Washington



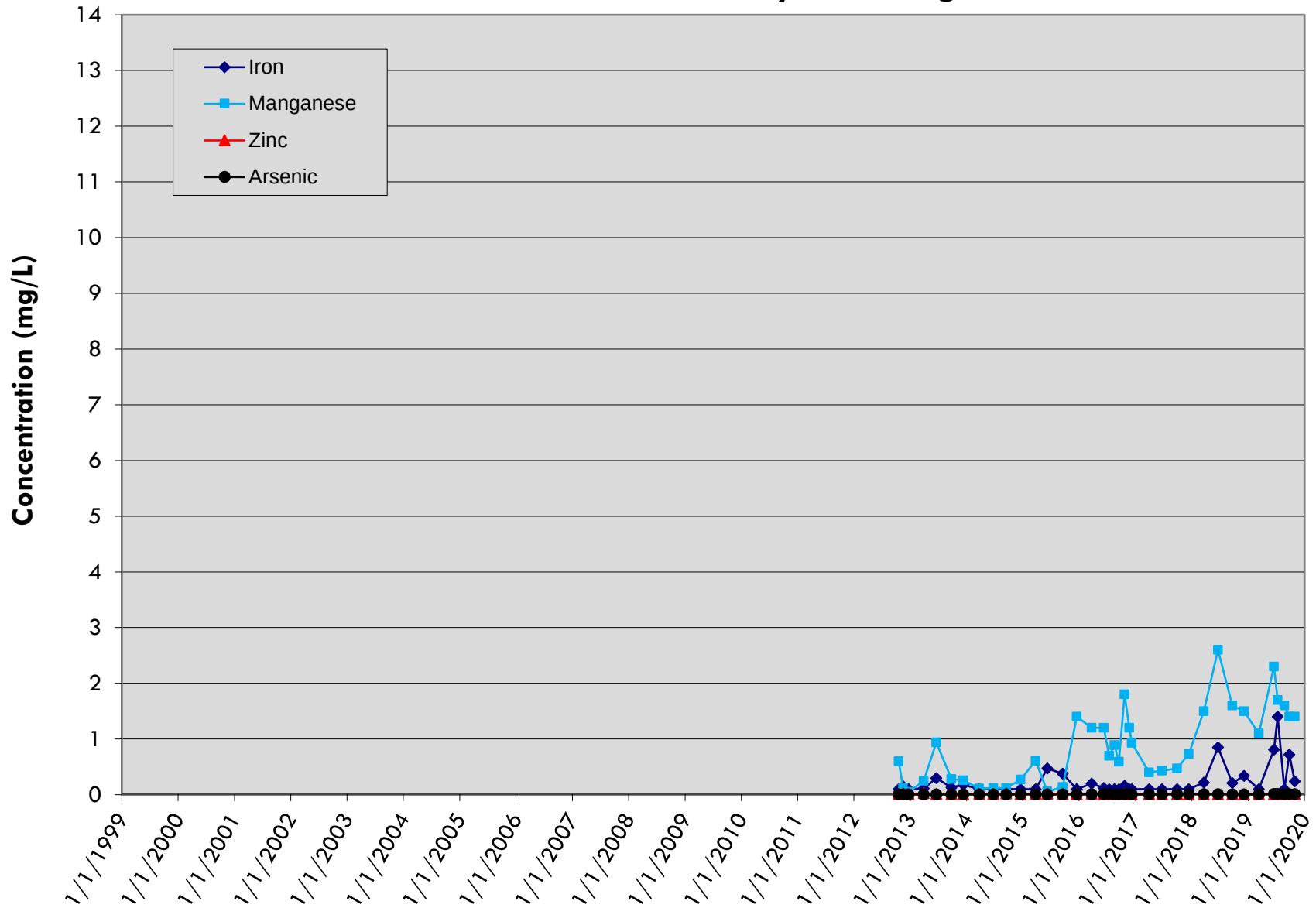
LDCS-4B

LRI Landfill, Pierce County, Washington



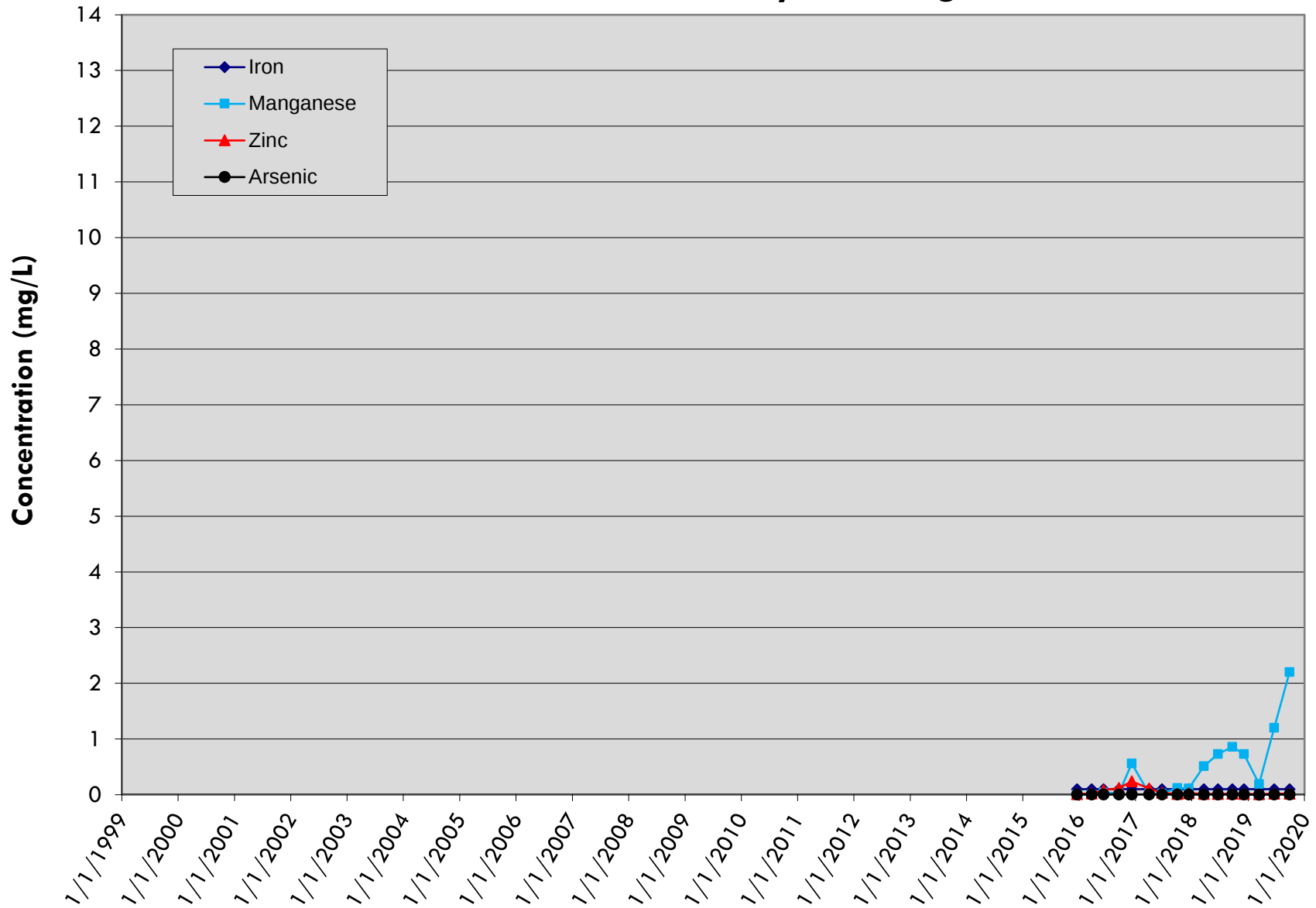
LDCS-5

LRI Landfill, Pierce County, Washington



LDCS-6A

LRI Landfill, Pierce County, Washington





Attachment H

LDCS Pumping Records and Conductivity Measurements



Summary of LDCS Volumes Pumped and Conductivity Data
Third 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)
7/1/2019	0.00	4,933	418	490	735	900	731	589	818	0	763	2,972	1,046	345	1,125	1,092	1,259
7/2/2019	0.20	4,540	424	490	735	650	722	442	818	3,760	762	4,369	1,046	802	1,125	2,070	--
7/3/2019	0.02	4,353	423	490	743	750	730	588	820	1,810	740	3,907	1,073	597	1,148	1,143	--
7/4/2019	0.00	4,805	422	490	739	800	737	578	817	140	750	2,831	1,050	407	1,135	1,213	--
7/5/2019	0.00	4,423	422	470	739	750	739	539	817	230	750	2,431	1,050	341	1,135	1,142	--
7/6/2019	0.00	4,423	422	470	739	750	739	539	817	230	730	2,431	1,040	341	1,115	1,142	--
7/7/2019	0.00	4,423	422	470	739	700	739	539	817	220	730	2,432	1,040	340	1,115	1,142	--
7/8/2019	0.00	4,713	422	500	736	650	735	599	822	1,630	730	3,161	1,040	340	1,115	1,115	--
7/9/2019	0.16	4,280	423	550	727	2800	741	738	829	1,500	896	3,146	1,040	647	992	1,074	--
7/10/2019	0.46	4,420	422	360	730	700	739	2013	830	1,490	890	5,505	1,025	1,456	985	1,109	--
7/11/2019	0.00	4,780	421	490	729	650	737	3625	786	1,800	1003	5,964	998	753	1,000	1,466	1,005
7/12/2019	0.00	4,020	422	470	734	650	738	2787	739	1,840	995	3,751	984	359	980	1,467	1,162
7/13/2019	0.00	5,030	423	470	734	700	742	2787	702	1,770	995	3,845	979	359	980	1,462	1,228
7/14/2019	0.00	9,060	423	470	734	750	741	2787	707	1,900	995	3,123	977	359	980	1,342	1,260
7/15/2019	0.20	13,330	425	440	732	650	737	2450	729	2,190	995	4,029	977	638	985	1,283	1,278
7/16/2019	0.00	18,220	428	480	738	750	738	2464	724	2,340	990	4,112	976	502	980	1,457	1,275
7/17/2019	0.16	4,460	431	350	742	750	742	2283	741	2,480	1000	3,441	975	462	970	1,482	1,273
7/18/2019	0.00	4,053	432	500	746	750	740	2215	684	2,210	760	3,321	1,085	449	1,120	1,424	--
7/19/2019	0.00	4,053	431	500	726	750	731	2215	707	2,210	760	3,321	780	449	1,130	1,424	--
7/20/2019	0.00	4,053	432	500	746	750	740	2215	684	2,210	760	3,321	780	449	1,130	1,424	--
7/21/2019	0.00	4,830	438	500	746	850	739	2215	728	2,310	760	3,106	780	449	1,130	1,424	--
7/22/2019	0.00	3,770	440	420	727	750	740	2606	739	2,180	890	2,770	740	368	1,095	1,273	--
7/23/2019	0.00	7,075	442	940	725	750	725	2606	767	4,190	860	5,097	740	662	1,080	2,323	--
7/24/2019	0.00	--	450	--	733	750	731	2606	794	--	830	--	760	--	1,090	--	--
7/25/2019	0.00	3,530	450	420	733	750	731	1810	794	2,170	845	2,141	740	344	1,085	1,086	--
7/26/2019	0.00	3,610	455	430	733	850	739	1554	802	2,030	833	2,299	743	333	1,070	1,079	--
7/27/2019	0.00	3,460	460	430	733	750	737	1554	811	2,020	833	2,190	743	336	1,070	1,086	1,285
7/28/2019	0.00	3,480	466	430	733	850	732	1554	821	2,020	833	2,040	743	339	1,070	1,025	1,286
7/29/2019	0.00	3,500	469	420	736	950	737	1488	833	2,020	837	2,056	742	334	1,074	1,020	1,285
7/30/2019	0.00	3,470	466	420	725	850	740	1357	845	1,880	830	2,605	731	336	1,080	1,008	1,284
7/31/2019	0.00	6,920	464	440	725	950	738	1195	855	1,740	830	1,913	731	337	1,080	1,023	1,285
8/1/2019	0.00	10,350	464	440	724	1000	739	1195	860	1,460	980	1,897	959	339	819	1,017	1,287
8/2/2019	0.06	13,740	464	430	727	950	739	1192	858	1,450	974	1,652	959	338	821	1,033	1,287
8/3/2019	0.00	3,350	467	420	727	850	734	1140	846	1,320	969	1,947	959	367	824	984	1,287
8/4/2019	0.00	2,530	475	420	727	850	739	1140	847	1,320	963	2,032	960	358	786	1,018	1,286
8/5/2019	0.00	3,350	480	420	728	900	741	1140	851	1,190	959	1,504	962	358	530	970	1,279
8/6/2019	0.00	3,260	482	420	729	850	733	894	852	1,200	956	323	962	339	695	987	1,281
8/7/2019	0.00	2,620	482	440	728	850	734	1025	850	1,180	950	191	977	339	785	1,033	1,283
8/8/2019	0.00	3,320	480	360	728	750	732	740	847	1,190	947	104	1,016	339	822	968	1,156
8/9/2019	0.14	2,510	481	420	738	850	726	738	843	1,040	945	5,504	1,049	319	840	938	1,238
8/10/2019	0.08	2,678	481	430	738	750	726	593	831	1,180	950	3,917	1,076	407	850	998	1,286
8/11/2019	0.13	2,678	481	430	738	750	726	592	831	1,180	950	3,917	1,076	407	850	998	1,286
8/12/2019	0.01	2,678	483	430	729	800	711	592	823	1,180	953	3,917	985	407	0	999	1,264
8/13/2019	0.00	8,210	486	360	735	700	727	577	829	1,190	956	2,569	992	385	797	1,080	1,270
8/14/2019	0.00	10,670	486	430	730	650	726	439	825	1,190	956	2,352	990	328	846	1,038	1,270
8/15/2019	0.00	13,920	489	370	728	700	724	441	822	2,370	956	4,655	991	640	858	1,032	1,175
8/16/2019	0.00	2,430	495	420	736	550	733	439	819	3,560	953	6,819	994	924	869	987	1,241
8/17/2019	0.00	2,460	499	390	736	600	733	440	816	1,050	947	2,269	997	284	877	991	1,267
8/18/2019	0.00	3,250	500	390	736	600	733	440	814	1,050	942	2,278	999	261	879	987	1,278
8/19/2019	0.00	2,400	500	390	722	600	733	441	814	1,050	940	2,129	1,002	272	878	985	1,284
8/20/2019	0.00	2,410	503	420	732	300	736	439	815	1,050	938	2,194	1,004	256	877	957	1,288
8/21/2019	0.22	2,400	505	370	720	750	744	440	815	1,050	938	2,462	1,005	255	878	945	1,290
8/22/2019	0.03	2,390	505	380	726	600	734	439	815	1,050	936	3,331	1,000	287	879	983	1,288
8/23/2019	0.01	2,320	508	410	738	450	732	304	816	1,180	934	2,818	990	286	885	1,018	1,281
8/24/2019	0.00	2,145	517	370	732	500	732	390	816	1,050	935	2,521	988	228	893	1,058	1,283
8/25/2019	0.00	2,145	517	370	732	500	732	390	817	1,050	937	2,341	989	256	899	988	1,287
8/26/2019	0.00	2,145	522	370	732	550	727	390	818	1,050	936	2,189	992	198	901	941	1,289
8/27/2019	0.00	2,978	522	500	732	550	727	534	818	1,040	933	2,201	989	198	803	990	1,291
8/28/2019	0.00	2,978	522	500	731	600	755	534	817	1,050	935	2,322	969	198	331	943	1,293
8/29/2019	0.05	2,978	530	320	725	1050	766	534	817	910	936	2,232	964	198	193	990	1,296
8/30/2019	0.03	750	530	710	638	1500	762	127	819	1,050	937	2,561	989	199	249	902	1,296
8/31/2019	0.00	750	530	370	702	400	758	127	819	1,050	935	2,322	1,037	199	606	937	1,296

Summary of LDCS Volumes Pumped and Conductivity Data
Third 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)
9/1/2019	0.00	748	0	360	727	500	759	127	818	1,050	935	2,225	1,065	227	785	941	1,236
9/2/2019	0.00	1,500	539	320	731	350	758	288	819	1,040	934	1,918	1,070	228	849	922	1,403
9/3/2019	0.00	2,240	555	360	733	400	755	439	820	920	934	1,974	1,066	199	874	840	1,464
9/4/2019	0.00	1,493	550	320	733	450	753	294	820	1,040	932	1,973	1,058	85	884	842	1,487
9/5/2019	0.00	1,743	557	360	735	400	751	345	820	1,050	927	1,910	1,051	189	891	837	1,495
9/6/2019	0.08	1,743	546	370	734	400	751	345	819	910	921	2,172	1,047	322	897	739	1,498
9/7/2019	0.38	1,740	546	320	730	1100	744	345	813	1,020	--	2,356	1,051	487	880	785	1,500
9/8/2019	0.05	1,540	560	350	741	350	753	282	820	1,050	--	2,508	1,010	544	878	785	1,500
9/9/2019	0.01	2,300	568	310	747	400	755	439	819	1,110	740	2,543	989	825	895	977	1,500
9/10/2019	0.70	1,530	570	300	746	650	757	293	820	1,220	--	2,881	981	873	890	1,301	1,500
9/11/2019	0.00	1,520	566	300	738	400	757	304	823	1,190	738	2,882	977	777	867	1,451	1,500
9/12/2019	0.34	1,530	563	360	737	700	754	338	825	1,310	--	1,916	977	328	851	1,446	1,500
9/13/2019	0.01	2,310	566	310	744	1050	752	338	824	1,190	720	2,501	981	839	835	1,444	1,500
9/14/2019	0.08	3,850	566	300	747	300	751	338	822	1,430	--	2,629	978	326	823	1,445	1,500
9/15/2019	0.79	6,190	565	380	751	400	754	293	820	1,600	--	5,555	972	2,270	810	1,875	1,500
9/16/2019	0.11	2,190	533	360	748	400	753	451	816	1,190	--	4,308	932	1,922	745	2,552	1,500
9/17/2019	0.77	1,588	530	300	743	300	753	280	818	270	--	5,125	964	1,036	755	3,579	1,500
9/18/2019	0.08	2,248	531	310	759	350	744	305	819	1,190	890	3,475	937	452	713	2,670	1,500
9/19/2019	0.01	2,043	508	320	730	400	746	292	827	570	885	2,760	1,060	339	712	1,896	1,500
9/20/2019	0.00	2,340	516	310	733	400	739	292	819	1,710	860	2,814	1,049	328	725	2,194	1,473
9/21/2019	0.00	1,760	518	310	738	350	739	292	823	530	--	2,480	1,071	299	729	1,909	1,487
9/22/2019	0.25	3,950	526	300	748	400	741	280	824	0	--	2,870	1,084	328	738	1,717	1,495
9/23/2019	0.00	6,320	520	370	747	400	746	305	824	0	900	3,029	1,090	510	746	1,759	1,498
9/24/2019	0.00	2,590	514	290	745	400	747	427	827	770	870	2,542	1,093	367	749	1,617	1,500
9/25/2019	0.00	2,390	509	360	743	450	742	293	828	1,180	904	2,461	1,077	257	754	1,478	1,500
9/26/2019	0.10	2,430	511	300	748	450	741	342	826	1,960	890	2,506	1,083	271	762	1,405	1,214
9/27/2019	0.00	2,430	503	360	747	450	742	342	823	1,970	900	2,465	1,083	297	771	1,371	1,395
9/28/2019	0.11	2,440	495	300	744	500	741	342	823	3,740	--	4,695	1,065	593	783	1,335	1,461
9/29/2019	0.01	4,870	488	360	735	400	739	291	826	4,280	--	6,625	1,039	890	830	1,272	1,486
9/30/2019	0.00	2,600	480	360	720	450	734	294	829	1,460	905	861	1,033	328	920	1,230	1,495

- = No data collected

* = Meter malfunction

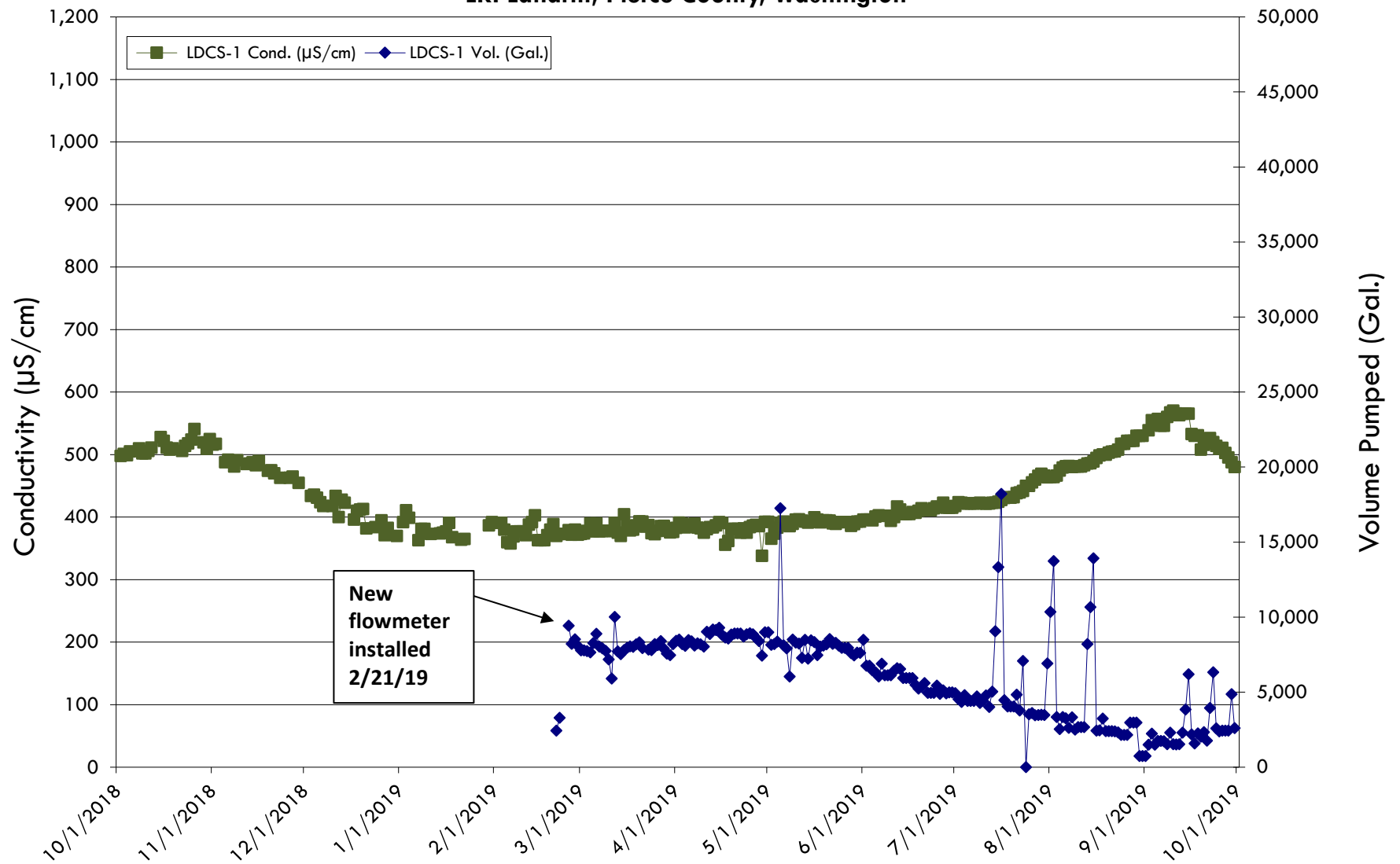
Summary of Leachate Volume and Depth Data
Third Quarter 2019
LRI Landfill, Pierce County, Washington

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.)
7/1/2019	5,706	11.5	7,763	11.2	3,196	7.9	6,700	8.6	13,212	7.6	19,800	9.0	89,242	24.3	8,652	9.9
7/2/2019	0	10.2	0	6.7	2,343	6.9	5,052	8.2	19,236	9.1	11,880	8.0	52,026	23.8	12,196	9.4
7/3/2019	2,469	11.7	0	9.8	3,482	11.1	8,574	9.2	16,944	5.1	24,480	9.0	50,918	24.3	9,704	8.5
7/4/2019	1,775	11.2	17	9.8	1,919	9.1	6,470	8.9	5,900	7.8	9,720	8.0	37,724	22.6	5,271	15.4
7/5/2019	1,536	11.2	2,942	9.8	2,268	9.1	6,541	9.0	9,317	7.9	39,600	1.0	19,364	22.6	8,776	9.2
7/6/2019	1,536	11.2	2,942	9.8	2,268	9.1	6,541	9.0	9,317	7.9	8,820	1.0	19,634	22.6	8,776	9.2
7/7/2019	1,536	11.2	2,942	9.8	2,268	9.1	6,541	9.0	9,317	7.9	8,820	1.0	19,634	22.6	8,776	9.2
7/8/2019	2,964	11.6	0	12.5	5,783	15.0	7,734	11.1	8,624	12.6	8,820	10.0	57,804	23.1	11,524	14.1
7/9/2019	2,286	11.0	0	11.2	3,569	9.9	7,326	8.0	11,624	9.0	26,460	9.9	33,238	21.1	10,100	11.4
7/10/2019	3,134	10.8	4,981	12.5	3,122	9.2	844	13.0	3,665	14.9	7,200	11.3	41,538	12.2	9,551	14.2
7/11/2019	4,090	10.0	4,630	10.0	3,364	9.7	12,773	22.3	14,364	17.4	21,060	13.6	31,184	18.2	20,015	15.8
7/12/2019	1,781	10.7	0	7.1	2,886	8.8	17,272	17.8	14,682	11.8	17,880	13.3	30,903	15.5	10,081	10.1
7/13/2019	1,781	10.8	0	7.1	2,886	9.6	9,702	10.4	11,724	10.0	17,880	12.2	30,903	15.5	8,829	10.3
7/14/2019	1,781	11.1	0	7.1	2,886	9.5	8,483	9.5	9,788	10.2	17,880	10.9	30,903	15.5	5,646	11.3
7/15/2019	1,756	10.7	2,862	11.8	3,942	9.5	2,074	13.0	2,538	15.2	31,320	11.9	43,386	21.7	4,963	16.5
7/16/2019	6,458	9.9	7,533	10.3	3,024	8.7	12,341	19.1	15,157	16.4	34,560	13.6	35,302	25.5	23,508	15.0
7/17/2019	1,515	10.6	0	6.8	3,083	8.6	8,023	10.0	15,700	8.4	14,580	8.8	23,490	21.9	9,759	9.2
7/18/2019	1,038	11.3	0	6.8	3,364	10.1	5,148	8.3	13,648	7.7	17,415	8.0	42,512	21.0	11,059	8.3
7/19/2019	1,825	11.0	0	8.3	2,934	9.8	8,607	11.9	11,875	7.7	17,415	9.0	36,371	19.8	9,688	8.6
7/20/2019	1,825	11.0	0	8.3	2,934	9.8	8,607	11.9	11,875	7.7	17,415	9.0	36,371	19.8	9,688	8.6
7/21/2019	1,825	10.9	7,882	8.3	2,934	8.6	5,683	10.0	12,183	8.0	17,415	8.3	36,371	19.8	9,688	8.6
7/22/2019	2,200	11.1	0	6.3	3,100	8.6	5,713	10.1	12,753	7.0	13,770	8.2	19,368	25.2	9,428	9.8
7/23/2019	8,147	11.6	0	7.6	6,602	11.0	6,374	8.5	25,314	7.8	21,600	9.0	41,150	26.5	9,454	9.6
7/24/2019	1,568	11.6	0	7.6	1,560	11.0	6,374	8.5	25,314	7.8	21,600	9.0	41,150	26.5	9,454	9.6
7/25/2019	1,568	11.6	1,051	7.6	1,560	11.0	6,190	8.5	19,012	7.8	18,360	9.0	49,456	26.5	9,848	9.6
7/26/2019	1,568	11.0	0	11.0	1,800	8.8	6,190	9.0	15,742	8.4	19,260	8.9	33,573	16.6	9,589	8.8
7/27/2019	1,568	10.9	0	11.0	1,800	8.8	8,174	9.0	12,551	6.4	19,260	8.3	33,573	16.6	9,149	8.9
7/28/2019	1,568	11.0	6,781	11.0	1,800	14.0	7,484	8.8	12,374	6.1	19,260	8.3	33,573	16.6	9,207	9.0
7/29/2019	2,530	10.7	0	10.5	0	17.6	5,743	8.6	12,853	6.6	17,550	8.2	20,744	24.8	9,409	9.9
7/30/2019	4,450	10.4	8,120	11.6	0	18.0	5,953	10.5	14,395	9.4	30,510	8.4	47,096	20.4	9,479	9.3
7/31/2019	1,396	10.8	0	6.8	0	18.6	6,358	8.6	18,026	7.6	17,820	8.4	30,254	26.0	9,626	9.4
8/1/2019	1,396	10.9	0	8.3	0	19.2	5,595	8.8	13,791	6.8	19,800	8.4	30,254	17.4	9,595	9.3
8/2/2019	2,165	10.5	0	9.6	5	19.2	7,447	11.0	13,609	8.5	17,280	9.7	17,982	13.4	9,717	9.6
8/3/2019	2,492	10.9	0	9.6	7,003	19.2	8,713	9.0	13,335	6.3	15,180	8.1	25,989	11.6	9,635	9.2
8/4/2019	2,492	11.3	0	9.6	7,003	19.2	6,426	8.7	11,949	6.4	15,180	8.3	25,989	19.3	10,094	8.9
8/5/2019	2,492	11.0	7,799	8.8	7,003	7.1	6,483	8.7	11,257	8.4	15,180	8.7	25,989	22.8	10,068	9.5
8/6/2019	2,085	11.0	0	9.5	2,472	10.8	6,360	8.9	15,992	7.3	13,320	8.3	42,092	18.4	9,928	9.6
8/7/2019	1,497	10.7	0	10.6	3,604	7.6	6,437	9.1	15,240	6.7	11,150	8.6	18,900	19.6	9,973	9.5
8/8/2019	3,420	11.0	0	11.9	3,183	7.6	5,731	9.2	12,231	6.3	10,800	8.4	51,362	20.0	9,840	9.1
8/9/2019	2,020	10.9	8,092	7.2	3,523	6.4	1,822	8.9	11,861	6.8	14,040	8.4	22,342	22.5	9,861	9.6
8/10/2019	2,076	6.5	0	7.2	2,828	6.4	6,535	8.2	12,973	6.6	10,800	9.0	9,922	24.1	11,064	9.7
8/11/2019	2,076	6.5	0	7.2	2,828	6.4	6,535	8.2	12,973	6.6	14,640	9.0	9,922	24.1	11,064	9.7
8/12/2019	2,076	11.1	0	11.2	2,828	10.3	6,535	8.0	12,973	6.1	14,640	8.0	9,922	26.6	11,064	9.1
8/13/2019	3,002	11.0	7,645	6.8	3,266	9.4	9,527	9.7	14,034	7.0	14,640	8.3	77,940	22.3	10,486	10.1
8/14/2019	1,137	11.1	0	8.1	3,476	7.1	8,625	8.9	12,441	7.4	11,160	8.6	26,030	17.4	10,333	9.8
8/15/2019	2,520	10.7	0	9.9	2,133	11.7	10,438	12.0	22,693	7.8	12,420	8.6	28,300	15.0	10,158	9.7
8/16/2019	2,896	10.7	1,502	10.7	3,405	9.7	6,304	9.5	33,220	8.1	13,680	8.7	40,822	11.1	10,458	9.5
8/17/2019	2,482	11.0	0	10.7	3,041	9.7	8,026	9.5	13,847	8.3	13,680	8.6	9,858	9.9	10,612	9.5
8/18/2019	2,482	11.0	0	10.7	3,041	9.7	13,309	9.1	11,397	8.0	13,680	8.3	7,490	19.4	10,624	8.9
8/19/2019	2,482	10.8	5,930	9.6	3,041	10.6	6,611	9.0	11,415	7.5	13,680	8.4	9,924	23.4	10,223	9.7
8/20/2019	3,544	11.0	0	11.2	2,721	11.9	7,080	10.0	15,104	9.4	14,760	8.9	19,416	23.4	10,478	9.9
8/21/2019	2,331	10.7	7,626	6.6	3,333	10.5	7,837	9.6	19,716	11.4	14,040	8.5	10,152	22.7	10,642	9.5
8/22/2019	2,903	11.1	0	7.9	3,133	10.1	6,757	9.2	14,575	8.7	19,090	8.6	11,240	20.2	11,611	10.2
8/23/2019	2,504	11.2	0	10.4	2,778	11.3	6,948	9.1	11,428	8.1	19,090	8.3	6,966	19.6	11,258	9.2
8/24/2019	2,085	10.8	0	10.4	3,068	11.3	6,361	8.6	13,361	7.6	19,090	8.4	5,014	22.4	10,407	9.5
8/25/2019	2,085	10.8	0	10.4	3,068	11.3	7,114	9.1	10,889	7.2	19,090	8.1	8,906	27.7	10,225	9.0
8/26/2019	2,085	6.7	8,642	10.4	3,068	10.4	6,862	9.3	10,550	8.0	19,090	9.2	15,830	31.8	10,240	9.7
8/27/2019	3,011	6.7	0	10.4	4,330	10.4	6,375	9.1	11,785	7.9	19,090	8.4	13,234	31.5	10,491	8.8
8/28/2019	3,011	6.7	0	9.2	2,444	10.4	6,813	9.0	13,571	9.1	19,090	9.0	15,190	27.9	10,564	9.9
8/29/2019	3,011	11.7	0	11.0	5,664	10.9	8,938	8.9	15,876	9.0	19,090	8.6	11,964	22.1	10,274	9.4
8/30/2019	1,742	11.7	7,580	7.5	9,486	10.9	4,976	9.0	11,732	8.1	4,186	8.7	7,794	15.3	10,566	9.2
8/31/2019	1,742	11.7	0	8.0	2,464	10.9	5,557	8.2	21,851	12.8	7,125	8.5	5,018	11.2	10,242	9.0

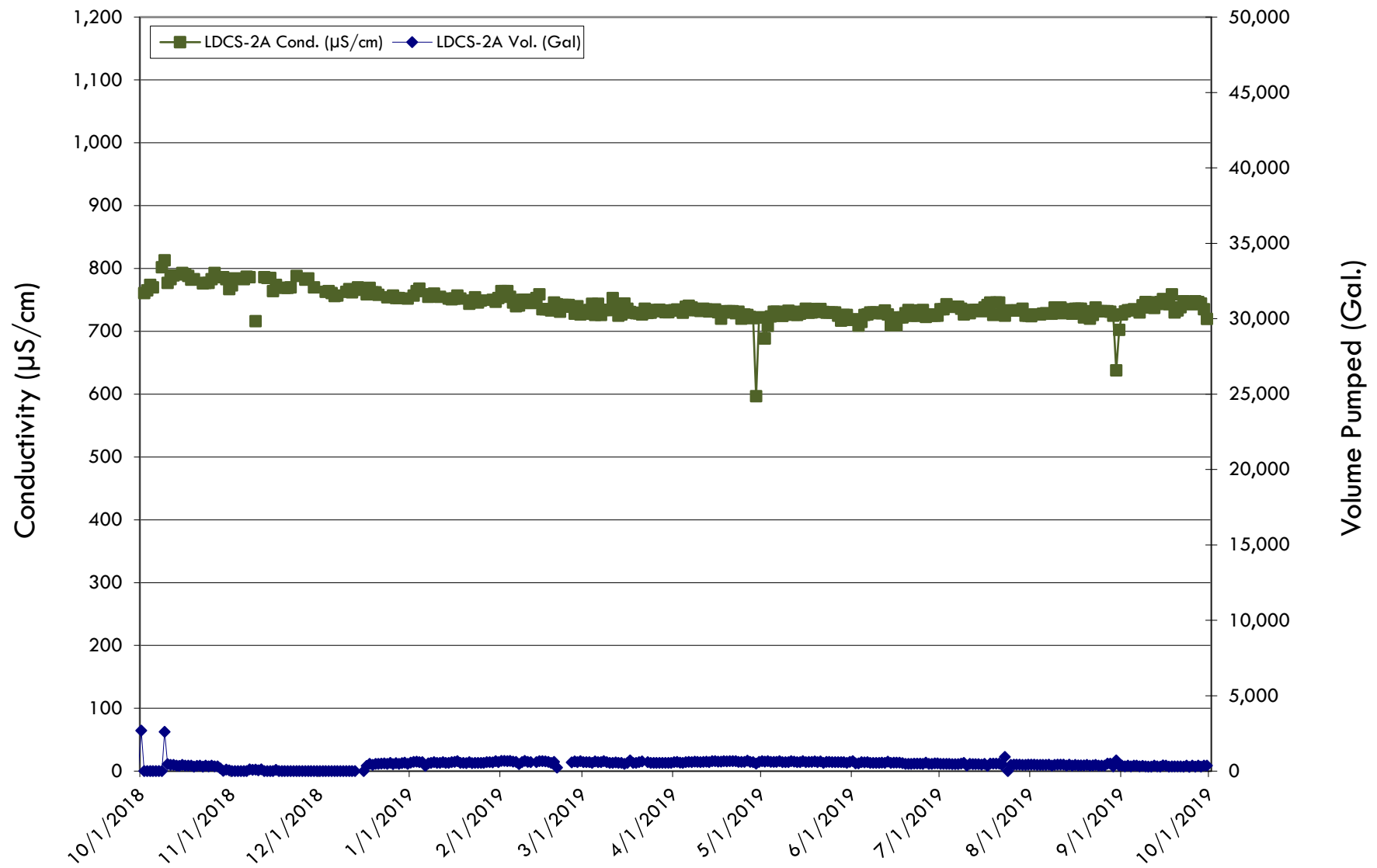
**Summary of Leachate Volume and Depth Data
Third Quarter 2019
LRI Landfill, Pierce County, Washington**

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.)
9/1/2019	3,300	0.0	0	9.4	2,801	8.5	7,503	8.9	13,334	8.0	4,984	8.4	16,578	16.4	10,428	9.1
9/2/2019	2,833	11.8	0	10.5	5,851	9.6	6,440	9.3	14,152	9.0	7,723	7.9	11,632	23.7	10,052	9.6
9/3/2019	2,237	11.0	7,996	9.7	3,531	8.6	6,240	9.1	12,319	8.5	6,097	8.8	8,044	21.1	10,169	9.8
9/4/2019	2,641	11.1	0	7.2	3,196	8.7	5,182	9.1	10,802	7.6	6,030	8.3	7,534	18.4	10,190	9.3
9/5/2019	2,203	7.5	0	8.5	4,471	8.9	2,095	8.9	16,154	9.0	6,485	8.6	7,634	16.0	10,439	9.6
9/6/2019	2,203	11.0	0	9.6	2,974	8.6	7,126	8.2	13,473	7.8	6,600	8.4	10,296	19.1	10,780	9.2
9/7/2019	2,203	11.0	9,160	9.5	3,298	11.5	5,639	7.4	11,403	7.5	7,158	9.0	23,715	21.3	16,017	9.7
9/8/2019	2,604	11.4	0	6.3	3,444	8.6	15,956	9.6	10,136	8.0	8,838	8.1	10,870	26.7	19,365	9.1
9/9/2019	1,205	11.3	0	7.3	3,107	8.6	21,746	9.0	10,817	8.8	6,007	8.5	10,574	28.3	19,002	11.9
9/10/2019	3,262	10.8	0	8.5	6,361	8.6	15,656	8.6	10,646	7.5	9,298	8.2	8,066	28.2	15,522	12.6
9/11/2019	1,610	11.1	0	9.5	2,175	8.4	11,984	9.3	9,698	7.7	9,210	8.4	17,180	27.9	15,486	17.7
9/12/2019	2,779	11.1	0	11.3	5,782	9.2	18,969	8.6	10,049	7.5	6,364	8.5	12,454	26.7	11,967	15.5
9/13/2019	1,808	11.1	7,571	7.6	8,185	8.7	18,969	11.4	11,466	8.2	7,087	8.7	16,054	25.8	14,377	19.2
9/14/2019	5,077	10.9	0	8.1	3,082	8.5	18,969	8.0	13,495	9.6	7,653	8.4	13,572	26.4	16,908	15.5
9/15/2019	7,547	11.1	0	9.7	3,790	8.6	14,782	9.2	9,529	9.9	8,353	8.2	11,008	31.2	19,009	18.0
9/16/2019	3,586	11.9	0	11.5	5,175	11.8	7,922	18.3	10,723	11.8	6,914	10.0	40,456	32.4	19,136	22.3
9/17/2019	1,658	12.3	0	11.5	2,402	15.5	15,192	24.6	9,396	14.1	8,053	10.0	38,290	36.8	19,876	11.8
9/18/2019	1,954	11.7	0	6.7	3,142	12.4	18,018	30.5	12,724	11.9	9,541	12.0	38,596	34.3	19,221	15.7
9/19/2019	2,584	11.8	0	8.0	3,280	15.1	21,513	31.2	13,547	17.2	7,844	13.0	39,997	33.4	14,251	14.4
9/20/2019	3,260	10.5	0	10.0	3,280	8.3	15,494	28.8	11,737	12.3	8,379	11.6	16,416	20.3	11,719	9.9
9/21/2019	1,545	11.2	0	10.8	3,280	9.1	35,391	19.1	13,060	9.8	8,857	8.0	15,846	18.7	12,119	9.3
9/22/2019	4,491	11.0	7,659	7.2	3,398	8.7	12,227	8.6	12,484	9.7	6,631	8.3	18,878	22.6	16,426	9.1
9/23/2019	6,750	11.0	0	7.5	8,833	8.6	15,120	9.8	10,457	9.8	7,611	8.4	13,696	23.4	11,867	9.5
9/24/2019	4,050	10.6	0	9.2	3,106	10.4	11,976	11.1	11,148	9.7	6,277	9.0	15,748	14.8	11,227	9.7
9/25/2019	1,355	10.9	0	10.5	3,875	9.2	8,305	9.1	15,607	9.7	4,715	8.2	13,620	8.9	10,906	9.5
9/26/2019	3,908	10.8	7,915	10.1	3,135	10.0	12,242	9.6	11,193	9.6	6,903	8.5	13,138	9.3	12,892	9.9
9/27/2019	2,083	10.9	0	7.3	3,135	9.4	11,081	11.2	16,117	11.7	6,979	9.0	19,316	9.8	11,148	9.8
9/28/2019	1,924	11.2	0	8.5	3,135	9.2	11,391	9.9	14,448	9.9	6,864	8.6	28,882	16.3	12,235	9.8
9/29/2019	3,646	11.0	1	9.8	2,865	8.7	9,952	8.5	10,324	7.4	5,876	8.6	42,182	23.5	10,810	9.3
9/30/2019	3,625	10.6	0	10.9	3,188	9.6	13,388	8.8	10,380	7.9	6,861	8.8	11,118	25.1	10,035	10.3

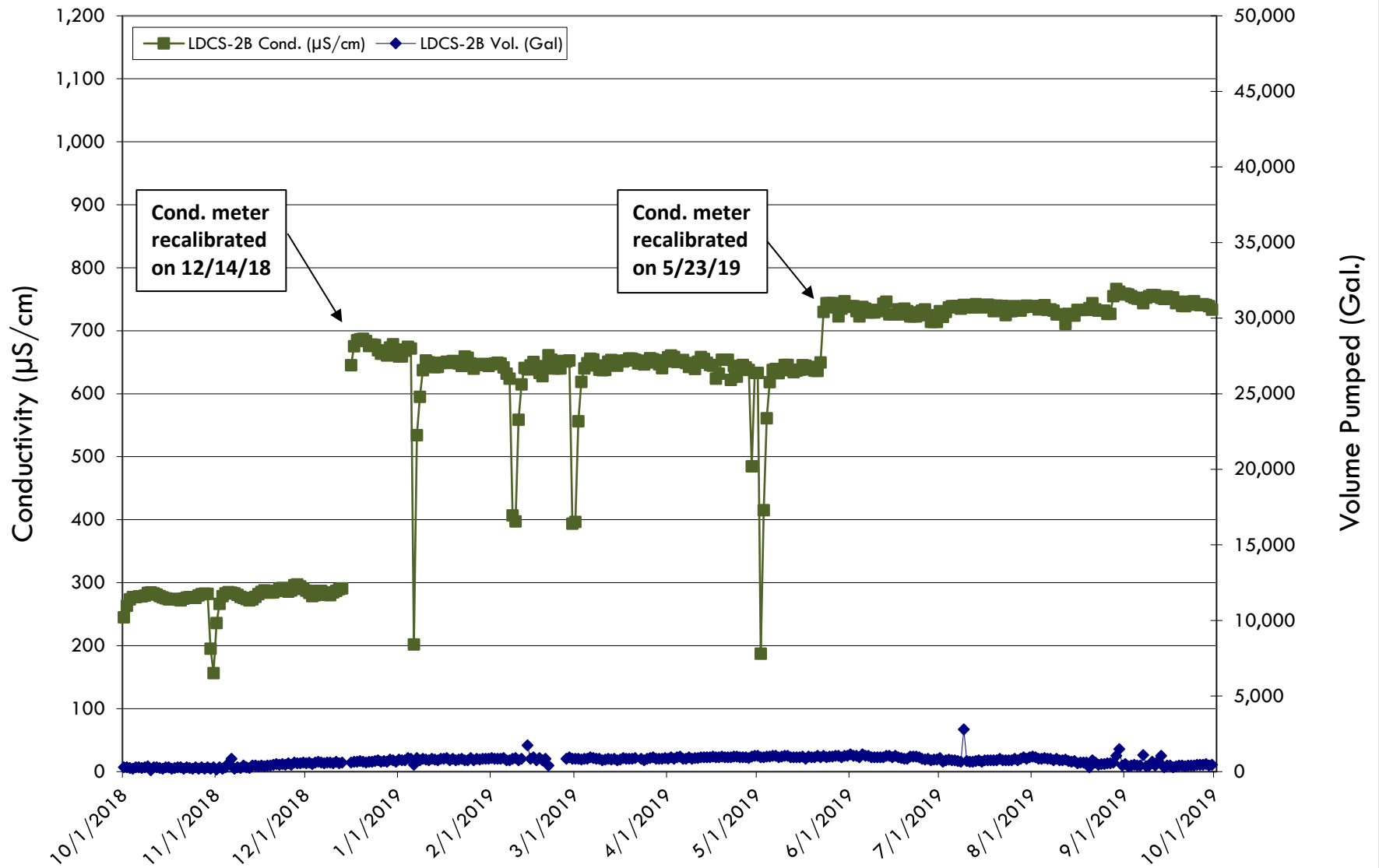
LDCS-1 (DailyTotals)
Conductivity vs Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



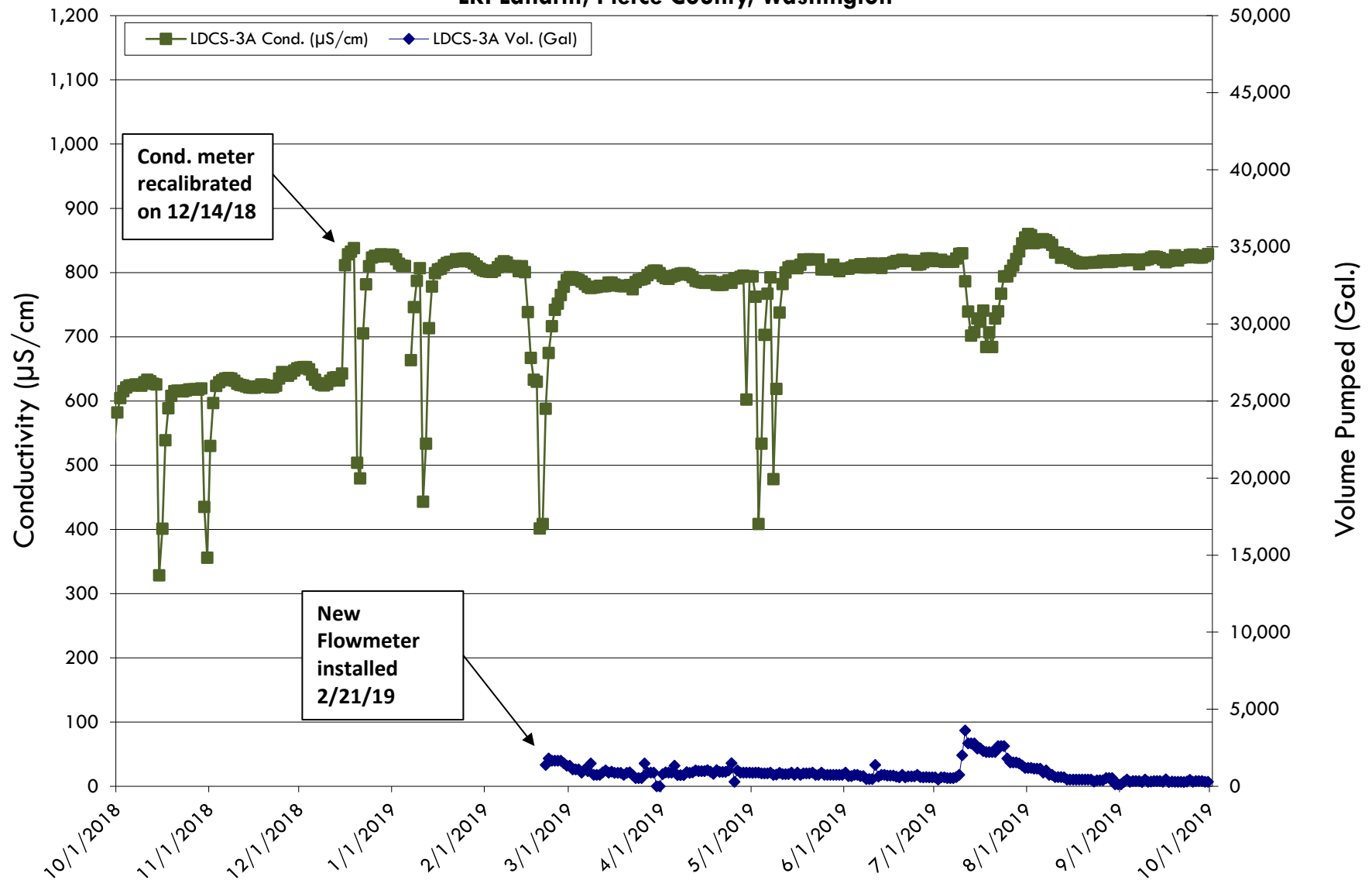
LDCS-2A (Daily Totals)
Conductivity vs Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



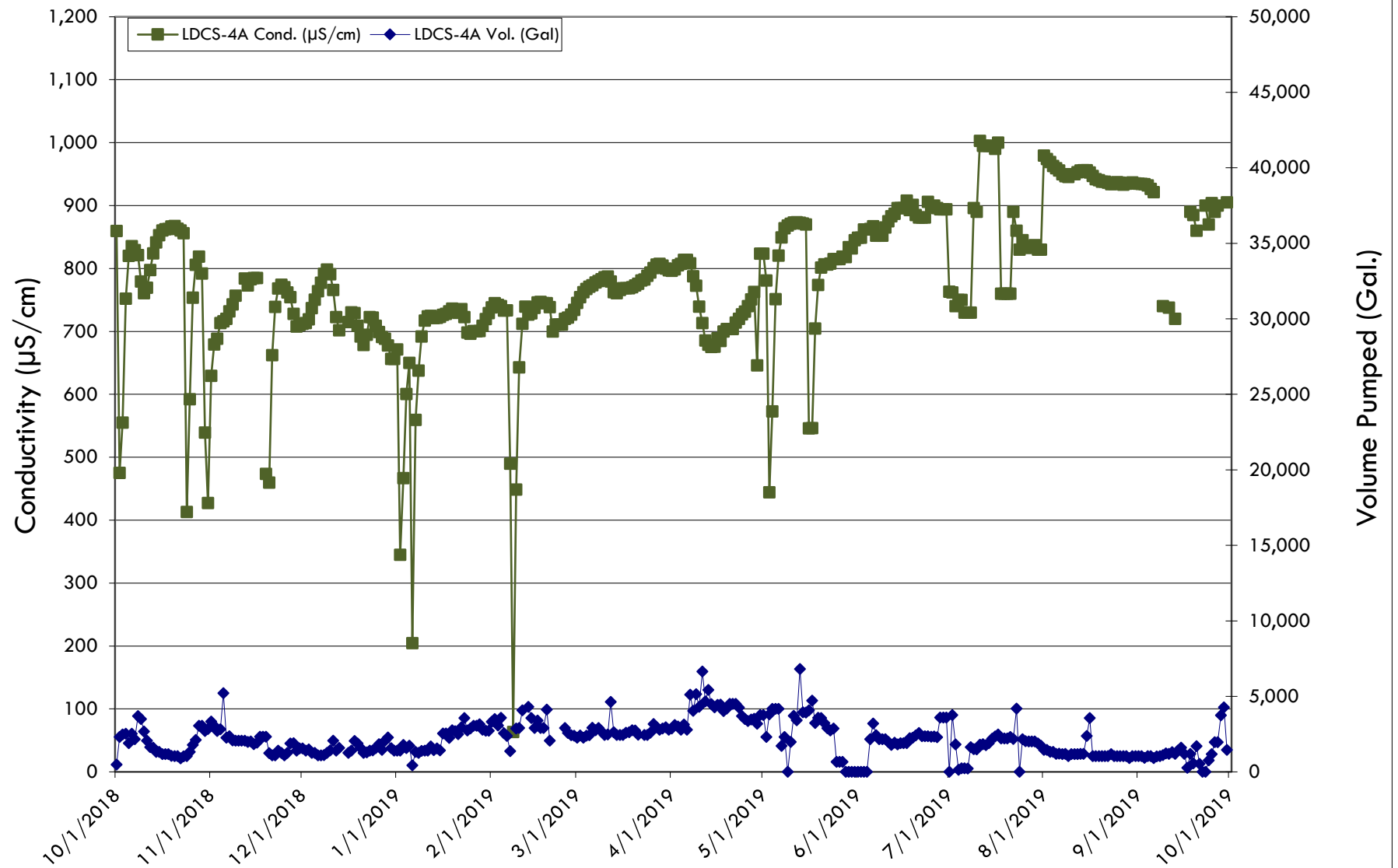
LDCS-2B (Daily Totals)
Conductivity vs Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



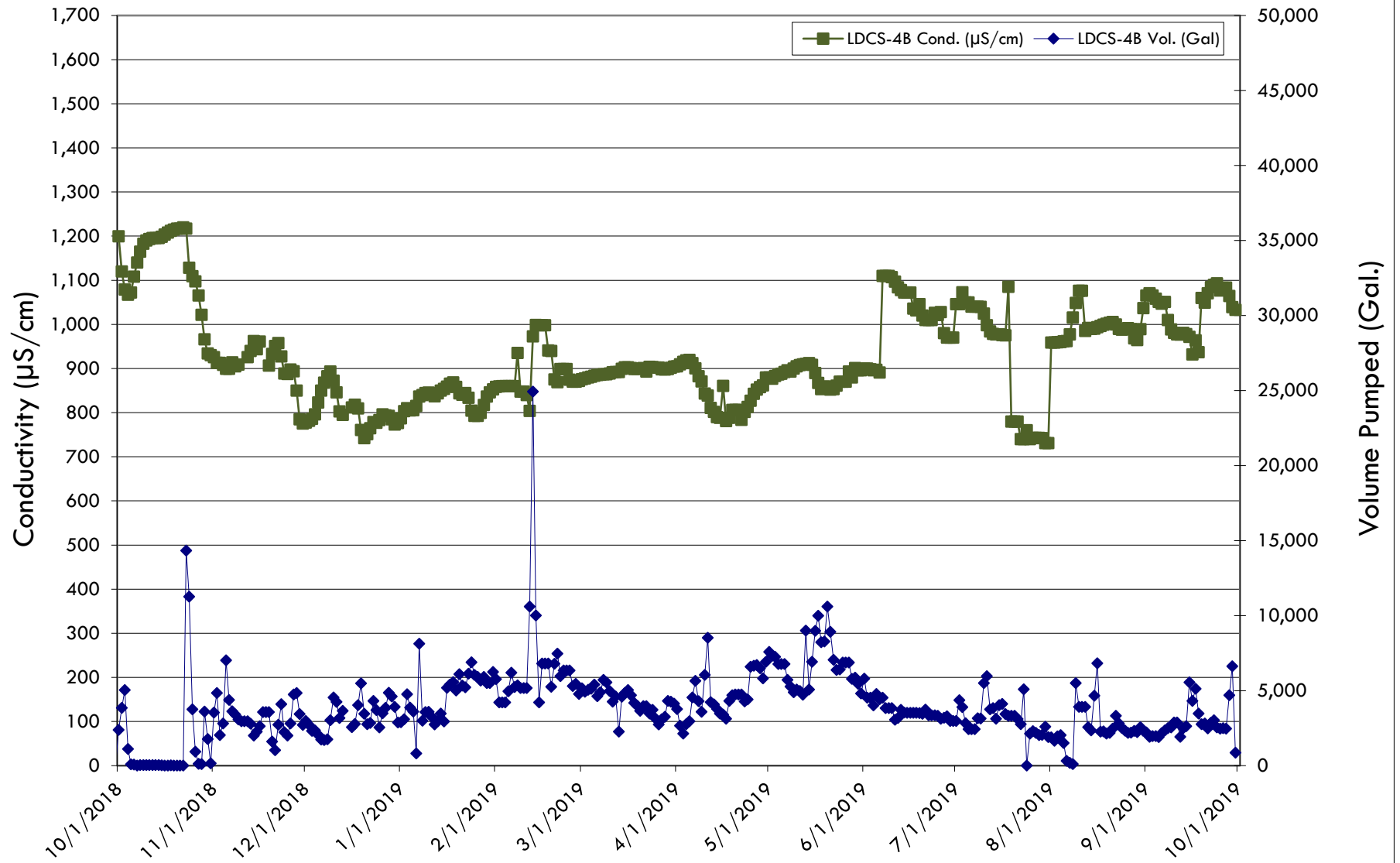
LDCS-3A (Daily Totals)
Conductivity vs Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



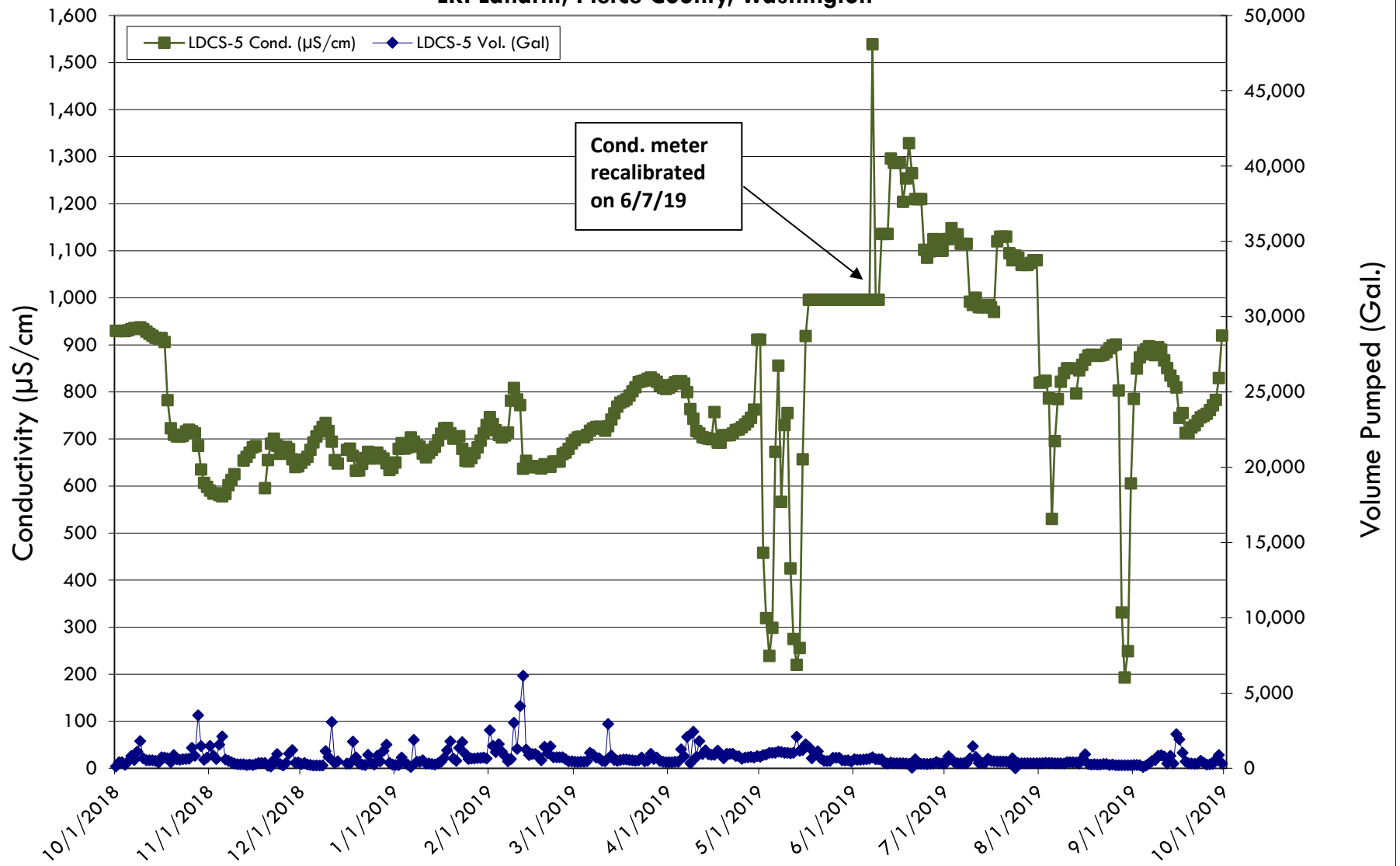
LDCS-4A (Daily Totals)
Conductivity vs Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



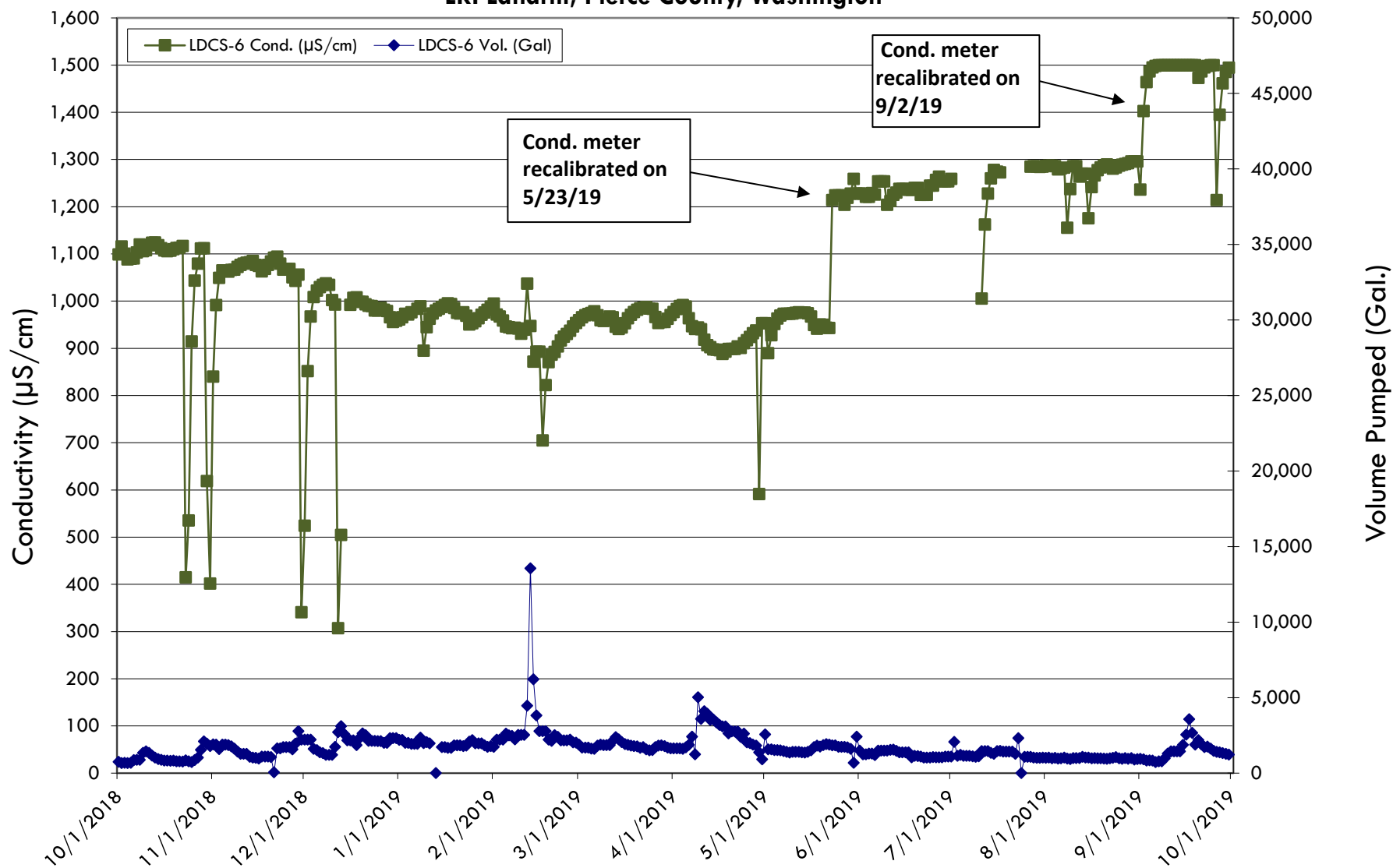
LDCS-4B (Daily Totals)
Conductivity vs Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



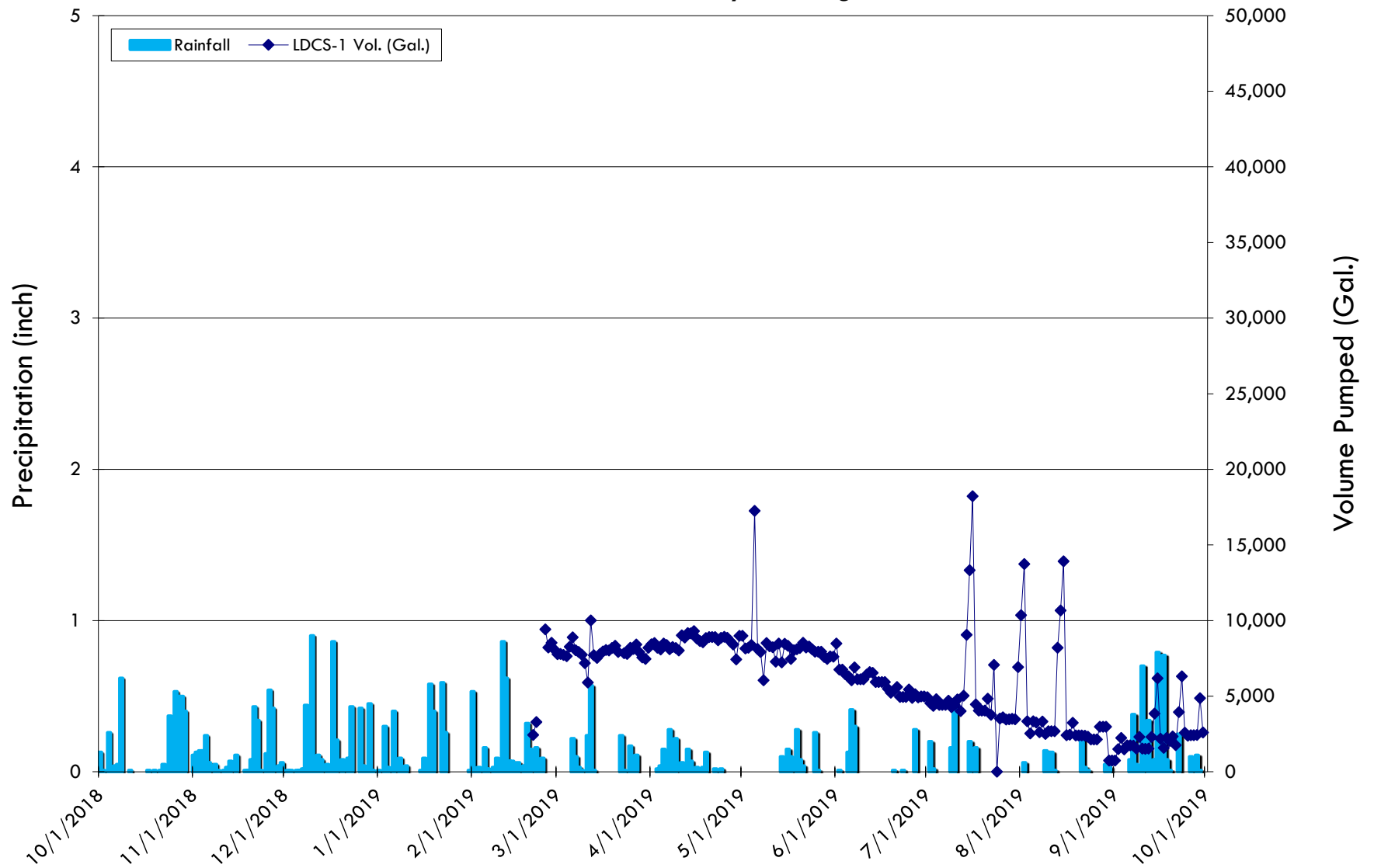
LDCS-5 (Daily Totals)
Conductivity vs Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



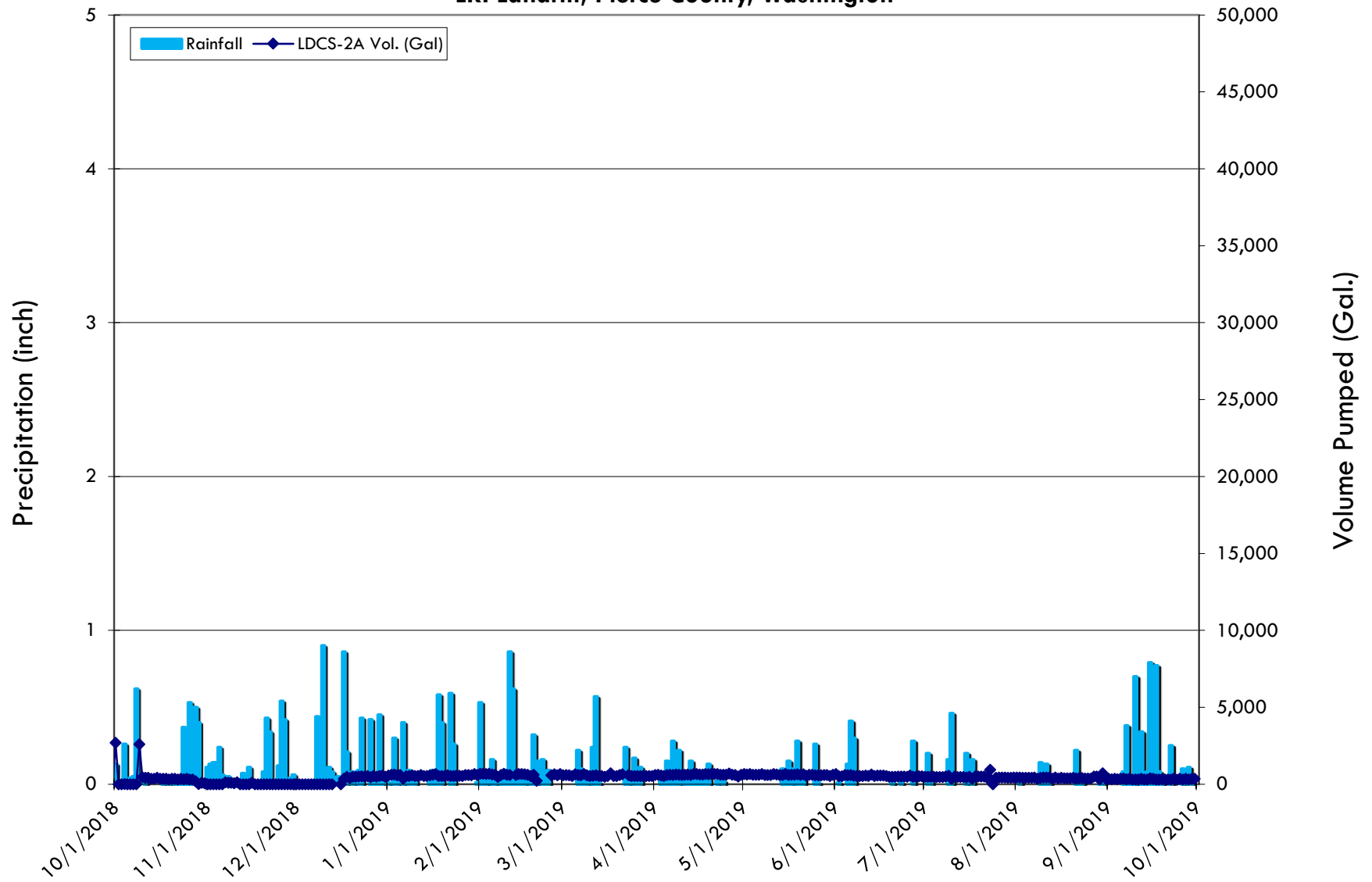
LDCS-6 (Daily Totals)
Conductivity vs Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



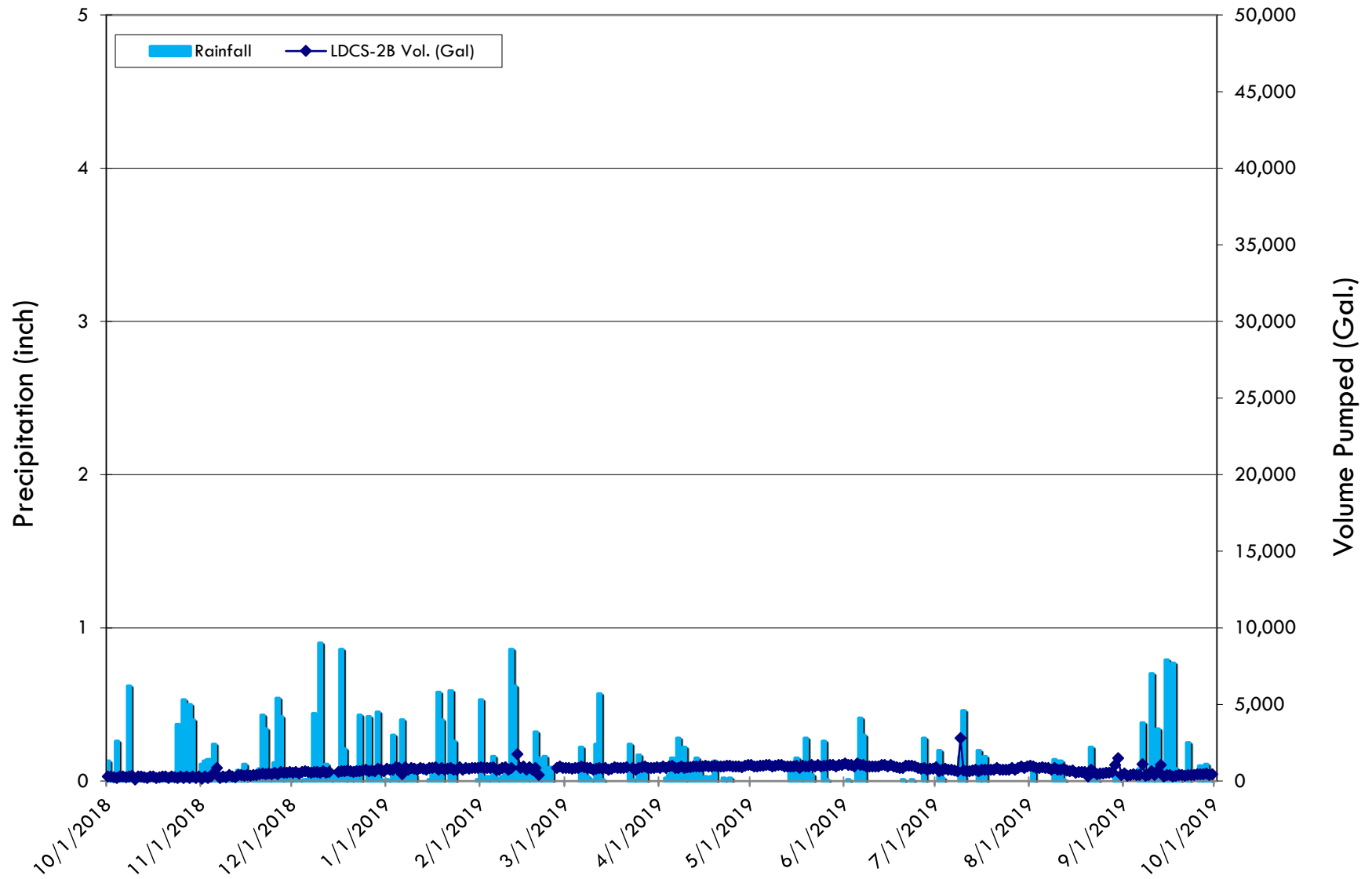
**LDCS-1 (Daily Totals)
Volume Pumped vs Precipitation
Third Quarter 2019
LRI Landfill, Pierce County, Washington**



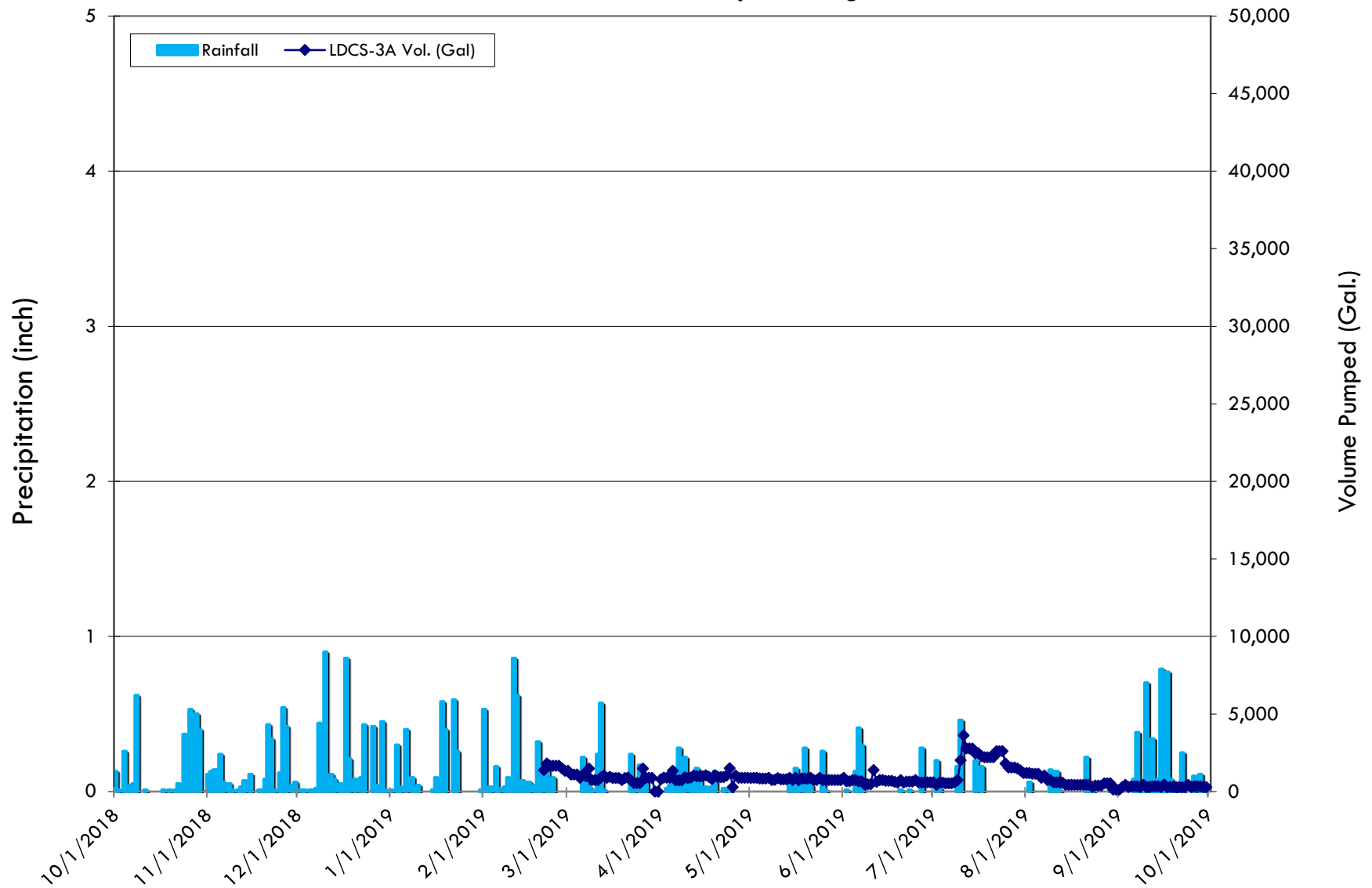
LDCS-2A (Daily Totals)
Volume Pumped vs Precipitation
Third Quarter 2019
LRI Landfill, Pierce County, Washington



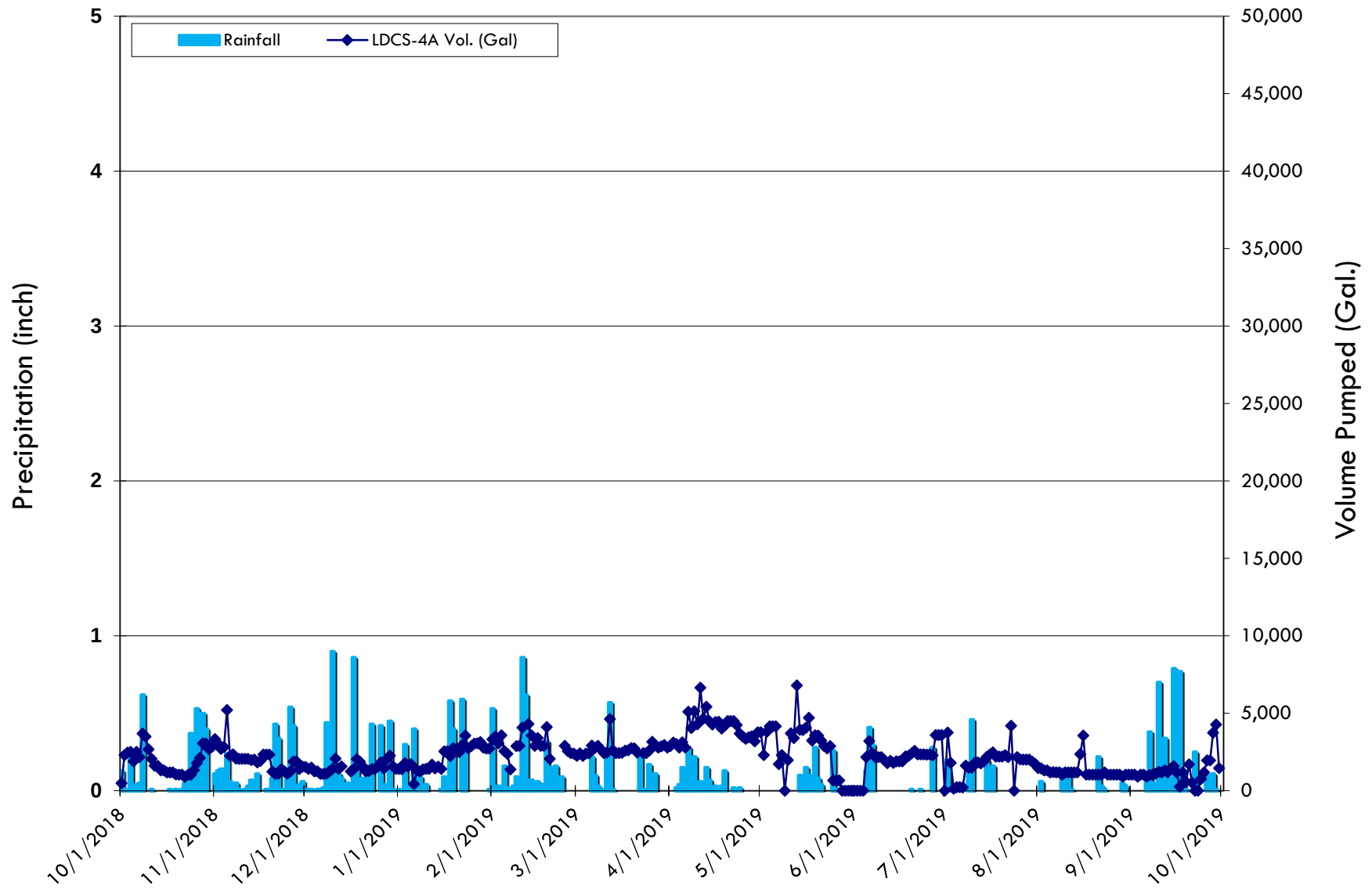
**LDCS-2B (Daily Totals)
Volume Pumped vs Precipitation
Third Quarter 2019
LRI Landfill, Pierce County, Washington**



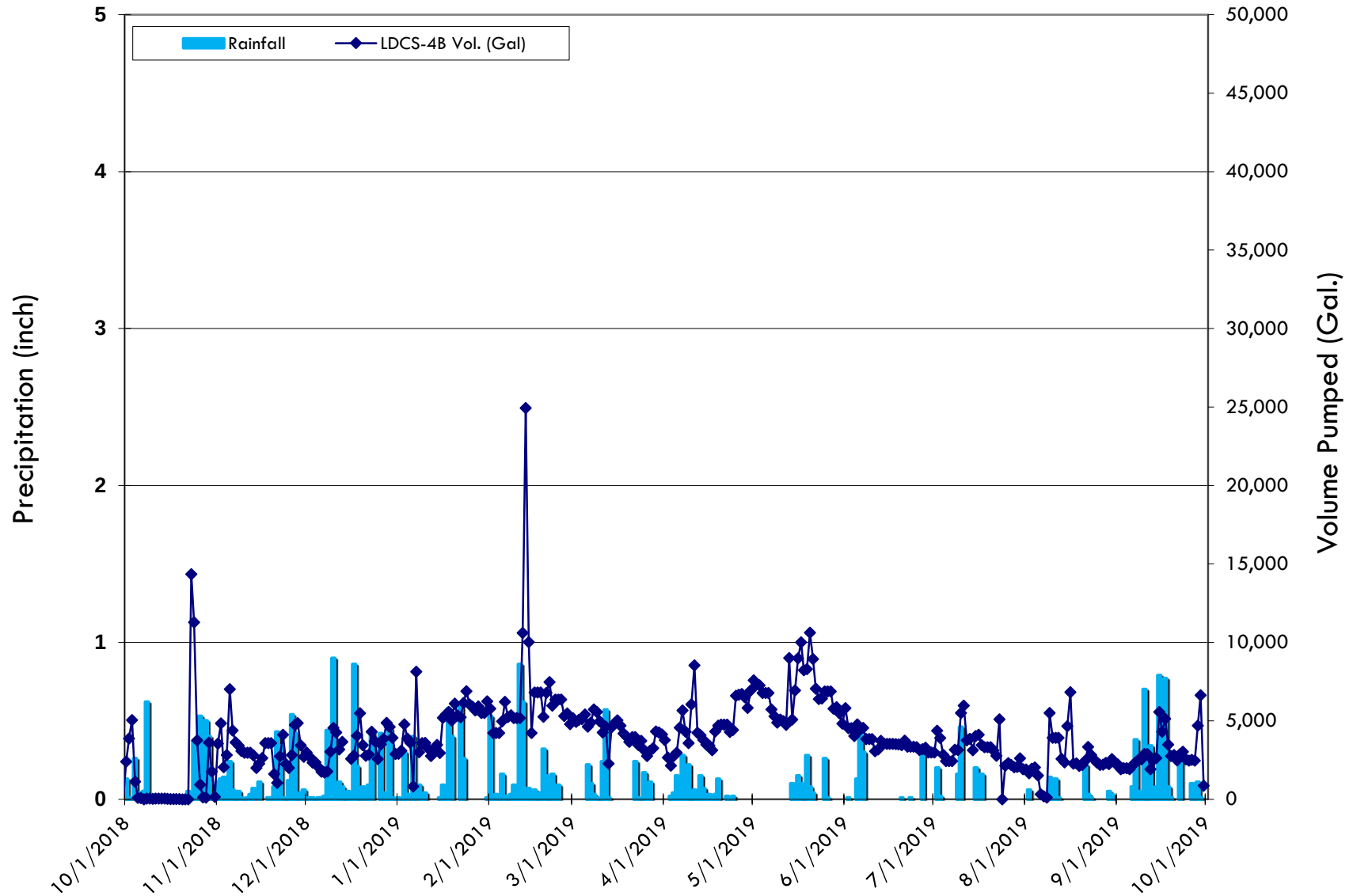
LDCS-3A (Daily Totals)
Volume Pumped vs Precipitation
Third Quarter 2019
LRI Landfill, Pierce County, Washington



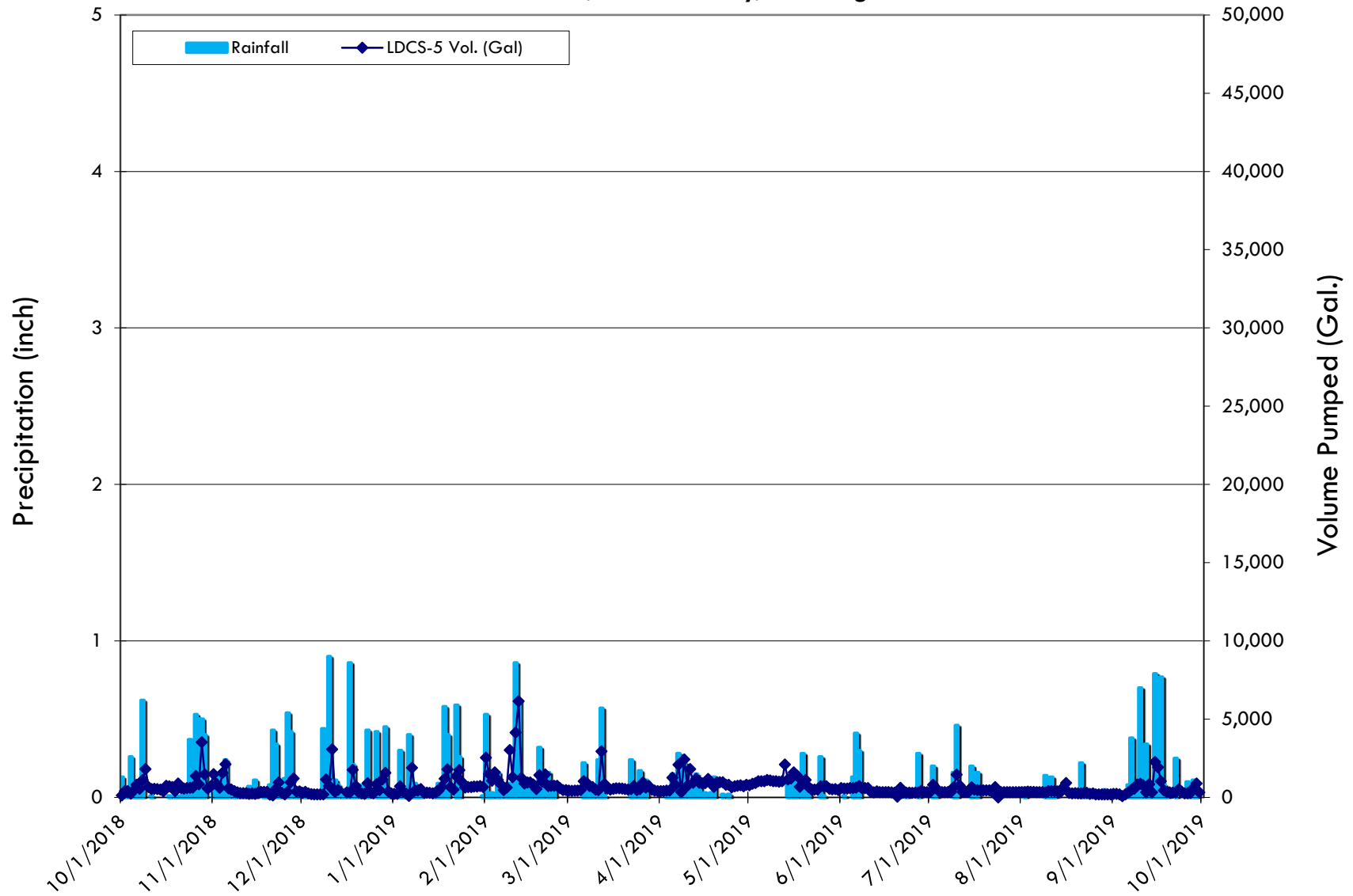
LDCS-4A (Daily Totals)
Volume Pumped vs Precipitation
Third Quarter 2019
LRI Landfill, Pierce County, Washington



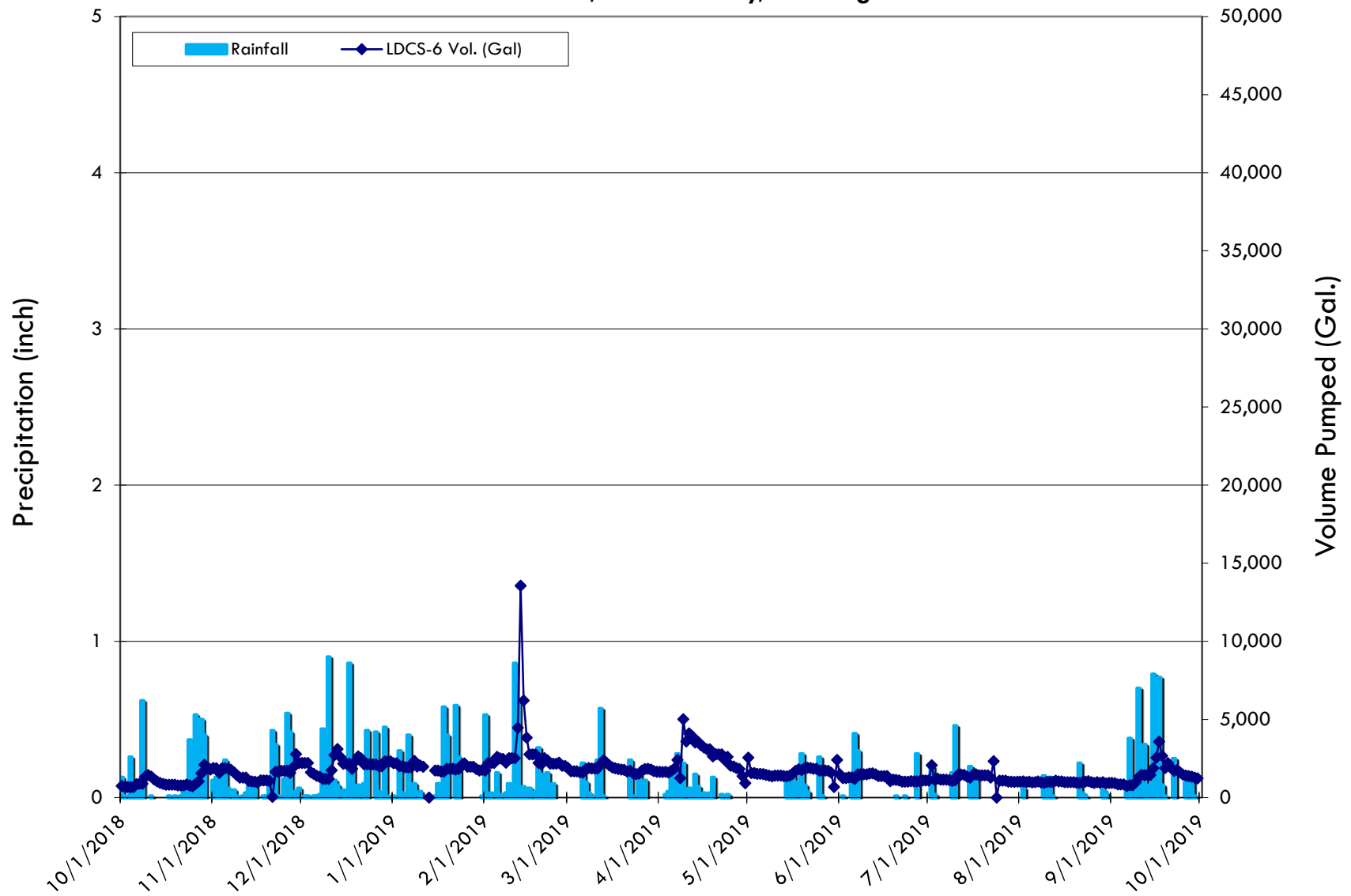
LDCS-4B (Daily Totals)
Volume Pumped vs Precipitation
Third Quarter 2019
LRI Landfill, Pierce County, Washington



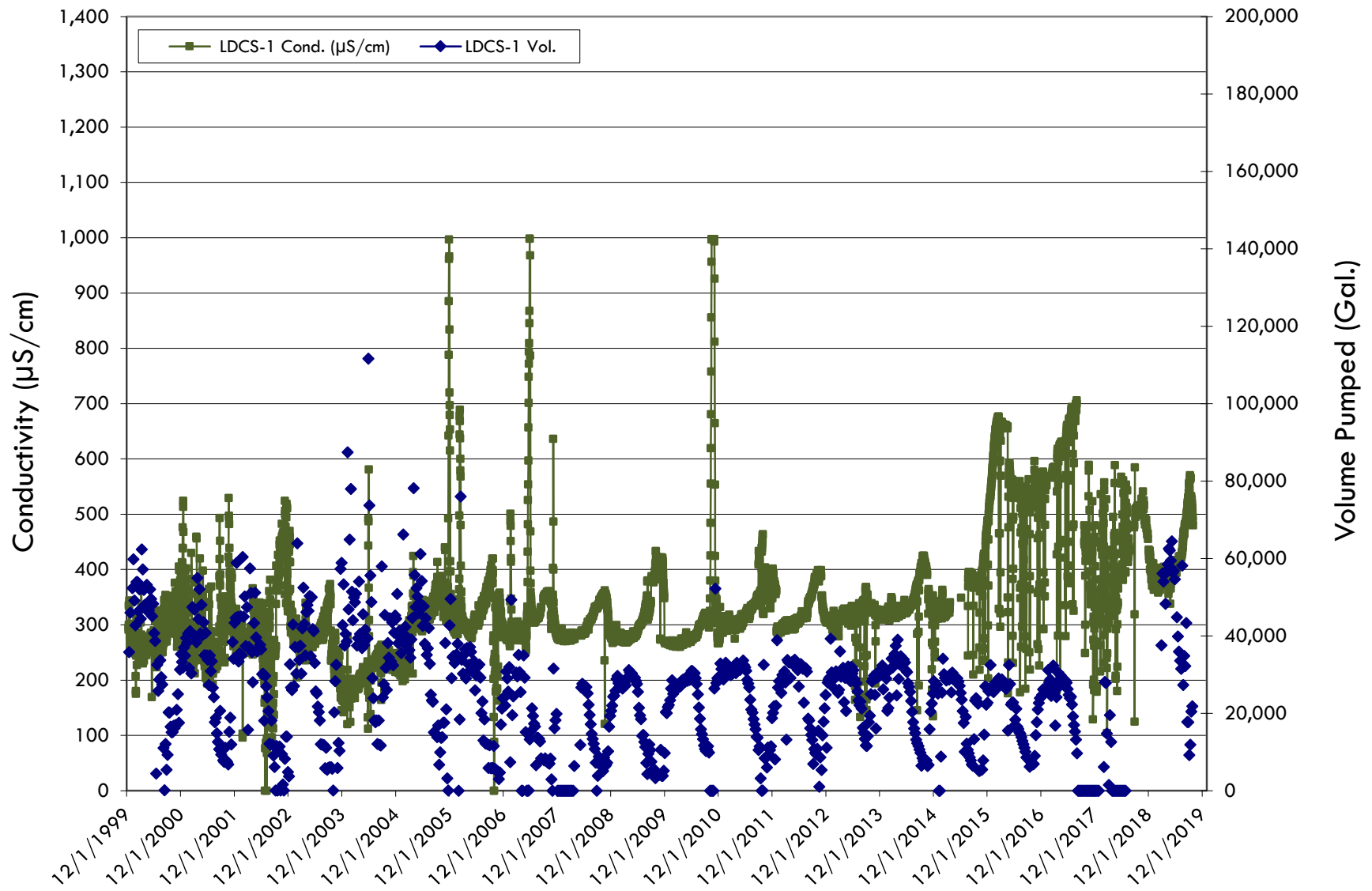
LDCS-5 (Daily Totals)
Volume Pumped vs Precipitation
Third Quarter 2019
LRI Landfill, Pierce County, Washington



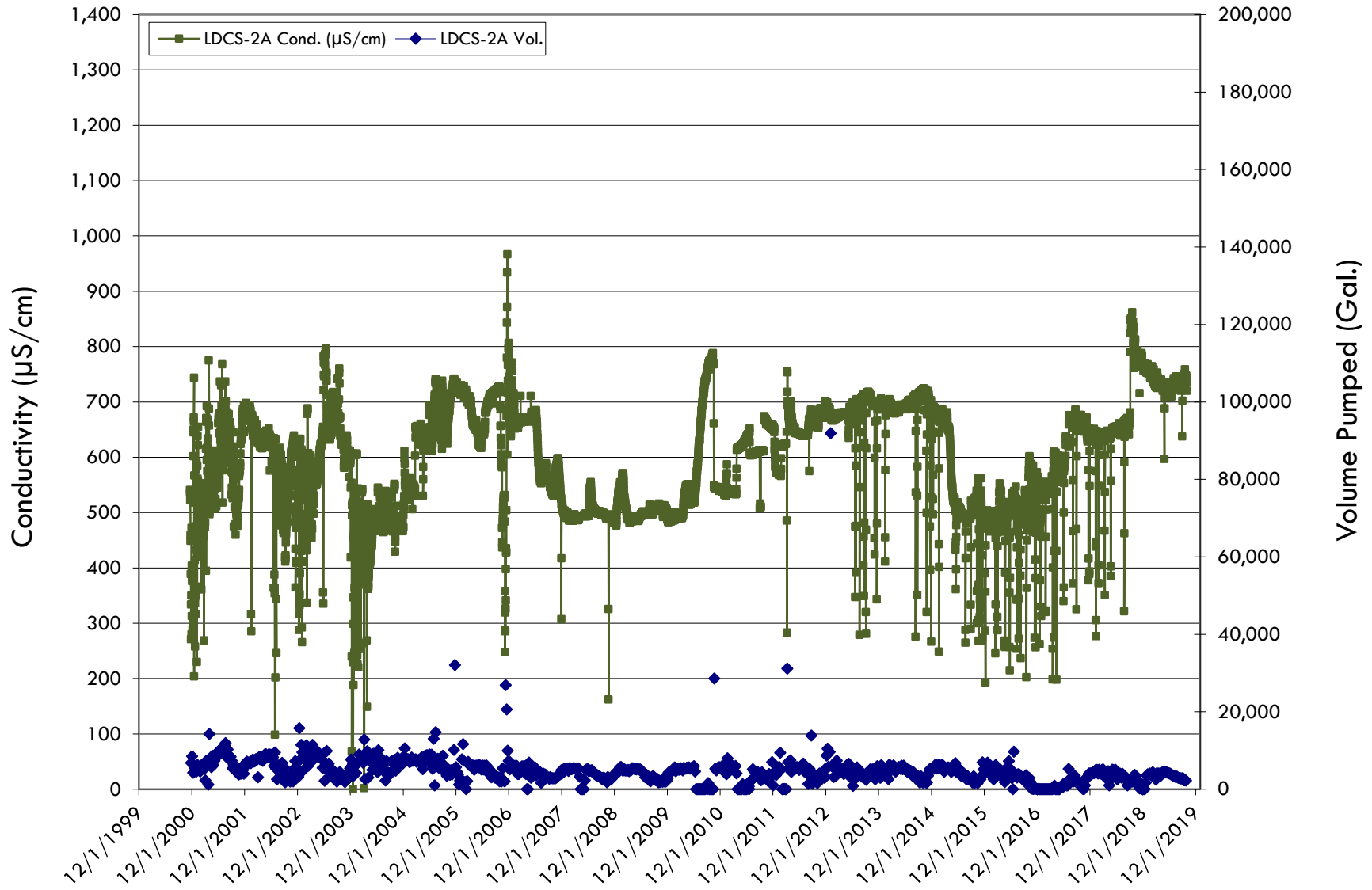
LDCS-6 (Daily Totals)
Volume Pumped vs Precipitation
Third Quarter 2019
LRI Landfill, Pierce County, Washington



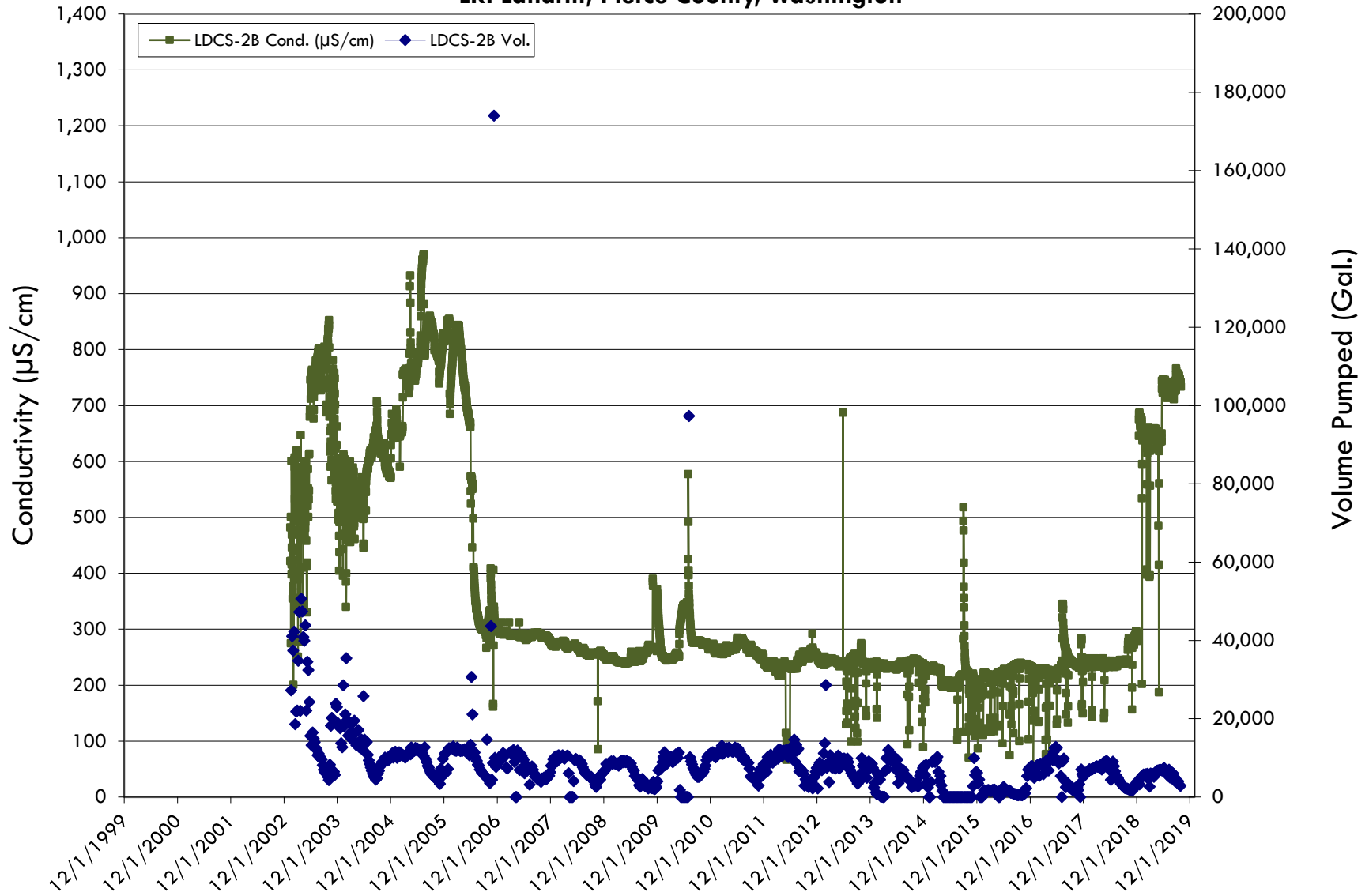
LDCS-1
Daily Conductivity vs Weekly Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



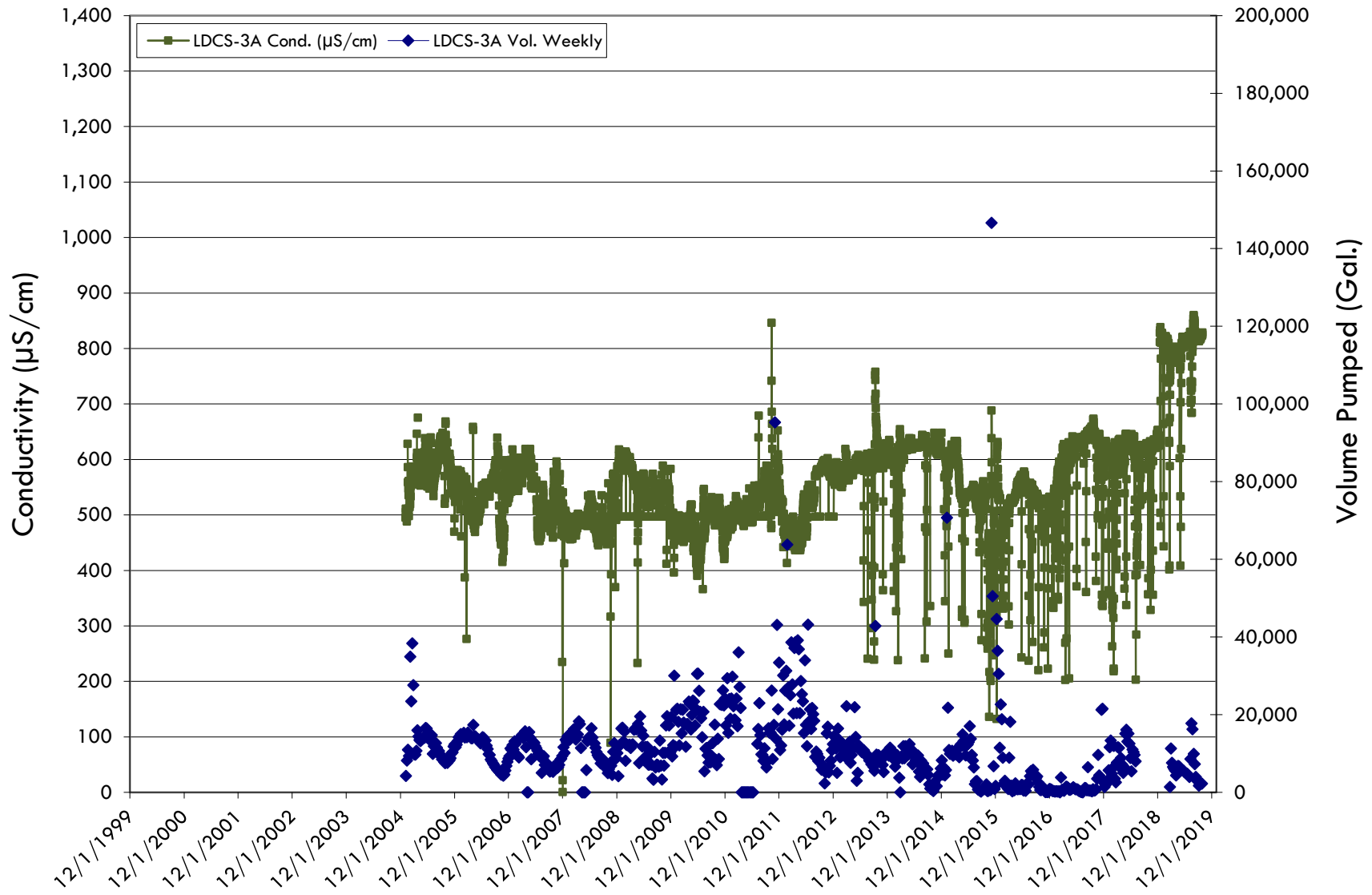
LDCS-2A
Daily Conductivity vs Weekly Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



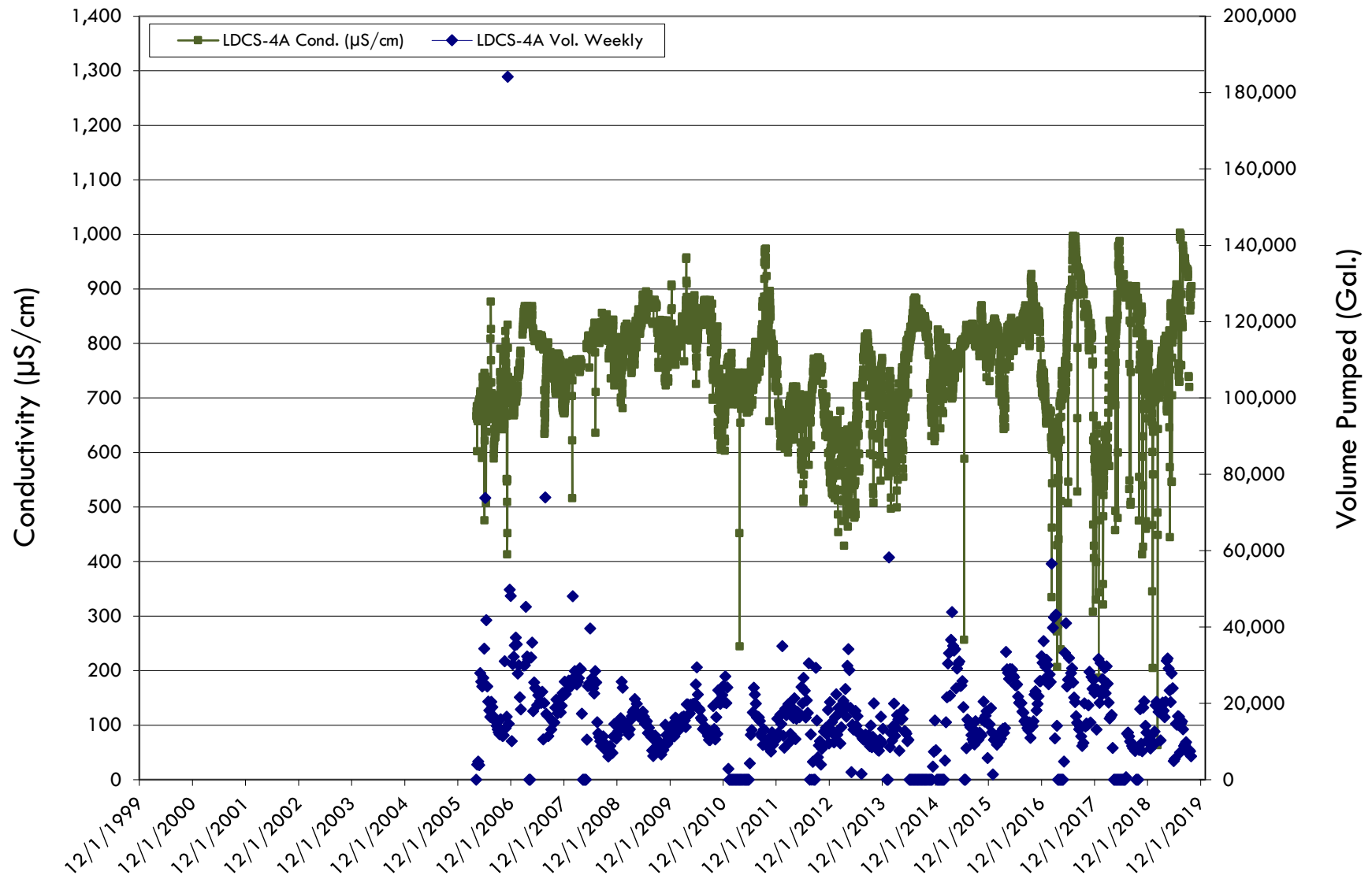
LDCS-2B
Daily Conductivity vs Weekly Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



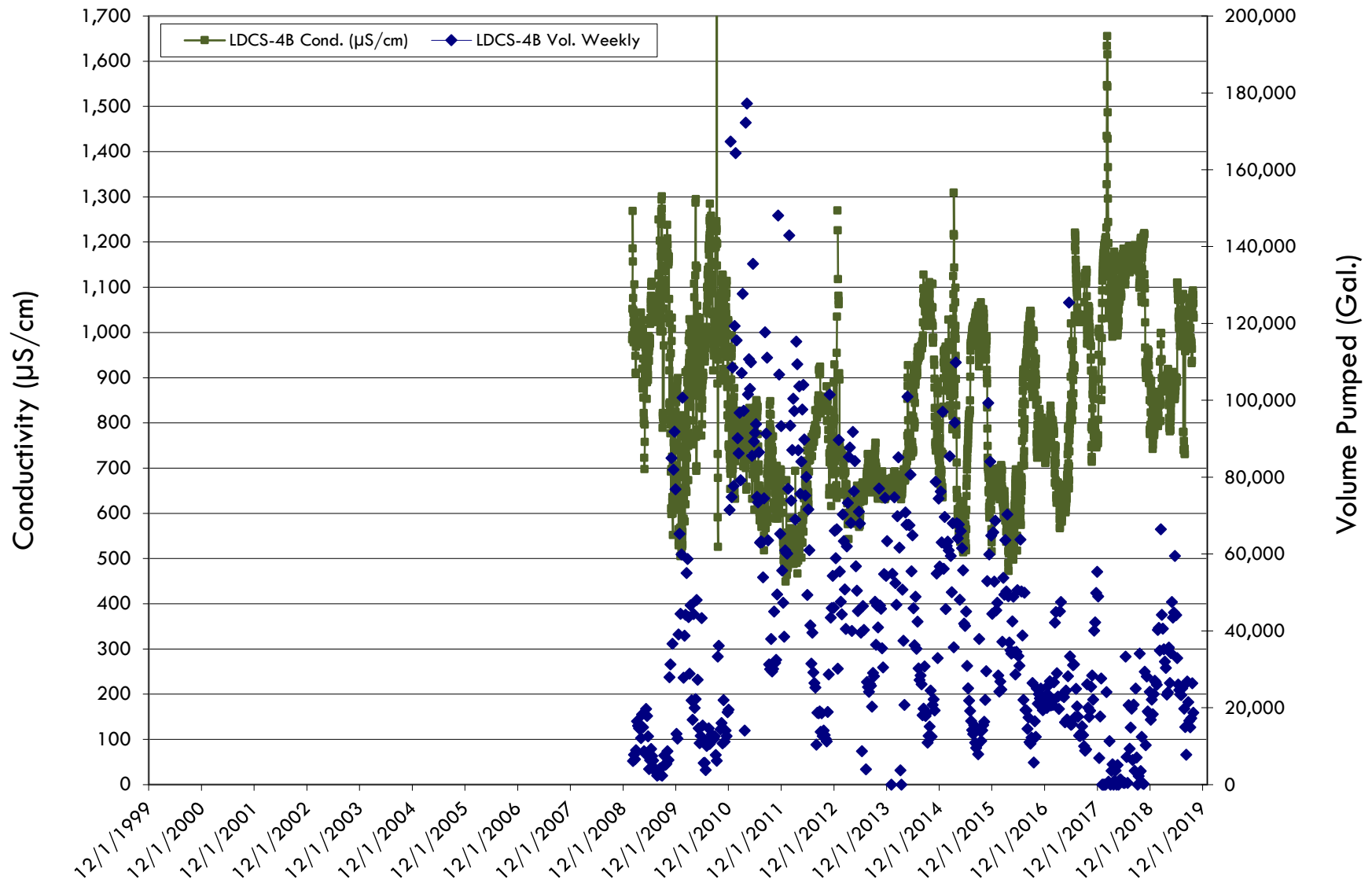
LDCS-3A
Daily Conductivity vs Weekly Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



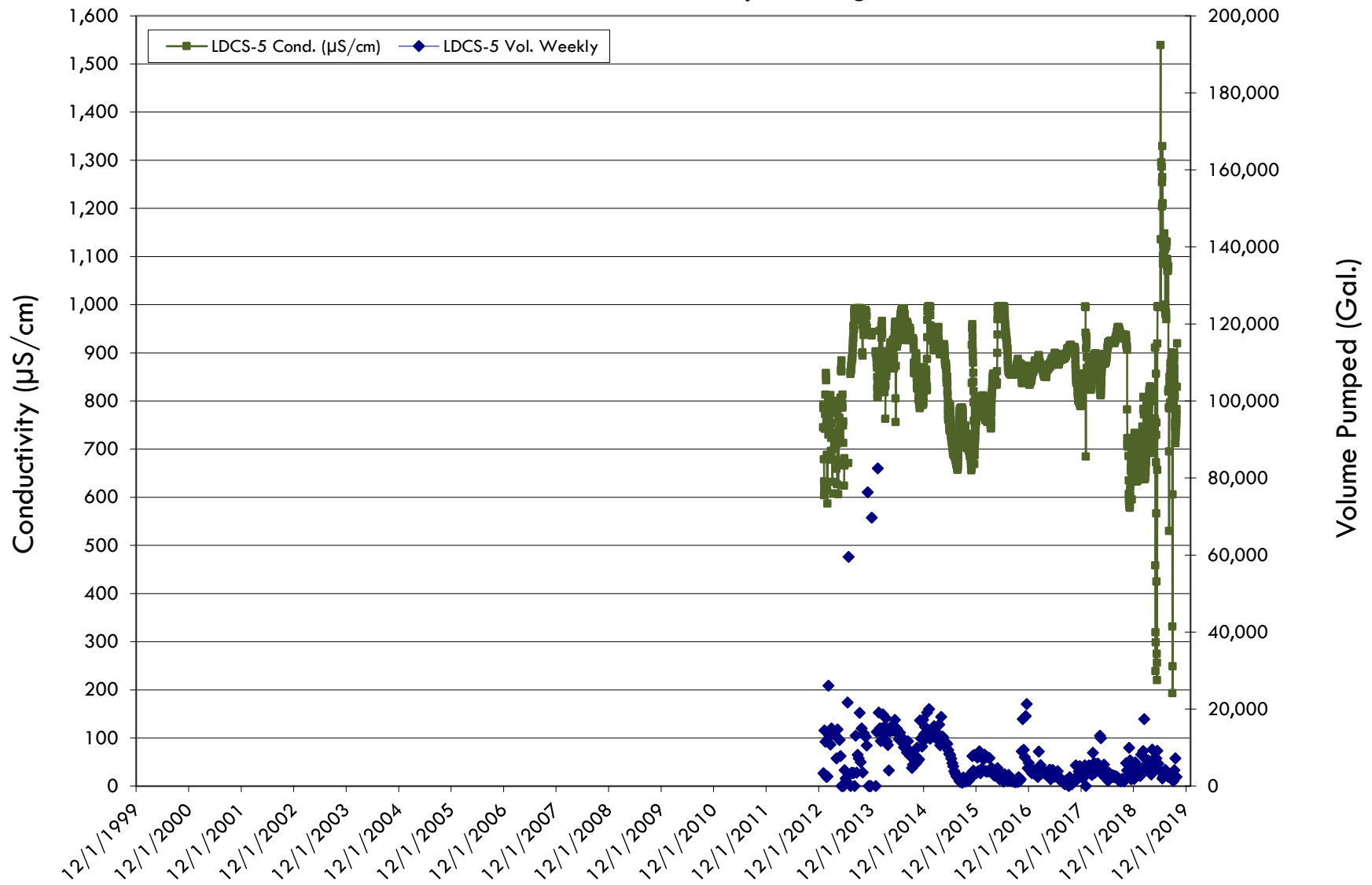
LDCS-4A
Daily Conductivity vs Weekly Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



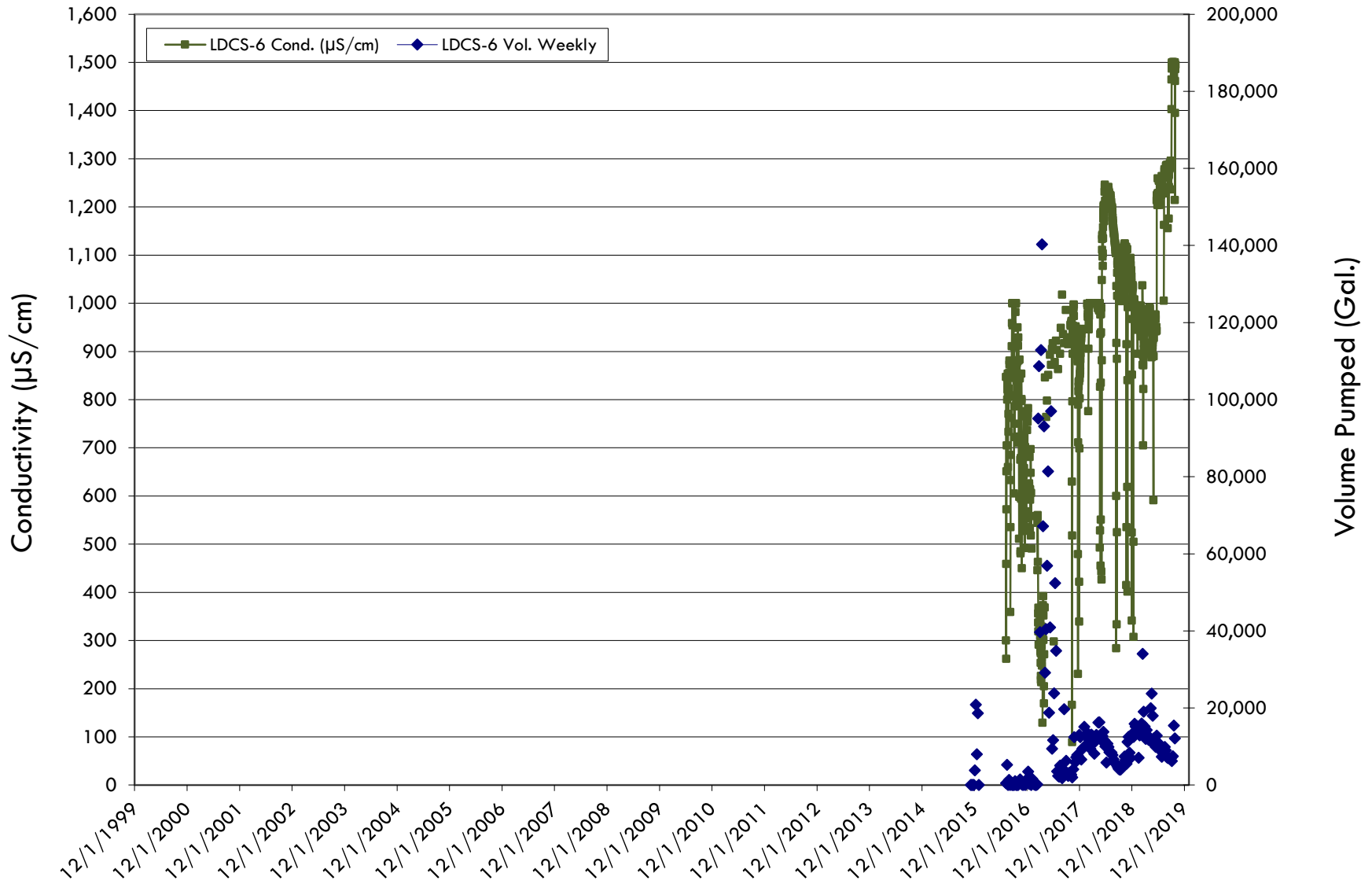
LDCS-4B
Daily Conductivity vs Weekly Volume Pumped
Third Quarter 2019
LRI Landfill, Pierce County, Washington



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



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





Attachment I

Surface Water Monitoring Data





Permit Number: WAR002603

Permittee: LRI 304th Street Landfill

Facility County: Pierce

Receiving Waterbody: South Creek

Monitoring Period: 07/01/2019 - 07/31/2019

Outfall: UNK - South Creek

Version: 1

Week	Monitoring Point	Turbidity (NTU) Measured NTU Weekly Grab	pH Standard Units Weekly Grab	Turbidity (NTU) Measured NTU Weekly Grab	pH Standard Units Weekly Grab	Turbidity (NTU) Measured NTU Weekly Grab	pH Standard Units Weekly Grab	Turbidity (NTU) Measured NTU Weekly Grab	pH Standard Units Weekly Grab
		C7-1	C7-1	C7-2	C7-2	C7-3	C7-3	C7-4	C7-4
1-F	7/5/19	C	M	C	M	C	M	C	M
2-Th	7/11/19	C	M	C	M	C	M	151	M
3-Th	7/18/19	C	M	C	M	3	M	C	M
4-M	7/22/19	C	M	C	M	5	M	C	M
5-M	7/29/19	C	M	C	M	5	M	C	M
Minimum			M		M		M		M
			BM: >= 6.5 (RO)		BM: >= 6.5 (RO)		BM: >= 6.5 (RO)		BM: >= 6.5 (RO)
Maximum		C	M	C	M	5	M	151	M
		BM: <= 25 (RO)	BM: <= 8.5 (RO)	BM: <= 25 (RO)	BM: <= 8.5 (RO)	BM: <= 25 (RO)	BM: <= 8.5 (RO)	BM: <= 25 (RO)	BM: <= 8.5 (RO)

Reporting Codes Used: C - No Discharge, M - Monitoring Is Conditional/Not Req This MP

Outfall: UNK - South Creek

Monitoring Point	Parameter	Sample Date/Statistical Base	Value	Notes/Comment
C7-4	All Parameters			Stormwater from the construction activity area breached a soil plug near C7-4 on July 11th. The stormwater was contained within an existing stormwater ditch and infiltrated into the subsurface within approximately 50 feet. Turbid stormwater from the construction activity area did not reach waters of the state or flow off-site. Repair and reinforcement of the soil plug began on July 11th and was completed within two days.

BMPs

Monitoring Point	Week	BMP
C7-1		Check Dams
C7-1		Other
C7-1		Sediment Trap
C7-1		Silt Fence
C7-1		Straw Wattles
C7-2		Other
C7-3		Other
C7-4		Check Dams
C7-4		Other
C7-4		Silt Fence

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

8/12/2019 9:20:27 AM

Signature

Date



Permit Number: WAR002603

Permittee: LRI 304th Street Landfill

Facility County: Pierce

Receiving Waterbody: South Creek

Monitoring Period: 08/01/2019 - 08/31/2019

Outfall: UNK - South Creek

Version: 1

Week	Monitoring Point	Turbidity (NTU) Measured NTU Weekly Grab	pH Standard Units Weekly Grab	Turbidity (NTU) Measured NTU Weekly Grab	pH Standard Units Weekly Grab	Turbidity (NTU) Measured NTU Weekly Grab	pH Standard Units Weekly Grab	Turbidity (NTU) Measured NTU Weekly Grab	pH Standard Units Weekly Grab
		C7-1	C7-1	C7-2	C7-2	C7-3	C7-3	C7-4	C7-4
2-M	8/5/19	C	M	C	M	3	M	C	M
3-M	8/12/19	C	M	C	M	C	M	C	M
4-W	8/21/19	C	M	C	M	C	M	C	M
5-M	8/26/19	C	M	C	M	C	M	C	M
Minimum			M		M		M		M
			BM: >= 6.5 (RO)		BM: >= 6.5 (RO)		BM: >= 6.5 (RO)		BM: >= 6.5 (RO)
Maximum		C	M	C	M	3	M	C	M
		BM: <= 25 (RO)	BM: <= 8.5 (RO)	BM: <= 25 (RO)	BM: <= 8.5 (RO)	BM: <= 25 (RO)	BM: <= 8.5 (RO)	BM: <= 25 (RO)	BM: <= 8.5 (RO)

Reporting Codes Used: C - No Discharge, M - Monitoring Is Conditional/Not Req This MP

BMPs

Monitoring Point	Week	BMP
C7-1		Check Dams
C7-1		Other
C7-1		Sediment Trap
C7-1		Silt Fence
C7-2		Other
C7-3		Other
C7-4		Check Dams
C7-4		Other
C7-4		Silt Fence

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

9/13/2019 4:11:45 PM

Signature

Date



Permit Number: WAR002603

Permittee: LRI 304th Street Landfill

Facility County: Pierce

Receiving Waterbody: South Creek

Monitoring Period: 09/01/2019 - 09/30/2019

Outfall: UNK - South Creek

Version: 1

Week	Monitoring Point	Turbidity (NTU) Measured NTU Weekly Grab	pH Standard Units Weekly Grab	Turbidity (NTU) Measured NTU Weekly Grab	pH Standard Units Weekly Grab	Turbidity (NTU) Measured NTU Weekly Grab	pH Standard Units Weekly Grab	Turbidity (NTU) Measured NTU Weekly Grab	pH Standard Units Weekly Grab
		C7-1	C7-1	C7-2	C7-2	C7-3	C7-3	C7-4	C7-4
1-T	9/3/19	C	M	C	M	C	M	C	M
2-M	9/9/19	C	M	C	M	C	M	C	M
2-T	9/10/19	8.7	M	C	M	C	M	193	M
2-W	9/11/19	10.0	M						
2-F	9/13/19	5.8	M						
2-Sa	9/14/19	1.9	M						
3-Su	9/15/19	2.5	M						
3-M	9/16/19	2.7	M						
3-T	9/17/19	2.1	M						
3-W	9/18/19	2.0	M						
3-Th	9/19/19	9.4	M	C	M	C	M	C	M
3-F	9/20/19	5.2	M						
3-Sa	9/21/19	4.6	M						
4-Su	9/22/19	9.7	M						
4-Th	9/26/19			C	M	C	M	C	M
Minimum			M		M		M		M
			BM: >= 6.5 (RO)		BM: >= 6.5 (RO)		BM: >= 6.5 (RO)		BM: >= 6.5 (RO)
Maximum		10	M	C	M	C	M	193	M
		BM: <= 25 (RO)	BM: <= 8.5 (RO)	BM: <= 25 (RO)	BM: <= 8.5 (RO)	BM: <= 25 (RO)	BM: <= 8.5 (RO)	BM: <= 25 (RO)	BM: <= 8.5 (RO)

Reporting Codes Used: C - No Discharge, M - Monitoring Is Conditional/Not Req This MP

Outfall: UNK - South Creek

Monitoring Point	Parameter	Sample Date/ Statistical Base	Value	Notes/Comment
C7-1	All Parameters			Construction stormwater treatment began on September 10th using Chitosan Enhanced Sand Filtration (CESF). Maximum turbidity readings are included for each day that treated discharge occurred.
C7-2	All Parameters			Anticipated construction activity within the area that drains to monitoring point C7-2 did not occur this construction season.
C7-4	All Parameters			Stormwater from the construction activity area leaked through a soil plug near C7-4 on September 10th. The stormwater was contained within an existing stormwater ditch and infiltrated into the subsurface within approximately 100 feet. Turbid stormwater from the construction activity area did not reach waters of the state or flow off-site. Repair of the soil plug was completed the same day as discovered.

BMPs

Monitoring Point	Week	BMP
C7-1		Check Dams
C7-1		Construction Stormwater Chemical Treatment
C7-1		Other
C7-1		Sediment Trap
C7-1		Silt Fence
C7-2		Other
C7-3		Other
C7-4		Check Dams



C7-4		Other
C7-4		Silt Fence

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

10/15/2019 8:31:19 AM

Date



Permit Number: WAR002557

Permittee: Pierce County Recycling - 304th Street L

Facility County: Pierce

Receiving Waterbody: South Creek

Monitoring Period: 07/01/2019 - 09/30/2019

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 BOD5 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
Minimum			BM: >= 5.0 (RO)									
Average		BM: <= 25			BM: <= 14	BM: <= 117						
Maximum			BM: <= 9.0 (RO)									
Month 1 Average							<= 37	<= 27	<= 4.9	<= 16	<= 71	<= 14
Month 2 Average							<= 37	<= 27	<= 4.9	<= 16	<= 71	<= 14
Month 3 Average							<= 37	<= 27	<= 4.9	<= 16	<= 71	<= 14

Reporting Codes Used: C - No Discharge

Overall DMR Notes/Comment

Reporting Code: C - No Discharge

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

11/15/2019 3:06:43 PM

Signature

Date

		Phenol Micrograms/L (ug/L) Quarterly Grab	Zinc Total Micrograms/L (ug/L) Quarterly Grab	pH Standard Units Quarterly Grab
Week	Monitoring Point	NEWB	NEWB	NEWB
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
Minimum				>= 6.0 (RO)
Average				
Maximum				<= 9.0 (RO)
Month 1 Average				
Month 2 Average				
Month 3 Average				

Attachment J
Landfill Gas Monitoring Data



SCS Engineers

04219001.04

July-19

Perimeter Gas Probes												
GP-1	7/18/2019	8:33	0.3	6.5	4.9	4.4	12.5	78.2	17.9	10.9	100.0	
GP-2	7/18/2019	8:42	0.2	17.7	15.8	20.1	0.2	63.9	16.8	9.8	100.0	
GP-3	7/18/2019	8:47	0.0	--	0.0	10.9	10.4	78.7	12.2	8.2	100.0	
GP-4	7/18/2019	8:52	0.0	--	0.0	9.6	5.0	85.4	11.8	7.8	100.0	
GP-9	7/18/2019	8:57	0.1	--	0.0	9.5	6.9	83.6	13.1	0.0	0.0	
GP-10	7/18/2019	8:23	0.0	7.5	7.6	25.2	0.2	67.0				
GP-10P	7/18/2019	8:19	0.0	9.8	12.1	24.5	2.2	61.2				
GP-11	7/18/2019	8:13	0.0	--	0.0	23.1	1.9	75.0				
GP-12	7/18/2019	8:06	0.0	32.3	21.6	49.6	5.9	22.9				
GP-13	7/18/2019	8:00	0.0	--	0.0	23.6	3.2	73.2				
GP-14	7/18/2019	9:25	0.2	--	0.0	0.0	21.0	79.0	15.0	0.0	0.0	
GP-15	7/18/2019	9:17	0.4	--	0.0	0.2	21.1	78.7	11.4	0.0	0.0	

	Beginning	Ending	Average	Starting Date:	7/18/2019
Weather:	Overcast	Overcast	Overcast	Starting Time:	8:00
Temperature, T (deg F):	60	67	63.5	Finishing Date:	7/18/2019
Wind Speed (mph):	3	2	2.5	Finishing Time:	9:25
Wind Direction:	70	300	185	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:	7/18/2019

Notes:

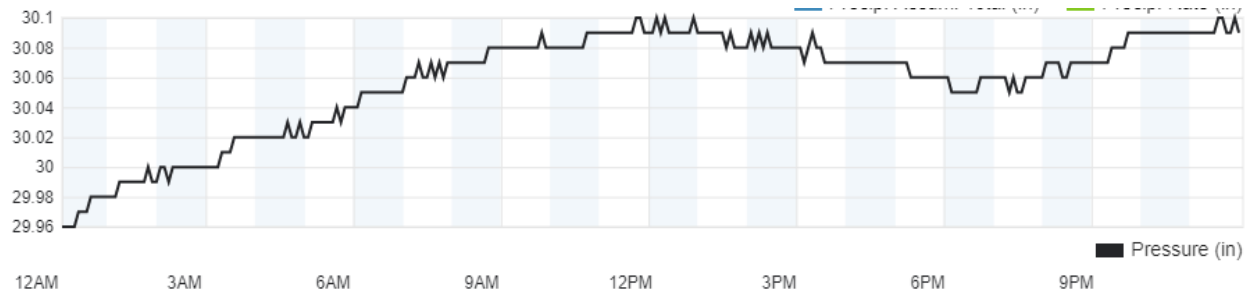
P _(well)	Relative Pressure	1.	Measurement for spike concentrations of CH ₄ and CO ₂ are recorded as a comment if observed during sampling.
CH ₄	Methane	2.	Water level measurements made where gas probe monitoring port allows for measurement, or where there is an adjacent measurement piezometer.
CO ₂	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
N ₂	Nitrogen		as GP-10.
TOC	Top of Casing		

**LRI Landfill
Barometric Pressure Trends
July 2019**

July 2019



July 18, 2019: Gas Probe Monitoring



Source: Weather Underground, SPANAFLIGHT KPLU Station (KWAPUYAL102)

<https://www.wunderground.com/dashboard/pws/KWAPUYAL102/graph/2019-07-18/2019-07-18/daily>

SCS Engineers

04219001.04

August-19

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

GP-1	8/23/2019	8:18	-0.1	12.9	8.2	5.8	11.3	74.7	19.2	12.2	100.0	
GP-2	8/23/2019	8:26	0.3	17.4	16.7	21.6	0.0	61.7	17.6	10.6	100.0	
GP-3	8/23/2019	8:33	0.0	--	0.0	12.1	9.7	78.2	12.8	8.8	100.0	
GP-4	8/23/2019	8:42	0.1	--	0.0	8.9	11.8	79.3	13.1	9.1	100.0	
GP-9	8/23/2019	8:50	0.1	--	0.0	10.5	4.9	84.6	13.7	0.0	0.0	
GP-10	8/23/2019	8:09	0.0	1.4	1.3	22.6	0.0	76.1				
GP-10P	8/23/2019	8:05	0.2	14.8	14.7	31.8	0.0	53.5				
GP-11	8/23/2019	7:51	0.0	--	0.0	18.6	5.5	75.9				
GP-12	8/23/2019	9:30	0.0	27.0	26.9	72.7	0.0	0.4				
GP-13	8/23/2019	7:42	0.0	--	0.5	28.7	0.0	70.8				
GP-14	8/23/2019	9:05	0.1	--	0.0	2.5	16.6	80.9	16.3	0.3	5.6	
GP-15	8/23/2019	9:18	0.1	--	0.0	0.1	20.7	79.2	12.4	0.0	0.0	

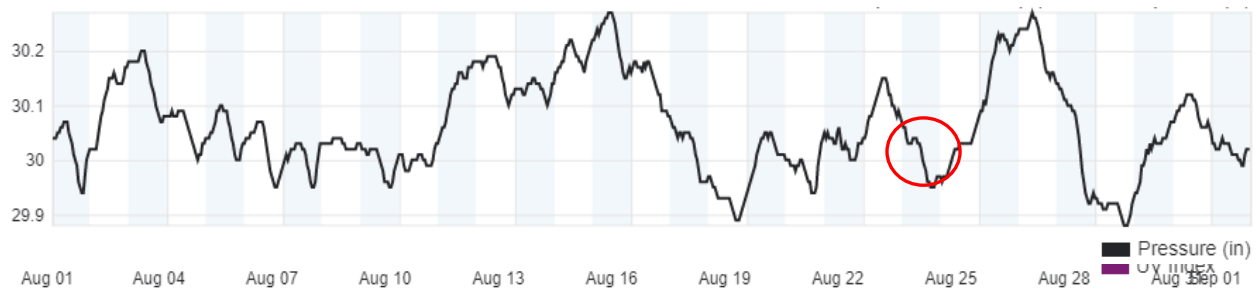
	Beginning	Ending	Average	Starting Date:	8/23/2019
Weather:	Overcast	Overcast	Overcast	Starting Time:	7:42
Temperature, T (deg F):	57	62	59.5	Finishing Date:	8/23/2019
Wind Speed (mph):	3	5	4	Finishing Time:	9:30
Wind Direction:	315	135	225	Monitored by:	A. Deep
Barometric Pressure, P (in Hg):	29.60	29.50	29.55	Instruments:	GEM 2000
24hr Baro.Trend (rising / falling / steady / unsteady)	-			Calibration Date:	8/23/2019

Notes:

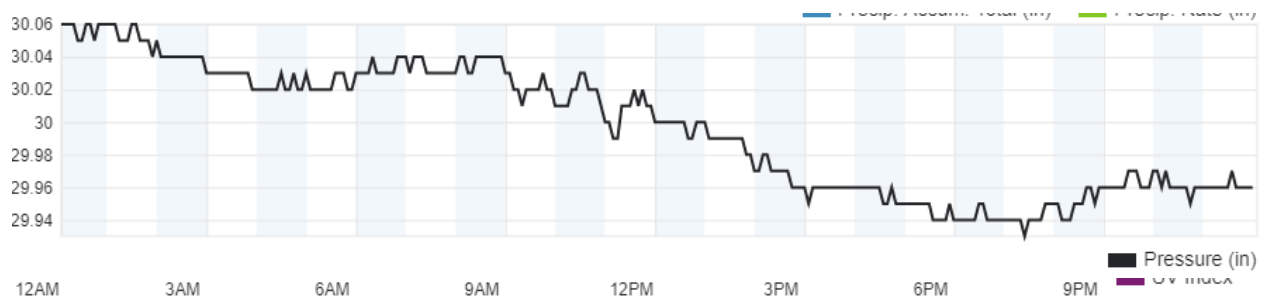
P _(well)	Relative Pressure	1.	Measurement for spike concentrations of CH ₄ and CO ₂ are recorded as a comment if observed during sampling.
CH ₄	Methane	2.	Water level measurements made where gas probe monitoring port allows for measurement, or where there is an adjacent measurement piezometer.
CO ₂	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
N ₂	Nitrogen		as GP-10.
TOC	Top of Casing		

**LRI Landfill
Barometric Pressure Trends
August 2019**

August 2019



August 23, 2019: Gas Probe Monitoring and Quarterly Indoor Air Monitoring



Source: Weather Underground, SPANAFLIGHT KPLU Station (KWAPUYAL102)

<https://www.wunderground.com/dashboard/pws/KWAPUYAL102/graph/2019-08-23/2019-08-23/daily>

SCS Engineers

04219001.04

September-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	9/25/2019	7:46	-0.3	11.8	6.9	4.5	15.2	73.4	18.6	11.6	100.0
GP-2	9/25/2019	7:55	0.1	20.2	18.1	23.2	0.0	58.7	18.0	11.0	100.0
GP-3	9/25/2019	8:01	0.0	--	0.0	13.3	9.3	77.4	12.3	8.3	100.0
GP-4	9/25/2019	8:06	0.0	--	0.0	10.5	10.0	79.5	13.5	9.5	100.0
GP-9	9/25/2019	8:13	0.1	--	0.0	10.6	7.0	82.4	13.4	0.0	0.0
GP-10	9/25/2019	7:39	0.0	7.9	6.9	26.7	0.0	66.4			
GP-10P	9/25/2019	7:36	0.3	23.1	21.1	35.7	0.0	43.2			
GP-11	9/25/2019	7:30	0.1	--	0.0	16.7	8.2	75.1			
GP-12	9/25/2019	7:23	0.0	16.9	23.6	69.2	1.2	6.0			
GP-13	9/25/2019	7:19	0.0	0.7	0.7	32.0	0.0	67.3			
GP-14	9/25/2019	8:25	0.2	--	0.0	0.2	21.6	78.2	15.6	0.0	0.0
GP-15	9/25/2019	8:33	0.3	--	0.0	0.1	21.6	78.3	11.3	0.0	0.0

General Data:

	Beginning	Ending	Average	Starting Date:	9/25/2019
Weather:	Overcast	Overcast	Overcast	Starting Time:	7:19
Temperature, T (deg F):	44	47	45.5	Finishing Date:	9/25/2019
Wind Speed (mph):	14	10	12	Finishing Time:	8:33
Wind Direction:	180	180	180	Monitored by:	T. Berndahl
Barometric Pressure, P (in Hg):	29.60	29.50	29.55	Instruments:	GEM 2000
24hr Baro.Trend (rising / falling / steady / unsteady)	-			Calibration Date:	9/25/2019

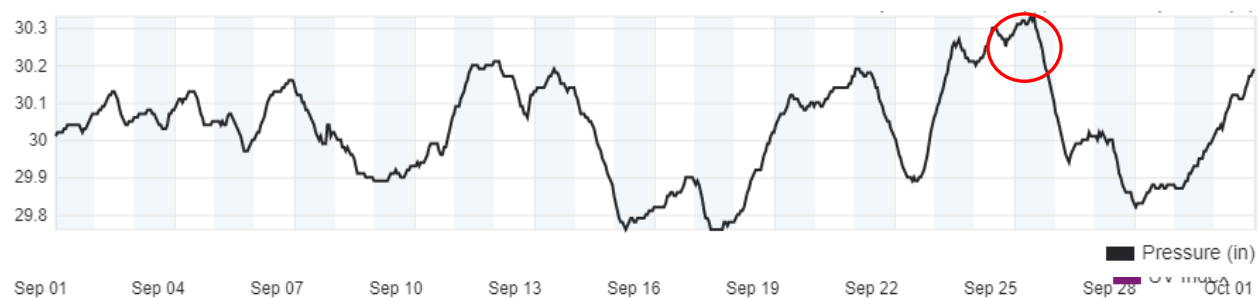
Headings:

Notes:

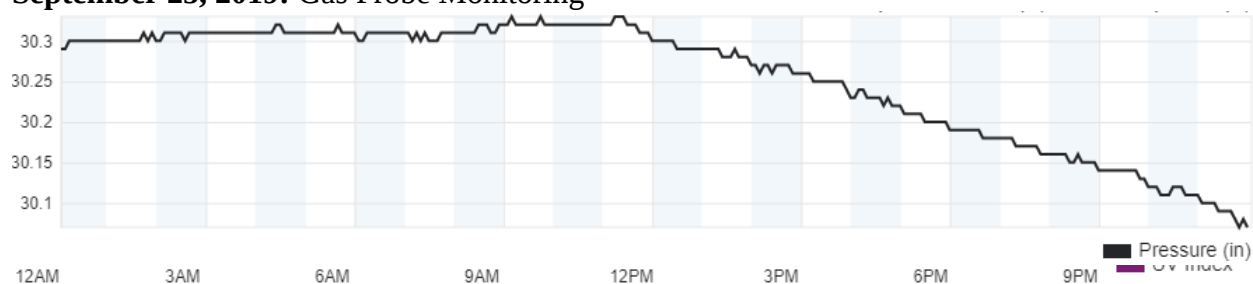
P _(well)	Relative Pressure	1.	Measurement for spike concentrations of CH ₄ and CO ₂ are recorded as a comment if observed during sampling.
CH ₄	Methane	2.	Water level measurements made where gas probe monitoring port allows for measurement, or where there is an adjacent measurement piezometer.
CO ₂	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
N ₂	Nitrogen		as GP-10.
TOC	Top of Casing		

LRI Landfill
Barometric Pressure Trends
September 2019

September 2019



September 25, 2019: Gas Probe Monitoring



Source: Weather Underground, SPANAFLIGHT KPLU Station (KWAPUYAL102)

<https://www.wunderground.com/dashboard/pws/KWAPUYAL102/graph/2019-09-25/2019-09-25/daily>

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

Project Number: 04219001.04

Date: 8/23/19
Weather Conditions: sunny
Instrument: MICRO FID
Measured By: Alexa Deep

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. 9 ppm
Repair Shop - survey atmosphere conditions throughout (lower height levels). 10 ppm near electrical boxes
Pay/Scale Booth - interior of building. 1 ppm
Work Shop - interior of shed adjacent to stormwater ponds. 8.5 near electrical panel

Background

upwind: 0.0 ppm

downwind: 1.4 ppm

Alexa Deep
Signature

August 23, 2019
File No. 04219001.11

Mr. George Duvendack
Pierce County Recycling, Composting and Disposal, LLC dba LRI
17925 Meridian Street East
Puyallup, Washington 98375

Subject: **2019 Gas Extraction Well Installation Report**
LRI Landfill, Graham, Washington

Dear George:

This letter presents a summary of the field activities performed by SCS Engineers (SCS) regarding the installation of 15 new landfill gas (LFG) extraction wells at the LRI Landfill located in Graham, Washington. The LFG extraction wells were installed in general accordance with the 2019 Gas System Expansion design plans, approved well construction variance, and well completion schedule issued by SCS on July 18, 2019.

Summary

SCS personnel were onsite from July 24, 2019 through August 12, 2019, to observe drilling and installation of the new LFG extraction wells performed by DBM Contractors, Inc. (DBM). Observations of the cuttings from well drilling were logged for each boring and are included on the attached boring and construction logs prepared by SCS. The following table presents a summary of the completed well installation data.

Table 1: Summary of Well Completion

Drawing ID	Well Designation	Surface Elevation (ft-msl) ⁽¹⁾	Installation Date	ECY Well Tag ⁽²⁾	Design Depth (ft)	Completed Depth (ft)	Length of Screen (ft)
2019-01	WE-251	715.33	8/5/2019	BKM-979	52.0	50.5	30.5
2019-02	WE-252	724.05	8/5/2019	BKM-978	61.0	60.5	40.5
2019-03	WE-253	731.08	8/6/2019	BKM-987	69.0	69.0	49.0
2019-04	WE-254	733.51	8/6/2019	BKM-986	72.0	72.0	52.0
2019-05	WE-255	739.96	8/7/2019	BKM-985	78.0	76.0	58.0
2019-06	WE-256	744.05	8/7/2019	BKM-984	83.0	83.0	63.0
2019-07	WE-257	751.62	8/8/2019	BKM-983	87.0	87.0	67.0
2019-08	WE-258	755.81	8/8/2019	BKM-982	79.0	77.0	59.0
2019-09	WE-263	805.55	8/9/2019	BKM-974	130.0	131.0	110.0
2019-10	Not Installed due to collapse of the boring						
2019-11	WE-262	828.51	7/29/2019	BKM-988	130.0	131.0	110.0
2019-12	Not included in final design, location not accessible by drill rig						
2019-13	WE-261	830.67	7/25/2019	BKM-973	130.0	117.0	75.0
2019-14	WE-249	695.69	8/2/2019	BKM-981	33.0	34.5	13.0
2019-15	WE-250	691.63	8/2/2019	BKM-976	25.0	25.0	7.0

Drawing ID	Well Designation	Surface Elevation (ft-msl) ⁽¹⁾	Installation Date	ECY Well Tag ⁽²⁾	Design Depth (ft)	Completed Depth (ft)	Length of Screen (ft)
2019-16	Not included in final design, location not at grade						
2019-17	Not included in final design, location not at grade						
2019-18	WE-259	844.25	7/24/2019	BKM-972	130.0	129.0	110.0
2019-19	WE-260	824.36	8/12/2019	BKM-975	130.0	130.0	110.0

Notes:

1. Survey data provided by HRK prior to drilling and installation. Elevations are for the original staked locations, and do not account for minor relocation at time of installation.
2. ECY Well Tags were provided by DBM upon completion of each well.

LFG Extraction Well Drilling and Installation

The borings for the LFG extraction wells were drilled using an IMT AF220 drill rig with a 10 foot long, 36-inch diameter bucket auger, 36-inch diameter open flight auger, and a 36-inch trap door bucket auger as conditions dictated. For each of the extraction wells, the borings were advanced to design depths, except where noted otherwise. The extraction wells were then constructed using 6 and 8-inch diameter Schedule 80 polyvinyl chloride (PVC) pipe and fittings or 6-inch diameter SDR 11 high-density polyethylene (HDPE) pipe and fittings. Backfill was completed with 2-inch minus round rock, hydrated bentonite chips, and clean soil as shown on the attached logs. All construction materials were provided by DBM and verified by SCS prior to use, with the exception of the clean soil backfill which was obtained from onsite sources. Drilling and installation of each well was completed in one day, except location 2019-13 (well WE-259), which was drilled to depth, but constructed the following day. A steel plate and soil cover was provided for 2019-13 overnight, consistent with guidance from site personnel.

The wells were completed with 5 feet of pipe stickup above the ground surface for PVC wells and 5 or 8 feet of stickup for HDPE wells, to allow for grading, landfill cover/closure, and connection to the existing LFG collection system. Upon completion, each well was issued a Washington State Department of Ecology (ECY) Well Tag in accordance with state regulations.

The following variations to design were completed in conjunction with the well installations:

- 2019-01: The boring was completed to a depth of 50.5 feet-bgs. The boring was shortened 1.5 feet from the design depth. The shortening of the boring resulted in a clearance of 16.5 feet from the operations layer.
- 2019-05: The boring was completed to a depth of 76 feet-bgs. The boring was shortened 2 feet from the design depth. The shortening of the boring resulted in a clearance of 18 feet from the operations layer.
- 2019-08: The boring was completed to a depth of 77 feet-bgs. The boring was shortened 2 feet from the design depth. The shortening of the boring resulted in a clearance of 17.6 feet from the operations layer.
- 2019-13: The boring was completed to a depth of 117 feet-bgs. The boring was shortened 13 feet from the design depth due to wet and hard drilling conditions. The shortening of the boring resulted in a clearance of 64.6 feet from the operations layer. Due to a partial collapse of the boring during construction the well screen was shortened by 35 feet to 75

feet (interval 18 to 93 feet-bgs), as the slough within the boring could not be removed by the driller without risk of causing additional damage to the boring.

- 2019-19: The boring location was moved approximately 75 feet west-northwest by LRI to accommodate landfill and operations. The well stake was re-surveyed by HRK Engineering and Field Services (HRK) on August 6, 2019 with the location ID of 2019-XX. The relocated boring was completed to 130 feet-bgs as designed in the July 18, 2019 drawings, resulting in a clearance of 58.7 feet from the operations layer.

Other notes regarding the vertical well drilling include the following:

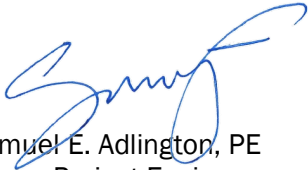
- 2019-09: The upper 40 feet of the boring largely consisted of wet and saturated soils, concrete debris, gravel and rocks. Therefore, a steel casing was provided and installed by DBM to a depth of approximately 36 feet-bgs to prevent collapse of the boring. The casing was removed upon completion of the well.
- 2019-10: On July 30, 2019 while drilling at a depth of approximately 115 feet-bgs, the drill rig encountered a breakdown that prevented removal of the bucket auger and Kelly bar from the boring. While the driller was attempting to retrieve the tooling, the boring collapsed, resulting in a partial loss of the tooling within the boring. The driller spent the next two days repairing the drill rig, replacing the tooling that was lost in the collapse, and backfilling the original boring as directed by LRI. SCS, LRI, and DBM met on August 6, 2019 to discuss the approach for the remaining wells and how to proceed at this location. A copy of the meeting summary is attached to this report. Due to similar drilling conditions found at locations 2019-09 and 2019-11, a decision was made to not install a well at this location as it would have required casing to a depth that would have been impractical with the equipment and materials available.

Following completion of the well installation work, each well was given a standard well designation consistent with LRI naming convention as shown in Table 1.

Closing

If you have any questions regarding the information presented in this letter or the attached boring logs, please do not hesitate to contact us.

Sincerely,



Samuel E. Adlington, PE
Senior Project Engineer
SCS Engineers
SEA/AED



Alexa Deep, EIT
Staff Engineer
SCS Engineers

cc: Keith Johnston, TPCDH
Jim Crandall, LRI
Olivier Moi, LRI
Kevin Lakey, SCS

Attachments:

2019 LFG Extraction Well Completion Logs
August 6, 2019 Meeting Summary RE: 2019-10
Updated LRI LF GCCS Site Plan

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

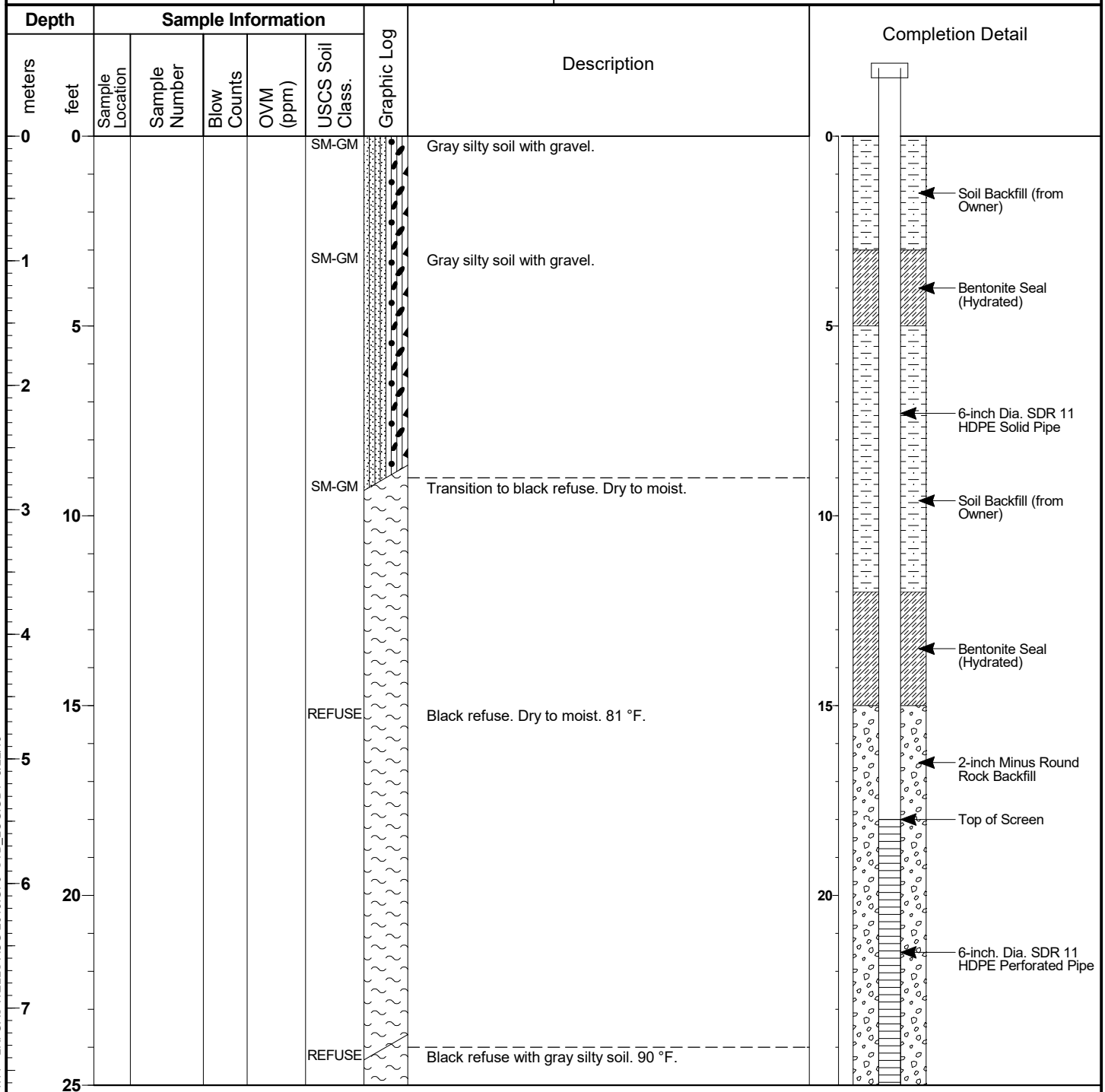
BORING NUMBER: WE-249

Page 1 of 2

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-981. Drawing ID: 2019-14. 8 ft-ags stickup.



Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **S. Graber**

Date Started: **8/2/19**

Date Ended: **8/2/19**

Boring Diameter: **36-inch**

Well Diameter: **6-inch**

Time Started: **10:15**

Time Ended: **11:30**

Elevation: **695.7 ft.**

Total Depth: **34.5 ft.**

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-249

Page 2 of 2

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
25									25
8									
9	30					REFUSE		Black refuse with some wood debris. Dry to moist. 93 °F.	
10						REFUSE		Black refuse. 96 °F.	Cap
11	35					REFUSE		Black refuse. Moist. 91 °F. End of boring.	2-inch Minus Round Rock Backfill
12	40								
13									
14	45								
15	50								
16									
55									

STANDARD_LOG_04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

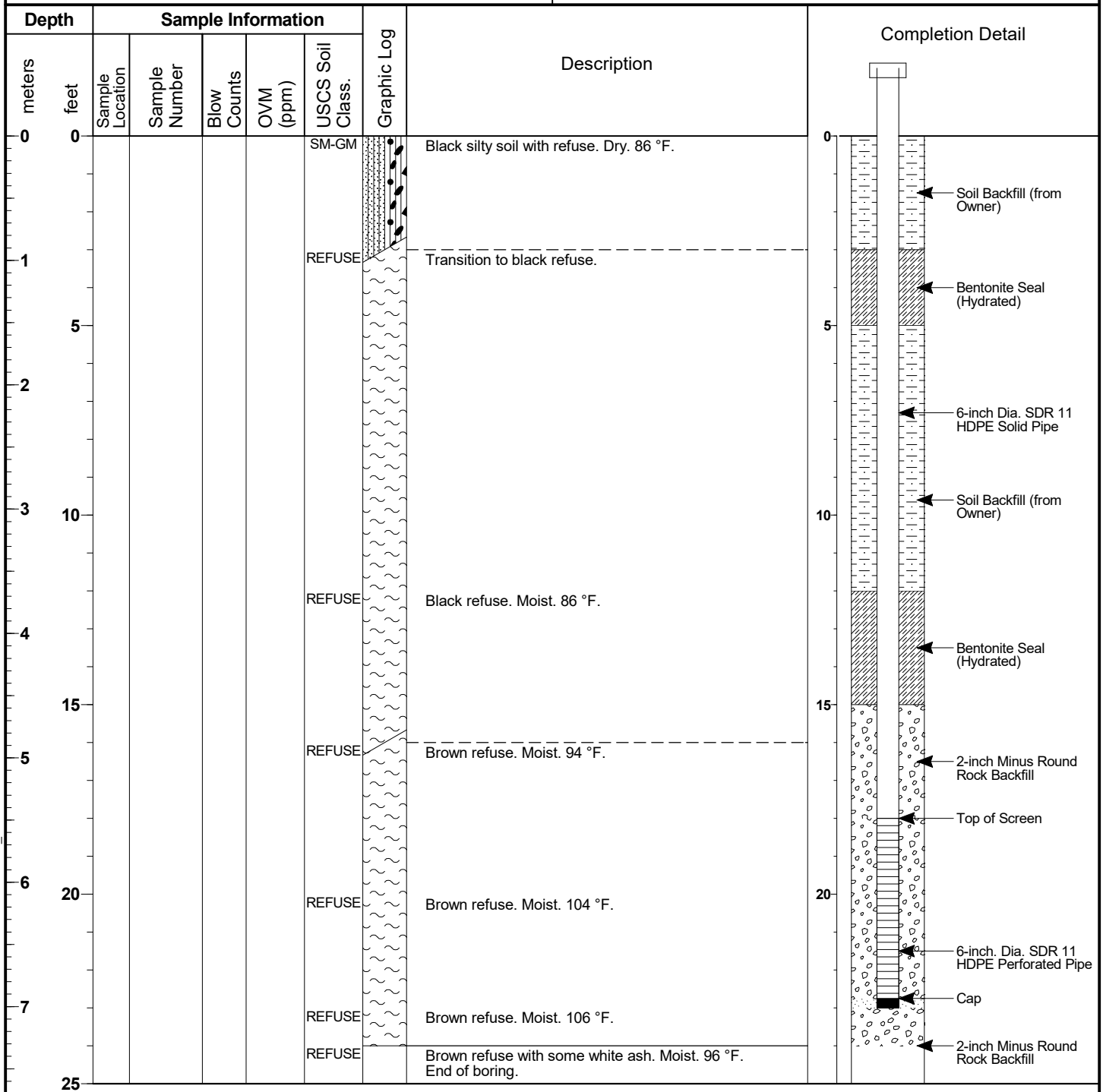
BORING NUMBER: WE-250

Page 1 of 1

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-976. Drawing ID: 2019-15. 8 ft-ags stickup.



Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **S. Graber**

Date Started: **8/2/19**

Date Ended: **8/2/19**

Boring Diameter: **36-inch**

Well Diameter: **6-inch**

Time Started: **13:30**

Time Ended: **14:30**

Elevation: **691.6 ft.**

Total Depth: **25.0 ft.**

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

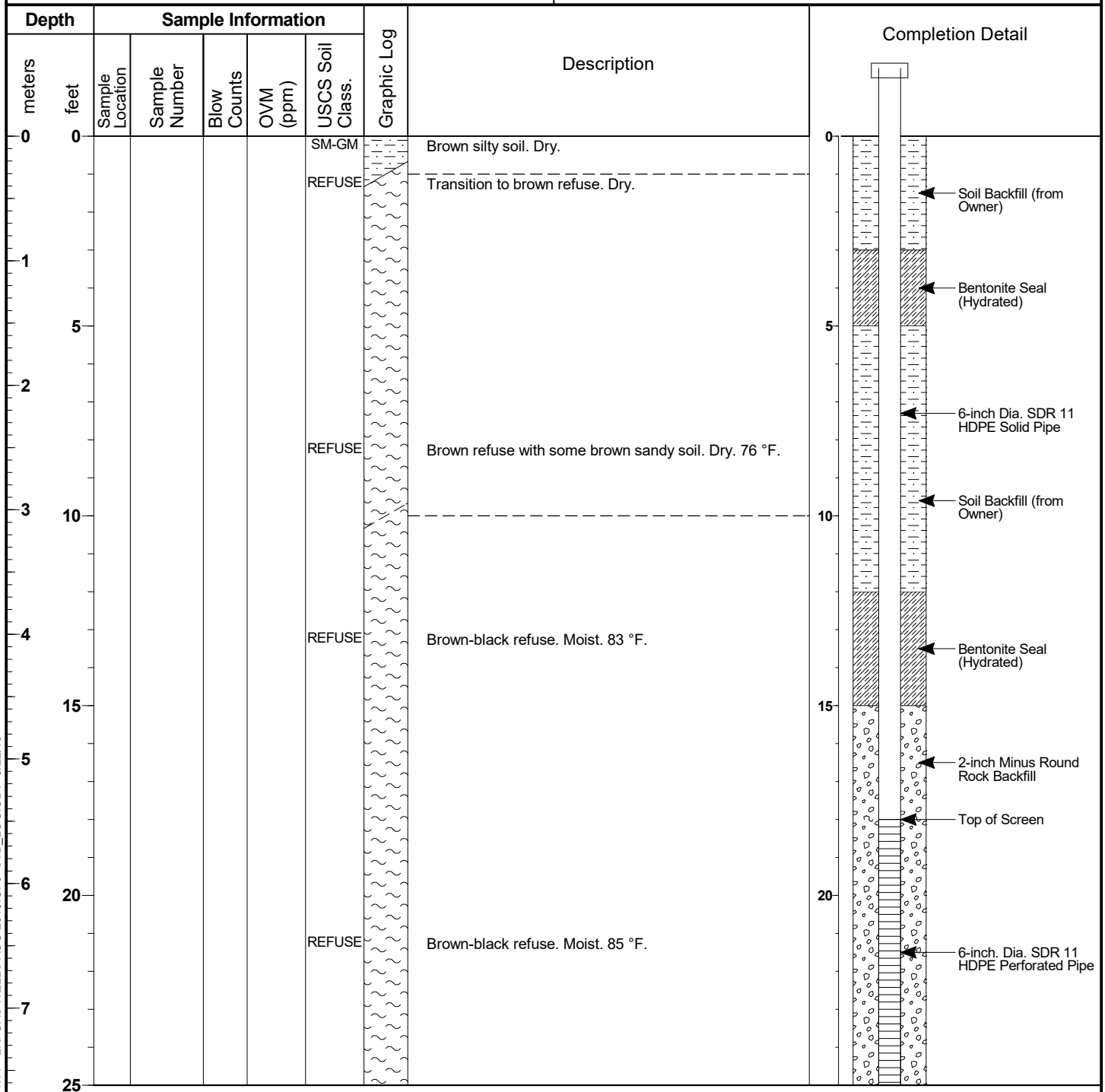
BORING NUMBER: WE-251

Page 1 of 2

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-979. Drawing ID: 2019-01. 8 ft-ags stickup.



Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **A. Deep**

Date Started: **8/5/19**

Date Ended: **8/5/19**

Boring Diameter: **36-inch**

Well Diameter: **6-inch**

Time Started: **07:55**

Time Ended: **10:45**

Elevation: **715.3 ft.**

Total Depth: **50.5 ft.**

STANDARD_LOG_04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-251

Page 2 of 2

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVN (ppm)	USCS Soil Class.			
8	25								25
9	30								30
10	35					REFUSE		Brown-black refuse. Moist. 102 °F.	35
11	40					REFUSE		Brown-black refuse. Moist. 92 °F.	40
12	45					REFUSE		Brown-black refuse. Moist. 90 °F.	45
13	50					REFUSE		Brown-black refuse. Moist. 102 °F.	50
14	55					REFUSE		Brown-black refuse. Moist. 99 °F. End of boring.	55

Centralizer

2-inch Minus Round Rock Backfill

6-inch Dia. SDR 11 HDPE Perforated Pipe

Cap

2-inch Minus Round Rock Backfill

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-252

Page 1 of 3

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-978. Drawing ID: 2019-02. 8 ft-ags stickup.



STANDARD_LOG 04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

Drilling Company: **DBM Contractors, Inc.**
Drilling Method: **IMT AF-220**
Logged By: **A. Deep**

Date Started: **8/5/19** Time Started: **11:10**
Date Ended: **8/5/19** Time Ended: **14:30**
Boring Diameter: **36-inch** Elevation: **724.1 ft.**
Well Diameter: **6-inch** Total Depth: **60.5 ft.**

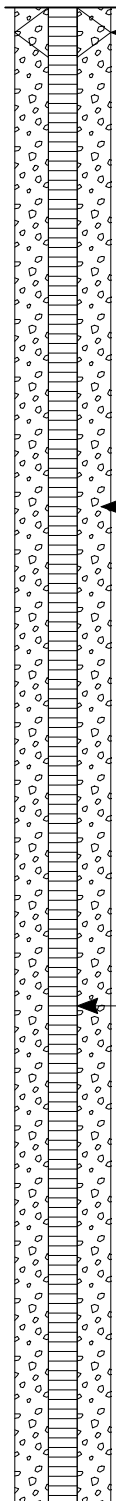
2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-252

Page 2 of 3

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
8	25					REFUSE		Brown-black refuse. Moist. 116 °F.	 Centralizer 2-inch Minus Round Rock Backfill 6-inch Dia. SDR 11 HDPE Perforated Pipe
9	30					REFUSE		Brown-black refuse. Moist. 110 °F.	
10	35					REFUSE		Brown-black refuse. Moist.	
11	40					REFUSE		Brown-black refuse. Moist. 105 °F.	
12	45					REFUSE		Brown-black refuse. Moist. 111 °F.	
13	50					REFUSE			
14	55								

STANDARD_LOG 04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-252

Page 3 of 3

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
17	55					REFUSE		Brown-black refuse. Moist. 114 °F.	Centralizer 6-inch Dia. SDR 11 HDPE Perforated Pipe Cap 2-inch Minus Round Rock Backfill
18	60					REFUSE		Brown-black refuse. Moist. 112 °F. End of boring.	
19									
20	65								
21	70								
22									
23	75								
24									
25	80								
	85								

STANDARD_LOG 04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

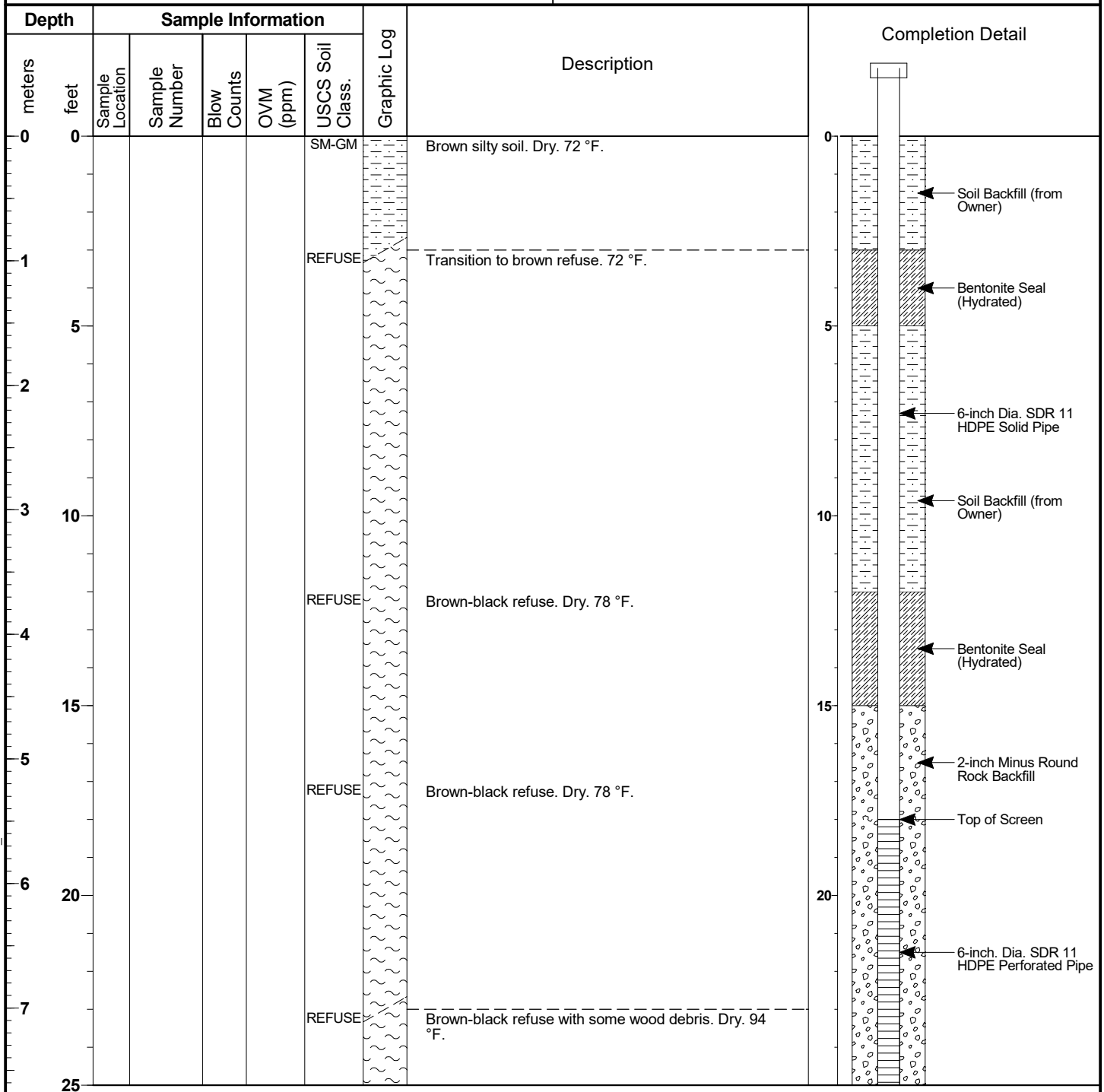
BORING NUMBER: WE-253

Page 1 of 3

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-987. Drawing ID: 2019-03. 8 ft-ags stickup.



Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **A. Deep**

Date Started: **8/6/19**

Date Ended: **8/6/19**

Boring Diameter: **36-inch**

Well Diameter: **6-inch**

Time Started: **07:30**

Time Ended: **10:30**

Elevation: **731.1 ft.**

Total Depth: **69.0 ft.**

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-253

Page 2 of 3

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
8	25								25
									Centralizer
9	30								
10									
	35					REFUSE		Brown-black refuse with some wood debris. Moist. 99 °F.	35
11									2-inch Minus Round Rock Backfill
12	40								
13						REFUSE		Brown refuse. Moist. 103 °F.	
14	45								6-inch Dia. SDR 11 HDPE Perforated Pipe
15	50								
16						REFUSE		Brown-black refuse with some wood debris. Moist. 94 °F.	
	55								

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-253

Page 3 of 3

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
55	17					REFUSE		Brown-black refuse. Moist. 100 °F.	Centralizer 6-inch Dia. SDR 11 HDPE Perforated Pipe Cap 2-inch Minus Round Rock Backfill
18	60					REFUSE		Brown-black refuse. Moist. 101 °F.	
19	65					REFUSE		Brown-black refuse. Moist. 104 °F.	
20	70					REFUSE		Brown-black refuse. Moist. End of boring.	
21	75								
22	80								
23	85								

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

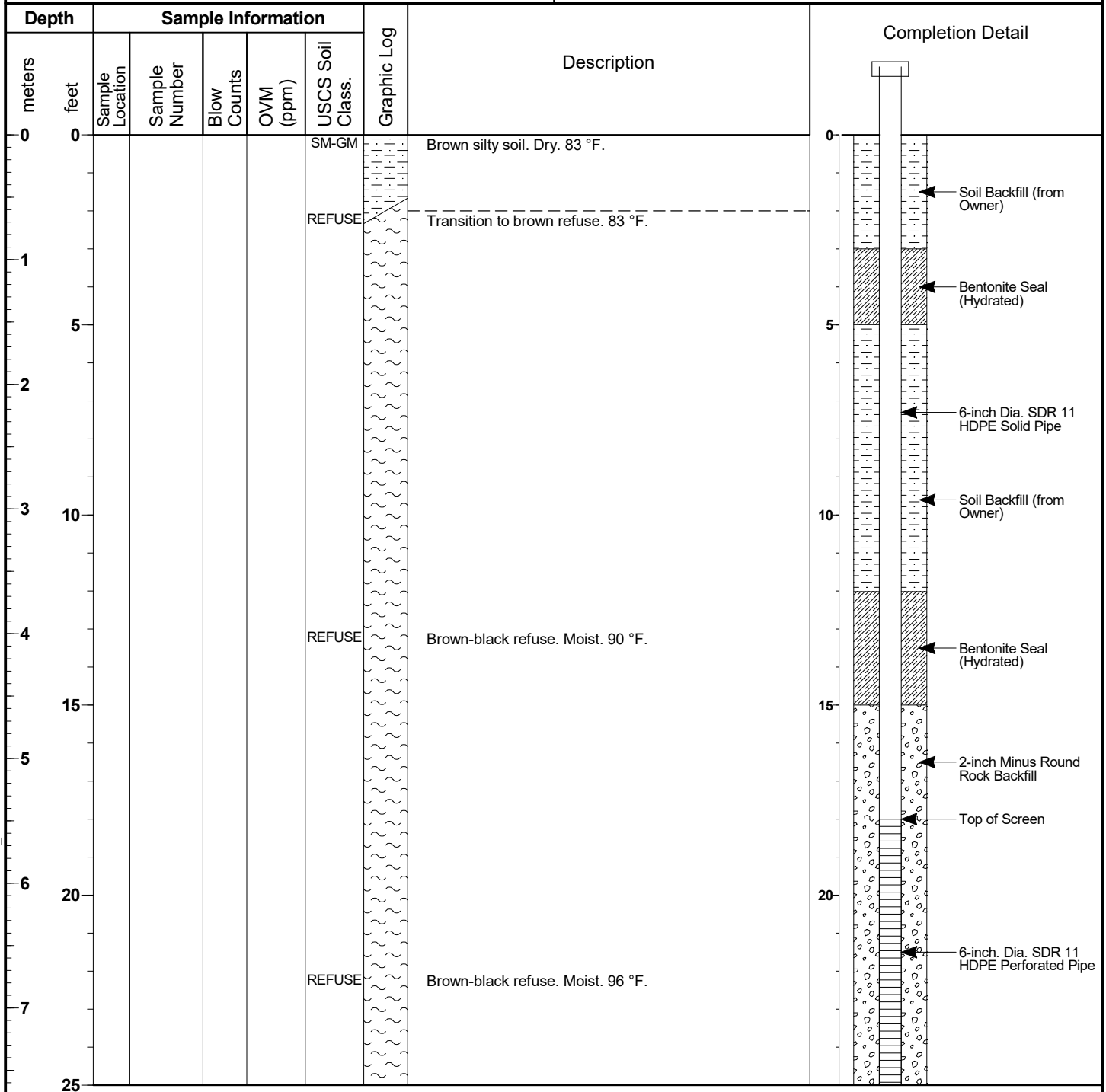
BORING NUMBER: WE-254

Page 1 of 3

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-986. Drawing ID: 2019-04. 8 ft-ags stickup.



Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **A. Deep**

Date Started: **8/6/19**

Date Ended: **8/6/19**

Boring Diameter: **36-inch**

Well Diameter: **6-inch**

Time Started: **11:00**

Time Ended: **13:30**

Elevation: **733.5 ft.**

Total Depth: **72.0 ft.**

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-254

Page 2 of 3

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
8	25								
9	30					REFUSE		Brown-black refuse with some wood debris. Moist. 104 °F.	
10									
11	35					REFUSE		Brown refuse. Moist. 93 °F.	
12	40								
13									
14	45					REFUSE		Brown refuse with some wood debris. Moist. 102 °F.	
15	50								
16									
	55					REFUSE		Brown refuse. Moist. 111 °F.	

STANDARD_LOG_04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

Centralizer

2-inch Minus Round Rock Backfill

6-inch Dia. SDR 11 HDPE Perforated Pipe

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-254

Page 3 of 3

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
55	17								
18	60					REFUSE		Brown-black refuse. Moist to wet (moisture increasing with depth). 105 °F.	Centralizer 6-inch Dia. SDR 11 HDPE Perforated Pipe Cap 2-inch Minus Round Rock Backfill
19	65					REFUSE		Brown-black refuse. Wet. 119 °F.	
20	70					REFUSE		Brown-black refuse. Wet. 104 °F.	
21	75					REFUSE		Brown-black refuse. Wet. 103 °F.	
22	80					REFUSE		End of boring.	
23	85								

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

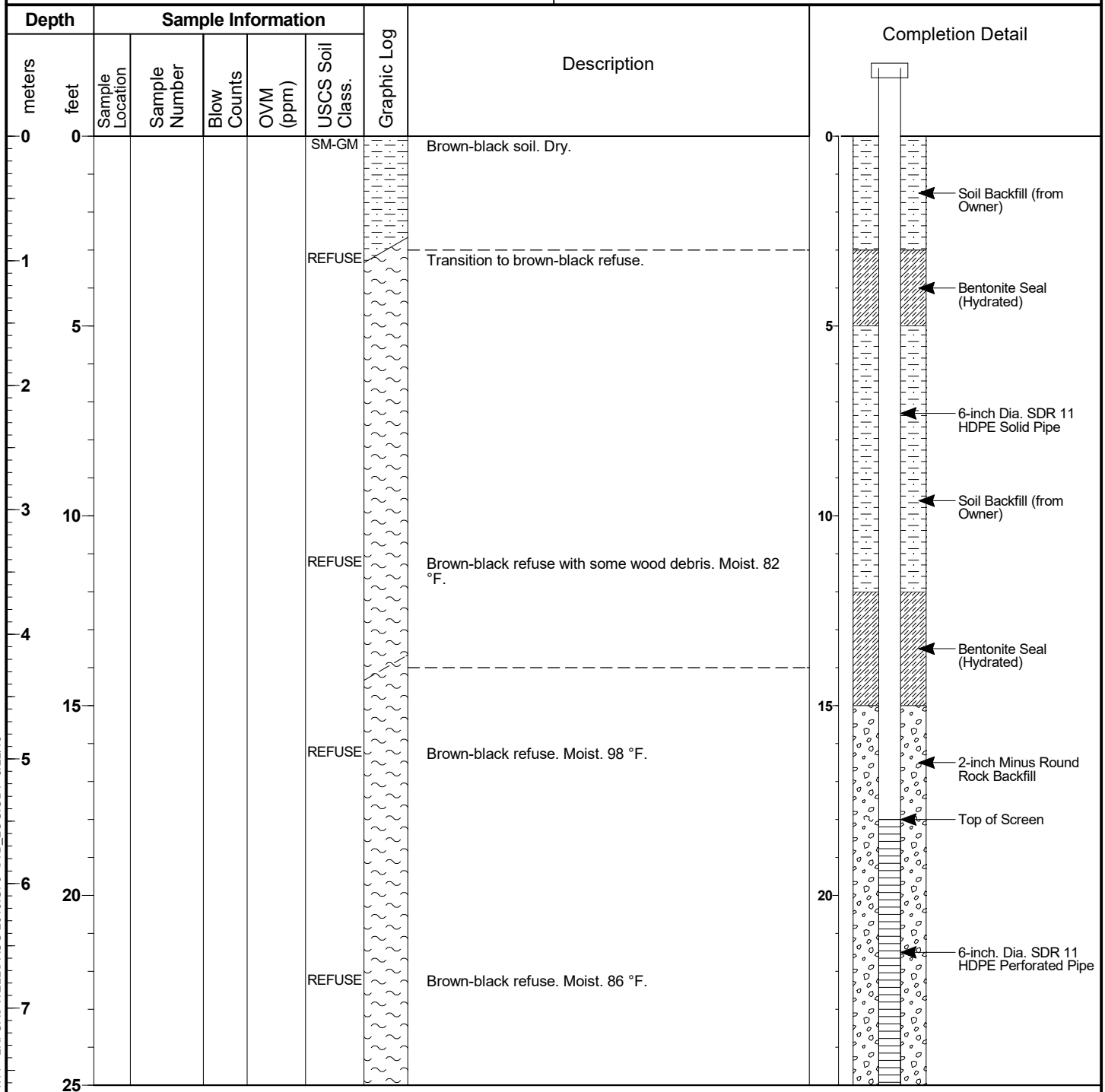
BORING NUMBER: WE-255

Page 1 of 3

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-985. Drawing ID: 2019-05. 8 ft-ags stickup.



Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **A. Deep**

Date Started: **8/7/19**

Date Ended: **8/6/19**

Boring Diameter: **36-inch**

Well Diameter: **6-inch**

Time Started: **08:00**

Time Ended: **11:15**

Elevation: **740.0 ft.**

Total Depth: **76.0 ft.**

STANDARD_LOG_04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-255

Page 2 of 3

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
8	25								25
9	30								30
10						REFUSE		Brown-black refuse. Moist. 108 °F.	
11	35								35
12	40								40
13						REFUSE		Brown-black refuse. Moist. 112 °F.	
14	45								45
15	50								50
16						REFUSE		Brown-black refuse. Moist. 100 °F.	
55									

Centralizer

2-inch Minus Round Rock Backfill

6-inch Dia. SDR 11 HDPE Perforated Pipe

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-255

Page 3 of 3

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
55	17								55
									Centralizer
18	60								60
19									
65	20								65
						REFUSE		Brown-black refuse. Moist. 102 °F.	6-inch Dia. SDR 11 HDPE Perforated Pipe
21	70								70
22									
75	23								75
						REFUSE		Brown-black refuse. Moist. 104 °F. End of boring.	Cap
24	80								80
25									
85									

STANDARD_LOG 04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

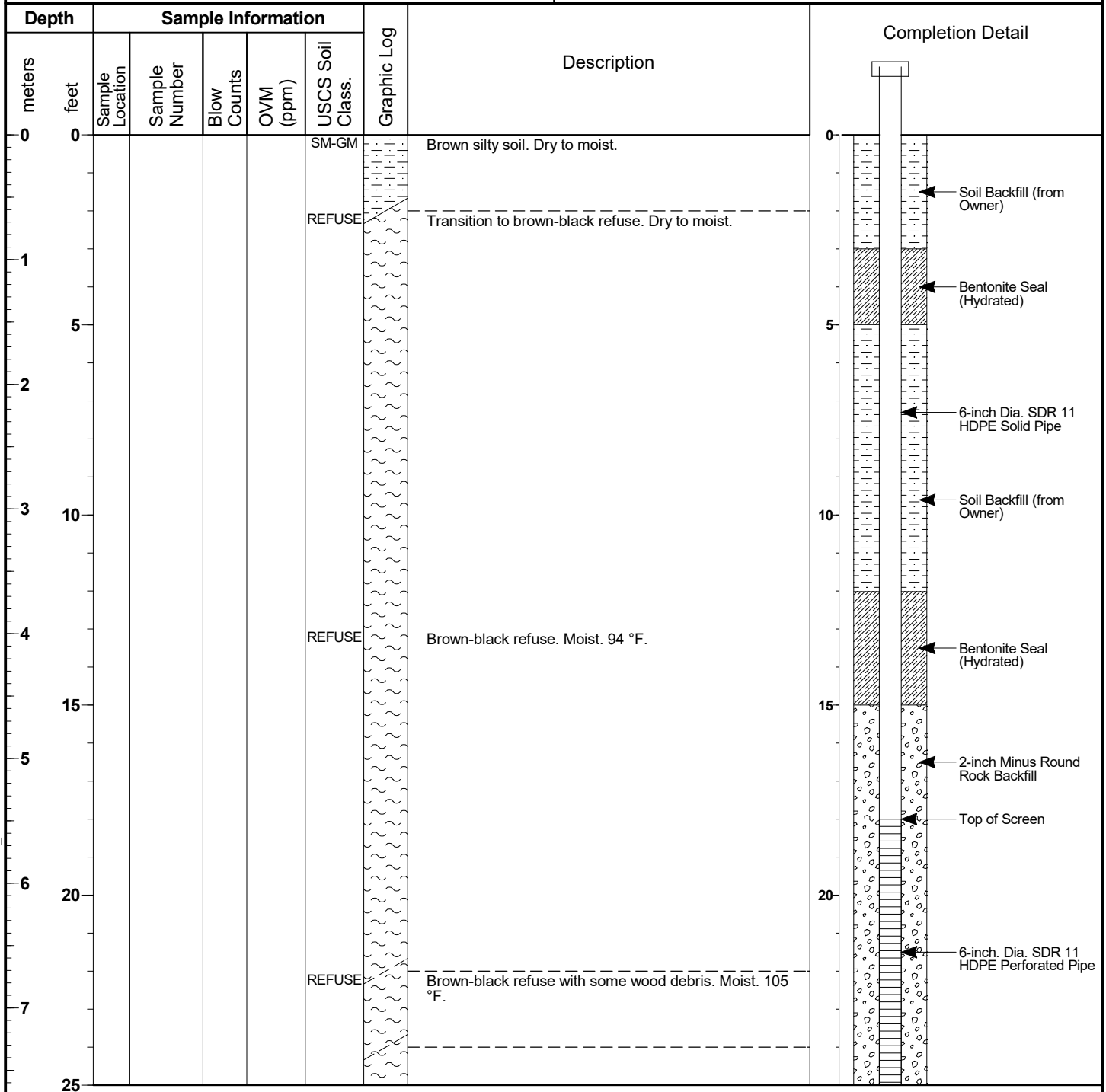
BORING NUMBER: WE-256

Page 1 of 3

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-984. Drawing ID: 2019-06. 8 ft-ags stickup.



Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **A. Deep**

Date Started: **8/7/19**

Date Ended: **8/6/19**

Boring Diameter: **36-inch**

Well Diameter: **6-inch**

Time Started: **11:45**

Time Ended: **16:00**

Elevation: **744.1 ft.**

Total Depth: **83.0 ft.**

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-256

Page 2 of 3

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
8	25					REFUSE		Brown-black refuse. Moist. 112 °F.	25
9	30								
10	35								
11	40					REFUSE		Brown-black refuse. Moist. 113 °F.	35
12	45								
13	50								
14	55					REFUSE		Brown woody debris with some refuse. Dry. 108 °F.	45
15									
16									
55									

Centralizer

2-inch Minus Round Rock Backfill

6-inch Dia. SDR 11 HDPE Perforated Pipe

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-256

Page 3 of 3

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
17	55								
18	60								
19	65					REFUSE		Brown-black refuse. Moist to wet (moisture increasing with depth). 122 °F.	
20	70					REFUSE		Brown-black refuse. Wet. 114 °F.	
21	75					REFUSE		Black refuse. Wet to saturated. 124 °F.	
22	80					REFUSE		Black refuse. Wet. 127 °F.	
23	85					REFUSE		Black refuse. Wet to saturated. 119 °F. End of boring.	

Centralizer

6-inch Dia. SDR 11
HDPE Perforated Pipe

Cap

2-inch Minus Round
Rock Backfill

STANDARD_LOG 04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

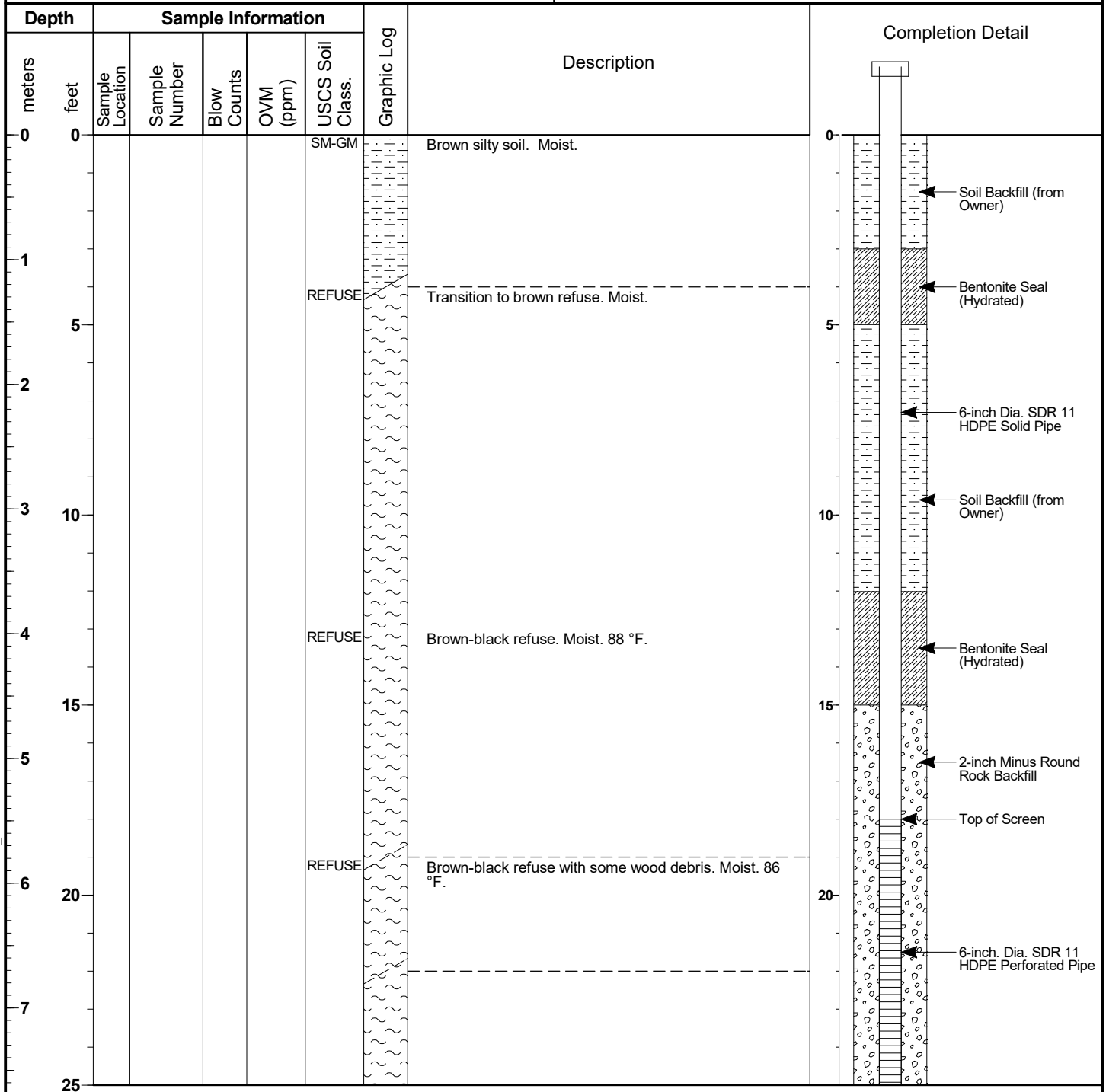
BORING NUMBER: WE-257

Page 1 of 4

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-983. Drawing ID: 2019-07. 5 ft-ags stickup.



Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **A. Deep**

Date Started: **8/8/19**

Date Ended: **8/8/19**

Boring Diameter: **36-inch**

Well Diameter: **6-inch**

Time Started: **07:00**

Time Ended: **10:15**

Elevation: **751.6 ft.**

Total Depth: **87.0 ft.**

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-257

Page 2 of 4

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
8	25								25
9	30								30
10									
	35								35
11									
12	40								40
13									
	45								45
14									
15	50								50
16									
	55								

REFUSE

Brown-black refuse. Moist. 85 °F.

REFUSE

Brown-black refuse. Moist. 86 °F.

Centralizer

2-inch Minus Round Rock Backfill

6-inch Dia. SDR 11 HDPE Perforated Pipe

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-257

Page 3 of 4

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
17	55								55
18	60					REFUSE		Brown-black refuse. Moist, increasing with depth. 96 °F.	Centralizer
19	65								65
20	70								6-inch Dia. SDR 11 HDPE Perforated Pipe
21	75					REFUSE		Brown-black refuse. Moist to wet. 90 °F.	2-inch Minus Round Rock Backfill
22	80					REFUSE		Brown-black refuse. Moist. 103 °F.	
23	85								Cap

STANDARD_LOG_04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

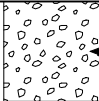
2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-257

Page 4 of 4

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
26	85								 2-inch Minus Round Rock Backfill
						REFUSE		Brown-black refuse with some soil. Moist. 83 °F. End of boring.	
27									
	90								
28									
29	95								
30									
	100								
31									
32	105								
33									
	110								
34									
35	115								

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

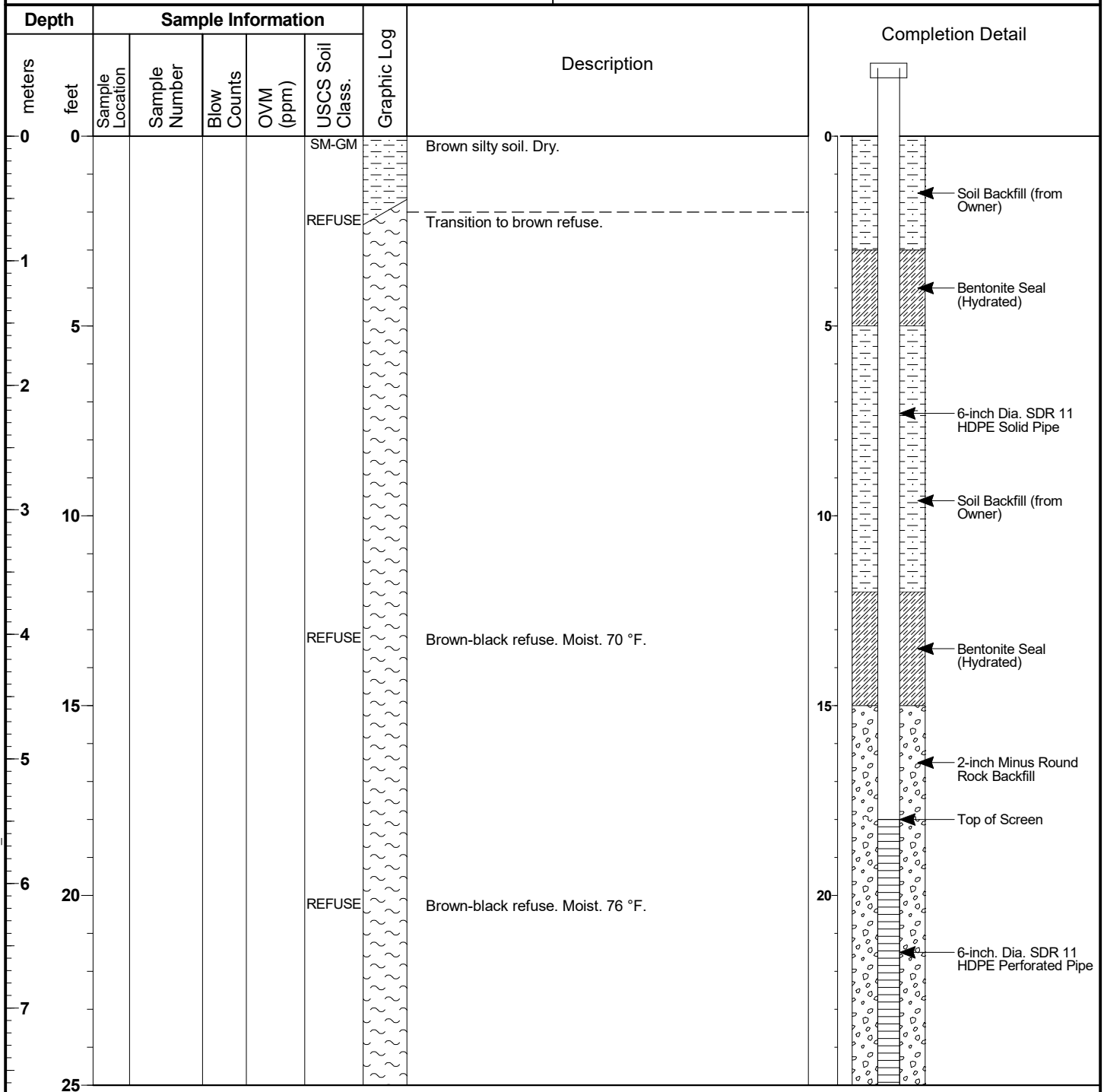
BORING NUMBER: WE-258

Page 1 of 3

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-982. Drawing ID: 2019-08. 5 ft-ags stickup.



Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **A. Deep**

Date Started: **8/8/19**

Date Ended: **8/8/19**

Boring Diameter: **36-inch**

Well Diameter: **6-inch**

Time Started: **10:45**

Time Ended: **14:00**

Elevation: **755.8 ft.**

Total Depth: **77.0 ft.**

STANDARD_LOG_04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-258

Page 2 of 3

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
8	25								25
									Centralizer
9	30								
10						REFUSE		Brown refuse. Dry. 80 °F.	
	35								
11						REFUSE		Brown refuse with brown-gray soil. Dry. 86 °F.	2-inch Minus Round Rock Backfill
12	40								
13									
	45								
14									6-inch Dia. SDR 11 HDPE Perforated Pipe
15	50					REFUSE		Brown-black refuse. Dry. 95 °F.	
16									
	55								

STANDARD_LOG_04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

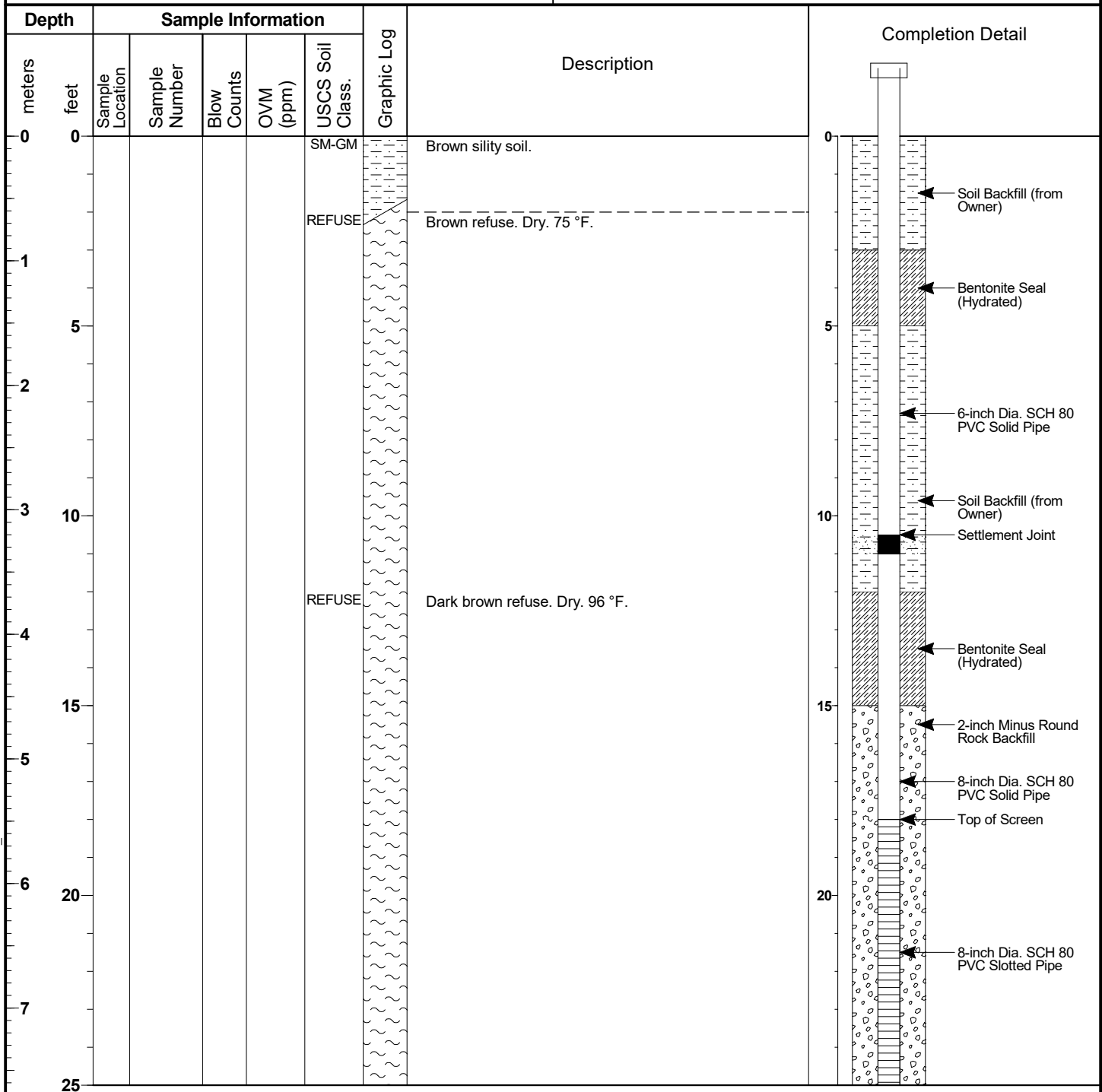
BORING NUMBER: WE-259

Page 1 of 5

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-972. Drawing ID: 2019-18. 5 ft-ags stickup.



STANDARD_LOG_04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **T. Berndahl**

Date Started: **7/24/19**

Date Ended: **7/24/19**

Boring Diameter: **36-inch**

Well Diameter: **8-inch**

Time Started: **10:24**

Time Ended: **16:30**

Elevation: **844.3 ft.**

Total Depth: **129.0 ft.**

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-259

Page 2 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
8	25					REFUSE		Dark brown refuse. Dry. 86 °F.	25
9	30					REFUSE		Brown-black refuse. Moist. 96 °F.	30
11	35					REFUSE		Brown-black refuse. Moist. 89 °F.	35
12	40					REFUSE			40
13	45					REFUSE			45
14	50					REFUSE			50
16	55					REFUSE			55

Centralizer

2-inch Minus Round Rock Backfill

8-inch Dia. SCH 80 PVC Slotted Pipe

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-259

Page 3 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
17	55					REFUSE		Brown-black refuse. Moist. 114 °F.	Centralizer 8-inch Dia. SCH 80 PVC Slotted Pipe 2-inch Minus Round Rock Backfill
18	60								
19	65					REFUSE		Black-brown refuse. Moist. 103 °F.	
20	70								
21	75					REFUSE		Black refuse. Wet. 114 °F.	
22	80								
23									
24									
25									
	85								

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-259

Page 4 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
26	85					REFUSE		Black, highly decomposed refuse. Wet to saturated. 108 °F.	85
27	90					REFUSE		Black, highly decomposed refuse. Wet to saturated.	90
28						REFUSE		Black, highly decomposed refuse (decomposition increasing with depth). Wet to saturated. 111 °F.	95
29	95					REFUSE		Black, highly decomposed refuse. Wet. 113 °F.	100
30	100					REFUSE		Black, highly decomposed refuse. Saturated. 109 °F.	105
31	105					REFUSE			110
32	110					REFUSE			115
33	115					REFUSE			

Centralizer

2-inch Minus Round Rock Backfill

8-inch Dia. SCH 80 PVC Slotted Pipe

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

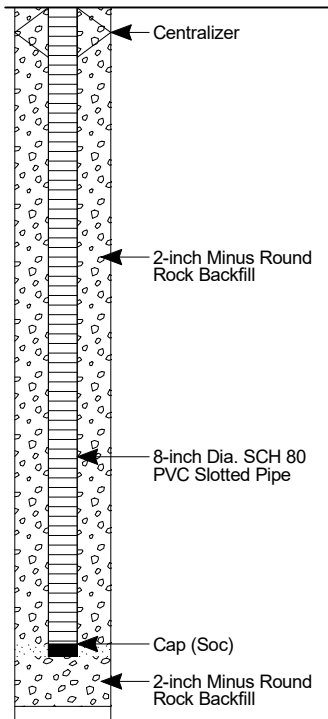
BORING NUMBER: WE-259

Page 5 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	QVM (ppm)	USCS Soil Class.			
115									115
36									
120						REFUSE		Black, highly decomposed refuse. Saturated.	120
37									
38						REFUSE		Black, highly decomposed refuse. Saturated. 109 °F.	
125									125
39						REFUSE		Black, highly decomposed refuse. Saturated. 110 °F.	
130						REFUSE		Black, highly decomposed refuse. Saturated. End of boring.	
40									130
41									135
42									140
43									145
44									
145									



STANDARD_LOG 04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

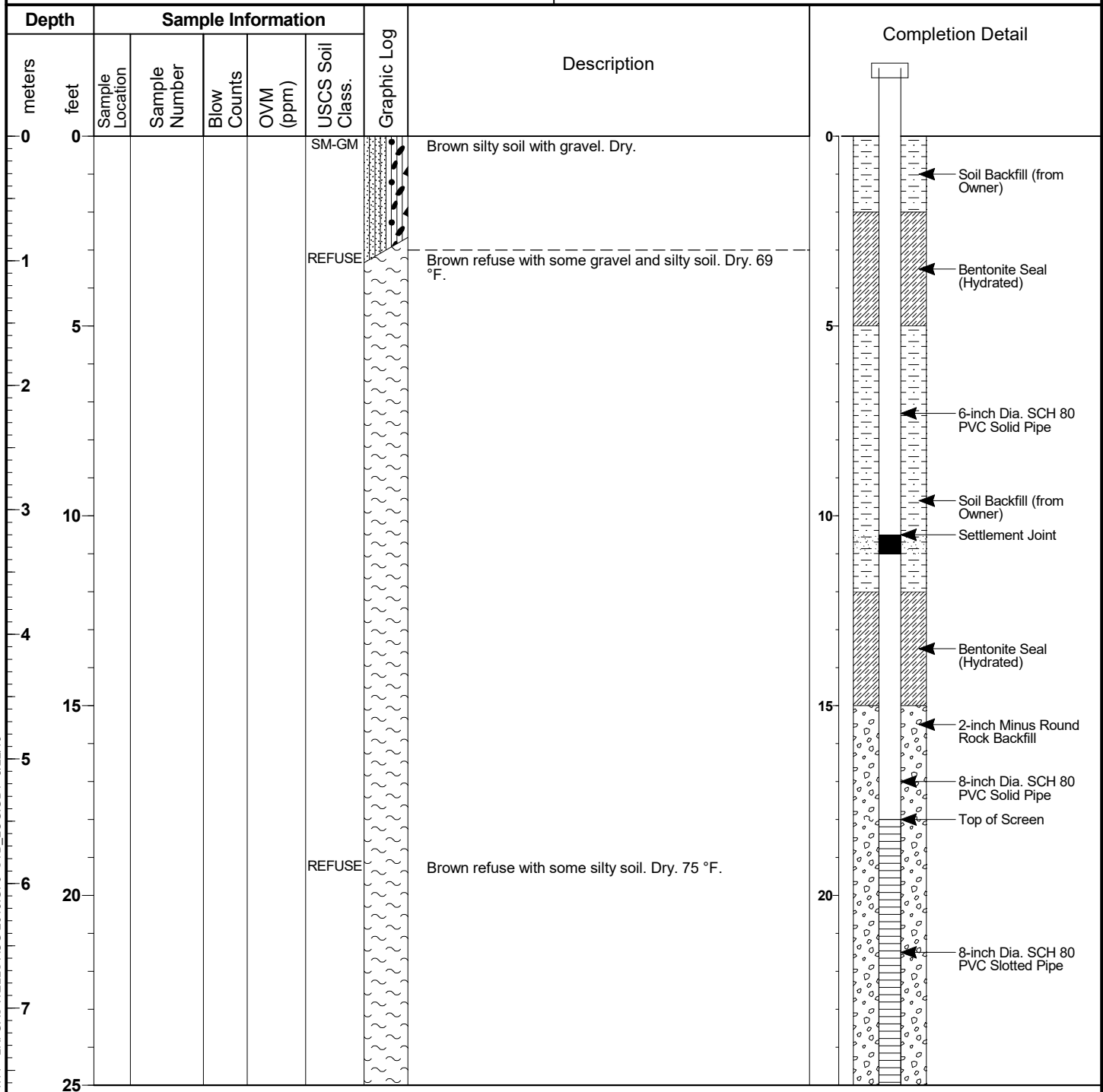
BORING NUMBER: WE-260

Page 1 of 5

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-975. Drawing ID: 2019-19 (Relocated as 2019-XX by LRI).
4.5 ft-ags stickup.



STANDARD_LOG_04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **A. Deep**

Date Started: **8/12/19**

Date Ended: **8/12/19**

Boring Diameter: **36-inch**

Well Diameter: **8-inch**

Time Started: **08:00**

Time Ended: **14:00**

Elevation: **841.8 ft.**

Total Depth: **130.0 ft.**

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-260

Page 2 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
8	25								
9	30								
10	35					REFUSE		Brown-black refuse. Dry to moist. 82 °F.	
11	40								
12	45								
13	50					REFUSE		Brown refuse with some white ash. Dry. 96 °F.	
14	55								
15									
16						REFUSE		Brown-black refuse with some wood debris. Dry to moist. 86 °F.	
55									

Centralizer

2-inch Minus Round Rock Backfill

8-inch Dia. SCH 80 PVC Slotted Pipe

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-260

Page 3 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
55	17								55
									Centralizer
18	60								60
19									
65	20								65
									8-inch Dia. SCH 80 PVC Slotted Pipe
21	70								70
22									
75	23								75
									2-inch Minus Round Rock Backfill
24	80								80
25									
85									

REFUSE

Brown-black refuse with some wood debris. Moist. 99 °F.

REFUSE

Brown-black refuse. Moist. 109 °F.

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-260

Page 4 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
26	85								85
27	90								
28									
29	95								95
30						REFUSE		Brown-black refuse. Moist. 101 °F.	
31	100								
32	105								105
33						REFUSE		Brown-black refuse. Moist. 109 °F.	
34	110								
35	115					REFUSE		Brown-black refuse. Moist. 113 °F.	

Centralizer

2-inch Minus Round Rock Backfill

8-inch Dia. SCH 80 PVC Slotted Pipe

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-260

Page 5 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	QVM (ppm)	USCS Soil Class.			
115						REFUSE		Brown-black refuse. Moist to wet (moisture increasing with depth). 88 °F.	115
36									
120									120
37									
38						REFUSE		Brown-black refuse. Moist. 115 °F.	125
125									
39									
130						REFUSE		Brown-black refuse. Wet. 112 °F. End of boring.	130
40									
41									
135									135
42									
140									140
43									
44									
145									

STANDARD_LOG_04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

Centralizer

2-inch Minus Round Rock Backfill

8-inch Dia. SCH 80 PVC Slotted Pipe

Cap (Soc)

2-inch Minus Round Rock Backfill

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

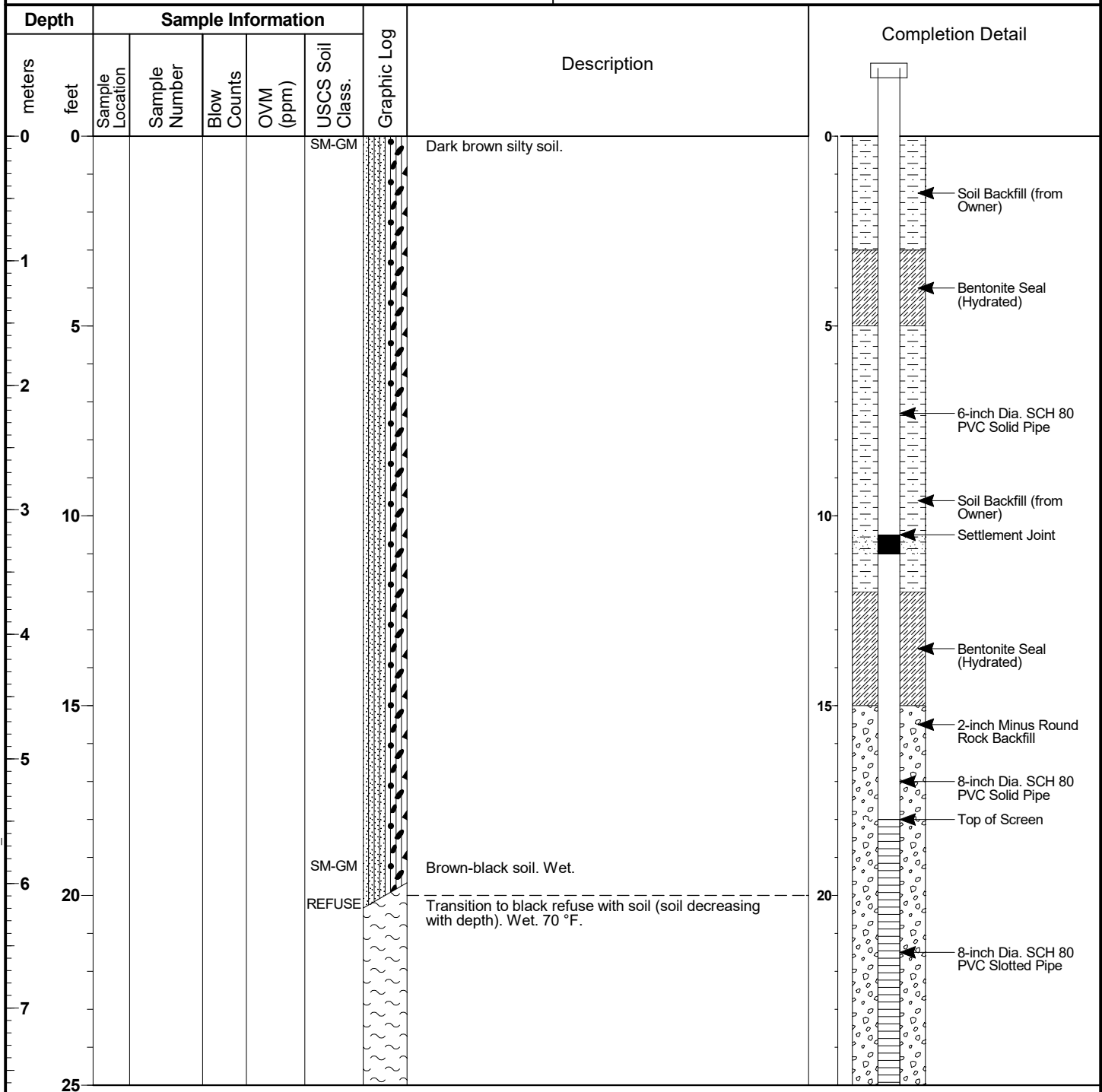
BORING NUMBER: WE-261

Page 1 of 5

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-973. Drawing ID: 2019-13. 4.5 ft-ags stickup.



Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **T. Berndahl**

Date Started: **7/25/19**

Date Ended: **7/26/19**

Boring Diameter: **36-inch**

Well Diameter: **8-inch**

Time Started: **08:41**

Time Ended: **14:45**

Elevation: **830.7 ft.**

Total Depth: **117.0 ft.**

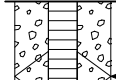
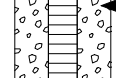
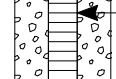
2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-261

Page 2 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
8	25					REFUSE		Black refuse with some soil. Saturated. 90 °F.	 Centralizer
9	30					REFUSE		Black refuse and soil. Saturated. 88 °F.	
11	35					SM-GM		Black refuse and soil. Saturated. 89 °F.	
12	40					SM-GM		Black refuse and soil. Wet, decreasing moisture with depth. 86 °F.	
13	45					SM-GM		Black silty, gravelly soil with some refuse. 88 °F.	 2-inch Minus Round Rock Backfill
14	50								
15	55								
									 8-inch Dia. SCH 80 PVC Slotted Pipe

STANDARD_LOG_04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-261

Page 3 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
55	17					REFUSE		Brown-black soil with some refuse. Refuse increasing with depth. Dry. 96 °F.	55
18	60					REFUSE		Black refuse with soil. Wet.	60
19	65					REFUSE		Black refuse with soil. Wet.	65
20	70					REFUSE		Black refuse with soil.	70
21	75					REFUSE		Black refuse with soil. Saturated. 98 °F.	75
22	80					REFUSE		Black refuse with soil. Saturated. 76 °F.	80
23	85					REFUSE		Black-gray sludge. Saturated.	85

Centralizer

8-inch Dia. SCH 80
PVC Slotted Pipe

Centralizer

2-inch Minus Round
Rock Backfill

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-261

Page 4 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	QVM (ppm)	USCS Soil Class.			
26	85								85
27	90								90
28									
29	95					REFUSE		Black-gray sludge. Saturated. 82 °F.	95
30	100								100
31									
32	105								105
33	110					REFUSE		Black-gray sludge. Saturated. 95 °F.	110
34									
35	115								

Centralizer

Cap (Soc)

2-inch Minus Round Rock Backfill

Boring Slough (unable to keep open)

STANDARD_LOG 04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-261

Page 5 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail	
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.				
115						REFUSE		Black refuse. Wet to saturated. 120 °F.		Boring Slough (unable to keep open)
36						REFUSE		Black refuse. Wet to saturated. 117 °F. End of boring.		
120										
37										
38	125									
39										
40	130									
41	135									
42										
43	140									
44										
145										

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

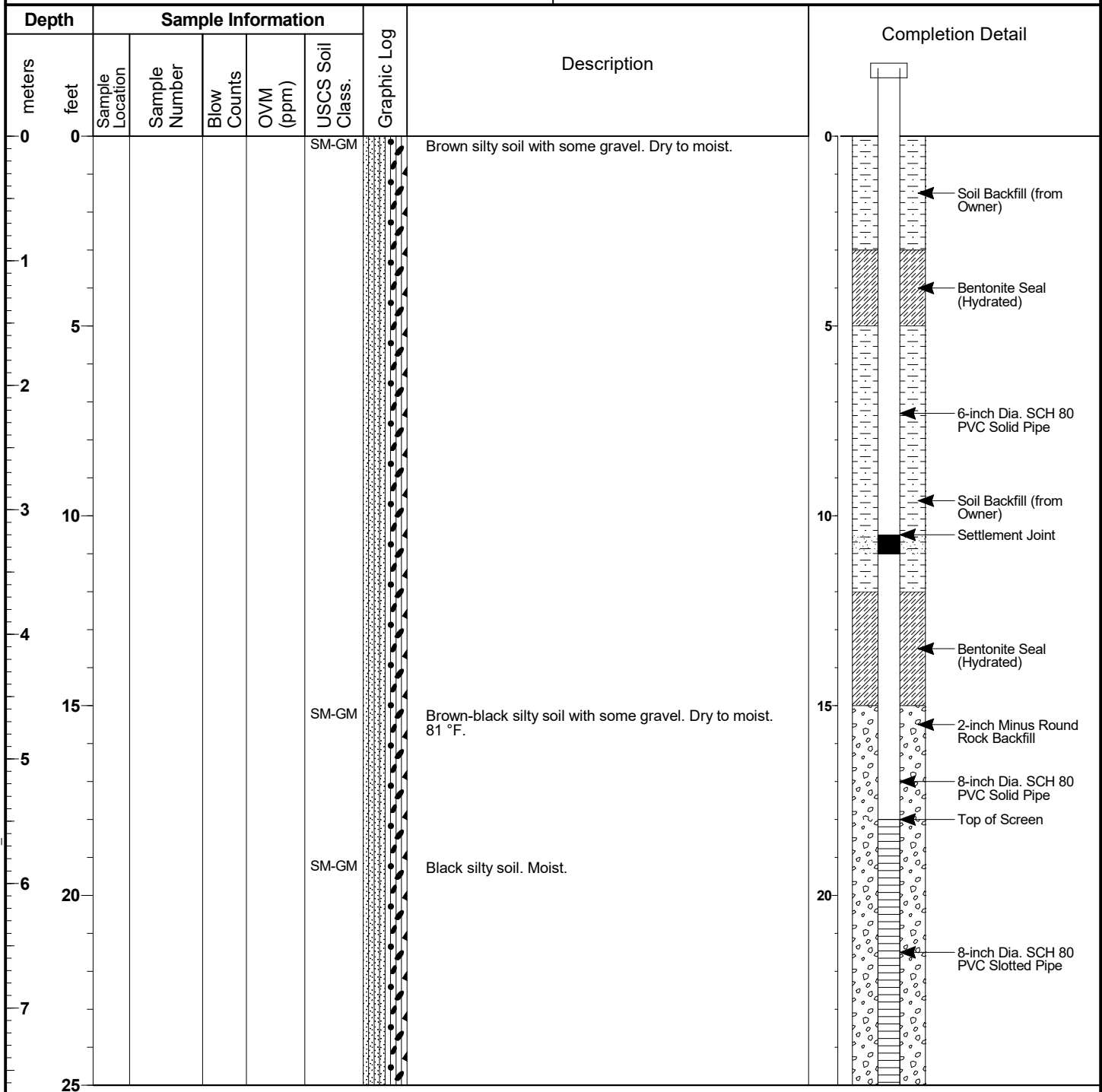
BORING NUMBER: WE-262

Page 1 of 5

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-988. Drawing ID: 2019-11. 5 ft-ags stickup.



Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **S. Graber**

Date Started: **7/29/19**

Date Ended: **7/29/19**

Boring Diameter: **36-inch**

Well Diameter: **8-inch**

Time Started: **08:25**

Time Ended: **17:00**

Elevation: **828.5 ft.**

Total Depth: **131.0 ft.**

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-262

Page 2 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
8	25					SM-GM		Black soil with some wood debris.	Centralizer
9	30								
10	35								
11	40					SM-GM		Black soil with some refuse. Moist.	2-inch Minus Round Rock Backfill
12	45								
13	50					SM-GM		Black soil. Moist. 94 °F.	8-inch Dia. SCH 80 PVC Slotted Pipe
14	55								
15									
16						SM-GM		Black soil. Moist. 98 °F.	

STANDARD_LOG_04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

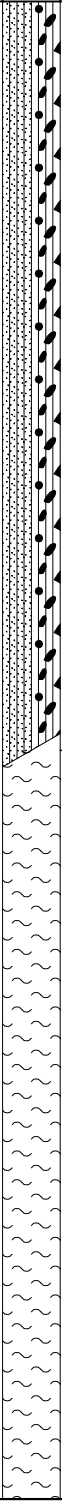
2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-262

Page 3 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
17	55					SM-GM		Black soil. Wet.	55 Centralizer 60 65 8-inch Dia. SCH 80 PVC Slotted Pipe 70 75 2-inch Minus Round Rock Backfill 80
18	60					SM-GM		Brown-black soil. Wet to saturated.	
19	65					REFUSE		Black refuse. Moist to wet.	
20	70					REFUSE		Black refuse. Wet.	
21	75								
22	80								
23	85								

STANDARD_LOG 04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-262

Page 4 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
26	85								85
27	90								
28						REFUSE		Black refuse. Saturated.	
29	95								95
30						REFUSE		Black refuse with some soil. Saturated. 106 °F.	
31	100								100
32	105					REFUSE		Brown-black refuse. Wet to saturated. 126 °F.	
33									
34	110								110
35	115					REFUSE		Brown refuse. Wet to saturated. 122 °F.	

Centralizer

2-inch Minus Round Rock Backfill

8-inch Dia. SCH 80 PVC Slotted Pipe

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-262

Page 5 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OM (ppm)	USCS Soil Class.			
115									115
36									
120									120
37						REFUSE		Brown refuse. Wet to saturated. 116 °F.	
38									
125									125
39									
130									130
40						REFUSE		Brown refuse. Wet to saturated. 108 °F. End of boring.	
41									135
42									
140									140
43									
44									
145									

STANDARD_LOG 04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

Centralizer

2-inch Minus Round Rock Backfill

8-inch Dia. SCH 80 PVC Slotted Pipe

Cap (Soc)

2-inch Minus Round Rock Backfill

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

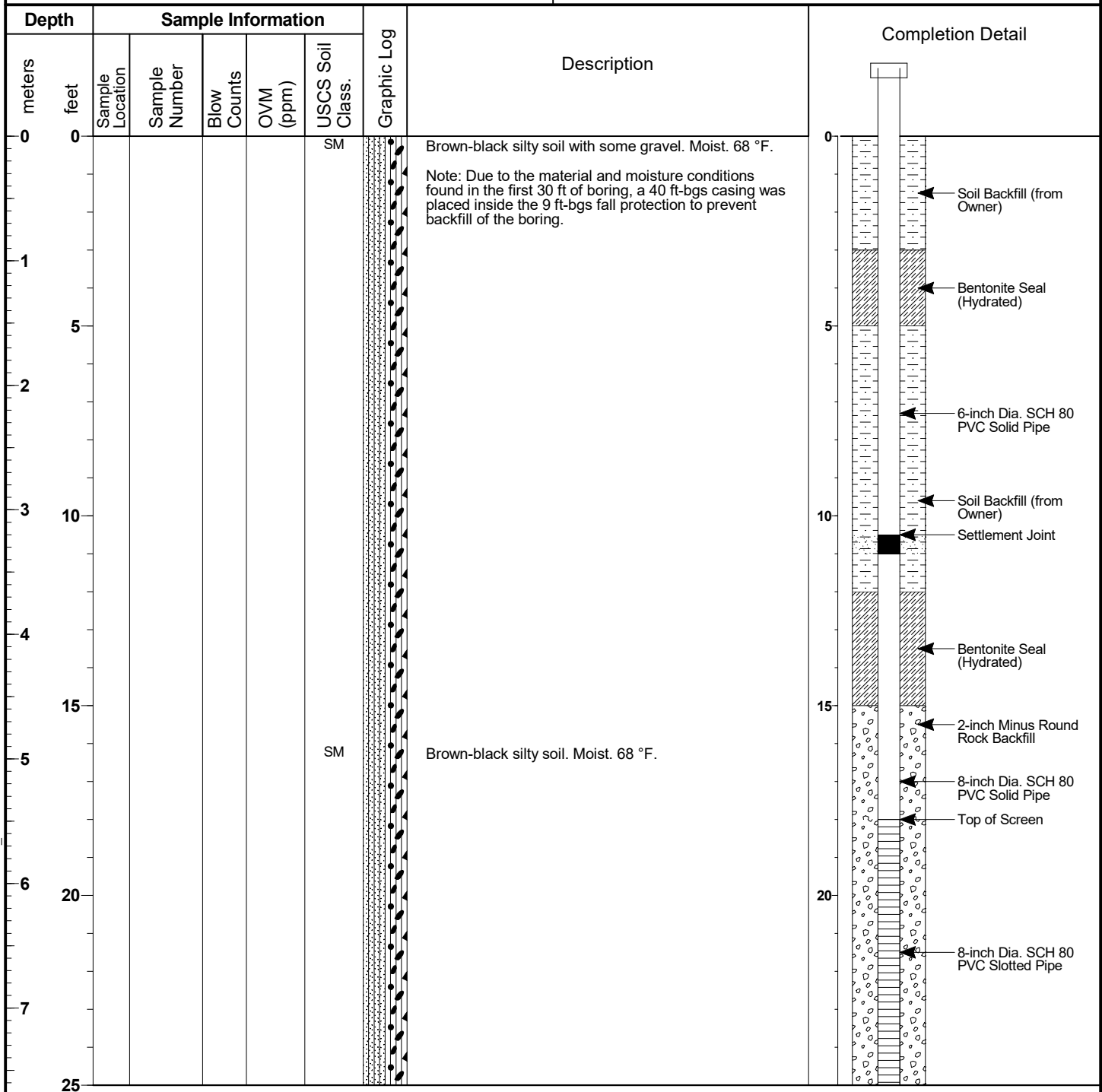
BORING NUMBER: WE-263

Page 1 of 5

LRI Landfill, Gas Wells July - August 2019
30919 Meridian East
Graham, Washington

JOB NUMBER: 04219001.11

REMARKS:
Start Card BKM-974. Drawing ID: 2019-09. 4.5 ft-ags stickup.



Drilling Company: **DBM Contractors, Inc.**

Drilling Method: **IMT AF-220**

Logged By: **A. Deep**

Date Started: **8/9/19**

Date Ended: **8/9/19**

Boring Diameter: **36-inch**

Well Diameter: **8-inch**

Time Started: **07:00**

Time Ended: **19:00**

Elevation: **805.6 ft.**

Total Depth: **131.0 ft.**

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-263

Page 2 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
8	25								
						CONC.		Brown-black soil with silty soil with lense of gray concrete rubble. Dry to moist. 72 °F.	
9	30					REFUSE		Brown-black soil and refuse sludge. Wet to saturated. 70 °F.	
10									
	35					SM-GM		Gray-black silty soil with some rock and concrete rubble. Moist. 74 °F. Bottom of cased interval (removed during construction of well).	
11									
12	40								
13						SM-GM		Brown-black silty soil with some refuse. Refuse increasing with depth. Wet. 80 °F.	
	45					REFUSE		Brown-black refuse with some soil. Soil decreasing with depth. Moist. 85 °F.	
14									
15	50					REFUSE		Brown-black refuse with some soil. Soil decreasing with depth. Moist. 83 °F.	
16									
	55								

Centralizer

2-inch Minus Round Rock Backfill

8-inch Dia. SCH 80 PVC Slotted Pipe

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-263

Page 3 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
17	55					REFUSE		Brown-black refuse with some soil. Soil decreasing with depth. Moist. 85 °F.	55
18	60					REFUSE		Brown refuse. Moist. 110 °F.	60
19	65					REFUSE		Brown-black refuse. Moist. 95 °F.	65
20	70					REFUSE		Brown refuse. Dry.	70
21	75					REFUSE			75
22	80					REFUSE			80
23	85					REFUSE			85

Centralizer

8-inch Dia. SCH 80
PVC Slotted Pipe

2-inch Minus Round
Rock Backfill

STANDARD_LOG 04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

BORING NUMBER: WE-263

Page 4 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OVM (ppm)	USCS Soil Class.			
26	85								
27	90					REFUSE		Brown refuse. Moist. 96 °F.	Centralizer 2-inch Minus Round Rock Backfill 8-inch Dia. SCH 80 PVC Slotted Pipe
28						REFUSE		Brown-black refuse. Dry to moist. 112 °F.	
29	95								
30						REFUSE		Brown refuse with some organic debris. Dry. 120 °F.	
31	100								
32	105								
33						REFUSE		Brown-black refuse. Moist. 128 °F.	
34	110								
35	115								

STANDARD_LOG 04219001.11 - LRI GAS WELLS AUG 2019.GPJ STD_LOG.GDT 8/22/19

2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005-1877

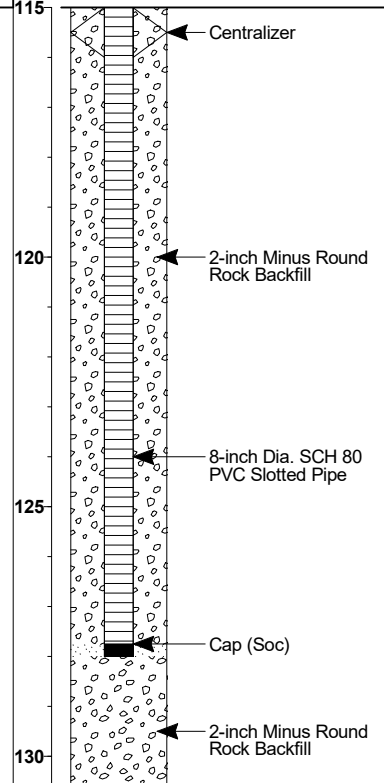
BORING NUMBER: WE-263

Page 5 of 5

LRI Landfill, Gas Wells July - August 2019

JOB NUMBER: 04219001.11

Depth		Sample Information					Graphic Log	Description	Completion Detail
meters	feet	Sample Location	Sample Number	Blow Counts	OM (ppm)	USCS Soil Class.			
115						REFUSE		Brown-black refuse. Dry to moist. 114 °F.	115
36									
120									
37									
38						REFUSE		Brown refuse. Dry to moist. 116 °F.	
125									
39						REFUSE		Brown refuse. Dry. 114 °F.	
130									
40						REFUSE		Brown-black refuse. Moist. 116 °F. End of boring.	
41									
42									
140									
43									
44									
145									



Adlington, Samuel

From: Adlington, Samuel
Sent: Friday, August 09, 2019 9:33 AM
To: Olivier Allen-moi
Cc: Lakey, Kevin; Berndahl, Travis; Deep, Alexa; Jim Crandall
Subject: Re: LRI 2019 GCCS Drilling Update (04219001.11)

Olivier,

To summarize our earlier discussion, due to the conditions found in the upper section of 2019-09 we are not going to re-drill a well at 2019-10. Conditions at 2019-09 are similar to what was encountered at 2019-11, and require casing the upper section where wet sludge is present. Due to this layer of wet sludge casing is required for the safety of the boring.

As this layer was found to be much thicker in the area of 2019-10 casing would not be practical for the designed location. DBM is going to complete 2019-09 today and then move to the relocated 2019-19 as discussed in my other email. If you have any questions or comments please let me know.

Thanks,
Sam

----- Original message -----

From: Olivier Allen-moi <Olivier.Moi@WasteConnections.com>
Date: 8/9/19 07:16 (GMT-08:00)
To: "Adlington, Samuel" <SAdlington@scsengineers.com>
Cc: "Lakey, Kevin" <KLakey@scsengineers.com>, "Berndahl, Travis" <TBerndahl@scsengineers.com>, "Deep, Alexa" <ADeep@scsengineers.com>, Jim Crandall <James.Crandall@WasteConnections.com>
Subject: RE: LRI 2019 GCCS Drilling Update (04219001.11)

Sam,

Thanks for the update.

Olivier

From: Adlington, Samuel [<mailto:SAdlington@scsengineers.com>]
Sent: Thursday, August 08, 2019 3:40 PM
To: Olivier Allen-moi
Cc: Lakey, Kevin; Berndahl, Travis; Deep, Alexa; Jim Crandall
Subject: LRI 2019 GCCS Drilling Update (04219001.11)

WARNING: This email is from outside of Waste Connections; Exercise caution.

Hello Olivier,

Now that I managed to get a day back in the office I wanted to send out a quick email summarizing the meeting we had with DBM this past Tuesday (8/6). In that meeting Dan Wigg (DBM), you, and I discussed the sequencing and approach

for the remainder of the wells to be drilled. The primary focus was on how to handle location 2019-10, where the drill rig broke down on July 30th and the boring collapsed while the rig was being repaired. Prior to the rig breaking down, 2019-10 was drilled to approximately 115 feet below ground surface (ft-bgs). A brief summary of the waste composition that was found is listed below:

<u>Start Depth</u>	<u>End Depth</u>	<u>Description/Notes</u>
<u>(ft-fgs)</u>	<u>(ft-bgs)</u>	
0	65	Wet black-gray soil with minor amounts of refuse, concrete debris, and organics. Max temperature 91°F.
65	115	Black highly degraded refuse. Very wet with sludge. Max temperature 104°F.

From this discussion the approach we decided on was to drill 2019-09 before making a final decision on whether or not to re-drill 2019-10. If conditions at 2019-09 are similar to what was encountered at 2019-11 and the upper half of 2019-10 then we would not proceed with 2019-10. If conditions at 2019-09 improve from what was found at 2019-10, then we will re-drill 2019-10 offset to the south of the original boring location, or on the other side of the haul road (west of staked location). The offset from the staked location is required for safety due to the previous boring collapsing.

All the other wells have gone in smoothly. Today the wells on the south face of Cell 6 were completed, and the rig is mobilizing to 2019-09 for tomorrow. I am hoping to get the re-survey data for 2019-19 in the relocated position today. As soon as I have that information I will issue a field directive before drilling at that location.

If you have any questions or comments please let me know.

Thanks,
Sam

Samuel E. Adlington, PE
Senior Project Engineer
SCS Engineers
2405 140th Ave NE, Suite 107
Bellevue, WA 98005
425-289-5468 (W)
425-495-0818 (C)
sadlington@scsengineers.com

Driven by Client Success
www.scsengineers.com

