King County
Solid Waste Division
Department of Natural Resources and Parks
King Street Center
201 South Jackson Street, Suite 701
Seattle, WA 98104-3855
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April 1, 2020

TO: Darshan Dhillon, Health and Environmental Investigator III, Environmental Health Division, Public Health – Seattle and King County

VIA: Laura Belt, P.E., Supervising Engineer DS LB

FM: Marisa Baptiste, Engineer III DS MB

RE: King County Vashon Island Closed Landfill 2019 Annual Groundwater Data Evaluation Report

The purpose of this letter is to transmit the *King County Vashon Island Closed Landfill 2019 Annual Groundwater Data Evaluation Report*. The potentiometric maps and groundwater velocity calculations that have been included in the report were prepared by a licensed hydrogeologist and have been previously submitted with quarterly reports. This report also includes an executive summary, site specific summary, exceedances table, trend test table, time-concentration plots of parameters of interest, and descriptive statistics summary table.

The 2019 Annual Report has been updated to include environmental data collected through December 2019.

If you have questions or need additional information, please contact me at 206-477-0458, or via email at marisa.baptiste@kingcounty.gov.

Enclosures

cc: Tim O'Connor, Hydrogeologist III, Washington State Department of Ecology
Alan Noell, PhD., P.E., Washington State Department of Ecology
Yolanda Pon, Managing Supervisor, Public Health - Seattle & King County
Glynda Steiner, P.E., CCM, Deputy Division Director, Solid Waste Division (SWD), Department of Natural Resources & Parks (DNRP)
Neil Fujii, P.E., FESS Manager, SWD, DNRP
Anne Holmes, P.E., Engineer Supervisor, SWD, DNRP
Joan Kenton, Environmental Compliance Coordinator, SWD, DNRP

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April 1, 2020

Tim O’Connor, Hydrogeologist III
Washington State Department of Ecology
Northwest Regional Office
3190 – 160th Avenue SE
Bellevue, WA 98008-5452

RE: King County Vashon Island Closed Landfill 2019 Annual Groundwater Data Evaluation Report

Dear Mr. O’Connor:

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Sincerely,

Marisa Baptiste
Engineer III

Enclosures

cc: Darshan Dhillon, Health and Environmental Investigator III, Environmental Health Division, Public Health – Seattle & King County
Alan Noell, PhD., P.E., Solid Waste Program, Washington State Department of Ecology
Glynda Steiner, P.E., CCM, Deputy Division Director, Solid Waste Division (SWD), Department of Natural Resources & Parks (DNRP)
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Joan Kenton, Environmental Compliance Coordinator, SWD, DNRP

KING COUNTY
VASHON ISLAND CLOSED LANDFILL

2019 ANNUAL GROUNDWATER DATA EVALUATION REPORT

King County
Department of
Natural Resources and Parks
Solid Waste Division

Serving Community | Protecting Environment | Operating Excellence

April 2020

www.kingcounty.gov/solidwaste

CERTIFICATION

KING COUNTY VASHON ISLAND CLOSED LANDFILL
2019 ANNUAL GROUNDWATER DATA EVALUATION REPORT CERTIFICATION

I certify in accordance with the requirements of WAC 173-351-400(c) (3), that the contents of this document were prepared under my direction or supervision under a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Where applicable, some specific and related hydrogeologic portions have been duly certified by the responsible groundwater scientist. Based on my inquiry of the person(s) directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

<table>
<tr><td>Name:
Laura Belt, P.E.</td><td>Title:
Supervising Engineer,
Facility Engineering
and Science Section</td><td>Date:

April 1, 2020</td></tr>
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EXPIRES 8-10-21

CHECKLIST FOR GROUNDWATER REPORTING
Municipal Solid Waste Landfills
WAC 173-351-415

Include a signed, completed copy of this checklist with each quarterly and annual report.

Quarterly groundwater reports shall be submitted to the jurisdictional health department and Ecology within 60 days of receipt of analytical data. Annual groundwater reports shall be submitted to the jurisdictional health department and Ecology by April 1 of each year.

1st ——— 2nd ——— 3rd ——— 4th ✓ ——— YEAR 2019	Reference (section, subsection)	Included in this report	Location – section or appendix
***Quarterly Groundwater Reports**: 173-351-415 (2) plus the referenced section*			
Statistical calculations and summaries			
Descriptive statistics	420, (1)	☒	Table 3-1
Statistical tests	420, (2)	☒	Tables 3-2 & 3-3; Appendix B
Notification of statistical increase (if applicable)	420, (4)	☒	Sect 4.2.1, 4.2.2, 4.2.3, & 4.2.4
Notification of concentrations above Chapter 173-200 WAC criteria (if any)	430, (4)	☒	Appendix B
Static water level readings	415, (2)	☒	Appendix H
Potentiometric surface elevation maps depicting flow direction	415, (2)	☒	Appendix G
Flow rate – calculated	415, (2)	☒	Appendix G
Cation-anion balances	430, (5a)	☒	Appendix I
Explanation of greater than 5% (or 10%) difference (if needed)	430, (5a)	☒	Sect 4.2.1, 4.2.2, 4.2.3, & 4.2.4
Trilinear diagrams	430, (5b)	☒	Appendix I
Leachate analyses (if sampled and tested)	415, (2)	☒	Appendix K
Data entered into EIM database (date entered: 02/12/2020)	415, (3)	☒	
Complete copy of the lab report with chain of custody record.		☐	
***Annual Groundwater Reports**: 173-351-415 (1)* **YEAR: 2019**			
Summary of statistical results and trends	415, (1)	☒	Tables 3-1, 3-2, and 3-3
Summary of groundwater flow rate and direction for the year	415, (1)	☒	Appendix G
Copy of all potentiometric maps for the year	415, (1)	☒	Appendix G
Summary geochemical evaluation	415, (1)	☒	Appendix I
For Quarterly and Annual Reports			
Stamped by a licensed professional	RCW 18.220	☒	

[signature]	April 1, 2020	King County Vashon Island Closed Landfill
Signature of Report Author	Date	Landfill

If you need this publication in an alternate format, please call the Waste 2 Resources Program at (360) 407-6900. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

KING COUNTY
VASHON ISLAND CLOSED LANDFILL

2019 ANNUAL GROUNDWATER DATA EVALUATION REPORT

King County Department of Natural Resources & Parks
Solid Waste Division, Facility Engineering & Science Section

April 2020

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EXECUTIVE SUMMARY

This report presents the results of statistical analyses on the groundwater monitoring data collected at the Vashon Island Closed Landfill (VLF) from January 1986 through December 2019 per WAC 173-351 and King County Solid Waste Code, Chapter 10.04. The fourth quarter 2019 data is presented in the following appendices: Appendix B Exceedance Reports, Appendix G Groundwater Velocity Calculations and Potentiometric Maps, Appendix H Groundwater Monitoring Data, Appendix I Ion Balance Summary & Trilinear Diagrams, Appendix J Surface Water Monitoring Data, Appendix K Leachate Monitoring Data, and Appendix L Landfill Gas Monitoring Data.

The Financial Assurance information in this document (included in Appendix N) presents the authorized 2019-2020 budget for the VLF. The financial information is presented in a format, which responds to the regulatory request for financial assurance and will be updated based on a remedial investigation and feasibility study ongoing for the landfill.

Landfilling was discontinued in August of 1999 with the final cover placement occurring in fall 2001. The landfill closure area is approximately 34 acres. The basic components of the cover system, from the top down, include: vegetative layer, upper drainage layer, impervious layer consists of high density polyethylene (HDPE), and lower gravel drainage layer.

The groundwater monitoring wells on VLF penetrate two water-bearing zones, Unit C, including Channels Cc1, Cc2, and Cc3, and Unit D.

Channel Cc1 has two monitoring wells, MW-10 and MW-13, which are not considered to be impacted by landfilling activities. Monitoring wells, MW-3 and MW-4, have reduced water volumes and do not always yield enough water to be sampled.

In Channel Cc2, the recent data reflects the variability in water quality present in background monitoring well MW-20 that presently indicates low and stable concentrations. Monitoring wells in the groundwater perched in Channel Cc2 displaying impacts from landfill activities, include monitoring wells MW-2, MW-21, MW-33, and MW-35. Stronger reducing conditions are identified in monitoring wells MW-21, MW-33, and MW-35 than in monitoring well MW-2, consistent with historical conditions. Since the landfill was closed and capped, wells in the Channel Cc2 have shown an overall reduction in volatile organic compounds (VOCs). Patterns observed for VOCs in monitoring wells MW-2, MW-21, MW-33, and MW-35 indicate landfill gas as the most probable source of these groundwater impacts, which differs from other water quality parameters. In 2014, Channel Cc2 entered voluntary cleanup under the Washington State Model Toxics Control Act (MTCA).

There are two groundwater monitoring wells (MW-8 and MW-36) in Channel Cc3, both of which are considered to be of good quality with little evidence of landfilling impacts.

Conditions in Unit D Aquifer show as being stable and they do not indicate impacts attributable to landfill activities.

We have continued to monitor the effectiveness of the landfill gas control system. One new vertical landfill gas extraction wells, GW-9, and four pairs of shallow/deep wells were installed in 2016 and 2017 to evaluate further for the presence of landfill gas on the South Slope area. In 2018, two more gas extraction wells, GW-10 and GW-11, and four additional temporary probes were installed and incorporated into the active landfill gas collection system. There have been no methane detections at the compliance monitoring points since 2008.

Springs discharge on the hillslope to the west of Westside Highway SW. The water from these springs has been collected since 1991 at three weirs, SW-W1, SW-W2, and SW-W3. The only VOC detected with any frequency in the weirs is vinyl chloride. Vinyl chloride is occasionally detected in SW-W1 and infrequently in SW-W2 and routinely detected in SW-W3. A surface water sampling location, SW-E was added to the sampling network in November of 2012 and sample results show that water quality is similar to SW-W1 with no VOC detections.

King County Solid Waste Division (KCSWD) currently monitors quarterly for groundwater, surface water, and leachate at VLF, monthly for landfill gas, and bi-annually for offsite wells. KCSWD is currently reviewing the need for improvements to the engineering control systems for the landfill.

1. PURPOSE

The purpose of this report is to present the annual conditions at Vashon Island Closed Landfill (VLF) in compliance of the regulatory requirements of the Washington Administrative Code (WAC) 173-351, *Criteria for Municipal Solid Waste Landfills*.

2. INTRODUCTION

This is the 2019 Annual Groundwater Data Evaluation Report that presents the results of statistical analyses on the groundwater monitoring data collected at the VLF from January 1986 through December 2019. This annual report describes the hydrogeologic conditions at the landfill and presents the evaluations on the groundwater quality data collected from upgradient and downgradient monitoring wells and on the water quality from seeps on the hillside to the west of the landfill. The data in this report are presented in compliance with Washington State Department of Ecology (Ecology) *Criteria for Municipal Solid Waste Landfills* (WAC 173-351-415), and the King County Code, *King County Solid Waste Regulations* (Title 10, Rules and Regulations No. 8).

In accordance with the annual reporting requirement of WAC 173-351, this annual report includes a discussion of maintenance activities at the site in 2019 (Table 2-1), surface water data (Appendix J), landfill gas data (Appendix L), and leachate data (Appendix K).

This report also provides a brief description of the partial closure and site improvements that were completed in 1989, the site investigations conducted at the landfill in 1995 and 1999 and the final closure construction completed in 2001. Groundwater quality trends are discussed in context of these site improvements. This report also includes a summary of previous site investigations and ongoing efforts; a description of the location, topography, and regional geology and groundwater hydrology of the landfill; a history of the landfill; evaluation methods; data quality; site hydrogeology; and results and discussion of groundwater flow and chemistry at the landfill. Planned future activities at the site are presented in Section 6. This report has been updated to reflect the updated hydrogeological conceptual model (Aspect, 2018).

2.1. SITE LOCATION and REGIONAL SETTING

The VLF is located on a 54.3-acre King County owned parcel in the west central portion of Vashon Island (Figure 1). The landfill property is divided by Westside Highway SW. Most of the property exists in sparsely to unwooded, gently rolling terrain at elevations of 300 to 400 ft. The 39-acre area east of the highway is primarily unwooded open space and consists of 10.3 acres of municipal solid waste and 28.7 acres of landfill facilities. The 15.3-acre area west of the highway is steep, undeveloped, forested land sloping towards the Colvos Passage, commonly referred to as the West Hillslope. The VLF property is bounded by Westside Highway Southwest and rural residential land to the northwest, by Southwest 184th Street to the north, by forested land and rural residential land to the east, and by rural residential land to the south (Figure 1).

Vashon Island has a mild climate, tempered by the surrounding Puget Sound. Summers are cool and dry, while winters are moist and mild. Meteorological data collect from the West Judd Creek Rain Gage on Vashon Island by King County (precipitation collected from 2004 – present and air temperature collected from 2007 – 2014) shows that the average monthly precipitation ranges from 0.5 inches in July to 7.7 inches in November. Total annual precipitation ranges from a minimum of 30.9 inches in 2013 to a maximum of 56.5 inches in 2006. Average daily temperature ranges from 48 °F to 54 °F. The annual maximum temperature ranges from 68 °F – 84 °F and the annual minimum temperature ranges from 19 °F – 32 °F.

2.2. SITE HISTORY

Solid waste disposal began at the landfill property in the early 1900s. Operation of the landfill was assumed by the Solid Waste Division in the late 1950s, when daily cover, record keeping, and other updated solid waste management practices were initiated (R.W. Beck and Associates, 1983). The landfill was closed in two phases; a partial closure in 1988, in accordance with WAC 173-304, and a final closure in 2001, in accordance with WAC 173-351.

The 1988, Phase 1, closure occurred in the northwest portion of the landfill (approximately 2.3 acres). The closure included installation of a cover, a liner below the lateral expansion area, surface water management, leachate collection, and landfill gas collection systems. The selected design consisted of installing an impermeable composite liner (consisting of high density polyethylene (HDPE) geomembrane, low-permeability soil, geotextile, and foundation material/natural soil liner) over the existing refuse area; a passive gas collection system under this liner; a leachate collection and conveyance system; an aerated pretreatment lagoon; stormwater control facilities (ditches, culverts, and siltation and detention ponds); and a venting and treatment system of landfill gas. A liner for the future refuse area was installed. These improvements were completed in 1989.

Phase 2 closure began in August of 1999 with the discontinuation of material placement in the landfill and the installation of a temporary plastic cover over the refuse. Stormwater facility improvements were constructed during the summer and fall of 1999, including a detention pond in the southeast corner and an underground drain system around the perimeter of the landfill. The leachate collection and conveyance system was expanded before cap placement during the Phase 2 closure, and the leachate lagoon was constructed. Between 1996 and 2001, the landfill gas system had additional horizontal trench collectors between refuse lifts connected into the existing active collection system. The final cover placement occurred in the fall of 2001. The basic components of the cover system, from the top down, include a vegetative layer, upper drainage layer, impervious layer consisting of HDPE, and a lower gravel drainage layer (Berryman & Henigar et. al, 1999). The combined Phase 1 and Phase 2 landfill closure area is approximately 10.3 acres.

2.3. PREVIOUS INVESTIGATIONS and SITE IMPROVEMENTS

Hydrogeology, water quality, and environmental investigations have been conducted at the VLF since 1983, led by R.W. Beck and Associates and Sweet, Edwards and Associates (1984), Harper-Owes (1986), Harper-Owes, et al. (1988), CH2M Hill (1995, 1996), Berryman & Henigar (1999), Berryman & Henigar et al. (2000), Berryman & Henigar and Udaloy Environmental Services (UES) (2004, 2006a), King County (2011), and Aspect Consulting (Aspect) (2012, 2018). In 1983, the first four groundwater monitoring wells (MW-1, MW-2, MW-3, and MW-4; Figure 2) were installed at the landfill. Piezometers P-1/1A/1B and P-2/2A, previously located in the fill area on the east side, were abandoned in 1988 by overdrilling and then filling the borehole with bentonite in accordance with the requirements of WAC 173-160. Monitoring wells MW-5 and MW-6 were installed in

1986. These wells were installed as part of a site assessment completed to determine how to best bring the landfill into compliance with state and local solid waste disposal regulations. Two piezometers, P-3 and P-4, were installed in 1992, and then later renumbered as monitoring wells MW-13 and MW-24. Monitoring well MW-13 is now utilized as a compliance groundwater monitoring well. Monitoring well MW-24 is used to monitor static groundwater levels only.

The R. W. Beck (1984) and Harper-Owes (1986) reports indicated some evidence of leachate in the sand and gravel units beneath the till. Water quality conditions were reevaluated in 1988 just prior to construction of the landfill closure and upgraded disposal area (letter report by Harper-Owes to Kevin Kiernan, King County Solid Waste Division). Conclusions at that time were that the leachate was more dilute than is typical of municipal landfills in the Pacific Northwest, with no indication of elevated concentrations of organic compounds. Perimeter monitoring wells had some exceedances of primary and secondary drinking water criteria. The west hillside weeps had exceedances only of secondary drinking water criteria.

In the summer of 1995, the existing groundwater monitoring network was supplemented with the installation of eight groundwater monitoring wells (MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-14, and MW-19). In 1995 eight gas probes were installed around the perimeter of the refuse area to determine if gas migration was occurring at the landfill. Other improvements made to the gas collection system in 1996 included converting the system from passive to active and changing the treatment system from flares to activated carbon. A detailed discussion of the depths and locations of the monitoring wells and gas probes installed in 1995 is provided in the *Groundwater Monitoring Well Construction Work Plan* (CH2M Hill, 1995).

In the fall of 1998, monitoring wells MW-20 and MW-21 were installed to provide supplementary monitoring of an extensive sand bed in the lacustrine silt.

In order to address the requirements in WAC 173-351-490 the *Vashon Island Landfill Hydrogeologic Report* (Berryman & Henigar et. al., 2000) was produced, providing an evaluation of the site hydrogeology.

Monitoring well MW-11 was damaged in February 2001 during the Nisqually earthquake, after which samples ceased to be collected from that well. Monitoring well MW-11 was decommissioned and replaced with monitoring well MW-29 in the summer of 2003. Multi-completion monitoring well MW-6S/D was also damaged in the earthquake and was decommissioned in 2003.

Drilling operations in 2003 included installing three additional monitoring wells (MW-26, MW-27 and MW-28) and one piezometer (MW-25) to expand the monitoring network. Monitoring well MW-28 has been dry since completion. A revision to the 2000 hydrogeologic report was completed in December 2004 (Berryman & Henigar and UES, 2004) incorporating these new wells into the hydrogeologic interpretation of the site. Table 2-2 provides details on all of the wells on the site.

Maintenance of the environmental control facilities is performed throughout the year. The Operations and Maintenance (O&M) Plan was produced at the end of 2005, which provided tables listing the specific O&M activities for each system. The new listings were incorporated into the

SWD Operations tracking database in 2006. A summary of the maintenance activities completed in 2019 is included as Table 2-1.

In March 2006, three documents covering the environmental evaluation of the landfill site were submitted to Ecology and Public Health-Seattle & King County (PH-SKC). (1) *Vashon Island Closed Landfill Environmental Evaluation* provided an evaluation of the landfill environmental control systems and their interaction with the hydrogeologic environment (Berryman & Henigar and UES, 2006a); (2) *Vashon Island Closed Landfill: Potential Effects of Landfill Gas and Leachate on Vashon Landfill Groundwater and Springs* provided a chemistry-based evaluation of the source of volatile organic compounds (VOCs) found in some of the wells present at the time (Berryman & Henigar and UES, 2006b); and (3) *VOC Sampling and Test Results* reported the findings of soil gas sampling performed at the site. Combined, these documents address the requirements of Compliance Task 4 in the *Vashon Closed Landfill Permit*.

These reports also provided recommendations for further actions, some of which were completed in 2006. One, the testing of the leachate lagoon liner, was completed in 2007. The results indicated that the liner did not have any leaks. In July 2015, the leachate lagoon was tested again for leaks by Beyond Leak Detection, a regulatory requirement and a condition of the *Vashon Closed Landfill – Municipal Solid Waste Handling Permit*, and found to have no leaks. Testing for leaks in the leachate lagoon is conducted every 5 years and will occur again in 2020.

Other recommendations in the reports require the procurement of consultant services, including installing wells as needed to better define site geology and hydrogeology; evaluating and enhancing the landfill gas extraction system; and better defining the geological contacts and springs on the West Hillslope (Berryman & Henigar and UES, 2006). Some of these services were performed by King County Water and Land Resources Division (KCWLRD). A consultant was hired to review all environmental investigations, monitoring, and remediation performed at the landfill and to identify data gaps and potential enhancements to the existing engineering control systems.

In December 2009, as part of an ongoing investigation on the West Hillslope, three shallow temporary monitoring wells (MW-30, MW-31, and MW-32) were installed by hand augur. These wells were sampled for one year and findings from this investigation are summarized in the *Vashon Closed Landfill Western Hillslope Investigation* (King County, 2011).

In March of 2015, the recommendation to better define the hydrogeology model, monitoring wells MW-33, MW-34, MW-35, and MW-36 were installed. Monitoring well MW-33 was the only additional well location. Monitoring well MW-34 replaced monitoring well MW-27, which may have been completed to allow interconnection between Channel Cc3 and Unit D. Monitoring well MW-35 replaced monitoring well MW-5D, which was an old multi-completion well. Monitoring well MW-36 replaced monitoring well MW-14, which had a stuck pump above the screen interval. Also in 2015, monitoring well MW-1 was decommissioned due to not yielding enough water to sample.

In October of 2018, the *Agency Draft Vashon Island Closed Landfill Remedial Investigation Report* (*RI*) was distributed to Ecology and Public Health-Seattle & King County (Aspect, 2018). The RI began in 2014 and was conducted in accordance with the Washington State Model Toxics Control

Act (MTCA; WAC 173-340). Data was gathered and analyzed to provide an understanding of the hydrogeologic site setting, nature and extent of contaminants, their fate and transport, and the receptors that may be impacted by the contaminants. The final RI will be used to prepare a Feasibility Study (FS) to determine the necessity for additional cleanup actions in compliance with MTCA regulations (WAC 173-340-350 through 173-340-390). Prior to the completion of the RI and FS, in 2016 and 2018, three gas extraction wells were installed (GW-9, GW-10, and GW-11) on southern slope of the landfill, in order to start to address the landfill gas infiltration into the groundwater in Channel Cc2.

2.4. GEOLOGY AND HYDROGEOLOGY

2.4.1. **Regional Geology**

Vashon Island is composed of glacially derived sediments from several glacial episodes. Surficial geology is primarily glacial till (or till-like units), (approximately 68 percent of the island), and glacial and alluvial outwash (the remaining 32 percent), (King County, 2005). A regional perspective is available in Figures 6 and 8, depicting a regional cross section in A-A'. Data suggest that tills representing at least three separate glacial advances occur on Vashon Island. The most recent of these was deposited during the Vashon Stade of the Fraser Glaciation, which reached its maximum southerly extent near Olympia about 17,000 years ago. The Vashon till (Qvt) mantles most of the island and is widespread throughout the Puget Lowlands. Surficial geologic materials in the VLF area consist of Quaternary (Vashon) till and advance outwash. The till is underlain by advance outwash (Qva) soils formed by water flowing in front of the approaching glacier; these outwash deposits were subsequently overridden and compacted by glacial ice and till. The advance outwash deposit tends to grade downward from gravelly sand to uniform fine to medium sand. Distribution of pre-Vashon and pre-Fraser deposits beneath the advance outwash is complex. The base of the advance outwash is defined by the uppermost appearance of interglacial silts or clay or oxidized non-glacial clasts. Exposures of the Quaternary pre-Fraser fine-grained facies (Qpff) unit are mapped on the steep bluff just west of the landfill. All VLF soils beneath the uppermost ("advance outwash") sands are presumed to be pre-Fraser in age and laterally continuous with those soils mapped west of the landfill. For the VLF, these soils include alluvial, fluvial, and lacustrine or glaciolacustrine sediments. (Aspect, 2018)

2.4.2. **Site Geology**

The site stratigraphic model categorizes the subsurface into seven primary units, designated A through G, based on interpreted geologic origin (Table 2-3 and Figures 6-11). Unit A is comprised of surficial till (Vashon till) that mantles the site. Soils in this unit consist of gravelly, silty sand. This weathered till has a thickness of 15-50 ft. throughout most of the landfill site, although absent in the southern portion of the site. Groundwater has not been identified in Unit A and there are no monitoring wells for the Vashon Till (Figure 2).

Unit B is designated as an advance outwash sand underlying the till. This unit has been encountered in all borings that extend beyond Unit A and ranges in thickness from about 40 to 50 ft.

Unit C is made up of a lacustrine silt layer that is interpreted to be laterally continuous beneath the site and under the outwash. This lacustrine silt is incised by fluvial sands and gravels approximately 100 to 120 ft. thick. These sands and gravels are interpreted as channel deposits. Perched saturated zones identified beneath the VLF site occur in channel deposits (Cc1 & Cc2) within the uppermost lacustrine silt (Unit C). The fine-grained (Cf) portions of Unit C act as an aquitard and consist of interbedded sandy silts, silts, and clays. Incised within the fine-grained soil are coarser sand deposits (Cc). The Cf soils were deposited in a low-energy glaciomarine or glaciolacustrine setting and the Cc sediments are a higher energy glaciofluvial deposit. Glaciofluvial deposits are typically less laterally extensive than non-glaciofluvial deposits and appear to represent subglacial meltwater channel deposits and possibly eskers (sinuous ribbons of sand and gravel deposited in meltwater tunnels at the base of the ice). Three coarser units have been identified within Unit C, designated from shallowest to deepest Cc1, Cc2, and Cc3. As depicted in the cross section, the Cc units are continuous across the VLF property.

Unit D is comprised of fluvial deposits exhibiting a wide range in texture consistent with varying energy in a fluvial environment. Textures range from sandy gravel channel deposits to fine-grained overbank deposits, and the unit exhibits a corresponding range of hydraulic properties. Thickness of Unit D ranges from about 25 to 65 ft. and has been encountered in all deeper borings.

Unit E is a lacustrine unit approximately 40 ft. thick, underlies Unit D and is thought to be continuous beneath the site. This unit is mainly comprised of silt and acts as an aquitard between the water-bearing fluvial deposits in Unit D and Unit F.

Unit F consists of Pre-Vashon fluvial deposits of widely varying texture, similar to those of Unit D. The thickness of Unit F ranges from 30 to over 90 ft.

Unit G is the oldest and deepest unit encountered in soil borings at the VLF and is a dark gray, varved clay though to be regionally extensive and over 50 ft. thick.

2.4.3. **Regional Hydrogeology**

Groundwater flow on Vashon Island is largely radial and downward, flowing outward from the island's central uplands towards the surrounding Puget Sound (King County, 2005). Vashon Island hydrogeology has previously been characterized based on island well logs and two primary aquifers were identified as being used as Vashon Island's water supply source: the Principal Aquifer generally located above sea level yielding moderate amounts of water to wells, and the Deep Aquifer at depths of about 100 to 300 ft. below sea level capable of yielding larger quantities of water (Carr, 1983). The 1998 groundwater management plan (GWAC, 1998) defined four hydrostratigraphic zones based on water level data and completion depths from 25 wells. Broadly speaking, Zones 1 and 2 are within the Principal Aquifer and Zones 3 and 4 are within the Deep Aquifer identified in the Carr Report. In both studies, groundwater flow in the shallower aquifers was to the east and west from a topographic high that extends in an approximate north-south axis along the island, with steeper gradients along the west side. Groundwater modeling completed as a component of the Water Resources Evaluation confirmed this aspect of groundwater flow on the island (King County, 2005). Research for the groundwater modeling found that groundwater use is fairly evenly divided among the shallow advance outwash, upper deep, and lower deep aquifers.

2.4.4. **Site Hydrogeology**

Four principal water-bearing units were identified based on existing hydrogeologic data: Channel Cc2, Channel Cc3, Unit D, and Unit F (Figures 6-11). Channel Cc2 and Unit D are the only water bearing units with sufficient information to produce potentiometric maps. Direction of groundwater flow within Channel Cc2 was determined to be primarily westward in the updated hydrogeological conceptual model (Aspect, 2018) and subsequent quarterly potentiometric reports (Appendix G). The direction of groundwater flow within the Unit D Aquifer (previously defined as the regional aquifer) is indeterminate, with flow components potentially northward, westward, and southward. Units B and Cc1 are not considered principal water-bearing units. While occasional groundwater has been measured in wells completed in these units, the saturated zone is thin to dry with strong seasonal variability.

Monitoring well MW-24 is the only well screened in Unit B (Aspect, 2018).

Groundwater in Channel Cc1 is currently evaluated using monitoring wells MW-3, MW-4, MW-10, and MW-13 (Figures 6-11) and all monitoring wells measure water levels within the Cc1 deposits. Monitoring wells typically producing sufficient water include MW-10, MW-13, and periodically monitoring wells MW-3 and MW-4.

Groundwater in the principal water bearing units occur in sands and gravels within the lowermost Unit C channel deposits (Cc2 and Cc3) and within Units D and F.

Monitoring wells MW-2, MW-9, MW-20, MW-21, MW-33, and MW-35 are located within the middle channel deposits (Cc2) (Figures 6-11). Monitoring wells MW-33 and MW-35 were installed in March of 2015 for water quality monitoring and hydrostratigraphic data collection to be define Channel Cc2.

A steep slope west of the landfill cuts across a water-bearing silt/sand contact. As a result, some 400 to 500 ft. to the west of the landfill, groundwater emerges and enters an unnamed creek before entering Puget Sound at Colvos Passage approximately two-thirds of a mile to the west. A hydrogeologic investigation of the hillslope attempting to locate the outcroppings of the Unit C channels and provide water quality monitoring locations for the channels was completed in 2011; the findings are presented in the *Vashon Landfill Western Hillslope Investigation Report*.

Monitoring wells MW-8 and MW-36 are installed in the lower channel deposits (Cc3) (Figures 6-11). Monitoring well MW-36 was installed in April of 2015.

Generally, water levels in the Channels Cc2 and Cc3 indicate unconfined groundwater conditions, with the exception of monitoring wells MW-20, MW-33, and MW-36. Groundwater in these three wells are above coarse-grained portions of the unit indicating confined conditions.

Monitoring wells MW-7, MW-12, MW-19, MW-25, MW-26, MW-29, and MW-34 are installed in Unit D (Figures 6-11). Monitoring well MW-34 was installed in March of 2015. Monitoring well MW-28 was installed to screen the contact between Unit D and Unit E and has been dry since installation and requires a two foot rise in surrounding groundwater levels to reach screen bottom. The elevation of this contact exceeds the water table elevation in Unit D at this location.

Units D and F are generally separated by an aquitard (Unit E) although the aquitard has likely been removed by erosion beneath at least some portions of the property (specifically, at monitoring wells MW-25 and MW-26, Figure 8).

A deeper aquitard, Unit G, was encountered in only one boring for monitoring well MW-7 (Figures 7 and 10). Due to its limited distribution, the hydrogeologic effect of the Unit G aquitard beneath the landfill is limited.

3. EVALUATION METHODS

The landfill environmental evaluation was conducted in accordance with the *Environmental Monitoring Sampling and Analysis Plan and Quality Assurance Project Plan for Vashon Island Closed Landfill* (SAP). The evaluation tools include:

- Descriptive Statistics (Table 3-1 and 3-4)
- Mann Kendall Trend Test (Tables 3-2 and 3-3)
- Exceedance Tables (Appendix B)
- Interwell Prediction Limits (Appendix B)
- Intrawell Prediction Limits (Appendix B)
- Time Concentration Plots (Appendices C-F)
- Trilinear Plots (Appendix I)

The prediction limit exceedances, regulatory standard exceedances, ion balances and trilinear diagrams are prepared for each quarterly report and compiled in this report. Samples from all monitoring wells are compared to the *National Primary and Secondary Drinking Water Regulations* (40 CFR Parts 141 and 143) and *Water Quality Standards for Groundwaters of the State of Washington* (WAC 173-200) found in Appendix A. The data from monitoring wells screened within Unit D Aquifer are compared to from the calculated intrawell prediction limits, and data from wells screened within Channel Cc2 are compared to interwell prediction limits calculated using data from upgradient monitoring well MW-20 (Appendix B). As described in the SAP, prediction limit calculations are dependent on the number of detections and the Shapiro-Wilk test for normality.

Beginning with the *Vashon Island Closed Landfill 2018 Annual Groundwater Data Evaluation* the Mann-Kendall trend test was performed using the R Project for Statistical Computing package ‘Kendall’. This tool produces more robust results compared with previously used technology. The trend test evaluates data for long-term trends, including historical data up to the last eight samples, and for short-term trends using the last eight samples. For wells with historical data beyond 50 samples, the most recent 50 samples are used in the long-term trend test. Monitoring wells with fewer than 20 samples are evaluated for short-term trends only. Monitoring wells that have not produced sufficient water for eight samples in the last two years are compiled for a long-term trend test only.

The descriptive statistics are calculated for long-term, including historical data up to the last eight samples, and for short-term using the last eight samples. Monitoring wells with fewer than 20 samples are evaluated for short-term only. Monitoring wells that have not produced sufficient water for eight samples in the last two years are compiled as a long-term trend only. These descriptive statistics are compared to historical values to identify any significant changes.

Groundwater levels in individual wells have been plotted as a function of time (Figures 12-16). Changes in water levels before and after the 1989 closure are noted. Groundwater flow directions were estimated based on water elevations in monitoring wells screened in similar water-bearing zones. Upgradient and downgradient wells are determined by flow direction.

3.1. DATA QUALITY

Five analytical labs have performed laboratory services for water samples collected at the Vashon Landfill including Laucks from 1986 to March 1990, AmTest from March 1990 to April 1992, and Analytical Resources (ARI) from April 1992 to May 1995, Laucks again from May 1995 to April 2008, Pace from April 2008 to March 2009, and the King County Environmental Laboratory from April 2009 to current. The State Manchester Laboratory accredited all five laboratories for the methods used at the time the samples were analyzed.

Contamination of blanks has important ramifications for data quality. However, some compounds have high blank contamination rates for compounds, such as methylene chloride. Although improvements have been made in reducing the rate of blank contamination in the lab, blank samples that have a longer residence time in the laboratory still show elevated rates. Since the common laboratory contaminants do not provide the only evidence of landfill impacts, other volatile organic compounds are used for this evaluation. Other compounds, such as, sulfate, zinc, and iron have also been detected in blanks. These detections will be noted for the individual samples in which they have occurred. Some data, particularly concerning solvents, must be qualified based on blank contamination events and measures of precision and accuracy. All sample results qualified with a "B" have blank contamination associated with the analysis. (See Appendix B)

There are instances where the limit of detection, because of technological limitations, is above the *National Primary and Secondary Drinking Water Regulations* and *Water Quality Standards for Groundwaters of the State of Washington* for groundwater or above the *Water Quality Standards for Surface Waters of the State of Washington* (WAC 173-201A) and *Water Quality Standards* (40 CFR Parts 131) for surface water. Because these concentrations are not quantifiable, they can be reported only qualitatively, as less than a reporting limit and are qualified accordingly. Another issue involving limits arises when the limits of detection or analytical sensitivity changes over time. Especially noticeable for parameters such as chloride, where more recent samples show more fluctuations or definition on the graphs due to more significant figures (greater sensitivity) being reported. Other factors that may contribute to these changes may be due to dilution, or due to technical or contractual specifications such as technical advancements in instrumentation in the contractual laboratory industry. These changes must be kept in mind while reviewing data evaluation and conclusions and laboratory qualifiers can be found in Appendix A.

A notable change in 2017 involves the methodology for the analytical testing covered by SW-846 (Test Methods for Evaluating Solid Waste). The previous Method Detection Limit (MDL) methodology has been updated in 2017 to use the Lower Limit of Quantitation (LLOQ).

The LLOQ is the lowest point on a calibration curve that can be used for quantification. It is a method that repeatedly tests and calibrates against known standards such as reagent water, method blanks, etc. Ultimately, the LLOQ's ability to detect an analyte at a specific concentration is dependent upon factors such as instrument sensitivity and can, at times, be greater than the baseline curve concentration.

During the second quarter of 2017, the transition to using the LLOQ methodology resulted in revised reporting limits for a number of analytes. Quantitation limits for all trace metals (i.e. non-major cationic species metals), and a subset of the VOCs analyzed for regularly are lower than past analyses, while some VOCs have higher or the same limits as before. As a result of these changes, previously unobserved trace metals and VOCs in a number of wells are now reportable at concentrations below previous methodologies could quantify.

4. RESULTS

4.1. GROUNDWATER ELEVATIONS AND FLOW DIRECTION

The updated hydrogeological conceptual model presents the latest interpretation of the hydrogeology and that interpretation has been used in the preparation of potentiometric surface maps and calculations of groundwater velocities (Aspect, 2018).

Monitoring well locations are shown on Figure 2. These monitoring wells penetrate four water-bearing zones (Channels Cc1, Cc2, and Cc3, and Unit D Aquifer). Cross-sections illustrating property stratigraphy are presented in Figures 6 through 11.

In order to utilize the most current information, an elevation datum transition from National Geodetic Vertical Datum of 1929 (NGVD29) to North American Vertical Datum of 1988 (NAVD88) was implemented. Water level elevations from 2016 to July 2019 were adjusted by approximately an increase in three feet from previous reports. In May of 2019, groundwater monitoring wells were resurveyed in the NAVD88 datum and starting in July of 2019 water level elevations were calculated from the updated reference elevations. Figures 12 through 16 highlight these modifications.

4.1.1. **Groundwater in Unit B**

Previously, monitoring well MW-24 was consider to be screened in Channel Cc1, but information provided in the updated hydrogeological conceptual model placed this well in Unit B. Monitoring well MW-24 does not produce enough groundwater, in order to sample, so only water level measurements are taken (Figure 12).

4.1.2. **Groundwater in Channel Cc1**

There are currently four monitoring wells screened in Channel Cc1 deposits: MW-3, MW-4, MW-10, and MW-13. Groundwater is encountered in this zone at elevations of 261 to 281 ft. above mean sea level (MSL).

The saturated thickness of the Channel Cc1 is generally less than 11 ft. (Figure 13). The water levels in monitoring wells MW-3 and MW-4 have declined due to minimal recharge rates and seasonally there is an insufficient volume of water present to collect samples. Monitoring well MW-4 is screened across a silt contact and the well can act as a sump. The well is not sampled unless the water levels rise above the silt contact. Monitoring well MW-4 yielded sufficient groundwater for three samples in 2019. Monitoring well MW-3 yielded sufficient water for two samples in 2019. Monitoring wells MW-10 and MW-13 have yielded sufficient groundwater for continuing analysis since 1993.

Historically, groundwater levels in the monitoring wells in Channel Cc1 have shown a variation from less than one foot to almost five feet with no marked seasonality. Water levels for most of the wells have fallen in elevation since 1991, at which time the practice began of periodically placing temporary HDPE cover over the completed refuse fill area. The final closure of the landfill in 2001 appears to have further reduced surface recharge to this sand zone.

Field permeability tests performed by Harper-Owes (1986) indicated that the average permeability of sand in Channel Cc1 was approximately 4.3 ft/day.

4.1.3. **Groundwater in Channel Cc2**

Monitoring wells MW-9, MW-2, MW-20, MW-21, MW-30, MW-33, and MW-35 are completed in Channel Cc2 and groundwater is encountered at elevations between 235 and 250 ft. MSL.

In 2019, water level fluctuations in monitoring wells MW-2, MW-9, MW-20, MW-21, MW-33, and MW-35 were less than one foot (Figure 14). This low or lack of response to the annual cycle of wet and dry seasons can be explained by the landfill not being located in an area where significant recharge to the aquifer occurs (Carr, 1983). Relatively low-permeability surficial deposits (till) and partial landfill closures in 1989 and 1999 contribute to the lack of significant recharge.

The general flow direction in the continuous thin sand, in which monitoring wells MW-2, MW-20, MW-21, MW-33 and MW-35 are located, is to the west. The potentiometric maps submitted quarterly and included in Appendix G generally agree with the flow directions reported by Carr (1983).

As part of the West Hillslope Investigation, monitoring wells MW-30, MW-31, and MW-32 were installed on the west hillslope, in order to better characterize the groundwater seeping out of the hillslope. Those wells were only sampled for the 2010 calendar year and water levels were collected quarterly through first quarter of 2016. Beginning in third quarter of 2019, monitoring well MW-30 began having quarterly water levels measured again, in order to better define the potentiometric map for Channel Cc2.

The south slope area perched zone monitored by monitoring wells MW-2, MW-20, MW-21, MW-33, and MW-35 has a hydraulic gradient of between 0.006 ft/ft and 0.027 ft/ft. Its hydraulic conductivity is estimated to be between 1.61 and 19.35 ft/day and the effective porosity is estimated to be 0.2. The estimated horizontal groundwater velocity for 2019 ranged from 0.05 to 2.65 ft/day. The calculated velocities are expected to be accurate only within one order of magnitude due to variability in permeability rates. Quarterly velocity calculations and potentiometric maps are attached in Appendix G.

4.1.4. **Groundwater in Channel Cc3**

Monitoring wells MW-8 and MW-36 are screened within Channel Cc3. Groundwater is encountered at elevations of 205 to 228 ft. MSL (Figure 15).

Monitoring wells MW-8 and MW-36 are screened within the coarser sand deposit of Channel Cc3. Monitoring well MW-8 was previously considered to not be hydraulically equivalent to groundwater in either Cc2 nor Cc3 and to be screened along a flow path from Cc2 to Cc3. The updated hydrogeological conceptual model (Aspect, 2018), shows that monitoring wells MW-8, MW-36, and decommissioned wells MW-14 and MW-27 are fully screened within Cc3 and that there is limited hydraulic interconnection between Channels Cc2 and Cc3.

Annual water-level fluctuations in the monitoring wells MW-8 and MW-36 are usually within an annual range of about one foot.

4.1.5. **Groundwater in the Unit D Aquifer**

There are seven monitoring wells screened within the Unit D Aquifer (MW-7, MW-12, MW-19, MW-25, MW-26, MW-29, and MW-34). Groundwater is encountered at elevations of 154 to 198 ft. MSL (Figure 16).

The general flow direction in the Unit D Aquifer is away from MW-7 southwest towards MW-12, northwest towards MW-19, and northeast towards MW-25 (Appendix G). The water fluctuations for the monitoring wells are less than two ft. in 2018, and without considerable seasonal trends (Figure 16). This lack of response to the annual cycle of wet and dry seasons can be explained by the landfill being located in an area where there is not significant recharge to the aquifer (Carr, 1983); which is in turn attributable to relatively low-permeability surficial deposits (till) and landfill closures. The potentiometric maps shown in Appendix G generally agree with the flow directions reported by Carr (1983).

In 2019, the groundwater velocity occurring in the Unit D Aquifer was between 0.36 and 8.99 ft/day, with a hydraulic gradient ranging from 0.016 to 0.039 ft/ft and a hydraulic conductivity estimated between 4.4 and 46.1 ft/day. The estimated velocities are expected to be accurate only within one order of magnitude due to variability in permeability rates (Appendix G).

4.2. GROUNDWATER QUALITY

Results for the groundwater quality beneath the VLF were derived from Channels Cc1, Cc2, Cc3, and the Unit D Aquifer. Statistical summaries present both short- and long-term data. Short-term term results obtained from January 2018 to December 2019 (sampling period) are emphasized all statistics and trend information discussed here is for that period unless otherwise indicated. Tables 3-1, 3-2, and 3-3 provide statistics and trends for both this recent period and the previous samples, respectively. All screen intervals are in reference to NAVD88, unless otherwise indicated. During the recent sampling period, eight samples were taken from each well, with the exceptions of monitoring wells MW-3 and MW-4. Certain wells have limited data because they are seasonally dry, have low production, or are slow to recover and did not yield adequate data for comprehensive analyses. Only long-term trend tests are available for these wells. For monitoring wells MW-33, MW-34, MW-35, and MW-36, which were installed in 2015, there is only sufficient data for short-term statistical and trend analysis. Apparent trends in individual wells, short- and long-term, are discussed where applicable (Tables 3-2 and 3-3). Hydraulically upgradient wells are discussed first. Exceedances of water quality standards, prediction limit exceedances, time-concentration plots, potentiometric maps, groundwater velocities, and raw analytical data are provided in appendices.

Due to the presence of VOCs in the downgradient monitoring wells within Channel Cc2, MW-2, MW-21, and MW-5D were put into assessment monitoring. As the first step, the wells were tested with an expanded parameter list specified in WAC 173-351 Appendix III in 2011. Results indicated that the single Appendix III parameter detected in the downgradient wells was dichlorodifluoromethane. These results led to an agreement that wells in assessment monitoring on the property should continue to be tested for dichlorodifluoromethane in addition to the Appendix I and II lists. This requirement applied to monitoring wells MW-20, MW-2, MW-21, MW-5D, MW-4, MW-8, and MW-27, but for property-wide consistency, all wells on property are tested for both Appendix I and II parameters and dichlorodifluoromethane. At the request of Ecology, monitoring wells MW-2, MW-5D, MW-20, and MW-21 were sampled again for Appendix III analytes in 2012, but there were no detections of Appendix III analytes other than dichlorodifluoromethane. In 2014, Ecology was given a demonstration, and based on the findings, agreed that KCSWD would cease sampling for any Appendix III analytes other than dichlorodifluoromethane for five years starting from the last sampling event of 2013. In 2018, monitoring wells MW-2, MW-20, MW-21, MW-33, and MW-35 (replacement for decommissioned well MW-5D) were sampled for the Appendix III analyte list. Four analytes were detected between the five wells during this sampling, 2,4,5-TP Silvex, 2-methyl-1-propanol, bis(2-chloroethyl) ether, and bis(2-ethylhexyl) phthalate. In 2019, monitoring wells MW-2, MW-20, MW-21, MW-33, and MW-35 were sampled again for the Appendix III analyte list. There were two analytes (2,4,5-TP Silvex and bis(2-chloroethyl) ether) detected in monitoring wells MW-33 and MW-35 and one analyte (diethyl phthalate) detected in monitoring well MW-33.

It is also important to note that several compounds, in particular acetone, zinc, and methylene chloride, have been frequently detected in blanks and field samples at similar concentrations. The likely source of these compounds is laboratory contamination.

Iron, manganese, and arsenic occur naturally in groundwater of this region. The Washington State Department of Ecology conducted a background study on arsenic in groundwater and found for the Puget Sound basin the natural background is 0.008 mg/L (Ecology, 2016). Therefore, exceedances of the *National Primary and Secondary Drinking Water Regulations* maximum contaminant levels (MCLs) and *Water Quality Standards for Groundwaters of the State of Washington* (SGWC) for these contaminants are believed to be representative of background groundwater quality unaffected by the Vashon Island Closed Landfill.

The pH field data for the period between late 1993 and early 1996 may not be reliable because of inconsistent field instrumentation.

4.2.1. **Groundwater in Channel Cc1**

As described in Section 3.1.1, monitoring wells MW-3, MW-4, MW-10, and MW-13 are the only monitoring wells in the groundwater in Channel Cc1, previously described as monitoring groundwater perched above the lacustrine silt.

The Channel Cc1 trilinear diagrams (Appendix I) for 2019 shows the sample is within the same calcium-magnesium-bicarbonate hydrochemical facie. The cation/anion ratio for the monitoring wells MW-3, MW-4 MW-10, and MW-13 are within ten percent (Appendix I) for all sampling events, which is sufficient for characterization.

Raw analytical groundwater data and time-concentration plots for monitoring wells in Channel Cc1 can be found in Appendices J and C, respectively.

4.2.1.1. MW-10

Monitoring well MW-10, located in the northwest corner of the property and northwest of the placement of the refuse, was installed with seven other additional groundwater monitoring wells during the summer of 1995. It is screened between 254.86 and 624.86 ft. MSL.

The pH (field) is neutral (median 7.15). Specific conductance (field) (median 148.0 µmhos/cm) and total dissolved solids (median 105.0 mg/L) are low and stable (Tables 3-1 and 3-2). Sulfate (median 8.8 mg/L), chloride (median 3.25 mg/L), and nitrate (median 0.65 mg/L) are low and stable (Table 3-2 and Appendix C). During the recent period, no conventional parameters exceeded the water quality standards.

Dissolved iron was not detected in the last eight samples but total iron was detected twice, however, iron is low and stable. Concentrations of common metals, calcium, and magnesium are low and stable and dissolved magnesium shows a statistically significant short-term decreasing trend (Table 3-2 and 3-3). Total arsenic exceeded the primary SGWC in all eight samples.

Chloroform was detected in the fourth quarter sampling results from monitoring well MW-10. The result was qualified as ‘JT’, meaning results are only reported as qualitative, i.e. ‘present, but unquantified’. Chloroform is frequently detected in field blank samples and is a known laboratory contaminant.

In general, the water quality in this well is good with no indications of landfill impact.

4.2.1.2. MW-13

Monitoring well MW-13 is screened above the lacustrine silt in sandy soils. It was installed in 1992 and placed on the quarterly monitoring schedule in June 1994. Monitoring well MW-13 is located in the southeast portion of the property and screened between 262.59 and 267.59 ft. MSL.

The pH (field) is neutral (median 7.08). Specific conductance (field) (median 163 µmhos/cm), total dissolved solids (median 118 mg/L), nitrate (median 0.22 mg/L), and sulfate (median 13.1 mg/L) are low and stable. There are statistically significant short-term decreasing trends for alkalinity and chloride. (Table 3-1 and Appendix C)

Manganese is low and stable. Concentrations of the common metals sodium, potassium, and magnesium are low and stable. There were short-term statistical increasing trends in this well of dissolved magnesium and dissolved sodium (Tables 3-2 and 3-2). Vanadium is detected regularly at low levels. Mercury has been detected twice in the entire monitoring history.

Arsenic exceeds the primary SGWC of 0.05 µg/L in all eight recent samples (Appendix B). No other samples exceeded Washington State or National water quality standards.

Chloroform was detected the third quarter sampling results from monitoring well MW-13. The result was qualified as 'JT', meaning results are only reported as qualitative, i.e. 'present, but unquantified'. Chloroform is frequently detected in field blank samples and is a known laboratory contaminant.

In general, water in this well is of good quality with no indications of potential landfill impact.

4.2.1.3. *MW-3 and MW-4*

Monitoring wells MW-3 and MW-4 are shallow wells in Channel Cc1. Monitoring well MW-3 is screened between 275.74 and 280.74 ft. MSL. Monitoring well MW-4 is screened between 266.05 and 276.05 ft. MSL. Monitoring well MW-3 had sufficient water to provide two samples and monitoring well MW-4 sufficient water to provide three samples in 2019. Monitoring well MW-3 shows similar or decreased values compared to previous years when sampled, except for nitrate, which has a long-term increasing trend in both monitoring wells (Tables 3-2 and 3-3). Since there were not eight consecutive samples take in the past two years for monitoring wells MW-3 and MW-4 there are not short-term trends for these wells. Monitoring well MW-3 had two exceedances of secondary SGWC and MCL for pH (field) and the primary SGWC for total arsenic. Monitoring well samples from monitoring well MW-4 exceeded the primary SGWC for total arsenic three times. In 2019, there were two VOC detections for samples in monitoring well MW-3 tetrachloroethene and trichlorofluoromethane. There were two VOCs detected for samples in monitoring well MW-4 in 2019, chloroform and cis-1,2-dichloroethene (Appendix B). All VOC detection, with the exception of trichlorofluoromethane, were qualified 'JT' meaning results are only reported as qualitative, i.e. 'present, but unquantified'.

4.2.1.4. *Groundwater in Channel Cc1 Summary*

Water quality in monitoring well MW-10 is good and is not considered impacted by landfilling activities. The absence of dissolved manganese in this well is notable. The conditions in this well in combination with low iron suggest a predominantly oxidizing environment.

Monitoring well MW-13 water quality is good and is not considered impacted by landfilling activities as well.

Monitoring wells MW-3 and MW-4 do not have sufficient water for four samples a year. The have decreasing or stable long-term trends for all constituents with the exception of nitrate.

Reduced water volumes in the other shallow wells following installation of the landfill cover suggest the cover is adequately preventing recharge through the waste and is protecting the groundwater.

4.2.2. **Groundwater in Channel Cc2**

Monitoring wells MW-2, MW-9, MW-20, MW-21, MW-33, and MW-35 monitor the groundwater perched within Channel Cc2. Monitoring wells MW-2, MW-20, MW-21, MW-33, and MW-35 are completed in continuous thin sand that correlates with the elevation and location of two of the seeps (seeps 2 and 3 or SW-S2 and SW-S3) on the west side of the landfill (King County, 2011).

The trilinear diagram shows all of the samples to be within the same calcium-magnesium-bicarbonate hydro-chemical facie, as they have been in past samples for these wells. Monitoring wells MW-2, MW-21, MW-33, and MW-35 continue to be characterized by more dominant bicarbonate-carbonate characteristics. The cation/anion ratio for the wells in this channel was within ten percent (Appendix I) for all of 2019. The reported results are sufficient for characterization.

Interwell prediction limits for the fourth quarter of 2019 are tabulated in Appendix B. The prediction limits in for monitoring wells in Channel Cc2 are compared to upgradient monitoring well MW-20.

Raw analytical groundwater data and time-concentration plots for monitoring wells in Channel Cc2 can be found in Appendices J and D, respectively.

4.2.2.1. MW-20

Monitoring well MW-20 is located in the southeast portion of the property. It was installed in October 1998 and is screened between 236.41 and 241.41 ft. MSL in a continuous sand bed within the lacustrine silt.

The field pH results show a neutral pH (median 7.01). Measurements of chloride (median 3.16 mg/L), sulfate (median 16.2 mg/L,) and total dissolved solids (median 138 mg/L) are stable. There are statistically significant short-term decreasing trends for specific conductance (median 204 µmhos/cm) and alkalinity (median 78 mg/L). (Tables 3-1, 3-2, and 3-3)

Many of the dissolved metals exhibit short-term stability; calcium (median 13.7 mg/L) and potassium (median 2.20 mg/L), and sodium (median 6.6 mg/L). Dissolved arsenic (median 0.002 mg/L) has statistically significant increasing short-term trends, while dissolved iron (median 0.32 mg/L), magnesium (median 13.7 mg/L), and manganese (median 0.22 mg/L) have a statistically significant short-term decreasing trends. During 2019, total arsenic and dissolved manganese sample results exceeded the respective primary and secondary SGWC and MDLs in all four quarterly samples. There was one exceedance of secondary SGWC and MDL for dissolved iron in the first quarter of 2019.

In 2019, dichlorodifluoromethane was detected in monitoring well MW-20 in all four quarters and has no short-term trend.

The assessment monitoring program for Appendix III parameters detected dichlorodifluoromethane, in 2011, as the single Appendix III parameter not included on the Appendix I and II lists. This parameter is included in the current monitoring program for VLF. At the request of Ecology, monitoring wells MW-2 MW-20, and MW-21 were sampled again in 2012 for Appendix III analytes. With the exception of dichlorodifluoromethane, there continue to be no detections of Appendix III analytes. A demonstration was presented to Ecology in 2014, and based on the findings it was agreed that, with the exception of dichlorodifluoromethane, KCSWD would cease sampling for Appendix III analytes for five years dating from 2013, the last year Appendix III analytes. In 2018, Appendix III analytes were sampled for again in the Channel Cc2 monitoring wells. 2-methyl-1-propanol (qualified as 'JT', meaning results are only reported as qualitative, i.e. 'present, but unquantified') and bis(2-ethylhexyl)phthalate (qualified as 'D' for dilution) were detected in monitoring well MW-20. These new Appendix III analyte detections may be the result of the LLOQ laboratory methodology that was implemented in 2017. In 2019, with the exception of dichlorodifluoromethane, there were no Appendix III analytes detected in sample results from monitoring well MW-20.

Groundwater quality conditions are low and stable in monitoring well MW-20 and because of that, it is used to calculate prediction limits and for upgradient comparison to monitoring wells MW-2, MW-9, MW 21, MW-33, and MW-35.

4.2.2.2. MW-9

MW-9 is located in the northwest portion of the property. It was installed as part of the addition of eight groundwater monitoring wells during the summer of 1995. It is screened between 224.22 and 236.22 ft. MSL in sand and gravel.

The pH conditions in this well are neutral, with a median of 7.00. The specific conductance (median 185 µmhos/cm), alkalinity (median 72mg/L), sulfate (median 11.6 mg/L), and total dissolved solids (median 127 mg/L) have statistically significant short-term decreasing trends. Chloride (median 4.48 mg/L) and nitrate (median 0.36 mg/L) appear to be stable in recent samples. Ammonia has only been detected once in the past two years. (Tables 3-1, 3-2, and 3-3)

Iron levels are low and stable with one detection of total iron in the past eight samples. Dissolved magnesium (median 11.4 mg/L) and total sodium (median 6.2 mg/L) have statistically significant short-term decreasing trends. All other metals show as being stable. Total arsenic results exceeds the SGWC of 0.05 μg/L in the eight most recent samples.

In 2019, there were no volatile organic compounds detected in MW-9.

The general water characteristics in this well demonstrate good quality with no indications of landfill impact.

4.2.2.3. MW-2 and MW-21

Monitoring wells MW-2 and MW-21 are located downgradient and in the southwest portion of the property. Monitoring well MW-2 has been monitored quarterly since September 1986. Monitoring well MW-21 was installed in fall 1998 and has been monitored continuously since then. The screen elevation for monitoring well MW-2 is 232.06 ft. to 237.06 ft. MSL and for monitoring well MW-21 237.05 ft. to 246.45 ft. MSL.

The pH measurements from these wells show conditions close to neutrality. The pH median values for monitoring wells MW-2 and MW-21 are 6.91 and 6.65, respectively, and are stable. In recent sampling in both wells, several indicator parameters and metals were elevated, compared to the upgradient monitoring well MW-20. Monitoring well MW-2 has the higher concentrations compared with monitoring well MW-20 for specific conductance (median 305 μmhos/cm), alkalinity (median 137 mg/L), total dissolved solids (median 179 mg/L), dissolved calcium (median 20.0 mg/L), dissolved magnesium (median 21.5 mg/L), and dissolved sodium (median 9.4 mg/L). Monitoring well MW-21 has higher concentrations compared to monitoring well MW-20 for specific conductance (median 268 μmhos/cm), alkalinity (median 124 mg/L), total dissolved solids (median 174 mg/L), dissolved calcium (median 19.5 mg/L), dissolved magnesium (median 17.8 mg/L), and dissolved sodium (median 11.4 mg/L). (Tables 3-1, 3-2, and 3-3)

For all four samples taken in 2019 from both monitoring wells MW-2 and MW-21 the secondary SGWC and MDL were exceeded for dissolved manganese and the SGWC for the total arsenic were exceeded. Monitoring well MW-21 exceeded the SGWC and MDL for dissolved iron in one sample. (Appendix B).

Both monitoring wells MW-2 and MW-21 showed statistically significant short-term trends for the past eight samples. Monitoring well MW-2 had short-term increasing trends for trichlorofluoromethane. For the monitoring period of 2018 through 2019, monitoring well MW-21 has showed statistically significant increasing short-term trends for indicator analytes including specific conductance, alkalinity, chloride (median 2.32 mg/L), nitrate (median 0.20

mg/L), sulfate (median 12.6 mg/L), total dissolved solids, dissolved calcium, dissolved magnesium, dissolved potassium (median 2.12 mg/L), and several VOCs (dichlorodifluoromethane, trichlorofluoromethane, and vinyl chloride). These increasing trends are most likely the result of two temporary period between 2018 and 2019 during which vacuum was either lost or limited, especially in the south hillslope.

Groundwater sampling results from monitoring wells MW-2 and MW-21 continue to show VOCs. The past eight samples for monitoring well MW-2 indicate overall stable levels for VOCs with minimal short-term trends as shown above. All of these compounds are present in landfill gas as well as leachate and their distribution between phases (partitioning) is regulated by physical properties (Henry's constant, solubility, vapor pressure) where these phases are in contact.

Most of these compounds are likely components of the waste stream; however, others are almost certainly degradation products of tetrachloroethene and/or trichloroethene by the process of reductive dechlorination. The detected VOCs, median values, or recent detection frequency for the last eight samples are as follows (Table 3-1):

- *Cis*-1,2 dichloroethene in MW-2 (eight out of eight samples, median 0.28 μg/L), and MW-21 (eight out of eight samples, median 0.79 μg/L);
- Dichlorodifluoromethane in MW-2 (eight out of eight samples, median 2.73 μg/L), and MW-21 (eight out of eight samples, median 1.09 μg/L).
- Trichlorofluoromethane in MW-2 (eight out of eight samples, median 0.42 μg/L), and MW-21 (eight out of eight samples, median 0.47 μg/L);
- Vinyl chloride in MW-2 (eight out of eight samples, median 0.07 μg/L), and MW-21 (eight out of eight samples, median 0.06 μg/L);

In 2019, monitoring wells MW-2 and MW-21 exceeded the SGWQ for vinyl chloride for all four samples taken (Appendix B).

In 2018, Appendix III analytes were sampled for again in the Channel Cc2 monitoring wells. Bis(2-ethylhexyl) phthalate was detected in monitoring well MW-2 and 2-methyl-1-propanol was detected in monitoring well MW-21. In 2019, there were no Appendix III analytes detected in from sample results for monitoring wells MW-2 and MW-21.

4.2.2.4. <u>MW-5D, MW-33, and MW-35</u>

Monitoring well MW-5D was monitored quarterly beginning in 1986 and decommissioned in April 2015. Historically, monitoring well MW-5D has displayed elevated concentrations of some indicator constituents, along with some exceedances. However, evaluation of recent data indicates in most cases short-term stability at considerably lower concentrations than historical data in this well. In 1992-1995, total dissolved solids, chloride, manganese, calcium, and magnesium levels went up while iron levels went down. In early 2002, manganese, total dissolved solids, and chloride levels were slightly higher than previous quarters while iron levels were unusually low. Levels for total dissolved solids, chloride, manganese, calcium, and magnesium returned to previous levels and iron came back up. During 2001 and 2002 an event similar to the one observed between 1992 and 1995, might have occurred but to a much lesser extent. In 2015, monitoring well MW-5D was decommissioned, due to silting.

Monitoring well MW-35 was installed in March of 2015, in order to replace monitoring well MW-5D and monitoring well MW-33 was installed in March of 2015, in order to better define groundwater quality in Channel Cc2. The screen elevation for monitoring well MW-33 is 219.63 ft. to 229.63ft. MSL and for monitoring well MW-35, 234.20 ft. to 244.2 ft. MSL

The pH measurements for monitoring wells MW-33 and MW-35 are close to neutral with median values of 6.64 and 6.62, respectively. In recent sampling in both wells, several indicator parameters and metals were elevated, compared to the upgradient monitoring well MW-20. Monitoring well MW-33 has higher concentrations compared with monitoring well MW-20 for the following indicator parameters: specific conductance (median 766 µmhos/cm), alkalinity (median 397 mg/L), ammonia (median 0.032 mg/L), chloride (median 4.08 mg/L), and total dissolved solids (median 450 mg/L), and for the following dissolved metals: arsenic (median 0.037 mg/L), calcium (median 68.9 mg/L), iron (median 7.12 mg/L), magnesium (median 56.1 mg/L), manganese (median 0.99 mg/L), potassium (median 3.53 mg/L), and sodium (median 19.2 mg/L). Monitoring well MW-35 has higher concentrations compared with monitoring well MW-20 for the following indicator parameters: specific conductance (median 695 µmhos/cm), alkalinity (median 346 mg/L), ammonia (median 0.067 mg/L), chloride (median 4.12 mg/L), sulfate (median 21.4 mg/L), and total dissolved solids (median 425 mg/L) and for the following dissolved metals: arsenic (median 0.036 mg/L), calcium (median 64.0 mg/L), iron (median 15.45 mg/L), magnesium (median 43.0 mg/L), manganese (median 12.51 mg/L), potassium (median 3.35 mg/L), and sodium (median 16.6 mg/L). (Tables 3-1, 3-2, and 3-3)

For all four samples taken in 2019 from both monitoring wells MW-33 and MW-35 the primary SGWC and MDL were exceeded for total arsenic and the secondary SGWC and MDL was exceeded for dissolved iron and dissolved manganese. Monitoring wells MW-33 and MW-35 exceed the secondary SGWC and MDL for pH in four samples and two samples, respectively. (Appendix B)

Both monitoring wells MW-33 and MW-35 showed statistically significant short-term trends for the past eight samples. Monitoring well MW-33 had short-term decreasing trends for specific conductance, chloride, total dissolved solids, and total magnesium and short-term increasing trend for dichlorodifluoromethane. Monitoring well MW-35 had short-term decreasing trends for dissolved and total arsenic, dissolved manganese, and toluene and had increasing trends for sulfate, 1,1-dichloroethane, *cis* 1,2-dichloroethene, dichlorodifluoromethane, and vinyl chloride. There were no long-term trends analyzed for either monitoring well, because there are fewer than twenty data points.

Groundwater sampling results from monitoring wells MW-33 and MW-35 show elevated concentrations of VOCs. The past eight samples indicate overall stable levels for VOCs with minimal short-term trends as shown above. The detected VOCs, median values, or recent detection frequency for the last eight samples are as follows (Table 3-1):

- 1,1-dichloroethane in MW-33 (eight out of eight samples, median 1.45 µg/L), and MW-35 (eight out of eight samples, median 0.24 µg/L);
- 1,2-dichloropropane in MW-33 (eight out of eight samples, median 6.77 µg/L), and MW-35 (eight out of eight samples, median 0.86 µg/L);
- Benzene in MW-33 (eight out of eight samples, median 0.98 µg/L), and MW-35 (eight out of eight samples, median 0.95 µg/L);
- Chloroethane in MW-33 (eight out of eight samples, median 0.42 µg/L)
- *cis*-1,2 dichloroethene in MW-33 (eight out of eight samples, median 28.05 µg/L), and MW-35 (eight out of eight samples, median 7.85 µg/L);
- Dichlorodifluoromethane in MW-33 (eight out of eight samples, median 4.61 µg/L), and MW-35 (eight out of eight samples, median 0.39 µg/L);
- Toluene in MW-33 (one out of eight samples, max 0.13 µg/L), and MW-35 (four out of eight samples, median 0.08 µg/L);
- Trichloroethene in MW-33 (seven out of eight samples, median 0.14 µg/L), and MW-35 (eight out of eight samples, median 1.08 µg/L);
- trans-1,2-dichloroethene in MW-33 (eight out of eight samples, median 0.69 µg/L), and MW-35 (eight out of eight samples, median 0.36 µg/L);
- Vinyl chloride in MW-33 (eight out of eight samples, median 29.7 µg/L), and MW-35 (eight out of eight samples, median 3.3 µg/L).

In 2018, monitoring wells MW-33 and MW-35 exceeded the primary SGWC and MDL for vinyl chloride for all four samples taken. Monitoring well MW-33 exceeded primary SGWC for 1,1-dichloroethane during all four sampling events, benzene during three sampling event, and bis(2-chloroethyl) ether during one sampling event and exceeded the primary SGWC and MDL for 1,2-dichloropropane during all four sampling events. Monitoring well MW-35 exceeded the primary SGWC for 1,2-dichloropropane during four sampling events, benzene during one sampling event, and bis(2-chloroethyl) ether during one sampling event. (Appendix B).

In 2018, Appendix III analytes were sampled for again in the Channel Cc2 monitoring wells. Bis(2-chloroethyl) ether and 2,4,5-TP Silvex was detected in both monitoring wells MW-33 and MW-35 and diethyl phthalate was detected in monitoring well MW-33.

4.2.2.5. Groundwater in Channel Cc2 Summary

The recent data reflects low and stable condition in water quality present in monitoring well MW-20. Chemical data from monitoring well MW-20 represents natural aquifer conditions in the vicinity of the landfill.

Impact from landfill activities is evident in monitoring wells MW-2, MW-21, MW-33, and MW-35. Closure activities have contributed to improvement of the water in monitoring well MW-2. Improvement in water quality is characterized by decreases in specific conductance, chloride, and nitrate and a reduction in the frequency and level of several VOCs.

In general, conditions in monitoring well MW-2 appear to be more oxidizing than other wells in Channel Cc2. This environment is characterized by lower levels of iron and ammonia, absence of manganese, and higher levels of nitrate.

The redox conditions in monitoring wells MW-21, MW-33, and MW-35 are more reducing, determined by lower levels of nitrate, and higher levels of iron, manganese, and ammonia.

The declines in concentration of general water quality indicators (specific conductance, dissolved solids, chlorides, metals, etc.) suggest that leachate impacts have been controlled with closure. A different response for several VOCs demonstrates that the source of these compounds has not been completely addressed by leachate control and most likely results from a landfill gas transport mechanism (although several show decreasing levels). The VOCs detected in groundwater are all present in significant amounts in landfill gas. Characterization of leachate indicates that the observed groundwater quality in impacted wells could not be achieved by leachate alone.

In 2014, Channel Cc2 was entered into voluntary cleanup under MTCA. These evaluations will contribute to determining if any additional improvements are needed.

4.2.3. **Groundwater in Channel Cc3**

Monitoring wells MW-8 and MW-36 monitor the groundwater in Channel Cc3. Monitoring well MW-14 was decommissioned in April of 2015 and monitoring well MW-27, which was previously thought to be screened in both Channel Cc3 and Unit D Aquifer, was decommissioned in July of 2016. The updated hydrogeological model shows monitoring well MW-27 had been fully screened in Unit C (Figure 9). Monitoring well MW-36, which replaced monitoring well MW-14, was commissioned in April of 2015.

The trilinear diagram shows all of the samples to be within the same calcium-magnesium-bicarbonate hydro-chemical facie, as they have been in past samples for these wells. The cation/anion ratio for the wells in this channel was within ten percent (Appendix I) for all of 2019. The reported results are sufficient for characterization.

Raw analytical groundwater data and time-concentration plots for monitoring wells in Channel Cc3 can be found in Appendices J and E, respectively.

4.2.3.1. <u>MW-8</u>

Monitoring well MW-8 is located in the west portion of the property. It was installed as part of the addition of eight groundwater monitoring wells during the summer of 1995.

Monitoring well MW-8 is screened between 205.81 and 215.81 ft. MSL and is beneath the lacustrine silt.

Monitoring well MW-8 has a slightly acidic pH values (median 6.60) with little variability and no apparent trends. Specific conductance (median 165 μmhos/cm), alkalinity (median 54 mg/L), chloride (median 4.42 mg/L), nitrate (median 3.14 mg/L), sulfate (median 7.6 mg/L), and total dissolved solids (median 120 mg/L), levels exhibit minor variability and with decreasing trend in nitrate. There are statistically significant short-term increasing trends for specific conductance, alkalinity, and sulfate. (Tables 3-1, 3-2, and 3-3)

Dissolved iron levels are low and stable with only no detections in the past eight samples. Other metals detected are barium, manganese, vanadium, and zinc, all near or at the laboratory minimum detectable level. Dissolved magnesium (median 9.3 mg/L), dissolved potassium (median 1.14 mg/L), and dissolved sodium (median 6.4 mg/L) are all low and stable with no statistically significant trends.

Monitoring well MW-8 exceeded the SGWC for total arsenic in all four sampling events of 2019 (Appendix B).

Chloroform was detected in the sample results for monitoring well MW-8 during the fourth quarter of 2019. This sample result was qualified 'JT', meaning results are only reported as qualitative, i.e. 'present, but unquantified'. Chloroform is frequently detected in field blank samples and is a known laboratory contaminant.

General characteristics show this well to be of good quality except for nitrate at a low level of impact, which in the short-term is decreasing. The source of the nitrate is uncertain due to the lack of any other impact indicators.

4.2.3.2. MW-36

Monitoring well MW-36 is located in the west portion of the property. It was installed as part of the addition of four groundwater monitoring wells during the spring of 2015. Monitoring well MW-36 is screened between 211.36 and 221.36 ft. MSL.

Monitoring well MW-36 has a pH value (median 7.57) with little variability and no apparent trends. Specific conductance (median 175 μmhos/cm), chloride (median 3.05 mg/L), nitrate (median 0.02 mg/L), sulfate (median 13.0 mg/L), and total dissolved solids (median 130 mg/L), levels exhibit minor variability and with no statistically significant trends. There were no long-term trends analyzed for monitoring well MW-36, because there are fewer than twenty data points. (Tables 3-1, 3-2, and 3-3)

Dissolved iron levels are low and stable with only no detections in the past eight samples. Other dissolved metals detected are barium, chromium, copper, manganese, and vanadium, all near or at the laboratory minimum detectable level. Dissolved magnesium (median 9.8

mg/L), dissolved potassium (median 2.76 mg/L), and dissolved sodium (median 6.6 mg/L) are all low and stable with no statistically significant trends.

Monitoring well MW-36 exceeded the SGWC for total arsenic in all four sampling events of 2019 (Appendix B).

Carbon disulfide was detected in monitoring well MW-36 during one sampling event during 2019 (Appendix B). This sample result was qualified 'JT', meaning results are only reported as qualitative, i.e. 'present, but unquantified'.

General characteristics show this well to be of good quality.

4.2.3.3. Groundwater in Channel Cc3 Summary

Monitoring wells MW-8 and MW-36 both appear to be well of good quality with little evidence of landfilling impacts. Monitoring well MW-8 had only one increasing trend short-term trend for nitrate; however, the overall water quality in both wells appears to be stable or decreasing.

4.2.4. **Groundwater in the Unit D Aquifer**

Monitoring wells MW-7, MW-12, MW-19, MW-26, MW-29, and MW-34 monitor the groundwater in the Unit D Aquifer.

Construction differences make the determination of groundwater gradients and flow direction difficult in the area monitored by these wells. Average screened depth below the water table in the wells ranges from near zero in monitoring wells MW-26 and MW-29 to more than 30 ft. in monitoring wells MW-7, MW-12, and MW-34.

The trilinear diagram shows all samples are within the same calcium-magnesium-bicarbonate hydrochemical facie. During this quarter, the cation/anion for the wells in this zone are within ten percent (Appendix I), which is sufficient for characterization.

Raw analytical groundwater data and time-concentration plots for monitoring wells in Unit D Aquifer can be found in Appendices J and F, respectively.

4.2.4.1. MW-7

Monitoring well MW-7 is located in the southeast portion of the property. Historically, monitoring well MW-7 has been interpreted to represent upgradient conditions. However, the interpretation provided in the 2004 Hydrogeologic Update redefined monitoring well MW-7 as downgradient. In the latest update of the hydrogeological model monitoring well MW-7 was redefined again as being upgradient. This well was installed as part of the addition of eight groundwater monitoring wells during the summer of 1995. The screened elevations for this well are between 144.40 and 154.4. ft. MSL.

The pH conditions in monitoring well MW-7 are slightly alkaline (median 7.46). Specific conductance (median 188 µmhos/cm), alkalinity (median 78 mg/L), chloride (median 3.37 mg/L), nitrate (median 0.02 mg/L), sulfate (median 10.8 mg/L), and total dissolved solids (median 134 mg/L) are stable. (Tables 3-1, 3-2, and 3-3)

Monitoring well MW-7 has a statistically significant short-term increasing trend of total iron (median 0.055 mg/L). Dissolved manganese (median 0.16 mg/L) has a statistically significant short-term decreasing trend. In 2019, total arsenic exceeded the primary SGWC and dissolved manganese exceeded the secondary MCL and SGWC, in all four quarters. Other metals detected occasionally in this period included vanadium and zinc.

Monitoring well MW-7 exceeded the intrawell prediction limit for total barium in two samples and total magnesium in one sample, in 2019 (Appendix B).

No volatile organic compounds were detected in monitoring well MW-7 in 2019.

The results from monitoring well MW-7 are considered to represent natural conditions and not related to landfilling activities.

4.2.4.2. MW-11, MW-25, and MW-29

Monitoring well MW-11 was installed as one of eight groundwater monitoring wells installed during the summer of 1995. The screened elevations for these wells are between 152.28 and 162.28 ft. MSL (NAVD 29). Monitoring well MW-11 was damaged during the Nisqually earthquake and decommissioned in 2003. The 2001 report provided the last assessment on well monitoring well MW-11 and indicated no impacts in this well from the landfill.

Monitoring well MW-25 was installed in 2003 to replace monitoring well MW-11. However, the screen failed during installation and the well cannot be developed. The well has been left in place for use for water level measurements only. Monitoring well MW-29 was subsequently installed in 2003 as the new replacement well for monitoring well MW-11. The screened elevations for monitoring well MW-29 are between 158.63 and 173.03 ft. MSL.

The water pH for monitoring well MW-29 is slightly alkaline (median 7.37). Specific conductance (median 243 µmhos/cm), alkalinity (median 102 mg/L), chloride (median 3.61 mg/L), sulfate (median 15.6 mg/L), and total dissolved solids (median 153 mg/L) are stable (Tables 3-1, 3-2, and 3-3).

There is a statistically significant increasing short-term trend for dissolved iron (median 0.84 mg/L). Dissolved manganese (median 0.10 mg/L) are stable. Sample results for monitoring well MW-29 exceeded primary SGWC for total arsenic in all four quarters for

2019 and exceeded the primary MCL for one quarter. Sample results for monitoring well MW-29 exceeded in the secondary SGWC and MCL for dissolved iron and dissolved manganese in all 2019 samples results (Appendix B). Other metals occasionally detected in this period include chromium, nickel, and zinc.

Monitoring well MW-29 exceeded the intrawell prediction limit for total arsenic in two quarterly sample results in 2019 (Appendix B).

One volatile organic compound, 2-butanone, was detected in monitoring well MW-29 in 2019 (Appendix B). This sample result was qualified 'JT', meaning results are only reported as qualitative, i.e. 'present, but unquantified'.

The redox conditions in the north portion of the property (including monitoring well MW-29) are more reducing, determined by lower levels of nitrate, and higher levels of iron, manganese, and ammonia (Table 3-1).

The results from monitoring well MW-29 resemble the historic monitoring MW-11 data and are considered to represent natural conditions and not related to landfilling activities.

4.2.4.3. MW-12, MW-19, MW-26, MW-28, and MW-34

Monitoring wells MW-12 and MW-19 were both installed in the summer of 1995. Monitoring well MW-12 is located to the south of the property. Monitoring well MW-19 is located to the northwest of the property. The screened elevations for monitoring well MW-12 are between 139.72 and 142.72 ft. MSL. The screened elevations for monitoring well MW-19 are between 131.64 and 143.14 ft. MSL.

Monitoring wells MW-26 and MW-28 were both installed in 2003. Monitoring well MW-26 is located in the northwest corner of the property and the screened elevations are between 144.15 and 158.25 ft. MSL. Monitoring well MW-28 has been dry since installation; its screened elevations are between 162.65 and 177.15 ft. MSL.

Monitoring well MW-34 was installed in March of 2015 to replace monitoring well MW-27 and was drilled to be fully screened in Unit D Aquifer. Monitoring well MW-34 is located on the western side of the property, east of Westside Hwy. The screened elevations for monitoring well MW-34 are between 137.94 ft. and 147.94 ft. MSL.

The pH for the Unit D Aquifer in monitoring wells MW-19 and MW-26 are slightly alkaline (medians 7.44 and 7.79, respectively) and monitoring wells MW-12 and MW-34 are neutral (medians 6.96 and 6.9, respectively).

Monitoring wells MW-12, MW-19, MW-26, and MW-34 are all stable in the short-term for specific conductance (medians 168, 219, 191, and 198 μmhos/cm, respectively), alkalinity (medians 65, 86, 75, and 69 mg/L, respectively), chloride (median 3.18, 4.61, 3.76, and 5.02 mg/L, respectively), and sulfate (medians 10.6, 17.0, 13.4, and 13.1 mg/L, respectively), except for monitoring well MW-34, which has a statistically significant short-term decreasing trend for sulfate.

In 2019, all samples results from monitoring wells MW-12, MW-19, MW-26, and MW-34 exceeded the primary SGWC for total arsenic. Monitoring wells MW-19 and MW-26 also exceeded the secondary MCL and SGWC for dissolved manganese for all sample results in 2019. (Appendix B)

Trends for monitoring wells MW-12 and MW-19 are stable for the past eight samples with no-short-term trends. Monitoring well MW-26 has statistically significant short-term increasing trends for dissolved iron (median 0.10 mg/L). Monitoring well MW-34 has statistically significant short-term decreasing trends for total potassium (median 1.58 mg/L). (Tables 3-1, 3-2 and 3-3)

Monitoring well MW-12 exceeded the intrawell prediction limit for alkalinity for one quarter in 2019, in 2019. Monitoring well MW-19 exceeded the intrawell prediction limit for total barium in one quarter in 2019.

Chloromethane and chloroform were detected in sample results for monitoring well MW-12. Acetone, chloroform, and vinyl chloride were detected in sample results for monitoring well MW-19. Chloroform was detected in sample results from both monitoring wells MW-26 and MW-34. With the exception of one detection of chloroform these sample results were qualified 'JT', meaning results are only reported as qualitative, i.e. 'present, but unquantified'. Constituents, such as acetone and chloroform, are known laboratory contaminants.

In general, conditions in monitoring wells MW-12 and MW-34 appear to be more oxidzing than other wells in Unit D Aquifer. This environment is characterized by lower levels of iron and ammonia, absence of manganese, and higher levels of nitrate (Table 3-1).

The redox conditions in the north portion of the property (including monitoring wells MW-19 and MW-26) are more reducing, determined by lower levels of nitrate, and higher levels of iron, manganese, and ammonia (Table 3-1).

Table 4-1 presents a water quality comparison of background conditions and Unit D Aquifer characterized beneath the Vashon Landfill. VOCs are not summarized due to the absence of detections in these wells.

4.2.4.4. Groundwater in Unit D Aquifer Summary

Trend analyses for most monitoring wells in this unit show stable concentrations for many of the constituents in the short-term. Exceptions include a statistically significant short-term increasing trend for dissolved iron in monitoring wells MW-26 and statistically significant short-term decreasing trends for sulfate and total potassium in monitoring well MW-34. Conditions present in wells in the Unit D Aquifer do not indicate impacts attributable to landfill activities. The water quality in this unit is good and is believed to represent natural conditions.

4.3. WEIR and SURFACE WATER QUALITY

The seeps and weirs are located on the western ravine adjacent to the landfill (Figure 3). The elevations for the seeps are 245 ft. for Seep 1; 227 ft. for Seep 2; and 218.74 ft. for Seep 3. The weir sampling locations SW-W1, SW-W2 and SW-W3 are located downstream of each weir. The elevations for the sampling locations are 230.59 ft. for SW-W1; 193.57 ft. for SW-W2; and 192.53 ft. for SW-W3 (Figure 3). The sampling stations consist of a v-notch weir.

Historically, the naming for these locations has on occasion been inadvertently switched. After a thorough review of the data, corrections have been made and the probable results from switching location names have been associated with the correct location name. However, single unusual results may be the result of the naming issues rather than true fluctuations in the data. As a result of this data issue, results reported previously may differ from the current conditions.

The *Vashon Closed Landfill Western Hillslope Investigation* (King County, 2011) identified the groundwater sources for each of the weirs as follows; weir SW-W1 contains groundwater seeping from Unit A, Unit B, Channel Cc1, and possibly Channel Cc2, weir SW-2 contains groundwater seeping from Channel Cc2 and possibly Channel Cc3, and weir SW-3 contains groundwater seeping from Channel Cc2 and possibly Channel Cc3. The sampling location of weir SW-W1 is closer to the groundwater seep SW-S1, than weirs SW-W2 and SW-W3 are to their associated seeps.

The weirs have been monitored since March 1991. Results for water from the weirs are presented in two periods similar to groundwater. Emphasis is on results obtained from the last eight samples, predominantly between 2018 and 2019. Four samples were collected from each of the three weirs in 2019.

The specific conductance ranges between 194.7 and 228.6 µmhos/cm for SW-W1; 466.3 to 625.1 µmhos/cm for SW-W2; and 260.1 to 307.2 µmhos/cm for SW-W3. Chloride levels range from 6.27 to 7.79 mg/L for SW-W1; 17.3 to 19.4 mg/L for SW-W2; and 7.93 to 9.72 mg/L for SW-W3. In general for specific conductance and chloride, SW-W1 has the lowest levels while SW-W2 displays the highest levels, and SW-W3 is midrange but tends closer to SW-W1. The maximum levels for both constituents have decreased compared to historical values for all three locations and in general the variability has decreased, as shown by decreases in standard deviation for short- and long-term periods at SW-W2 and SW-W3 (Table 3-4).

The medians for total calcium concentrations are 16.7 mg/L for SW-W1, 53.55 mg/L for SW-W2, and 23.85 mg/L for SW-W3. The medians for total magnesium concentrations are 12.05 mg/L for SW-W1, 42.45 mg/L for SW-W2, and 19.05 for SW-W3. The medians for total potassium concentrations are 1.22 mg/L for SW-W1, 3.14 mg/L for SW-W2, and 2.38 mg/L for SW-W3. The medians for total sodium concentrations are 7.24 mg/L for SW-W1, 15.55 mg/L for SW-W2, and 8.78 mg/L for SW-W3. As with specific conductance and chloride, SW-W1 and SW-W3 have lower levels for calcium, magnesium, potassium, and sodium, while SW-W2 has the higher levels. The levels of these metals are stable relative to long-term values at all three locations. All medians above are approximately equal to or lower than last year's values (Table 3-4).

The only volatile organic compound detected with any frequency in the weirs is vinyl chloride. Vinyl chloride was detected in SW-W1 four times in 2018 and four times in 2019. Vinyl chloride is occasionally detected in SW-W2, but is routinely detected in SW-W3. The median decreased in the recent samples for SW-W3 to 0.036 µg/L. SW-W2 had no vinyl chloride detections in the recent eight samples (Table 3-4).

Most of the exceedances of the Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A) and Water Quality Standards (40 CFR Parts 131) are for metals. Historically the value of these exceedances in evaluating water impacts associated with municipal solid waste landfills is limited since the standards are based on dissolved metals and the weir results are based on total metals. In 2007, field procedures changed allowing samples collected to be field filtered and metals to be analyzed for both total and dissolved constituents. Dissolved metals were then compared to groundwater criteria and total metals were compared to surface water criteria. Because water collected at the weirs is truly surface water, having been exposed to atmospheric conditions, it will no longer be compared to groundwater standards starting in 2011. Fecal coliforms, total iron, and turbidity exceeded the surface water quality standards in 2019 (Appendix B). In previous quarterly reports for 2019, it was reported that there had also been exceedances of ammonia; however, after carefully examination of the ammonia standard calculations, it was determined that these exceeds had been miscalculated. There were no ammonia exceedances in 2019. All other exceedances are very inconsistent.

In November of 2011, a new surface water sampling location was established. Station SW-E is located approximately 1200 ft. southwest of the weir locations on the east side of a culvert on Robinwood Road SW, approximately 200 ft. south of the Robinwood Road SW-Sunset Road SW intersection (Figure 1). The first sample was analyzed for the same analytes as for the weirs, but this analyte set was be paired down to a few analytes starting in the first quarter of 2015. As of 2015, station SW-E has only be sampled for pH (field), specific conductance (field and laboratory), dissolved oxygen (field), oxidation-reduction potential (field), turbidity (field and laboratory), total arsenic, total calcium, total iron, total magnesium, total manganese, total potassium, total sodium, and vinyl chloride.

Station SW-E had a slightly alkaline pH with a median of 7.57 and a specific conductance median of 218.9 µmhos/cm. The median values for total metals are arsenic 0.0021 mg/L, calcium 16.2 mg/L, iron is 0.45 mg/L, magnesium is 13.8 mg/L, potassium is 1.99 mg/L, and sodium is 6.92 mg/L. Station SW-E has lower metal values in all metals compared to SW-W1 with the exception of potassium which is less than 1 mg/L higher (Table 3-4).

SW-E had no vinyl chloride detections.

4.3.1.1. <u>Weir and Surface Water Summary</u>

Conditions in SW-W1 represent the lowest levels of impact while SW-W2 displays somewhat higher low levels. SW-W3 exhibits a midrange impact based on conventional parameters and metals, and showing detections of vinyl chloride. The increased detection frequency of vinyl chloride in sample results from weir SW-W1 maybe be the result of the change in the laboratory detection limit to the LLOQ, which occurred in second quarter of 2017 coinciding with the increased detection frequency. Many of the vinyl chloride results since second quarter of 2017 have been qualified 'JT', meaning results are only reported as qualitative, i.e. 'present, but unquantified', including three of the four detections in 2019. Water quality monitoring will continue at the weirs to provide water quality data for surface water flow leaving the property. The water quality is compared to surface water standards. The new down-stream surface water station has water quality values similar or better than SW-W1.

4.4. OFFSITE DOMESTIC WELL MONITORING

In 2002, Department of Natural Resources and Parks (DNRP) conducted sampling on Vashon-Maury Island in eleven domestic wells located around the landfill. No evidence of contamination originating from the landfill was found. The data was presented in the *2002 Vashon Island Closed Landfill Annual Report*. Data are included with the onsite well data in the pdf files.

In 2005, King County Solid Waste Division agreed to monitor three of these eleven wells. The first round of these samples was collected in October 2005. One of the three wells is no longer sampled as access is no longer available. Starting in 2010, samples will be collected from both of the off property wells bi-annually. Samples from the 85 Acres well (DW-85) are collected from the well head and the Paquette well (DW-PA) sample is taken from one of the properties connected to that well. Four samples were collected in 2019 from the two off property wells (DW-85 and DW-PA) (Figure 4). No evidence of contamination originating from the landfill was found. The results from the domestic wells are included in Appendix H.

5. LANDFILL GAS

Landfill gas is monitored by a network of compliance probes installed around the perimeter of the landfill and ambient air stations around the property boundary (Figure 5). The monitoring network comprises of nine ambient air stations, three groundwater monitoring wells, and twenty-six gas probes. Probes are monitored monthly. The results can be found in Appendix L. There were no detections in 2019. The effects of landfill gas on current groundwater conditions are being reviewed to determine whether data gaps exist in the current analysis. In 2017, two sets (shallow and deep) temporary gas probes were installed to continue the determination of landfill gas on the south hillslope. In 2016 and 2018, three gas extraction wells (GW-9, GW-10, and GW-11) were installed on the south slope hillslope of the landfill, in order to increase the radius of influence of the landfill extraction system. The *Landfill Gas System Evaluation Summary Report* determined that the radius of influence for extracting methane was 190 ft., 135 ft., and 50ft for gas wells GW-9, GW-10, and GW-11, respectively (Aspect, 2019).

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. CONCLUSIONS

Conditions at the Vashon Island Closed Landfill have continued the historic trend, with some VOCs showing decreasing trends. Therefore, most of the conclusions drawn from the previous Annual Reports hold true for this report. The following conclusions reiterate some conclusions from previous Annual Reports:

1. The groundwater generally moves westward in the middle channel of the lacustrine silt, now designated Channel Cc2, within Unit C.
2. The flow direction within the Unit D Aquifer is better defined and potentiometric maps show less radial flow after monitoring well MW-27 was decommissioned. The updated hydrogeological conceptual model provided a further definition in the potentiometric maps (Appendix G).
3. The monitoring wells in the Unit D Aquifer showed low sensitivity to hydrologic activity, based on the observation of very small seasonal water level fluctuations, indicating limited groundwater recharge in the area of the landfill.
4. Landfilling impacts have been recognized in Channel Cc2 at monitoring wells MW-2, MW-21, MW-33, and MW-35, including for VOCs. Detections for many VOCs have declined significantly or are stable in the short-term. Leachate is believed to have contributed to past impacts. Recent data, specifically levels of VOCs in monitoring wells MW-2, MW-21, MW-33, and MW-35, suggest possible transport of historic contaminants from landfill gas.
5. Expanded Appendix III analyte testing was consistent with previous sample results.
6. The landfill closure has been effective in improving the water quality condition of impacted wells, based on reductions in specific conductance, total dissolved solids, chloride, and several VOCs.
7. Results obtained from wells in Unit D Aquifer do not show impacts attributable to landfill activities, but instead reflect the natural variations in water quality that exist around the landfill.

6.2. RECOMMENDATIONS/PROPOSED ACTIONS

1. The existing monitoring network shall continue to be monitored as described in the 2004 *Vashon Island Landfill Hydrogeologic Report Update* and following protocols from the *Environmental Monitoring Sampling and Analysis Plan and Quality Assurance Project Plan for Vashon Island Closed Landfill*.
2. Evaluation of the operating efficiency of the landfill gas collection system and probe network will continue into 2020 to determine if more improvements to the collection and treatment system are needed. Furthermore, we will continue to assess the effect of landfill gas wells GW-9, GW-10, and GW-11 have on groundwater conditions.
3. Monitoring of the groundwater wells will continue for Appendix I and II parameters, with the addition of dichlorodifluoromethane. In 2019, KCSWD performed the second of two

samples for Appendix III parameters on monitoring wells in Channel Cc2, MW-2, MW-20, MW-21, MW-33, and MW-35, for a minimum of once per year for two years. In 2020 we will reassess Appendix III analytes.

4. The water-bearing zone in Channel Cc2 shall continue in assessment monitoring in accordance with WAC 173-351-430 and the RI will be completed in 2020.
5. Surface water sampling site SW-E will be sampled quarterly for pH (field), specific conductance (field and laboratory), turbidity (field and laboratory), hardness, total metals, and vinyl chloride.
6. In accordance with WAC 173-350-340, the leachate lagoon at VLF will be tested in 2020 for leaks, and KCSWD is developing a schedule and budget for testing leachate conveyance pipes at VLF, in order to be in compliance with the newly updated WAC 173-350-340.

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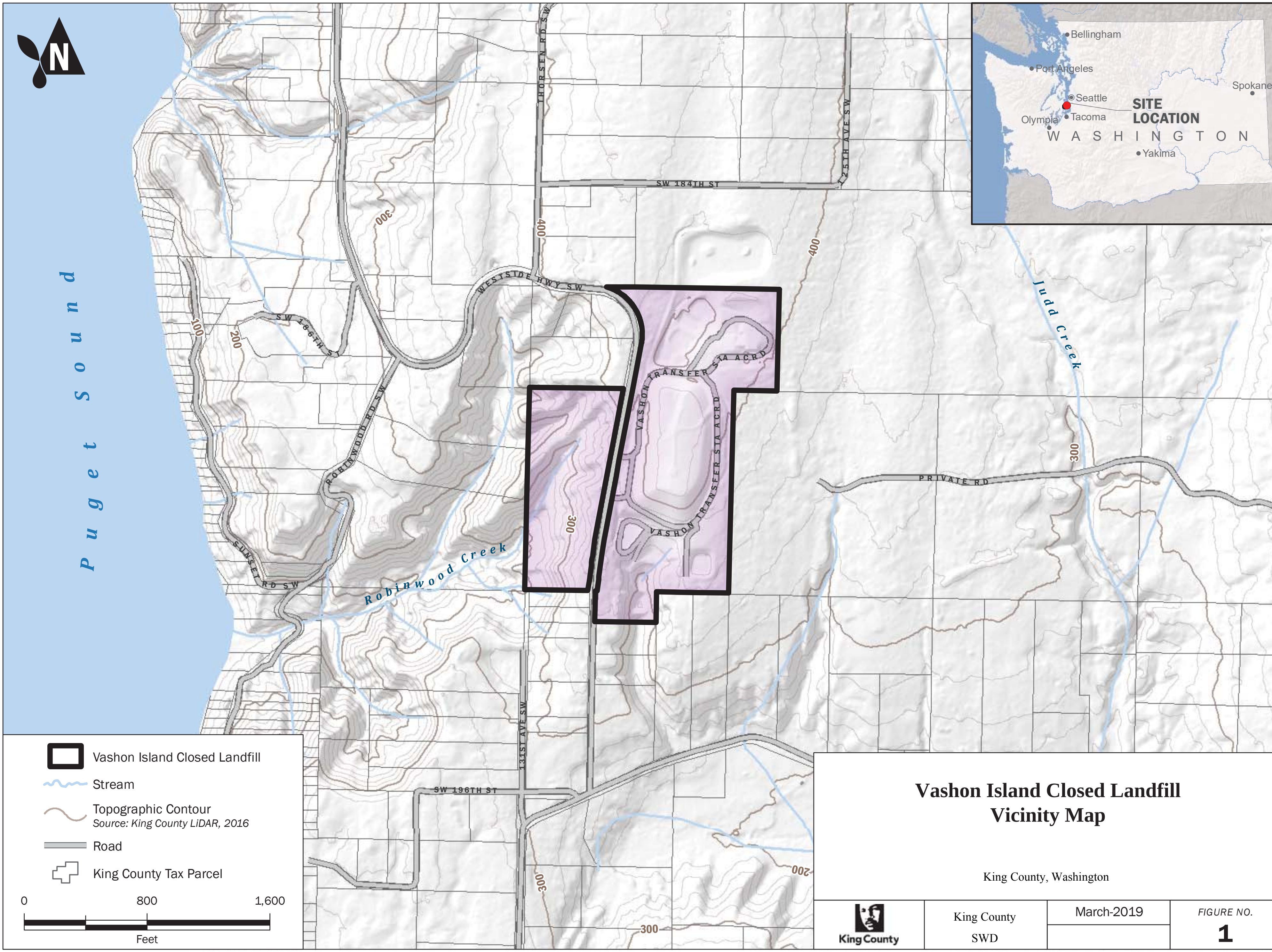
FIGURES and TABLES



Vashon Island Closed Landfill Vicinity Map

King County, Washington

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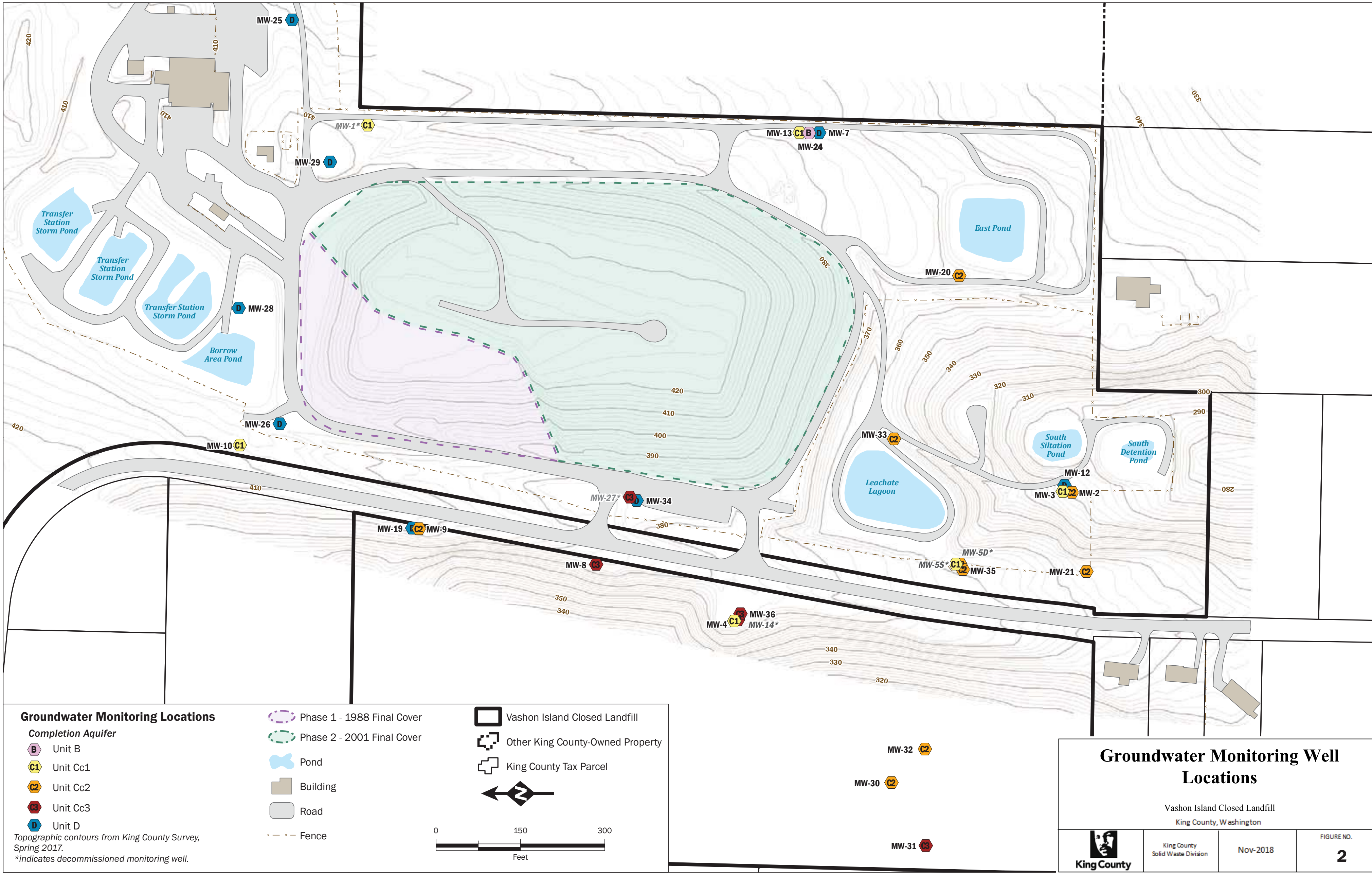
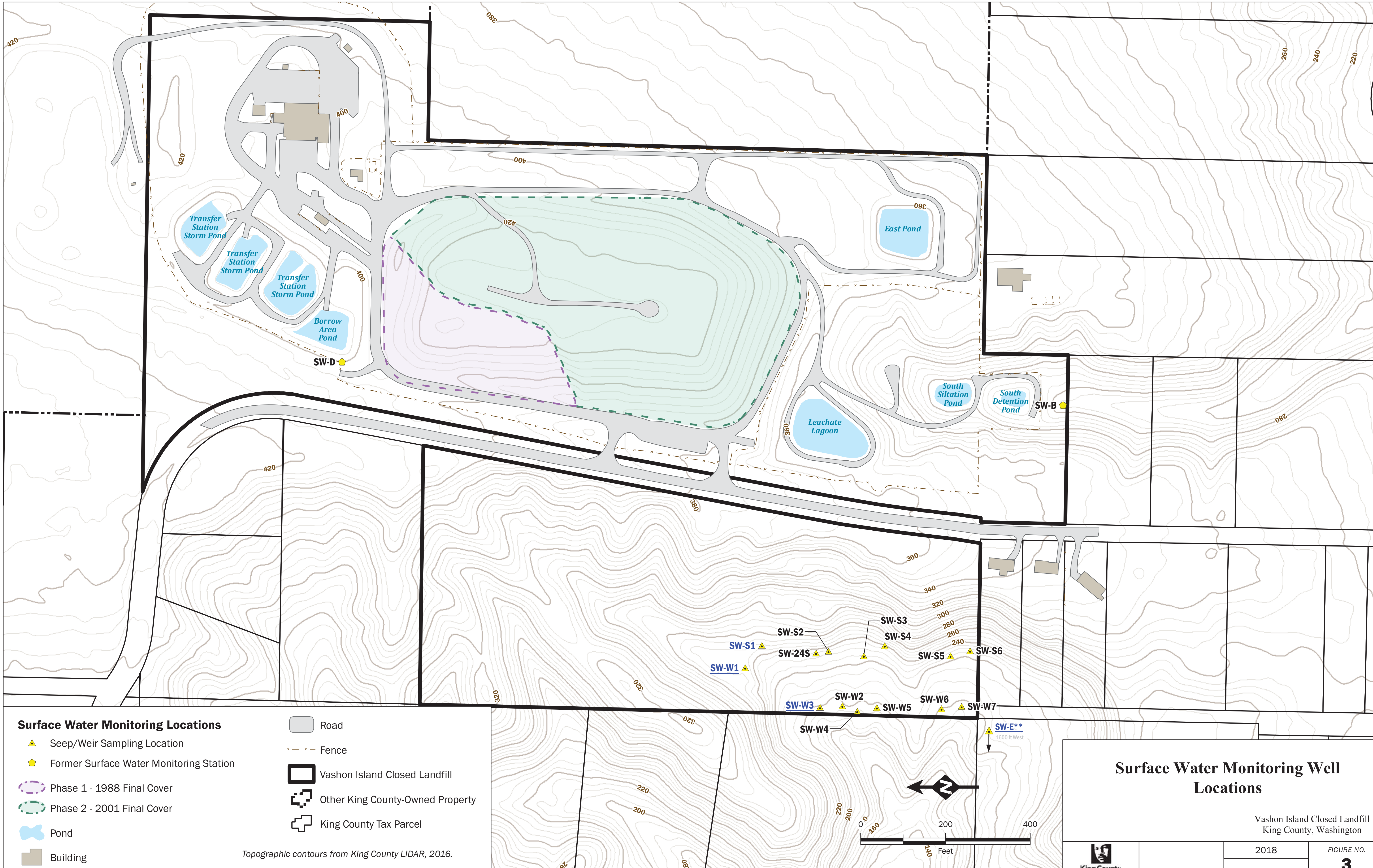


Groundwater Monitoring Well Locations

Vashon Island Closed Landfill

King County, Washington



Surface Water Monitoring Well Locations

Vashon Island Closed Landfill
King County, Washington

King County

2018

FIGURE NO. 3

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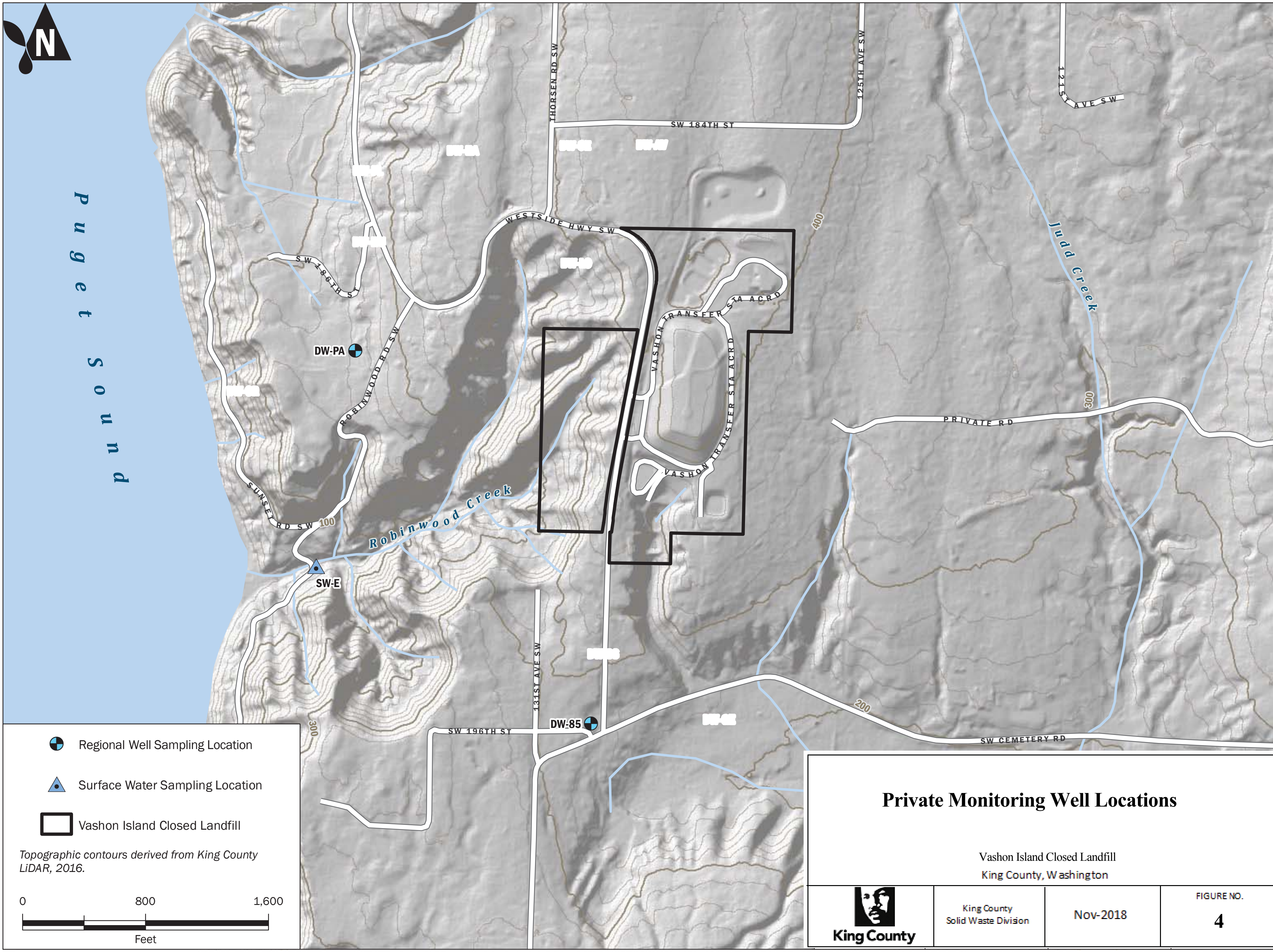
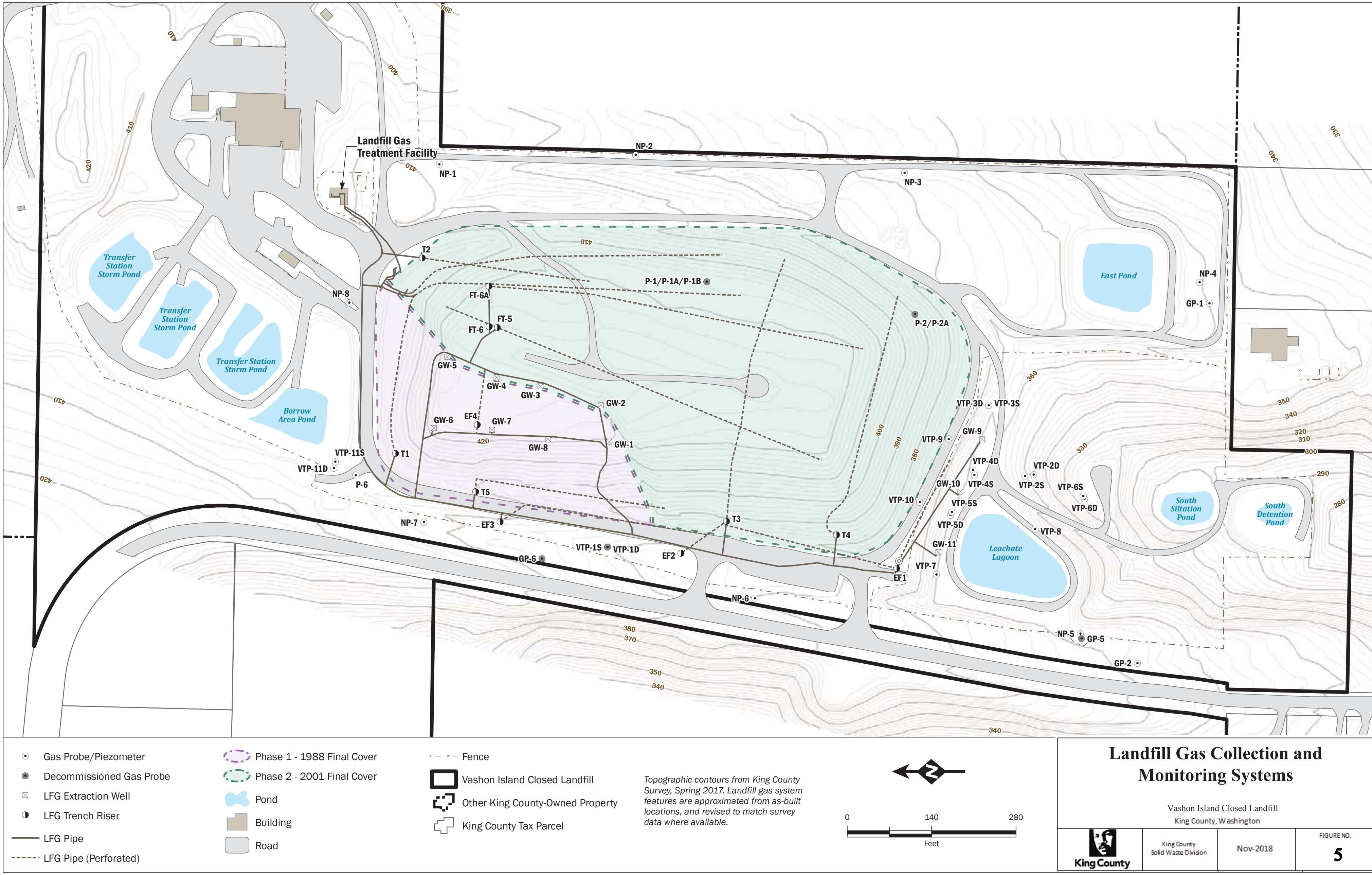
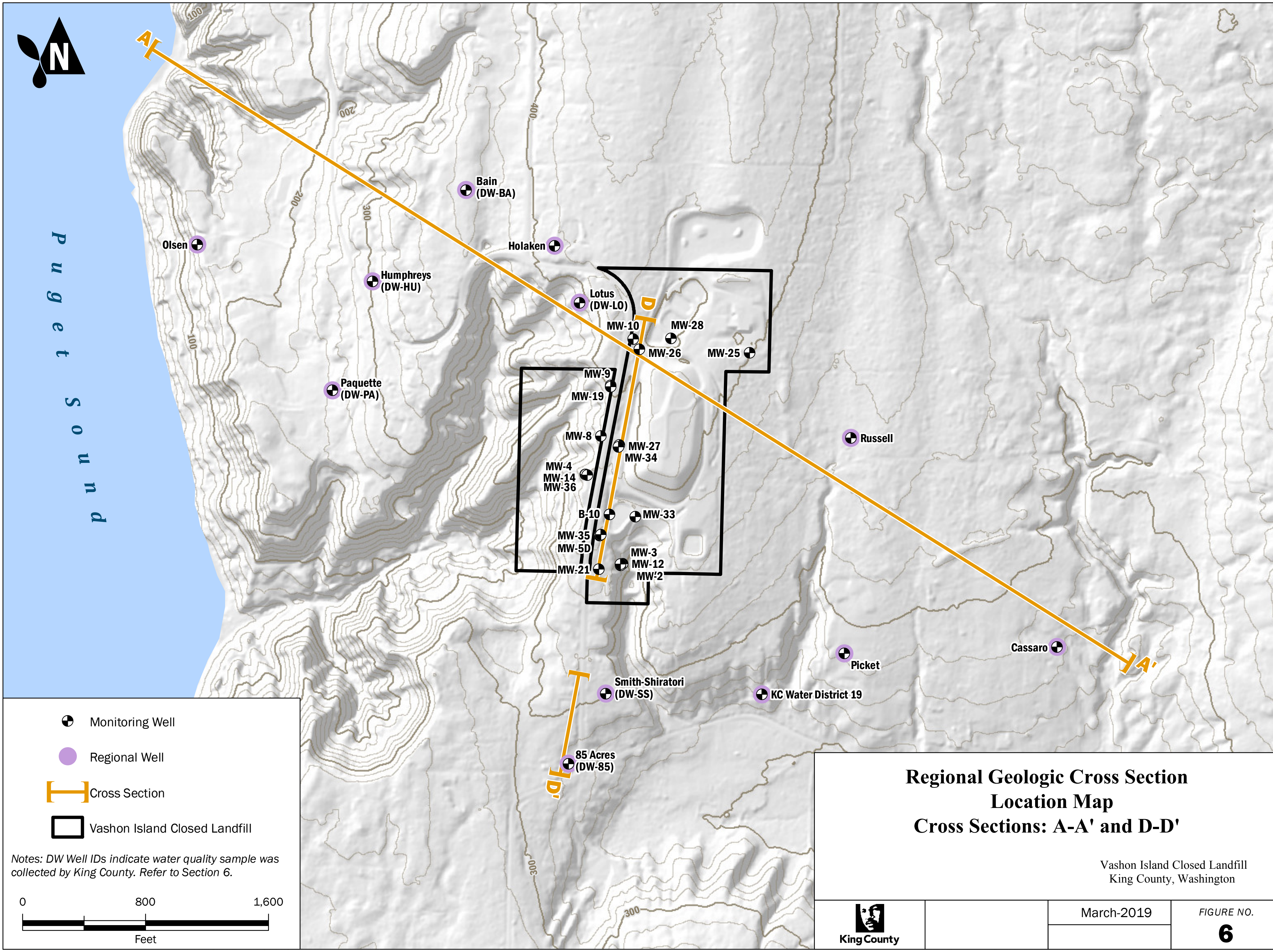


Private Monitoring Well Locations

Vashon Island Closed Landfill
King County, Washington

King County	King County Solid Waste Division	Nov-2018	FIGURE NO. 4


Landfill Gas Collection and Monitoring Systems
Vashon Island Closed Landfill
King County, Washington
King County
King County Solid Waste Division
Nov-2018
FIGURE NO.
5
Landfill Gas Treatment Facility
Transfer Station Storm Pond
Transfer Station Storm Pond
Transfer Station Storm Pond
Borrow Area Pond
East Pond
Leachate Lagoon
South Siltation Pond
South Detention Pond
NP-1
NP-2
NP-3
NP-4
NP-5
NP-6
NP-7
NP-8
GP-1
GP-2
GP-5
GP-6
P-1/P-1A/P-1B
P-2/P-2A
P-6
T1
T2
T3
T4
T5
EF1
EF2
EF3
EF4
FT-5
FT-6
FT-6A
GW-1
GW-2
GW-3
GW-4
GW-5
GW-6
GW-7
GW-8
GW-9
GW-10
GW-11
VTP-1S
VTP-1D
VTP-2D
VTP-2S
VTP-3D
VTP-3S
VTP-4D
VTP-4S
VTP-5S
VTP-5D
VTP-6S
VTP-6D
VTP-7
VTP-8
VTP-9
VTP-10
VTP-11S
VTP-11D
Gas Probe/Piezometer
Decommissioned Gas Probe
LFG Extraction Well
LFG Trench Riser
LFG Pipe
LFG Pipe (Perforated)
Phase 1 - 1988 Final Cover
Phase 2 - 2001 Final Cover
Pond
Building
Road
Fence
Vashon Island Closed Landfill
Other King County-Owned Property
King County Tax Parcel
Topographic contours from King County Survey, Spring 2017. Landfill gas system features are approximated from as-built locations, and revised to match survey data where available.
0
140
280
Feet



Regional Geologic Cross Section Location Map
Cross Sections: A-A' and D-D'

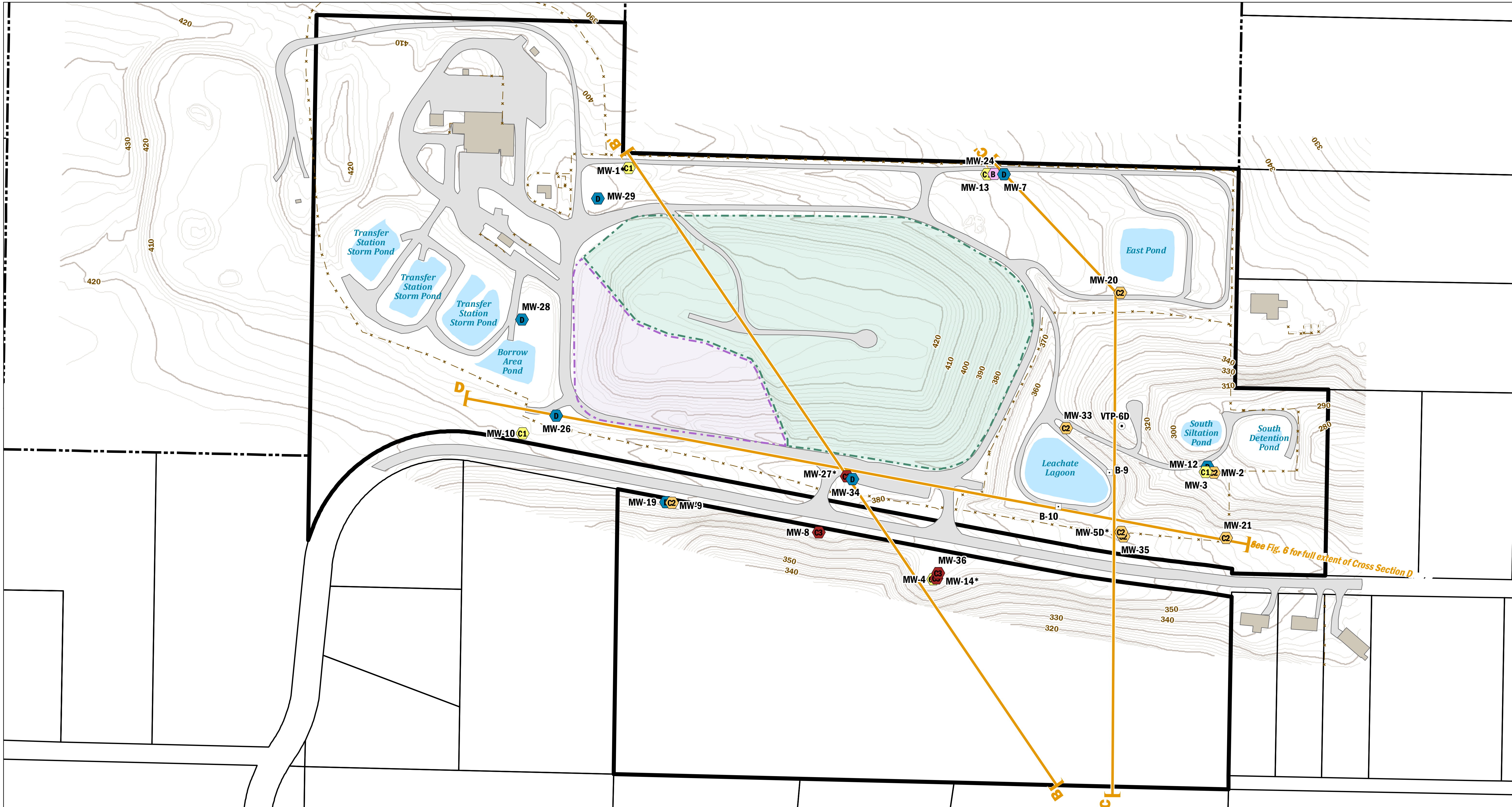
Vashon Island Closed Landfill
King County, Washington

King County

March-2019

FIGURE NO. 6

GIS Path: T:\projects_8\KingCounty_SolidWaste\VashonIslandLandfill\Delivered\RIFS\3-1 Regional Geologic Cross Section Location Map.mxd || Coordinate System: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet || Date Saved: 9/19/2018 || User: rpepin || Print Date: 10/3/2018



Monitoring Well Completion Aquifer
- B Unit B
- C1 Unit Cc1
- C2 Unit Cc2
- C3 Unit Cc3
- D Unit D

- Boring
- Gas Probe
- Cross Section
- Phase 1 - 1988 Final Cover
- Phase 2 - 2001 Final Cover
- Pond
- Building
- Road
- Fence
- Vashon Island Closed Landfill
- Other King County-Owned Property
- King County Tax Parcel

Topographic contours from King County Survey, Spring 2017.
**indicates decommissioned monitoring well.*

0 200 400
Feet

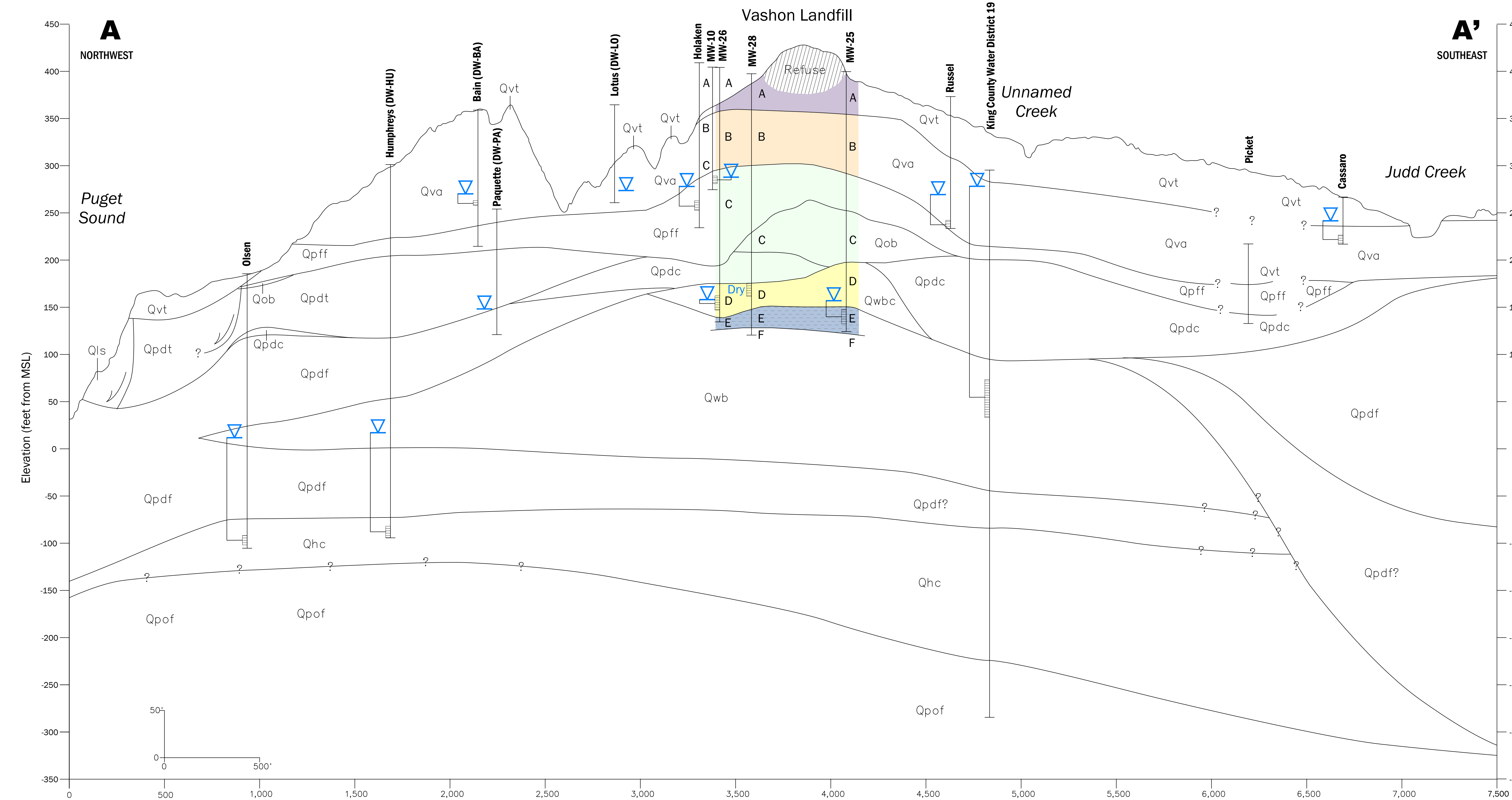
Site Cross Section Location Map
Cross Sections: B-B', C-C', and D-D'

Vashon Island Closed Landfill
King County, Washington

King County

March-2019

FIGURE NO.
7



Source: Modified from Troost, 2004.

Geologic Units

Qls	Landslide Deposits (Holocene)
Qvt	Vashon Till
Qva	Advance Outwash
Qob	Olympia Beds
Qpdt	Possession Drift Till
Qpdc	Possession Drift, Coarse-Grained Facies
Qpdf	Possession Drift, Fine-Grained Facies
Qwbc	Whidbey Beds, Coarse-Grained Facies
Qwb	Whidbey Beds, Undifferentiated
Qhc	Hamm Creek Formation
Qpof	Pre-Olympia Deposits, Fine-Grained Facies
Qpff	Pre-Fraser Glaciation Deposits, Fine-Grained Facies

Refuse/Fill
Unit A
Unit B
Unit C
Coarse
Fine
Unit D
Unit E

Static Water Level
Screen Interval

Note: DW well ID's indicate water quality sample was collected by county. Refer to Section 6 for data.

Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 100'
Vertical Exaggeration 5x

0 500 1000 Feet

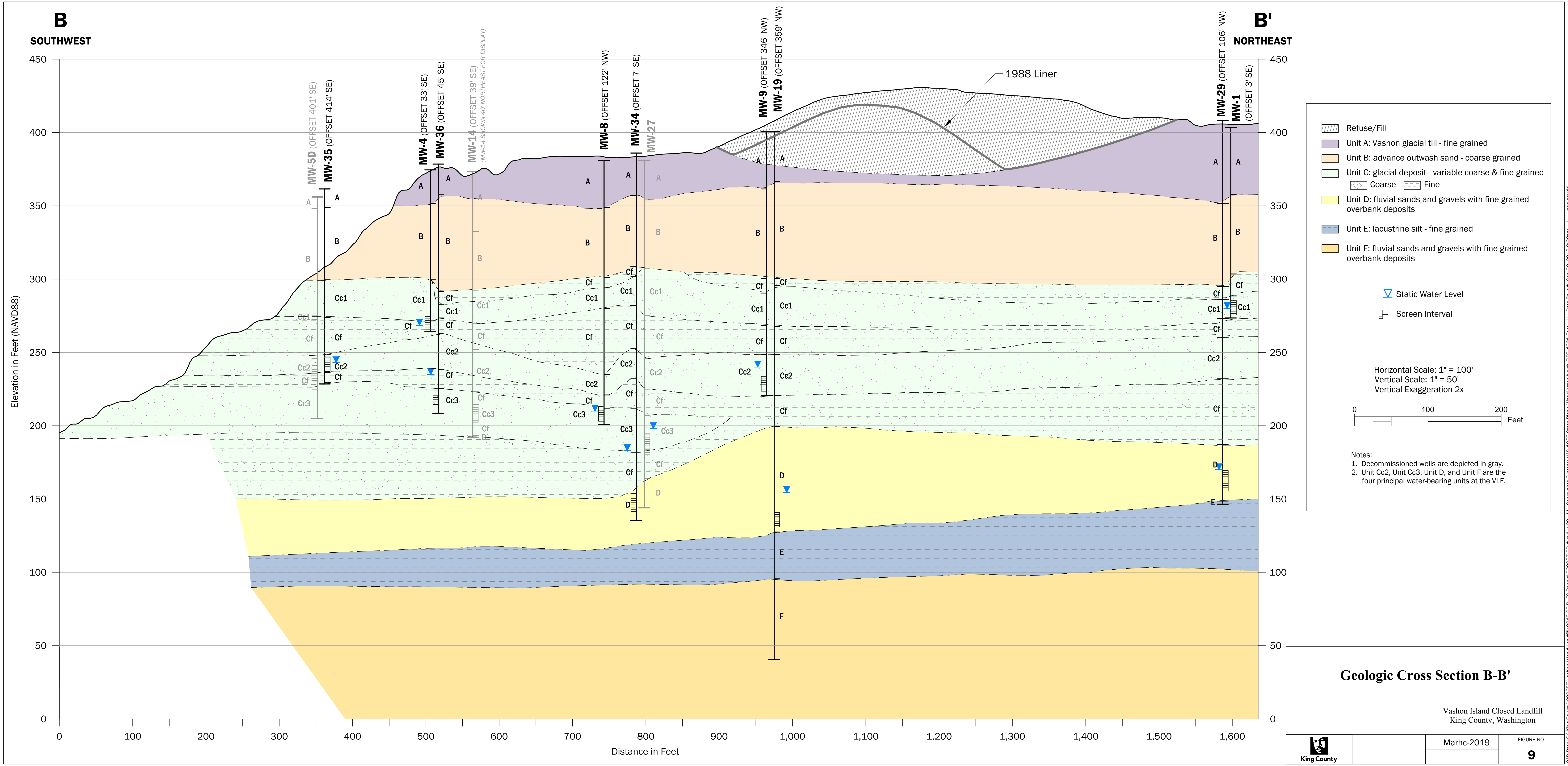
Regional Geologic Cross Section A-A'

Vashon Island Closed Landfill
King County, Washington

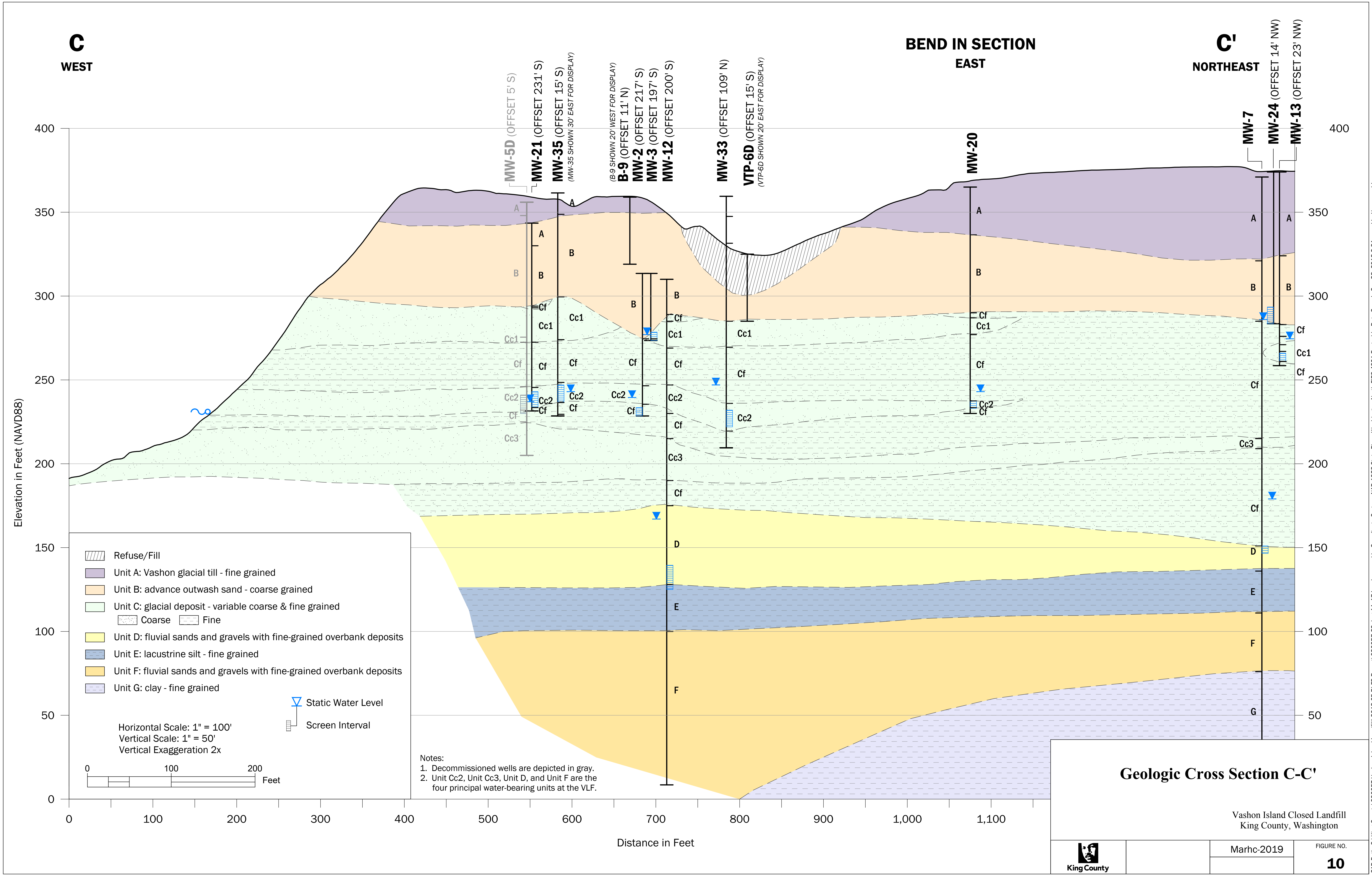
King County

March-2019

FIGURE NO.
8



B
SOUTHWEST
B'
NORTHEAST
Elevation in Feet (NAVD88)
Distance in Feet
1988 Liner
MW-5D (OFFSET 401' SE)
MW-35 (OFFSET 414' SE)
MW-4 (OFFSET 33' SE)
MW-36 (OFFSET 45' SE)
MW-14 (OFFSET 39' SE)
(MW-14 SHOWN 40' NORTHEAST FOR DISPLAY)
MW-8 (OFFSET 122' NW)
MW-34 (OFFSET 7' SE)
MW-27
MW-9 (OFFSET 346' NW)
MW-19 (OFFSET 359' NW)
MW-29 (OFFSET 106' NW)
MW-1 (OFFSET 3' SE)
Refuse/Fill
Unit A: Vashon glacial till - fine grained
Unit B: advance outwash sand - coarse grained
Unit C: glacial deposit - variable coarse & fine grained
Coarse
Fine
Unit D: fluvial sands and gravels with fine-grained overbank deposits
Unit E: lacustrine silt - fine grained
Unit F: fluvial sands and gravels with fine-grained overbank deposits
Static Water Level
Screen Interval
Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 50'
Vertical Exaggeration 2x
0
100
200
Feet
Notes:
1. Decommissioned wells are depicted in gray.
2. Unit Cc2, Unit Cc3, Unit D, and Unit F are the four principal water-bearing units at the VLF.
Geologic Cross Section B-B'
Vashon Island Closed Landfill
King County, Washington
King County
Marhc-2019
FIGURE NO.
9



C
WEST
BEND IN SECTION
EAST
C'
NORTHEAST
MW-5D (OFFSET 5' S)
MW-21 (OFFSET 231' S)
MW-35 (OFFSET 15' S)
(MW-35 SHOWN 30' EAST FOR DISPLAY)
(B-9 SHOWN 20' WEST FOR DISPLAY)
B-9 (OFFSET 11' N)
MW-2 (OFFSET 217' S)
MW-3 (OFFSET 197' S)
MW-12 (OFFSET 200' S)
MW-33 (OFFSET 109' N)
VTP-6D (OFFSET 15' S)
(VTP-6D SHOWN 20' EAST FOR DISPLAY)
MW-20
MW-7
MW-24 (OFFSET 14' NW)
MW-13 (OFFSET 23' NW)
Elevation in Feet (NAVD88)
Distance in Feet
A
B
Cf
Cc1
Cc2
Cc3
D
E
F
G
Refuse/Fill
Unit A: Vashon glacial till - fine grained
Unit B: advance outwash sand - coarse grained
Unit C: glacial deposit - variable coarse & fine grained
Coarse
Fine
Unit D: fluvial sands and gravels with fine-grained overbank deposits
Unit E: lacustrine silt - fine grained
Unit F: fluvial sands and gravels with fine-grained overbank deposits
Unit G: clay - fine grained
Static Water Level
Screen Interval
Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 50'
Vertical Exaggeration 2x
0
100
200
Feet
Notes:
1. Decommissioned wells are depicted in gray.
2. Unit Cc2, Unit Cc3, Unit D, and Unit F are the four principal water-bearing units at the VLF.
Geologic Cross Section C-C'
Vashon Island Closed Landfill
King County, Washington
King County
Marhc-2019
FIGURE NO.
10

Geologic Cross Section D-D'

Vashon Island Closed Landfill
King County, Washington

King County

Marhc-2019

FIGURE NO.
11

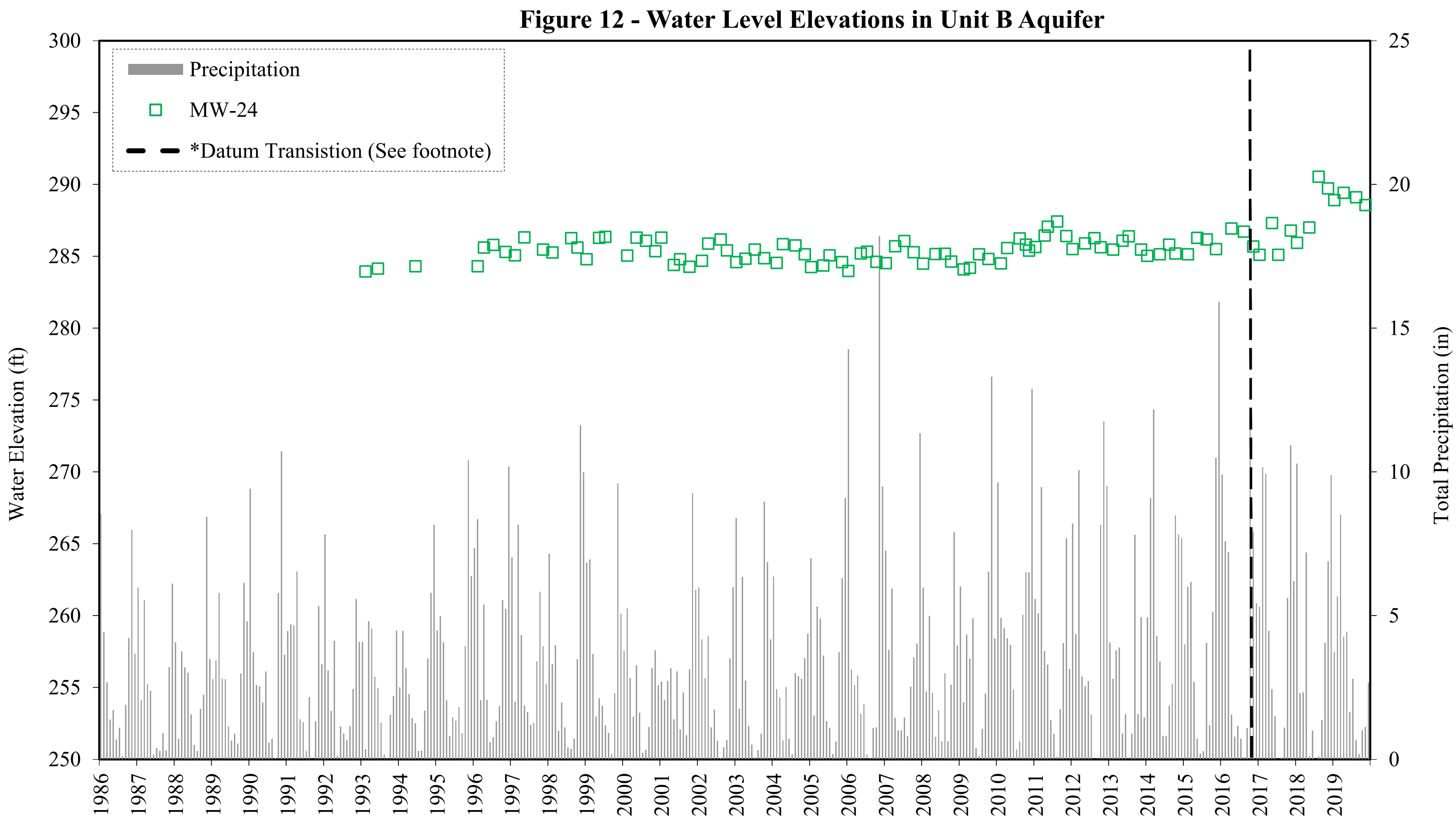


Figure 12 - Water Level Elevations in Unit B Aquifer
Precipitation
MW-24
*Datum Transistion (See footnote)
Water Elevation (ft)
Total Precipitation (in)
300
295
290
285
280
275
270
265
260
255
250
25
20
15
10
5
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

Figure 13 - Water Level Elevations in Channel Cc1

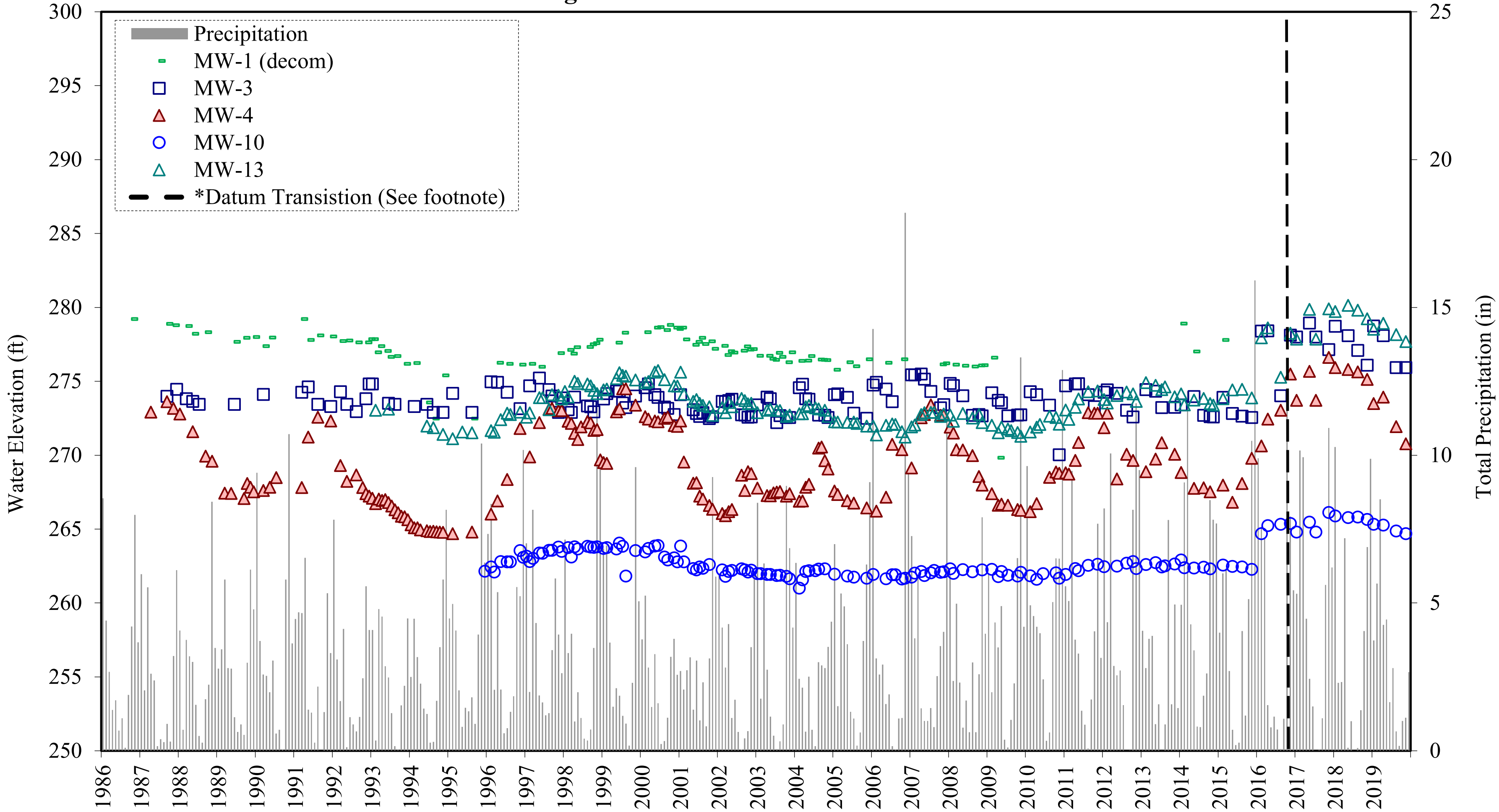


Figure 14 - Water Level Elevations in Channel Cc2

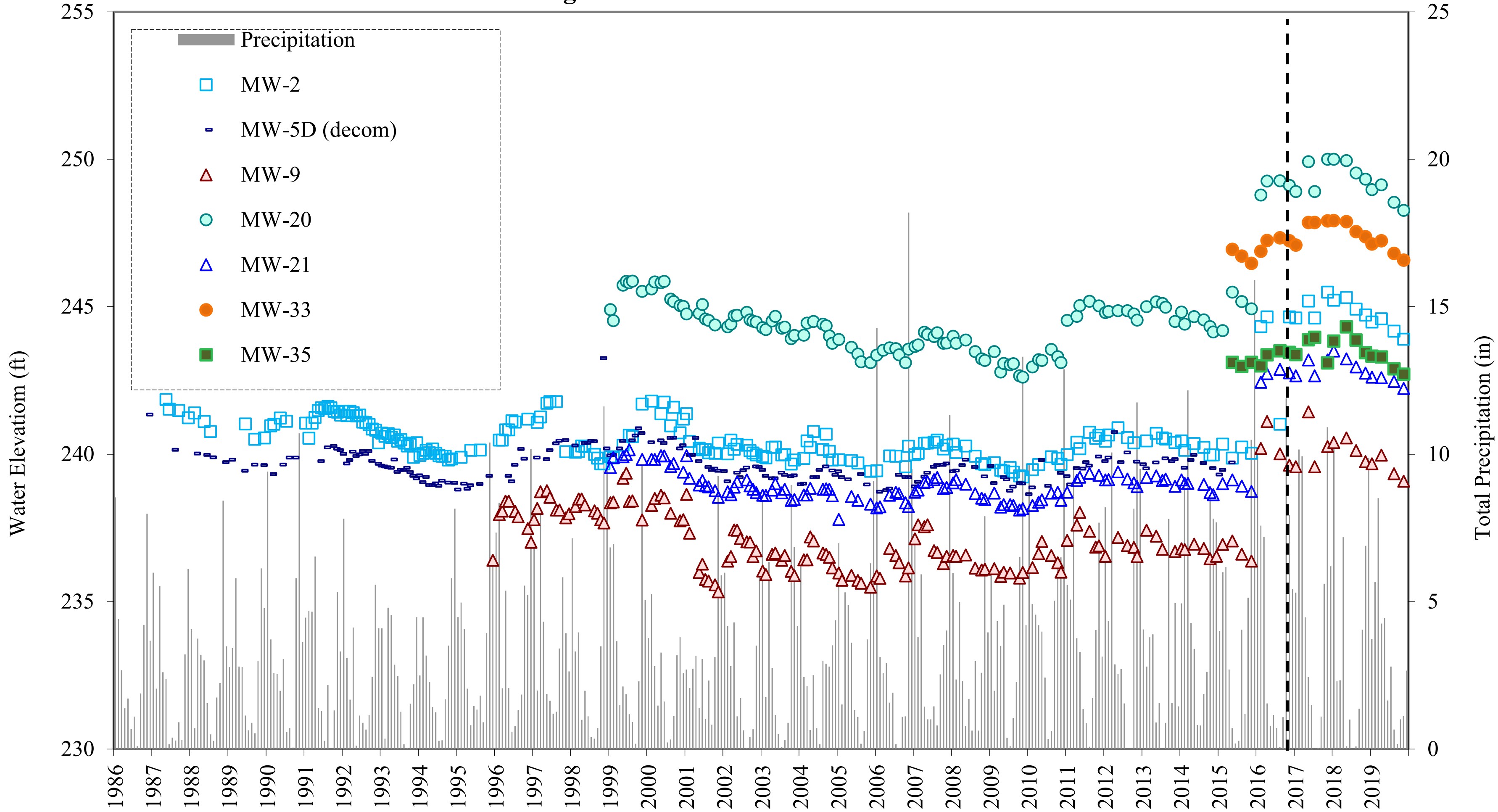


Figure 15 - Water Level Elevations in Channel Cc3

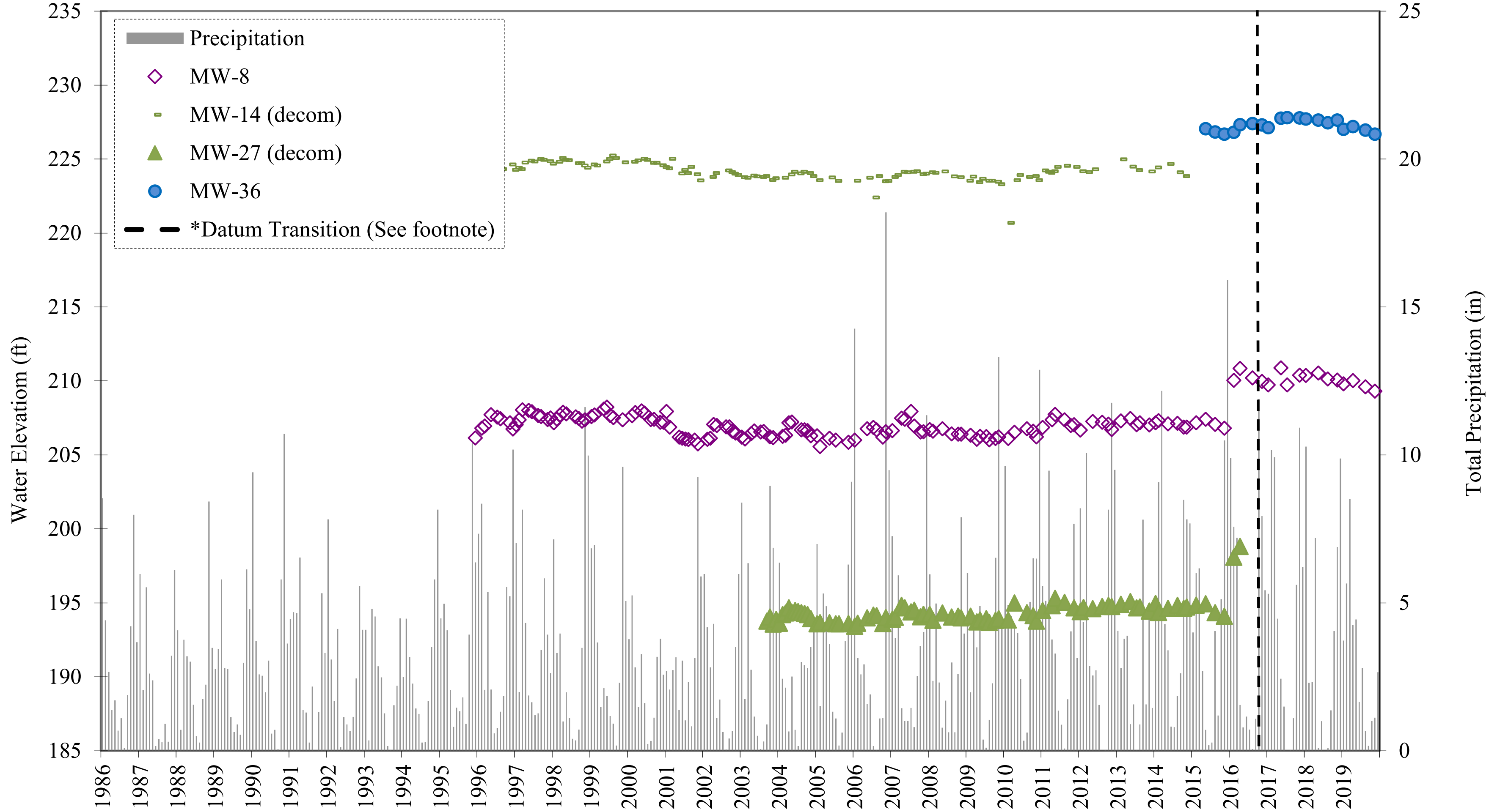


Figure 16 - Water Level Elevations in Unit D Aquifer

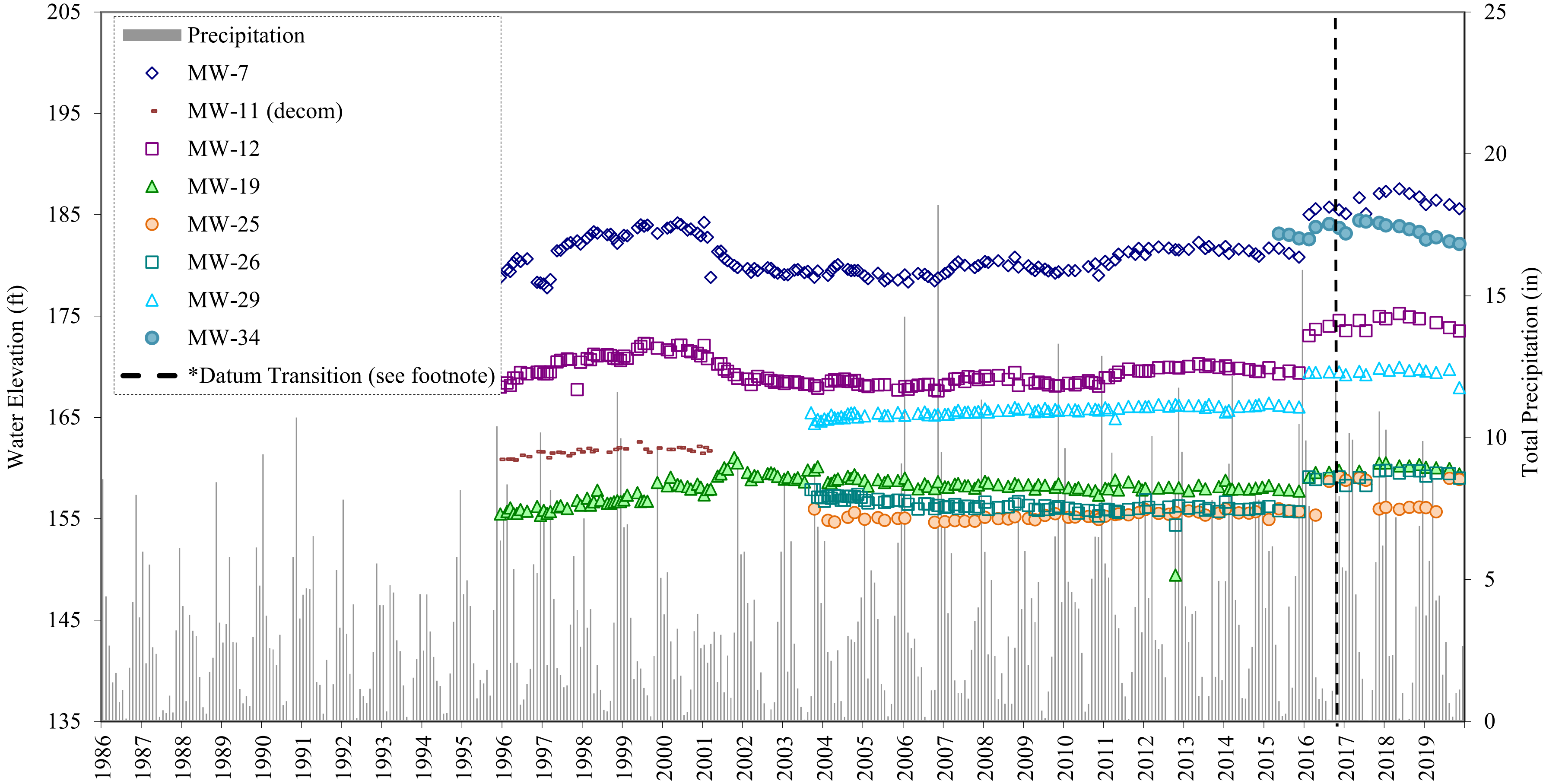


Table 2-1
Significant Maintenance Activities Summary 2019

Maintenance Activity	Resolution
Landfill Gas Blower Maintenance	The landfill gas blower was sent in for repairs to have the bearings replaced.
Gravel Road Maintenance at Landfill	Asphalt grindings were removed from the landfill road and replaced with crushed gravel under King County Department of Local Services and Permitting Division Permit # GRDE19-0107.
Dead Trees Removed	Five trees were removed near monitoring well MW-10. Four of the tree were in the right-of-way and were removed by King County Roads Division and one tree was on the landfill property and was removed by King County Solid Waste Division.
Survey of Well Locations	A survey of well locations was conducted by Licensed Surveyor with King County Roads Division.
Sampling & Analysis Plan for Terrestrial Ecological Evaluation	A Terrestrial Ecological Evaluation was conducted on the west hillslope. The Sampling and Analysis plan was submitted to Ecology and PH-SKC. The results of the evaluation will be included in the Remedial Investigation.
Landfill Gas System Evaluation Summary Report	The Landfill Gas System Evaluation Summary Report was submitted to Ecology and PH-SKC for review.
Update Landfill Gas Monitoring Summary Technical Memorandum	The Update Landfill Gas Monitoring Summary Technical Memorandum was submitted to Ecology and PH-SKC for review.

Table 2-2

Vashon Island Closed Landfill Groundwater Monitoring Well Completion Details

Well Number	Date Completed	Installed By	Top of PVC Casing Elevation (feet)[a]	Well Casing and Screen	Well Dia. (inches)	Screen slot (inches)	Top of Screen Elevation[b]	Bottom of Screen Elevation[b]	Top of Seal Elevation[b]	Bottom of Seal Elevation[b]	Seal Type	Top of Sand Pack (feet elev.)[b]	Bottom of Sand Pack (feet elev.)[b]	Sand Type	Reference[c]
MW-1[d]	9/8/1983	Sweet- Edwards	407.06	Sch 80 PVC	3	0.010	287.94	277.94	405.94	292.94	Bentonite	292.94	275.94	3/8 minus pea gravel	A
MW-2	9/9/1983	Sweet- Edwards	318.09	Sch 80 PVC	3	0.010	237.39	232.39	316.39	250.39	Bentonite	248.39	231.39	3/8 minus pea gravel	A
MW-3	9/12/1983	Sweet- Edwards	318.12	Sch 80 PVC	3	0.010	281.15	276.15	316.15	284.15	Bentonite	284.15	276.15	3/8 minus pea gravel	A
MW-4	9/14/1983	Sweet- Edwards	377.30	Sch 80 PVC	3	0.010	276.17	266.17	376.17	281.17	Bentonite	281.17	266.17	3/8 minus pea gravel	A
MW-5S[d]	3/6/1986	Golder	360.09	Sch 40 PVCb	2	0.020	285.32	275.32	359.32	356.32	Bentonite	356.32	274.82	#8 Monteray & Gravel	B
MW-5D[d]	3/6/1986	Golder	360.66	Sch 40 PVCb	2	0.020	244.32	233.32	258.82	253.32	Bentonite	257.32	233.32	#8 Monteray & Gravel	B
MW-6S[d]	3/19/1986	Golder	397.7	Sch 40 PVCb	2	0.020	290.88	280.88	395.88	392.88	Bentonite	392.88	279.88	#8 Aqua and Gravel	B
MW-6D[d]	3/19/1986	Golder	397.6	Sch 40 PVCb	2	0.020	245.38	235.38	259.88	253.88	Bentonite	247.88	234.88	#8 Aqua	B
MW-7	4/28/1995	CH2M HILL	376.56	Sch 40 PVC	2	0.010	154.40	144.40	374.40	157.40	Bentonite	157.40	142.40	#20 x 40	C
MW-8	6/30/1995	CH2M HILL	386.13	Sch 40 PVC	2	0.010	215.95	205.95	383.95	216.95	Bentonite	216.95	203.95	#20 x 40	C
MW-9	6/12/1995	CH2M HILL	405.32	Sch 40 PVC	2	0.010	236.39	226.39	403.39	239.39	Bentonite	239.39	223.39	#20 x 40	C
MW-10	7/1/1995	CH2M HILL	410.21	Sch 40 PVC	2	0.010	265.04	255.04	408.04	268.04	Bentonite	268.04	253.04	#20 x 40	C
MW-11[d]	5/15/1995	CH2M HILL	409.85	Sch 40 PVC	2	0.010	165.74	155.74	407.74	167.74	Bentonite	167.74	147.74	#20 x 40	C
MW-12	5/26/1995	CH2M HILL	315.67	Sch 40 PVC	2	0.010	142.90	132.90	313.40	146.40	Bentonite	146.40	127.40	#20 x 40	C
MW-13	4/22/1992	Terra	377.37	Sch 40 PVC	2	0.020	267.30	262.30	375.30	269.30	Bentonite	269.30	259.80	#8	D
MW-14[d]	6/21/1995	CH2M HILL	379.14	Sch 40 PVC	2	0.020	216.08	206.08	377.08	223.08	Bentonite	223.08	205.08	#20 x 40	C
MW-19	6/12/1995	CH2M HILL	405.58	Sch 40 PVC	2	0.020	142.85	132.85	402.35	142.35	Bentonite	142.35	126.35	#20 x 40	C
MW-20	10/21/1998	UES	370.43	Sch 40 PVC	2	0.020	240.79	236.49	368.49	244.09	Bentonite	244.09	234.49	#20 x 40	E
MW-21	10/21/1998	UES	348.95	Sch 40 PVC	2	0.020	246.46	237.06	347.06	252.06	Bentonite	252.06	236.06	#20 x 40	E
MW-24	4/27/1992	Terra	377.53	Sch 40 PVC	2	0.020	294.96	284.96	375.46	298.46	Bentonite	298.46	285.46	#8	D
MW-25	8/11/2003	UES	402.48	Sch 80 PVC	4	0.020	152.04	137.94	400.54	155.54	Bentonite	155.54	133.54	#16 x 30	F
MW-26	8/6/2003	UES	406.58	Sch 80 PVC	4	0.020	158.30	144.20	404.40	162.10	Bentonite	162.10	140.70	#16 x 30	F
MW-27[d]	8/15/2003	UES	386.34	Sch 80 PVC	4	0.020	197.55	183.35	384.05	200.55	Bentonite	200.55	180.55	#16 x 30	F
MW-28	8/29/2003	UES	398.72	Sch 80 PVC	4	0.020	177.04	162.64	396.64	180.14	Bentonite	180.14	160.84	#16 x 30	F
MW-29	8/29/2003	UES	413.79	Sch 80 PVC	4	0.020	173.02	158.22	411.22	175.22	Bentonite	175.22	150.22	#16 x 30	G
MW-33	3/13/2015	Aspect Consulting	359.77	Sch 40 PVC	4	0.020	229.78	219.78	357.07	232.90	Bentonite	232.90	217.82	10 x 20 Colorado Silica	I
MW-34	3/26/2015	Aspect Consulting	385.88	Sch 40 PVC	4	0.020	147.96	137.96	383.26	151.26	Bentonite	151.26	135.76	10 x 20 Colorado Silica	I
MW-35	3/18/2015	Aspect Consulting	361.47	Sch 40 PVC	4	0.020	244.25	233.35	358.75	247.25	Bentonite	247.25	233.55	10 x 20 Colorado Silica	I
MW-36	4/2/2015	Aspect Consulting	378.24	Sch 40 PVC	4	0.020	221.25	211.25	375.25	223.25	Bentonite	223.25	210.25	10 x 20 Colorado Silica	I
P-1S[d]	3/12/1986	Golder	No data	Sch 40 PVC	2	0.020	307.46	297.46	396.46	393.46	Bentonite	393.46	291.46	#8 Aqua and Gravel	B
P-1D[d]	3/12/1986	Golder	No data	Sch 40 PVC	2	0.020	281.96	271.96	291.46	286.46	Bentonite	286.46	271.46	#8 Aqua	B
P-1A[d]	3/25/1986	Golder	No data	Sch 40 PVC	2	0.020	283.48	273.48	357.48	289.48	Bentonite	289.48	272.48	#8 Monteray	B
P-1B[d]	3/29/1986	Golder	No data	Sch 40 PVC	2	0.020	302.54	292.54	383.54	307.54	Bentonite	307.54	292.54	10 x 20 silica	B
P-2[d]	3/19/1986	Golder	No data	Sch 40 PVC	2	0.020	277.19	262.19	287.19	282.19	Bentonite	282.19	260.19	#8 Aqua	B
P-2A[d]	3/24/1986	Golder	No data	Sch 40 PVC	2	0.020	297.06	285.06	352.06	310.06	Bentonite	310.06	283.56	#8 Aqua	B
P-4	2/29/1988	Golder	No data	Sch 80 PVC	1	0.020	378.36	376.36	410.86	380.36	Bentonite	380.36	375.36	#16 Monteray	H

[a]All survey data in feet are relative to site NAVD88 datum.
[b]Well installed as a dual-completion.
[c] A = R.W. Beck, 1984; B = Golder Associates, 1986; C = CH2M HILL, 1996; D = Terra Associates., 1992; E = B&H and UES, 1999b; F = B&H and UES, 2003b; G = B&H and UES, 2003a; H = Golder Associates, 1986; I = Aspect Consulting, 2015.
[d]Well has been decommissioned.

Table 2-3
Summary of Vashon Island Closed Landfill Site Stratigraphic Units [a]

Formation [b]	Depositional Facies	Sediment Type	Approximate Elevations at Vashon Island Closed Landfill Site
Unit A: Vashon glacial till - fine grained (Qvt)	Vashon glacial till	The till ranges in thickness from 15 to 50 feet, except where it has been eroded or removed by landfill-related activities. The unit mainly consists gravelly, silty sand soils.	Occurs as surficial deposit in all portions of the site except where absent by erosion. The base of the till varies from elevations of about 405 feet in the northeast to about 350 feet in the south. In general, till is absent below about 330 feet.
Unit B: Advance outwash sand - coarse grained (Qva)	Advance outwash	Approximately 40 to 50 foot-thick deposit of an advance outwash sand.	Occurs beneath entire site directly beneath till or as surficial unit in areas where till is absent by erosion. Basal contact elevation ranges from 370 to 280 feet.
Unit C: Glacial deposit - variable coarse & fine grained (Qob, Qpdc, and Qpff)	Pre-Fraser Glaciation Deposits, Fine-Grained Facies, Olympia Beds, and Possession Drift, Coarse-Grained Facies	Approximately 100 to 120 foot-thick sequence. Fine-grained portions of Unit C consist of interbedded sandy silts, silts, and clays. Incised within the fine-grained soil are coarser sand deposits. Three significant extensive channel deposits have been identified within this unit (i.e. Cc1, Cc2, and Cc3) with limited hydraulic interconnection between them.	Occurs beneath entire site at elevations of about 304 to about 150 feet. Where fully penetrated, the basal contact elevation ranges from 181 to 191 feet.
Unit D: Fluvial sands and gravels with fine-grained overbank deposits (Qwbc)	Whidbey Beds, Coarse-Grained Facies	Fluvial deposits exhibiting a wide range in texture consistent with varying energy in a fluvial environment. Textures range from sandy gravel channel deposits to fine-grained overbank deposits, and the unit exhibits a corresponding range of hydraulic properties. Thickness of Unit D ranges from about 25 to 65 feet.	Occurs beneath the entire site at elevations of about 115 to 200 feet. Where fully penetrated, the basal contact elevation ranges from 125 to 134 feet.
Unit E: Lacustrine silt - fine grained (Qwb and/ or Qwbc)	Whidbey Beds, Undifferentiated or Coarse-Grained Facies	Mainly comprised of silt and acts as an aquitard between the water-bearing fluvial deposits in Unit D and Unit F. A lacustrine unit with its thickness of approximately 40 feet, Unit D and is thought to be continuous beneath the site.	Occurs at elevations of 90 to 160 feet, apparently beneath most of the site.
Unit F: Fluvial sands and gravels with fine-grained overbank deposits (Qwb)	Whidbey Beds, Undifferentiated	The thickness of Unit F varies from 30 to over 90 feet. The unit consists of Pre-Vashon fluvial deposits of widely varying texture, similar to those of Unit D	Occurs at elevations below about 90 to 130 feet beneath all portions of the site.
Unit G: Clay - fine grained (Qwb)	Whidbey Beds, Undifferentiated	More than 50-foot-thick deposit of dark gray, varved clay	Occurs at elevations below about 0 to 75 feet.

[a] – Aspect (2018)
[b] - Assignments to classifications derived from Booth (1991) are queried where tentative.

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
pH, Field [standard units]						
No. of Analyses	30	47	91	8	98	8
No. of Detections	30	47	91	8	98	8
Minimum	5.44	5.94	6.77	6.75	6.72	6.70
Maximum	6.82	7.97	8.42	7.64	7.96	7.41
Mean	6.08	6.53	7.37	7.18	7.22	7.06
Standard Deviation	0.337	0.336	0.282	0.267	0.231	0.233
Median	6.11	6.44	7.37	7.15	7.21	7.08
Specific Conductance, Field [umhos/cm]						
No. of Analyses	30	47	91	8	97	8
No. of Detections	30	47	91	8	97	8
Minimum	61	150	100	146	130	159
Maximum	200	860	159	150	195	167
Mean	111	480	131	148	160	163
Standard Deviation	28.3	212.8	11.6	1.4	15.0	3.6
Median	100	487	130	148	160	163
Alkalinity [mg/L]						
No. of Analyses	23	26	89	8	91	8
No. of Detections	23	26	89	8	91	8
Minimum	19	38	52	55	30	63
Maximum	41	320	70	64	80	67
Mean	28	149	57	58	64	65
Standard Deviation	5.9	109.8	2.8	2.8	7.7	1.4
Median	28	120	56	57	64	64
Ammonia-N [mg/L]						
No. of Analyses	29	59	89	8	96	8
No. of Detections	10	23	12	2	11	1
Minimum	ND	ND	ND	ND	ND	ND
Maximum	0.650	0.332	0.060	0.005	0.070	0.002
Mean	0.109	0.048	0.010	ID	0.010	ID
Standard Deviation	0.201	0.072	0.011	ID	0.011	ID
Median	0.005	0.025	0.005	ID	0.005	ID
Chloride [mg/L]						
No. of Analyses	30	59	89	8	96	8
No. of Detections	30	57	88	8	96	8
Minimum	0.94	ND	ND	3.19	2.50	2.93
Maximum	11.00	19.00	30.90	3.40	10.60	3.15
Mean	2.69	8.94	3.39	3.26	3.53	3.03
Standard Deviation	2.26	4.10	2.97	0.07	1.04	0.08
Median	2.00	7.84	3.00	3.25	3.09	3.02
Nitrate-N [mg/L]						
No. of Analyses	30	59	89	8	96	8
No. of Detections	30	34	89	8	95	8
Minimum	0.2	ND	0.21	0.574	ND	0.164
Maximum	5.53	6.30	0.84	0.70	0.28	0.26
Mean	1.88	1.33	0.40	0.64	0.10	0.21
Standard Deviation	1.38	1.78	0.11	0.04	0.05	0.03
Median	1.30	0.10	0.39	0.65	0.08	0.22
Sulfate [mg/L]						
No. of Analyses	30	59	89	8	95	8
No. of Detections	30	59	89	8	95	8
Minimum	4.8	3.7	2.6	8.5	12.8	12.0
Maximum	19.0	46.0	11.0	9.4	26.8	14.3
Mean	10.2	17.0	9.5	8.8	18.7	13.1
Standard Deviation	3.86	8.92	0.93	0.28	2.44	0.81
Median	9.6	15.0	9.7	8.8	19.0	13.1
Total Dissolved Solids [mg/L]						
No. of Analyses	25	44	88	8	95	8
No. of Detections	25	44	88	8	95	8
Minimum	8	29	46	103	68	115
Maximum	90	500	130	107	150	122
Mean	66	305	97	105	116	118
Standard Deviation	16.62	130.05	13.05	1.46	14.49	2.43
Median	69	330	99	105	119	118

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
Arsenic, Dissolved [mg/L]						
No. of Analyses	30	59	89	8	96	8
No. of Detections	1	16	88	8	95	8
Minimum	ND	ND	ND	0.002	ND	0.002
Maximum	0.007	0.006	0.002	0.002	0.003	0.002
Mean	ID	0.001	0.002	0.002	0.002	0.002
Standard Deviation	ID	1E-03	4E-04	5E-05	3E-04	1E-04
Median	ID	0.001	0.002	0.002	0.002	0.002
Arsenic, Total [mg/L]						
No. of Analyses	8	11	17	8	20	8
No. of Detections	5	10	17	8	20	8
Minimum	ND	ND	0.0015	0.0015	0.0016	0.0018
Maximum	0.0005	0.0006	0.0018	0.0017	0.0022	0.0021
Mean	0.0002	0.0004	0.0016	0.0016	0.0018	0.0020
Standard Deviation	0.0002	0.0001	0.0001	0.0001	0.0002	0.0001
Median	0.0001	0.0004	0.0016	0.0016	0.0018	0.0020
Calcium, Dissolved [mg/L]						
No. of Analyses	24	36	89	8	96	8
No. of Detections	24	36	89	8	96	8
Minimum	6.0	11.1	4.3	9.4	6.5	9.5
Maximum	11.0	73.6	13.0	9.9	11.5	10.4
Mean	8.9	40.9	8.9	9.8	9.4	10.1
Standard Deviation	1.19	23.66	1.02	0.20	0.89	0.35
Median	9.3	42.5	9.0	9.9	9.5	10.2
Calcium, Total [mg/L]						
No. of Analyses	8	11	17	8	20	8
No. of Detections	8	11	17	8	20	8
Minimum	5.9	11.2	8.2	9.4	8.4	9.6
Maximum	9.7	17.2	10.8	11.2	11.5	11.4
Mean	8.2	12.5	9.3	10.0	9.7	10.1
Standard Deviation	1.21	1.66	0.74	0.53	0.80	0.59
Median	8.65	12.00	9.28	9.93	9.60	10.04
Iron, Dissolved [mg/L]						
No. of Analyses	30	59	89	8	96	8
No. of Detections	21	40	55	0	61	4
Minimum	ND	ND	ND	ND	ND	ND
Maximum	8.60	0.50	0.30	ND	0.49	0.03
Mean	0.95	0.07	0.03	ID	0.04	0.01
Standard Deviation	2.31	0.10	0.05	ID	0.06	0.01
Median	0.03	0.03	0.01	ID	0.02	0.01
Iron, Total [mg/L]						
No. of Analyses	8	11	17	8	20	8
No. of Detections	8	10	15	2	20	6
Minimum	0.03	ND	ND	ND	0.01	ND
Maximum	0.27	0.34	0.04	0.017	2.18	0.05
Mean	0.14	0.06	0.01	ID	0.20	0.02
Standard Deviation	0.08	0.09	0.008	ID	0.48	0.016
Median	0.14	0.03	0.013	ID	0.06	0.022
Magnesium, Dissolved [mg/L]						
No. of Analyses	24	36	89	8	96	8
No. of Detections	24	36	89	8	96	8
Minimum	1.8	8.0	4.2	9.2	7.7	11.0
Maximum	3.1	56.8	12.0	10.1	14.0	12.5
Mean	2.4	31.0	8.3	9.7	10.6	11.8
Standard Deviation	0.29	18.22	0.93	0.27	1.21	0.64
Median	2.4	35.0	8.2	9.7	10.4	12.1
Magnesium, Total [mg/L]						
No. of Analyses	8	11	17	8	20	8
No. of Detections	8	11	17	8	20	8
Minimum	2.2	7.8	8.0	9.3	9.6	11.2
Maximum	2.9	11.9	10.8	10.9	13.6	13.6
Mean	2.5	9.1	9.1	9.9	11.4	11.9
Standard Deviation	0.25	1.08	0.74	0.52	1.22	0.80
Median	2.5	9.1	8.9	9.8	11.3	11.7

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
Manganese, Dissolved [mg/L]						
No. of Analyses	30	59	89	8	96	8
No. of Detections	23	52	8	2	57	8
Minimum	ND	ND	ND	ND	ND	0.0003
Maximum	2.700	0.970	0.003	0.0002	0.027	0.010
Mean	0.325	0.150	0.001	ID	0.003	0.003
Standard Deviation	0.829	0.213	0.000	ID	0.004	0.003
Median	0.002	0.063	0.001	ID	0.001	0.002
Manganese, Total [mg/L]						
No. of Analyses	8	11	17	8	20	8
No. of Detections	8	11	8	8	17	8
Minimum	0.002	0.001	ND	0.00014	ND	0.0004
Maximum	0.019	0.169	0.0019	0.0009	0.0650	0.008
Mean	0.008	0.032	0.0007	0.0003	0.0095	0.002
Standard Deviation	0.006	0.051	0.0005	0.0002	0.0142	0.002
Median	0.005	0.015	0.0005	0.0002	0.0057	0.002
Potassium, Dissolved [mg/L]						
No. of Analyses	24	36	89	8	96	8
No. of Detections	24	36	89	8	96	8
Minimum	1.41	0.88	0.65	1.43	1.10	1.71
Maximum	4.10	2.70	2.00	1.54	2.24	1.87
Mean	2.98	1.64	1.36	1.49	1.70	1.80
Standard Deviation	0.72	0.55	0.15	0.04	0.17	0.07
Median	3.00	1.70	1.35	1.49	1.70	1.81
Potassium, Total [mg/L]						
No. of Analyses	8	11	17	8	20	8
No. of Detections	8	11	17	8	20	8
Minimum	1.39	0.90	1.28	1.42	1.48	1.73
Maximum	2.80	1.17	1.65	1.59	2.50	1.88
Mean	2.28	1.03	1.48	1.51	1.85	1.81
Standard Deviation	0.50	0.09	0.09	0.06	0.20	0.06
Median	2.37	1.03	1.48	1.53	1.83	1.81
Sodium, Dissolved [mg/L]						
No. of Analyses	24	36	89	8	96	8
No. of Detections	24	36	89	8	96	8
Minimum	2.5	5.4	2.3	4.9	4.9	5.9
Maximum	7.1	24.8	6.4	5.4	14.4	6.7
Mean	4.8	12.8	4.6	5.2	6.0	6.3
Standard Deviation	1.10	6.26	0.47	0.15	0.98	0.26
Median	4.7	12.0	4.5	5.2	5.8	6.3
Sodium, Total [mg/L]						
No. of Analyses	8	11	17	8	20	8
No. of Detections	8	11	17	8	20	8
Minimum	2.4	5.8	4.4	5.0	5.4	6.1
Maximum	7.7	7.5	5.6	5.7	15.8	7.0
Mean	4.8	6.6	4.9	5.3	6.6	6.4
Standard Deviation	1.80	0.55	0.32	0.23	2.22	0.30
Median	4.6	6.8	4.9	5.2	6.1	6.3

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
1,1 Dichloroethane [ug/L]						
No. of Analyses	30	59	89	8	96	8
No. of Detections	0	17	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	5.00	ND	ND	ND	ND
Mean	ID	0.45	ID	ID	ID	ID
Standard Deviation	ID	0.65	ID	ID	ID	ID
Median	ID	0.50	ID	ID	ID	ID
1,2-Dichloropropane [ug/L]						
No. of Analyses	30	59	89	8	96	8
No. of Detections	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID
Benzene [ug/L]						
No. of Analyses	30	59	89	8	96	8
No. of Detections	0	0	1	0	1	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	0.28	ND	0.22	ND
Mean	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID
Chloroethane [ug/L]						
No. of Analyses	30	59	89	8	96	8
No. of Detections	0	6	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	5.00	ND	ND	ND	ND
Mean	ID	0.92	ID	ID	ID	ID
Standard Deviation	ID	1.05	ID	ID	ID	ID
Median	ID	0.10	ID	ID	ID	ID
cis-1,2-Dichloroethene [ug/L]						
No. of Analyses	27	46	89	8	96	8
No. of Detections	0	19	0	0	1	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	16.00	ND	ND	0.79	ND
Mean	ID	1.04	ID	ID	ID	ID
Standard Deviation	ID	2.46	ID	ID	ID	ID
Median	ID	0.50	ID	ID	ID	ID
Dichlorodifluoromethane [ug/L]						
No. of Analyses	23	27	89	8	91	8
No. of Detections	0	12	0	0	1	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	5.00	ND	ND	1.50	ND
Mean	ID	1.08	ID	ID	ID	ID
Standard Deviation	ID	1.40	ID	ID	ID	ID
Median	ID	0.10	ID	ID	ID	ID

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
Toluene [ug/L]						
No. of Analyses	30	59	89	8	96	8
No. of Detections	0	0	1	0	1	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	0.35	ND	0.78	ND
Mean	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID
trans-1,2-Dichloroethene [ug/L]						
No. of Analyses	29	51	89	8	96	8
No. of Detections	0	1	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	5.00	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID
Trichloroethene [ug/L]						
No. of Analyses	30	59	89	8	96	8
No. of Detections	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID
Trichlorofluoromethane [ug/L]						
No. of Analyses	24	37	89	8	96	8
No. of Detections	13	26	1	0	1	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	0.67	5.00	0.20	ND	1.00	ND
Mean	0.23	0.89	ID	ID	ID	ID
Standard Deviation	0.17	0.96	ID	ID	ID	ID
Median	0.22	0.83	ID	ID	ID	ID
Vinyl Chloride [ug/L]						
No. of Analyses	30	59	89	8	96	8
No. of Detections	0	23	1	0	1	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	19.0	0.02	ND	0.10	ND
Mean	ID	3.0	ID	ID	ID	ID
Standard Deviation	ID	4.9	ID	ID	ID	ID
Median	ID	0.5	ID	ID	ID	ID

NOTES:

Short - eight most recent analyses in the last two years.
Long - historical data up to the last eight samples, but no greater than 50 samples.
umhos/cm - microSiemens per centimeter
mg/L - milligram per liter
ug/L - microgram per liter
ID - insufficient Data (i.e. the number of detections is less than 3)
ND - Not Detected (i.e. at laboratory MDL - Method Detection Limit)

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc2									
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33	MW-35
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Short	Short
pH, Field [standard units]										
No. of Analyses	149	8	92	8	77	8	80	8	8	8
No. of Detections	149	8	92	8	77	8	80	8	8	8
Minimum	6.06	6.50	6.77	6.55	6.95	6.57	6.56	6.41	6.48	6.46
Maximum	7.75	7.22	7.98	7.31	8.56	7.58	8.24	7.02	6.83	6.73
Mean	6.87	6.87	7.36	7.00	7.85	7.09	6.89	6.71	6.65	6.61
Standard Deviation	0.240	0.292	0.224	0.262	0.390	0.366	0.241	0.205	0.102	0.087
Median	6.90	6.91	7.36	7.00	7.92	7.01	6.87	6.65	6.64	6.62
Specific Conductance, Field [umhos/cm]										
No. of Analyses	149	8	92	8	78	8	80	8	8	8
No. of Detections	149	8	92	8	78	8	80	8	8	8
Minimum	230	285	110	173	140	190	200	252	748	649
Maximum	1024	316	210	196	242	233	480	301	821	749
Mean	444	303	156	184	176	206	341	272	771	696
Standard Deviation	120.2	9.5	19.9	7.7	22.6	14.8	69.6	16.7	23.5	29.8
Median	425	305	150	185	170	204	334	268	766	695
Alkalinity [mg/L]										
No. of Analyses	92	8	91	8	77	8	77	8	8	8
No. of Detections	92	8	91	8	77	8	77	8	8	8
Minimum	110	130	56	68	59	72	117	116	390	330
Maximum	500	146	100	76	95	89	290	137	421	359
Mean	218	136	67	72	73	79	194	124	399	343
Standard Deviation	54.9	5.2	6.4	2.9	6.2	6.1	47.3	7.2	10.1	9.4
Median	219	137	66	72	72	78	190	124	397	346
Ammonia-N [mg/L]										
No. of Analyses	149	8	91	8	77	8	76	8	8	8
No. of Detections	19	4	11	1	45	8	39	8	8	8
Minimum	ND	ND	ND	ND	ND	0.0136	ND	0.0093	0.027	0.0319
Maximum	0.040	0.009	0.060	0.002	0.100	0.017	0.130	0.021	0.065	0.071
Mean	0.012	0.003	0.010	ID	0.018	0.015	0.018	0.015	0.035	0.062
Standard Deviation	0.009	0.003	0.011	ID	0.013	0.001	0.020	0.004	0.012	0.013
Median	0.005	0.002	0.005	ID	0.015	0.014	0.015	0.014	0.032	0.067
Chloride [mg/L]										
No. of Analyses	150	8	91	8	77	8	77	8	8	8
No. of Detections	147	8	91	8	77	8	77	8	8	8
Minimum	ND	2.64	3.00	4.25	3.00	3.11	2.13	2.15	3.84	3.83
Maximum	10.60	3.04	23.00	4.83	4.30	3.33	15.20	2.40	4.61	4.32
Mean	4.35	2.86	4.44	4.50	3.62	3.17	4.04	2.29	4.12	4.09
Standard Deviation	1.55	0.13	2.05	0.23	0.35	0.07	1.89	0.11	0.28	0.16
Median	4.00	2.90	4.00	4.48	3.60	3.16	4.00	2.32	4.08	4.12
Nitrate-N [mg/L]										
No. of Analyses	150	8	92	8	77	8	77	8	8	8
No. of Detections	72	2	91	8	14	0	44	8	2	0
Minimum	ND	ND	ND	0.32	ND	ND	ND	0.09	ND	ND
Maximum	1.25	0.17	1.60	0.43	0.11	ND	0.56	0.45	0.04	ND
Mean	0.13	ID	0.25	0.36	0.02	ID	0.08	0.21	ID	ID
Standard Deviation	0.24	ID	0.26	0.03	0.01	ID	0.09	0.13	ID	ID
Median	0.05	ID	0.18	0.36	0.01	ID	0.03	0.20	ID	ID
Sulfate [mg/L]										
No. of Analyses	150	8	91	8	77	8	77	8	8	8
No. of Detections	150	8	91	8	77	8	77	8	8	8
Minimum	1.5	12.6	9.0	10.7	14.0	15.4	10.0	11.7	15.3	19.6
Maximum	18.8	14.7	18.0	13.4	18.0	17.5	19.0	14.0	17.7	22.2
Mean	12.5	14.0	12.9	11.8	16.1	16.3	14.1	12.8	16.8	21.2
Standard Deviation	2.80	0.68	1.31	1.01	1.16	0.65	2.76	0.81	0.82	0.86
Median	12.0	14.2	13.0	11.6	16.0	16.2	14.0	12.6	17.1	21.4
Total Dissolved Solids [mg/L]										
No. of Analyses	139	8	91	8	76	8	77	8	8	8
No. of Detections	139	8	91	8	76	8	77	8	8	8
Minimum	34	170	58	123	50	130	157	160	434	407
Maximum	480	184	160	132	160	146	307	192	486	445
Mean	272	179	112	127	124	138	230	174	454	426
Standard Deviation	64.49	5.37	18.37	3.92	18.29	6.15	34.52	9.64	16.76	13.63
Median	260	179	112	127	123	138	230	174	450	425

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc2									
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33	MW-35
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Short	Short
Arsenic, Dissolved [mg/L]										
No. of Analyses	150	8	91	8	77	8	77	8	8	8
No. of Detections	89	8	90	8	76	8	70	8	8	8
Minimum	ND	0.001	ND	0.002	ND	0.002	ND	0.001	0.033	0.029
Maximum	0.004	0.001	0.003	0.003	0.005	0.002	0.023	0.002	0.039	0.038
Mean	0.001	0.001	0.002	0.002	0.002	0.002	0.005	0.001	0.037	0.033
Standard Deviation	6E-04	8E-05	4E-04	1E-04	5E-04	1E-04	6E-03	1E-04	2E-03	4E-03
Median	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.001	0.037	0.034
Arsenic, Total [mg/L]										
No. of Analyses	20	8	19	8	19	8	19	8	8	8
No. of Detections	4	8	19	8	19	8	16	8	8	8
Minimum	ND	0.0007	0.0022	0.0023	0.0013	0.0023	ND	0.0018	0.0323	0.0289
Maximum	0.0025	0.0010	0.0025	0.0025	0.0028	0.0044	0.0072	0.0087	0.0397	0.0404
Mean	0.0007	0.0009	0.0023	0.0024	0.0018	0.0029	0.0028	0.0042	0.0375	0.0341
Standard Deviation	0.0005	0.0001	0.0001	0.0001	0.0005	0.0007	0.0020	0.0023	0.0023	0.0043
Median	0.0005	0.0009	0.0023	0.0024	0.0016	0.0027	0.0030	0.0036	0.0382	0.0343
Calcium, Dissolved [mg/L]										
No. of Analyses	125	8	91	8	77	8	77	8	8	8
No. of Detections	125	8	91	8	77	8	77	8	8	8
Minimum	4.3	18.9	7.8	12.8	9.1	12.8	16.3	18.4	65.0	60.1
Maximum	47.9	21.8	15.8	15.0	18.0	14.1	40.0	21.8	73.4	72.8
Mean	31.9	20.2	11.8	13.9	12.3	13.6	25.9	19.6	68.9	65.0
Standard Deviation	9.51	0.97	1.47	0.79	1.60	0.52	6.12	1.08	2.41	3.71
Median	32.0	20.0	12.0	14.0	12.0	13.7	25.6	19.5	68.9	64.0
Calcium, Total [mg/L]										
No. of Analyses	19	8	19	8	19	8	19	8	8	8
No. of Detections	19	8	19	8	19	8	19	8	8	8
Minimum	18.4	18.8	8.5	12.7	11.5	12.6	16.1	18.7	66.1	62.0
Maximum	27.1	23.0	16.7	16.1	14.4	14.6	24.9	21.0	72.7	71.5
Mean	23.0	20.5	12.9	14.1	13.3	13.6	20.6	19.6	69.3	65.8
Standard Deviation	2.52	1.26	1.84	1.23	0.92	0.67	2.47	0.76	2.38	3.37
Median	24.00	20.50	13.00	13.80	13.30	13.50	20.20	19.50	68.85	64.55
Iron, Dissolved [mg/L]										
No. of Analyses	150	8	91	8	77	8	77	8	8	8
No. of Detections	104	0	50	0	56	8	77	8	8	8
Minimum	ND	ND	ND	ND	ND	0.22	0.146	0.251	6.51	13.7
Maximum	0.89	ND	0.29	ND	0.51	0.39	5.20	0.45	7.66	16.40
Mean	0.07	ID	0.03	ID	0.07	0.30	1.51	0.35	7.04	15.56
Standard Deviation	0.11	ID	0.05	ID	0.08	0.06	1.28	0.08	0.39	0.97
Median	0.03	ID	0.02	ID	0.05	0.32	1.20	0.36	7.12	15.85
Iron, Total [mg/L]										
No. of Analyses	20	8	19	8	19	8	19	8	8	8
No. of Detections	15	3	18	1	18	8	19	8	8	8
Minimum	ND	ND	ND	ND	ND	0.49	0.23	0.57	6.44	14.30
Maximum	0.15	0.02	0.35	0.02	5.12	2.07	2.82	3.28	7.74	18.00
Mean	0.02	0.01	0.06	ID	0.55	0.96	1.09	1.44	7.05	16.11
Standard Deviation	0.032	0.007	0.08	ID	1.15	0.51	0.73	0.91	0.44	1.25
Median	0.017	0.005	0.03	ID	0.14	0.83	0.95	1.17	6.92	16.50
Magnesium, Dissolved [mg/L]										
No. of Analyses	125	8	91	8	77	8	77	8	8	8
No. of Detections	125	8	91	8	77	8	77	8	8	8
Minimum	3.9	20.2	6.6	10.1	7.7	12.0	15.2	16.5	53.3	38.3
Maximum	53.9	23.7	13.0	12.2	14.4	15.1	43.2	22.0	59.4	46.6
Mean	35.8	21.7	9.3	11.3	10.3	13.6	26.0	18.3	56.3	42.3
Standard Deviation	10.62	1.10	1.23	0.84	1.65	1.06	7.77	1.95	2.02	2.52
Median	35.0	21.5	9.2	11.4	9.9	13.7	24.0	17.8	56.1	42.2
Magnesium, Total [mg/L]										
No. of Analyses	19	8	19	8	19	8	19	8	8	8
No. of Detections	19	8	19	8	19	8	19	8	8	8
Minimum	19.4	20.6	8.5	10.1	8.7	12.3	14.3	16.2	53.6	38.7
Maximum	31.8	23.0	14.0	13.2	15.0	15.7	25.7	21.5	61.1	45.2
Mean	26.4	21.6	10.9	11.5	12.2	13.8	20.2	18.2	56.6	42.6
Standard Deviation	3.66	0.88	1.19	1.17	1.94	1.34	3.57	1.89	2.50	2.65
Median	26.6	21.6	10.9	11.4	12.5	13.4	19.7	17.9	55.7	43.6

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc2									
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33	MW-35
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Short	Short
Manganese, Dissolved [mg/L]										
No. of Analyses	150	8	91	8	77	8	76	8	8	8
No. of Detections	149	8	9	1	77	8	76	8	8	8
Minimum	ND	0.13	ND	ND	0.05	0.15	0.17	0.17	0.88	2.29
Maximum	0.59	0.26	0.540	0.0001	0.55	0.29	1.60	0.73	1.10	2.53
Mean	0.12	0.19	0.007	ID	0.21	0.22	0.57	0.47	0.99	2.44
Standard Deviation	0.08	0.05	0.057	ID	0.09	0.05	0.32	0.19	0.07	0.09
Median	0.11	0.18	0.001	ID	0.21	0.22	0.49	0.50	0.99	2.45
Manganese, Total [mg/L]										
No. of Analyses	20	8	19	8	19	8	19	8	8	8
No. of Detections	20	8	12	8	19	8	19	8	8	8
Minimum	0.07	0.14	ND	0.000	0.15	0.16	0.17	0.21	0.90	2.21
Maximum	0.24	0.31	0.015	0.0007	2.92	0.30	1.05	0.94	1.08	2.75
Mean	0.12	0.21	0.003	0.0003	0.49	0.23	0.52	0.57	0.99	2.49
Standard Deviation	0.03	0.07	0.004	0.0002	0.60	0.06	0.28	0.23	0.06	0.16
Median	0.11	0.19	0.001	0.0002	0.35	0.23	0.40	0.55	1.00	2.47
Potassium, Dissolved [mg/L]										
No. of Analyses	125	8	91	8	77	8	77	8	8	8
No. of Detections	125	8	91	8	77	8	77	8	8	8
Minimum	0.59	2.05	1.20	2.07	1.50	2.05	1.80	1.96	3.38	3.12
Maximum	3.70	2.32	2.41	2.33	2.90	2.28	3.30	2.48	3.79	3.60
Mean	2.52	2.20	1.92	2.20	2.06	2.18	2.39	2.15	3.56	3.33
Standard Deviation	0.40	0.09	0.20	0.10	0.22	0.09	0.35	0.16	0.13	0.16
Median	2.50	2.19	1.90	2.19	2.06	2.20	2.30	2.12	3.53	3.32
Potassium, Total [mg/L]										
No. of Analyses	19	8	19	8	19	8	19	8	8	8
No. of Detections	19	8	19	8	19	8	19	8	8	8
Minimum	2.08	2.07	1.92	2.03	1.98	2.12	2.05	2.02	3.48	3.07
Maximum	2.58	2.38	2.67	2.43	2.48	2.32	2.74	2.31	3.68	3.55
Mean	2.35	2.25	2.19	2.21	2.23	2.21	2.30	2.16	3.60	3.37
Standard Deviation	0.15	0.12	0.19	0.13	0.14	0.09	0.20	0.11	0.07	0.15
Median	2.40	2.25	2.17	2.24	2.21	2.20	2.25	2.15	3.61	3.42
Sodium, Dissolved [mg/L]										
No. of Analyses	125	8	91	8	77	8	77	8	8	8
No. of Detections	125	8	91	8	77	8	77	8	8	8
Minimum	2.2	8.7	4.5	5.6	4.2	6.0	8.4	10.4	17.5	15.2
Maximum	14.0	10.3	6.4	6.6	8.0	7.0	13.0	12.0	19.8	17.0
Mean	10.4	9.4	5.3	6.1	6.2	6.5	10.3	11.3	19.1	16.3
Standard Deviation	1.75	0.49	0.43	0.37	0.78	0.33	0.95	0.62	0.77	0.76
Median	10.0	9.4	5.2	6.2	6.1	6.6	10.0	11.4	19.2	16.6
Sodium, Total [mg/L]										
No. of Analyses	19	8	19	8	19	8	19	8	8	8
No. of Detections	19	8	19	8	19	8	19	8	8	8
Minimum	8.2	9.0	5.2	5.6	4.9	6.1	9.2	10.6	18.2	14.8
Maximum	11.4	10.2	6.8	6.8	6.9	7.3	11.8	12.2	20.3	17.0
Mean	9.3	9.4	5.8	6.2	6.1	6.6	10.6	11.2	19.3	16.3
Standard Deviation	0.75	0.38	0.41	0.44	0.53	0.46	0.78	0.57	0.67	0.80
Median	9.1	9.3	5.8	6.0	6.1	6.4	10.9	11.1	19.3	16.6

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc2									
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33	MW-35
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Short	Short
1,1 Dichloroethane [ug/L]										
No. of Analyses	160	8	92	8	78	8	78	8	8	8
No. of Detections	8	0	0	0	0	0	0	0	8	8
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	1.29	0.12
Maximum	0.50	ND	ND	ND	ND	ND	ND	ND	1.67	0.33
Mean	0.19	ID	ID	ID	ID	ID	ID	ID	1.47	0.23
Standard Deviation	0.17	ID	ID	ID	ID	ID	ID	ID	0.14	0.09
Median	0.10	ID	ID	ID	ID	ID	ID	ID	1.45	0.24
1,2-Dichloropropane [ug/L]										
No. of Analyses	160	8	92	8	78	8	78	8	8	8
No. of Detections	0	0	0	0	0	0	0	0	8	8
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	6.26	0.58
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	8.09	1.33
Mean	ID	ID	ID	ID	ID	ID	ID	ID	6.92	0.90
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	0.67	0.27
Median	ID	ID	ID	ID	ID	ID	ID	ID	6.77	0.86
Benzene [ug/L]										
No. of Analyses	160	8	92	8	78	8	78	8	8	8
No. of Detections	0	0	0	0	0	0	3	0	8	8
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	0.93	0.77
Maximum	ND	ND	ND	ND	ND	ND	0.25	ND	1.08	1.17
Mean	ID	ID	ID	ID	ID	ID	0.10	ID	1.00	0.94
Standard Deviation	ID	ID	ID	ID	ID	ID	0.03	ID	0.06	0.12
Median	ID	ID	ID	ID	ID	ID	0.10	ID	0.98	0.95
Chloroethane [ug/L]										
No. of Analyses	160	8	92	8	78	8	78	8	8	8
No. of Detections	26	0	0	0	0	0	0	0	8	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	0.27	ND
Maximum	2.50	ND	ND	ND	ND	ND	ND	ND	0.53	ND
Mean	0.63	ID	ID	ID	ID	ID	ID	ID	0.40	ID
Standard Deviation	0.86	ID	ID	ID	ID	ID	ID	ID	0.09	ID
Median	0.10	ID	ID	ID	ID	ID	ID	ID	0.42	ID
cis-1,2-Dichloroethene [ug/L]										
No. of Analyses	135	8	92	8	78	8	78	8	8	8
No. of Detections	36	8	0	0	1	0	76	8	8	8
Minimum	ND	0.11	ND	ND	ND	ND	ND	0.63	24.10	4.92
Maximum	0.60	0.41	ND	ND	0.98	ND	8.70	0.97	33.10	10.70
Mean	0.17	0.28	ID	ID	ID	ID	2.17	0.79	28.14	7.79
Standard Deviation	0.13	0.09	ID	ID	ID	ID	2.17	0.11	2.92	2.46
Median	0.10	0.28	ID	ID	ID	ID	1.15	0.79	28.05	7.85
Dichlorodifluoromethane [ug/L]										
No. of Analyses	91	8	92	8	78	8	77	8	8	8
No. of Detections	89	8	0	0	13	8	75	8	8	8
Minimum	ND	2.10	ND	ND	ND	0.29	ND	0.79	3.21	0.23
Maximum	30.00	4.33	ND	ND	1.86	0.49	20.00	2.19	5.73	0.75
Mean	10.90	2.88	ID	ID	0.22	0.38	5.11	1.23	4.45	0.44
Standard Deviation	6.40	0.67	ID	ID	0.33	0.07	3.80	0.51	0.89	0.21
Median	9.26	2.73	ID	ID	0.10	0.35	3.99	1.09	4.61	0.39

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc2									
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33	MW-35
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Short	Short
Toluene [ug/L]										
No. of Analyses	160	8	92	8	78	8	78	8	8	8
No. of Detections	2	0	0	0	1	0	0	0	1	4
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	2.50	ND	ND	ND	0.22	ND	ND	ND	0.13	0.12
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	0.08
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	0.03
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	0.08
trans-1,2-Dichloroethene [ug/L]										
No. of Analyses	138	8	92	8	78	8	78	8	8	8
No. of Detections	0	0	0	0	0	0	12	5	8	8
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	0.63	0.28
Maximum	ND	ND	ND	ND	ND	ND	0.41	0.13	0.73	0.40
Mean	ID	ID	ID	ID	ID	ID	0.13	0.09	0.68	0.35
Standard Deviation	ID	ID	ID	ID	ID	ID	0.08	0.03	0.04	0.04
Median	ID	ID	ID	ID	ID	ID	0.10	0.11	0.69	0.36
Trichloroethene [ug/L]										
No. of Analyses	160	8	92	8	78	8	78	8	8	8
No. of Detections	0	0	0	0	0	0	0	0	7	8
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.93
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	0.16	1.22
Mean	ID	ID	ID	ID	ID	ID	ID	ID	0.13	1.08
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	0.03	0.10
Median	ID	ID	ID	ID	ID	ID	ID	ID	0.14	1.08
Trichlorofluoromethane [ug/L]										
No. of Analyses	125	8	92	8	78	8	78	8	8	8
No. of Detections	121	8	0	0	1	0	74	8	0	0
Minimum	ND	0.22	ND	ND	ND	ND	ND	0.26	ND	ND
Maximum	23.00	0.97	ND	ND	0.61	ND	9.00	0.92	ND	ND
Mean	6.68	0.46	ID	ID	ID	ID	2.27	0.48	ID	ID
Standard Deviation	5.48	0.24	ID	ID	ID	ID	2.31	0.22	ID	ID
Median	4.40	0.42	ID	ID	ID	ID	1.20	0.47	ID	ID
Vinyl Chloride [ug/L]										
No. of Analyses	160	8	92	8	78	8	78	8	8	8
No. of Detections	148	8	0	0	1	0	77	8	8	8
Minimum	ND	0.05	ND	ND	ND	ND	ND	0.04	24.3	1.8
Maximum	40.0	0.13	ND	ND	0.09	ND	1.00	0.08	34.1	5.4
Mean	6.4	0.08	ID	ID	ID	ID	0.35	0.06	28.8	3.3
Standard Deviation	8.4	0.03	ID	ID	ID	ID	0.22	0.02	3.4	1.5
Median	0.8	0.07	ID	ID	ID	ID	0.35	0.06	29.7	3.3

NOTES:

Short - eight most recent analyses in the last two years.
Long - historical data up to the last eight samples, but no greater than 50 samples.
umhos/cm - microSiemens per centimeter
mg/L - milligram per liter
ug/L - microgram per liter
ID - insufficient Data (i.e. the number of detections is less than 3)
ND - Not Detected (i.e. at laboratory MDL - Method Detection Limit)

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc3		
Well Location	MW-8		MW-36
Time Interval	Long	Short	Short
pH, Field [standard units]			
No. of Analyses	91	8	8
No. of Detections	91	8	8
Minimum	6.23	5.97	6.51
Maximum	7.95	7.06	7.78
Mean	6.85	6.58	7.43
Standard Deviation	0.316	0.355	0.443
Median	6.81	6.60	7.57
Specific Conductance, Field [umhos/cm]			
No. of Analyses	91	8	8
No. of Detections	91	8	8
Minimum	130	158	171
Maximum	650	168	178
Mean	169	165	174
Standard Deviation	52.9	3.4	2.3
Median	165	165	175
Alkalinity [mg/L]			
No. of Analyses	90	8	8
No. of Detections	90	8	8
Minimum	47	51	68
Maximum	78	58	70
Mean	60	54	69
Standard Deviation	5.9	2.3	1.0
Median	60	54	69
Ammonia-N [mg/L]			
No. of Analyses	90	8	8
No. of Detections	8	1	2
Minimum	ND	ND	ND
Maximum	0.430	0.004	0.004
Mean	0.015	ID	ID
Standard Deviation	0.047	ID	ID
Median	0.005	ID	ID
Chloride [mg/L]			
No. of Analyses	90	8	8
No. of Detections	90	8	8
Minimum	3.00	4.25	2.96
Maximum	6.23	4.57	3.21
Mean	4.38	4.40	3.06
Standard Deviation	0.48	0.12	0.07
Median	4.29	4.42	3.05
Nitrate-N [mg/L]			
No. of Analyses	90	8	8
No. of Detections	89	8	8
Minimum	ND	2.77	0.019
Maximum	8.10	3.42	0.02
Mean	3.92	3.12	0.02
Standard Deviation	0.919	0.263	0.001
Median	3.80	3.14	0.02
Sulfate [mg/L]			
No. of Analyses	90	8	8
No. of Detections	90	8	8
Minimum	6.7	6.9	12.5
Maximum	11.0	8.2	13.4
Mean	8.5	7.6	13.0
Standard Deviation	0.83	0.47	0.34
Median	8.5	7.6	13.0
Total Dissolved Solids [mg/L]			
No. of Analyses	90	8	8
No. of Detections	90	8	8
Minimum	54	117	121
Maximum	150	127	138
Mean	117	121	130
Standard Deviation	15.92	3.49	4.61
Median	120	120	130

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc3		
Well Location	MW-8		MW-36
Time Interval	Long	Short	Short
Arsenic, Dissolved [mg/L]			
No. of Analyses	90	8	8
No. of Detections	4	8	8
Minimum	ND	0.000	0.002
Maximum	0.002	0.000	0.002
Mean	0.001	0.000	0.002
Standard Deviation	2E-04	9E-06	8E-05
Median	0.001	0.0005	0.002
Arsenic, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	3	8	8
Minimum	ND	0.0005	0.0017
Maximum	0.0005	0.0005	0.0019
Mean	0.0005	0.0005	0.0017
Standard Deviation	0.0000	0.00001	0.0001
Median	0.0005	0.0005	0.0017
Calcium, Dissolved [mg/L]			
No. of Analyses	90	8	8
No. of Detections	90	8	8
Minimum	9.7	11.3	13.3
Maximum	15.9	12.2	14.6
Mean	11.9	11.7	14.1
Standard Deviation	1.20	0.36	0.45
Median	12.0	11.7	14.1
Calcium, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	18	8	8
Minimum	9.5	11.2	13.5
Maximum	12.5	12.4	14.9
Mean	11.2	11.8	14.2
Standard Deviation	0.75	0.38	0.51
Median	11.35	11.85	14.35
Iron, Dissolved [mg/L]			
No. of Analyses	90	8	8
No. of Detections	52	0	0
Minimum	ND	ND	ND
Maximum	0.17	ND	ND
Mean	0.03	ID	ID
Standard Deviation	0.03	ID	ID
Median	0.02	ID	ID
Iron, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	8	0	1
Minimum	ND	ND	ND
Maximum	0.07	ND	0.33
Mean	0.02	ID	ID
Standard Deviation	0.020	ID	ID
Median	0.005	ID	ID
Magnesium, Dissolved [mg/L]			
No. of Analyses	90	8	8
No. of Detections	90	8	8
Minimum	7.1	8.9	9.1
Maximum	11.9	9.6	10.0
Mean	9.3	9.4	9.7
Standard Deviation	0.78	0.22	0.32
Median	9.2	9.3	9.8
Magnesium, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	18	8	8
Minimum	8.3	9.2	9.4
Maximum	10.0	9.7	10.3
Mean	9.1	9.5	9.8
Standard Deviation	0.48	0.14	0.27
Median	9.0	9.5	9.8

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc3		
Well Location	MW-8		MW-36
Time Interval	Long	Short	Short
Manganese, Dissolved [mg/L]			
No. of Analyses	90	8	8
No. of Detections	4	0	8
Minimum	ND	ND	0.0009
Maximum	0.0029	ND	0.0018
Mean	0.0006	ID	0.0014
Standard Deviation	0.0004	ID	0.0003
Median	0.0005	ID	0.0014
Manganese, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	3	1	8
Minimum	ND	ND	0.003
Maximum	0.0022	0.0002	0.243
Mean	0.0006	ID	0.035
Standard Deviation	0.0005183	ID	0.084
Median	0.0005	ID	0.006
Potassium, Dissolved [mg/L]			
No. of Analyses	90	8	8
No. of Detections	90	8	8
Minimum	0.90	1.06	2.59
Maximum	1.50	1.17	2.90
Mean	1.09	1.13	2.74
Standard Deviation	0.11	0.04	0.12
Median	1.10	1.14	2.76
Potassium, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	18	8	8
Minimum	1.02	1.09	2.67
Maximum	1.29	1.15	2.85
Mean	1.15	1.13	2.76
Standard Deviation	0.07	0.02	0.06
Median	1.12	1.13	2.76
Sodium, Dissolved [mg/L]			
No. of Analyses	90	8	8
No. of Detections	90	8	8
Minimum	4.5	6.1	6.1
Maximum	7.3	6.7	6.9
Mean	6.1	6.4	6.5
Standard Deviation	0.47	0.22	0.30
Median	6.1	6.4	6.6
Sodium, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	18	8	8
Minimum	5.6	6.3	6.2
Maximum	6.6	6.6	6.7
Mean	6.1	6.4	6.5
Standard Deviation	0.27	0.11	0.18
Median	6.2	6.4	6.5

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc3		
Well Location	MW-8		MW-36
Time Interval	Long	Short	Short
1,1 Dichloroethane [ug/L]			
No. of Analyses	89	8	8
No. of Detections	0	0	0
Minimum	ND	ND	ND
Maximum	ND	ND	ND
Mean	ID	ID	ID
Standard Deviation	ID	ID	ID
Median	ID	ID	ID
1,2-Dichloropropane [ug/L]			
No. of Analyses	89	8	8
No. of Detections	0	0	0
Minimum	ND	ND	ND
Maximum	ND	ND	ND
Mean	ID	ID	ID
Standard Deviation	ID	ID	ID
Median	ID	ID	ID
Benzene [ug/L]			
No. of Analyses	89	8	8
No. of Detections	0	0	0
Minimum	ND	ND	ND
Maximum	ND	ND	ND
Mean	ID	ID	ID
Standard Deviation	ID	ID	ID
Median	ID	ID	ID
Chloroethane [ug/L]			
No. of Analyses	89	8	8
No. of Detections	0	0	0
Minimum	ND	ND	ND
Maximum	ND	ND	ND
Mean	ID	ID	ID
Standard Deviation	ID	ID	ID
Median	ID	ID	ID
cis-1,2-Dichloroethene [ug/L]			
No. of Analyses	89	8	8
No. of Detections	0	0	0
Minimum	ND	ND	ND
Maximum	ND	ND	ND
Mean	ID	ID	ID
Standard Deviation	ID	ID	ID
Median	ID	ID	ID
Dichlorodifluoromethane [ug/L]			
No. of Analyses	89	8	8
No. of Detections	11	0	0
Minimum	ND	ND	ND
Maximum	0.64	ND	ND
Mean	0.14	ID	ID
Standard Deviation	0.11	ID	ID
Median	0.10	ID	ID

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc3		
Well Location	MW-8		MW-36
Time Interval	Long	Short	Short
Toluene [ug/L]			
No. of Analyses	89	8	8
No. of Detections	1	0	0
Minimum	ND	ND	ND
Maximum	0.33	ND	ND
Mean	ID	ID	ID
Standard Deviation	ID	ID	ID
Median	ID	ID	ID
trans-1,2-Dichloroethene [ug/L]			
No. of Analyses	89	8	8
No. of Detections	0	0	0
Minimum	ND	ND	ND
Maximum	ND	ND	ND
Mean	ID	ID	ID
Standard Deviation	ID	ID	ID
Median	ID	ID	ID
Trichloroethene [ug/L]			
No. of Analyses	89	8	8
No. of Detections	0	0	0
Minimum	ND	ND	ND
Maximum	ND	ND	ND
Mean	ID	ID	ID
Standard Deviation	ID	ID	ID
Median	ID	ID	ID
Trichlorofluoromethane [ug/L]			
No. of Analyses	89	8	8
No. of Detections	20	0	0
Minimum	ND	ND	ND
Maximum	0.56	ND	ND
Mean	0.16	ID	ID
Standard Deviation	0.11	ID	ID
Median	0.10	ID	ID
Vinyl Chloride [ug/L]			
No. of Analyses	89	8	8
No. of Detections	0	0	0
Minimum	ND	ND	ND
Maximum	ND	ND	ND
Mean	ID	ID	ID
Standard Deviation	ID	ID	ID
Median	ID	ID	ID

NOTES:

Short	- eight most recent analyses in the last two years.
Long	- historical data up to the last eight samples, but no greater than 50 samples.
umhos/cm	- microSiemens per centimeter
mg/L	- milligram per liter
ug/L	- microgram per liter
ID	- insufficient Data (i.e. the number of detections is less than 3)
ND	- Not Detected (i.e. at laboratory MDL - Method Detection Limit)

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Unit D Aquifer										
Well Location	MW-7		MW-12		MW-19		MW-26		MW-29		MW-34
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
pH, Field [standard units]											
No. of Analyses	93	8	93	8	93	8	66	8	62	8	8
No. of Detections	93	8	93	8	93	8	66	8	62	8	8
Minimum	6.76	7.13	6.80	6.59	6.84	7.04	7.44	7.34	7.02	6.65	6.64
Maximum	8.38	7.64	8.37	7.38	8.54	7.70	9.20	8.29	7.80	7.62	7.10
Mean	7.71	7.40	7.47	7.02	7.64	7.42	8.12	7.75	7.53	7.32	6.89
Standard Deviation	0.291	0.210	0.255	0.285	0.256	0.206	0.255	0.333	0.162	0.307	0.161
Median	7.78	7.46	7.48	6.96	7.65	7.44	8.14	7.79	7.57	7.37	6.90
Specific Conductance, Field [umhos/cm]											
No. of Analyses	93	8	93	8	93	8	66	8	62	8	8
No. of Detections	93	8	93	8	93	8	66	8	62	8	8
Minimum	100	184	115	165	100	215	136	185	165	236	192
Maximum	194	189	185	171	230	221	200	193	265	248	201
Mean	160	188	140	168	195	219	171	190	215	242	198
Standard Deviation	15.7	1.9	12.7	2.0	24.0	2.3	14.0	3.1	21.5	3.8	2.6
Median	160	188	140	168	200	219	170	191	210	243	198
Alkalinity [mg/L]											
No. of Analyses	90	8	90	8	91	8	62	8	62	8	8
No. of Detections	90	8	90	8	91	8	62	8	62	8	8
Minimum	58	77	30	63	64	84	67	74	88	99	67
Maximum	100	79	66	66	110	87	86	78	140	103	71
Mean	74	78	58	65	84	86	74	75	99	102	69
Standard Deviation	5.0	0.8	4.3	0.9	12.4	1.0	3.5	1.1	7.4	1.2	1.1
Median	73	78	58	65	83	86	75	75	100	102	69
Ammonia-N [mg/L]											
No. of Analyses	90	8	89	8	91	8	62	8	62	8	8
No. of Detections	90	8	7	0	76	8	62	8	6	7	0
Minimum	0.073	0.219	ND	ND	ND	0.0267	0.03	0.179	ND	ND	ND
Maximum	0.320	0.261	0.060	ND	0.200	0.034	0.300	0.298	0.030	0.004	ND
Mean	0.205	0.239	0.009	ID	0.047	0.031	0.221	0.245	0.009	0.002	ID
Standard Deviation	0.052	0.014	0.008	ID	0.034	0.002	0.046	0.032	0.007	0.001	ID
Median	0.201	0.239	0.005	ID	0.037	0.030	0.226	0.248	0.005	0.002	ID
Chloride [mg/L]											
No. of Analyses	90	8	90	8	91	8	62	8	62	8	8
No. of Detections	90	8	90	8	91	8	62	8	62	8	8
Minimum	2.70	3.28	2.60	3.08	3.70	4.55	3.00	3.69	3.39	3.48	4.92
Maximum	5.00	3.41	5.00	3.21	37.60	4.82	9.11	3.93	5.60	3.78	5.20
Mean	3.19	3.36	3.08	3.17	5.52	4.64	3.95	3.77	3.90	3.61	5.03
Standard Deviation	0.33	0.05	0.37	0.04	3.46	0.09	0.83	0.07	0.32	0.09	0.09
Median	3.07	3.37	3.00	3.18	5.00	4.61	3.85	3.76	3.96	3.61	5.02
Nitrate-N [mg/L]											
No. of Analyses	90	8	90	8	91	8	62	8	62	8	8
No. of Detections	35	7	90	8	34	1	27	5	1	0	8
Minimum	ND	ND	0.55	0.70	ND	ND	ND	ND	ND	ND	1.93
Maximum	0.34	0.02	1.90	0.74	0.81	0.01	0.23	0.02	0.08	ND	2.47
Mean	0.02	0.01	0.74	0.72	0.02	ID	0.03	0.01	ID	ID	2.25
Standard Deviation	0.039	0.005	0.147	0.017	0.085	ID	0.031	0.005	ID	ID	0.192
Median	0.02	0.02	0.74	0.72	0.01	ID	0.03	0.01	ID	ID	2.24
Sulfate [mg/L]											
No. of Analyses	90	8	90	8	91	8	62	8	62	8	8
No. of Detections	90	8	90	8	91	8	62	8	62	8	8
Minimum	8.7	10.5	9.0	10.5	12.0	16.3	11.0	13.0	14.9	14.9	12.4
Maximum	14.0	11.3	12.0	11.1	24.0	17.3	14.2	13.9	18.0	16.2	13.7
Mean	10.5	10.9	10.2	10.7	18.9	16.9	13.0	13.4	16.5	15.6	13.1
Standard Deviation	0.66	0.26	0.53	0.21	2.08	0.34	0.68	0.28	0.88	0.50	0.40
Median	10.3	10.8	10.0	10.6	18.4	17.0	13.0	13.4	16.5	15.6	13.1
Total Dissolved Solids [mg/L]											
No. of Analyses	90	8	90	8	91	8	62	8	62	8	8
No. of Detections	90	8	90	8	91	8	62	8	62	8	8
Minimum	63	131	53	116	80	141	90	135	90	147	133
Maximum	160	136	150	124	170	147	450	142	170	160	144
Mean	115	133	101	119	133	143	135	139	145	154	138
Standard Deviation	15.67	1.58	15.40	2.66	19.92	1.85	44.85	2.51	14.80	5.37	3.59
Median	120	134	100	119	130	144	130	140	149	153	138

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Unit D Aquifer										
Well Location	MW-7		MW-12		MW-19		MW-26		MW-29		MW-34
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
Arsenic, Dissolved [mg/L]											
No. of Analyses	90	8	90	8	91	8	62	8	62	8	8
No. of Detections	90	8	90	8	91	8	62	8	62	8	8
Minimum	0.002	0.005	0.002	0.002	0.001	0.001	0.002	0.003	0.004	0.004	0.001
Maximum	0.022	0.005	0.006	0.002	0.027	0.001	0.003	0.003	0.008	0.004	0.001
Mean	0.007	0.005	0.002	0.002	0.004	0.001	0.003	0.003	0.005	0.004	0.001
Standard Deviation	3E-03	2E-04	4E-04	3E-05	4E-03	3E-05	4E-04	6E-05	7E-04	9E-05	3E-05
Median	0.006	0.005	0.002	0.002	0.002	0.001	0.003	0.003	0.005	0.004	0.001
Arsenic, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	19	8	18	8	19	8	19	8	19	8	8
Minimum	0.0046	0.0050	0.0019	0.0020	0.0011	0.0012	0.0029	0.0035	0.0035	0.0047	0.0013
Maximum	0.0059	0.0053	0.0023	0.0021	0.0019	0.0021	0.0108	0.0062	0.0131	0.0155	0.0015
Mean	0.0051	0.0051	0.0020	0.0021	0.0014	0.0015	0.0042	0.0049	0.0061	0.0097	0.0013
Standard Deviation	0.0003	0.0001	0.0001	0.0000	0.0002	0.0003	0.0020	0.0008	0.0027	0.0043	5.22E-05
Median	0.0051	0.0051	0.0020	0.0021	0.0013	0.0014	0.0034	0.0049	0.0053	0.0084	0.0013
Calcium, Dissolved [mg/L]											
No. of Analyses	90	8	90	8	91	8	62	8	62	8	8
No. of Detections	90	8	90	8	91	8	62	8	62	8	8
Minimum	9.2	15.1	7.7	11.6	9.2	14.6	11.2	16.6	13.6	19.2	13.0
Maximum	18.0	16.8	13.0	12.3	19.6	15.7	18.3	18.7	23.0	21.2	14.6
Mean	13.1	16.0	9.8	12.0	14.1	15.4	15.7	17.7	18.4	20.7	14.0
Standard Deviation	1.55	0.54	1.08	0.25	1.97	0.35	1.25	0.60	1.40	0.65	0.52
Median	13.0	16.1	9.8	12.1	14.0	15.5	15.8	17.9	18.3	20.9	14.1
Calcium, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	19	8	18	8	19	8	19	8	19	8	8
Minimum	12.2	15.4	8.0	11.8	13.5	14.7	14.9	17.6	17.6	20.0	13.4
Maximum	16.0	16.8	11.5	12.8	16.8	16.1	19.1	18.7	22.2	22.0	14.9
Mean	14.3	16.1	10.3	12.2	14.9	15.5	16.8	18.2	19.5	20.8	14.1
Standard Deviation	1.02	0.52	0.84	0.34	0.92	0.48	1.31	0.39	1.21	0.67	0.52
Median	14.30	16.05	10.25	12.25	14.80	15.55	16.70	18.15	19.30	20.75	14.05
Iron, Dissolved [mg/L]											
No. of Analyses	90	8	90	8	91	8	62	8	62	8	8
No. of Detections	64	5	51	0	89	8	62	8	62	8	0
Minimum	ND	ND	ND	ND	ND	0.0338	0.033	0.0601	0.29	0.808	ND
Maximum	0.22	0.02	0.42	ND	0.19	0.10	0.23	0.17	0.98	0.93	ND
Mean	0.04	0.01	0.04	ID	0.06	0.05	0.10	0.11	0.67	0.85	ID
Standard Deviation	0.04	0.00	0.06	ID	0.04	0.02	0.04	0.03	0.12	0.04	ID
Median	0.04	0.01	0.01	ID	0.05	0.04	0.10	0.10	0.71	0.84	ID
Iron, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	18	8	12	4	19	8	19	8	19	8	3
Minimum	ND	0.03	ND	ND	0.06	0.09	0.14	0.95	0.73	1.19	ND
Maximum	0.06	0.10	0.94	0.03	0.72	1.09	10.50	5.24	4.24	5.85	0.47
Mean	0.02	0.06	0.10	0.01	0.24	0.43	2.35	3.01	1.60	3.39	0.07
Standard Deviation	0.012	0.025	0.224	0.008	0.19	0.31	3.40	1.28	1.00	1.91	0.163
Median	0.022	0.055	0.019	0.008	0.17	0.36	1.28	2.98	1.24	2.97	0.005
Magnesium, Dissolved [mg/L]											
No. of Analyses	90	8	90	8	91	8	62	8	62	8	8
No. of Detections	90	8	90	8	91	8	62	8	62	8	8
Minimum	6.3	9.5	6.2	9.5	8.4	13.5	5.4	7.3	10.0	14.1	11.8
Maximum	11.0	10.6	10.0	10.1	17.1	14.5	7.9	8.1	16.2	15.6	13.0
Mean	8.1	10.0	7.8	9.8	12.7	14.2	6.6	7.7	12.9	14.9	12.5
Standard Deviation	0.78	0.34	0.84	0.25	1.92	0.33	0.57	0.29	1.29	0.51	0.44
Median	8.2	10.0	7.8	9.8	12.6	14.2	6.6	7.7	13.0	15.0	12.6
Magnesium, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	19	8	18	8	19	8	19	8	19	8	8
Minimum	7.8	9.8	7.9	9.6	12.2	13.8	6.1	7.5	11.9	14.3	12.0
Maximum	10.5	11.1	9.6	10.7	16.0	15.0	9.6	8.2	15.9	15.6	13.4
Mean	8.8	10.3	8.7	10.2	14.2	14.4	7.3	7.8	13.9	15.0	12.6
Standard Deviation	0.75	0.46	0.58	0.37	1.12	0.41	0.87	0.24	0.95	0.44	0.43
Median	8.7	10.2	8.7	10.2	14.2	14.6	7.1	7.8	14.0	15.1	12.6

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Unit D Aquifer										
Well Location	MW-7		MW-12		MW-19		MW-26		MW-29		MW-34
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
Manganese, Dissolved [mg/L]											
No. of Analyses	90	8	90	8	90	8	62	8	62	8	8
No. of Detections	88	8	4	0	89	8	62	8	62	8	8
Minimum	ND	0.1260	ND	ND	ND	0.44	0.04	0.06	0.07	0.09	0.00014
Maximum	0.26	0.18	0.140	ND	1.35	0.51	0.08	0.07	0.12	0.12	0.0003
Mean	0.14	0.16	0.002	ID	0.43	0.49	0.06	0.07	0.09	0.10	0.0002
Standard Deviation	0.03	0.02	0.015	ID	0.20	0.02	0.01	0.002	0.01	0.01	0.0001
Median	0.14	0.16	0.001	ID	0.47	0.50	0.06	0.07	0.09	0.10	0.0002
Manganese, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	19	8	7	7	19	8	19	8	19	8	8
Minimum	0.15	0.18	ND	ND	0.44	0.52	0.05	0.08	0.08	0.09	0.0002
Maximum	0.26	0.56	0.0151	0.0004	0.72	0.86	0.20	0.11	0.21	0.17	0.0156
Mean	0.18	0.29	0.0018	0.0002	0.53	0.60	0.09	0.09	0.11	0.12	0.0023
Standard Deviation	0.03	0.13	0.0035	0.0001	0.07	0.12	0.04	0.01	0.03	0.03	0.0054
Median	0.18	0.24	0.0005	0.0002	0.52	0.56	0.07	0.09	0.10	0.12	0.0003
Potassium, Dissolved [mg/L]											
No. of Analyses	90	8	90	8	91	8	62	8	62	8	8
No. of Detections	90	8	90	8	91	8	62	8	62	8	8
Minimum	1.60	2.63	1.40	1.82	1.70	2.37	2.10	2.92	1.55	2.11	1.48
Maximum	3.60	2.95	2.30	1.93	3.30	2.62	3.30	3.29	2.50	2.34	1.68
Mean	2.54	2.77	1.72	1.88	2.41	2.48	2.84	3.07	2.04	2.25	1.57
Standard Deviation	0.28	0.11	0.17	0.04	0.24	0.09	0.23	0.12	0.18	0.08	0.07
Median	2.51	2.78	1.74	1.89	2.43	2.48	2.90	3.04	2.06	2.27	1.56
Potassium, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	19	8	18	8	19	8	19	8	19	8	8
Minimum	2.12	2.71	1.67	1.83	2.29	2.37	2.76	3.05	2.02	2.15	1.56
Maximum	2.95	2.87	2.08	1.95	2.86	2.64	3.37	3.20	2.36	2.34	1.63
Mean	2.64	2.80	1.80	1.92	2.50	2.50	3.07	3.10	2.18	2.24	1.59
Standard Deviation	0.16	0.05	0.11	0.04	0.13	0.09	0.19	0.05	0.11	0.07	0.03
Median	2.66	2.80	1.78	1.93	2.47	2.50	3.06	3.08	2.15	2.25	1.58
Sodium, Dissolved [mg/L]											
No. of Analyses	90	8	90	8	90	8	62	8	62	8	8
No. of Detections	90	8	90	8	90	8	62	8	62	8	8
Minimum	4.8	5.9	4.3	5.7	4.8	6.6	6.5	8.6	5.1	6.4	6.6
Maximum	7.5	6.6	10.0	6.4	7.5	7.3	9.5	9.4	7.6	7.1	7.3
Mean	5.9	6.3	5.4	6.1	6.3	7.0	8.0	8.9	6.1	6.8	6.9
Standard Deviation	0.55	0.23	0.94	0.20	0.56	0.24	0.76	0.33	0.50	0.27	0.28
Median	5.8	6.4	5.3	6.1	6.3	6.9	8.0	8.7	6.1	6.8	6.9
Sodium, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	19	8	18	8	19	8	19	8	19	8	8
Minimum	5.4	6.1	5.0	6.1	6.1	6.8	7.1	8.5	5.3	6.6	6.5
Maximum	6.6	6.8	6.7	6.7	8.0	7.2	10.1	9.3	7.0	7.1	7.3
Mean	5.9	6.4	5.7	6.4	6.8	7.1	8.5	8.9	6.4	6.9	6.9
Standard Deviation	0.42	0.26	0.39	0.21	0.51	0.17	0.89	0.24	0.41	0.19	0.26
Median	5.8	6.3	5.7	6.3	6.8	7.1	8.5	8.9	6.5	6.9	6.8

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Unit D Aquifer										
Well Location	MW-7		MW-12		MW-19		MW-26		MW-29		MW-34
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
1,1 Dichloroethane [ug/L]											
No. of Analyses	90	8	91	8	91	8	62	8	62	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
1,2-Dichloropropane [ug/L]											
No. of Analyses	90	8	91	8	91	8	62	8	62	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Benzene [ug/L]											
No. of Analyses	90	8	91	8	91	8	62	8	62	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Chloroethane [ug/L]											
No. of Analyses	90	8	91	8	91	8	62	8	62	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
cis-1,2-Dichloroethene [ug/L]											
No. of Analyses	90	8	91	8	91	8	62	8	62	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Dichlorodifluoromethane [ug/L]											
No. of Analyses	90	8	91	8	91	8	62	8	62	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2019

	Unit D Aquifer										
Well Location	MW-7		MW-12		MW-19		MW-26		MW-29		MW-34
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
Toluene [ug/L]											
No. of Analyses	90	8	91	8	91	8	62	8	62	8	8
No. of Detections	0	0	0	0	1	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	0.95	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
trans-1,2-Dichloroethene [ug/L]											
No. of Analyses	90	8	91	8	91	8	62	8	62	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Trichloroethene [ug/L]											
No. of Analyses	90	8	91	8	91	8	62	8	62	8	8
No. of Detections	0	0	1	0	1	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	0.35	ND	0.28	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Trichlorofluoromethane [ug/L]											
No. of Analyses	90	8	91	8	91	8	62	8	62	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Vinyl Chloride [ug/L]											
No. of Analyses	90	8	91	8	91	8	62	8	62	8	8
No. of Detections	0	0	0	0	0	1	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	0.0	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID

NOTES:

Short - eight most recent analyses in the last two years.
Long - historical data up to the last eight samples, but no greater than 50 samples.
umhos/cm - microSiemens per centimeter
mg/L - milligram per liter
ug/L - microgram per liter
ID - insufficient Data (i.e. the number of detections is less than 3)
ND - Not Detected (i.e. at laboratory MDL - Method Detection Limit)

Table 3-2
Summary of Trend Results for Groundwater Well Samples
Summary of Trend Analysis
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
pH, Field [standard units]	D	--	D	--	--	--
Specific Conductance, Field [umhos/cm]	D	D	I	--	--	--
Alkalinity [mg/L]	D	D	--	--	--	D
Ammonia-N [mg/L]	--[a]	D	--[a]	--	D	--
Chloride [mg/L]	D	--	I	--	--	D
Nitrate-N [mg/L]	I	I	I	--	--	--
Sulfate [mg/L]	D	--	D	--	D	--
Total Dissolved Solids [mg/L]	--	D	I	--	--	--
Arsenic, Dissolved [mg/L]	D	D	--	--	--	--
Arsenic, Total [mg/L]	--[a]	--	D	--	--	--
Calcium, Dissolved [mg/L]	D	D	--	--	--	--
Calcium, Total [mg/L]	--	--	I	--	--	--
Iron, Dissolved [mg/L]	D	D	D	--	--	--
Iron, Total [mg/L]	--	--	--	--	D	--
Magnesium, Dissolved [mg/L]	--	D	I	D	I	D
Magnesium, Total [mg/L]	--	D	--	--	--	--
Manganese, Dissolved [mg/L]	D	D	--[a]	--	I	--
Manganese, Total [mg/L]	--	--	--[a]	--	--	--
Potassium, Dissolved [mg/L]	D	D	I	--	I	--
Potassium, Total [mg/L]	D	D	--	--	D	--
Sodium, Dissolved [mg/L]	--	D	I	--	--	D
Sodium, Total [mg/L]	D	D	--	--	--	--
1,1 Dichloroethane [ug/L]	--	D	--	--	--	--
1,2-Dichloropropane [ug/L]	--	--	--	--	--	--
Benzene [ug/L]	--	--	--	--	--	--
Chloroethane [ug/L]	--	--[a]	--	--	--	--
cis-1,2-Dichloroethene [ug/L]	--	--	--	--	--	--
Dichlorodifluoromethane [ug/L]	--	D	--	--	--	--
Toluene [ug/L]	--	--	--	--	--	--
trans-1,2-Dichloroethene [ug/L]	--	D	--	--	--	--
Trichloroethene [ug/L]	--	--	--	--	--	--
Trichlorofluoromethane [ug/L]	--	D	--	--	--	--
Vinyl Chloride [ug/L]	--	D	--	--	D	--

NOTES:

Short	- eight most recent analyses in the last two years.
Long	- historical data up to the last eight samples, but no greater than 50 samples.
D	- decreasing trend
I	- increasing trend
--	- no detectable trend or too few data point to determine significance
NaN	- too few data points to calculate probability
Probability	- probability null hypothesis (i.e. 'No Trend') is true (aka p-value)
Significance	- trend is significant at 0.05
umhos/cm	- microSiemens per centimeter
mg/L	- milligram per liter
ug/L	- microgram per liter
a	Trend analysis resulted in artificial decreasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.
b	Trend analysis resulted in artificial increasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.

Table 3-2
Summary of Trend Results for Groundwater Well Samples
Summary of Trend Analysis
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc2									
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33	MW-35
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Short	Short
pH, Field [standard units]	--	--	D	--	D	--	I	--	--	--
Specific Conductance, Field [umhos/cm]	D	--	I	D	I	D	D	I	D	--
Alkalinity [mg/L]	D	--	I	D	I	D	D	I	--	--
Ammonia-N [mg/L]	--[a]	--	D	--	I	--	--	--	--	--
Chloride [mg/L]	--	--	I	--	D	--	D	I	D	--
Nitrate-N [mg/L]	--	--	I	--	--[a]	--	I	I	--	--
Sulfate [mg/L]	I	--	--	D	I	--	I	I	--	I
Total Dissolved Solids [mg/L]	D	--	I	D	I	--	D	I	D	--
Arsenic, Dissolved [mg/L]	--	--	--	--	D	I	D	--	--	D
Arsenic, Total [mg/L]	--	--	--	--	I	--	I	D	--	D
Calcium, Dissolved [mg/L]	D	--	--	--	I	--	D	I	--	--
Calcium, Total [mg/L]	D	--	I	--	--	--	D	I	--	--
Iron, Dissolved [mg/L]	D	--	D	--	--	D	D	--	--	--
Iron, Total [mg/L]	--	--	--	--	I	--	I	D	--	--
Magnesium, Dissolved [mg/L]	D	--	I	D	I	D	D	I	--	--
Magnesium, Total [mg/L]	D	--	--	D	I	D	D	I	D	--
Manganese, Dissolved [mg/L]	--	--	--[a]	--	I	D	--	--	--	D
Manganese, Total [mg/L]	--	--	--	--	--	D	I	--	--	--
Potassium, Dissolved [mg/L]	D	--	I	--	--	--	D	I	--	--
Potassium, Total [mg/L]	D	--	--	--	--	--	D	I	--	--
Sodium, Dissolved [mg/L]	D	--	I	--	--	--	--	--	--	--
Sodium, Total [mg/L]	D	--	--	D	I	--	--	--	--	--
1,1 Dichloroethane [ug/L]	D	--	--	--	--	--	--	--	--	I
1,2-Dichloropropane [ug/L]	--	--	--	--	--	--	--	--	--	--
Benzene [ug/L]	--	--	--	--	--	--	--	--	--	--
Chloroethane [ug/L]	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene [ug/L]	--[b]	--	--	--	--	--	--	D	--	I
Dichlorodifluoromethane [ug/L]	D	--	--	--	I	--	D	I	I	I
Toluene [ug/L]	--	--	--	--	D	--	--	--	--	D
trans-1,2-Dichloroethene [ug/L]	--	--	--	--	--	--	--[b]	D	--	--
Trichloroethene [ug/L]	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane [ug/L]	D	I	--	--	--	--	D	I	--	--
Vinyl Chloride [ug/L]	D	--	--	--	--	--	D	I	--	I

NOTES:

Short	- eight most recent analyses in the last two years.
Long	- historical data up to the last eight samples, but no greater than 50 samples.
D	- decreasing trend
I	- increasing trend
--	- no detectable trend or too few data point to determine significance
NaN	- too few data points to calculate probability
Probability	- probability null hypothesis (i.e. 'No Trend') is true (aka p-value)
Significance	- trend is significant at 0.05
umhos/cm	- microSiemens per centimeter
mg/L	- milligram per liter
ug/L	- microgram per liter
[a]	Trend analysis resulted in artificial decreasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.
[b]	Trend analysis resulted in artificial increasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.

Table 3-2
Summary of Trend Results for Groundwater Well Samples
Summary of Trend Analysis
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc3		
Well Location	MW-8		MW-36
Time Interval	Long	Short	Short
pH, Field [standard units]	--	--	--
Specific Conductance, Field [umhos/cm]	--	I	--
Alkalinity [mg/L]	D	I	--
Ammonia-N [mg/L]	D	--	--
Chloride [mg/L]	I	--	--
Nitrate-N [mg/L]	--	D	--
Sulfate [mg/L]	D	I	--
Total Dissolved Solids [mg/L]	I	--	--
Arsenic, Dissolved [mg/L]	--[a]	--	--
Arsenic, Total [mg/L]	--[a]	--	--
Calcium, Dissolved [mg/L]	D	--	--
Calcium, Total [mg/L]	I	--	--
Iron, Dissolved [mg/L]	D	--	--
Iron, Total [mg/L]	--	--	--
Magnesium, Dissolved [mg/L]	--	--	--
Magnesium, Total [mg/L]	--	--	--
Manganese, Dissolved [mg/L]	--[a]	--	--
Manganese, Total [mg/L]	--	--	--
Potassium, Dissolved [mg/L]	--	--	--
Potassium, Total [mg/L]	--	--	--
Sodium, Dissolved [mg/L]	--	--	--
Sodium, Total [mg/L]	--	--	--
1,1 Dichloroethane [ug/L]	--	--	--
1,2-Dichloropropane [ug/L]	--	--	--
Benzene [ug/L]	--	--	--
Chloroethane [ug/L]	--	--	--
cis-1,2-Dichloroethene [ug/L]	--	--	--
Dichlorodifluoromethane [ug/L]	--	--	--
Toluene [ug/L]	D	--	--
trans-1,2-Dichloroethene [ug/L]	--	--	--
Trichloroethene [ug/L]	--	--	--
Trichlorofluoromethane [ug/L]	--	--	--
Vinyl Chloride [ug/L]	--	--	--

NOTES:

Short	- eight most recent analyses in the last two years.
Long	- historical data up to the last eight samples, but no greater than 50 samples.
D	- decreasing trend
I	- increasing trend
--	- no detectable trend or too few data point to determine significance
NaN	- too few data points to calculate probability
Probability	- probability null hypothesis (i.e. 'No Trend') is true (aka p-value)
Significance	- trend is significant at 0.05
umhos/cm	- microSiemens per centimeter
mg/L	- milligram per liter
ug/L	- microgram per liter
a	Trend analysis resulted in artificial decreasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.
b	Trend analysis resulted in artificial increasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.

Table 3-2
Summary of Trend Results for Groundwater Well Samples
Summary of Trend Analysis
Vashon Island Closed Landfill
1986 through 2019

	Unit D Aquifer										
Well Location	MW-7		MW-12		MW-19		MW-26		MW-29		MW-34
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
pH, Field [standard units]	D	--	--	--	D	--	D	--	D	--	--
Specific Conductance, Field [umhos/cm]	I	--	I	--	I	--	--	--	I	--	--
Alkalinity [mg/L]	I	--	I	--	--	--	--	--	I	--	--
Ammonia-N [mg/L]	I	--	D	--	--	--	I	--	--[a]	--	--
Chloride [mg/L]	I	--	I	--	D	--	--	--	D	--	--
Nitrate-N [mg/L]	D	--	--	--	D	--	D	--	D	--	D
Sulfate [mg/L]	I	--	I	--	D	--	--	--	D	--	--
Total Dissolved Solids [mg/L]	I	--	I	--	--	--	I	--	I	--	--
Arsenic, Dissolved [mg/L]	D	--	--	--	D	--	--	--	D	--	--
Arsenic, Total [mg/L]	D	--	--	--	D	--	I	--	D	--	--
Calcium, Dissolved [mg/L]	I	--	I	--	--	--	--	--	I	--	--
Calcium, Total [mg/L]	I	--	--	--	--	--	--	--	--	--	--
Iron, Dissolved [mg/L]	D	--	D	--	D	--	--	I	--	I	--
Iron, Total [mg/L]	I	I	I	--	--	--	I	--	--	--	--
Magnesium, Dissolved [mg/L]	I	--	I	--	--	--	I	--	I	--	--
Magnesium, Total [mg/L]	--	--	--	--	--	--	--	--	--	--	--
Manganese, Dissolved [mg/L]	--	D	--	--	--	--	--	--	--	--	--
Manganese, Total [mg/L]	--	--	--	--	--	--	I	--	--	--	--
Potassium, Dissolved [mg/L]	I	--	I	--	--	--	I	--	I	--	--
Potassium, Total [mg/L]	I	--	--	--	--	--	--	--	--	--	D
Sodium, Dissolved [mg/L]	--	--	I	--	--	--	--	--	I	--	--
Sodium, Total [mg/L]	--	--	--	--	--	--	D	--	--	--	--
1,1 Dichloroethane [ug/L]	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane [ug/L]	--	--	--	--	--	--	--	--	--	--	--
Benzene [ug/L]	--	--	--	--	--	--	--	--	--	--	--
Chloroethane [ug/L]	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene [ug/L]	--	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane [ug/L]	--	--	--	--	--	--	--	--	--	--	--
Toluene [ug/L]	--	--	--	--	D	--	--	--	--	--	--
trans-1,2-Dichloroethene [ug/L]	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene [ug/L]	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane [ug/L]	--	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride [ug/L]	--	--	--	--	--	--	--	--	--	--	--

NOTES:

Short	- eight most recent analyses in the last two years.
Long	- historical data up to the last eight samples, but no greater than 50 samples.
D	- decreasing trend
I	- increasing trend
--	- no detectable trend or too few data point to determine significance
NaN	- too few data points to calculate probability
Probability	- probability null hypothesis (i.e. 'No Trend') is true (aka p-value)
Significance	- trend is significant at 0.05
umhos/cm	- microSiemens per centimeter
mg/L	- milligram per liter
ug/L	- microgram per liter
a	Trend analysis resulted in artificial decreasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.
b	Trend analysis resulted in artificial increasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
pH, Field [standard units]						
No. of Analyses	30	47	50	8	50	8
No. of Detections	30	47	50	8	50	8
Trend	D	--	D	--	--	--
S-value	-163	128	-346	4	52	2
Probability	0.003838	0.243877	0.003862	0.710523	0.669415	0.901539
Significant	YES	NO	YES	NO	NO	NO
Specific Conductance, Field [umhos/cm]						
No. of Analyses	30	47	50	8	50	8
No. of Detections	30	47	50	8	50	8
Trend	D	D	I	--	--	--
S-value	-204	-674	304	-2	-49	-16
Probability	0.000272	6.72E-10	0.009871	0.901539	0.686354	0.063487
Significant	YES	YES	YES	NO	NO	NO
Alkalinity [mg/L]						
No. of Analyses	23	26	50	8	50	8
No. of Detections	23	26	50	8	50	8
Trend	D	D	--	--	--	D
S-value	-147	-247	173	-15	0	-22
Probability	0.000111	5.8E-08	0.149134	0.080905	1	0.009375
Significant	YES	YES	NO	NO	NO	YES
Ammonia-N [mg/L]						
No. of Analyses	29	50	50	8	50	8
No. of Detections	10	23	7	2	1	1
Trend	--[a]	D	--[a]	--	D	--
S-value	-249	-575	-646	-7	-635	5
Probability	1.81E-06	1.26E-06	4E-09	0.32394	3.12E-10	0.382733
Significant	YES	YES	YES	--	YES	--
Chloride [mg/L]						
No. of Analyses	30	50	50	8	50	8
No. of Detections	30	48	49	8	50	8
Trend	D	--	I	--	--	D
S-value	-276	-68	440	2	-64	-22
Probability	7.93E-07	0.57381	0.000234	0.900004	0.597626	0.008321
Significant	YES	NO	YES	NO	NO	YES
Nitrate-N [mg/L]						
No. of Analyses	30	50	50	8	50	8
No. of Detections	30	33	50	8	49	8
Trend	I	I	I	--	--	--
S-value	152	574	769	10	-14	16
Probability	0.006931	1.41E-06	1.27E-10	0.26551	0.913403	0.063487
Significant	YES	YES	YES	NO	NO	NO
Sulfate [mg/L]						
No. of Analyses	30	50	50	8	50	8
No. of Detections	30	50	50	8	50	8
Trend	D	--	D	--	D	--
S-value	-287	-124	-521	-4	-784	-13
Probability	3.12E-07	0.303283	1.3E-05	0.710523	4.77E-11	0.134625
Significant	YES	NO	YES	NO	YES	NO
Total Dissolved Solids [mg/L]						
No. of Analyses	25	44	50	8	50	8
No. of Detections	25	44	50	8	50	8
Trend	--	D	I	--	--	--
S-value	-83	-619	339	-9	-81	-8
Probability	0.055279	3.99E-10	0.004647	0.310926	0.502547	0.368803
Significant	NO	YES	YES	NO	NO	NO

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

		Channel Cc1					
Well Location		MW-3	MW-4	MW-10		MW-13	
Time Interval		Long	Long	Long	Short	Long	Short
Arsenic, Dissolved [mg/L]							
	No. of Analyses	30	50	50	8	50	8
	No. of Detections	1	16	50	8	50	8
	Trend	D	D	--	--	--	--
	S-value	-229	-581	-111	-11	231	6
	Probability	9.65E-07	8.2E-08	0.356322	0.212486	0.053983	0.536187
	Significant	YES	YES	NO	NO	NO	NO
Arsenic, Total [mg/L]							
	No. of Analyses	8	11	17	8	20	8
	No. of Detections	5	10	17	8	20	8
	Trend	--[a]	--	D	--	--	--
	S-value	-19	-23	-57	-9	30	2
	Probability	0.021896	0.084857	0.02074	0.308325	0.345066	0.901539
	Significant	YES	NO	YES	NO	NO	NO
Calcium, Dissolved [mg/L]							
	No. of Analyses	24	36	50	8	50	8
	No. of Detections	24	36	50	8	50	8
	Trend	D	D	--	--	--	--
	S-value	-106	-449	150	-7	80	-16
	Probability	0.009059	1.04E-09	0.212476	0.454427	0.508136	0.059451
	Significant	YES	YES	NO	NO	NO	NO
Calcium, Total [mg/L]							
	No. of Analyses	8	11	17	8	20	8
	No. of Detections	8	11	17	8	20	8
	Trend	--	--	I	--	--	--
	S-value	-12	13	61	-6	-12	-9
	Probability	0.173546	0.343284	0.013374	0.536187	0.720895	0.318567
	Significant	NO	NO	YES	NO	NO	NO
Iron, Dissolved [mg/L]							
	No. of Analyses	30	50	50	8	50	8
	No. of Detections	21	33	18	0	25	4
	Trend	D	D	D	--	--	--
	S-value	-239	-251	-573	0	-142	0
	Probability	1.99E-05	0.035273	2.34E-08	NaN	0.210248	1
	Significant	YES	YES	YES	--	NO	NO
Iron, Total [mg/L]							
	No. of Analyses	8	11	17	8	20	8
	No. of Detections	8	10	15	2	20	6
	Trend	--	--	--	--	D	--
	S-value	-2	-9	-13	-1	-84	-9
	Probability	0.901539	0.533417	0.617583	1	0.007084	0.318567
	Significant	NO	NO	NO	--	YES	NO
Magnesium, Dissolved [mg/L]							
	No. of Analyses	24	36	50	8	50	8
	No. of Detections	24	36	50	8	50	8
	Trend	--	D	I	D	I	D
	S-value	22	-473	302	-18	258	-21
	Probability	0.601396	1.27E-10	0.011786	0.035448	0.030482	0.012649
	Significant	NO	YES	YES	YES	YES	YES
Magnesium, Total [mg/L]							
	No. of Analyses	8	11	17	8	20	8
	No. of Detections	8	11	17	8	20	8
	Trend	--	D	--	--	--	--
	S-value	-5	-30	45	-14	-30	-13
	Probability	0.617989	0.023542	0.069043	0.107762	0.346256	0.134625
	Significant	NO	YES	NO	NO	NO	NO

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
Manganese, Dissolved [mg/L]						
No. of Analyses	30	50	50	8	50	8
No. of Detections	23	43	7	2	20	8
Trend	D	D	--[a]	--	I	--
S-value	-262	-302	-252	5	218	-8
Probability	2.72E-06	0.01175	0.002553	0.510798	0.042553	0.386476
Significant	YES	YES	YES	--	YES	NO
Manganese, Total [mg/L]						
No. of Analyses	8	11	17	8	20	8
No. of Detections	8	11	8	8	17	8
Trend	--	--	--[a]	--	--	--
S-value	6	5	-76	-2	-33	-6
Probability	0.536187	0.755497	0.000771	0.901539	0.298235	0.536187
Significant	NO	NO	YES	NO	NO	NO
Potassium, Dissolved [mg/L]						
No. of Analyses	24	36	50	8	50	8
No. of Detections	24	36	50	8	50	8
Trend	D	D	I	--	I	--
S-value	-206	-488	290	-8	411	-9
Probability	3.56E-07	2.71E-11	0.015363	0.37908	0.000556	0.318567
Significant	YES	YES	YES	NO	YES	NO
Potassium, Total [mg/L]						
No. of Analyses	8	11	17	8	20	8
No. of Detections	8	11	17	8	20	8
Trend	D	D	--	--	D	--
S-value	-20	-31	19	-13	-67	-11
Probability	0.018741	0.019517	0.458028	0.134625	0.031795	0.212486
Significant	YES	YES	NO	NO	YES	NO
Sodium, Dissolved [mg/L]						
No. of Analyses	24	36	50	8	50	8
No. of Detections	24	36	50	8	50	8
Trend	--	D	I	--	--	D
S-value	-27	-469	261	-15	211	-18
Probability	0.518854	1.7E-10	0.0295	0.080905	0.078836	0.035448
Significant	NO	YES	YES	NO	NO	YES
Sodium, Total [mg/L]						
No. of Analyses	8	11	17	8	20	8
No. of Detections	8	11	17	8	20	8
Trend	D	D	--	--	--	--
S-value	-20	-28	32	-15	-59	-8
Probability	0.018741	0.035001	0.200846	0.080905	0.059464	0.386476
Significant	YES	YES	NO	NO	NO	NO

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
1,1 Dichloroethane [ug/L]						
No. of Analyses	30	50	50	8	50	8
No. of Detections	0	17	0	0	0	0
Trend	--	D	--	--	--	--
S-value	-239	-629	-141	0	-141	0
Probability	NaN	9.05E-08	NaN	NaN	NaN	NaN
Significant	--	YES	--	--	--	--
1,2-Dichloropropane [ug/L]						
No. of Analyses	30	50	50	8	50	8
No. of Detections	0	0	0	0	0	0
Trend	--	--	--	--	--	--
S-value	-239	-731	-141	0	-141	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--
Benzene [ug/L]						
No. of Analyses	30	50	50	8	50	8
No. of Detections	0	0	0	0	0	0
Trend	--	--	--	--	--	--
S-value	-239	-731	-141	0	-141	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--
Chloroethane [ug/L]						
No. of Analyses	30	50	50	8	50	8
No. of Detections	0	6	0	0	0	0
Trend	--	--[a]	--	--	--	--
S-value	-228	-740	-141	0	-141	0
Probability	NaN	1.13E-10	NaN	NaN	NaN	NaN
Significant	--	YES	--	--	--	--
cis-1,2-Dichloroethene [ug/L]						
No. of Analyses	27	46	50	8	50	8
No. of Detections	0	19	0	0	0	0
Trend	--	--	--	--	--	--
S-value	-167	-66	-141	0	-141	0
Probability	NaN	0.532929	NaN	NaN	NaN	NaN
Significant	--	NO	--	--	--	--
Dichlorodifluoromethane [ug/L]						
No. of Analyses	23	27	50	8	50	8
No. of Detections	0	12	0	0	0	0
Trend	--	D	--	--	--	--
S-value	-90	-242	-141	0	-141	0
Probability	NaN	2.26E-07	NaN	NaN	NaN	NaN
Significant	--	YES	--	--	--	--

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
Toluene [ug/L]						
No. of Analyses	30	50	50	8	50	8
No. of Detections	0	0	0	0	0	0
Trend	--	--	--	--	--	--
S-value	-234	-691	-141	0	-141	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--
trans-1,2-Dichloroethene [ug/L]						
No. of Analyses	29	50	50	8	50	8
No. of Detections	0	1	0	0	0	0
Trend	--	D	--	--	--	--
S-value	-215	-710	-141	0	-141	0
Probability	NaN	1.08E-10	NaN	NaN	NaN	NaN
Significant	--	YES	--	--	--	--
Trichloroethene [ug/L]						
No. of Analyses	30	50	50	8	50	8
No. of Detections	0	0	0	0	0	0
Trend	--	--	--	--	--	--
S-value	-239	-731	-141	0	-141	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--
Trichlorofluoromethane [ug/L]						
No. of Analyses	24	37	50	8	50	8
No. of Detections	13	26	0	0	0	0
Trend	--	D	--	--	--	--
S-value	-11	-332	-141	0	-141	0
Probability	0.798067	1.39E-05	NaN	NaN	NaN	NaN
Significant	NO	YES	--	--	--	--
Vinyl Chloride [ug/L]						
No. of Analyses	30	50	50	8	50	8
No. of Detections	0	18	0	0	1	0
Trend	--	D	--	--	D	--
S-value	-252	-682	-141	0	-167	0
Probability	NaN	8.09E-09	NaN	NaN	0.00302	NaN
Significant	--	YES	--	--	YES	--

NOTES:

Short	- eight most recent analyses in the last two years.
Long	- historical data up to the last eight samples, but no greater than 50 samples.
D	- decreasing trend
I	- increasing trend
--	- no detectable trend or too few data point to determine significance
NaN	- too few data points to calculate probability
Probability	- probability null hypothesis (i.e. 'No Trend') is true (aka p-value)
Significance	- trend is significant at 0.05
umhos/cm	- microSiemens per centimeter
mg/L	- milligram per liter
ug/L	- microgram per liter
[a]	Trend analysis resulted in artificial decreasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.
[b]	Trend analysis resulted in artificial increasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc2									
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33	MW-35
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Short	Short
pH, Field [standard units]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	8	50	8	50	8	8	8
Trend	--	--	D	--	D	--	I	--	--	--
S-value	198	4	-416	13	-608	12	360	7	7	13
Probability	0.099098	0.710523	0.00051	0.134625	3.79E-07	0.173546	0.002643	0.454427	0.454427	0.134625
Significant	NO	NO	YES	NO	YES	NO	YES	NO	NO	NO
Specific Conductance, Field [umhos/cm]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	8	50	8	50	8	8	8
Trend	D	--	I	D	I	D	D	I	D	--
S-value	-681	16	351	-20	451	-24	-581	22	-19	6
Probability	1.25E-08	0.063487	0.00317	0.018741	0.00015	0.004434	1.2E-06	0.009375	0.024822	0.536187
Significant	YES	NO	YES	YES	YES	YES	YES	YES	YES	NO
Alkalinity [mg/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	8	50	8	50	8	8	8
Trend	D	--	I	D	I	D	D	I	--	--
S-value	-951	6	334	-26	348	-22	-793	22	-16	1
Probability	1.71E-15	0.536187	0.005319	0.001982	0.003675	0.009375	3.42E-11	0.008321	0.063487	1
Significant	YES	NO	YES	YES	YES	YES	YES	YES	NO	NO
Ammonia-N [mg/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	4	4	1	1	34	8	23	8	8	8
Trend	--[a]	--	D	--	I	--	--	--	--	--
S-value	-506	-2	-630	-5	401	7	-40	-16	-8	-6
Probability	1.2E-06	0.894318	8.22E-10	0.382733	0.00066	0.454427	0.7388	0.063487	0.386476	0.536187
Significant	YES	NO	YES	--	YES	NO	NO	NO	NO	NO
Chloride [mg/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	8	50	8	50	8	8	8
Trend	--	--	I	--	D	--	D	I	D	--
S-value	-118	-15	373	-14	-634	2	-622	19	-20	8
Probability	0.327424	0.080905	0.00185	0.107762	1.16E-07	0.900004	2.02E-07	0.024822	0.018741	0.386476
Significant	NO	NO	YES	NO	YES	NO	YES	YES	YES	NO
Nitrate-N [mg/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	42	2	49	8	10	0	40	8	2	0
Trend	--	--	I	--	--[a]	--	I	I	--	--
S-value	55	13	373	-6	-407	0	406	24	-8	-3
Probability	0.651217	0.04852	0.001859	0.536187	0.000194	NaN	0.000666	0.004434	0.315659	NaN
Significant	NO	--	YES	NO	YES	--	YES	YES	--	--
Sulfate [mg/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	8	50	8	50	8	8	8
Trend	I	--	--	D	I	--	I	I	--	I
S-value	739	-9	-59	-20	266	-12	591	20	14	17
Probability	6.31E-10	0.318567	0.62597	0.018741	0.025739	0.173546	7.71E-07	0.018741	0.102358	0.046063
Significant	YES	NO	NO	YES	YES	NO	YES	YES	NO	YES
Total Dissolved Solids [mg/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	8	50	8	50	8	8	8
Trend	D	--	I	D	I	--	D	I	D	--
S-value	-673	-1	533	-18	716	-11	-720	20	-19	-2
Probability	1.81E-08	1	8.37E-06	0.032667	2.14E-09	0.212486	1.76E-09	0.018741	0.024822	0.901539
Significant	YES	NO	YES	YES	YES	NO	YES	YES	YES	NO

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc2									
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33	MW-35
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Short	Short
Arsenic, Dissolved [mg/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	26	8	50	8	50	8	43	8	8	8
Trend	--	--	--	--	D	I	D	--	--	D
S-value	-34	-6	-117	9	-291	20	-319	-6	0	-24
Probability	0.770901	0.536187	0.331287	0.318567	0.015099	0.018741	0.007707	0.536187	1	0.004434
Significant	NO	NO	NO	NO	YES	YES	YES	NO	NO	YES
Arsenic, Total [mg/L]										
No. of Analyses	20	8	19	8	19	8	19	8	8	8
No. of Detections	4	8	19	8	19	8	16	8	8	8
Trend	--	--	--	--	I	--	I	D	--	D
S-value	33	-6	15	2	99	-2	70	-20	2	-21
Probability	0.16915	0.536187	0.621849	0.901539	0.000607	0.901539	0.015544	0.018741	0.901539	0.012649
Significant	NO	NO	NO	NO	YES	NO	YES	YES	NO	YES
Calcium, Dissolved [mg/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	8	50	8	50	8	8	8
Trend	D	--	--	--	I	--	D	I	--	--
S-value	-819	6	215	-16	320	-3	-733	19	-10	6
Probability	7.48E-12	0.536187	0.072026	0.063487	0.007283	0.800021	8.92E-10	0.024822	0.26551	0.536187
Significant	YES	NO	NO	NO	YES	NO	YES	YES	NO	NO
Calcium, Total [mg/L]										
No. of Analyses	19	8	19	8	19	8	19	8	8	8
No. of Detections	19	8	19	8	19	8	19	8	8	8
Trend	D	--	I	--	--	--	D	I	--	--
S-value	-113	8	76	-14	42	-10	-77	25	-12	6
Probability	8.57E-05	0.386476	0.00857	0.107762	0.149532	0.26551	0.007764	0.00277	0.173546	0.536187
Significant	YES	NO	YES	NO	NO	NO	YES	YES	NO	NO
Iron, Dissolved [mg/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	15	0	16	0	29	8	50	8	8	8
Trend	D	--	D	--	--	D	D	--	--	--
S-value	-504	0	-497	0	47	-20	-601	-16	-9	-15
Probability	1.91E-07	NaN	5.02E-07	NaN	0.690426	0.018741	5.12E-07	0.063487	0.318567	0.080905
Significant	YES	--	YES	--	NO	YES	YES	NO	NO	NO
Iron, Total [mg/L]										
No. of Analyses	20	8	19	8	19	8	19	8	8	8
No. of Detections	15	3	18	1	18	8	19	8	8	8
Trend	--	--	--	--	I	--	I	D	--	--
S-value	6	-14	11	7	101	-8	104	-18	-10	-11
Probability	0.869858	0.062393	0.726447	0.19043	0.00046	0.386476	0.000311	0.035448	0.26551	0.212486
Significant	NO	NO	NO	--	YES	NO	YES	YES	NO	NO
Magnesium, Dissolved [mg/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	8	50	8	50	8	8	8
Trend	D	--	I	D	I	D	D	I	--	--
S-value	-752	2	517	-17	569	-18	-680	21	-14	4
Probability	3.25E-10	0.901539	1.57E-05	0.046063	2E-06	0.035448	1.33E-08	0.012649	0.107762	0.710523
Significant	YES	NO	YES	YES	YES	YES	YES	YES	NO	NO
Magnesium, Total [mg/L]										
No. of Analyses	19	8	19	8	19	8	19	8	8	8
No. of Detections	19	8	19	8	19	8	19	8	8	8
Trend	D	--	--	D	I	D	D	I	D	--
S-value	-117	6	52	-17	108	-17	-75	25	-23	0
Probability	4.84E-05	0.536187	0.073849	0.046063	0.00018	0.041601	0.009627	0.00277	0.006091	1
Significant	YES	NO	NO	YES	YES	YES	YES	YES	YES	NO

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc2									
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33	MW-35
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Short	Short
Manganese, Dissolved [mg/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	49	8	7	1	50	8	50	8	8	8
Trend	--	--	--[a]	--	I	D	--	--	--	D
S-value	-73	8	-267	-3	621	-26	-188	-9	-14	-18
Probability	0.546461	0.386476	0.000465	0.662521	2.14E-07	0.001982	0.117725	0.318567	0.107762	0.035448
Significant	NO	NO	YES	--	YES	YES	NO	NO	NO	YES
Manganese, Total [mg/L]										
No. of Analyses	20	8	19	8	19	8	19	8	8	8
No. of Detections	20	8	12	8	19	8	19	8	8	8
Trend	--	--	--	--	--	D	I	--	--	--
S-value	-49	6	-6	10	-21	-23	91	-14	-12	-4
Probability	0.119199	0.536187	0.85725	0.26551	0.484108	0.006091	0.00164	0.107762	0.173546	0.710523
Significant	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO
Potassium, Dissolved [mg/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	8	50	8	50	8	8	8
Trend	D	--	I	--	--	--	D	I	--	--
S-value	-530	3	451	-10	215	-2	-534	22	5	-5
Probability	9.33E-06	0.803089	0.000164	0.26551	0.072985	0.901539	8.12E-06	0.009375	0.617989	0.617989
Significant	YES	NO	YES	NO	NO	NO	YES	YES	NO	NO
Potassium, Total [mg/L]										
No. of Analyses	19	8	19	8	19	8	19	8	8	8
No. of Detections	19	8	19	8	19	8	19	8	8	8
Trend	D	--	--	--	--	--	D	I	--	--
S-value	-71	-8	48	-16	30	-15	-68	21	-7	-14
Probability	0.014088	0.386476	0.099902	0.063487	0.310009	0.080905	0.019003	0.012649	0.454427	0.107762
Significant	YES	NO	NO	NO	NO	NO	YES	YES	NO	NO
Sodium, Dissolved [mg/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	8	50	8	50	8	8	8
Trend	D	--	I	--	--	--	--	--	--	--
S-value	-506	-6	390	-16	-184	-15	39	-12	-5	-5
Probability	2.38E-05	0.536187	0.001132	0.063487	0.125698	0.080905	0.74929	0.166905	0.617989	0.617989
Significant	YES	NO	YES	NO	NO	NO	NO	NO	NO	NO
Sodium, Total [mg/L]										
No. of Analyses	19	8	19	8	19	8	19	8	8	8
No. of Detections	19	8	19	8	19	8	19	8	8	8
Trend	D	--	--	D	I	--	--	--	--	--
S-value	-80	-12	50	-18	60	-13	32	-9	-8	-13
Probability	0.005683	0.173546	0.086282	0.035448	0.038884	0.134625	0.275261	0.318567	0.386476	0.134625
Significant	YES	NO	NO	YES	YES	NO	NO	NO	NO	NO

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc2									
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33	MW-35
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Short	Short
1,1 Dichloroethane [ug/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	2	0	0	0	0	0	0	0	8	8
Trend	D	--	--	--	--	--	--	--	--	**I**
S-value	-230	0	-141	0	-141	0	-141	0	13	20
Probability	0.000219	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.134625	0.018741
Significant	YES	--	--	--	--	--	--	--	NO	YES
1,2-Dichloropropane [ug/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	0	0	0	0	0	0	0	0	8	8
Trend	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-141	0	-141	0	-141	0	14	12
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.107762	0.173546
Significant	--	--	--	--	--	--	--	--	NO	NO
Benzene [ug/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	0	0	0	0	0	0	0	0	8	8
Trend	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-141	0	-141	0	-141	0	5	-6
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.617989	0.536187
Significant	--	--	--	--	--	--	--	--	NO	NO
Chloroethane [ug/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	0	0	0	0	0	0	0	0	8	0
Trend	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-141	0	-141	0	-141	0	2	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.901539	NaN
Significant	--	--	--	--	--	--	--	--	NO	--
cis-1,2-Dichloroethene [ug/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	5	8	0	0	1	0	49	8	8	8
Trend	--[b]	--	--	--	--	--	--	D	--	**I**
S-value	145	-16	-141	0	-103	0	-194	-26	14	18
Probability	0.032134	0.063487	NaN	NaN	0.068409	NaN	0.106335	0.001982	0.107762	0.035448
Significant	YES	NO	--	--	NO	--	NO	YES	NO	YES
Dichlorodifluoromethane [ug/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	48	8	0	0	12	8	49	8	8	8
Trend	D	--	--	--	**I**	--	D	**I**	**I**	**I**
S-value	-440	14	-141	0	446	-16	-743	22	17	24
Probability	0.00024	0.107762	NaN	NaN	6.16E-07	0.063487	5.41E-10	0.009375	0.046063	0.004434
Significant	YES	NO	--	--	YES	NO	YES	YES	YES	YES

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc2									
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33	MW-35
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Short	Short
Toluene [ug/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	0	0	0	0	1	0	0	0	1	4
Trend	--	--	--	--	D	--	--	--	--	D
S-value	-141	0	-141	0	-157	0	-141	0	-1	-16
Probability	NaN	NaN	NaN	NaN	0.005319	NaN	NaN	NaN	1	0.046302
Significant	--	--	--	--	YES	--	--	--	--	YES
trans-1,2-Dichloroethene [ug/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	0	0	0	0	0	0	3	5	8	8
Trend	--	--	--	--	--	--	--[b]	D	--	--
S-value	-141	0	-141	0	-141	0	139	-23	4	-16
Probability	NaN	NaN	NaN	NaN	NaN	NaN	0.004846	0.005086	0.710523	0.063487
Significant	--	--	--	--	--	--	YES	YES	NO	NO
Trichloroethene [ug/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	0	0	0	0	0	0	0	0	7	8
Trend	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-141	0	-141	0	-141	0	-4	-11
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.710523	0.212486
Significant	--	--	--	--	--	--	--	--	NO	NO
Trichlorofluoromethane [ug/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	49	8	0	0	1	0	48	8	0	0
Trend	D	I	--	--	--	--	D	I	--	--
S-value	-583	20	-141	0	-103	0	-709	18	0	0
Probability	1.12E-06	0.018741	NaN	NaN	0.068409	NaN	3.16E-09	0.035448	NaN	NaN
Significant	YES	YES	--	--	NO	--	YES	YES	--	--
Vinyl Chloride [ug/L]										
No. of Analyses	50	8	50	8	50	8	50	8	8	8
No. of Detections	49	8	0	0	1	0	49	8	8	8
Trend	D	--	--	--	--	--	D	I	--	I
S-value	-816	2	-141	0	-103	0	-913	20	12	22
Probability	9.07E-12	0.901539	NaN	NaN	0.068409	NaN	2.36E-14	0.018741	0.173546	0.009375
Significant	YES	NO	--	--	NO	--	YES	YES	NO	YES

NOTES:

Short	- eight most recent analyses in the last two years.
Long	- historical data up to the last eight samples, but no greater than 50 samples.
D	- decreasing trend
I	- increasing trend
--	- no detectable trend or too few data point to determine significance
NaN	- too few data points to calculate probability
Probability	- probability null hypothesis (i.e. 'No Trend') is true (aka p-value)
Significance	- trend is significant at 0.05
umhos/cm	- microSiemens per centimeter
mg/L	- milligram per liter
ug/L	- microgram per liter
[a]	Trend analysis resulted in artificial decreasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.
[b]	Trend analysis resulted in artificial increasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc3		
Well Location	MW-8		MW-36
Time Interval	Long	Short	Short
pH, Field [standard units]			
No. of Analyses	50	8	8
No. of Detections	50	8	8
Trend	--	--	--
S-value	-77	-6	-1
Probability	0.524653	0.536187	1
Significant	NO	NO	NO
Specific Conductance, Field [umhos/cm]			
No. of Analyses	50	8	8
No. of Detections	50	8	8
Trend	--	I	--
S-value	-142	20	-8
Probability	0.2353	0.018741	0.386476
Significant	NO	YES	NO
Alkalinity [mg/L]			
No. of Analyses	50	8	8
No. of Detections	50	8	8
Trend	D	I	--
S-value	-529	18	-14
Probability	9.9E-06	0.035448	0.107762
Significant	YES	YES	NO
Ammonia-N [mg/L]			
No. of Analyses	50	8	8
No. of Detections	1	1	2
Trend	D	--	--
S-value	-637	-1	-5
Probability	9.56E-10	1	0.510798
Significant	YES	--	--
Chloride [mg/L]			
No. of Analyses	50	8	8
No. of Detections	50	8	8
Trend	I	--	--
S-value	292	7	-1
Probability	0.014836	0.454427	1
Significant	YES	NO	NO
Nitrate-N [mg/L]			
No. of Analyses	50	8	8
No. of Detections	50	8	8
Trend	--	D	--
S-value	-221	-21	-10
Probability	0.065672	0.012649	0.247888
Significant	NO	YES	NO
Sulfate [mg/L]			
No. of Analyses	50	8	8
No. of Detections	50	8	8
Trend	D	I	--
S-value	-558	18	6
Probability	3.14E-06	0.035448	0.536187
Significant	YES	YES	NO
Total Dissolved Solids [mg/L]			
No. of Analyses	50	8	8
No. of Detections	50	8	8
Trend	I	--	--
S-value	293	11	-1
Probability	0.014385	0.212486	1
Significant	YES	NO	NO

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc3		
Well Location	MW-8		MW-36
Time Interval	Long	Short	Short
Arsenic, Dissolved [mg/L]			
No. of Analyses	50	8	8
No. of Detections	4	8	8
Trend	--[a]	--	--
S-value	-135	12	-11
Probability	0.030622	0.166905	0.212486
Significant	YES	NO	NO
Arsenic, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	3	8	8
Trend	--[a]	--	--
S-value	-44	0	-2
Probability	0.011378	1	0.900004
Significant	YES	NO	NO
Calcium, Dissolved [mg/L]			
No. of Analyses	50	8	8
No. of Detections	50	8	8
Trend	D	--	--
S-value	-424	8	1
Probability	0.00037	0.37908	1
Significant	YES	NO	NO
Calcium, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	18	8	8
Trend	I	--	--
S-value	56	-1	-1
Probability	0.036457	1	1
Significant	YES	NO	NO
Iron, Dissolved [mg/L]			
No. of Analyses	50	8	8
No. of Detections	16	0	0
Trend	D	--	--
S-value	-465	0	0
Probability	4.01E-06	NaN	NaN
Significant	YES	--	--
Iron, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	8	0	1
Trend	--	--	--
S-value	-10	0	-7
Probability	0.706197	NaN	0.19043
Significant	NO	--	--
Magnesium, Dissolved [mg/L]			
No. of Analyses	50	8	8
No. of Detections	50	8	8
Trend	--	--	--
S-value	-154	4	-8
Probability	0.20035	0.710523	0.37908
Significant	NO	NO	NO
Magnesium, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	18	8	8
Trend	--	--	--
S-value	3	2	-7
Probability	0.939527	0.901539	0.454427
Significant	NO	NO	NO

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc3		
Well Location	MW-8		MW-36
Time Interval	Long	Short	Short
Manganese, Dissolved [mg/L]			
No. of Analyses	50	8	8
No. of Detections	3	0	8
Trend	--[a]	--	--
S-value	-237	0	-12
Probability	0.001016	NaN	0.173546
Significant	YES	--	NO
Manganese, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	3	1	8
Trend	--	--	--
S-value	-22	3	-12
Probability	0.338139	0.662521	0.173546
Significant	NO	--	NO
Potassium, Dissolved [mg/L]			
No. of Analyses	50	8	8
No. of Detections	50	8	8
Trend	--	--	--
S-value	114	7	6
Probability	0.341785	0.454427	0.52982
Significant	NO	NO	NO
Potassium, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	18	8	8
Trend	--	--	--
S-value	2	-5	-8
Probability	0.968728	0.612407	0.37908
Significant	NO	NO	NO
Sodium, Dissolved [mg/L]			
No. of Analyses	50	8	8
No. of Detections	50	8	8
Trend	--	--	--
S-value	74	-10	-10
Probability	0.541135	0.26551	0.26551
Significant	NO	NO	NO
Sodium, Total [mg/L]			
No. of Analyses	18	8	8
No. of Detections	18	8	8
Trend	--	--	--
S-value	-3	-14	-5
Probability	0.939614	0.107762	0.617989
Significant	NO	NO	NO

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc3		
Well Location	MW-8		MW-36
Time Interval	Long	Short	Short
1,1 Dichloroethane [ug/L]			
No. of Analyses	50	8	8
No. of Detections	0	0	0
Trend	--	--	--
S-value	-141	0	0
Probability	NaN	NaN	NaN
Significant	--	--	--
1,2-Dichloropropane [ug/L]			
No. of Analyses	50	8	8
No. of Detections	0	0	0
Trend	--	--	--
S-value	-141	0	0
Probability	NaN	NaN	NaN
Significant	--	--	--
Benzene [ug/L]			
No. of Analyses	50	8	8
No. of Detections	0	0	0
Trend	--	--	--
S-value	-141	0	0
Probability	NaN	NaN	NaN
Significant	--	--	--
Chloroethane [ug/L]			
No. of Analyses	50	8	8
No. of Detections	0	0	0
Trend	--	--	--
S-value	-141	0	0
Probability	NaN	NaN	NaN
Significant	--	--	--
cis-1,2-Dichloroethene [ug/L]			
No. of Analyses	50	8	8
No. of Detections	0	0	0
Trend	--	--	--
S-value	-141	0	0
Probability	NaN	NaN	NaN
Significant	--	--	--
Dichlorodifluoromethane [ug/L]			
No. of Analyses	50	8	8
No. of Detections	0	0	0
Trend	--	--	--
S-value	-141	0	0
Probability	NaN	NaN	NaN
Significant	--	--	--

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Channel Cc3		
Well Location	MW-8		MW-36
Time Interval	Long	Short	Short
Toluene [ug/L]			
No. of Analyses	50	8	8
No. of Detections	1	0	0
Trend	D	--	--
S-value	-151	0	0
Probability	0.007365	NaN	NaN
Significant	YES	--	--
trans-1,2-Dichloroethene [ug/L]			
No. of Analyses	50	8	8
No. of Detections	0	0	0
Trend	--	--	--
S-value	-141	0	0
Probability	NaN	NaN	NaN
Significant	--	--	--
Trichloroethene [ug/L]			
No. of Analyses	50	8	8
No. of Detections	0	0	0
Trend	--	--	--
S-value	-141	0	0
Probability	NaN	NaN	NaN
Significant	--	--	--
Trichlorofluoromethane [ug/L]			
No. of Analyses	50	8	8
No. of Detections	0	0	0
Trend	--	--	--
S-value	-141	0	0
Probability	NaN	NaN	NaN
Significant	--	--	--
Vinyl Chloride [ug/L]			
No. of Analyses	50	8	8
No. of Detections	0	0	0
Trend	--	--	--
S-value	-141	0	0
Probability	NaN	NaN	NaN
Significant	--	--	--

NOTES:

Short	- eight most recent analyses in the last two years.
Long	- historical data up to the last eight samples, but no greater than 50 samples.
D	- decreasing trend
I	- increasing trend
--	- no detectable trend or too few data point to determine significance
NaN	- too few data points to calculate probability
Probability	- probability null hypothesis (i.e. 'No Trend') is true (aka p-value)
Significance	- trend is significant at 0.05
umhos/cm	- microSiemens per centimeter
mg/L	- milligram per liter
ug/L	- microgram per liter
[a]	Trend analysis resulted in artificial decreasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.
[b]	Trend analysis resulted in artificial increasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Unit D Aquifer										
Well Location	MW-7		MW-12		MW-19		MW-26		MW-29		MW-34
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
pH, Field [standard units]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	8
Trend	D	--	--	--	D	--	D	--	D	--	--
S-value	-309	1	-201	4	-396	11	-325	0	-328	6	0
Probability	0.009908	1	0.093995	0.710523	0.000939	0.212486	0.006689	1	0.006186	0.536187	1
Significant	YES	NO	NO	NO	YES	NO	YES	NO	YES	NO	NO
Specific Conductance, Field [umhos/cm]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	8
Trend	I	--	I	--	I	--	--	--	I	--	--
S-value	240	7	443	4	260	0	209	13	316	-6	-13
Probability	0.042332	0.454427	0.00017	0.710523	0.029358	1	0.078935	0.134625	0.007994	0.536187	0.134625
Significant	YES	NO	YES	NO	YES	NO	NO	NO	YES	NO	NO
Alkalinity [mg/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	8
Trend	I	--	I	--	--	--	--	--	I	--	--
S-value	460	-9	615	16	-79	-14	225	-6	450	-15	-8
Probability	0.000121	0.318567	2.74E-07	0.063487	0.513692	0.107762	0.060733	0.52982	0.000149	0.069919	0.37908
Significant	YES	NO	YES	NO	NO	NO	NO	NO	YES	NO	NO
Ammonia-N [mg/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	2	0	39	8	50	8	4	7	0
Trend	I	--	D	--	--	--	I	--	--[a]	--	--
S-value	698	0	-629	0	110	-10	461	7	-642	2	0
Probability	5.43E-09	1	2.83E-09	NaN	0.359713	0.26551	0.000117	0.454427	2.29E-10	0.901539	NaN
Significant	YES	NO	YES	--	NO	NO	YES	NO	YES	NO	--
Chloride [mg/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	8
Trend	I	--	I	--	D	--	--	--	D	--	--
S-value	336	1	341	10	-417	-3	-75	-1	-418	8	-2
Probability	0.005019	1	0.004345	0.258095	0.000498	0.803089	0.535517	1	0.000483	0.386476	0.901539
Significant	YES	NO	YES	NO	YES	NO	NO	NO	YES	NO	NO
Nitrate-N [mg/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	16	7	50	8	17	1	27	5	1	0	8
Trend	D	--	--	--	D	--	D	--	D	--	D
S-value	-543	0	-119	3	-582	3	-330	0	-511	0	-26
Probability	1.6E-06	1	0.323346	0.803089	3.98E-07	0.662521	0.004939	1	7.62E-08	NaN	0.001982
Significant	YES	NO	NO	NO	YES	--	YES	NO	YES	--	YES
Sulfate [mg/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	8
Trend	I	--	I	--	D	--	--	--	D	--	--
S-value	392	14	538	4	-565	2	159	5	-284	3	16
Probability	0.001019	0.102358	6.54E-06	0.700116	2.07E-06	0.900004	0.182994	0.617989	0.01752	0.803089	0.063487
Significant	YES	NO	YES	NO	YES	NO	NO	NO	YES	NO	NO
Total Dissolved Solids [mg/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	8
Trend	I	--	I	--	--	--	I	--	I	--	--
S-value	629	6	554	16	149	-4	447	-1	574	-7	-2
Probability	1.42E-07	0.520912	3.63E-06	0.059451	0.214966	0.700116	0.000188	1	1.54E-06	0.454427	0.901539
Significant	YES	NO	YES	NO	NO	NO	YES	NO	YES	NO	NO

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Unit D Aquifer										
Well Location	MW-7		MW-12		MW-19		MW-26		MW-29		MW-34
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
Arsenic, Dissolved [mg/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	8
Trend	D	--	--	--	D	--	--	--	D	--	--
S-value	-629	-10	-72	-3	-987	-16	88	-7	-602	-1	-13
Probability	1.49E-07	0.26551	0.551949	0.800021	1.56E-16	0.063487	0.466371	0.454427	4.91E-07	1	0.126484
Significant	YES	NO	NO	NO	YES	NO	NO	NO	YES	NO	NO
Arsenic, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	19	8	18	8	19	8	19	8	19	8	8
Trend	D	--	--	--	D	--	I	--	D	--	--
S-value	-81	2	33	-7	-65	15	70	2	-63	16	-12
Probability	0.005074	0.901539	0.224813	0.437302	0.024973	0.080905	0.015544	0.901539	0.030075	0.063487	0.166905
Significant	YES	NO	NO	NO	YES	NO	YES	NO	YES	NO	NO
Calcium, Dissolved [mg/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	8
Trend	I	--	I	--	--	--	--	--	I	--	--
S-value	253	5	379	8	68	-7	131	5	294	-10	-3
Probability	0.034467	0.617989	0.001557	0.37908	0.574465	0.444833	0.275318	0.617989	0.013699	0.247888	0.803089
Significant	YES	NO	YES	NO	NO	NO	NO	NO	YES	NO	NO
Calcium, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	19	8	18	8	19	8	19	8	19	8	8
Trend	I	--	--	--	--	--	--	--	--	--	--
S-value	63	2	48	-1	-21	2	27	1	31	-1	-3
Probability	0.029606	0.900004	0.074408	1	0.483034	0.901539	0.361843	1	0.291741	1	0.803089
Significant	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Iron, Dissolved [mg/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	24	5	15	0	49	8	50	8	50	8	0
Trend	D	--	D	--	D	--	--	I	--	I	--
S-value	-316	-9	-463	0	-429	8	-32	18	108	19	0
Probability	0.004396	0.308325	2.85E-06	NaN	0.000341	0.386476	0.795342	0.035448	0.370604	0.024822	NaN
Significant	YES	NO	YES	--	YES	NO	NO	YES	NO	YES	--
Iron, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	18	8	12	4	19	8	19	8	19	8	3
Trend	I	I	I	--	--	--	I	--	--	--	--
S-value	57	22	56	2	22	16	73	6	-53	16	6
Probability	0.04981	0.009375	0.033424	0.894318	0.46225	0.063487	0.01177	0.536187	0.068873	0.063487	0.473542
Significant	YES	YES	YES	NO	NO	NO	YES	NO	NO	NO	NO
Magnesium, Dissolved [mg/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	8
Trend	I	--	I	--	--	--	I	--	I	--	--
S-value	345	-3	521	-3	203	-16	422	2	441	-9	-10
Probability	0.003989	0.803089	1.33E-05	0.803089	0.090557	0.059451	0.000427	0.901539	0.00022	0.318567	0.26551
Significant	YES	NO	YES	NO	NO	NO	YES	NO	YES	NO	NO
Magnesium, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	19	8	18	8	19	8	19	8	19	8	8
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	51	-1	8	-5	-20	-9	43	-8	23	-8	-12
Probability	0.080243	1	0.790752	0.617989	0.505443	0.318567	0.141726	0.386476	0.439804	0.386476	0.166905
Significant	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Unit D Aquifer										
Well Location	MW-7		MW-12		MW-19		MW-26		MW-29		MW-34
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
Manganese, Dissolved [mg/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	49	8	3	0	49	8	50	8	50	8	8
Trend	--	D	--	--	--	--	--	--	--	--	--
S-value	204	-22	-112	0	-106	-10	-62	-3	-161	-5	8
Probability	0.089125	0.009375	0.098559	NaN	0.379158	0.26551	0.609676	0.803089	0.180641	0.617989	0.386476
Significant	NO	YES	NO	--	NO	NO	NO	NO	NO	NO	NO
Manganese, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	19	8	7	7	19	8	19	8	19	8	8
Trend	--	--	--	--	--	--	I	--	--	--	--
S-value	-39	14	-8	2	-5	16	65	4	-22	10	-6
Probability	0.182624	0.107762	0.761518	0.901539	0.888706	0.063487	0.025151	0.710523	0.46225	0.26551	0.536187
Significant	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO
Potassium, Dissolved [mg/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	8
Trend	I	--	I	--	--	--	I	--	I	--	--
S-value	368	4	404	7	190	2	344	9	416	-10	3
Probability	0.002104	0.710523	0.000724	0.454427	0.113217	0.901539	0.004052	0.318567	0.000504	0.26551	0.803089
Significant	YES	NO	YES	NO	NO	NO	YES	NO	YES	NO	NO
Potassium, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	19	8	18	8	19	8	19	8	19	8	8
Trend	I	--	--	--	--	--	--	--	--	--	D
S-value	75	-9	34	-4	-42	-4	-4	1	36	-1	-20
Probability	0.009334	0.318567	0.210328	0.706197	0.150704	0.710523	0.916359	1	0.21935	1	0.014713
Significant	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES
Sodium, Dissolved [mg/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	8
Trend	--	--	I	--	--	--	--	--	I	--	--
S-value	84	-14	515	-10	206	-16	127	1	284	-10	-4
Probability	0.487286	0.107762	1.69E-05	0.26551	0.086298	0.063487	0.291704	1	0.017871	0.26551	0.710523
Significant	NO	NO	YES	NO	NO	NO	NO	NO	YES	NO	NO
Sodium, Total [mg/L]											
No. of Analyses	19	8	18	8	19	8	19	8	19	8	8
No. of Detections	19	8	18	8	19	8	19	8	19	8	8
Trend	--	--	--	--	--	--	D	--	--	--	--
S-value	9	-6	49	-12	6	-5	-67	0	25	-8	-6
Probability	0.779566	0.536187	0.069044	0.173546	0.861052	0.617989	0.020941	1	0.400525	0.37908	0.536187
Significant	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Unit D Aquifer										
Well Location	MW-7		MW-12		MW-19		MW-26		MW-29		MW-34
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
1,1 Dichloroethane [ug/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-141	0	-141	0	-141	0	-141	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane [ug/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-141	0	-141	0	-141	0	-141	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--
Benzene [ug/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-141	0	-141	0	-141	0	-141	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--
Chloroethane [ug/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-141	0	-141	0	-141	0	-141	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene [ug/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-141	0	-141	0	-141	0	-141	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane [ug/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-141	0	-141	0	-141	0	-141	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2019

	Unit D Aquifer										
Well Location	MW-7		MW-12		MW-19		MW-26		MW-29		MW-34
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
Toluene [ug/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	1	0	0	0	0	0	0
Trend	--	--	--	--	D	--	--	--	--	--	--
S-value	-141	0	-141	0	-145	0	-141	0	-141	0	0
Probability	NaN	NaN	NaN	NaN	0.010092	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	YES	--	--	--	--	--	--
trans-1,2-Dichloroethene [ug/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-141	0	-141	0	-141	0	-141	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene [ug/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-141	0	-141	0	-141	0	-141	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane [ug/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-141	0	-141	0	-141	0	-141	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride [ug/L]											
No. of Analyses	50	8	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	1	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	-141	0	-92	0	-165	3	-141	0	-141	0	0
Probability	NaN	NaN	NaN	NaN	NaN	0.662521	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--

NOTES:

Short	- eight most recent analyses in the last two years.
Long	- historical data up to the last eight samples, but no greater than 50 samples.
D	- decreasing trend
I	- increasing trend
--	- no detectable trend or too few data point to determine significance
NaN	- too few data points to calculate probability
Probability	- probability null hypothesis (i.e. 'No Trend') is true (aka p-value)
Significance	- trend is significant at 0.05
umhos/cm	- microSiemens per centimeter
mg/L	- milligram per liter
ug/L	- microgram per liter
[a]	Trend analysis resulted in artificial decreasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.
[b]	Trend analysis resulted in artificial increasing trend caused by changes in MDL and new detection after change to LLOQ in 2nd quarter of 2017.

Table 3-4
Summary of Statistical Analyses for West Hillslope Seep/Weir Surface Water Samples
Vashon Island Closed Landfill
1986 through 2019

	West Hillslope Seep/Weir							
Well Location	**SW-W1**		**SW-W2**		**SW-W3**		**SW-E**	
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short
pH, Field [standard units]								
No. of Analyses	74	8	105	8	105	8	24	8
No. of Detections	74	8	105	8	105	8	24	8
Minimum	6.54	7.24	6.88	7.45	6.26	7.05	6.42	7.05
Maximum	8.76	7.86	8.89	8.34	10.71	7.94	10.18	8.14
Mean	7.56	7.49	7.97	7.70	7.80	7.56	7.60	7.61
Standard Deviation	0.44	0.24	0.38	0.27	0.55	0.31	0.73	0.38
Median	7.625	7.44	8.07	7.66	7.85	7.635	7.51	7.57
Specific Conductance, Field [umhos/cm]								
No. of Analyses	75	8	106	8	107	8	23	8
No. of Detections	75	8	106	8	107	8	23	8
Minimum	70	194.7	325	466.3	190	260.1	110	187.5
Maximum	860	228.6	1200	625.1	1034	307.2	370	223.8
Mean	317.98	209.83	747.62	579.39	452.52	286.71	185.76	214.39
Standard Deviation	165.55	12.59	182.27	56.87	168.83	17.26	49.64	12.13
Median	240	211.5	722.5	602.25	420	292.05	180	218.9
Alkalinity [mg/L]								
No. of Analyses	45	8	64	8	63	8		
No. of Detections	45	8	64	8	63	8		
Minimum	66.2	71	222	261	86.6	111		
Maximum	150	91.1	530	311	290	136		
Mean	90.50	81.85	393.94	291.88	174.49	124.25		
Standard Deviation	18.56	7.72	69.67	17.96	52.49	9.65		
Median	88.2	82.75	397.5	297	165	129		
Ammonia-N [mg/L]								
No. of Analyses	73	8	106	8	105	8		
No. of Detections	44	8	42	8	30	8		
Minimum	ND	0.0118	ND	0.0032	ND	0.0052		
Maximum	0.14	0.0278	45	0.0096	0.2	0.0134		
Mean	0.025	0.020	0.440	0.006	0.016	0.008		
Standard Deviation	0.028	0.006	4.369	0.002	0.025	0.003		
Median	0.015	0.0199	0.01	0.00545	0.005	0.00705		
Chemical Oxygen Demand [mg/L]								
No. of Analyses	73	8	105	8	104	8		
No. of Detections	66	8	103	8	90	8		
Minimum	ND	11	ND	12	ND	11		
Maximum	100	41.7	130	31.1	160	43.9		
Mean	19.52	18.06	21.24	16.64	17.60	18.24		
Standard Deviation	16.69	10.09	18.20	6.13	20.36	10.60		
Median	15	14	16	14.5	13.7	15.5		
Chloride [mg/L]								
No. of Analyses	73	8	104	8	104	8		
No. of Detections	73	8	102	8	102	8		
Minimum	3	6.27	ND	17.3	ND	7.93		
Maximum	15	7.79	79	19.4	48	9.72		
Mean	5.93	7.13	31.28	18.45	12.02	8.71		
Standard Deviation	1.86	0.50	11.42	0.68	6.07	0.51		
Median	5.42	7.115	32	18.65	10	8.69		
Nitrate-N [mg/L]								
No. of Analyses	73	8	106	8	105	8		
No. of Detections	65	8	77	8	97	8		
Minimum	ND	0.286	ND	0.066	ND	0.202		
Maximum	4.26	1.73	9	0.275	1.4	0.557		
Mean	1.57	0.85	0.24	0.16	0.36	0.32		
Standard Deviation	1.10	0.50	0.87	0.07	0.28	0.12		
Median	1.76	0.7065	0.112	0.155	0.301	0.286		

Table 3-4
Summary of Statistical Analyses for West Hillslope Seep/Weir Surface Water Samples
Vashon Island Closed Landfill
1986 through 2019

	West Hillslope Seep/Weir							
Well Location	**SW-W1**		**SW-W2**		**SW-W3**		**SW-E**	
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short
Sulfate [mg/L]								
No. of Analyses	73	8	106	8	105	8		
No. of Detections	72	8	106	8	105	8		
Minimum	ND	7.93	4.6	12.2	6	10.9		
Maximum	35.9	10.5	29.9	15	109	13		
Mean	11.47	8.97	8.79	13.50	12.14	11.86		
Standard Deviation	5.02	0.79	3.42	0.97	9.74	0.67		
Median	10.3	8.915	8	13.4	11.4	11.8		
Arsenic, Dissolved [mg/L]								
No. of Analyses	41	8	43	8	43	8	20	8
No. of Detections	38	8	41	8	43	8	20	8
Minimum	ND	0.0018	ND	0.0012	0.0017	0.0030	0.0011	0.0017
Maximum	0.0086	0.0050	0.0160	0.0016	0.0039	0.0038	0.0023	0.0022
Mean	0.0026	0.0034	0.0018	0.0014	0.0027	0.0034	0.0018	0.0019
Standard Deviation	0.0019	0.0011	0.0023	0.0001	0.0005	0.0003	0.0004	0.0002
Median	0.0021	0.0036	0.0015	0.0014	0.0026	0.0035	0.0018	0.0019
Arsenic, Total [mg/L]								
No. of Analyses	74	8	105	8	104	8	20	8
No. of Detections	74	8	105	8	103	8	20	8
Minimum	0.0020	0.0035	0.0016	0.0015	ND	0.0038	0.0015	0.0019
Maximum	0.0830	0.0083	0.0170	0.0086	0.0520	0.0089	0.0106	0.0025
Mean	0.0113	0.0058	0.0046	0.0032	0.0059	0.0055	0.0026	0.0022
Standard Deviation	0.0119	0.0017	0.0028	0.0023	0.0062	0.0021	0.0019	0.0002
Median	0.0070	0.0056	0.0040	0.0028	0.0046	0.0046	0.0022	0.0021
Calcium, Dissolved [mg/L]								
No. of Analyses	41	8	43	8	43	8	20	8
No. of Detections	41	8	43	8	43	8	20	8
Minimum	12.2	14.8	35	49.2	17.2	21.4	7.78	14.1
Maximum	18.3	18.5	74.3	57.1	33	26.5	16.7	17
Mean	15.31	16.79	57.31	52.30	23.86	23.18	13.18	15.80
Standard Deviation	1.58	1.28	8.15	3.17	3.68	1.73	2.71	1.00
Median	15.2	16.85	57.6	51.3	23	23.1	14.2	15.95
Calcium, Total [mg/L]								
No. of Analyses	69	8	99	8	98	8	20	8
No. of Detections	69	8	99	8	98	8	20	8
Minimum	12.4	14.9	27	48.7	17.3	20.6	8.51	14.4
Maximum	84.8	19	127	55.4	93	26.7	18.9	16.8
Mean	29.69	16.95	74.77	52.56	41.69	23.43	14.17	15.83
Standard Deviation	20.32	1.32	20.62	2.81	19.21	2.02	2.97	0.99
Median	18.4	16.7	71	53.55	37	23.85	15	16.2
Iron, Dissolved [mg/L]								
No. of Analyses	41	8	43	8	43	8	20	8
No. of Detections	40	8	43	8	43	8	20	8
Minimum	ND	0.109	0.012	0.0115	0.018	0.0181	0.033	0.0378
Maximum	1.43	0.386	8.97	0.0406	0.215	0.13	0.221	0.0788
Mean	0.2746	0.2160	0.2887	0.0258	0.0760	0.0472	0.0800	0.0503
Standard Deviation	0.3104	0.0930	1.3599	0.0110	0.0526	0.0362	0.0508	0.0135
Median	0.1770	0.2140	0.0292	0.0262	0.0505	0.0399	0.0626	0.0489
Iron, Total [mg/L]								
No. of Analyses	74	8	105	8	104	8	20	8
No. of Detections	74	8	105	8	104	8	20	8
Minimum	0.682	0.853	0.364	0.501	0.49	0.51	0.226	0.29
Maximum	76	4.19	27.9	9.07	37.5	5.43	14.9	0.759
Mean	8.09	2.10	4.40	2.35	3.51	1.84	1.70	0.48
Standard Deviation	10.82	1.06	4.86	2.81	5.42	1.97	3.34	0.16
Median	4.30	2.02	2.83	1.65	1.90	0.88	0.63	0.45

Table 3-4
Summary of Statistical Analyses for West Hillslope Seep/Weir Surface Water Samples
Vashon Island Closed Landfill
1986 through 2019

	West Hillslope Seep/Weir							
Well Location	**SW-W1**		**SW-W2**		**SW-W3**		**SW-E**	
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short
Magnesium, Dissolved [mg/L]								
No. of Analyses	41	8	43	8	43	8	20	8
No. of Detections	41	8	43	8	43	8	20	8
Minimum	10.1	11.5	28.9	40.6	11.7	17.7	6.36	12.4
Maximum	16	13.6	63.6	47	25.8	22.3	15.8	15
Mean	12.67	12.60	48.90	43.56	19.52	19.28	11.77	14.08
Standard Deviation	1.30	0.92	7.53	2.63	3.09	1.59	2.70	0.93
Median	12.70	12.65	49.00	42.80	19.30	19.05	12.40	14.30
Magnesium, Total [mg/L]								
No. of Analyses	69	8	99	8	99	8	20	8
No. of Detections	69	8	99	8	99	8	20	8
Minimum	10.1	11.1	20	40	14.5	17.2	6.98	12.4
Maximum	55.3	13.9	104	47.6	89	22.4	15.7	15.1
Mean	19.41	12.41	63.44	43.40	32.71	19.24	12.49	13.93
Standard Deviation	10.22	1.00	18.56	2.88	14.63	1.75	2.52	0.97
Median	14.50	12.05	59.20	42.45	29.00	19.05	13.45	13.80
Manganese, Dissolved [mg/L]								
No. of Analyses	41	8	43	8	43	8	20	8
No. of Detections	41	8	43	8	43	8	20	8
Minimum	0.0113	0.165	0.016	0.021	0.112	0.224	0.00725	0.00616
Maximum	3.18	0.545	2.4	0.103	0.513	0.581	0.0188	0.0129
Mean	0.396	0.351	0.128	0.052	0.290	0.386	0.011	0.009
Standard Deviation	0.538	0.136	0.360	0.026	0.089	0.130	0.003	0.002
Median	0.268	0.329	0.057	0.050	0.293	0.352	0.011	0.009
Manganese, Total [mg/L]								
No. of Analyses	74	8	104	8	103	8	20	8
No. of Detections	74	8	104	8	103	8	20	8
Minimum	0.325	0.476	0.177	0.126	0.254	0.465	0.0243	0.0359
Maximum	18	1.43	17.9	1.9	8.56	2.14	1.14	0.0934
Mean	2.464	0.831	2.039	0.508	1.200	0.949	0.122	0.058
Standard Deviation	2.869	0.329	2.545	0.574	1.486	0.706	0.242	0.020
Median	1.405	0.842	0.998	0.370	0.780	0.614	0.061	0.051
Potassium, Dissolved [mg/L]								
No. of Analyses	41	8	43	8	43	8	20	8
No. of Detections	40	8	43	8	42	8	20	8
Minimum	ND	0.945	1.2	2.76	ND	1.93	1.68	1.8
Maximum	1.53	1.34	4.05	3.45	2.8	2.56	2.78	2.14
Mean	1.07	1.18	3.17	3.11	2.10	2.23	2.01	1.95
Standard Deviation	0.22	0.15	0.44	0.27	0.40	0.20	0.24	0.11
Median	1.09	1.21	3.19	3.12	2.11	2.20	2.00	1.93
Potassium, Total [mg/L]								
No. of Analyses	69	8	100	8	99	8	20	8
No. of Detections	69	8	100	8	99	8	20	8
Minimum	0.82	0.944	1.8	2.88	1.7	1.92	1.65	1.76
Maximum	2.8	1.36	5.6	3.48	17	2.56	3.38	2.08
Mean	1.36	1.19	3.46	3.16	2.66	2.28	2.00	1.96
Standard Deviation	0.42	0.16	0.54	0.21	1.54	0.23	0.35	0.10
Median	1.20	1.22	3.40	3.14	2.40	2.38	1.94	1.99

Table 3-4
Summary of Statistical Analyses for West Hillslope Seep/Weir Surface Water Samples
Vashon Island Closed Landfill
1986 through 2019

	West Hillslope Seep/Weir							
Well Location	**SW-W1**		**SW-W2**		**SW-W3**		**SW-E**	
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short
Sodium, Dissolved [mg/L]								
No. of Analyses	41	8	43	8	43	8	20	8
No. of Detections	41	8	43	8	43	8	20	8
Minimum	5.44	6.95	9.55	15	6.21	8.43	4.47	6.61
Maximum	8.04	7.76	19.3	17.5	11.1	9.99	7.54	7.65
Mean	6.78	7.41	15.16	15.96	8.66	9.01	6.24	7.15
Standard Deviation	0.58	0.33	1.80	0.93	0.90	0.53	0.81	0.38
Median	6.73	7.44	15.00	15.55	8.60	8.96	6.40	7.27
Sodium, Total [mg/L]								
No. of Analyses	69	8	100	8	98	8	20	8
No. of Detections	69	8	100	8	98	8	20	8
Minimum	5.33	6.79	7.8	14.8	6.52	8.22	4.73	6.55
Maximum	17.2	7.97	25	17.3	18.2	9.53	7.34	7.43
Mean	8.77	7.33	16.04	15.94	11.14	8.91	6.44	7.00
Standard Deviation	3.04	0.44	2.44	0.98	2.91	0.49	0.80	0.33
Median	7.28	7.24	16.00	15.55	10.00	8.78	6.68	6.92
Vinyl Chloride [ug/L]								
No. of Analyses	71	8	103	8	102	8	20	8
No. of Detections	11	8	1	0	75	8	0	0
Minimum	ND	0.0103	ND	ND	ND	0.0294	ND	ND
Maximum	1	0.0228	ND	ND	1	0.0573	ND	ND
Mean	0.062	0.017	ID	ID	0.078	0.039	ID	ID
Standard Deviation	0.200	0.005	ID	ID	0.164	0.009	ID	ID
Median	0.010	0.017	ID	ID	0.045	0.036	ID	ID

NOTES:

Short - eight most recent analyses in the last two years.
Long - historical data up to the last eight samples, but no greater than 50 samples.
umhos/cm - microSiemens per centimeter
mg/L - milligram per liter
ug/L - microgram per liter
ID - insufficient Data (i.e. the number of detections is less than 3)
ND - Not Detected (i.e. at laboratory MDL - Method Detection Limit)

Table 4-1
Comparison of Background Conditions and Unit D Aquifer
Vashon Island Closed Landfill

Constituent	Area Background Range*	Unit D Aquifer Jan. 2018 - Dec. 2019
General Indicators		
pH (Field)	6.5 to 8.3	6.59 to 8.29
Specific Conductance (Field)	80 to 545	165 to 248
Chloride	1.6 to 14	3.08 to 5.20
Nitrate	<0.2 to 5.8	<0.01 to 1.93
Sulfate	<0.50 to 41	10.5 to 17.3
Metals		
Arsenic, Total	<0.001 to 0.017	0.0012 to 0.0155
Iron, Total	0.04 to 10	<0.01 to 5.85
Manganese, Total	0.005 to 0.960	<0.0001 to 0.86
Sodium, Total	5.0 to 62	6.1 to 9.3

Notes:
All values except pH (standard units) and specific conductivity (umhos/cm) are reported in milligrams per liter (mg/L).

*Background values are based on Carr (1983) and Vashon-Maury Island Groundwater Management Plan (1998)

Appendix A

Groundwater Quality Standards
&
Laboratory Qualifiers

Water Quality Standards

Analyte	CAS No.	National Drinking Water Regulation MCL		Eff. Date	Ref.	Washington State Groundwater Quality Criteria Criterion*		Eff. Date	Ref.
Primary Standards									
A. Inorganics									
Antimony	7440-36-0	0.006	mg/L	17-Jan-94	FR v. 57 No.138	0.006	mg/L	17-Jan-94	WAC 173-200
Arsenic c	7440-38-2	0.01	mg/L	23-Jan-06	66 FR 28342	0.00005	mg/L	01-Dec-90	WAC 173-200
Asbestos	132207-33-1	7	mf/L	30-Jul-92	FR v. 56 No. 20	7	mf/L	30-Jul-92	WAC 173-200
Barium	7440-39-3	2.0	mg/L	1-Jan-93	FR v. 56 No. 126	1.0	mg/L	01-Dec-90	WAC 173-200
Beryllium	7440-41-7	0.004	mg/L	17-Jan-94	FR v. 57 No.138	0.004	mg/L	17-Jan-94	WAC 173-200
Cadmium	7440-43-9	0.005	mg/L	30-Jul-92	FR v. 56 No. 20	0.005	mg/L	01-Dec-90	WAC 173-200
Chromium	7440-47-3	0.1	mg/L	30-Jul-92	FR v. 56 No. 20	0.05	mg/L	01-Dec-90	WAC 173-200
Copper	7440-50-8	1.3**	mg/L	7-Dec-92	FR v. 57 No. 125	1.0	mg/L	01-Dec-90	WAC 173-200
Cyanide	57-12-5	0.2	mg/L	17-Jan-94	FR v. 57 No.138	0.2	mg/L	17-Jan-94	WAC 173-200
Fluoride	16984-48-8	4.0	mg/L	2-Oct-87	40 CFR 141	4.0	mg/L	01-Dec-90	WAC 173-200
Lead	7439-92-1	0.015**	mg/L	7-Dec-92	FR v. 57 No. 125	0.015	mg/L	01-Dec-90	WAC 173-200
Mercury	7439-97-6	0.002	mg/L	2-Apr-86	40 CFR 141	0.002	mg/L	01-Dec-90	WAC 173-200
Nickel	7440-02-0	0.1	mg/L	17-Jan-94	FR v. 57 No.138	0.1	mg/L	17-Jan-94	WAC 173-200
Nitrate	14797-55-8	10.0	mg/L	2-Apr-86	FR v. 56 No. 20	10.0	mg/L	01-Dec-90	WAC 173-200
Nitrate and Nitrite	14797-55-8+14797-65-0	10.0	mg/L	30-Jul-92	FR v. 56 No. 20	10.0	mg/L	30-Jul-92	WAC 173-200
Nitrite	14797-65-0	1	mg/L	30-Jul-92	FR v. 56 No. 20	1.0	mg/L	30-Jul-92	WAC 173-200
Selenium	7782-49-2	0.05	mg/L	30-Jul-92	FR v. 56 No. 20	0.01	mg/L	01-Dec-90	WAC 173-200
Silver	7440-22-4	--				0.05	mg/L	01-Dec-90	WAC 173-200
Sodium	7440-23-5	20***	mg/L	20-Sep-04		20***	mg/L	03-Jul-04	WAC 246-290
Thallium	7440-28-0	0.002	mg/L	17-Jan-94	FR v. 57 No.138	0.002	mg/L	17-Jan-94	WAC 173-200
Total Coliforms		1/100	mL	24-Dec-75	40 CFR 141	1/100	mL	01-Dec-90	WAC 173-200
Turbidity		1	NTU	24-Dec-75	40 CFR 141	--	--	--	--
B. Organic Chemicals									
Alachlor	15972-60-8	2	µg/L	30-Jul-92	FR v. 56 No. 20	2	µg/L	30-Jul-92	WAC 173-200
Atrazine	1912-24-9	3	µg/L	30-Jul-92	FR v. 56 No. 20	3	µg/L	30-Jul-92	WAC 173-200
Benzene c	71-43-2	5	µg/L	9-Jan-89	40 CFR 141	1	µg/L	01-Dec-90	WAC 173-200
Bis(2-ethylhexyl)phthalate	117-81-7	6	µg/L	17-Jan-94	FR v. 57 No.138	6	µg/L	01-Dec-90	WAC 173-200
Bromodichloromethane c	75-27-4	--				0.3	µg/L	01-Dec-90	WAC 173-200
Bromoform c	75-25-2	--				5	µg/L	01-Dec-90	WAC 173-200
Carbofuran	1563-66-2	40	µg/L	30-Jul-92	FR v. 56 No. 20	40	µg/L	30-Jul-92	WAC 173-200
Carbon Tetrachloride c	56-23-5	5	µg/L	9-Jan-89	40 CFR 141	0.3	µg/L	01-Dec-90	WAC 173-200
Chlordane c	5103-71-9	2	µg/L	30-Jul-92	FR v. 56 No. 20	0.06	µg/L	01-Dec-90	WAC 173-200
Chlorobenzene	108-90-7	100	µg/L	30-Jul-92	FR v. 56 No. 20	100	µg/L	30-Jul-92	WAC 173-200
Chlorodibromomethane c	124-48-1	--				0.5	µg/L	01-Dec-90	WAC 173-200
Chloroform c	67-66-3	--				7	µg/L	01-Dec-90	WAC 173-200
2,4-D	94-75-7	70	µg/L	30-Jul-92	FR v. 56 No. 20	70	µg/L	01-Dec-90	WAC 173-200
Dalapon	75-99-0	200	µg/L	17-Jan-94	FR v. 57 No.138	200	µg/L	17-Jan-94	WAC 173-200
1,2-Dibromo-3-chloropropane	96-12-8	0.2	µg/L	30-Jul-92	FR v. 56 No. 20	0.2	µg/L	30-Jul-92	WAC 173-200
1,2-Dichlorobenzene	95-50-1	600	µg/L	30-Jul-92	FR v. 56 No. 20	600	µg/L	30-Jul-92	WAC 173-200
1,4-Dichlorobenzene c	106-46-7	75	µg/L	9-Jan-89	40 CFR 141	4	µg/L	01-Dec-90	WAC 173-200
1,1-Dichloroethane c	75-34-3	--				1	µg/L	01-Dec-90	WAC 173-200
1,2-Dichloroethane c	107-06-2	5	µg/L	9-Jan-89	40 CFR 141	0.5	µg/L	01-Dec-90	WAC 173-200
1,1-Dichloroethene	75-35-4	7	µg/L	9-Jan-89	40 CFR 141	7	µg/L	01-Dec-90	WAC 173-200
c-1,2-Dichloroethene	156-59-2	70	µg/L	30-Jul-92	FR v. 56 No. 20	70	µg/L	30-Jul-92	WAC 173-200
t-1,2-Dichloroethene	156-60-5	100	µg/L	30-Jul-92	FR v. 56 No. 20	100	µg/L	30-Jul-92	WAC 173-200
1,2-Dichloropropane c	78-87-5	5	µg/L	30-Jul-92	FR v. 56 No. 20	0.6	µg/L	01-Dec-90	WAC 173-200
1,3-Dichloropropene tot. c	542-75-6	--				0.2	µg/L	01-Dec-90	WAC 173-200
Di(ethylhexyl)adipate	103-23-1	400	µg/L	17-Jan-94	FR v. 57 No.138	400	µg/L	17-Jan-94	WAC 173-200
Dinoseb	88-85-7	7	µg/L	17-Jan-94	FR v. 57 No.138	7	µg/L	17-Jan-94	WAC 173-200
Diquat	231-36-7	20	µg/L	17-Jan-94	FR v. 57 No.138	20	µg/L	17-Jan-94	WAC 173-200
Endothall	145-73-3	100	µg/L	17-Jan-94	FR v. 57 No.138	100	µg/L	17-Jan-94	WAC 173-200
Endrin	72-20-8	2	µg/L	17-Jan-94	40 CFR 141	0.2	µg/L	01-Dec-90	WAC 173-200
Ethylbenzene	100-41-4	700	µg/L	30-Jul-92	FR v. 56 No. 20	700	µg/L	30-Jul-92	WAC 173-200
Ethylene dibromide c	106-93-4	0.05	µg/L	30-Jul-92	FR v. 56 No. 20	0.001	µg/L	01-Dec-90	WAC 173-200
Glyphosate	1071-83-6	70	µg/L	17-Jan-94	FR v. 57 No.138	70	µg/L	17-Jan-94	WAC 173-200
Heptachlor c	76-44-8	0.4	µg/L	30-Jul-92	FR v. 56 No. 20	0.02	µg/L	01-Dec-90	WAC 173-200
Heptachlor epoxide c	1024-57-3	0.2	µg/L	30-Jul-92	FR v. 56 No. 20	0.009	µg/L	01-Dec-90	WAC 173-200
Hexachlorobenzene	118-74-1	1	µg/L	17-Jan-94	FR v. 57 No.138	0.05	µg/L	01-Dec-90	WAC 173-200
Hexachlorocyclopentadiene (HEX)	77-47-4	50	µg/L	17-Jan-94	FR v. 57 No.138	50	µg/L	17-Jan-94	WAC 173-200
Lindane c	58-89-9	0.2	µg/L	30-Jul-92	FR v. 56 No. 20	0.06	µg/L	01-Dec-90	WAC 173-200

Water Quality Standards

Analyte	CAS No.	National Drinking Water Regulation MCL		Eff. Date	Ref.	Washington State Groundwater Quality Criteria Criterion*		Eff. Date	Ref.
Methoxychlor	72-43-5	40	µg/L	30-Jul-92	FR v. 56 No. 20	40	µg/L	30-Jul-92	WAC 173-200
Methylene Chloride c	75-09-2	5	µg/L	17-Jan-94	FR v. 57 No.138	5	µg/L	17-Jan-94	WAC 173-200
Oxamyl (vydate)	23135-22-0	200	µg/L	17-Jan-94	FR v. 57 No.138	200	µg/L	17-Jan-94	WAC 173-200
PAHs [Benzo(a)pyrene]		0.2	µg/L	17-Jan-94	FR v. 57 No.138	0.01	µg/L	17-Jan-94	WAC 173-200
PCBs c	27323-18-8	0.5	µg/L	30-Jul-92	FR v. 56 No. 20	0.01	µg/L	01-Dec-90	WAC 173-200
Pentachlorophenol	87-86-5	1	µg/L	1-Jan-93	FR v. 56 No. 126	1	µg/L	01-Jan-93	WAC 173-200
Picloram	1918-02-1	500	µg/L	17-Jan-94	FR v. 57 No.138	500	µg/L	17-Jan-94	WAC 173-200
Simazine	122-34-9	4	µg/L	17-Jan-94	FR v. 57 No.138	4	µg/L	17-Jan-94	WAC 173-200
Styrene	100-42-5	100	µg/L	30-Jul-92	FR v. 56 No. 20	100	µg/L	30-Jul-92	WAC 173-200
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	3E-05	µg/L	17-Jan-94	FR v. 57 No.138	0.0000006	µg/L	01-Dec-90	WAC 173-200
Tetrachloroethylene c	127-18-4	5	µg/L	30-Jul-92	FR v. 56 No. 20	0.8	µg/L	30-Jul-92	WAC 173-200
Toluene	108-88-3	1000	µg/L	30-Jul-92	FR v. 56 No. 20	1000	µg/L	30-Jul-92	WAC 173-200
Total Trihalomethanes c	75-27-4, 75-25-2, 124-48-1, 67-66-3	100	µg/L	29-Nov-79	40 CFR 141	--	--	--	--
Toxaphene c	8001-35-2	3	µg/L	30-Jul-92	FR v. 56 No. 20	0.08	µg/L	01-Dec-90	WAC 173-200
2,4,5-TP	93-72-1	50	µg/L	30-Jul-92	FR v. 56 No. 20	100	µg/L	01-Dec-90	WAC 173-200
1,2,4-Trichlorobenzene	120-82-1	70	µg/L	17-Jan-94	FR v. 57 No.138	70	µg/L	17-Jan-94	WAC 173-200
1,1,1-Trichloroethane	71-55-6	200	µg/L	9-Jan-89	40 CFR 141	200	µg/L	01-Dec-90	WAC 173-200
1,1,2-Trichloroethane	79-00-5	5	µg/L	17-Jan-94	FR v. 57 No.138	5	µg/L	17-Jan-94	WAC 173-200
Trichloroethylene (TCE) c	79-01-6	5	µg/L	9-Jan-89	40 CFR 141	3	µg/L	01-Dec-90	WAC 173-200
Vinyl chloride c	75-01-4	2	µg/L	9-Jan-89	40 CFR 141	0.02	µg/L	01-Dec-90	WAC 173-200
Xylenes (total)	1330-20-7	10000	µg/L	30-Jul-92	FR v. 56 No. 20	10000	µg/L	30-Jul-92	WAC 173-200
C. Radionuclides and Radioactivity									
Radium 226 & Radium 228		5	pCi/L	9-Jul-76	FR v. 41 No. 133	5	pCi/L	01-Dec-90	WAC 173-200
Radium 226	13982-63-3	--				3	pCi/L	01-Dec-90	WAC 173-200
Radium 228	15262-20-1	--				5	pCi/L	01-Dec-90	WAC 173-200
Gross Alpha particle activity		15	pCi/L	9-Jul-76	FR v. 41 No. 133	15	pCi/L	01-Dec-90	WAC 173-200
Tritium	10028-17-8	20,000	pCi/L	9-Jul-76	FR v. 41 No. 133	20,000	pCi/L	01-Dec-90	WAC 173-200
Strontium	7440-24-6	8	pCi/L	9-Jul-76	FR v. 41 No. 133	8	pCi/L	01-Dec-90	WAC 173-200
Gross Beta particle activity		50	pCi/L	9-Jul-76	FR v. 41 No. 133	50	pCi/L	01-Dec-90	WAC 173-200
D. Additional Carcinogens Listed in Groundwater Criteria									
Acrylamide	79-06-1	--				0.02	µg/L	01-Dec-90	WAC 173-200
Acrylonitrile	107-13-1	--				0.07	µg/L	01-Dec-90	WAC 173-200
Aldrin	309-00-2	--				0.005	µg/L	01-Dec-90	WAC 173-200
Aniline	62-53-3	--				14	µg/L	01-Dec-90	WAC 173-200
Aramite	140-57-8	--				3	µg/L	01-Dec-90	WAC 173-200
Azobenzene	103-33-3	--				0.7	µg/L	01-Dec-90	WAC 173-200
Benzidine	92-87-5	--				0.0004	µg/L	01-Dec-90	WAC 173-200
Benzo(a)pyrene	50-32-8	--				0.008	µg/L	01-Dec-90	WAC 173-200
Benzotrichloride	98-07-7	--				0.007	µg/L	01-Dec-90	WAC 173-200
Benzyl chloride	100-44-7	--				0.5	µg/L	01-Dec-90	WAC 173-200
Bis(chloroethyl)ether	111-44-4	--				0.07	µg/L	01-Dec-90	WAC 173-200
Bis(chloromethyl)ether	542-88-1	--				0.0004	µg/L	01-Dec-90	WAC 173-200
Carbazole	86-74-8	--				5	µg/L	01-Dec-90	WAC 173-200
4-Chloro-2-methyl analine	95-69-2	--				0.1	µg/L	01-Dec-90	WAC 173-200
4-Chloro-2-methyl analine hydrochloride	3165-93-3	--				0.2	µg/L	01-Dec-90	WAC 173-200
o-Chloronitrobenzene	88-73-3	--				3	µg/L	01-Dec-90	WAC 173-200
p-Chloronitrobenzene	100-00-5	--				5	µg/L	01-Dec-90	WAC 173-200
Chlorthalonil	1897-45-6	--				30	µg/L	01-Dec-90	WAC 173-200
Diallate	2303-16-4	--				1	µg/L	01-Dec-90	WAC 173-200
DDT (includes DDE and DDD)	50-29-3, 72-55-9, 72-54-8	--				0.3	µg/L	01-Dec-90	WAC 173-200
1,2-Dibromomethane	106-93-4	--				0.001	µg/L	01-Dec-90	WAC 173-200
3,3'-Dichlorobenzidine	91-94-1	--				0.2	µg/L	01-Dec-90	WAC 173-200
Dichlorovos	62-73-7	--				0.3	µg/L	01-Dec-90	WAC 173-200
Dieldrin	60-57-1	--				0.005	µg/L	01-Dec-90	WAC 173-200
3,3'-Dimethoxybenzidine	119-90-4	--				6.0	µg/L	01-Dec-90	WAC 173-200
3,3-Dimethylbenzidine	119-93-7	--				0.007	µg/L	01-Dec-90	WAC 173-200
1,2-Dimethylhydrazine	540-73-8	--				60	µg/L	01-Dec-90	WAC 173-200
2,4-Dinitrotoluene	121-14-2	--				0.1	µg/L	01-Dec-90	WAC 173-200
2,6-Dinitrotoluene	606-20-2	--				0.1	µg/L	01-Dec-90	WAC 173-200
1,4-Dioxane	123-91-1	--				7	µg/L	01-Dec-90	WAC 173-200
1,2-Diphenylhydrazine	122-66-7	--				0.09	µg/L	01-Dec-90	WAC 173-200

Water Quality Standards

Analyte	CAS No.	National Drinking Water Regulation MCL		Eff. Date	Ref.	Washington State Groundwater Quality Criteria Criterion*		Eff. Date	Ref.
Direct Black 38	1937-37-7	--				0.009	µg/L	01-Dec-90	WAC 173-200
Direct Blue 6	2602-46-2	--				0.009	µg/L	01-Dec-90	WAC 173-200
Direct Brown 95	16071-86-6	--				0.009	µg/L	01-Dec-90	WAC 173-200
Epichlorohydrin	106-89-8	--				8	µg/L	01-Dec-90	WAC 173-200
Ethyl acrylate	140-88-5	--				2	µg/L	01-Dec-90	WAC 173-200
Ethylene thiourea	96-45-7	--				2	µg/L	01-Dec-90	WAC 173-200
Folpet	133-07-3	--				20	µg/L	01-Dec-90	WAC 173-200
Furazolidone	67-45-8	--				0.02	µg/L	01-Dec-90	WAC 173-200
Furium	531-82-8	--				0.002	µg/L	01-Dec-90	WAC 173-200
Furmecyclox	60568-05-0	--				3	µg/L	01-Dec-90	WAC 173-200
Hexachlorocyclohexane (alpha)	319-84-6	--				0.001	µg/L	01-Dec-90	WAC 173-200
Hexachlorocyclohexane (technical)	608-73-1	--				0.05	µg/L	01-Dec-90	WAC 173-200
Hexachlorodibenzo-p-dioxin, mix	34465-46-8	--				0.00001	µg/L	01-Dec-90	WAC 173-200
Hydrazine/hydrazine sufate	302-01-2/10034-93-2	--				0.03	µg/L	01-Dec-90	WAC 173-200
2-Methoxy-5-nitroanaline	99-59-2	--				2.0	µg/L	01-Dec-90	WAC 173-200
2-Methylaniline	95-53-4	--				0.2	µg/L	01-Dec-90	WAC 173-200
2-Methylaniline hydrochloride	636-21-5	--				0.5	µg/L	01-Dec-90	WAC 173-200
4,4'-Methylene bis(N,N'-dimethyl) aniline	101-61-1	--				2.0	µg/L	01-Dec-90	WAC 173-200
Mirex	2385-85-5	--				0.05	µg/L	01-Dec-90	WAC 173-200
Nitrofurazone	59-87-0	--				0.06	µg/L	01-Dec-90	WAC 173-200
N-Nitrosodiethanolamine	1116-54-7	--				0.03	µg/L	01-Dec-90	WAC 173-200
N-Nitrosodiethylamine	55-18-5	--				0.0005	µg/L	01-Dec-90	WAC 173-200
N-Nitrosodimethylamine	62-75-9	--				0.002	µg/L	01-Dec-90	WAC 173-200
N-Nitrosodiphenylamine	86-30-6	--				17.0	µg/L	01-Dec-90	WAC 173-200
N-Nitroso-di-n-propylamine	621-64-7	--				0.01	µg/L	01-Dec-90	WAC 173-200
N-Nitrosopyrrolidine	930-55-2	--				0.04	µg/L	01-Dec-90	WAC 173-200
N-Nitroso-di-n-butylamine	924-16-3	--				0.02	µg/L	01-Dec-90	WAC 173-200
N-Nitroso-N-methylethylylamine	10595-95-6	--				0.004	µg/L	01-Dec-90	WAC 173-200
PBBs	59536-65-1	--				0.01	µg/L	01-Dec-90	WAC 173-200
o-Phenylenediamine	95-54-5	--				0.005	µg/L	01-Dec-90	WAC 173-200
Propylene oxide	75-56-9	--				0.01	µg/L	01-Dec-90	WAC 173-200
p,a,a,a-Tetrachlorotoluene	5216-25-1	--				0.004	µg/L	01-Dec-90	WAC 173-200
2,4-Toluenediamine	95-80-7	--				0.002	µg/L	01-Dec-90	WAC 173-200
o-Toluidine	95-53-4	--				0.2	µg/L	01-Dec-90	WAC 173-200
2,4,6-Trichlorophenol	88-06-2	--				4.0	µg/L	01-Dec-90	WAC 173-200
Trimethyl phosphate	512-56-1	--				2.0	µg/L	01-Dec-90	WAC 173-200
Secondary Standards									
Aluminum	7429-90-5	0.05-0.2	mg/L	30-Jul-92	FR v. 56 No. 20	0.05-0.2	mg/L	30-Jul-92	WAC 173-200
Copper	7440-50-8	1.0	mg/L	7-Dec-92	FR v. 57 No. 125	1.0	mg/L	01-Dec-90	WAC 173-200
Iron	7439-89-6	0.3	mg/L	2-Apr-86	40 CFR 143	0.3	mg/L	01-Dec-90	WAC 173-200
Manganese	7439-96-5	0.05	mg/L	2-Apr-86	40 CFR 143	0.05	mg/L	01-Dec-90	WAC 173-200
Color		15	units	2-Apr-86	40 CFR 143	15	units	01-Dec-90	WAC 173-200
pH	12408-02-5	6.5-8.5	units	2-Apr-86	40 CFR 143	6.5-8.5	units	01-Dec-90	WAC 173-200
Specific Conductivity		--				700	µS/cm		WAC 246-290
Total Dissolved Solids		500	mg/L	2-Apr-86	40 CFR 143	500	mg/L	01-Dec-90	WAC 173-200
Chloride	16887-00-6	250	mg/L	2-Apr-86	40 CFR 143	250	mg/L	01-Dec-90	WAC 173-200
Fluoride	16984-48-8	2.0	mg/L	2-Apr-86	40 CFR 143	p			
Silver	7440-22-4	0.1	mg/L	30-Jul-92	FR v. 56 No. 20	p			
Sulfate	14808-79-8	250	mg/L	2-Apr-86	40 CFR 143	250	mg/L	01-Dec-90	WAC 173-200
Surfactants		0.5	mg/L	2-Apr-86	40 CFR 143	0.5	mg/L	01-Dec-90	WAC 173-200
Corrosivity		non-corrosive		2-Apr-86	40 CFR 143	non-corrosive		01-Dec-90	WAC 173-200
Odor-Threshold		3	units	2-Apr-86	40 CFR 143	3	units	01-Dec-90	WAC 173-200
Zinc	7440-66-6	5.0	mg/L	2-Apr-86	40 CFR 143	5.0	mg/L	01-Dec-90	WAC 173-200

NOTES:

p = Listed as a primary standard
c = Listed as a carcinogen in the Washington State Groundwater Quality Criteria
-- = no standard established
* = Criteria shall be the most stringent concentration of the Federal MCLG, MCL, or State MCL
** = treatment technique in lieu of an MCL
*** = A Drinking Water Advisory, not an enforceable standard.
National Primary and Secondary Drinking Water Regulations (40 CFR Parts 141 and 143)
Washington State Groundwater Quality Criteria = Water Quality Standards for Groundwaters of the State of Washington (WAC 173-200)

mg/L = milligrams per liter
mf/L = million fibers per liter
mL = milliliter
NTU = Nephelometric Turbidity Unit
µg/L = micrograms per liter
pCi/L = per liter
µS/cm = microSiemen per centimeter
units = standard unit for either color, pH, or odor
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal

Compiled by KCSWD 1/12/94. Revised 12/13/19

KING COUNTY SOLID WASTE DIVISION
QUALIFIER INFORMATION
(Effective 8/27/2015)

QUAL	QUALIFIER DESCRIPTION
U	Undetected; Analyte Concentration Less than Method Detection Limit (< MDL)
T	Estimated; Less than Reporting Detection Limit (<RDL) but Greater than Method Detection Limit (> MDL)
J	Reported Value is an Estimate
B	Matrix Target Analyte Present in Blank, AND, Sample Result Less than or Equal to 10x Blank Detection
C	Confluent Growth
E	Estimated; Outside Expected Accuracy
H	Exceeds Holding Time
R	Data Rejected
S	Sample Handling Errors
X	Too Numerous to Count
D	Re-analysis Due to Dilution
P	PASS – Qualitative Result Acceptable
F	FAIL – Qualitative Result is not Acceptable
G	Estimated with Low Bias (Coliform; BOD; All Other Chemistry Parameters)
L	Estimated with High Bias (BOD; All Other Chemistry Parameters)

Appendix B

Exceedance Reports

Summary of Groundwater Quality Criteria Exceedances

Summary of Groundwater Prediction Limit Exceedances

Summary of Groundwater Volatile Organic Compound Detections Exceedances

Summary of Surface Water Monitoring Location Exceedances vs. Surface Water Quality Standards

Table B-1
Channel Cc1: Summary of Groundwater Regulatory Standard Exceedances
January 1, 2019 - December 31, 2019

Parameter	Units	Site ID	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded Numerical Limit
pH (Field)	std. Units	MW-3	1/24/2019	5.79	MCL2; SGWC2	< 6.5, or > 8.5
			5/7/2019	5.82		
Arsenic, Total	mg/L	MW-3	1/24/2019	0.0000691	SGWC1	0.00005
			5/7/2019	0.0000904		
		MW-4	2/27/2019	0.00033	SGWC1	0.00005
			5/8/2019	0.000335		
			11/4/2019	0.00036		
		MW-10	1/23/2019	0.00153	SGWC1	0.00005
			5/7/2019	0.00157		
			8/30/2019	0.00158		
			11/1/2019	0.00153		
		MW-13	1/23/2019	0.0021	SGWC1	0.00005
			5/7/2019	0.00187		
			8/16/2019	0.0019		
			11/4/2019	0.00198		

Notes:
MCL1 - National Primary Drinking Water Regulation Maximum Contaminant Level
MCL2 - National Secondary Drinking Water Regulation Maximum Contaminant Level
SGWC1 - Washington State Primary Groundwater Quality Criterion
SGWC2 - Washington State Secondary Groundwater Quality Criterion
See Analytical Data Qualifier Page for Data Qualifier Information (Page A-4, Appendix A)

Table B-2
Channel Cc2: Summary of Groundwater Regulatory Standard Exceedances
January 1, 2019 - December 31, 2019

Parameter	Units	Site ID	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded Numerical Limit
Specific Conductance (Field)	umhos/cm	MW-33	2/27/2019	770.3	SGWC2	700
			5/10/2019	762		
			8/30/2019	761.8		
			11/6/2019	748		
		MW-35	8/30/2019	716	SGWC2	700
			11/6/2019	749		
Arsenic, Total	mg/L	MW-2	3/20/2019	0.000803	SGWC1	0.00005
			5/10/2019	0.000701		
			8/30/2019	0.000827		
			11/6/2019	0.000926		
		MW-9	1/28/2019	0.00225	SGWC1	0.00005
			5/8/2019	0.00232		
			8/15/2019	0.00237		
			11/4/2019	0.0024		
		MW-20	1/29/2019	0.00319	SGWC1	0.00005
			5/10/2019	0.00234		
			8/30/2019	0.00309		
			11/6/2019	0.00252		
		MW-21	2/27/2019	0.00264	SGWC1	0.00005
			5/10/2019	0.00386		
			8/30/2019	0.00238		
			11/6/2019	0.00179		
		MW-33	2/27/2019	0.0382	MCL1; SGWC1	0.01, 0.00005
			5/10/2019	0.0372		
			8/30/2019	0.0397		
			11/6/2019	0.0381		
		MW-35	2/27/2019	0.0335	MCL1; SGWC1	0.01, 0.00005
			5/10/2019	0.0298		
			8/30/2019	0.0298		
			11/6/2019	0.0289		
Iron, Dissolved	mg/L	MW-20	1/29/2019	0.332	MCL2; SGWC2	0.3; 0.3
		MW-21	11/6/2019	0.42	MCL2; SGWC2	0.3; 0.3
		MW-33	2/27/2019	6.91	MCL2; SGWC2	0.3; 0.3
			5/10/2019	7.08		
			8/30/2019	6.51		
			11/6/2019	7.28		
		MW-35	2/27/2019	15.8	MCL2; SGWC2	0.3; 0.3
			5/10/2019	15.9		
			8/30/2019	13.7		
			11/6/2019	14.5		
Manganese, Dissolved	mg/L	MW-2	3/20/2019	0.154	MCL2; SGWC2	0.05; 0.05
			5/10/2019	0.224		
			8/30/2019	0.248		
			11/6/2019	0.187		
		MW-20	1/29/2019	0.225	MCL2; SGWC2	0.05; 0.05
			5/10/2019	0.174		
			8/30/2019	0.154		
			11/6/2019	0.152		
		MW-21	2/27/2019	0.165	MCL2; SGWC2	0.05; 0.05
			5/10/2019	0.282		
			8/30/2019	0.48		
			11/6/2019	0.52		
		MW-33	2/27/2019	0.997	MCL2; SGWC2	0.05; 0.05
			5/10/2019	1.01		
			8/30/2019	0.945		
			11/6/2019	0.944		
		MW-35	2/27/2019	2.39	MCL2; SGWC2	0.05; 0.05
			5/10/2019	2.5		
			8/30/2019	2.29		
			11/6/2019	2.38		

Table B-2 ***(continued)***
Channel Cc2: Summary of Groundwater Regulatory Standard Exceedances
January 1, 2019 - December 31, 2019

1,1-Dichloroethane	ug/L	MW-33	2/27/2019	1.61	SGWC1	1.0
			5/10/2019	1.4		
			8/30/2019	1.57		
			11/6/2019	1.67		
1,2-Dichloropropane	ug/L	MW-33	2/27/2019	7.42	MCL1; SGWC1	5.0; 0.6
			5/10/2019	6.58		
			8/30/2019	7.41		
			11/6/2019	8.09		
		MW-35	2/27/2019	1.33	SGWC1	0.6
			5/10/2019	1.14		
			8/30/2019	1.12		
			11/6/2019	0.888		
Benzene	ug/L	MW-33	2/27/2019	1.08	SGWC1	1.0
			8/30/2019	1		
			11/6/2019	1.06		
		MW-35	2/27/2019	1.17	SGWC1	1.0
Bis(2-Chloroethyl)ether	ug/L	MW-33	11/6/2019	3.15	SGWC1	0.7
		MW-35	11/6/2019	1.06	SGWC1	0.7
Vinyl Chloride	ug/L	MW-2	3/20/2019	0.0834	SGWC1	0.02
			5/10/2019	0.132 D		
			8/30/2019	0.113		
			11/6/2019	0.0549 D		
		MW-21	2/27/2019	0.0557	SGWC1	0.02
			5/10/2019	0.0681 D		
			8/30/2019	0.0708		
			11/6/2019	0.084 D		
		MW-33	2/27/2019	34.1	MCL1; SGWC1	2.0; 0.02
			5/10/2019	31.3 D		
			8/30/2019	30.4		
			11/6/2019	30.5 D		
		MW-35	2/27/2019	4	MCL1; SGWC1	2.0; 0.02
			5/10/2019	4.15		
			8/30/2019	4.83		
			11/6/2019	5.41 D		

Notes:
MCL1 - National Primary Drinking Water Regulation Maximum Contaminant Level
MCL2 - National Secondary Drinking Water Regulation Maximum Contaminant Level
SGWC1 - Washington State Primary Groundwater Quality Criterion
SGWC2 - Washington State Secondary Groundwater Quality Criterion
See Analytical Data Qualifier Page for Data Qualifier Information (Page A-4, Appendix A)

Table B-3
Channel Cc3: Summary of Groundwater Regulatory Standard Exceedances

January 1, 2019 - December 31, 2019

Parameter	Units	Site ID	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded Numerical Limit
pH (Field)	Std pH Units	MW-8	8/14/2019	6.22	MCL2; SGWC2	< 6.5, or > 8.5
Arsenic, Total	mg/L	MW-8	1/22/2019	0.000493	SGWC1	0.00005
			5/7/2019	0.000487		
			8/14/2019	0.000508		
			11/1/2019	0.000472		
		MW-36	1/23/2019	0.00178	SGWC1	0.00005
			5/7/2019	0.0017		
			8/29/2019	0.00174		
			11/5/2019	0.00175		

Notes:

MCL1 - National Primary Drinking Water Regulation Maximum Contaminant Level
MCL2 - National Secondary Drinking Water Regulation Maximum Contaminant Level
SGWC1 - Washington State Primary Groundwater Quality Criterion
SGWC2 - Washington State Secondary Groundwater Quality Criterion
See Analytical Data Qualifier Page for Data Qualifier Information (Page A-4, Appendix A)

Table B-4
Unit D Aquifer: Summary of Groundwater Regulatory Standard Exceedances
January 1, 2019 - December 31, 2019

Parameter	Units	Site ID	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded Numerical Limit
Arsenic, Total	mg/L	MW-7	1/23/2019	0.00505	SGWC1	0.00005
			5/8/2019	0.00499		
			8/29/2019	0.00512		
			11/4/2019	0.00526		
		MW-12	1/24/2019	0.00205	SGWC1	0.00005
			5/7/2019	0.00205		
			8/15/2019	0.00209		
			11/4/2019	0.00209		
		MW-19	1/28/2019	0.00135	SGWC1	0.00005
			5/8/2019	0.00154		
			8/14/2019	0.00137		
			11/4/2019	0.00147		
		MW-26	1/24/2019	0.00455	SGWC1	0.00005
			5/10/2019	0.00617		
			8/30/2019	0.00345		
			11/5/2019	0.00527		
		MW-29	1/28/2019	0.015	MCL1; SGWC1	0.01; 0.00005
			5/10/2019	0.013		
			8/29/2019	0.0155		
			11/4/2019	0.00685	SGWC1	0.00005
		MW-34	1/22/2019	0.00131	SGWC1	0.00005
			5/7/2019	0.00145		
			8/29/2019	0.00132		
			11/5/2019	0.00127		
Iron, Dissolved	mg/L	MW-29	1/28/2019	0.848	MCL2; SGWC2	0.3; 0.3
			5/10/2019	0.876		
			8/29/2019	0.932		
			11/4/2019	0.842		
Manganese, Dissolved	mg/L	MW-7	1/23/2019	0.164	MCL2; SGWC2	0.05; 0.05
			5/8/2019	0.159		
			8/29/2019	0.126		
			11/4/2019	0.133		
		MW-19	1/28/2019	0.51	MCL2; SGWC2	0.05; 0.05
			5/8/2019	0.438		
			8/14/2019	0.481		
			11/4/2019	0.494		
		MW-26	1/24/2019	0.0678	MCL2; SGWC2	0.05; 0.05
			5/10/2019	0.0679		
			8/30/2019	0.0617		
			11/5/2019	0.0686		
		MW-29	1/28/2019	0.0989	MCL2; SGWC2	0.05; 0.05
			5/10/2019	0.116		
			8/29/2019	0.0978		
			11/4/2019	0.0883		

Notes:
MCL1 - National Primary Drinking Water Regulation Maximum Contaminant Level
MCL2 - National Secondary Drinking Water Regulation Maximum Contaminant Level
SGWC1 - Washington State Primary Groundwater Quality Criterion
SGWC2 - Washington State Secondary Groundwater Quality Criterion
See Analytical Data Qualifier Page for Data Qualifier Information (Page A-4, Appendix A)

Table B-5
Channel Cc2: Summary of Groundwater Prediction Limit Exceedances
Interwell

January 1, 2019 - December 31, 2019

Parameter	Units	Well ID	Sample Date	Sample Value	Prediction Limit (PL) Value
pH (Field)	std. Units	MW-2	11/6/2019	6.50	6.95 (lower prediction limit)
		MW-20	8/30/2019	6.87	
		MW-21	5/10/2019	6.61	
			11/6/2019	6.59	
		MW-33	2/27/2019	6.64	
			5/10/2019	6.83	
			8/30/2019	6.69	
			11/6/2019	6.63	
		MW-35	2/27/2019	6.61	
			5/10/2019	6.62	
			8/30/2019	6.73	
			11/6/2019	6.68	
		MW-9	5/8/2019	6.88	
Specific Conductance (Field)	umhos/cm	MW-2	3/20/2019	305.5	242.1
			5/10/2019	310.5	
			8/30/2019	304.6	
			11/6/2019	315.6	
		MW-21	2/27/2019	266.9	
			5/10/2019	278.7	
			8/30/2019	289.3	
			11/6/2019	300.8	
		MW-33	2/27/2019	770.3	
			5/10/2019	762	
			8/30/2019	761.8	
			11/6/2019	748	
		MW-35	2/27/2019	670	
			5/10/2019	688	
			11/6/2019	749	
Alkalinity, Total (as CaCO3)	mg/L	MW-2	3/20/2019	137	94.9
			5/10/2019	146	
			8/30/2019	136	
			11/6/2019	138	
		MW-21	2/27/2019	122	
			5/10/2019	128	
			8/30/2019	128	
			11/6/2019	137	
		MW-33	2/27/2019	395	
			5/10/2019	398	
			8/30/2019	390	
			11/6/2019	391	
		MW-35	2/27/2019	330	
			5/10/2019	342	
			8/30/2019	346	
			11/6/2019	359	
Ammonia	mg/L	MW-33	8/30/2019	0.034	0.0322
		MW-35	2/27/2019	0.0664	
			5/10/2019	0.0647	
			8/30/2019	0.071	
			11/6/2019	0.058	

Table B-5 ***(continued)***
Channel Cc2: Summary of Groundwater Prediction Limit Exceedances
Interwell

January 1, 2019 - December 31, 2019

Parameter	Units	Well ID	Sample Date	Sample Value	Prediction Limit (PL) Value
Chloride	mg/L	MW-35	5/10/2019	4.21	4.09
			8/30/2019	4.2	
			11/6/2019	4.15	
		MW-9	1/28/2019	4.4	
			5/8/2019	4.56	
			8/15/2019	4.29	
			11/4/2019	4.26	
Nitrate-Nitrogen (NO3 as N)	mg/L	MW-2	8/30/2019	0.064	0.05
			11/6/2019	0.174	
		MW-21	2/27/2019	0.193	
			5/10/2019	0.211	
			8/30/2019	0.356	
			11/6/2019	0.450	
		MW-9	1/28/2019	0.355	
			5/8/2019	0.379	
			8/15/2019	0.359	
			11/4/2019	0.323	
Sulfate	mg/L	MW-35	2/27/2019	21.1	18.33
			5/10/2019	21.6	
			8/30/2019	22.20	
			11/6/2019	22.10	
Total Dissolved Solids	mg/L	MW-2	3/20/2019	178	159.86
			5/10/2019	184	
			8/30/2019	170	
			11/6/2019	184	
		MW-21	2/27/2019	173	
			5/10/2019	178	
			8/30/2019	179	
			11/6/2019	192	
		MW-33	2/27/2019	447	
			5/10/2019	453	
			8/30/2019	443	
			11/6/2019	434	
		MW-35	2/27/2019	407	
			5/10/2019	423	
			8/30/2019	427	
			11/6/2019	438	
Total Organic Carbon	mg/L	MW-35	2/27/2019	3.81	2.33
			5/10/2019	3.3	
			8/30/2019	3.32	
			11/6/2019	4.15	
Total Solids	mg/L	MW-33	2/27/2019	469	286
			5/10/2019	479	
			8/30/2019	466	
			11/6/2019	459	
		MW-35	2/27/2019	440	
			5/10/2019	459	
			8/30/2019	497	
			11/6/2019	489	

Table B-5 *(continued)*

Channel Cc2: Summary of Groundwater Prediction Limit Exceedances

Interwell

January 1, 2019 - December 31, 2019

Parameter	Units	Well ID	Sample Date	Sample Value	Prediction Limit (PL) Value
Arsenic, Total	mg/L	MW-33	2/27/2019	0.0382	0.0044
			5/10/2019	0.0372	
			8/30/2019	0.0397	
			11/6/2019	0.0381	
		MW-35	2/27/2019	0.0335	
			5/10/2019	0.0298	
			8/30/2019	0.0298	
			11/6/2019	0.0289	
Calcium, Total	mg/L	MW-2	3/20/2019	20.4	15.63
			5/10/2019	23	
			8/30/2019	20.6	
			11/6/2019	20.8	
		MW-21	2/27/2019	19.5	
			5/10/2019	19.9	
			8/30/2019	20.3	
			11/6/2019	21	
		MW-33	2/27/2019	70	
			5/10/2019	69.4	
			8/30/2019	68.3	
			11/6/2019	66.1	
		MW-35	2/27/2019	64.4	
			5/10/2019	62.4	
			8/30/2019	68.40	
			11/6/2019	71.5	
Iron, Dissovled	mg/L	MW-33	2/27/2019	6.91	0.51
			5/10/2019	7.08	
			8/30/2019	6.51	
			11/6/2019	7.28	
		MW-35	2/27/2019	15.8	
			5/10/2019	15.9	
			8/30/2019	13.70	
			11/6/2019	14.50	
Magnesium, Total	mg/L	MW-2	3/20/2019	20.6	17.71
			5/10/2019	22.6	
			8/30/2019	21.8	
			11/6/2019	23.0	
		MW-21	5/10/2019	18.8	
			8/30/2019	20.1	
			11/6/2019	21.5	
		MW-33	2/27/2019	55.6	
			5/10/2019	55.6	
			8/30/2019	55.1	
			11/6/2019	53.6	
		MW-35	2/27/2019	39.7	
			5/10/2019	38.7	
			8/30/2019	44.70	
			11/6/2019	45.20	

Table B-5 ***(continued)***
Channel Cc2: Summary of Groundwater Prediction Limit Exceedances
Interwell

January 1, 2019 - December 31, 2019

Parameter	Units	Well ID	Sample Date	Sample Value	Prediction Limit (PL) Value
Manganese, Dissovled	mg/L	MW-33	2/27/2019	0.997	0.55
			5/10/2019	1.01	
			8/30/2019	0.95	
			11/6/2019	0.94	
		MW-35	2/27/2019	2.39	
			5/10/2019	2.5	
			8/30/2019	2.29	
			11/6/2019	2.38	
Potassium, Total	mg/L	MW-33	2/27/2019	3.56	2.55
			5/10/2019	3.63	
			8/30/2019	3.68	
			11/6/2019	3.48	
		MW-35	2/27/2019	3.27	
			5/10/2019	3.07	
			8/30/2019	3.44	
			11/6/2019	3.40	
Sodium, Total	mg\L	MW-2	3/20/2019	9.24	7.68
			5/10/2019	9.62	
			8/30/2019	9.3	
			11/6/2019	9.0	
		MW-21	2/27/2019	11	
			5/10/2019	10.9	
			8/30/2019	10.7	
			11/6/2019	11.1	
		MW-33	2/27/2019	19	
			5/10/2019	19.1	
			8/30/2019	19.4	
			11/6/2019	18.8	
		MW-35	2/27/2019	15.4	
			5/10/2019	14.8	
			8/30/2019	16.6	
			11/6/2019	16.5	
Vinyl Chloride	ug/L	MW-2	5/10/2019	0.132	0.0867
			8/30/2019	0.1	
		MW-33	2/27/2019	34.1	
			5/10/2019	31.3	
			8/30/2019	30.4	
			11/6/2019	30.5	
		MW-35	2/27/2019	4	
			5/10/2019	4.15	
			8/30/2019	4.83	
			11/6/2019	5.41	

Table B-6
Unit D Aquifer: Summary of Groundwater Prediction Limit Exceedances
Intrawell

January 1, 2019 - December 31, 2019

Parameter	Units	Well ID	Sample Date	Sample Value	Prediction Limit (PL) Value
Alkalinity, Total (as CaCO3)	mg/L	MW-12	8/15/2019	66.3	65.8201
Arsenic, Total	mg/L	MW-29	1/28/2019	0.015	0.0144
			8/29/2019	0.0155	
Barium, Total	mg/L	MW-7	5/8/2019	0.0163	0.0161
			8/29/2019	0.0176	
		MW-19	5/8/2019	0.0233	0.0226

Table B-7
Channel Cc1: Summary of Groundwater Volatile Organic Compound Detections

January 1, 2019 - December 31, 2019

Compound	Units	Site ID	Date	Sample Value
Chloroform	ug/L	MW-10	11/1/2019	0.169 JT
		MW-13	8/16/2019	0.127 JT
		MW-4	11/4/2019	0.189 JT
Cis-1,2-dichloroethene	ug/L	MW-4	2/27/2019	0.126 JT
			5/8/2019	0.131 JT
			11/4/2019	0.106 JT
Tetrachloroethene	ug/L	MW-3	1/24/2019	0.102 JT
Trichlorofluoromethane	ug/L	MW-3	1/24/2019	0.287

Table B-8
Channel Cc2: Summary of Groundwater Volatile Organic Compound Detections
January 1, 2019 - December 31, 2019

Compound	Units	Site ID	Date	Sample Value
1,1-dichloroethane	ug/L	MW-33	2/27/2019	1.61
			5/10/2019	1.4
			8/30/2019	1.57
			11/6/2019	1.67
		MW-35	2/27/2019	0.297
			5/10/2019	0.29
			8/30/2019	0.333
			11/6/2019	0.309
1,1-dichloroethene	ug/L	MW-33	2/27/2019	0.167 JT
			5/10/2019	0.141 JT
			8/30/2019	0.161 JT
			11/6/2019	0.174 JT
1,2-dichloroethane	ug/L	MW-33	2/27/2019	0.123 JT
			5/10/2019	0.113 JT
			11/6/2019	0.104 JT
1,2-dichloropropane	ug/L	MW-33	2/27/2019	7.42
			5/10/2019	6.58
			8/30/2019	7.41
			11/6/2019	8.09
		MW-35	2/27/2019	1.33
			5/10/2019	1.14
			8/30/2019	1.12
			11/6/2019	0.888
Benzene	ug/L	MW-33	2/27/2019	1.08
			5/10/2019	0.941
			8/30/2019	1
			11/6/2019	1.06
		MW-35	2/27/2019	1.17
			5/10/2019	0.974
			8/30/2019	0.932
			11/6/2019	0.769
Chloroethane	ug/L	MW-33	2/27/2019	0.533
			5/10/2019	0.44
			8/30/2019	0.41
			11/6/2019	0.358
Chloromethane	ug/L	MW-21	5/10/2019	0.303 JT
			11/6/2019	0.321 JT
Cis-1,2-dichloroethene	ug/L	MW-2	3/20/2019	0.294
			5/10/2019	0.247
			8/30/2019	0.273
			11/6/2019	0.105
		MW-21	2/27/2019	0.823
			5/10/2019	0.733
			8/30/2019	0.665
			11/6/2019	0.629
		MW-33	2/27/2019	28.6
			5/10/2019	27.1
			8/30/2019	31
			11/6/2019	33.1
		MW-35	2/27/2019	9.88
			5/10/2019	10.2
			8/30/2019	10.7
			11/6/2019	9.31

Table B-8 ***(continued)***
Channel Cc2: Summary of Groundwater Volatile Organic Compound Detections
January 1, 2019 - December 31, 2019

Dichlorodifluoromethane	ug/L	MW-2	3/20/2019	2.45
			5/10/2019	2.79
			8/30/2019	3.15
			11/6/2019	4.33
		MW-20	1/29/2019	0.359
			5/10/2019	0.286
			8/30/2019	0.34
			11/6/2019	0.342
		MW-21	2/27/2019	1.01
			5/10/2019	1.22
			8/30/2019	1.82
			11/6/2019	2.19
		MW-33	2/27/2019	4.37
			5/10/2019	4.84
			8/30/2019	5.73
			11/6/2019	5.29
		MW-35	2/27/2019	0.434
			5/10/2019	0.476
			8/30/2019	0.745
			11/6/2019	0.749
O-xylene	ug/L	MW-35	2/27/2019	0.131 JT
			5/10/2019	0.124 JT
Trans-1,2-dichloroethene	ug/L	MW-21	2/27/2019	0.109 JT
		MW-33	2/27/2019	0.706
			5/10/2019	0.636
			8/30/2019	0.678
			11/6/2019	0.733
		MW-35	2/27/2019	0.38
			5/10/2019	0.322
			8/30/2019	0.319
			11/6/2019	0.282
Trichloroethene	ug/L	MW-33	2/27/2019	0.148 JT
			8/30/2019	0.143 JT
			11/6/2019	0.146 JT
		MW-35	2/27/2019	1.22
			5/10/2019	0.969
			8/30/2019	1.01
			11/6/2019	0.928
Trichlorofluoromethane	ug/L	MW-2	3/20/2019	0.481
			5/10/2019	0.469
			8/30/2019	0.573
			11/6/2019	0.968
		MW-21	2/27/2019	0.456
			5/10/2019	0.475
			8/30/2019	0.595
			11/6/2019	0.923
Vinyl Chloride	ug/L	MW-2	3/20/2019	0.0834
			5/10/2019	0.132 D
			8/30/2019	0.113
			11/6/2019	0.0549 D
		MW-21	2/27/2019	0.0557
			5/10/2019	0.0681 D
			8/30/2019	0.0708
			11/6/2019	0.084 D
		MW-33	2/27/2019	34.1
			5/10/2019	31.3 D
			8/30/2019	30.4
			11/6/2019	30.5 D
		MW-35	2/27/2019	4
			5/10/2019	4.15
			8/30/2019	4.83
			11/6/2019	5.41 D

Table B-9
Channel Cc3: Summary of groundwater volatile organic compound detections

January 1, 2019 - December 31, 2019

Compound	Units	Site ID	Date	Sample Value
Carbon Disulfide	ug/L	MW-36	5/7/2019	0.104 JT
Chloroform	ug/L	MW-8	11/1/2019	0.134 JT

Table B-10
Unit D Aquifer: Summary of groundwater volatile organic compound detections

January 1, 2019 - December 31, 2019

Compound	Units	Site ID	Date	Sample Value
2-butanone	ug/L	MW-29	5/10/2019	1.57 JT
Acetone	ug/L	MW-19	8/14/2019	3.33 JT
Chloroform	ug/L	MW-12	8/15/2019	0.102 JT
			11/4/2019	0.221
		MW-19	11/4/2019	0.158 JT
		MW-26	11/5/2019	0.107 JT
		MW-34	11/5/2019	0.108 JT
Chloromethane	ug/L	MW-12	1/24/2019	0.274 JT
Vinyl Chloride	ug/L	MW-19	5/8/2019	0.0101 JT

Table B-11
Summary of Trip, Field, and Method Blanks Volatile Organic Compound Detections
January 1, 2019 - December 31, 2019

Summary of trip blank volatile organic compound detections

Compound	Units	Sample ID	Date	Sample Value
2-methyl-1-propanol	ug/L	VTRP190319X	3/18/2019	12.6 L
Acetone	ug/L	VTRP190507X	5/6/2019	4.46 JT

Summary of field blank volatile organic compound detections

Compound	Units	Sample ID	Date	Sample Value
2-butanone	ug/L	WV2-190320F	3/20/2019	1.68 JT
		WV13190816F	8/16/2019	4.07 JT
		WV26190830F	8/30/2019	2.54 JT
Acetone	ug/L	WV2-190510F	5/10/2019	6.56
		WV13190816F	8/16/2019	6.15
Chloroform	ug/L	WV2-190320F	3/20/2019	0.767
		WV13190816F	8/16/2019	0.134 JT
		WV34191105F	11/5/2019	0.28
Toluene	ug/L	WV13190816F	8/16/2019	0.245
		WV26190830F	8/30/2019	0.165 JT

Summary of method blank volatile organic compound detections

Compound	Units	Workgroup ID	Date	Sample Value
Acetone	ug/L	WG167240-1	11/7/2019	6.14 B
Chloroform	ug/L	WG166026-1	9/6/2019	0.112 BJT

Table B-12
Summary of Surface Water Regulatory Standard Exceedances

West Hillslope Seeps & Site Surface Water Discharge

January 1, 2019 - December 31, 2019

Compound	Units	Site ID	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded Numerical Limit
Coliform, Fecal	cfu/100mL	SW-W1	6/18/2019	300	SSWC; FA; FC	100; 200; 200
		SW-W2	6/18/2019	300	SSWC; FA; FC	100; 200; 200
Iron, Total	mg/L	SW-W1	3/20/2019	1.39	FC	1
			6/18/2019	1.96		
			8/29/2019	2.33		
			11/7/2019	2.07		
		SW-W2	3/20/2019	2.35	FC	1
			6/18/2019	9.07		
			8/29/2019	1.53		
		SW-W3	6/18/2019	4.52	FC	1
			11/7/2019	5.43		
Turbidity	ntu	SW-W2	6/18/2019	54.1	SSWC; FA; FC	25; 25; 25
		SW-W3	6/18/2019	37.5	SSWC; FA; FC	25; 25; 25
			11/7/2019	31.8		

Notes:

FC - Federal Acute Surface Water Criteria

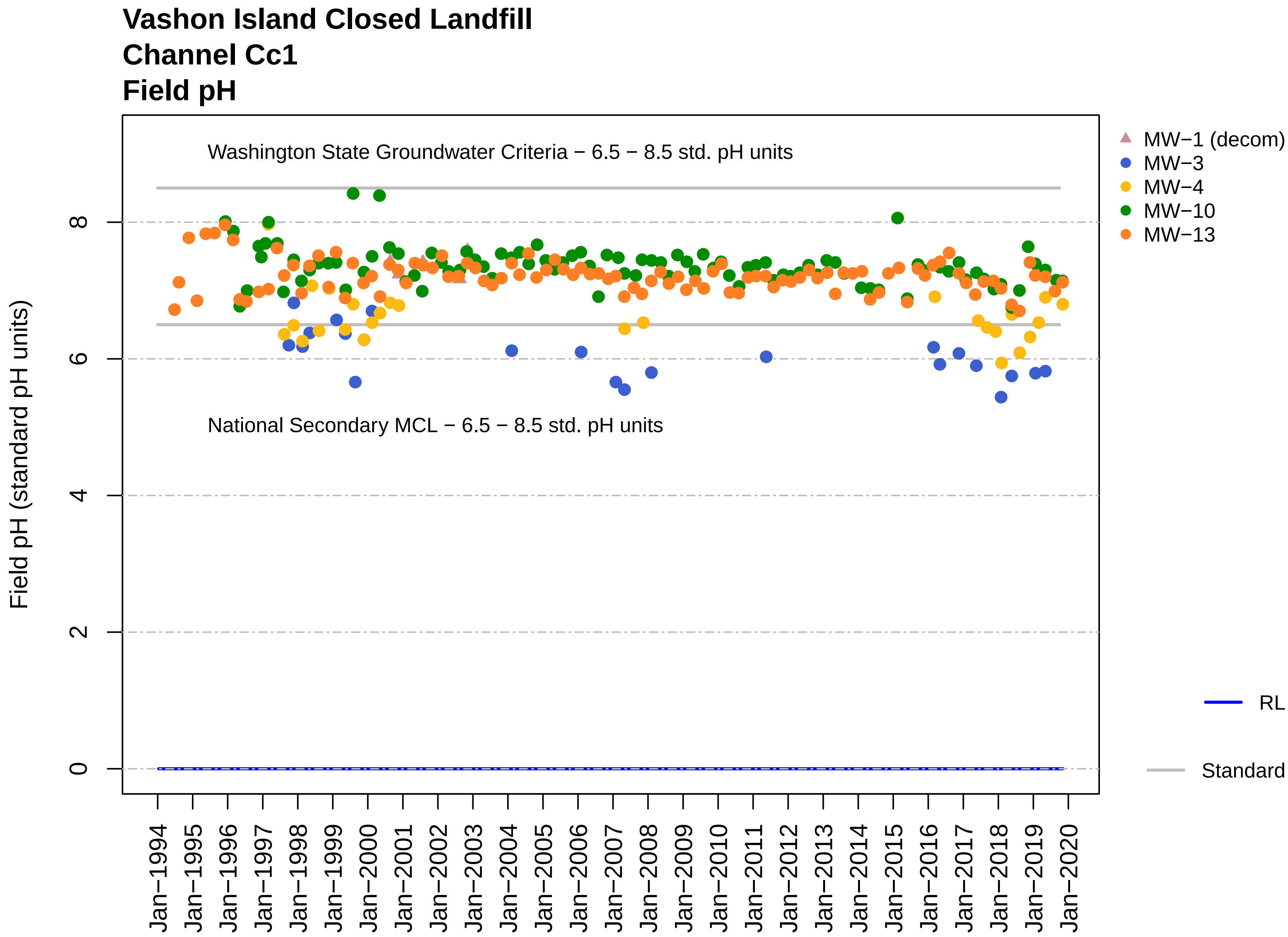
FC - Federal Chronic Surface Water Criteria

SSWC - State Surface Water Chronic Criteria

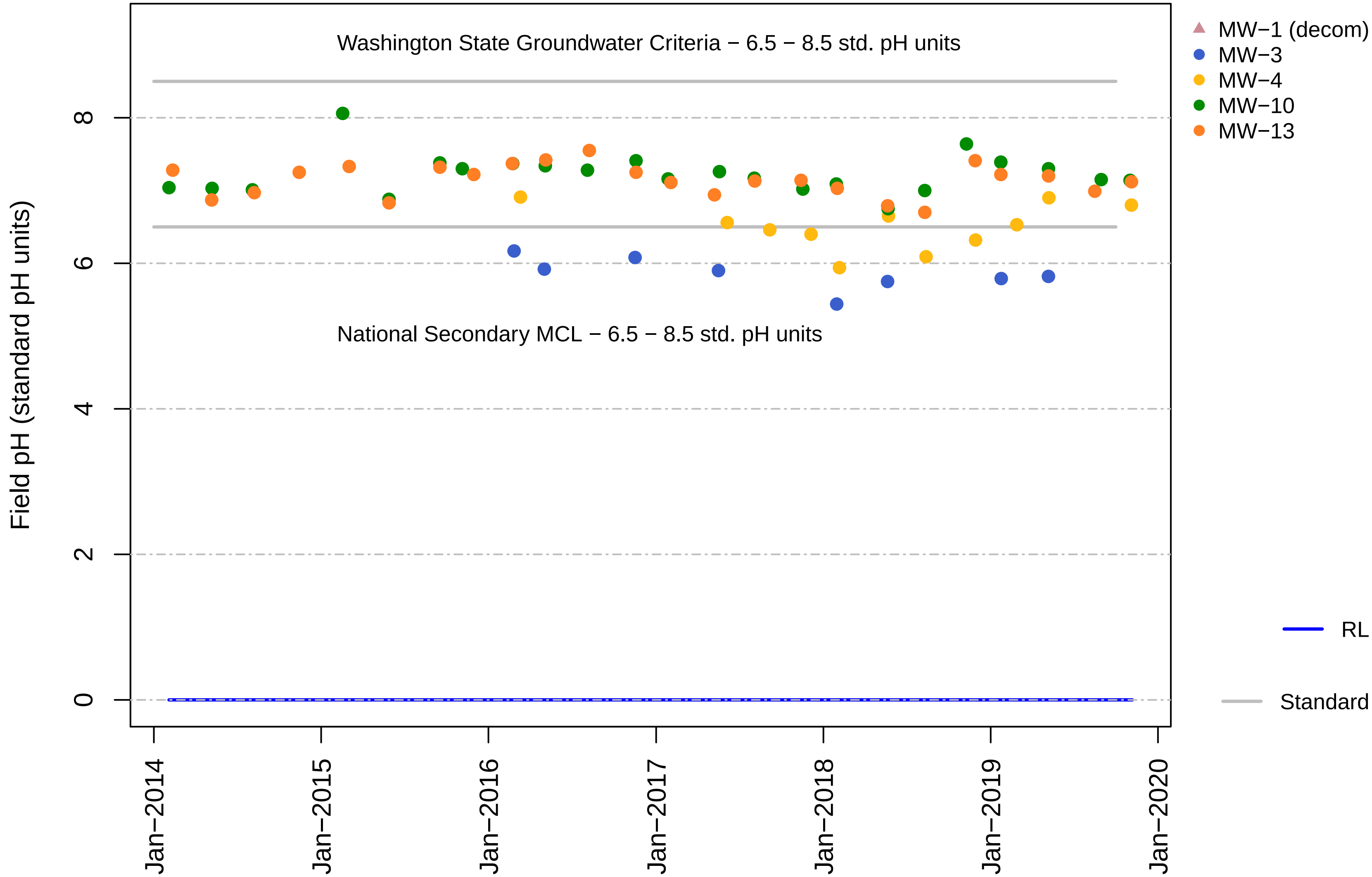
See Analytical Data Qualifier Page for Data Qualifier Information (Page A-4, Appendix A)

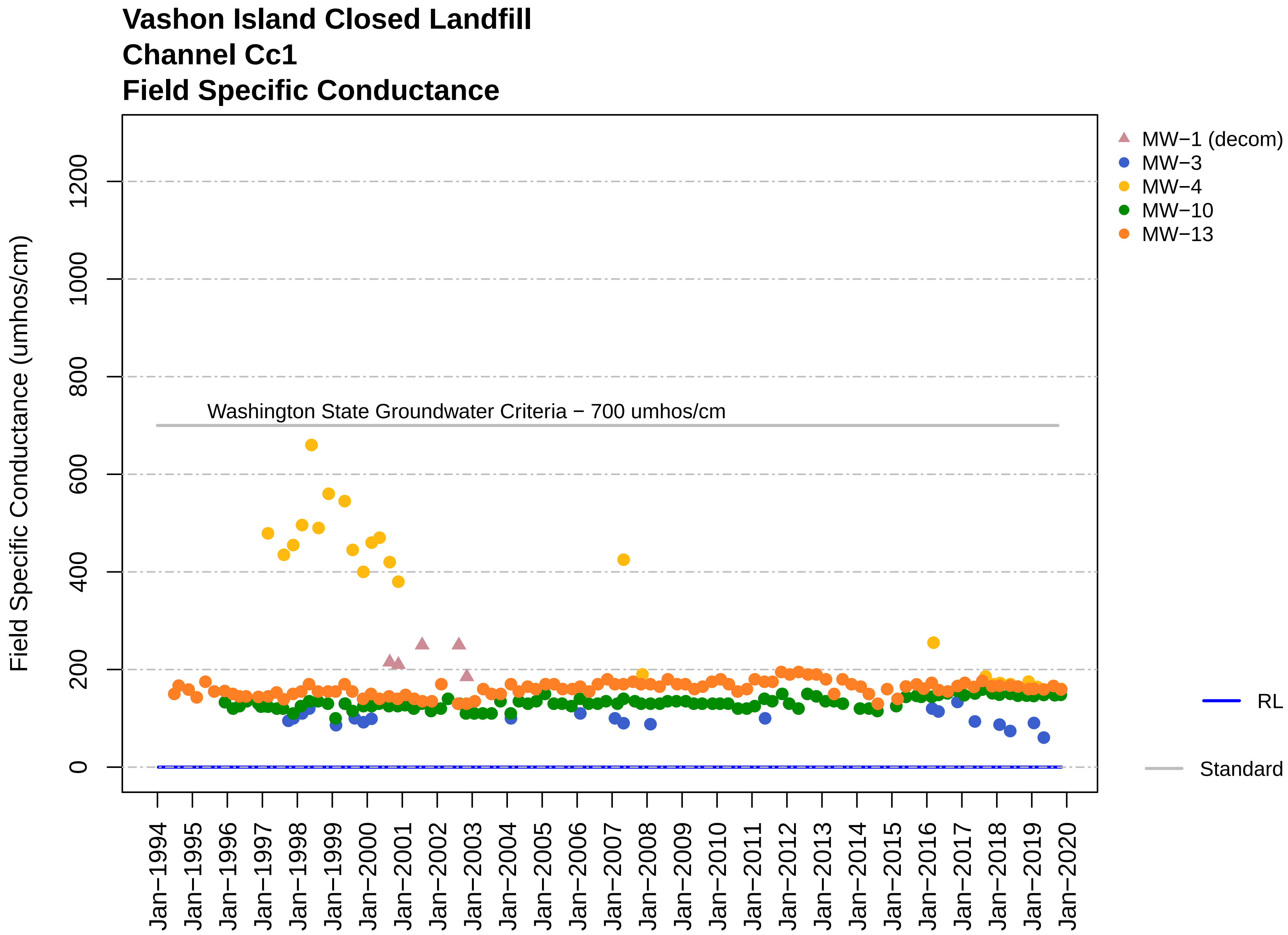
Appendix C

Time Concentration Plots for
Groundwater in Channel Cc1

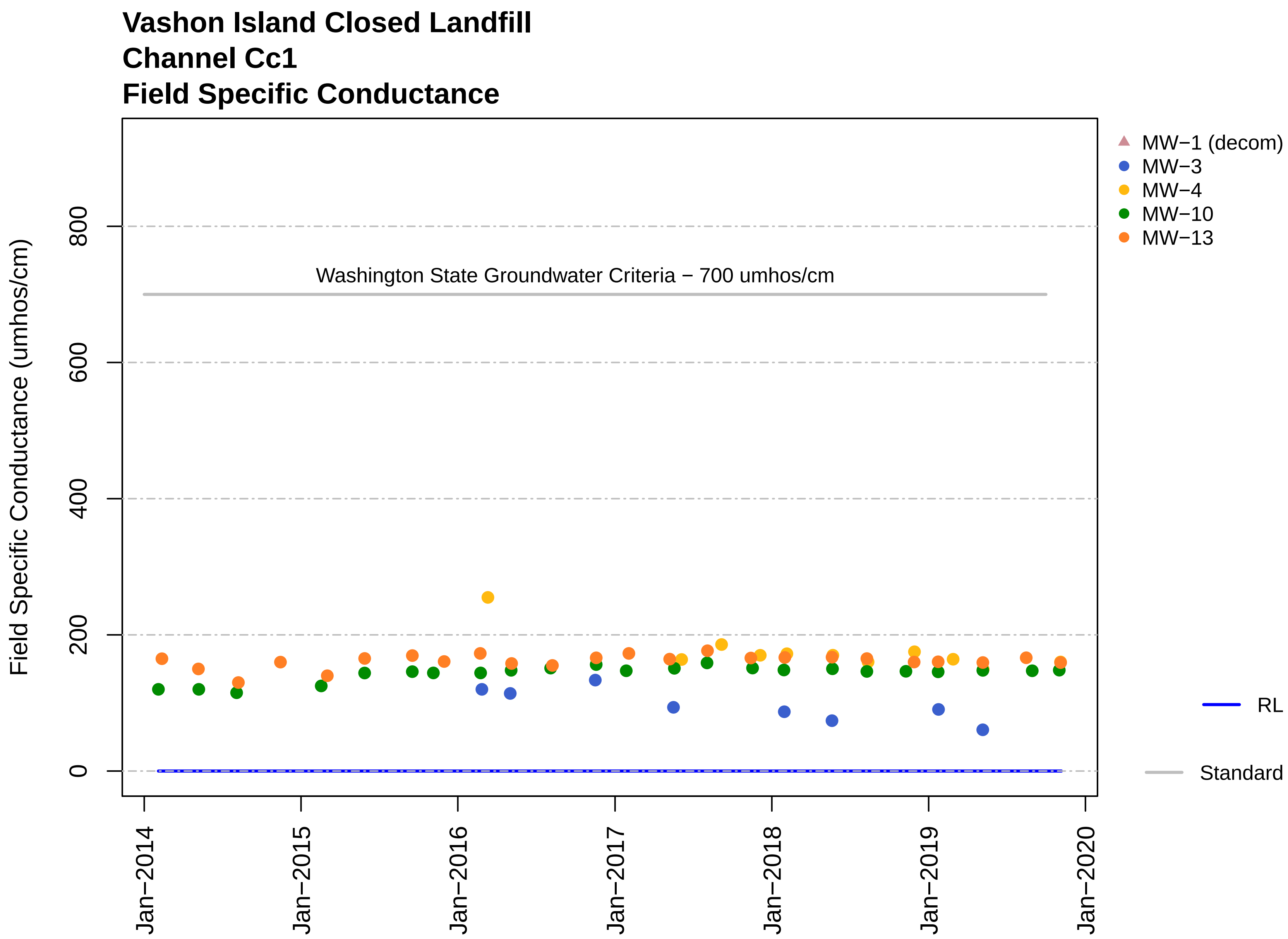

Vashon Island Closed Landfill
Channel Cc1
Field pH
Washington State Groundwater Criteria − 6.5 − 8.5 std. pH units
National Secondary MCL − 6.5 − 8.5 std. pH units
Field pH (standard pH units)
0
2
4
6
8
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

Vashon Island Closed Landfill
Channel Cc1
Field pH

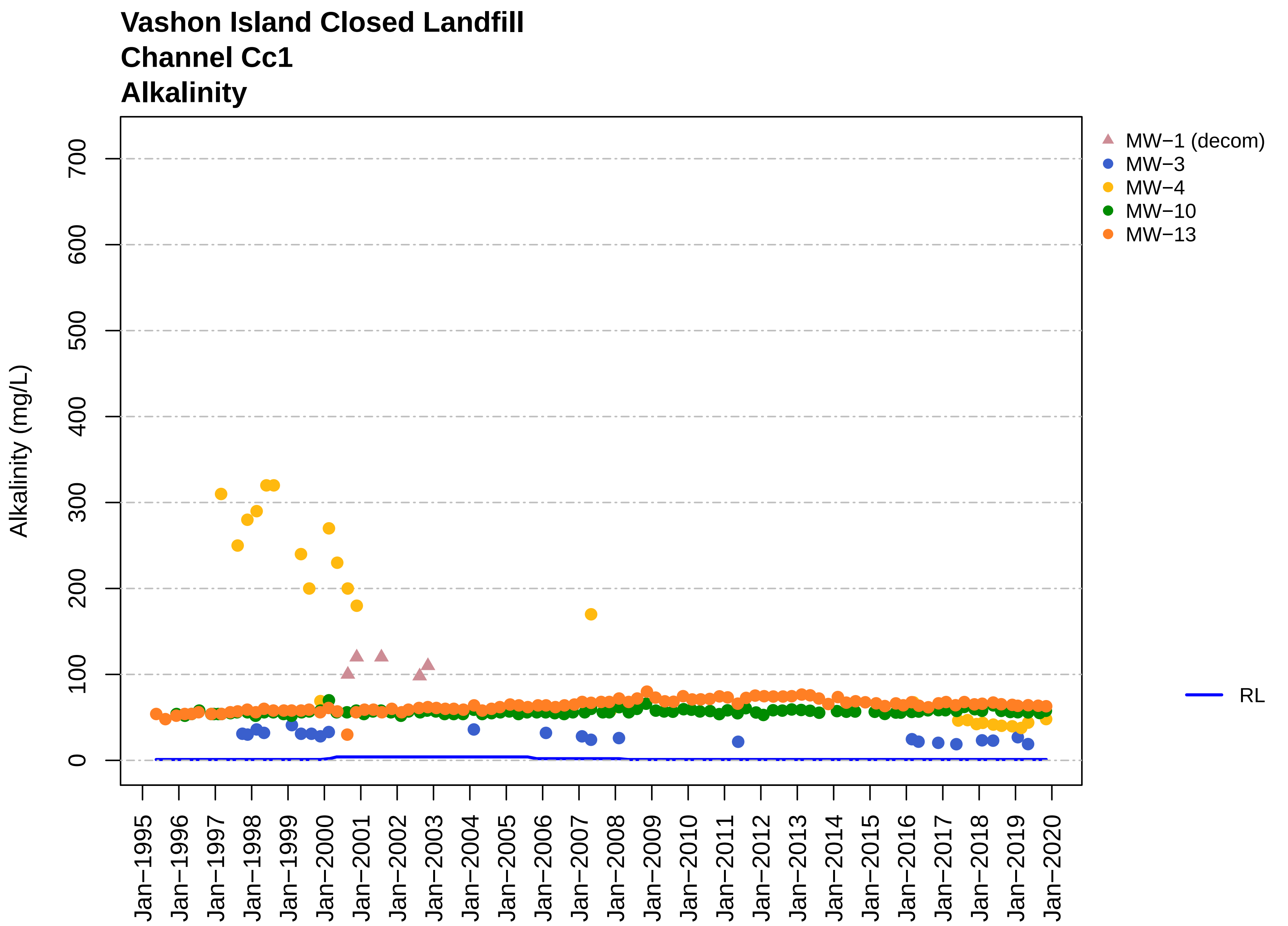


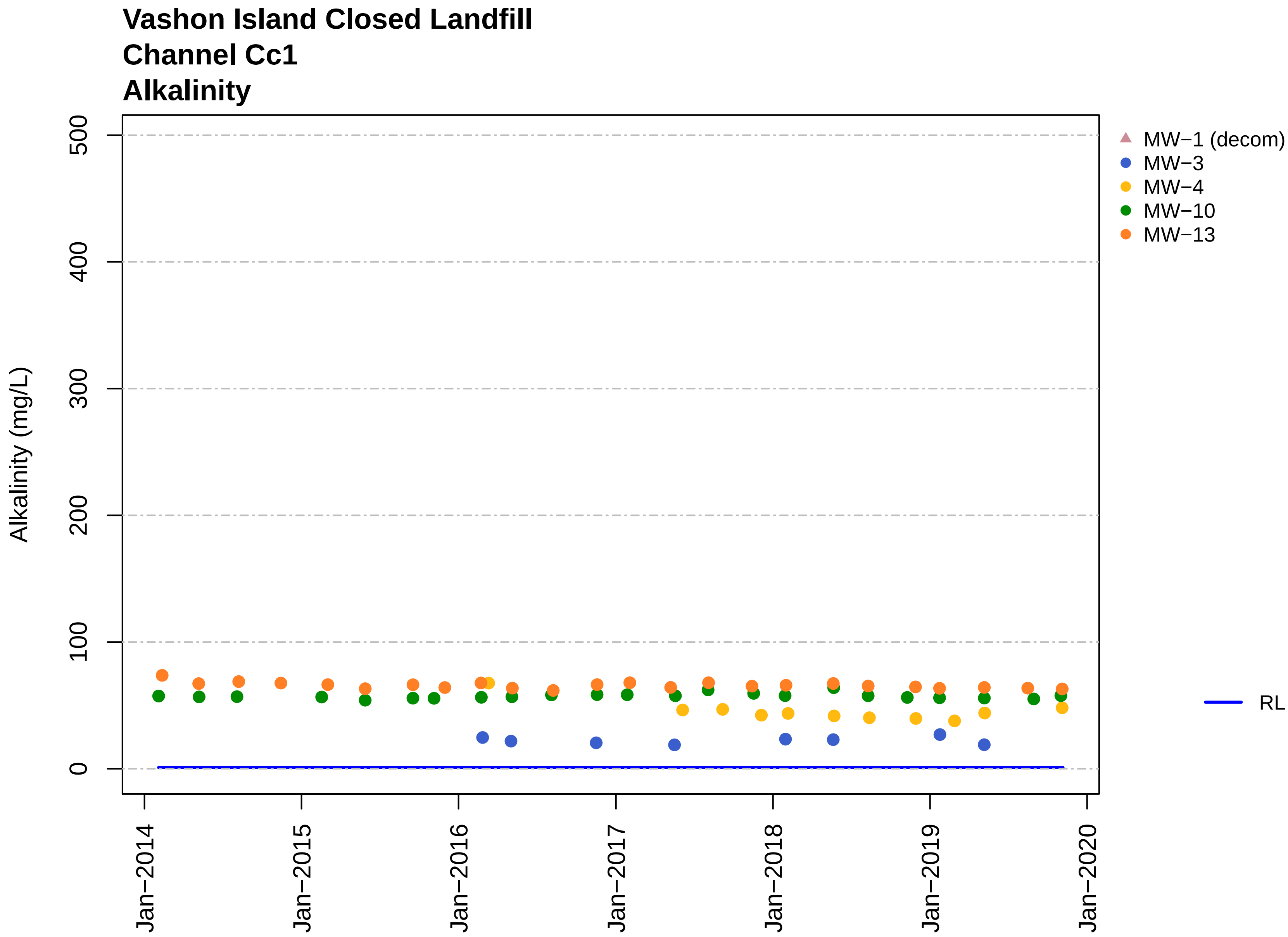


Vashon Island Closed Landfill
Channel Cc1
Field Specific Conductance
Field Specific Conductance (umhos/cm)
0
200
400
600
800
1000
1200
Washington State Groundwater Criteria − 700 umhos/cm
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

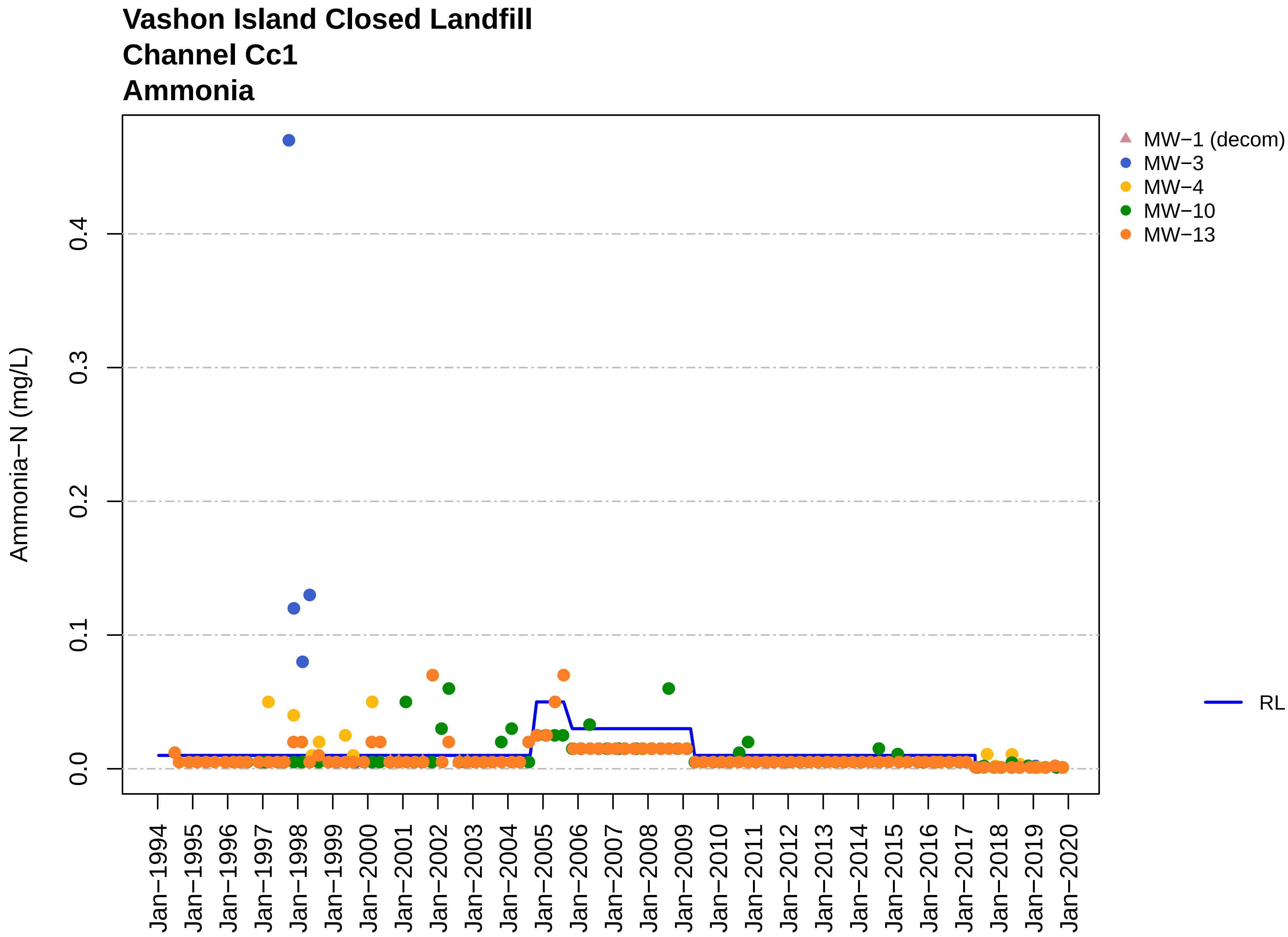


Vashon Island Closed Landfill
Channel Cc1
Field Specific Conductance
Field Specific Conductance (umhos/cm)
0
200
400
600
800
Washington State Groundwater Criteria − 700 umhos/cm
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

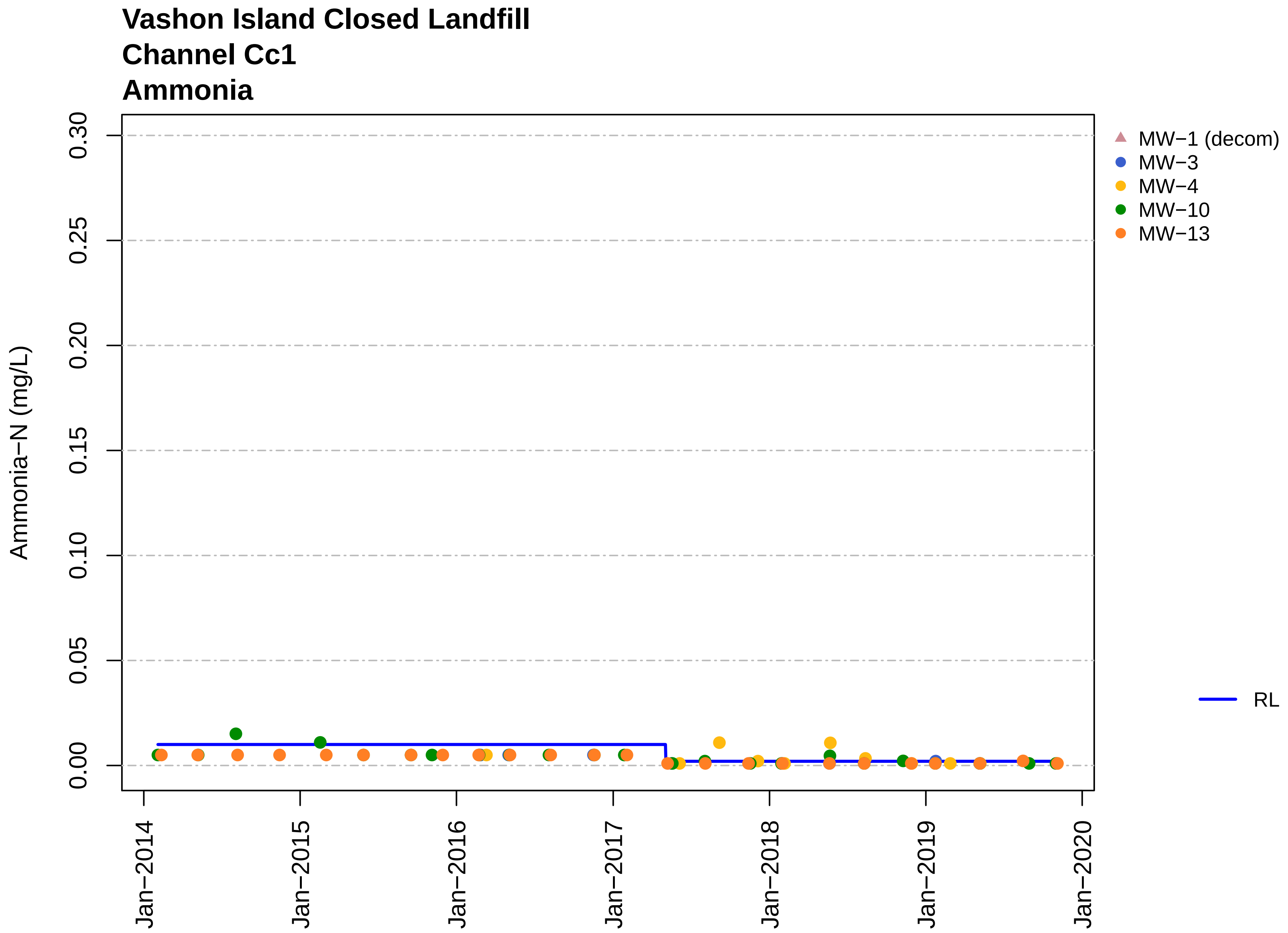

Vashon Island Closed Landfill
Channel Cc1
Alkalinity
Alkalinity (mg/L)
0
100
200
300
400
500
600
700
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL



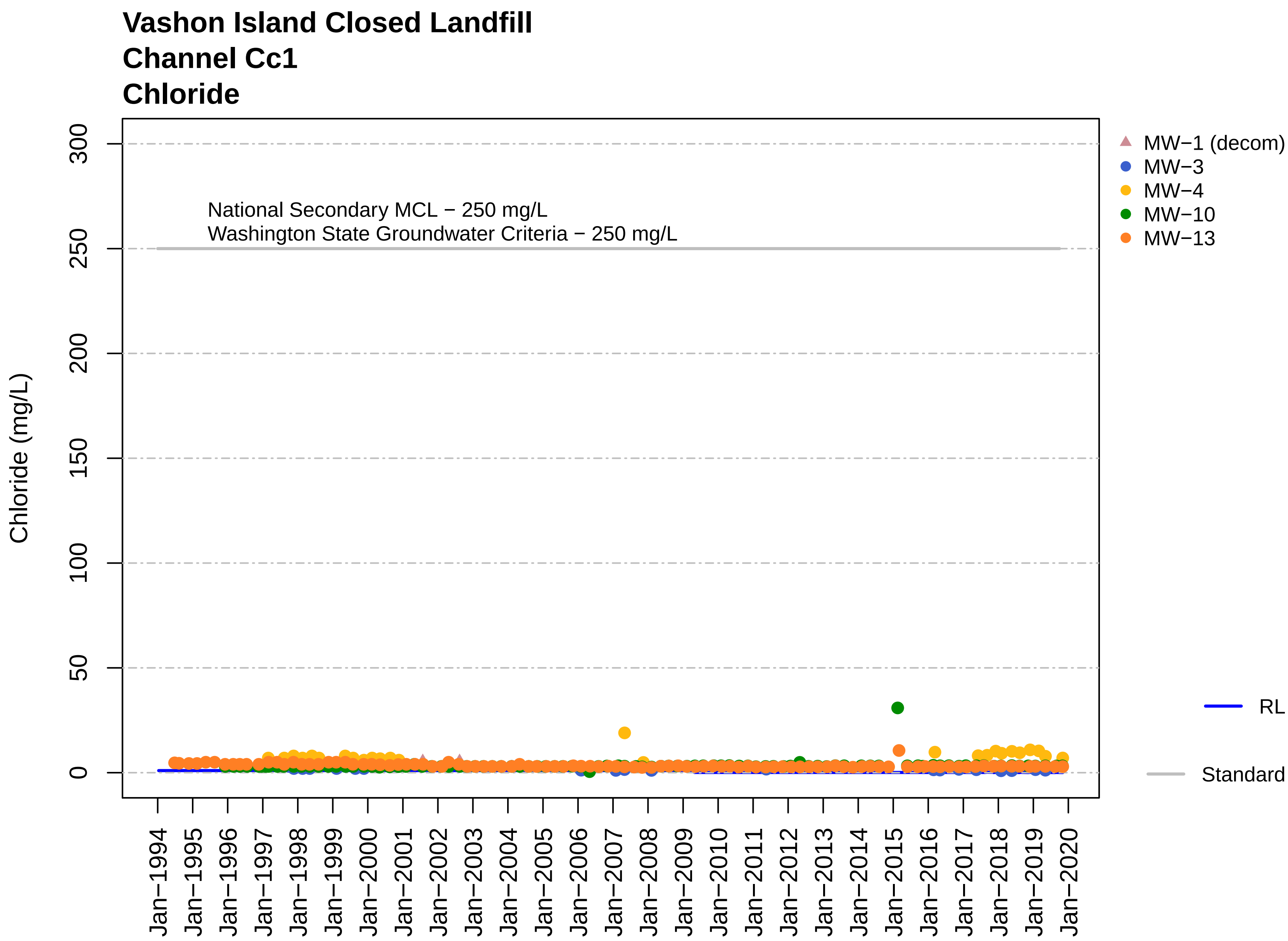
Vashon Island Closed Landfill
Channel Cc1
Alkalinity
Alkalinity (mg/L)
0
100
200
300
400
500
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL



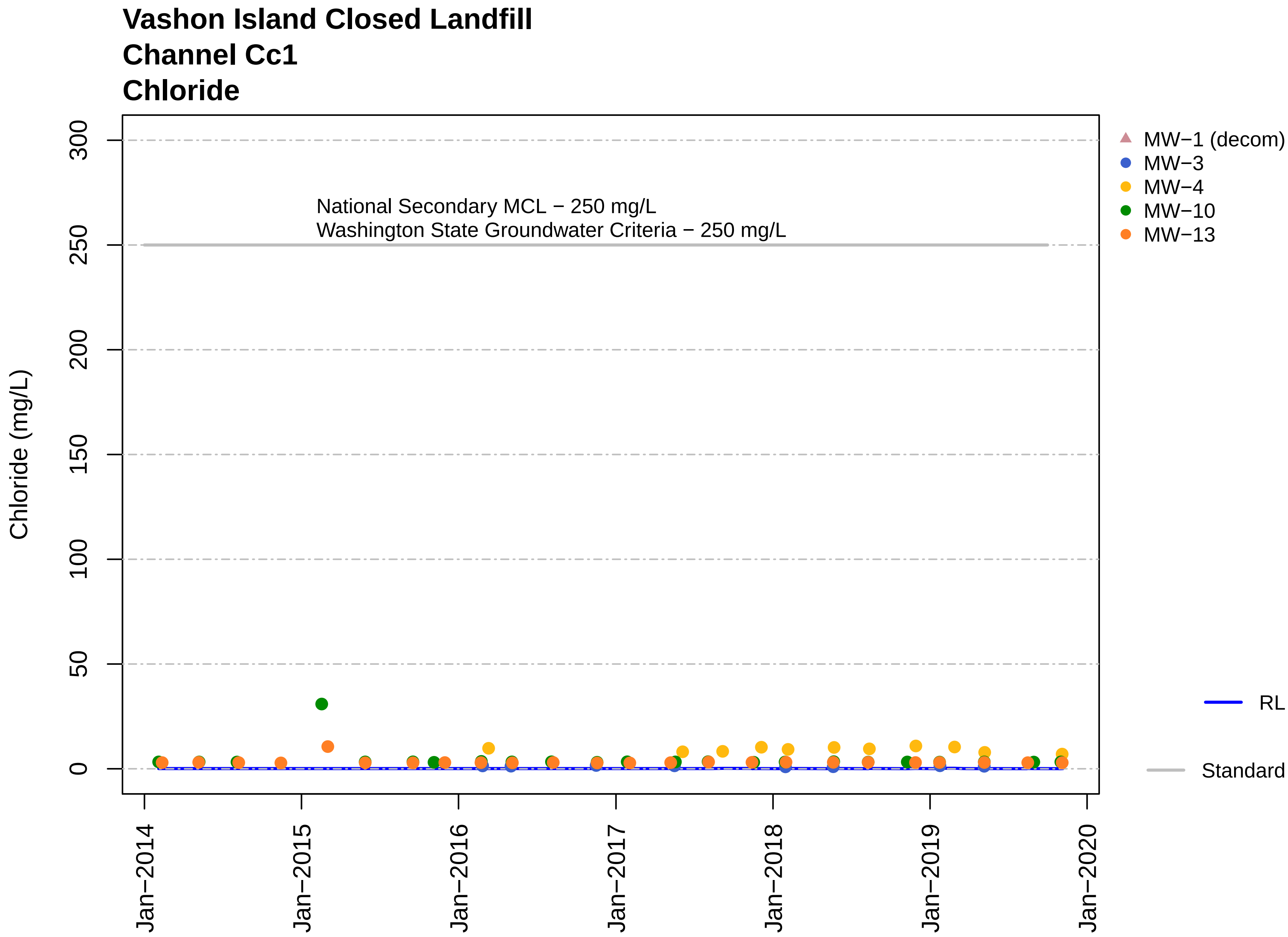
Vashon Island Closed Landfill
Channel Cc1
Ammonia
Ammonia−N (mg/L)
0.0
0.1
0.2
0.3
0.4
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020



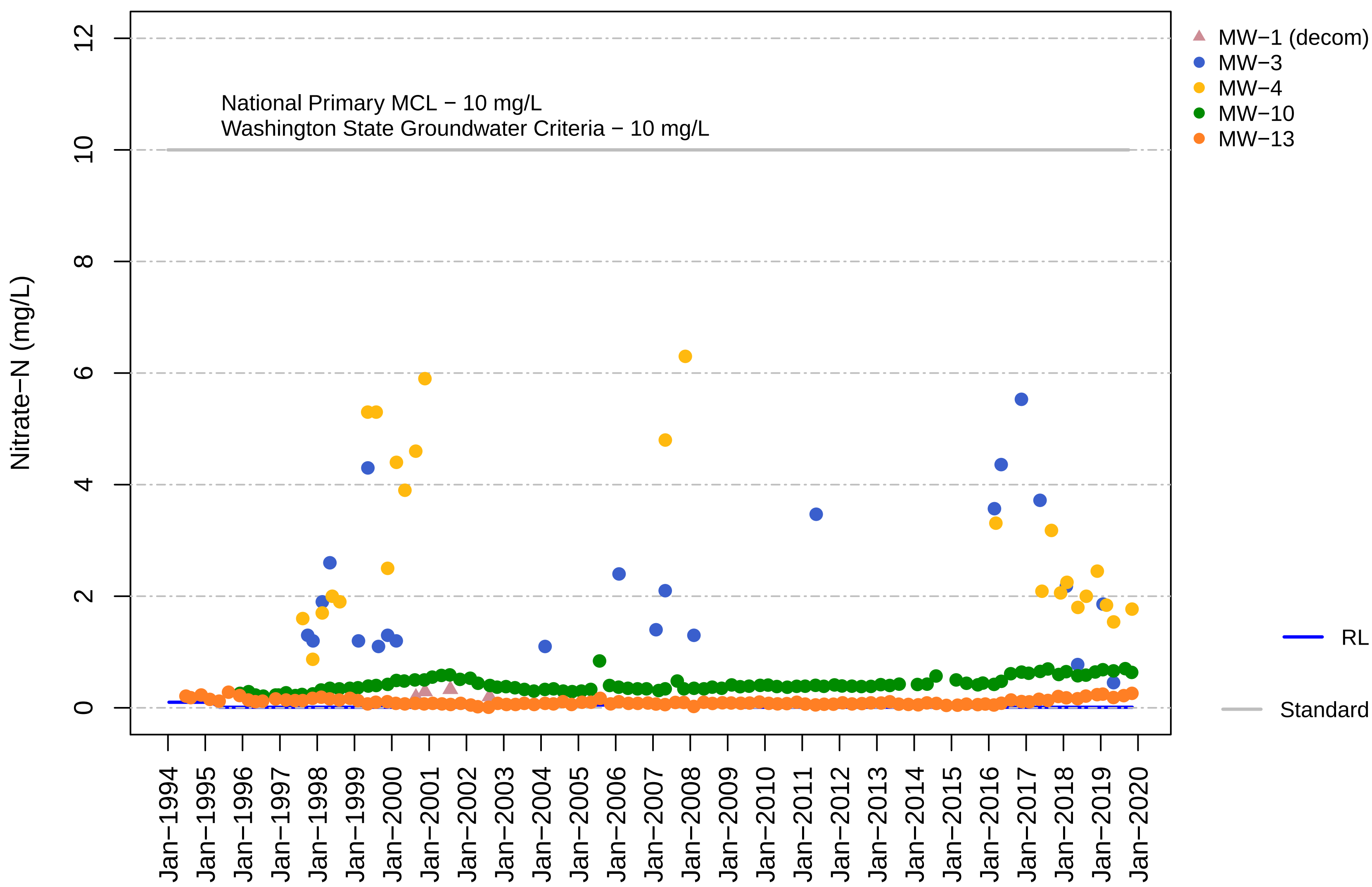
Vashon Island Closed Landfill
Channel Cc1
Ammonia
Ammonia−N (mg/L)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL



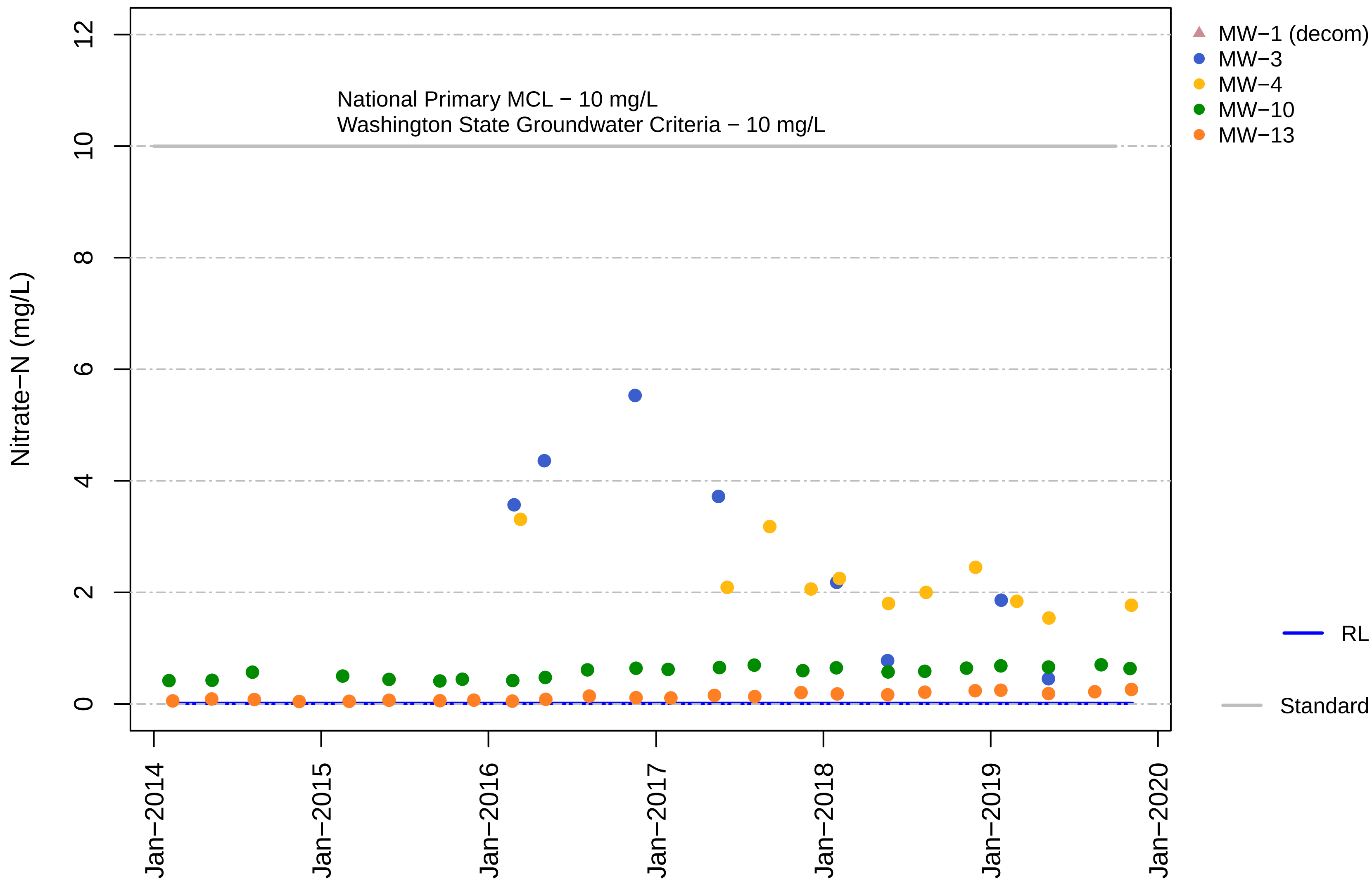
Vashon Island Closed Landfill
Channel Cc1
Chloride
Chloride (mg/L)
0
50
100
150
200
250
300
National Secondary MCL − 250 mg/L
Washington State Groundwater Criteria − 250 mg/L
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020


Vashon Island Closed Landfill
Channel Cc1
Chloride
National Secondary MCL − 250 mg/L
Washington State Groundwater Criteria − 250 mg/L
Chloride (mg/L)
0
50
100
150
200
250
300
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

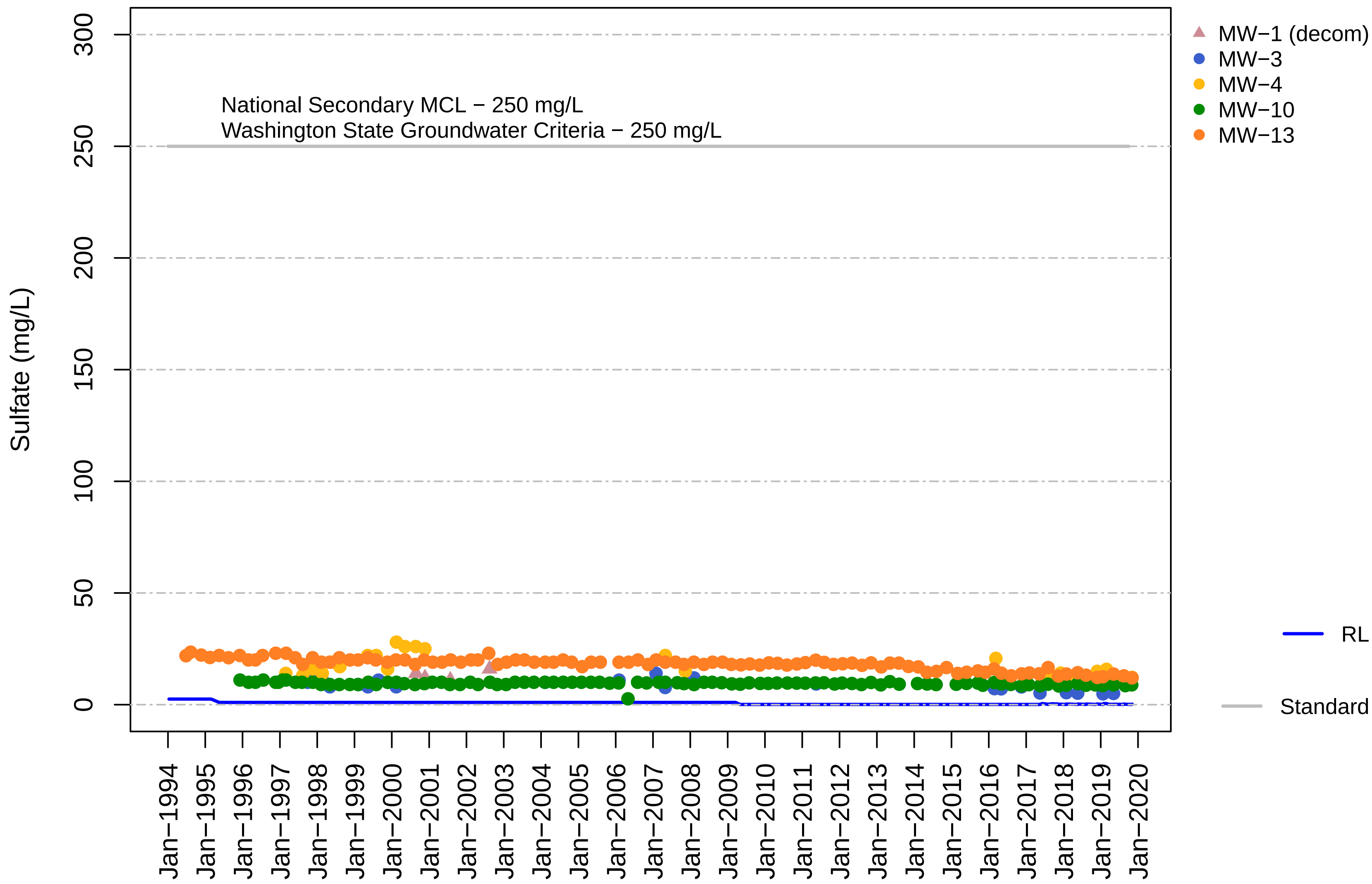
Vashon Island Closed Landfill
Channel Cc1
Nitrate

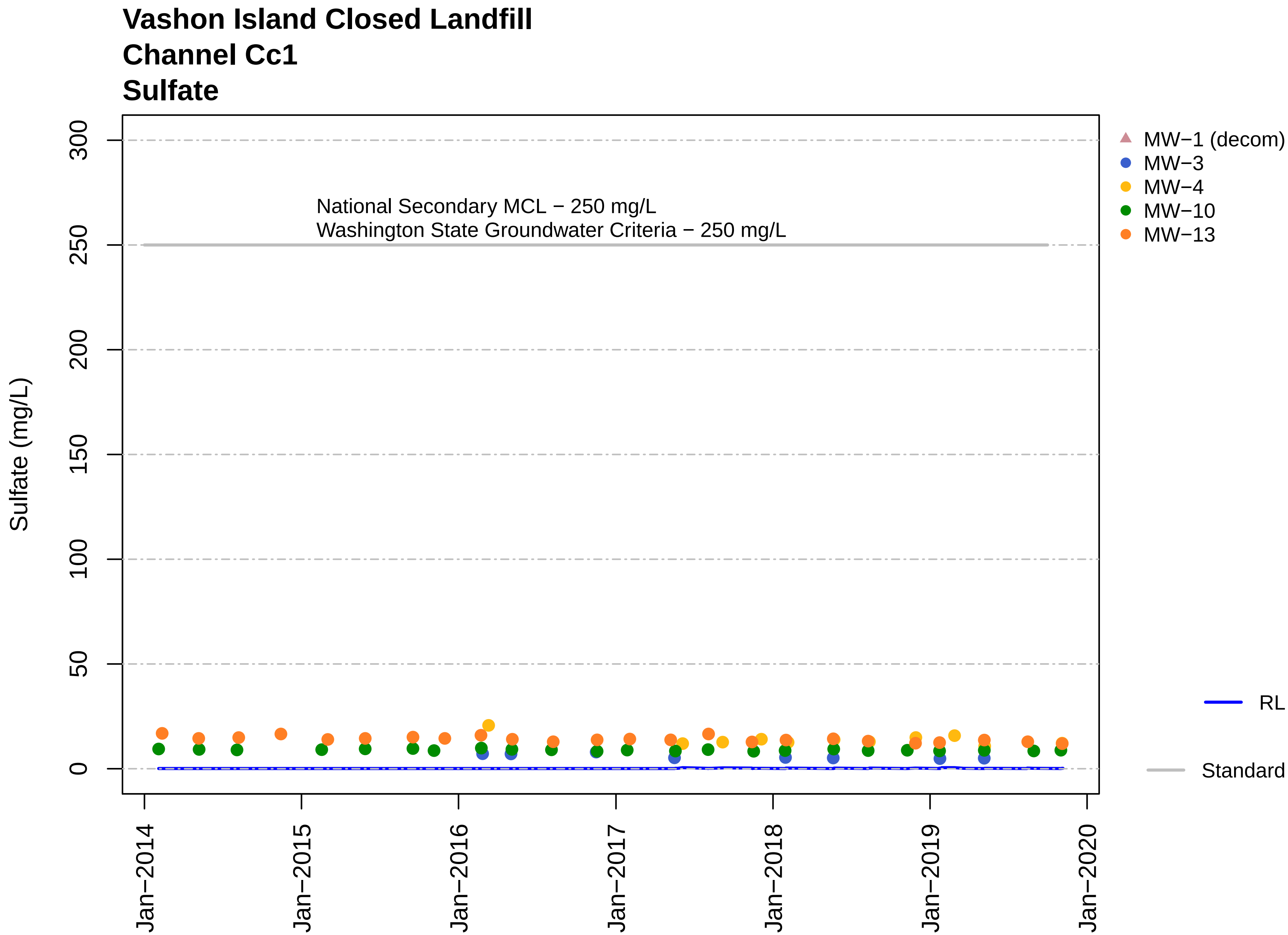


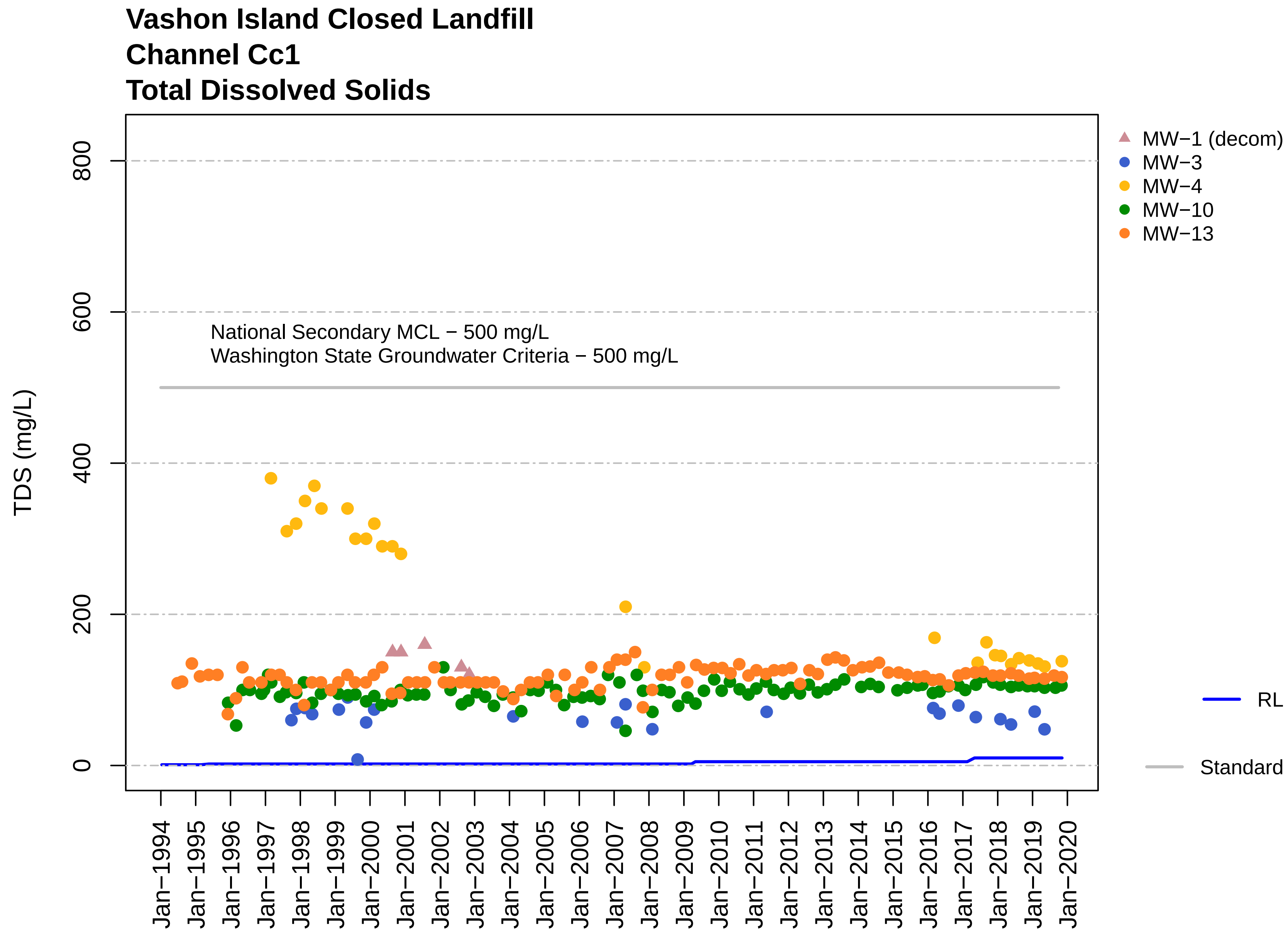
Vashon Island Closed Landfill
Channel Cc1
Nitrate



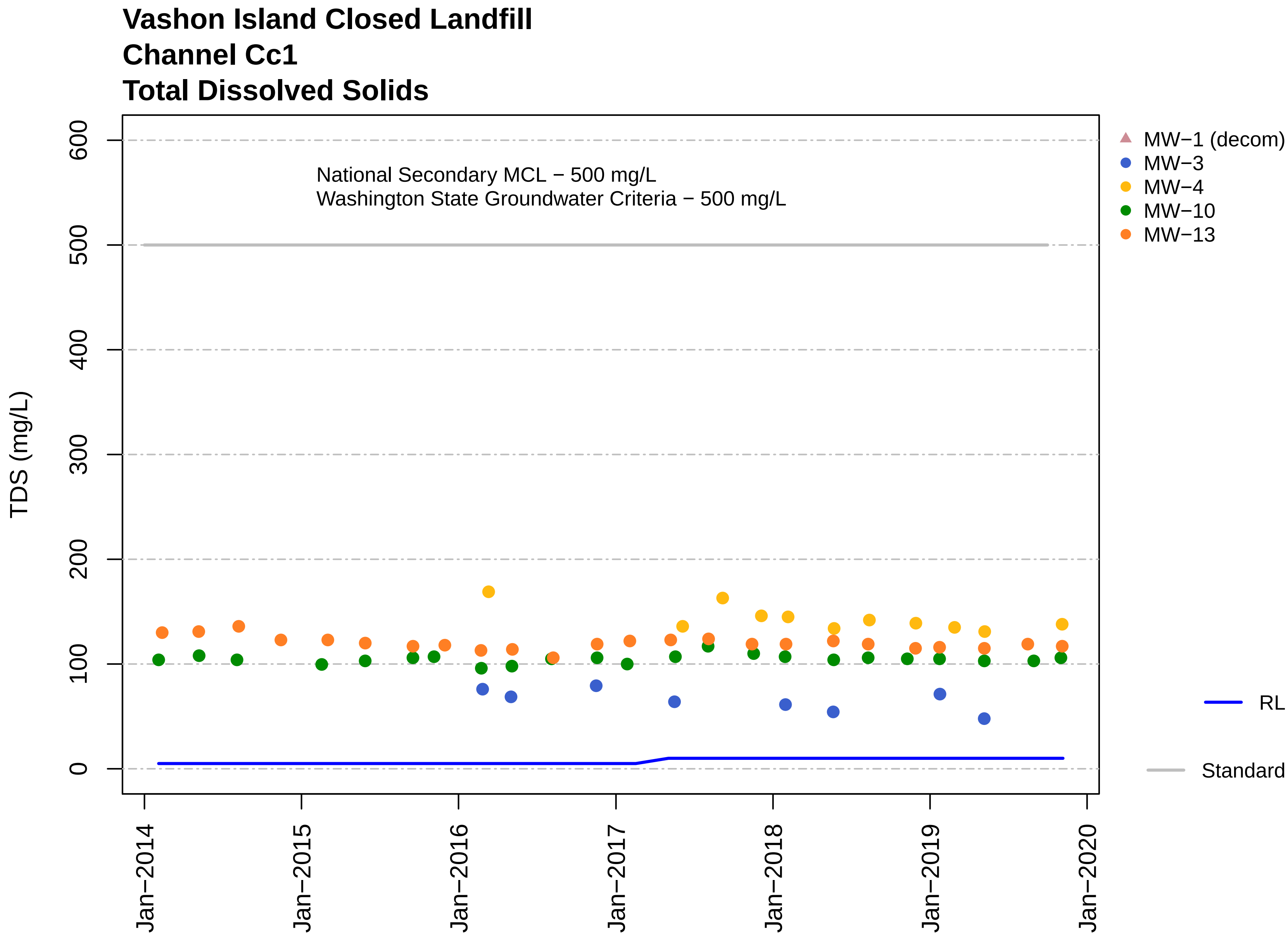
Vashon Island Closed Landfill
Channel Cc1
Sulfate



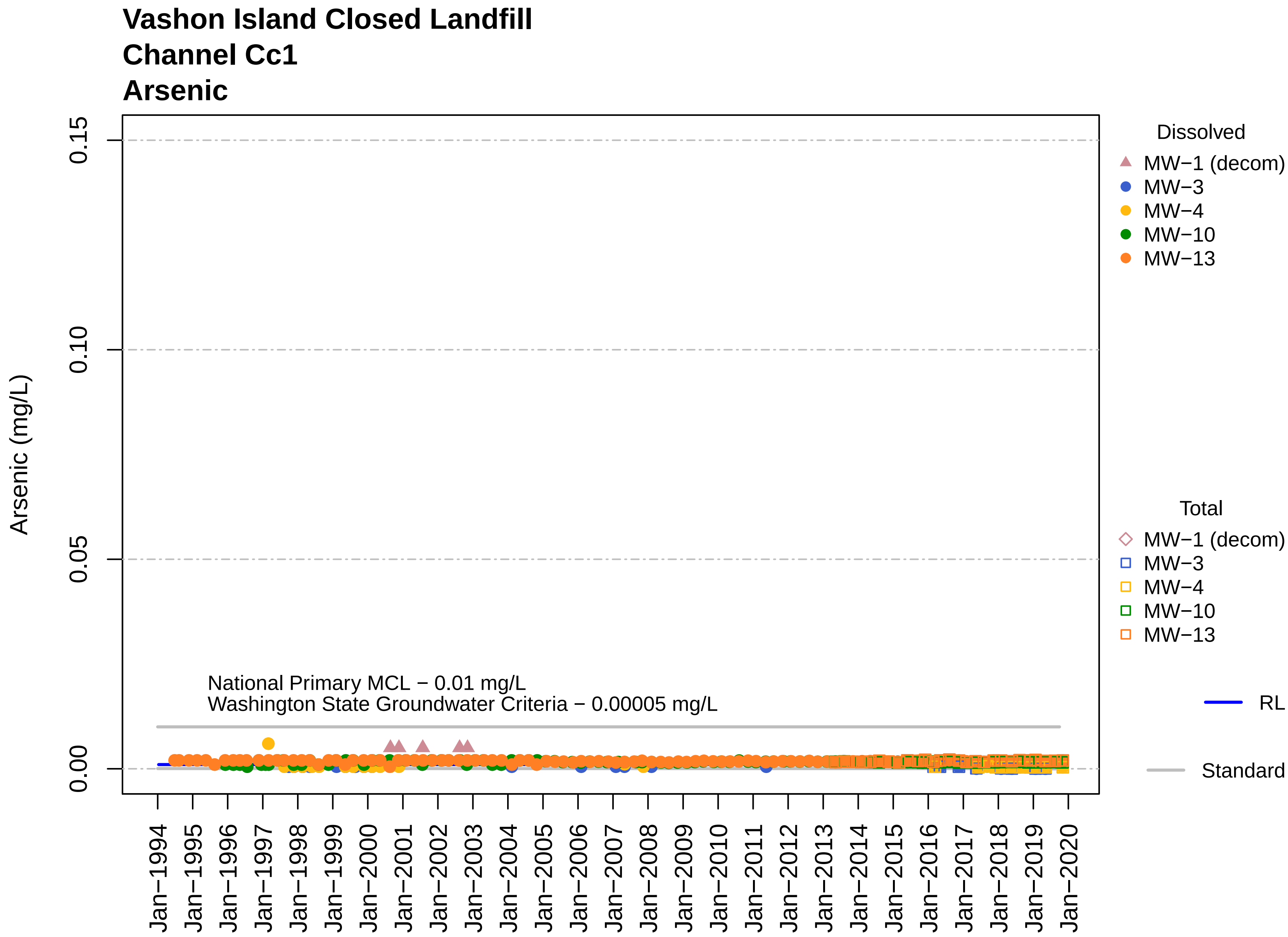

Vashon Island Closed Landfill
Channel Cc1
Sulfate
Sulfate (mg/L)
0
50
100
150
200
250
300
National Secondary MCL − 250 mg/L
Washington State Groundwater Criteria − 250 mg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

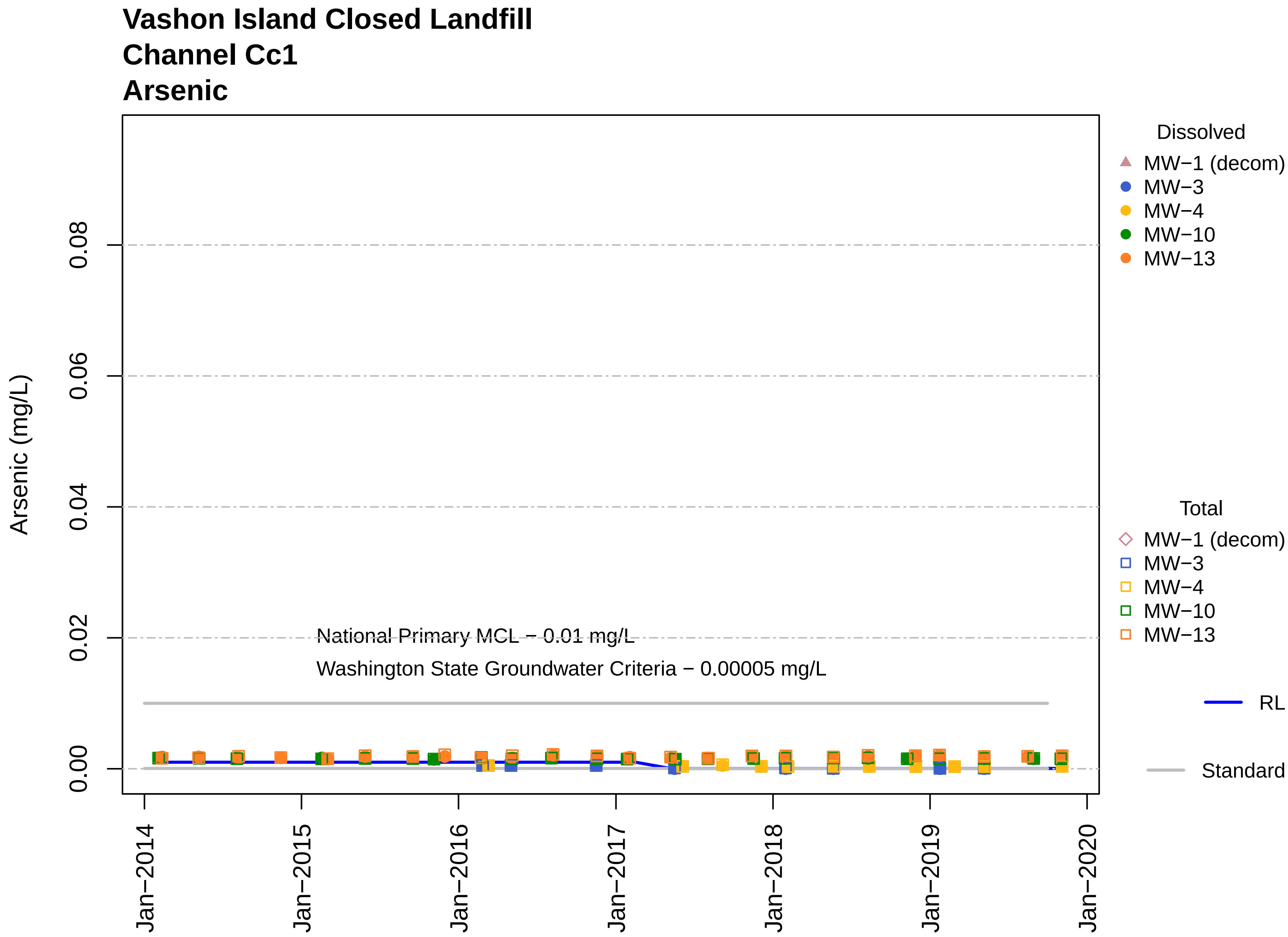


Vashon Island Closed Landfill
Channel Cc1
Total Dissolved Solids
TDS (mg/L)
0
200
400
600
800
National Secondary MCL − 500 mg/L
Washington State Groundwater Criteria − 500 mg/L
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

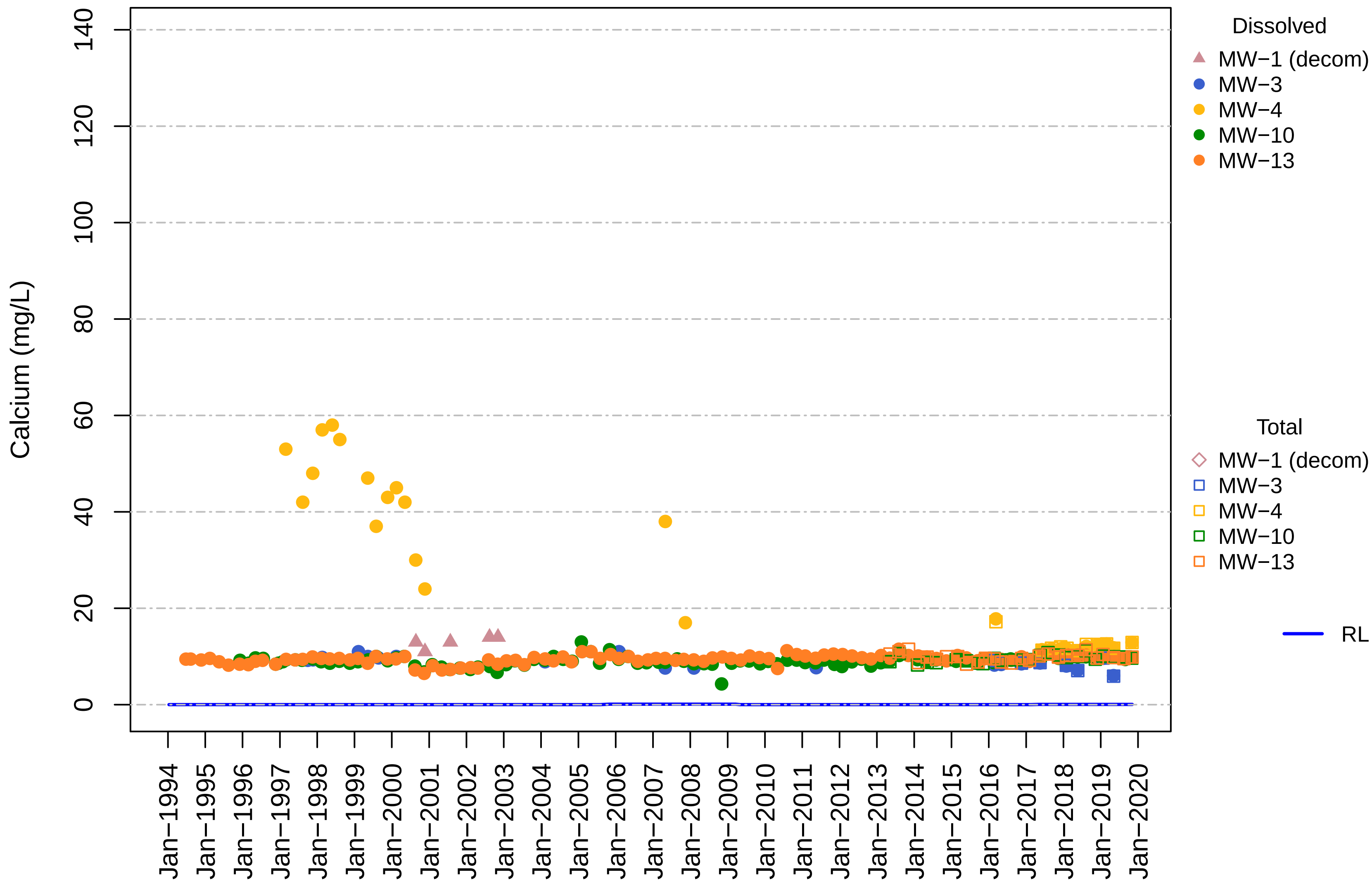


Vashon Island Closed Landfill
Channel Cc1
Total Dissolved Solids
National Secondary MCL − 500 mg/L
Washington State Groundwater Criteria − 500 mg/L
TDS (mg/L)
0
100
200
300
400
500
600
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

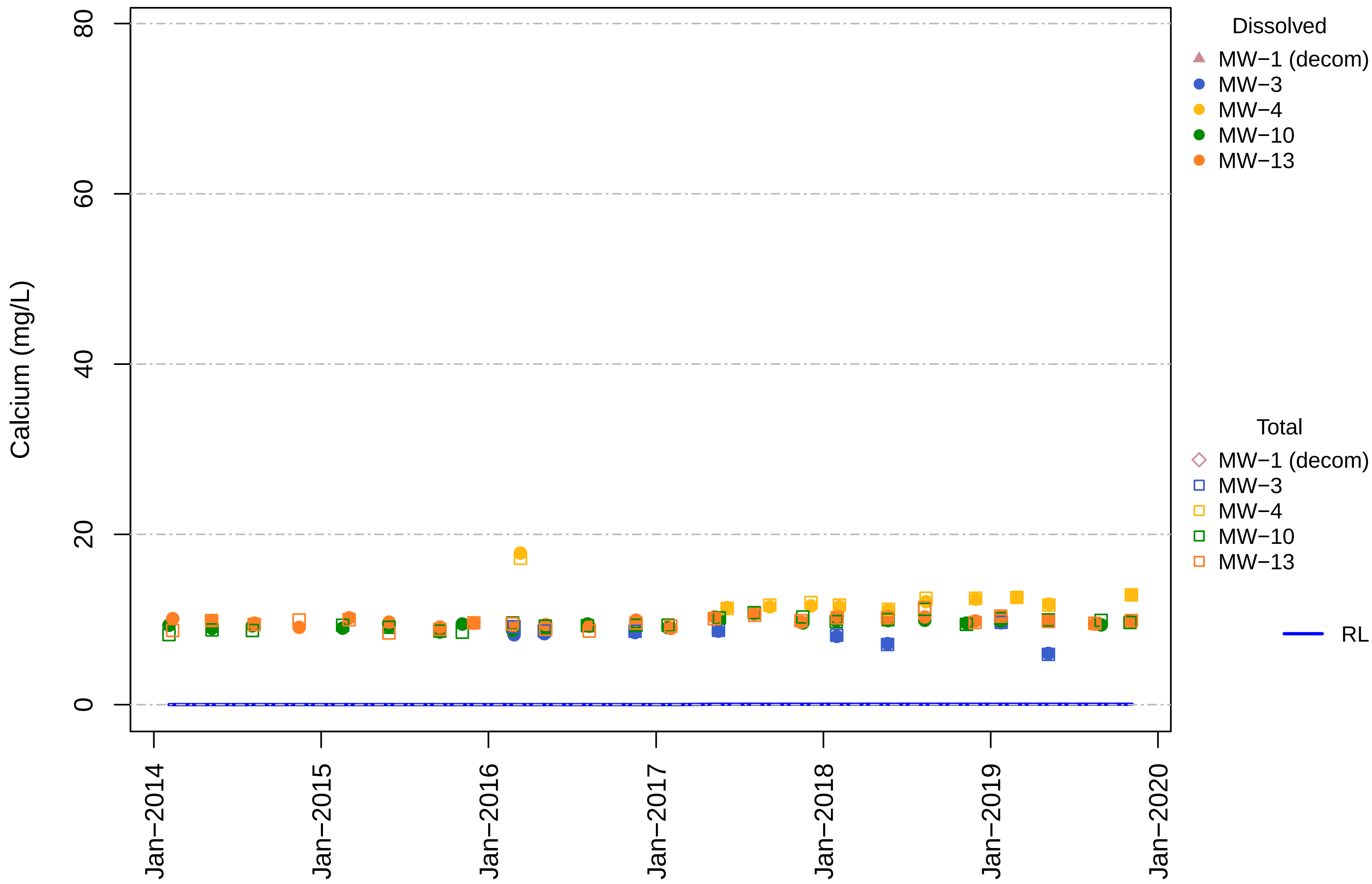

Vashon Island Closed Landfill
Channel Cc1
Arsenic
Arsenic (mg/L)
0.00
0.05
0.10
0.15
National Primary MCL − 0.01 mg/L
Washington State Groundwater Criteria − 0.00005 mg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
Total
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

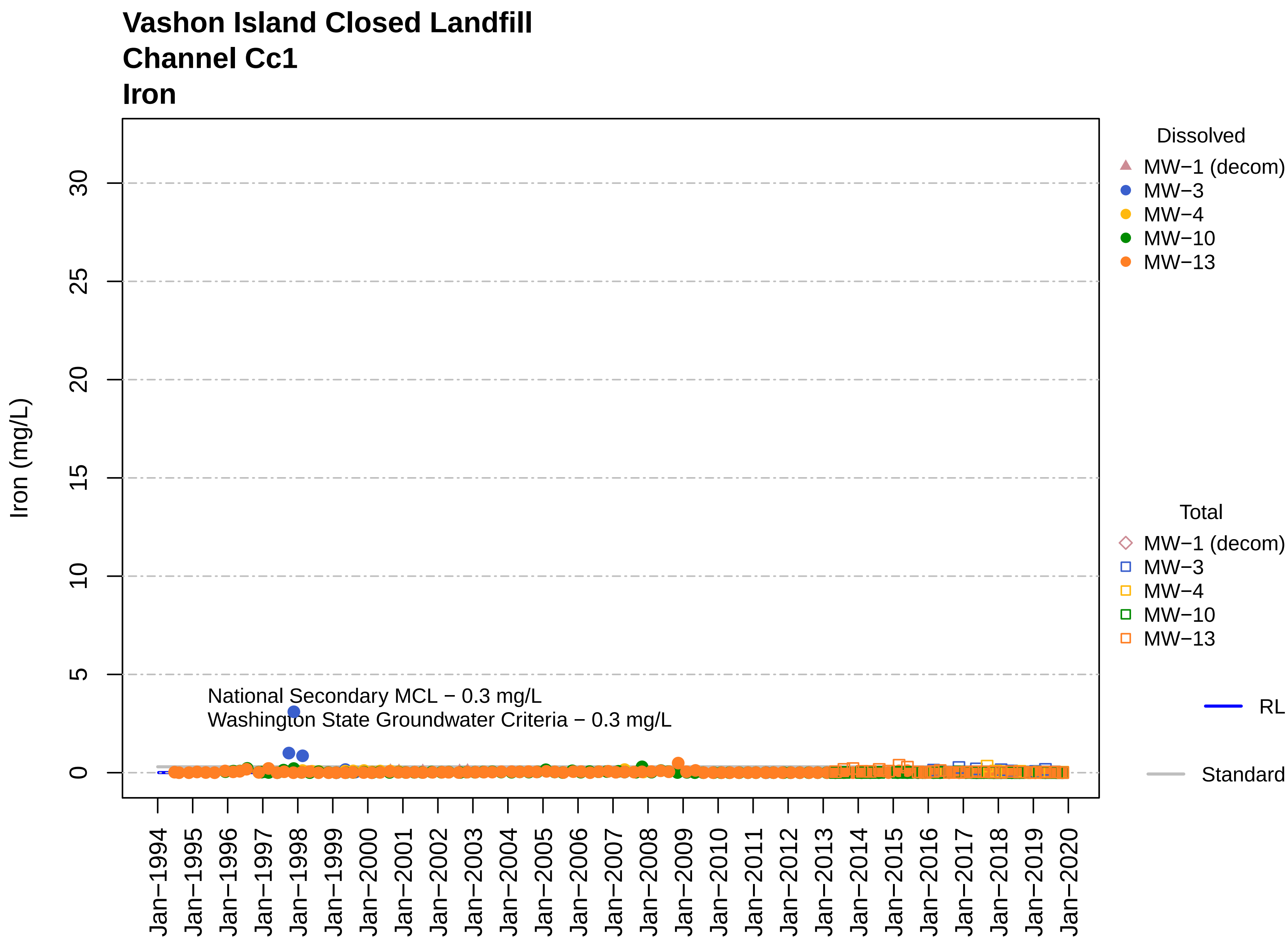

Vashon Island Closed Landfill
Channel Cc1
Arsenic
Arsenic (mg/L)
0.00
0.02
0.04
0.06
0.08
National Primary MCL − 0.01 mg/L
Washington State Groundwater Criteria − 0.00005 mg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
Total
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

Vashon Island Closed Landfill
Channel Cc1
Calcium

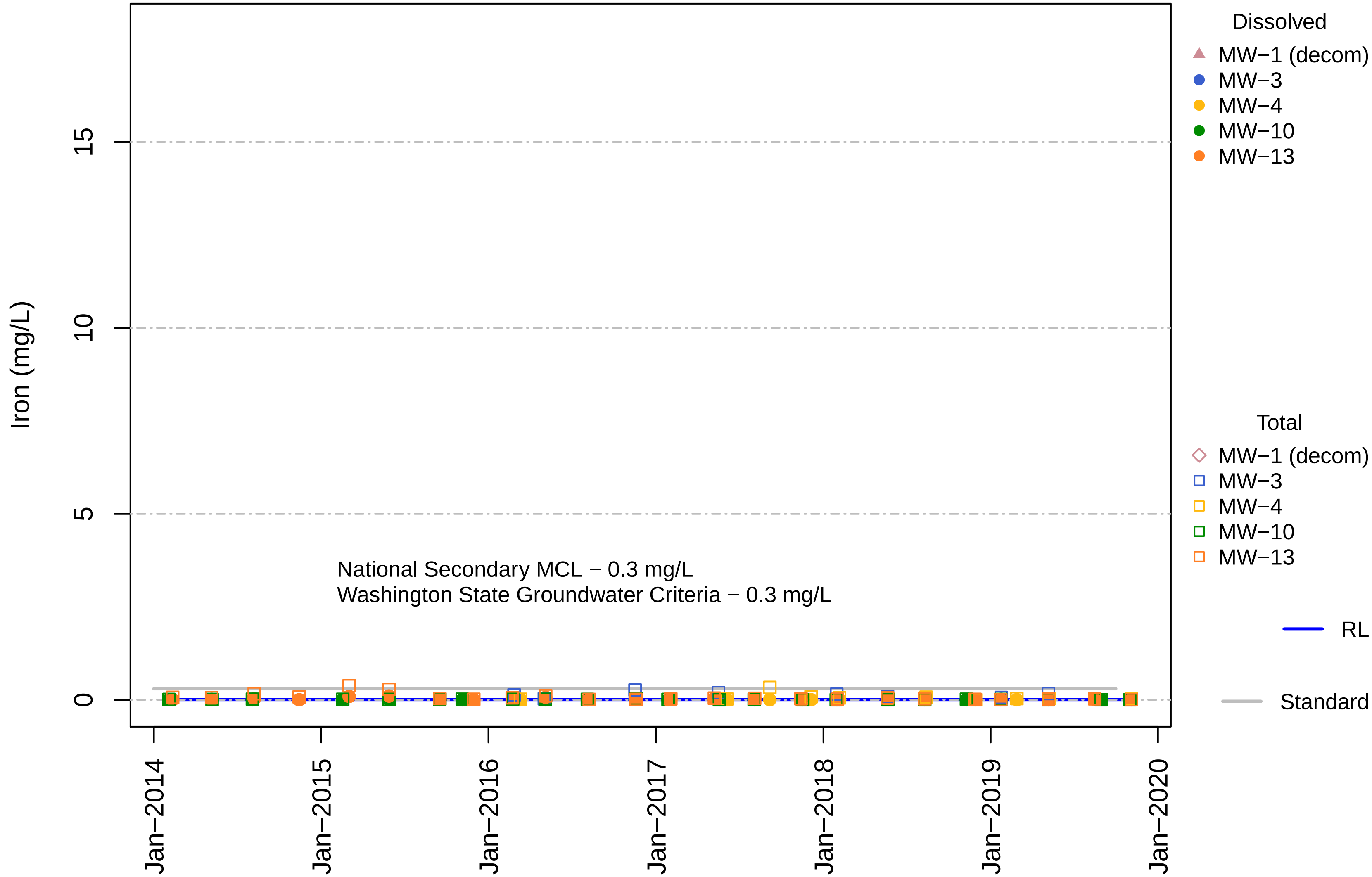


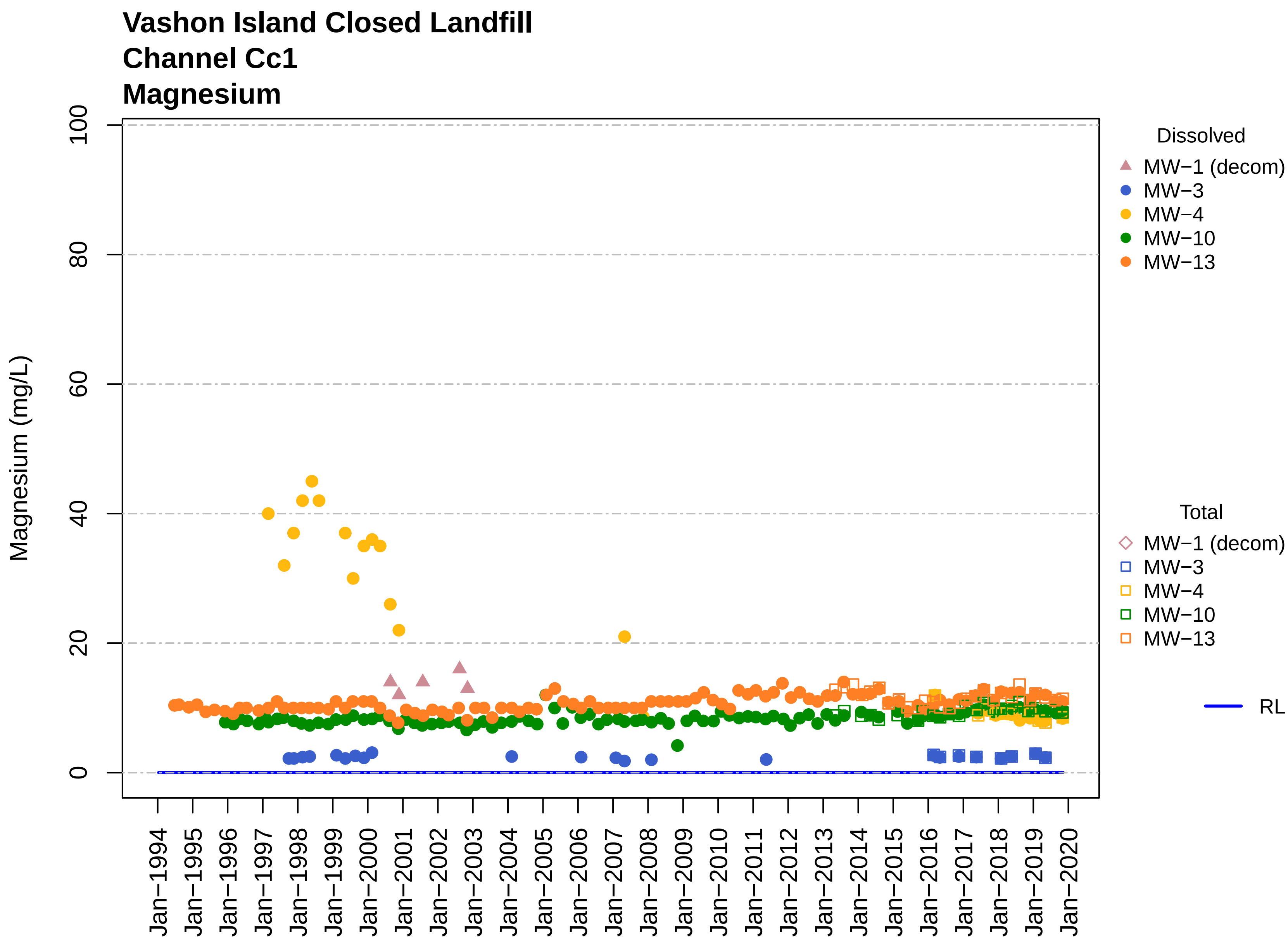
Vashon Island Closed Landfill
Channel Cc1
Calcium



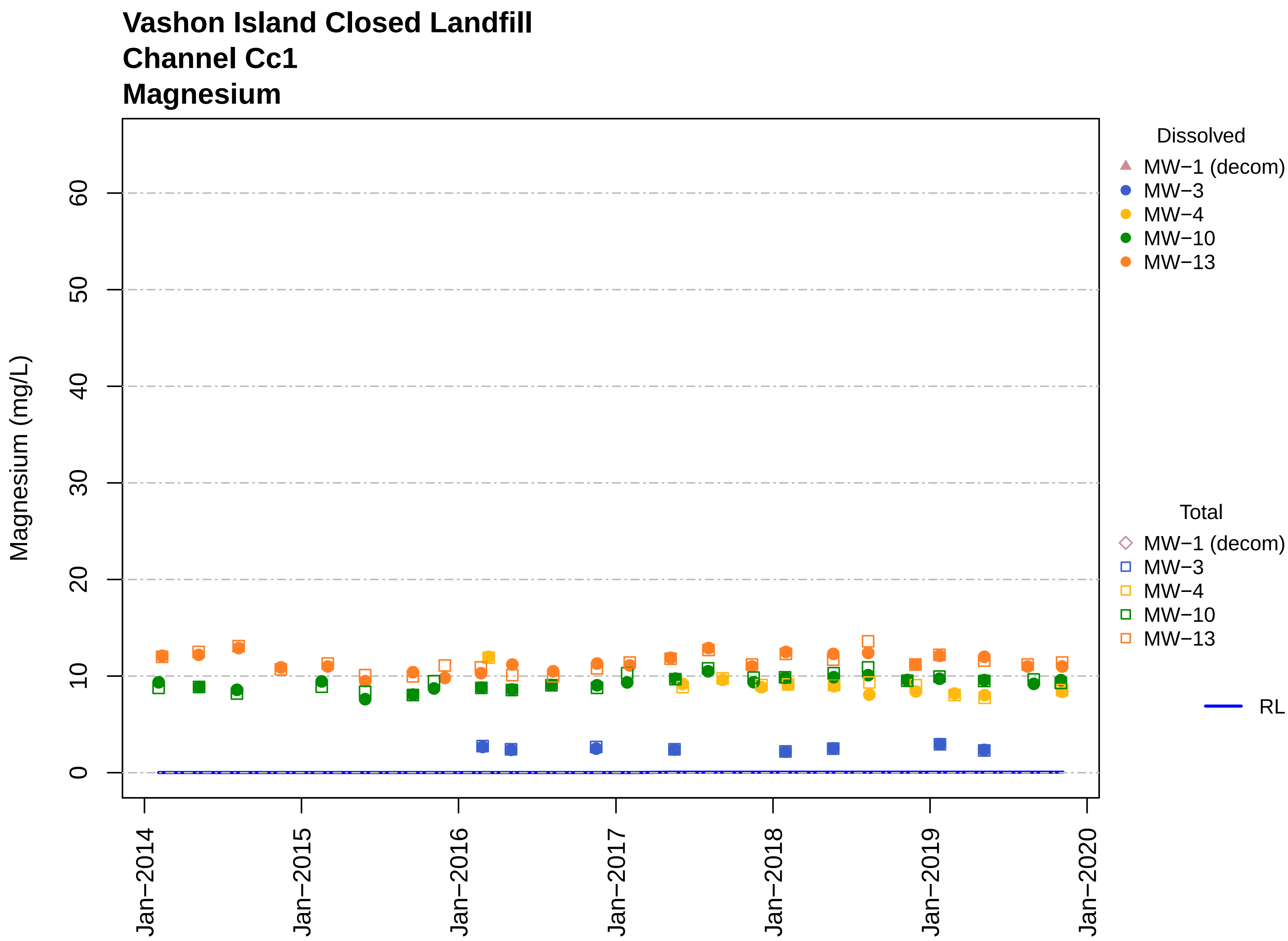

Vashon Island Closed Landfill
Channel Cc1
Iron
Iron (mg/L)
0
5
10
15
20
25
30
National Secondary MCL − 0.3 mg/L
Washington State Groundwater Criteria − 0.3 mg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
Total
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

Vashon Island Closed Landfill
Channel Cc1
Iron

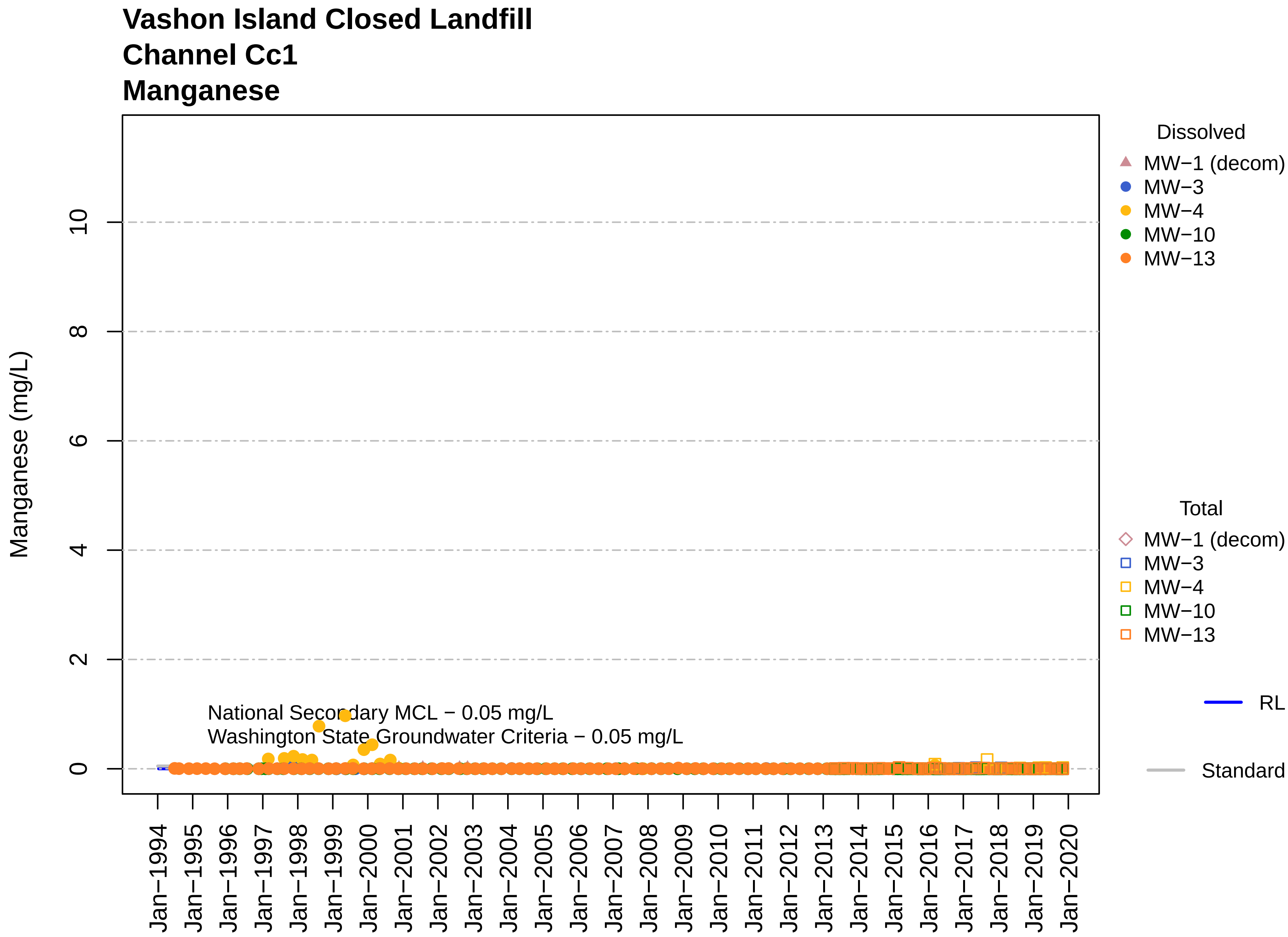




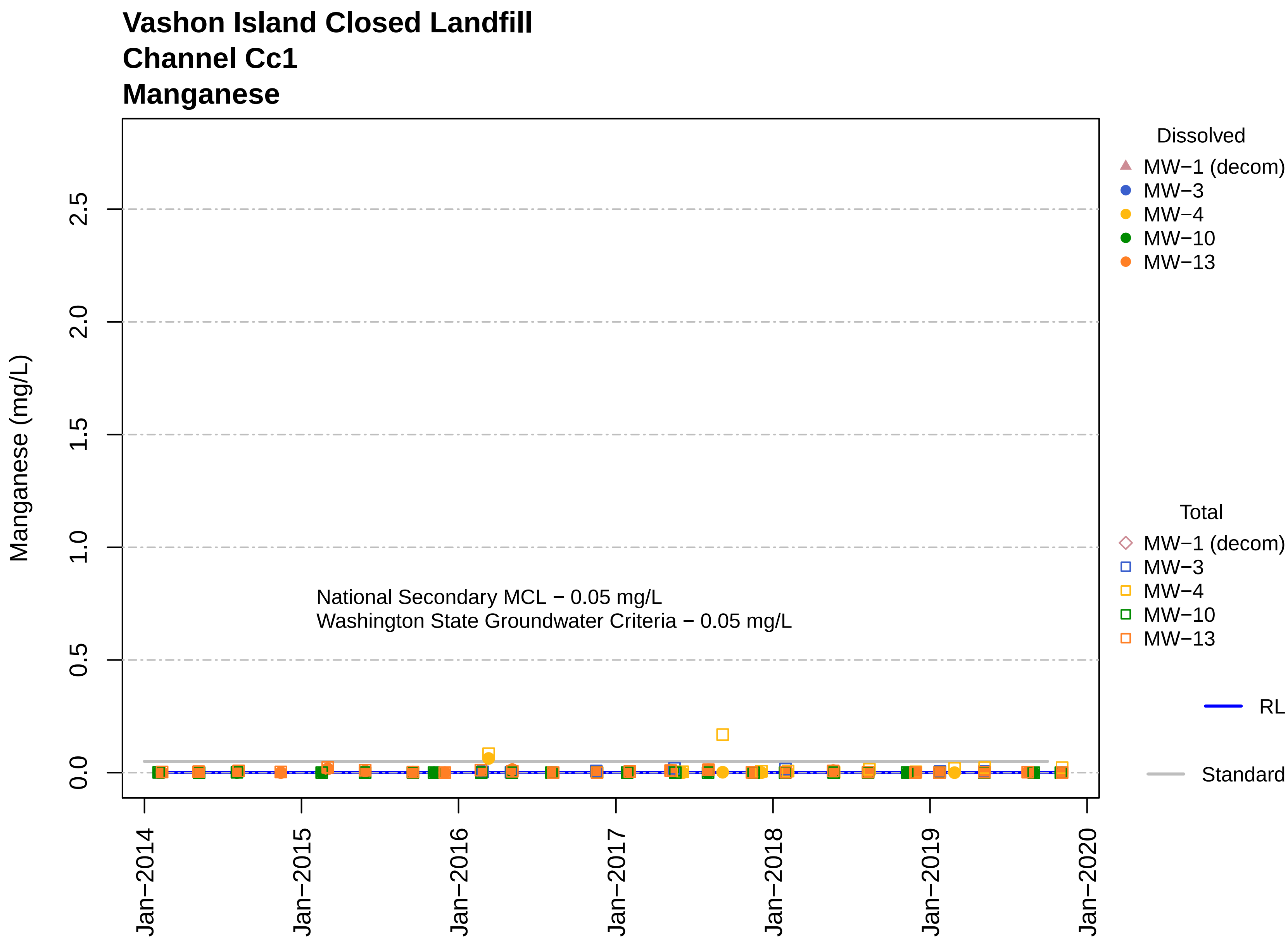
Vashon Island Closed Landfill
Channel Cc1
Magnesium
Magnesium (mg/L)
0
20
40
60
80
100
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
Total
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL



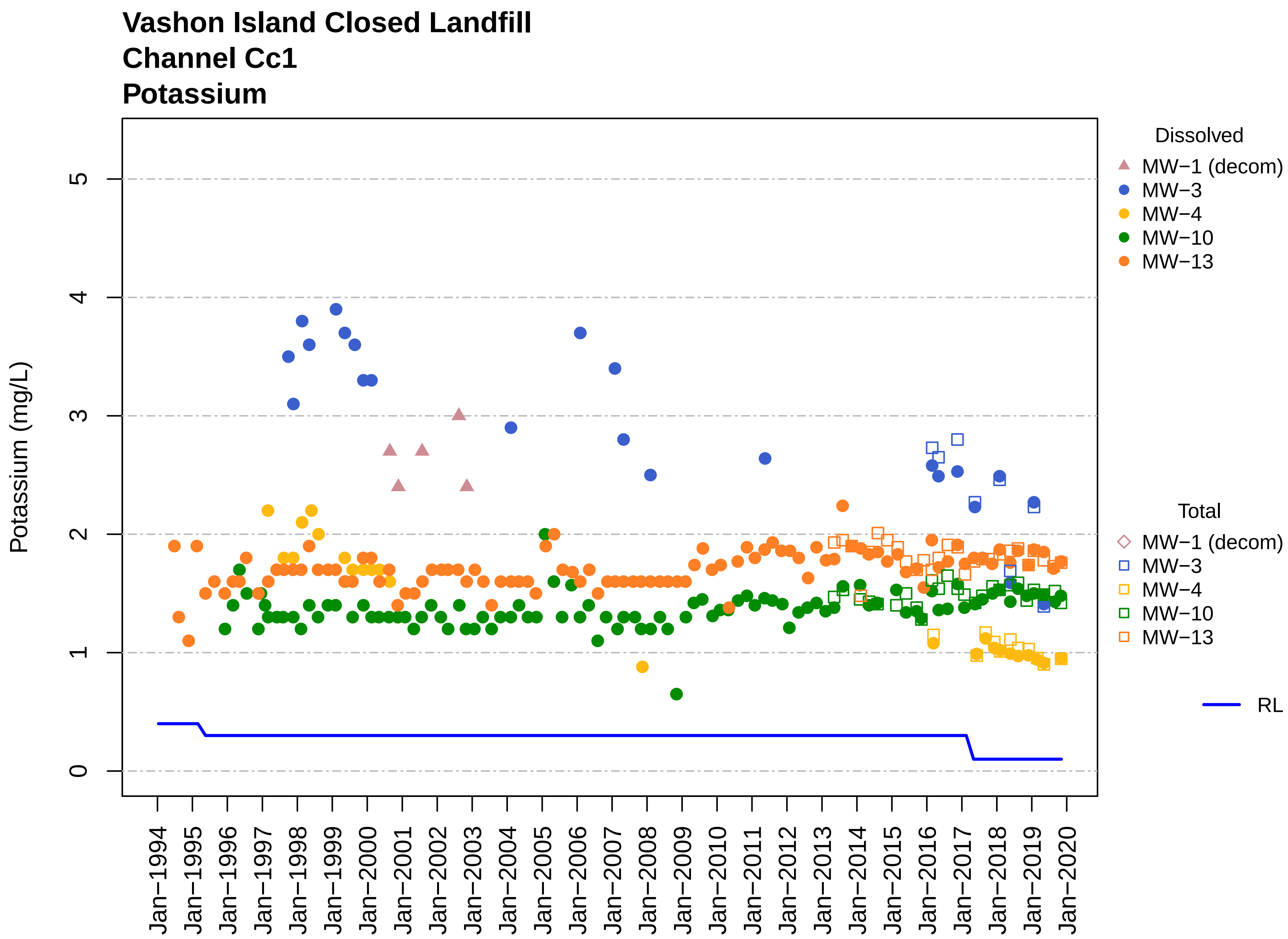
Vashon Island Closed Landfill
Channel Cc1
Magnesium
Magnesium (mg/L)
0
10
20
30
40
50
60
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
Total
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL



Vashon Island Closed Landfill
Channel Cc1
Manganese
Manganese (mg/L)
0
2
4
6
8
10
National Secondary MCL − 0.05 mg/L
Washington State Groundwater Criteria − 0.05 mg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
Total
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

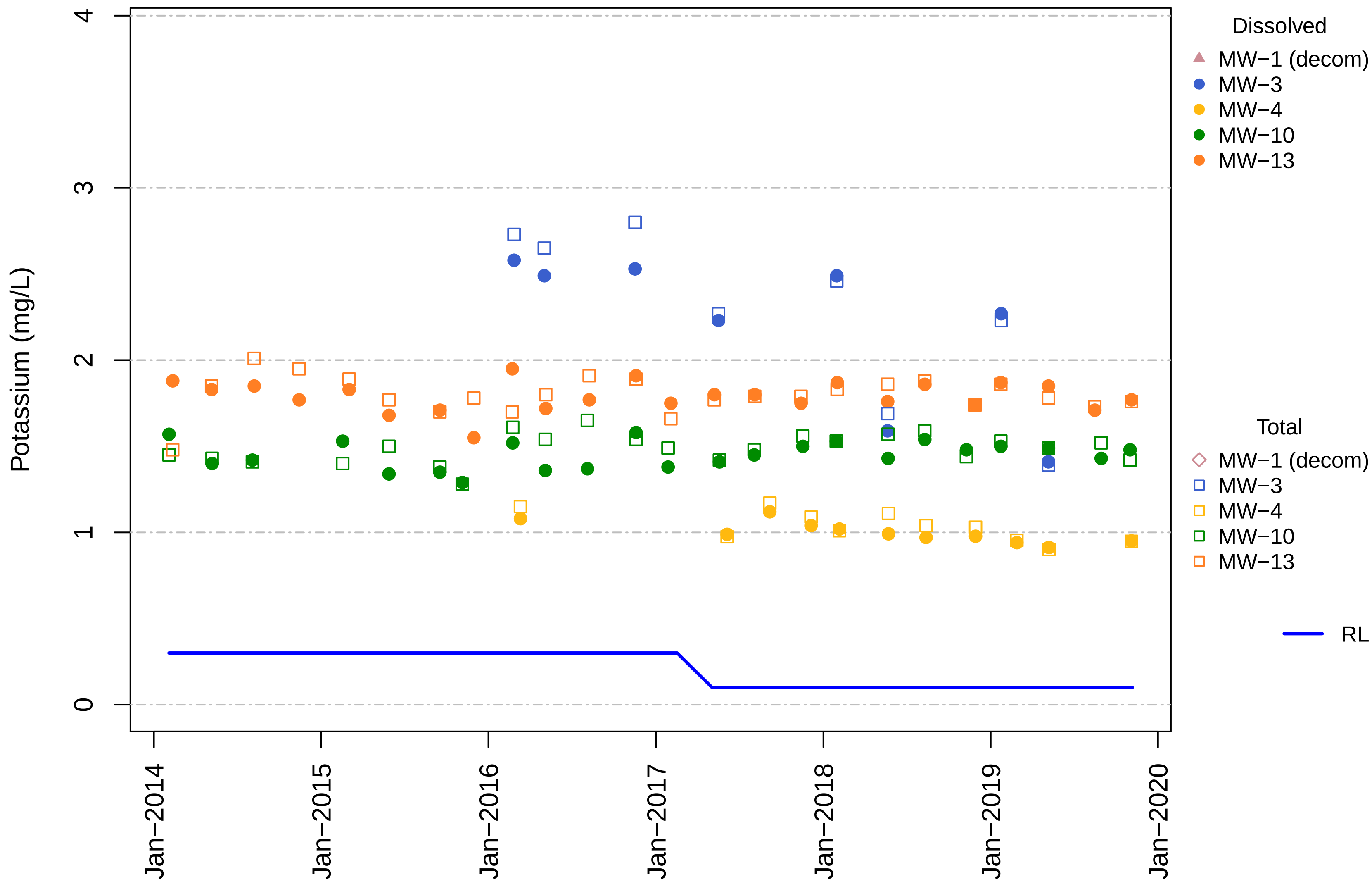


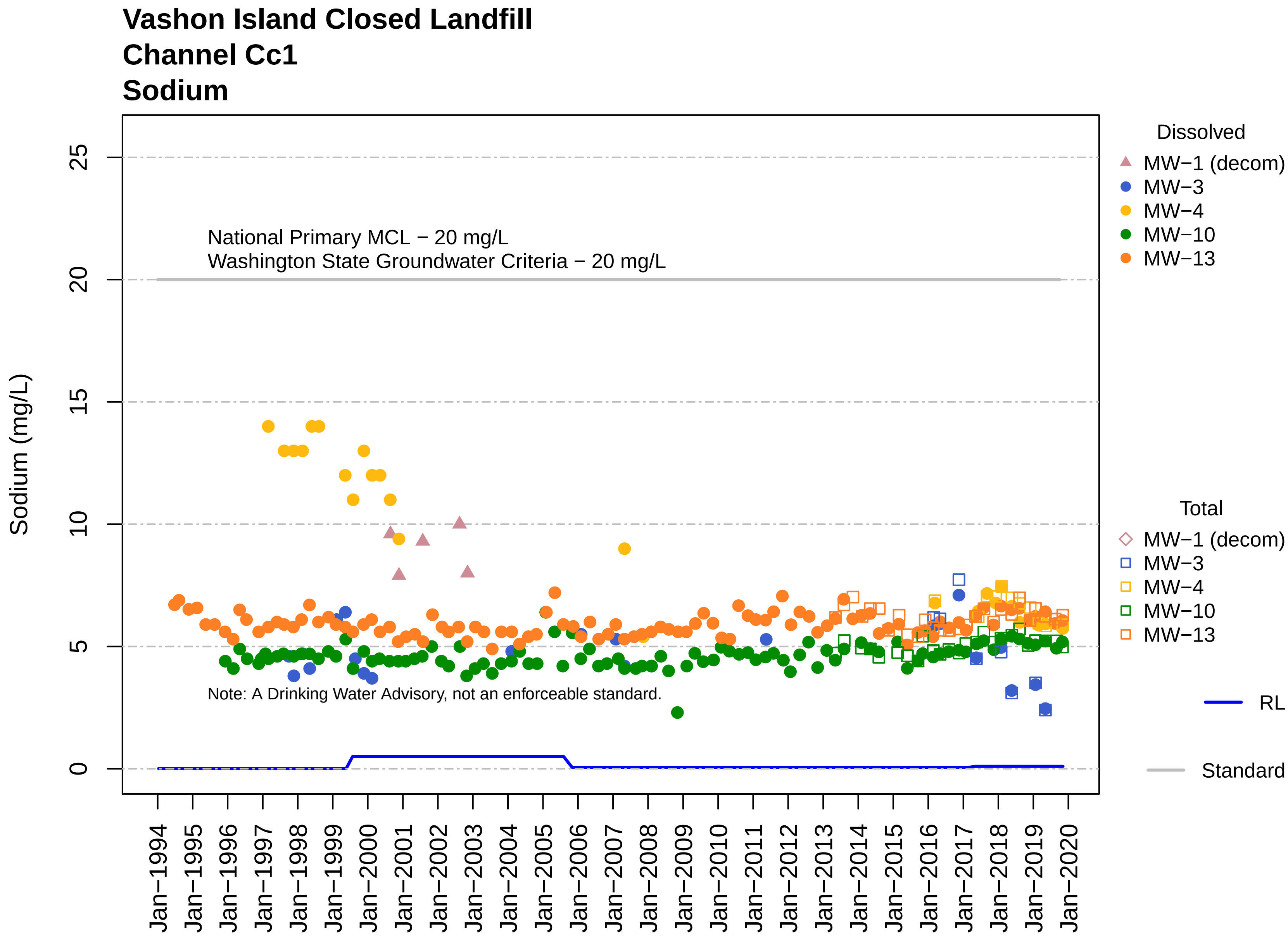
Vashon Island Closed Landfill
Channel Cc1
Manganese
Manganese (mg/L)
0.0
0.5
1.0
1.5
2.0
2.5
National Secondary MCL − 0.05 mg/L
Washington State Groundwater Criteria − 0.05 mg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
Total
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

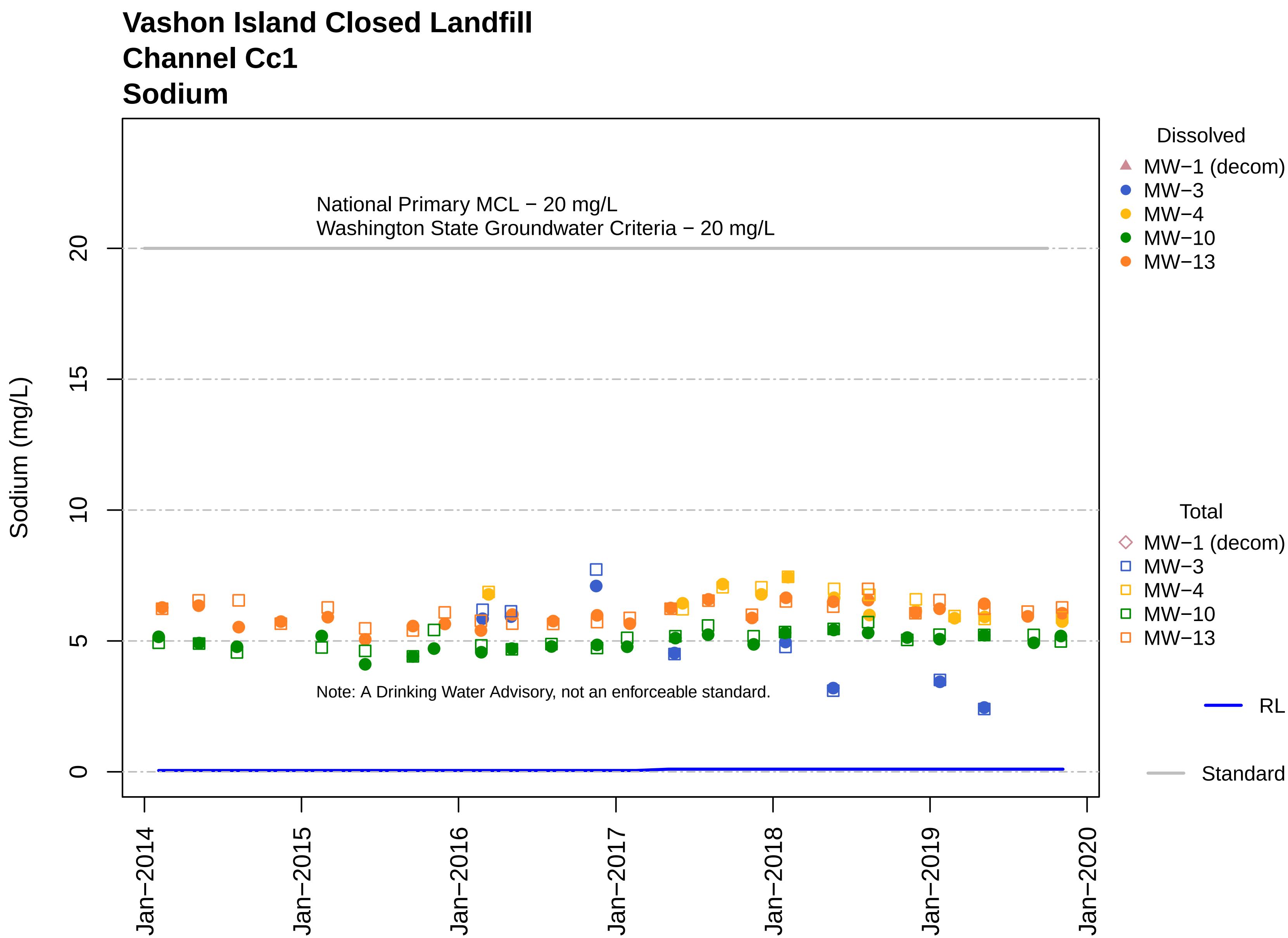


Vashon Island Closed Landfill
Channel Cc1
Potassium
Potassium (mg/L)
0
1
2
3
4
5
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
Total
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL

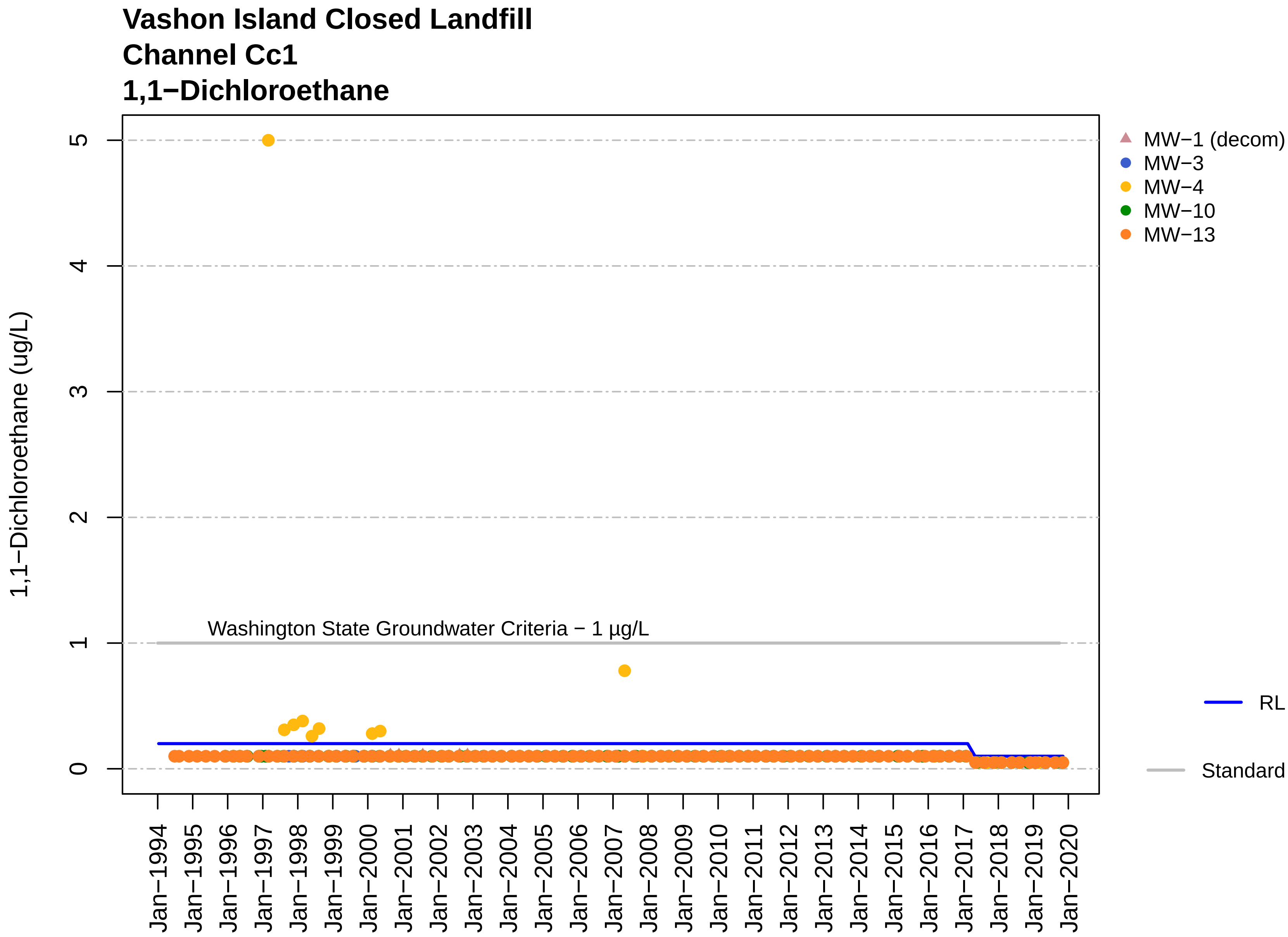
Vashon Island Closed Landfill
Channel Cc1
Potassium

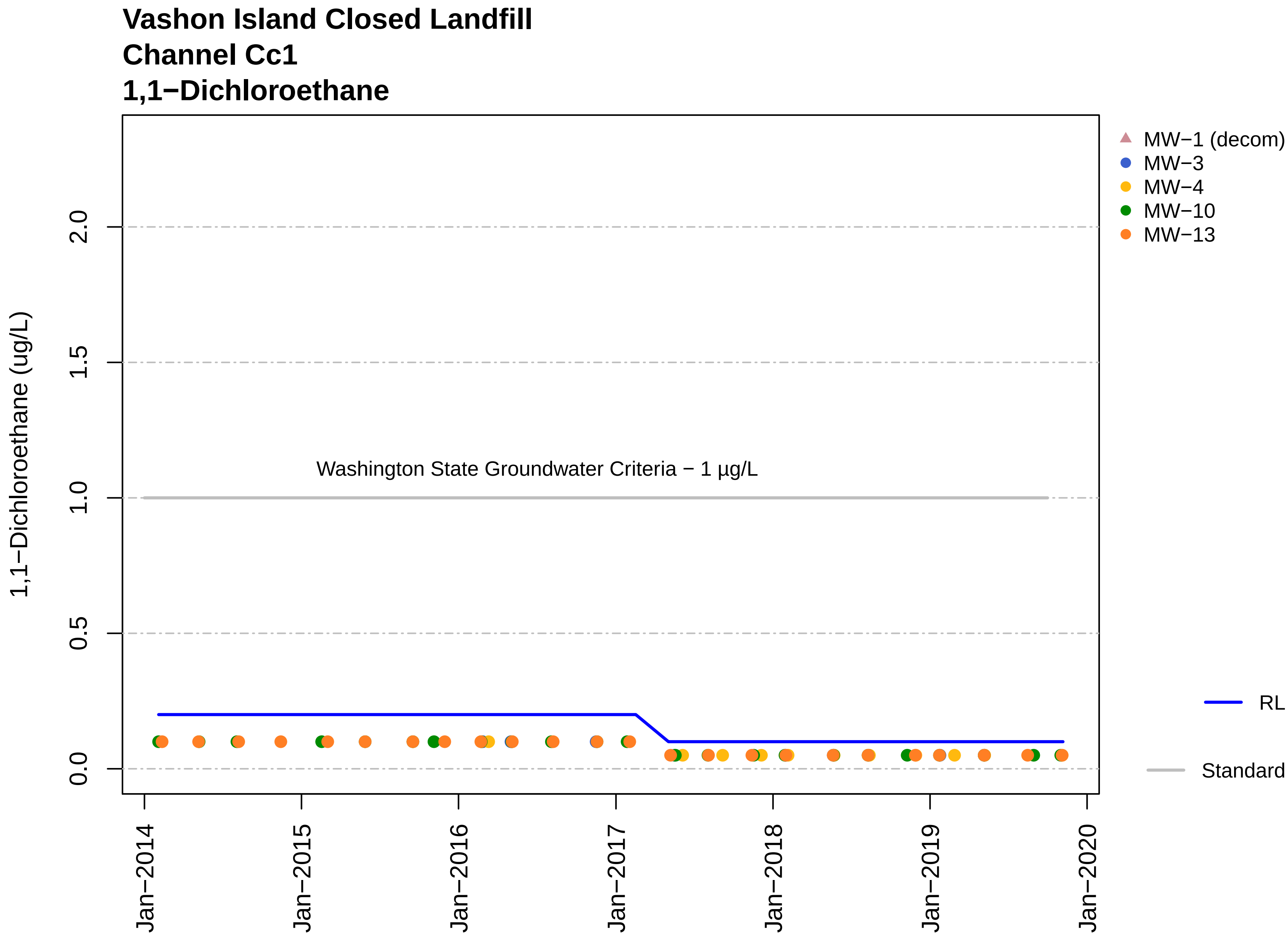


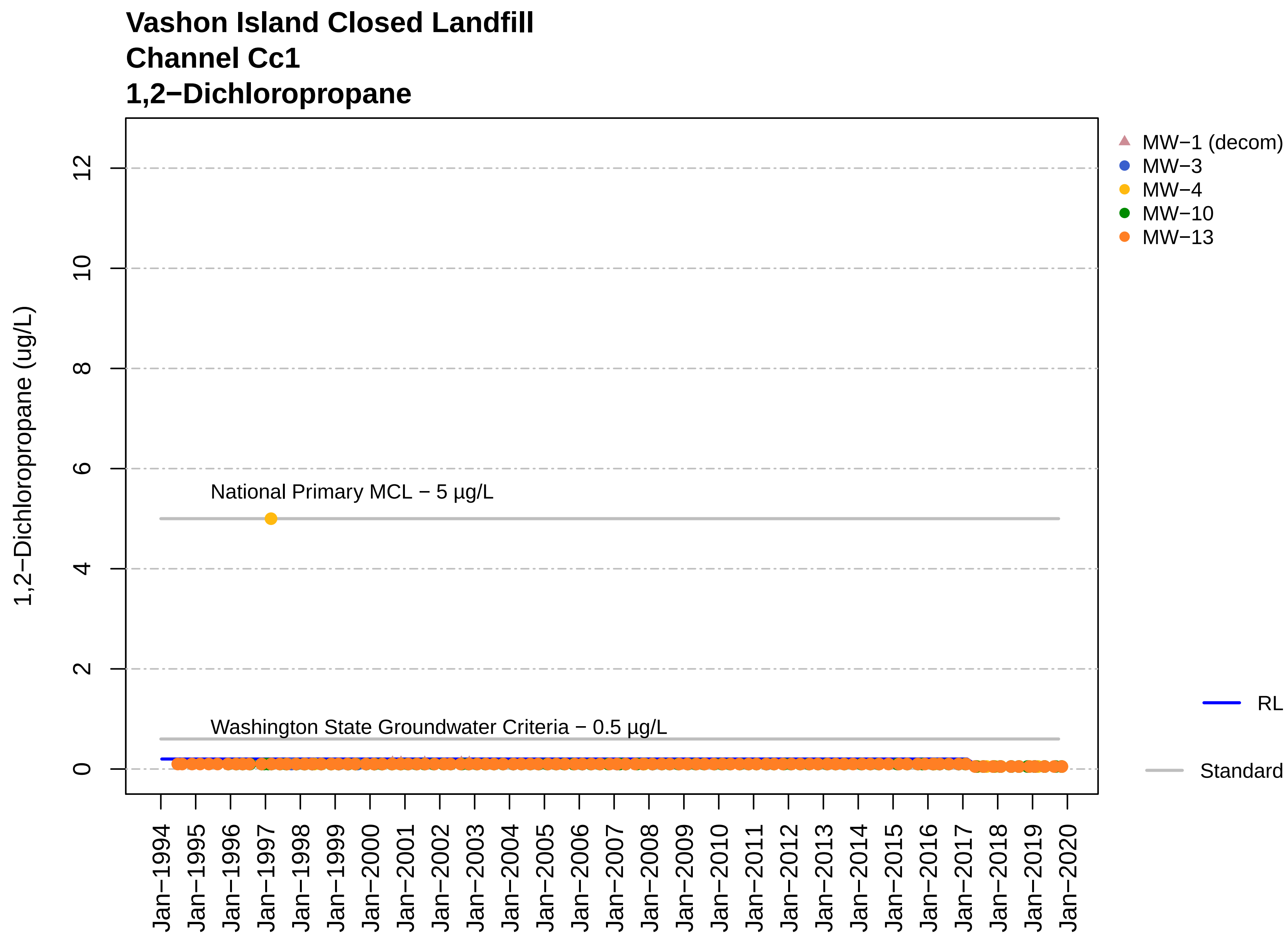

Vashon Island Closed Landfill
Channel Cc1
Sodium
Sodium (mg/L)
0
5
10
15
20
25
National Primary MCL − 20 mg/L
Washington State Groundwater Criteria − 20 mg/L
Note: A Drinking Water Advisory, not an enforceable standard.
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
Total
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard



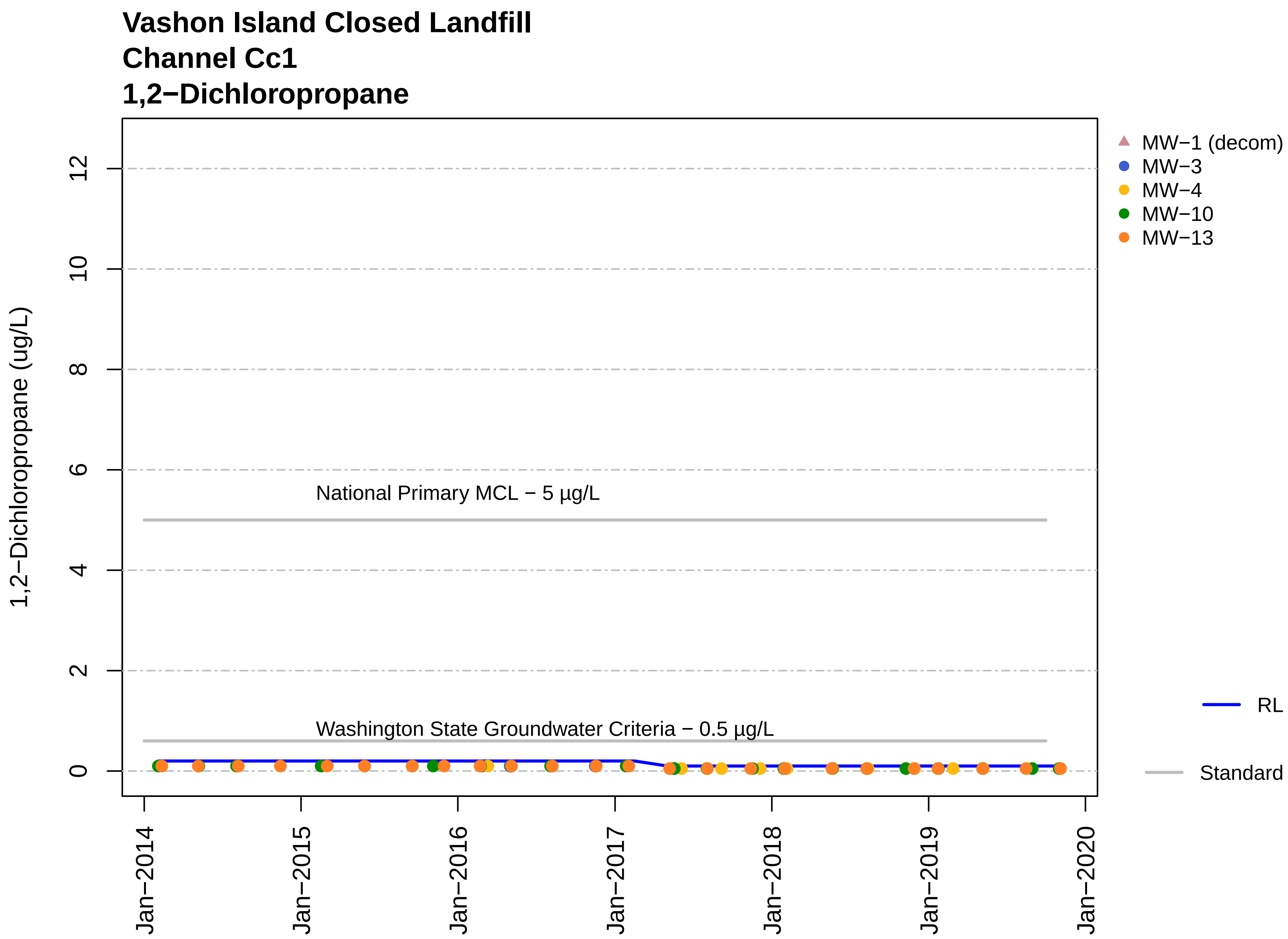
Vashon Island Closed Landfill
Channel Cc1
Sodium
Sodium (mg/L)
0
5
10
15
20
National Primary MCL − 20 mg/L
Washington State Groundwater Criteria − 20 mg/L
Note: A Drinking Water Advisory, not an enforceable standard.
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
Total
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

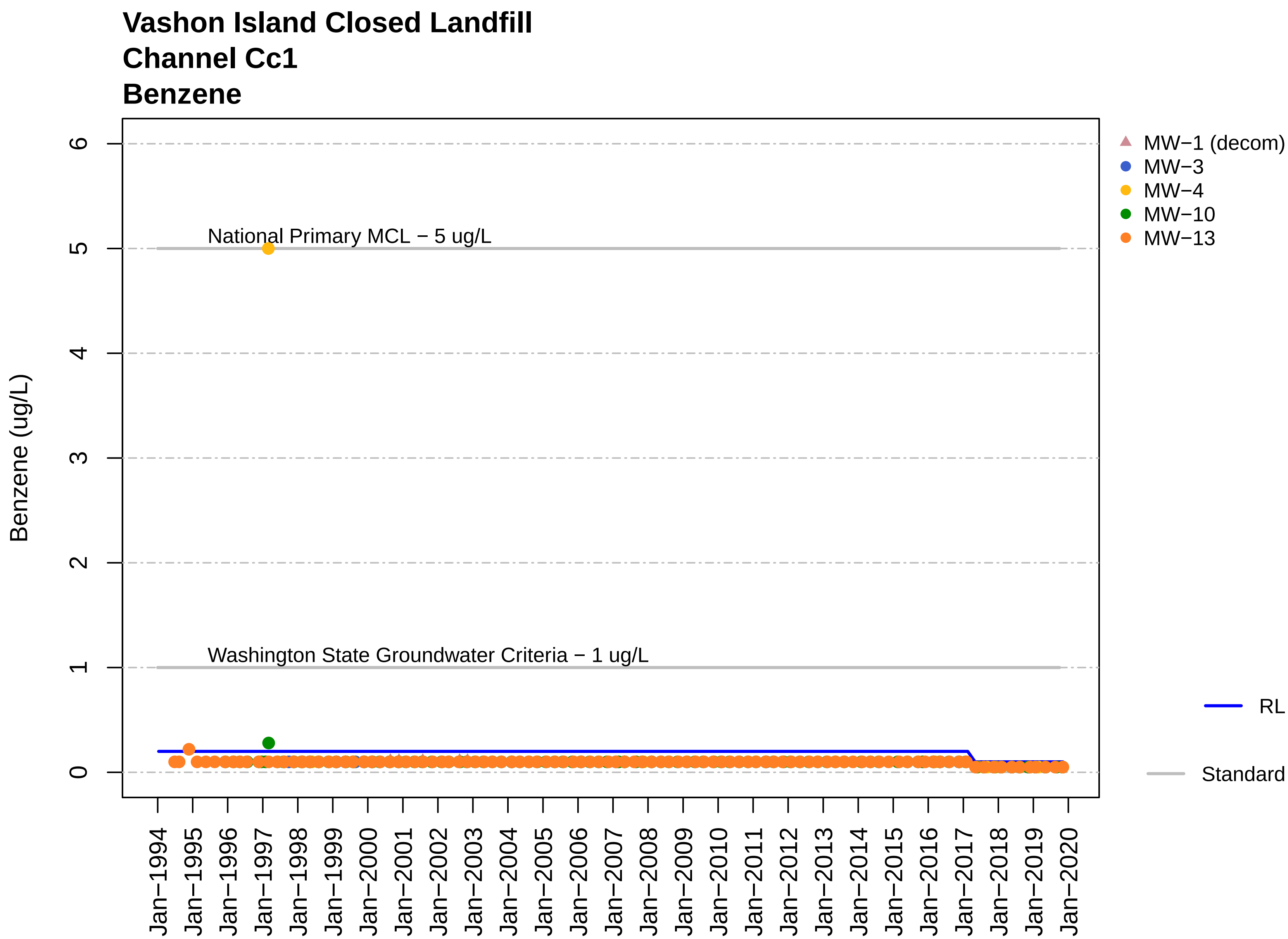

Vashon Island Closed Landfill
Channel Cc1
1,1−Dichloroethane
1,1−Dichloroethane (ug/L)
Washington State Groundwater Criteria − 1 µg/L
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard
0
1
2
3
4
5
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

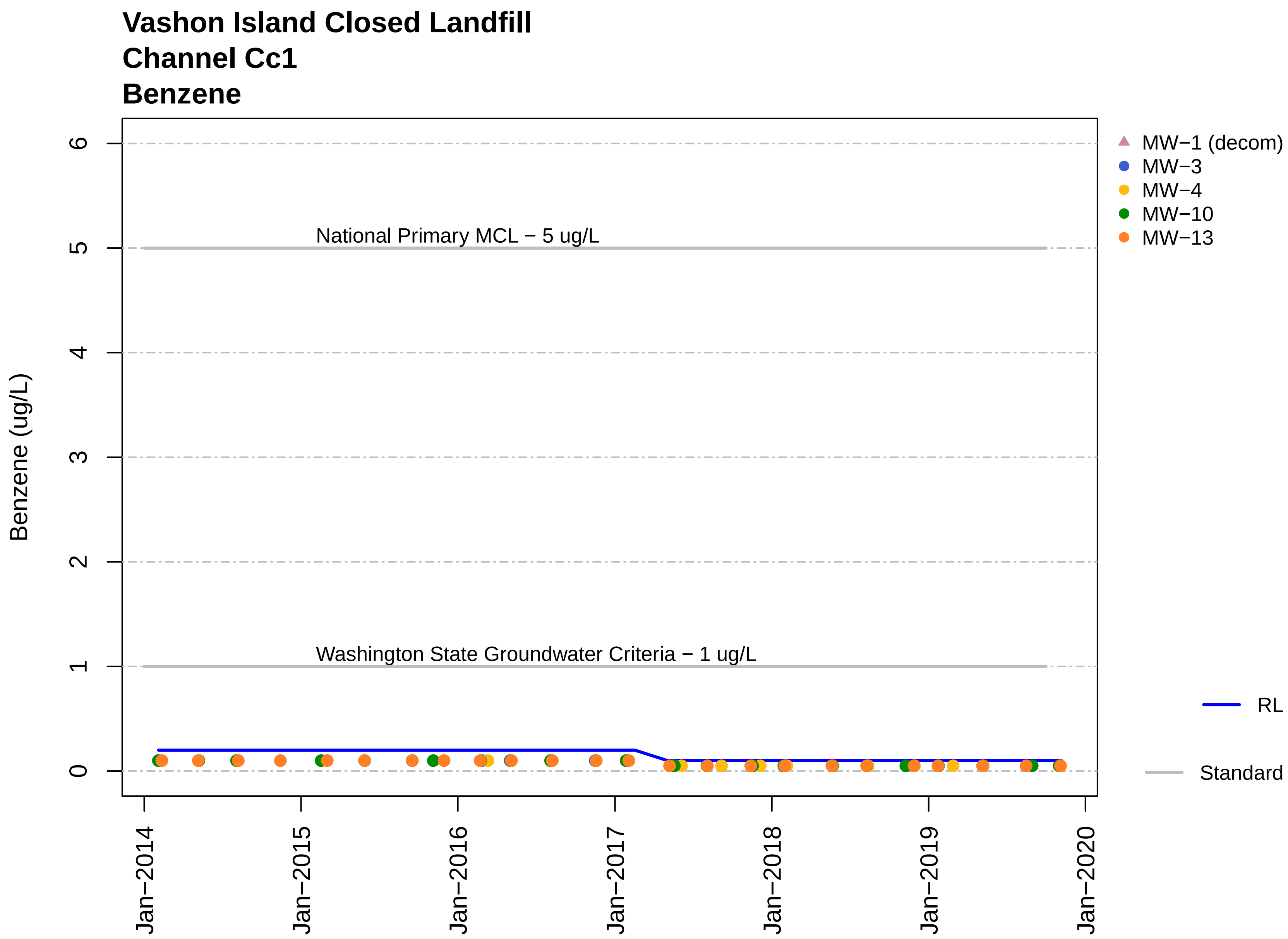

Vashon Island Closed Landfill
Channel Cc1
1,1−Dichloroethane
1,1−Dichloroethane (ug/L)
0.0
0.5
1.0
1.5
2.0
Washington State Groundwater Criteria − 1 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

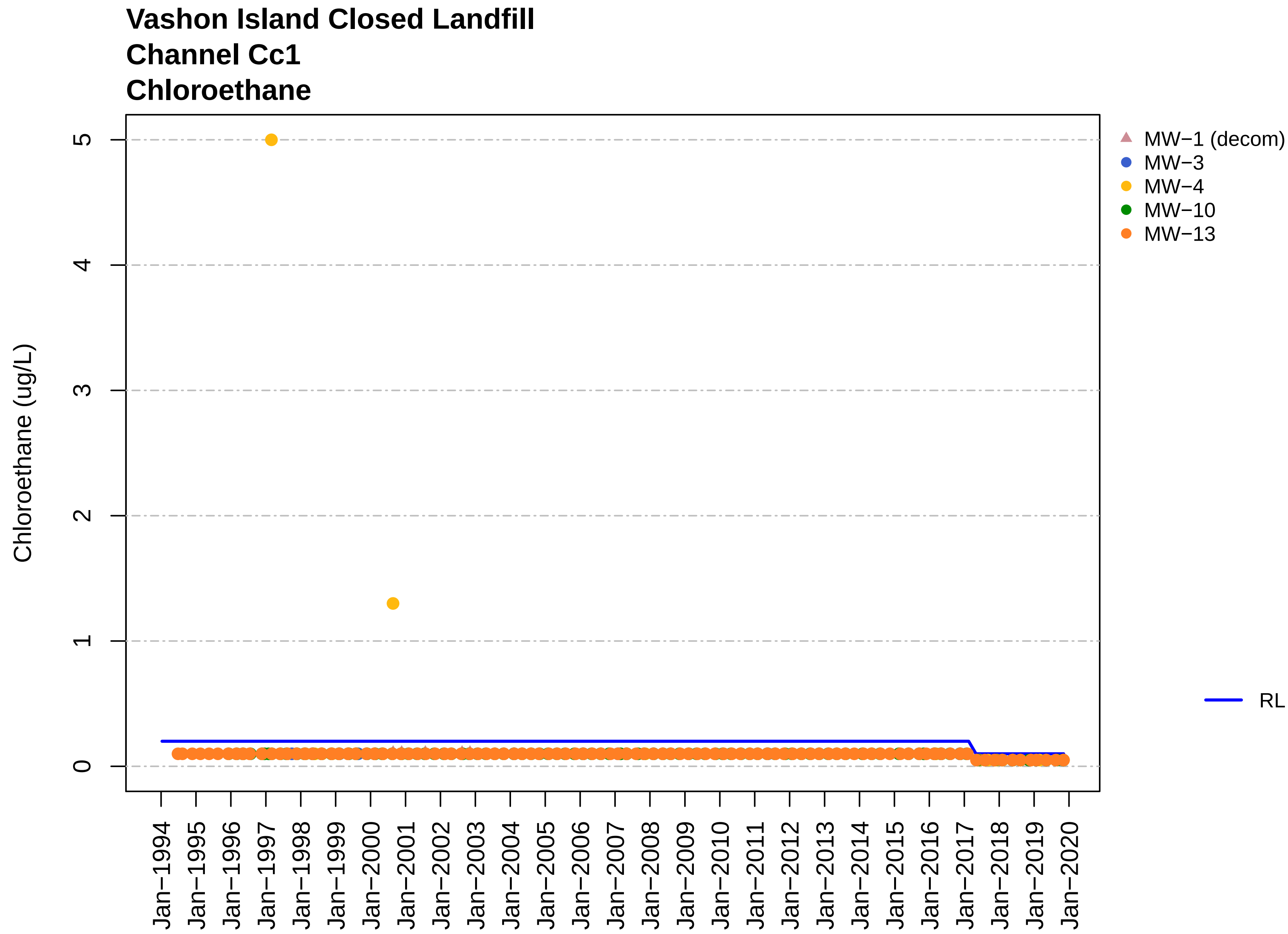


Vashon Island Closed Landfill
Channel Cc1
1,2−Dichloropropane
1,2−Dichloropropane (ug/L)
0
2
4
6
8
10
12
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.5 µg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard


Vashon Island Closed Landfill
Channel Cc1
1,2−Dichloropropane
1,2−Dichloropropane (ug/L)
0
2
4
6
8
10
12
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.5 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

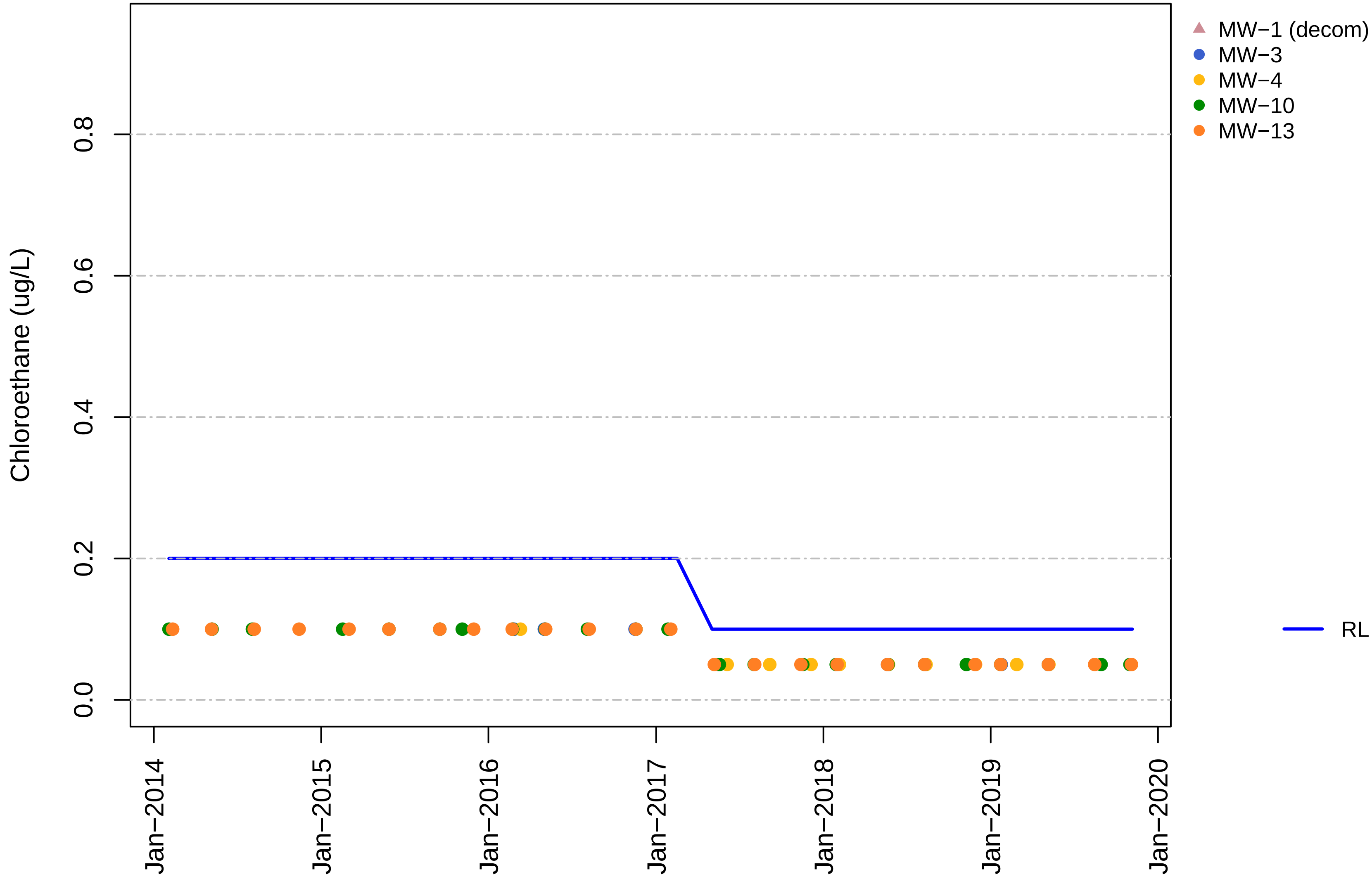

Vashon Island Closed Landfill
Channel Cc1
Benzene
Benzene (ug/L)
0
1
2
3
4
5
6
National Primary MCL − 5 ug/L
Washington State Groundwater Criteria − 1 ug/L
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

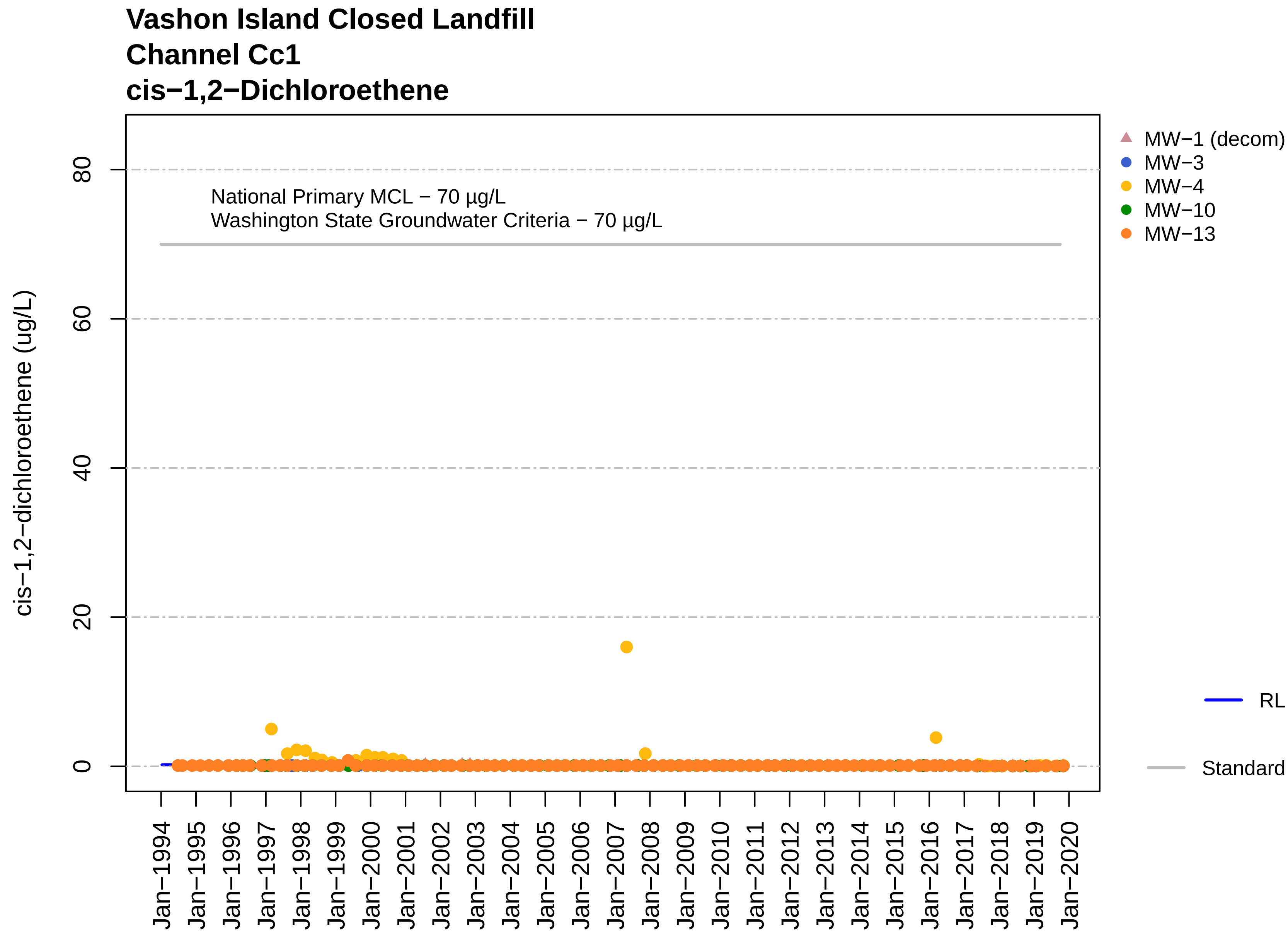

Vashon Island Closed Landfill
Channel Cc1
Benzene
Benzene (ug/L)
0
1
2
3
4
5
6
National Primary MCL − 5 ug/L
Washington State Groundwater Criteria − 1 ug/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard



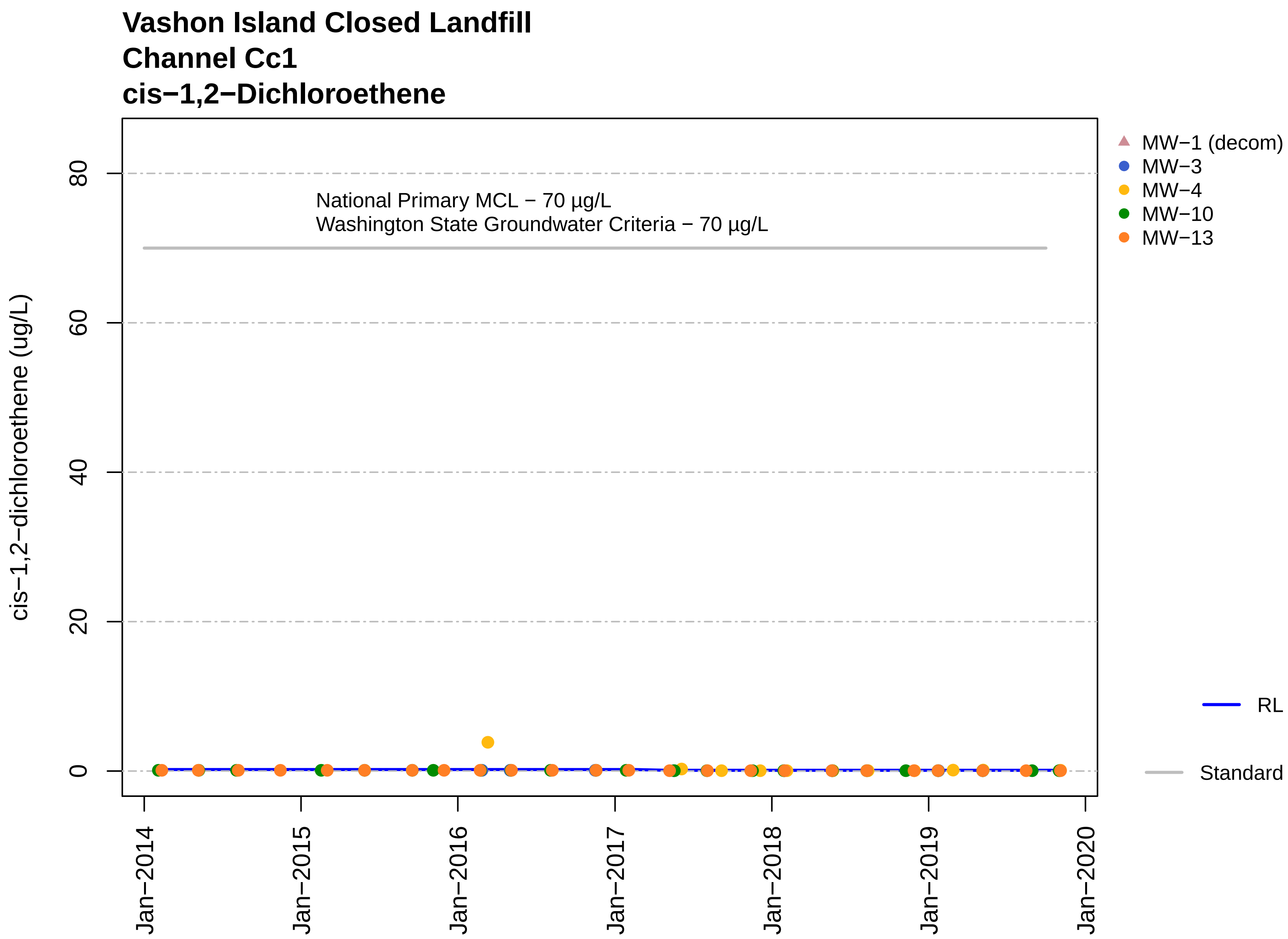
Vashon Island Closed Landfill
Channel Cc1
Chloroethane
Chloroethane (ug/L)
0
1
2
3
4
5
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

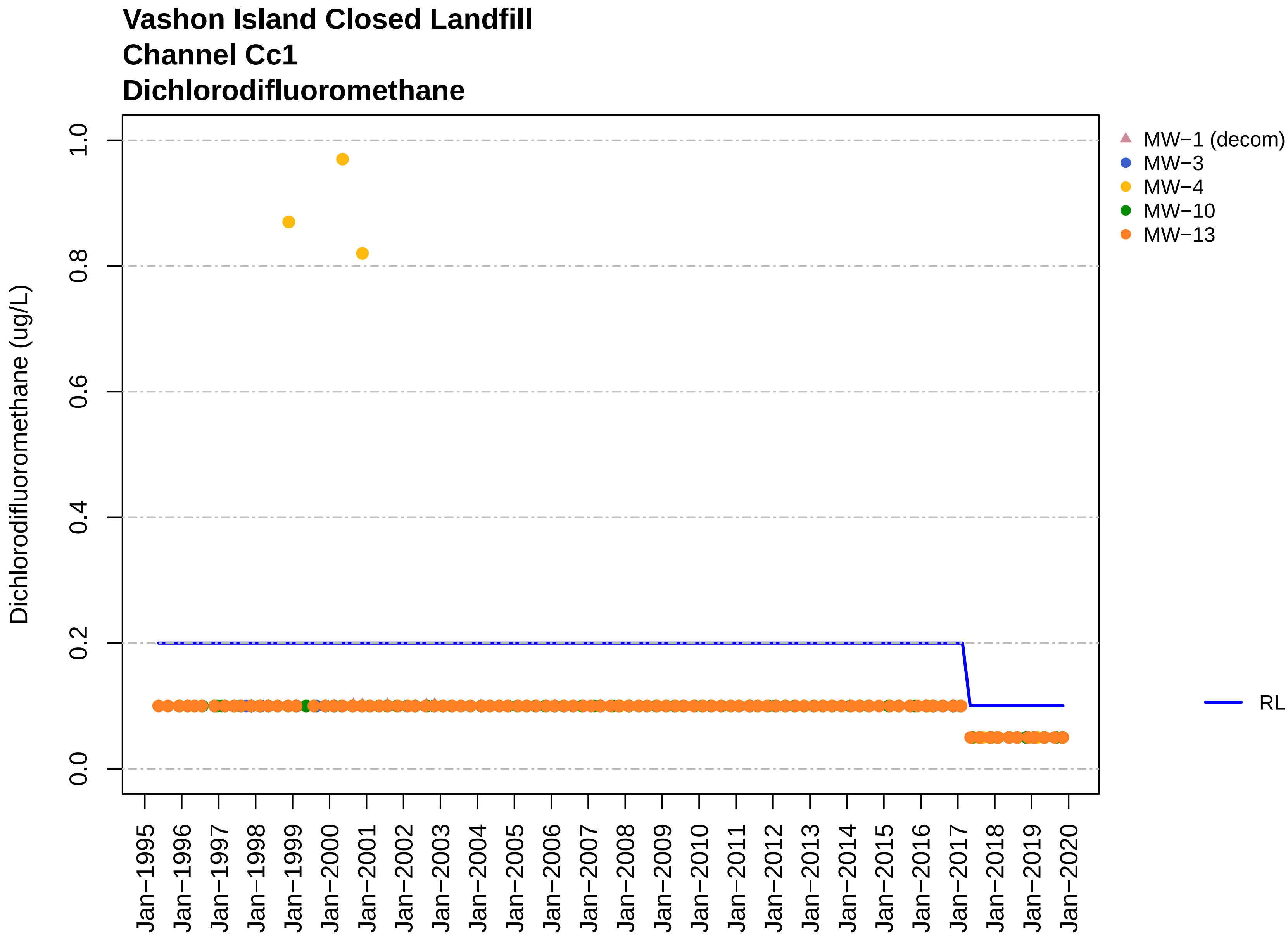
Vashon Island Closed Landfill
Channel Cc1
Chloroethane



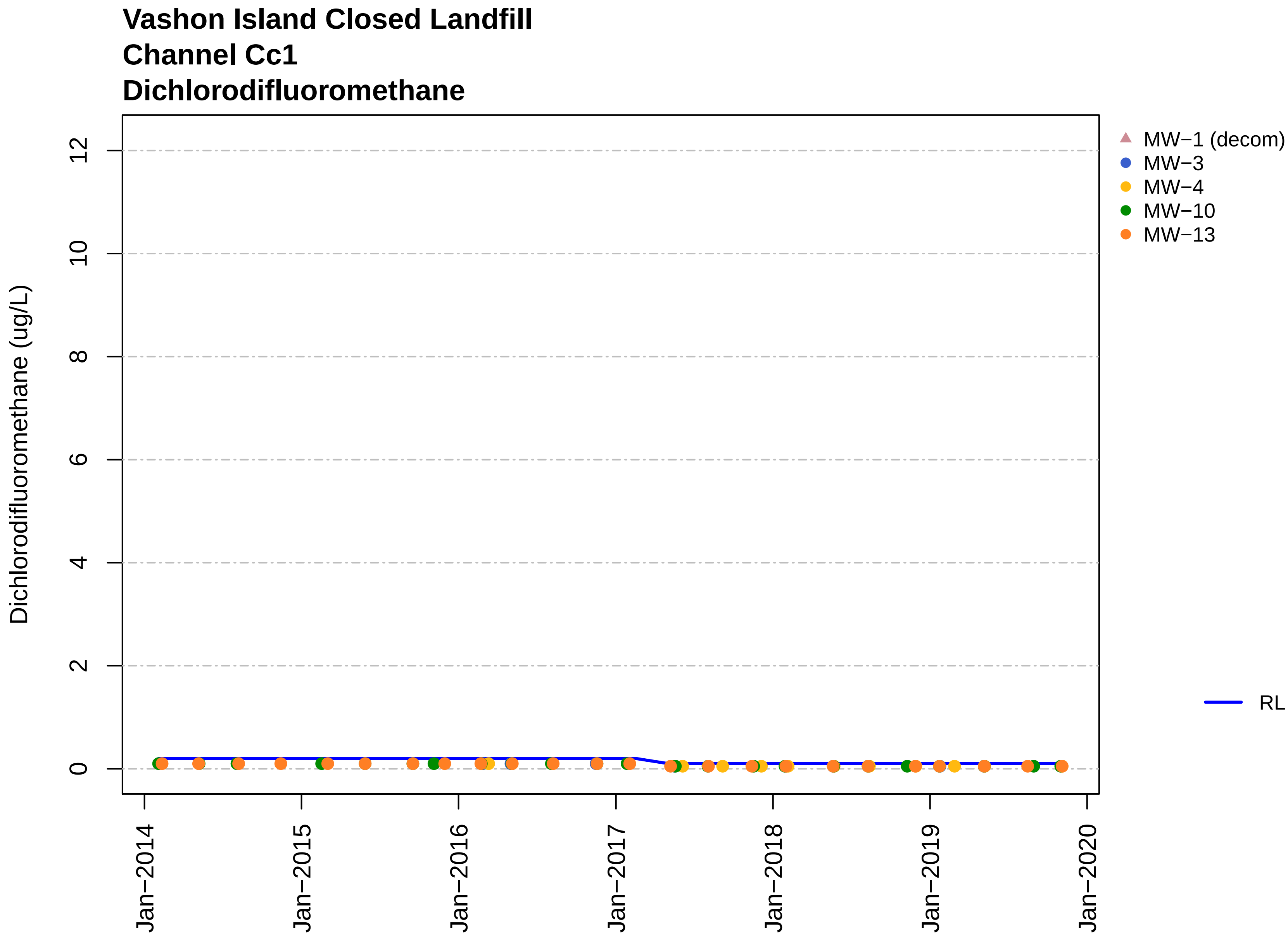


Vashon Island Closed Landfill
Channel Cc1
cis−1,2−Dichloroethene
National Primary MCL − 70 µg/L
Washington State Groundwater Criteria − 70 µg/L
cis−1,2−dichloroethene (ug/L)
0
20
40
60
80
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

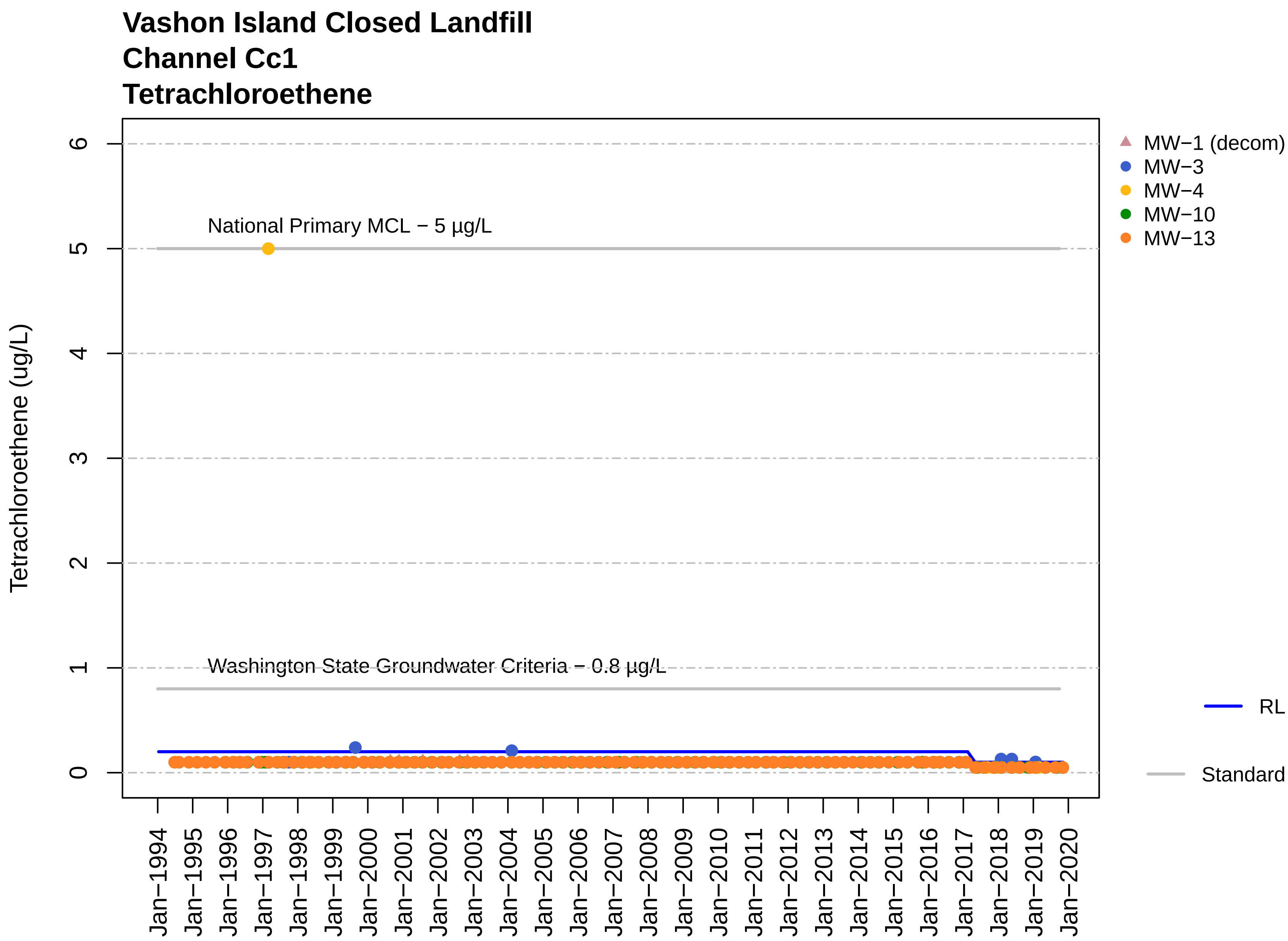

Vashon Island Closed Landfill
Channel Cc1
cis−1,2−Dichloroethene
National Primary MCL − 70 µg/L
Washington State Groundwater Criteria − 70 µg/L
cis−1,2−dichloroethene (ug/L)
0
20
40
60
80
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard



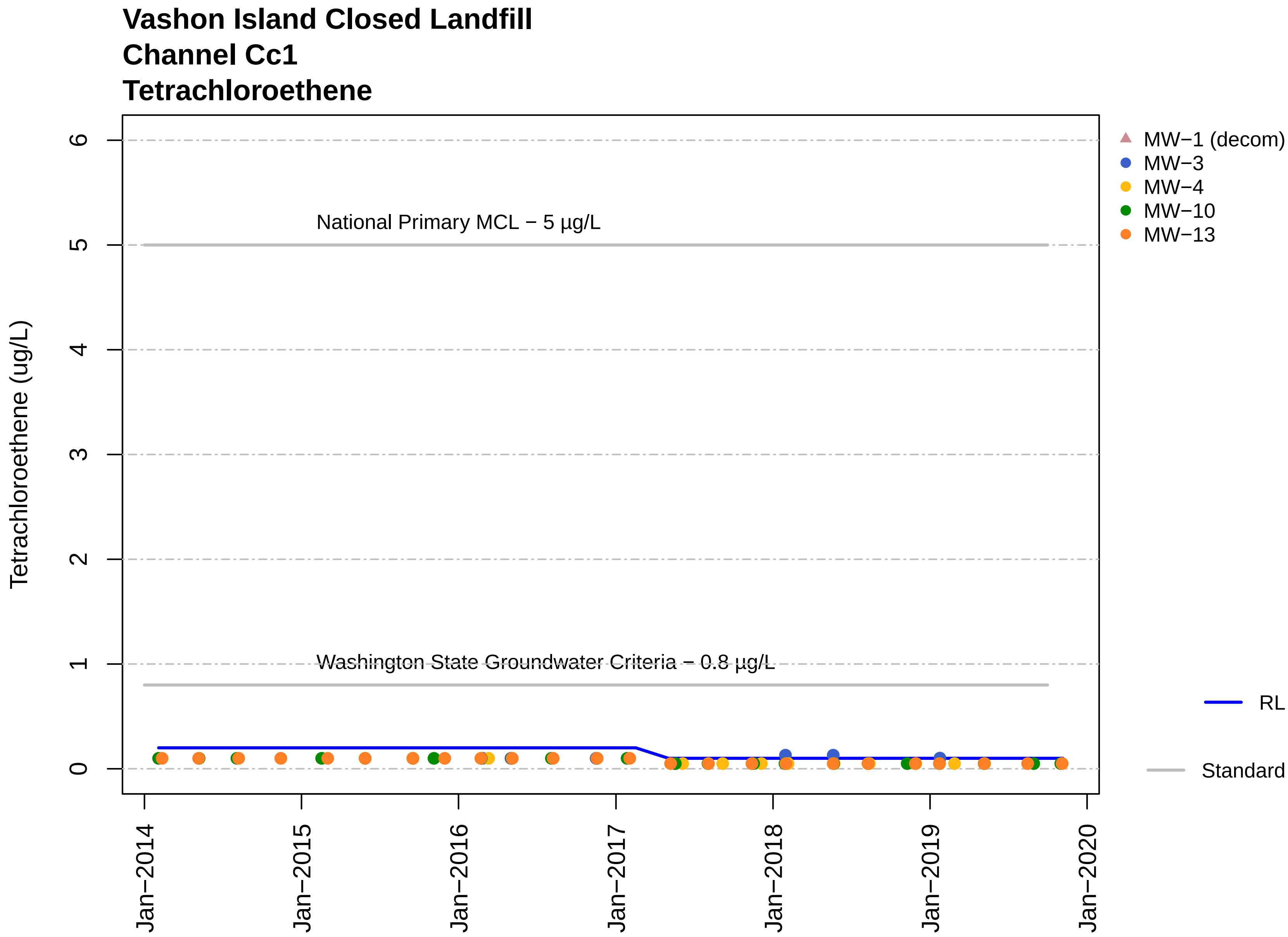
Vashon Island Closed Landfill
Channel Cc1
Dichlorodifluoromethane
Dichlorodifluoromethane (ug/L)
0.0
0.2
0.4
0.6
0.8
1.0
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL



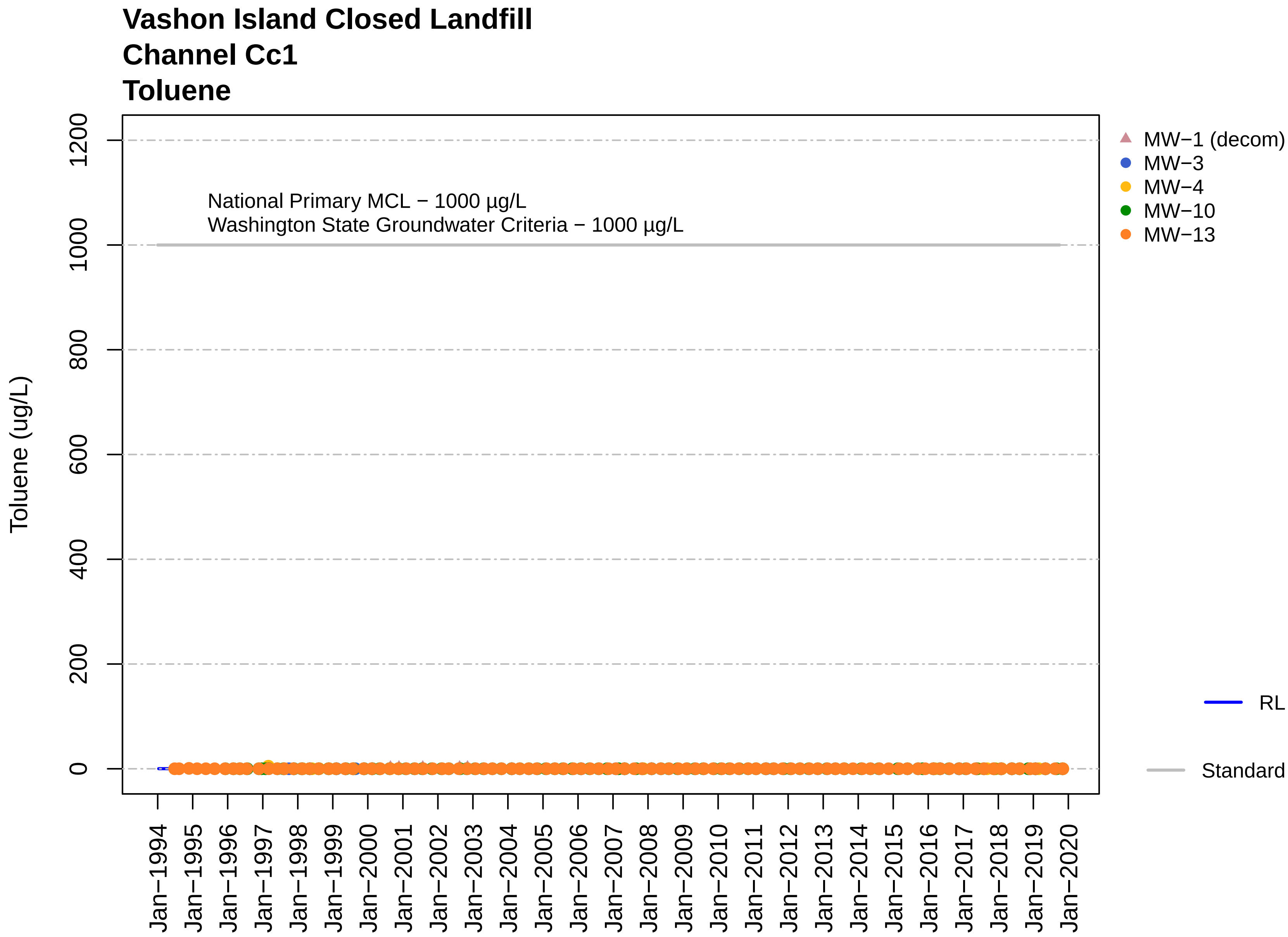
Vashon Island Closed Landfill
Channel Cc1
Dichlorodifluoromethane
Dichlorodifluoromethane (ug/L)
0
2
4
6
8
10
12
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL

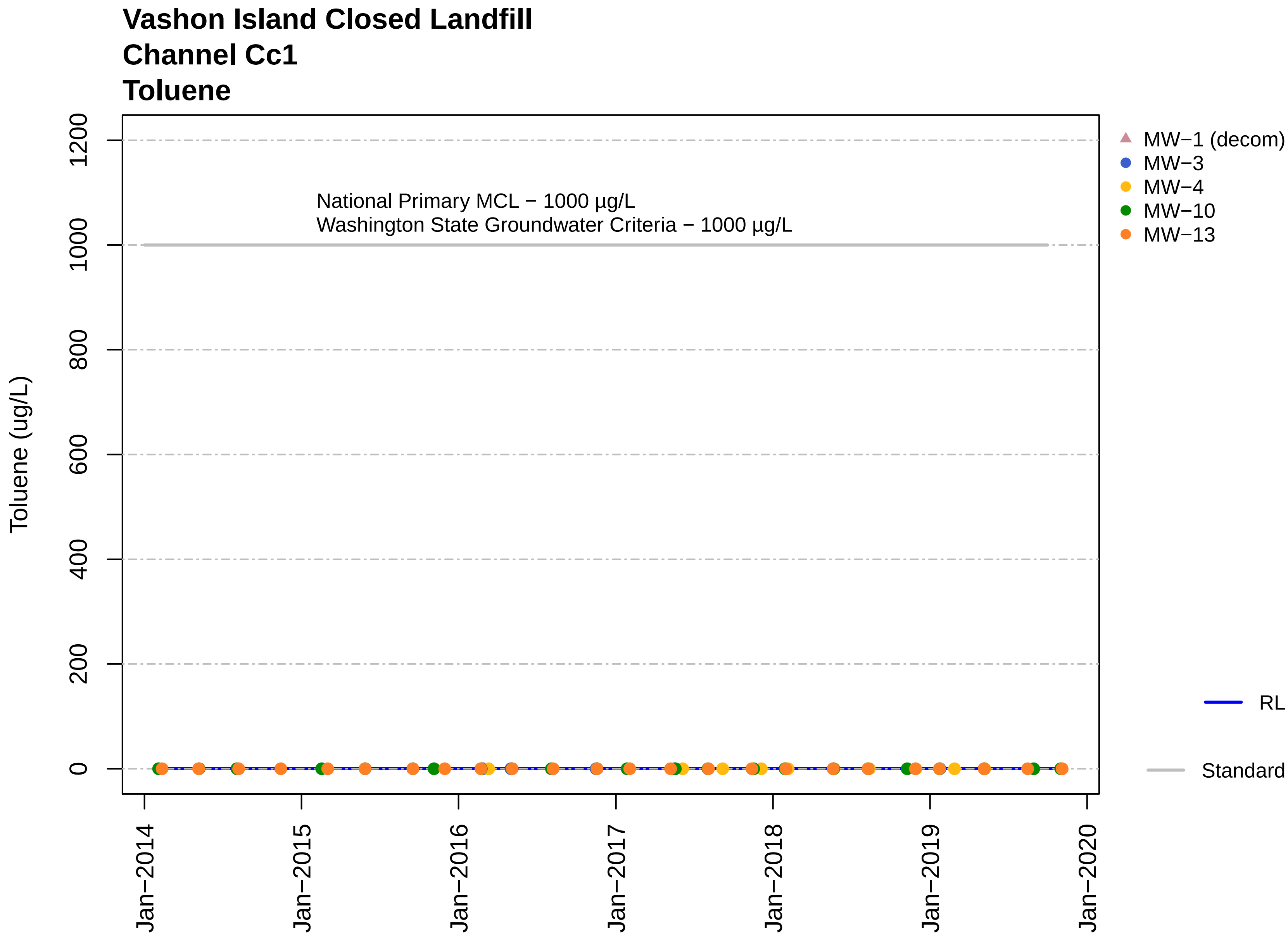


Vashon Island Closed Landfill
Channel Cc1
Tetrachloroethene
Tetrachloroethene (ug/L)
0
1
2
3
4
5
6
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.8 µg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

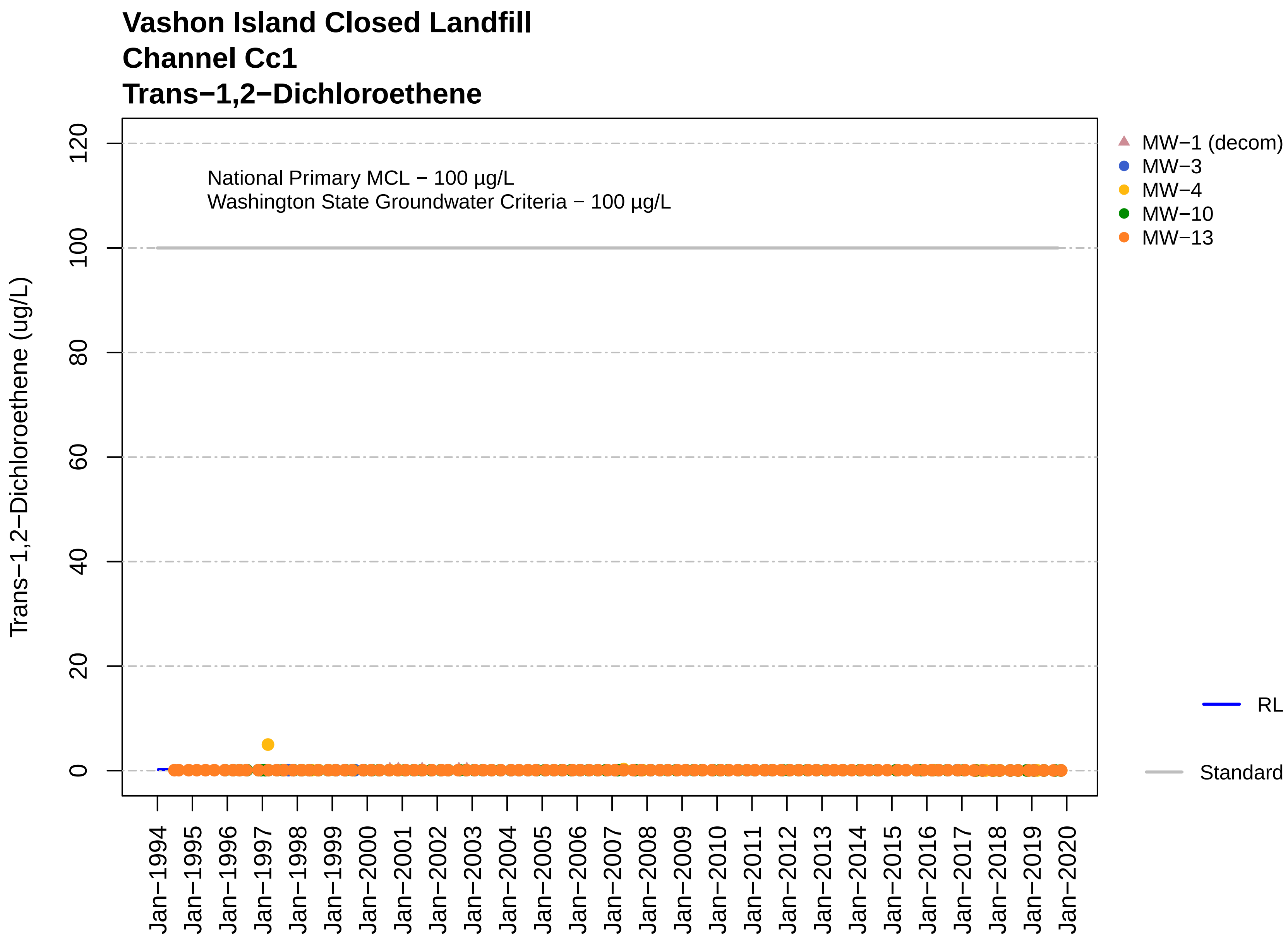


Vashon Island Closed Landfill
Channel Cc1
Tetrachloroethene
Tetrachloroethene (ug/L)
0
1
2
3
4
5
6
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.8 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

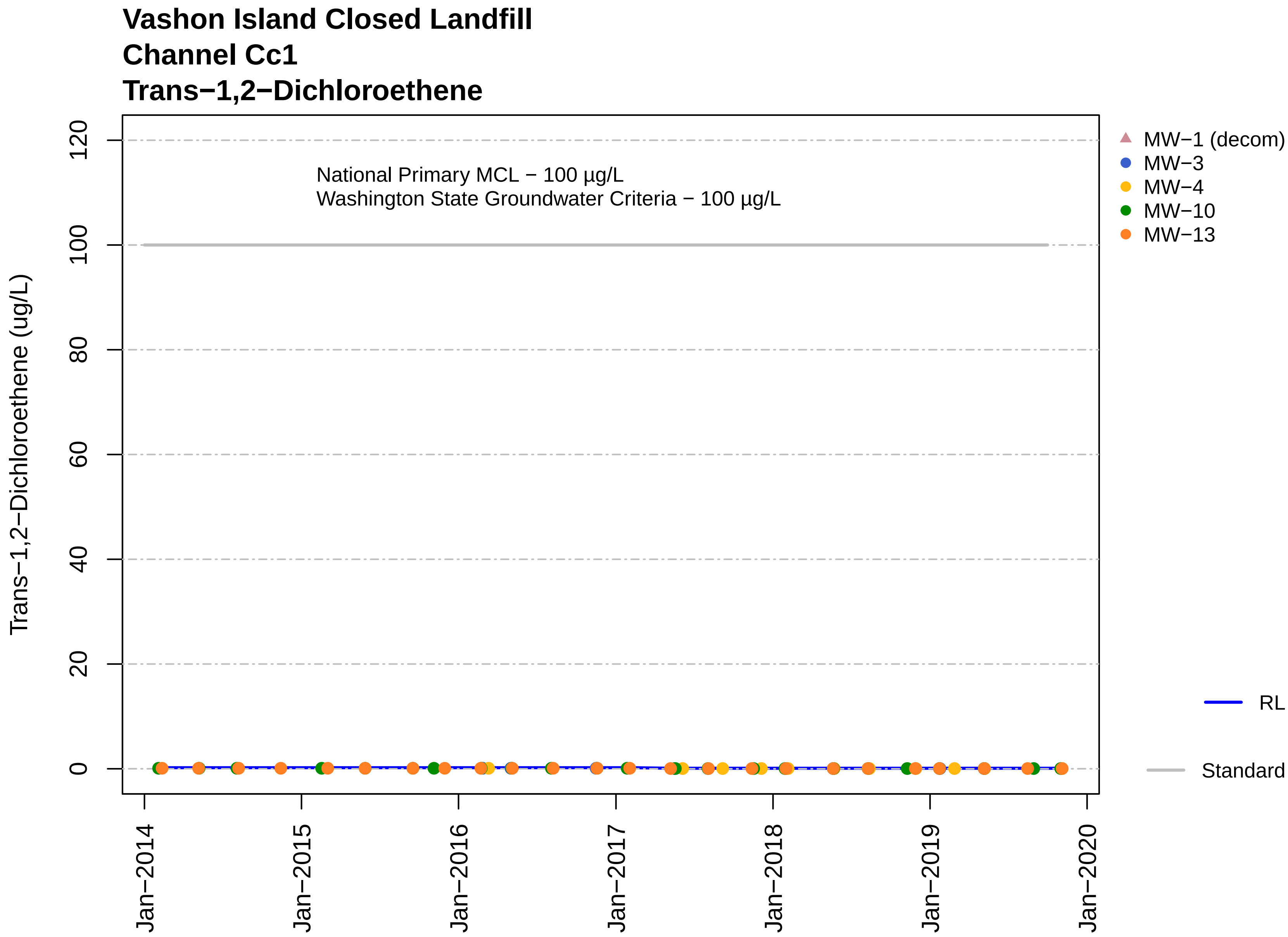

Vashon Island Closed Landfill
Channel Cc1
Toluene
Toluene (ug/L)
0
200
400
600
800
1000
1200
National Primary MCL − 1000 µg/L
Washington State Groundwater Criteria − 1000 µg/L
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

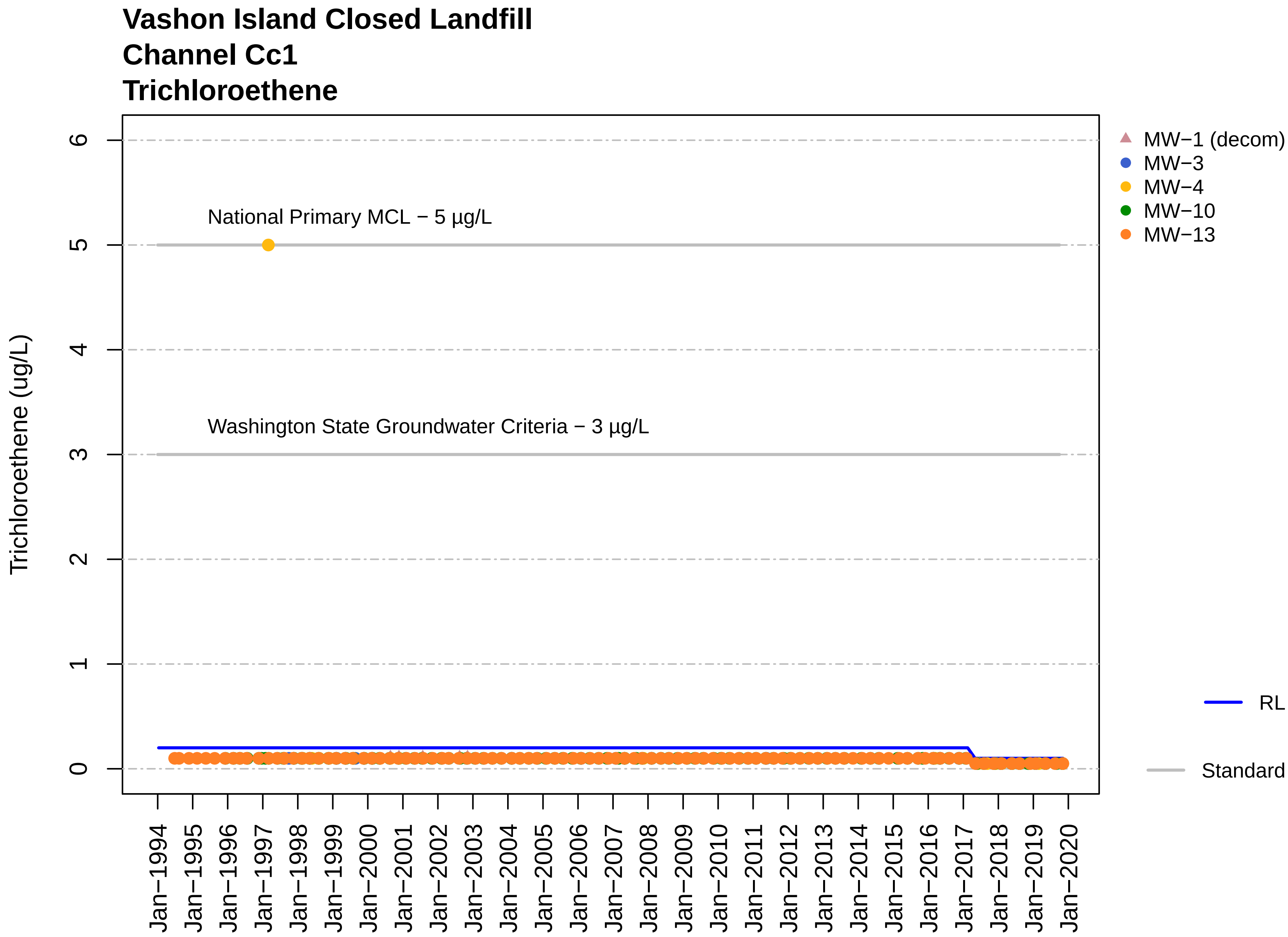


Vashon Island Closed Landfill
Channel Cc1
Toluene
Toluene (ug/L)
0
200
400
600
800
1000
1200
National Primary MCL − 1000 µg/L
Washington State Groundwater Criteria − 1000 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

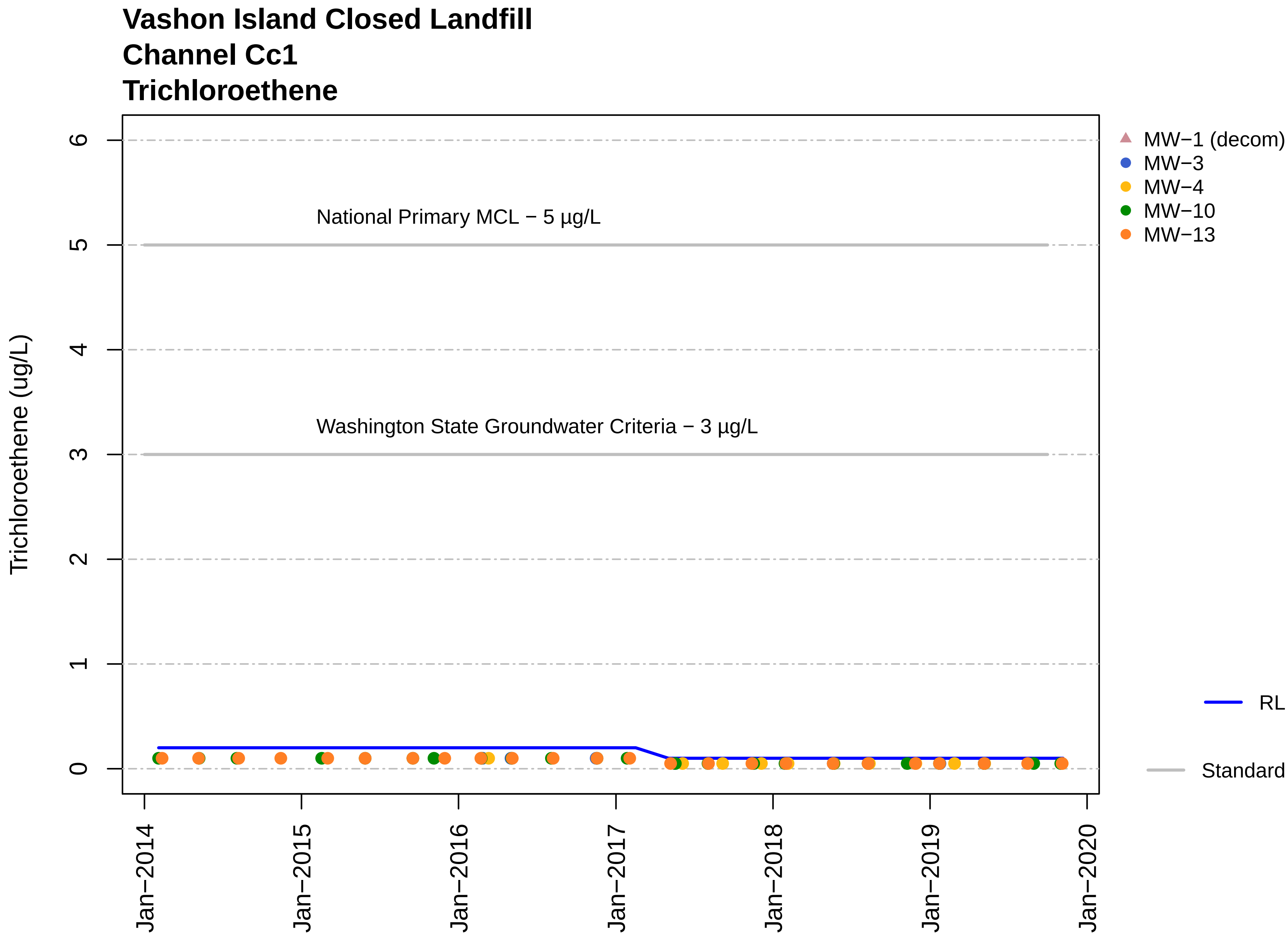


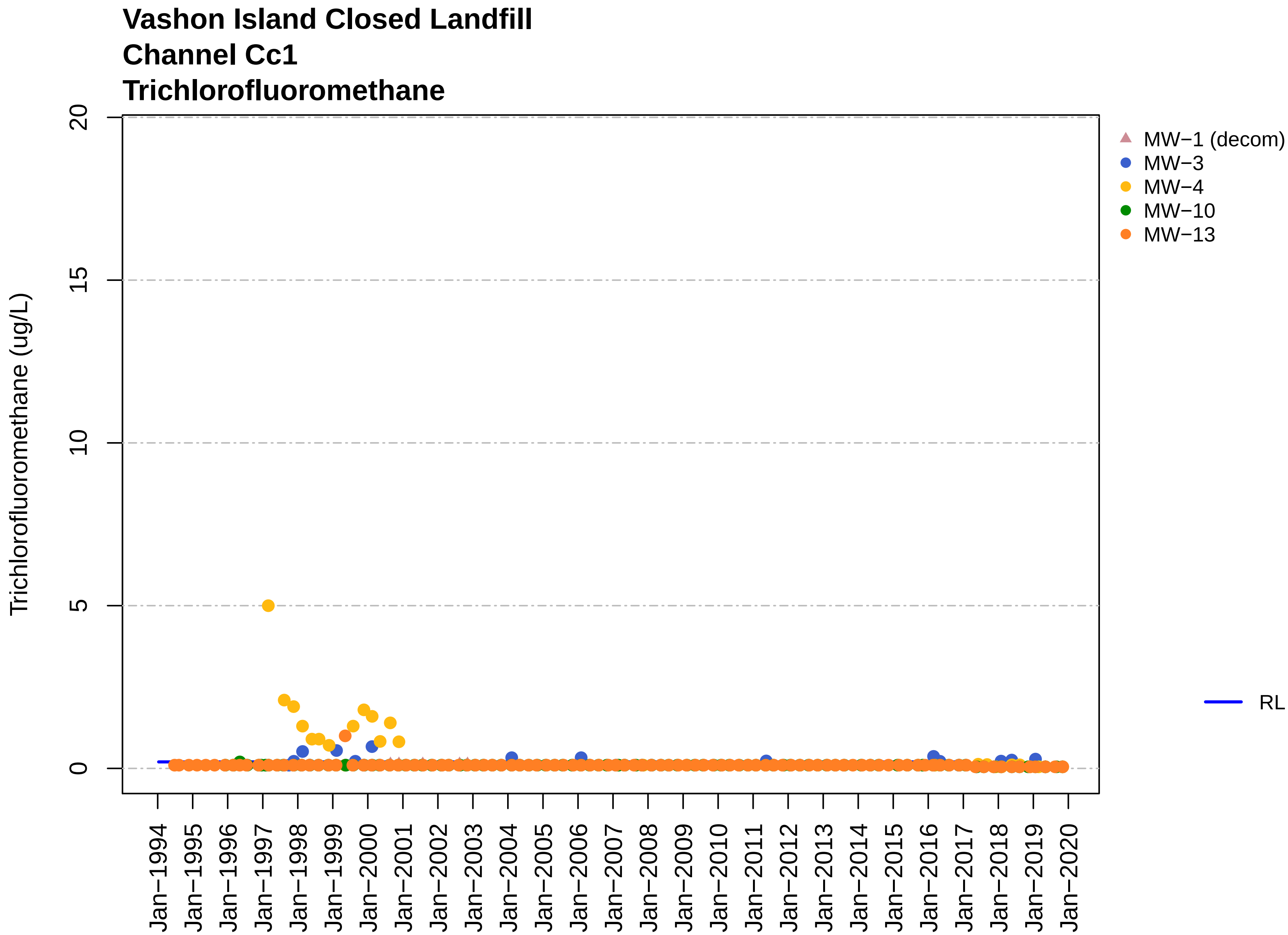
Vashon Island Closed Landfill
Channel Cc1
Trans−1,2−Dichloroethene
National Primary MCL − 100 µg/L
Washington State Groundwater Criteria − 100 µg/L
Trans−1,2−Dichloroethene (ug/L)
0
20
40
60
80
100
120
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

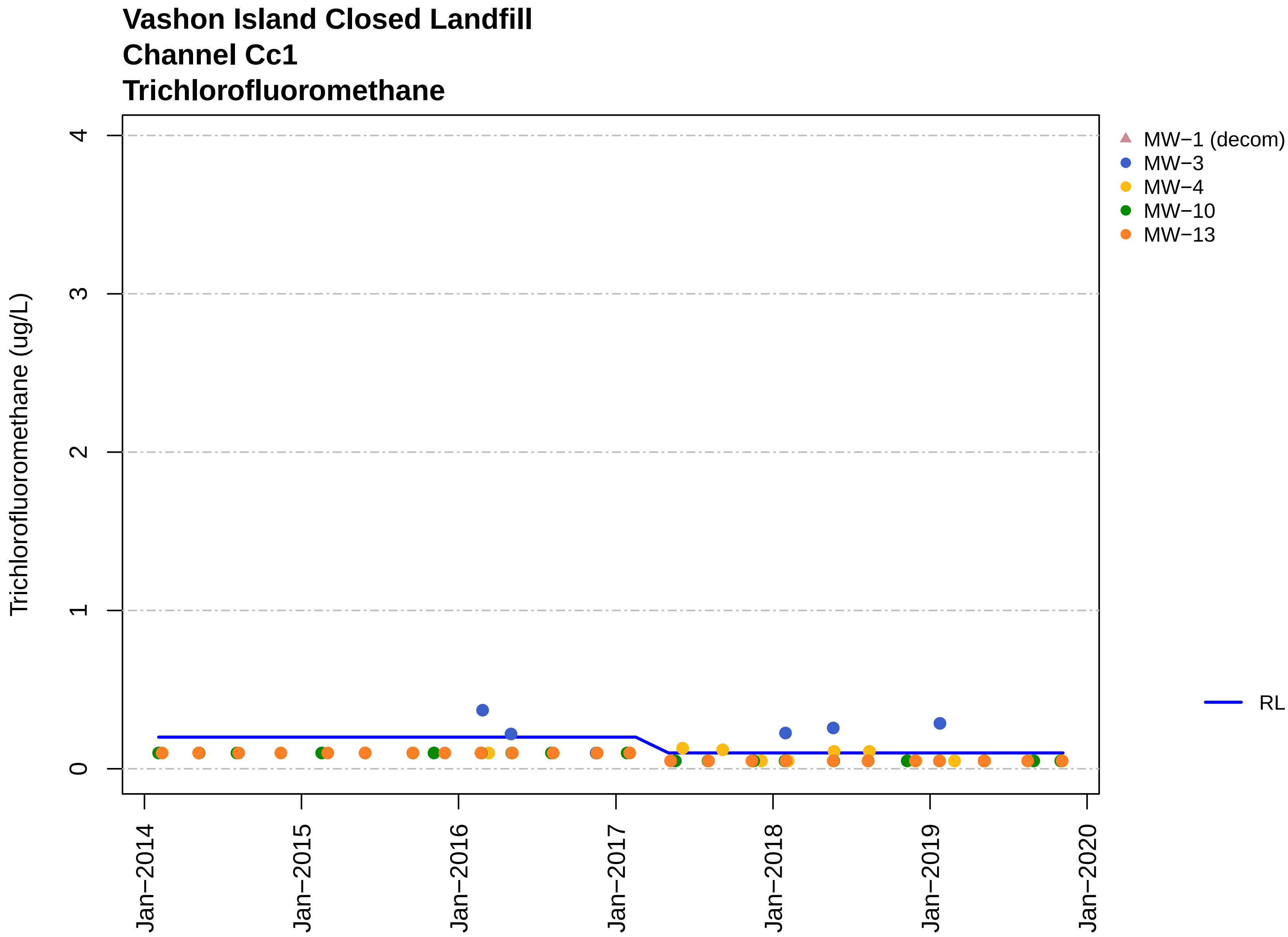

Vashon Island Closed Landfill
Channel Cc1
Trans−1,2−Dichloroethene
National Primary MCL − 100 µg/L
Washington State Groundwater Criteria − 100 µg/L
Trans−1,2−Dichloroethene (ug/L)
0
20
40
60
80
100
120
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard



Vashon Island Closed Landfill
Channel Cc1
Trichloroethene
Trichloroethene (ug/L)
0
1
2
3
4
5
6
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 3 µg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

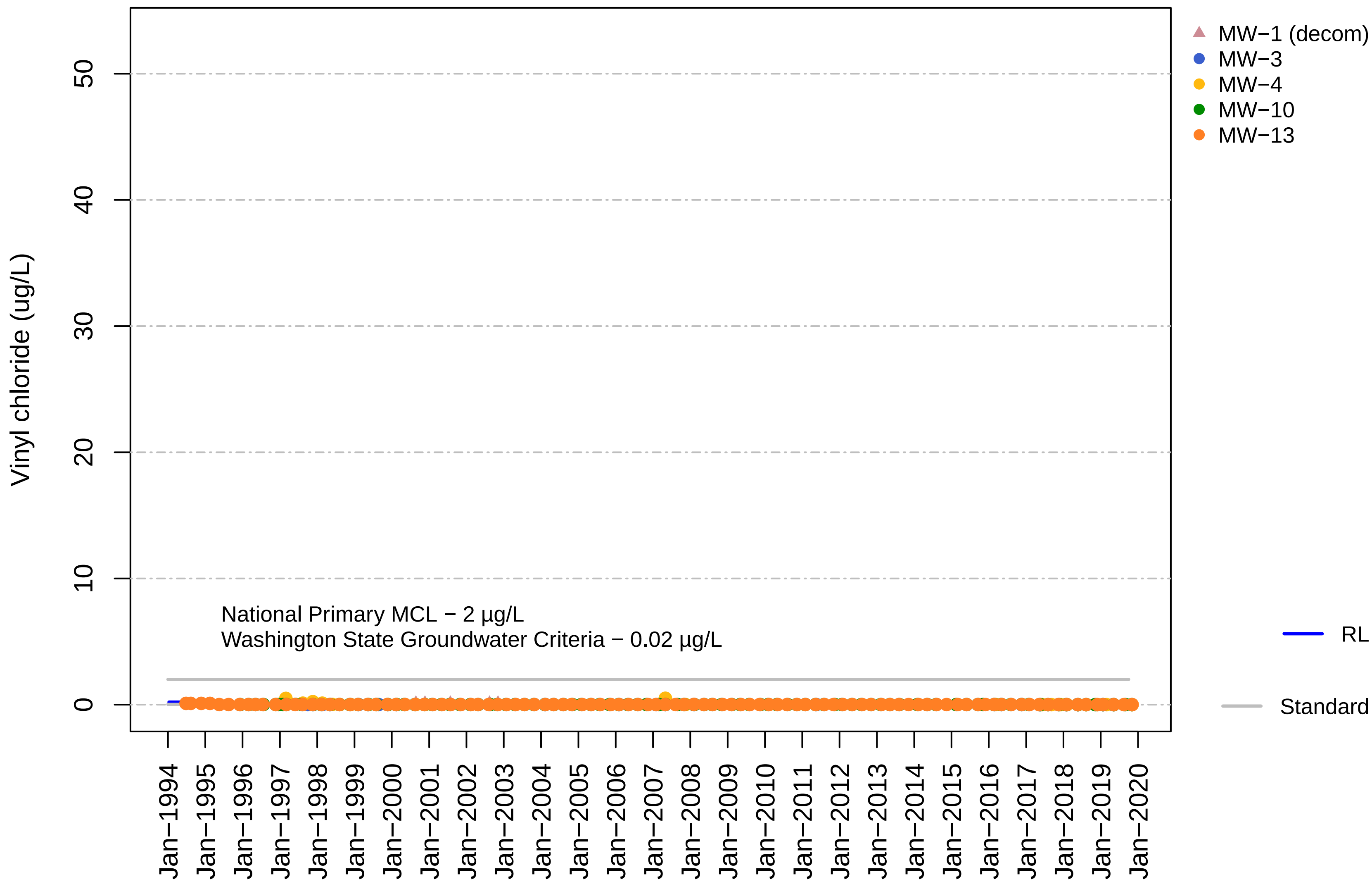

Vashon Island Closed Landfill
Channel Cc1
Trichloroethene
Trichloroethene (ug/L)
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 3 µg/L
0
1
2
3
4
5
6
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

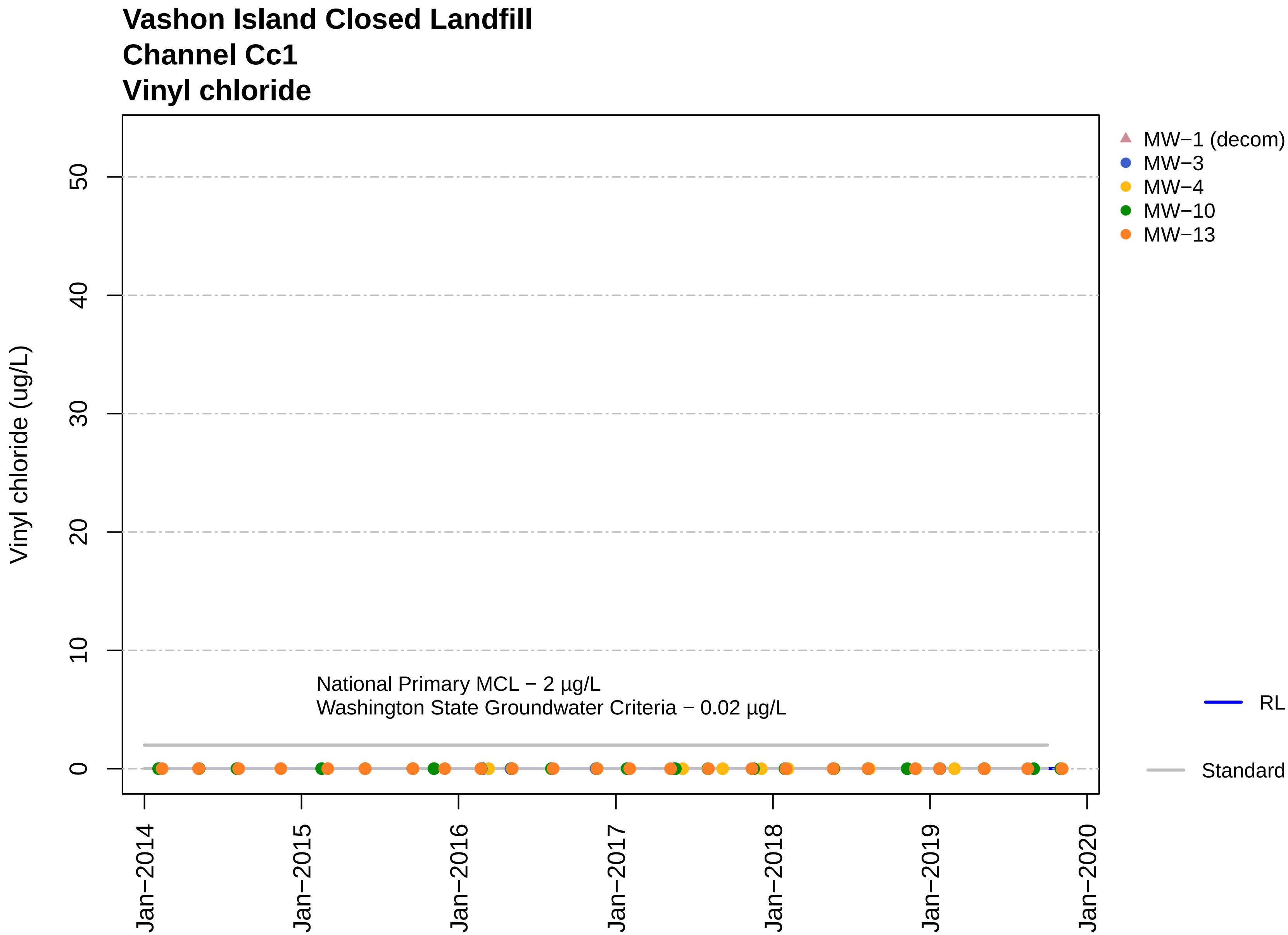

Vashon Island Closed Landfill
Channel Cc1
Trichlorofluoromethane
Trichlorofluoromethane (ug/L)
0
5
10
15
20
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL



Vashon Island Closed Landfill
Channel Cc1
Trichlorofluoromethane
Trichlorofluoromethane (ug/L)
0
1
2
3
4
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL

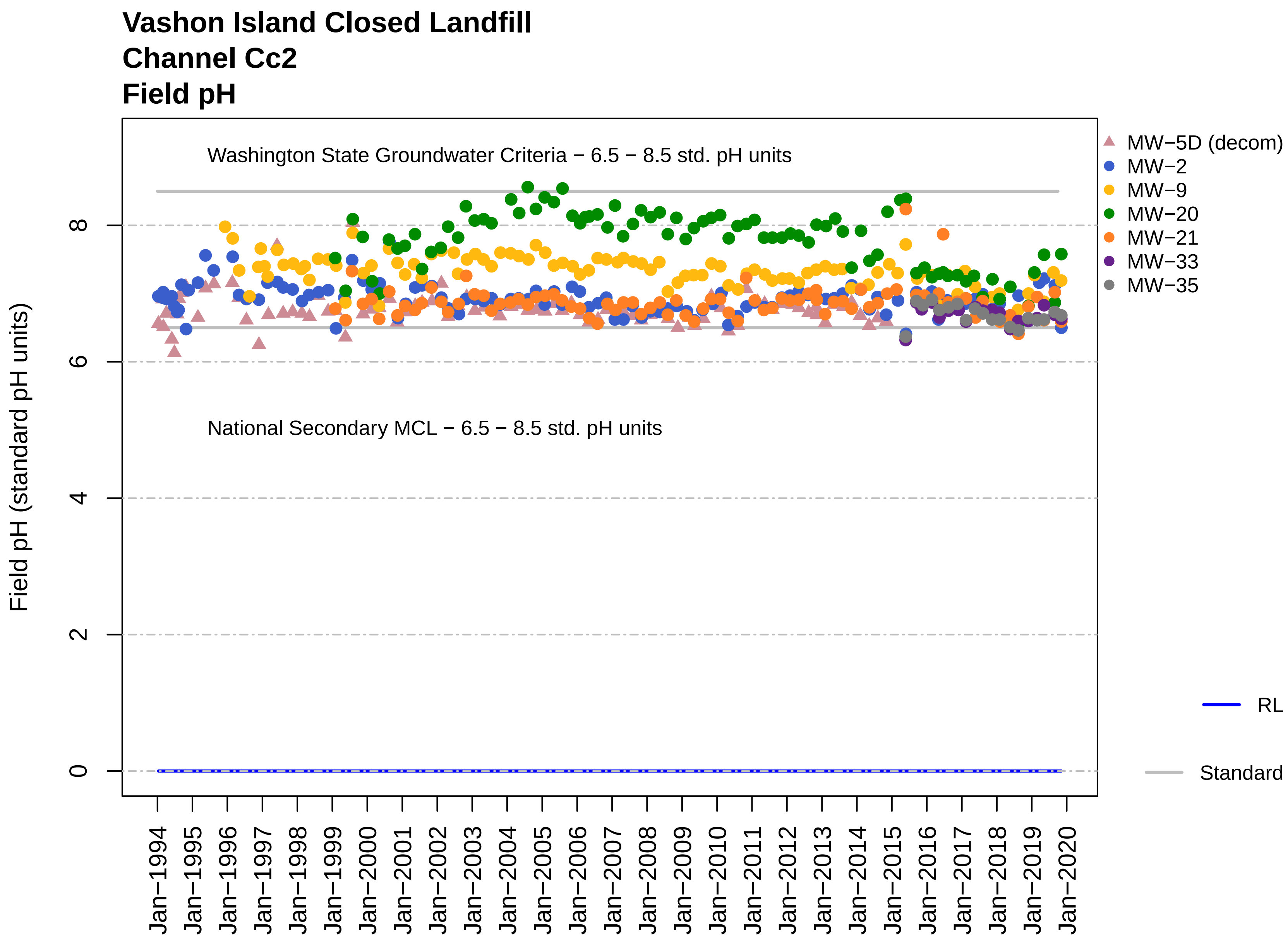
Vashon Island Closed Landfill
Channel Cc1
Vinyl chloride

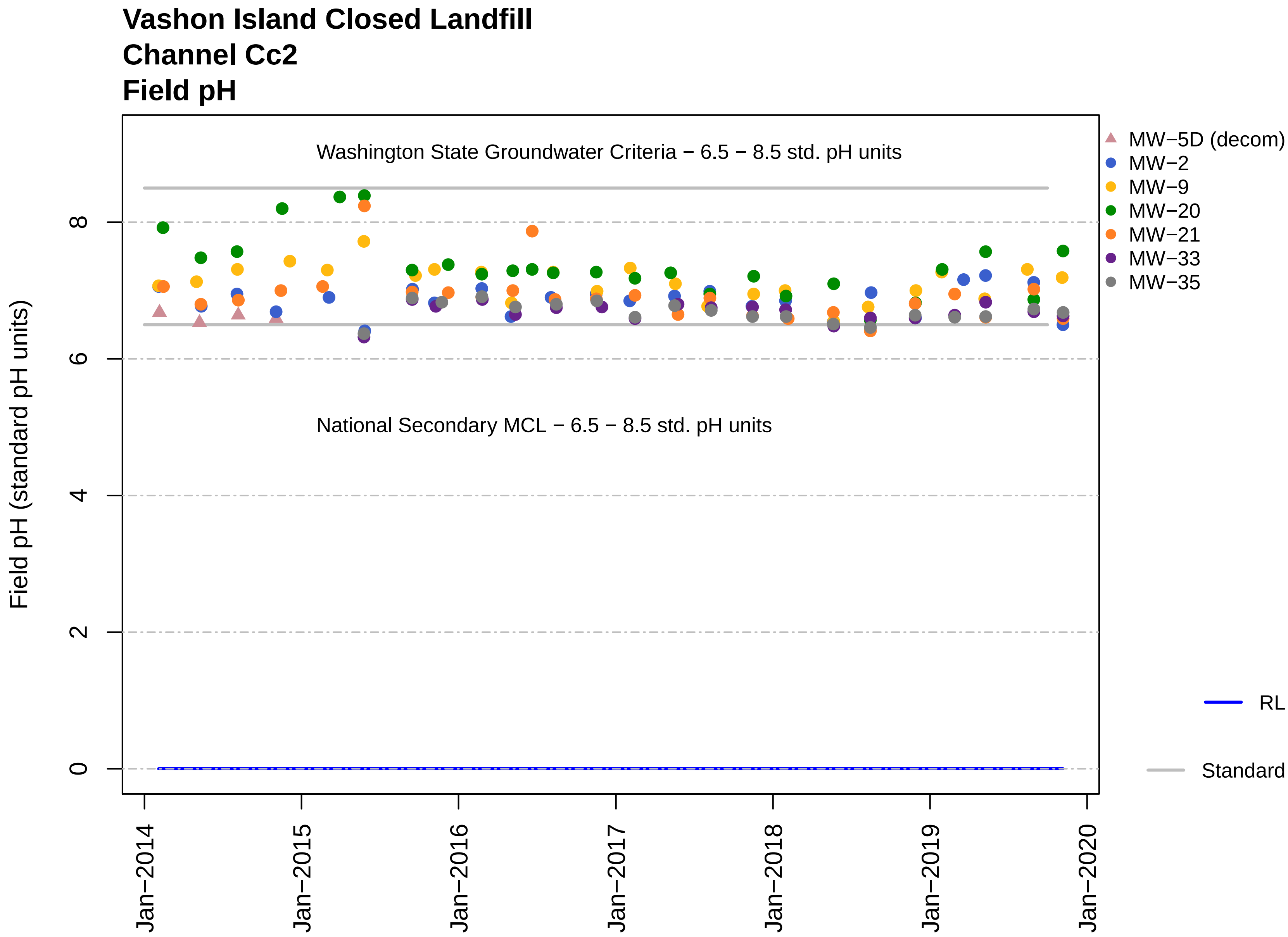



Vashon Island Closed Landfill
Channel Cc1
Vinyl chloride
Vinyl chloride (ug/L)
0
10
20
30
40
50
National Primary MCL − 2 µg/L
Washington State Groundwater Criteria − 0.02 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−1 (decom)
MW−3
MW−4
MW−10
MW−13
RL
Standard

Appendix D

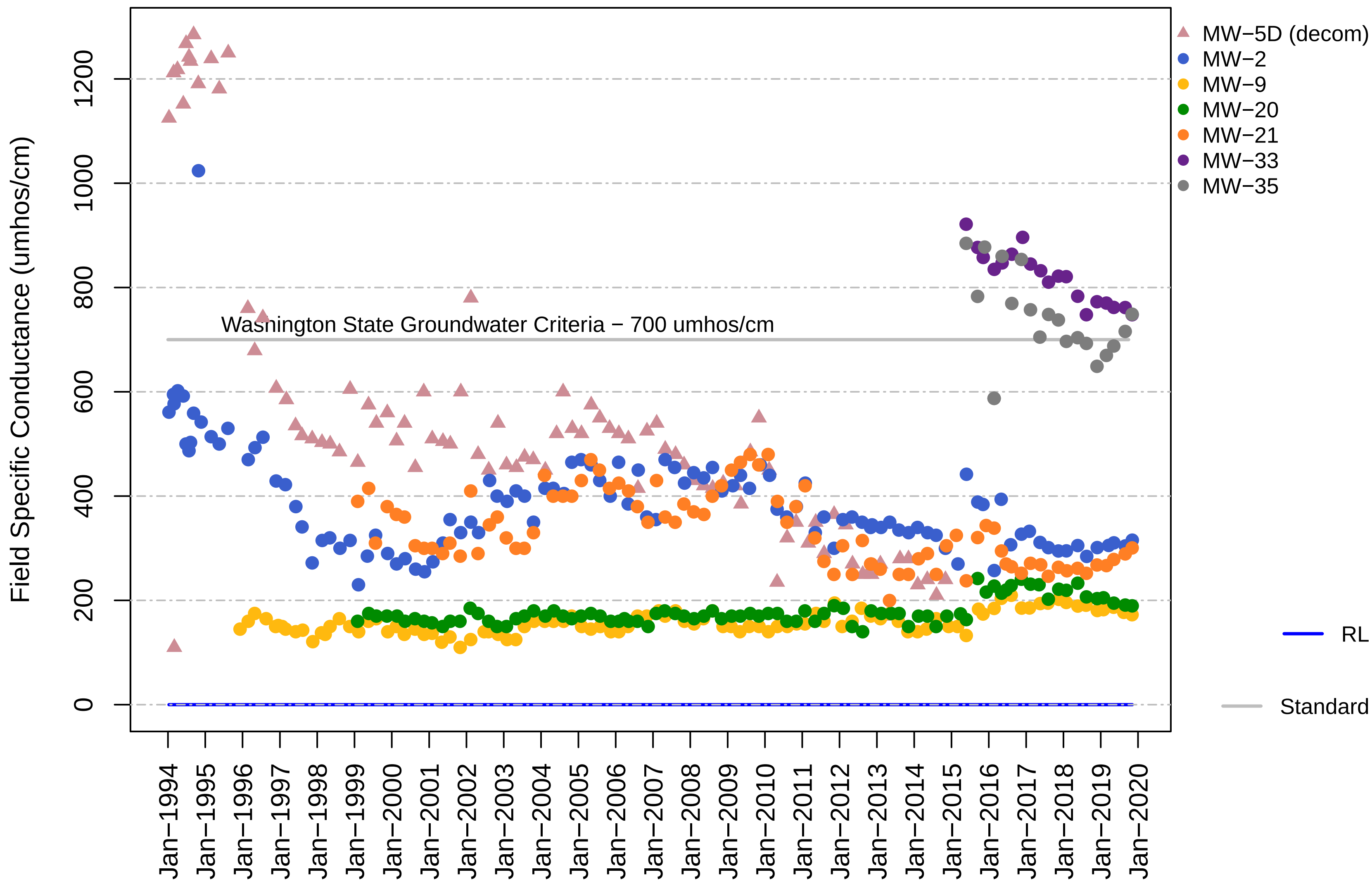
Time Concentration Plots for
Groundwater in Channel Cc2


Vashon Island Closed Landfill
Channel Cc2
Field pH
Washington State Groundwater Criteria − 6.5 − 8.5 std. pH units
National Secondary MCL − 6.5 − 8.5 std. pH units
Field pH (standard pH units)
0
2
4
6
8
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

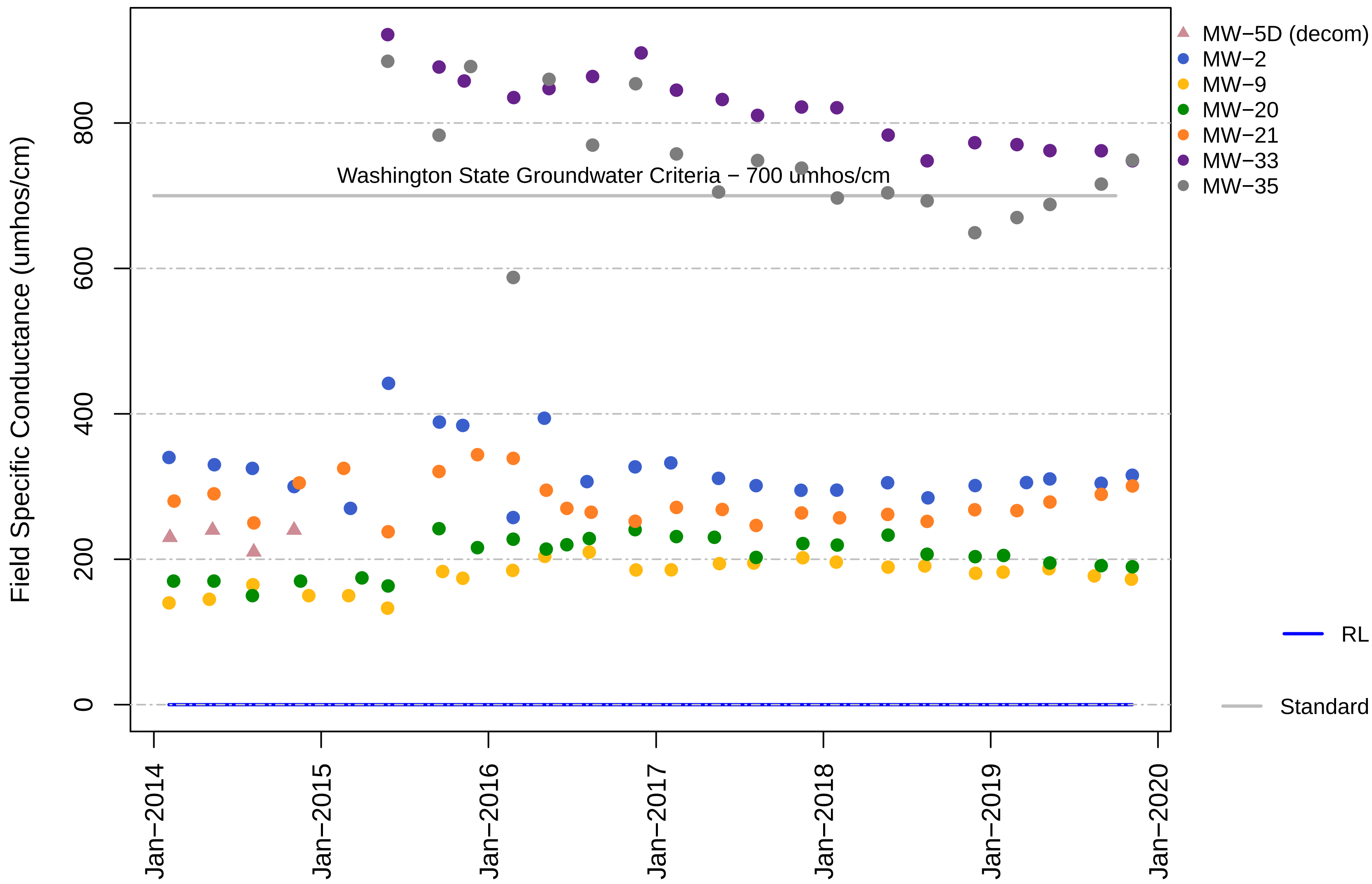


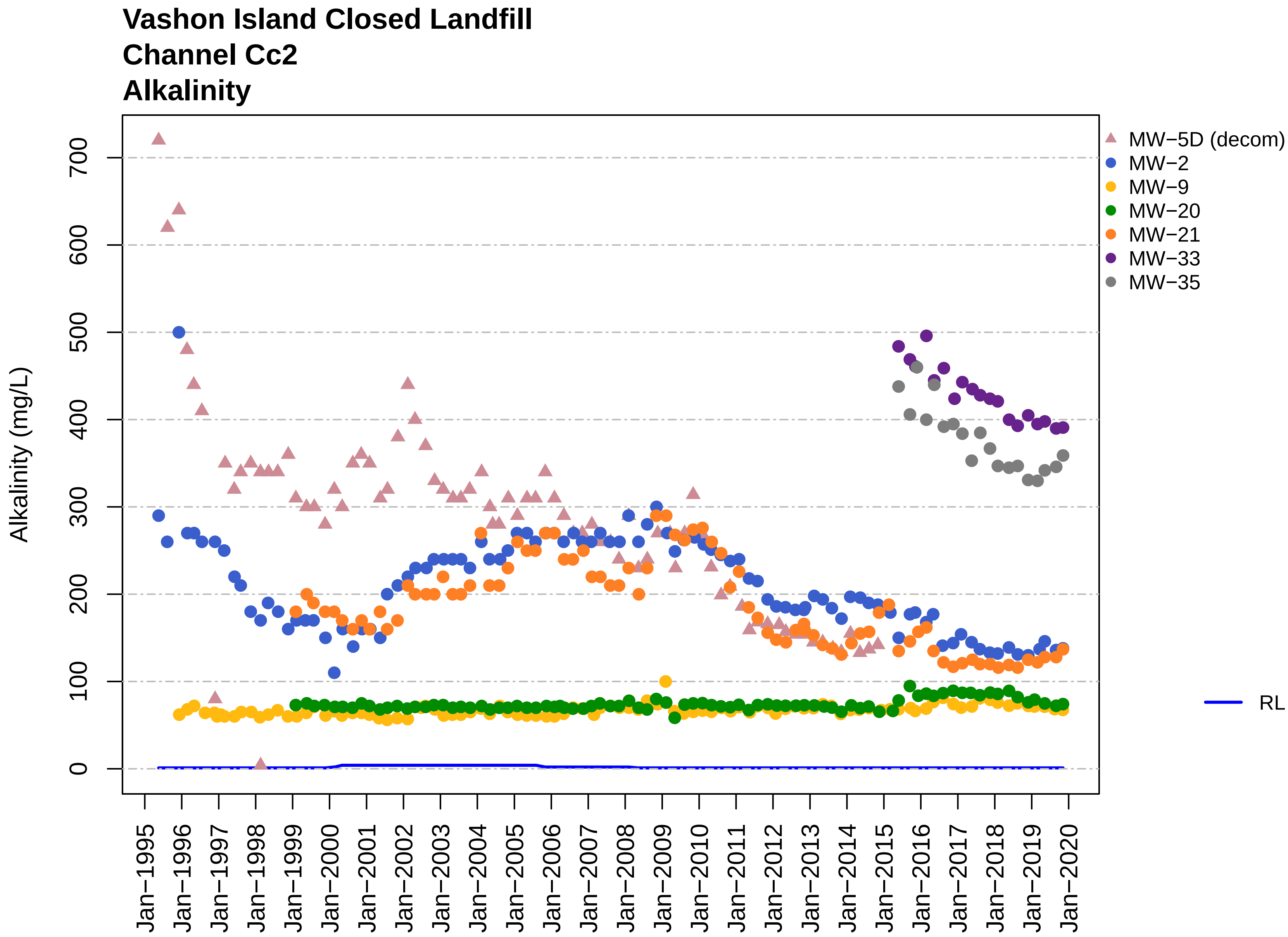
Vashon Island Closed Landfill
Channel Cc2
Field pH
Washington State Groundwater Criteria − 6.5 − 8.5 std. pH units
National Secondary MCL − 6.5 − 8.5 std. pH units
Field pH (standard pH units)
0
2
4
6
8
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

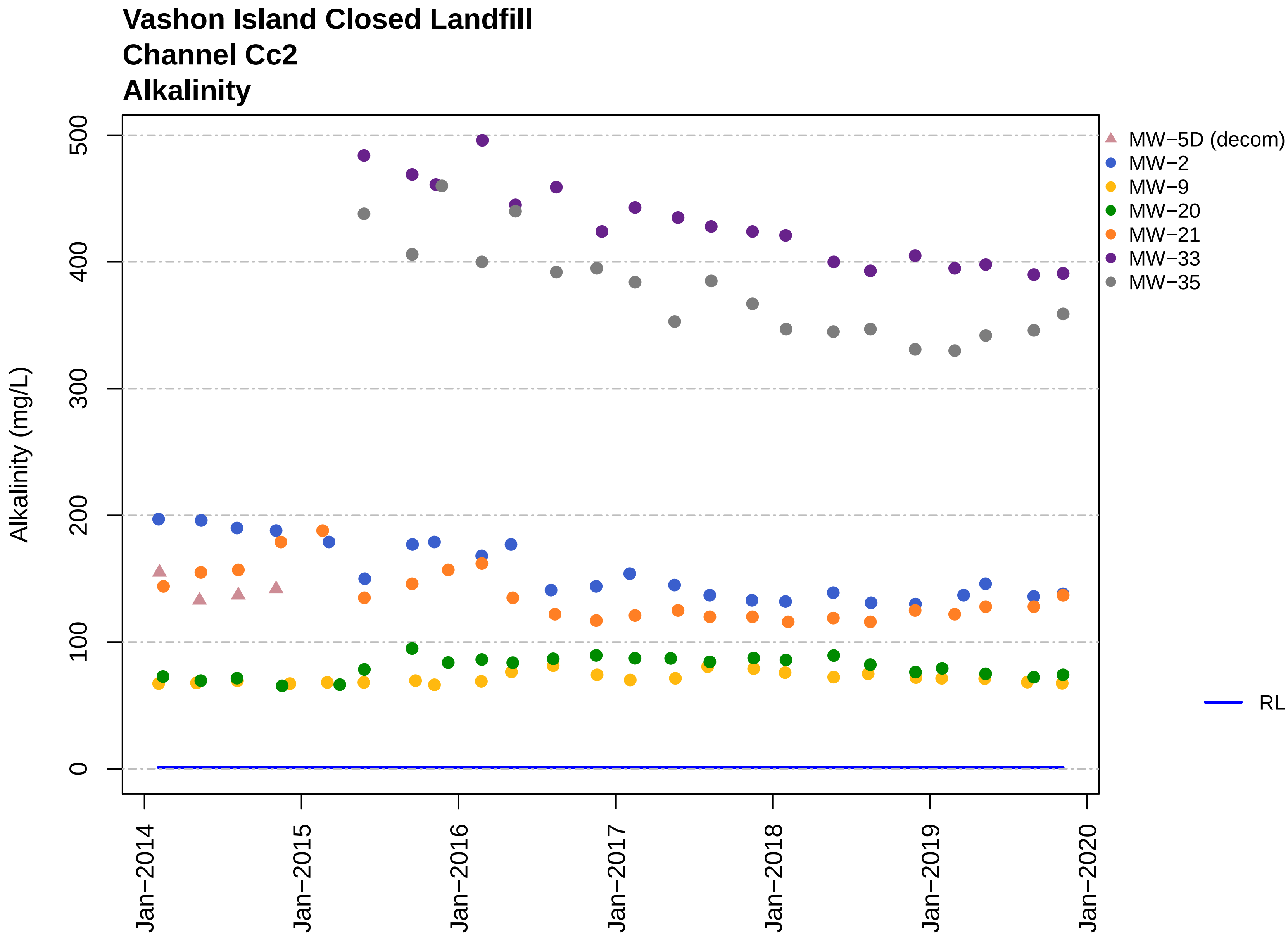
Vashon Island Closed Landfill
Channel Cc2
Field Specific Conductance



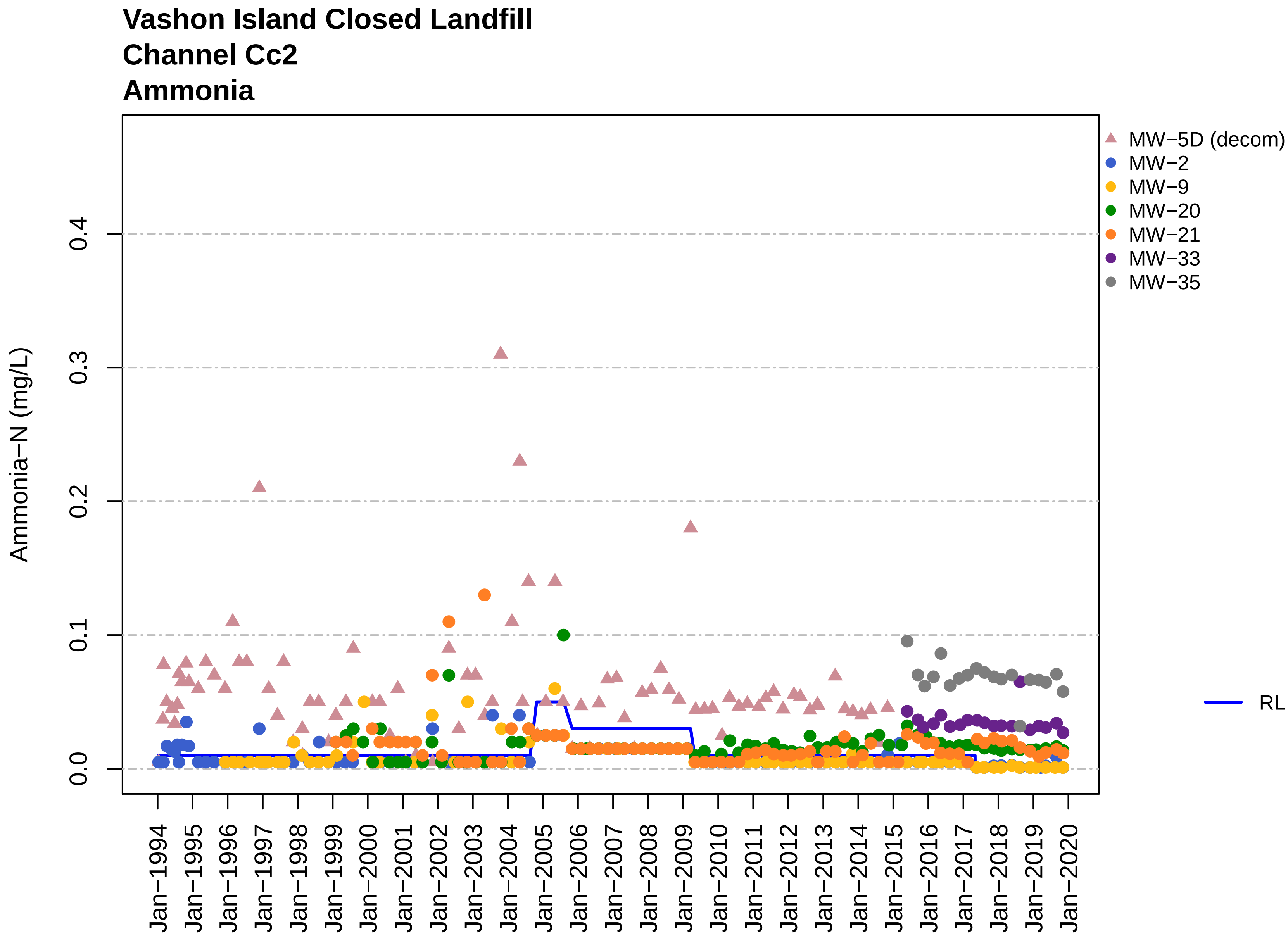
Vashon Island Closed Landfill
Channel Cc2
Field Specific Conductance

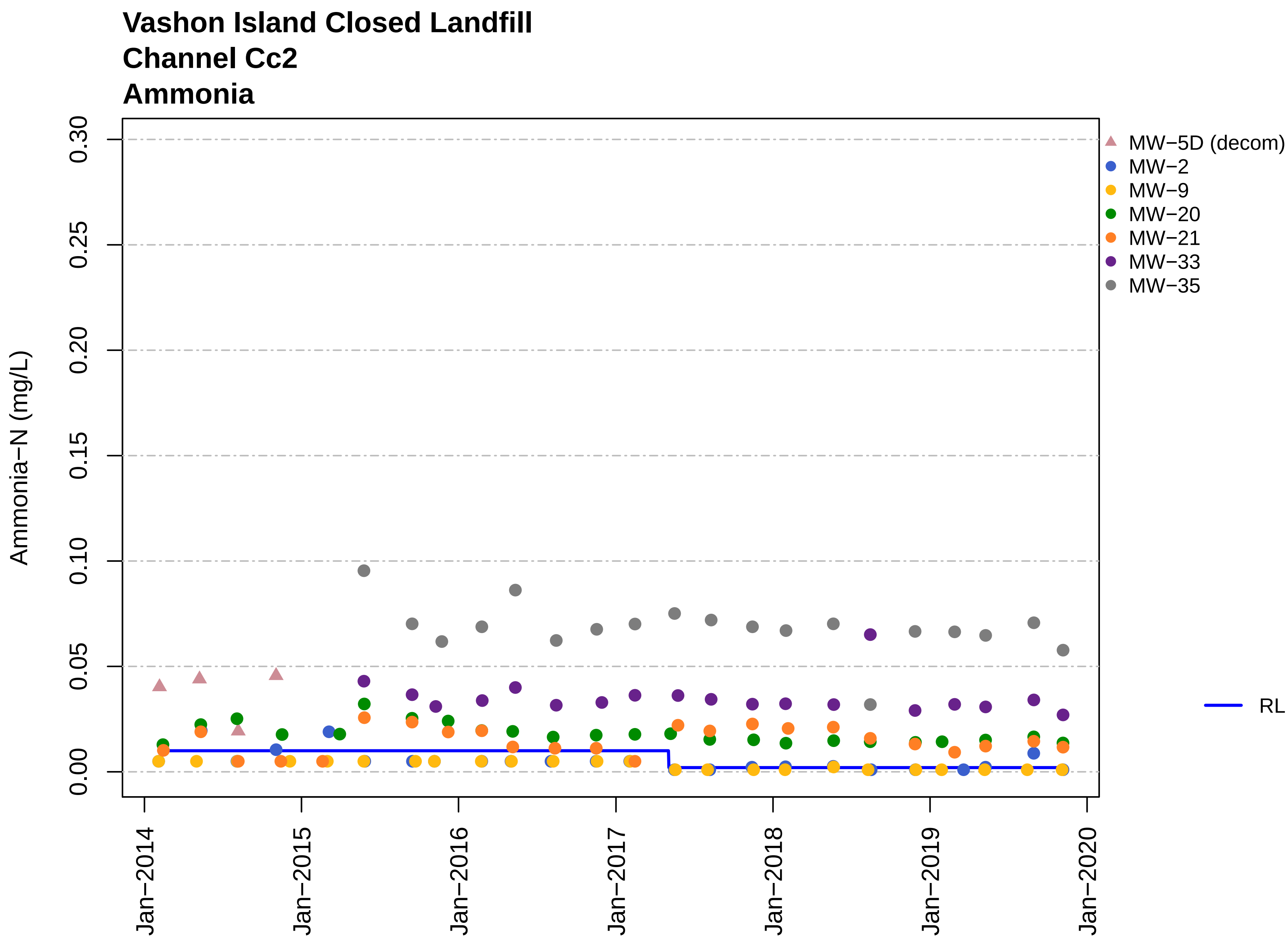



Vashon Island Closed Landfill
Channel Cc2
Alkalinity
Alkalinity (mg/L)
0
100
200
300
400
500
600
700
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020



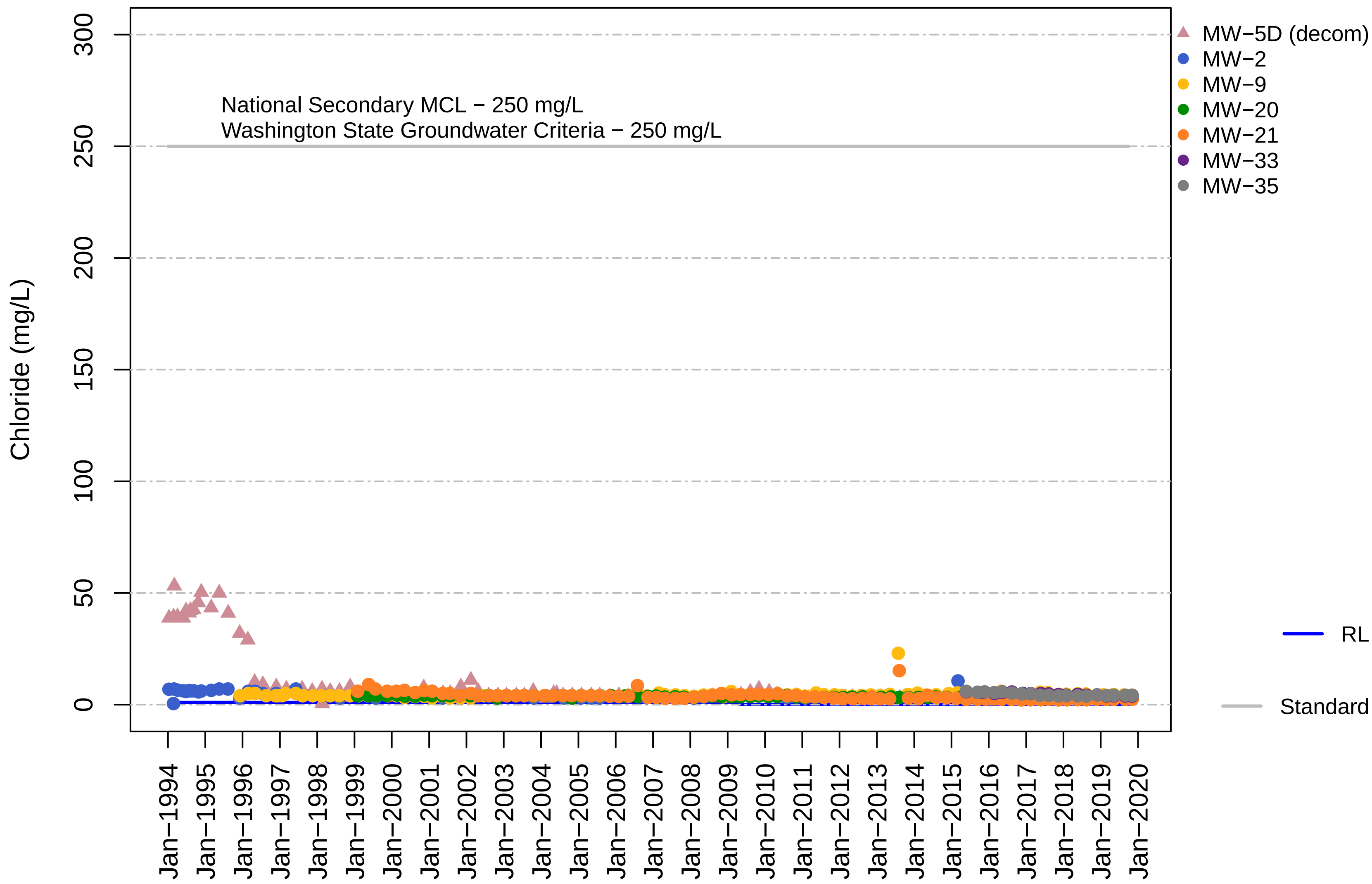
Vashon Island Closed Landfill
Channel Cc2
Alkalinity
Alkalinity (mg/L)
0
100
200
300
400
500
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL


Vashon Island Closed Landfill
Channel Cc2
Ammonia
Ammonia−N (mg/L)
0.0
0.1
0.2
0.3
0.4
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

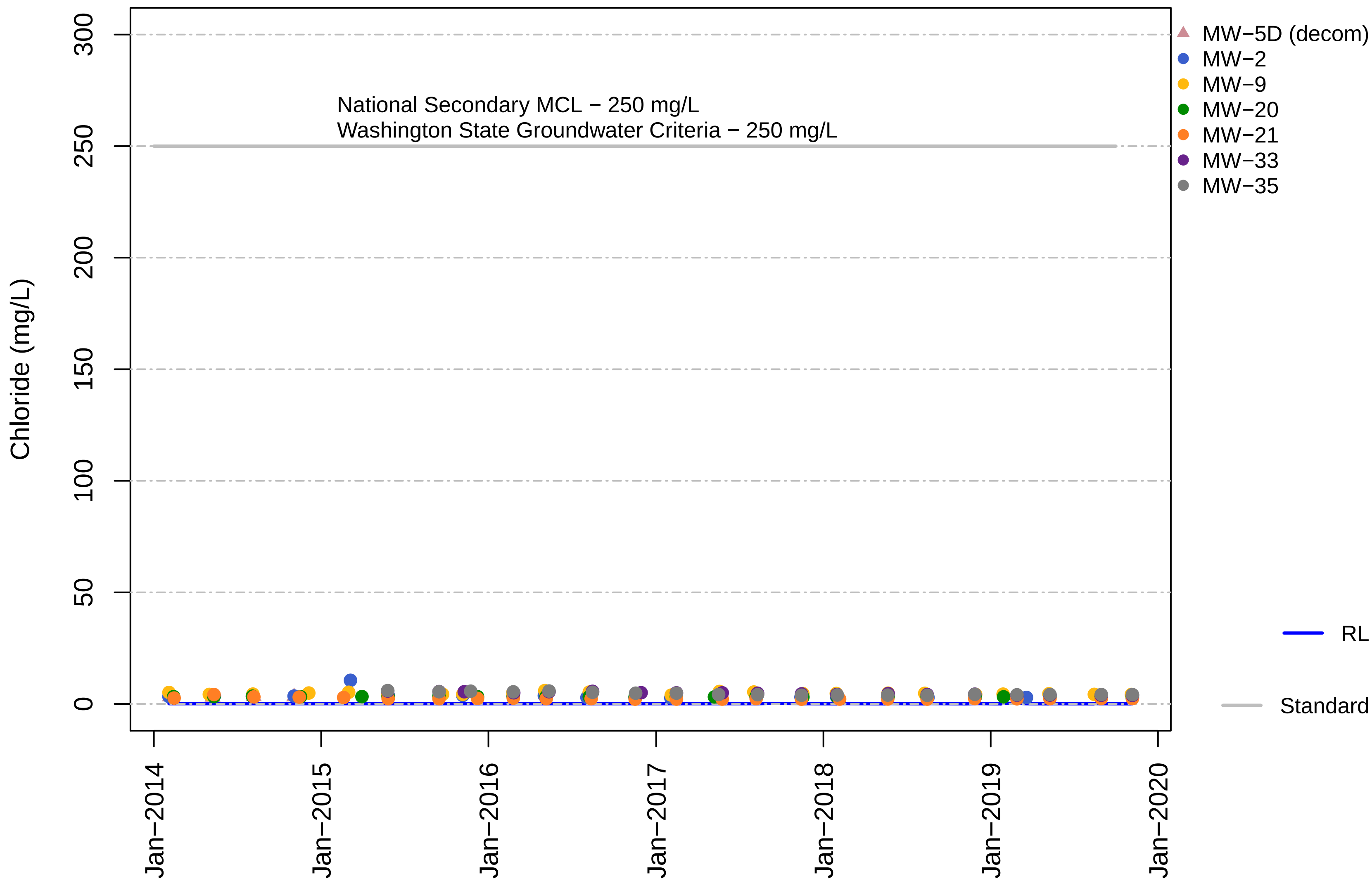


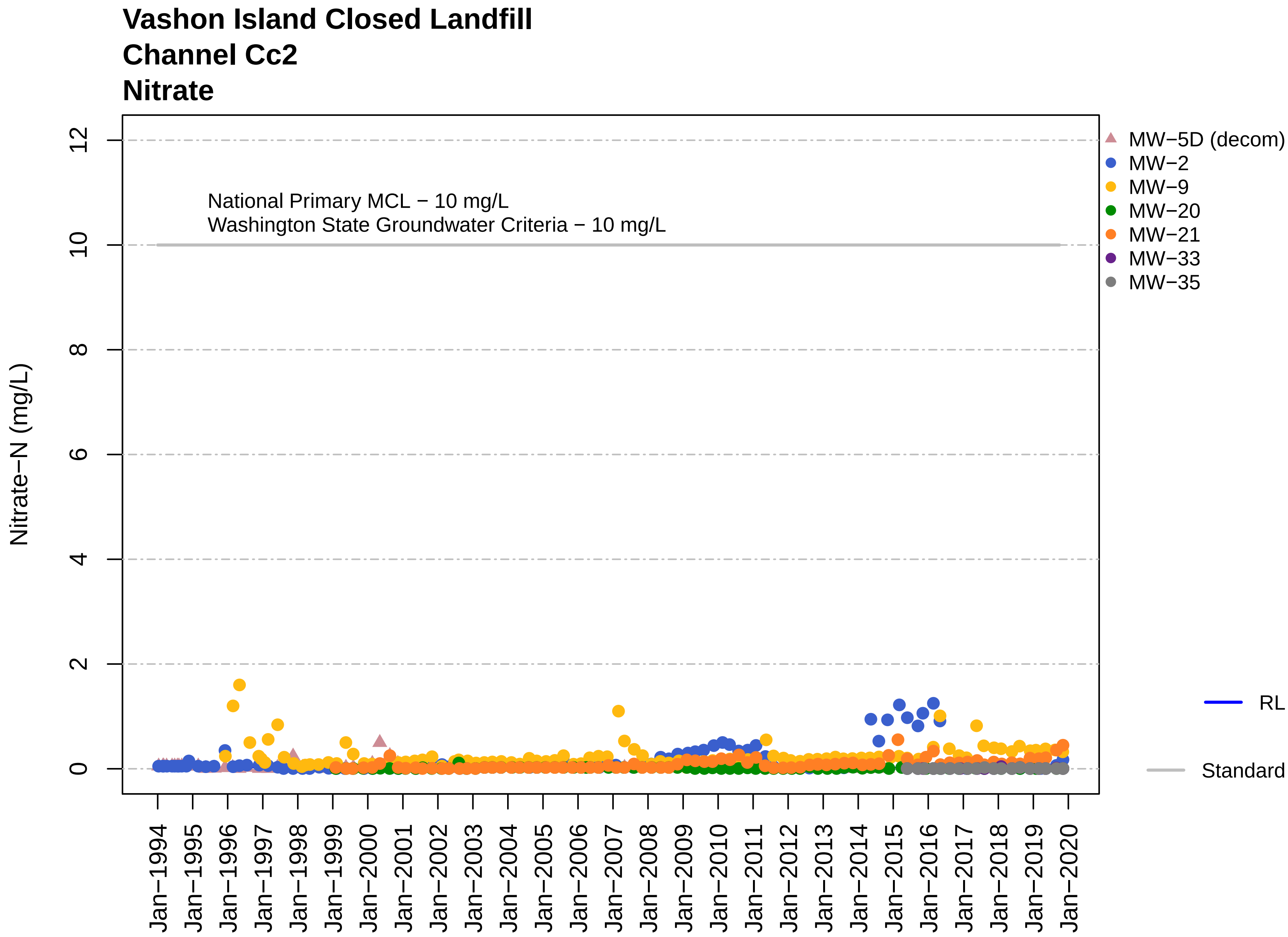
Vashon Island Closed Landfill
Channel Cc2
Ammonia
Ammonia−N (mg/L)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL

Vashon Island Closed Landfill
Channel Cc2
Chloride

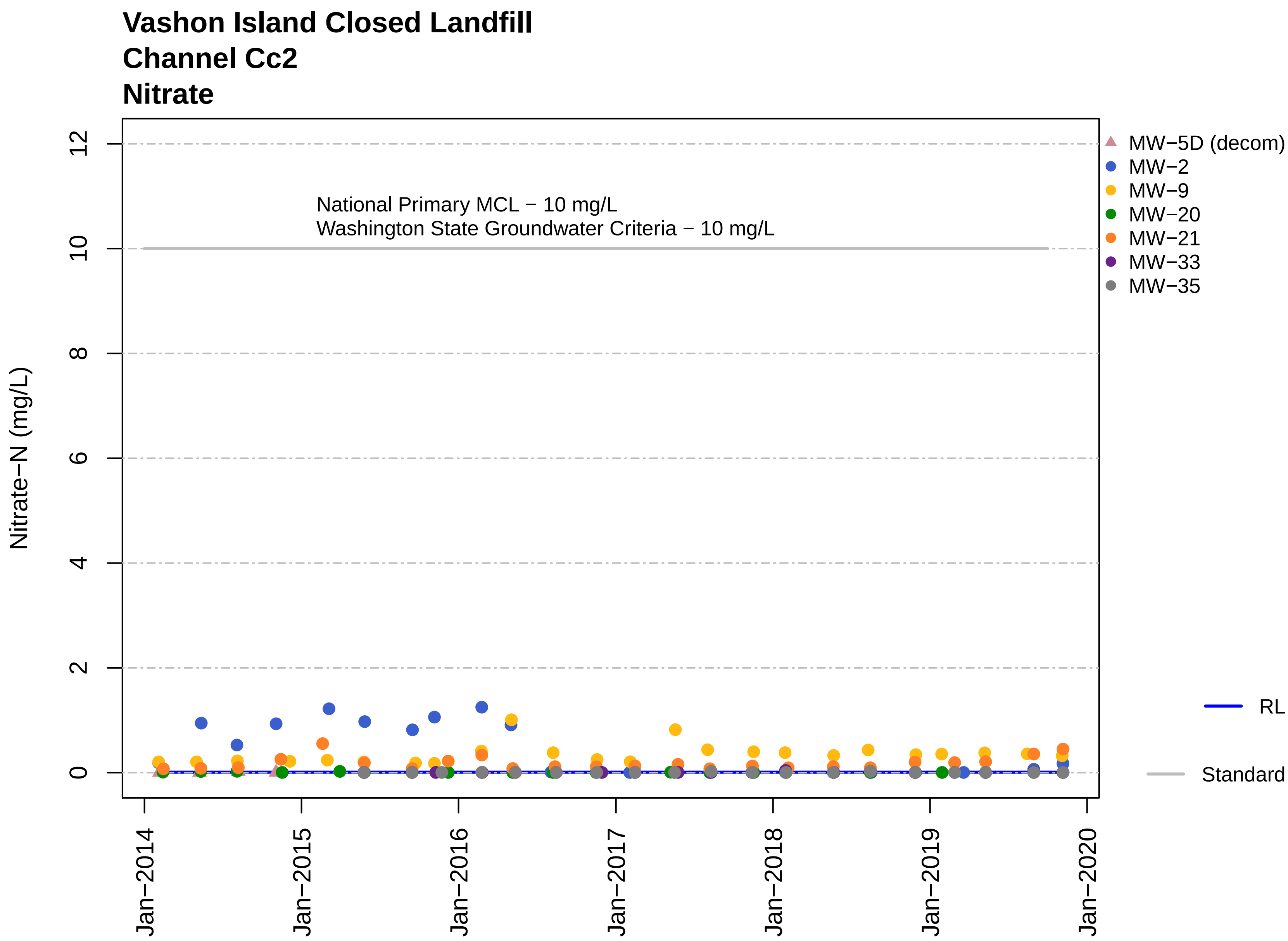


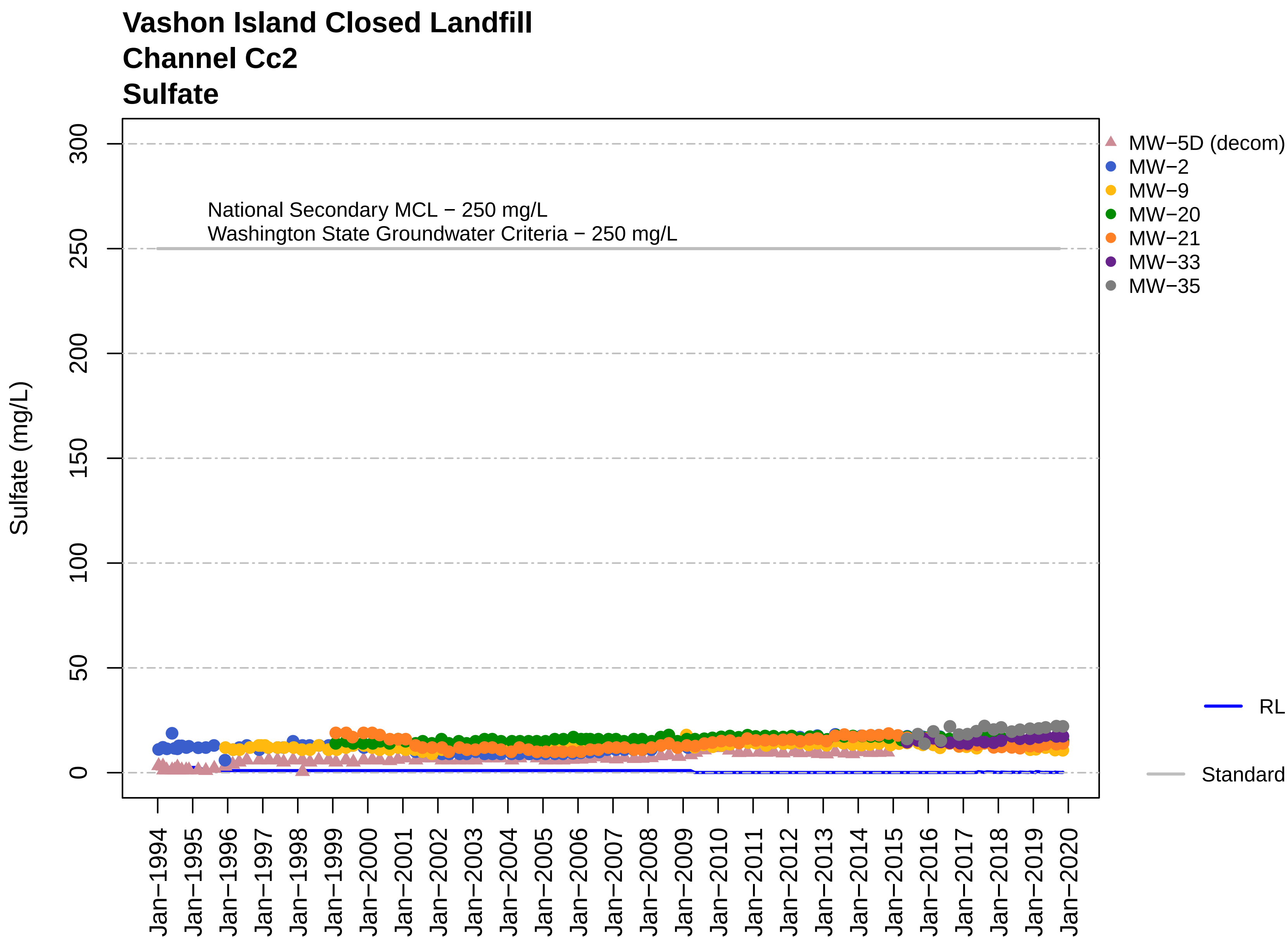
Vashon Island Closed Landfill
Channel Cc2
Chloride

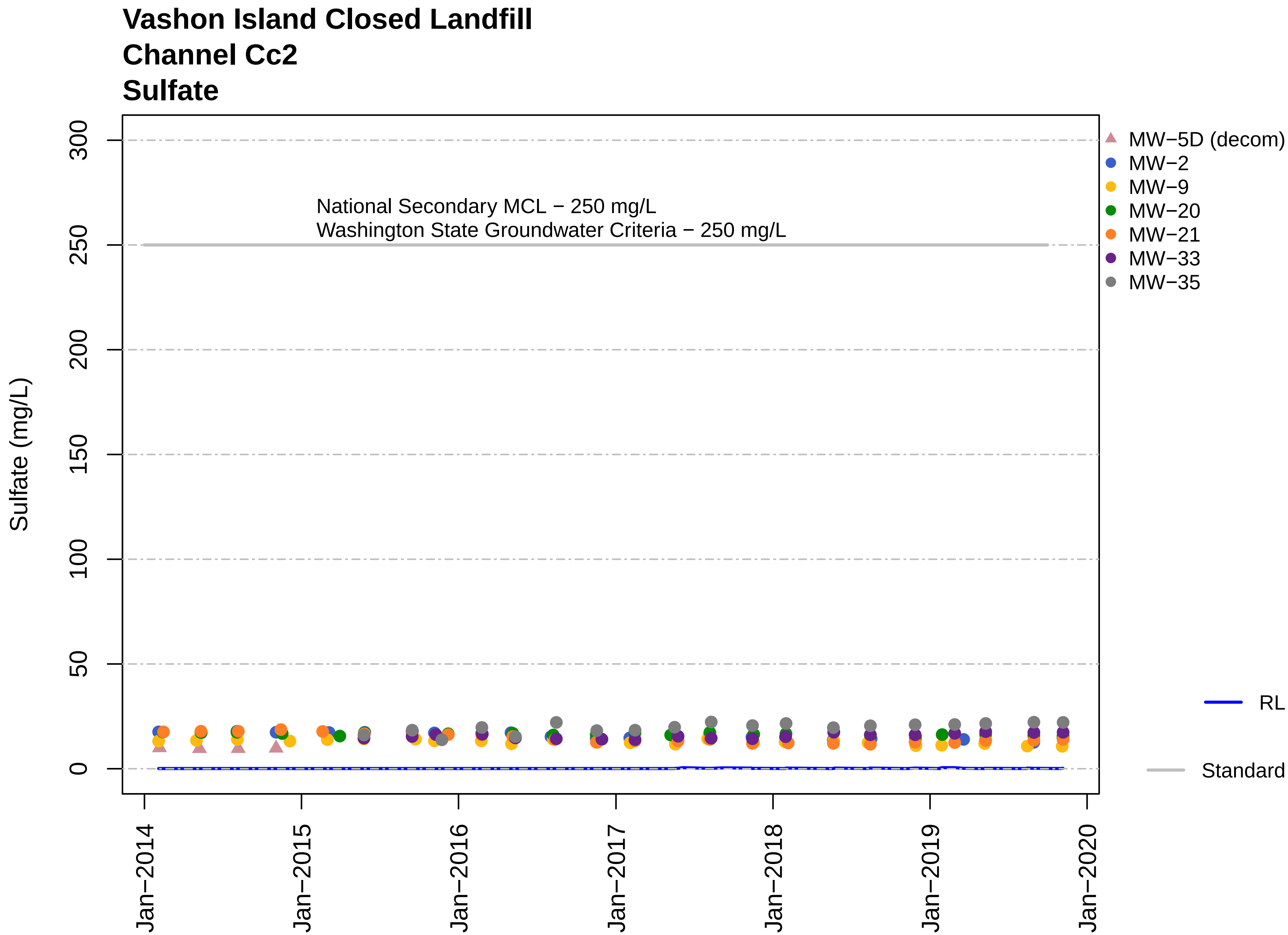


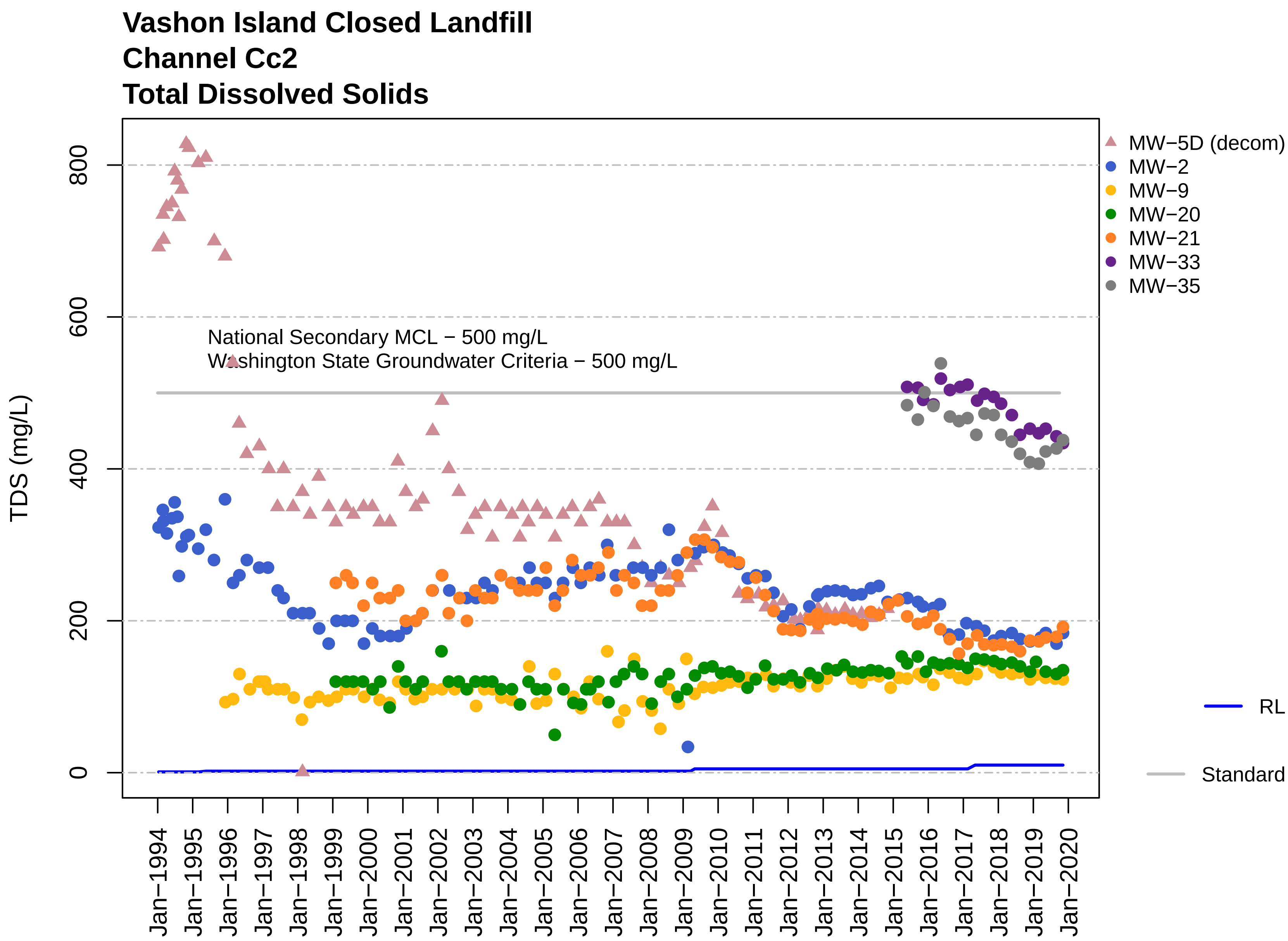


Vashon Island Closed Landfill
Channel Cc2
Nitrate
National Primary MCL − 10 mg/L
Washington State Groundwater Criteria − 10 mg/L
Nitrate−N (mg/L)
0
2
4
6
8
10
12
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

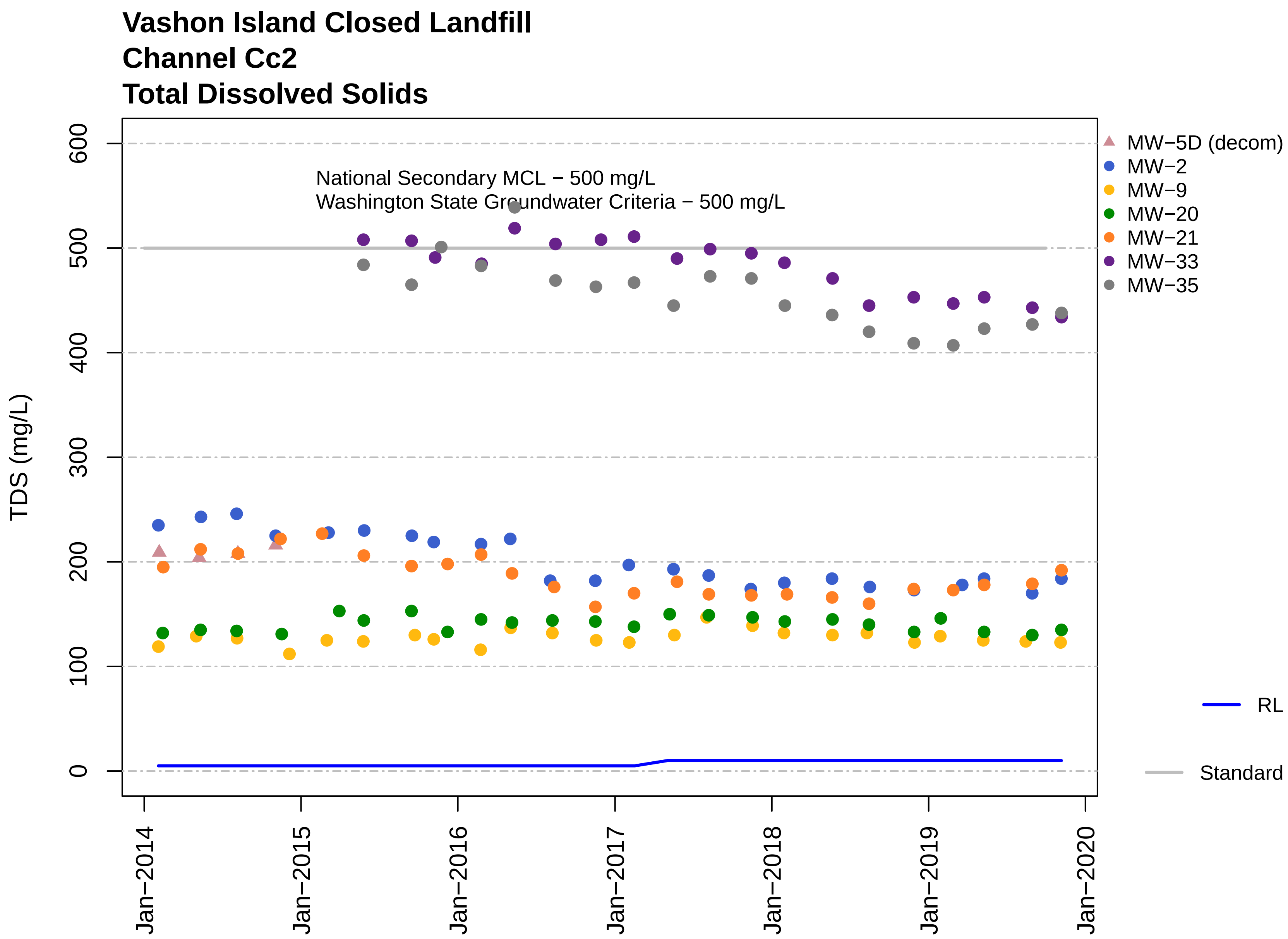

Vashon Island Closed Landfill
Channel Cc2
Nitrate
National Primary MCL − 10 mg/L
Washington State Groundwater Criteria − 10 mg/L
Nitrate−N (mg/L)
0
2
4
6
8
10
12
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard


Vashon Island Closed Landfill
Channel Cc2
Sulfate
Sulfate (mg/L)
0
50
100
150
200
250
300
National Secondary MCL − 250 mg/L
Washington State Groundwater Criteria − 250 mg/L
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

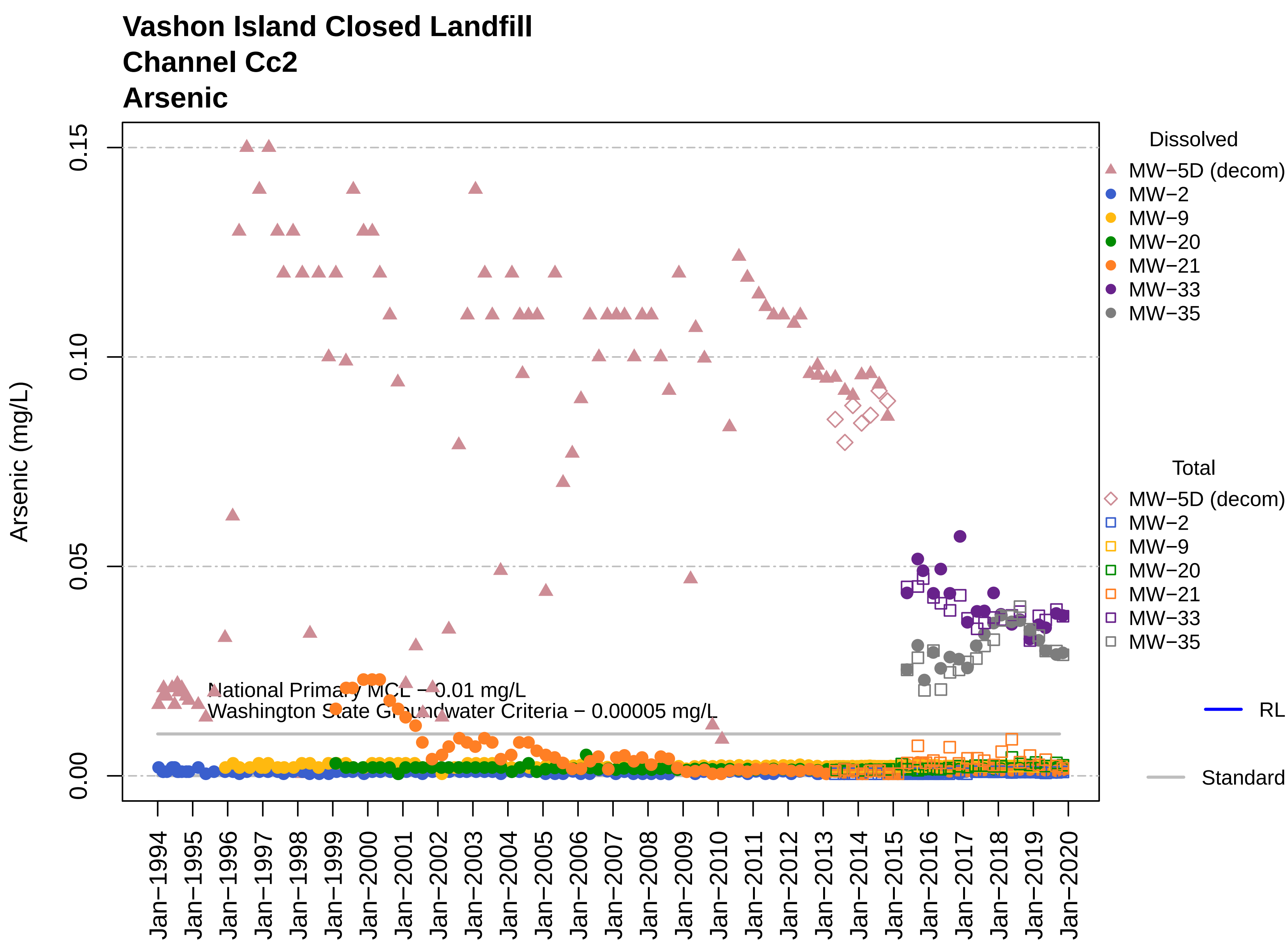

Vashon Island Closed Landfill
Channel Cc2
Sulfate
National Secondary MCL − 250 mg/L
Washington State Groundwater Criteria − 250 mg/L
Sulfate (mg/L)
0
50
100
150
200
250
300
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard



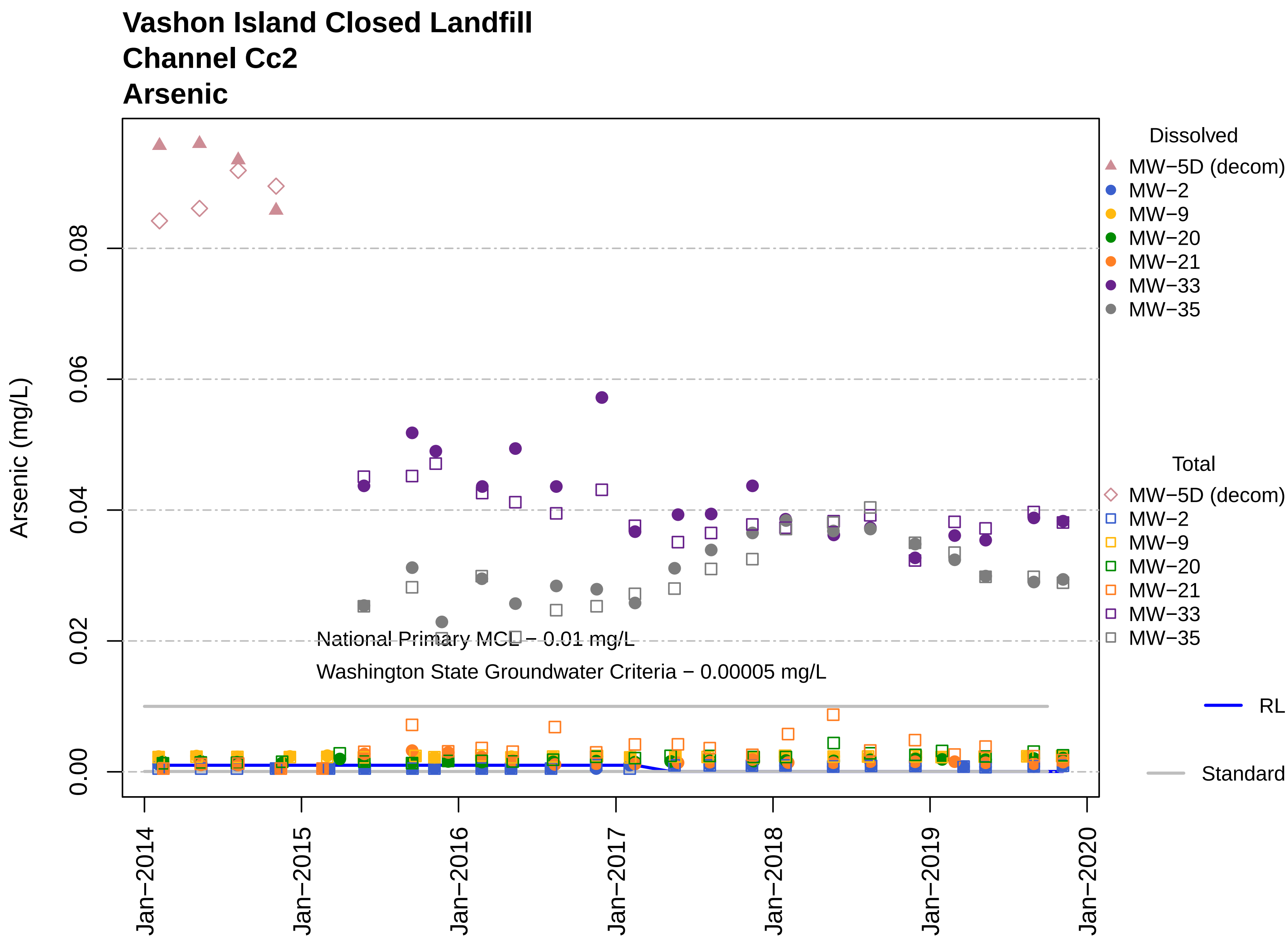
Vashon Island Closed Landfill
Channel Cc2
Total Dissolved Solids
TDS (mg/L)
0
200
400
600
800
National Secondary MCL − 500 mg/L
Washington State Groundwater Criteria − 500 mg/L
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

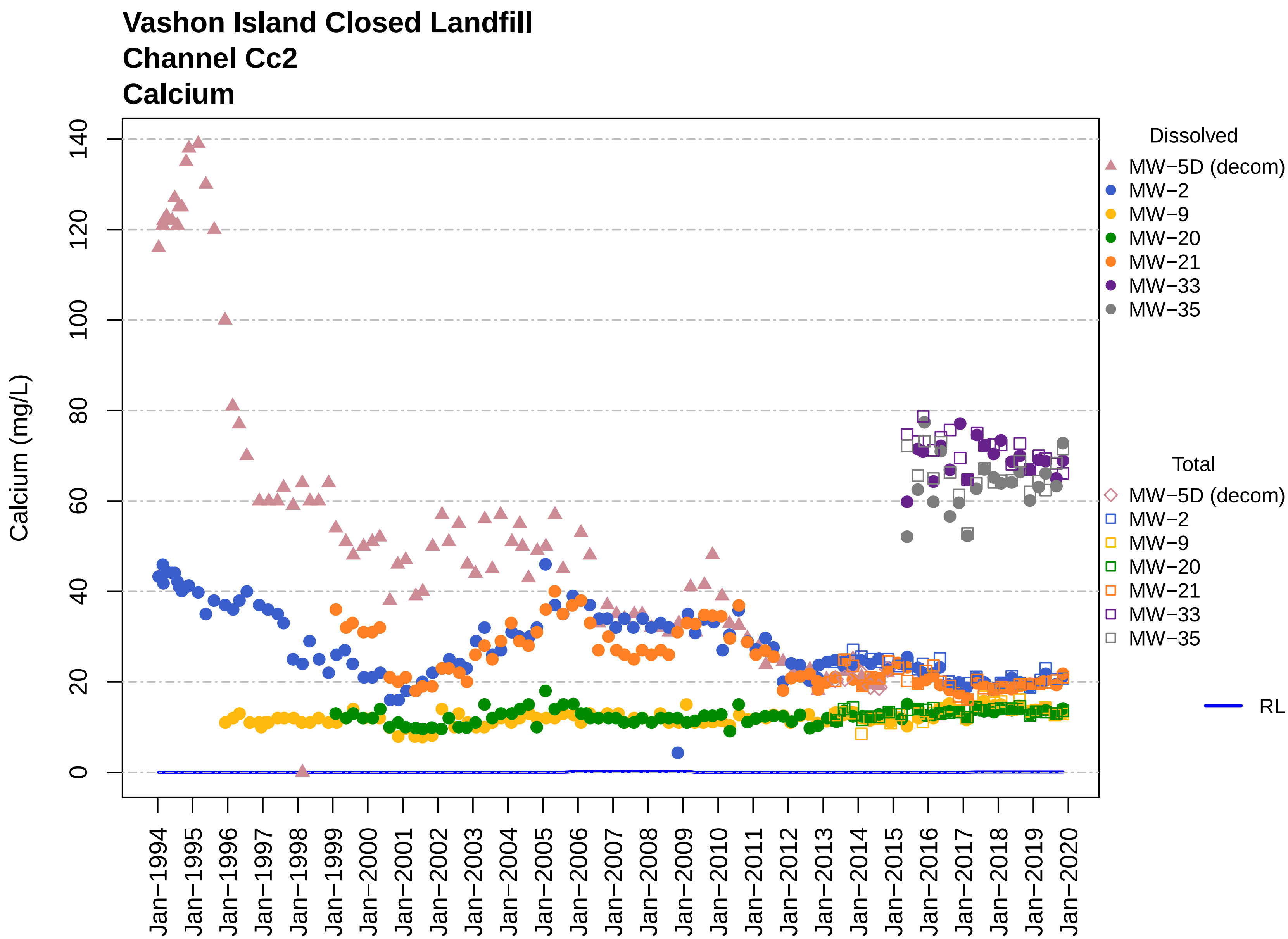


Vashon Island Closed Landfill
Channel Cc2
Total Dissolved Solids
National Secondary MCL − 500 mg/L
Washington State Groundwater Criteria − 500 mg/L
TDS (mg/L)
0
100
200
300
400
500
600
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

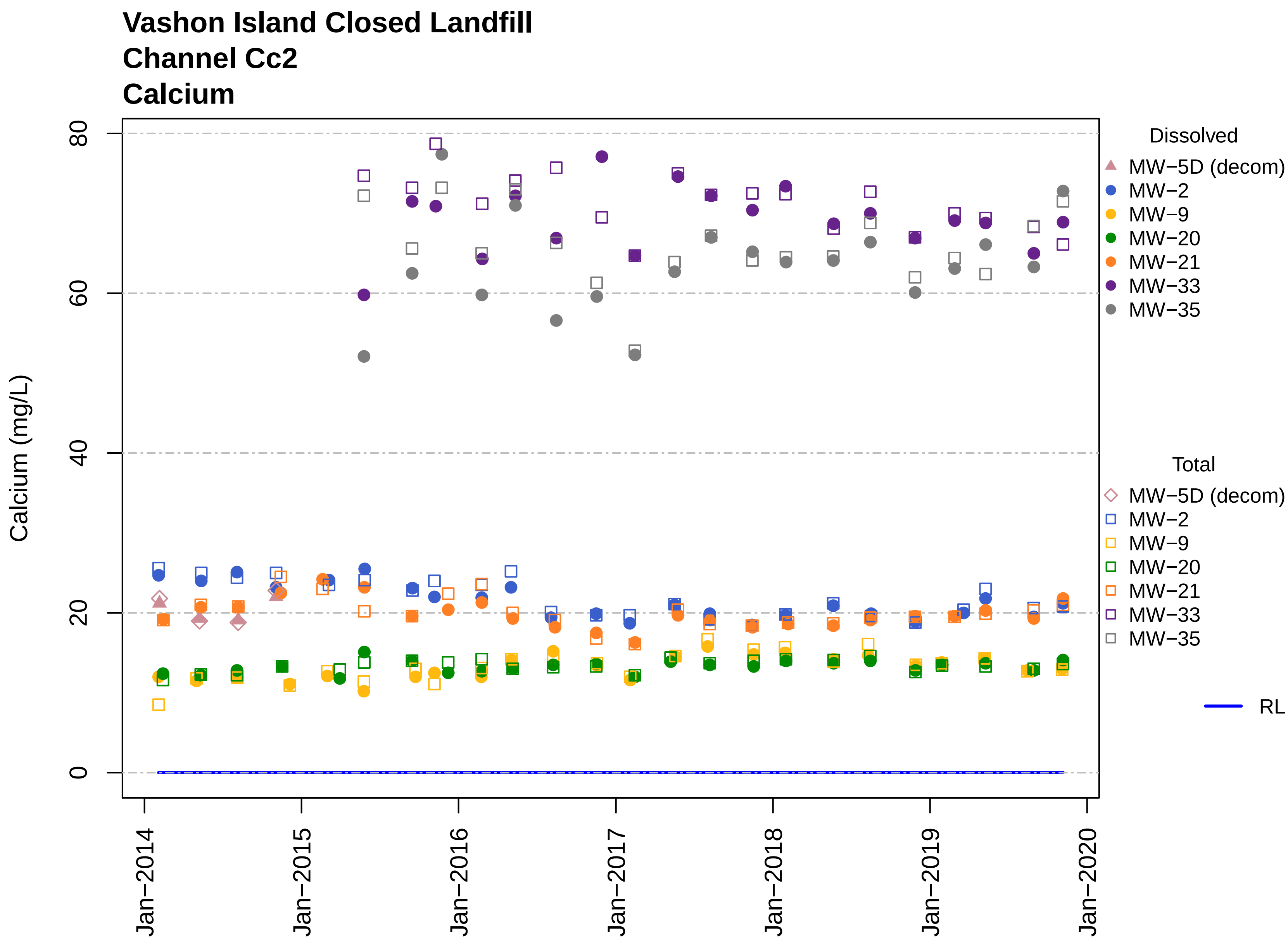


Vashon Island Closed Landfill
Channel Cc2
Arsenic
Arsenic (mg/L)
0.00
0.05
0.10
0.15
National Primary MCL − 0.01 mg/L
Washington State Groundwater Criteria − 0.00005 mg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
Total
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard


Vashon Island Closed Landfill
Channel Cc2
Arsenic
Arsenic (mg/L)
0.00
0.02
0.04
0.06
0.08
National Primary MCL − 0.01 mg/L
Washington State Groundwater Criteria − 0.00005 mg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
Total
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

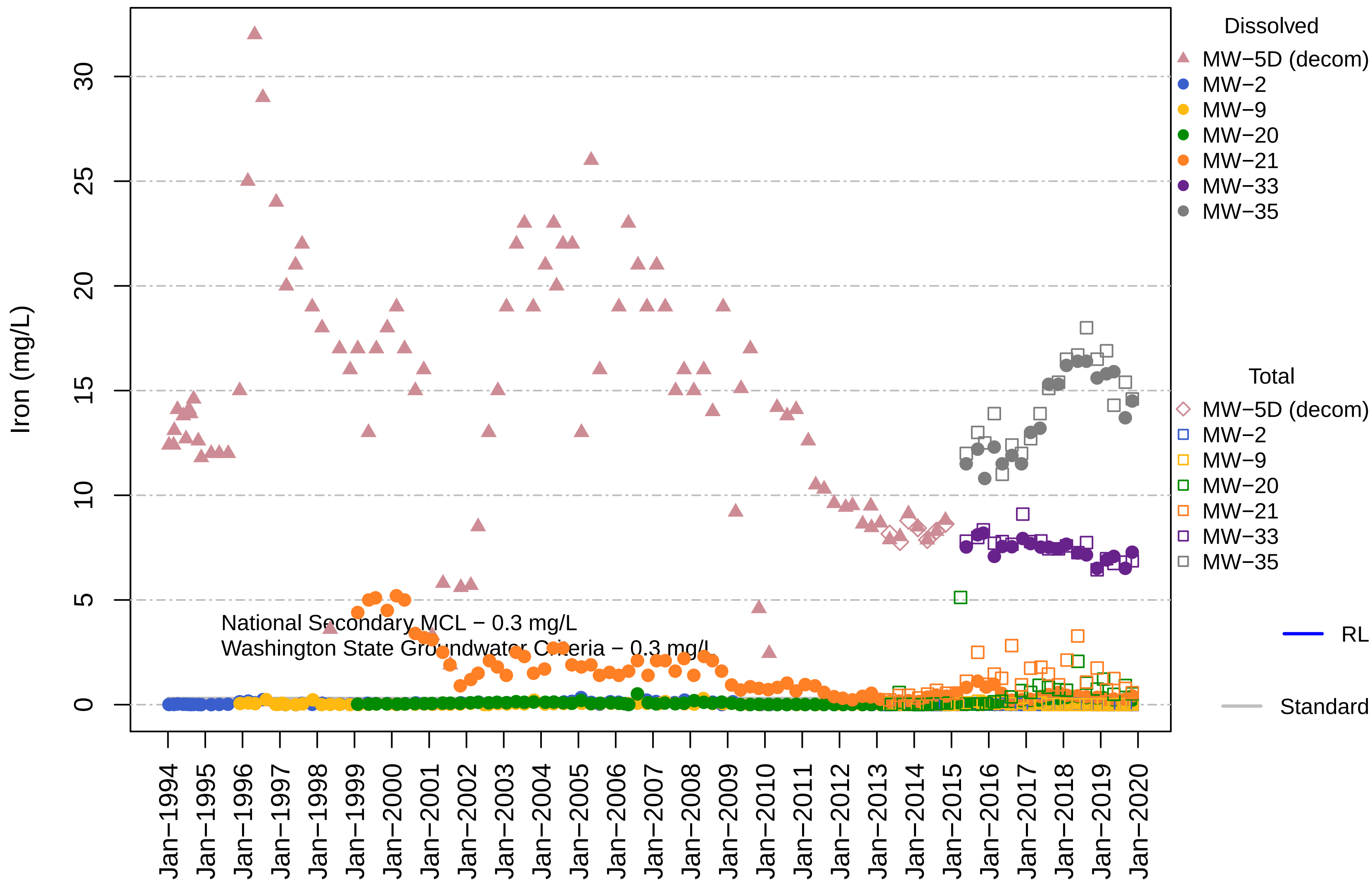


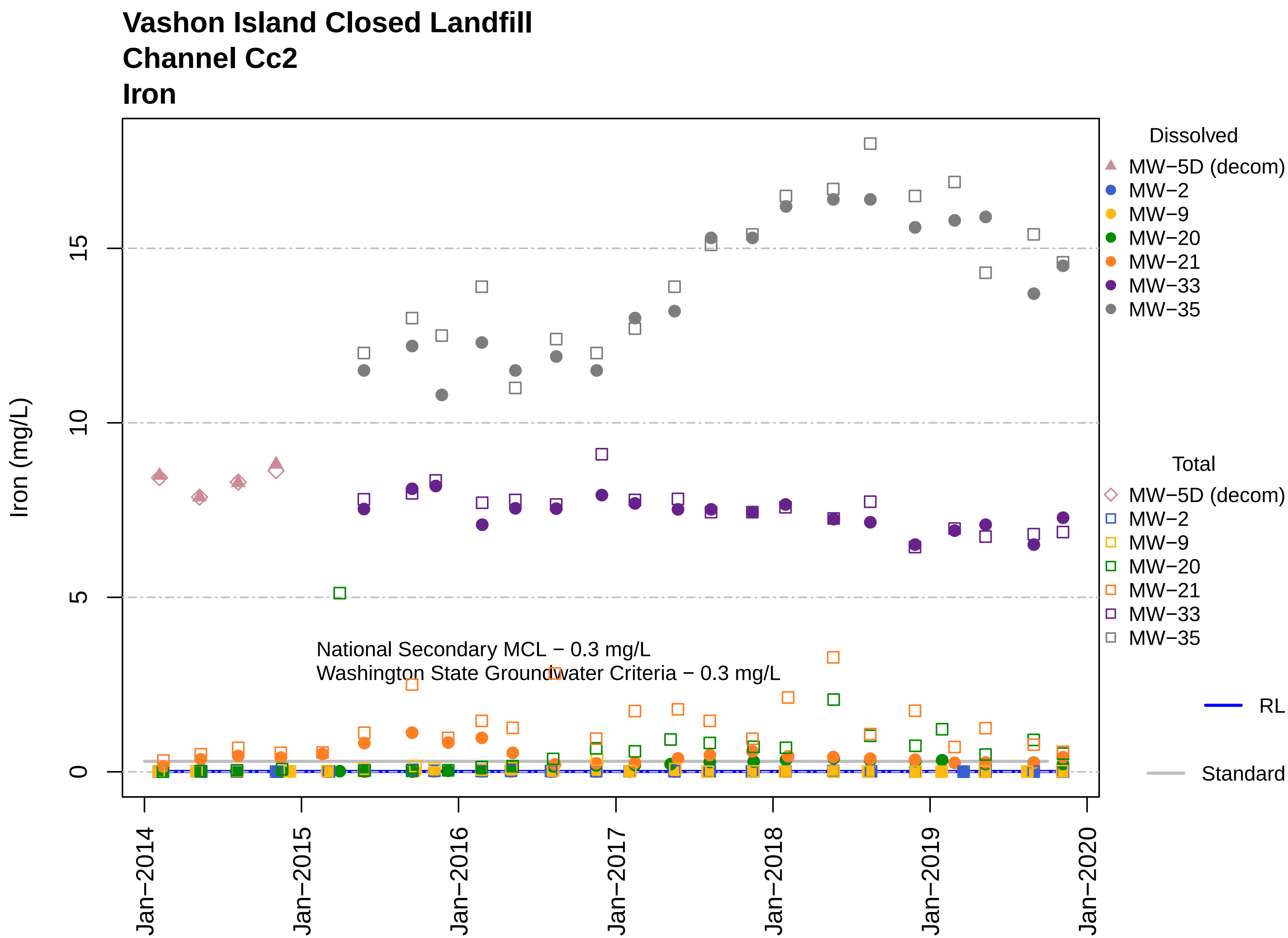
Vashon Island Closed Landfill
Channel Cc2
Calcium
Calcium (mg/L)
0
20
40
60
80
100
120
140
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
Total
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL

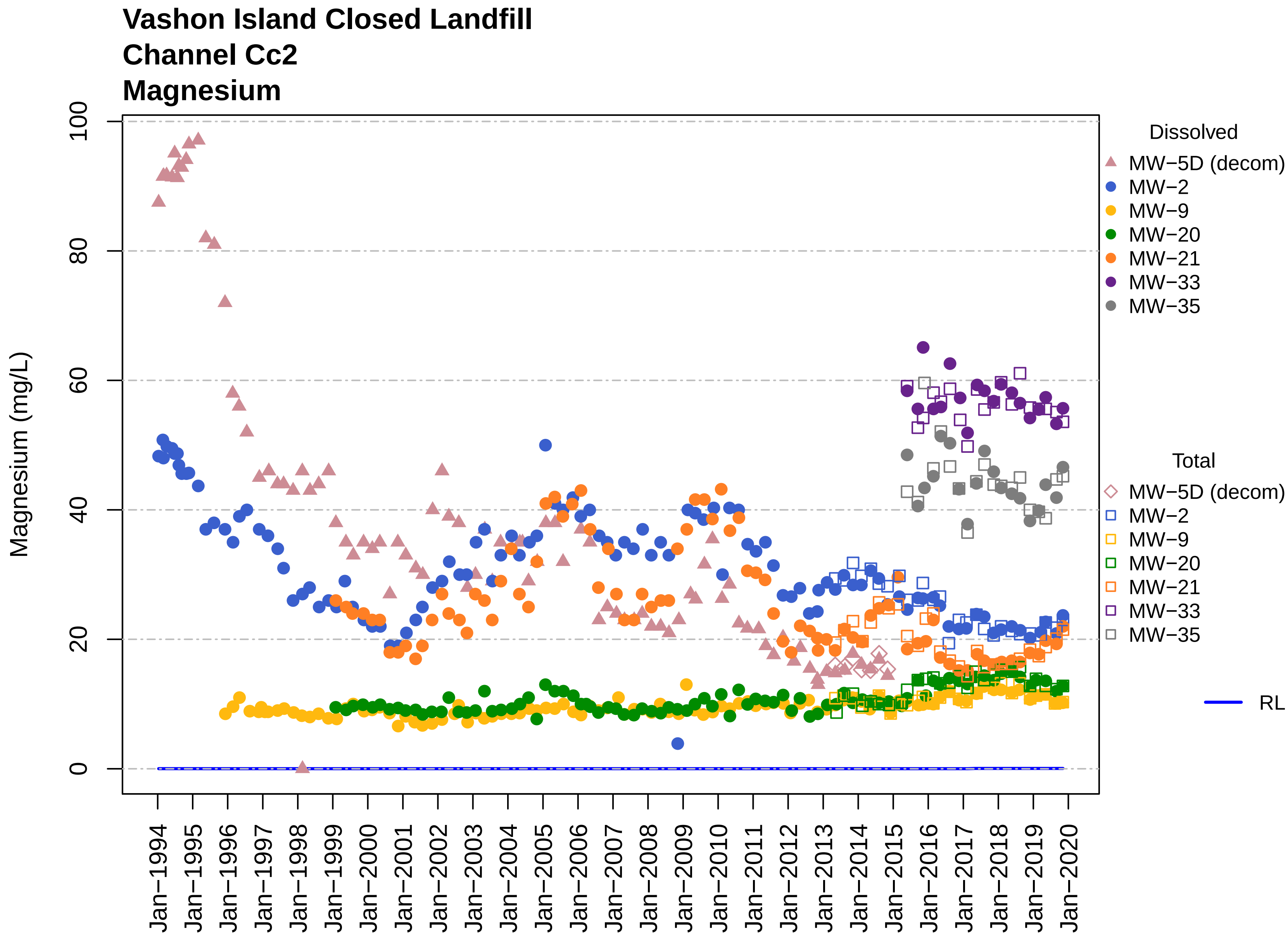


Vashon Island Closed Landfill
Channel Cc2
Calcium
Calcium (mg/L)
0
20
40
60
80
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
Total
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL

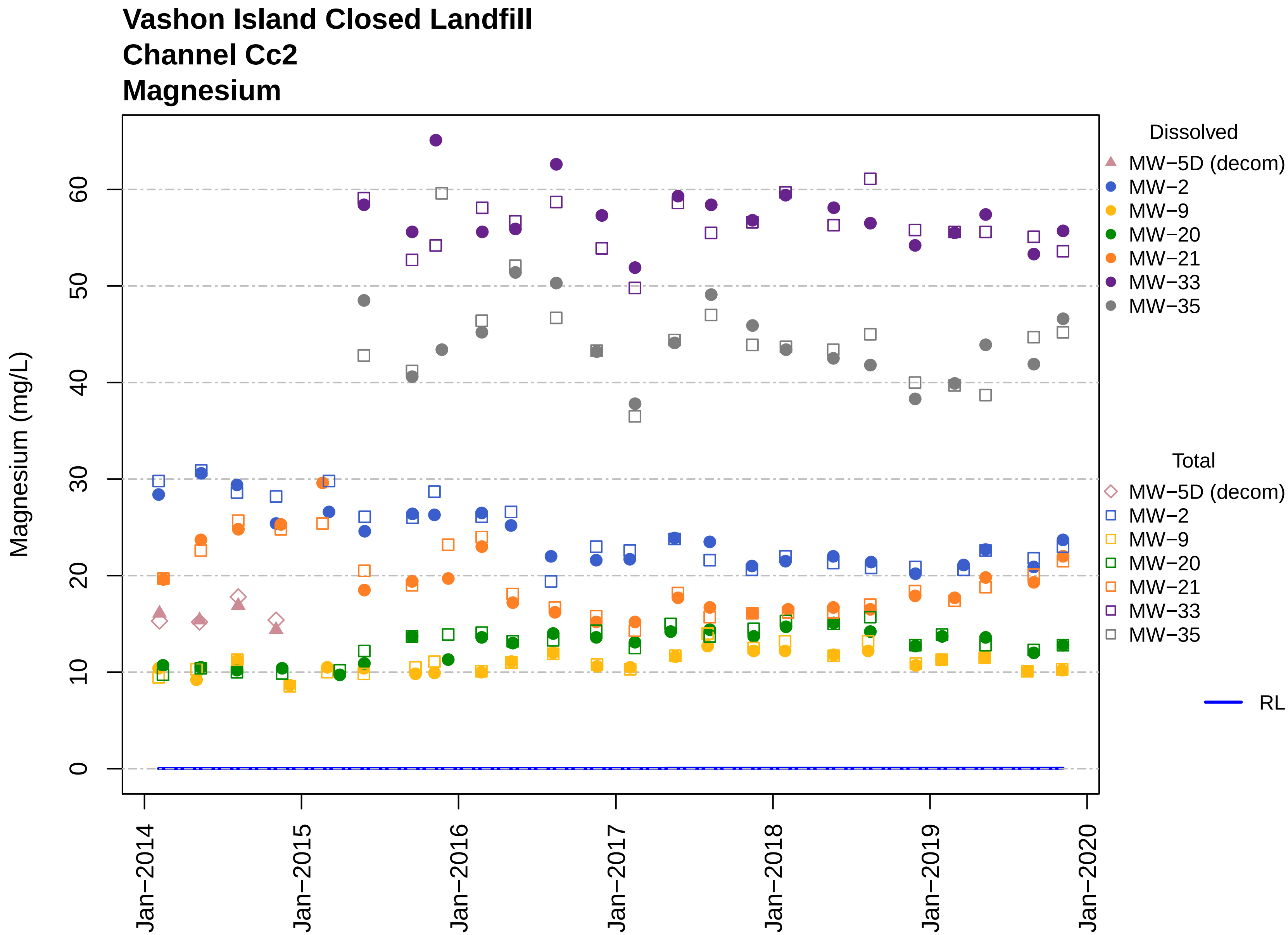
Vashon Island Closed Landfill
Channel Cc2
Iron



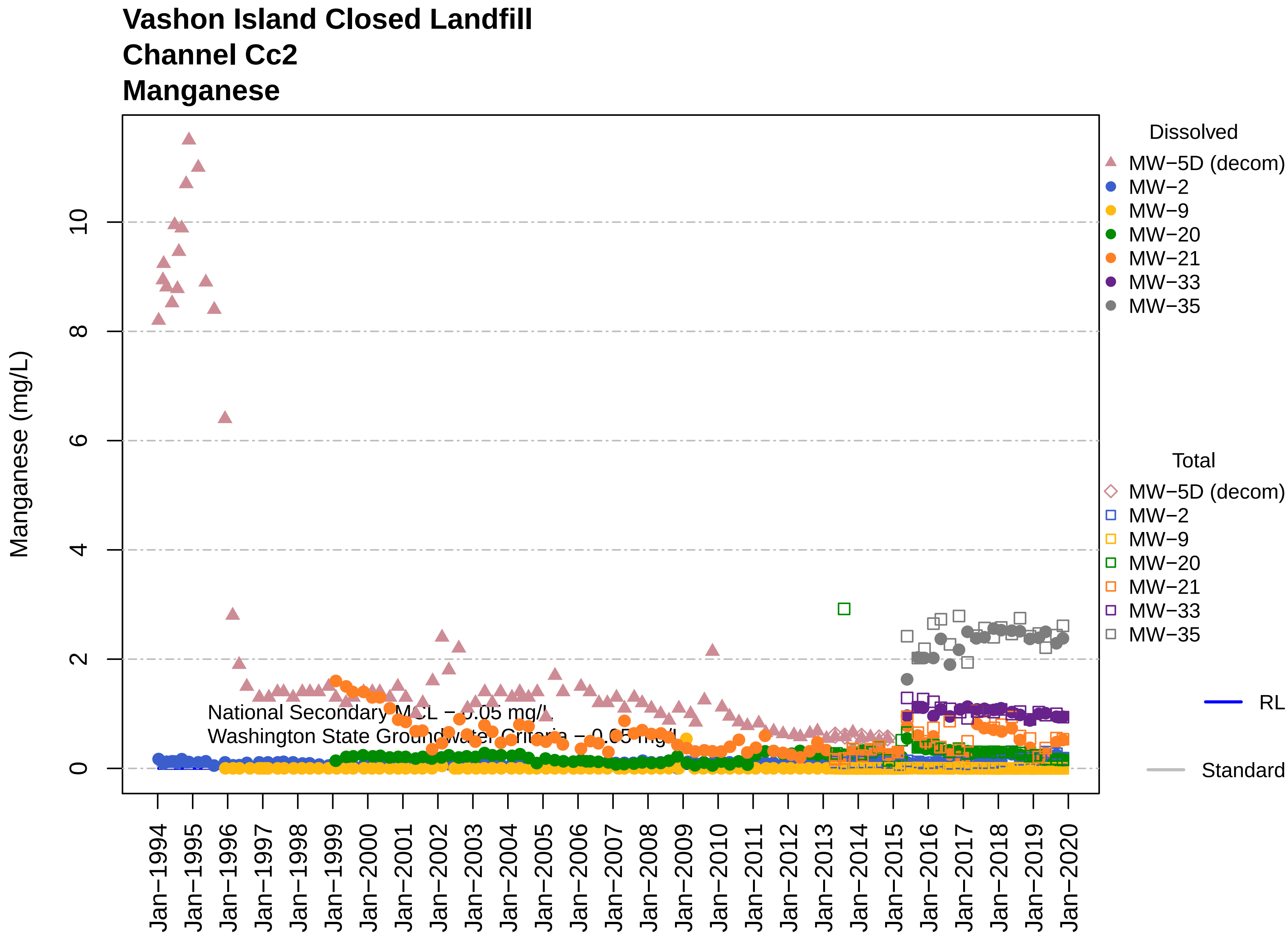

Vashon Island Closed Landfill
Channel Cc2
Iron
Iron (mg/L)
0
5
10
15
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
National Secondary MCL − 0.3 mg/L
Washington State Groundwater Criteria − 0.3 mg/L
Dissolved
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
Total
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard



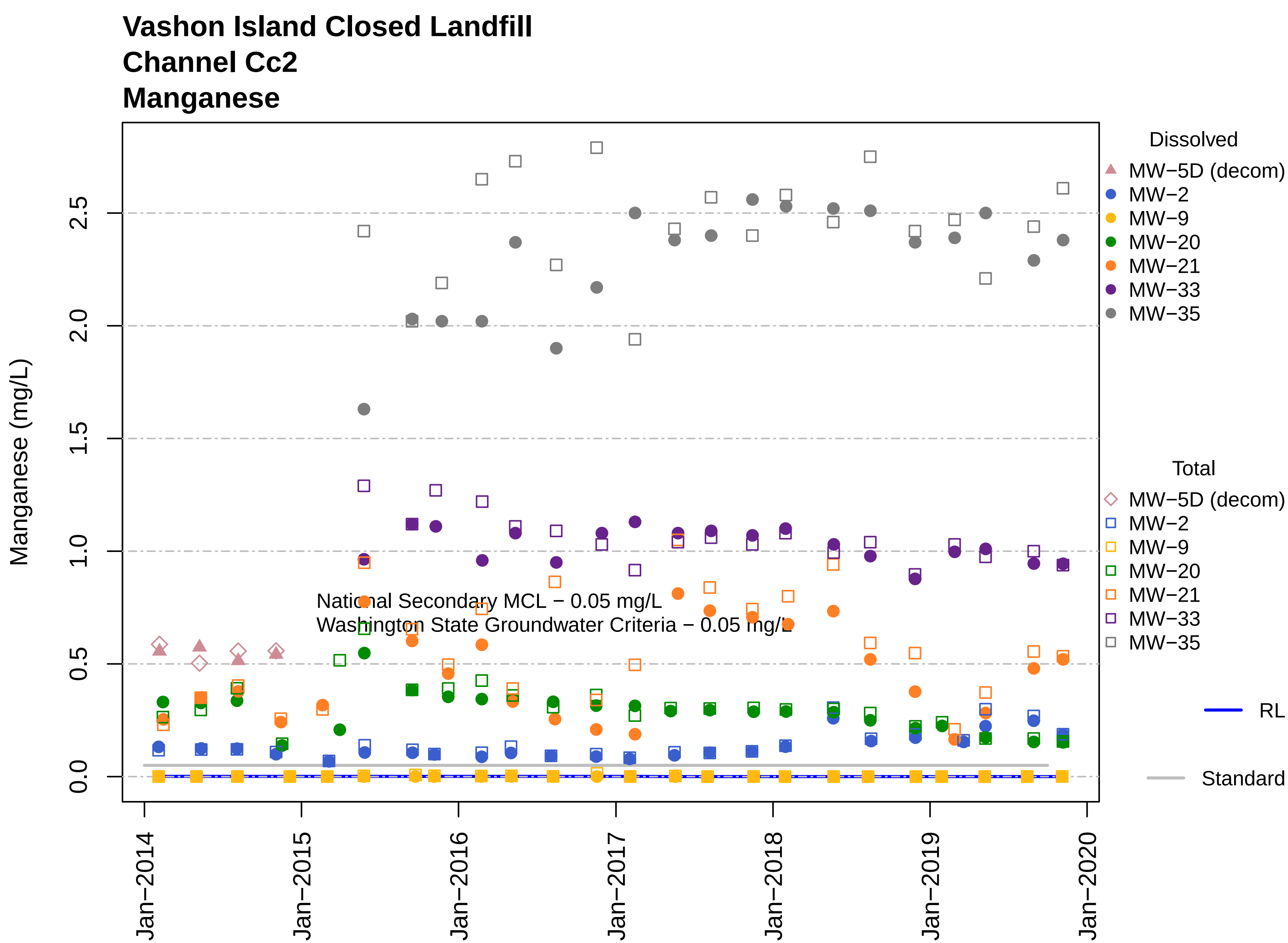
Vashon Island Closed Landfill
Channel Cc2
Magnesium
Magnesium (mg/L)
0
20
40
60
80
100
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
Total
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL



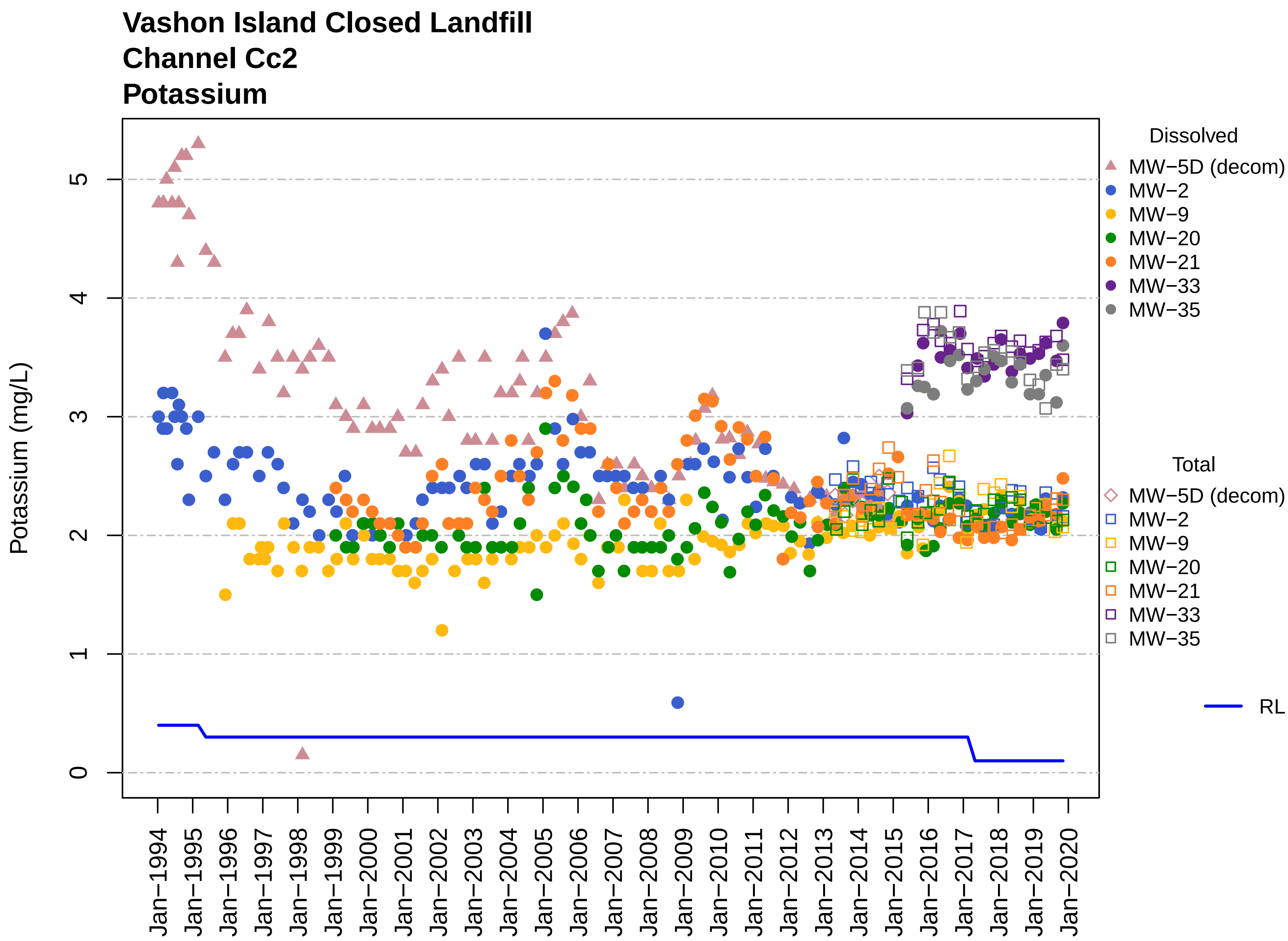
Vashon Island Closed Landfill
Channel Cc2
Magnesium
Magnesium (mg/L)
0
10
20
30
40
50
60
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
Total
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL



Vashon Island Closed Landfill
Channel Cc2
Manganese
Manganese (mg/L)
0
2
4
6
8
10
National Secondary MCL = 0.05 mg/L
Washington State Groundwater Criteria = 0.05 mg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
Total
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

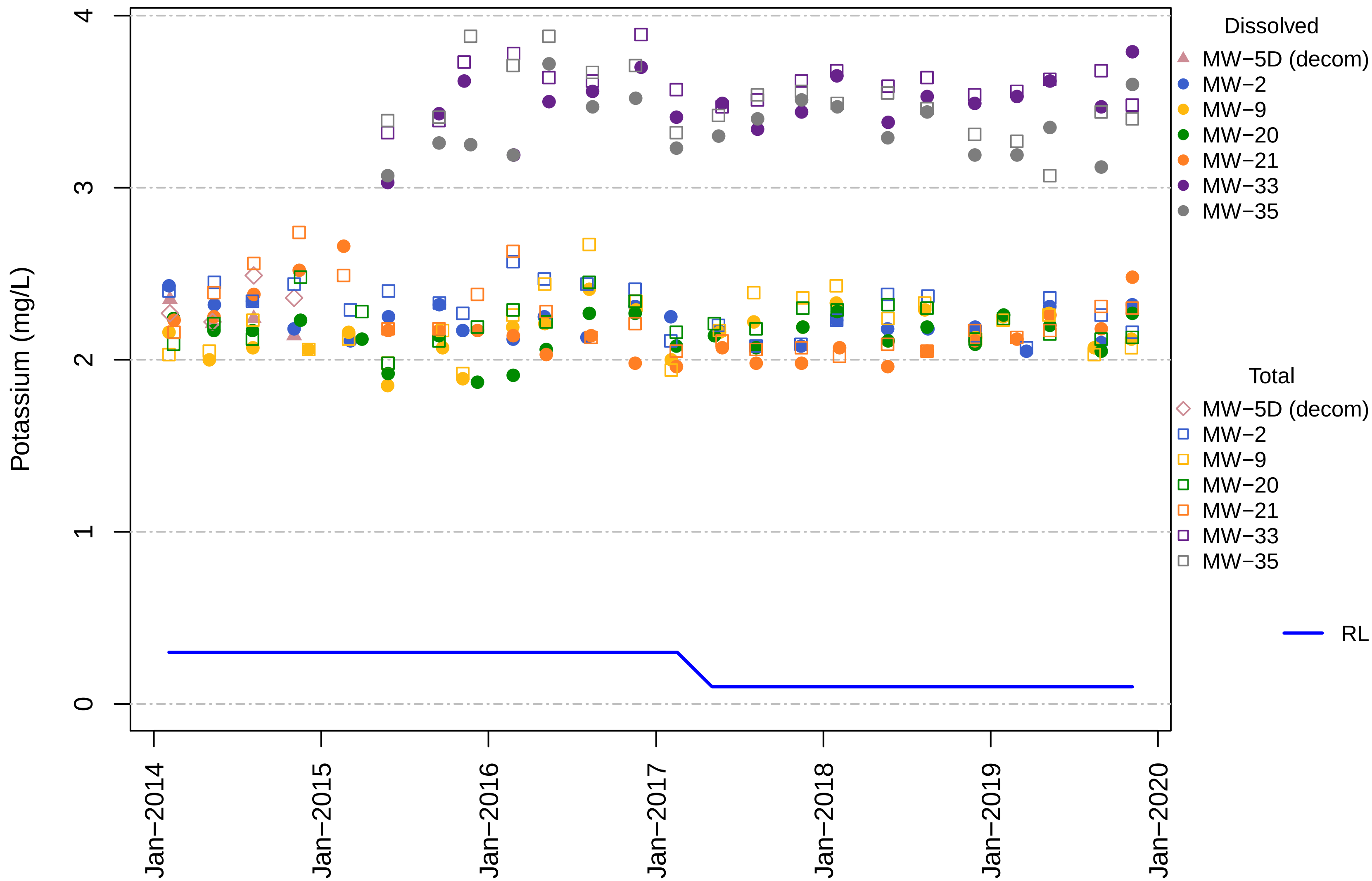


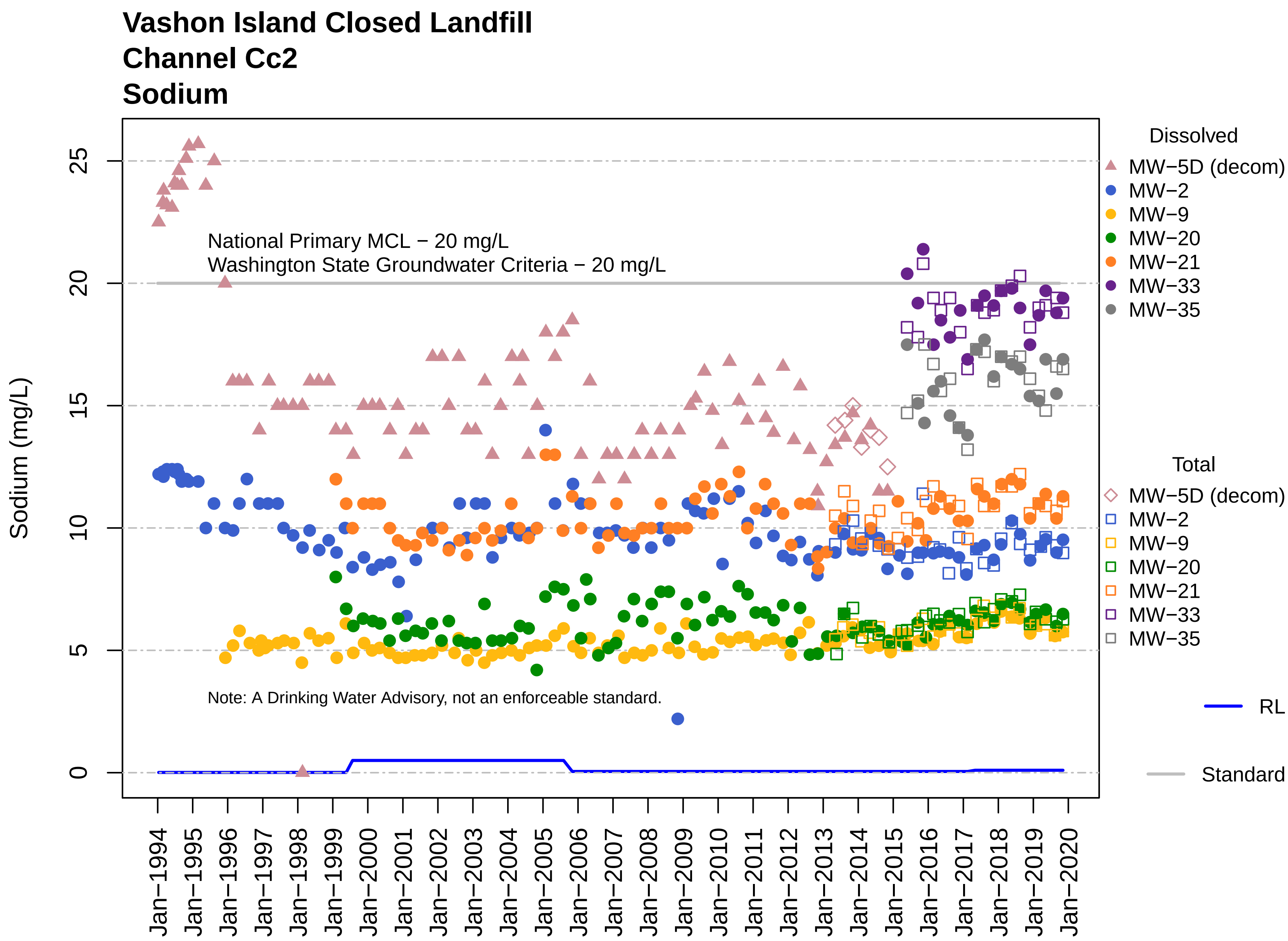
Vashon Island Closed Landfill
Channel Cc2
Manganese
Manganese (mg/L)
0.0
0.5
1.0
1.5
2.0
2.5
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
National Secondary MCL − 0.05 mg/L
Washington State Groundwater Criteria − 0.05 mg/L
Dissolved
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
Total
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard



Vashon Island Closed Landfill
Channel Cc2
Potassium
Potassium (mg/L)
0
1
2
3
4
5
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
Total
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL

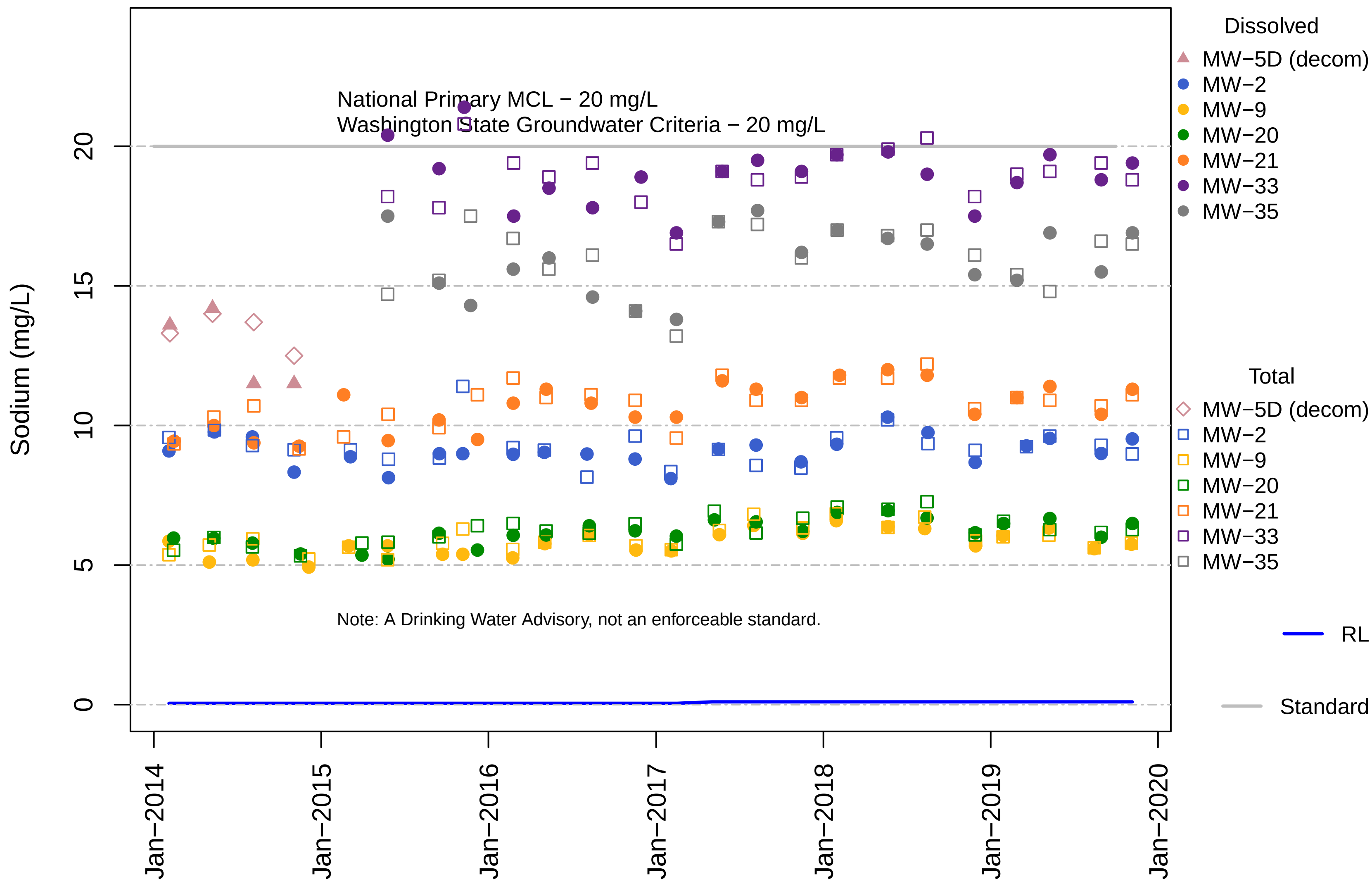
Vashon Island Closed Landfill
Channel Cc2
Potassium

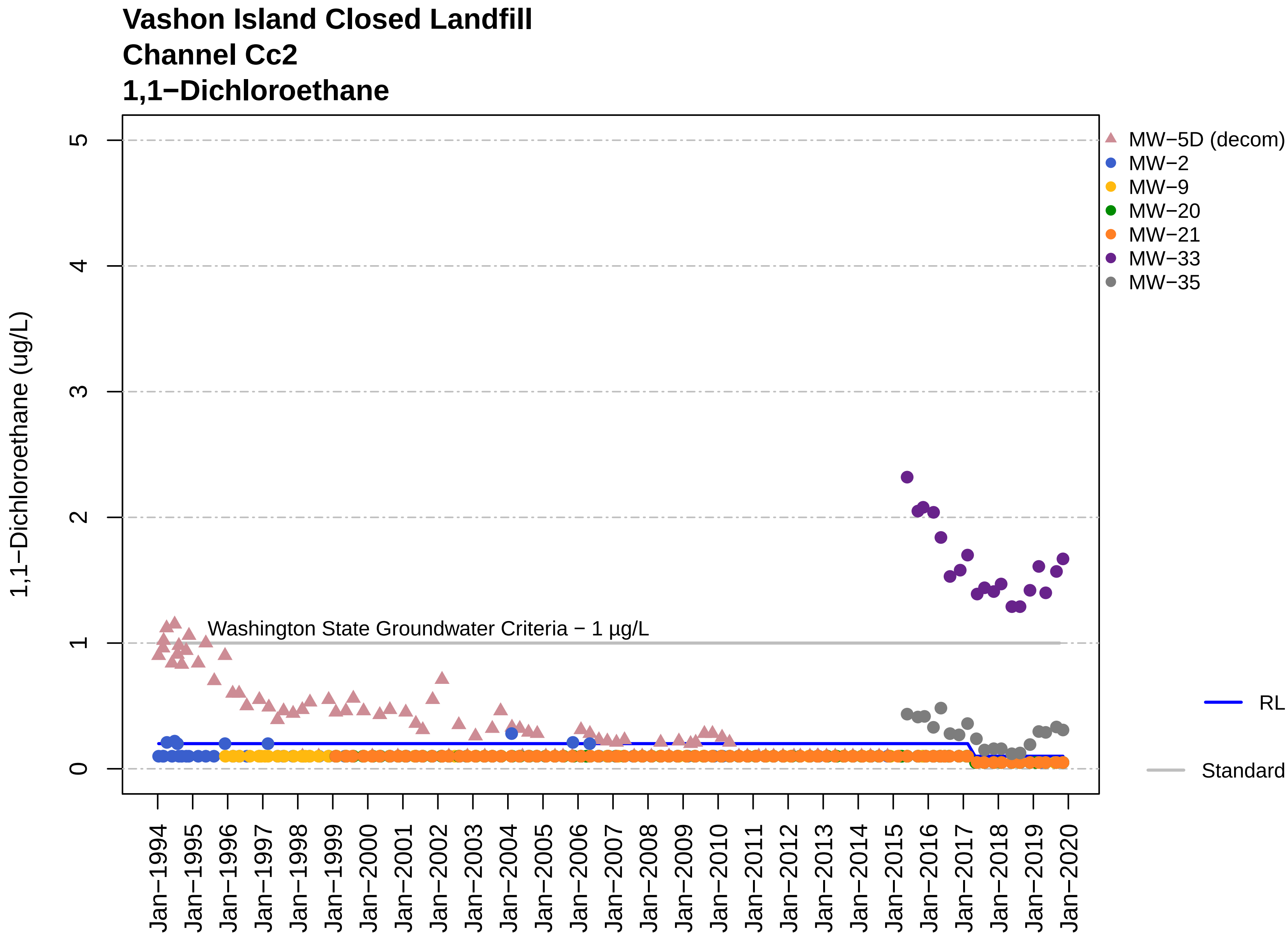


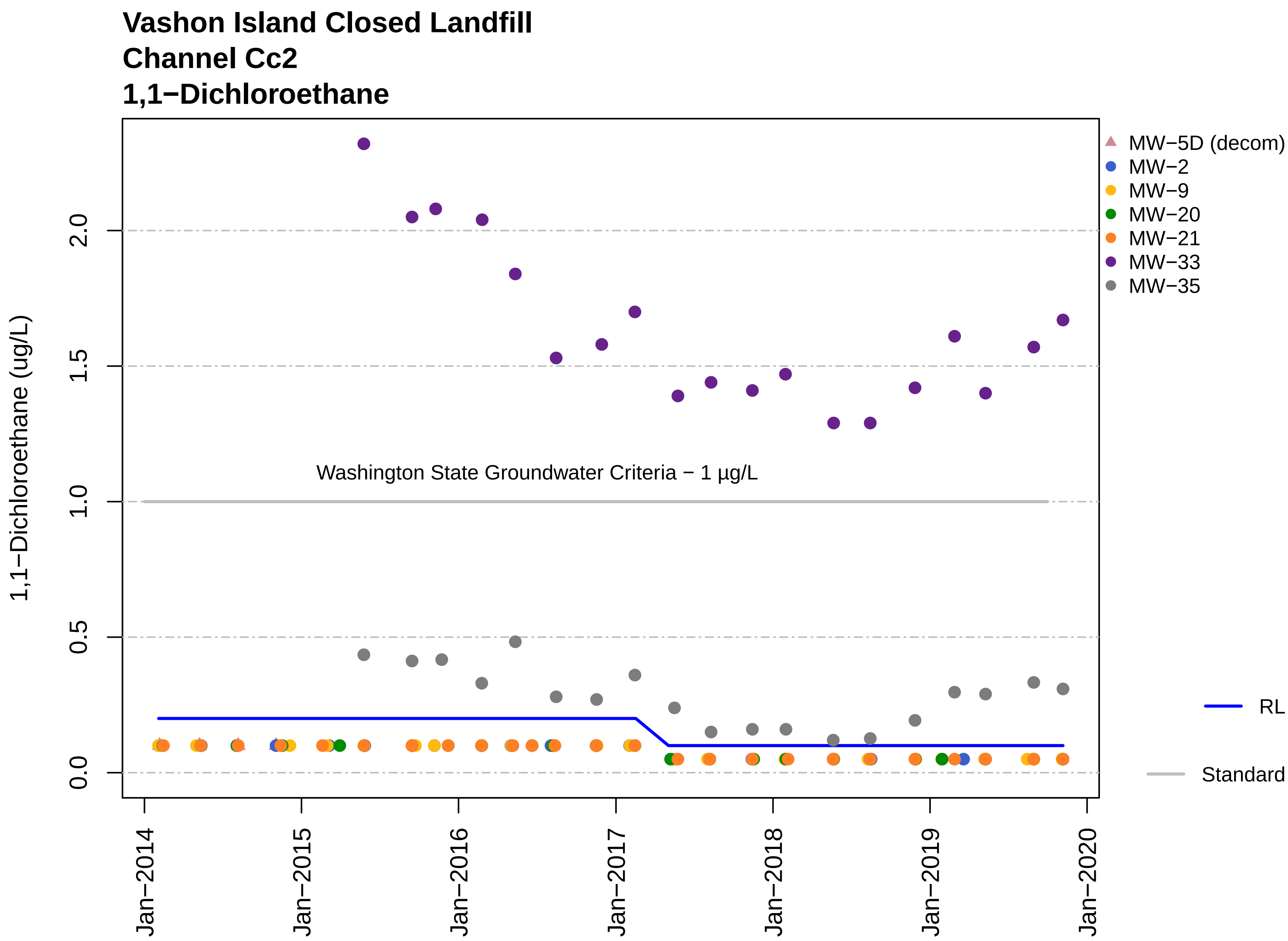


Vashon Island Closed Landfill
Channel Cc2
Sodium
Sodium (mg/L)
0
5
10
15
20
25
National Primary MCL − 20 mg/L
Washington State Groundwater Criteria − 20 mg/L
Note: A Drinking Water Advisory, not an enforceable standard.
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
Total
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

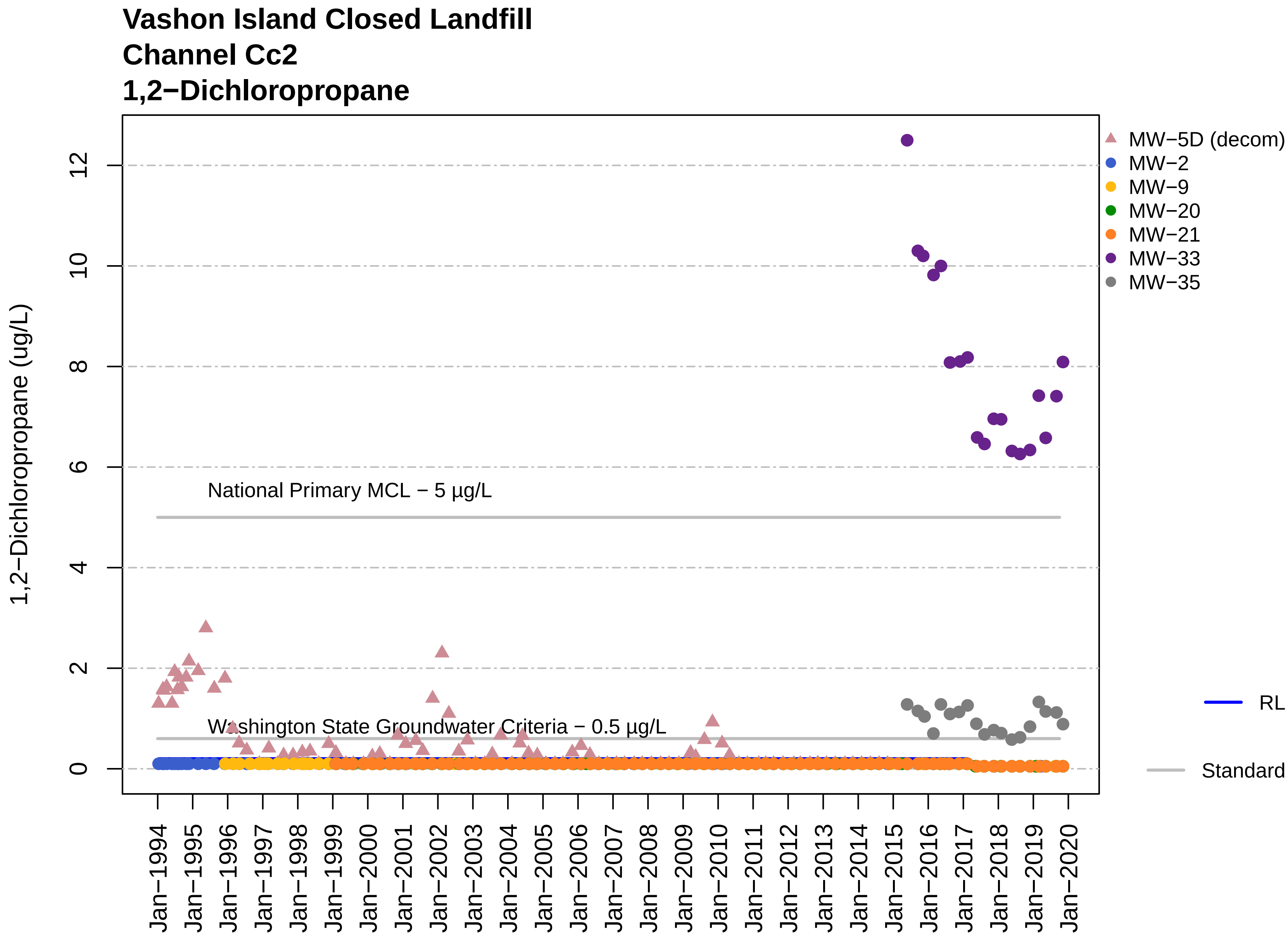
Vashon Island Closed Landfill
Channel Cc2
Sodium




Vashon Island Closed Landfill
Channel Cc2
1,1−Dichloroethane
1,1−Dichloroethane (ug/L)
0
1
2
3
4
5
Washington State Groundwater Criteria − 1 µg/L
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

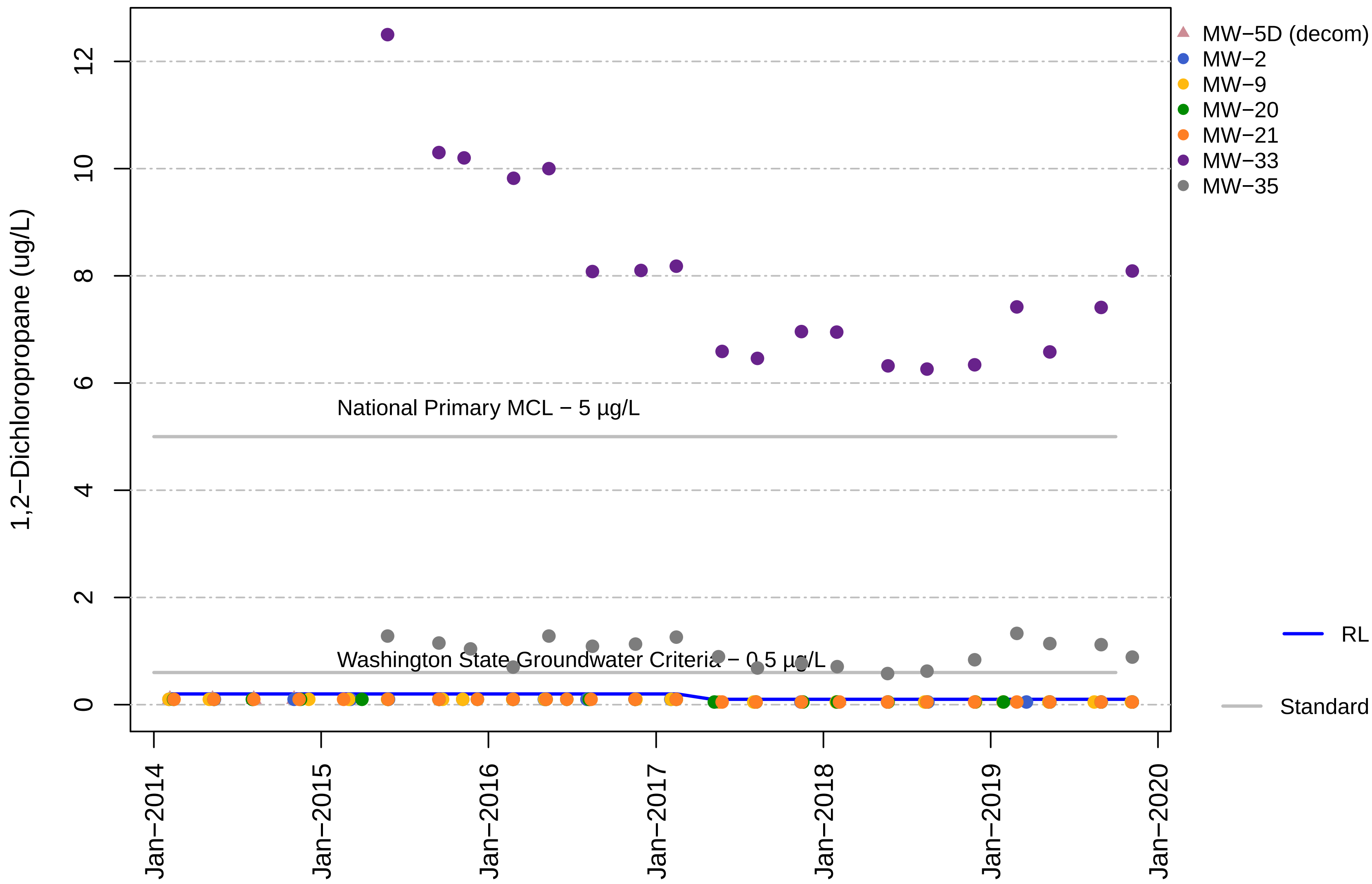


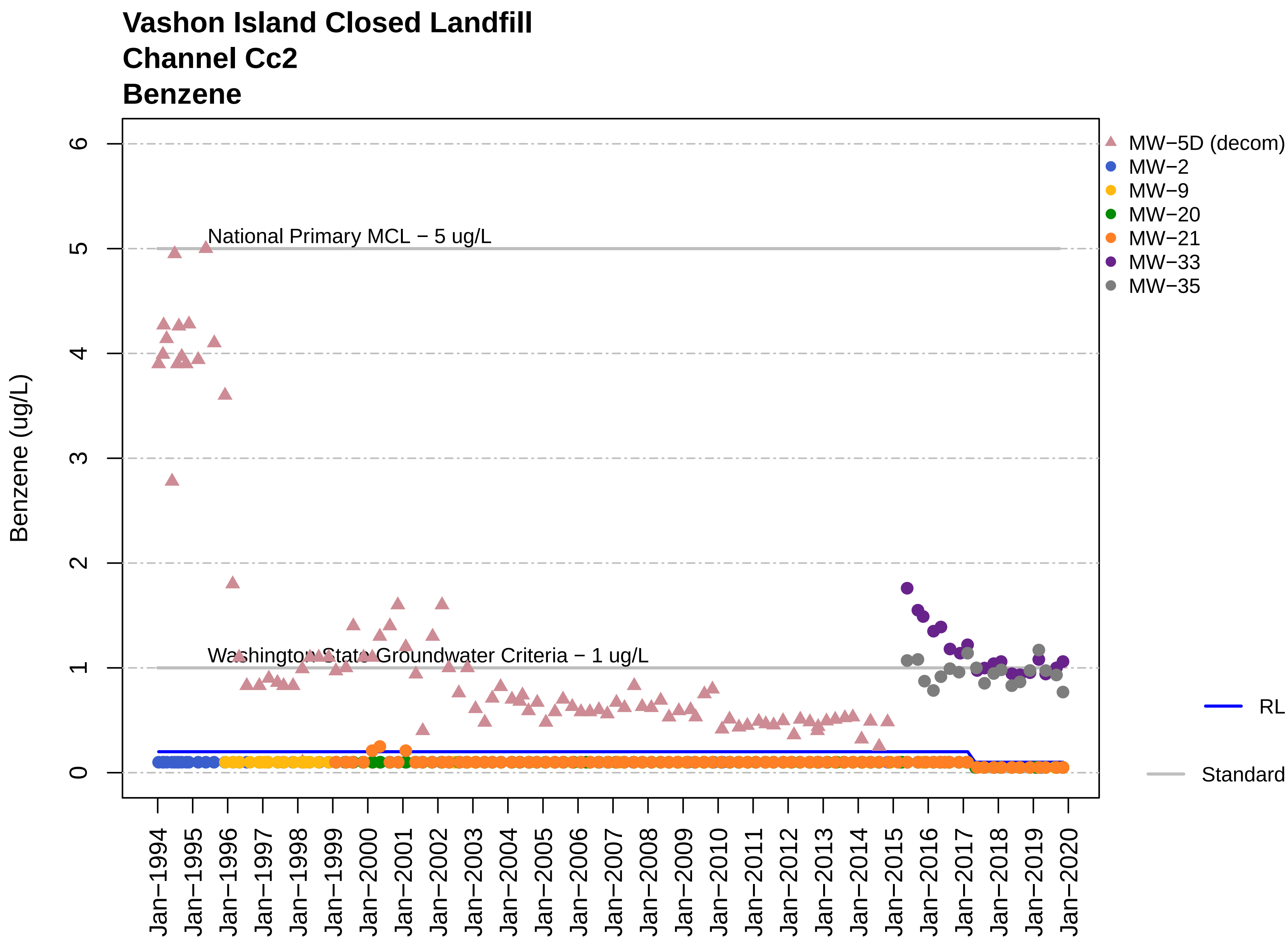
Vashon Island Closed Landfill
Channel Cc2
1,1−Dichloroethane
1,1−Dichloroethane (ug/L)
0.0
0.5
1.0
1.5
2.0
Washington State Groundwater Criteria − 1 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard



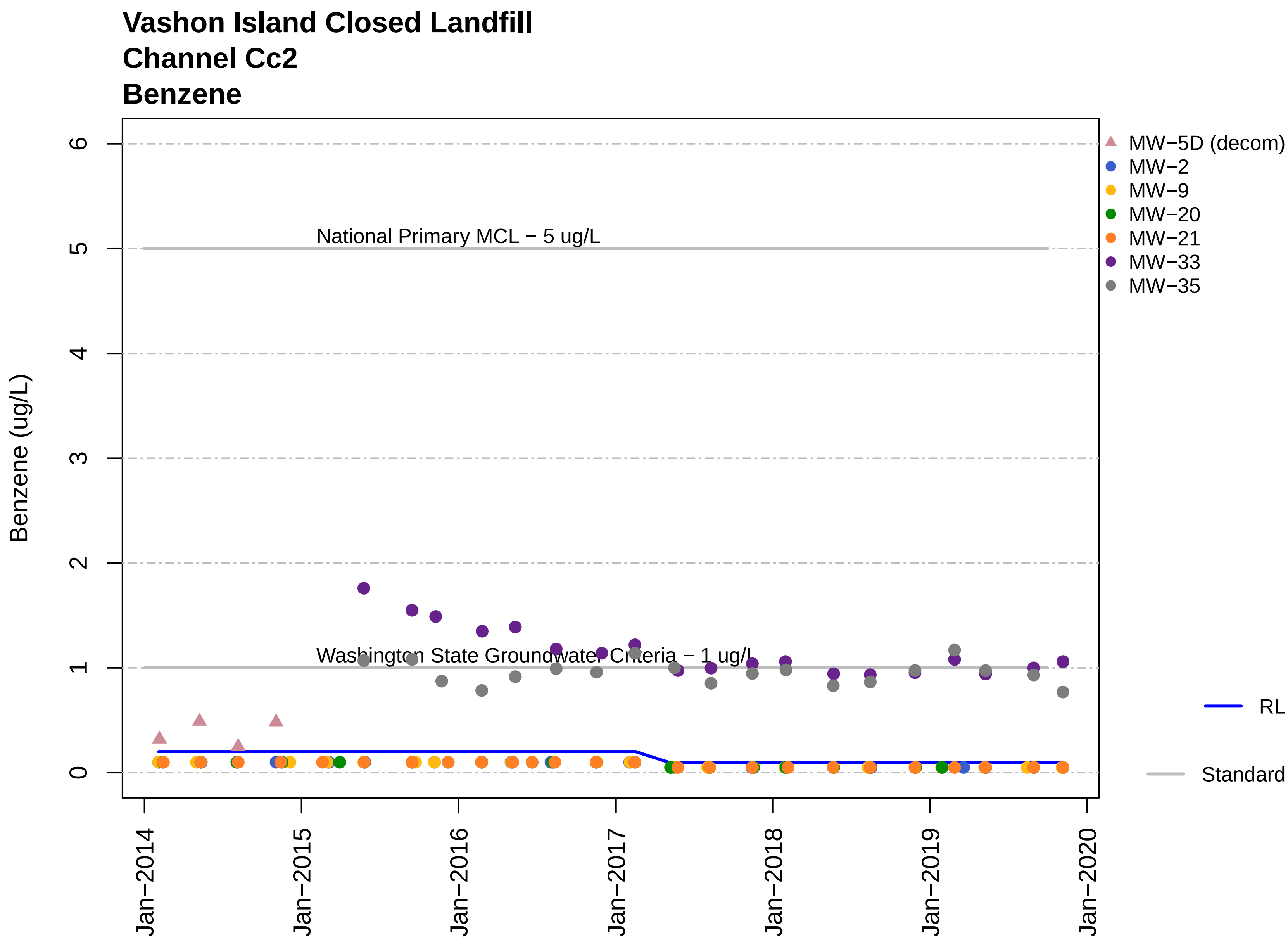
Vashon Island Closed Landfill
Channel Cc2
1,2−Dichloropropane
1,2−Dichloropropane (ug/L)
0
2
4
6
8
10
12
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.5 µg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

Vashon Island Closed Landfill
Channel Cc2
1,2−Dichloropropane

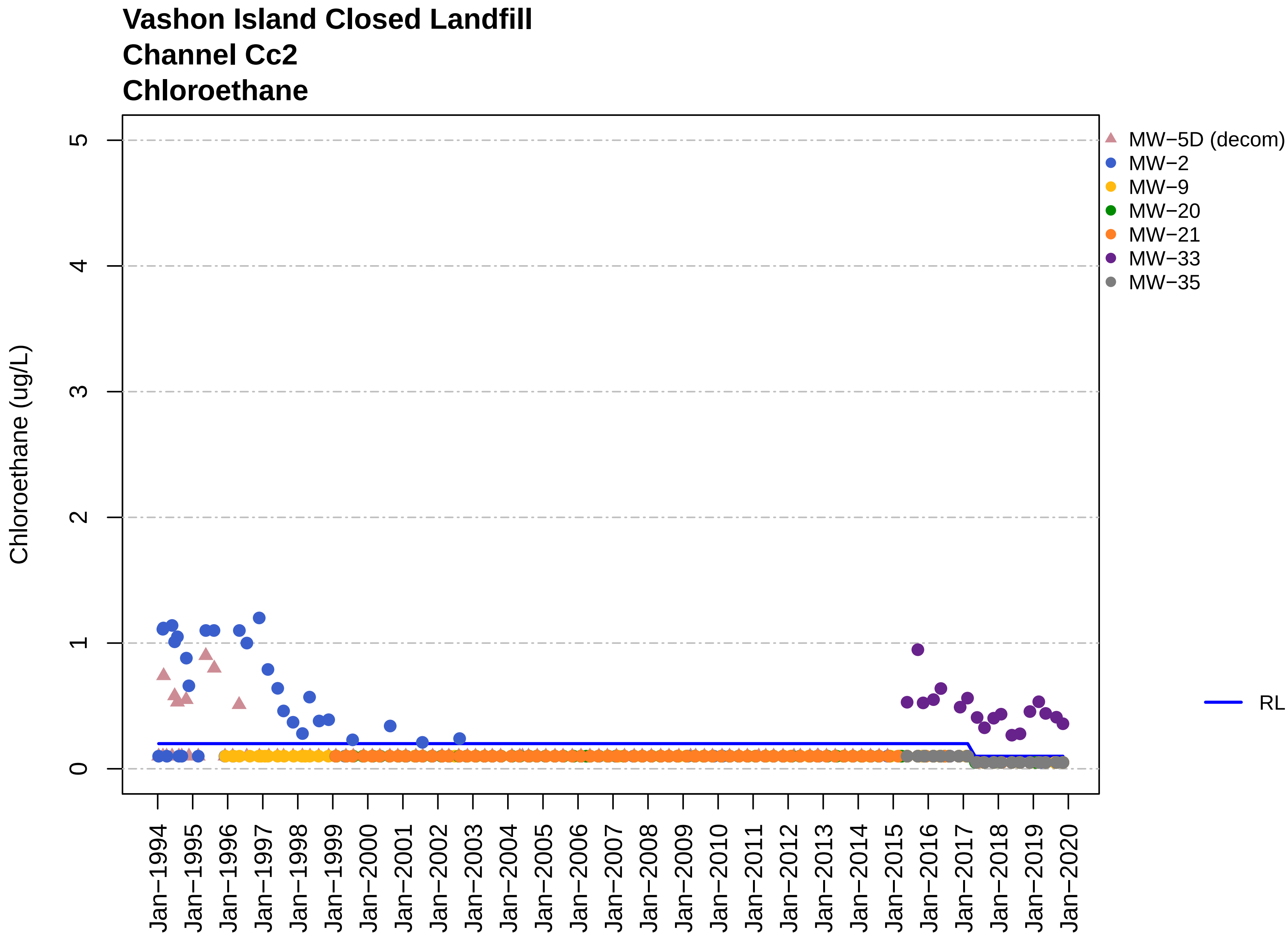




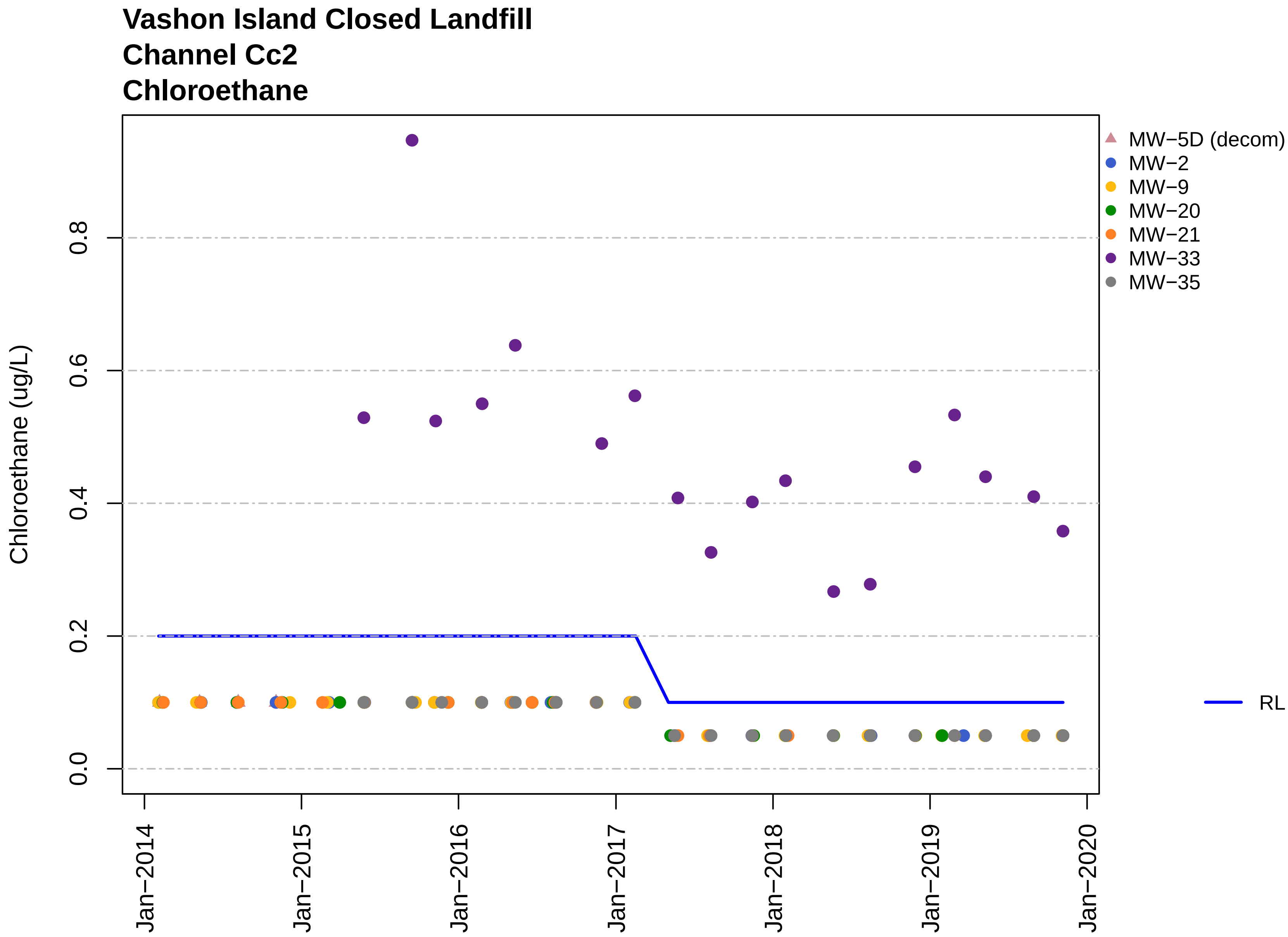
Vashon Island Closed Landfill
Channel Cc2
Benzene
Benzene (ug/L)
National Primary MCL − 5 ug/L
Washington State Groundwater Criteria − 1 ug/L
0
1
2
3
4
5
6
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard



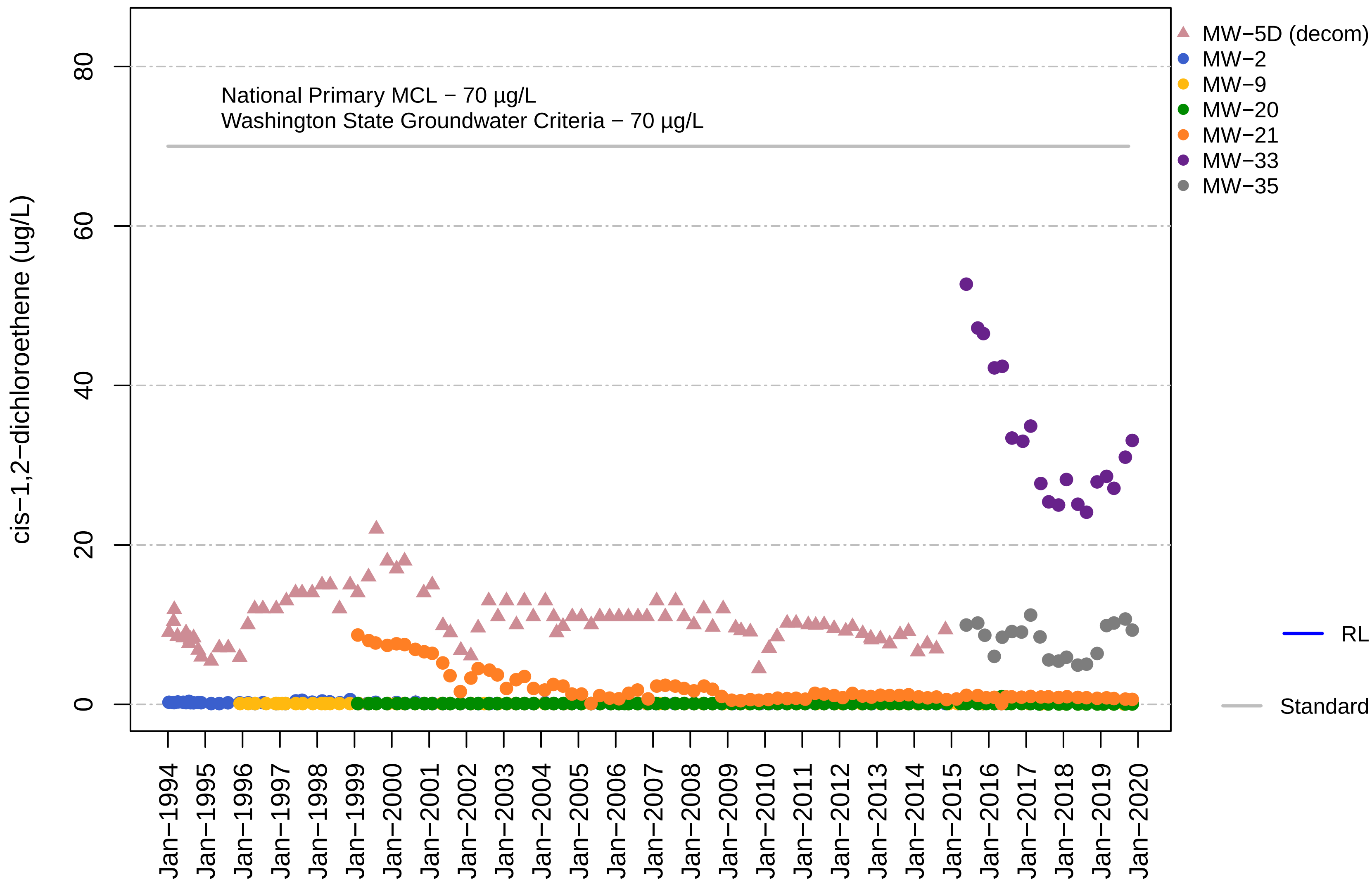
Vashon Island Closed Landfill
Channel Cc2
Benzene
Benzene (ug/L)
National Primary MCL − 5 ug/L
Washington State Groundwater Criteria − 1 ug/L
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard
0
1
2
3
4
5
6
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020



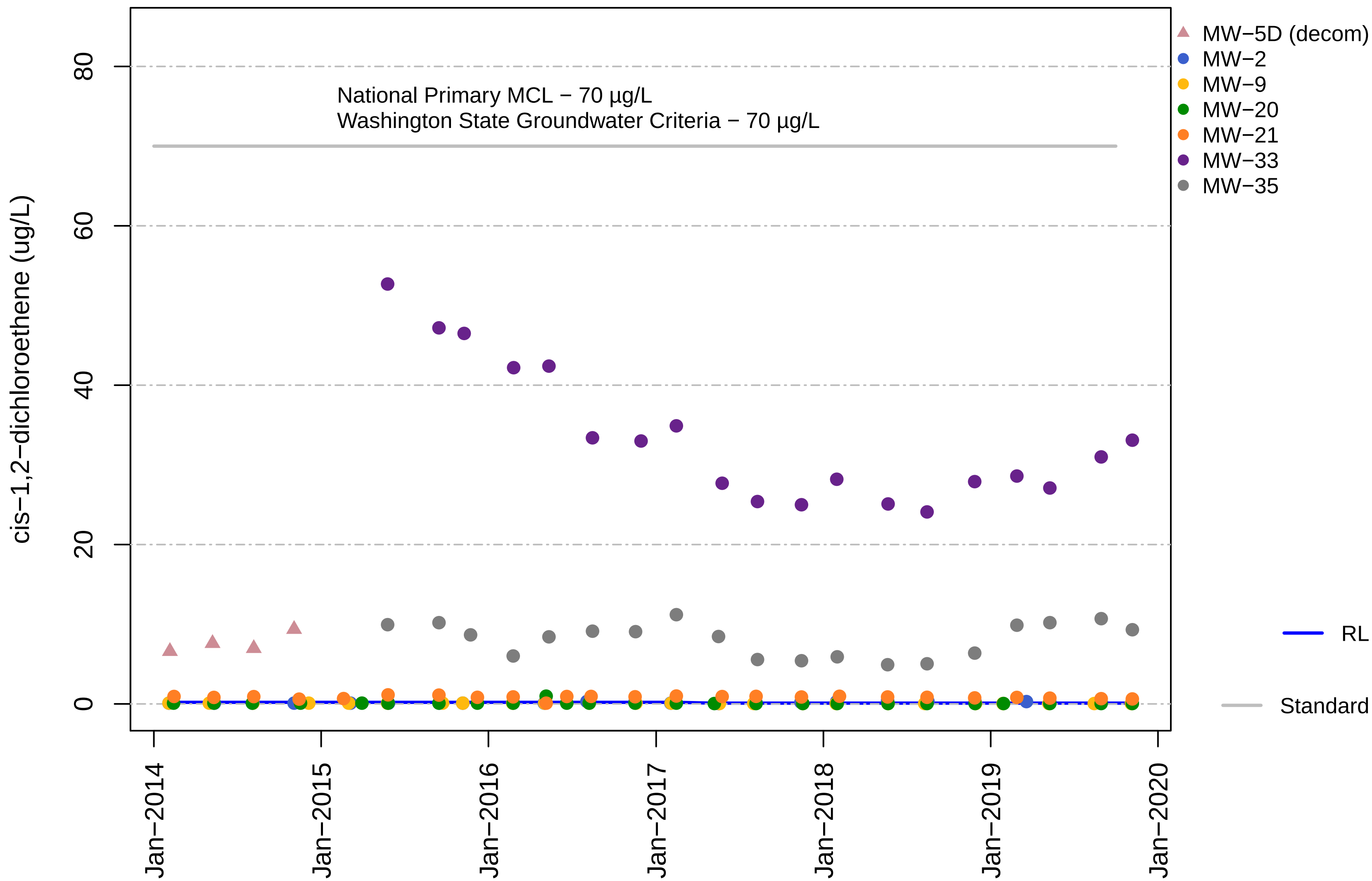
Vashon Island Closed Landfill
Channel Cc2
Chloroethane
Chloroethane (ug/L)
0
1
2
3
4
5
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

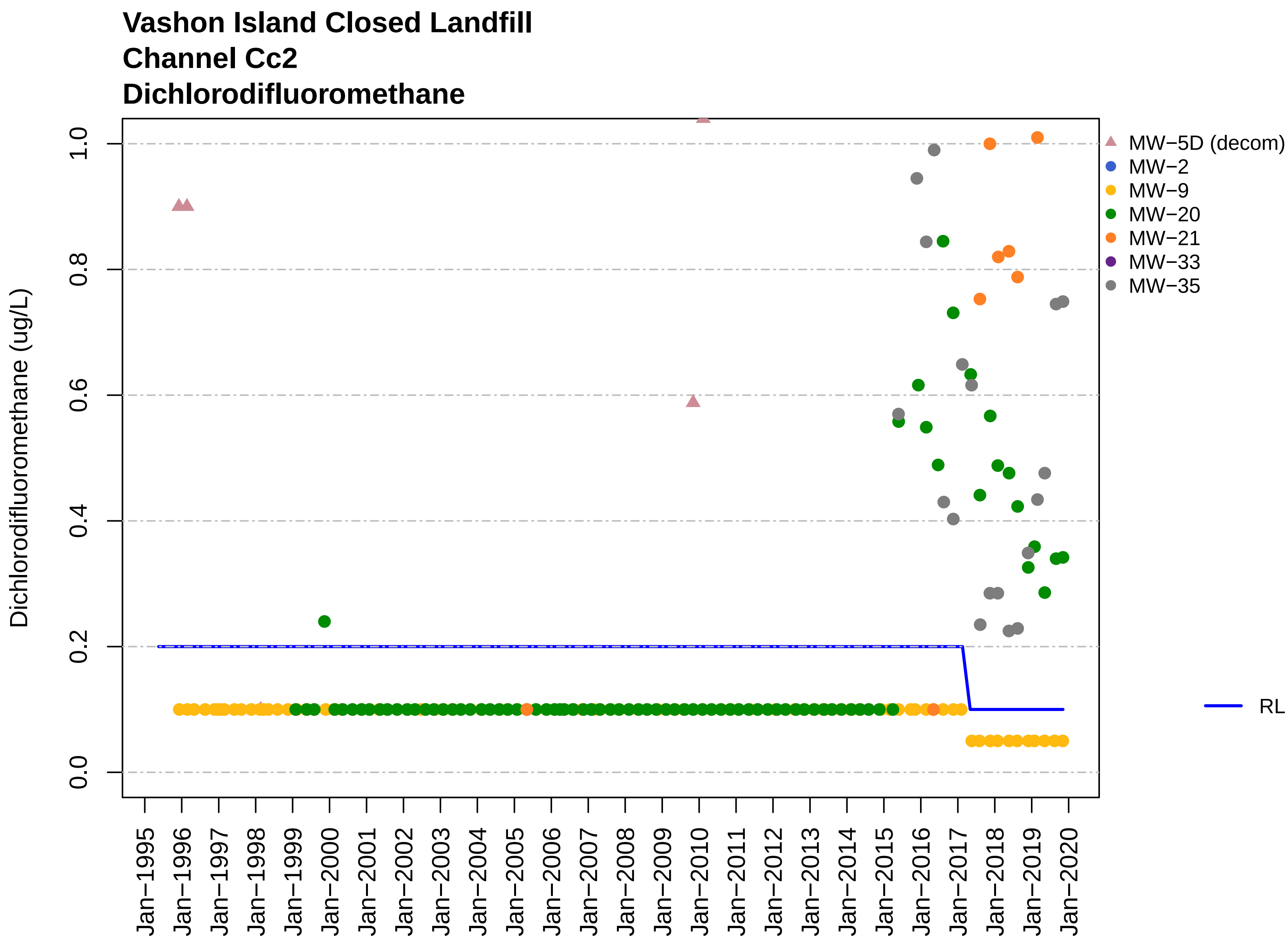

Vashon Island Closed Landfill
Channel Cc2
Chloroethane
Chloroethane (ug/L)
0.0
0.2
0.4
0.6
0.8
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL

Vashon Island Closed Landfill
Channel Cc2
cis−1,2−Dichloroethene

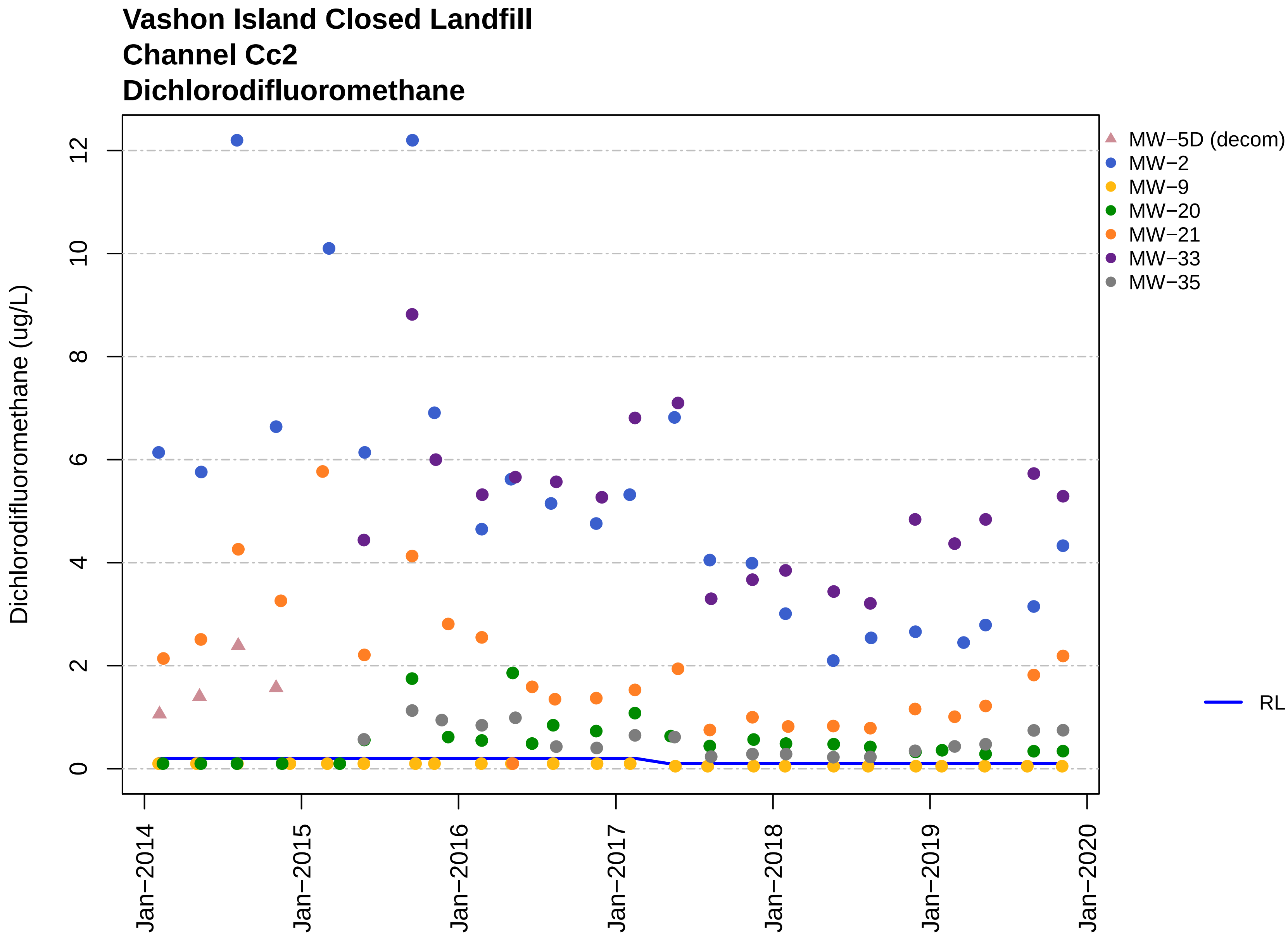


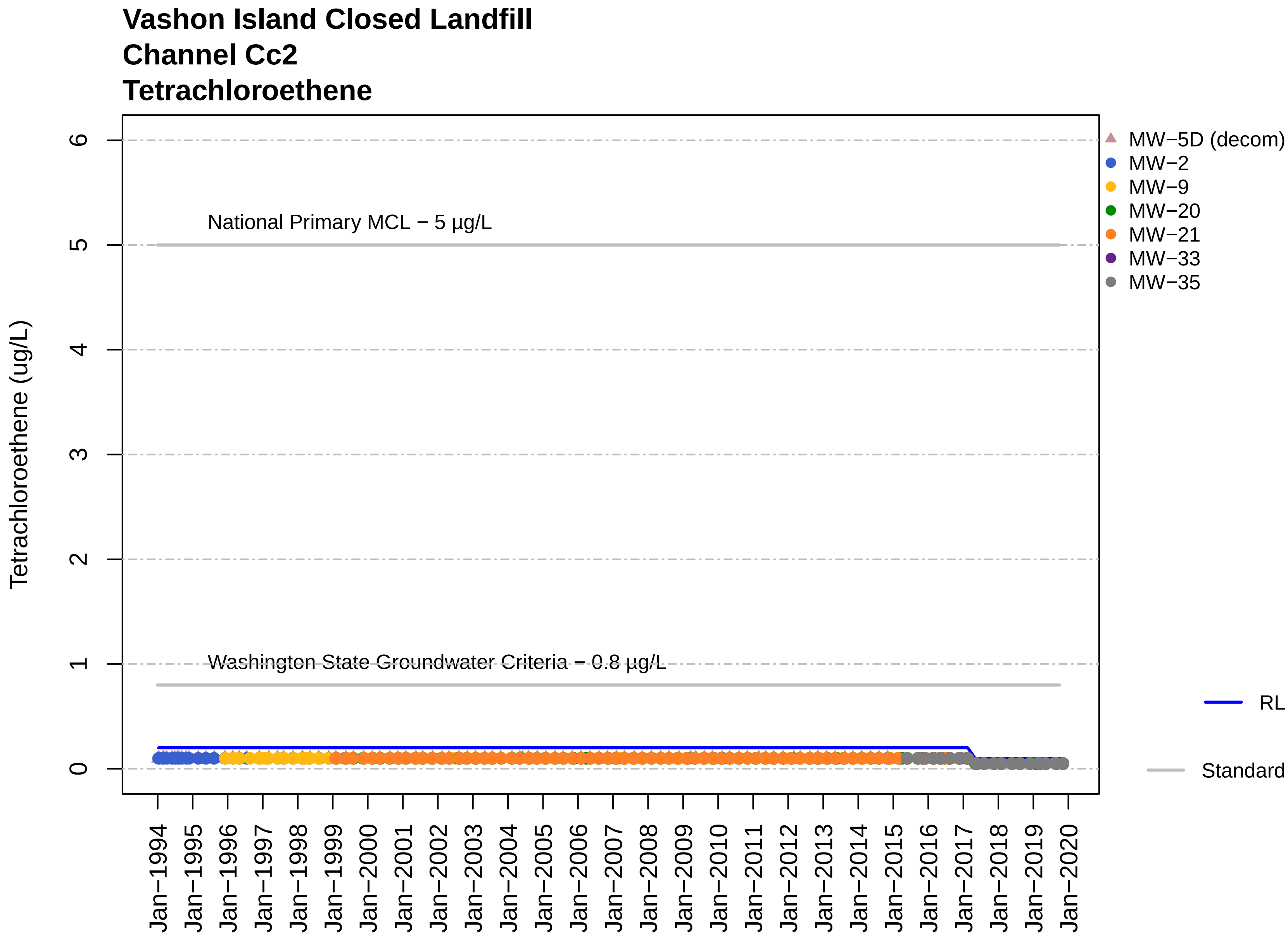
Vashon Island Closed Landfill
Channel Cc2
cis−1,2−Dichloroethene



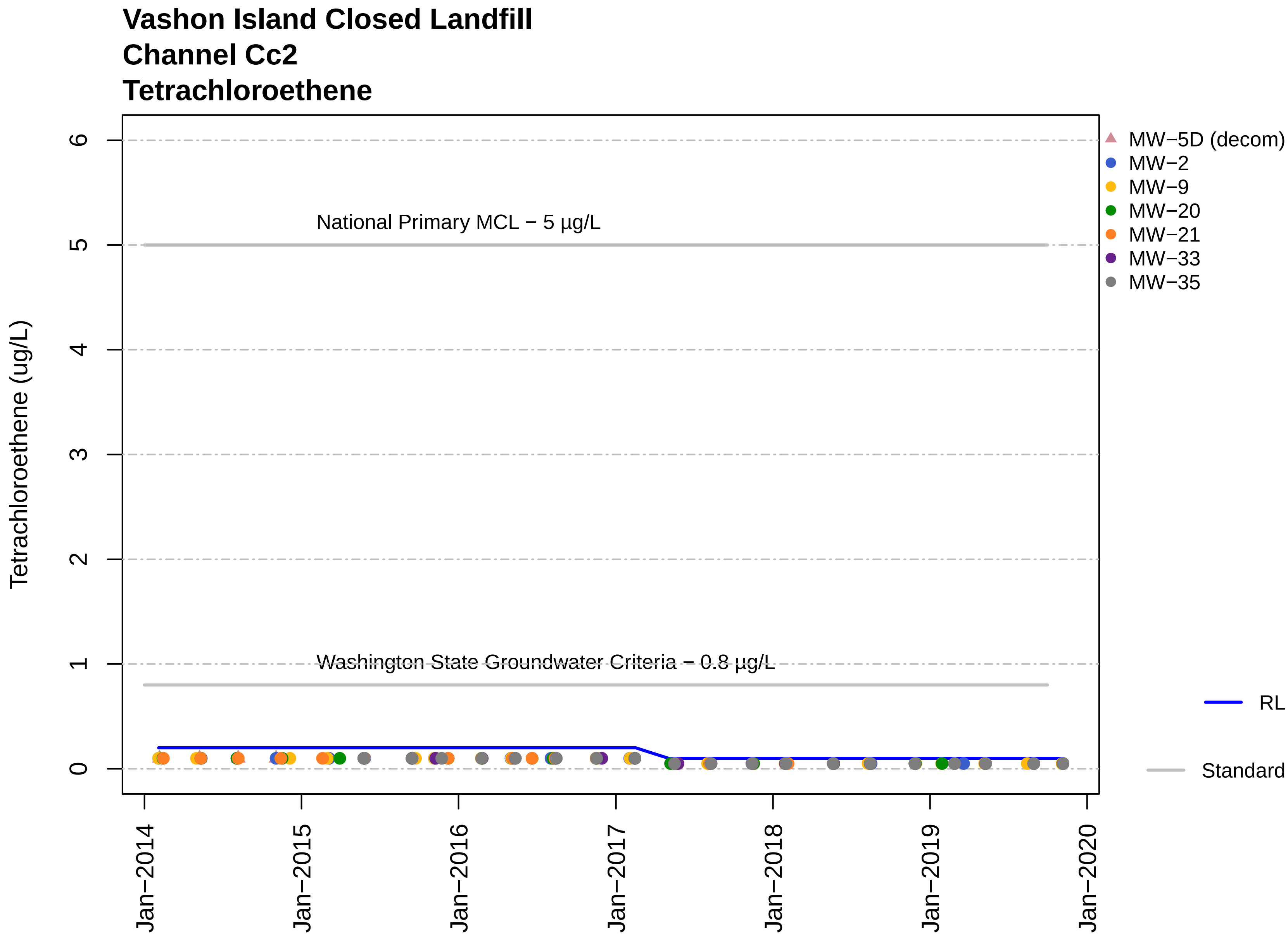


Vashon Island Closed Landfill
Channel Cc2
Dichlorodifluoromethane
Dichlorodifluoromethane (ug/L)
0.0
0.2
0.4
0.6
0.8
1.0
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL

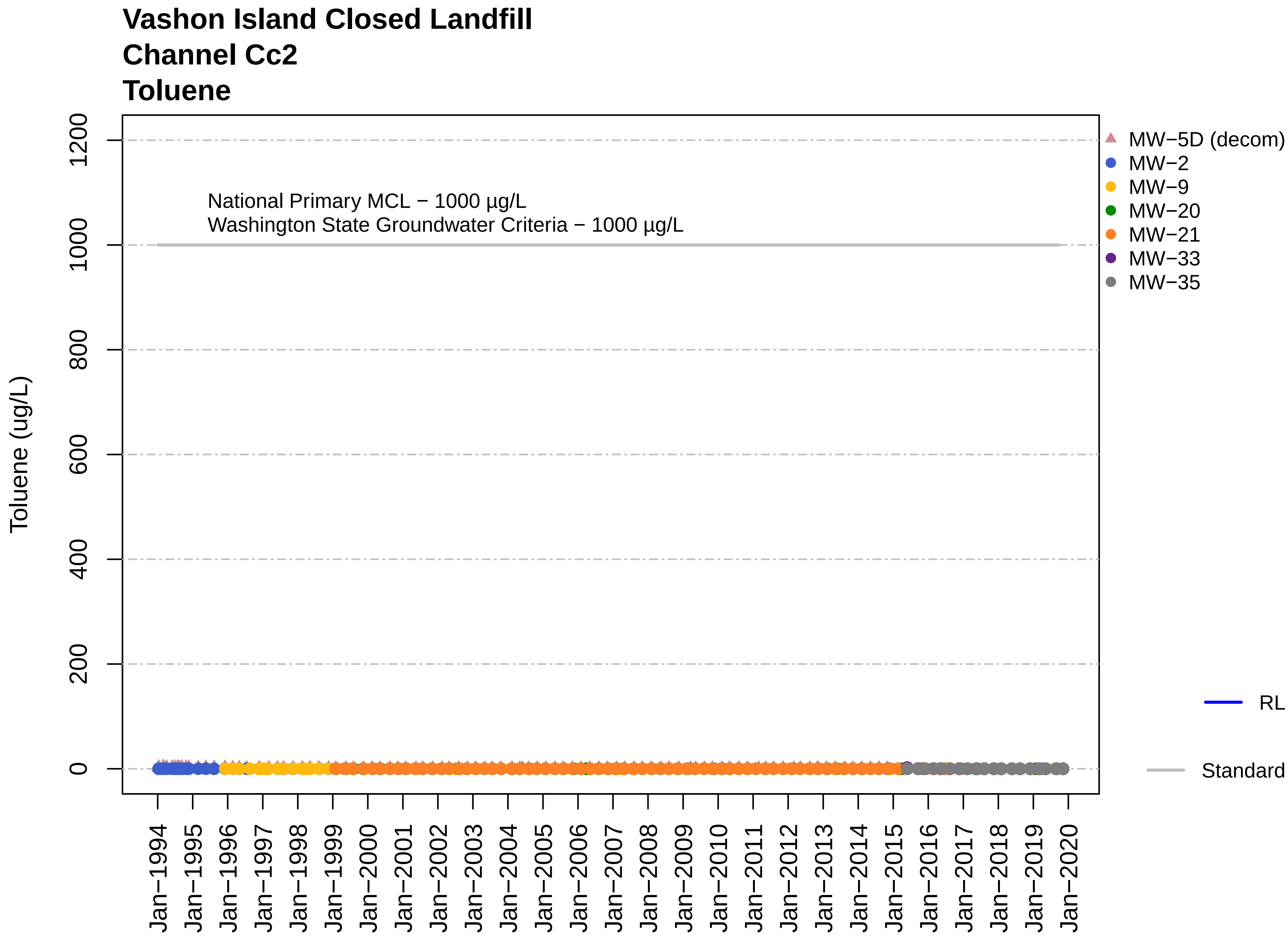

Vashon Island Closed Landfill
Channel Cc2
Dichlorodifluoromethane
Dichlorodifluoromethane (ug/L)
0
2
4
6
8
10
12
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL

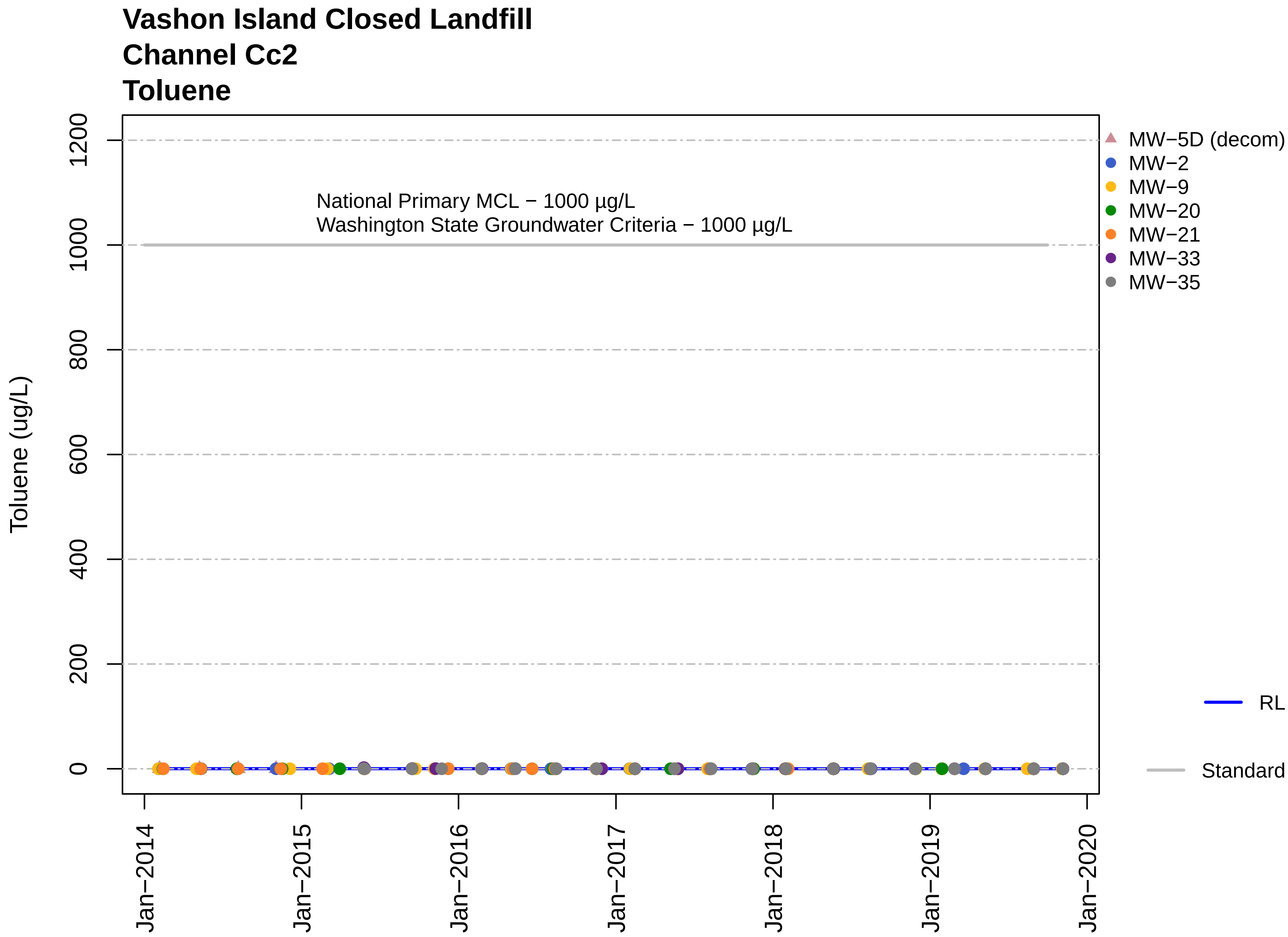


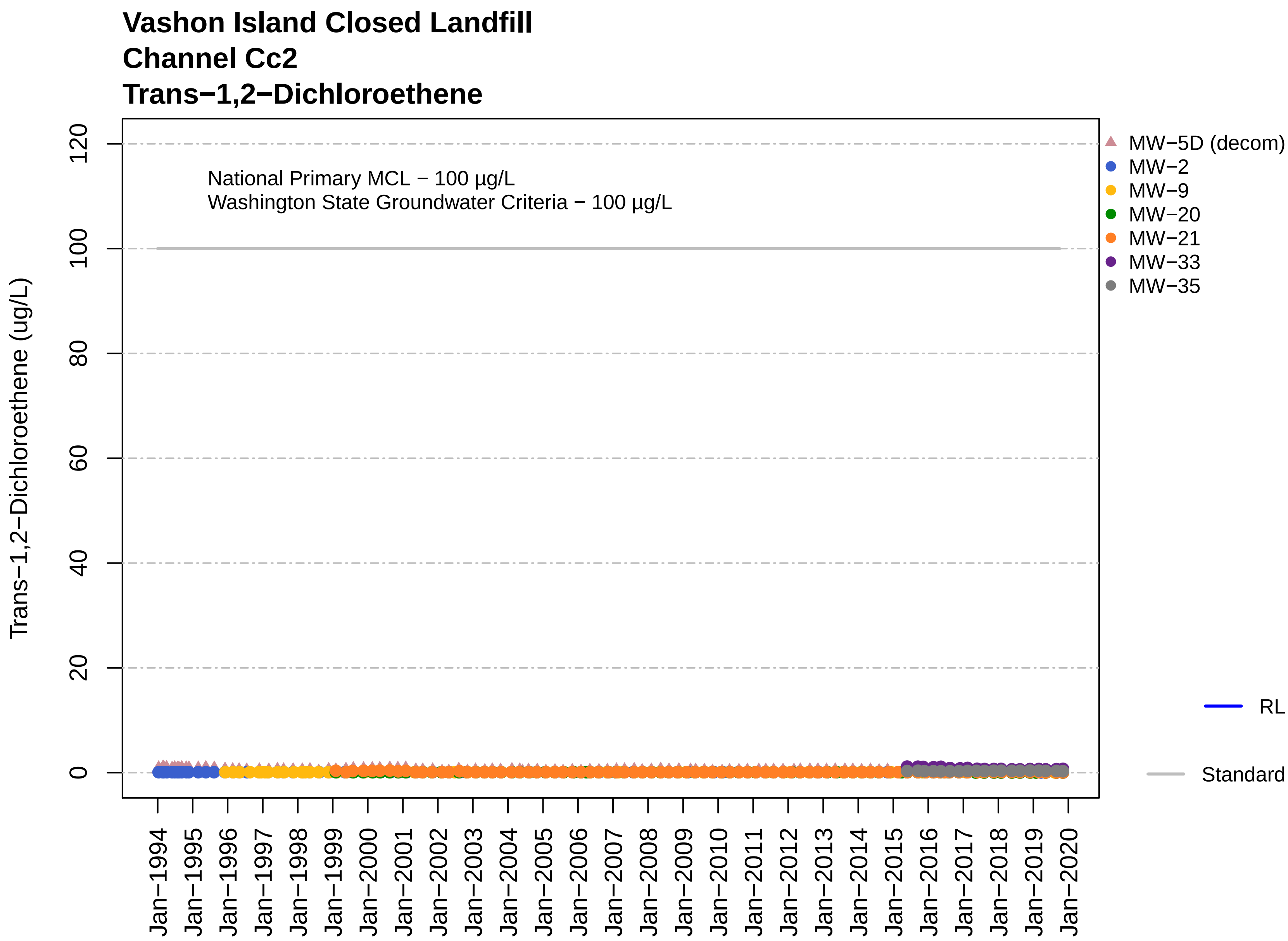
Vashon Island Closed Landfill
Channel Cc2
Tetrachloroethene
Tetrachloroethene (ug/L)
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.8 µg/L
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard
0
1
2
3
4
5
6
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

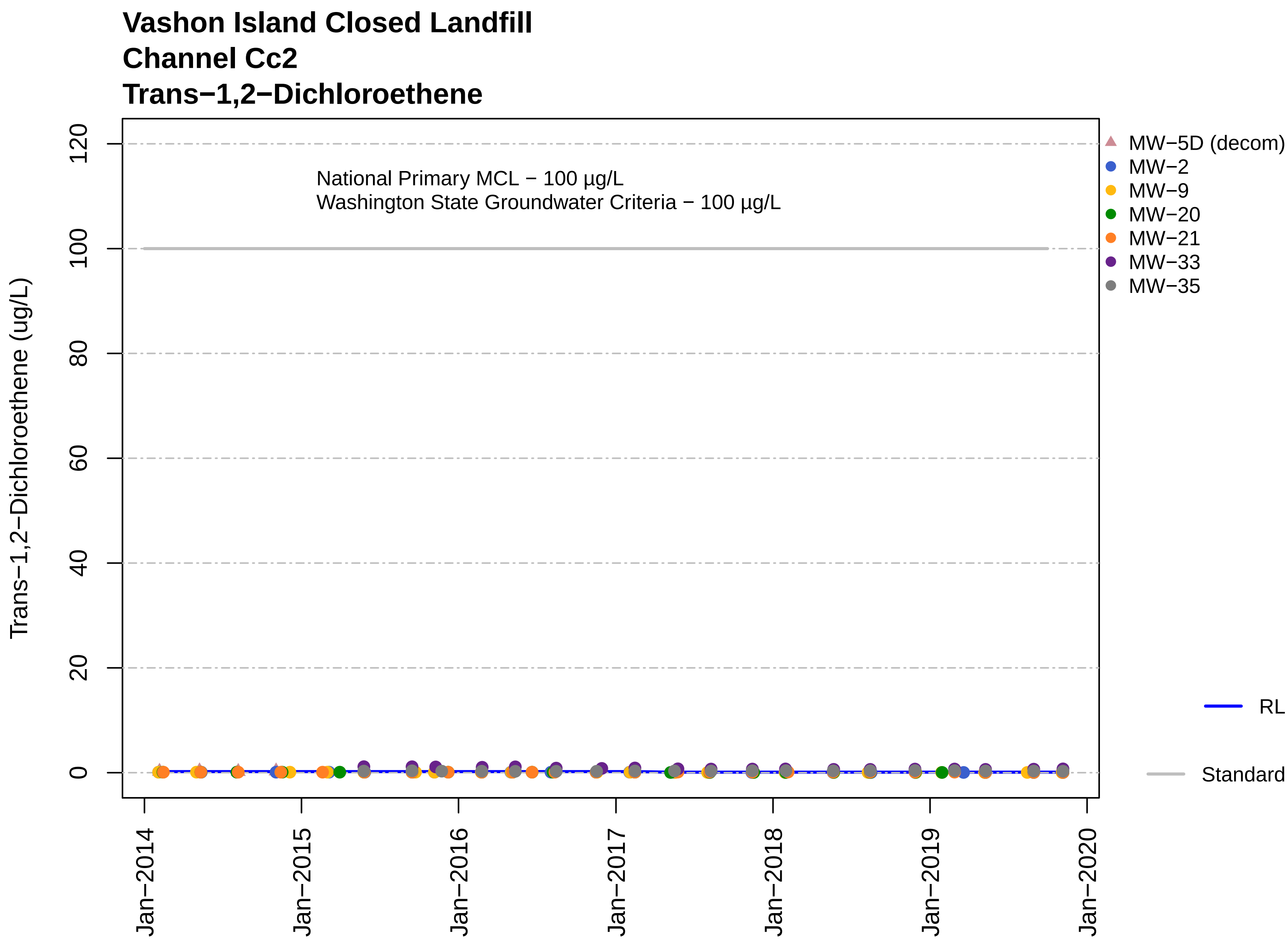


Vashon Island Closed Landfill
Channel Cc2
Tetrachloroethene
Tetrachloroethene (ug/L)
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.8 µg/L
0
1
2
3
4
5
6
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

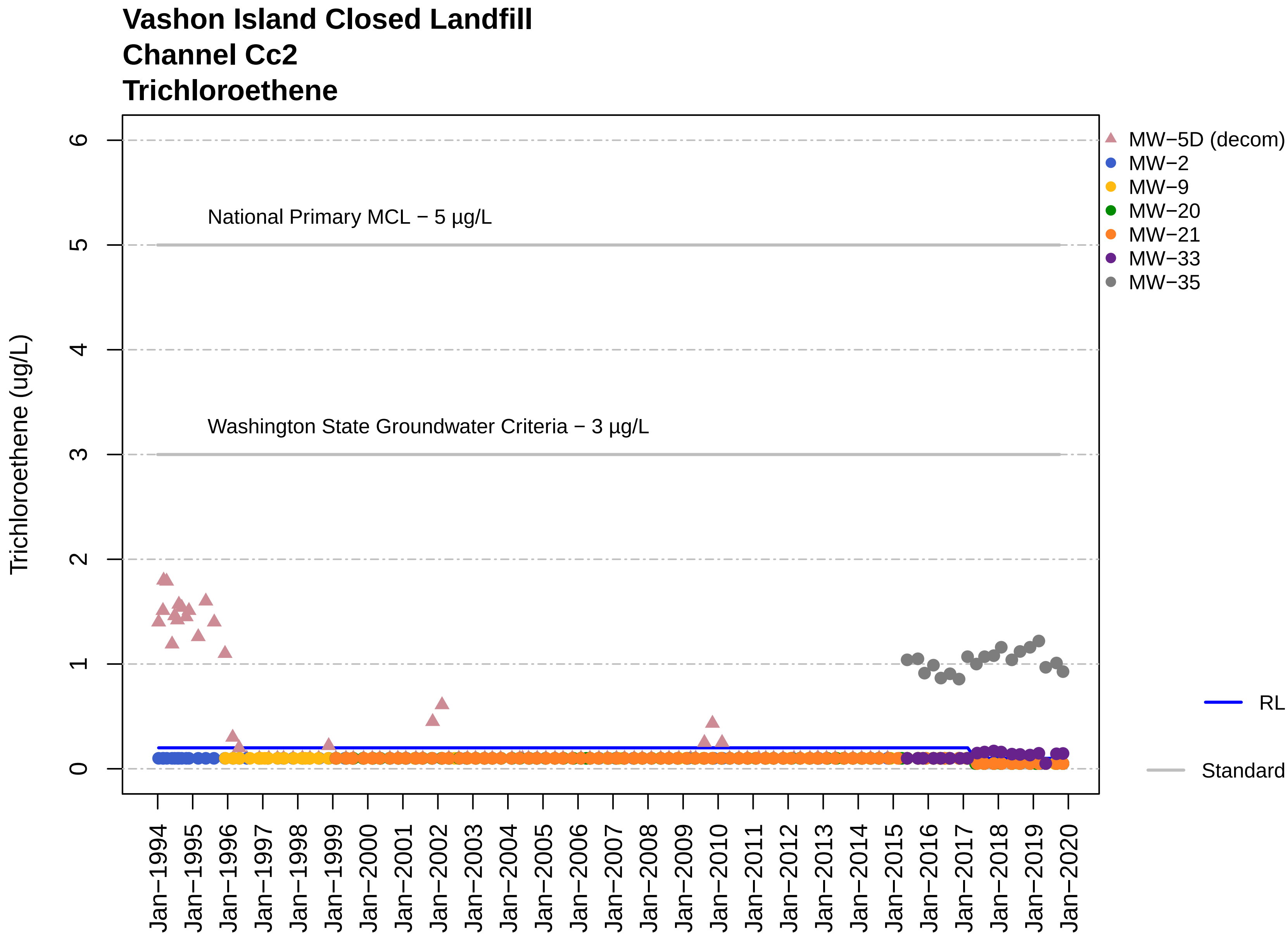

Vashon Island Closed Landfill
Channel Cc2
Toluene
Toluene (ug/L)
National Primary MCL − 1000 µg/L
Washington State Groundwater Criteria − 1000 µg/L
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard
0
200
400
600
800
1000
1200
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020


Vashon Island Closed Landfill
Channel Cc2
Toluene
Toluene (ug/L)
0
200
400
600
800
1000
1200
National Primary MCL − 1000 µg/L
Washington State Groundwater Criteria − 1000 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

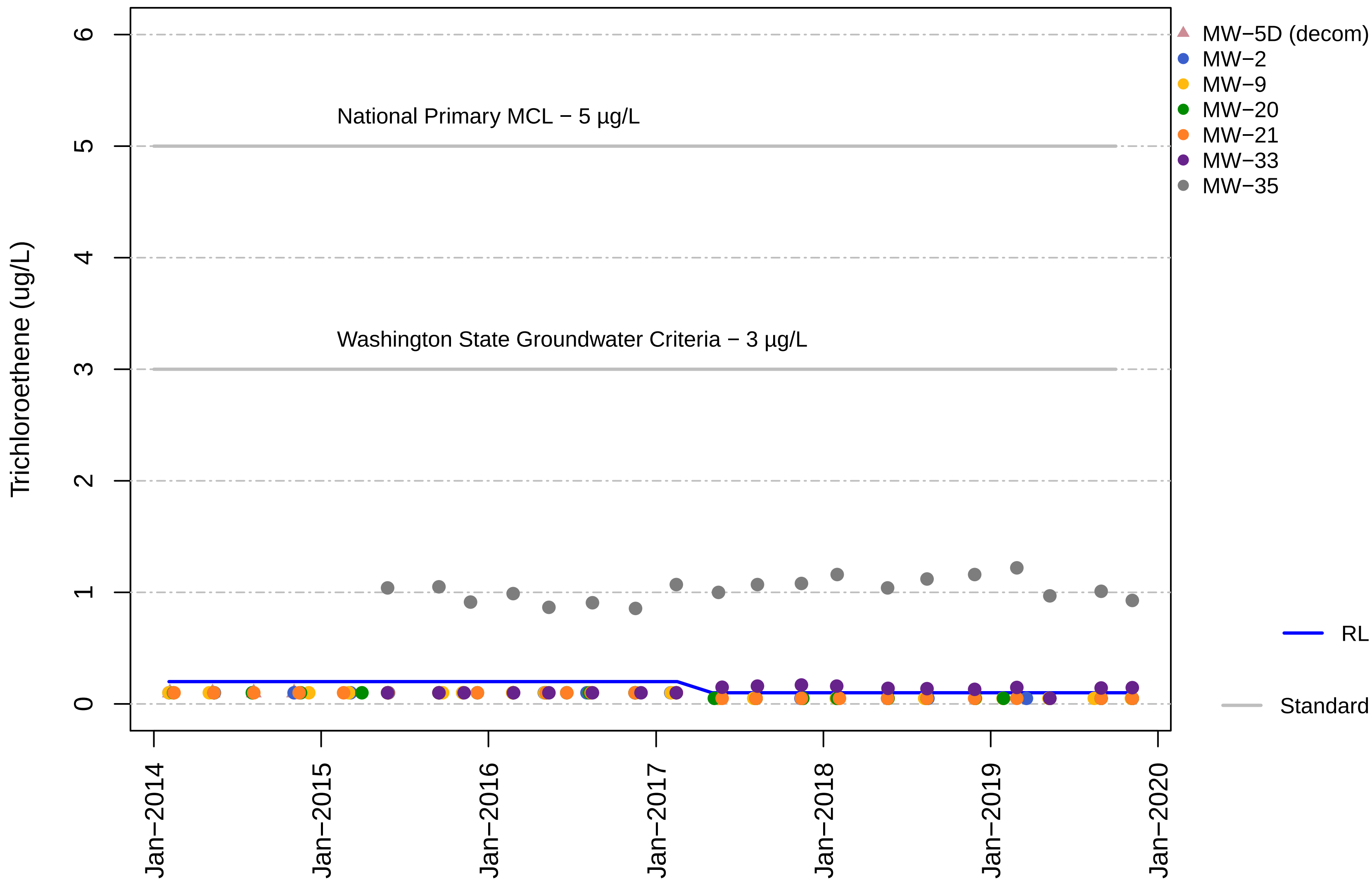

Vashon Island Closed Landfill
Channel Cc2
Trans−1,2−Dichloroethene
National Primary MCL − 100 µg/L
Washington State Groundwater Criteria − 100 µg/L
Trans−1,2−Dichloroethene (ug/L)
0
20
40
60
80
100
120
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

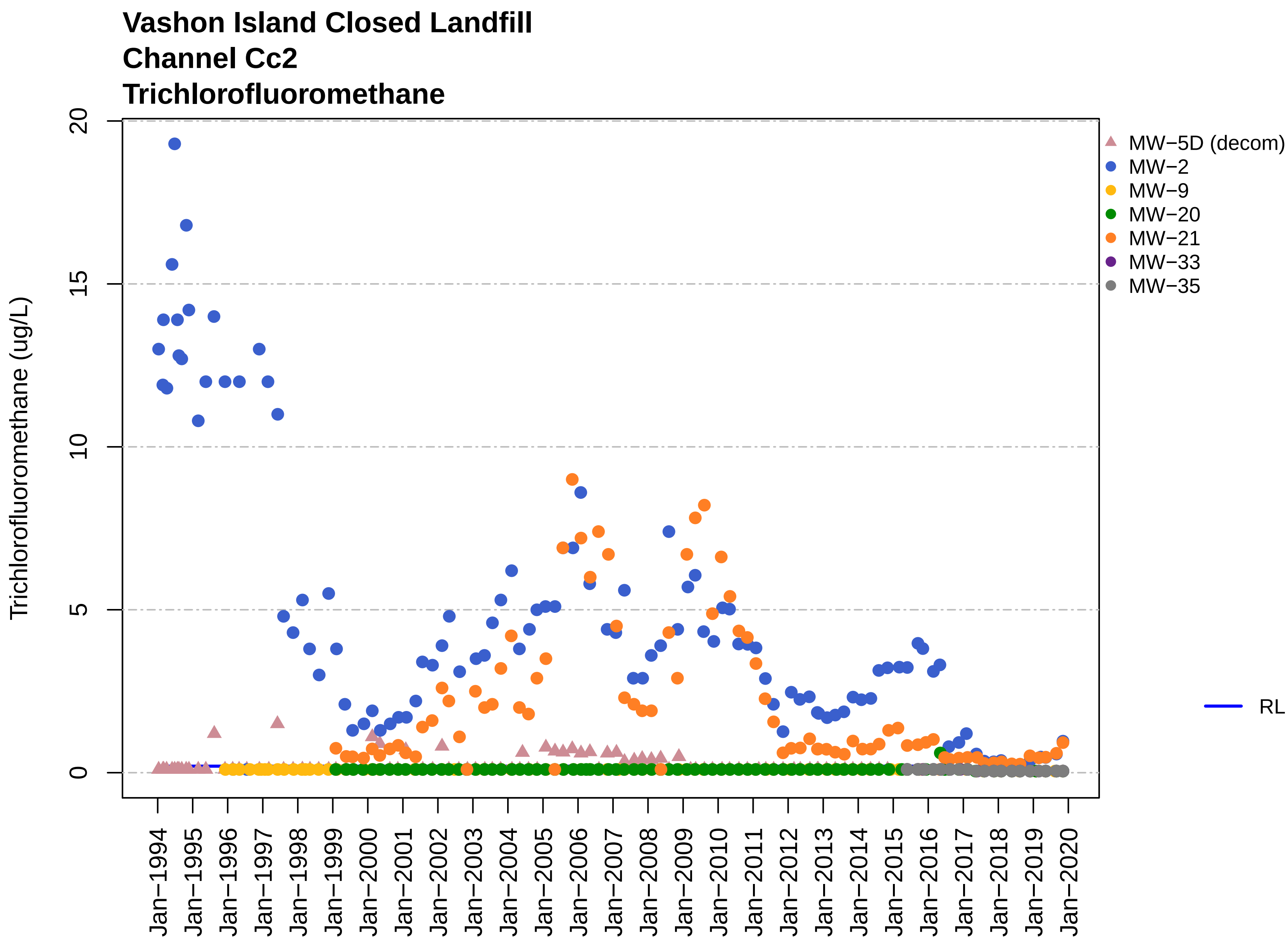


Vashon Island Closed Landfill
Channel Cc2
Trans−1,2−Dichloroethene
National Primary MCL − 100 µg/L
Washington State Groundwater Criteria − 100 µg/L
Trans−1,2−Dichloroethene (ug/L)
0
20
40
60
80
100
120
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

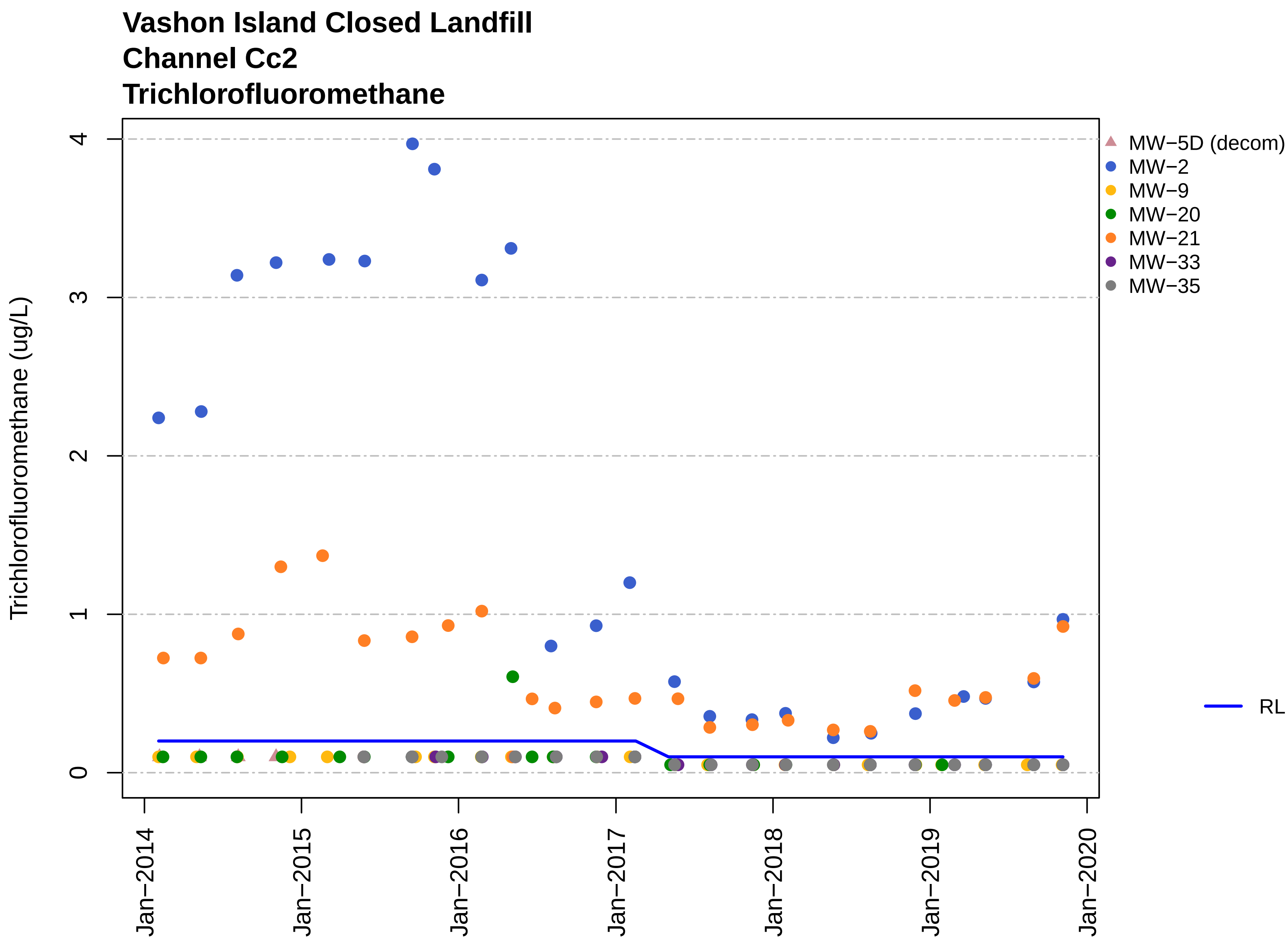

Vashon Island Closed Landfill
Channel Cc2
Trichloroethene
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 3 µg/L
Trichloroethene (ug/L)
0
1
2
3
4
5
6
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

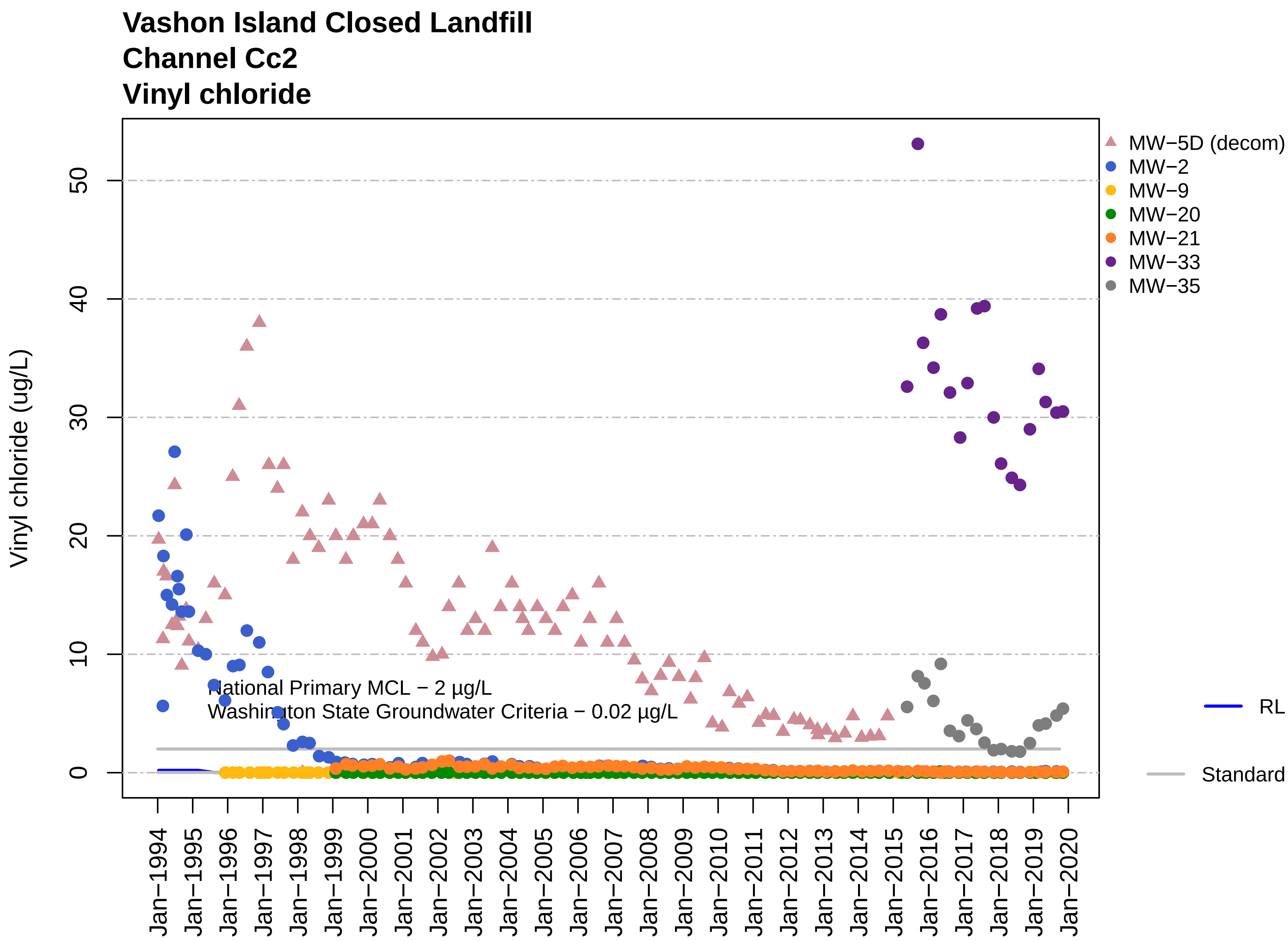
Vashon Island Closed Landfill
Channel Cc2
Trichloroethene



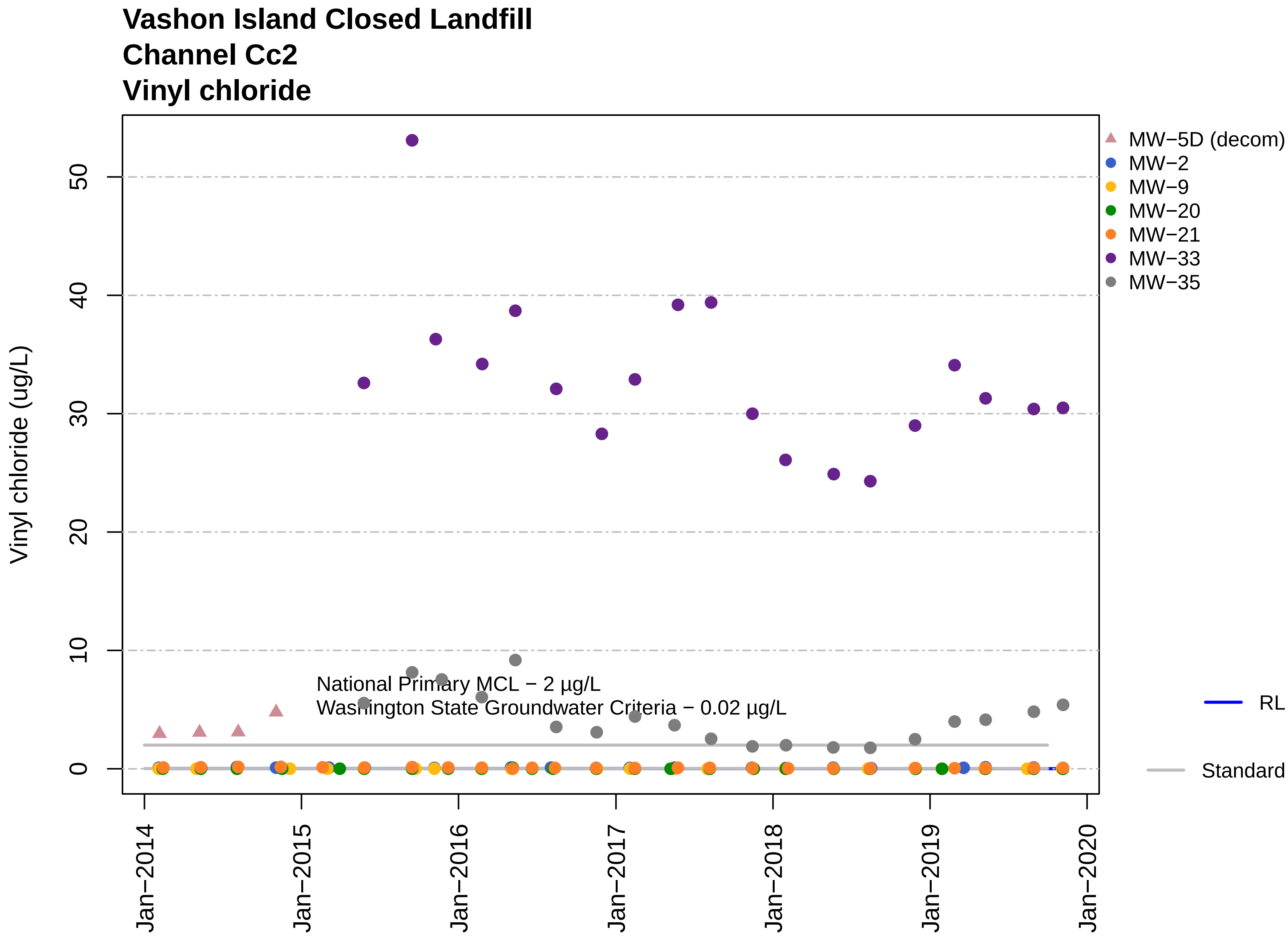


Vashon Island Closed Landfill
Channel Cc2
Trichlorofluoromethane
Trichlorofluoromethane (ug/L)
0
5
10
15
20
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL


Vashon Island Closed Landfill
Channel Cc2
Trichlorofluoromethane
Trichlorofluoromethane (ug/L)
0
1
2
3
4
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL



Vashon Island Closed Landfill
Channel Cc2
Vinyl chloride
Vinyl chloride (ug/L)
0
10
20
30
40
50
National Primary MCL − 2 µg/L
Washington State Groundwater Criteria − 0.02 µg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

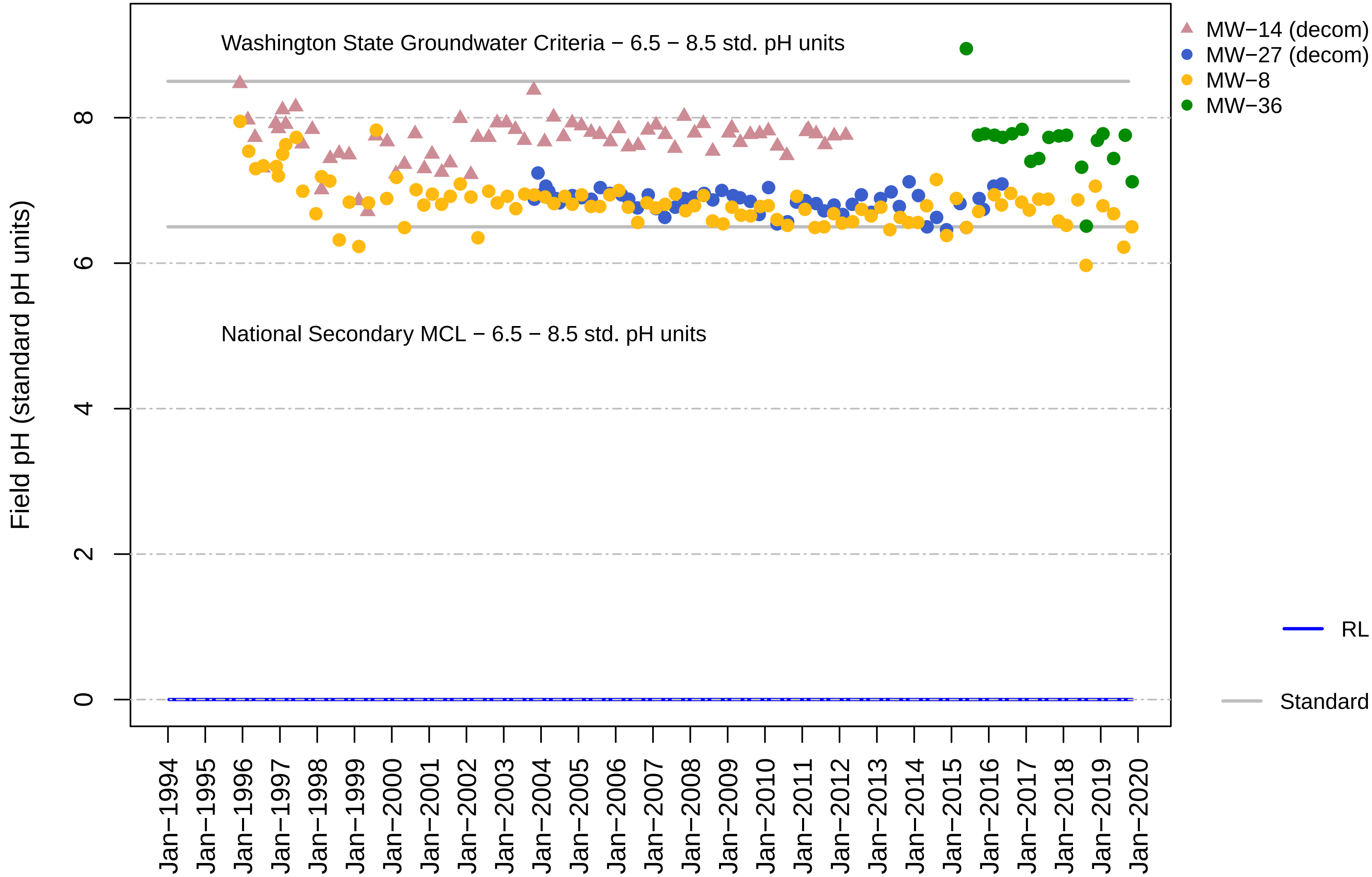


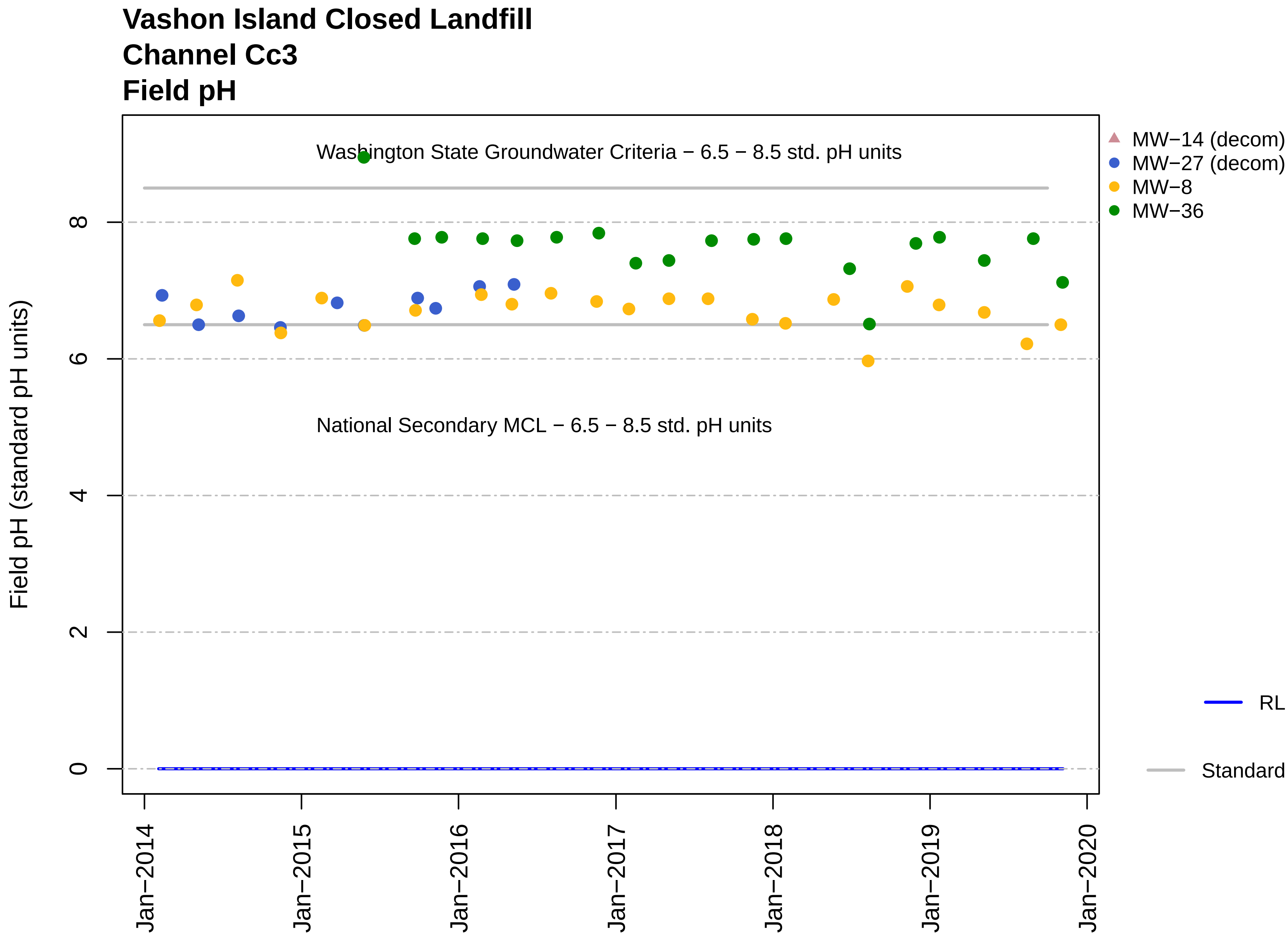
Vashon Island Closed Landfill
Channel Cc2
Vinyl chloride
Vinyl chloride (ug/L)
0
10
20
30
40
50
National Primary MCL − 2 µg/L
Washington State Groundwater Criteria − 0.02 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−5D (decom)
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
RL
Standard

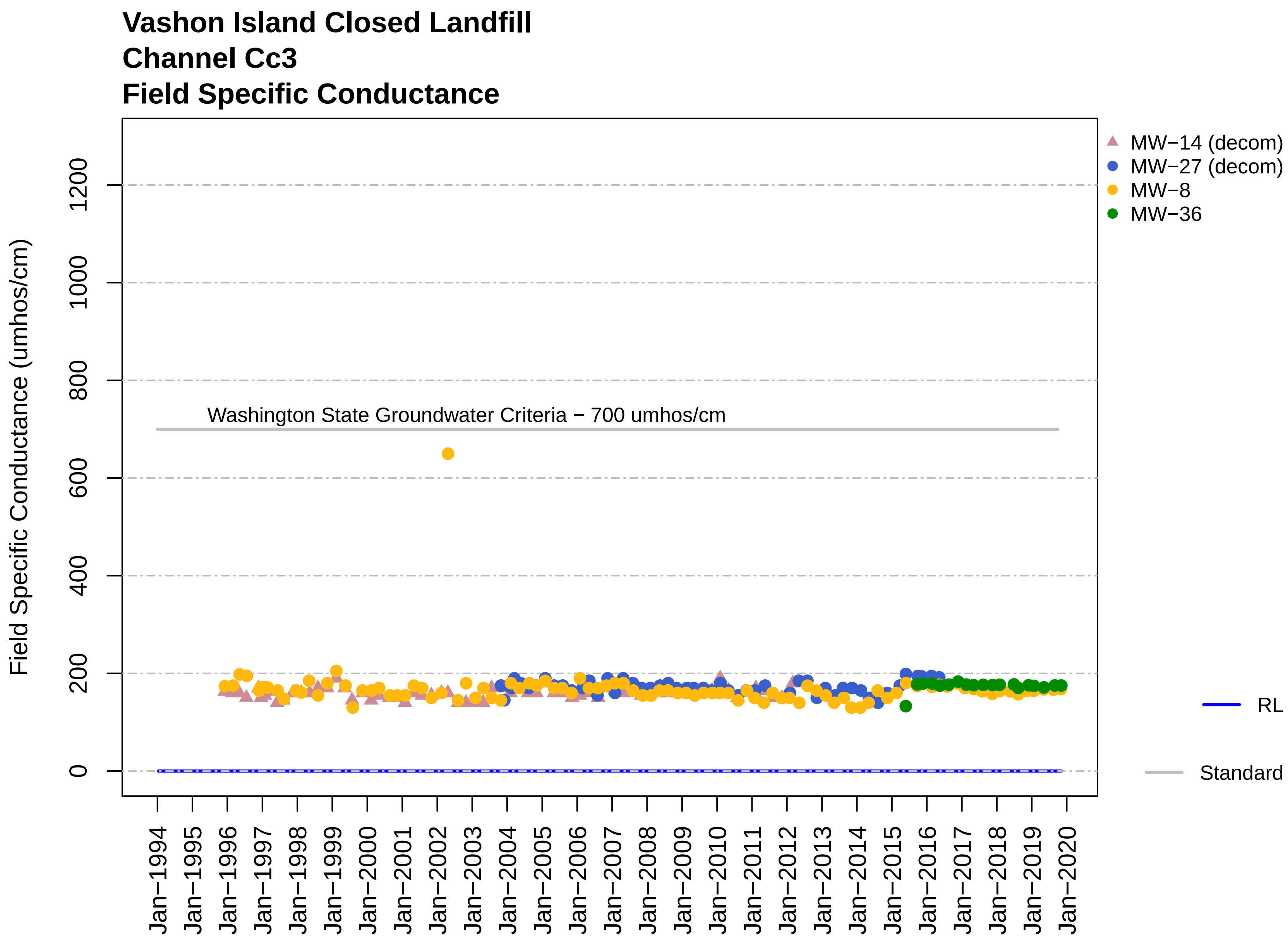
Appendix E

Time Concentration Plots for
Groundwater in Channel Cc3

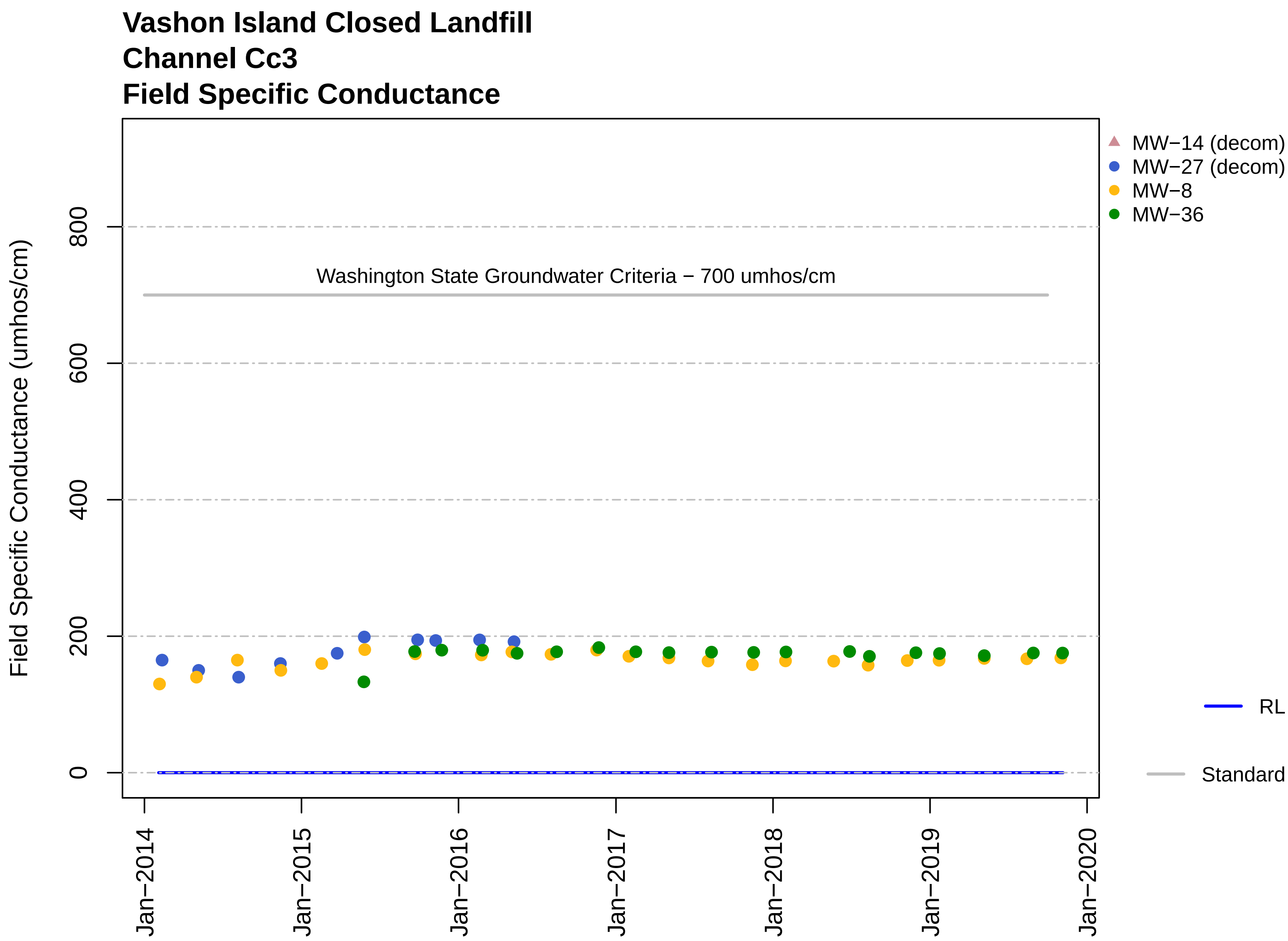
Vashon Island Closed Landfill
Channel Cc3
Field pH



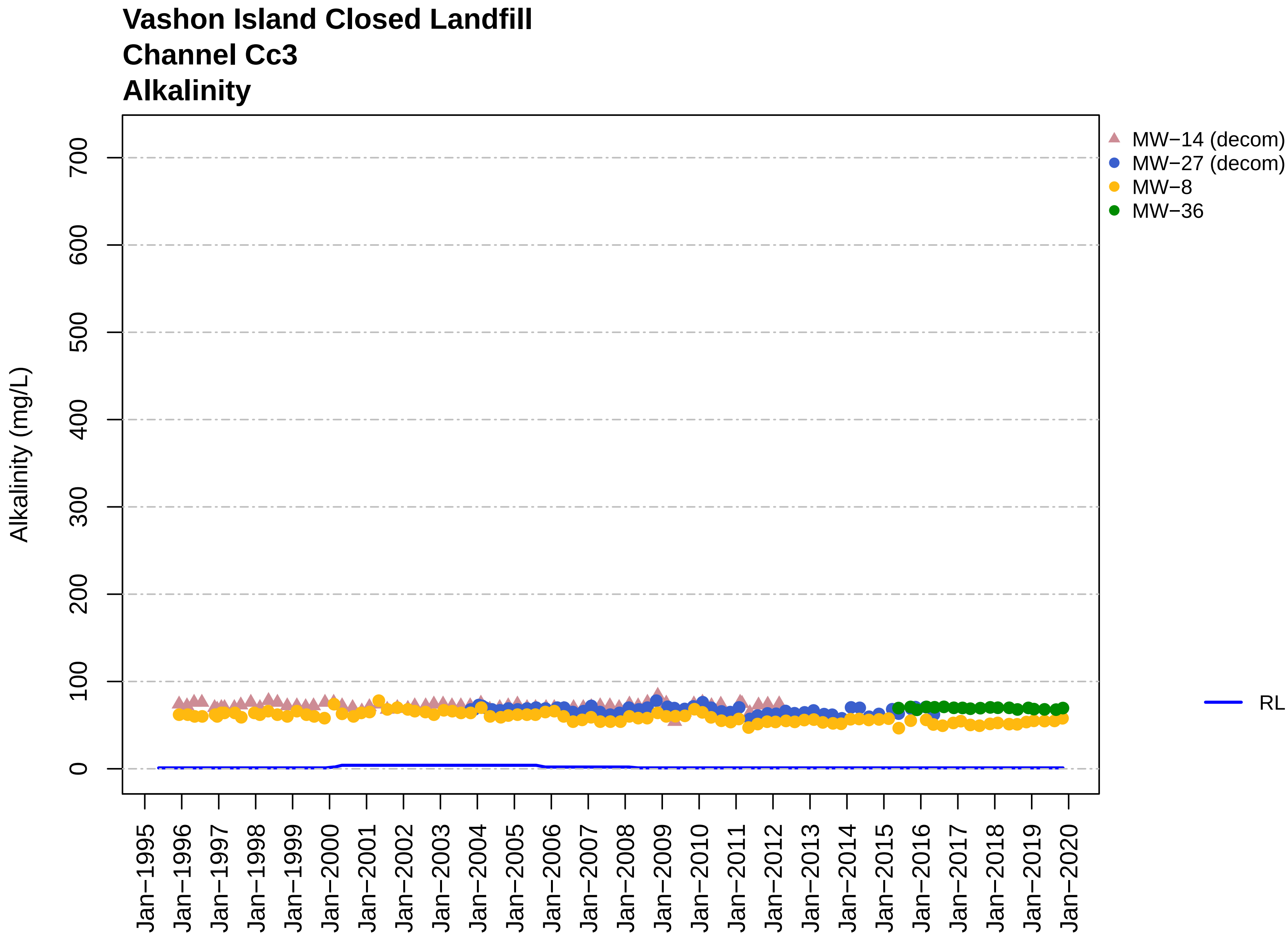

Vashon Island Closed Landfill
Channel Cc3
Field pH
Washington State Groundwater Criteria − 6.5 − 8.5 std. pH units
National Secondary MCL − 6.5 − 8.5 std. pH units
Field pH (standard pH units)
0
2
4
6
8
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

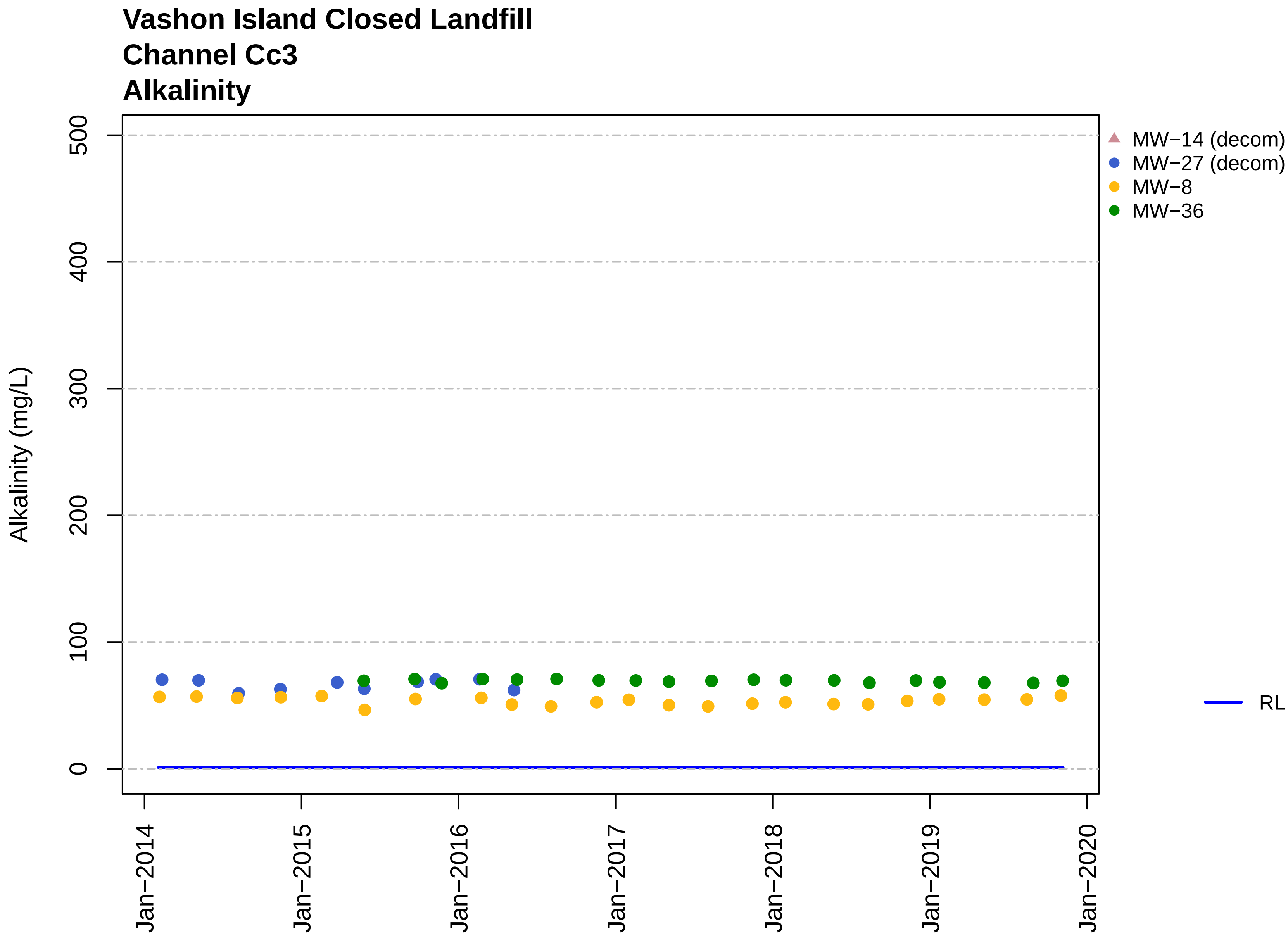


Vashon Island Closed Landfill
Channel Cc3
Field Specific Conductance
Field Specific Conductance (umhos/cm)
0
200
400
600
800
1000
1200
Washington State Groundwater Criteria − 700 umhos/cm
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

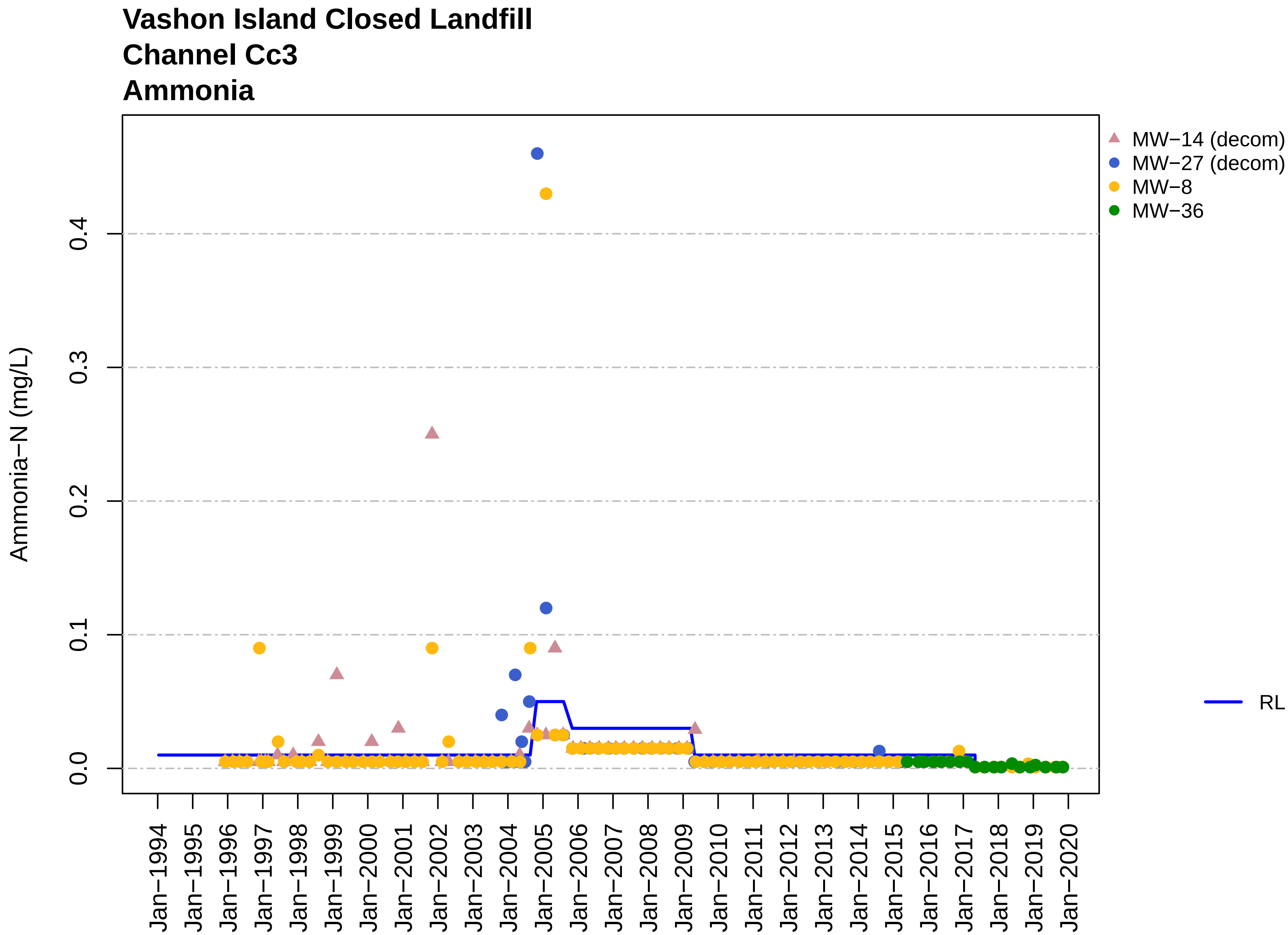


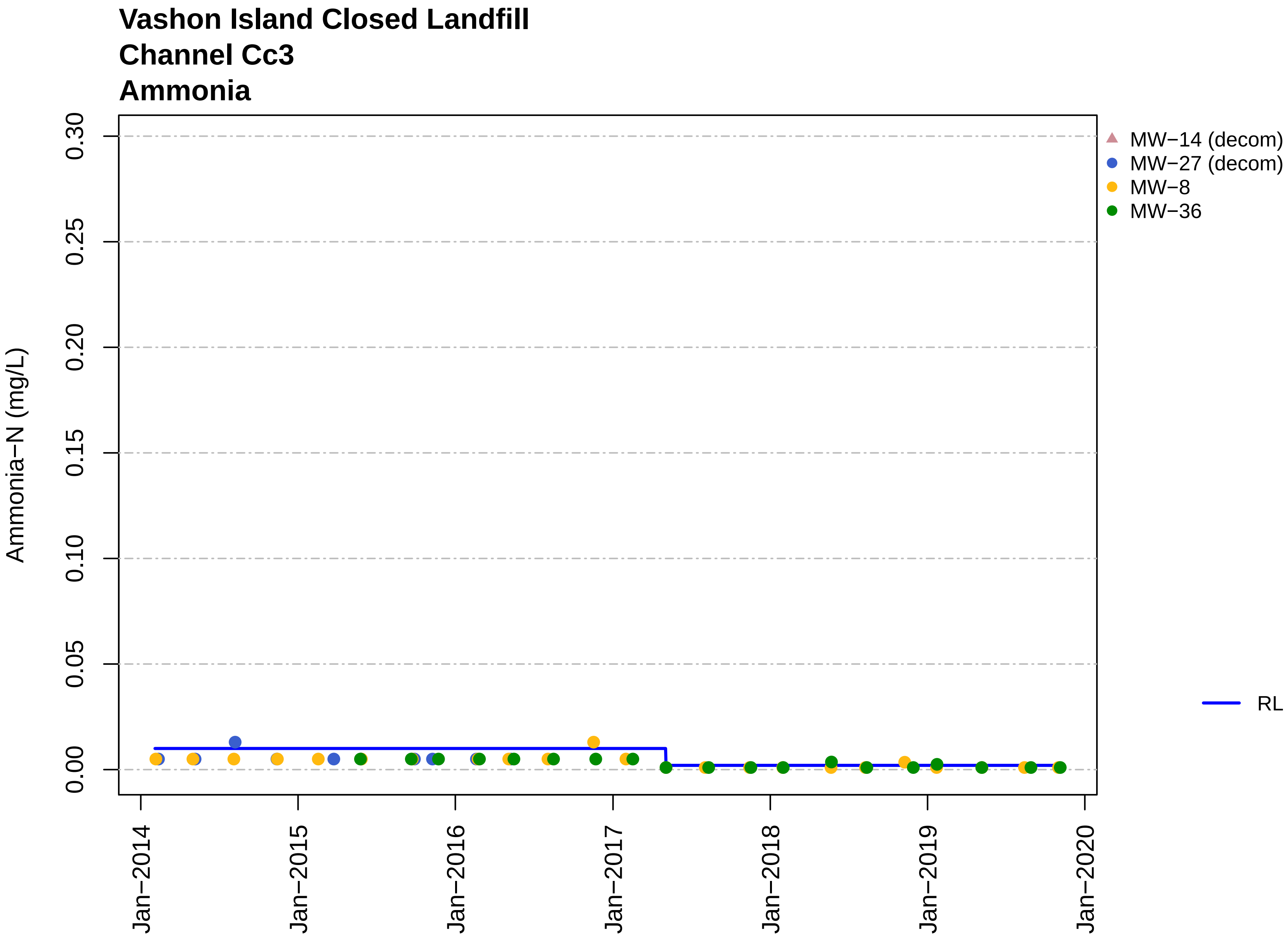
Vashon Island Closed Landfill
Channel Cc3
Field Specific Conductance
Field Specific Conductance (umhos/cm)
800
600
400
200
0
Washington State Groundwater Criteria − 700 umhos/cm
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

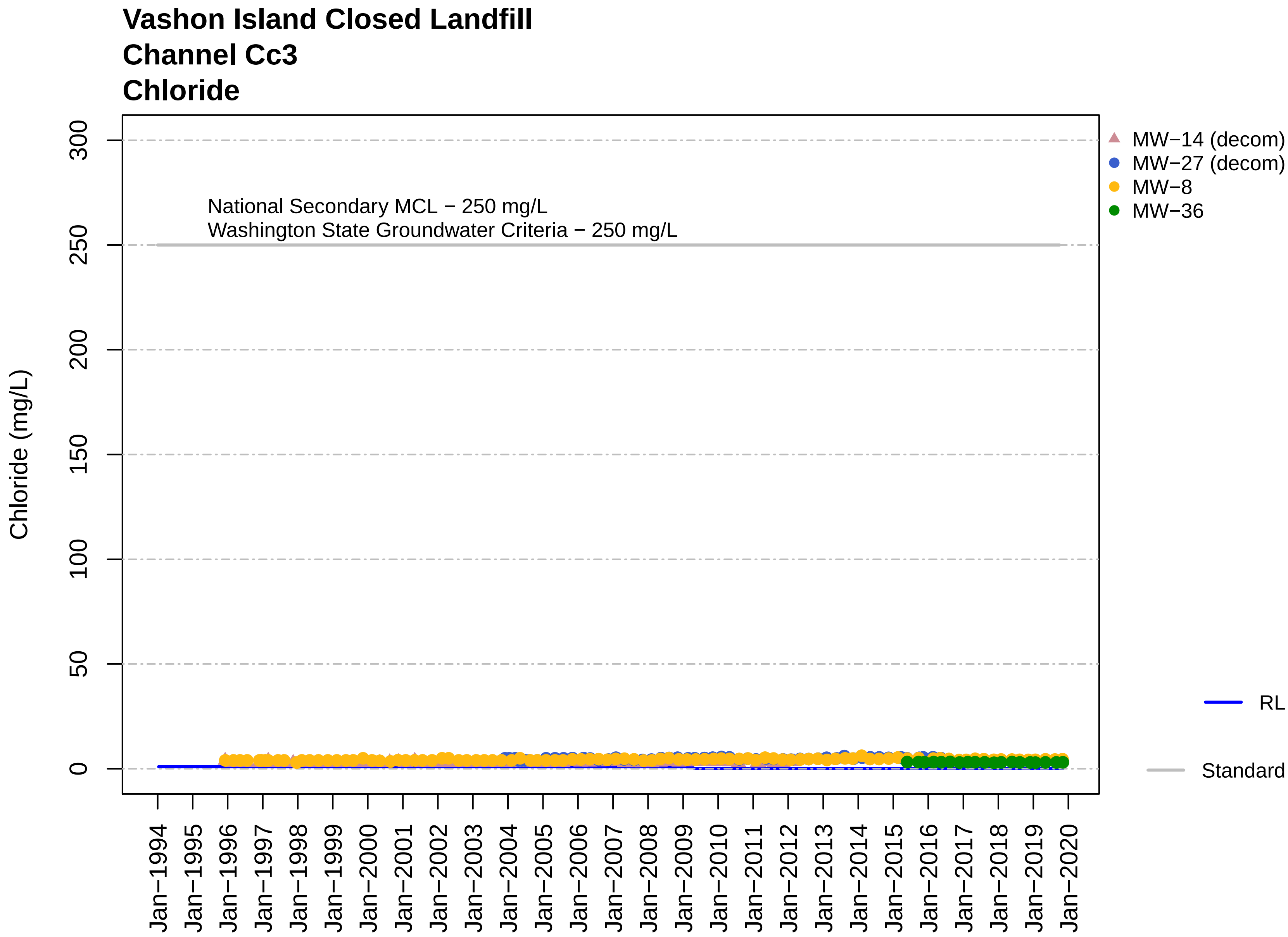

Vashon Island Closed Landfill
Channel Cc3
Alkalinity
Alkalinity (mg/L)
0
100
200
300
400
500
600
700
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL

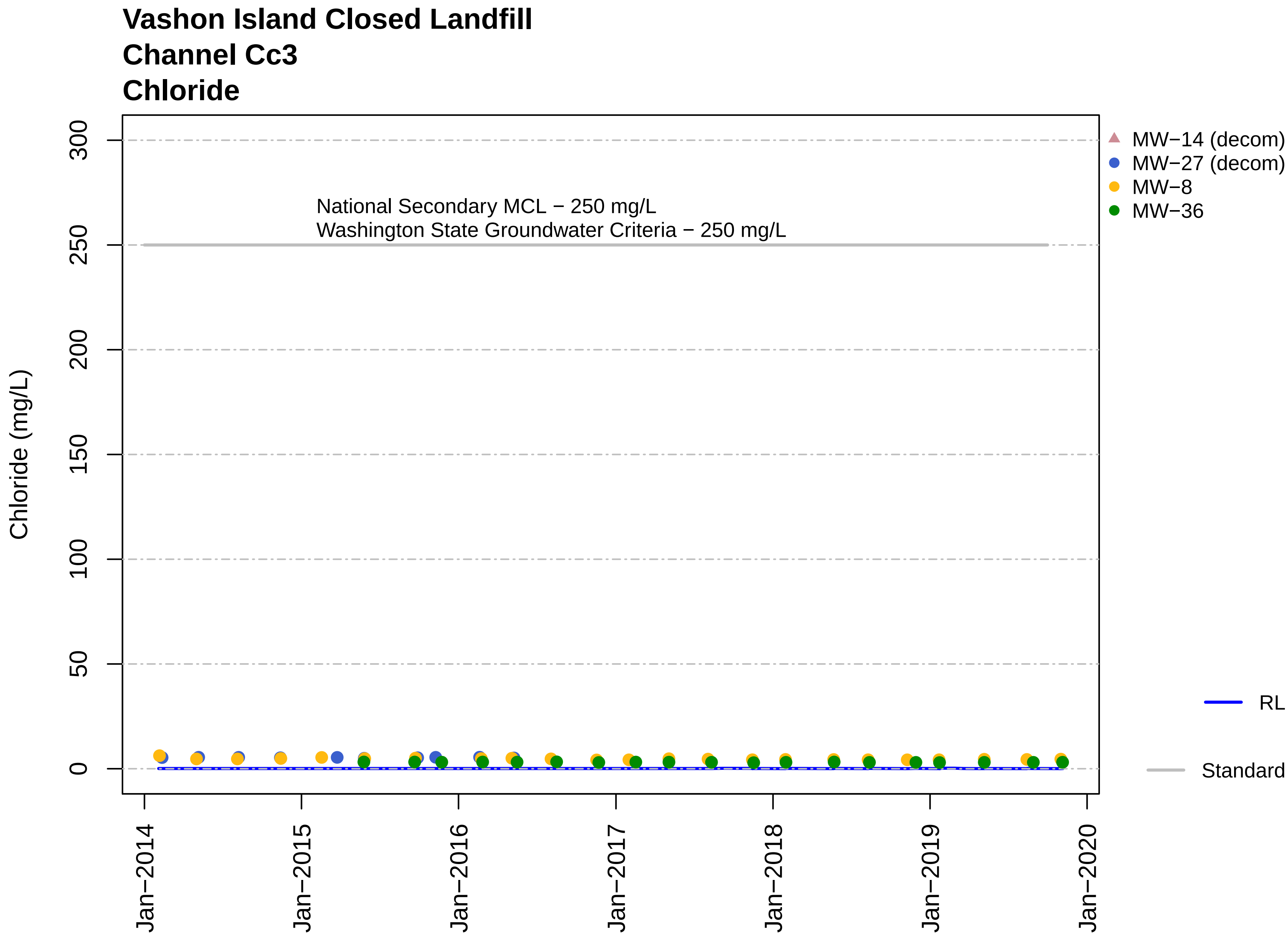


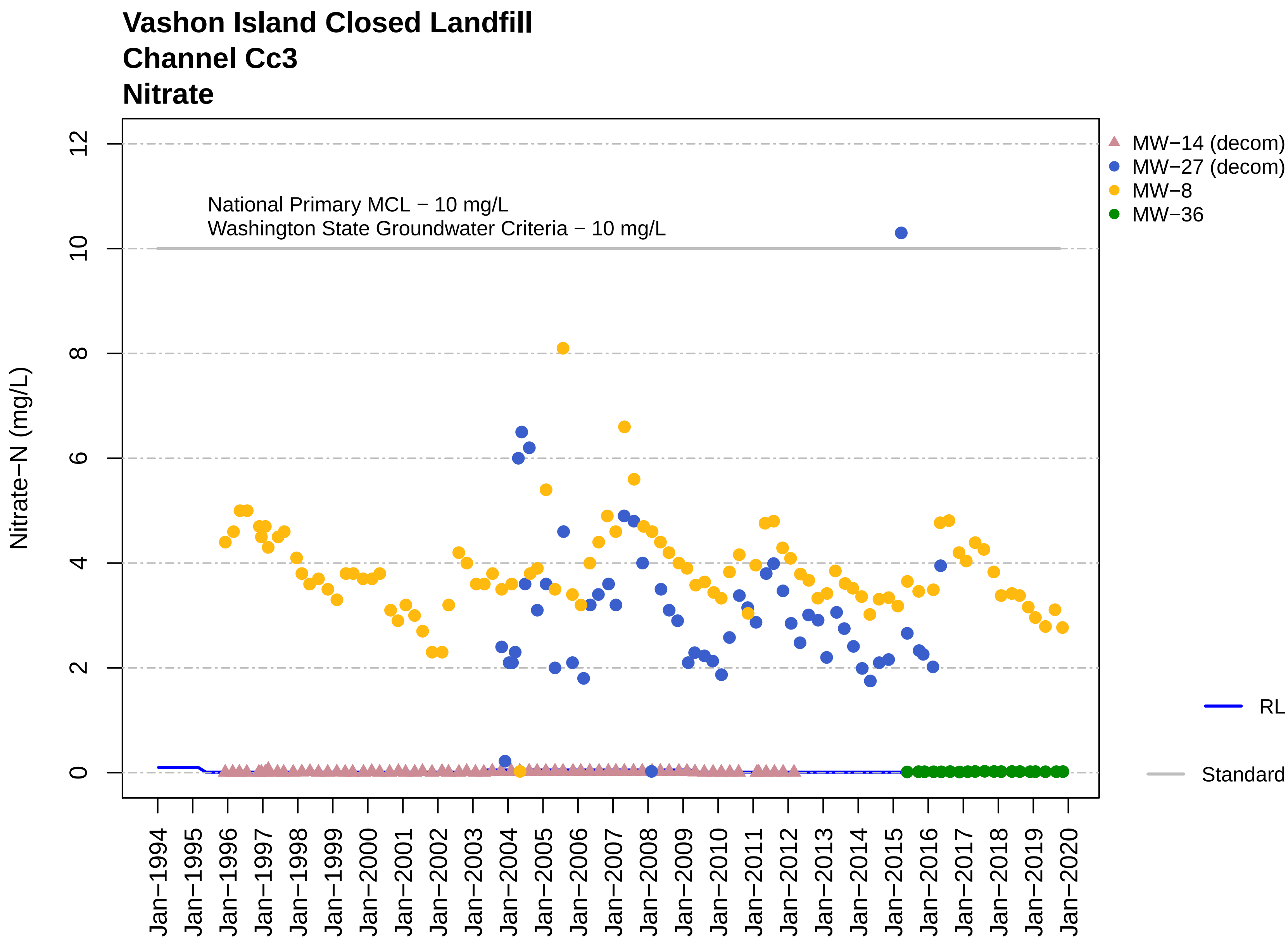
Vashon Island Closed Landfill
Channel Cc3
Alkalinity
Alkalinity (mg/L)
0
100
200
300
400
500
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL


Vashon Island Closed Landfill
Channel Cc3
Ammonia
Ammonia−N (mg/L)
0.0
0.1
0.2
0.3
0.4
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

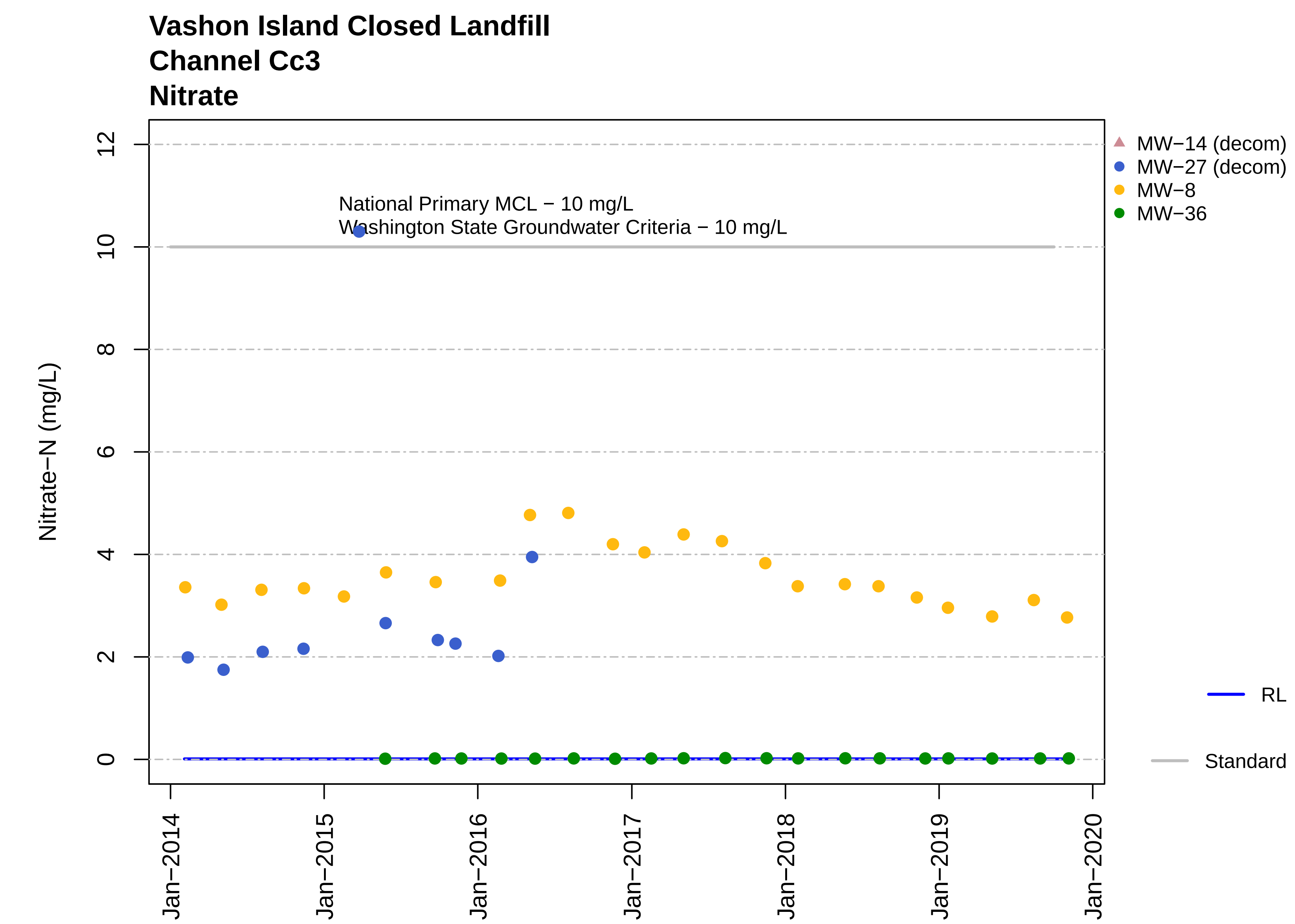

Vashon Island Closed Landfill
Channel Cc3
Ammonia
Ammonia−N (mg/L)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL

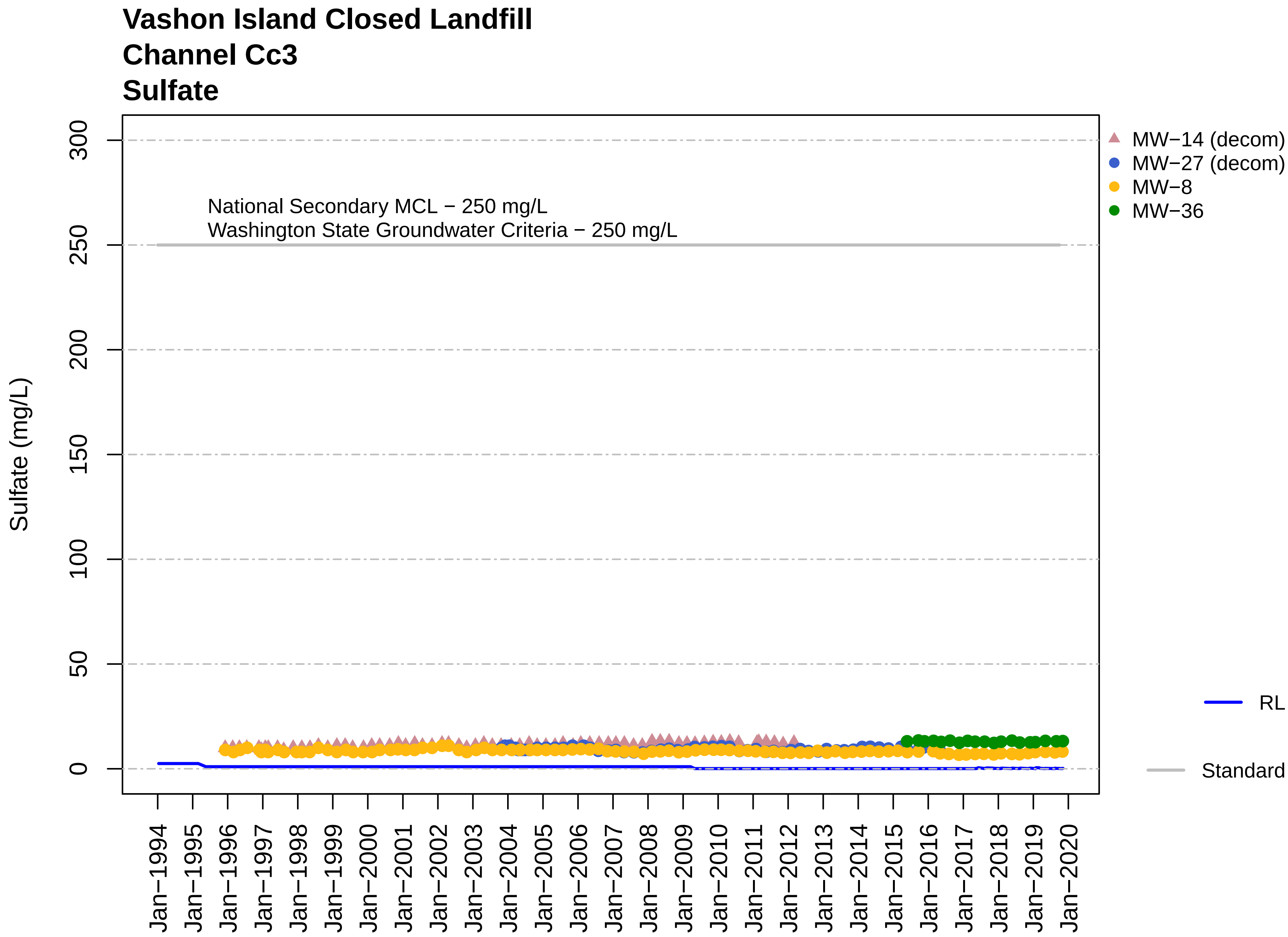

Vashon Island Closed Landfill
Channel Cc3
Chloride
Chloride (mg/L)
0
50
100
150
200
250
300
National Secondary MCL − 250 mg/L
Washington State Groundwater Criteria − 250 mg/L
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020


Vashon Island Closed Landfill
Channel Cc3
Chloride
Chloride (mg/L)
300
250
200
150
100
50
0
National Secondary MCL − 250 mg/L
Washington State Groundwater Criteria − 250 mg/L
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

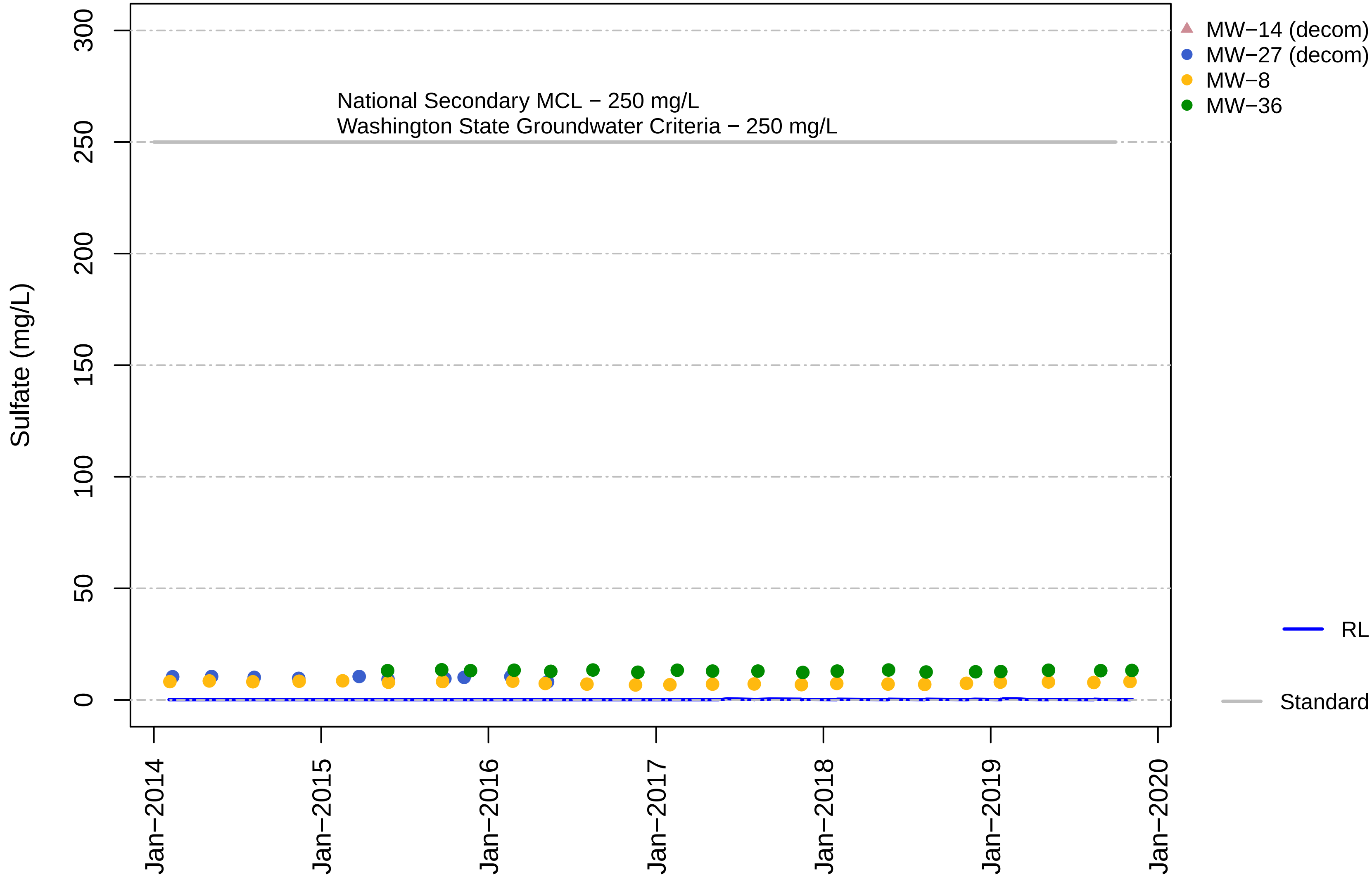


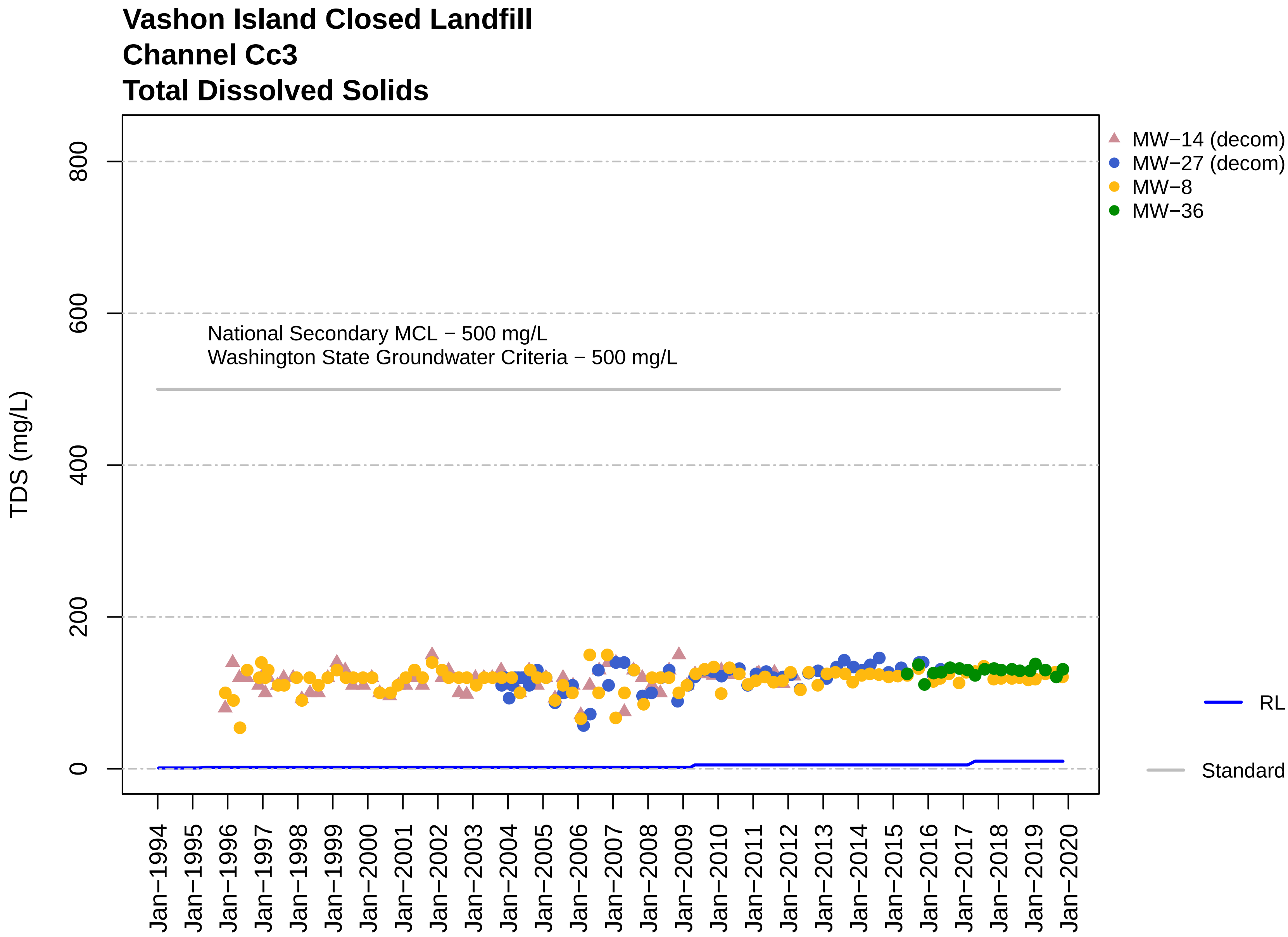
Vashon Island Closed Landfill
Channel Cc3
Nitrate
Nitrate−N (mg/L)
National Primary MCL − 10 mg/L
Washington State Groundwater Criteria − 10 mg/L
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
0
2
4
6
8
10
12
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

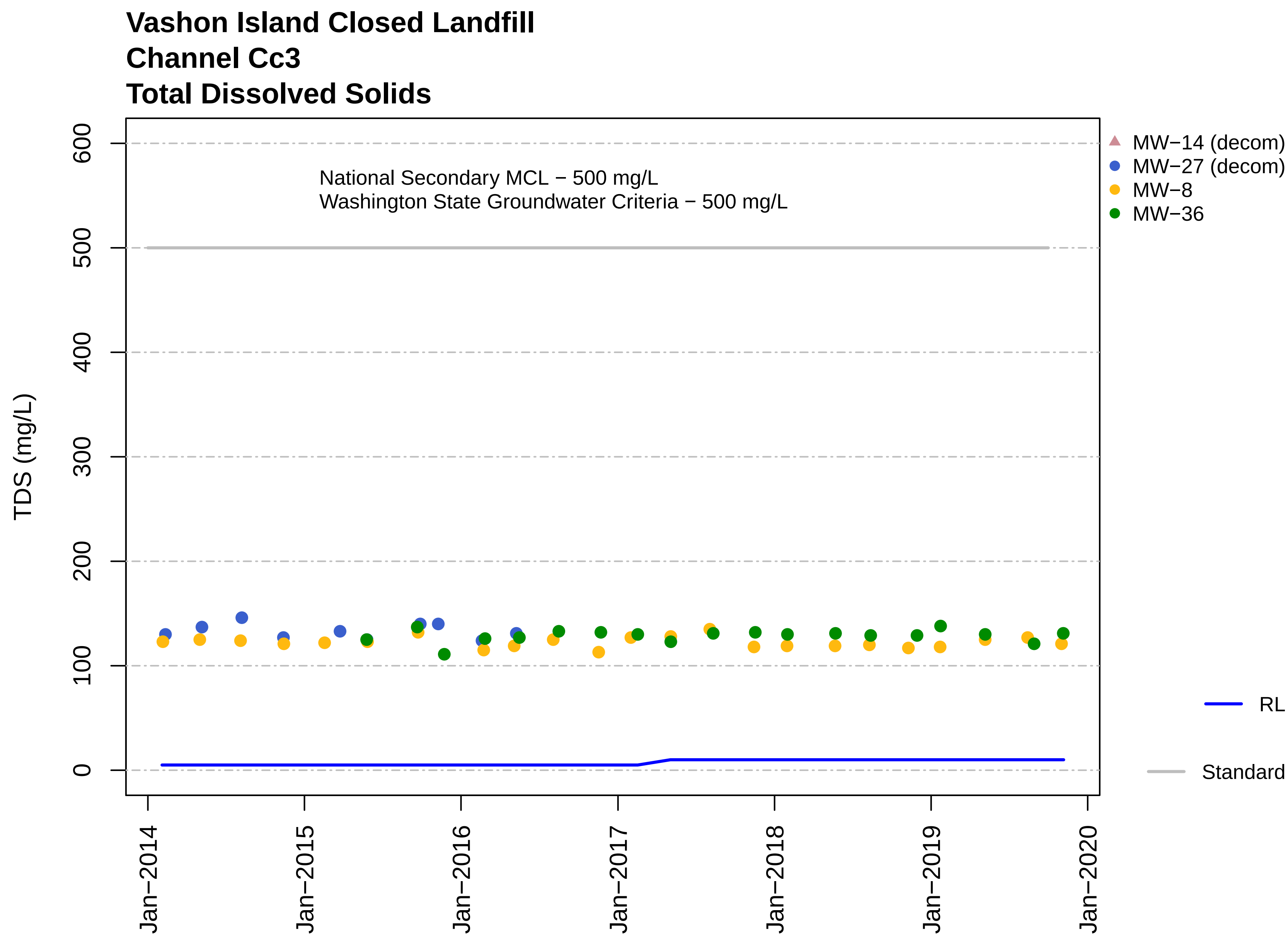

Vashon Island Closed Landfill
Channel Cc3
Nitrate
National Primary MCL − 10 mg/L
Washington State Groundwater Criteria − 10 mg/L
Nitrate−N (mg/L)
0
2
4
6
8
10
12
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

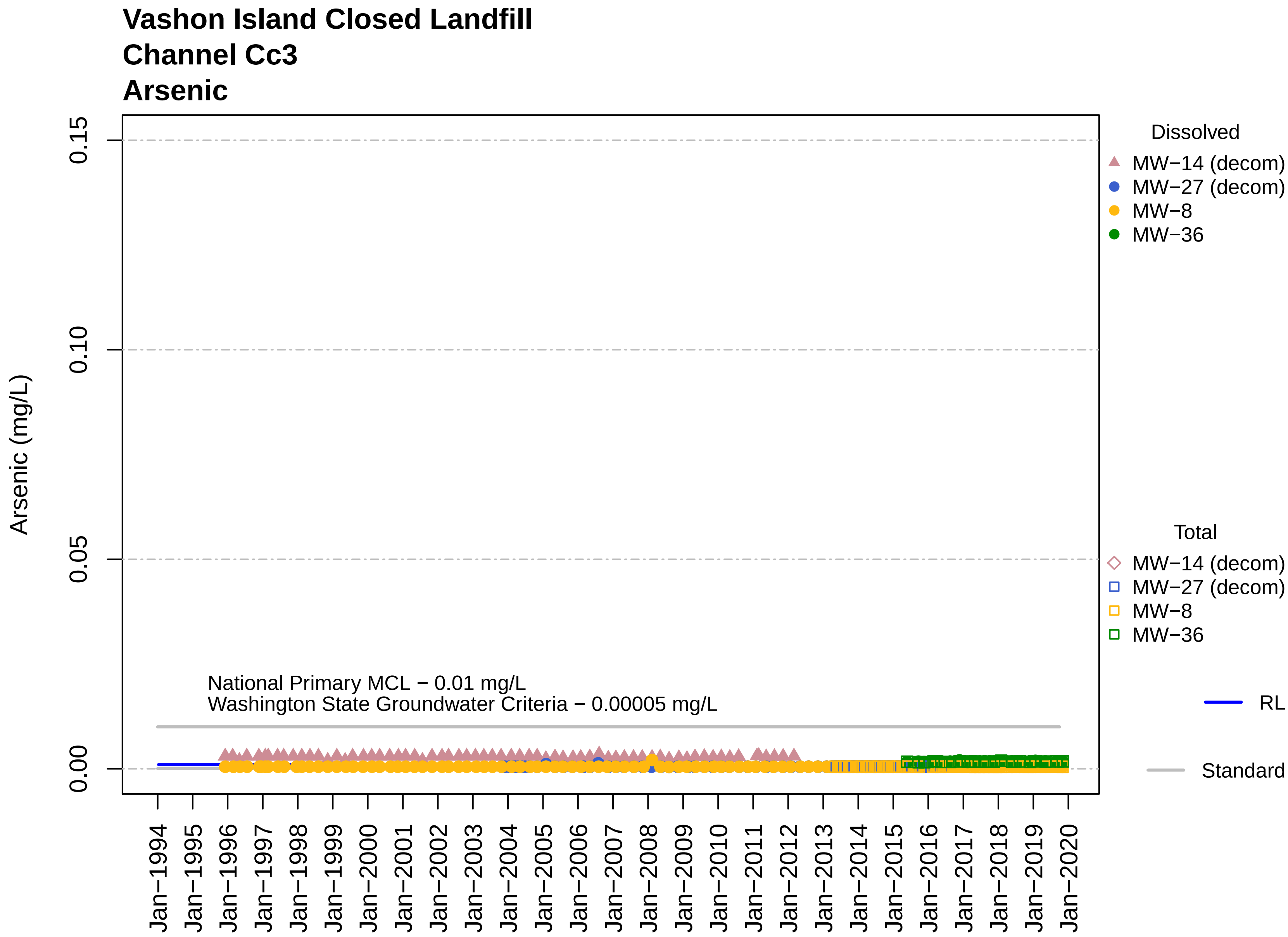

Vashon Island Closed Landfill
Channel Cc3
Sulfate
Sulfate (mg/L)
National Secondary MCL − 250 mg/L
Washington State Groundwater Criteria − 250 mg/L
0
50
100
150
200
250
300
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

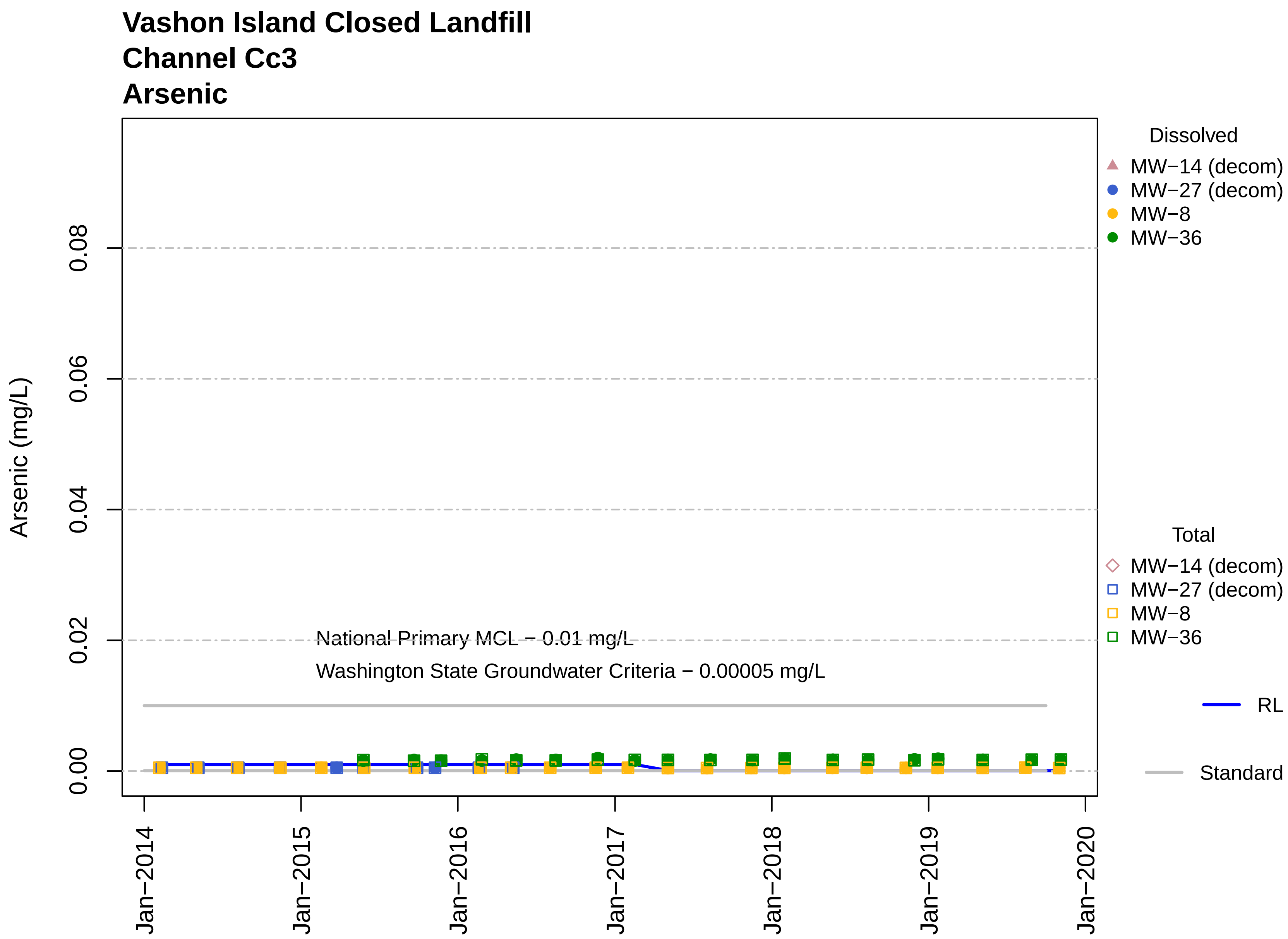
Vashon Island Closed Landfill
Channel Cc3
Sulfate



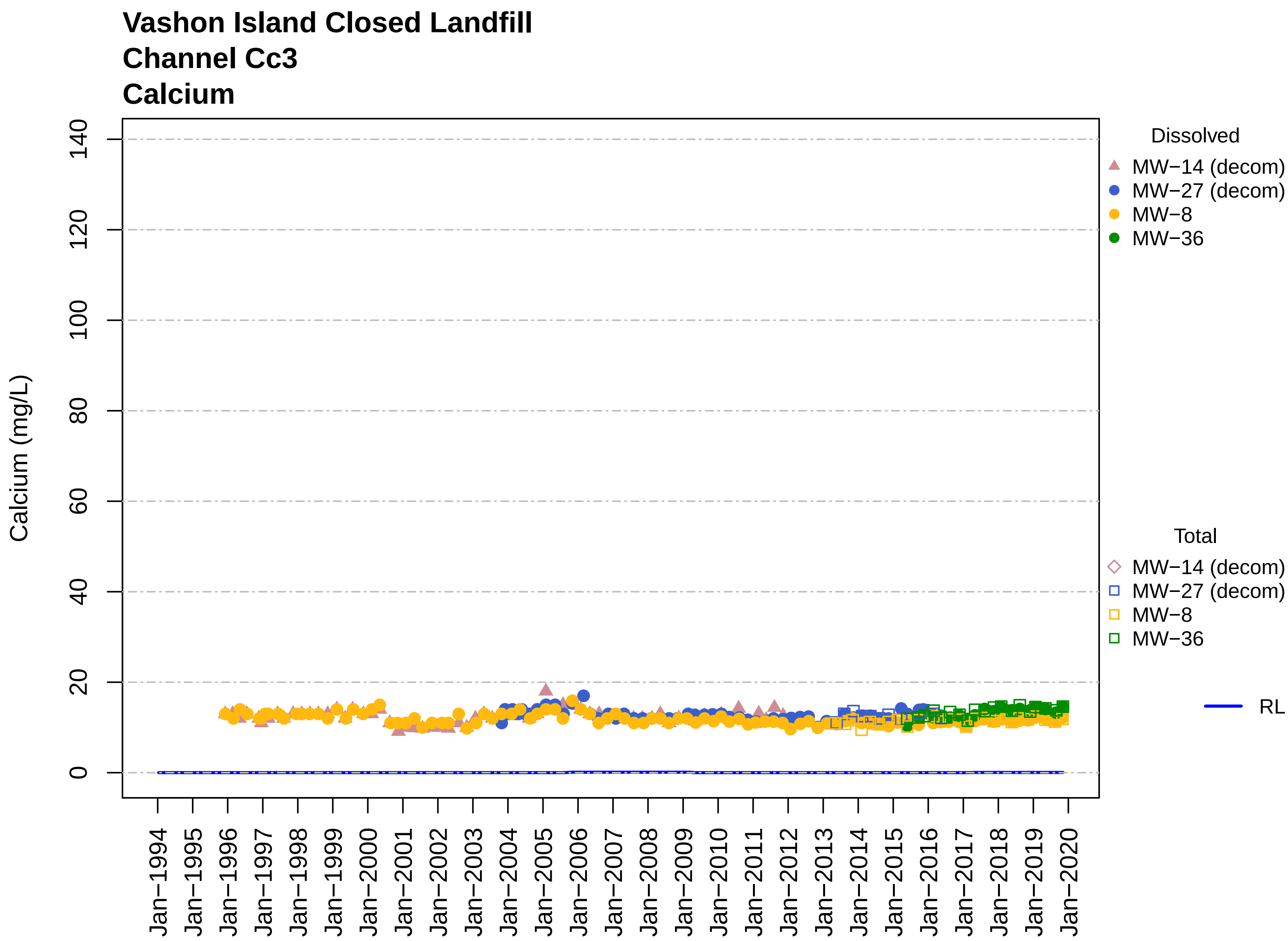

Vashon Island Closed Landfill
Channel Cc3
Total Dissolved Solids
TDS (mg/L)
0
200
400
600
800
National Secondary MCL − 500 mg/L
Washington State Groundwater Criteria − 500 mg/L
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020


Vashon Island Closed Landfill
Channel Cc3
Total Dissolved Solids
National Secondary MCL − 500 mg/L
Washington State Groundwater Criteria − 500 mg/L
TDS (mg/L)
0
100
200
300
400
500
600
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

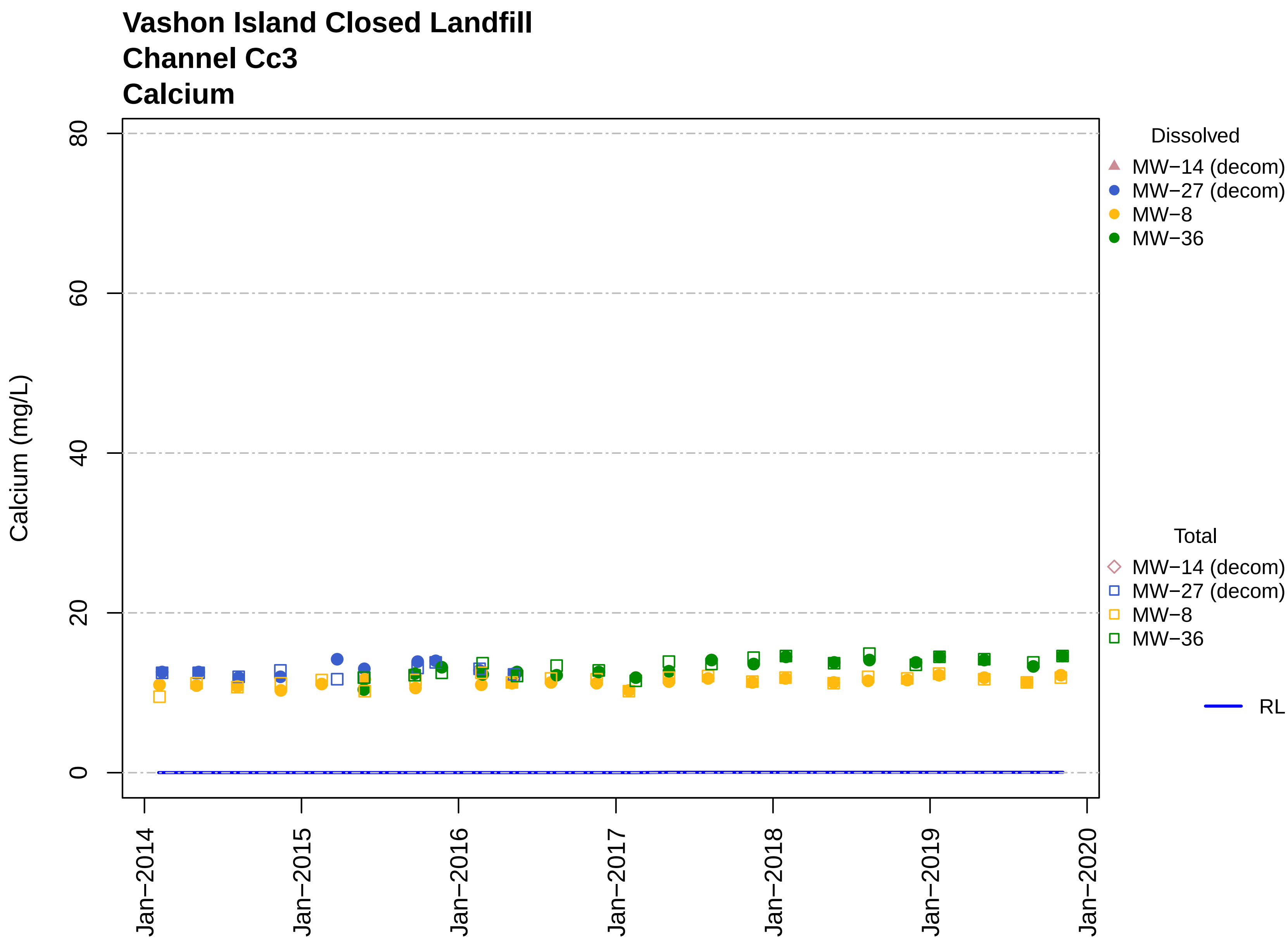

Vashon Island Closed Landfill
Channel Cc3
Arsenic
Arsenic (mg/L)
0.15
0.10
0.05
0.00
National Primary MCL − 0.01 mg/L
Washington State Groundwater Criteria − 0.00005 mg/L
Dissolved
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
Total
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020



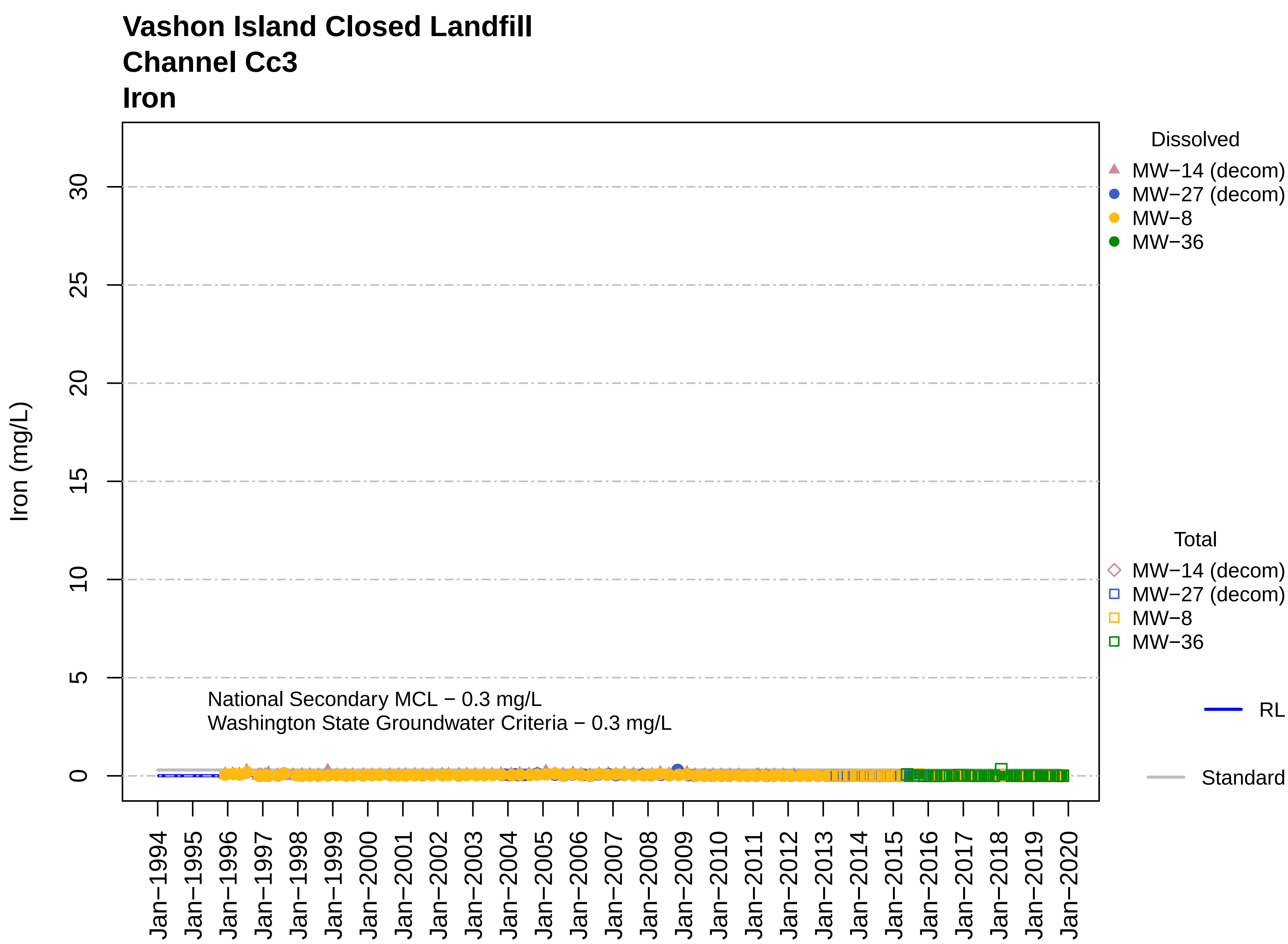
Vashon Island Closed Landfill
Channel Cc3
Arsenic
Arsenic (mg/L)
0.00
0.02
0.04
0.06
0.08
National Primary MCL − 0.01 mg/L
Washington State Groundwater Criteria − 0.00005 mg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
Total
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard



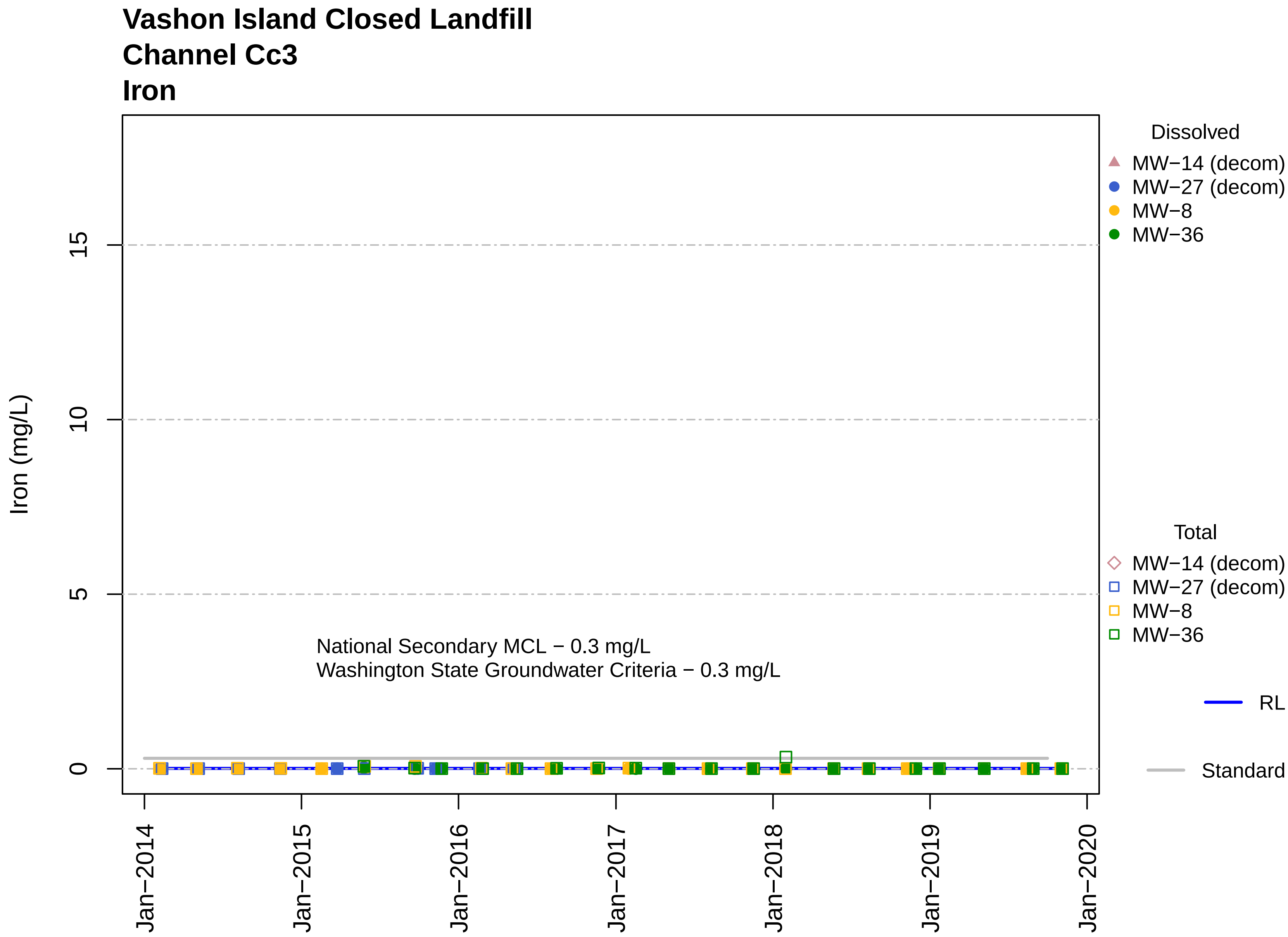
Vashon Island Closed Landfill
Channel Cc3
Calcium
Calcium (mg/L)
0
20
40
60
80
100
120
140
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
Total
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL



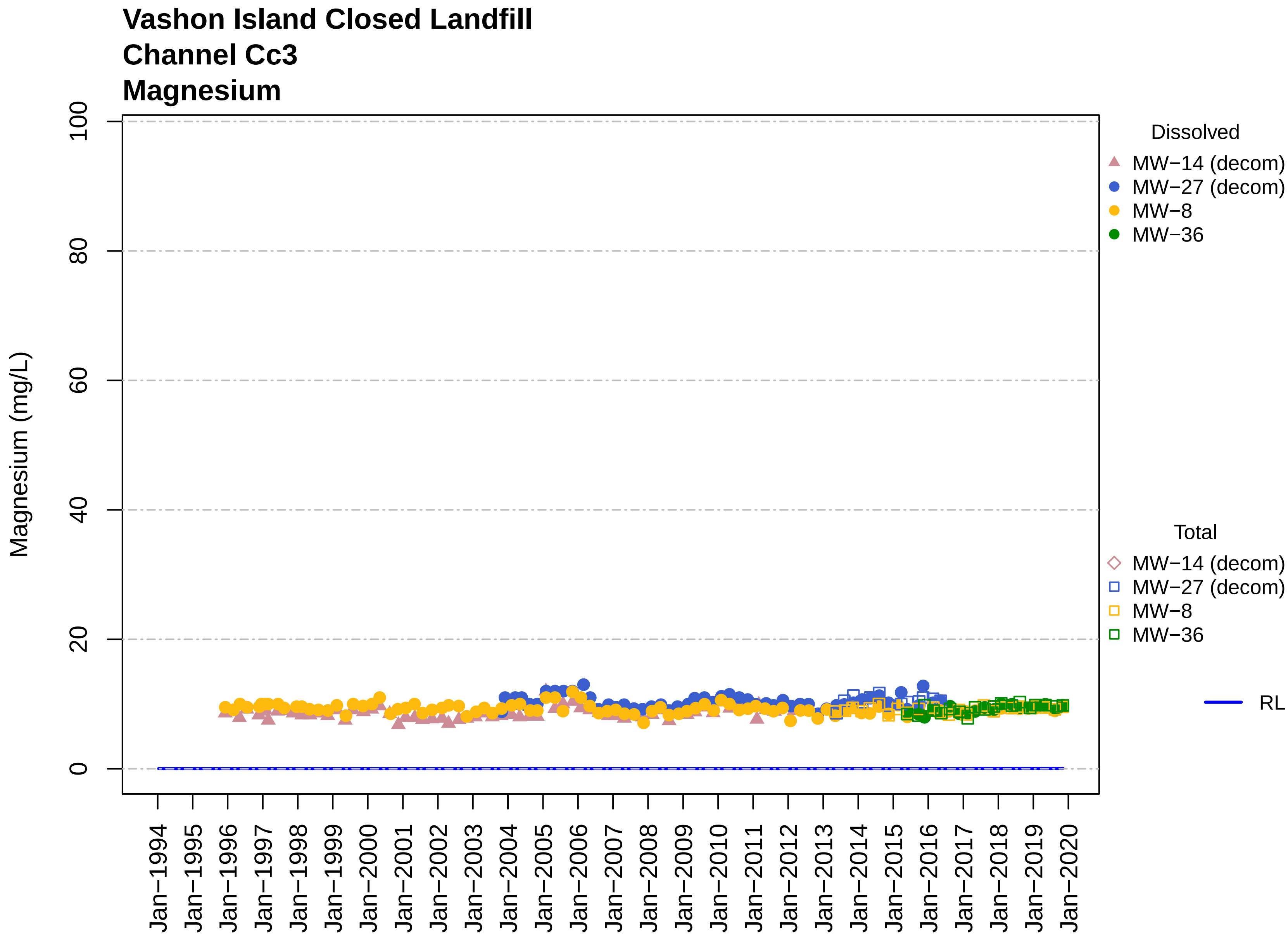
Vashon Island Closed Landfill
Channel Cc3
Calcium
Calcium (mg/L)
0
20
40
60
80
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
Total
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL



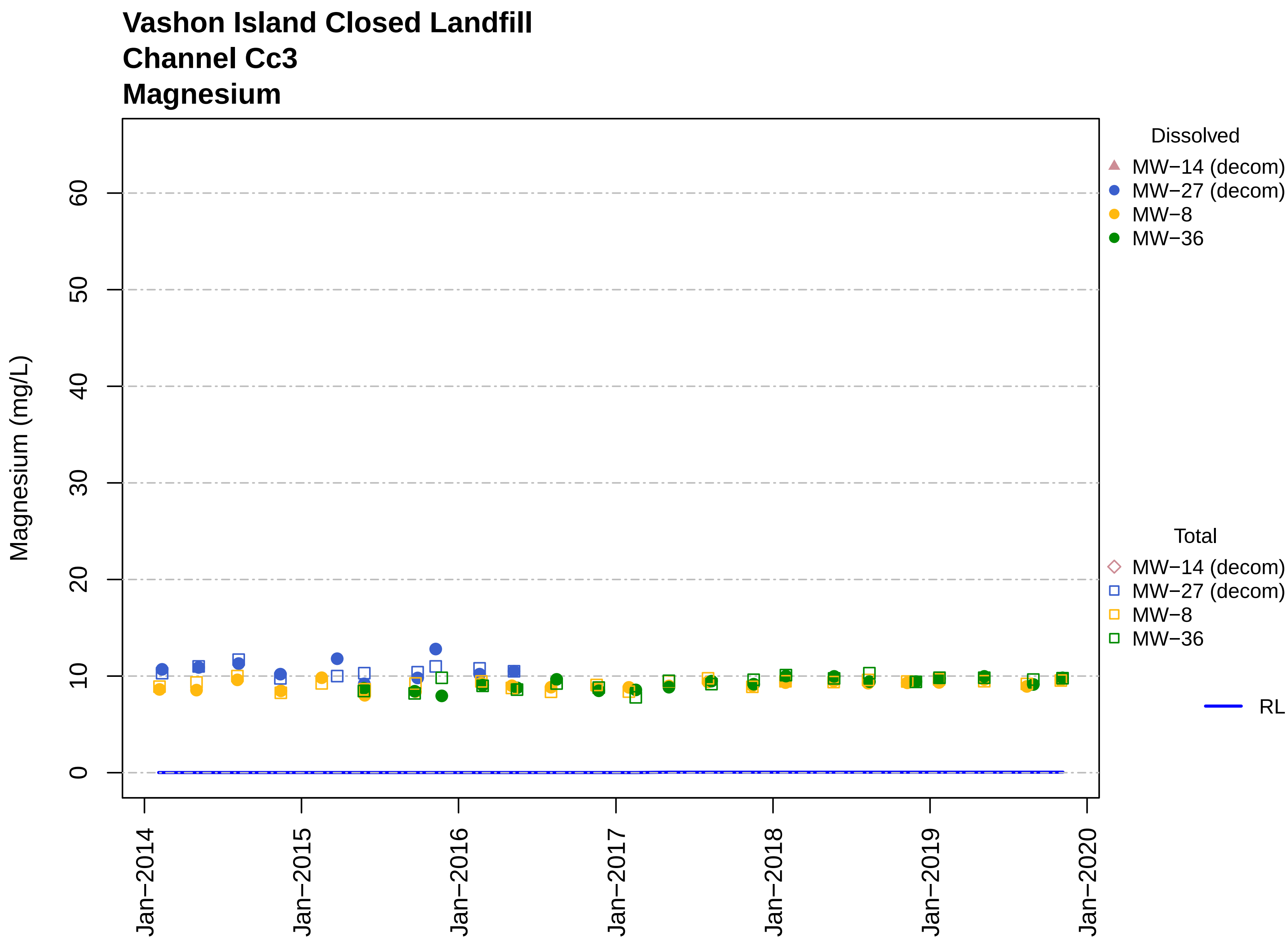
Vashon Island Closed Landfill
Channel Cc3
Iron
Iron (mg/L)
0
5
10
15
20
25
30
National Secondary MCL − 0.3 mg/L
Washington State Groundwater Criteria − 0.3 mg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
Total
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard



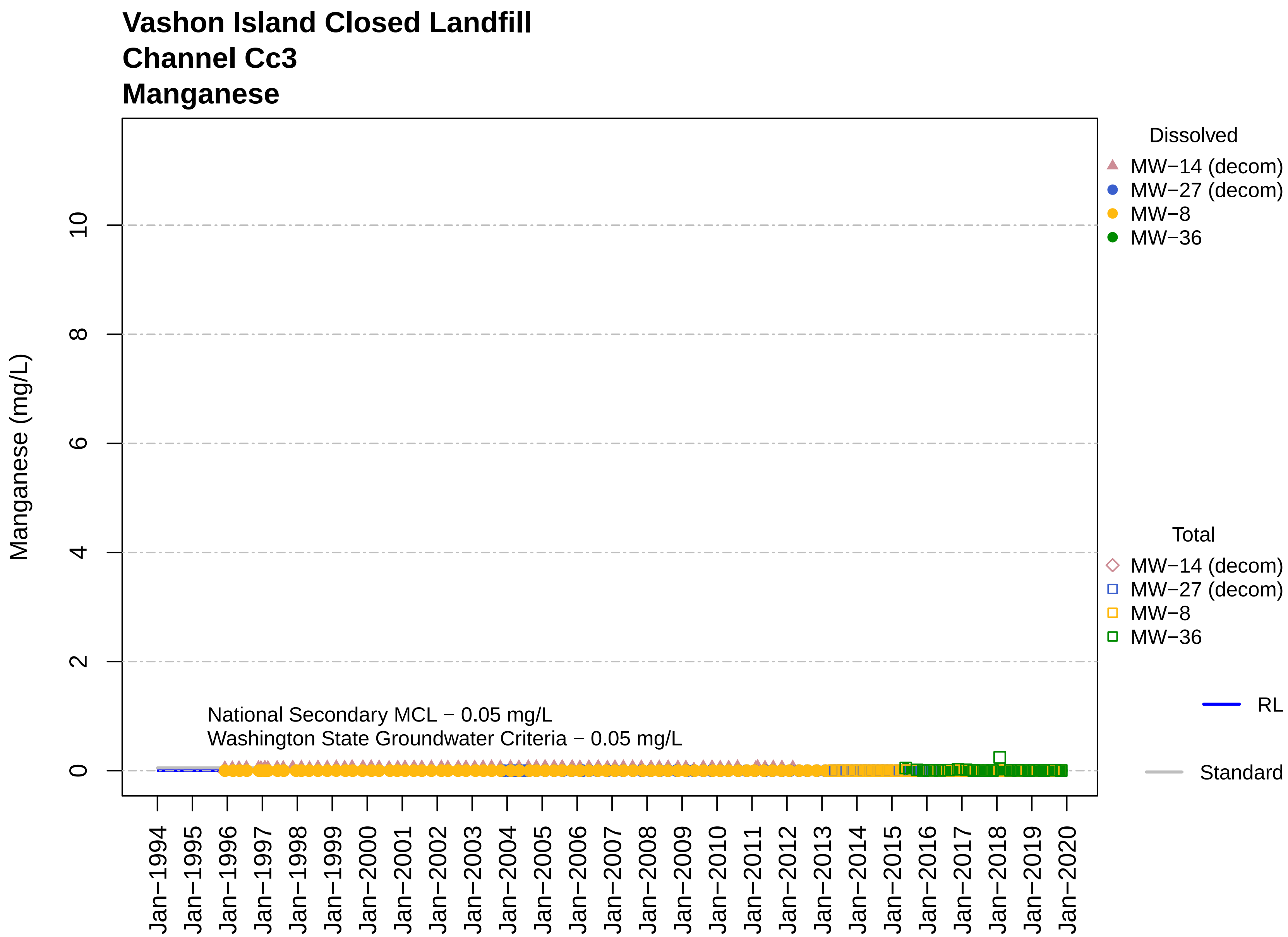
Vashon Island Closed Landfill
Channel Cc3
Iron
Iron (mg/L)
0
5
10
15
National Secondary MCL − 0.3 mg/L
Washington State Groundwater Criteria − 0.3 mg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
Total
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

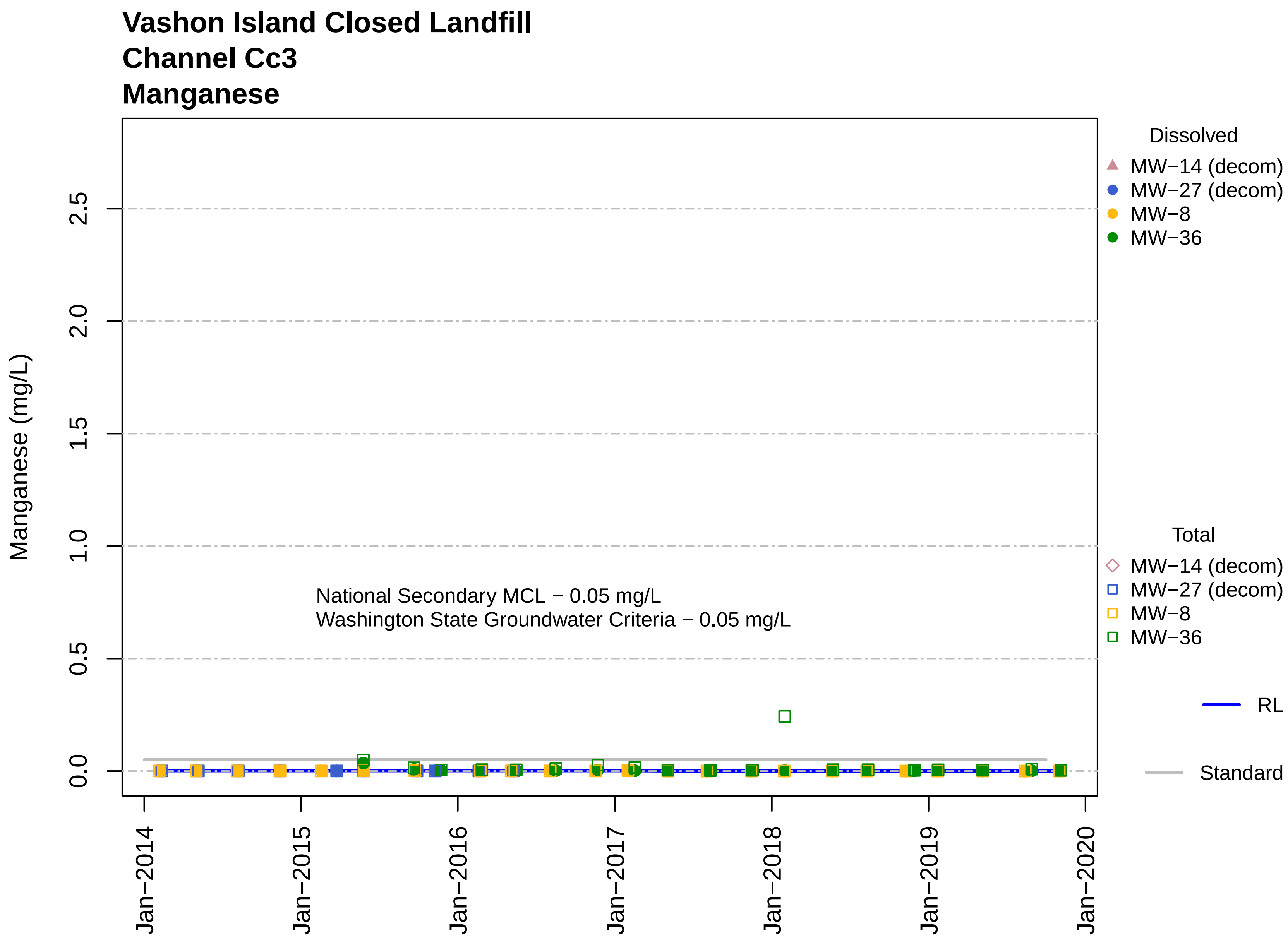


Vashon Island Closed Landfill
Channel Cc3
Magnesium
Magnesium (mg/L)
0
20
40
60
80
100
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
Total
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL

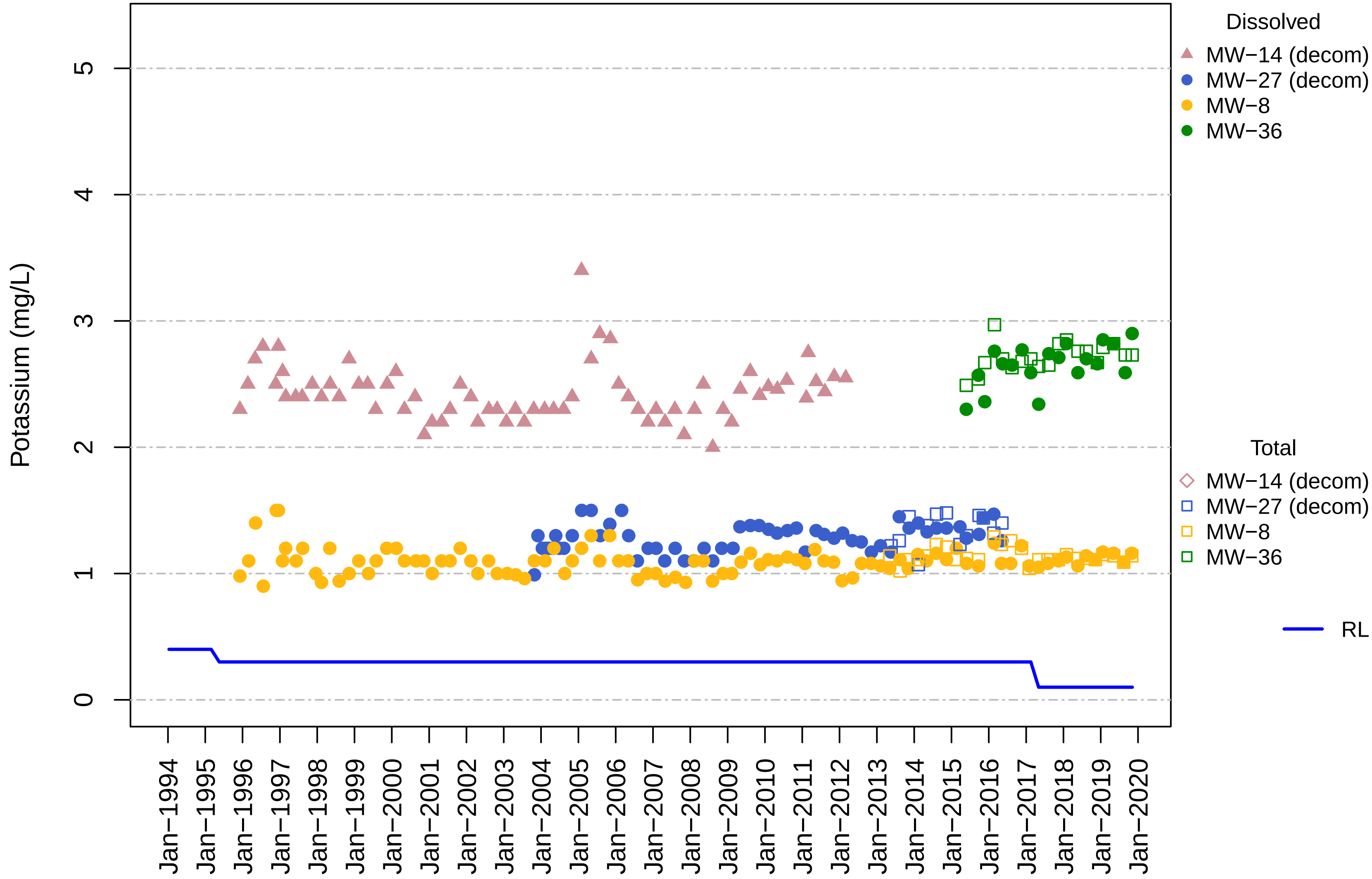


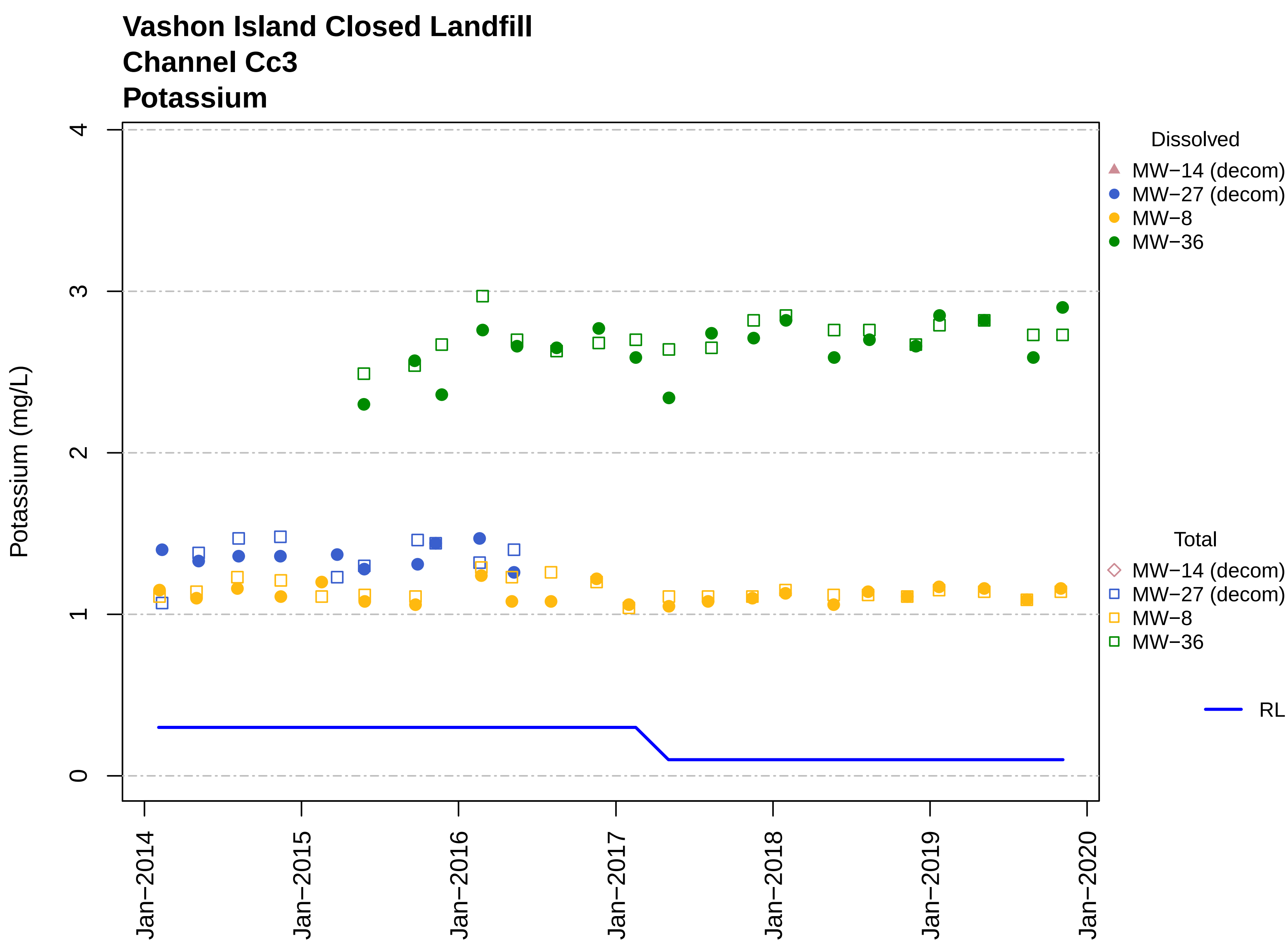
Vashon Island Closed Landfill
Channel Cc3
Magnesium
Magnesium (mg/L)
0
10
20
30
40
50
60
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
Total
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL

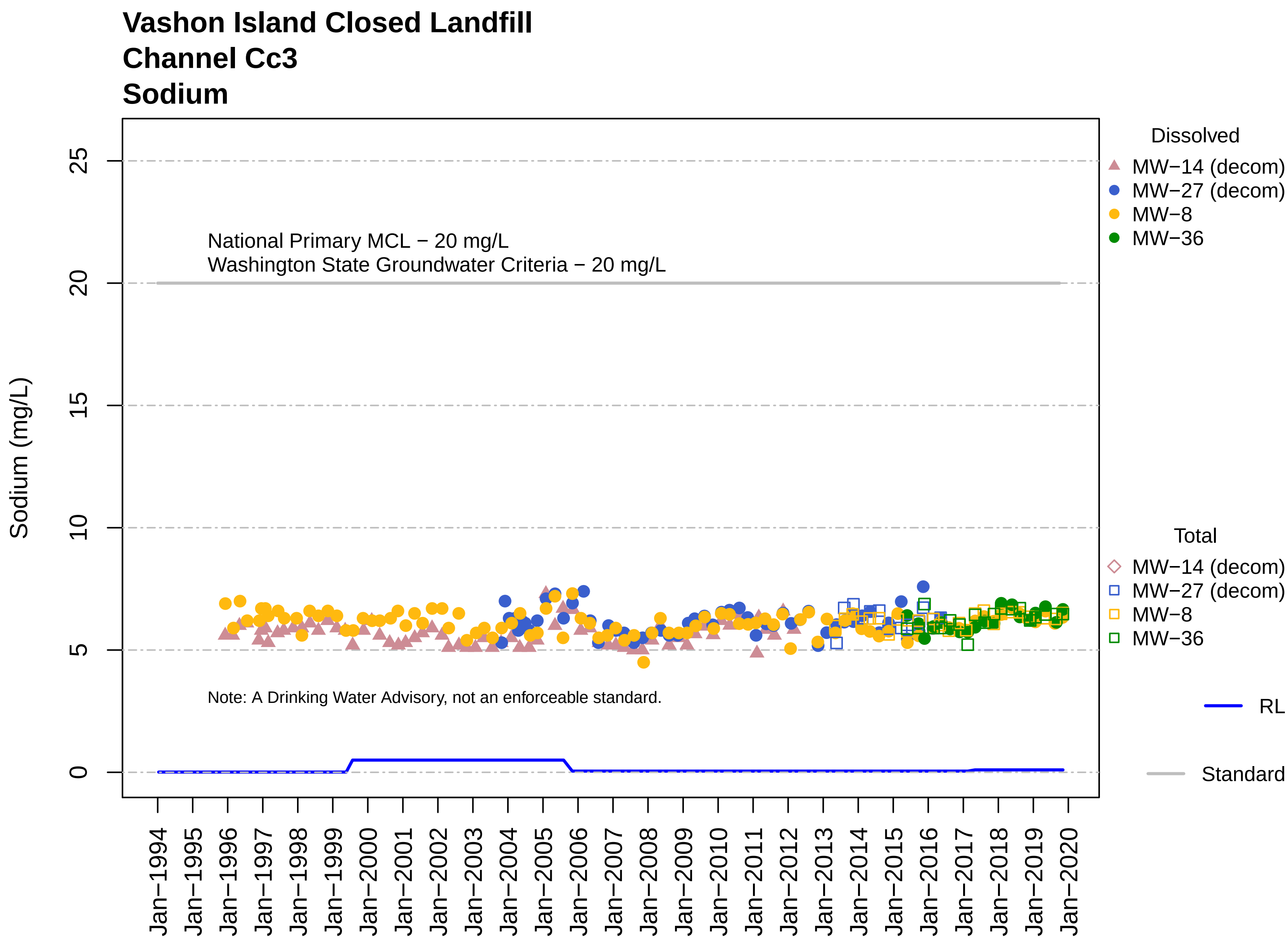

Vashon Island Closed Landfill
Channel Cc3
Manganese
Manganese (mg/L)
0
2
4
6
8
10
National Secondary MCL − 0.05 mg/L
Washington State Groundwater Criteria − 0.05 mg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
Total
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

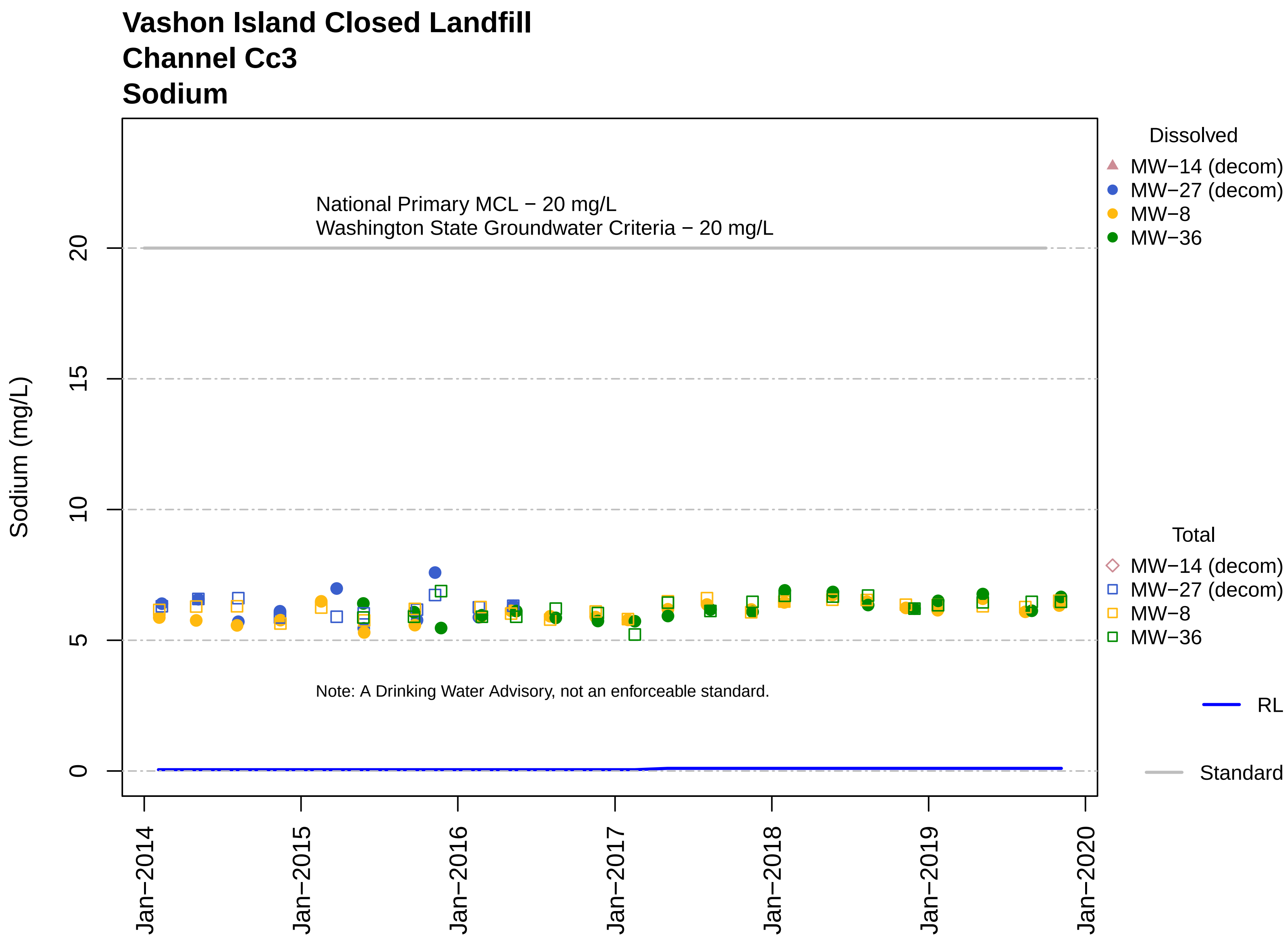

Vashon Island Closed Landfill
Channel Cc3
Manganese
Manganese (mg/L)
0.0
0.5
1.0
1.5
2.0
2.5
National Secondary MCL − 0.05 mg/L
Washington State Groundwater Criteria − 0.05 mg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
Total
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

Vashon Island Closed Landfill
Channel Cc3
Potassium

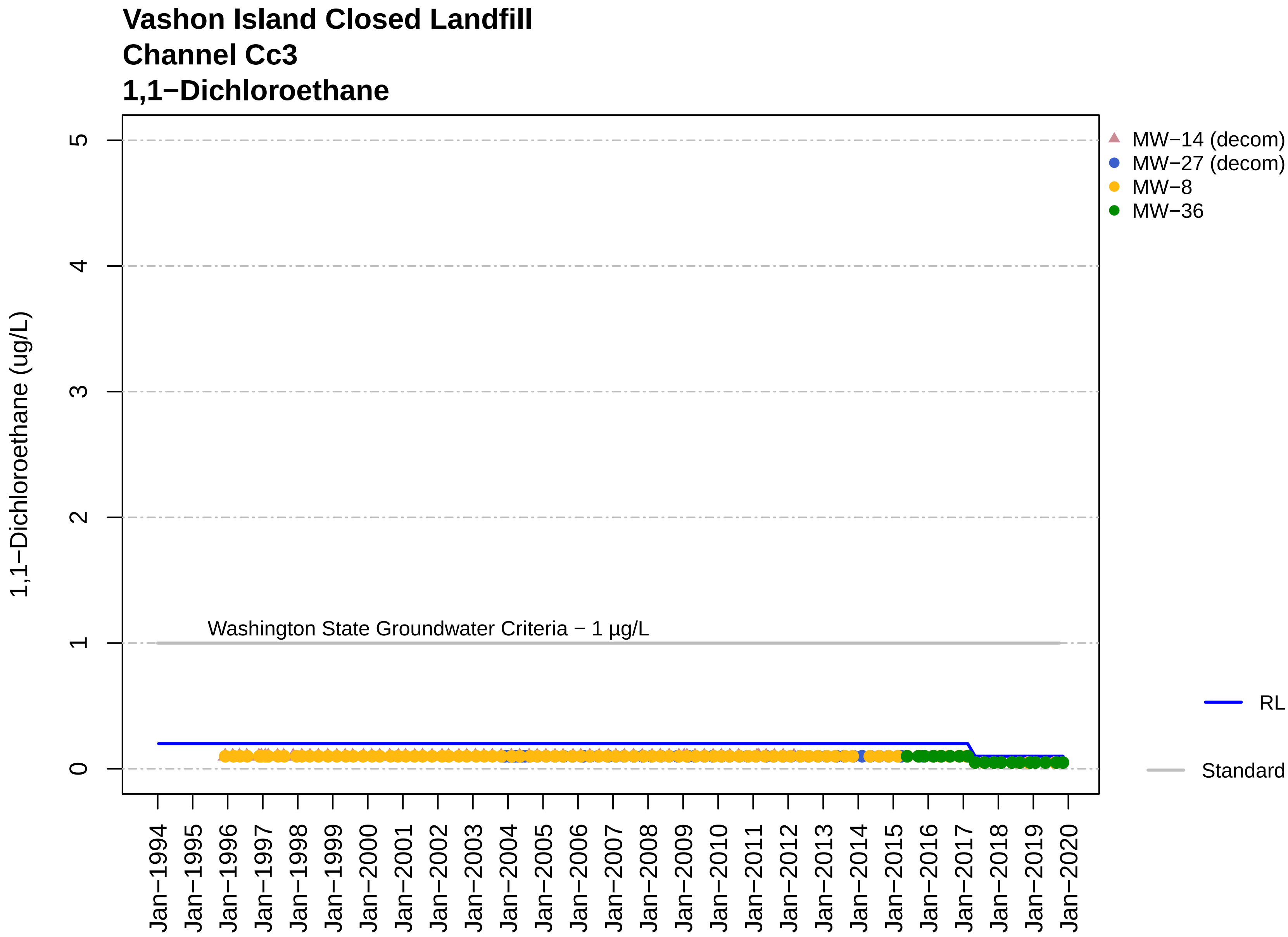



Vashon Island Closed Landfill
Channel Cc3
Potassium
Potassium (mg/L)
0
1
2
3
4
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
Total
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL

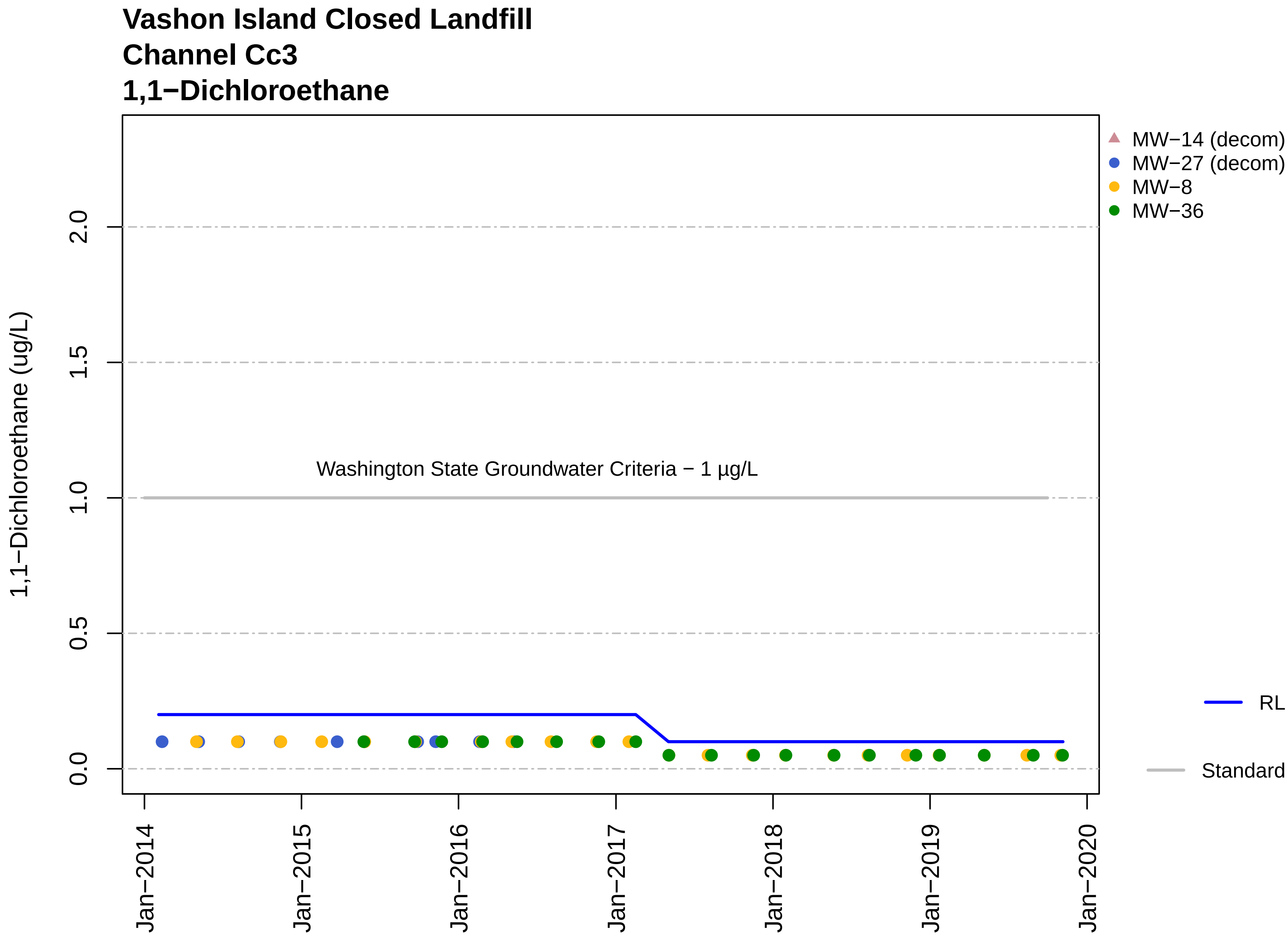

Vashon Island Closed Landfill
Channel Cc3
Sodium
Sodium (mg/L)
0
5
10
15
20
25
National Primary MCL − 20 mg/L
Washington State Groundwater Criteria − 20 mg/L
Note: A Drinking Water Advisory, not an enforceable standard.
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
Total
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

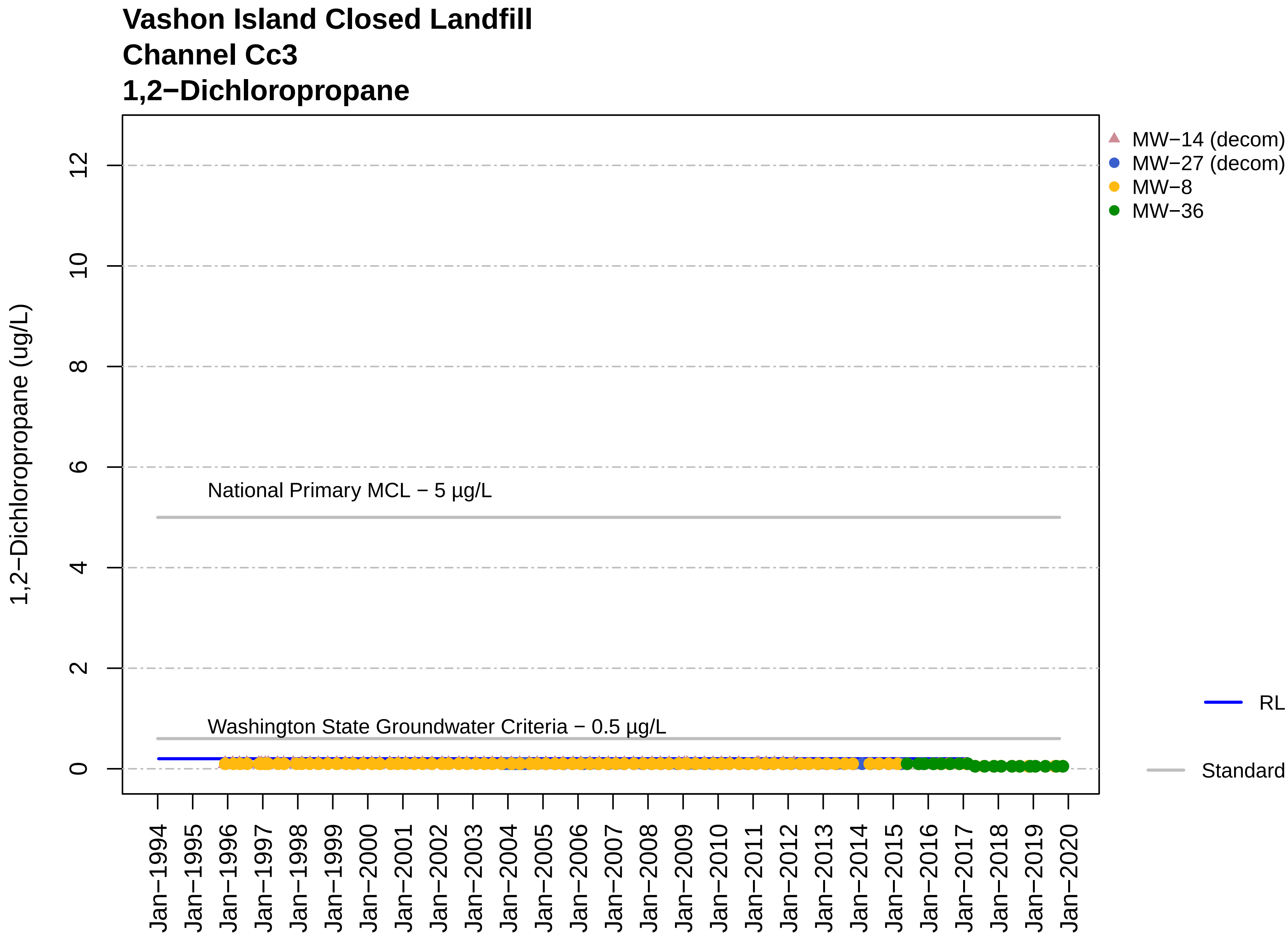


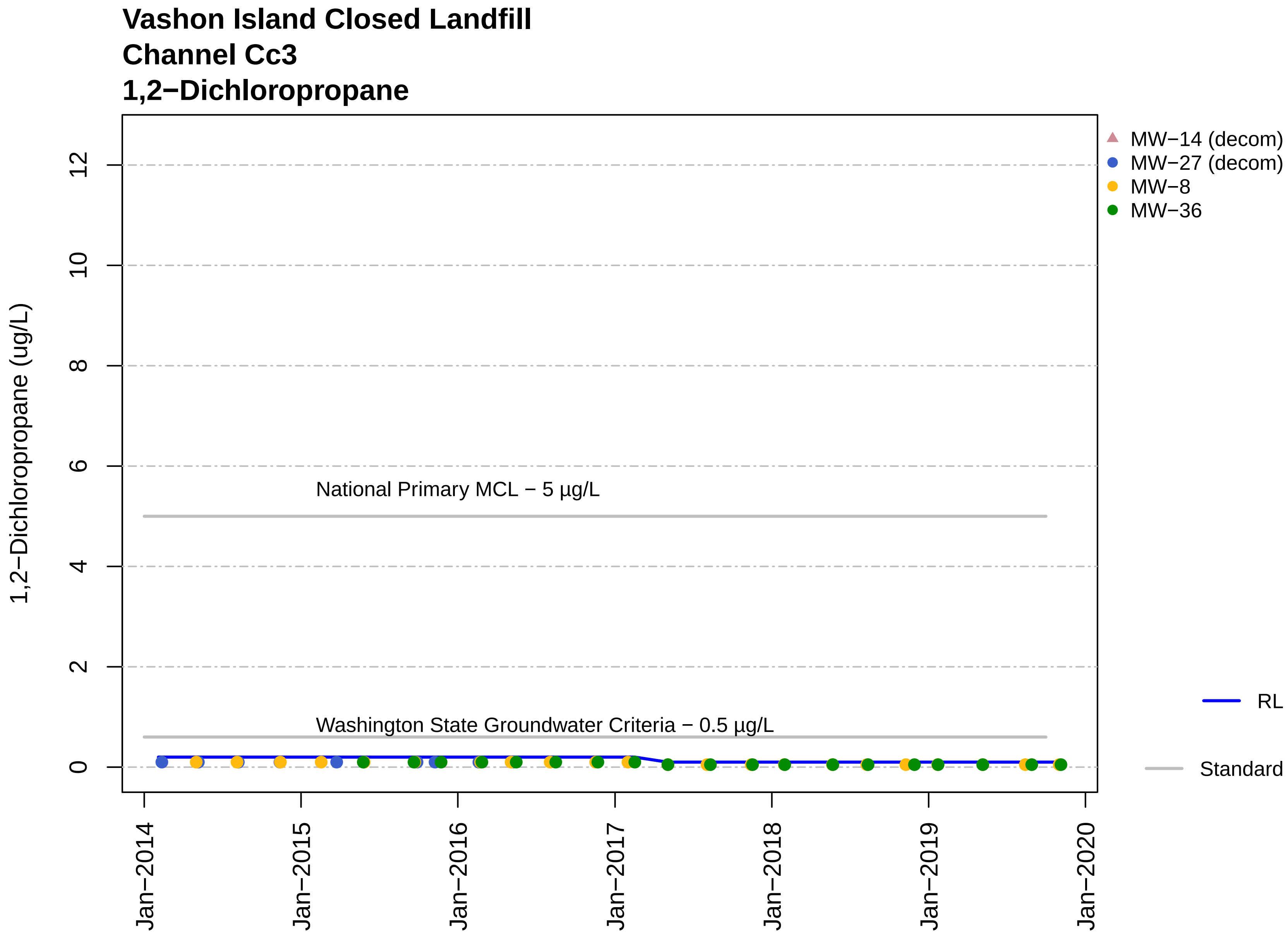
Vashon Island Closed Landfill
Channel Cc3
Sodium
Sodium (mg/L)
National Primary MCL − 20 mg/L
Washington State Groundwater Criteria − 20 mg/L
Note: A Drinking Water Advisory, not an enforceable standard.
0
5
10
15
20
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
Total
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard



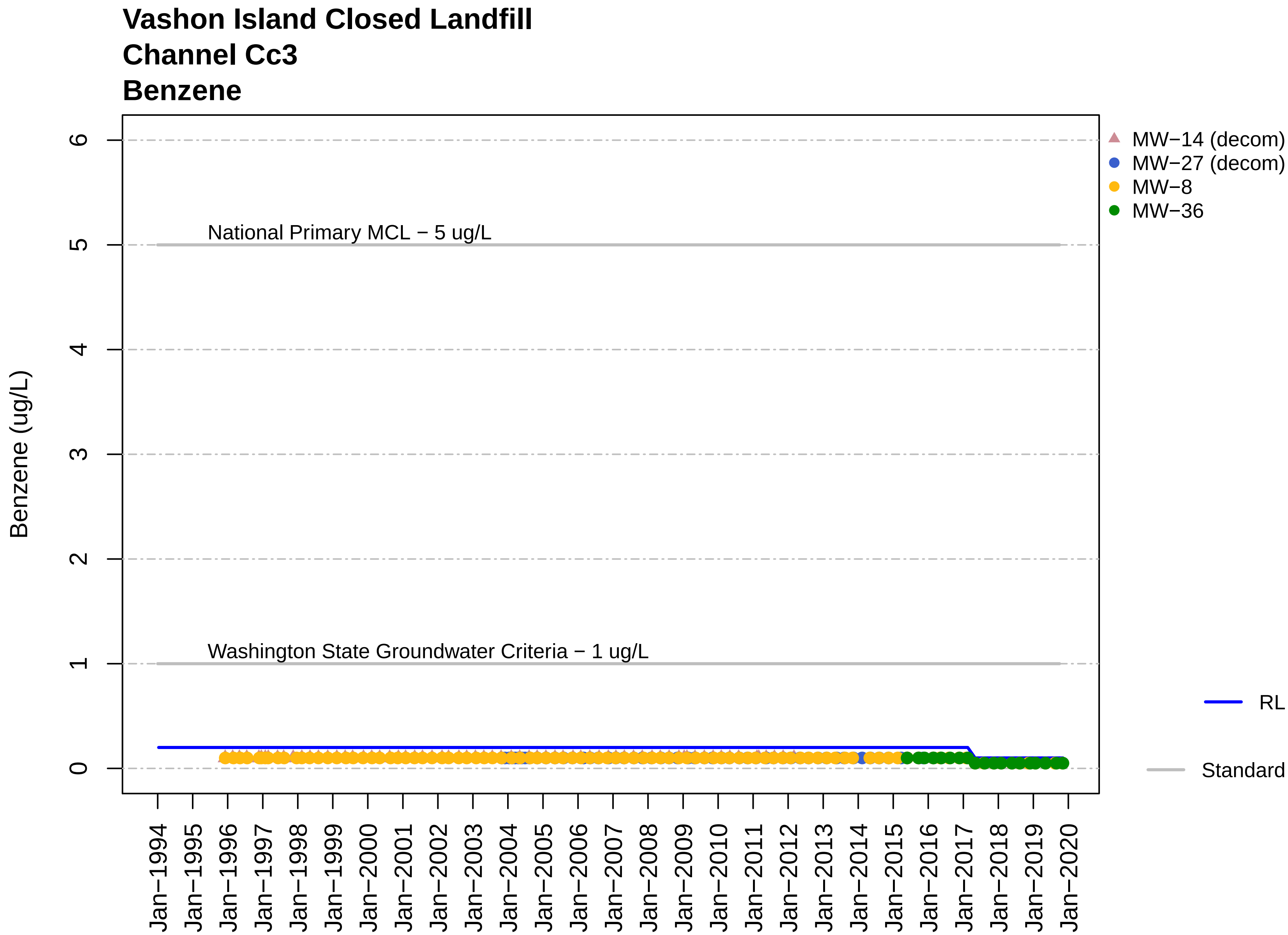
Vashon Island Closed Landfill
Channel Cc3
1,1−Dichloroethane
1,1−Dichloroethane (ug/L)
0
1
2
3
4
5
Washington State Groundwater Criteria − 1 µg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

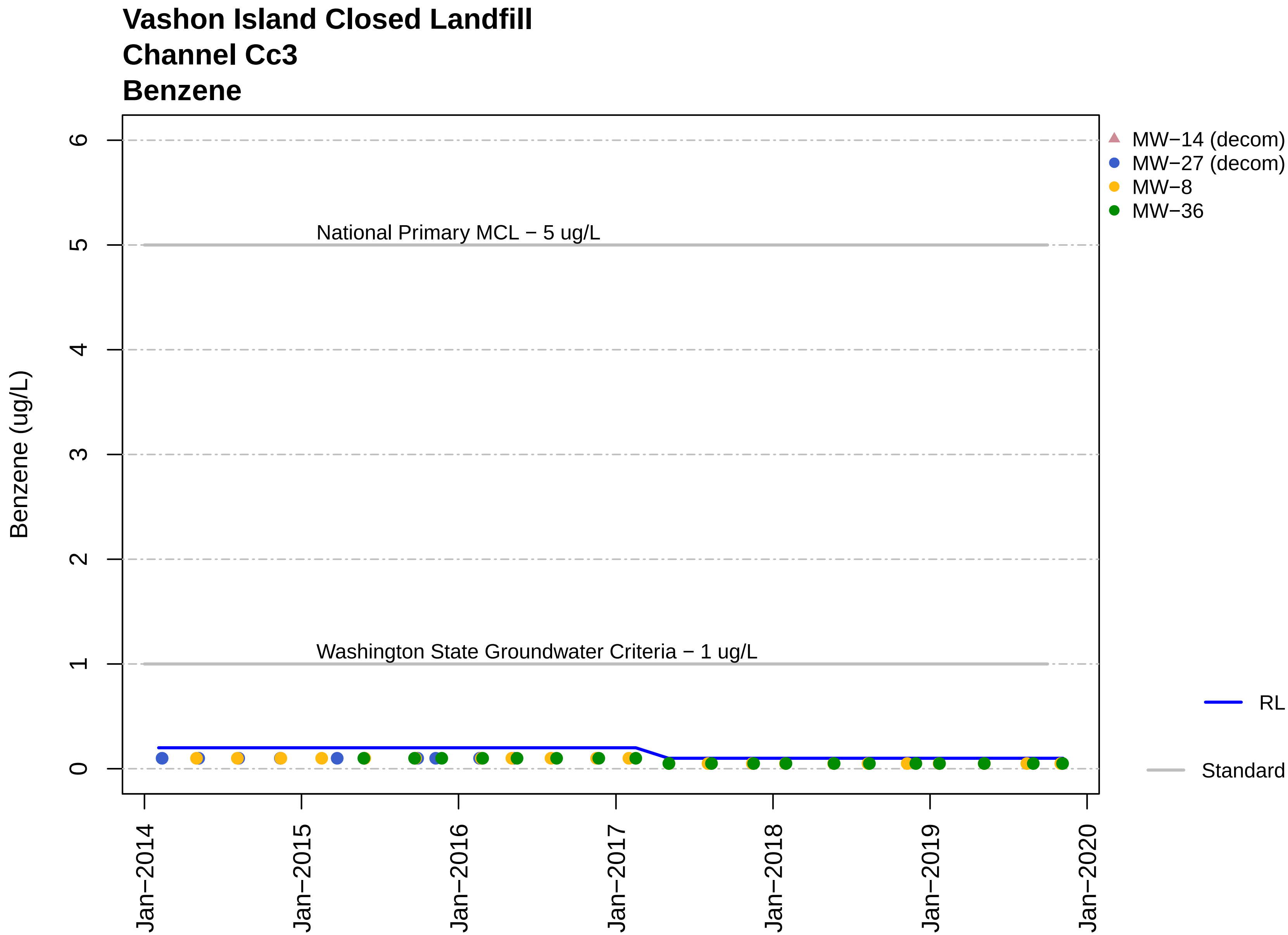

Vashon Island Closed Landfill
Channel Cc3
1,1−Dichloroethane
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
Washington State Groundwater Criteria − 1 µg/L
1,1−Dichloroethane (ug/L)
0.0
0.5
1.0
1.5
2.0
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020


Vashon Island Closed Landfill
Channel Cc3
1,2−Dichloropropane
1,2−Dichloropropane (ug/L)
0
2
4
6
8
10
12
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.5 µg/L
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020



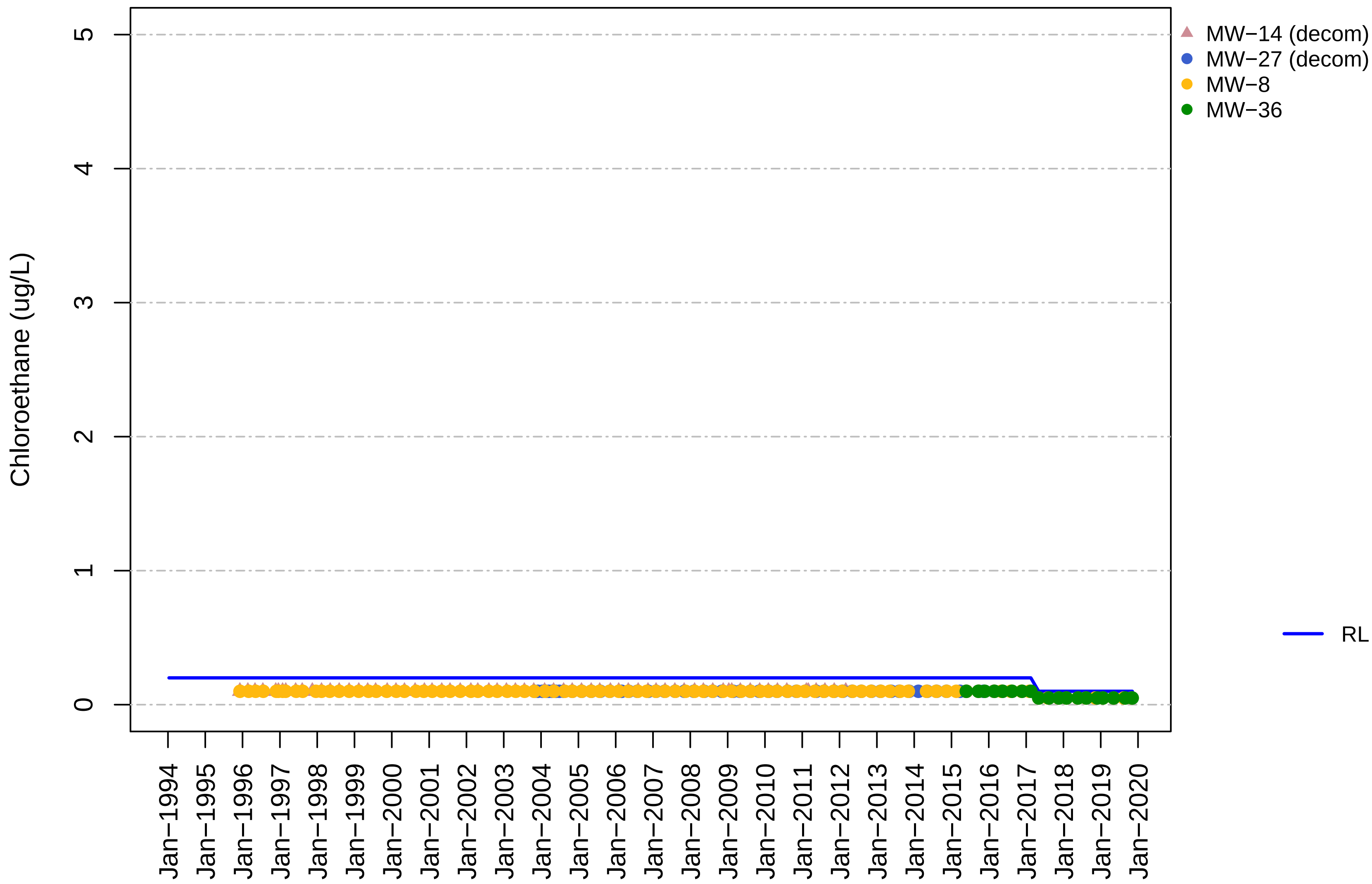
Vashon Island Closed Landfill
Channel Cc3
1,2−Dichloropropane
1,2−Dichloropropane (ug/L)
0
2
4
6
8
10
12
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.5 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

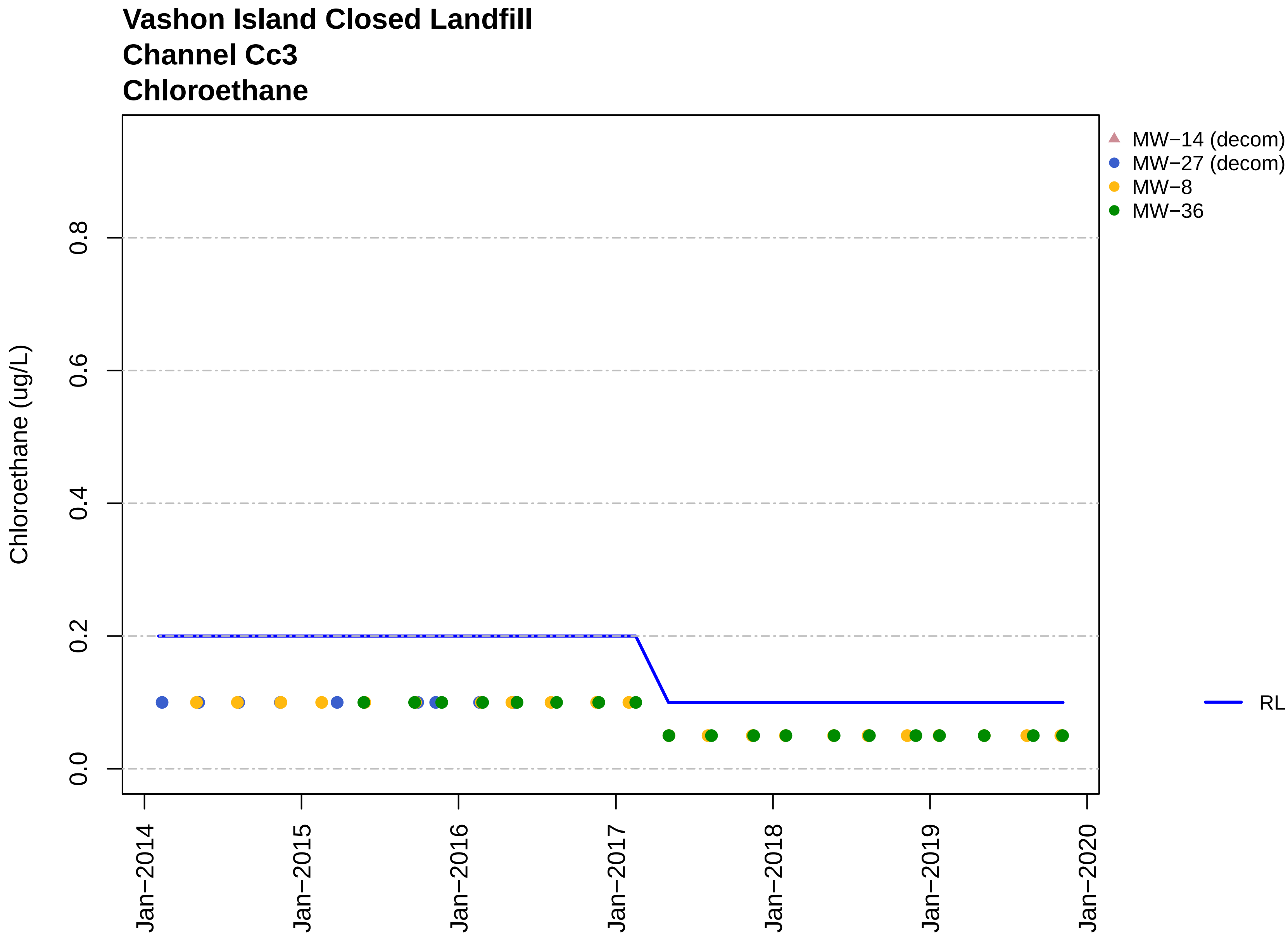

Vashon Island Closed Landfill
Channel Cc3
Benzene
Benzene (ug/L)
National Primary MCL − 5 ug/L
Washington State Groundwater Criteria − 1 ug/L
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
0
1
2
3
4
5
6
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

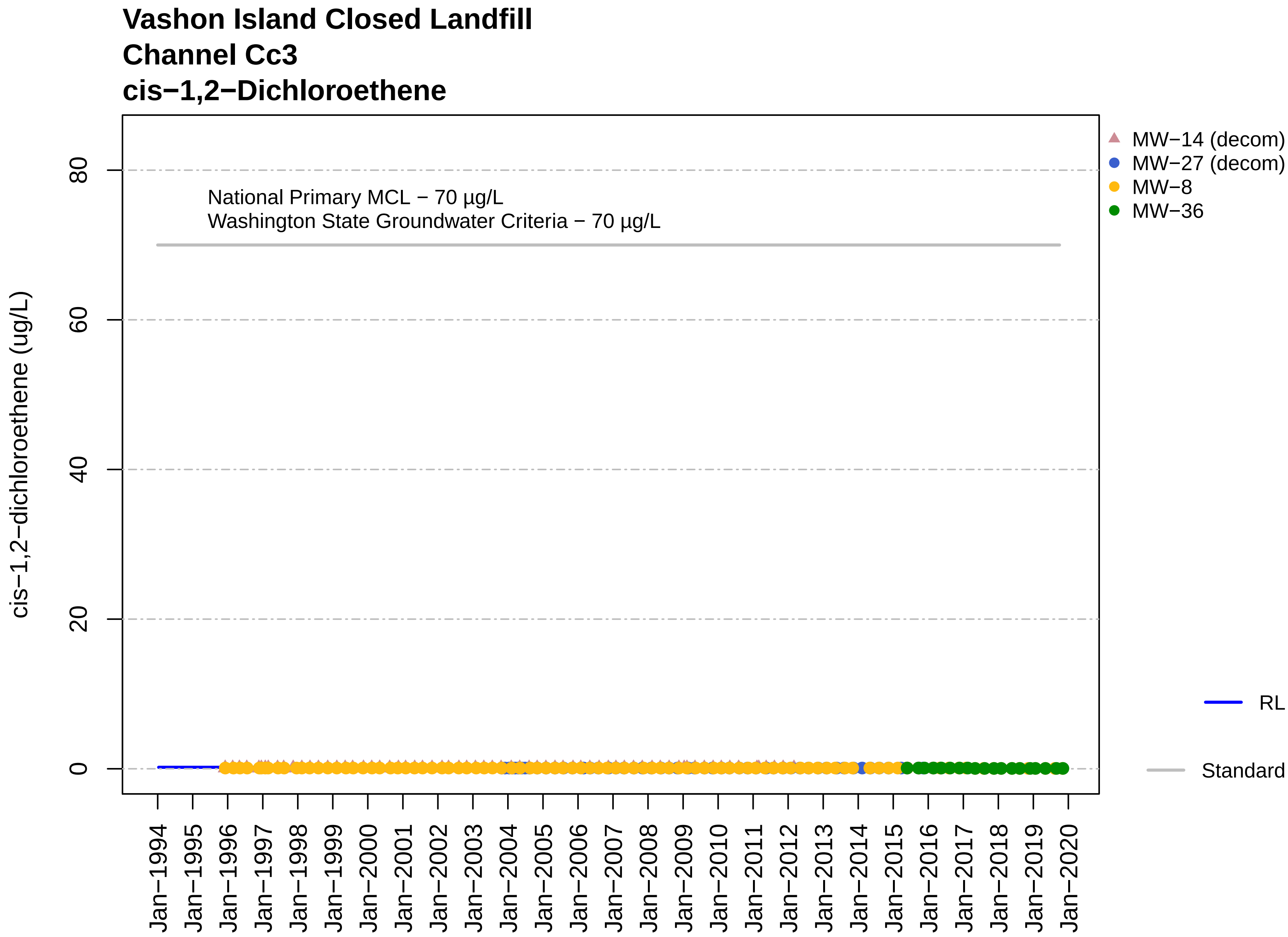


Vashon Island Closed Landfill
Channel Cc3
Benzene
Benzene (ug/L)
National Primary MCL − 5 ug/L
Washington State Groundwater Criteria − 1 ug/L
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
0
1
2
3
4
5
6
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

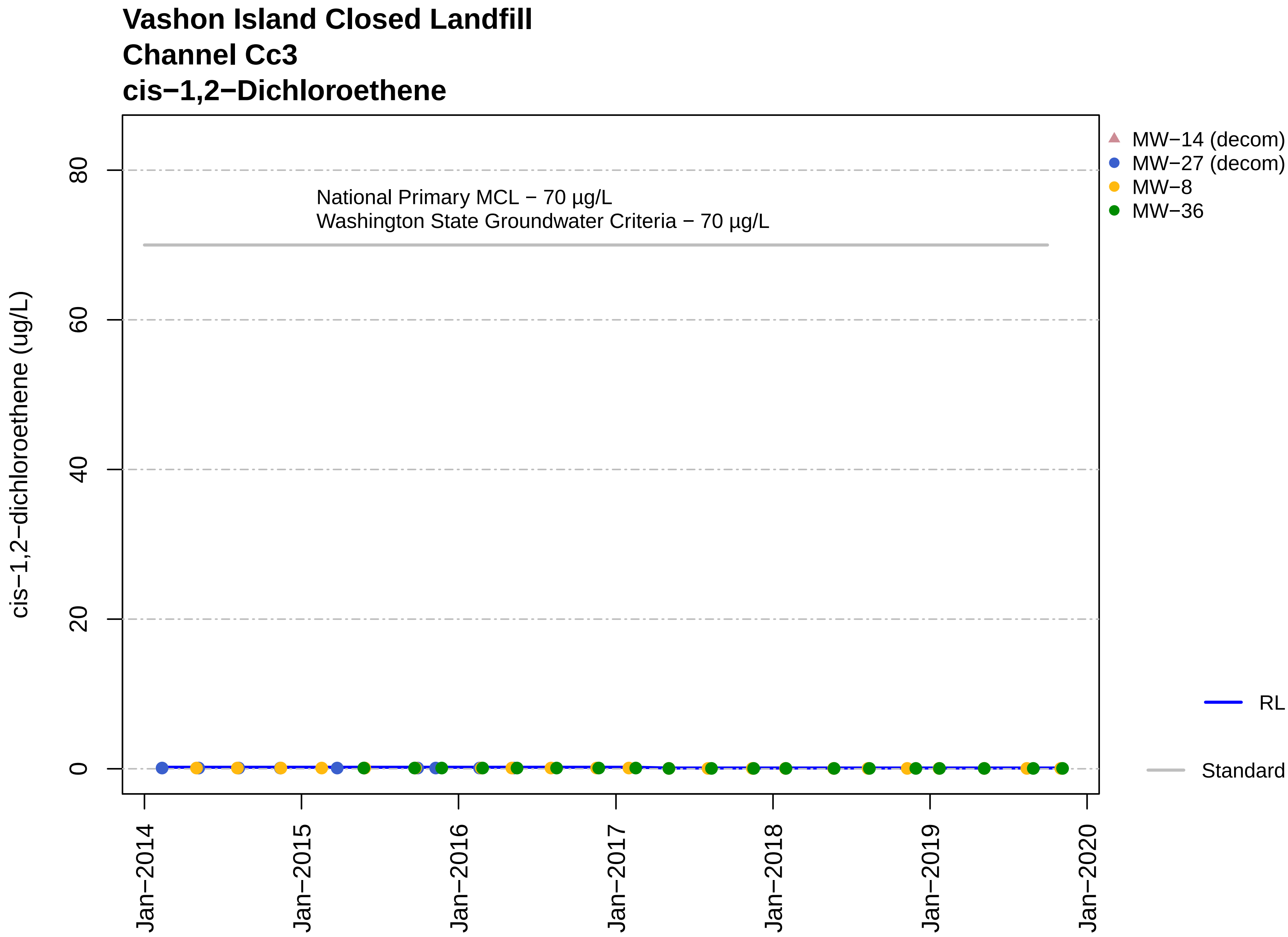
Vashon Island Closed Landfill
Channel Cc3
Chloroethane



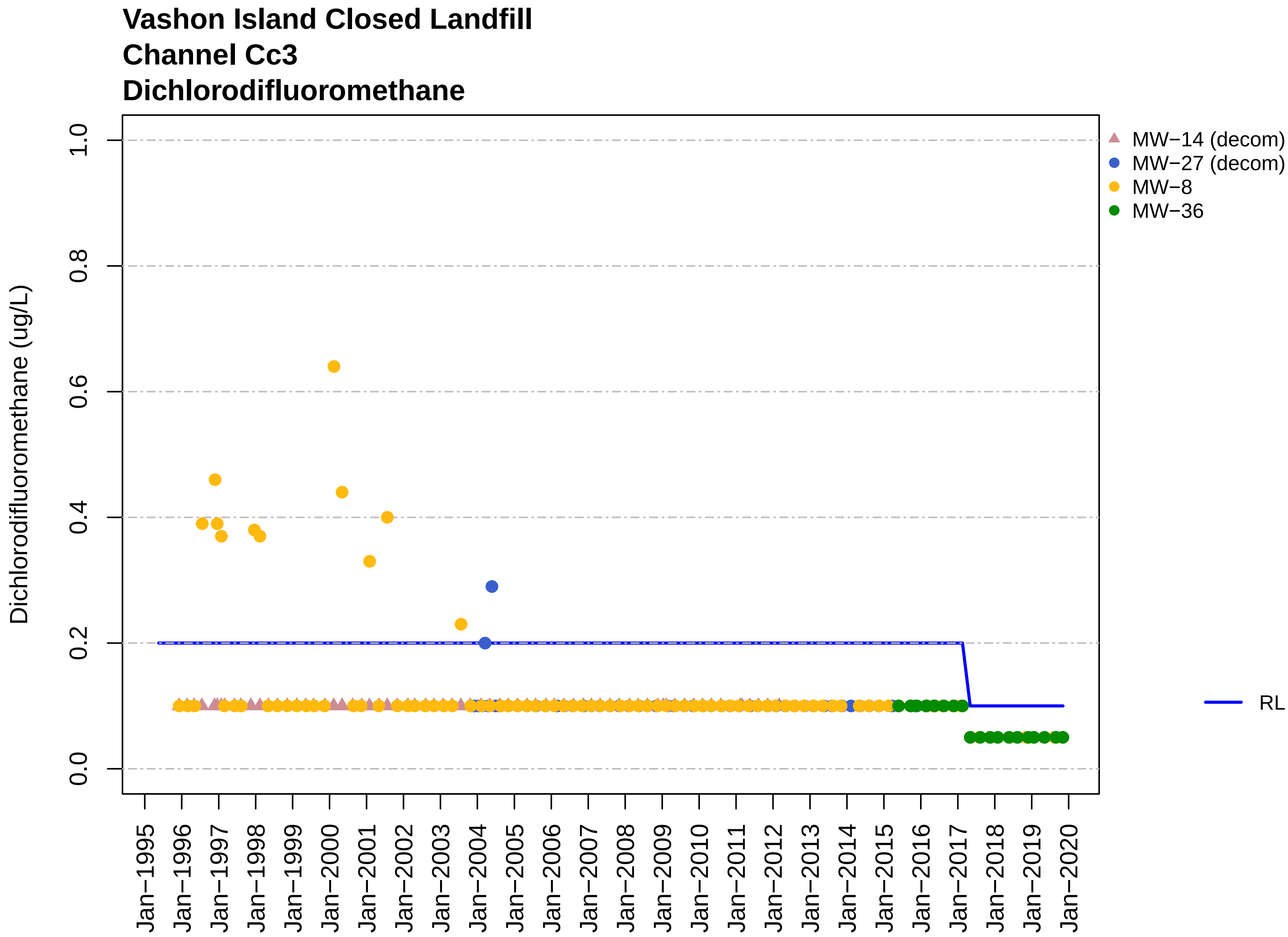

Vashon Island Closed Landfill
Channel Cc3
Chloroethane
Chloroethane (ug/L)
0.0
0.2
0.4
0.6
0.8
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL



Vashon Island Closed Landfill
Channel Cc3
cis−1,2−Dichloroethene
cis−1,2−dichloroethene (ug/L)
0
20
40
60
80
National Primary MCL − 70 µg/L
Washington State Groundwater Criteria − 70 µg/L
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

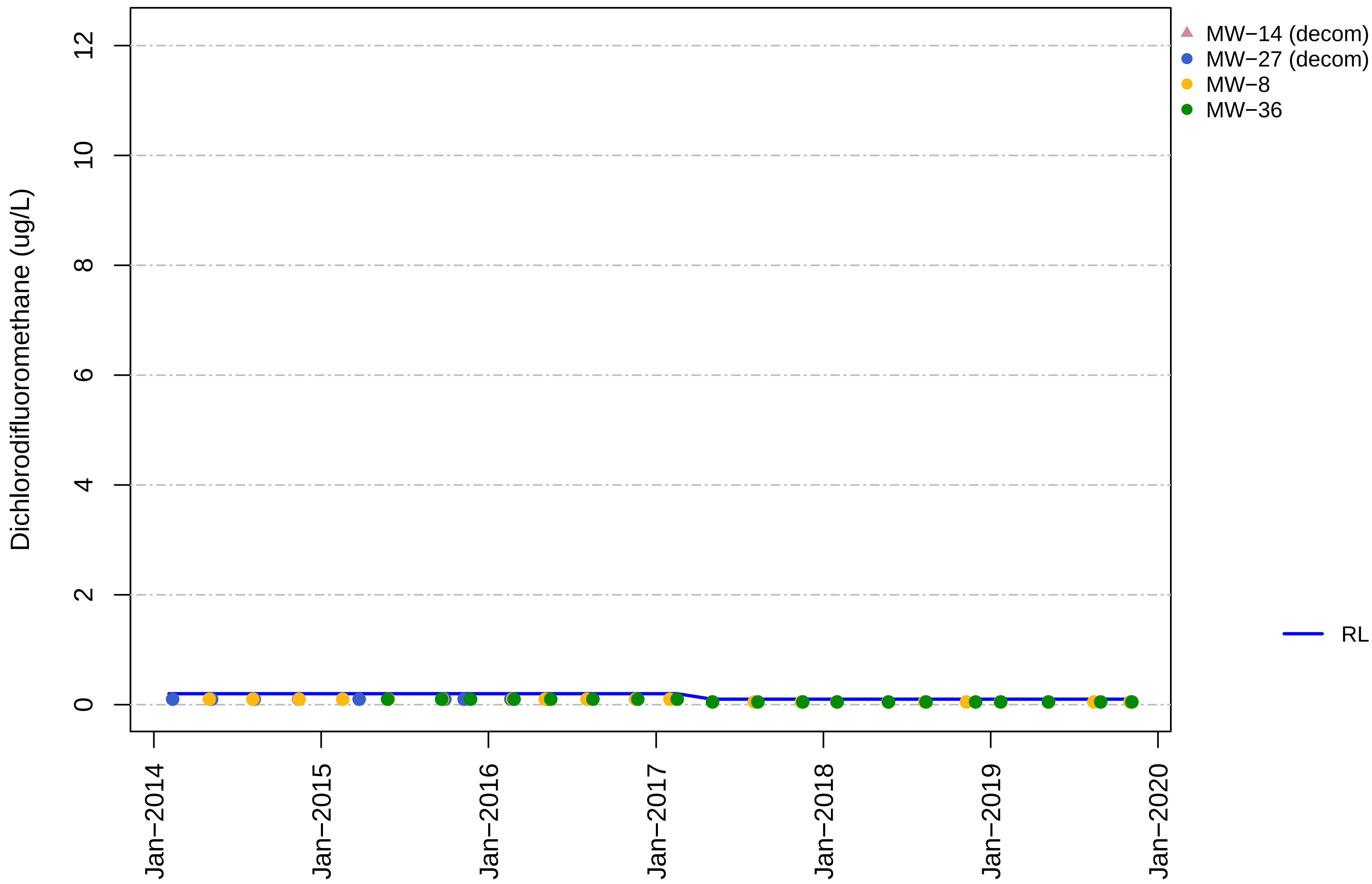


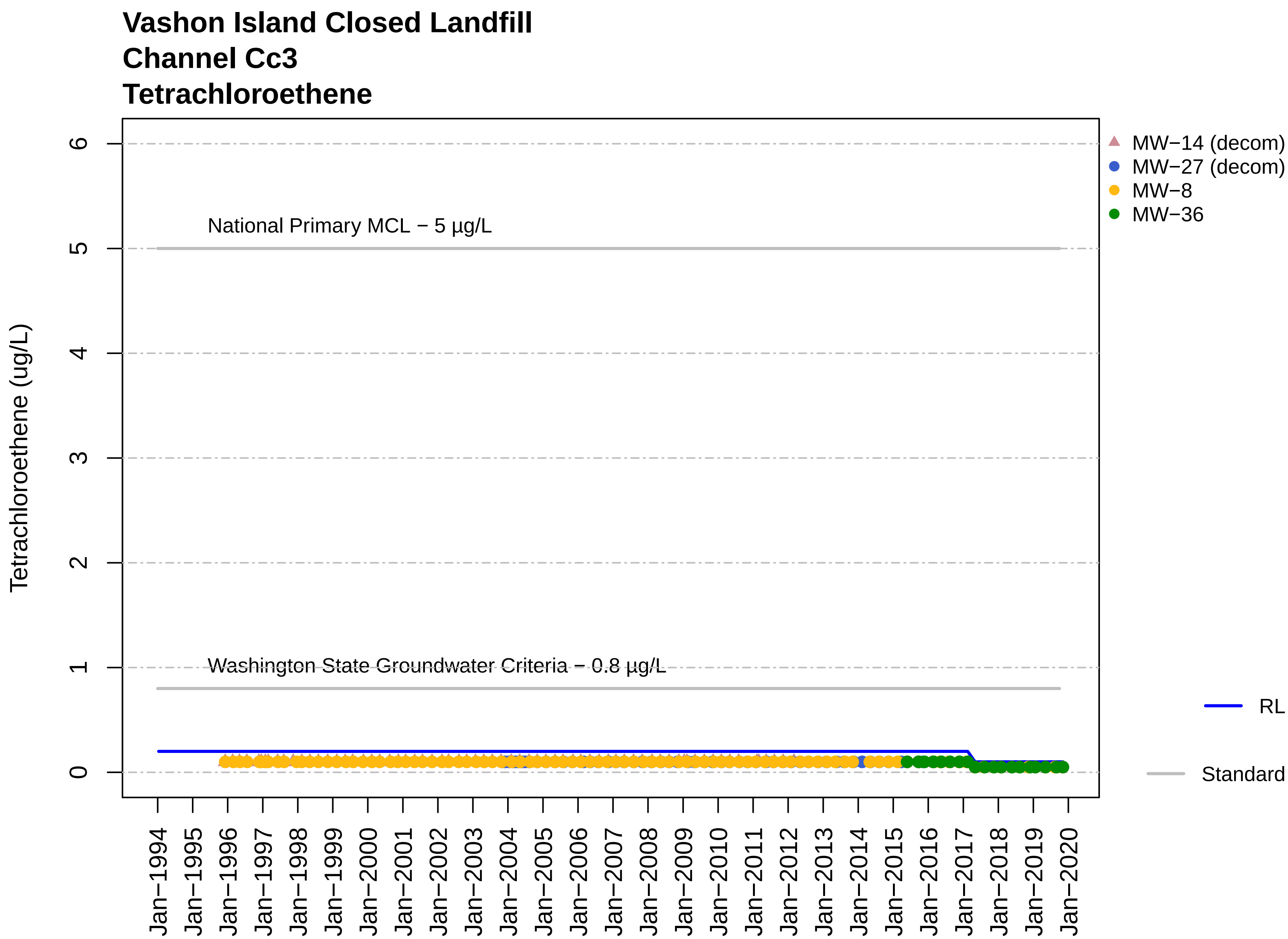
Vashon Island Closed Landfill
Channel Cc3
cis−1,2−Dichloroethene
National Primary MCL − 70 µg/L
Washington State Groundwater Criteria − 70 µg/L
cis−1,2−dichloroethene (ug/L)
0
20
40
60
80
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

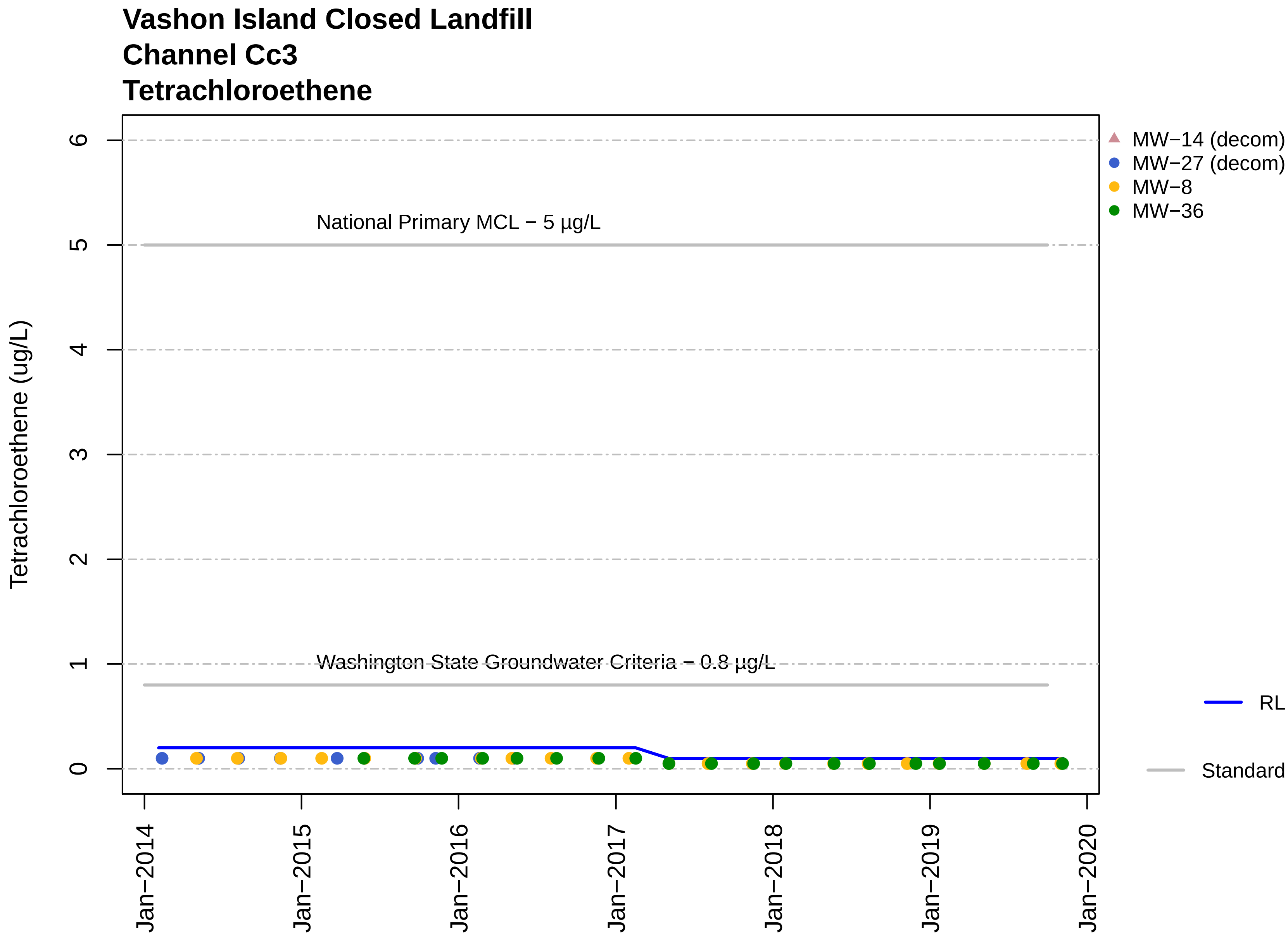


Vashon Island Closed Landfill
Channel Cc3
Dichlorodifluoromethane
Dichlorodifluoromethane (ug/L)
0.0
0.2
0.4
0.6
0.8
1.0
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL

Vashon Island Closed Landfill
Channel Cc3
Dichlorodifluoromethane

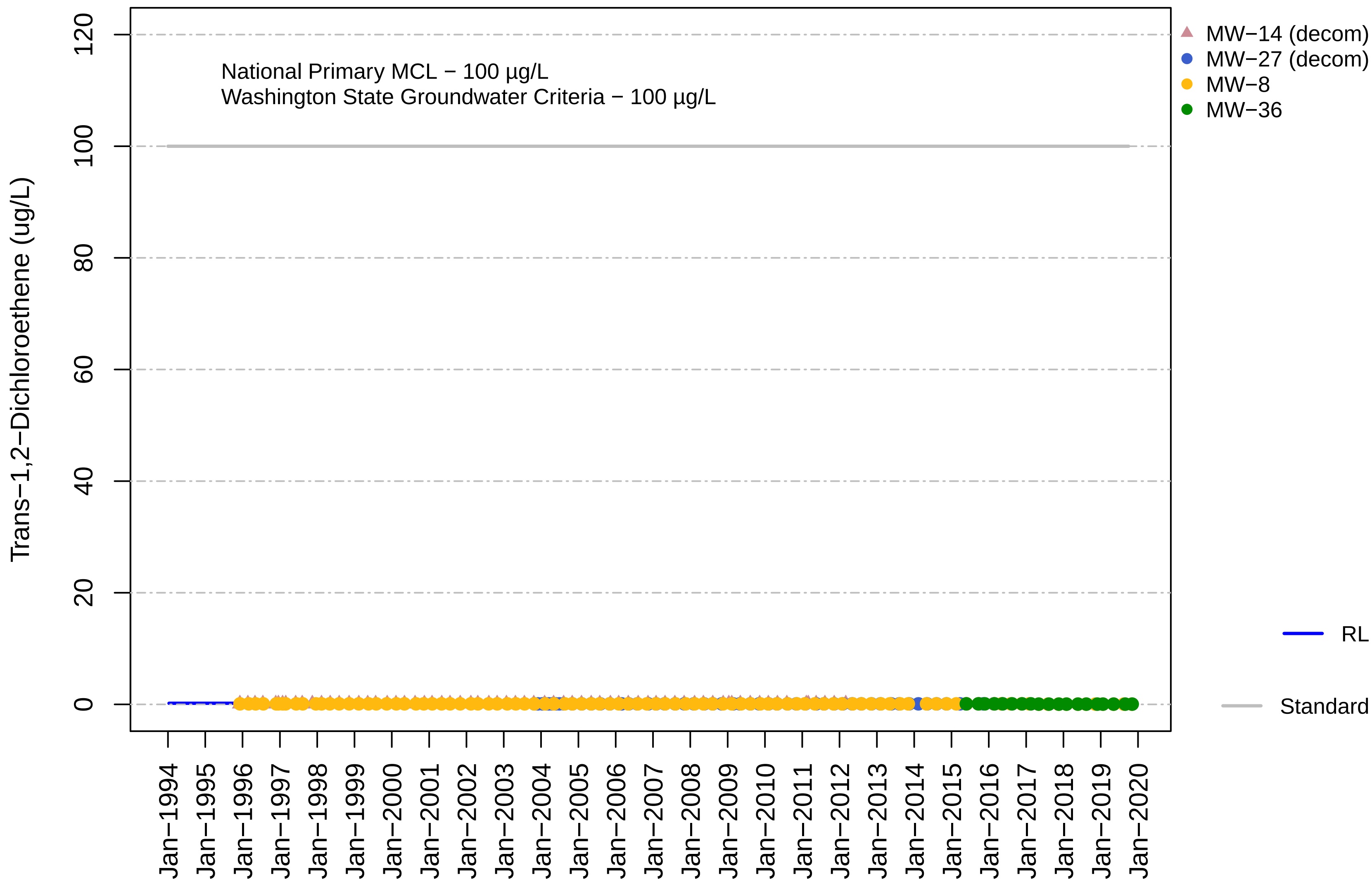


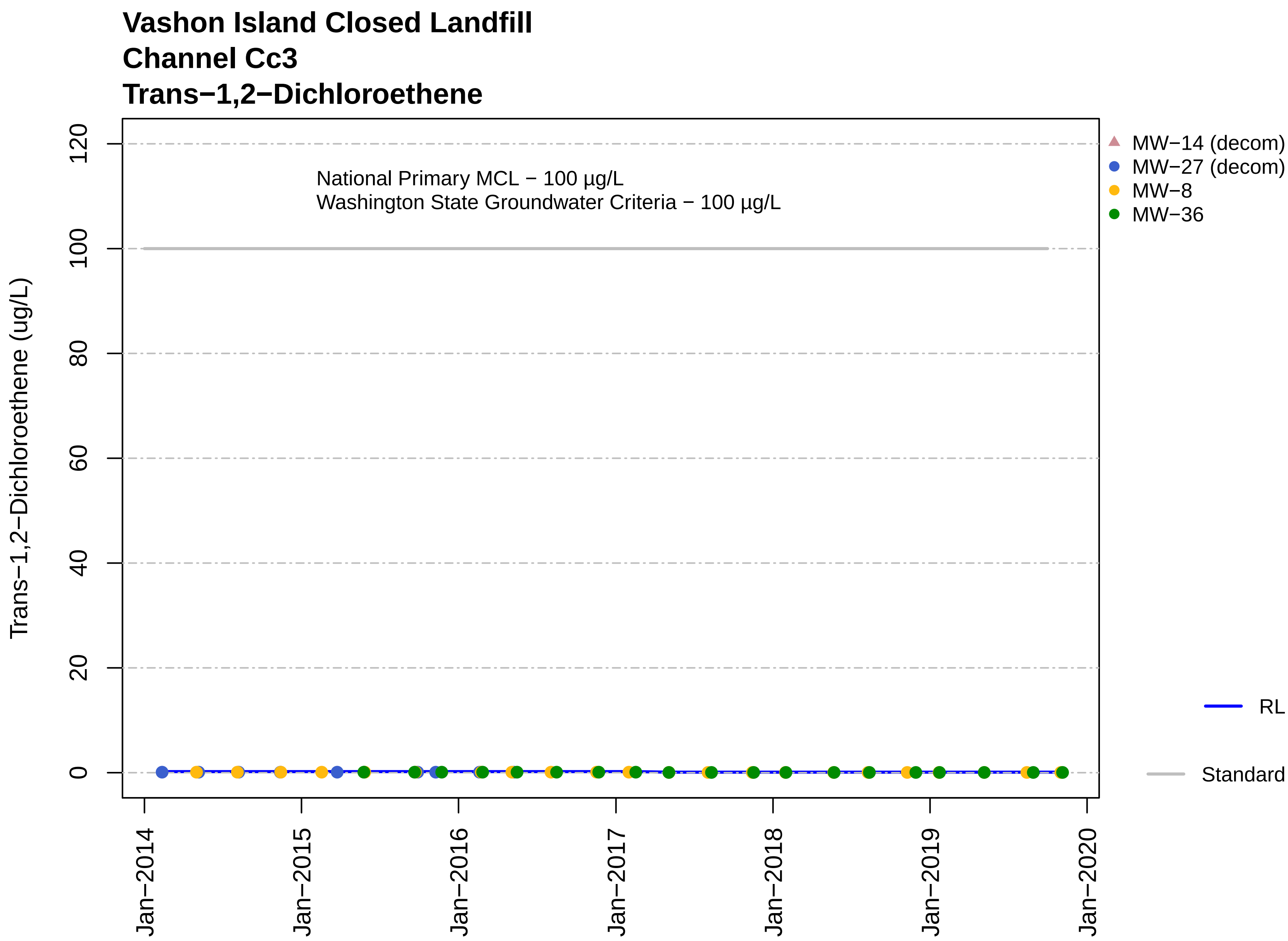

Vashon Island Closed Landfill
Channel Cc3
Tetrachloroethene
Tetrachloroethene (ug/L)
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.8 µg/L
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
0
1
2
3
4
5
6
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020



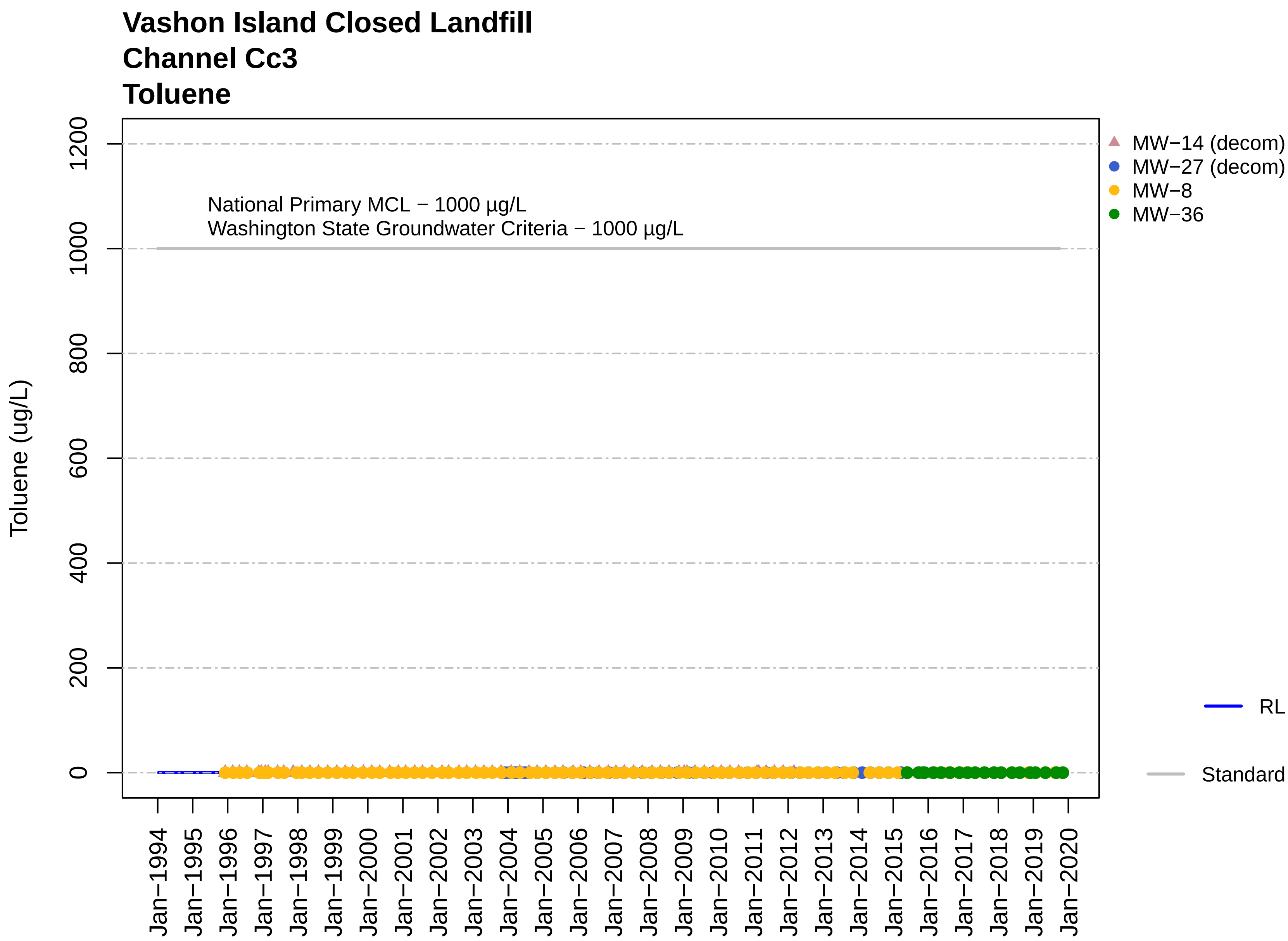
Vashon Island Closed Landfill
Channel Cc3
Tetrachloroethene
Tetrachloroethene (ug/L)
0
1
2
3
4
5
6
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.8 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

Vashon Island Closed Landfill
Channel Cc3
Trans−1,2−Dichloroethene

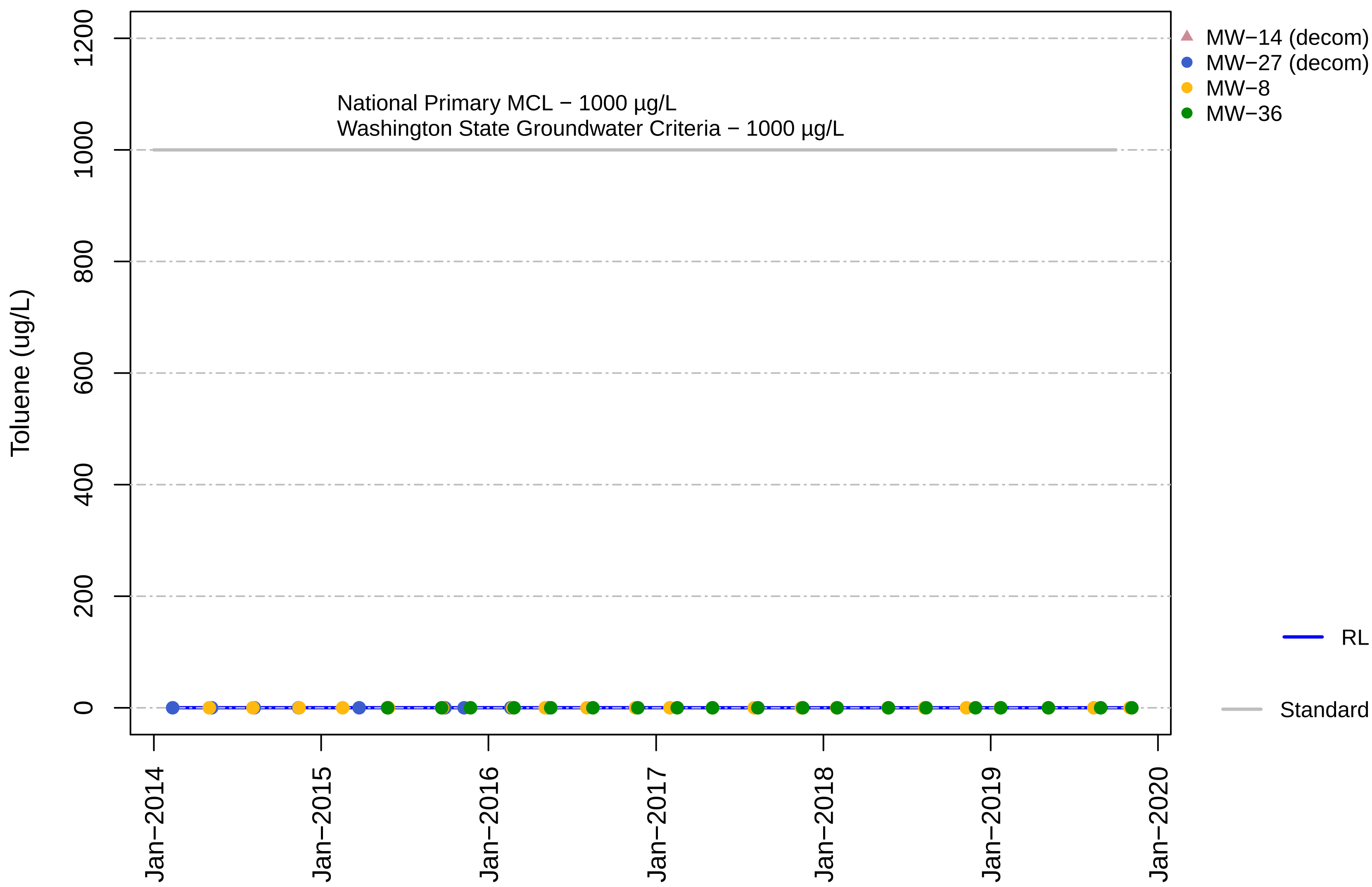




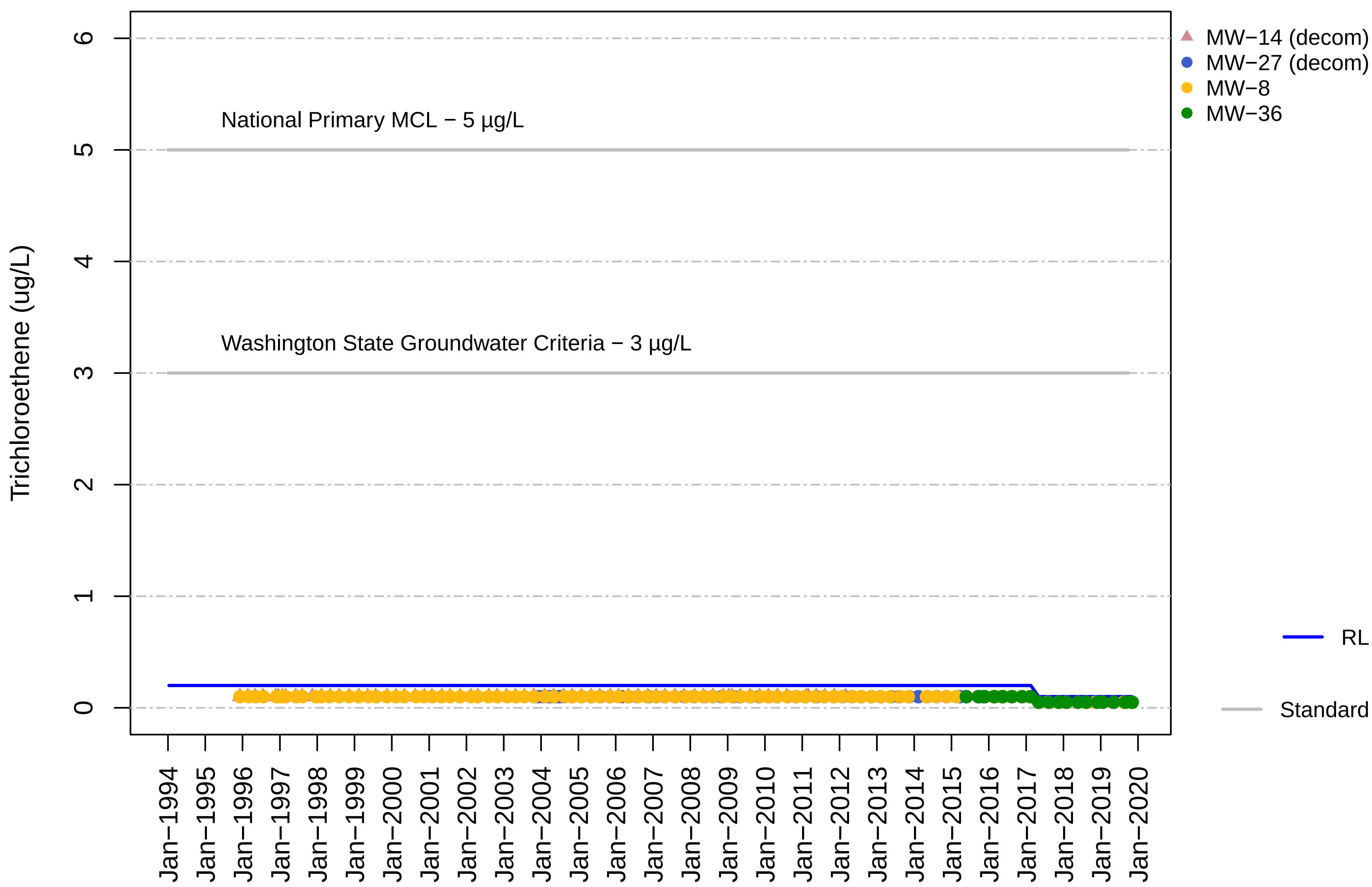
Vashon Island Closed Landfill
Channel Cc3
Trans−1,2−Dichloroethene
National Primary MCL − 100 µg/L
Washington State Groundwater Criteria − 100 µg/L
Trans−1,2−Dichloroethene (ug/L)
0
20
40
60
80
100
120
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

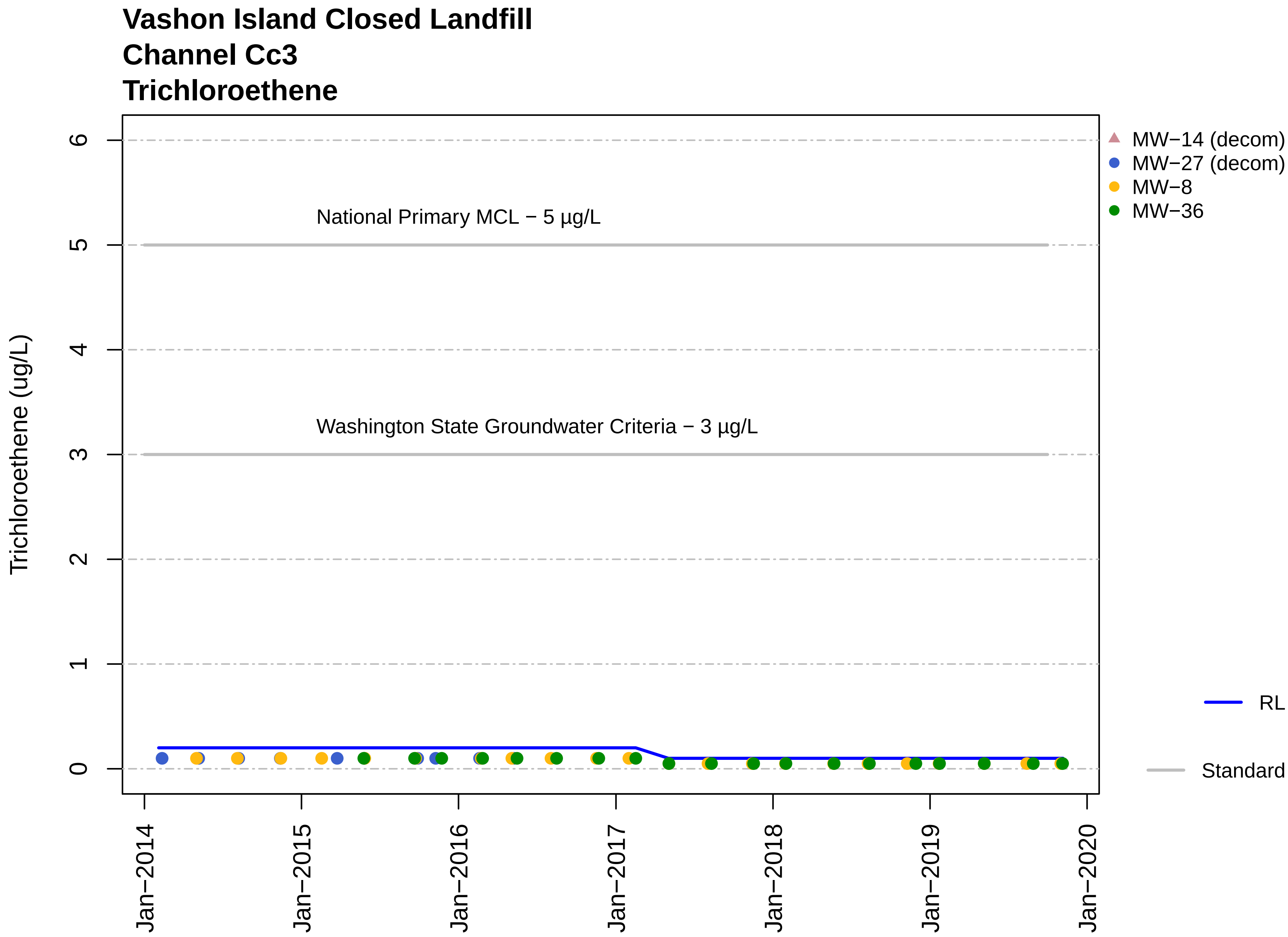

Vashon Island Closed Landfill
Channel Cc3
Toluene
Toluene (ug/L)
0
200
400
600
800
1000
1200
National Primary MCL − 1000 µg/L
Washington State Groundwater Criteria − 1000 µg/L
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

Vashon Island Closed Landfill
Channel Cc3
Toluene

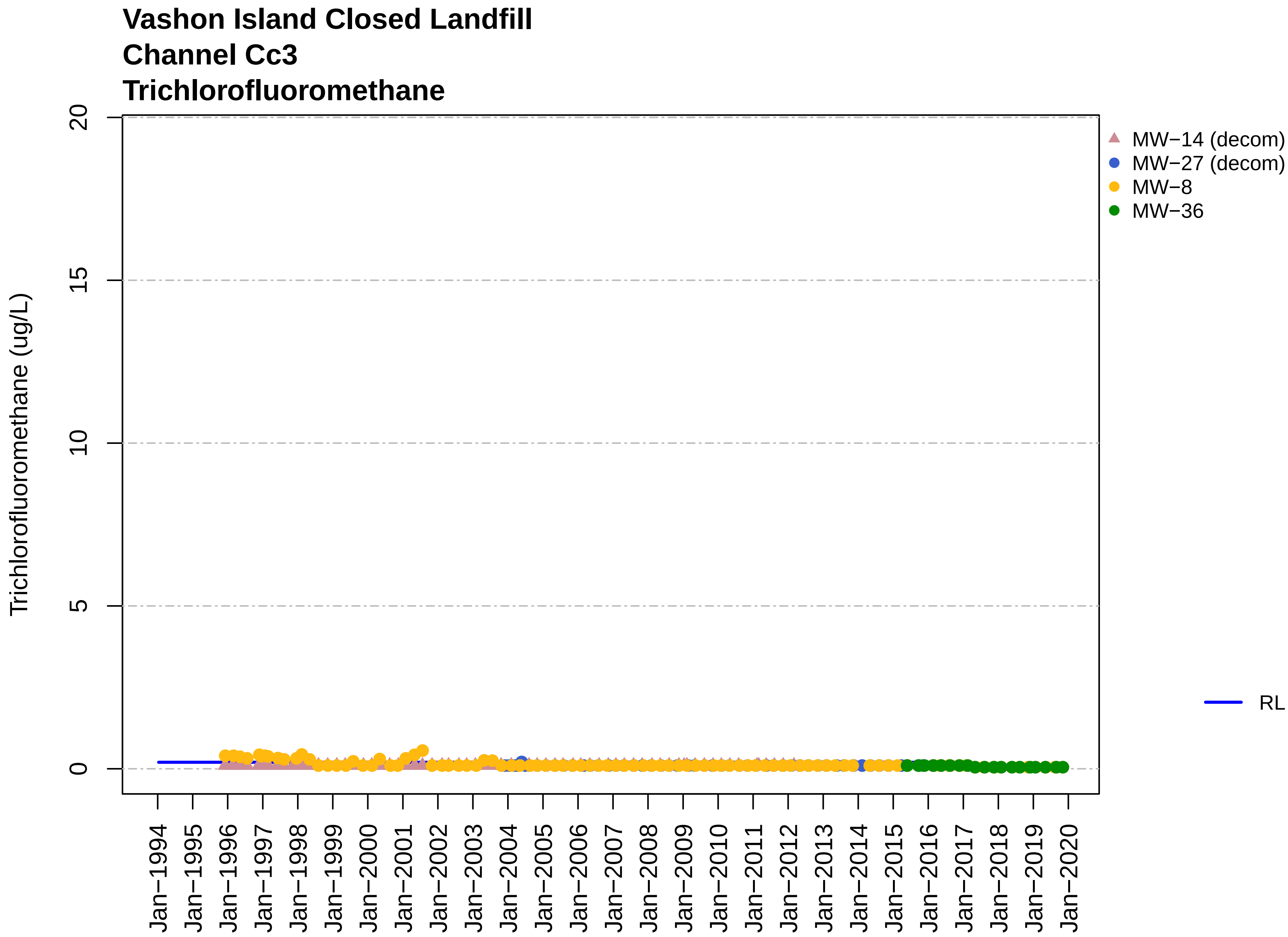


Vashon Island Closed Landfill
Channel Cc3
Trichloroethene

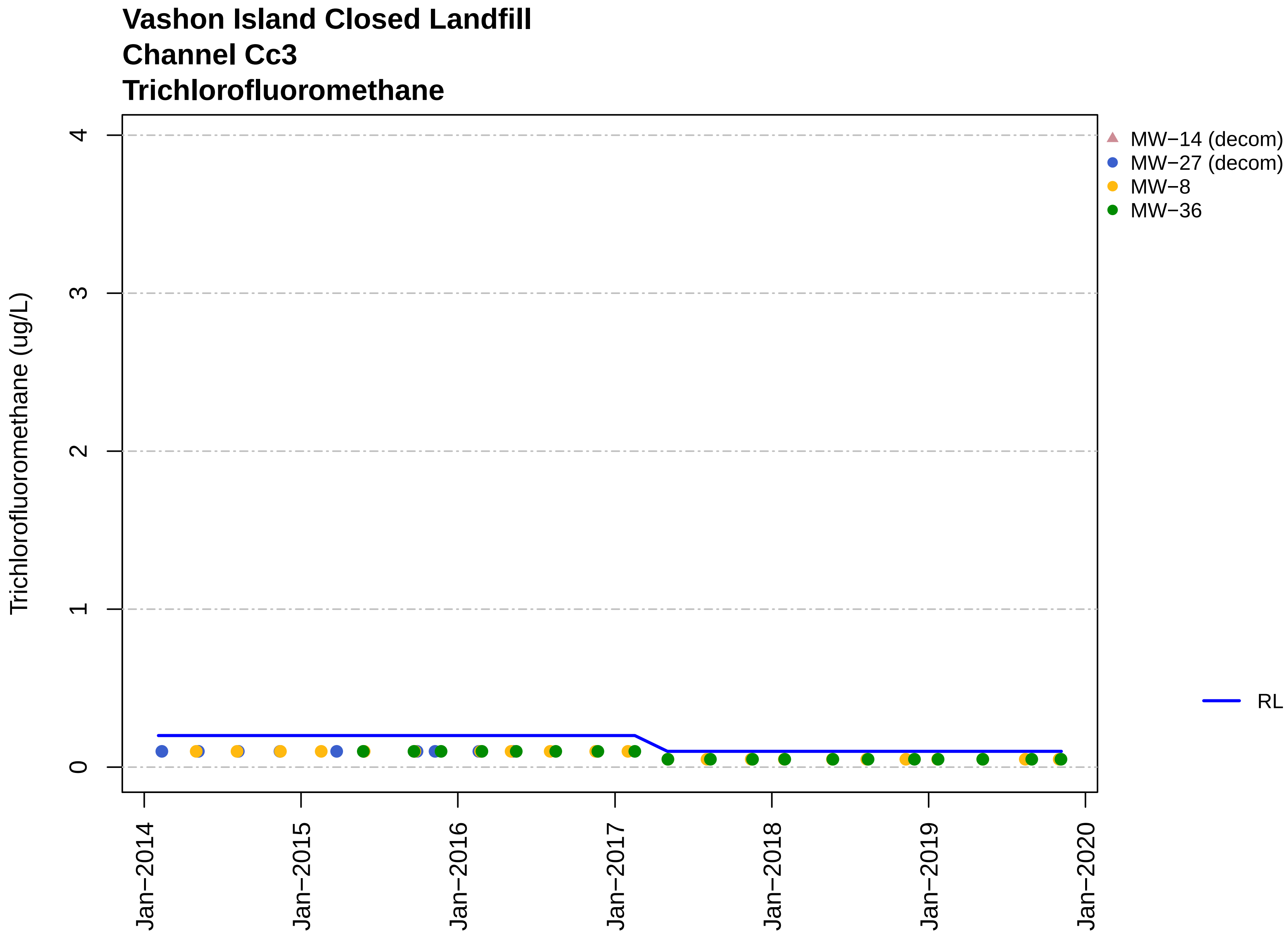




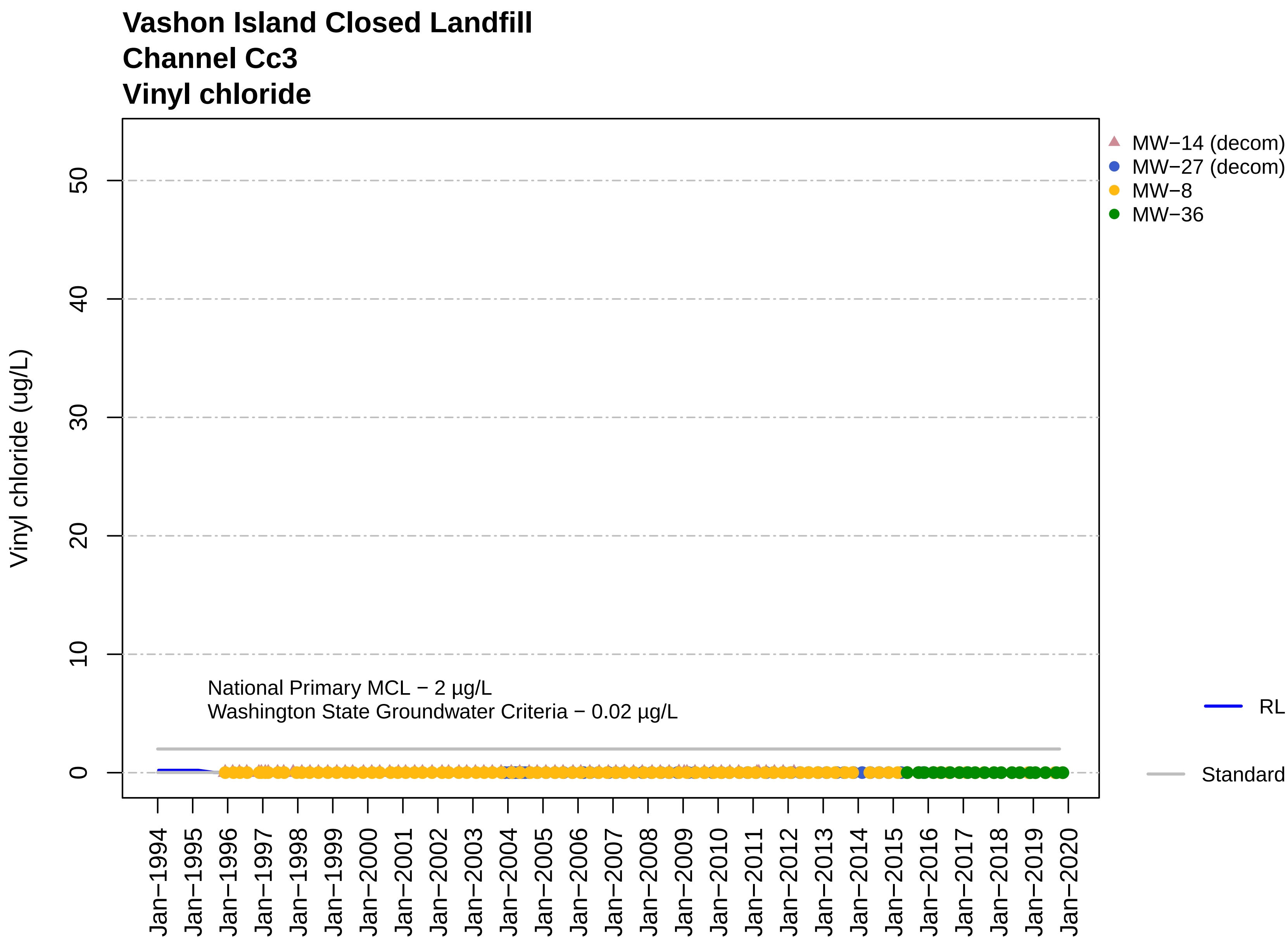
Vashon Island Closed Landfill
Channel Cc3
Trichloroethene
Trichloroethene (ug/L)
0
1
2
3
4
5
6
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 3 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

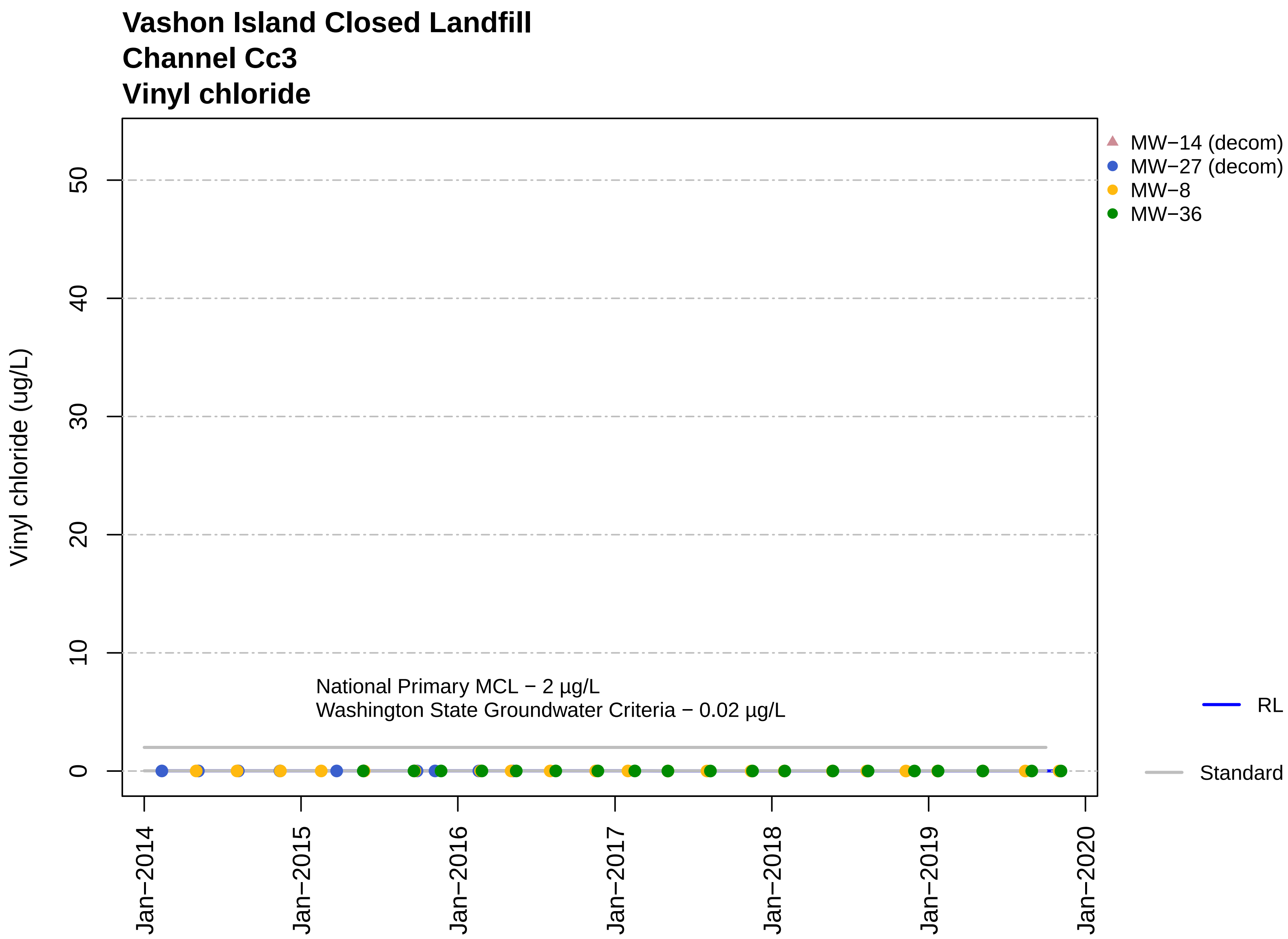


Vashon Island Closed Landfill
Channel Cc3
Trichlorofluoromethane
Trichlorofluoromethane (ug/L)
0
5
10
15
20
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020



Vashon Island Closed Landfill
Channel Cc3
Trichlorofluoromethane
Trichlorofluoromethane (ug/L)
0
1
2
3
4
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL

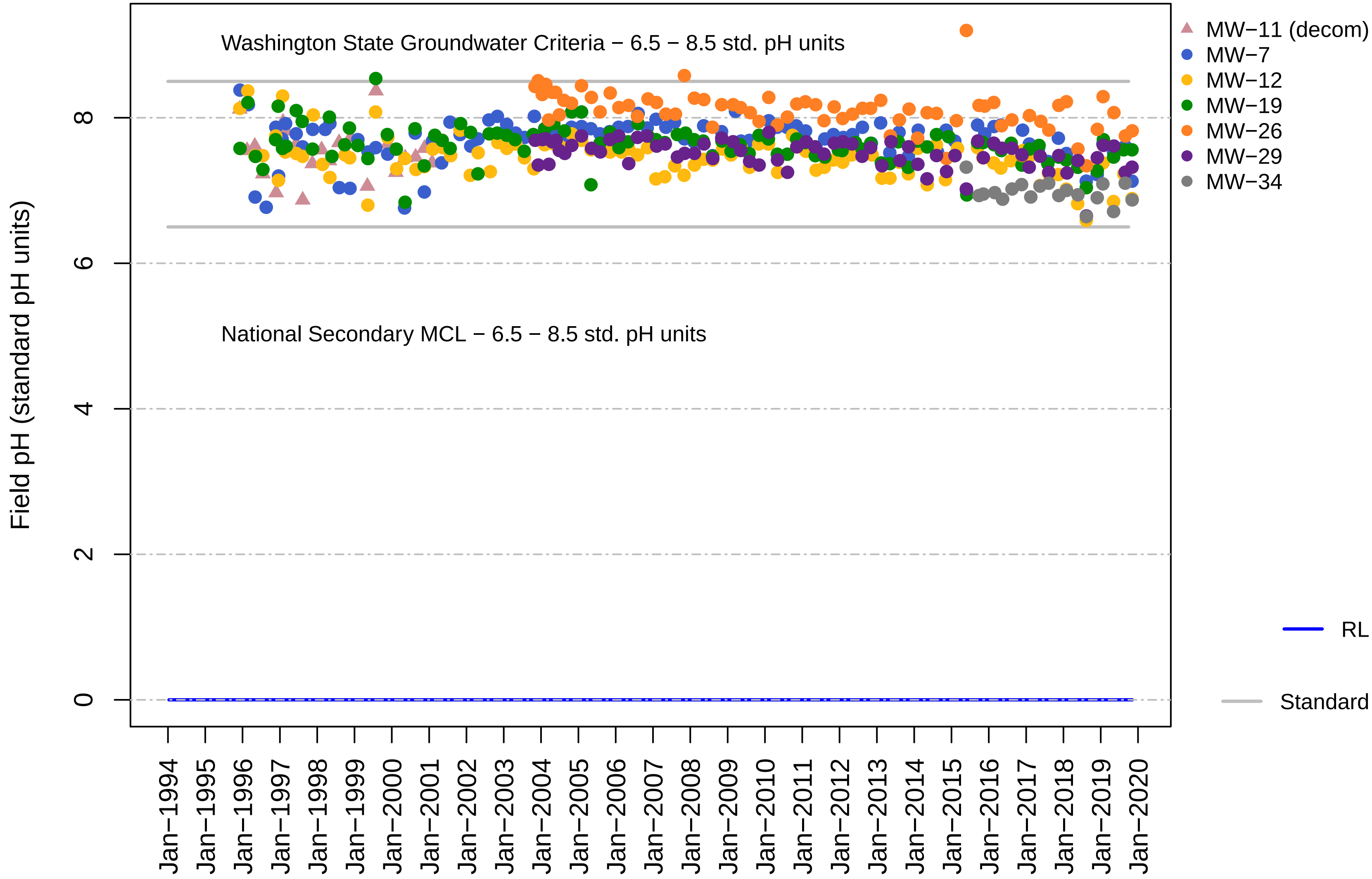

Vashon Island Closed Landfill
Channel Cc3
Vinyl chloride
Vinyl chloride (ug/L)
0
10
20
30
40
50
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
National Primary MCL − 2 µg/L
Washington State Groundwater Criteria − 0.02 µg/L
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

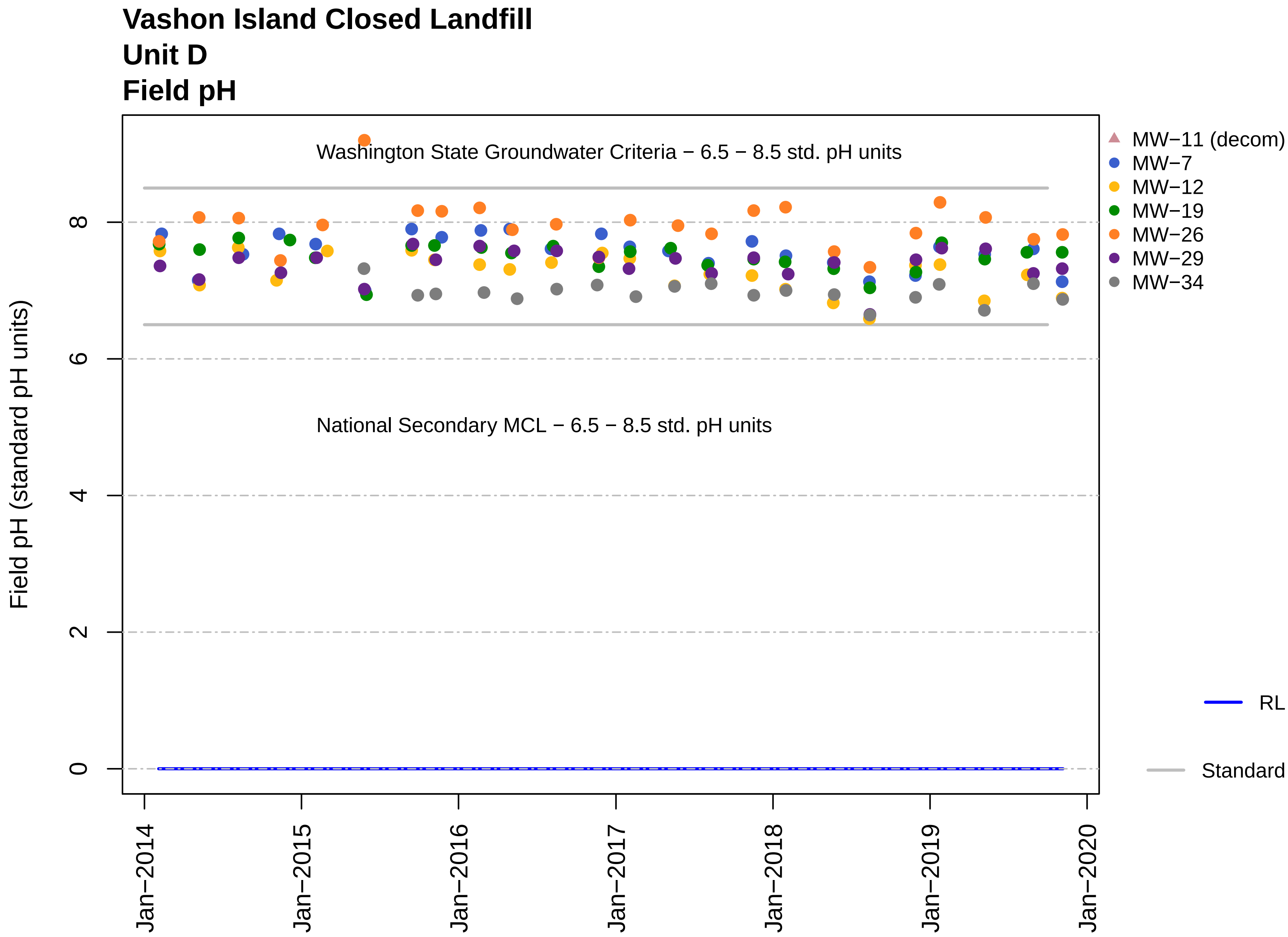

Vashon Island Closed Landfill
Channel Cc3
Vinyl chloride
Vinyl chloride (ug/L)
0
10
20
30
40
50
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
National Primary MCL − 2 µg/L
Washington State Groundwater Criteria − 0.02 µg/L
MW−14 (decom)
MW−27 (decom)
MW−8
MW−36
RL
Standard

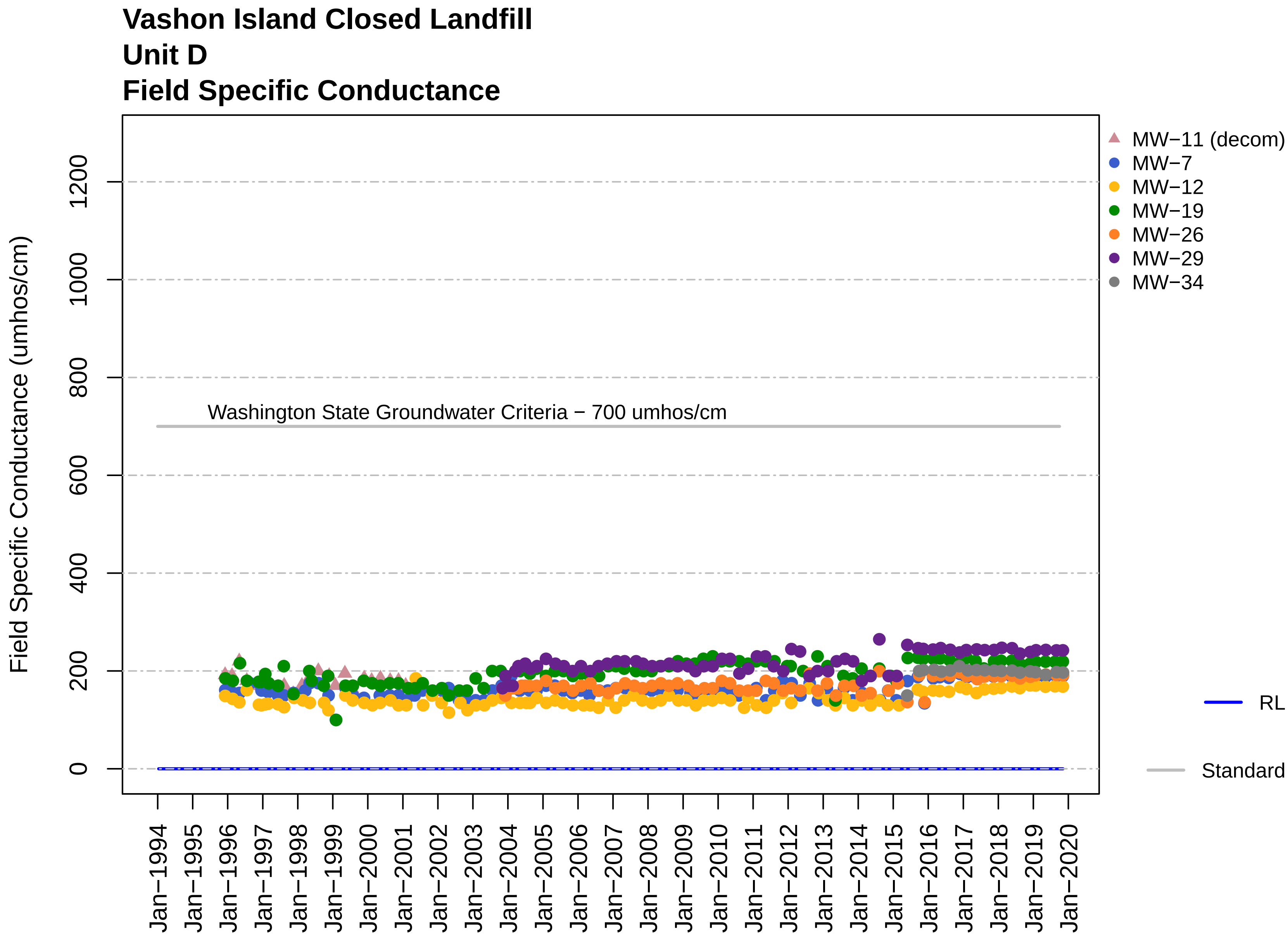
Appendix F

Time Concentration Plots for
Groundwater in Unit D Aquifer

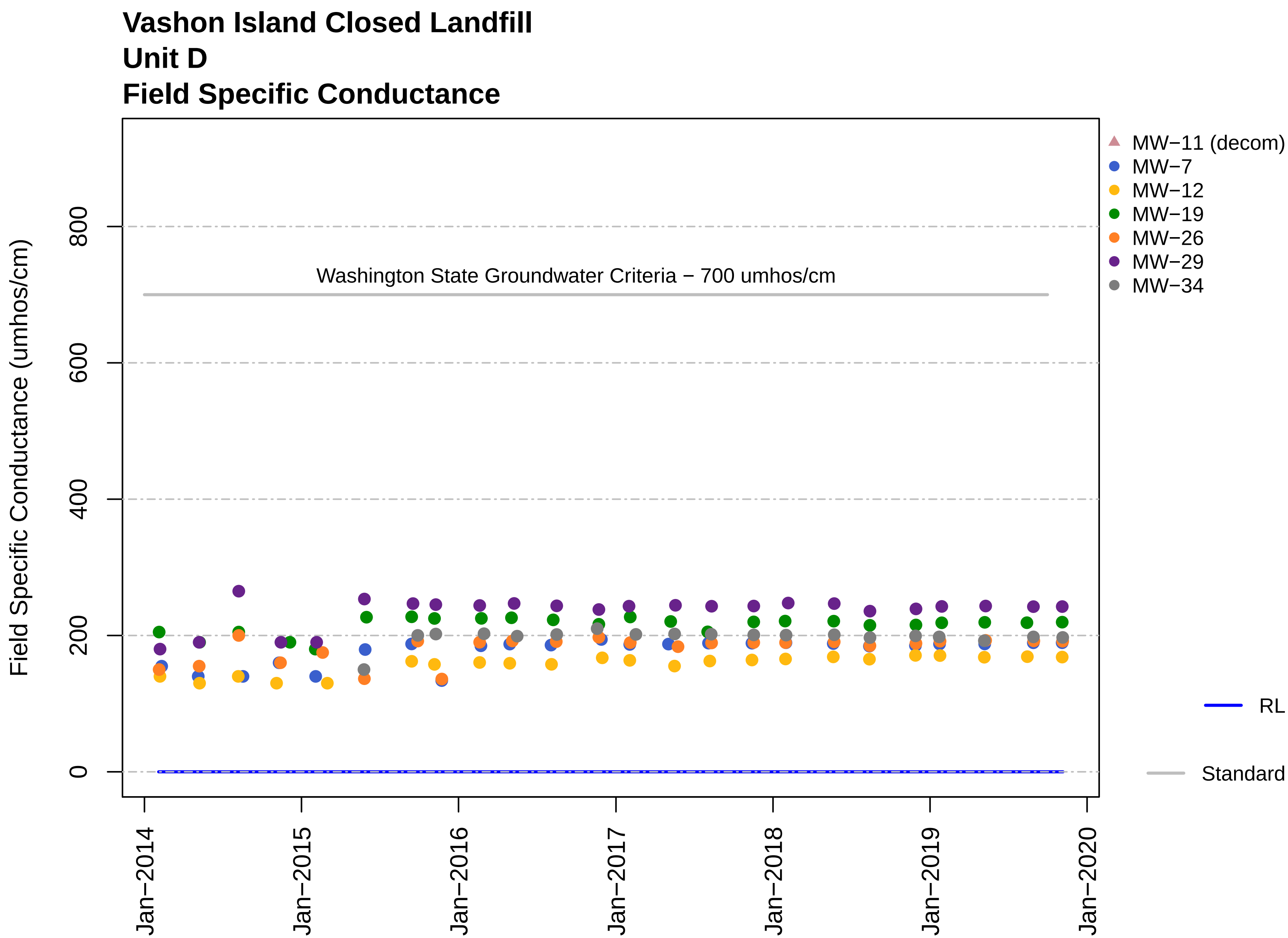
Vashon Island Closed Landfill
Unit D
Field pH



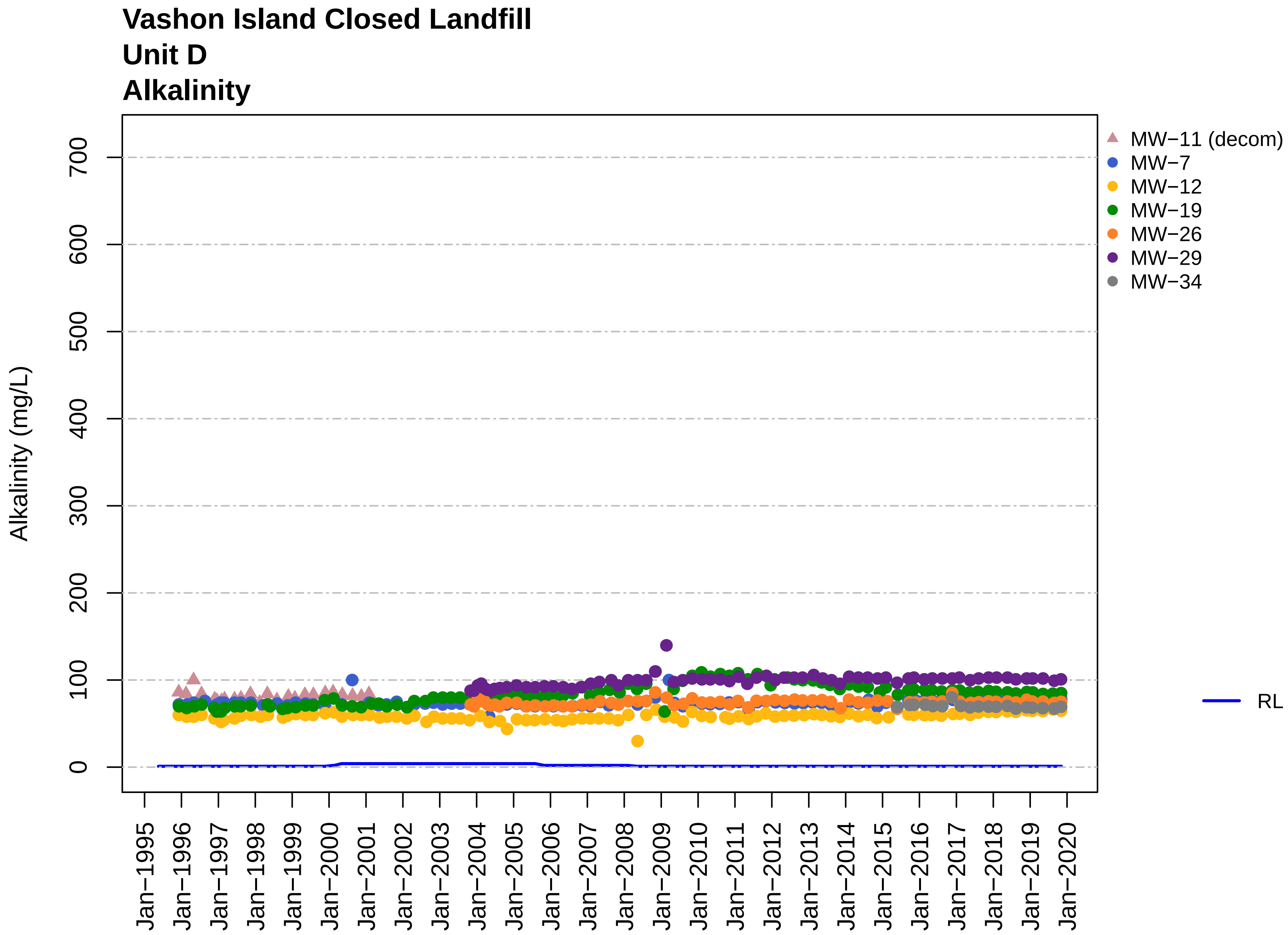

Vashon Island Closed Landfill
Unit D
Field pH
Washington State Groundwater Criteria − 6.5 − 8.5 std. pH units
National Secondary MCL − 6.5 − 8.5 std. pH units
Field pH (standard pH units)
0
2
4
6
8
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

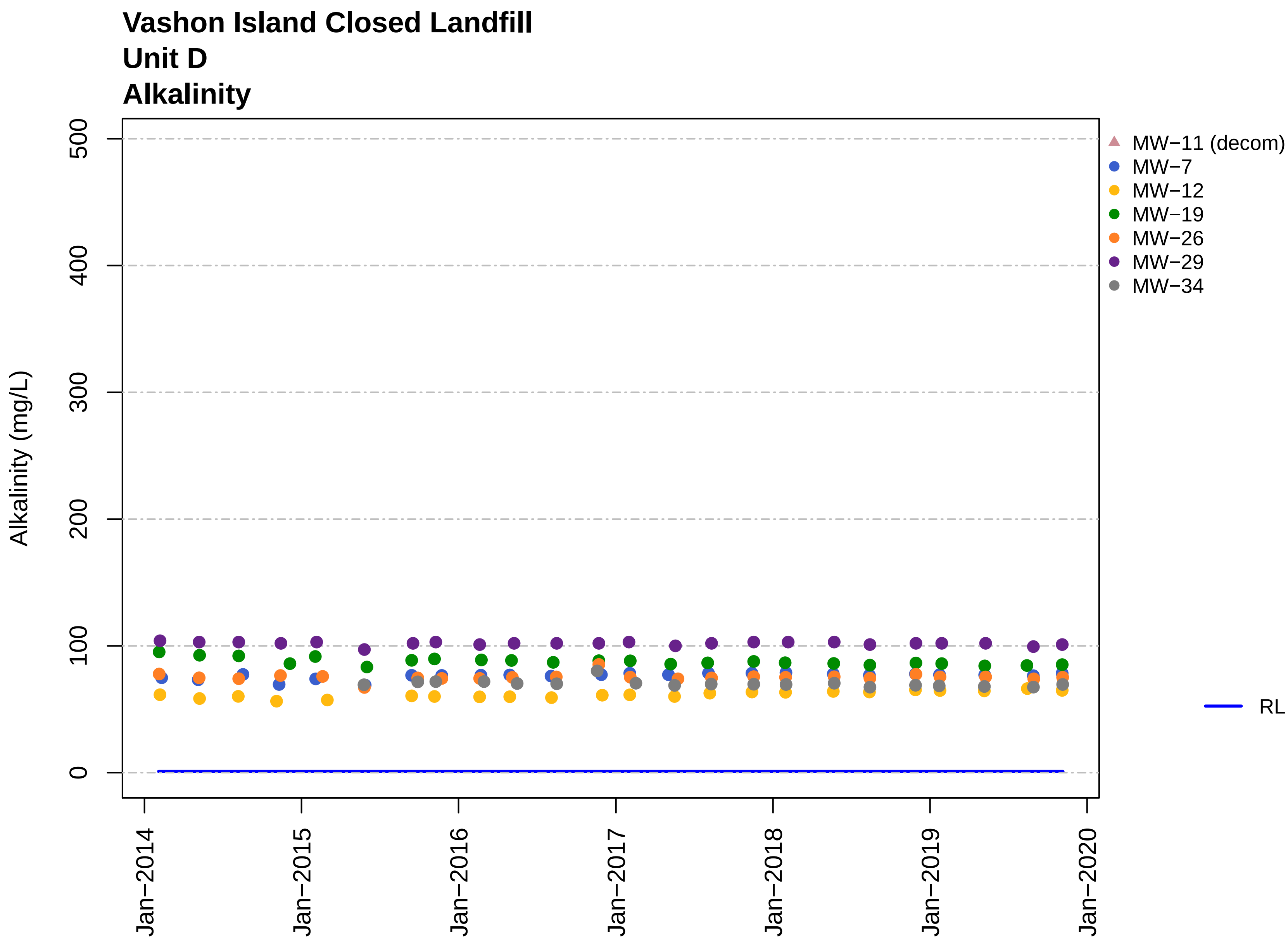


Vashon Island Closed Landfill
Unit D
Field Specific Conductance
Field Specific Conductance (umhos/cm)
0
200
400
600
800
1000
1200
Washington State Groundwater Criteria − 700 umhos/cm
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard



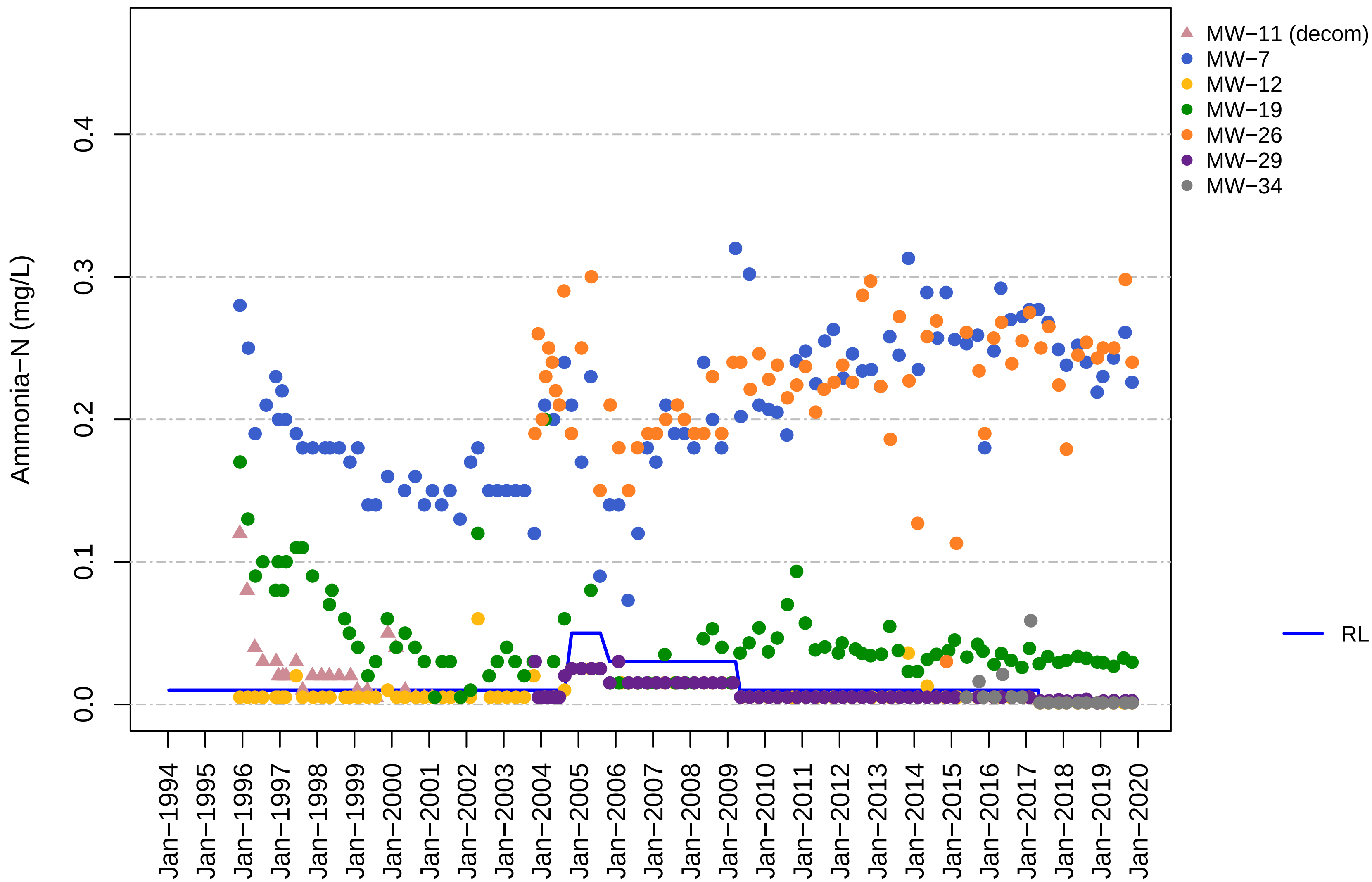
Vashon Island Closed Landfill
Unit D
Field Specific Conductance
Field Specific Conductance (umhos/cm)
Washington State Groundwater Criteria − 700 umhos/cm
0
200
400
600
800
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

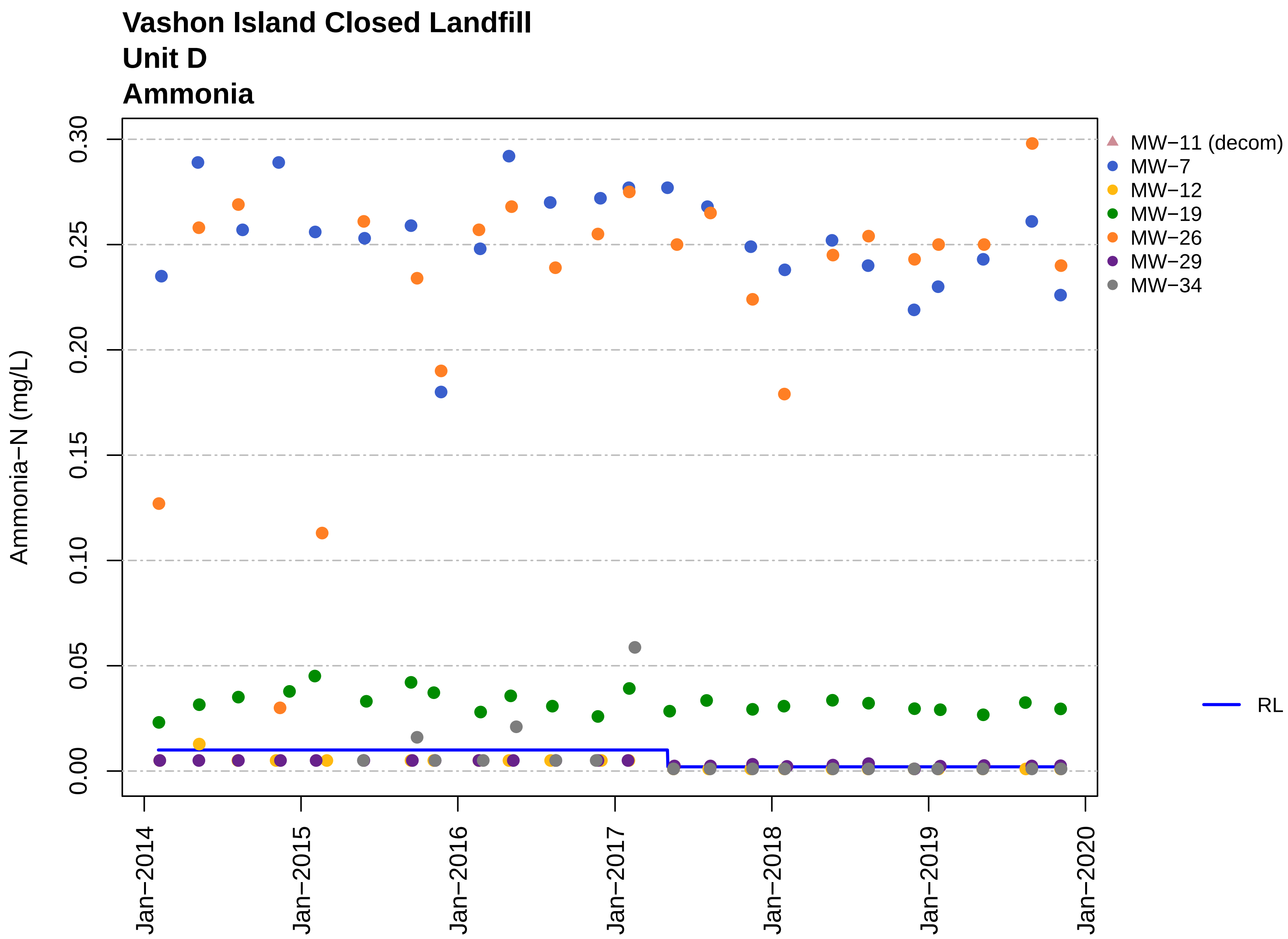

Vashon Island Closed Landfill
Unit D
Alkalinity
Alkalinity (mg/L)
0
100
200
300
400
500
600
700
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL



Vashon Island Closed Landfill
Unit D
Alkalinity
Alkalinity (mg/L)
0
100
200
300
400
500
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL

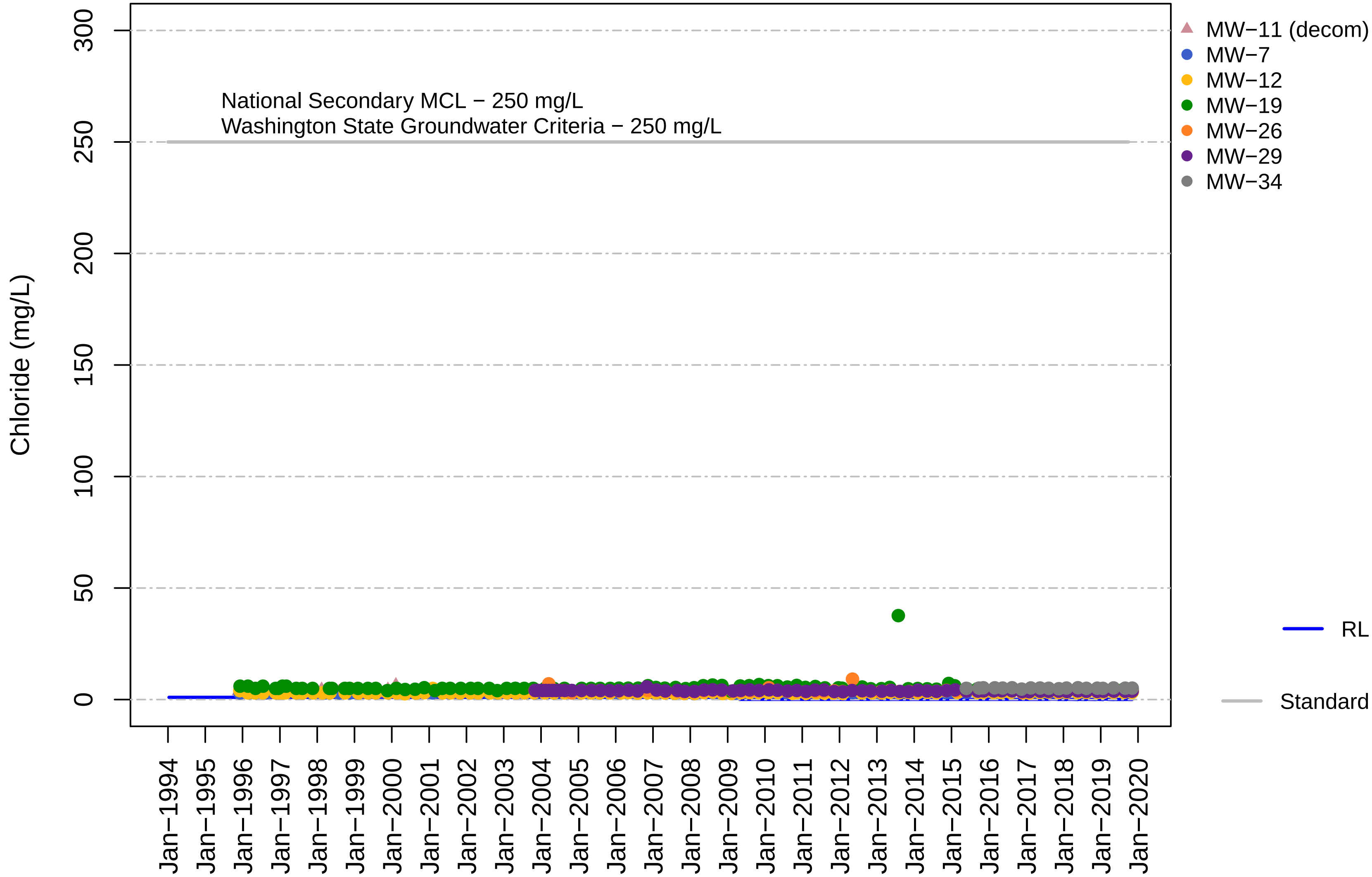
Vashon Island Closed Landfill
Unit D
Ammonia

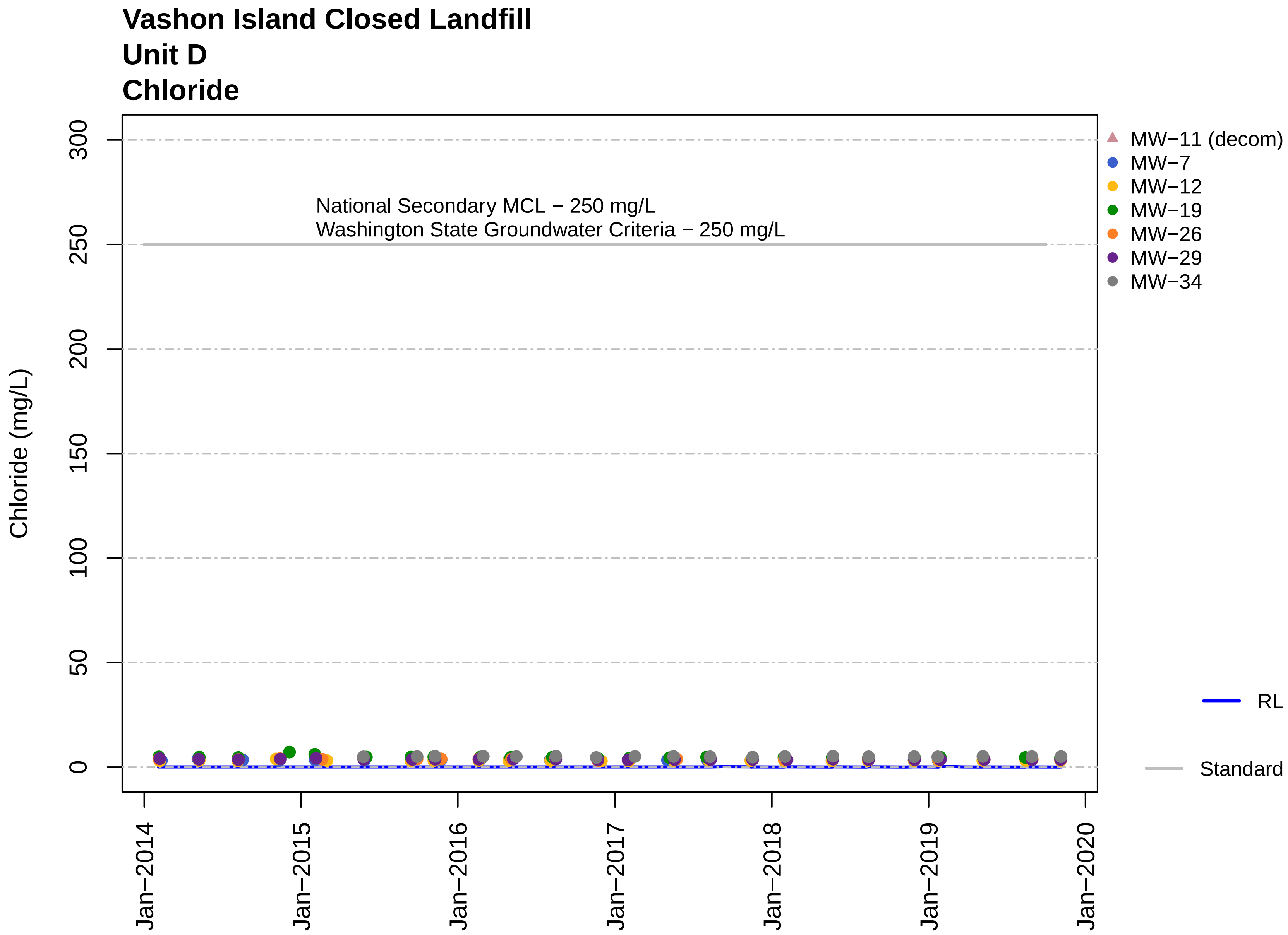




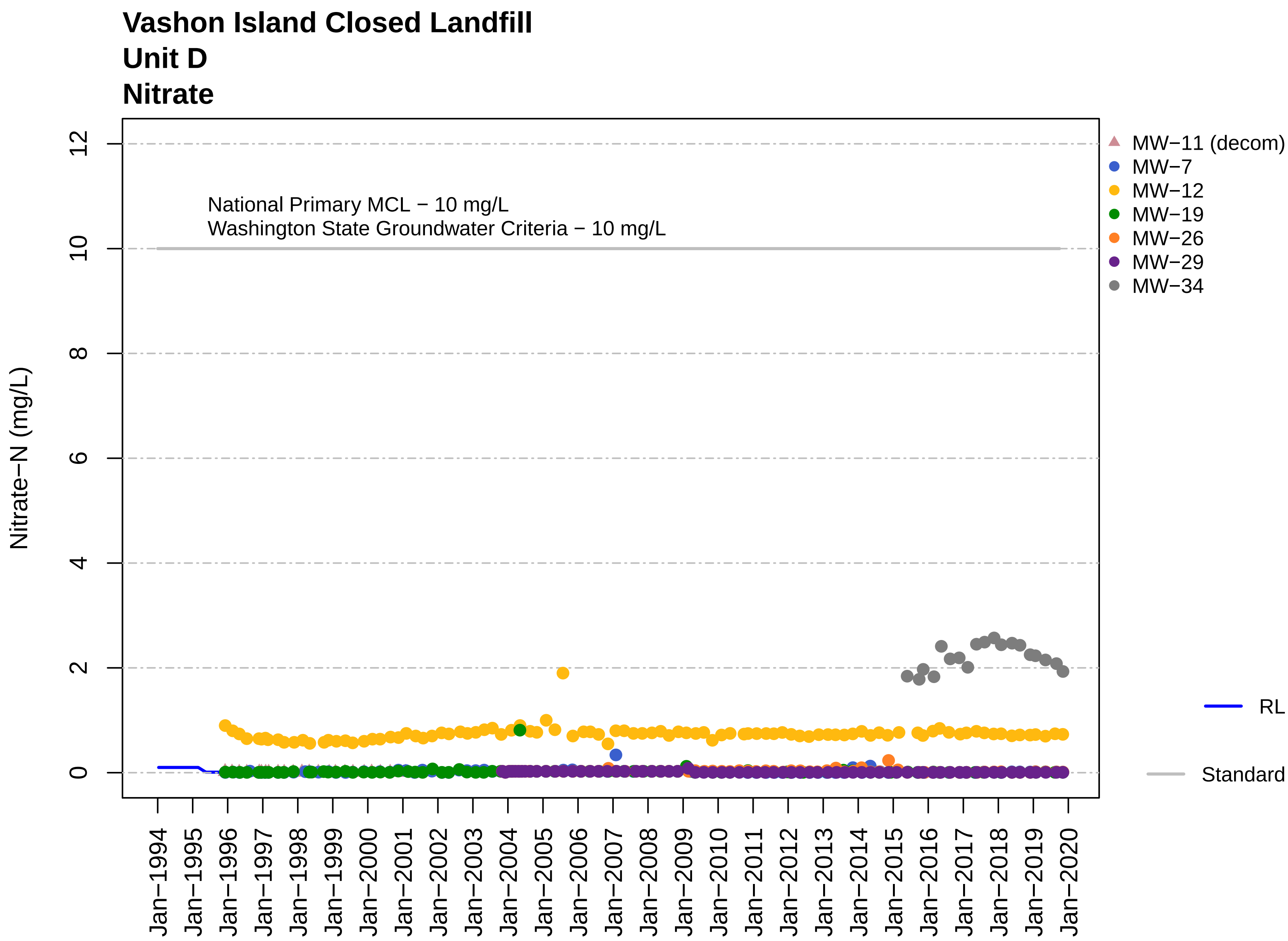
Vashon Island Closed Landfill
Unit D
Ammonia
Ammonia−N (mg/L)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL

Vashon Island Closed Landfill
Unit D
Chloride

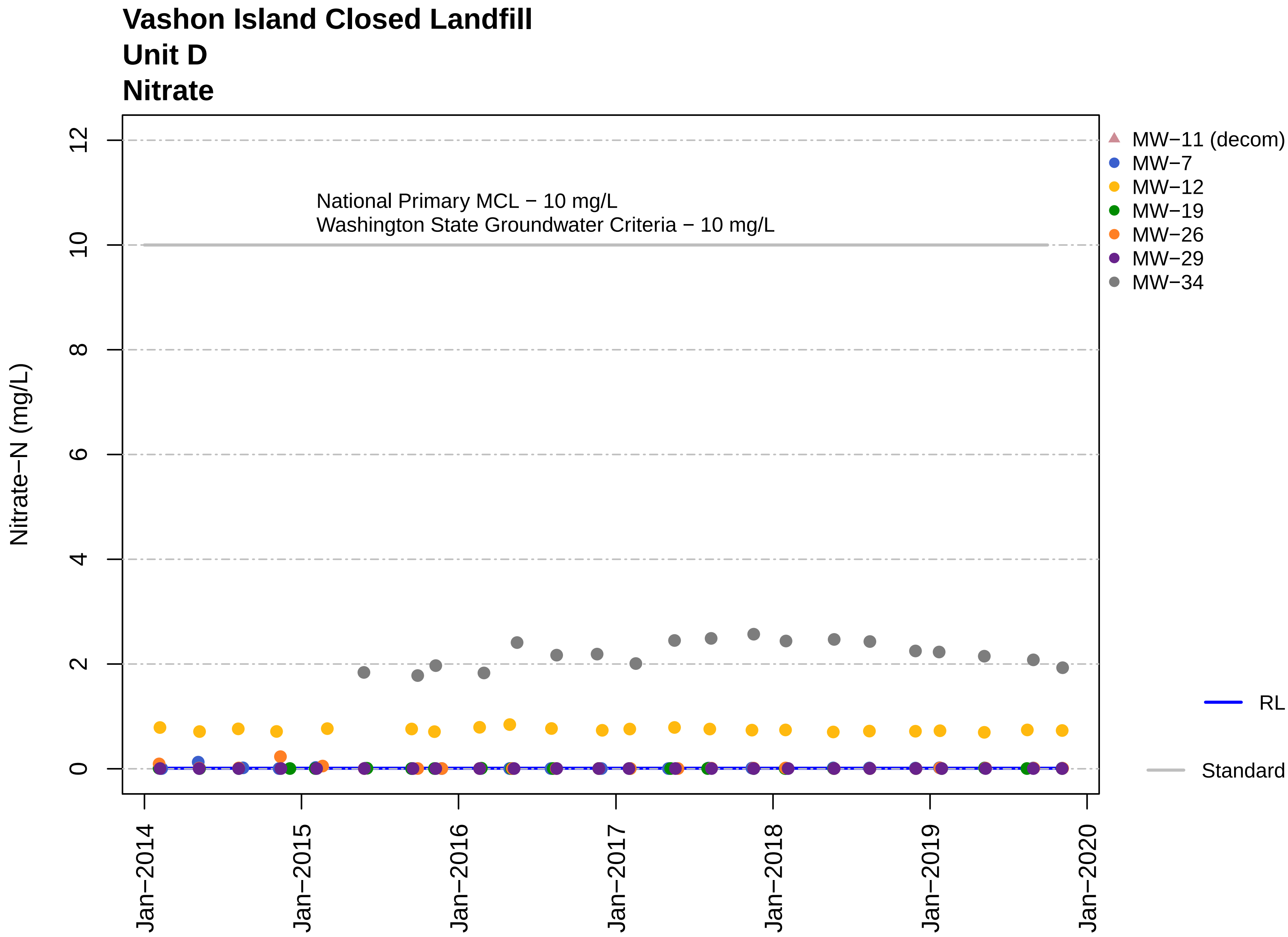




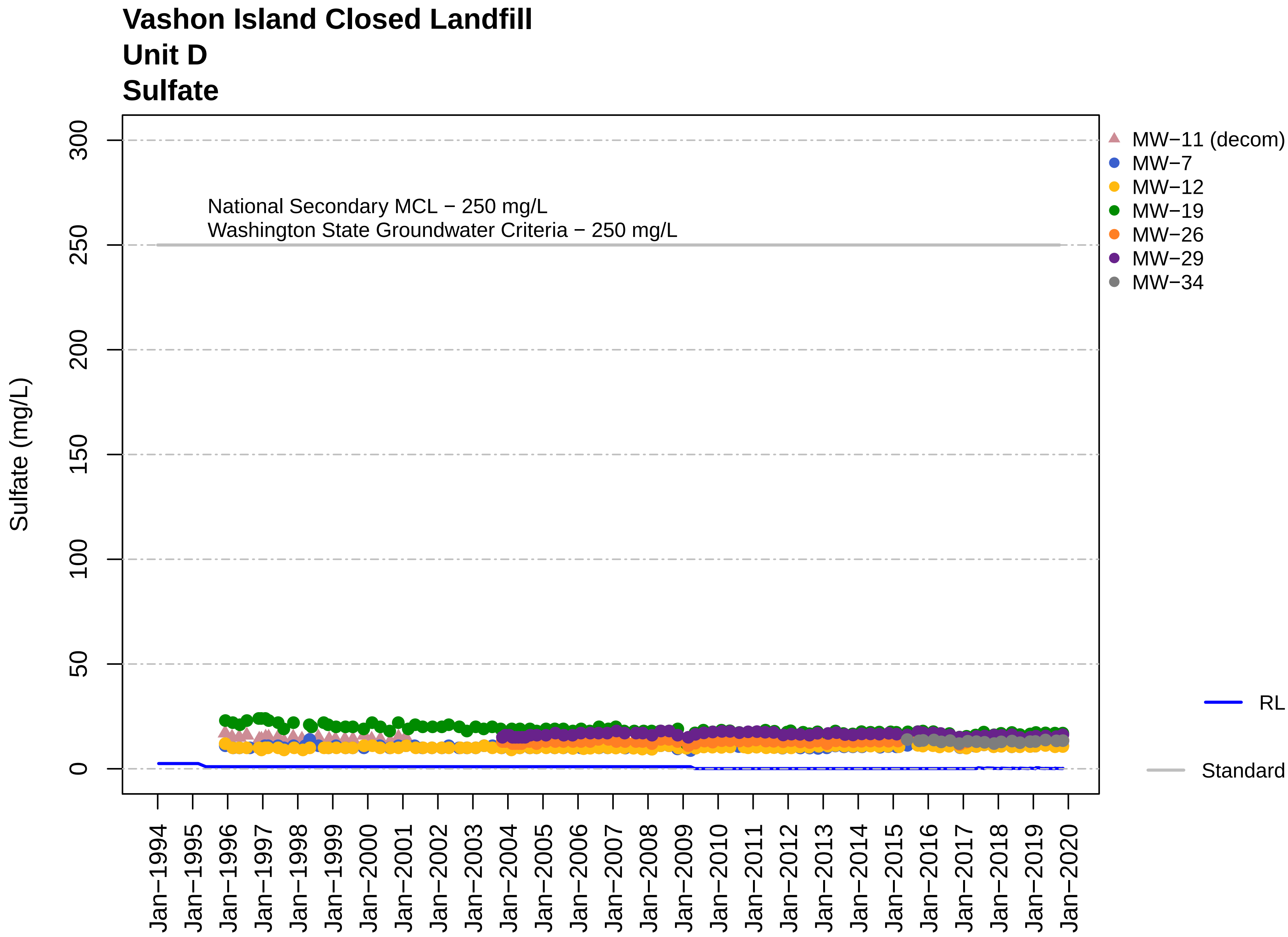
Vashon Island Closed Landfill
Unit D
Chloride
Chloride (mg/L)
0
50
100
150
200
250
300
National Secondary MCL − 250 mg/L
Washington State Groundwater Criteria − 250 mg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

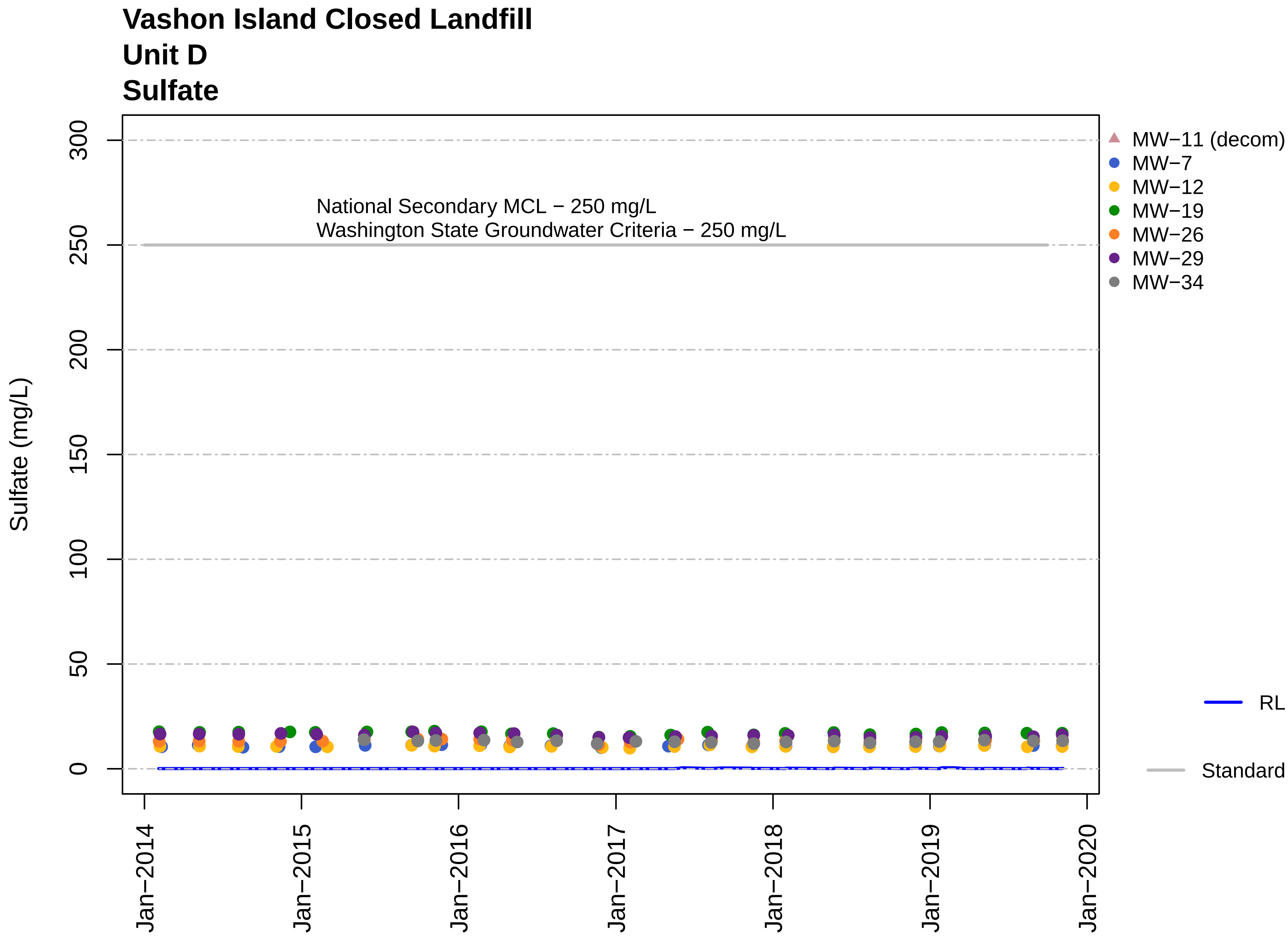


Vashon Island Closed Landfill
Unit D
Nitrate
National Primary MCL − 10 mg/L
Washington State Groundwater Criteria − 10 mg/L
Nitrate−N (mg/L)
0
2
4
6
8
10
12
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

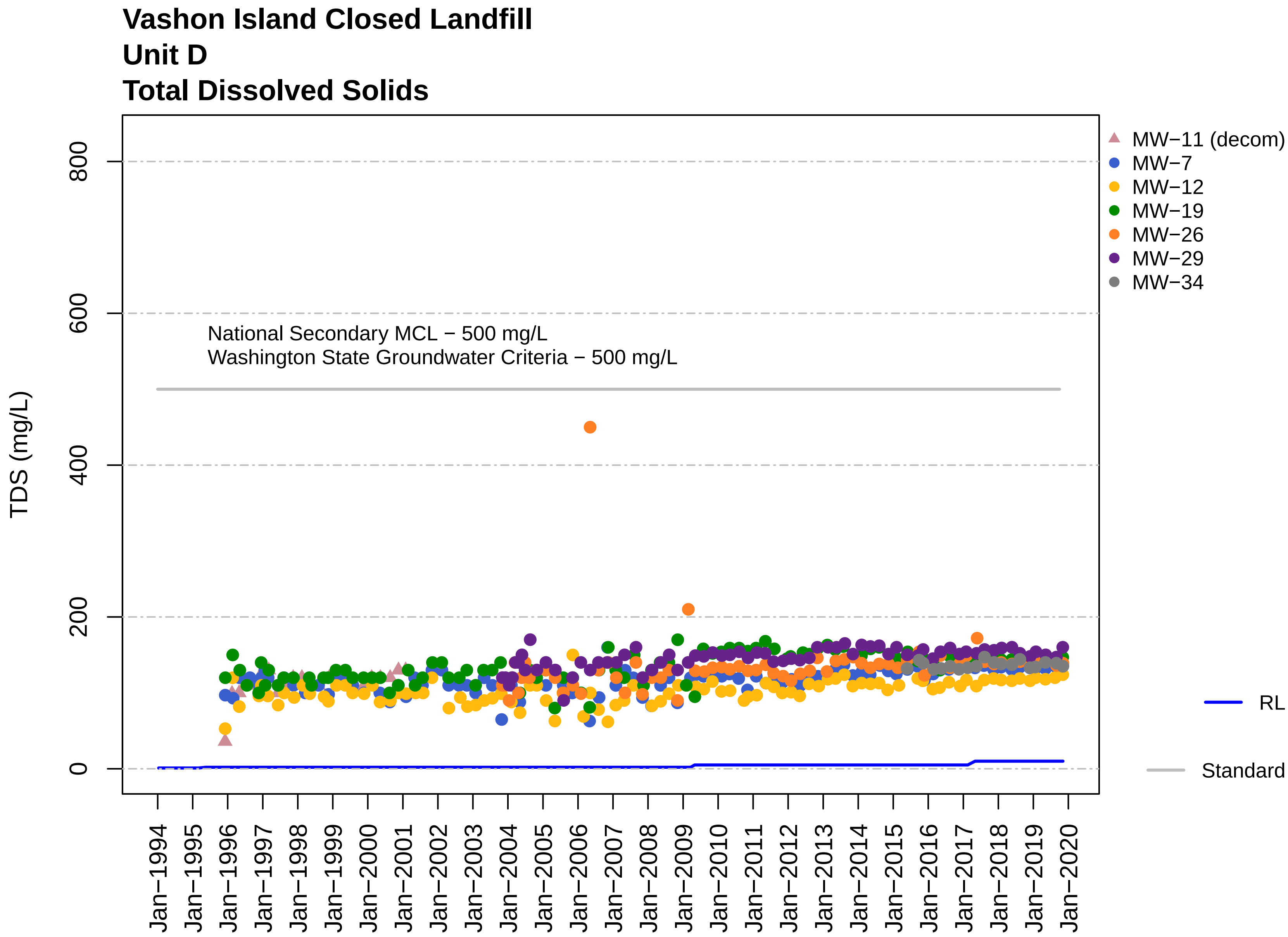


Vashon Island Closed Landfill
Unit D
Nitrate
Nitrate−N (mg/L)
0
2
4
6
8
10
12
National Primary MCL − 10 mg/L
Washington State Groundwater Criteria − 10 mg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

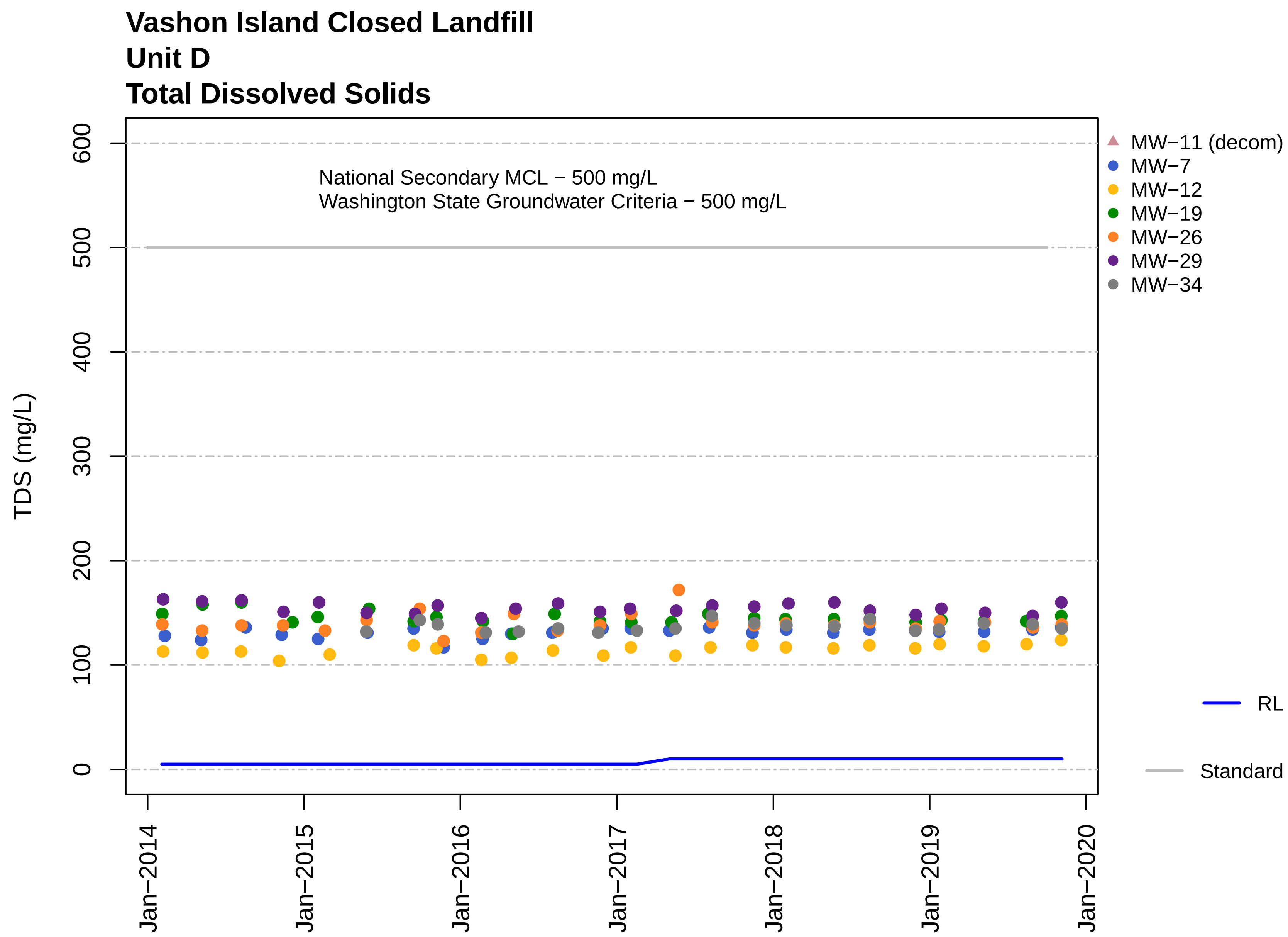

Vashon Island Closed Landfill
Unit D
Sulfate
Sulfate (mg/L)
300
250
200
150
100
50
0
National Secondary MCL − 250 mg/L
Washington State Groundwater Criteria − 250 mg/L
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

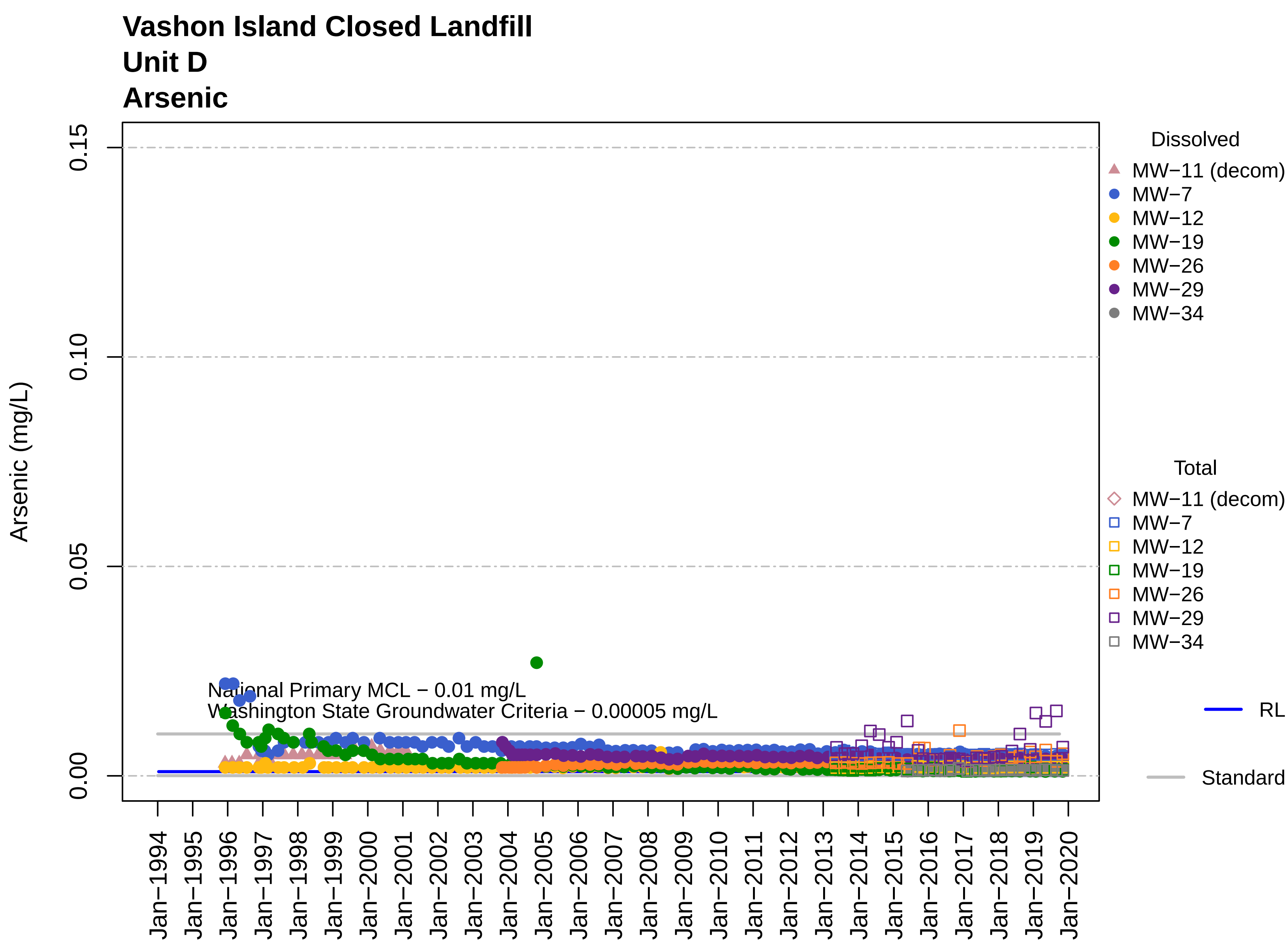


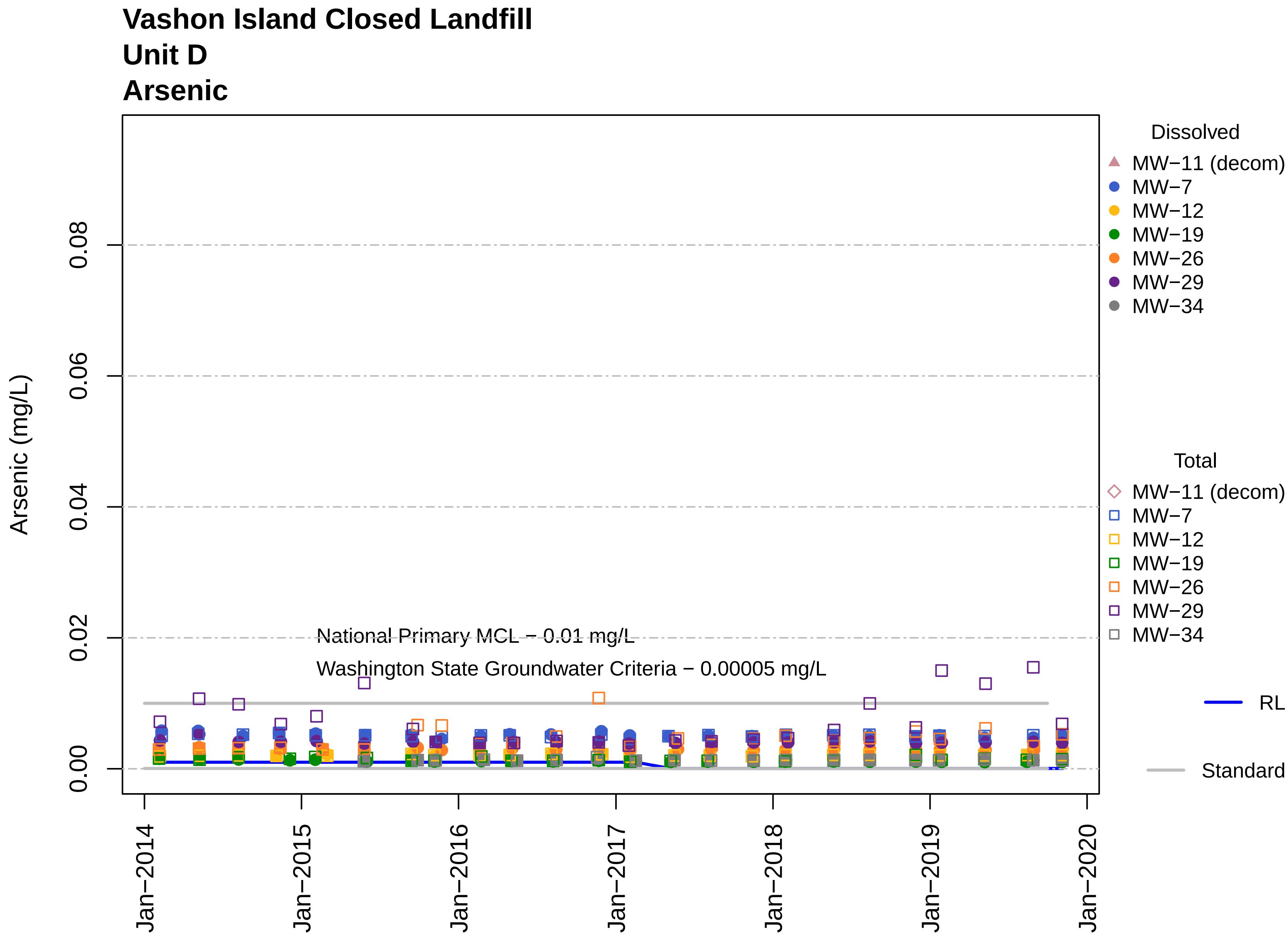
Vashon Island Closed Landfill
Unit D
Sulfate
Sulfate (mg/L)
0
50
100
150
200
250
300
National Secondary MCL − 250 mg/L
Washington State Groundwater Criteria − 250 mg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard



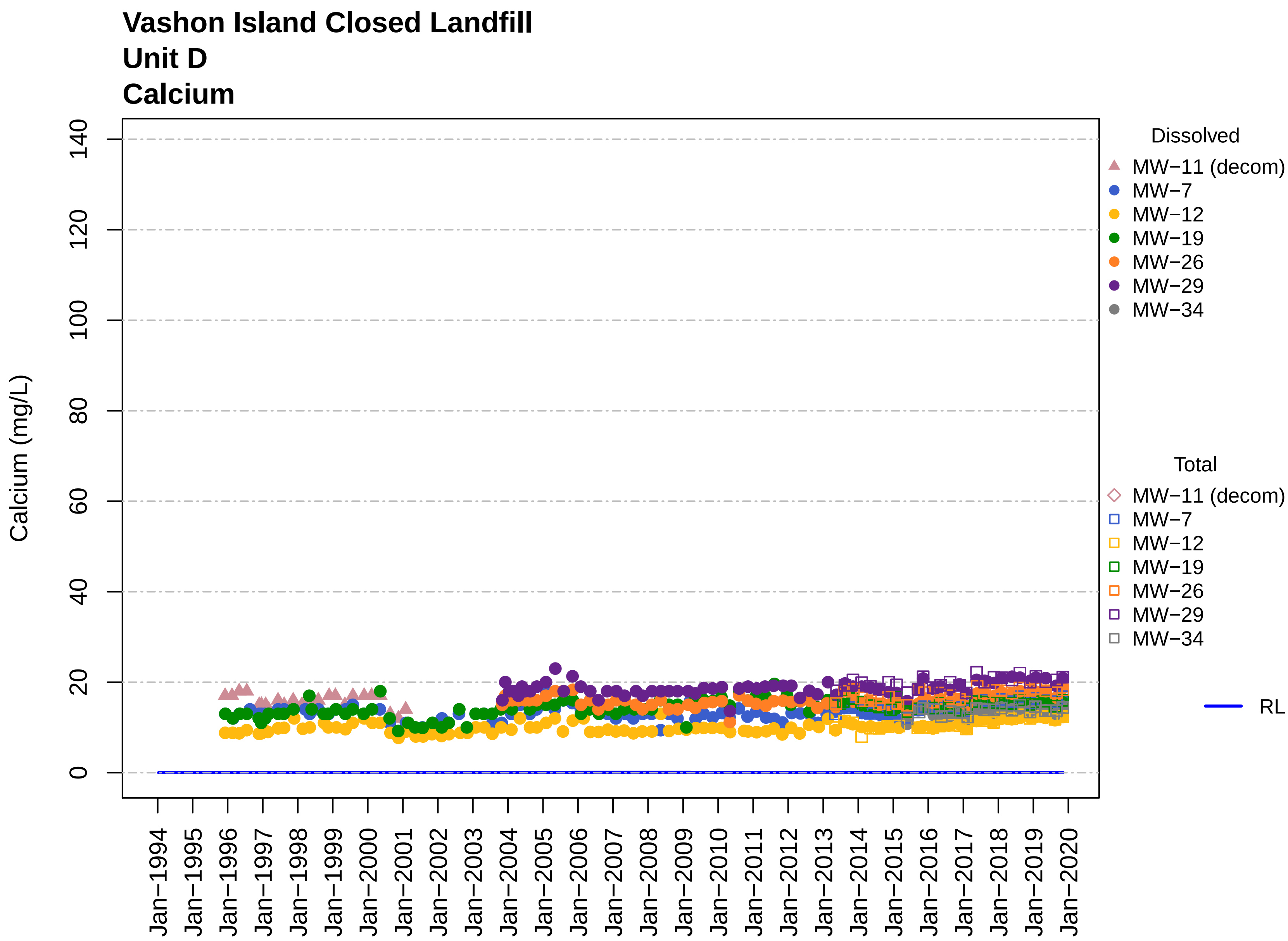
Vashon Island Closed Landfill
Unit D
Total Dissolved Solids
TDS (mg/L)
0
200
400
600
800
National Secondary MCL − 500 mg/L
Washington State Groundwater Criteria − 500 mg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard


Vashon Island Closed Landfill
Unit D
Total Dissolved Solids
National Secondary MCL − 500 mg/L
Washington State Groundwater Criteria − 500 mg/L
TDS (mg/L)
0
100
200
300
400
500
600
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

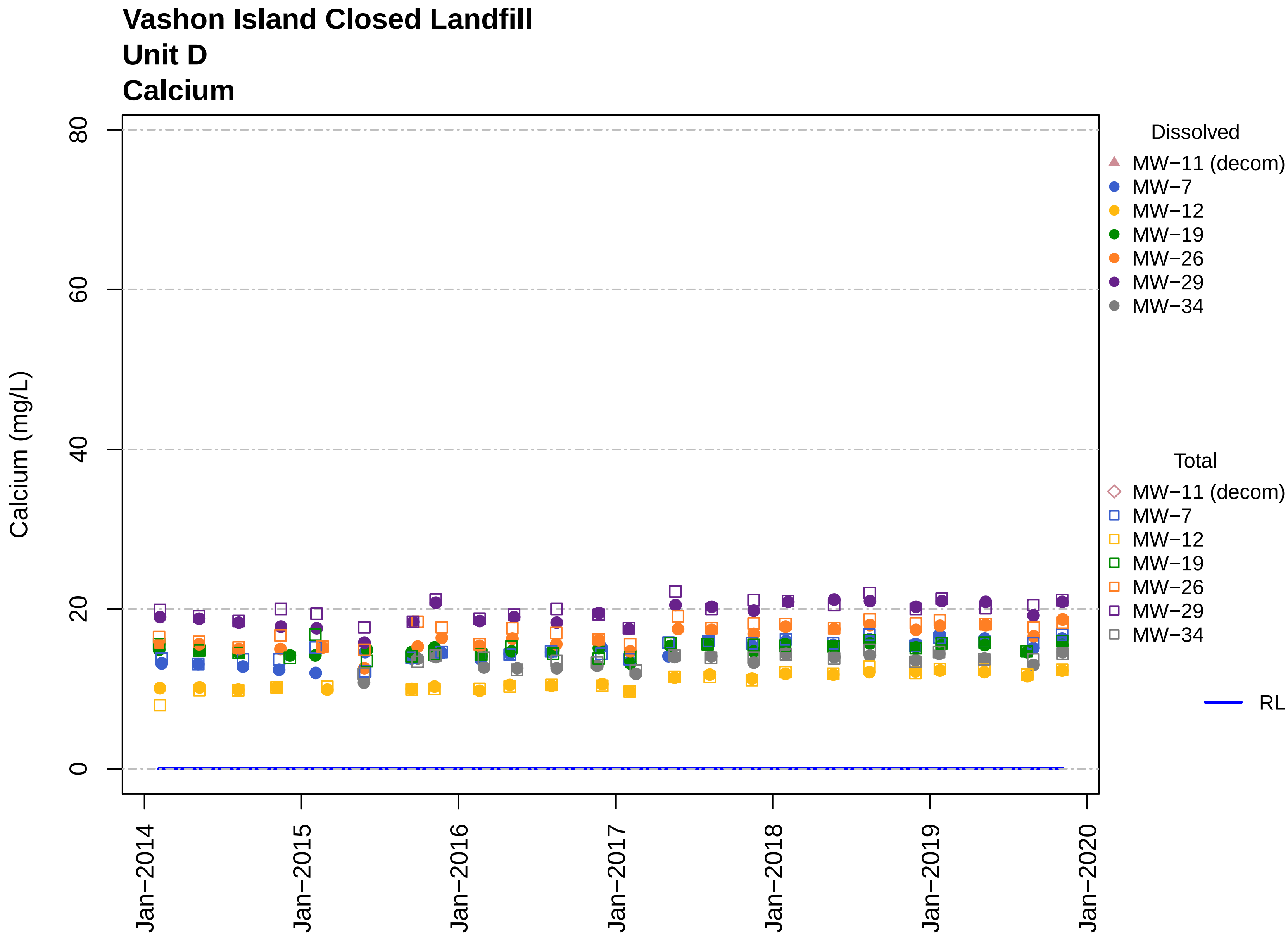

Vashon Island Closed Landfill
Unit D
Arsenic
Arsenic (mg/L)
0.00
0.05
0.10
0.15
National Primary MCL − 0.01 mg/L
Washington State Groundwater Criteria − 0.00005 mg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
Total
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

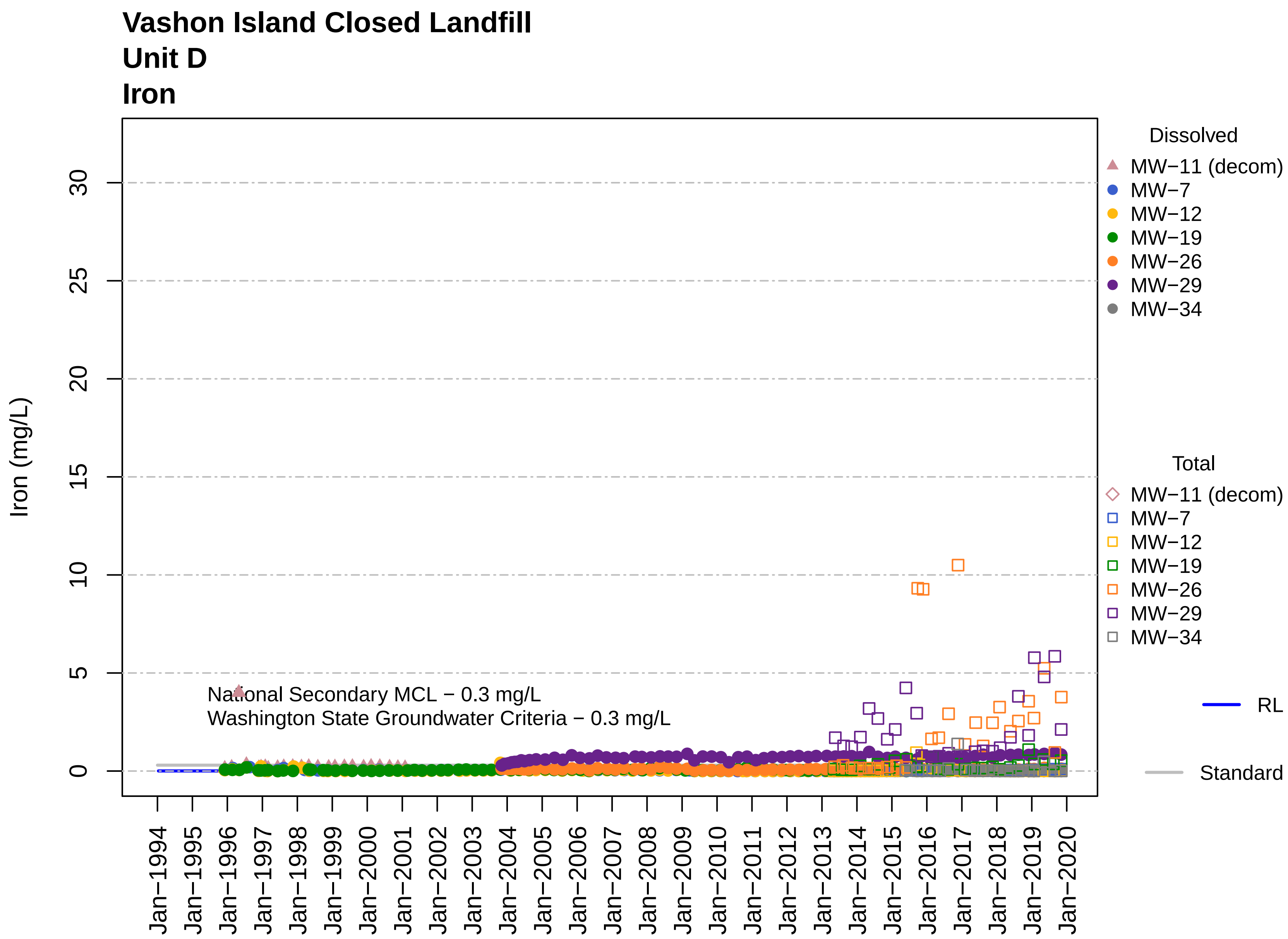


Vashon Island Closed Landfill
Unit D
Arsenic
Arsenic (mg/L)
0.00
0.02
0.04
0.06
0.08
National Primary MCL − 0.01 mg/L
Washington State Groundwater Criteria − 0.00005 mg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
Total
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

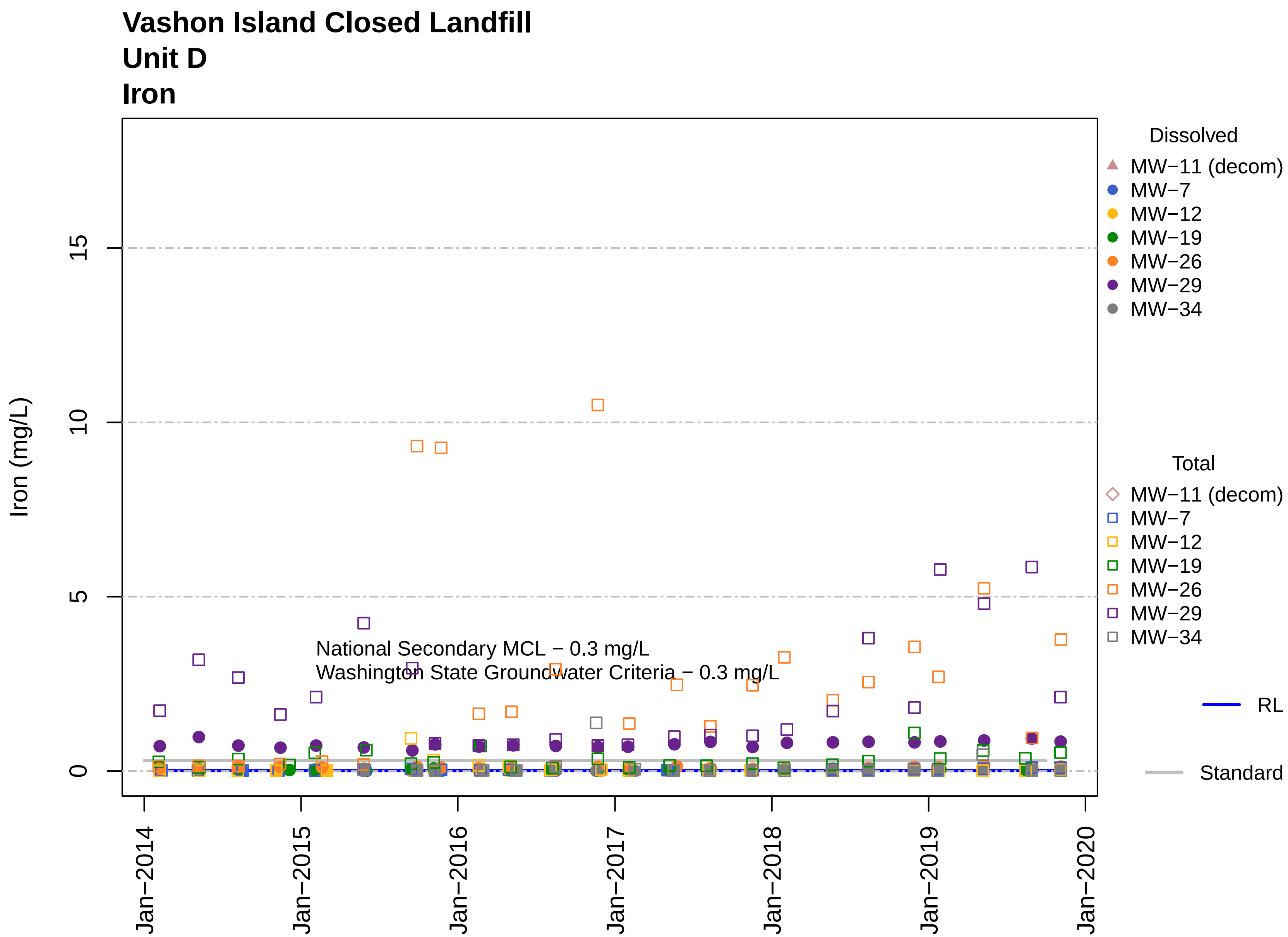


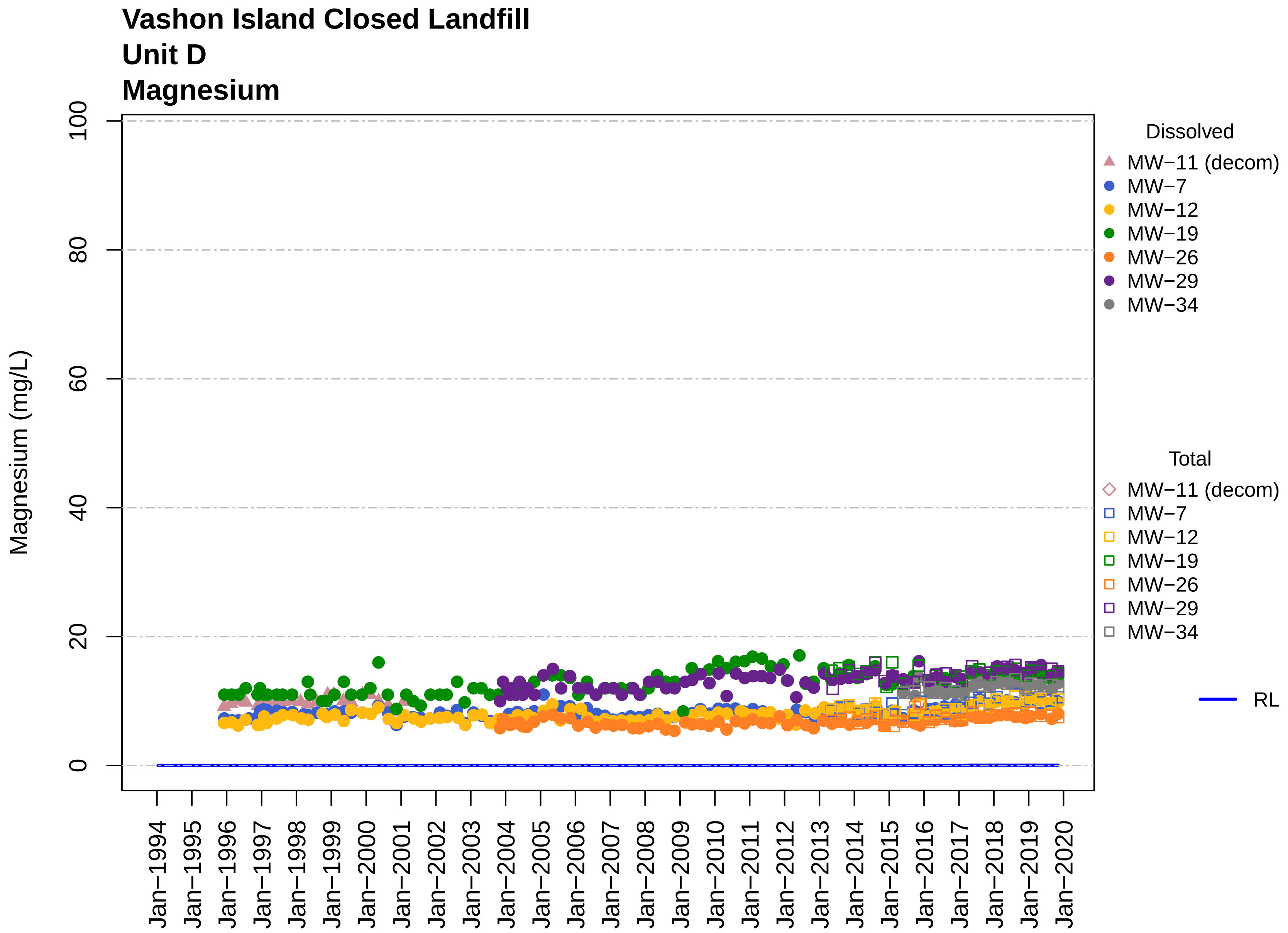
Vashon Island Closed Landfill
Unit D
Calcium
Calcium (mg/L)
0
20
40
60
80
100
120
140
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
Total
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL


Vashon Island Closed Landfill
Unit D
Calcium
Calcium (mg/L)
80
60
40
20
0
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
Total
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL

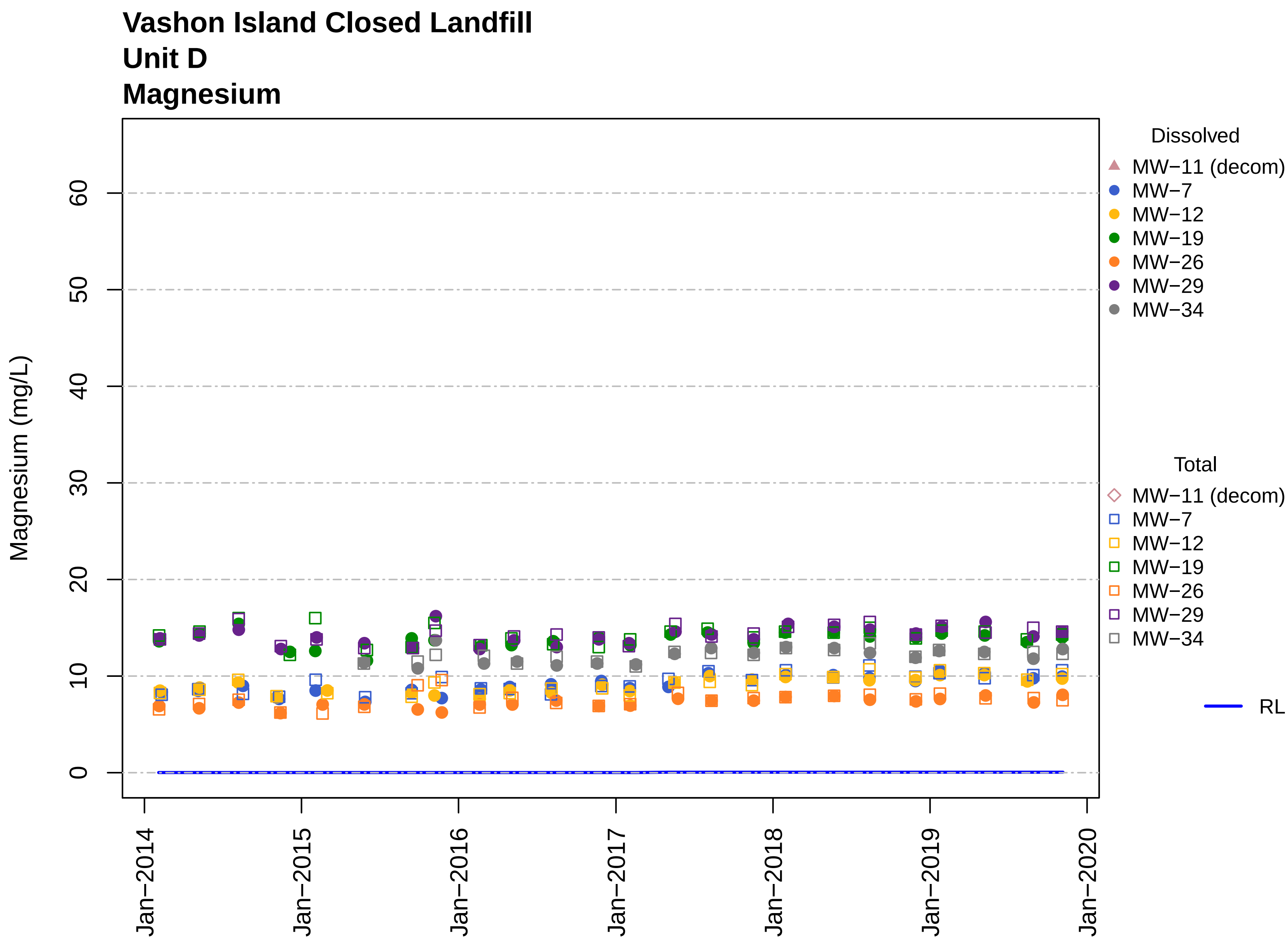


Vashon Island Closed Landfill
Unit D
Iron
Iron (mg/L)
0
5
10
15
20
25
30
National Secondary MCL − 0.3 mg/L
Washington State Groundwater Criteria − 0.3 mg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
Total
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

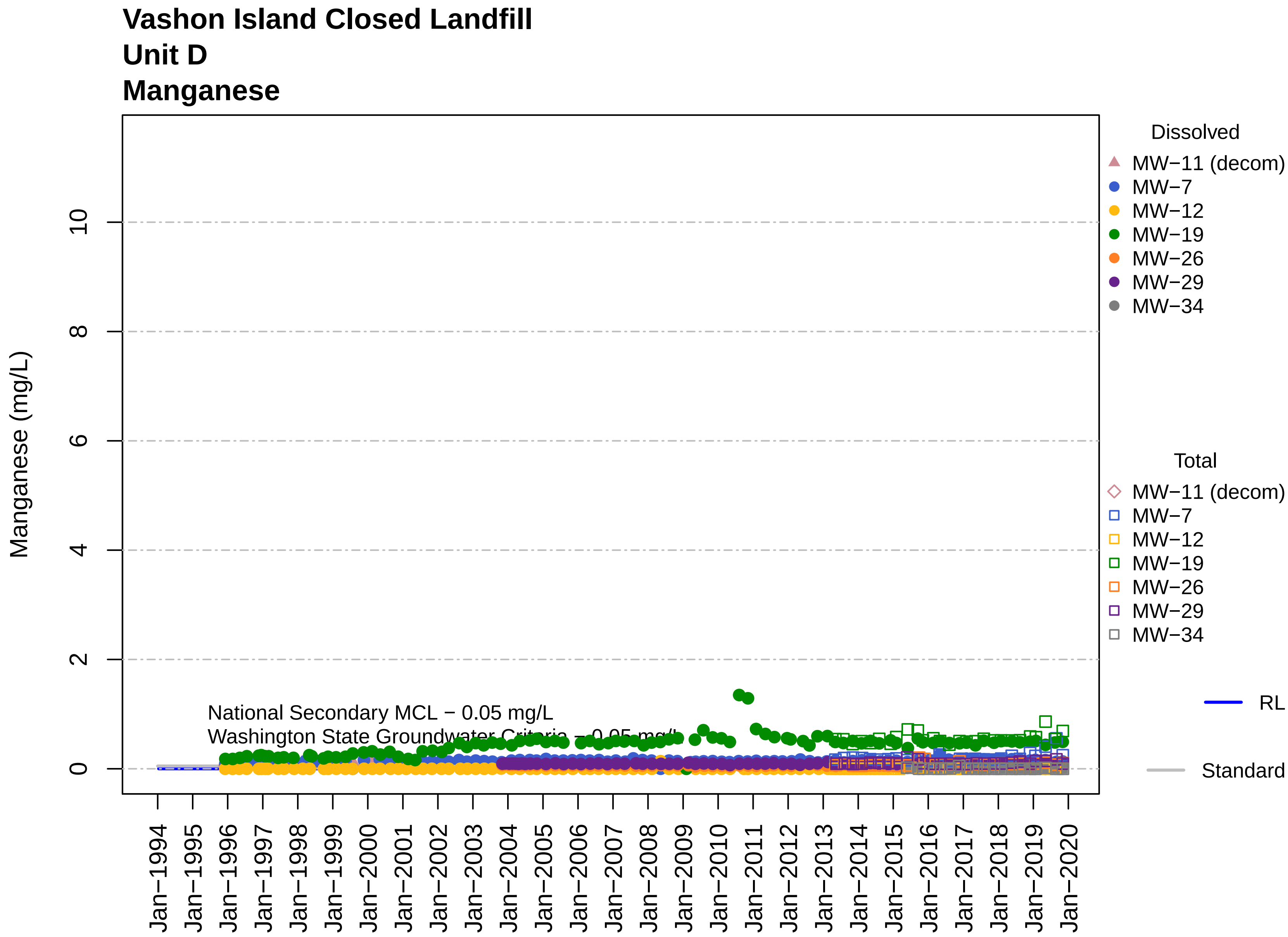

Vashon Island Closed Landfill
Unit D
Iron
Iron (mg/L)
0
5
10
15
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
National Secondary MCL − 0.3 mg/L
Washington State Groundwater Criteria − 0.3 mg/L
Dissolved
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
Total
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard



Vashon Island Closed Landfill
Unit D
Magnesium
Magnesium (mg/L)
0
20
40
60
80
100
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
Total
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL

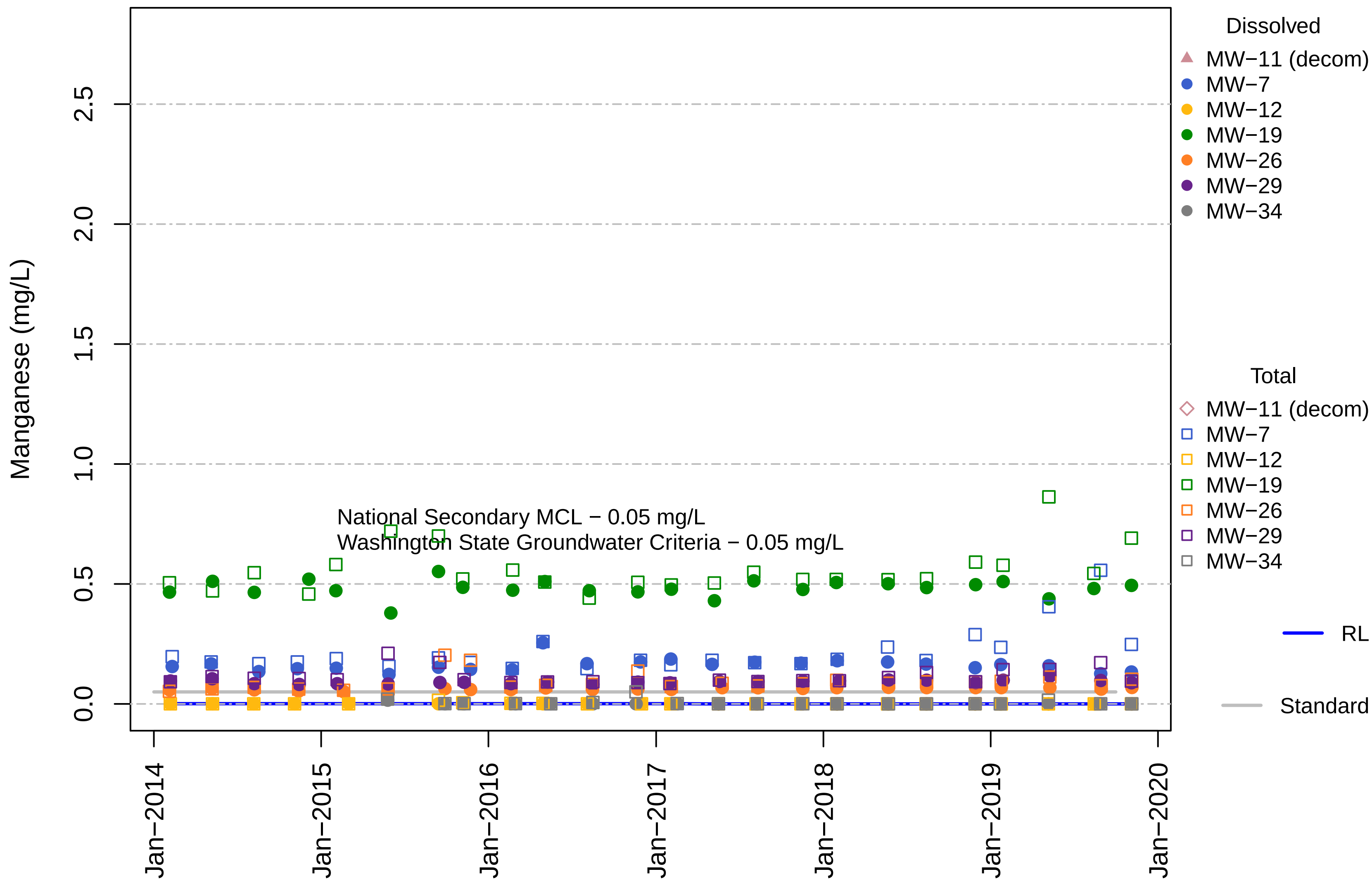


Vashon Island Closed Landfill
Unit D
Magnesium
Magnesium (mg/L)
0
10
20
30
40
50
60
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
Total
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL

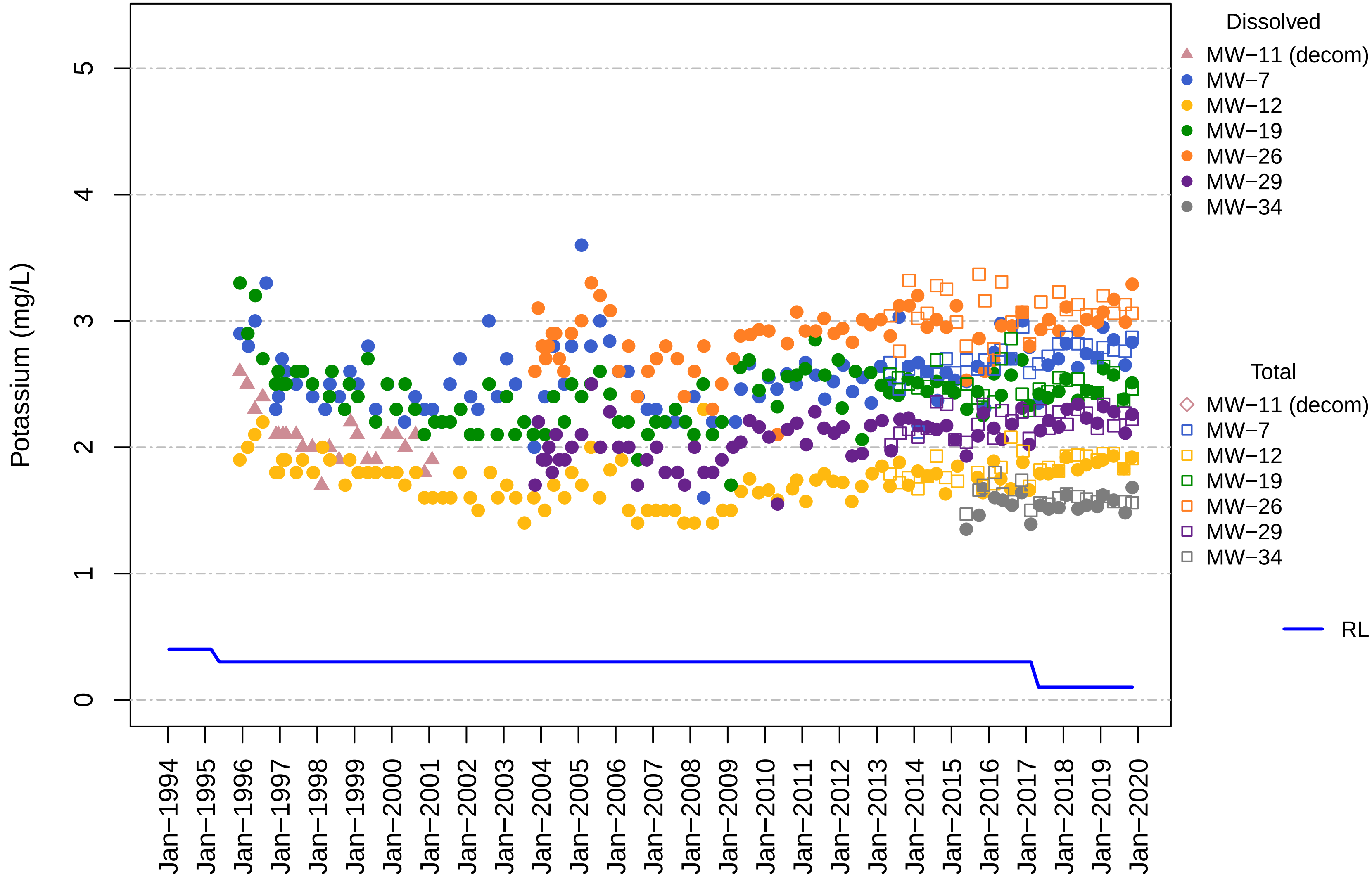


Vashon Island Closed Landfill
Unit D
Manganese
Manganese (mg/L)
0
2
4
6
8
10
National Secondary MCL − 0.05 mg/L
Washington State Groundwater Criteria − 0.05 mg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
Total
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

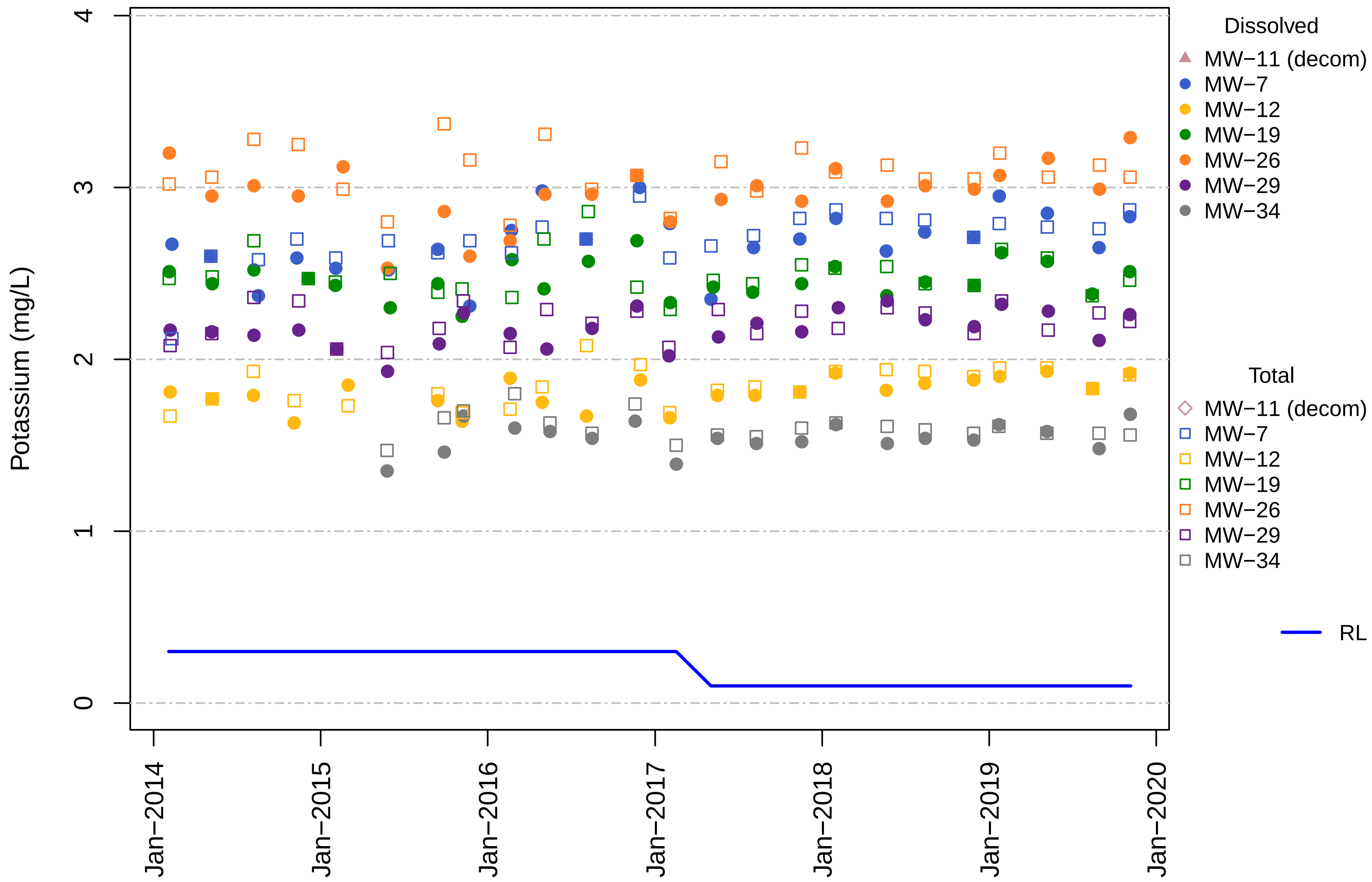
Vashon Island Closed Landfill
Unit D
Manganese

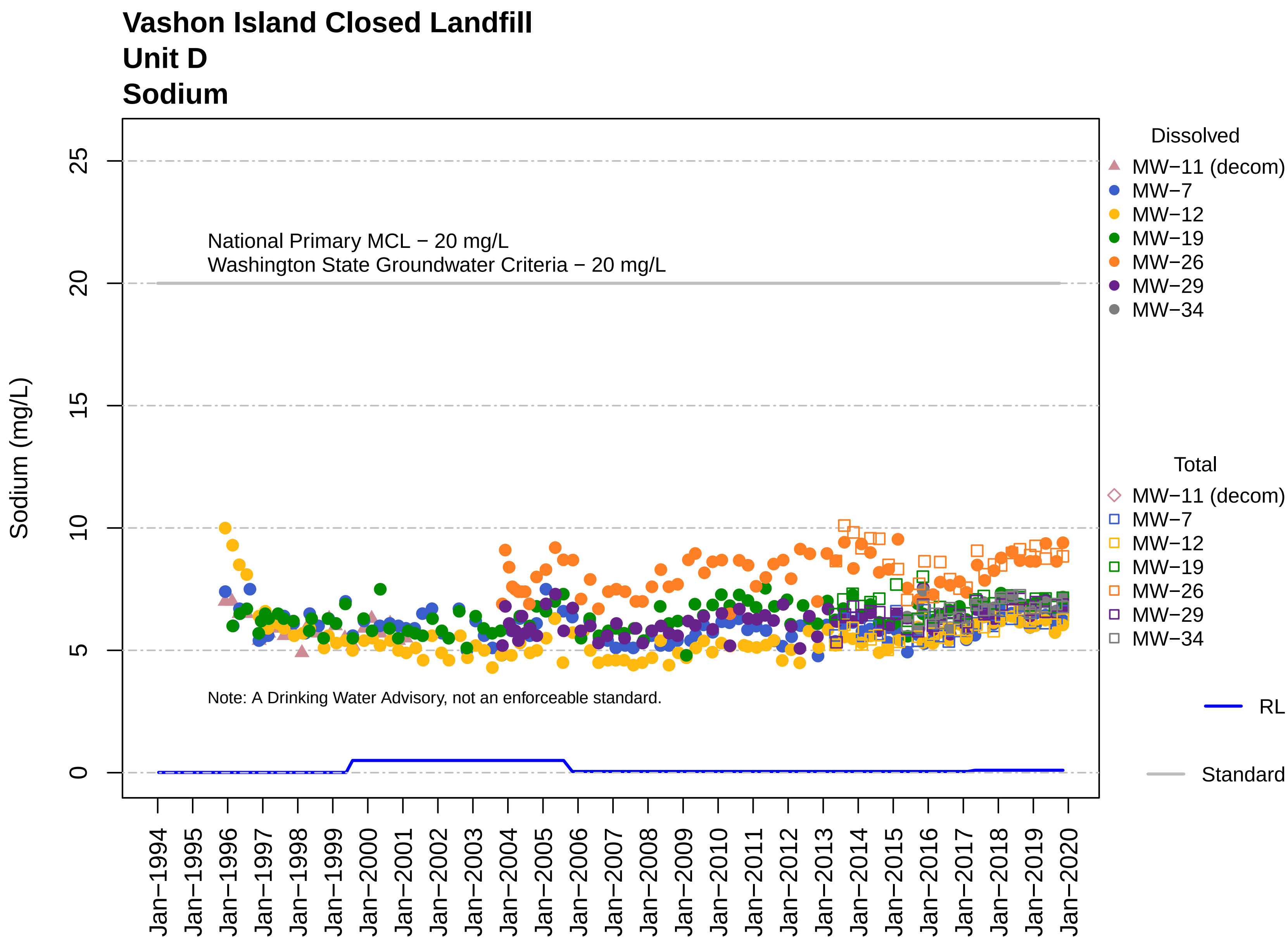


Vashon Island Closed Landfill
Unit D
Potassium

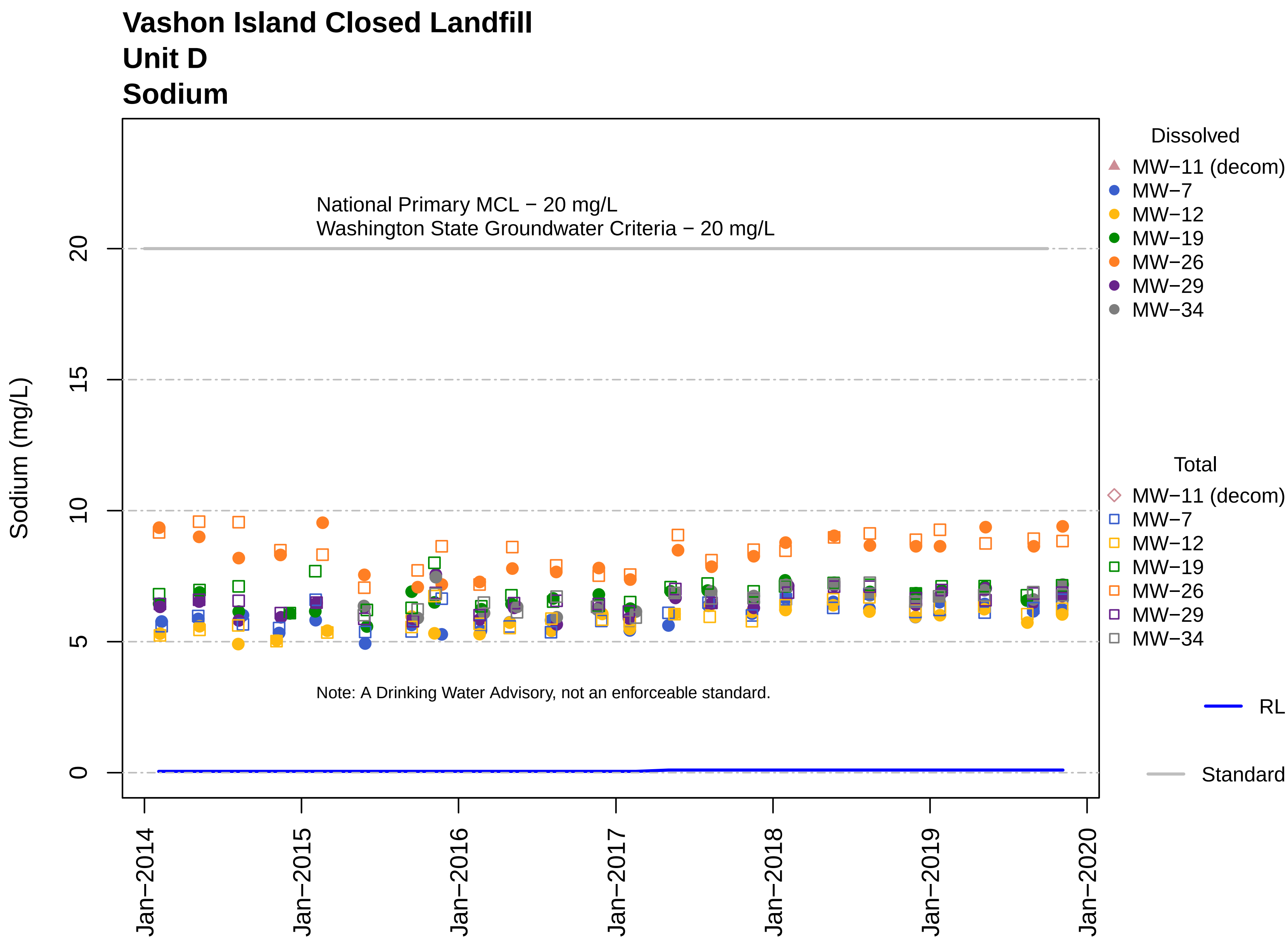


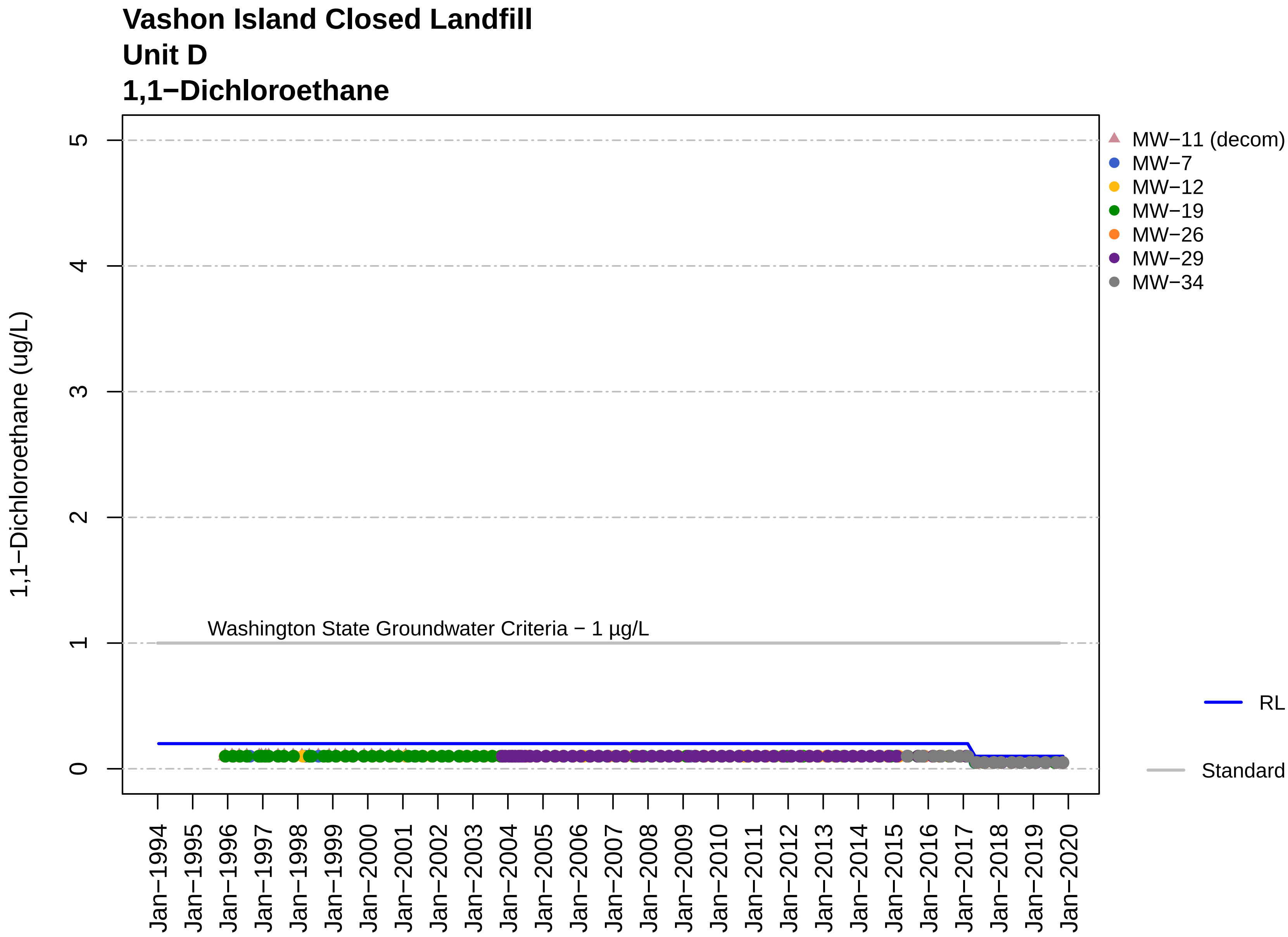
Vashon Island Closed Landfill
Unit D
Potassium



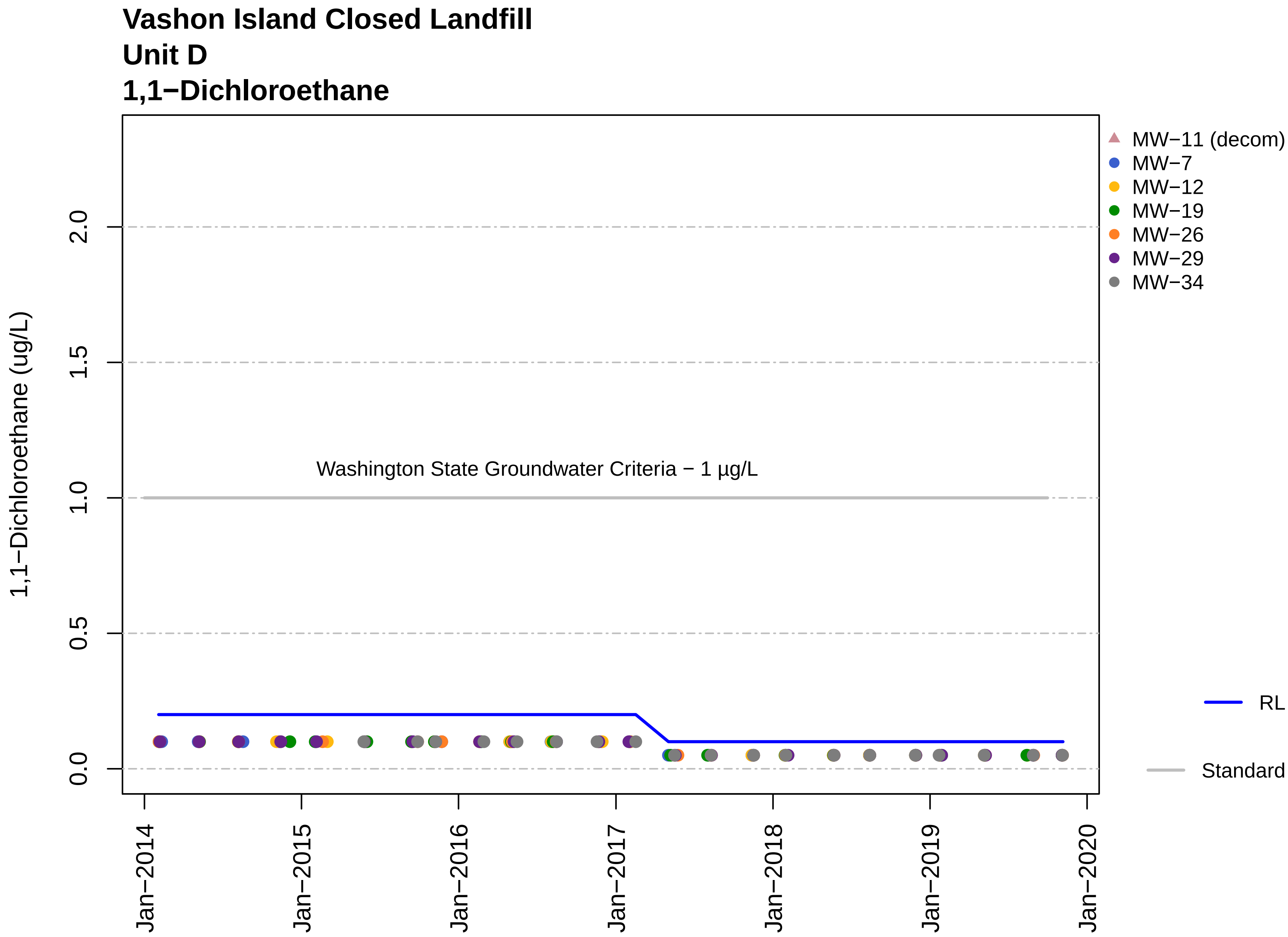


Vashon Island Closed Landfill
Unit D
Sodium
Sodium (mg/L)
National Primary MCL − 20 mg/L
Washington State Groundwater Criteria − 20 mg/L
Note: A Drinking Water Advisory, not an enforceable standard.
0
5
10
15
20
25
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
Total
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

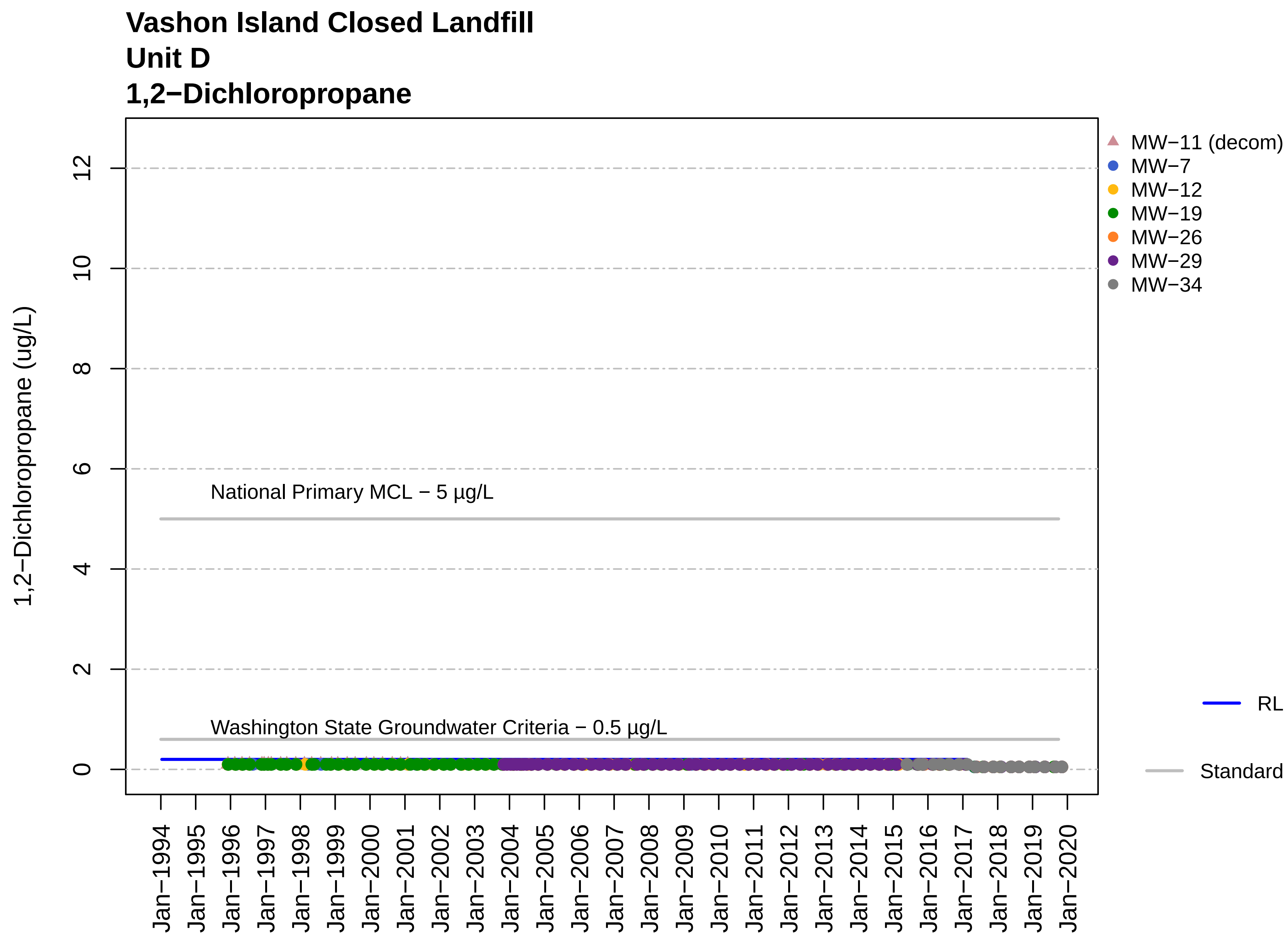

Vashon Island Closed Landfill
Unit D
Sodium
National Primary MCL − 20 mg/L
Washington State Groundwater Criteria − 20 mg/L
Note: A Drinking Water Advisory, not an enforceable standard.
Sodium (mg/L)
0
5
10
15
20
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Dissolved
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
Total
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard



Vashon Island Closed Landfill
Unit D
1,1−Dichloroethane
1,1−Dichloroethane (ug/L)
0
1
2
3
4
5
Washington State Groundwater Criteria − 1 µg/L
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020



Vashon Island Closed Landfill
Unit D
1,1−Dichloroethane
1,1−Dichloroethane (ug/L)
0.0
0.5
1.0
1.5
2.0
Washington State Groundwater Criteria − 1 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard



Vashon Island Closed Landfill
Unit D
1,2−Dichloropropane
1,2−Dichloropropane (ug/L)
0
2
4
6
8
10
12
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.5 µg/L
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
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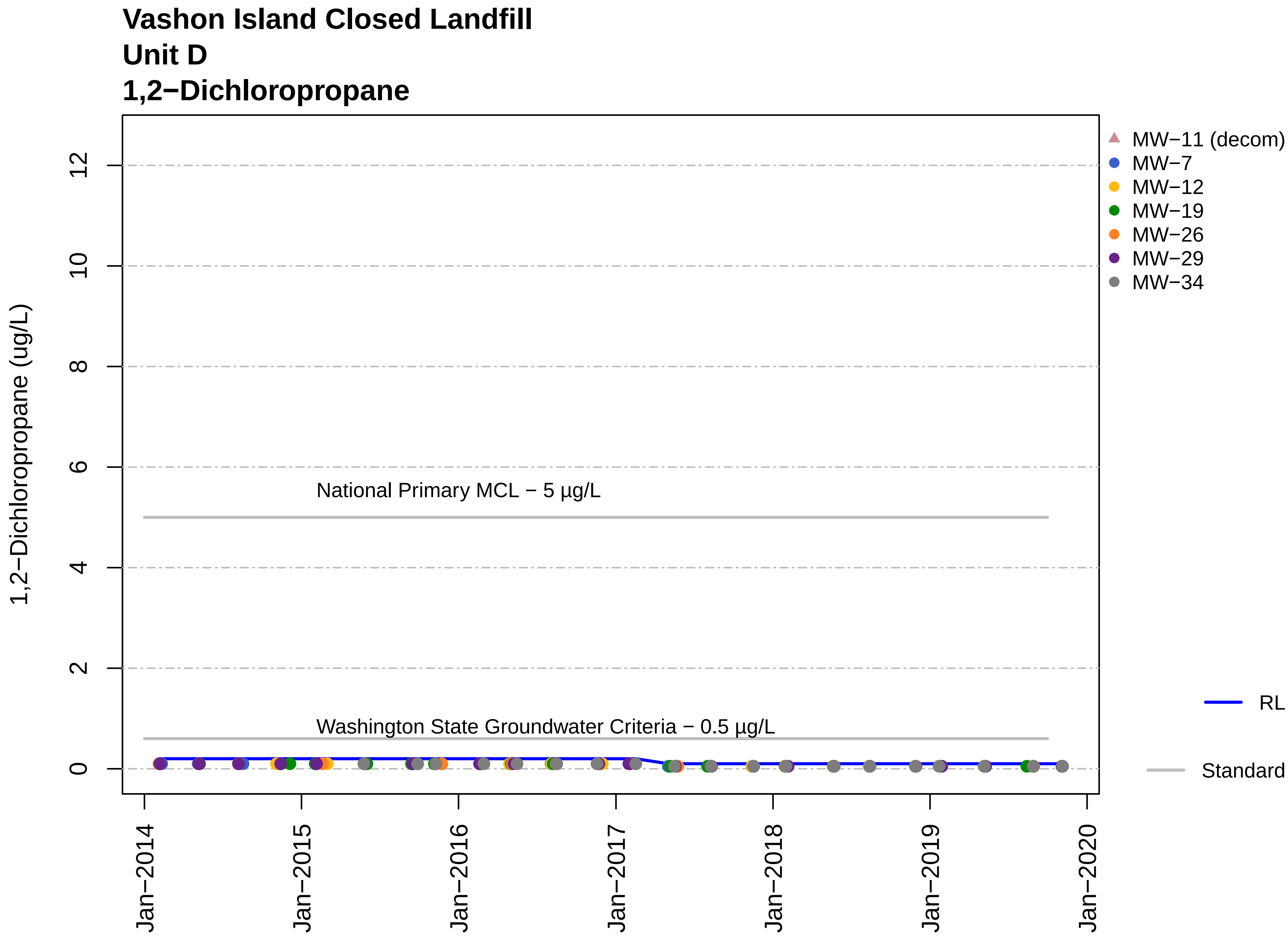
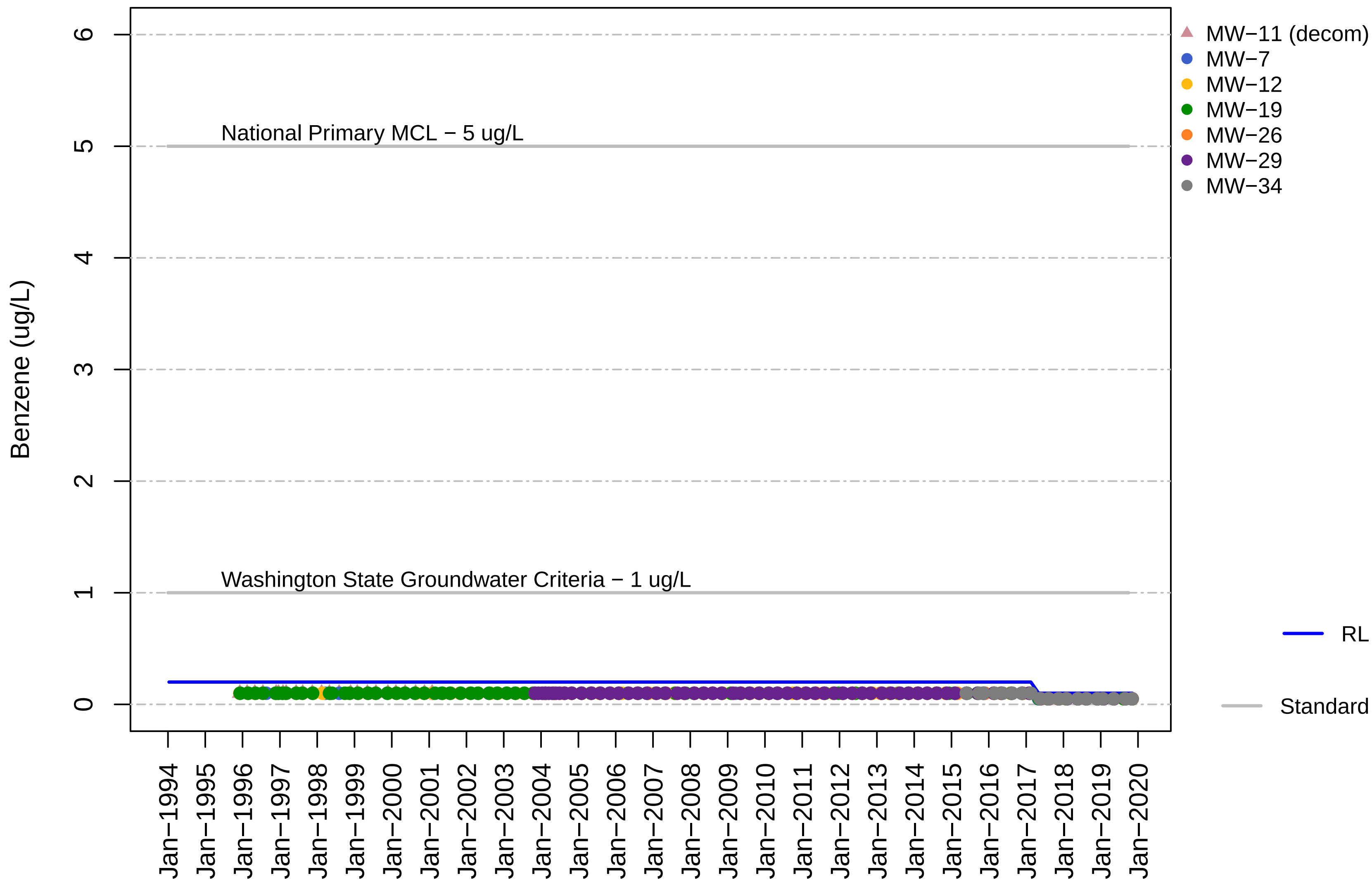
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

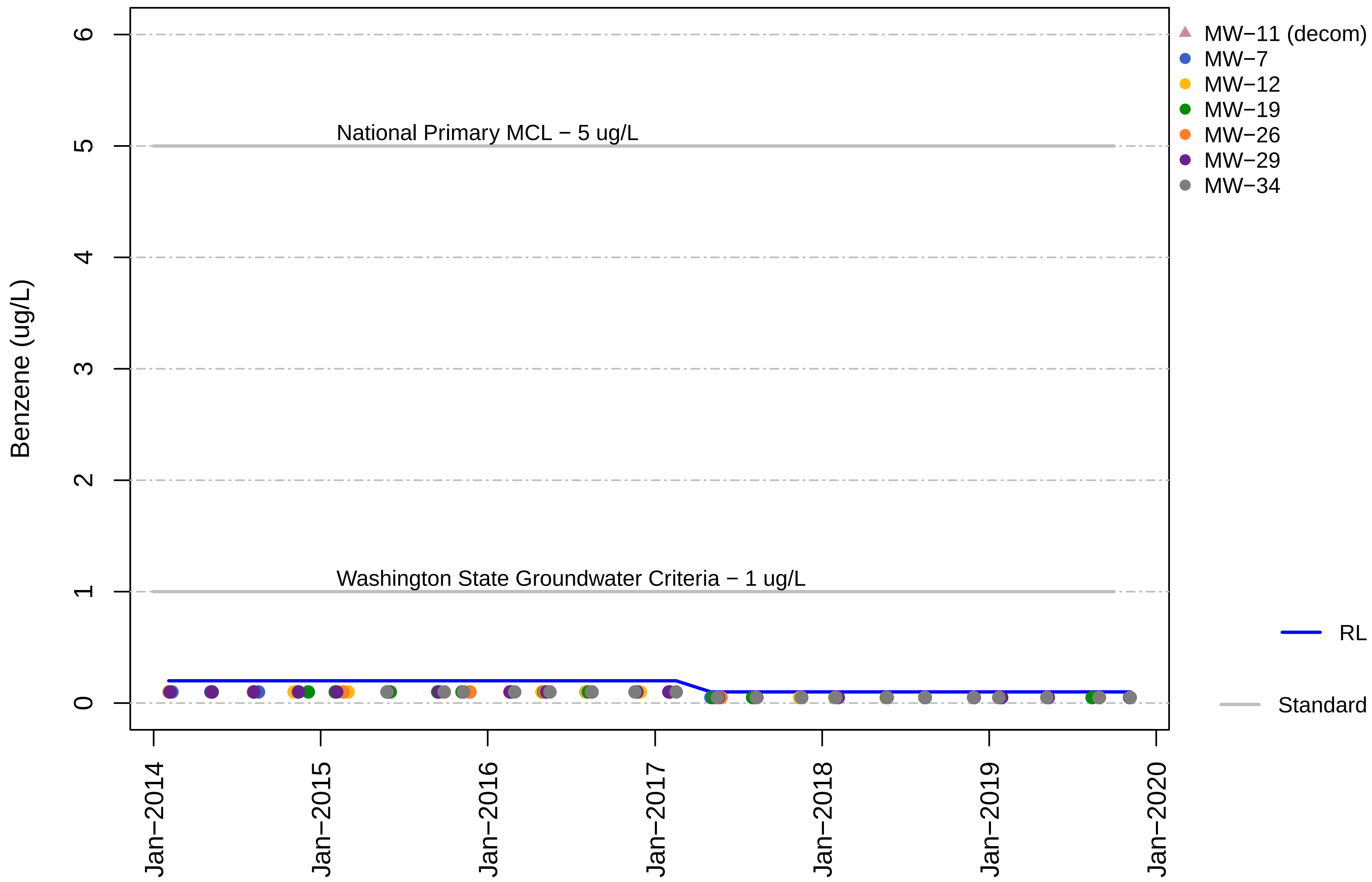


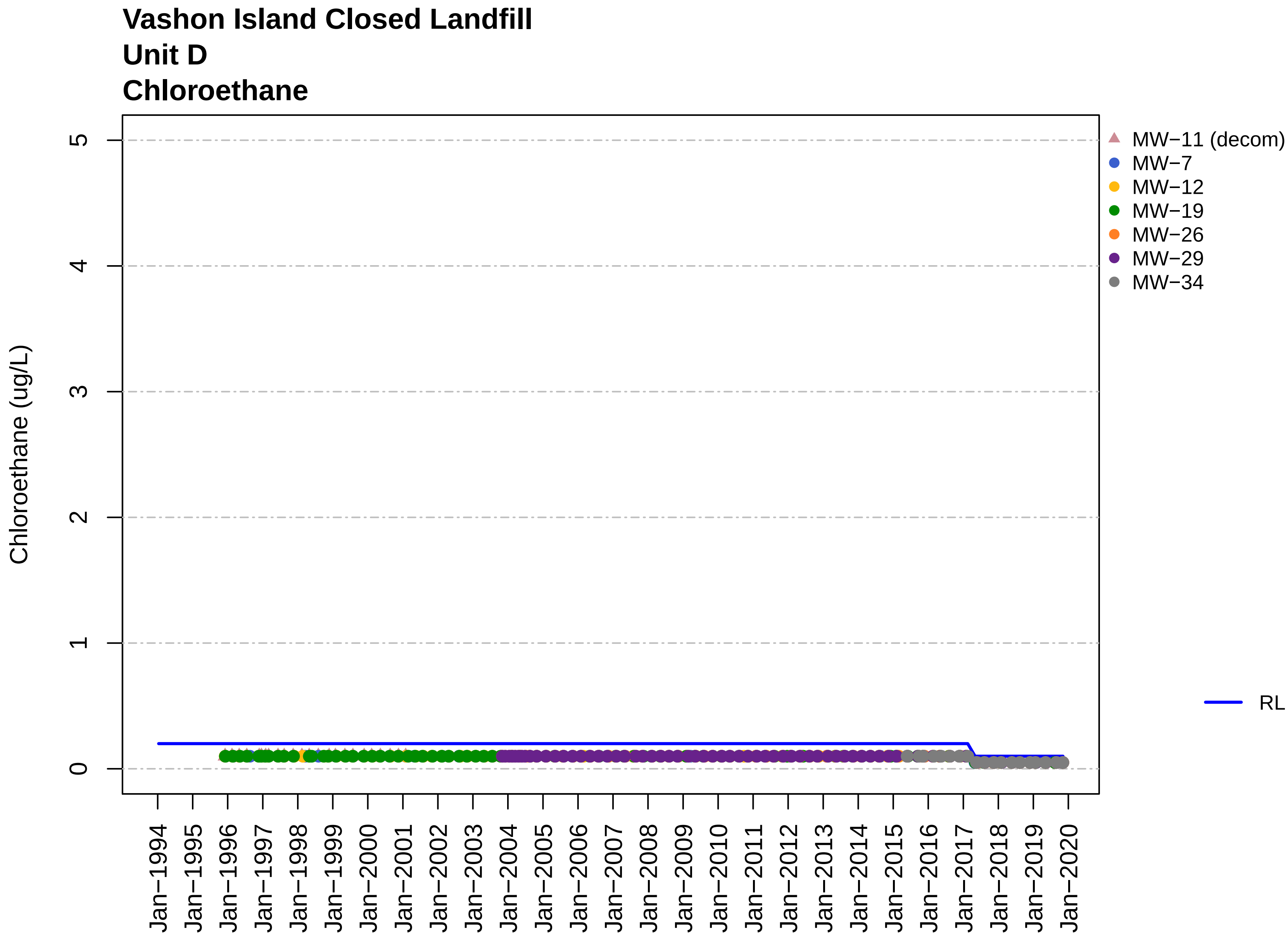
Vashon Island Closed Landfill
Unit D
1,2−Dichloropropane
1,2−Dichloropropane (ug/L)
0
2
4
6
8
10
12
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.5 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

Vashon Island Closed Landfill
Unit D
Benzene

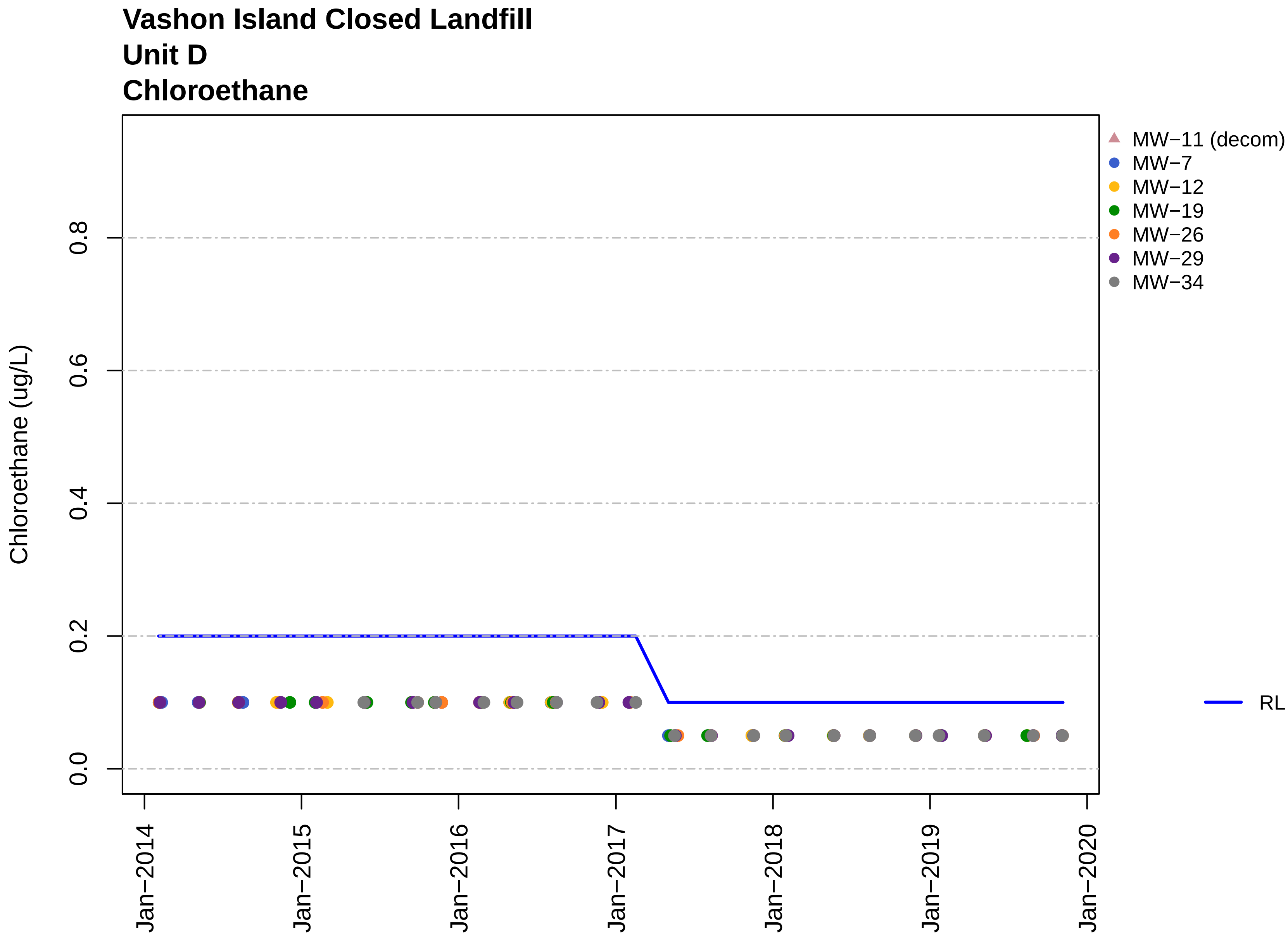


Vashon Island Closed Landfill
Unit D
Benzene

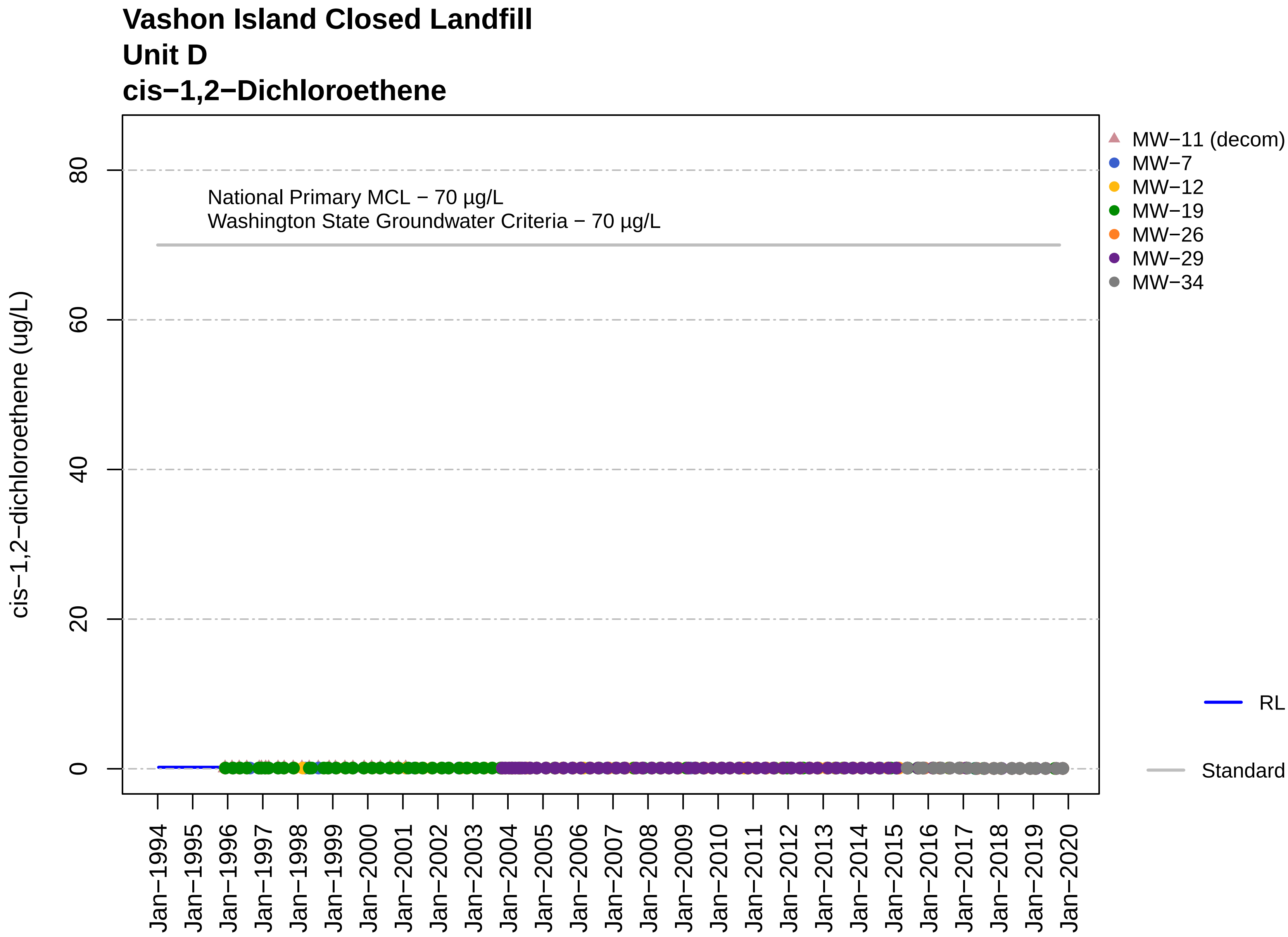




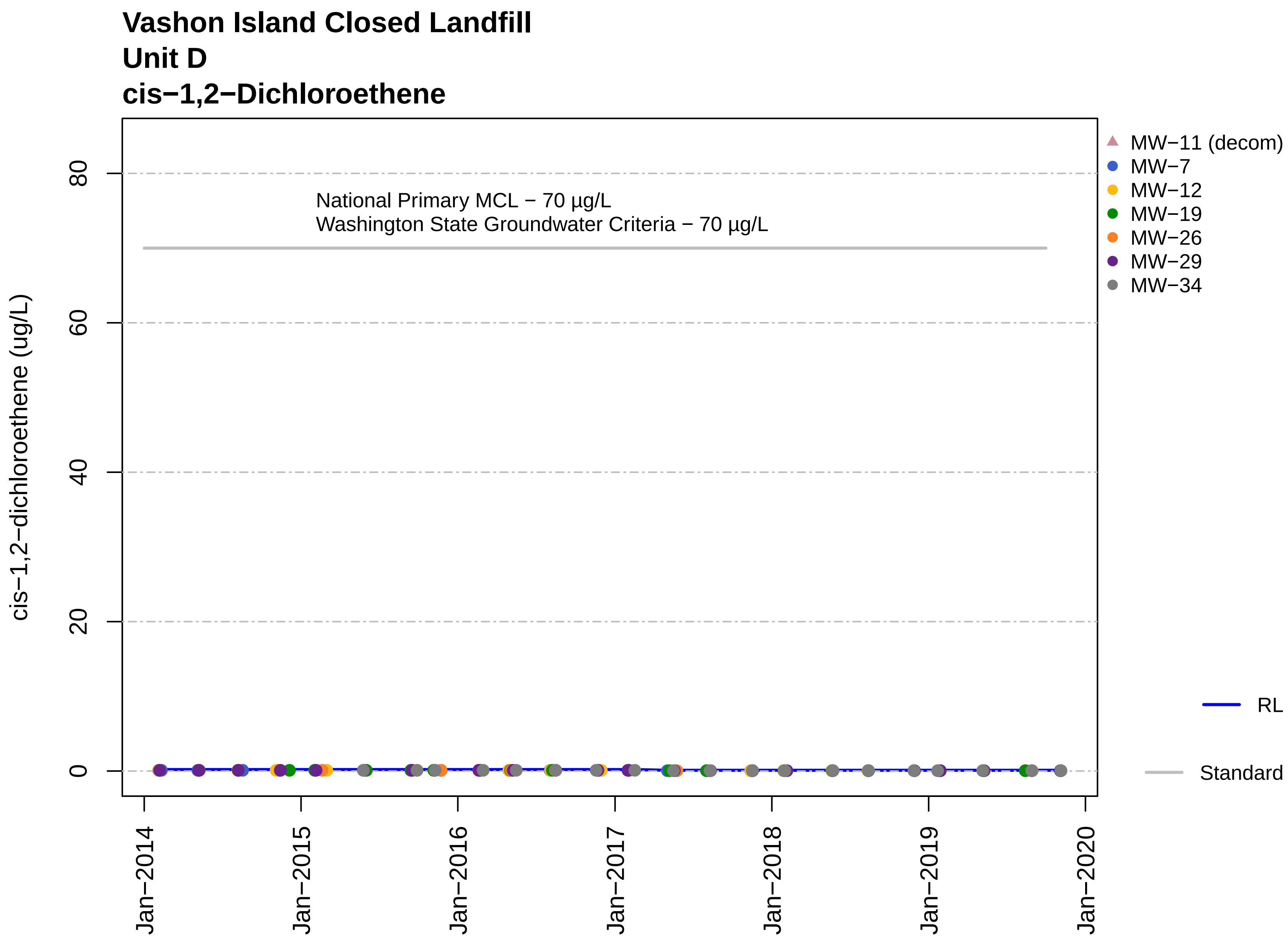
Vashon Island Closed Landfill
Unit D
Chloroethane
Chloroethane (ug/L)
0
1
2
3
4
5
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL

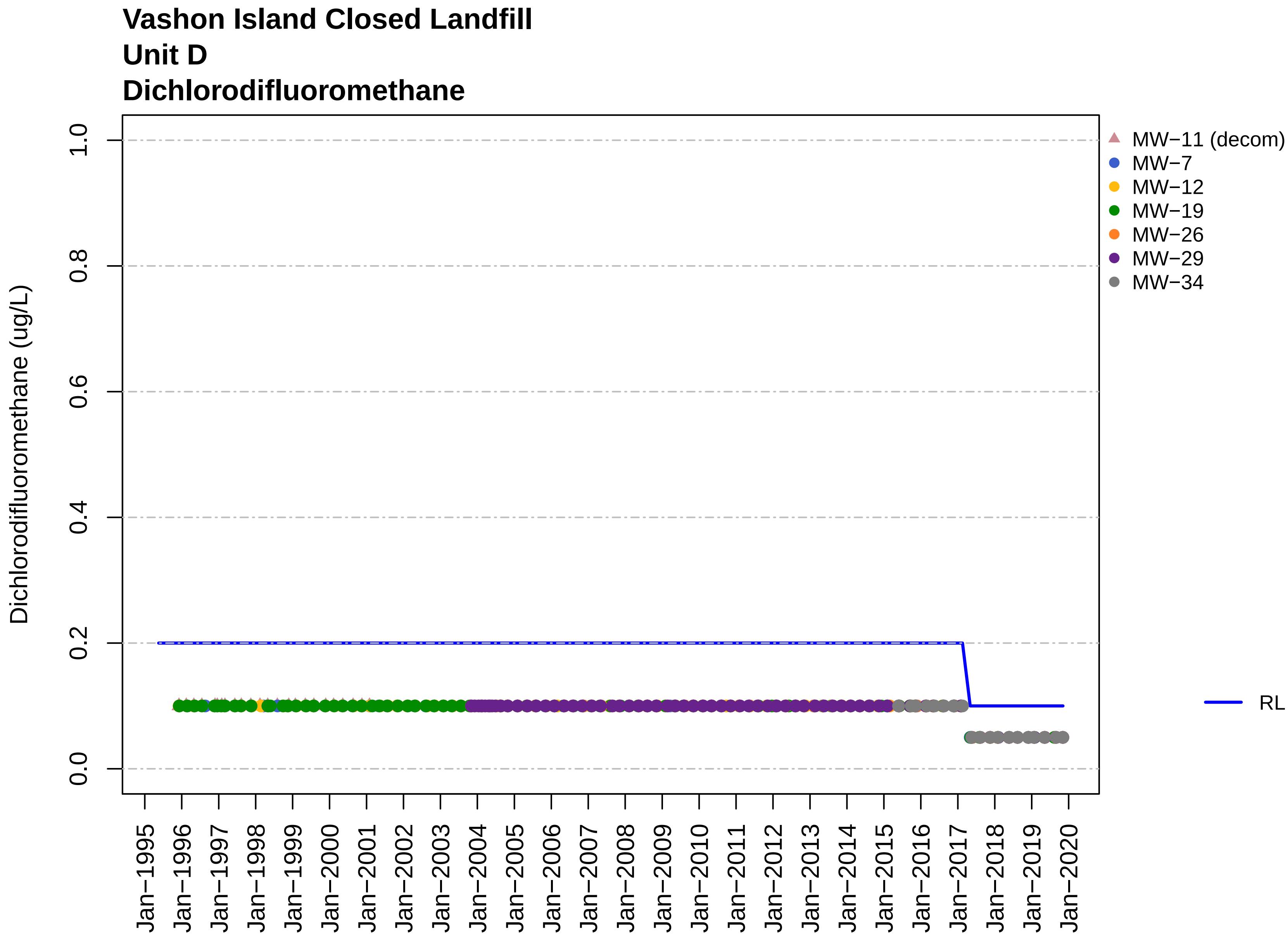


Vashon Island Closed Landfill
Unit D
Chloroethane
Chloroethane (ug/L)
0.0
0.2
0.4
0.6
0.8
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL

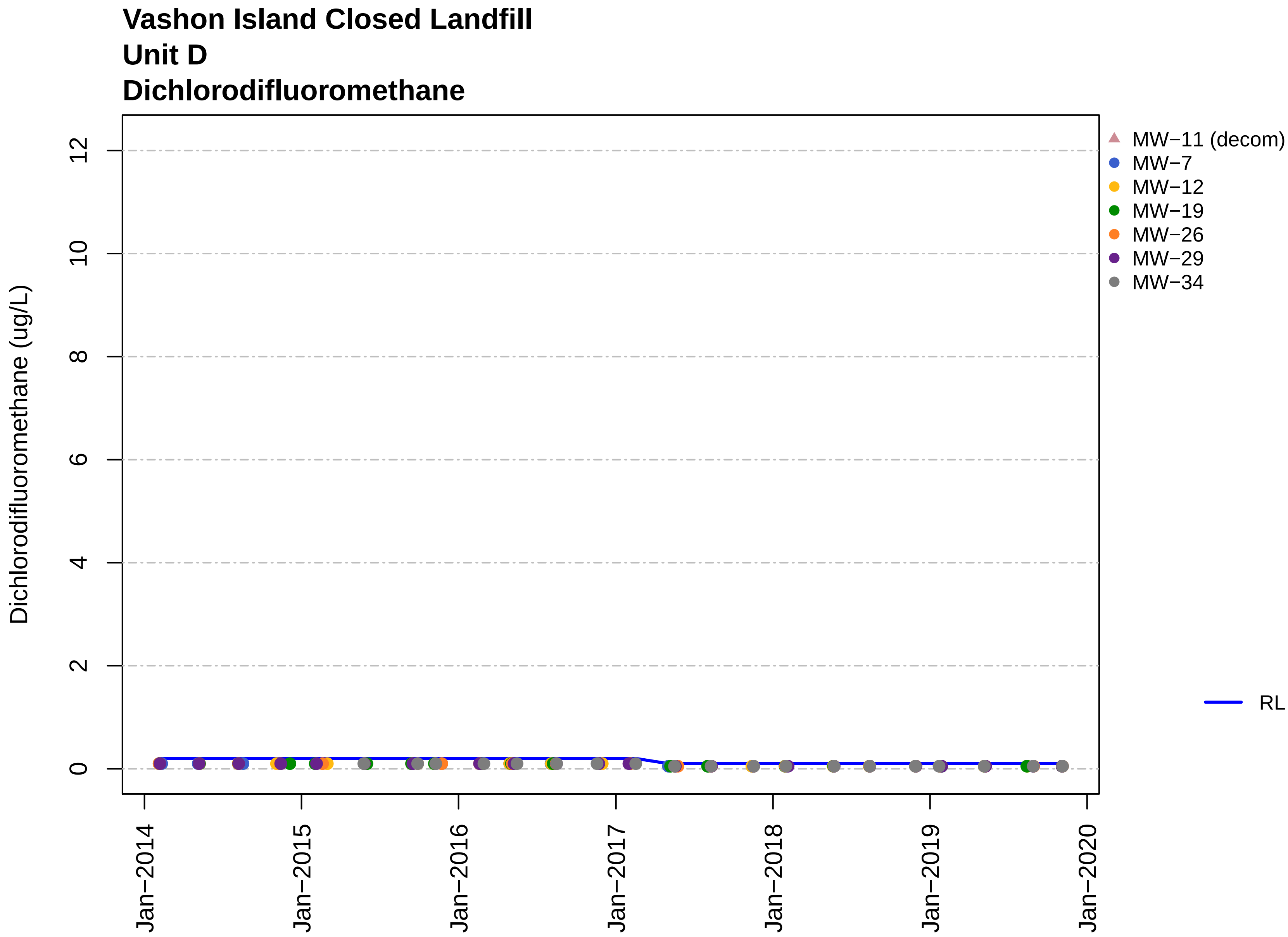


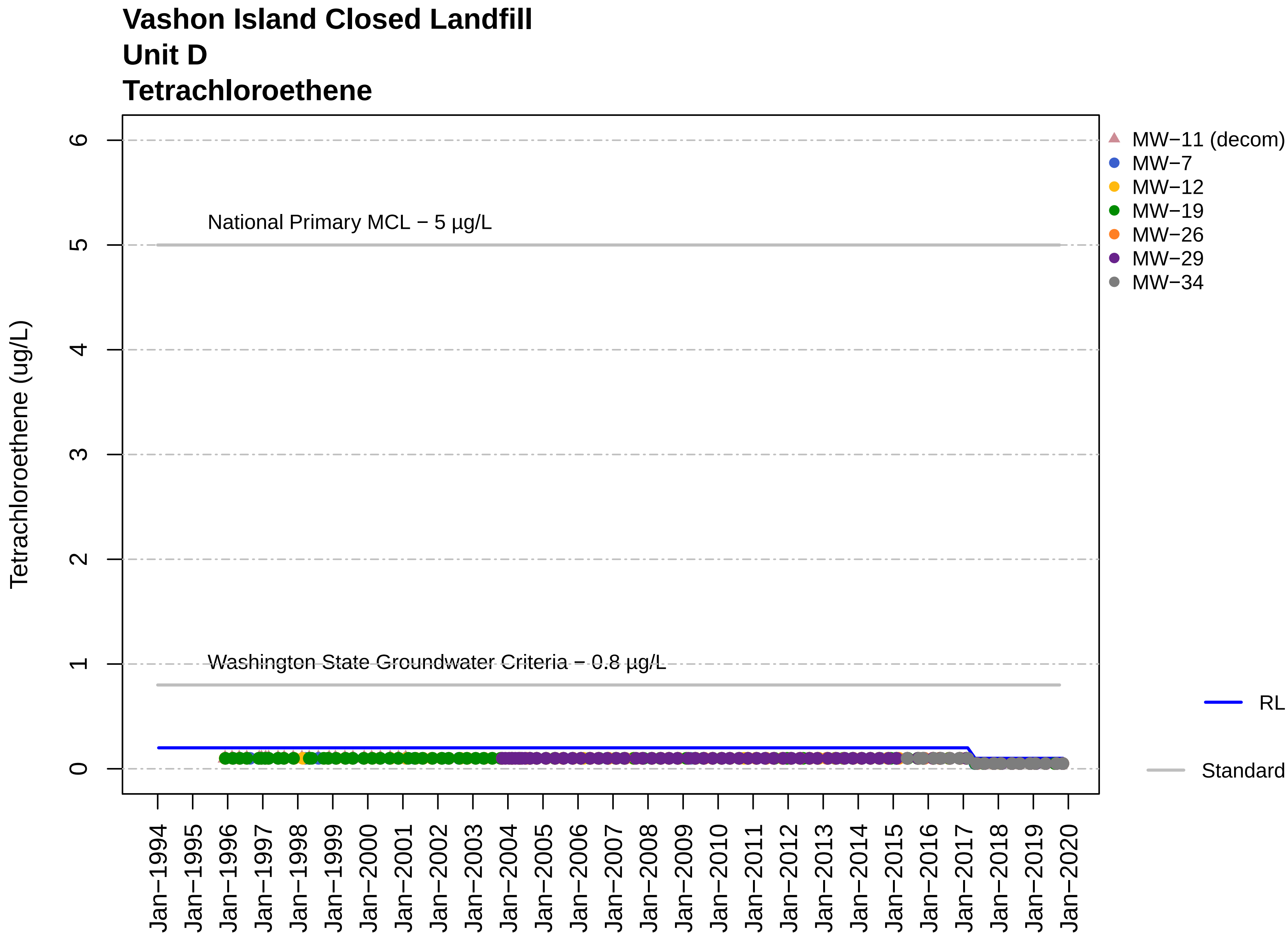
Vashon Island Closed Landfill
Unit D
cis−1,2−Dichloroethene
National Primary MCL − 70 µg/L
Washington State Groundwater Criteria − 70 µg/L
cis−1,2−dichloroethene (ug/L)
0
20
40
60
80
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard


Vashon Island Closed Landfill
Unit D
cis−1,2−Dichloroethene
National Primary MCL − 70 µg/L
Washington State Groundwater Criteria − 70 µg/L
cis−1,2−dichloroethene (ug/L)
0
20
40
60
80
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard



Vashon Island Closed Landfill
Unit D
Dichlorodifluoromethane
Dichlorodifluoromethane (ug/L)
0.0
0.2
0.4
0.6
0.8
1.0
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL


Vashon Island Closed Landfill
Unit D
Dichlorodifluoromethane
Dichlorodifluoromethane (ug/L)
0
2
4
6
8
10
12
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL


Vashon Island Closed Landfill
Unit D
Tetrachloroethene
Tetrachloroethene (ug/L)
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.8 µg/L
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard
0
1
2
3
4
5
6
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
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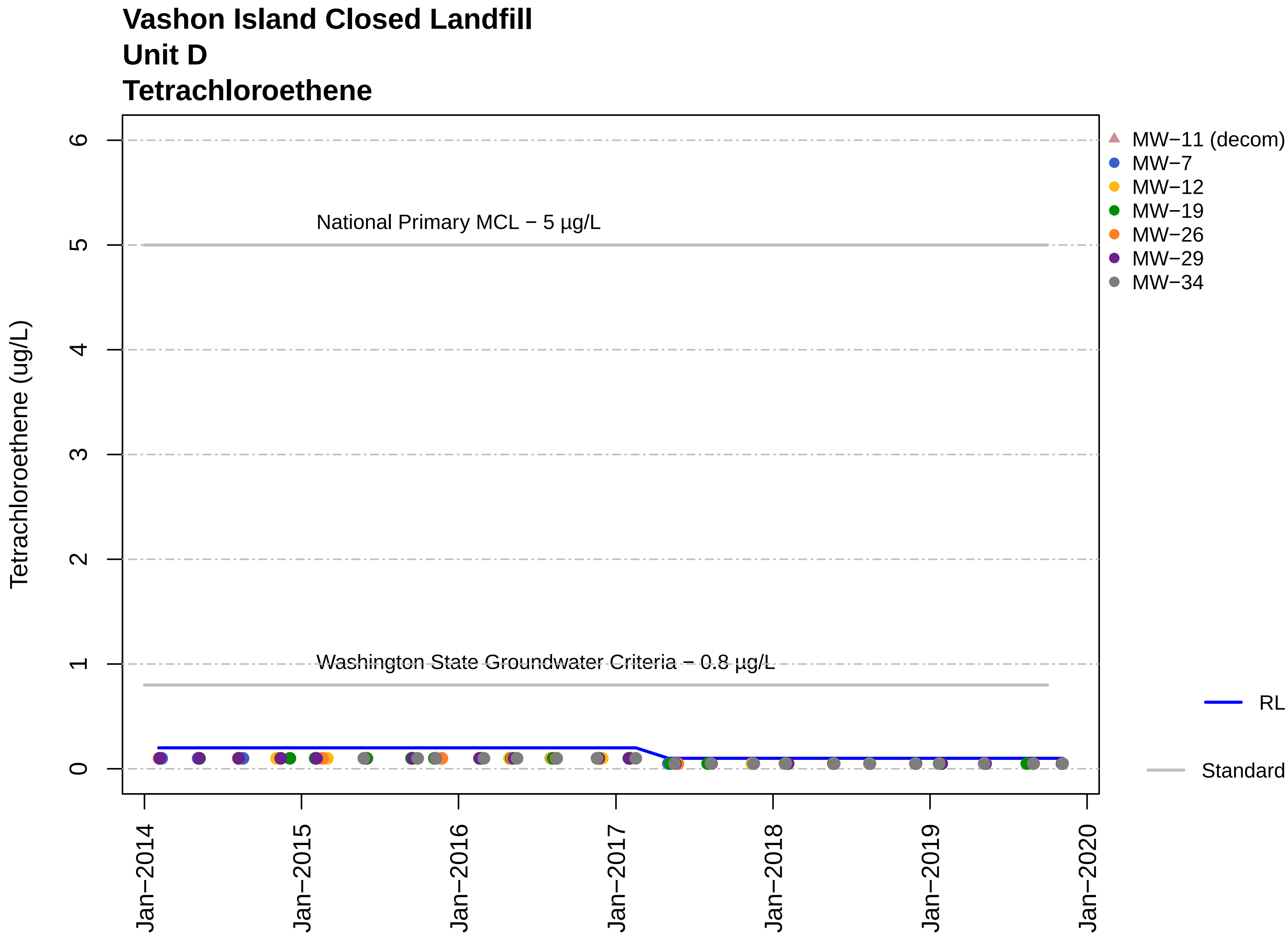
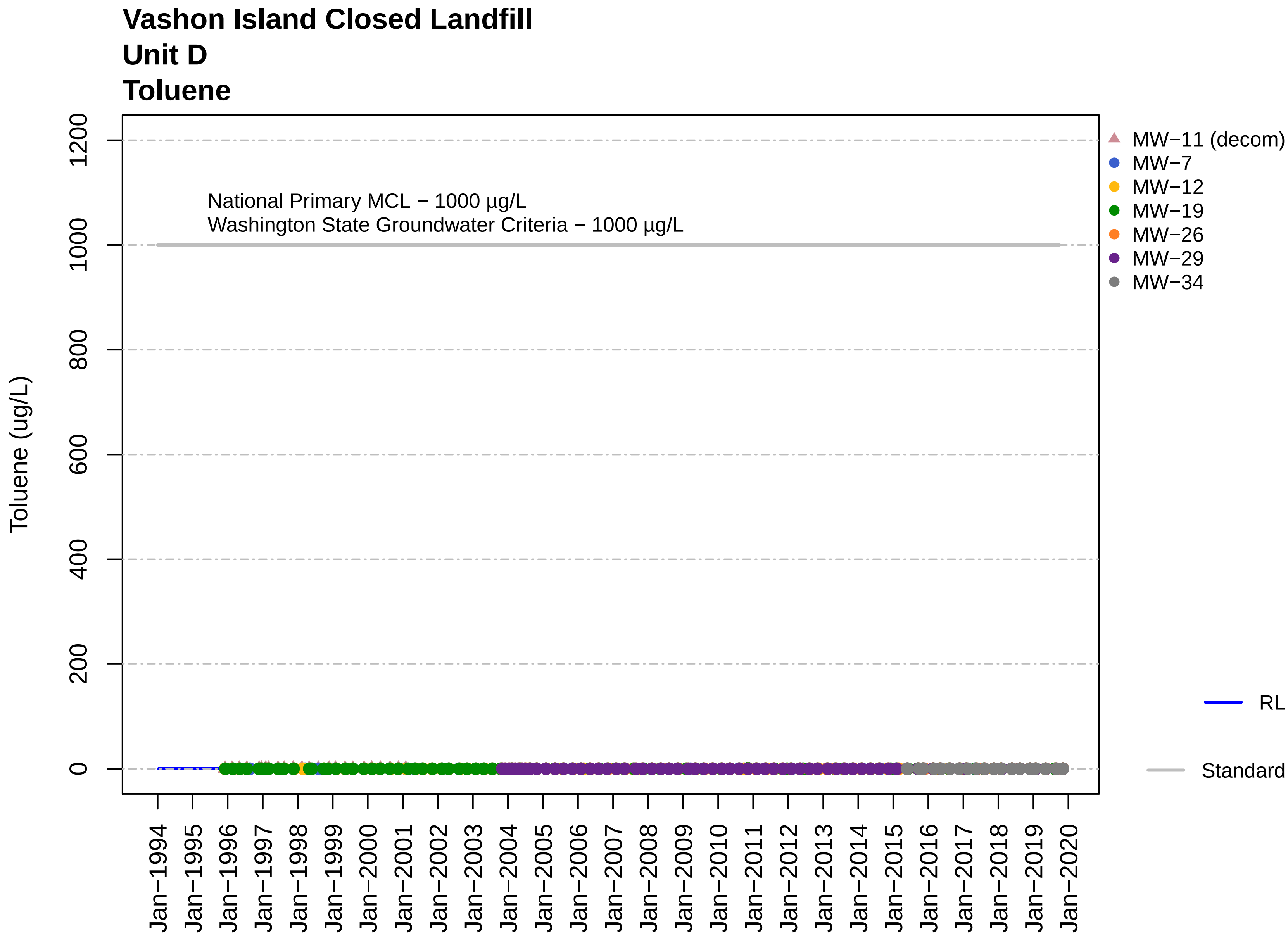
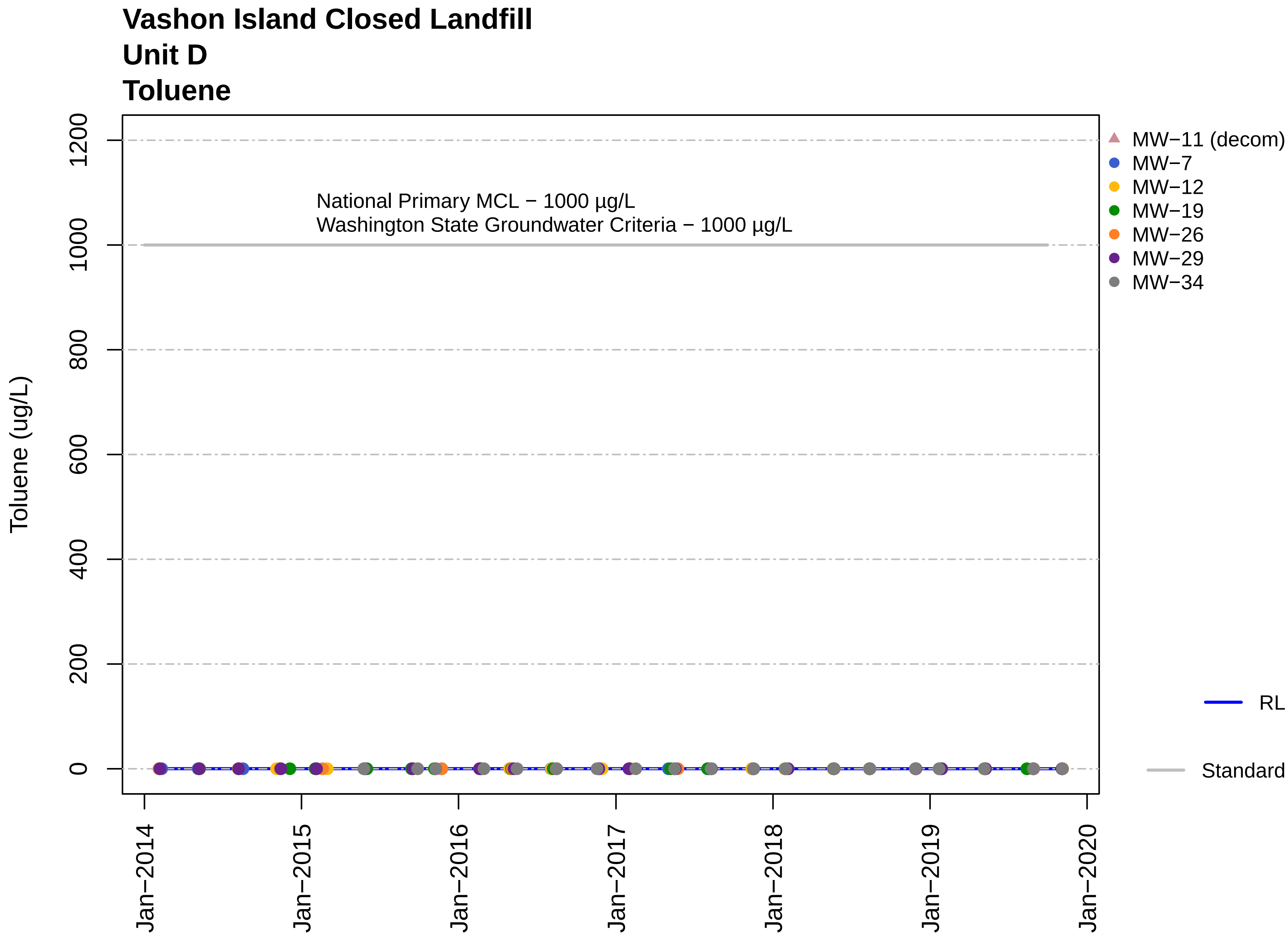
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

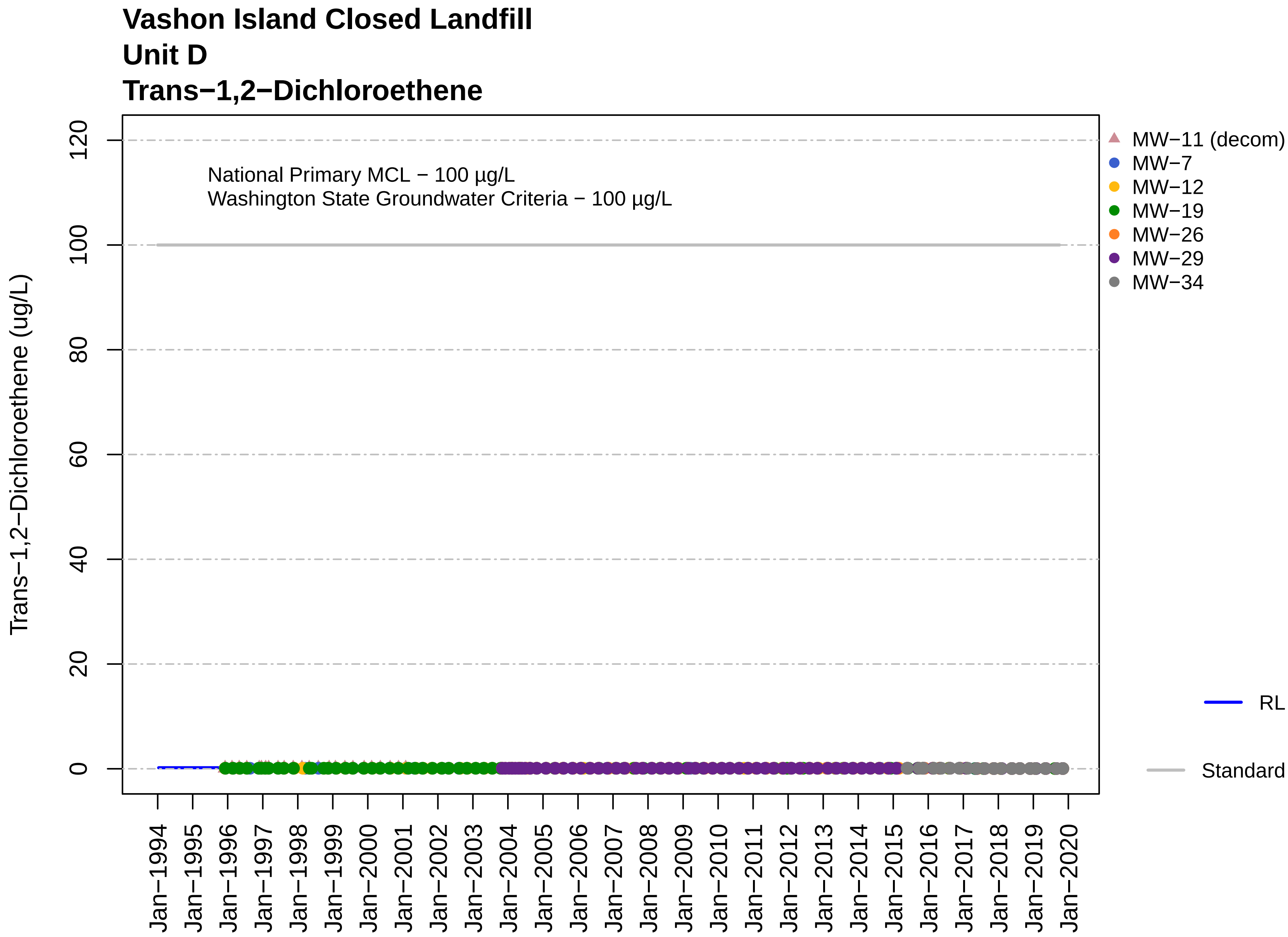


Vashon Island Closed Landfill
Unit D
Tetrachloroethene
Tetrachloroethene (ug/L)
0
1
2
3
4
5
6
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.8 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

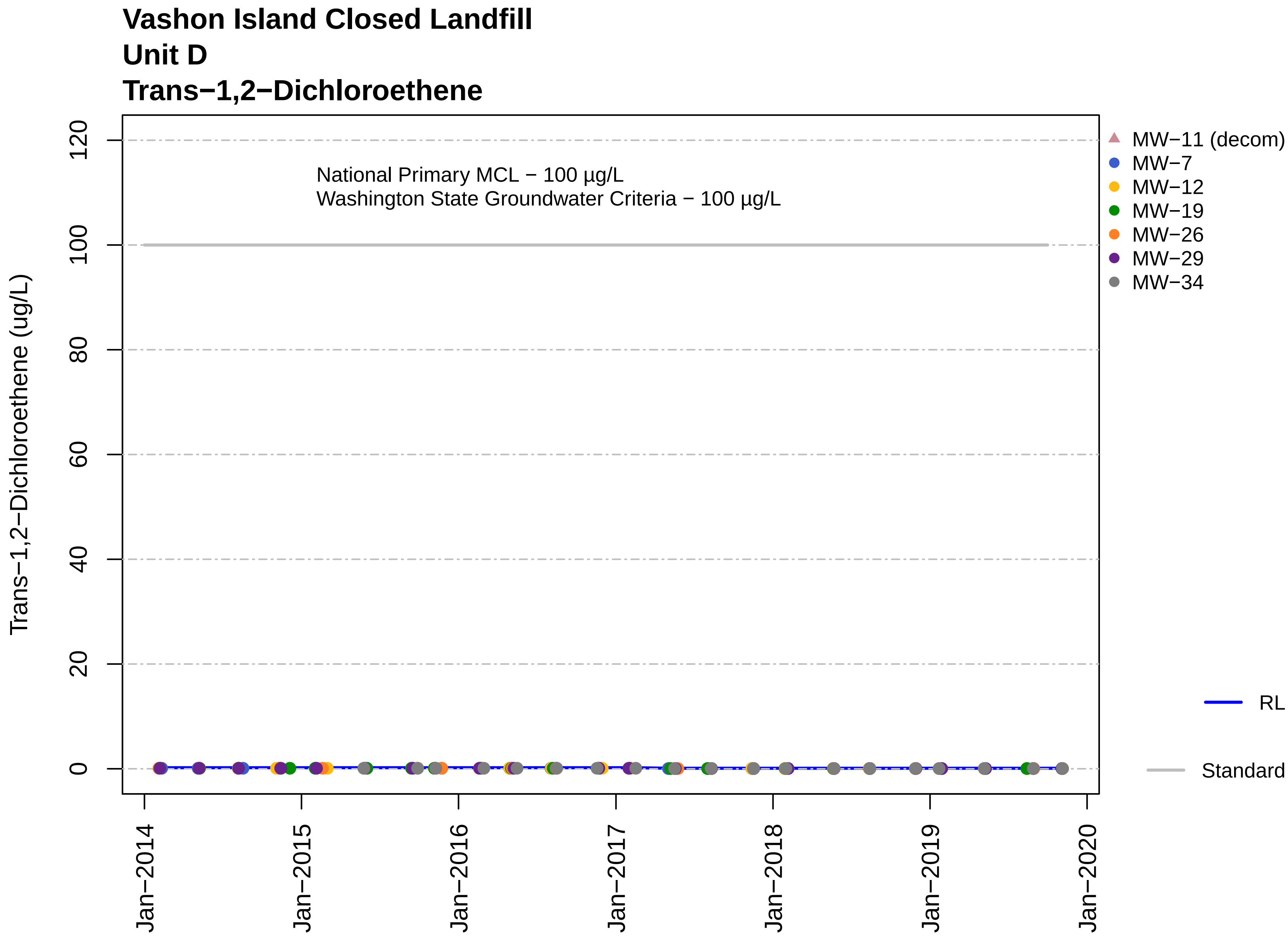

Vashon Island Closed Landfill
Unit D
Toluene
Toluene (ug/L)
National Primary MCL − 1000 µg/L
Washington State Groundwater Criteria − 1000 µg/L
0
200
400
600
800
1000
1200
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

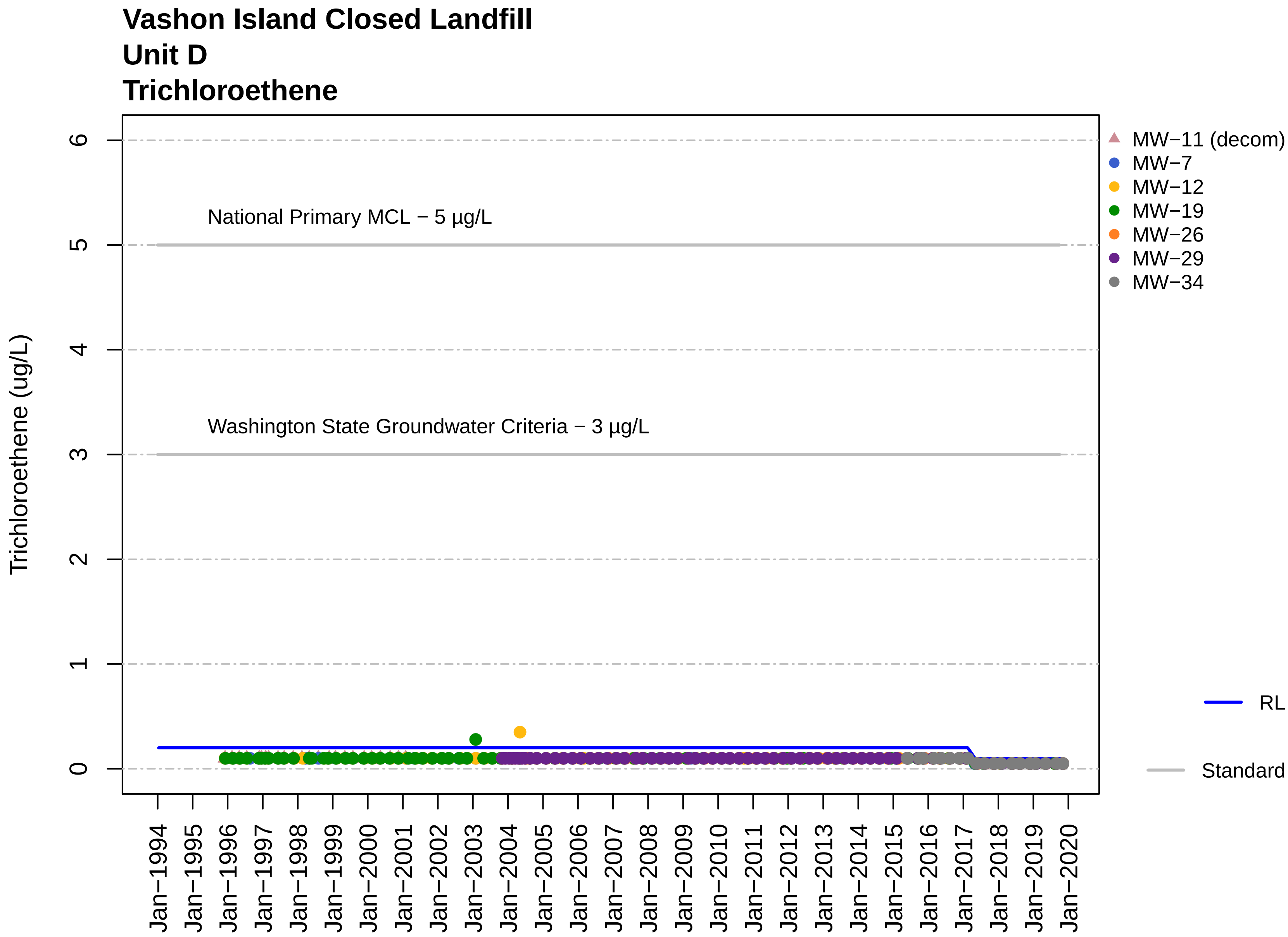


Vashon Island Closed Landfill
Unit D
Toluene
National Primary MCL − 1000 µg/L
Washington State Groundwater Criteria − 1000 µg/L
Toluene (ug/L)
0
200
400
600
800
1000
1200
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard



Vashon Island Closed Landfill
Unit D
Trans−1,2−Dichloroethene
National Primary MCL − 100 µg/L
Washington State Groundwater Criteria − 100 µg/L
Trans−1,2−Dichloroethene (ug/L)
0
20
40
60
80
100
120
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard


Vashon Island Closed Landfill
Unit D
Trans−1,2−Dichloroethene
National Primary MCL − 100 µg/L
Washington State Groundwater Criteria − 100 µg/L
Trans−1,2−Dichloroethene (ug/L)
0
20
40
60
80
100
120
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard



Vashon Island Closed Landfill
Unit D
Trichloroethene
Trichloroethene (ug/L)
0
1
2
3
4
5
6
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 3 µg/L
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
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Jan−2008
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Jan−2011
Jan−2012
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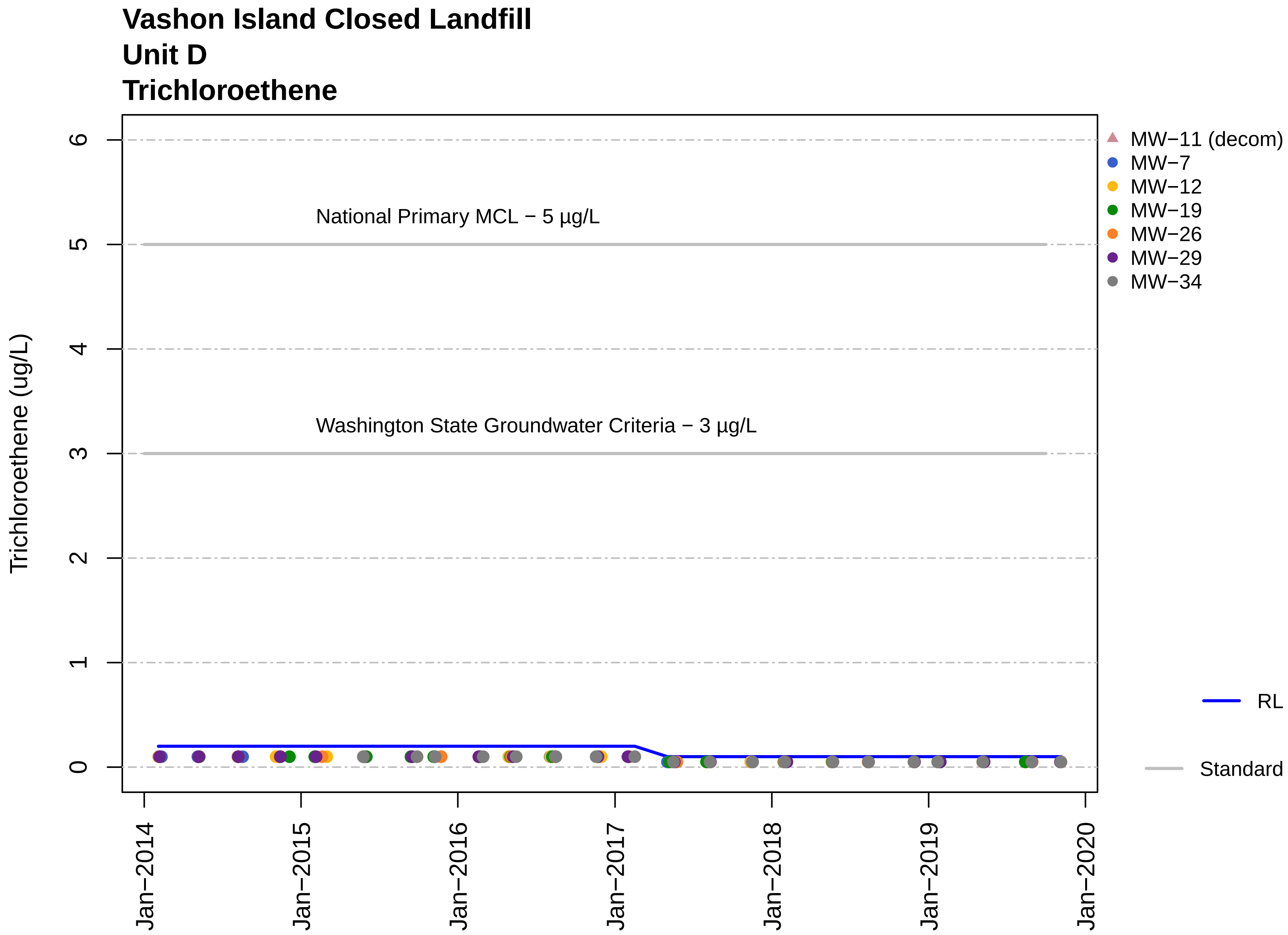
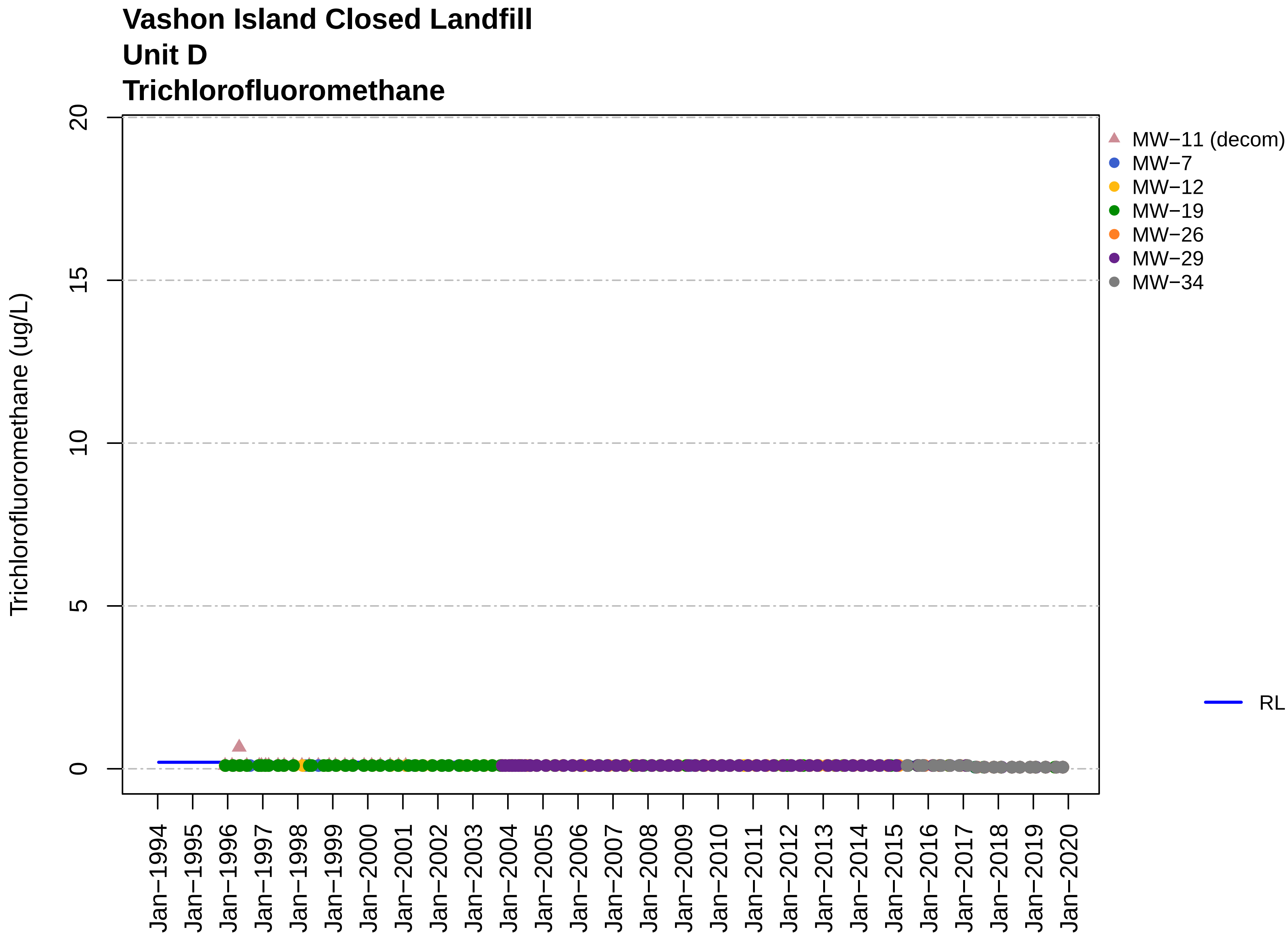
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

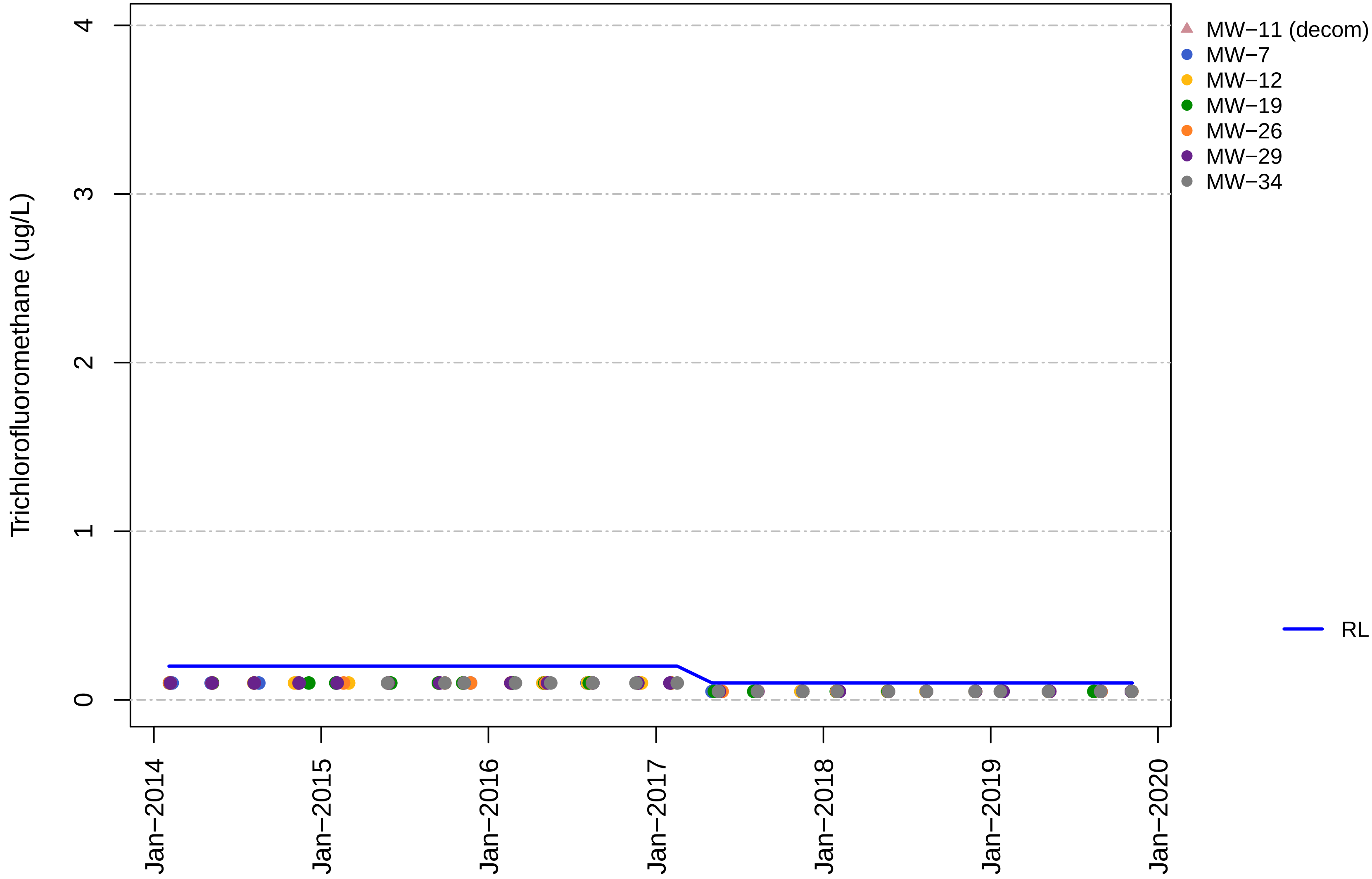


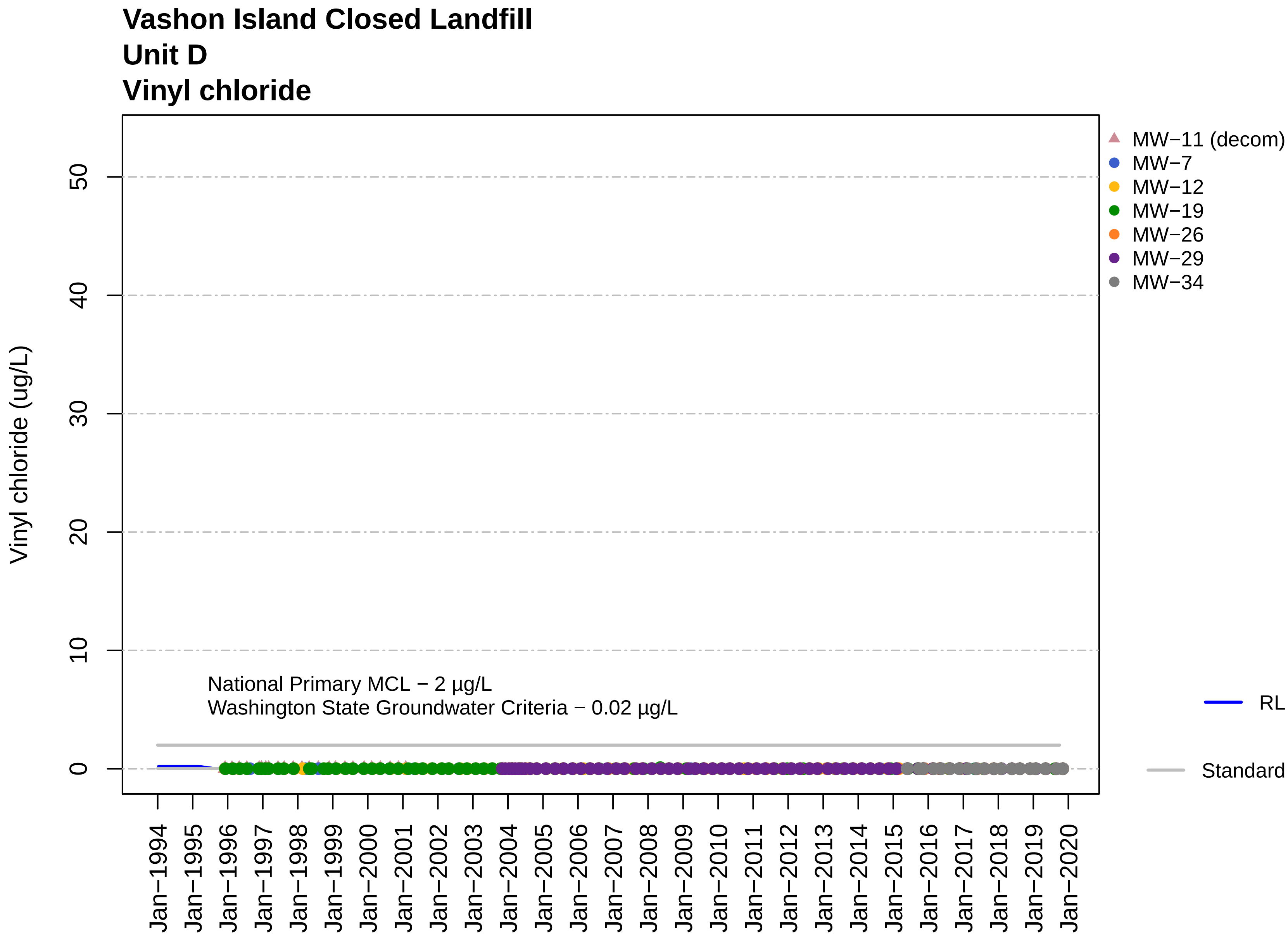
Vashon Island Closed Landfill
Unit D
Trichloroethene
Trichloroethene (ug/L)
0
1
2
3
4
5
6
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 3 µg/L
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard



Vashon Island Closed Landfill
Unit D
Trichlorofluoromethane
Trichlorofluoromethane (ug/L)
0
5
10
15
20
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

Vashon Island Closed Landfill
Unit D
Trichlorofluoromethane





Vashon Island Closed Landfill
Unit D
Vinyl chloride
Vinyl chloride (ug/L)
0
10
20
30
40
50
National Primary MCL − 2 µg/L
Washington State Groundwater Criteria − 0.02 µg/L
MW−11 (decom)
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
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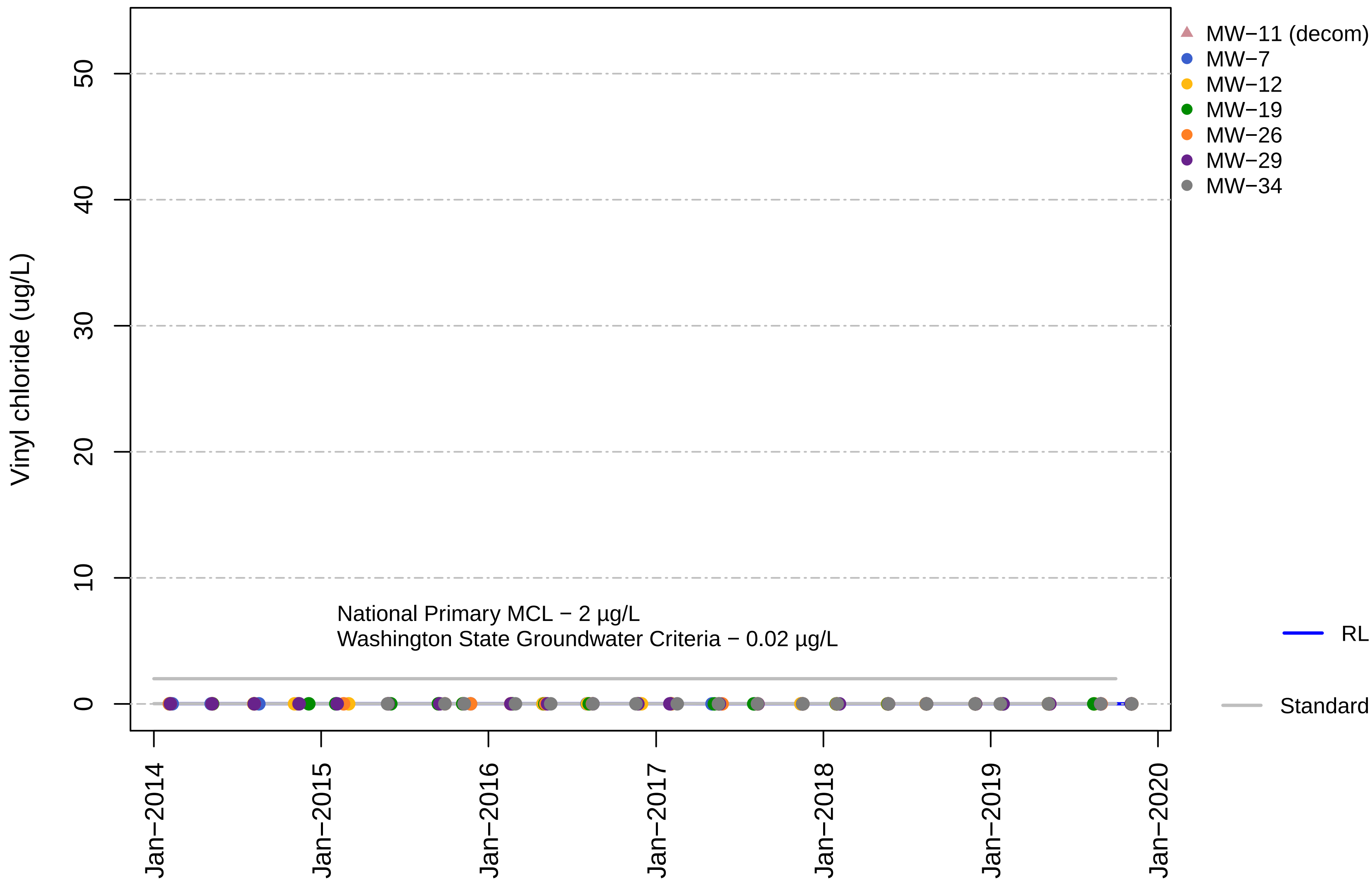
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020

Vashon Island Closed Landfill
Unit D
Vinyl chloride



Appendix G

Groundwater Velocity Calculations and Potentiometric Maps

King County
Water and Land Resources Division
Department of Natural Resources and Parks
King Street Center
201 South Jackson Street, Suite 600
Seattle, WA 98104-3855
206-477-4800 Fax 206-296-0192
TTY Relay: 711

Memorandum

May 1, 2019

TO: Marisa Baptiste, Engineer II, Facility Engineering and Science Section, Solid Waste Division, Department of Natural Resources and Parks (DNRP)

FM: Sevin Bilir, Environmental Scientist IV, Science and Technical Support Section, Water and Land Resources Division, DNRP

RE: Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations
First Quarter 2019 Results
Vashon Island Closed Landfill, King County, Washington
Project No. 1126980 – Task 25.106

King County Water and Land Resources Division (KCWLR Division) submits this memorandum report on groundwater conditions during the first quarter of 2019 for the middle channel deposit in the Cc2 perched zone and the Unit D aquifer beneath the Vashon Island Closed Landfill (Landfill), in accordance with the *Proposal for Potentiometric Groundwater Surface Maps and Groundwater Velocity Calculations* (KCWLR Division, 2019).

An agency draft of the recent remedial investigation report (Aspect, 2018) provided additional understanding of the hydrogeology that has been incorporated into this memorandum. King County Solid Waste Division (KCSWD) personnel measured groundwater elevations at the Landfill on January 22, 2019. These measurements were received by KCWLR Division on April 4, 2019 and were used to:

1. Evaluate the potentiometric groundwater surface elevation for the Cc2 perched zone and the Unit D aquifer;
2. Determine the groundwater flow direction and horizontal gradient for the Cc2 perched zone and the Unit D aquifer; and
3. Calculate the groundwater velocity of the Cc2 perched zone and the Unit D aquifer.

Groundwater Elevation Data

KCSWD attempted to measure groundwater levels at 14 monitoring wells during the first quarter of 2019. These monitoring wells were completed in the Cc2 perched zone and the Unit D aquifer, as referred to in *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Aspect, 2018).

Table A-1 lists spring and groundwater monitoring well identifications, locations, construction details, measured depth to groundwater levels and calculated groundwater elevations for monitoring wells in the Cc2 perched zone and Unit D aquifer.

Unit C – Cc2 Perched Zone

Within Unit C, three separate coarse-grained perched zones are identified within variable fine-grained sediment (Aspect 2018). The Cc2 channel deposit perched zone is not laterally extensive across the Landfill as it was not identified in borings southeast and northwest of the landfill closure area (Aspect, 2018). Groundwater in this perched zone can be measured in wells MW-2, MW-9, MW-20, MW-21, MW-33, and MW-35 and at west hillslope springs 18S and 24S (Aspect, 2018).

According to Aspect (2018), water levels in the Unit Cc2 perched zone generally indicate unconfined groundwater conditions, with the exception of monitoring wells MW-20 and MW-33. Groundwater elevations in these wells are above coarse-grained portions of the unit indicating confined conditions (Aspect 2018). During this quarter, water levels in monitoring wells MW-33 were measured at a little over 15 feet above the top of the screen and may be influenced by these confining conditions.

West hillslope springs 18S and 24S were monitored during a previous short term investigation (KCWLR Division, 2006) and are no longer monitored. Figure A-1 shows spring and monitoring well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Cc2 perched zone for the January 22, 2019 measurement event.

Unit D Aquifer

Groundwater in the Unit D aquifer is measured by monitoring wells MW-7, MW-12, MW-19, MW-25, MW-26, MW-28, MW-29, and MW-34 (Aspect, 2018). Measured water levels in monitoring wells MW-7, MW-12, MW-19 and MW-34 were at least 17 feet above the top of the screen and may be influenced by vertical gradients, permeability differences (Aspect 2018), or confining conditions in the Unit D aquifer.

Monitoring well MW-28 was reported as and historically has been reported as “dry.” MW-28 screen was installed at the contact between Unit D and unit below (Unit E) and requires a two foot rise in surrounding groundwater levels to reach the screen bottom.

Figure A-2 shows monitoring well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Unit D aquifer for the January 22, 2019 measurement event.

Direction of Groundwater Flow

Figures A-1 and A-2 show groundwater elevations, potentiometric surface contours and interpreted groundwater flow directions for the monitoring wells in the Cc2 perched zone, and the monitoring wells in the Unit D aquifer, respectively, based on the January 22, 2019 measurements.

Groundwater elevations from measurements made on January 22, 2019, indicate that groundwater in the Cc2 perched zone generally flowed towards the west (Figure A-1). Previously surveyed ground surface elevations of springs 18S and 24S (located on the west hillslope) are included in this report to add to gap of information to the west of the landfill, as indicated in previous reports (Aspect. 2018).

As per Aspect (2018), groundwater flow direction in Unit D is strongly influenced by the typically higher water levels in MW-7 and MW-34. Groundwater elevations from measurements made on January 22, 2019, indicate that groundwater in the Unit D aquifer flows generally southwesterly south of the divide and northerly north of the divide with components of flow to the northeast and northwest (Figure A-2). The groundwater gradient south of the divide is less steep than that the north of the divide.

Groundwater Parameters

Horizontal groundwater velocity was calculated using the following formula:

where: $$v = \frac{1}{n_{eff}} K \frac{\Delta H}{\Delta L}$$

v = Groundwater velocity [L/t]
n_{eff} = Effective porosity [dimensionless]
K = Hydraulic conductivity [L/t]
$\frac{\Delta H}{\Delta L}$ = Hydraulic gradient [L/L]

Horizontal groundwater velocity was calculated for the southern Cc2 perched zone and for the Unit D aquifer. The hydraulic conductivity and effective porosity values were based on the new ranges referred to in the *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Aspect, 2018). However, average horizontal hydraulic conductivity values for Unit Cc2 are assumed incorrectly listed but assumed correctly commented in notes. Table A-2 reflects this correction (with notes) and presents a summary of the groundwater parameters used to calculate groundwater velocities from first quarter 2019 data.

The hydraulic gradient was determined from the potentiometric surface maps (Figures A-1 and A-2). The average hydraulic gradient in the Cc2 perched zone was approximately 0.014 feet/feet (ft/ft). The average hydraulic gradient in the Unit D aquifer was approximately 0.036 and 0.017 ft/ft in the northerly and southerly direction, respectively.

On January 22, 2019, the average horizontal groundwater velocity in the Cc2 perched zone was approximately 0.59 feet per day (ft/d) property wide and 0.39 ft/d in the south slope area. The average horizontal groundwater velocity in the Unit D aquifer was approximately 1.81 and 0.84 ft/d in the northerly and southerly direction, respectively.

References

Aspect. 2018. *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Contract Number E00102E08; Task No. 310.3 – D310.3.2).October 9. AGENCY DRAFT.

King County Water and Land Resources Division (KCWLR Division). 2006. *Vashon Island Closed Landfill Hillslope Report for Scope of Work #1*.

KCWLR Division. 2019. *Proposal for 2019 Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations*; King County Closed Landfills (Cedar Falls, Enumclaw, Hobart and Vashon Island) and Cedar Hills Regional Landfill. January 31.

Thank you for the opportunity to provide hydrogeologic services to the KCSWD. If you have any questions, please feel free to contact me at 206-477-4646 or sevin.bilir@kingcounty.gov.

Sincerely,

Sevin Bilir, WA LHG
Environmental Scientist IV
King County Water and Land Resources Division

Enclosures:

Table A-1:	Groundwater Elevations – First Quarter 2019
Table A-2:	Groundwater Parameters – First Quarter 2019
Figure A-1:	Groundwater Potentiometric Surface Map – First Quarter 2019 – Cc2 Perched Zone
Figure A-2:	Groundwater Potentiometric Surface Map – First Quarter 2019 – Unit D Aquifer

Table A-1: Groundwater Elevations – First Quarter 2019

Vashon Island Closed Landfill
King County, Washington

							January 22, 2019	
	Spring / Well Identification	Easting	Northing	Top of Casing Elevation (feet MSL)	Top of Screen Elevation (feet)	Bottom of Screen Elevation (feet)	Measured Depth to Water (feet)	Groundwater Elevations (feet MSL)
Cc2 Perched Zone	18S*	1227270.5272*	162552.8362*	NA	NA	NA	NA	227.94*
	24S*	1227262.207*	162692.4735*	NA	NA	NA	NA	227.24*
	MW-2	1227788.192	162365.5107	318.09	237.39	232.39	73.61	244.48
	MW-9	1227723.361	163526.7593	405.32	236.39	226.39	165.64	239.68
	MW-20	1228173.098	162566.14	370.43	240.79	236.49	121.46	248.97
	MW-21	1227647.721	162339.8555	348.95	246.46	237.06	106.34	242.61
	MW-33	1227883.225	162681.958	359.24	231.95	221.95	112.11	247.13
	MW-35	1227651.14	162559.4538	361.48	246.98	236.98	118.15	243.33
Unit D Aquifer	MW-7	1228427.426	162810.969	376.56	154.40	144.40	190.56	186.00
	MW-12	1227800.607	162374.9914	315.67	142.90	132.90	141.42	174.25
	MW-19	1227724.722	163534.7053	405.58	142.85	132.85	245.51	160.07
	MW-25	1228627.795	163748.581	399.22	152.04	137.94	243.14	156.08
	MW-26	1227909.96	163770.324	406.58	158.30	144.20	247.37	159.21
	MW-28**	1228115.845	163843.491	398.72	177.04	162.64	DRY	DRY
	MW-29	1228375.178	163680.916	413.79	173.02	158.22	244.21	169.58
	MW-34	1227773.787	163135.4694	385.94	150.64	140.64	203.38	182.56

Notes

1. Water level measurements made by KCSWD personnel.
2. Northing & Easting coordinates are Washington North State Plane Coordinates in WGS84.
3. Elevations reported in feet above Mean Sea Level based on the NAVD 88.
4. NA Not applicable.
5. DRY Moisture detected below screen.

* Hillslope springs 18S and 24S interpreted as discharge from Cc Perched Zone (Aspect 2018b). Hillslope spring elevations and locations were not surveyed this quarter. These data are from 2006.

** MW-28 requires 2-foot rise in groundwater levels. MW-28 screen installed at contact between Unit D and unit below (Unit E). Historically reported as dry well (Aspect, 2018b).

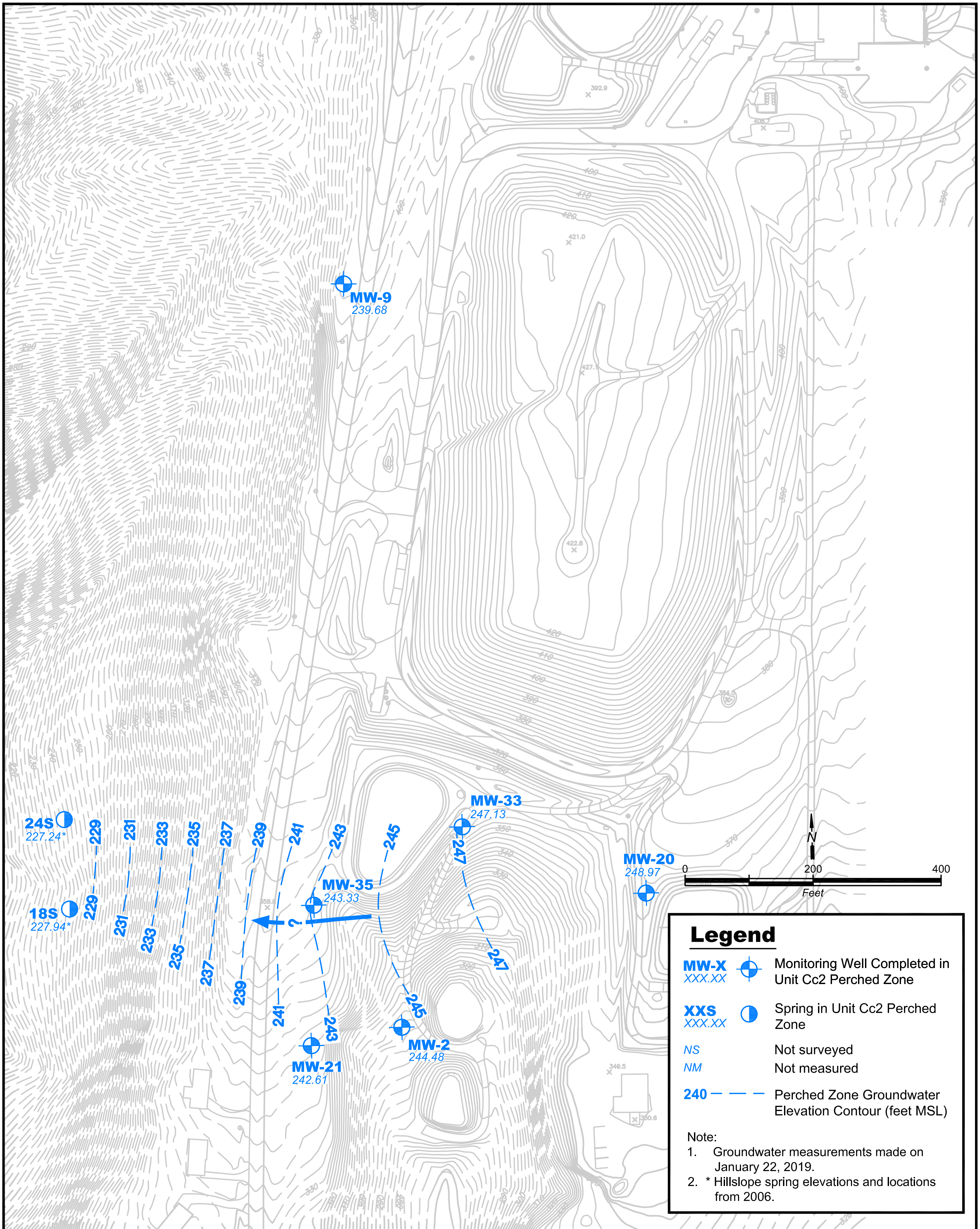
Table A-2: Groundwater Parameters – First Quarter 2019

Vashon Island Closed Landfill
King County, Washington

Water Bearing Zone Beneath Landfill	Horizontal Hydraulic Conductivity (K)[3] Range	(cm/s)	(ft/d)	Horizontal Hydraulic Gradient (DH/DL) (ft/ft)	Effective Porosity (n_{eff})	Horizontal Groundwater Velocity (v) (ft/d)	General Groundwater Flow Direction
Unit Cc2 - Property Wide[4]	Low	5.7E-04	1.61	0.008	20%	0.06	West
	High	1.6E-02	46.08	0.021	20%	4.81	
	Average[6]	2.9E-03	8.21	0.014	20%	0.59	
Unit Cc2 - South Slope Area[5]	Low	5.7E-04	1.61	0.008	20%	0.06	West
	High	6.8E-03	19.35	0.019	20%	1.88	
	Average[6]	2.1E-03	5.81	0.014	20%	0.39	
Unit D - Northerly flow direction	Low	1.5E-03	4.4	0.036	20%	0.78	North - with some to the NE and NW away from ridge
	High	1.6E-02	46.1		20%	8.19	
	Average	3.6E-03	10.2		20%	1.81	
Unit D - Southerly flow direction	Low	1.5E-03	4.4	0.017	20%	0.36	Southwest - away from ridge
	High	1.6E-02	46.1		20%	3.81	
	Average	3.6E-03	10.2		20%	0.84	

Notes

1. Horizontal hydraulic conductivity values and effective porosity values as reported in Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1 (Contract Number E00102E08; Task No. 310.3 – D310.3.2). October 9. AGENCY DRAFT (Aspect, 2018). However, average horizontal hydraulic conductivity values for Unit Cc2 are assumed incorrectly listed in the table and assumed correctly commented on in the notes. This table above reflects the correct values. See notes 4 and 6 below.
2. Average hydraulic conductivity values are the geometric mean of values reported per well and unit (Aspect, 2018).
3. Horizontal hydraulic gradients based on average of gradients measured at several points from the maps shown on Figures A-1 and A-2.
4. Calculations for Property wide Unit Cc2 horizontal hydraulic conductivities include data from wells MW-2, MW-9, MW-20, MW-21, MW-33, and MW-35.
5. Calculations for South Slope Area Unit Cc2 horizontal hydraulic conductivities include data from wells MW-2, MW-20, MW-21, MW-33, and MW-35.
6. Calculations of average hydraulic conductivities for Unit Cc2 did not include data obtained in 1986 from MW-2 as the value was significantly lower than a remeasurement completed in 2015 (Aspect, 2018).



King County

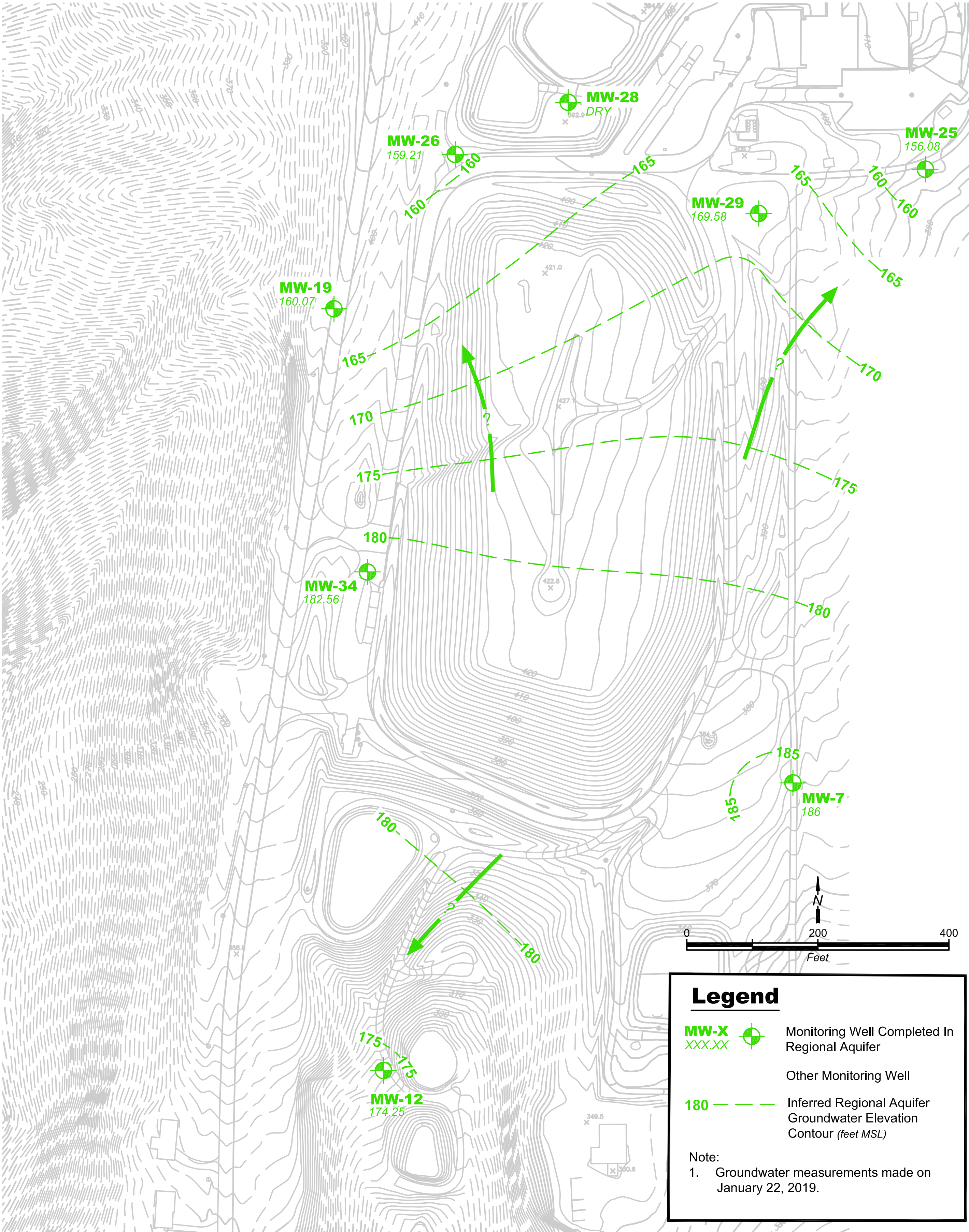
Groundwater Potentiometric Surface Map
First Quarter 2019 - Cc2 Perched Zone

Vashon Island Closed Landfill

King County, Washington

DATE: April 2019	PROJECT NO. 1033601
DESIGNED BY: SB	
DRAWN BY: KK	FIGURE NO. A-1
REVISED BY: SB	

VI_1Q2019_Cc2Perched.dwg



King County

Groundwater Potentiometric Surface Map
First Quarter 2019 - Unit D Aquifer

Vashon Island Closed Landfill

King County, Washington

DATE: April 2019	PROJECT NO. 1033601
DESIGNED BY: SB	
DRAWN BY: KK	FIGURE NO. A-2
REVISED BY: SB	

VI_1Q2019_UnitD.dwg

King County
Water and Land Resources Division
Department of Natural Resources and Parks
King Street Center
201 South Jackson Street, Suite 600
Seattle, WA 98104-3855
206-477-4800 Fax 206-296-0192
TTY Relay: 711

Memorandum

July 29, 2019

TO: Marisa Baptiste, Engineer II, Facility Engineering and Science Section, Solid Waste Division, Department of Natural Resources and Parks (DNRP)

FM: Sevin Bilir, Environmental Scientist IV, Science and Technical Support Section, Water and Land Resources Division, DNRP

RE: Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations
Second Quarter 2019 Results
Vashon Island Closed Landfill, King County, Washington
Project No. 1126980 – Task 25.106

King County Water and Land Resources Division (KCWLR Division) submits this memorandum report on groundwater conditions during the second quarter of 2019 for the middle channel deposit in the Cc2 perched zone and the Unit D aquifer beneath the Vashon Island Closed Landfill (Landfill), in accordance with the *Proposal for Potentiometric Groundwater Surface Maps and Groundwater Velocity Calculations* (KCWLR Division, 2019).

An agency draft of the recent remedial investigation report (Aspect, 2018) provided additional understanding of the hydrogeology that has been incorporated into this memorandum. King County Solid Waste Division (KCSWD) personnel measured groundwater elevations at the Landfill on April 25, 2019. These measurements were received by KCWLR Division on June 28, 2019 and were used to:

1. Evaluate the potentiometric groundwater surface elevation for the Cc2 perched zone and the Unit D aquifer;
2. Determine the groundwater flow direction and horizontal gradient for the Cc2 perched zone and the Unit D aquifer; and
3. Calculate the groundwater velocity of the Cc2 perched zone and the Unit D aquifer.

Groundwater Elevation Data

KCSWD attempted to measure groundwater levels at 14 monitoring wells during the second quarter of 2019. These monitoring wells were completed in the Cc2 perched zone and the Unit D aquifer, as referred to in *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Aspect, 2018).

Table A-1 lists spring and groundwater monitoring well identifications, locations, construction details, measured depth to groundwater levels and calculated groundwater elevations for monitoring wells in the Cc2 perched zone and Unit D aquifer.

Unit C – Cc2 Perched Zone

Within Unit C, three separate coarse-grained perched zones are identified within variable fine-grained sediment (Aspect 2018). The Cc2 channel deposit perched zone is not laterally extensive across the Landfill as it was not identified in borings southeast and northwest of the landfill closure area (Aspect, 2018). Groundwater in this perched zone can be measured in wells MW-2, MW-9, MW-20, MW-21, MW-33, and MW-35 and at west hillslope springs 18S and 24S (Aspect, 2018).

According to Aspect (2018), water levels in the Unit Cc2 perched zone generally indicate unconfined groundwater conditions, with the exception of monitoring wells MW-20 and MW-33. Groundwater elevations in these wells are above coarse-grained portions of the unit indicating confined conditions (Aspect 2018). During this quarter, the water level in monitoring well MW-33 was measured at a little over 15 feet above the top of the screen and may be influenced by these confining conditions.

West hillslope springs 18S and 24S were monitored during a previous short term investigation (KCWLR Division, 2006) and are no longer monitored. Figure A-1 shows spring and monitoring well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Cc2 perched zone for the April 25, 2019 measurement event.

Unit D Aquifer

Groundwater in the Unit D aquifer is measured by monitoring wells MW-7, MW-12, MW-19, MW-25, MW-26, MW-28, MW-29, and MW-34 (Aspect, 2018). Measured water levels in monitoring wells MW-7, MW-12, MW-19 and MW-34 were at least 17 feet above the top of the screen and may be influenced by vertical gradients, permeability differences (Aspect 2018), or confining conditions in the Unit D aquifer.

Monitoring well MW-28 was reported as and historically has been reported as “dry.” MW-28 screen was installed at the contact between Unit D and unit below (Unit E) and requires a two foot rise in surrounding groundwater levels to reach the screen bottom.

Figure A-2 shows monitoring well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Unit D aquifer for the April 25, 2019 measurement event.

Direction of Groundwater Flow

Figures A-1 and A-2 show groundwater elevations, potentiometric surface contours and interpreted groundwater flow directions for the monitoring wells in the Cc2 perched zone, and the monitoring wells in the Unit D aquifer, respectively, based on the April 25, 2019 measurements.

Groundwater elevations from measurements made on April 25, 2019, indicate that groundwater in the Cc2 perched zone generally flowed towards the west (Figure A-1). Previously surveyed ground surface elevations of springs 18S and 24S (located on the west hillslope) are included in this report to add to gap of information to the west of the landfill, as indicated in previous reports (Aspect. 2018).

As per Aspect (2018), groundwater flow direction in Unit D is strongly influenced by the typically higher water levels in MW-7 and MW-34. Groundwater elevations from measurements made on April 25, 2019, indicate that groundwater in the Unit D aquifer flows generally southwesterly south of the divide and northerly north of the divide with components of flow to the northeast and northwest (Figure A-2). The groundwater gradient south of the divide is less steep than that the north of the divide.

Groundwater Parameters

Horizontal groundwater velocity was calculated using the following formula:

where: $$v = \frac{1}{n_{eff}} K \frac{\Delta H}{\Delta L}$$

v = Groundwater velocity [L/t]
n_{eff} = Effective porosity [dimensionless]
K = Hydraulic conductivity [L/t]
$\frac{\Delta H}{\Delta L}$ = Hydraulic gradient [L/L]

Horizontal groundwater velocity was calculated for the southern Cc2 perched zone and for the Unit D aquifer. The hydraulic conductivity and effective porosity values were based on the new ranges referred to in the *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Aspect, 2018). However, average horizontal hydraulic conductivity values for Unit Cc2 are assumed incorrectly listed but assumed correctly commented in notes. Table A-2 reflects this correction (with notes) and presents a summary of the groundwater parameters used to calculate groundwater velocities from second quarter 2019 data.

The hydraulic gradient was determined from the potentiometric surface maps (Figures A-1 and A-2). The average hydraulic gradient in the Cc2 perched zone was approximately 0.015 feet/feet (ft/ft) property wide and 0.019 ft/d in the south slope area. The average hydraulic gradient in the Unit D aquifer was approximately 0.031 and 0.016 ft/ft in the northerly and southerly flow directions, respectively.

On April 25, 2019, the average horizontal groundwater velocity in the Cc2 perched zone was approximately 0.63 feet per day (ft/d) property wide and 0.55 ft/d in the south slope area. The average horizontal groundwater velocity in the Unit D aquifer was approximately 1.60 and 0.64 ft/d in the northerly and southerly direction, respectively.

References

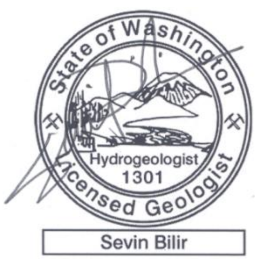
Aspect. 2018. *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill*, *Volume 1* (Contract Number E00102E08; Task No. 310.3 – D310.3.2).October 9. AGENCY DRAFT.

King County Water and Land Resources Division (KCWLR Division). 2006. *Vashon Island Closed Landfill Hillslope Report for Scope of Work #1*.

KCWLR Division. 2019. *Proposal for 2019 Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations*; King County Closed Landfills (Cedar Falls, Enumclaw, Hobart and Vashon Island) and Cedar Hills Regional Landfill. January 31.

Thank you for the opportunity to provide hydrogeologic services to the KCSWD. If you have any questions, please feel free to contact me at 206-477-4646 or sevin.bilir@kingcounty.gov.

Sincerely,



Sevin Bilir, WA LHG
Environmental Scientist IV
King County Water and Land Resources Division

Enclosures:

Table A-1:	Groundwater Elevations – Second Quarter 2019
Table A-2:	Groundwater Parameters – Second Quarter 2019
Figure A-1:	Groundwater Potentiometric Surface Map – Second Quarter 2019 – Cc2 Perched Zone
Figure A-2:	Groundwater Potentiometric Surface Map – Second Quarter 2019 – Unit D Aquifer

Table A-1: Groundwater Elevations – Second Quarter 2019

Vashon Island Closed Landfill
King County, Washington

	Spring / Well Identification	Easting	Northing	Top of Casing Elevation (feet MSL)	Top of Screen Elevation (feet)	Bottom of Screen Elevation (feet)	April 25, 2019 Measured Depth to Water (feet)	April 25, 2019 Groundwater Elevations (feet MSL)
Cc2 Perched Zone	18S*	1227270.5272*	162552.8362*	NA	NA	NA	NA	227.94*
	24S*	1227262.207*	162692.4735*	NA	NA	NA	NA	227.24*
	MW-2	1227788.192	162365.5107	318.09	237.39	232.39	73.50	244.59
	MW-9	1227723.361	163526.7593	405.32	236.39	226.39	165.35	239.97
	MW-20	1228173.098	162566.14	370.43	240.79	236.49	121.29	249.14
	MW-21	1227647.721	162339.8555	348.95	246.46	237.06	106.35	242.60
	MW-33	1227883.225	162681.958	359.24	231.95	221.95	112.00	247.24
	MW-35	1227651.14	162559.4538	361.48	246.98	236.98	118.18	243.30
Unit D Aquifer	MW-7	1228427.426	162810.969	376.56	154.40	144.40	190.14	186.42
	MW-12	1227800.607	162374.9914	315.67	142.90	132.90	141.32	174.35
	MW-19	1227724.722	163534.7053	405.58	142.85	132.85	245.55	160.03
	MW-25	1228627.795	163748.581	399.22	152.04	137.94	243.53	155.69
	MW-26	1227909.96	163770.324	406.58	158.30	144.20	247.07	159.51
	MW-28**	1228115.845	163843.491	398.72	177.04	162.64	DRY	DRY
	MW-29	1228375.178	163680.916	413.79	173.02	158.22	244.35	169.44
	MW-34	1227773.787	163135.4694	385.94	150.64	140.64	203.17	182.77

Notes

1. Water level measurements made by KCSWD personnel.
2. Northing & Easting coordinates are Washington North State Plane Coordinates in WGS84.
3. Elevations reported in feet above Mean Sea Level based on the NAVD 88.
4. NA Not applicable.
5. DRY Moisture detected below screen.

* Hillslope springs 18S and 24S interpreted as discharge from Cc Perched Zone (Aspect 2018b). Spring locations are approximate; dependent on groundwater elevation. Hillslope spring elevations and locations were not surveyed this quarter. These data are from 2006.

** MW-28 requires 2-foot rise in groundwater levels. MW-28 screen installed at contact between Unit D and unit below (Unit E). Historically reported as a dry well (Aspect, 2018b).

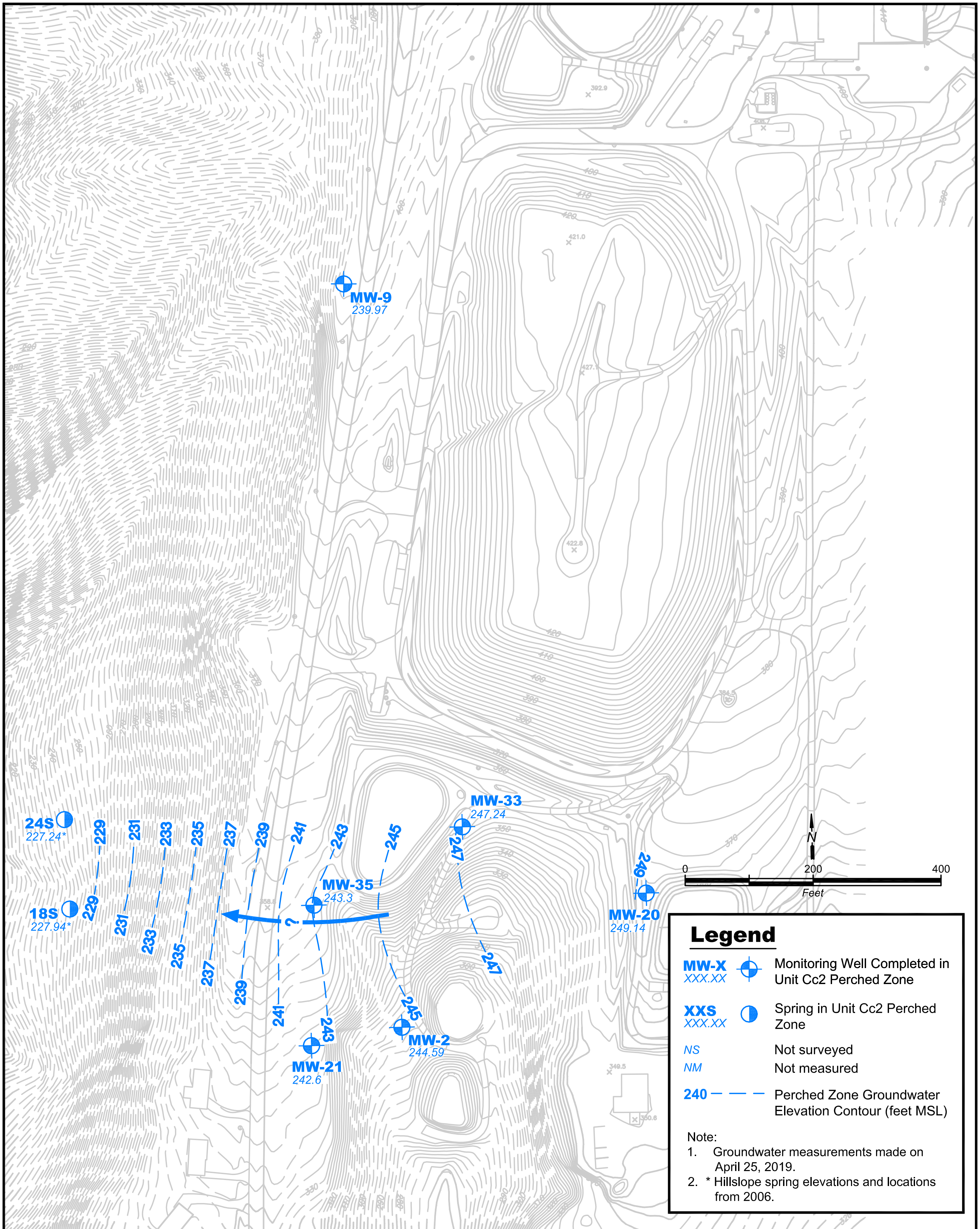
Table A-2: Groundwater Parameters – Second Quarter 2019

Vashon Island Closed Landfill
King County, Washington

Water Bearing Zone Beneath Landfill	Horizontal Hydraulic Conductivity (K)[3] Range	(cm/s)	(ft/d)	Horizontal Hydraulic Gradient (DH/DL) (ft/ft)	Effective Porosity (n_{eff})	Horizontal Groundwater Velocity (v) (ft/d)	General Groundwater Flow Direction
Unit Cc2 - Property Wide[4]	Low	5.7E-04	1.61	0.010	20%	0.08	West
	High	1.6E-02	46.08	0.021	20%	4.78	
	Average[6]	2.9E-03	8.21	0.015	20%	0.63	
Unit Cc2 - South Slope Area[5]	Low	5.7E-04	1.61	0.010	20%	0.08	West
	High	6.8E-03	19.35	0.027	20%	2.65	
	Average[6]	2.1E-03	5.81	0.019	20%	0.55	
Unit D - Northerly flow direction	Low	1.5E-03	4.4	0.031	20%	0.69	North - with some to the NE and NW away from divide
	High	1.6E-02	46.1		20%	7.25	
	Average	3.6E-03	10.2		20%	1.60	
Unit D - Southerly flow direction	Low	1.5E-03	4.4	0.016	20%	0.36	Southwest - away from divide
	High	1.6E-02	46.1		20%	3.80	
	Average	3.6E-03	10.2		20%	0.84	

Notes

1. Horizontal hydraulic conductivity values and effective porosity values as reported in Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1 (Contract Number E00102E08; Task No. 310.3 – D310.3.2). October 9. AGENCY DRAFT (Aspect, 2018). However, average horizontal hydraulic conductivity values for Unit Cc2 are assumed incorrectly listed in the table and assumed correctly commented on in the notes. This table above reflects the correct values. See notes 4 and 6 below.
2. Average hydraulic conductivity values are the geometric mean of values reported per well and unit (Aspect, 2018).
3. Horizontal hydraulic gradients based on average of gradients measured at several points from the maps shown on Figures A-1 and A-2.
4. Calculations for Property wide Unit Cc2 horizontal hydraulic conductivities include data from wells MW-2, MW-9, MW-20, MW-21, MW-33, and MW-35.
5. Calculations for South Slope Area Unit Cc2 horizontal hydraulic conductivities include data from wells MW-2, MW-20, MW-21, MW-33, and MW-35.
6. Calculations of average hydraulic conductivities for Unit Cc2 did not include data obtained in 1986 from MW-2 as the value was significantly lower than a remeasurement completed in 2015 (Aspect, 2018).



King County

Groundwater Potentiometric Surface Map
Second Quarter 2019 - Cc2 Perched Zone

Vashon Island Closed Landfill

King County, Washington

DATE: July 2019	PROJECT NO. 1033601
DESIGNED BY: SB	
DRAWN BY: KK	FIGURE NO. A-1
REVISED BY: SB	

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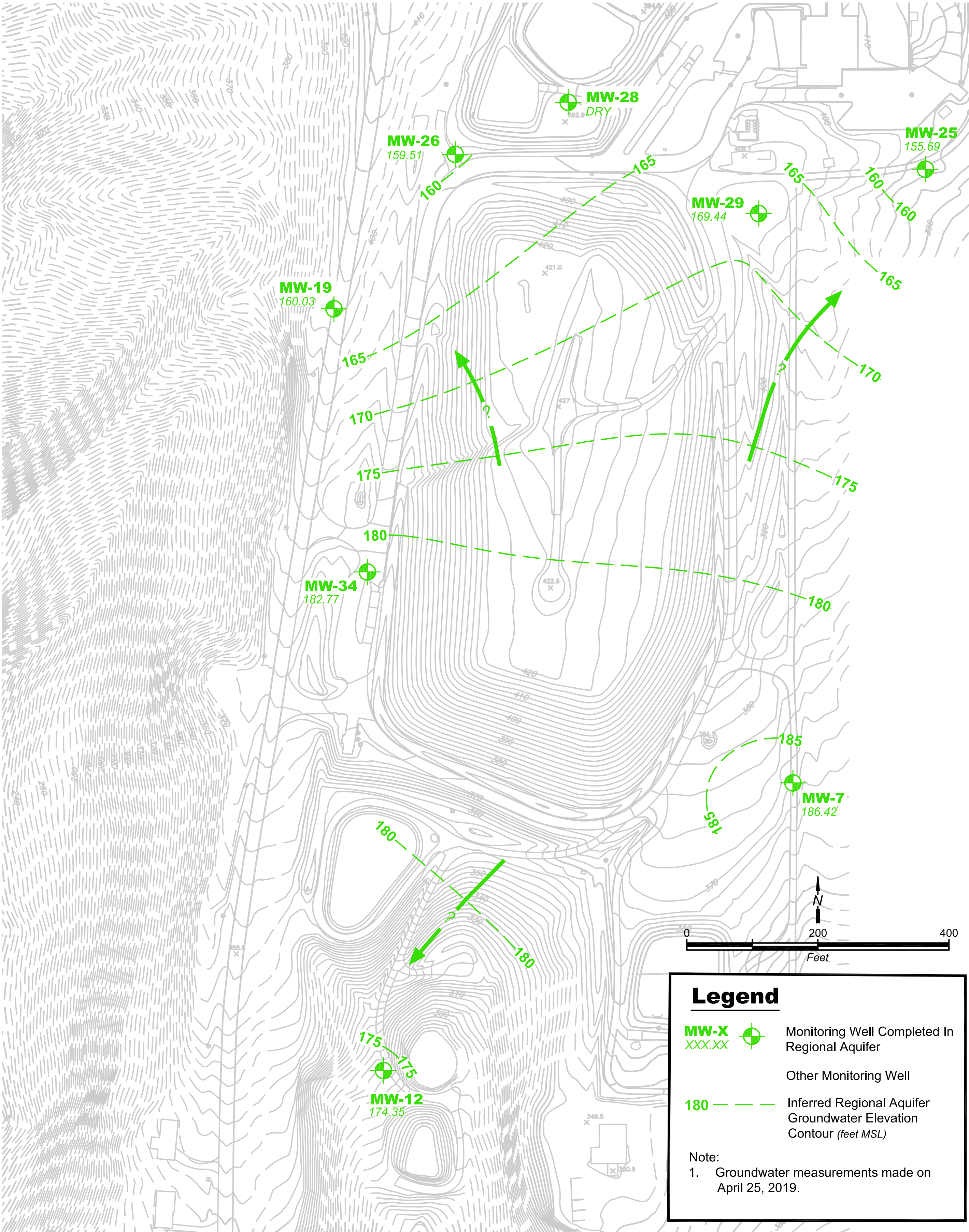


King County

Groundwater Potentiometric Surface Map
Second Quarter 2019 - Unit D Aquifer
Vashon Island Closed Landfill
King County, Washington

DATE: July 2019	PROJECT NO. 1033601
DESIGNED BY: SB	
DRAWN BY: KK	FIGURE NO. A-2
REVISED BY: SB	

VI_2Q2019_UnitD.dwg

King County
Water and Land Resources Division
Department of Natural Resources and Parks
King Street Center
201 South Jackson Street, Suite 704
Seattle, WA 98104-3855
206-477-4800 Fax 206-296-0192
TTY Relay: 711

Memorandum

November 6, 2019

TO: Marisa Baptiste, Engineer II, Facility Engineering and Science Section, Solid Waste Division, Department of Natural Resources and Parks (DNRP)

FM: Sevin Bilir, Environmental Scientist IV, Science and Technical Support Section, Water and Land Resources Division, DNRP

RE: Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations
Third Quarter 2019 Results
Vashon Island Closed Landfill, King County, Washington
Project No. 1126980 – Task 25.106

King County Water and Land Resources Division (KCWLRD) submits this memorandum report on groundwater conditions during the third quarter of 2019 for the middle channel deposit in the Cc2 perched zone and the Unit D aquifer beneath the Vashon Island Closed Landfill (Landfill), in accordance with the *Proposal for Potentiometric Groundwater Surface Maps and Groundwater Velocity Calculations* (KCWLRD, 2019).

An agency draft of the recent remedial investigation report (Aspect, 2018) provided additional understanding of the hydrogeology that has been incorporated into this memorandum. King County Solid Waste Division (KCSWD) personnel measured groundwater elevations at the Landfill on August 14, 2019. These measurements were received by KCWLRD on October 1 through 18, 2019 and were used to:

1. Evaluate the potentiometric groundwater surface elevation for the Cc2 perched zone and the Unit D aquifer;
2. Determine the groundwater flow direction and horizontal gradient for the Cc2 perched zone and the Unit D aquifer; and
3. Calculate the groundwater velocity of the Cc2 perched zone and the Unit D aquifer.

Groundwater Elevation Data

KCSWD attempted to measure groundwater levels at 14 monitoring wells during the third quarter of 2019. These monitoring wells were completed in the Cc2 perched zone and the Unit D aquifer, as referred to in *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Aspect, 2018).

Table A-1 lists spring and groundwater monitoring well identifications, locations, construction details, measured depth to groundwater levels and calculated groundwater elevations for monitoring wells in the Cc2 perched zone and Unit D aquifer.

Unit C – Cc2 Perched Zone

Within Unit C, three separate coarse-grained perched zones are identified within variable fine-grained sediment (Aspect 2018). The Cc2 channel deposit perched zone is not laterally extensive across the Landfill as it was not identified in borings southeast and northwest of the landfill closure area (Aspect, 2018). Groundwater in this perched zone can be measured in wells MW-2, MW-9, MW-20, MW-21, MW-30, MW-33, and MW-35 (Aspect, 2018). MW-30 is located on the west hillslope and replaces data from west hillslope springs 18S and 24S which were monitored during a previous short term investigation (KCWLR Division, 2006).

According to Aspect (2018), water levels in the Unit Cc2 perched zone generally indicate unconfined groundwater conditions, with the exception of monitoring wells MW-20 and MW-33. Groundwater elevations in these wells are above coarse-grained portions of the unit indicating confined conditions (Aspect 2018). During this quarter, the water level in monitoring well MW-33 was measured at a little over 17 feet above the top of the screen and may be influenced by these confining conditions.

Figure A-1 shows monitoring well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Cc2 perched zone for the August 14, 2019 measurement event.

Unit D Aquifer

Groundwater in the Unit D aquifer is measured by monitoring wells MW-7, MW-12, MW-19, MW-25, MW-26, MW-28, MW-29, and MW-34 (Aspect, 2018). Measured water levels in monitoring wells MW-7, MW-12, MW-19, MW-25 and MW-34 were at least 16.8 feet above the top of the screen and may be influenced by vertical gradients, permeability differences (Aspect 2018), or confining conditions in the Unit D aquifer.

Monitoring well MW-28 was reported as and historically has been reported as “dry.” MW-28 screen was installed at the contact between Unit D and unit below (Unit E) and requires a two foot rise in surrounding groundwater levels to reach the screen bottom.

Figure A-2 shows monitoring well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Unit D aquifer for the August 14, 2019 measurement event.

Direction of Groundwater Flow

Figures A-1 and A-2 show groundwater elevations, potentiometric surface contours and interpreted groundwater flow directions for the monitoring wells in the Cc2 perched zone, and the monitoring wells in the Unit D aquifer, respectively, based on the August 14, 2019 measurements.

Groundwater elevations from measurements made on August 14, 2019, indicate that groundwater in the Cc2 perched zone generally flowed towards the west property-wide with a west to west-southwest component in the south slope area (Figure A-1).

As per Aspect (2018), groundwater flow direction in Unit D is strongly influenced by the typically higher water levels in MW-7 and MW-34. Groundwater elevations from measurements made on August 14, 2019, indicate that groundwater in the Unit D aquifer flows generally southwesterly south of the divide and northerly north of the divide with components of flow to the northeast and northwest (Figure A-2). The groundwater gradient south of the divide is less steep than that the north of the divide.

Groundwater Parameters

Horizontal groundwater velocity was calculated using the following formula:

where: $$v = \frac{1}{n_{eff}} K \frac{\Delta H}{\Delta L}$$

v = Groundwater velocity [L/t]
n_{eff} = Effective porosity [dimensionless]
K = Hydraulic conductivity [L/t]
$\frac{\Delta H}{\Delta L}$ = Hydraulic gradient [L/L]

Horizontal groundwater velocity was calculated for the southern Cc2 perched zone and for the Unit D aquifer. The hydraulic conductivity and effective porosity values were based on the new ranges referred to in the *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Aspect, 2018). However, average horizontal hydraulic conductivity values for Unit Cc2 are assumed incorrectly listed but assumed correctly commented in notes. Table A-2 reflects this correction (with notes) and presents a summary of the groundwater parameters used to calculate groundwater velocities from third quarter 2019 data.

The hydraulic gradient was determined from the potentiometric surface maps (Figures A-1 and A-2). The average hydraulic gradient in the Cc2 perched zone was approximately 0.020 feet/feet (ft/ft) property wide and 0.011 ft/d in the south slope area. The average hydraulic gradient in the Unit D aquifer was approximately 0.032 and 0.017 ft/ft in the northerly and southerly flow directions, respectively.

On August 14, 2019, the average horizontal groundwater velocity in the Cc2 perched zone was approximately 0.84 feet per day (ft/d) property wide and 0.33 ft/d in the south slope area. The average horizontal groundwater velocity in the Unit D aquifer was approximately 1.62 and 0.85 ft/d in the northerly and southerly direction, respectively.

References

Aspect. 2018. *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Contract Number E00102E08; Task No. 310.3 – D310.3.2).October 9. AGENCY DRAFT.

King County Water and Land Resources Division (KCWLD). 2006. *Vashon Island Closed Landfill Hillslope Report for Scope of Work #1*.

KCWLRD. 2019. *Proposal for 2019 Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations*; King County Closed Landfills (Cedar Falls, Enumclaw, Hobart and Vashon Island) and Cedar Hills Regional Landfill. January 31.

Thank you for the opportunity to provide hydrogeologic services to the KCSWD. If you have any questions, please feel free to contact me at 206-477-4646 or sevin.bilir@kingcounty.gov.

Sincerely,

Sevin Bilir, WA LHG
Environmental Scientist IV
King County Water and Land Resources Division

Enclosures:

Table A-1:	Groundwater Elevations – Third Quarter 2019
Table A-2:	Groundwater Parameters – Third Quarter 2019
Figure A-1:	Groundwater Potentiometric Surface Map – Third Quarter 2019 – Cc2 Perched Zone
Figure A-2:	Groundwater Potentiometric Surface Map – Third Quarter 2019 – Unit D Aquifer

Table A-1: Groundwater Elevations – Third Quarter 2019

Vashon Island Closed Landfill
King County, Washington

	Spring / Well Identification	Easting	Northing	Top of Casing Elevation (feet MSL)	Top of Screen Elevation (feet)	Bottom of Screen Elevation (feet)	August 14, 2019 Measured Depth to Water (feet)	August 14, 2019 Groundwater Elevations (feet MSL)
Cc2 Perched Zone	MW-2	1227788.528	162365.9093	317.97	237.06	232.06	73.80	244.17
	MW-9	1227723.68	163527.2132	405.17	236.22	224.22	165.83	239.34
	MW-20	1228173.43	162566.5169	370.32	241.41	236.41	121.78	248.54
	MW-21	1227647.9	162340.1004	349.05	246.45	237.05	106.58	242.47
	MW-30[1]	1227273.259	162671.0985	235.67	230.40	225.40	6.05	229.62
	MW-33	1227883.526	162682.2373	359.17	229.63	219.63	112.36	246.81
	MW-35	1227651.526	162559.8176	361.34	244.20	234.20	118.44	242.90
Unit D Aquifer	MW-7	1228427.676	162811.2959	376.75	154.40	144.40	190.75	186.00
	MW-12	1227800.993	162375.2801	315.53	142.72	132.72	141.67	173.86
	MW-19	1227725.024	163535.1173	405.43	143.14	131.64	245.47	159.96
	MW-25	1228628.125	163749.0004	402.33	141.76	137.76	243.34	158.99
	MW-26	1227910.183	163770.6585	406.54	153.55	144.15	247.10	159.44
	MW-28[2]	1228116.115	163843.8819	398.73	172.15	162.65	DRY	DRY
	MW-29	1228375.594	163681.2568	413.85	168.03	158.63	244.13	169.72
	MW-34	1227774.04	163135.0399	385.96	147.94	137.94	203.61	182.35

Notes

1. MW-30 is located on the west hillslope and replaces use of data from hillslope springs 18S and 24S in preparation of potentiometric maps.
2. MW-28 requires 2-foot rise in groundwater levels. MW-28 screen installed at contact between Unit D and unit below (Unit E). Historically reported as a dry well (Aspect, 2018b).

Water level measurements made by KCSWD personnel.

Easting & northing coordinates are Washington North State Plane Coordinates in WGS84.

Elevations reported in feet above mean sea level (MSL) based on the NAVD 88.

DRY Water detected below screen interval.

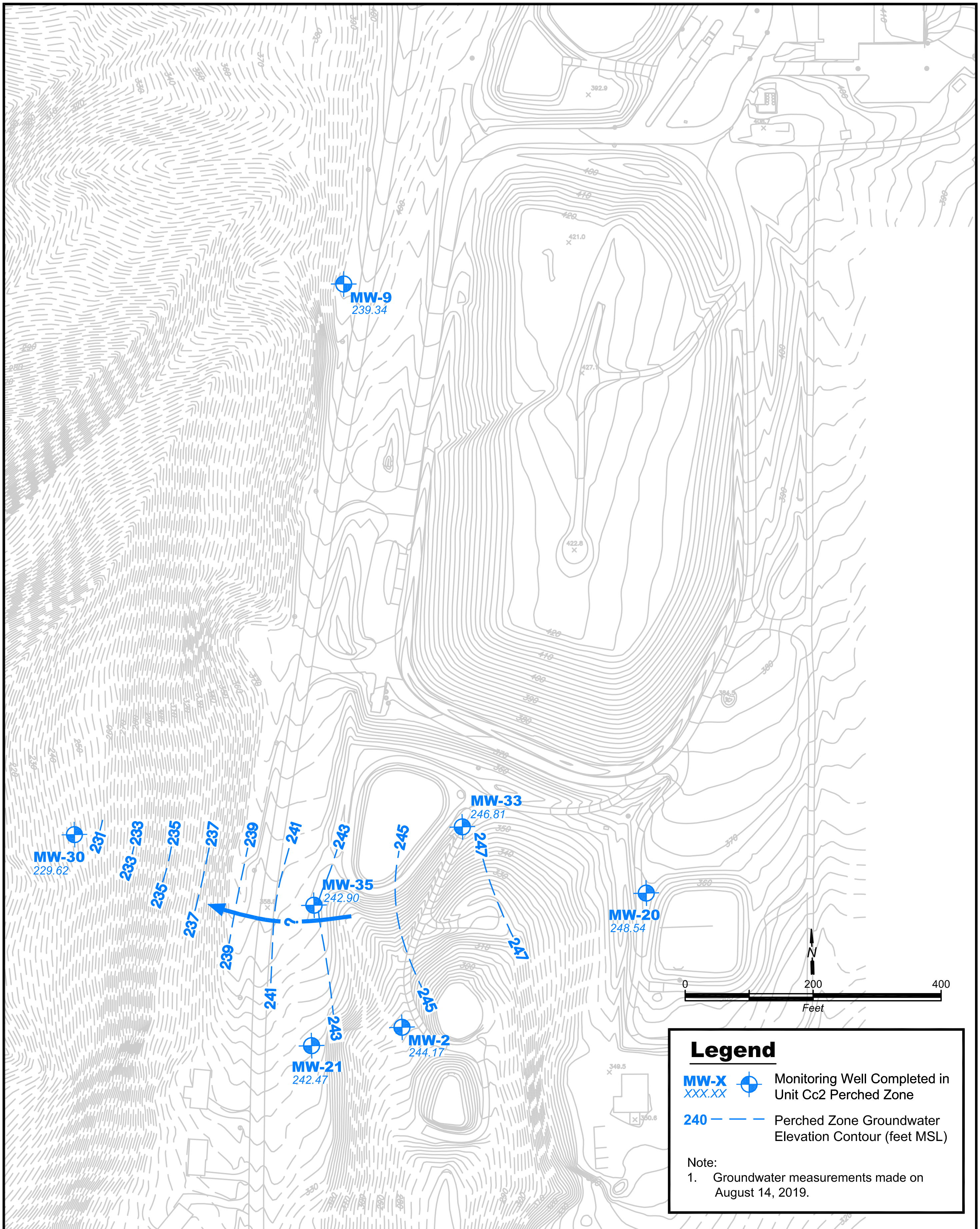
Table A-2: Groundwater Parameters – Third Quarter 2019

Vashon Island Closed Landfill
King County, Washington

Water Bearing Zone Beneath Landfill	Horizontal Hydraulic Conductivity (*K*)[1,2]			Horizontal Hydraulic Gradient (DH/DL)[3]	Effective Porosity (n_{eff})[1]	Horizontal Groundwater Velocity (*v*)	General Groundwater Flow Direction
	Range	(cm/s)	(ft/d)	(ft/ft)		(ft/d)	
Unit Cc2 - Property Wide[4,6]	Low	5.7E-04	1.61	0.008	20%	0.06	West
	High	1.6E-02	46.08	0.033	20%	7.58	
	Average[6]	2.9E-03	8.21	0.020	20%	0.84	
Unit Cc2 - South Slope Area[5,6]	Low	5.7E-04	1.61	0.008	20%	0.06	West to West-southwest
	High	6.8E-03	19.35	0.015	20%	1.41	
	Average[6]	2.1E-03	5.81	0.011	20%	0.33	
Unit D - Northerly flow direction	Low	1.5E-03	4.4	0.032	20%	0.70	North - with flow to the northeast and northwest
	High	1.6E-02	46.1		20%	7.35	
	Average	3.6E-03	10.2		20%	1.62	
Unit D - Southerly flow direction	Low	1.5E-03	4.4	0.017	20%	0.36	Southwest - away from divide
	High	1.6E-02	46.1		20%	3.83	
	Average	3.6E-03	10.2		20%	0.85	

Notes

1. Horizontal hydraulic conductivity values and effective porosity values as reported in *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Contract Number E00102E08; Task No. 310.3 – D310.3.2). October 9. AGENCY DRAFT (Aspect, 2018). However, average horizontal hydraulic conductivity values for Unit Cc2 are assumed incorrectly listed in the table and assumed correctly commented on in the notes. This table above reflects the correct values. See notes 4 and 6 below.
2. Average hydraulic conductivity values are the geometric mean of values reported per well and unit (Aspect, 2018).
3. Horizontal hydraulic gradients based on average of gradients measured at several points from the maps shown on Figures A-1 and A-2.
4. Calculations for Property wide Unit Cc2 horizontal hydraulic conductivities include data from wells MW-2, MW-9, MW-20, MW-21, MW-33, and MW-35. (Aspect, 2018).
5. Calculations for South Slope Area Unit Cc2 horizontal hydraulic conductivities include data from wells MW-2, MW-20, MW-21, MW-33, and MW-35. (Aspect, 2018).
6. Calculations of average hydraulic conductivities for Unit Cc2 did not include data obtained in 1986 from MW-2 as the value was significantly lower than a remeasurement completed in 2015 (Aspect, 2018).

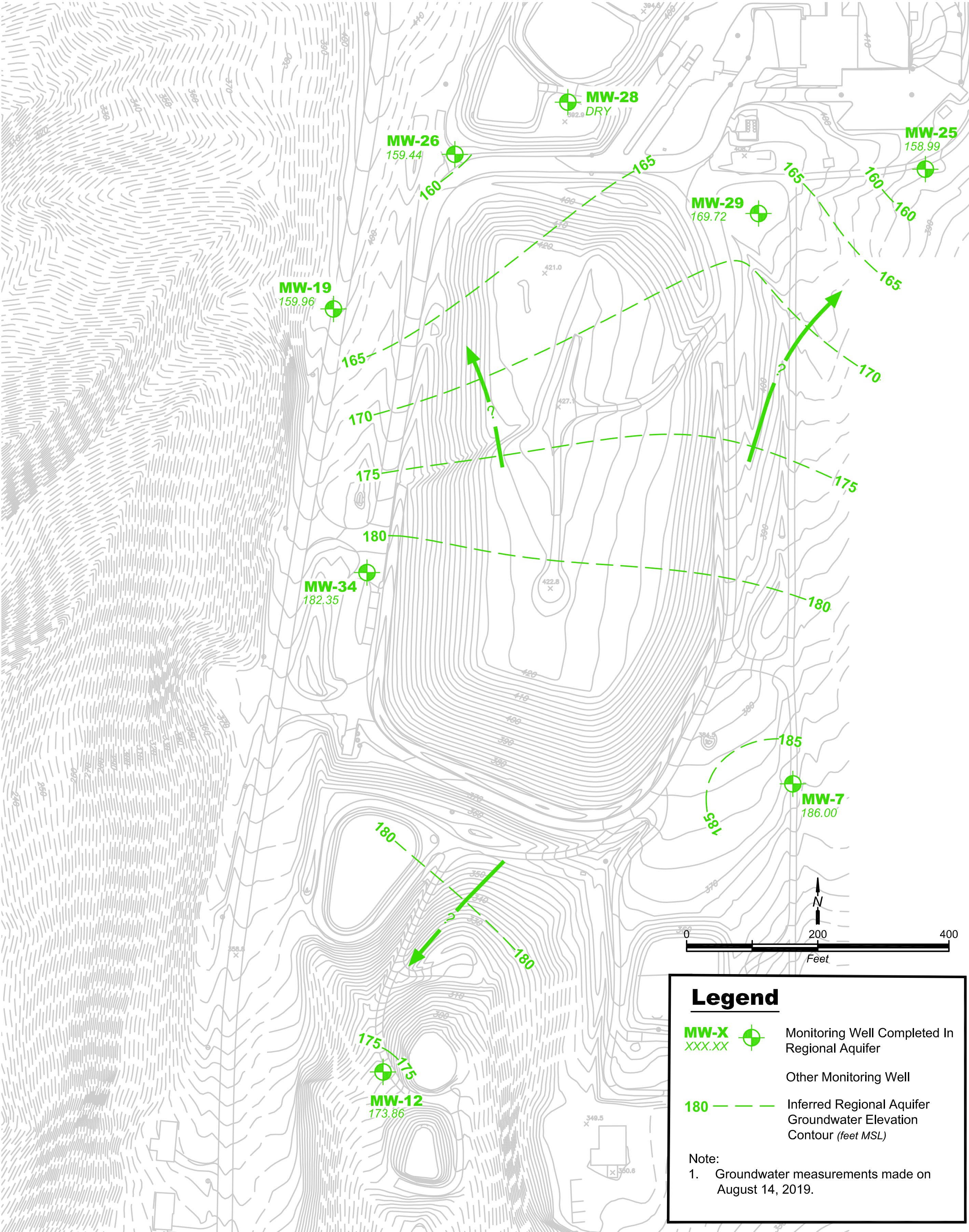


King County

Groundwater Potentiometric Surface Map
Third Quarter 2019 - Cc2 Perched Zone
Vashon Island Closed Landfill
King County, Washington

DATE: October 2019
DESIGNED BY: SB
DRAWN BY: KK
REVISED BY: SB
PROJECT NO. 1033601
FIGURE NO. A-1

VI_3Q2019_Cc2Perched.dwg



King County

Groundwater Potentiometric Surface Map

Third Quarter 2019 - Unit D Aquifer

Vashon Island Closed Landfill

King County, Washington

DATE: October 2019	PROJECT NO. 1033601
DESIGNED BY: SB	
DRAWN BY: KK	FIGURE NO. A-2
REVISED BY: SB	

VI_3Q2019_UnitD.dwg

King County
Water and Land Resources Division
Department of Natural Resources and Parks
King Street Center
201 South Jackson Street, Suite 704
Seattle, WA 98104-3855
206-477-4800 Fax 206-296-0192
TTY Relay: 711

TECHNICAL MEMORANDUM

January 29, 2020

TO: Marisa Baptiste, Engineer III, Facility Engineering and Science Section, Solid Waste Division, Department of Natural Resources and Parks (DNRP)

FM: Sevin Bilir, Environmental Scientist IV, Science and Technical Support Section, Water and Land Resources Division, DNRP

RE: Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations
Fourth Quarter 2019 Results
Vashon Island Closed Landfill, King County, Washington
Project No. 1033601 – Task 29.14.137.45

King County Water and Land Resources Division (WLRD) submits this memorandum report on groundwater conditions during the fourth quarter of 2019 for the middle channel deposit in the Cc2 perched zone and the Unit D aquifer beneath the Vashon Island Closed Landfill (Landfill), in accordance with the *Proposal for Potentiometric Groundwater Surface Maps and Groundwater Velocity Calculations* (WLRD, 2019). An agency draft of the recent remedial investigation report (Aspect, 2018) provided additional understanding of the hydrogeology that has been incorporated into this memorandum.

King County Solid Waste Division (SWD) personnel measured groundwater elevations at the Landfill on November 1, 2019. These measurements were received by WLRD on December 26, 2019, and were used to:

1. Evaluate the potentiometric groundwater surface elevation for the Cc2 perched zone and the Unit D aquifer;
2. Determine the groundwater flow direction and horizontal gradient for the Cc2 perched zone and the Unit D aquifer; and
3. Calculate the groundwater velocity of the Cc2 perched zone and the Unit D aquifer.

There have been no significant changes in the interpreted aquifer groundwater conditions since the report submitted for the third quarter of the 2019 monitoring event.

Groundwater Elevation Data

The SWD measured groundwater levels at 14 monitoring wells during the fourth quarter of 2019. These monitoring wells were completed in the Cc2 perched zone and the Unit D aquifer, as referred to in *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Aspect, 2018).

Table A-1 lists groundwater monitoring well identifications, locations, well construction details, measured depth to groundwater levels and calculated groundwater elevations for monitoring wells screened in the Cc2 perched zone and Unit D aquifer.

Unit C – Cc2 Perched Zone

Within Unit C, three separate coarse-grained perched zones are identified within variable fine-grained sediment (Aspect 2018). The Cc2 channel deposit perched zone is not laterally extensive across the Landfill as it was not identified in borings southeast and northwest of the landfill closure area (Aspect, 2018). Groundwater in this perched zone can be measured in wells MW-2, MW-9, MW-20, MW-21, MW-30, MW-33, and MW-35 (Aspect, 2018).

According to Aspect (2018), water levels in the Unit Cc2 perched zone generally indicate unconfined groundwater conditions, with the exception of monitoring wells MW-20 and MW-33. Groundwater elevations in these wells are above coarse-grained portions of the unit indicating confined conditions (Aspect 2018). During this quarter, the water level in monitoring well MW-33 was measured at almost 17 feet above the top of the screen and may be influenced by these confining conditions.

Figure A-1 shows monitoring well locations, groundwater elevations and groundwater potentiometric surface contours for the Cc2 perched zone for the November 1, 2019 measurement event.

Unit D Aquifer

Groundwater in the Unit D aquifer is measured by monitoring wells MW-7, MW-12, MW-19, MW-25, MW-26, MW-28, MW-29, and MW-34 (Aspect, 2018). Measured water levels in monitoring wells MW-7, MW-12, MW-19, MW-25 and MW-34 were at least 16.28 feet above the top of the screen and may be influenced by vertical gradients, permeability differences (Aspect 2018), or confining conditions in the Unit D aquifer.

Monitoring well MW-28 was reported as dry as the water level was noted below the screen bottom. This well has historically been reported as “dry” for this reason. MW-28 screen was installed at the contact between Unit D and unit below (Unit E) and requires a two foot rise in surrounding groundwater levels to reach the screen bottom.

Figure A-2 shows monitoring well locations, groundwater elevations and groundwater potentiometric surface contours for the Unit D aquifer for the November 1, 2019 measurement event.

Direction of Groundwater Flow

Figures A-1 and A-2 also show interpreted groundwater flow directions for the monitoring wells in the Cc2 perched zone, and the monitoring wells in the Unit D aquifer, respectively, based on the November 1, 2019 measurements. Groundwater elevations from measurements made on November 1, 2019, indicate that groundwater in the Cc2 perched zone generally flowed towards the west property-wide with a west to west-southwest component in the south slope area (Figure A-1).

As per Aspect (2018), groundwater flow direction in Unit D is strongly influenced by the typically higher water levels in MW-7 and MW-34. Groundwater elevations from measurements made on November 1, 2019, indicate that groundwater in the Unit D aquifer flows generally southwesterly south of the divide and northerly north of the divide with components of flow to the northeast and northwest (Figure A-2). The groundwater gradient south of the divide is less steep than that north of the divide.

Groundwater Parameters

Horizontal groundwater velocity was calculated using the following formula:

where: $$v = \frac{1}{n_{eff}} K \frac{\Delta H}{\Delta L}$$

v = Groundwater velocity [L/t]
n_{eff} = Effective porosity [dimensionless]
K = Hydraulic conductivity [L/t]
$\frac{\Delta H}{\Delta L}$ = Hydraulic gradient [L/L]

Horizontal groundwater velocity was calculated for the southern Cc2 perched zone and for the Unit D aquifer. The hydraulic conductivity and effective porosity values were based on ranges referred to in the *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Aspect, 2018). However, average horizontal hydraulic conductivity values for Unit Cc2 are assumed incorrectly listed but assumed correctly commented on in the notes. Table A-2 reflects this correction (with notes) and presents a summary of the groundwater parameters used to calculate groundwater velocities from the fourth quarter 2019 data.

The average hydraulic gradient in the Cc2 perched zone was approximately 0.0020 feet/feet (ft/ft) property wide and 0.014 ft/d in the south slope area. The average hydraulic gradient in the Unit D aquifer was approximately 0.039 and 0.017 ft/ft in the northerly and southerly flow directions, respectively.

On November 1, 2019, the average horizontal groundwater velocity in the Cc2 perched zone was approximately 0.81 feet per day (ft/d) property wide and 0.39 ft/d in the south slope area. The average horizontal groundwater velocity in the Unit D aquifer was approximately 1.99 and 0.87 ft/d in the northerly and southerly direction, respectively.

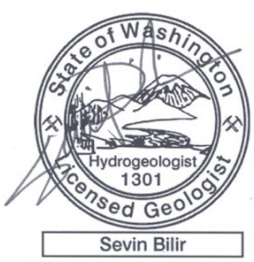
References

Aspect Consulting, LLC. (Aspect). 2018. *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill*, *Volume 1* (Contract Number E00102E08; Task No. 310.3 – D310.3.2). October 9. AGENCY DRAFT.

King County Water and Land Resources Division (WLRD). 2019. *Proposal for 2019 Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations*; King County Closed Landfills (Cedar Falls, Enumclaw, Hobart and Vashon Island) and Cedar Hills Regional Landfill. January 31.

Thank you for the opportunity to provide hydrogeologic services to SWD. If you have any questions, please feel free to contact me at 206-477-4646 or sevin.bilir@kingcounty.gov.

Sincerely,



Sevin Bilir, WA LHG
Environmental Scientist IV
King County Water and Land Resources Division

Enclosures:

Table A-1:	Groundwater Elevations – Fourth Quarter 2019
Table A-2:	Groundwater Parameters – Fourth Quarter 2019
Figure A-1:	Groundwater Potentiometric Surface Map – Fourth Quarter 2019 – Cc2 Perched Zone
Figure A-2:	Groundwater Potentiometric Surface Map – Fourth Quarter 2019 – Unit D

Table A-1: Groundwater Elevations – Fourth Quarter 2019

Vashon Island Closed Landfill
King County, Washington

	Well Identification	Easting[2] (ft)	Northing[2] (ft)	Top of Casing Elevation (ft MSL)	Top of Screen Elevation (ft MSL)	Bottom of Screen Elevation (ft MSL)	November 1, 2019 Measured Depth to Water[1] (ft)	November 1, 2019 Groundwater Elevations (ft MSL)
Cc2 Perched Zone	MW-2	1227788.53	162365.91	317.97	237.06	232.06	74.07	243.90
	MW-9	1227723.68	163527.21	405.17	236.22	224.22	166.09	239.08
	MW-20	1228173.43	162566.52	370.32	241.41	236.41	122.05	248.27
	MW-21	1227647.90	162340.10	349.05	246.45	237.05	106.82	242.23
	MW-30	1227273.26	162671.10	235.67	230.40	225.40	5.91	229.76
	MW-33	1227883.53	162682.24	359.17	229.63	219.63	112.59	246.58
	MW-35	1227651.53	162559.82	361.34	244.20	234.20	118.63	242.71
Unit D Aquifer	MW-7	1228427.68	162811.30	376.75	154.40	144.40	191.16	185.59
	MW-12	1227800.99	162375.28	315.53	142.72	132.72	142.01	173.52
	MW-19	1227725.02	163535.12	405.43	143.14	131.64	246.01	159.42
	MW-25	1228628.13	163749.00	402.33	141.76	137.76	243.45	158.88
	MW-26	1227910.18	163770.66	406.54	153.55	144.15	247.52	159.02
	MW-28[3]	1228116.12	163843.88	398.73	172.15	162.65	DRY	NA
	MW-29	1228375.59	163681.26	413.85	168.03	158.63	245.92	167.93
	MW-34	1227774.04	163135.04	385.96	147.94	137.94	203.85	182.11

Notes:
1. Water level measurements made by SWD personnel.
2. Reference datum for eastings and northings is the North American Datum of 1983 (NAD83/11).
3. MW-28 requires 2 foot rise in groundwater levels. MW-28 screen installed at contact between Unit D and unit below (Unit E). Historically reported as a dry well (Aspect, 2018).

Elevations are reported in feet (ft) above mean sea level (MSL) based on the North American Vertical Datum of 1988 (NAVD88).
Eastings, northings, and top of casing elevation were resurveyed in May 2019.
DRY Well indicated as dry, water detected below screen interval.
NA Not applicable.

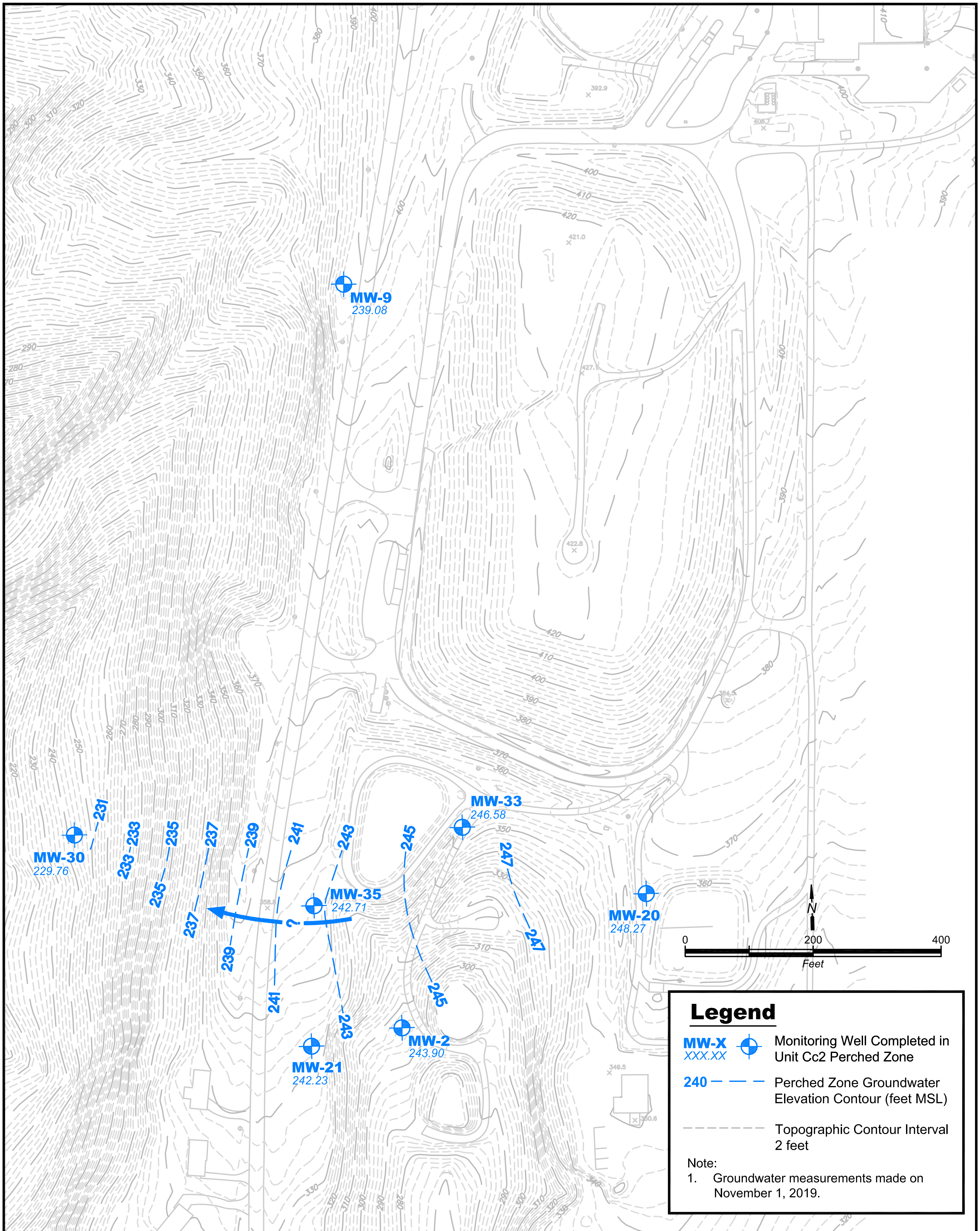
Table A-2: Groundwater Parameters – Fourth Quarter 2019

Vashon Island Closed Landfill
King County, Washington

	Horizontal Hydraulic Conductivity (K)[1,2]			Horizontal Hydraulic Gradient (DH/DL)[3]	Effective Porosity (n_{eff})[1]	Horizontal Groundwater Velocity (v)	General Groundwater Flow Direction
Water Bearing Zone	Range	(cm/s)	(ft/d)	(ft/ft)		(ft/d)	
Unit Cc2 - Property Wide[4,6]	Low	5.7E-04	1.61	0.007	20%	0.05	West
	High	1.6E-02	46.08	0.033		7.60	
	Average[6]	2.9E-03	8.21	0.020		0.81	
Unit Cc2 - South Slope Area[5,6]	Low	5.7E-04	1.61	0.006		0.05	West to West-southwest
	High	6.8E-03	19.35	0.021		2.03	
	Average[6]	2.1E-03	5.81	0.014		0.39	
Unit D - Northerly flow direction	Low	1.5E-03	4.4	0.039		0.85	North - with flow to the northeast and northwest
	High	1.6E-02	46.1			8.99	
	Average	3.6E-03	10.2			1.99	
Unit D - Southerly flow direction	Low	1.5E-03	4.4	0.017		0.37	Southwest - away from divide
	High	1.6E-02	46.1			3.92	
	Average	3.6E-03	10.2			0.87	

Notes:

1. Horizontal hydraulic conductivity values and effective porosity values (Aspect, 2018). However, average horizontal hydraulic conductivity values for Unit Cc2 are assumed incorrectly listed in the report table and assumed correctly commented on in the notes. The table above reflects the correct values. See notes 4 and 6 below.
2. Average hydraulic conductivity values are the geometric mean of values reported per well and unit (Aspect, 2018).
3. Horizontal hydraulic gradients based on average of gradients measured at several points from the maps shown on Figures A-1 and A-2.
4. Calculations for Property wide Unit Cc2 horizontal hydraulic conductivities include data from wells MW-2, MW-9, MW-20, MW-21, MW-33, and MW-35. (Aspect, 2018).
5. Calculations for South Slope Area Unit Cc2 horizontal hydraulic conductivities include data from wells MW-2, MW-20, MW-21, MW-33, and MW-35. (Aspect, 2018).
6. Calculations of average hydraulic conductivities for Unit Cc2 did not include data obtained in 1986 from MW-2 as the value was significantly lower than a remeasurement completed in 2015 (Aspect, 2018).



Legend

MW-X XXX.XX	Monitoring Well Completed in Unit Cc2 Perched Zone
240	Perched Zone Groundwater Elevation Contour (feet MSL)
	Topographic Contour Interval 2 feet

Note:

1. Groundwater measurements made on November 1, 2019.

King County

Groundwater Potentiometric Surface Map

Fourth Quarter 2019 - Cc2 Perched Zone

Vashon Island Closed Landfill

King County, Washington

DATE:	January 2020	PROJECT NO.	1033601
DESIGNED BY:	SB		
DRAWN BY:	KK	FIGURE NO.	A-1
REVISED BY:	SB		

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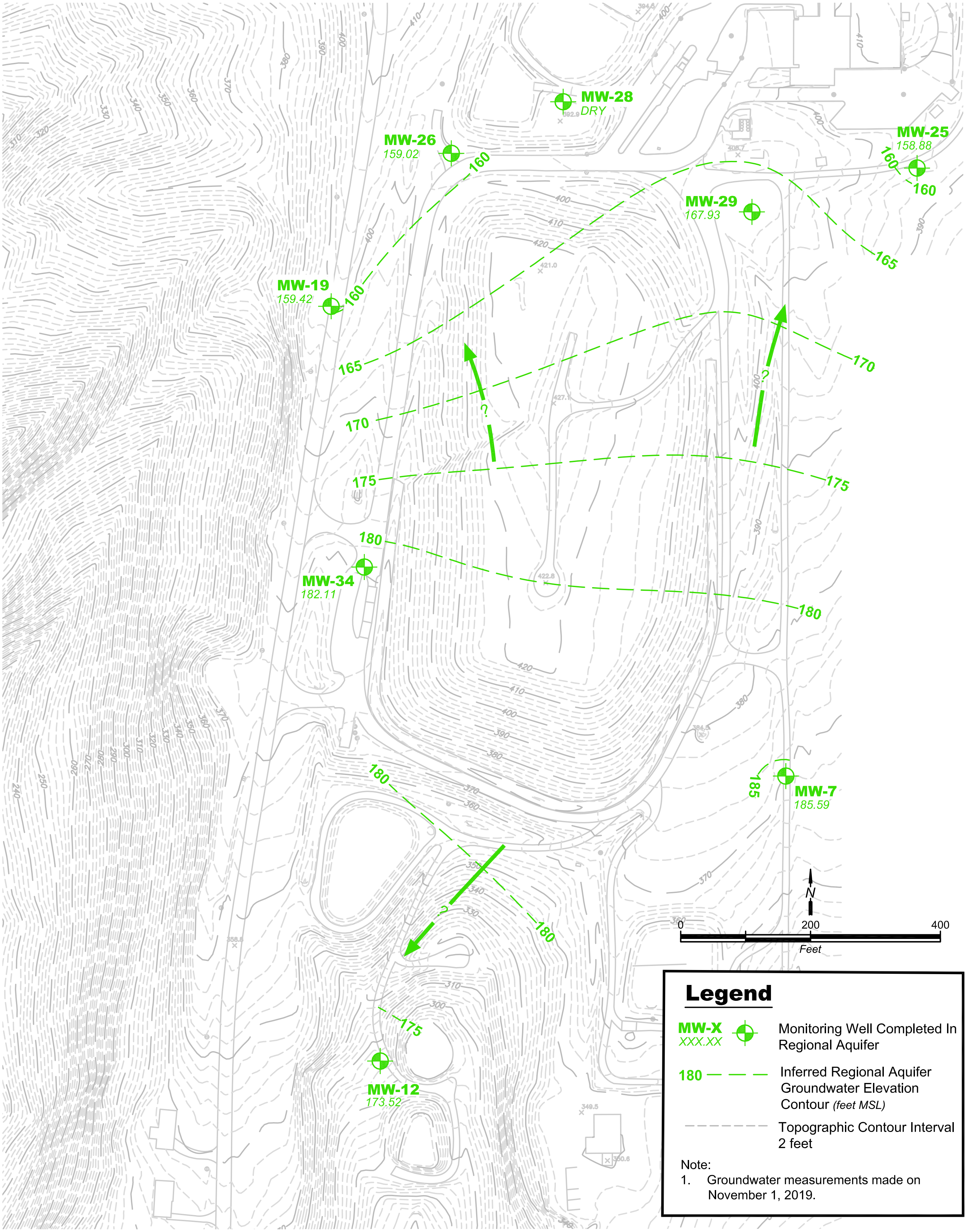

King County

Groundwater Potentiometric Surface Map

Fourth Quarter 2019 - Unit D Aquifer

Vashon Island Closed Landfill

King County, Washington

DATE: January 2020	PROJECT NO. 1033601
DESIGNED BY: SB	
DRAWN BY: KK	FIGURE NO. A-2
REVISED BY: SB	

VI_4Q2019_UnitD.dwg

Appendix H

Groundwater Monitoring Data

Table H-1
Groundwater - Static Water Levels

Static Water Levels		Top of PVC Casing Elevation	Depth to Groundwater	Groundwater Elevation
Well #	Measurement Date	(feet)	(feet)	(feet above MSL)
Unit B				
MW-24	1/22/2019	377.53	88.63	288.90
MW-24	4/25/2019	377.53	88.12	289.41
MW-24	8/14/2019	377.48	88.39	289.09
MW-24	11/1/2019	377.48	88.93	288.55
Channel Cc1				
MW-3	1/22/2019	318.12	39.37	278.75
MW-3	4/25/2019	318.12	40.03	278.09
MW-3	8/14/2019	318.02	42.10	275.92
MW-3	11/1/2019	318.02	42.10	275.92
MW-4	1/22/2019	377.30	103.80	273.50
MW-4	4/25/2019	377.30	103.37	273.93
MW-4	8/14/2019	377.18	105.24	271.94
MW-4	11/1/2019	377.18	106.41	270.77
MW-10	1/22/2019	410.21	144.88	265.33
MW-10	4/25/2019	410.21	144.93	265.28
MW-10	8/14/2019	409.94	145.07	264.87
MW-10	11/1/2019	409.94	145.25	264.69
MW-13	1/22/2019	377.37	98.85	278.52
MW-13	4/25/2019	377.37	98.44	278.93
MW-13	8/14/2019	377.28	99.12	278.16
MW-13	11/1/2019	377.28	99.59	277.69
Channel Cc2				
MW-2	1/22/2019	318.09	73.61	244.48
MW-2	4/25/2019	318.09	73.50	244.59
MW-2	8/14/2019	317.97	73.80	244.17
MW-2	11/1/2019	317.97	74.07	243.90
MW-9	1/22/2019	405.32	165.64	239.68
MW-9	4/25/2019	405.32	165.35	239.97
MW-9	8/14/2019	405.17	165.83	239.34
MW-9	11/1/2019	405.17	166.09	239.08
MW-20	1/22/2019	370.43	121.46	248.97
MW-20	4/25/2019	370.43	121.29	249.14
MW-20	8/14/2019	370.32	121.78	248.54
MW-20	11/1/2019	370.32	122.05	248.27
MW-21	1/22/2019	348.95	106.34	242.61
MW-21	4/25/2019	348.95	106.35	242.60
MW-21	8/14/2019	349.05	106.58	242.47
MW-21	11/1/2019	349.05	106.82	242.23
MW-33	1/22/2019	359.24	112.11	247.13
MW-33	4/25/2019	359.24	112.00	247.24
MW-33	8/14/2019	359.17	112.36	246.81
MW-33	11/1/2019	359.17	112.59	246.58
MW-35	1/22/2019	361.48	118.15	243.33
MW-35	4/25/2019	361.48	118.18	243.30
MW-35	8/14/2019	361.34	118.44	242.90
MW-35	11/1/2019	361.34	118.63	242.71

Table H-1 ***(continued)***
Groundwater - Static Water Levels

Static Water Levels		Top of PVC Casing Elevation	Depth to Groundwater	Groundwater Elevation
Well #	Measurement Date	(feet)	(feet)	(feet above MSL)
Channel Cc3				
MW-8	1/22/2019	386.13	176.33	209.80
MW-8	4/25/2019	386.13	176.10	210.03
MW-8	8/14/2019	386.00	176.40	209.60
MW-8	11/1/2019	386.00	176.68	209.32
MW-36	1/22/2019	378.26	151.24	227.02
MW-36	4/25/2019	378.26	151.07	227.19
MW-36	8/14/2019	378.19	151.23	226.96
MW-36	11/1/2019	378.19	151.50	226.69
Unit D				
MW-7	1/22/2019	376.56	190.56	186.00
MW-7	4/25/2019	376.56	190.14	186.42
MW-7	8/14/2019	376.75	190.75	186.00
MW-7	11/1/2019	376.75	191.16	185.59
MW-12	1/22/2019	315.67	141.42*	174.25*
MW-12	4/25/2019	315.67	141.32	174.35
MW-12	8/14/2019	315.53	141.67	173.86
MW-12	11/1/2019	315.53	142.01	173.52
MW-19	1/22/2019	405.58	245.51	160.07
MW-19	4/25/2019	405.58	245.55	160.03
MW-19	8/14/2019	405.43	245.47	159.96
MW-19	11/1/2019	405.43	246.01	159.42
MW-25	1/22/2019	399.22	243.14	156.08
MW-25	4/25/2019	399.22	243.53	155.69
MW-25	8/14/2019	402.33	243.34	158.99
MW-25	11/1/2019	402.33	243.45	158.88
MW-26	1/22/2019	406.58	247.37	159.21
MW-26	4/25/2019	406.58	247.07	159.51
MW-26	8/14/2019	406.54	247.10	159.44
MW-26	11/1/2019	406.54	247.52	159.02
MW-28	1/22/2019	398.72	Dry	Dry
MW-28	4/25/2019	398.72	Dry	Dry
MW-28	8/14/2019	398.73	Dry	Dry
MW-28	11/1/2019	398.73	Dry	Dry
MW-29	1/22/2019	413.79	244.21	169.58
MW-29	4/25/2019	413.79	244.35	169.44
MW-29	8/14/2019	413.85	244.13	169.72
MW-29	11/1/2019	413.85	245.92	167.93
MW-34	1/22/2019	385.94	203.38	182.56
MW-34	4/25/2019	385.94	203.17	182.77
MW-34	8/14/2019	385.96	203.61	182.35
MW-34	11/1/2019	385.96	203.85	182.11

*The 1Q2019 static water level measurement and the sampling water level measurement (taken on 1/22/2019 and 1/24/2019 respectively) for monitroing well MW-12 have both been rejected; a one foot discrepancy between the two measurements was unable to be resolved with certainty.

Table H-2
Groundwater - Sampling Water Levels

Sampling Water Levels		Top of PVC Casing Elevation	Depth to Groundwater	Groundwater Elevation
Well #	Measurement Date	(feet)	(feet)	(feet above MSL)
Channel Cc1				
MW-3	1/24/2019	318.12	39.32	278.80
MW-3	5/7/2019	318.12	40.45	277.67
MW-3	8/15/2019	318.02	Dry	Dry
MW-3	11/4/2019	318.02	42.10	275.92
MW-4	2/27/2019	377.30	103.72	273.58
MW-4	5/8/2019	377.30	104.46	272.84
MW-4	8/30/2019	377.18	105.82	271.36
MW-4	11/4/2019	377.18	106.38	270.80
MW-10	1/23/2019	410.21	144.98	265.26
MW-10	5/7/2019	410.21	145.09	265.12
MW-10	8/30/2019	409.94	145.15	264.79
MW-10	11/1/2019	409.94	145.25	264.69
MW-13	1/23/2019	377.37	98.70	278.67
MW-13	5/7/2019	377.37	98.64	278.73
MW-13	8/16/2019	377.28	99.00	278.28
MW-13	11/4/2019	377.28	99.62	277.66
Channel Cc2				
MW-2	3/20/2019	318.09	73.38	244.71
MW-2	5/10/2019	318.09	73.45	244.64
MW-2	8/30/2019	317.97	74.00	243.97
MW-2	11/6/2019	317.97	74.10	243.87
MW-9	1/28/2019	405.32	165.51	239.81
MW-9	5/8/2019	405.32	165.62	239.70
MW-9	8/15/2019	405.17	165.92	239.25
MW-9	11/4/2019	405.17	165.97	239.20
MW-20	1/29/2019	370.43	121.22	249.21
MW-20	5/10/2019	370.43	121.21	249.22
MW-20	8/30/2019	370.32	121.93	248.39
MW-20	11/6/2019	370.32	122.05	248.27
MW-21	2/27/2019	345.66	106.29	239.37
MW-21	5/10/2019	345.66	106.32	239.34
MW-21	8/30/2019	349.05	107.62	241.43
MW-21	11/6/2019	349.05	106.84	242.21
MW-33	2/27/2019	359.24	111.83	247.41
MW-33	5/10/2019	359.24	111.93	247.31
MW-33	8/30/2019	359.17	112.51	246.66
MW-33	11/6/2019	359.17	112.61	246.56
MW-35	2/27/2019	361.48	118.03	243.45
MW-35	5/10/2019	361.48	118.16	243.32
MW-35	8/30/2019	361.34	118.44	242.90
MW-35	11/6/2019	361.34	118.71	242.63

Table H-2 *(continued)*
Groundwater - Sampling Water Levels

Sampling Water Levels		Top of PVC Casing Elevation	Depth to Groundwater	Groundwater Elevation
Well #	Measurement Date	(feet)	(feet)	(feet above MSL)
Channel Cc3				
MW-8	1/22/2019	386.13	176.33	209.80
MW-8	5/7/2019	386.13	176.20	209.93
MW-8	8/14/2019	386.00	176.40	209.60
MW-8	11/1/2019	386.00	176.68	209.32
MW-36	1/23/2019	378.26	151.20	227.06
MW-36	5/7/2019	378.26	151.15	227.11
MW-36	8/29/2019	378.19	151.28	226.91
MW-36	11/5/2019	378.19	151.45	226.74
Unit D				
MW-7	1/23/2019	376.56	190.20	186.36
MW-7	5/8/2019	376.56	190.35	186.21
MW-7	8/29/2019	376.75	190.69	186.06
MW-7	11/4/2019	376.75	191.06	185.69
MW-12	1/24/2019	315.67	142.44*	173.23*
MW-12	5/7/2019	315.67	141.38	174.29
MW-12	8/15/2019	315.53	141.73	173.80
MW-12	11/4/2019	315.53	141.93	173.60
MW-19	1/28/2019	405.58	245.54	160.04
MW-19	5/8/2019	405.58	245.46	160.12
MW-19	8/14/2019	405.43	245.47	159.96
MW-19	11/4/2019	405.43	245.59	159.84
MW-26	1/24/2019	406.58	247.41	159.17
MW-26	5/10/2019	406.58	246.86	159.72
MW-26	8/30/2019	406.54	247.12	159.42
MW-26	11/5/2019	406.54	247.28	159.26
MW-29	1/28/2019	413.79	244.26	169.53
MW-29	5/10/2019	413.79	244.01	169.78
MW-29	8/29/2019	413.85	244.31	169.54
MW-29	11/4/2019	413.85	244.18	169.67
MW-34	1/22/2019	385.94	203.22	182.72
MW-34	5/7/2019	385.94	203.22	182.72
MW-34	8/29/2019	385.96	203.68	182.28
MW-34	11/5/2019	385.96	203.85	182.11

*The 1Q2019 static water level measurement and the sampling water level measurement (taken on 1/22/2019 and 1/24/2019 respectively) for monitroing well MW-12 have both been rejected; a one foot discrepancy between the two measurements was unable to be resolved with certainty.

Table H-3
Groundwater - Field Parameters

Groundwater - Field Parameters			Specific Conductance (Field)	Dissolved Oxygen (DO) (Field)	Oxidation-Reduction Potential (ORP) (Field)	pH (Field)	Purge Volume	Temperature (Field)	Turbidity (Field)
Well #	Sample Date	Sample ID	(µmhos/cm)	(mg/L)	(mV)	(Std. Units)	(gal)	(° C)	(NTU)
Channel Cc1									
MW-3	1/24/2019	WV3-190124-	90.5	--	--	5.79	3.50	9.70	1.05
MW-3	5/7/2019	WV3-190507-	60.6	9.22	186.10	5.82	0.80	10.47	3.06
**MW-3	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--
MW-4	2/27/2019	WV4-190227-	164.2	10.42	194.60	6.53	0.80	9.83	0.87
MW-4	5/8/2019	WV4-190508-	149.5	10.07	147.90	6.90	0.40	10.68	0.44
MW-4	11/4/2019	WV4-191104-	160.2	--	--	6.80	2.20	10.71	0.91
**MW-4	--	--	--	--	--	--	--	--	--
MW-10	1/23/2019	WV10190123-	145.7	6.06	274.80	7.39	2.40	10.03	0.51
MW-10	5/7/2019	WV10190507-	147.9	5.43	131.00	7.30	4.00	10.50	0.59
MW-10	8/30/2019	WV10190830-	147.3	5.88	173.90	7.15	2.50	10.65	0.28
MW-10	11/1/2019	WV10191101-	148.2	5.45	262.70	7.14	3.00	9.96	0.71
MW-13	1/23/2019	WV13190123-	160.5	7.8	295.2	7.22	2.5	10.27	0.27
MW-13	5/7/2019	WV13190507-	159.4	7.28	182.3	7.2	2.2	10.84	0.48
MW-13	5/7/2019	WV13190507D	159.4	7.28	182.3	7.2	2.2	10.84	0.48
MW-13	8/16/2019	WV13190816-	166.4	4.97	91.8	6.99	5	10.7	0.29
MW-13	11/4/2019	WV13191104-	159.3	5.89	153.9	7.12	3.5	10.58	0.32
Channel Cc2									
MW-2	3/20/2019	WV2-190320-	305.5	0.43	119.20	7.16	2.40	10.18	0.22
MW-2	5/10/2019	WV2-190510-	310.5	0.95	87.80	7.22	2.00	10.44	0.24
MW-2	8/30/2019	WV2-190830-	304.6	0.72	172.60	7.12	3.00	10.15	1.85
MW-2	11/6/2019	WV2-191106-	315.6	0.98	224.90	6.50	3.50	9.76	0.40
MW-9	1/28/2019	WV9-190128-	182.3	8.36	338.80	7.27	2.50	9.95	0.44
MW-9	5/8/2019	WV9-190508-	186.9	8.89	322.40	6.88	4.00	10.10	0.41
MW-9	8/15/2019	WV9-190815-	177.1	8.25	151.80	7.31	3.00	10.32	0.36
MW-9	11/4/2019	WV9-191104-	172.6	7.66	271.50	7.19	2.75	9.93	0.46
MW-20	1/29/2019	WV20190129-	205.2	1.33	49.00	7.31	2.10	10.82	10.10
MW-20	5/10/2019	WV20190510-	194.9	0.55	-66.60	7.57	3.50	11.61	1.89
MW-20	8/30/2019	WV20190830-	191.2	0.82	-22.80	6.87	4.00	11.19	3.01
MW-20	11/6/2019	WV20191106-	189.7	1.06	-89.00	7.58	5.00	10.51	4.95
MW-21	2/27/2019	WV21190227-	266.9	2.50	115.80	6.95	3.60	9.45	4.46
MW-21	5/10/2019	WV21190510-	278.7	1.52	79.20	6.61	4.80	9.75	5.72
MW-21	8/30/2019	WV21190830-	289.3	0.62	24.60	7.02	5.00	10.37	3.71
MW-21	11/6/2019	WV21191106-	300.8	0.68	75.80	6.59	5.00	9.91	2.08
MW-33	2/27/2019	WV33190227-	770.3	0.63	-63.30	6.64	3.50	11.74	0.67
MW-33	5/10/2019	WV33190510-	762.0	0.53	-55.80	6.83	4.00	12.56	0.36
MW-33	8/30/2019	WV33190830-	761.8	0.63	-51.90	6.69	2.50	13.31	1.05
MW-33	11/6/2019	WV33191106-	748.0	0.89	-74.30	6.63	4.00	12.85	11.90
MW-35	2/27/2019	WV35190227-	670.0	0.48	-67.80	6.61	3.70	10.16	4.37
MW-35	5/10/2019	WV35190510-	688.0	0.40	-64.50	6.62	3.00	10.53	1.85
MW-35	8/30/2019	WV35190830-	7.2	0.16	-77.10	6.73	6.00	10.98	7.75
MW-35	11/6/2019	WV35191106-	749.0	0.25	-71.20	6.68	4.00	10.59	2.07

Table H-3 (*continued*)
Groundwater - Field Parameters

Groundwater - Field Parameters			Specific Conductance (Field)	Dissolved Oxygen (DO) (Field)	Oxidation-Reduction Potential (ORP) (Field)	pH (Field)	Purge Volume	Temperature (Field)	Turbidity (Field)
Well #	Sample Date	Sample ID	(µmhos/cm)	(mg/L)	(mV)	(Std. Units)	(gal)	(°C)	(NTU)
Channel Cc3									
MW-8	1/22/2019	WV8-190122-	164.8	10.03	267.7	6.79	2.25	10.14	0.2
MW-8	5/7/2019	WV8-190507-	167.5	10.04	132.5	6.68	4	10.99	0.28
MW-8	8/14/2019	WV8-190814-	167.0	10.06	224.60	6.22	2.25	11.23	0.17
MW-8	8/14/2019	WV8-190814D	167.0	10.06	224.60	6.22	2.25	11.23	0.17
MW-8	11/1/2019	WV8-191101-	168.3	10.19	204.90	6.50	1.60	10.83	0.21
MW-36	1/23/2019	WV36190123-	174.6	3.08	271.70	7.78	2.50	11.41	0.25
MW-36	1/23/2019	WV36190123D	174.6	3.08	271.70	7.78	2.50	11.41	0.25
MW-36	5/7/2019	WV36190507-	171.5	3.26	312.00	7.44	2.50	11.71	--
MW-36	8/29/2019	WV36190829-	175.4	2.91	100.20	7.76	3.25	12.01	0.45
MW-36	11/5/2019	WV36191105-	175.3	3.33	204.30	7.12	2.50	11.63	0.33
Unit D									
MW-7	1/23/2019	WV7-190123-	187.5	1.70	285.20	7.64	2.50	10.30	0.65
MW-7	5/8/2019	WV7-190508-	187.6	1.50	153.40	7.53	3.50	11.02	1.42
MW-7	8/29/2019	WV7-190829-	189.3	1.27	105.70	7.61		11.00	1.29
MW-7	11/4/2019	WV7-191104-	189.4	0.84	149.90	7.13	4.50	10.49	1.08
MW-12	1/24/2019	WV12190124-	170.5	5.05	375.40	7.38	2.50	9.46	0.55
MW-12	5/7/2019	WV12190507-	168.1	4.84	182.60	6.85	2.30	9.74	0.33
MW-12	8/15/2019	WV12190815-	168.9	4.98	190.50	7.23	2.75	9.78	0.43
MW-12	11/4/2019	WV12191104-	168.3	5.10	260.60	6.89	2.50	9.38	1.23
MW-19	1/28/2019	WV19190128-	218.6	0.79	204.10	7.70	6.50	9.66	1.91
MW-19	5/8/2019	WV19190508-	219.3	1.29	262.60	7.46	3.00	10.02	4.43
MW-19	8/14/2019	WV19190814-	218.7	1.01	2.50	7.56	5.00	10.30	2.02
MW-19	11/4/2019	WV19191104-	219.5	0.98	13.50	7.56	5.00	9.85	2.36
MW-26	1/24/2019	WV26190124-	191.6	1.00	50.40	8.29	4.50	10.12	9.64
MW-26	5/10/2019	WV26190510-	192.8	0.59	-55.30	8.07	5.75	10.60	20.30
MW-26	8/30/2019	WV26190830-	192.1	0.66	-113.70	7.75	5.25	10.84	7.69
MW-26	11/5/2019	WV26191105-	191.6	0.68	-109.20	7.82	5.75	10.68	4.86
MW-29	1/28/2019	WV29190128-	242.6	1.12	61.40	7.62	4.50	10.13	25.60
MW-29	5/10/2019	WV29190510-	243.2	0.72	-94.70	7.61	4.75	10.88	55.20
MW-29	8/29/2019	WV29190829-	242.3	1.00	-82.00	7.25	4.00	10.97	22.80
MW-29	11/4/2019	WV29191104-	242.4	0.63	-98.70	7.32	6.25	10.62	12.40
MW-34	1/22/2019	WV34190122-	197.9	6.44	271.00	7.09	2.50	11.67	0.23
MW-34	5/7/2019	WV34190507-	192.3	6.17	269.70	6.71	2.60	12.55	3.98
MW-34	8/29/2019	WV34190829-	197.9	6.23	127.90	7.10	2.50	12.68	0.47
MW-34	11/5/2019	WV34191105-	197.1	6.66	215.30	6.87	2.00	12.94	0.29
Field Blank									
FIELD BLANK	3/20/2019	WV2-190320F	0.9	--	--	7.19	--	16.60	--
FIELD BLANK	5/10/2019	WV2-190510F	0.9	--	--	8.15	--	20.00	--
FIELD BLANK	8/16/2019	WV13190816F	0.6	--	--	7.67	--	20.68	--
FIELD BLANK	8/30/2019	WV26190830F	1.1	--	--	8.39	--	19.51	--
Offsite Private Wells									
DW-85	1/29/2019	WV85190129-	150.9	1.69	68.00	7.54	120.00	8.07	0.27
DW-85	8/16/2019	WV85190816-	152.6	1.50	-153.00	7.19	75.00	12.97	0.23
DW-PA	1/29/2019	WVPA190129-	186.1	9.14	196.20	7.31	60.00	9.62	0.61
DW-PA	8/16/2019	WVPA190816-	187.0	8.96	114.00	6.88	60.00	11.71	0.55

** Water level was below pump - no sample collected.

Table H-4
Groundwater - Conventionals

Groundwater - Conventionals			Alkalinity, Total (as $CACO_3$)	Ammonia as N	Chloride	Nitrate	Specific Conductance (Lab)	Sulfate	Total Dissolved Solids	Total Organic Carbon	Total Solids	Total Suspended Solids
Well #	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µmhos/cm)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Channel Cc1												
MW-3	1/24/2019	WV3-190124-	27.00	0.0021 T	1.46	1.86	93.60	4.84	71.30	1.14	72.60	1 U
MW-3	5/7/2019	WV3-190507-	19.00	0.002 U	1.21	0.45	63.70	5.02	47.90	0.85 T	52.40	1.20
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/27/2019	WV4-190227-	37.80	0.002 U	10.40	1.84	165.00	15.80	135.00	0.93 T	138.00	0.5 U
MW-4	5/8/2019	WV4-190508-	44.00	0.002 U	7.84	1.54	151.00	10.80	131.00	0.62 T	132.00	0.5 U
**MW-4	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	11/4/2019	WV4-191104-	48.10	0.002 U	7.01	1.77	159.00	12.20	138.00	0.87 T	140.00	--
MW-10	1/23/2019	WV10190123-	56.00	0.002 U	3.19	0.68	145.00	8.53	105.00	0.73 T	107.00	0.5 U
MW-10	5/7/2019	WV10190507-	55.80	0.002 U	3.28	0.66	145.00	8.81	103.00	0.5 U	108.00	0.5 U
MW-10	8/30/2019	WV10190830-	55.10	0.002 U	3.21	0.70	143.00	8.50	103.00	0.5 U	108.00	0.5 U
MW-10	11/1/2019	WV10191101-	57.70	0.002 U	3.28	0.64	149.00	8.86	106.00	0.5 U	109.00	0.5 U
MW-13	1/23/2019	WV13190123-	63.50	0.002 U	3.02	0.25	164.00	12.50	116.00	0.83 T	117.00	0.5 U
MW-13	5/7/2019	WV13190507-	64.20	0.002 U	3.02	0.19	165.00	13.70	115.00	0.5 U	122.00	1.10
MW-13	5/7/2019	WV13190507D	63.90	0.002 U	3.14	0.18	165.00	13.70	116.00	0.5 U	120.00	0.9 T
MW-13	8/16/2019	WV13190816-	63.60	0.0022T	2.93	0.22	164.00	12.90	119.00	0.5 U	122.00	1.00
MW-13	11/4/2019	WV13191104-	63.00	0.002 U	2.93	0.26	159.00	12.00	117.00	0.55 T	117.00	0.5 U
Channel Cc2												
MW-2	3/20/2019	WV2-190320-	137.00	0.002 U	2.92	0.01 U	304.00	14.00	178.00	1.12	177.00	0.5 U
MW-2	5/10/2019	WV2-190510-	146.00	0.0022 T	2.81	0.01 U	310.00	13.60	184.00	0.68 T	190.00	0.5 U
MW-2	8/30/2019	WV2-190830-	136.00	0.0088T	2.64	0.06	293.00	12.60	170.00	0.52 T	181.00	0.5 U
MW-2	11/6/2019	WV2-191106-	138.00	0.002 U	2.73	0.17	298.00	14.60	184.00	0.54 T	189.00	0.5 U
MW-9	1/28/2019	WV9-190128-	71.40	0.002 U	4.40	0.36	176.00	11.20	129.00	0.58 T	133.00	0.5 U
MW-9	5/8/2019	WV9-190508-	71.20	0.002 U	4.56	0.38	184.00	12.00	125.00	0.5 U	129.00	0.5 U
MW-9	8/15/2019	WV9-190815-	68.40	0.002 U	4.29	0.36	175.00	10.80	124.00	0.5 U	124.00	0.5 U
MW-9	11/4/2019	WV9-191104-	67.50	0.002 U	4.26	0.32	170.00	10.70	123.00	0.5 U	125.00	0.5 U
MW-20	1/29/2019	WV20190129-	79.30	0.01	3.17	0.01 SU	199.00	16.30	146.00	0.61 T	154.00	5.20
MW-20	5/10/2019	WV20190510-	75.00	0.02	3.19	0.01 U	191.00	16.40	133.00	0.5 U	140.00	1 U
MW-20	8/30/2019	WV20190830-	72.30	0.02	3.16	0.01 U	185.00	15.90	130.00	0.5 U	135.00	1.90
MW-20	11/6/2019	WV20191106-	74.20	0.01	3.16	0.01 U	186.00	15.70	135.00	0.5 U	139.00	1.10
MW-21	2/27/2019	WV21190227-	122.00	0.0093 T	2.29	0.19	270.00	12.50	173.00	1.07	176.00	2.00
MW-21	5/10/2019	WV21190510-	128.00	0.01	2.35	0.21	278.00	13.50	178.00	0.81 T	181.00	2.30
MW-21	8/30/2019	WV21190830-	128.00	0.01	2.40	0.36	282.00	13.60	179.00	0.95 T	184.00	1.50
MW-21	11/6/2019	WV21191106-	137.00	0.01	2.40	0.45	296.00	14.00	192.00	0.88 T	192.00	1.20
MW-33	2/27/2019	WV33190227-	395.00	0.03	3.90	0.01 U	762.00	16.90	447.00	1.91	469.00	11.40
MW-33	5/10/2019	WV33190510-	398.00	0.03	3.95	0.01 U	755.00	17.70	453.00	1.71	479.00	7.00
MW-33	8/30/2019	WV33190830-	390.00	0.03	3.88	0.015 T	727.00	17.30	443.00	1.99	466.00	10.00
MW-33	11/6/2019	WV33191106-	391.00	0.03	3.84	0.01 U	719.00	17.40	434.00	2.31	459.00	9.80
MW-35	2/27/2019	WV35190227-	330.00	0.07	4.08	0.01 U	644.00	21.10	407.00	3.81	440.00	36.40
MW-35	5/10/2019	WV35190510-	342.00	0.06	4.21	0.01 U	655.00	21.60	423.00	3.30	459.00	28.90
MW-35	8/30/2019	WV35190830-	346.00	0.07	4.20	0.01 U	662.00	22.20	427.00	3.32	497.00	65.10
MW-35	11/6/2019	WV35191106-	359.00	0.06	4.15	0.01 U	686.00	22.10	438.00	4.15	489.00	35.40

Table H-4 ***(continued)***
Groundwater - Conventionals

Groundwater - Conventionals			Alkalinity, Total (as $CACO_3$)	Ammonia as N	Chloride	Nitrate	Specific Conductance (Lab)	Sulfate	Total Dissolved Solids	Total Organic Carbon	Total Solids	Total Suspended Solids
Well #	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µmhos/cm)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Channel Cc3												
MW-8	1/22/2019	WV8-190122-	54.90	0.002 U	4.29	2.96	164.00	7.96	118.00	0.55 T	120.00	0.5 U
MW-8	5/7/2019	WV8-190507-	54.60	0.002 U	4.52	2.79	165.00	8.04	125.00	0.5 U	123.00	0.5 U
MW-8	8/14/2019	WV8-190814-	54.80	0.002 U	4.43	3.11	164.00	7.81	127.00	0.5 U	126.00	0.5 U
MW-8	8/14/2019	WV8-190814D	56.00	0.002 U	4.41	3.11	167.00	7.80	120.00	0.5 U	152.00	0.5 U
MW-8	11/1/2019	WV8-191101-	57.80	0.002 U	4.57	2.77	169.00	8.22	121.00	0.5 T	124.00	0.5 U
MW-36	1/23/2019	WV36190123-	68.30	0.0025 T	2.96	0.021 T	172.00	12.70	138 H	0.71 T	132.00	0.5 U
MW-36	1/23/2019	WV36190123D	68.30	0.002 U	2.97	0.021 T	173.00	12.70	129.00	0.74 T	133.00	0.5 U
MW-36	5/7/2019	WV36190507-	68.00	0.002 U	3.05	0.019 T	173.00	13.30	130.00	0.5 U	133.00	0.5 U
MW-36	8/29/2019	WV36190829-	67.70	0.002 U	3.05	0.02 T	171.00	13.10	121.00	0.5 U	131.00	0.5 U
MW-36	11/5/2019	WV36191105-	69.50	0.002 U	3.10	0.02	173.00	13.20	131.00	0.5 U	131.00	0.5 U
Unit D												
MW-7	1/23/2019	WV7-190123-	77.30	0.23	3.28	0.02 T	186.00	10.80	132.00	0.65 T	137.00	1 U
MW-7	5/8/2019	WV7-190508-	77.10	0.24	3.38	0.017 T	186.00	11.30	132.00	0.5 U	135.00	0.8 T
MW-7	8/29/2019	WV7-190829-	76.50	0.26	3.36	0.02	185.00	11.10	134.00	0.5 U	136.00	1.50
MW-7	11/4/2019	WV7-191104-	78.40	0.23	3.41	0.01	186.00	11.00	136.00	0.81 T	136.00	0.5 U
MW-12	1/24/2019	WV12190124-	64.80	0.002 U	3.15	0.73	167.00	10.80	120.00	0.67 T	124.00	0.5 U
MW-12	5/7/2019	WV12190507-	64.50	0.002 U	3.21	0.70	166.00	11.10	118.00	0.5 U	119.00	1 U
MW-12	8/15/2019	WV12190815-	66.30	0.002 U	3.20	0.74	169.00	10.50	120.00	0.5 U	117.00	0.5 U
MW-12	11/4/2019	WV12191104-	64.90	0.002 U	3.20	0.73	165.00	10.60	124.00	0.5 U	123.00	0.8 T
MW-19	1/28/2019	WV19190128-	86.00	0.03	4.70	0.01 U	217.00	17.30	143.00	0.61 T	154.00	1.30
MW-19	5/8/2019	WV19190508-	84.20	0.03	4.66	0.012 T	215.00	17.10	142.00	0.5 U	148.00	3.60
MW-19	8/14/2019	WV19190814-	84.50	0.03	4.59	0.01 U	214.00	17.00	142.00	0.5 U	146.00	1 U
MW-19	11/4/2019	WV19191104-	85.20	0.03	4.59	0.01 U	214.00	17.00	147.00	0.51 T	146.00	0.9 T
MW-26	1/24/2019	WV26190124-	75.50	0.25	3.69	0.016 T	189.00	13.30	142 J	0.83 T	181 J	117 J
MW-26	5/10/2019	WV26190510-	75.50	0.25	3.77	0.013 T	189.00	13.70	141.00	0.66 T	165.00	37.00
MW-26	8/30/2019	WV26190830-	74.00	0.30	3.75	0.012 T	187.00	13.40	136.00	0.5 U	155.00	14.70
MW-26	11/5/2019	WV26191105-	75.20	0.24	3.80	0.01 T	189.00	13.50	139.00	0.5 U	153.00	11.60
MW-29	1/28/2019	WV29190128-	102.00	0.0023 T	3.61	0.01 U	239.00	15.50	154.00	0.74 T	177.00	16.20
MW-29	5/10/2019	WV29190510-	102.00	0.0026 T	3.64	0.01 U	238.00	15.60	150.00	0.5 U	192.00	24.80
MW-29	8/29/2019	WV29190829-	99.40	0.0024T	3.60	0.01 U	234.00	15.30	147.00	0.5 U	165.00	14.60
MW-29	11/4/2019	WV29191104-	101.00	0.0025 T	3.63	0.01 U	238.00	16.20	160.00	0.5 U	160.00	6.60
MW-34	1/22/2019	WV34190122-	68.40	0.002 U	4.92	2.23	197.00	13.00	134.00	0.57 T	139.00	0.5 U
MW-34	5/7/2019	WV34190507-	67.90	0.002 U	5.11	2.15	195.00	13.70	140.00	0.56 T	147.00	10.30
MW-34	8/29/2019	WV34190829-	67.40	0.002 U	5.01	2.08	193.00	13.30	139.00	0.5 U	143.00	0.5 U
MW-34	11/5/2019	WV34191105-	69.50	0.002 U	5.03	1.93	195.00	13.40	135.00	0.5 U	137.00	0.5 U
Field Blank												
FIELD BLANK	3/20/2019	WV2-190320F	1 U	0.002 U	0.05 U	0.01 U	1.2 T	0.1 U	10 U	0.5 U	10 U	0.5 U
FIELD BLANK	5/10/2019	WV2-190510F	1 U	0.002 U	0.05 U	0.01 U	1.7 T	0.1 U	10 U	0.5 U	10 U	0.5 U
FIELD BLANK	8/16/2019	WV13190816F	1 U	0.002 U	0.05 U	0.01 U	1.5	0.1 U	10 U	0.5 U	10 U	0.5 U
FIELD BLANK	8/30/2019	WV26190830F	1 U	0.002 U	0.05 U	0.01 U	1.4	0.1 U	10 U	0.5 U	10 U	0.5 U
Offsite Private Wells												
DW-85	1/29/2019	WV85190129-	69.80	0.27	2.65	0.01 U	151.00	2.24	109.00	0.5 U	117.00	0.5 U
DW-85	8/16/2019	WV85190816-	68.80	0.28	2.66	0.01 U	149.00	2.21	109.00	0.5 U	111.00	1 U
DW-PA	1/29/2019	WVPA190129-	68.40	0.002 U	5.72	1.19	186.00	11.20	126.00	0.5 U	132.00	0.5 U
DW-PA	8/16/2019	WVPA190816-	67.60	0.002 U	5.62	1.19	184.00	11.00	127.00	0.5 U	129.00	0.5 T

** Water level was below pump - no sample collected.

Table H-5
Groundwater - Metals (Dissolved & Total)

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	Antimony, Dissolved (mg/L)	Antimony, Total (mg/L)	Arsenic, Dissolved (mg/L)	Arsenic, Total (mg/L)	Barium, Dissolved (mg/L)	Barium, Total (mg/L)	Beryllium, Dissolved (mg/L)	Beryllium, Total (mg/L)	Cadmium, Dissolved (mg/L)	Cadmium, Total (mg/L)	Calcium, Dissolved (mg/L)	Calcium, Total (mg/L)	Chromium, Dissolved (mg/L)	Chromium, Total (mg/L)	Cobalt, Dissolved (mg/L)	Cobalt, Total (mg/L)	Copper, Dissolved (mg/L)	Copper, Total (mg/L)	Iron, Dissolved (mg/L)	Iron, Total (mg/L)	Lead, Dissolved (mg/L)	Lead, Total (mg/L)
			Channel Cc1																					
MW-3	1/24/2019	WV3-190124-	0.0003 U	0.0003 U	5E-05 U	0.0000691	0.03	0.031	0.0001 U	0.0001 U	5E-05 U	5E-05 U	9.61	9.67	0.0002 U	0.0002 U	5E-05 U	0.000052	0.0002 U	0.0002 U	0.0161	0.0651	0.0001 U	0.0001 U
MW-3	5/7/2019	WV3-190507-	0.0003 U	0.0003 U	5E-05 U	0.0000904	0.0152	0.0167	0.0001 U	0.0001 U	5E-05 U	5E-05 U	6.02	5.91	0.0002 U	0.000271	5E-05 U	0.0000794	0.0002 U	0.000297	0.0117	0.17	0.0001 U	0.000149
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/27/2019	WV4-190227-	0.0003 U	0.0003 U	0.000324	0.00033	0.00408	0.00472	0.0001 U	0.0001 U	5E-05 U	5E-05 U	12.6	12.6	0.00381	0.0038	5E-05 U	5E-05 U	0.000213	0.0002 U	0.01 U	0.035	0.0001 U	0.0001 U
MW-4	5/8/2019	WV4-190508-	0.0003 U	0.0003 U	0.000316	0.000335	0.00381	0.00413	0.0001 U	0.0001 U	5E-05 U	5E-05 U	11.8	11.7	0.00451	0.00455	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.032	0.0001 U	0.0001 U
MW-4	11/4/2019	WV4-191104-	0.0003 U	0.0003 U	0.000365	0.00036	0.00411	0.00412	0.0001 U	0.0001 U	5E-05 U	5E-05 U	12.9	12.9	0.00425	0.00426	5E-05 U	5E-05 U	0.00148	0.000215	0.01 U	0.0229	0.0001 U	0.0001 U
**MW-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	1/23/2019	WV10190123-	0.0003 U	0.0003 U	0.0015	0.00153	0.0033	0.0034	0.0001 U	0.0001 U	5E-05 U	5E-05 U	9.87	10.1	0.00337	0.00351	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.0126	0.0001 U	0.0001 U
MW-10	5/7/2019	WV10190507-	0.0003 U	0.0003 U	0.00153	0.00157	0.0034	0.00356	0.0001 U	0.0001 U	5E-05 U	5E-05 U	9.91	9.95	0.00346	0.00341	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-10	8/30/2019	WV10190830-	0.0003 U	0.0003 U	0.00154	0.00158	0.0031	0.00332	0.0001 U	0.0001 U	5E-05 U	5E-05 U	9.37	9.9	0.00329	0.00355	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-10	11/1/2019	WV10191101-	0.0003 U	0.0003 U	0.00155	0.00153	0.00311	0.00303	0.0001 U	0.0001 U	5E-05 U	5E-05 U	9.85	9.65	0.00303	0.00286	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-13	1/23/2019	WV13190123-	0.0003 U	0.0003 U	0.00204	0.0021	0.004	0.00403	0.0001 U	0.0001 U	5E-05 U	5E-05 U	10.4	10.4	0.00253	0.00298	5E-05 U	5E-05 U	0.000211	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-13	5/7/2019	WV13190507-	0.0003 U	0.0003 U	0.00177	0.00187	0.00393	0.00419	0.0001 U	0.0001 U	5E-05 U	5E-05 U	10	9.77	0.00219	0.00258	5E-05 U	5E-05 U	0.000238	0.000273	0.0113	0.0257	0.0001 U	0.0001 U
MW-13	5/7/2019	WV13190507D	0.0003 U	0.0003 U	0.00178	0.00186	0.00404	0.00436	0.0001 U	0.0001 U	5E-05 U	5E-05 U	10.2	9.9	0.0023	0.00242	5E-05 U	5E-05 U	0.000425	0.000268	0.0109	0.0257	0.0001 U	0.0001 U
MW-13	8/16/2019	WV13190816-	0.0003 U	0.0003 U	0.00183	0.0019	0.00392	0.00398	0.0001 U	0.0001 U	5E-05 U	5E-05 U	9.46	9.55	0.002	0.00215	5E-05 U	5E-05 U	0.000243	0.00026	0.0124	0.0291	0.0001 U	0.0001 U
MW-13	11/4/2019	WV13191104-	0.0003 U	0.0003 U	0.00199	0.00198	0.0039	0.0038	0.0001 U	0.0001 U	5E-05 U	5E-05 U	9.73	9.88	0.00203	0.00204	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
			Channel Cc2																					
MW-2	3/20/2019	WV2-190320-	0.0003 U	0.0003 U	0.000801	0.000803	0.00633	0.00656	0.0001 U	0.0001 U	5E-05 U	5E-05 U	20	20.4	0.0002 U	0.0002 U	0.0000633	0.0000665	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-2	5/10/2019	WV2-190510-	0.0003 U	0.0003 U	0.00074	0.000701	0.00658	0.00692	0.0001 U	0.0001 U	5E-05 U	0.0000516	21.8	23	0.0002 U	0.000301	0.0000521	5E-05 U	0.0002 U	0.000215	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-2	8/30/2019	WV2-190830-	0.0003 U	0.0003 U	0.000816	0.000827	0.00674	0.00698	0.0001 U	0.0001 U	5E-05 U	5E-05 U	19.5	20.6	0.0002 U	0.0002 U	0.0000946	0.000103	0.000205	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-2	11/6/2019	WV2-191106-	0.0003 U	0.0003 U	0.000947	0.000926	0.00716	0.00663	0.0001 U	0.0001 U	5E-05 U	5E-05 U	21.2	20.8	0.0002 U	0.0002 U	0.000108	0.000109	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-9	1/28/2019	WV9-190128-	0.0003 U	0.0003 U	0.00224	0.00225	0.00375	0.00376	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.8	13.7	0.00397	0.00405	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-9	5/8/2019	WV9-190508-	0.0003 U	0.0003 U	0.00229	0.00232	0.00378	0.00419	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.3	14.3	0.00416	0.00415	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-9	8/15/2019	WV9-190815-	0.0003 U	0.0003 U	0.00239	0.00237	0.00361	0.00351	0.0001 U	0.0001 U	5E-05 U	5E-05 U	12.8	12.7	0.00397	0.00392	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-9	11/4/2019	WV9-191104-	0.0003 U	0.0003 U	0.00251	0.0024	0.00355	0.00334	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13	12.9	0.00375	0.00384	5E-05 U	5E-05 U	0.000397	0.000736	0.01 U	0.0177	0.0001 U	0.0001 U
MW-20	1/29/2019	WV20190129-	0.0003 U	0.0003 U	0.00189	0.00319	0.00654	0.00738	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.5	13.4	0.0002 U	0.0002 U	0.0000556	0.0000665	0.0002 U	0.0002 U	0.332	1.22	0.0001 U	0.0001 U
MW-20	5/10/2019	WV20190510-	0.0003 U	0.0003 U	0.00185	0.00234	0.00559	0.00611	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.7	13.3	0.000342	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.22	0.494	0.0001 U	0.0001 U
MW-20	8/30/2019	WV20190830-	0.0003 U	0.0003 U	0.00204	0.00309	0.0056	0.00639	0.0001 U	0.0001 U	5E-05 U	5E-05 U	12.8	13	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.261	0.915	0.0001 U	0.0001 U
MW-20	11/6/2019	WV20191106-	0.0003 U	0.0003 U	0.0021	0.00252	0.00547	0.00542	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.1	13.6	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.224	0.521	0.0001 U	0.0001 U
MW-21	2/27/2019	WV21190227-	0.0003 U	0.0003 U	0.00155	0.00264	0.00595	0.00678	0.0001 U	0.0001 U	5E-05 U	5E-05 U	19.6	19.5	0.0002 U	0.0002 U	0.0000947	0.000123	0.000314	0.0002 U	0.256	0.711	0.0001 U	0.0001 U
MW-21	5/10/2019	WV21190510-	0.0003 U	0.0003 U	0.00138	0.00386	0.0063	0.00742	0.0001 U	0.0001 U	5E-05 U	5E-05 U	20.3	19.9	0.000266	0.0002 U	0.000131	0.000193	0.0002 U	0.0002 U	0.27	1.25	0.0001 U	0.0001 U
MW-21	8/30/2019	WV21190830-	0.0003 U	0.0003 U	0.00124	0.00238	0.00509	0.00743	0.0001 U	0.0001 U	5E-05 U	0.000112	19.3	20.3	0.0002 U	0.0002 U	0.000179	0.000222	0.0002 U	0.000258	0.251	0.777	0.0001 U	0.0001 U
MW-21	11/6/2019	WV21191106-	0.0003 U	0.0003 U	0.00148	0.00179	0.00823	0.00788	0.0001 U	0.0001 U	5E-05 U	5E-05 U	21.8	21	0.0002 U	0.0002 U	0.000246	0.000246	0.0002 U	0.0002 U	0.42	0.573	0.0001 U	0.0001 U
MW-33	2/27/2019	WV33190227-	0.0003 U	0.0003 U	0.0361	0.0382	0.0276	0.0273	0.0001 U	0.0001 U	5E-05 U	5E-05 U	69.1	70	0.0002 U	0.0002 U	0.00141	0.00145	0.0002 U	0.0002 U	6.91	6.97	0.0001 U	0.0001 U
MW-33	5/10/2019	WV33190510-	0.0003 U	0.0003 U	0.0354	0.0372	0.0262	0.0282	0.0001 U	0.0001 U	5E-05 U	5E-05 U	68.8	69.4	0.0002 U	0.00053	0.00138	0.00133	0.0002 U	0.0002 U	7.08	6.74	0.0001 U	0.0001 U
MW-33	8/30/2019	WV33190830-	0.0003 U	0.0003 U	0.0388	0.0397	0.0262	0.0265	0.0001 U	0.0001 U	5E-05 U	5E-05 U	65	68.3	0.0002 U	0.0002 U	0.00142	0.00143	0.0002 U	0.0002 U	6.51	6.81	0.0001 U	0.0001 U
MW-33	11/6/2019	WV33191106-	0.0003 U	0.0003 U	0.0383	0.0381	0.0267	0.0249	0.0001 U	0.0001 U	5E-05 U	5E-05 U	68.9	66.1	0.0002 U	0.0002 U	0.00129	0.00125	0.0002 U	0.0002 U	7.28	6.87	0.0001 U	0.0001 U
MW-35	2/27/2019	WV35190227-	0.0003 U	0.0003 U	0.0324	0.0335	0.0222	0.0257	0.0001 U	0.0001 U	5E-05 U	5E-05 U	63.1	64.4	0.0002 U	0.000966	0.00203	0.00232	0.0002 U	0.000511	15.8	16.9	0.0001 U	0.000116
MW-35	5/10/2019	WV35190510-	0.0003 U	0.0003 U	0.0299	0.0298	0.0223	0.025	0.0001 U	0.0001 U	5E-05 U	5E-05 U	66.1	62.4	0.000458	0.00123	0.00198	0.00195	0.000824	0.000949	15.9	14.3	0.0001 U	0.000134
MW-35	8/30/2019	WV35190830-	0.0003 U	0.0003 U	0.029	0.0298	0.0227	0.0284	0.0001 U	0.0001 U	5E-05 U	5E-05 U	63.3	68.4	0.0002 U	0.00157	0.00189	0.00223	0.0002 U	0.000919	13.7	15.4	0.0001 U	0.000203
MW-35	11/6/2019	WV35191106-	0.0003 U	0.0003 U	0.0294	0.0289	0.0242	0.0247	0.0001 U	0.0001 U	5E-05 U	5E-05 U	72.8	71.5	0.000224	0.0014	0.00182	0.00192	0.0002 U	0.000629	14.5	14.6	0.0001 U	0.000179

Table H-5 (*continued*)
Groundwater - Metals (Dissolved & Total)

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	Magnesium, Dissolved (mg/L)	Magnesium, Total (mg/L)	Manganese, Dissolved (mg/L)	Manganese, Total (mg/L)	Mercury, Dissolved (mg/L)	Mercury, Total (mg/L)	Nickel, Dissolved (mg/L)	Nickel, Total (mg/L)	Potassium, Dissolved (mg/L)	Potassium, Total (mg/L)	Selenium, Dissolved (mg/L)	Selenium, Total (mg/L)	Silver, Dissolved (mg/L)	Silver, Total (mg/L)	Sodium, Dissolved (mg/L)	Sodium, Total (mg/L)	Thallium, Dissolved (mg/L)	Thallium, Total (mg/L)	Vanadium, Dissolved (mg/L)	Vanadium, Total (mg/L)	Zinc, Dissolved (mg/L)	Zinc, Total (mg/L)
Channel Cc1																								
MW-3	1/24/2019	WV3-190124-	2.96	2.94	0.00155	0.00463	5E-05 U	5E-05 U	0.000288	0.000343	2.27	2.23	0.0005 U	0.0005 U	4E-05 U	4E-05 U	3.44	3.51	0.0001 U	0.0001 U	0.000159	0.000201	0.0005 U	0.0005 DU
MW-3	5/7/2019	WV3-190507-	2.36	2.3	0.000657	0.00464	5E-05 U	5E-05 U	0.00036	0.000486	1.41	1.39	0.0005 U	0.0005 U	4E-05 U	4E-05 U	2.46	2.4	0.0001 U	0.0001 U	0.000107	0.000298	0.000666	0.000555
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/27/2019	WV4-190227-	8.2	8.04	0.000193	0.0193	5E-05 U	5E-05 U	0.000761	0.00171	0.941	0.954	0.0005 U	0.0005 U	4E-05 U	4E-05 U	5.87	5.95	0.0001 U	0.0001 U	0.0023	0.00235	0.0005 U	0.0005
MW-4	5/8/2019	WV4-190508-	8.03	7.75	0.000821	0.0228	5E-05 U	5E-05 U	0.000729	0.00168	0.913	0.901	0.0005 U	0.0005 U	4E-05 U	4E-05 U	5.92	5.84	0.0001 U	0.0001 U	0.00234	0.00251	0.0005 U	0.0005 U
MW-4	11/4/2019	WV4-191104-	8.37	8.55	0.000977	0.0225	5E-05 U	5E-05 DU	0.00189	0.00145 D	0.951	0.948	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	5.74	5.89	0.0001 U	0.0001 U	0.00243 D	0.00251	0.0005 U	0.0005 U
**MW-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	1/23/2019	WV10190123-	9.73	9.95	0.0001 U	0.000508	5E-05 U	5E-05 U	0.00025	0.000233	1.5	1.53	0.0005 U	0.0005 U	4E-05 U	0.0000493	5.07	5.24	0.0001 U	0.0001 U	0.00444	0.00444	0.0005 U	0.0005 DU
MW-10	5/7/2019	WV10190507-	9.59	9.49	0.0001 U	0.000274	5E-05 U	5E-05 U	0.00027	0.000302	1.49	1.49	0.0005 U	0.0005 U	4E-05 U	4E-05 U	5.22	5.23	0.0001 U	0.0001 U	0.00428	0.00444	0.0005 U	0.0005 U
MW-10	8/30/2019	WV10190830-	9.2	9.65	0.000222	0.000195	5E-05 U	5E-05 U	0.000266	0.000271	1.43	1.52	0.0005 U	0.0005 U	4E-05 U	4E-05 U	4.93	5.23	0.0001 U	0.0001 U	0.00437	0.00446 D	0.00106	0.0005 U
MW-10	11/1/2019	WV10191101-	9.58	9.29	0.0001 U	0.000212	5E-05 U	5E-05 U	0.000309	0.0003	1.48	1.42	0.0005 U	0.0005 U	4E-05 U	4E-05 U	5.19	4.98	0.0001 U	0.0001 U	0.00404 D	0.00408	0.000647	0.000557
MW-13	1/23/2019	WV13190123-	12.1	12.2	0.000257	0.000359	5E-05 U	5E-05 U	0.000975	0.00101	1.87	1.86	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.23	6.56	0.0001 U	0.0001 U	0.00668	0.00679	0.0005 U	0.0005 DU
MW-13	5/7/2019	WV13190507-	12	11.6	0.00307	0.00219	5E-05 U	5E-05 U	0.0011	0.00116	1.85	1.78	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.42	6.23	0.0001 U	0.0001 U	0.00559	0.00595	0.0005 U	0.000521
MW-13	5/7/2019	WV13190507D	12.1	11.5	0.00294	0.00235	5E-05 U	5E-05 U	0.00116	0.0011	1.89	1.81	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.47	6.18	0.0001 U	0.0001 U	0.00561	0.00585	0.0005	0.0005 U
MW-13	8/16/2019	WV13190816-	11	11.2	0.00256	0.00241	5E-05 U	5E-05 U	0.00103	0.00112	1.71	1.73	0.0005 U	0.0005 DU	4E-05 U	4E-05 U	5.94	6.12	0.0001 U	0.0001 U	0.0055 D	0.006	0.0005 U	0.000615
MW-13	11/4/2019	WV13191104-	11	11.4	0.00043	0.000524	5E-05 U	5E-05 DU	0.000949	0.000979 D	1.77	1.76	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	6.06	6.28	0.0001 U	0.0001 U	0.006 D	0.00618	0.000649	0.0005 U
Channel Cc2																								
MW-2	3/20/2019	WV2-190320-	21.1	20.6	0.154	0.161	5E-05 U	5E-05 U	0.00386	0.00395	2.05	2.07	0.0005 U	0.0005 U	4E-05 U	4E-05 U	9.27	9.24	0.0001 U	0.0001 U	0.00311	0.00301	0.000905	0.000828
MW-2	5/10/2019	WV2-190510-	22.7	22.6	0.224	0.299	5E-05 U	5E-05 U	0.00413	0.00467	2.31	2.36	0.0005 U	0.0005 U	4E-05 U	4E-05 U	9.54	9.62	0.0001 U	0.0001 U	0.00266	0.00235	0.00127	0.000779
MW-2	8/30/2019	WV2-190830-	20.9	21.8	0.248	0.269	5E-05 U	5E-05 U	0.00446	0.0046	2.1	2.26	0.0005 U	0.0005 U	4E-05 U	4E-05 U	9	9.29	0.0001 U	0.0001 U	0.00316	0.00329 D	0.000985	0.00055
MW-2	11/6/2019	WV2-191106-	23.7	23	0.187	0.188	5E-05 DU	5E-05 DU	0.00444	0.00453 D	2.32	2.16	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	9.52	8.98	0.0001 DU	0.0001 U	0.00355 D	0.0037	0.000574	0.000501
MW-9	1/28/2019	WV9-190128-	11.3	11.3	0.0001 U	0.000275	5E-05 U	5E-05 U	0.000128	0.000137	2.25	2.23	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.06	6.01	0.0001 U	0.0001 U	0.00456 D	0.00483 D	0.0005 U	0.0005 U
MW-9	5/8/2019	WV9-190508-	11.5	11.5	0.0001 U	0.000181	5E-05 U	5E-05 U	0.000136	0.000158	2.27	2.26	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.33	6.07	0.0001 U	0.0001 U	0.00488	0.00496	0.000745	0.000649
MW-9	8/15/2019	WV9-190815-	10.1	10.1	0.0001 U	0.000484	5E-05 U	5E-05 U	0.000124	0.000181	2.07	2.03	0.0005 U	0.0005 DU	4E-05 U	4E-05 U	5.59	5.62	0.0001 U	0.0001 U	0.00499 D	0.00501	0.0005 U	0.000718
MW-9	11/4/2019	WV9-191104-	10.2	10.3	0.0001 U	0.000733	5E-05 U	5E-05 DU	0.000128	0.000211 D	2.12	2.07	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	5.75	5.79	0.0001 U	0.0001 U	0.00491 D	0.00493	0.00068	0.00263
MW-20	1/29/2019	WV20190129-	13.7	13.9	0.225	0.241	5E-05 U	5E-05 U	0.000404	0.000456	2.26	2.24	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.49	6.57	0.0001 U	0.0001 U	0.000141 D	0.000196 D	0.0005 U	0.000657
MW-20	5/10/2019	WV20190510-	13.6	12.8	0.174	0.169	5E-05 U	5E-05 U	0.000384	0.000284	2.2	2.15	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.67	6.27	0.0001 U	0.0001 U	0.000134	0.000212	0.0005 U	0.0005 U
MW-20	8/30/2019	WV20190830-	12	12.3	0.154	0.169	5E-05 U	5E-05 U	0.000224	0.000241	2.05	2.12	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6	6.17	0.0001 U	0.0001 U	0.000195	0.000199 D	0.0005 U	0.0005 U
MW-20	11/6/2019	WV20191106-	12.8	12.8	0.152	0.156	5E-05 DU	5E-05 DU	0.000169	0.000211 D	2.27	2.13	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	6.49	6.27	0.0001 DU	0.0001 U	0.000262 D	0.000165	0.0005 U	0.000545
MW-21	2/27/2019	WV21190227-	17.7	17.4	0.165	0.21	5E-05 U	5E-05 U	0.00101	0.00108	2.12	2.13	0.0005 U	0.0005 U	4E-05 U	4E-05 U	11	11	0.0001 U	0.0001 U	0.000459	0.000621	0.00099	0.000554
MW-21	5/10/2019	WV21190510-	19.8	18.8	0.282	0.373	5E-05 U	5E-05 U	0.0012	0.0014	2.26	2.17	0.0005 U	0.0005 U	4E-05 U	4E-05 U	11.4	10.9	0.0001 U	0.0001 U	0.000478	0.000783	0.0005 U	0.0005 U
MW-21	8/30/2019	WV21190830-	19.3	20.1	0.48	0.555	5E-05 U	5E-05 U	0.00165	0.00192	2.18	2.31	0.0005 U	0.0005 U	4E-05 U	4E-05 U	10.4	10.7	0.0001 U	0.0001 U	0.000574	0.000694 D	0.00088	0.00135
MW-21	11/6/2019	WV21191106-	22	21.5	0.52	0.534	5E-05 DU	5E-05 DU	0.0021	0.00211 D	2.48	2.3	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	11.3	11.1	0.0001 DU	0.0001 U	0.00068 D	0.000667	0.0005 U	0.0005 U
MW-33	2/27/2019	WV33190227-	55.5	55.6	0.997	1.03	5E-05 U	5E-05 U	0.00619	0.00639	3.53	3.56	0.0005 U	0.0005 U	4E-05 U	4E-05 U	18.7	19	0.0001 U	0.0001 U	0.000735	0.000713	0.000549	0.000562 J
MW-33	5/10/2019	WV33190510-	57.4	55.6	1.01	0.975	5E-05 U	5E-05 U	0.00606	0.0063	3.62	3.63	0.0005 U	0.0005 U	4E-05 U	4E-05 U	19.7	19.1	0.0001 U	0.0001 U	0.000681	0.000715	0.0005 U	0.0005 U
MW-33	8/30/2019	WV33190830-	53.3	55.1	0.945	1	5E-05 U	5E-05 U	0.00613	0.00611	3.47	3.68	0.0005 U	0.0005 U	4E-05 U	4E-05 U	18.8	19.4	0.0001 U	0.0001 U	0.000708	0.000733 D	0.0005 U	0.0005 U
MW-33	11/6/2019	WV33191106-	55.7	53.6	0.944	0.938	5E-05 DU	5E-05 DU	0.00564	0.00559 D	3.79	3.48	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	19.4	18.8	0.0001 DU	0.0001 U	0.000695 D	0.000621	0.0005 U	0.000517
MW-35	2/27/2019	WV35190227-	39.9	39.7	2.39	2.47	5E-05 U	5E-05 U	0.00393	0.00514	3.19	3.27	0.0005 U	0.0005 U	4E-05 U	4E-05 U	15.2	15.4	0.0001 U	0.0001 U	0.00028	0.000793	0.00135 J	0.00396
MW-35	5/10/2019	WV35190510-	43.9	38.7	2.5	2.21	5E-05 U	5E-05 U	0.00373	0.00447	3.35	3.07	0.0005 U	0.0005 U	4E-05 U	4E-05 U	16.9	14.8	0.0001 U	0.0001 U	0.000445	0.000706	0.00286	0.00353
MW-35	8/30/2019	WV35190830-	41.9	44.7	2.29	2.44	5E-05 U	5E-05 U	0.00334	0.00527	3.12	3.44	0.0005 U	0.0005 U	4E-05 U	4E-05 U	15.5	16.6	0.0001 U	0.0001 U	0.000254	0.00138 D	0.00112	0.00918
MW-35	11/6/2019	WV35191106-	46.6	45.2	2.38	2.61	5E-05 DU	5E-05 DU	0.00344	0.00449 D	3.6	3.4	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	16.9	16.5	0.0001 DU	0.0001 U	0.000252 D	0.000831	0.000845	0.00405

Table H-5 (*continued*)
Groundwater - Metals (Dissolved & Total)

Well #	Sample Date	Sample ID	Antimony, Dissolved (mg/L)	Antimony, Total (mg/L)	Arsenic, Dissolved (mg/L)	Arsenic, Total (mg/L)	Barium, Dissolved (mg/L)	Barium, Total (mg/L)	Beryllium, Dissolved (mg/L)	Beryllium, Total (mg/L)	Cadmium, Dissolved (mg/L)	Cadmium, Total (mg/L)
			Channel Cc3									
MW-8	1/22/2019	WV8-190122-	0.0003 U	0.0003 U	0.000483	0.000493	0.0036	0.00371	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-8	5/7/2019	WV8-190507-	0.0003 U	0.0003 U	0.000496	0.000487	0.0037	0.00369	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-8	8/14/2019	WV8-190814-	0.0003 U	0.0003 U	0.000496	0.000508	0.00357	0.00348	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-8	8/14/2019	WV8-190814D	0.0003 U	0.0003 U	0.000516	0.000506	0.00365	0.00369	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-8	11/1/2019	WV8-191101-	0.0003 U	0.0003 U	0.000481	0.000472	0.00344	0.00344	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-36	1/23/2019	WV36190123-	0.0003 U	0.0003 U	0.00189	0.00178	0.00744	0.00726	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-36	1/23/2019	WV36190123D	0.0003 U	0.0003 U	0.00189	0.00181	0.00742	0.00742	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-36	5/7/2019	WV36190507-	0.0003 U	0.0003 U	0.00173	0.0017	0.00742	0.00827	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-36	8/29/2019	WV36190829-	0.0003 U	0.0003 U	0.0017	0.00174	0.00688	0.0076	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-36	11/5/2019	WV36191105-	0.0003 U	0.0003 U	0.00173	0.00175	0.00757	0.00713	0.0001 U	0.0001 U	5E-05 U	5E-05 U
			Unit D									
MW-7	1/23/2019	WV7-190123-	0.0003 U	0.0003 U	0.00512	0.00505	0.0131	0.0141	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-7	5/8/2019	WV7-190508-	0.0003 U	0.0003 U	0.00473	0.00499	0.0136	0.0163	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-7	8/29/2019	WV7-190829-	0.0003 U	0.0003 U	0.00475	0.00512	0.0126	0.0176	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-7	11/4/2019	WV7-191104-	0.0003 U	0.0003 U	0.00508	0.00526	0.0129	0.0139	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-12	1/24/2019	WV12190124-	0.0003 U	0.0003 U	0.00199	0.00205	0.00478	0.00483	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-12	5/7/2019	WV12190507-	0.0003 U	0.0003 U	0.00198	0.00205	0.0046	0.00505	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-12	8/15/2019	WV12190815-	0.0003 U	0.0003 U	0.00205	0.00209	0.00485	0.00483	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-12	11/4/2019	WV12191104-	0.0003 U	0.0003 U	0.00207	0.00209	0.00482	0.00457	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-19	1/28/2019	WV19190128-	0.0003 U	0.0003 U	0.00106	0.00135	0.0161	0.0178	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-19	5/8/2019	WV19190508-	0.0003 U	0.0003 U	0.00102	0.00154	0.0161	0.0233	0.0001 U	0.0001 U	5E-05 U	0.0000789
MW-19	8/14/2019	WV19190814-	0.0003 U	0.0003 U	0.00107	0.00137	0.0157	0.0175	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-19	11/4/2019	WV19191104-	0.0003 U	0.0003 U	0.00105	0.00147	0.0155	0.0175	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-26	1/24/2019	WV26190124-	0.0003 U	0.0003 U	0.00297	0.00455	0.00915	0.0165	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-26	5/10/2019	WV26190510-	0.0003 U	0.0003 U	0.0029	0.00617	0.00924	0.0235	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-26	8/30/2019	WV26190830-	0.0003 U	0.0003 U	0.00285	0.00345	0.00861	0.0115	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-26	11/5/2019	WV26191105-	0.0003 U	0.0003 U	0.00301	0.00527	0.00954	0.018	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-29	2/5/2018	WV29180205-	0.0003 U	0.0003 U	0.00402	0.00467	0.0106	0.0105	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-29	5/23/2018	WV29180523-	0.0003 U	0.0003 U	0.00405	0.00592	0.0109	0.0127	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-29	8/14/2018	WV29180814-	0.0003 U	0.0003 U	0.00418	0.00998	0.0107	0.0148	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-29	11/29/2018	WV29181129-	0.0003 U	0.0003 U	0.00391	0.00632	0.00982	0.0115	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-34	1/22/2019	WV34190122-	0.0003 U	0.0003 U	0.00133	0.00131	0.00439	0.00451	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-34	5/7/2019	WV34190507-	0.0003 U	0.0003 U	0.00131	0.00145	0.00424	0.0064	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-34	8/29/2019	WV34190829-	0.0003 U	0.0003 U	0.00128	0.00132	0.00427	0.00444	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-34	11/5/2019	WV34191105-	0.0003 U	0.0003 U	0.00133	0.00127	0.00467	0.00429	0.0001 U	0.0001 U	5E-05 U	5E-05 U
			Field Blank									
FIELD BLANK	3/20/2019	WV2-190320F	0.0003 U	0.0003 U	5E-05 U	5E-05 U	0.0005 U	0.0005 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U
FIELD BLANK	5/10/2019	WV2-190510F	0.0003 U	0.0003 U	5E-05 U	5E-05 U	0.0005 U	0.0005 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U
FIELD BLANK	8/16/2019	WV13190816F	0.0003 U	0.0003 U	5E-05 U	5E-05 U	0.0005 U	0.0005 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U
FIELD BLANK	8/30/2019	WV26190830F	0.0003 U	0.0003 U	5E-05 U	5E-05 U	0.0005 U	0.0005 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U
			Offsite Private Wells									
DW-85	1/29/2019	WV85190129-	0.0003 U	0.0003 U	0.000422	0.000449	0.00981	0.00982	0.0001 U	0.0001 U	5E-05 U	5E-05 U
DW-85	8/16/2019	WV85190816-	0.0003 U	0.0003 U	0.000454	0.00044	0.00984	0.00981	0.0001 U	0.0001 U	5E-05 U	5E-05 U
DW-PA	1/29/2019	WVPA190129-	0.0003 U	0.0003 U	0.00145	0.00144	0.00399	0.00413	0.0001 U	0.0001 U	5E-05 U	5E-05 U
DW-PA	8/16/2019	WVPA190816-	0.0003 U	0.0003 U	0.00154	0.00157	0.00386	0.00386	0.0001 U	0.0001 U	5E-05 U	5E-05 U

Well #	Sample Date	Sample ID	Calcium, Dissolved (mg/L)	Calcium, Total (mg/L)	Chromium, Dissolved (mg/L)	Chromium, Total (mg/L)	Cobalt, Dissolved (mg/L)	Cobalt, Total (mg/L)	Copper, Dissolved (mg/L)	Copper, Total (mg/L)	Iron, Dissolved (mg/L)	Iron, Total (mg/L)	Lead, Dissolved (mg/L)	Lead, Total (mg/L)
			Channel Cc3											
MW-8	1/22/2019	WV8-190122-	12.2	12.4	0.002	0.00216	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-8	5/7/2019	WV8-190507-	11.9	11.7	0.00222	0.00234	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-8	8/14/2019	WV8-190814-	11.3	11.3	0.00206	0.00201	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-8	8/14/2019	WV8-190814D	11.6	11.5	0.00209	0.00217	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-8	11/1/2019	WV8-191101-	12.2	11.9	0.00206	0.00203	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-36	1/23/2019	WV36190123-	14.5	14.5	0.000471	0.000561	5E-05 U	5E-05 U	0.000301	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-36	1/23/2019	WV36190123D	14.1	14.7	0.000467	0.000558	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-36	5/7/2019	WV36190507-	14.1	14.2	0.000605	0.000661	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-36	8/29/2019	WV36190829-	13.3	13.8	0.000563	0.000603	5E-05 U	0.0000539	0.000225	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-36	11/5/2019	WV36191105-	14.6	14.6	0.00061	0.000601	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
			Unit D											
MW-7	1/23/2019	WV7-190123-	16.8	16.4	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.0546	0.0001 U	0.0001 U
MW-7	5/8/2019	WV7-190508-	16.3	15.9	0.0002 U	0.0002 U	5E-05 U	0.0000848	0.0002 U	0.0002 U	0.0112	0.0641	0.0001 U	0.0001 U
MW-7	8/29/2019	WV7-190829-	15.1	15.7	0.0002 U	0.0002 U	5E-05 U	0.000133	0.0002 U	0.0002 U	0.01 U	0.0953	0.0001 U	0.0001 U
MW-7	11/4/2019	WV7-191104-	16.3	16.8	0.0002 U	0.000208	5E-05 U	0.000058	0.0002 U	0.0002 U	0.013	0.0948	0.0001 U	0.0001 U
MW-12	1/24/2019	WV12190124-	12.3	12.5	0.0034	0.00362	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-12	5/7/2019	WV12190507-	12.1	12.4	0.00377	0.00395	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.0118	0.0001 U	0.0001 U
MW-12	8/15/2019	WV12190815-	11.6	11.8	0.00375	0.00383	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-12	11/4/2019	WV12191104-	12.3	12.4	0.00382	0.00381	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.027	0.0001 U	0.0001 U
MW-19	1/28/2019	WV19190128-	15.5	15.7	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.000248	0.0002 U	0.0473	0.357	0.0001 U	0.0001 U
MW-19	5/8/2019	WV19190508-	15.5	15.8	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.00023	0.0514	0.587	0.0001 U	0.0001 U
MW-19	8/14/2019	WV19190814-	14.6	14.7	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0412	0.364	0.0001 U	0.0001 U
MW-19	11/4/2019	WV19191104-	15.5	16	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0445	0.529	0.0001 U	0.0001 U
MW-26	1/24/2019	WV26190124-	17.9	18.6	0.0002 U	0.000907	5E-05 U	0.000303	0.0002 U	0.000923	0.11	2.7	0.0001 U	0.000324
MW-26	5/10/2019	WV26190510-	18	18.1	0.0002 U	0.00105	5E-05 U	0.000362	0.0002 U	0.00137	0.168	5.24	0.0001 U	0.000471
MW-26	8/30/2019	WV26190830-	16.6	17.7	0.0002 U	0.000575	5E-05 U	0.000144	0.0002 U	0.000571	0.0968	0.946	0.0001 U	0.000154
MW-26	11/5/2019	WV26191105-	18.7	18.3	0.0002 U	0.000475	5E-05 U	0.000124	0.0002 U	0.00044	0.129	3.77	0.0001 U	0.000161
MW-29	2/5/2018	WV29180205-	20.9	21	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.808	1.19	0.0001 U	0.0001 U
MW-29	5/23/2018	WV29180523-	21.2	20.5	0.0002 U	0.000208	5E-05 U	0.0000508	0.0002 U	0.000288	0.823	1.72	0.0001 U	0.0001 U
MW-29	8/14/2018	WV29180814-	21	22	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.839	3.81	0.0001 U	0.0001 U
MW-29	11/29/2018	WV29181129-	20.3	20	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.823	1.82	0.0001 U	0.0001 U
MW-34	1/22/2019	WV34190122-	14.4	14.6	0.000976	0.00107	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-34	5/7/2019	WV34190507-	13.8	13.7	0.00106	0.00218	5E-05 U	0.000337	0.0002 U	0.000643	0.01 U	0.469	0.0001 U	0.000167
MW-34	8/29/2019	WV34190829-	13	13.7	0.00104	0.00114	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.0115	0.0001 U	0.0001 U
MW-34	11/5/2019	WV34191105-	14.6	14.4	0.00106	0.00104	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
			Field Blank											
FIELD BLANK	3/20/2019	WV2-190320F	0.05 U	0.05 U	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
FIELD BLANK	5/10/2019	WV2-190510F	0.05 U	0.05 U	0.0002 U	0.000258	5E-05 U	5E-05 U	0.0002 U	0.00026	0.01 U	0.01 U	0.0001 U	0.0001 U
FIELD BLANK	8/16/2019	WV13190816F	0.05 U	0.05 U	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.000243	0.01 U	0.01 U	0.0001 U	0.0001 U
FIELD BLANK	8/30/2019	WV26190830F	0.05 U	0.05 U	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
			Offsite Private Wells											
DW-85	1/29/2019	WV85190129-	14.5	14.5	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0107	0.0763	0.103	0.0001 U	0.000153
DW-85	8/16/2019	WV85190816-	13.4	13.7	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.000255	0.0626	0.0657	0.0001 U	0.0001 U
DW-PA	1/29/2019	WVPA190129-	13.4	13.7	0.00188	0.00189	5E-05 U	5E-05 U	0.0122	0.0108	0.01 U	0.0174	0.000871	0.00053
DW-PA	8/16/2019	WVPA190816-	12.7	12.7	0.00198	0.00199	5E-05 U	5E-05 U	0.00835	0.00806	0.01 U	0.0575	0.000224	0.000262

Table H-5 (*continued*)
Groundwater - Metals (Dissolved & Total)

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	Magnesium, Dissolved (mg/L)	Magnesium, Total (mg/L)	Manganese, Dissolved (mg/L)	Manganese, Total (mg/L)	Mercury, Dissolved (mg/L)	Mercury, Total (mg/L)	Nickel, Dissolved (mg/L)	Nickel, Total (mg/L)	Potassium, Dissolved (mg/L)	Potassium, Total (mg/L)	Selenium, Dissolved (mg/L)	Selenium, Total (mg/L)	Silver, Dissolved (mg/L)	Silver, Total (mg/L)	Sodium, Dissolved (mg/L)	Sodium, Total (mg/L)	Thallium, Dissolved (mg/L)	Thallium, Total (mg/L)	Vanadium, Dissolved (mg/L)	Vanadium, Total (mg/L)	Zinc, Dissolved (mg/L)	Zinc, Total (mg/L)
Channel Cc3																								
MW-8	1/22/2019	WV8-190122-	9.34	9.66	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.000574	0.000612	1.17	1.15	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.15	6.35	0.0001 U	0.0001 U	0.0025	0.00254	0.0005 U	0.0005 DU
MW-8	5/7/2019	WV8-190507-	9.64	9.47	0.0001 U	0.000201	5E-05 U	5E-05 U	0.000626	0.000701	1.16	1.14	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.59	6.3	0.0001 U	0.0001 U	0.00242	0.00252	0.000507	0.000559
MW-8	8/14/2019	WV8-190814-	8.93	9.19	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.000654	0.0006	1.09	1.09	0.0005 U	0.0005 DU	4E-05 U	4E-05 U	6.09	6.27	0.0001 U	0.0001 U	0.00256 D	0.0025	0.00102	0.00101
MW-8	8/14/2019	WV8-190814D	9	9.31	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.000596	0.000656	1.11	1.1	0.0005 U	0.0005 DU	4E-05 U	4E-05 U	6.22	6.44	0.0001 U	0.0001 U	0.00259 D	0.00258	0.0005 U	0.000685
MW-8	11/1/2019	WV8-191101-	9.58	9.54	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.000598	0.000657	1.16	1.14	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.33	6.51	0.0001 U	0.0001 U	0.00238 D	0.00237	0.0005 U	0.0005 U
MW-36	1/23/2019	WV36190123-	9.76	9.83	0.00158	0.00533	5E-05 U	5E-05 U	0.0001 U	0.000133	2.85	2.79	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.51	6.34	0.0001 U	0.0001 U	0.0019	0.0019	0.0005 U	0.0005 DU
MW-36	1/23/2019	WV36190123D	9.64	9.86	0.00154	0.00509	5E-05 U	5E-05 U	0.0001 U	0.000145	2.79	2.81	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.3	6.63	0.0001 U	0.0001 U	0.00181	0.0019	0.0005 U	0.0005 DU
MW-36	5/7/2019	WV36190507-	9.97	9.83	0.00127	0.00373	5E-05 U	5E-05 U	0.0001 U	0.000131	2.82	2.82	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.77	6.45	0.0001 U	0.0001 U	0.00181	0.00197	0.000612	0.00065
MW-36	8/29/2019	WV36190829-	9.13	9.64	0.00141	0.00864	5E-05 U	5E-05 U	0.0001 U	0.000135	2.59	2.73	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.13	6.47	0.0001 U	0.0001 U	0.00182	0.00191 D	0.0005 U	0.0005 U
MW-36	11/5/2019	WV36191105-	9.82	9.78	0.0009	0.00314	5E-05 DU	5E-05 DU	0.0001 U	0.000134 D	2.9	2.73	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	6.66	6.47	0.0001 DU	0.0001 U	0.00179 D	0.00193	0.0005 U	0.0005 U
Unit D																								
MW-7	1/23/2019	WV7-190123-	10.6	10.3	0.164	0.236	5E-05 U	5E-05 U	0.0001 U	0.000128	2.95	2.79	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.51	6.21	0.0001 U	0.0001 U	0.000197	0.000192	0.0005 U	0.000726 D
MW-7	5/8/2019	WV7-190508-	10.3	9.78	0.159	0.405	5E-05 U	5E-05 U	0.000126 J	0.000202	2.85	2.77	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.44	6.11	0.0001 U	0.0001 U	0.000124	0.000166	0.00055 J	0.00119
MW-7	8/29/2019	WV7-190829-	9.77	10.1	0.126	0.557	5E-05 U	5E-05 U	0.000111	0.000197	2.65	2.76	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.16	6.28	0.0001 U	0.0001 U	0.00023	0.000228 D	0.00132	0.00231
MW-7	11/4/2019	WV7-191104-	9.95	10.6	0.133	0.248	5E-05 U	5E-05 DU	0.0001 U	0.000239 D	2.83	2.87	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	6.23	6.6	0.0001 U	0.0001 U	0.000194 D	0.000142	0.000643	0.00173
MW-12	1/24/2019	WV12190124-	10.1	10.6	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.00018	0.000204	1.9	1.95	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.01	6.31	0.0001 U	0.0001 U	0.00521	0.00522	0.0005 U	0.0005 DU
MW-12	5/7/2019	WV12190507-	10.1	10.3	0.0001 U	0.000209	5E-05 U	5E-05 U	0.000189	0.000259	1.93	1.95	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.24	6.34	0.0001 U	0.0001 U	0.00511	0.00529	0.000537	0.000523
MW-12	8/15/2019	WV12190815-	9.45	9.63	0.0001 U	0.000123	5E-05 U	5E-05 U	0.000176	0.000204	1.83	1.83	0.0005 U	0.0005 DU	4E-05 U	4E-05 U	5.73	6.05	0.0001 U	0.0001 U	0.00525 D	0.0053	0.0005 U	0.0005 U
MW-12	11/4/2019	WV12191104-	9.74	10.2	0.0001 U	0.000401	5E-05 U	5E-05 DU	0.00013	0.000253 D	1.92	1.91	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	6.04	6.26	0.0001 U	0.0001 U	0.00514 D	0.00521	0.0005 U	0.0005 U
MW-19	1/28/2019	WV19190128-	14.4	14.7	0.51	0.578	5E-05 U	5E-05 U	0.000107	0.000106	2.62	2.64	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.96	7.11	0.0001 U	0.0001 U	0.000102 D	0.000106 D	0.00102	0.00149
MW-19	5/8/2019	WV19190508-	14.2	14.6	0.438	0.863	5E-05 U	5E-05 U	0.0001 U	0.000173	2.57	2.59	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.09	7.12	0.0001 U	0.0001 U	7.5E-05 U	0.000113	0.000803 J	0.00256
MW-19	8/14/2019	WV19190814-	13.5	13.8	0.481	0.544 D	5E-05 U	5E-05 U	0.0001 U	0.0001 U	2.38	2.37	0.0005 U	0.0005 DU	4E-05 U	4E-05 U	6.57	6.77	0.0001 U	0.0001 U	0.00014 D	0.000141	0.0005 U	0.00121
MW-19	11/4/2019	WV19191104-	14	14.3	0.494	0.691	5E-05 U	5E-05 DU	0.0001 U	0.000109 D	2.51	2.46	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	6.82	7.15	0.0001 U	0.0001 U	0.000146 D	0.0000866	0.0005 U	0.000711
MW-26	1/24/2019	WV26190124-	7.63	8.18	0.0678	0.0944	5E-05 U	5E-05 U	0.000137	0.00127	3.07	3.2	0.0005 U	0.0005 U	4E-05 U	4E-05 U	8.64	9.27	0.0001 U	0.0001 U	0.000143	0.00119	0.000528	0.033 D
MW-26	5/10/2019	WV26190510-	7.99	7.7	0.0679	0.112	5E-05 U	5E-05 U	0.000137	0.00133	3.17	3.06	0.0005 U	0.0005 U	4E-05 U	4E-05 U	9.37	8.75	0.0001 U	0.0001 U	0.000114	0.0011	0.000781	0.0404
MW-26	8/30/2019	WV26190830-	7.27	7.72	0.0617	0.076	5E-05 U	5E-05 U	0.00021	0.00065	2.99	3.13	0.0005 U	0.0005 U	4E-05 U	4E-05 U	8.64	8.93	0.0001 U	0.0001 U	0.00017	0.00057 D	0.000909	0.0328
MW-26	11/5/2019	WV26191105-	8.06	7.5	0.0686	0.103	5E-05 DU	5E-05 DU	0.000129	0.000567 D	3.29	3.06	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	9.4	8.84	0.0001 DU	0.0001 U	0.000116 D	0.000401	0.000556	0.0148
MW-29	2/5/2018	WV29180205-	15.4	15.1	0.0963	0.0967	5E-05 U	5E-05 U	0.0001 U	0.000126	2.3	2.18	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.13	6.87	0.0001 U	0.0001 U	7.5E-05 U	7.5E-05 U	0.00305	0.0005 U
MW-29	5/23/2018	WV29180523-	15.1	15.3	0.1	0.11	5E-05 U	5E-05 U	0.0001 U	0.00033	2.34	2.3	0.0005 U	0.0005 U	4E-05 DU	4E-05 U	7.14	7.1	0.0001 U	0.0001 U	0.000124	0.000397 D	0.0005 U	0.00124 D
MW-29	8/14/2018	WV29180814-	14.8	15.6	0.0989	0.131	5E-05 U	5E-05 U	0.000121	0.000285	2.23	2.27	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.81	7.1	0.0001 U	0.0001 U	0.000129 D	0.000322	0.000993	0.0011
MW-29	11/29/2018	WV29181129-	14.4	14.3	0.0889	0.0925	5E-05 U	5E-05 U	0.0001 U	0.000157	2.19	2.15	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.41	6.66	0.0001 U	0.0001 U	7.5E-05 U	0.000112	0.0005 U	0.0005 U
MW-34	1/22/2019	WV34190122-	12.6	12.7	0.000138	0.000249	5E-05 U	5E-05 U	0.00117	0.00122	1.62	1.61	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.72	6.73	0.0001 U	0.0001 U	0.00291	0.00284	0.000556	0.0005 DU
MW-34	5/7/2019	WV34190507-	12.5	12.3	0.00028	0.0156	5E-05 U	5E-05 U	0.00119	0.0026	1.58	1.57	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.96	6.78	0.0001 U	0.0001 U	0.00279	0.00347	0.00106	0.00383
MW-34	8/29/2019	WV34190829-	11.8	12.5	0.000228	0.000417	5E-05 U	5E-05 U	0.00129	0.0013	1.48	1.57	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.61	6.89	0.0001 U	0.0001 U	0.00276	0.00288 D	0.000958	0.000561
MW-34	11/5/2019	WV34191105-	12.8	12.3	0.000232	0.000218	5E-05 DU	5E-05 DU	0.00118	0.00115 D	1.68	1.56	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	7.18	6.77	0.0001 DU	0.0001 U	0.00264 D	0.00275	0.000668	0.0005 U
Field Blank																								
FIELD BLANK	3/20/2019	WV2-190320F	0.05 U	0.05 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.0001 U	0.0001 U	0.1 U	0.1 U	0.0005 U	0.0005 U	4E-05 U	4E-05 U	0.1 U	0.1 U	0.0001 U	0.0001 U	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U
FIELD BLANK	5/10/2019	WV2-190510F	0.05 U	0.05 U	0.0001 U	0.00011	5E-05 U	5E-05 U	0.0001 U	0.000168	0.1 U	0.1 U	0.0005 U	0.0005 U	4E-05 U	4E-05 U	0.1 U	0.1 U	0.0001 U	0.0001 U	7.5E-05 U	0.000106	0.0005 U	0.0005 U
FIELD BLANK	8/16/2019	WV13190816F	0.05 U	0.05 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.0001 U	0.0001 U	0.1 U	0.1 U	0.0005 U	0.0005 DU	4E-05 U	4E-05 U	0.1 U	0.1 U	0.0001 U	0.0001 U	7.5E-05 DU	7.5E-05 U	0.0005 U	0.0005 U
FIELD BLANK	8/30/2019	WV26190830F	0.05 U	0.05 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.0001 U	0.0001 U	0.1 U	0.1 U	0.0005 U	0.0005 U	4E-05 U	4E-05 U	0.1 U	0.1 U	0.0001 U	0.0001 U	0.000109	8.58E-05 D	0.0005 U	0.0005 U
Offsite Private Wells																								
DW-85	1/29/2019	WV85190129-	6.67	6.76	0.0547	0.0553	5E-05 U	5E-05 U	0.0001 U	0.0001 U	2.67	2.71	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.06	6.16	0.0001 U	0.0001 U	0.000159 D	0.000145 D	0.00067	0.0153
DW-85	8/16/2019	WV85190816-	6.23	6.46	0.0527	0.0549	5E-05 U	5E-05 U	0.0001 U	0.0001 U	2.44	2.48	0.0005 U	0.0005 DU	4E-05 U	4E-05 U	5.66	6.11	0.0001 U	0.0001 U	0.000177 D	0.000191	0.000786	0.00106
DW-PA	1/29/2019	WVPA190129-	11.3	11.6	0.000332	0.000284	5E-05 U	5E-05 U	0.00054	0.000512	1.63	1.65	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.77	6.86	0.0001 U	0.0001 U	0.00349 D	0.0033 D	0.0047	0.00291
DW-PA	8/16/2019	WVPA190816-	10.8	11.3	0.000455	0.000772	5E-05 U	5E-05 U	0.000514	0.000543	1.52	1.54	0.0005 U	0.0005 DU	4E-05 U	4E-05 U	6.33	6.78	0.0001 U	0.0001 U	0.00347 D	0.00367	0.00189	0.00206

** Water level was below pump - no sample collected.

Table H-6
Groundwater - Volatile Organic Compounds

Groundwater - VOAs Well #	CAS # Sample Date	Sample ID	1,1,1,2-Tetrachloro-ethane 630-20-6 (µg/L)	1,1,1-Trichloro-ethane 71-55-6 (µg/L)	1,1,2,2-Tetrachloro-ethane 79-34-5 (µg/L)	1,1,2-Trichloro-ethane 79-00-5 (µg/L)	1,1-Dichloro-ethane 75-34-3 (µg/L)	1,1-Dichloro-ethene 75-35-4 (µg/L)	1,2,3-Trichloro-propane 96-18-4 (µg/L)	1,2-Dibromo-3-Chloropro-pane 96-12-8 (µg/L)	1,2-Dibromo-ethane 106-93-4 (µg/L)	1,2-Dichloro-benzene 95-50-1 (µg/L)	1,2-Dichloro-ethane 107-06-2 (µg/L)	1,2-Dichloro-propane 78-87-5 (µg/L)	1,4-Dichloro-benzene 106-46-7 (µg/L)	2-Butanone 78-93-3 (µg/L)	2-Hexanone 591-78-6 (µg/L)	4-Methyl-2-Pentanone 108-10-1 (µg/L)	Acetone 67-64-1 (µg/L)	Acrylo-nitrile 107-13-1 (µg/L)	Benzene 71-43-2 (µg/L)	Bromochloro-methane 74-97-5 (µg/L)	Bromo-dichloro-methane 75-27-4 (µg/L)	Bromoform 75-25-2 (µg/L)	Bromo-methane 74-83-9 (µg/L)	Carbon Disulfide 75-15-0 (µg/L)	Carbon Tetra-chloride 56-23-5 (µg/L)
Channel Cc1																											
MW-3	1/24/2019	WV3-190124-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-3	5/7/2019	WV3-190507-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/27/2019	WV4-190227-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-4	5/8/2019	WV4-190508-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-4	11/4/2019	WV4-191104-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	1/23/2019	WV10190123-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-10	5/7/2019	WV10190507-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-10	8/30/2019	WV10190830-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-10	11/1/2019	WV10191101-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-13	1/23/2019	WV13190123-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-13	5/7/2019	WV13190507-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-13	5/7/2019	WV13190507D	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-13	8/16/2019	WV13190816-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-13	11/4/2019	WV13191104-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
Channel Cc2																											
MW-2	3/20/2019	WV2-190320-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-2	5/10/2019	WV2-190510-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-2	8/30/2019	WV2-190830-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-2	11/6/2019	WV2-191106-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-9	1/28/2019	WV9-190128-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-9	5/8/2019	WV9-190508-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-9	8/15/2019	WV9-190815-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-9	11/4/2019	WV9-191104-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-20	1/29/2019	WV20190129-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-20	5/10/2019	WV20190510-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-20	8/30/2019	WV20190830-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-20	11/6/2019	WV20191106-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-21	2/27/2019	WV21190227-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-21	5/10/2019	WV21190510-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-21	8/30/2019	WV21190830-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-21	11/6/2019	WV21191106-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-33	2/27/2019	WV33190227-	0.25 U	0.1 U	0.1 U	0.1 U	1.61	0.167 JT	0.1 U	2.5 U	0.1 U	0.1 U	0.123 JT	7.42	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	1.08	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-33	5/10/2019	WV33190510-	0.25 U	0.1 U	0.1 U	0.1 U	1.4	0.141 JT	0.1 U	2.5 U	0.1 U	0.1 U	0.113 JT	6.58	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.941	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-33	8/30/2019	WV33190830-	0.25 U	0.1 U	0.1 U	0.1 U	1.57	0.161 JT	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	7.41	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	1	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-33	11/6/2019	WV33191106-	0.25 U	0.1 U	0.1 U	0.1 U	1.67	0.174 JT	0.1 U	2.5 U	0.1 U	0.1 U	0.104 JT	8.09	0.1 U	0.25 U	0.5 U	2.5 U	2.5 U	0.035 U	1.06	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-35	2/27/2019	WV35190227-	0.25 U	0.1 U	0.1 U	0.1 U	0.297	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	1.33	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	1.17	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-35	5/10/2019	WV35190510-	0.25 U	0.1 U	0.1 U	0.1 U	0.29	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	1.14	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.974	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-35	8/30/2019	WV35190830-	0.25 U	0.1 U	0.1 U	0.1 U	0.333	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	1.12	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.932	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-35	11/6/2019	WV35191106-	0.25 U	0.1 U	0.1 U	0.1 U	0.309	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.888	0.1 U	0.25 U	0.5 U	2.5 U	2.5 U	0.035 U	0.769	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U

Table H-6 *(continued)*
Groundwater - Volatile Organic Compounds

Groundwater - VOAs Well #	CAS # Sample Date	Sample ID	Chloro-benzene 108-90-7 (µg/L)	Chloro-dibromo-methane 124-48-1 (µg/L)	Chloro-ethane 75-00-3 (µg/L)	Chloroform 67-66-3 (µg/L)	Chloro-methane 74-87-3 (µg/L)	Cis-1-2-Dichloro-ethene 156-59-2 (µg/L)	Cis-1,3-Dichloro-propene 10061-01-5 (µg/L)	Dibromo-methane 74-95-3 (µg/L)	Dichloro-difluoro-methane 75-71-8 (µg/L)	Ethyl-benzene 100-41-4 (µg/L)	M & P Xylene MPX (µg/L)	Methyl Iodide 74-88-4 (µg/L)	Methylene Chloride 75-09-2 (µg/L)	O-Xylene 95-47-6 (µg/L)	Styrene 100-42-5 (µg/L)	Tetra-chloroethene 127-18-4 (µg/L)	Toluene 108-88-3 (µg/L)	Trans-1-2-Dichloro-ethene 156-60-5 (µg/L)	Trans-1-3-Dichloro-propene 10061-02-6 (µg/L)	Trans-1-4-Dichloro-2-Butene 110-57-6 (µg/L)	Trichloro-ethene 79-01-6 (µg/L)	Trichloro-fluoro-methane 75-69-4 (µg/L)	Vinyl Acetate 108-05-4 (µg/L)	Vinyl Chloride 75-01-4 (µg/L)
															Channel Cc1											
MW-3	1/24/2019	WV3-190124-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.102 JT	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.287	0.1 U	0.01 U
MW-3	5/7/2019	WV3-190507-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/27/2019	WV4-190227-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.126 JT	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-4	5/8/2019	WV4-190508-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.131 JT	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-4	11/4/2019	WV4-191104-	0.1 U	0.5 U	0.1 U	0.189 JT	0.25 U	0.106 JT	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	1/23/2019	WV10190123-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-10	5/7/2019	WV10190507-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-10	8/30/2019	WV10190830-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-10	11/1/2019	WV10191101-	0.1 U	0.5 U	0.1 U	0.169 JT	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-13	1/23/2019	WV13190123-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-13	5/7/2019	WV13190507-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-13	5/7/2019	WV13190507D	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-13	8/16/2019	WV13190816-	0.1 U	0.5 U	0.1 U	0.127 JT	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-13	11/4/2019	WV13191104-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
															Channel Cc2											
MW-2	3/20/2019	WV2-190320-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.294	0.25 U	0.1 U	2.45	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.481	0.1 U	0.0834
MW-2	5/10/2019	WV2-190510-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.247	0.25 U	0.1 U	2.79	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.469	0.1 U	0.132 D
MW-2	8/30/2019	WV2-190830-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.273	0.25 U	0.1 U	3.15	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.573	0.1 U	0.113
MW-2	11/6/2019	WV2-191106-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.105 JT	0.25 U	0.1 U	4.33	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.968	0.1 U	0.0549 D
MW-9	1/28/2019	WV9-190128-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-9	5/8/2019	WV9-190508-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-9	8/15/2019	WV9-190815-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-9	11/4/2019	WV9-191104-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-20	1/29/2019	WV20190129-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.359	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-20	5/10/2019	WV20190510-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.286	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-20	8/30/2019	WV20190830-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.34	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-20	11/6/2019	WV20191106-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.342	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-21	2/27/2019	WV21190227-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.823	0.25 U	0.1 U	1.01	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.109 JT	0.5 U	5 U	0.1 U	0.456	0.1 U	0.0557
MW-21	5/10/2019	WV21190510-	0.1 U	0.5 U	0.1 U	0.1 U	0.303 JT	0.733	0.25 U	0.1 U	1.22	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.475	0.1 U	0.0681 D
MW-21	8/30/2019	WV21190830-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.665	0.25 U	0.1 U	1.82	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.595	0.1 U	0.0708
MW-21	11/6/2019	WV21191106-	0.1 U	0.5 U	0.1 U	0.1 U	0.321 JT	0.629	0.25 U	0.1 U	2.19	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.923	0.1 U	0.084 D
MW-33	2/27/2019	WV33190227-	0.1 U	0.5 U	0.533	0.1 U	0.25 U	28.6	0.25 U	0.1 U	4.37	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.706	0.5 U	5 U	0.148 JT	0.1 U	0.1 U	34.1
MW-33	5/10/2019	WV33190510-	0.1 U	0.5 U	0.44	0.1 U	0.25 U	27.1	0.25 U	0.1 U	4.84	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.636	0.5 U	5 U	0.1 U	0.1 U	0.1 U	31.3 D
MW-33	8/30/2019	WV33190830-	0.1 U	0.5 U	0.41	0.1 U	0.25 U	31	0.25 U	0.1 U	5.73	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.678	0.5 U	5 U	0.143 JT	0.1 U	0.1 U	30.4
MW-33	11/6/2019	WV33191106-	0.1 U	0.5 U	0.358	0.1 U	0.25 U	33.1	0.25 U	0.1 U	5.29	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.733	0.5 U	0.5 U	0.146 JT	0.1 U	0.1 U	30.5 D
MW-35	2/27/2019	WV35190227-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	9.88	0.25 U	0.1 U	0.434	0.1 U	0.1 U	0.1 U	2.5 U	0.131 JT	0.1 U	0.1 U	0.1 U	0.38	0.5 U	5 U	1.22	0.1 U	0.1 U	4
MW-35	5/10/2019	WV35190510-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	10.2	0.25 U	0.1 U	0.476	0.1 U	0.1 U	0.1 U	2.5 U	0.124 JT	0.1 U	0.1 U	0.1 U	0.322	0.5 U	5 U	0.969	0.1 U	0.1 U	4.15
MW-35	8/30/2019	WV35190830-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	10.7	0.25 U	0.1 U	0.745	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.319	0.5 U	5 U	1.01	0.1 U	0.1 U	4.83
MW-35	11/6/2019	WV35191106-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	9.31	0.25 U	0.1 U	0.749	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.282	0.5 U	0.5 U	0.928	0.1 U	0.1 U	5.41 D

Table H-6 *(continued)*
Groundwater - Volatile Organic Compounds

Groundwater - VOAs Well #	CAS # Sample Date	Sample ID	1,1,1,2-Tetrachloro-ethane 630-20-6 (µg/L)	1,1,1-Trichloro-ethane 71-55-6 (µg/L)	1,1,2,2-Tetrachloro-ethane 79-34-5 (µg/L)	1,1,2-Trichloro-ethane 79-00-5 (µg/L)	1,1-Dichloro-ethane 75-34-3 (µg/L)	1,1-Dichloro-ethene 75-35-4 (µg/L)	1,2,3-Trichloro-propane 96-18-4 (µg/L)	1,2-Dibromo-3-Chloropro-pane 96-12-8 (µg/L)	1,2-Dibromo-ethane 106-93-4 (µg/L)	1,2-Dichloro-benzene 95-50-1 (µg/L)	1,2-Dichloro-ethane 107-06-2 (µg/L)	1,2-Dichloro-propane 78-87-5 (µg/L)	1,4-Dichloro-benzene 106-46-7 (µg/L)	2-Butanone 78-93-3 (µg/L)	2-Hexanone 591-78-6 (µg/L)	4-Methyl-2-Pentanone 108-10-1 (µg/L)	Acetone 67-64-1 (µg/L)	Acrylo-nitrile 107-13-1 (µg/L)	Benzene 71-43-2 (µg/L)	Bromochloro-methane 74-97-5 (µg/L)	Bromo-dichloro-methane 75-27-4 (µg/L)	Bromoform 75-25-2 (µg/L)	Bromo-methane 74-83-9 (µg/L)	Carbon Disulfide 75-15-0 (µg/L)	Carbon Tetra-chloride 56-23-5 (µg/L)
Channel Cc3																											
MW-8	1/22/2019	WV8-190122-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-8	5/7/2019	WV8-190507-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-8	8/14/2019	WV8-190814-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-8	8/14/2019	WV8-190814D	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-8	11/1/2019	WV8-191101-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-36	1/23/2019	WV36190123-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-36	1/23/2019	WV36190123D	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-36	5/7/2019	WV36190507-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.104 JT	0.25 U
MW-36	8/29/2019	WV36190829-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-36	11/5/2019	WV36191105-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
Unit D																											
MW-7	1/23/2019	WV7-190123-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-7	5/8/2019	WV7-190508-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-7	8/29/2019	WV7-190829-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-7	11/4/2019	WV7-191104-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-12	1/24/2019	WV12190124-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-12	5/7/2019	WV12190507-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-12	8/15/2019	WV12190815-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-12	11/4/2019	WV12191104-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-19	1/28/2019	WV19190128-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-19	5/8/2019	WV19190508-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-19	8/14/2019	WV19190814-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	3.33 JT	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-19	11/4/2019	WV19191104-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-26	1/24/2019	WV26190124-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-26	5/10/2019	WV26190510-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-26	8/30/2019	WV26190830-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-26	11/5/2019	WV26191105-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-29	1/28/2019	WV29190128-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-29	5/10/2019	WV29190510-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1.57 JT	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-29	8/29/2019	WV29190829-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-29	11/4/2019	WV29191104-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-34	1/22/2019	WV34190122-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-34	5/7/2019	WV34190507-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-34	8/29/2019	WV34190829-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
MW-34	11/5/2019	WV34191105-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
Field Blank																											
FIELD BLANK	3/20/2019	WV2-190320F	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1.68 JT	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
FIELD BLANK	5/10/2019	WV2-190510F	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	6.56	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
FIELD BLANK	8/16/2019	WV13190816F	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	4.07 JT	0.5 U	2.5 U	6.15	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
FIELD BLANK	8/30/2019	WV26190830F	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.54 JT	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
Offsite Private Wells																											
DW-85	1/29/2019	WV85190129-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
DW-85	8/16/2019	WV85190816-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
DW-PA	1/29/2019	WVPA190129-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
DW-PA	8/16/2019	WVPA190816-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U

Table H-6 *(continued)*
Groundwater - Volatile Organic Compounds

Groundwater - VOAs Well #	CAS # Sample Date	Sample ID	Chloro-benzene 108-90-7 (µg/L)	Chloro-dibromo-methane 124-48-1 (µg/L)	Chloro-ethane 75-00-3 (µg/L)	Chloroform 67-66-3 (µg/L)	Chloro-methane 74-87-3 (µg/L)	Cis-1-2-Dichloro-ethene 156-59-2 (µg/L)	Cis-1,3-Dichloro-propene 10061-01-5 (µg/L)	Dibromo-methane 74-95-3 (µg/L)	Dichloro-difluoro-methane 75-71-8 (µg/L)	Ethyl-benzene 100-41-4 (µg/L)	M & P Xylene MPX (µg/L)	Methyl Iodide 74-88-4 (µg/L)	Methylene Chloride 75-09-2 (µg/L)	O-Xylene 95-47-6 (µg/L)	Styrene 100-42-5 (µg/L)	Tetra-chloroethene 127-18-4 (µg/L)	Toluene 108-88-3 (µg/L)	Trans-1-2-Dichloro-ethene 156-60-5 (µg/L)	Trans-1-3-Dichloro-propene 10061-02-6 (µg/L)	Trans-1-4-Dichloro-2-Butene 110-57-6 (µg/L)	Trichloro-ethene 79-01-6 (µg/L)	Trichloro-fluoro-methane 75-69-4 (µg/L)	Vinyl Acetate 108-05-4 (µg/L)	Vinyl Chloride 75-01-4 (µg/L)
Channel Cc3																										
MW-8	1/22/2019	WV8-190122-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-8	5/7/2019	WV8-190507-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-8	8/14/2019	WV8-190814-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-8	8/14/2019	WV8-190814D	0.1 U	0.5 U	0.1 U	0.114 JT	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-8	11/1/2019	WV8-191101-	0.1 U	0.5 U	0.1 U	0.134 JT	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-36	1/23/2019	WV36190123-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-36	1/23/2019	WV36190123D	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-36	5/7/2019	WV36190507-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-36	8/29/2019	WV36190829-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-36	11/5/2019	WV36191105-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
Unit D																										
MW-7	1/23/2019	WV7-190123-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-7	5/8/2019	WV7-190508-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-7	8/29/2019	WV7-190829-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-7	11/4/2019	WV7-191104-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-12	1/24/2019	WV12190124-	0.1 U	0.5 U	0.1 U	0.1 U	0.274 JT	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-12	5/7/2019	WV12190507-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-12	8/15/2019	WV12190815-	0.1 U	0.5 U	0.1 U	0.102 JT	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-12	11/4/2019	WV12191104-	0.1 U	0.5 U	0.1 U	0.221	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-19	1/28/2019	WV19190128-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-19	5/8/2019	WV19190508-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.0101 DJT
MW-19	8/14/2019	WV19190814-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-19	11/4/2019	WV19191104-	0.1 U	0.5 U	0.1 U	0.158 JT	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-26	1/24/2019	WV26190124-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-26	5/10/2019	WV26190510-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-26	8/30/2019	WV26190830-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-26	11/5/2019	WV26191105-	0.1 U	0.5 U	0.1 U	0.107 JT	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-29	1/28/2019	WV29190128-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-29	5/10/2019	WV29190510-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-29	8/29/2019	WV29190829-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-29	11/4/2019	WV29191104-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-34	1/22/2019	WV34190122-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-34	5/7/2019	WV34190507-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-34	8/29/2019	WV34190829-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
MW-34	11/5/2019	WV34191105-	0.1 U	0.5 U	0.1 U	0.108 JT	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
Field Blank																										
FIELD BLANK	3/20/2019	WV2-190320F	0.1 U	0.5 U	0.1 U	0.767	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
FIELD BLANK	5/10/2019	WV2-190510F	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
FIELD BLANK	8/16/2019	WV13190816F	0.1 U	0.5 U	0.1 U	0.134 JT	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.245	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
FIELD BLANK	8/30/2019	WV26190830F	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.165 JT	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
Offsite Private Wells																										
DW-85	1/29/2019	WV85190129-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
DW-85	8/16/2019	WV85190816-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
DW-PA	1/29/2019	WVPA190129-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
DW-PA	8/16/2019	WVPA190816-	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U

** Water level was below pump - no sample collected.

Table H-6b
Groundwater - Dissolved Gases

Groundwater - Dissolved Gas Analytes			ETHANE	ETHYLENE	METHANE
		CAS #	74-84-0	74-85-1	74-82-8
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)
MW-3	5/7/2019	WV3-190507-	0.1 Un	0.1 Un	0.5 Un
**MW-3	--	--	--	--	--
**MW-3	--	--	--	--	--
MW-4	5/8/2019	WV4-190508-	0.1 Un	0.02 Jn	0.069 Jn
**MW-4	--	--	--	--	--
MW-4	11/4/2019	WV4-191104-	0.1 Un	0.1 Un	0.5 Un
MW-10	5/7/2019	WV10190507-	0.1 Un	0.0085 Jn	0.5 Un
MW-10	8/30/2019	WV10190830-	0.1 Un	0.1 Un	0.5 Un
MW-10	11/1/2019	WV10191101-	0.1 Un	0.1 Un	0.5 Un
MW-13	5/7/2019	WV13190507-	0.1 Un	0.1 Un	0.057 Jn
MW-13	5/7/2019	WV13190507D	0.1 Un	0.01 Jn	0.15 Jn
MW-13	8/16/2019	WV13190816-	0.1 Un	0.1 Un	0.054 Jn
MW-13	11/4/2019	WV13191104-	0.1 Un	0.1 Un	0.5 Un
MW-2	5/10/2019	WV2-190510-	0.023 Jn	0.037 Jn	2.9 n
MW-2	8/30/2019	WV2-190830-	0.018 Jn	0.026 Jn	3 n
MW-2	11/6/2019	WV2-191106-	0.01 Jn	0.01 Jn	0.86 n
MW-2	11/6/2019	WV2-191106D	0.1 Un	0.0096 Jn	0.85 n
MW-9	5/8/2019	WV9-190508-	0.1 Un	0.1 Un	0.5 Un
MW-9	8/15/2019	WV9-190815-	0.1 Un	0.1 Un	0.5 Un
MW-9	11/4/2019	WV9-191104-	0.1 Un	0.1 Un	0.5 Un
MW-20	5/10/2019	WV20190510-	0.0086 Jn	0.0075 Jn	0.62 n
MW-20	8/30/2019	WV20190830-	0.1 Un	0.1 Un	0.23 Jn
MW-20	11/6/2019	WV20191106-	0.1 Un	0.1 Un	0.22 Jn
MW-21	5/10/2019	WV21190510-	0.012 Jn	0.0073 Jn	3.4 n
MW-21	8/30/2019	WV21190830-	0.012 Jn	0.014 Jn	2.6 n
MW-21	11/6/2019	WV21191106-	0.011 Jn	0.1 Un	2.1 n
MW-33	5/10/2019	WV33190510-	0.14 n	0.77 n	720 n
MW-33	8/30/2019	WV33190830-	0.12 n	0.71 n	550 n
MW-33	11/6/2019	WV33191106-	0.095 Jn	0.58 n	440 n
MW-35	5/10/2019	WV35190510-	0.057 Jn	0.2 n	280 n
MW-35	8/30/2019	WV35190830-	0.067 Jn	0.22 n	320 n
MW-35	11/6/2019	WV35191106-	0.058 Jn	0.2 n	260 n
MW-7	5/8/2019	WV7-190508-	0.1 Un	0.1 Un	0.69 n
MW-7	8/29/2019	WV7-190829-	0.1 Un	0.1 Un	0.63 n
MW-7	11/4/2019	WV7-191104-	0.1 Un	0.1 Un	0.74 n
MW-12	5/7/2019	WV12190507-	0.1 Un	0.1 Un	0.5 Un
MW-12	8/15/2019	WV12190815-	0.1 Un	0.1 Un	0.5 Un
MW-12	11/4/2019	WV12191104-	0.1 Un	0.1 Un	0.5 Un
MW-19	5/8/2019	WV19190508-	0.1 Un	0.1 Un	0.23 Jn
MW-19	8/14/2019	WV19190814-	0.1 Un	0.1 Un	0.22 Jn
MW-19	11/4/2019	WV19191104-	0.1 Un	0.1 Un	0.36 Jn
MW-26	5/10/2019	WV26190510-	0.0074 Jn	0.1 Un	7.5 n
MW-26	8/30/2019	WV26190830-	0.0078 Jn	0.013 Jn	7.1 n
MW-26	11/5/2019	WV26191105-	0.0078 Jn	0.1 Un	8.6 n
MW-29	5/10/2019	WV29190510-	0.1 Un	0.0081 Jn	0.19 Jn
MW-29	8/29/2019	WV29190829-	0.1 Un	0.1 Un	0.22 Jn
MW-29	11/4/2019	WV29191104-	0.1 Un	0.1 Un	0.19 Jn
MW-34	5/7/2019	WV34190507-	0.1 Un	0.011 Jn	0.5 Un
MW-34	8/29/2019	WV34190829-	0.1 Un	0.1 Un	0.5 Un
MW-34	11/5/2019	WV34191105-	0.1 Un	0.1 Un	0.046 Jn
MW-8	5/7/2019	WV8-190507-	0.1 Un	0.1 Un	0.5 Un
MW-8	8/14/2019	WV8-190814-	0.1 Un	0.1 Un	0.5 Un
MW-8	8/14/2019	WV8-190814D	0.1 Un	0.1 Un	0.5 Un
MW-8	11/1/2019	WV8-191101-	0.1 Un	0.1 Un	0.5 Un
MW-36	5/7/2019	WV36190507-	0.1 Un	0.013 Jn	0.16 Jn
MW-36	8/29/2019	WV36190829-	0.1 Un	0.1 Un	0.14 Jn
MW-36	11/5/2019	WV36191105-	0.1 Un	0.1 Un	0.16 Jn
FIELD BLANK	8/16/2019	WV13190816F	0.1 Un	0.011 Jn	0.2 Jn
FIELD BLANK	8/29/2019	WV26190830F	0.1 Un	0.1 Un	0.29 Jn
FIELD BLANK	5/10/2019	WV2-190510F	0.013 Jn	0.018 Jn	0.28 Jn

Note:
ANALYTICAL RESULTS LAB QUALIFIERS (Pace Analytical Energy Services LLC)
U - Indicates the compound was analyzed for, but not detected at or above the noted concentration.
J - Estimated concentration greater than the set method detection limit (MDL) and less than the set reporting limit (PQL).
n - The laboratory does not hold NELAP/TNI accreditation for this method or analyte.
** Water level was below pump - no sample collected.

Table H-7
Groundwater - VOA Trip Blanks

Groundwater VTRPs			1,1,1,2-Tetrachloro-ethane	1,1,1-Trichloro-ethane	1,1,2,2-Tetrachloro-ethane	1,1,2-Trichloro-ethane	1,1-Dichloro-ethane	1,1-Dichloro-ethene	1,2,3-Trichloro-propane	1,2-Dibromo-3-Chloro-propane	1,2-Dibromo-ethane	1,2-Dichloro-benzene	1,2-Dichloro-ethane	1,2-Dichloro-propane	1,4-Dichloro-benzene	2-Butanone	2-Hexanone	4-Methyl-2-Pentanone	Acetone	Acrylonitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Bromo-methane	Carbon Disulfide	Carbon Tetrachloride
		CAS #	630-20-6	71-55-6	79-34-5	79-00-5	75-34-3	75-35-4	96-18-4	96-12-8	106-93-4	95-50-1	107-06-2	78-87-5	106-46-7	78-93-3	591-78-6	108-10-1	67-64-1	107-13-1	71-43-2	74-97-5	75-27-4	75-25-2	74-83-9	75-15-0	56-23-5
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
VOA TRIP BLANK	1/18/2019	VTRP190122Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	1/18/2019	VTRP190123Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	1/22/2019	VTRP190124X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	1/23/2019	VTRP190129X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	1/24/2019	VTRP190128X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	2/25/2019	VTRP190227X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	2/25/2019	VTRP190227Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	3/19/2019	VTRP190320Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	3/19/2019	VTRP190320Y3	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	5/2/2019	VTRP190507Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	5/2/2019	VTRP190507Z	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	5/6/2019	VTRP190507X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	4.46 JT	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	5/7/2019	VTRP190508X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	5/7/2019	VTRP190508Z	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	5/9/2019	VTRP190510X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	5/9/2019	VTRP190510Z	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	6/17/2019	VTRP190618Y2	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	8/12/2019	VTRP190814Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	8/12/2019	VTRP190814Z	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	8/14/2019	VTRP190815Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	8/15/2019	VTRP190816Z	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	8/28/2019	VTRP190829X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	8/29/2019	VTRP190829Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	8/29/2019	VTRP190829Y2	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	8/29/2019	VTRP190830X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	8/29/2019	VTRP190830Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	8/30/2019	VTRP190830Z	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	10/28/2019	VTRP191101Z	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	10/30/2019	VTRP191101X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	11/1/2019	VTRP191104X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	11/1/2019	VTRP191104Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	11/1/2019	VTRP191104Z	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	11/4/2019	VTRP191105X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	11/4/2019	VTRP191105Z	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	11/4/2019	VTRP191106X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	11/4/2019	VTRP191106Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	11/4/2019	VTRP191106Z	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U

Table H-7 *(continued)*
Groundwater - VOA Trip Blanks

Groundwater VTRPs			Chloro-benzene	Chloro-dibromo-methane	Chloro-ethane	Chloroform	Chloro-methane	Cis-1-2-Dichloro-ethene	Cis-1,3-Dichloro-propene	Dibromo-methane	Dichloro-difluoro-methane	Ethylbenzene	M & P Xylene	Methyl Iodide	Methylene Chloride	O-Xylene	Styrene	Tetrachloro-ethene	Toluene	Trans-1-2-Dichloro-ethene	Trans-1-3-Dichloro-propene	Trans-1-4-Dichloro-2-Butene	Trichloro-ethene	Trichloro-fluoro-methane	Vinyl Acetate	Vinyl Chloride
		CAS #	108-90-7	124-48-1	75-00-3	67-66-3	74-87-3	156-59-2	10061-01-5	74-95-3	75-71-8	100-41-4	MPX	74-88-4	75-09-2	95-47-6	100-42-5	127-18-4	108-88-3	156-60-5	10061-02-6	110-57-6	79-01-6	75-69-4	108-05-4	75-01-4
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
VOA TRIP BLANK	1/18/2019	VTRP190122Y	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	1/18/2019	VTRP190123Y	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	1/22/2019	VTRP190124X	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	1/23/2019	VTRP190129X	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	1/24/2019	VTRP190128X	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	2/25/2019	VTRP190227X	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	2/25/2019	VTRP190227Y	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	3/19/2019	VTRP190320Y	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	3/19/2019	VTRP190320Y3	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	5/2/2019	VTRP190507Y	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	5/2/2019	VTRP190507Z	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	5/6/2019	VTRP190507X	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	5/7/2019	VTRP190508X	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	5/7/2019	VTRP190508Z	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	5/9/2019	VTRP190510X	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	5/9/2019	VTRP190510Z	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	6/17/2019	VTRP190618Y2	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/12/2019	VTRP190814Y	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/12/2019	VTRP190814Z	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/14/2019	VTRP190815Y	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/15/2019	VTRP190816Z	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/28/2019	VTRP190829X	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	8/29/2019	VTRP190829Y	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	8/29/2019	VTRP190829Y2	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	8/29/2019	VTRP190830X	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/29/2019	VTRP190830Y	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/30/2019	VTRP190830Z	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	10/28/2019	VTRP191101Z	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	10/30/2019	VTRP191101X	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	11/1/2019	VTRP191104X	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	11/1/2019	VTRP191104Y	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	11/1/2019	VTRP191104Z	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	11/4/2019	VTRP191105X	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	11/4/2019	VTRP191105Z	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	11/4/2019	VTRP191106X	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	11/4/2019	VTRP191106Y	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	11/4/2019	VTRP191106Z	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.01 DU

Table H-8
Groundwater - Appendix III Analytes

Groundwater - Metals (Dissolved & Total)

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	TIN Dissolved (mg/L)	TIN Total (mg/L)
			Channel Cc2	
MW-2	11/6/2019	WV2-191106-	0.0005 U	0.0005 U
MW-2	11/6/2019	WV2-191106D	0.0005 U	0.0005 U
MW-20	11/6/2019	WV20191106-	0.0005 U	0.0005 U
MW-21	11/6/2019	WV21191106-	0.0005 U	0.0005 U
MW-33	11/6/2019	WV33191106-	0.0005 U	0.0005 U
MW-35	11/6/2019	WV35191106-	0.0005 U	0.0005 U

Groundwater - Volatile Organic Compounds

Groundwater - VOCs CAS # Well #	Sample Date	Sample ID	1,1-Dichloropropene 563-58-6 (µg/L)	1,3-Dichlorobenzene 541-73-1 (µg/L)	1,3-Dichloropropane 142-28-9 (µg/L)	2,2-Dichloropropane 594-20-7 (µg/L)	2-Methyl-1-Propanol 78-83-1 (µg/L)	3-Chloropropene 107-05-1 (µg/L)	Acetonitrile 75-05-8 (µg/L)	Acrolein 107-02-8 (µg/L)	Chloroprene 126-99-8 (µg/L)	Methyl Methacrylate 80-62-6 (µg/L)	Methylacrylonitrile 126-98-7 (µg/L)	Propionitrile 107-12-0 (µg/L)
										Channel Cc2				
MW-2	11/6/2019	WV2-191106-	0.1 U	0.1 U	0.1 U	0.1 U	10 U	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U
MW-2	11/6/2019	WV2-191106D	0.1 U	0.1 U	0.1 U	0.1 U	10 U	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U
MW-20	11/6/2019	WV20191106-	0.1 U	0.1 U	0.1 U	0.1 U	10 U	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U
MW-21	11/6/2019	WV21191106-	0.1 U	0.1 U	0.1 U	0.1 U	10 U	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U
MW-33	11/6/2019	WV33191106-	0.1 U	0.1 U	0.1 U	0.1 U	10 U	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U
MW-35	11/6/2019	WV35191106-	0.1 U	0.1 U	0.1 U	0.1 U	10 U	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U

Groundwater - VOC Trip Blanks

Groundwater VTRPs CAS # Site ID	Sample Date	Sample ID	1,1-Dichloropropene 563-58-6 (µg/L)	1,3-Dichlorobenzene 541-73-1 (µg/L)	1,3-Dichloropropane 142-28-9 (µg/L)	2,2-Dichloropropane 594-20-7 (µg/L)	2-Methyl-1-Propanol 78-83-1 (µg/L)	3-Chloropropene 107-05-1 (µg/L)	Acetonitrile 75-05-8 (µg/L)	Acrolein 107-02-8 (µg/L)	Chloroprene 126-99-8 (µg/L)	Methyl Methacrylate 80-62-6 (µg/L)	Methylacrylonitrile 126-98-7 (µg/L)	Propionitrile 107-12-0 (µg/L)
VOA TRIP BLANK	11/4/2019	VTRP191106X	0.1 U	0.1 U	0.1 U	0.1 U	10 U	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U
VOA TRIP BLANK	11/4/2019	VTRP191106Y	0.1 U	0.1 U	0.1 U	0.1 U	10 U	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U
VOA TRIP BLANK	11/4/2019	VTRP191106Z	0.1 U	0.1 U	0.1 U	0.1 U	10 U	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U

Table H-8 (*continued*)
Groundwater - Appendix III Analytes

Groundwater - Semi-Volatile Organic Compounds

Groundwater - SemiVOCs CAS # Site ID	Sample Date	Sample ID	1,2,4-Trichlorobenzene 120-82-1 (µg/L)	1,2-Dichlorobenzene 95-50-1 (µg/L)	1,2-Diphenylhydrazine 122-66-7 (µg/L)	1,3-Dichlorobenzene 541-73-1 (µg/L)	1,4-Dichlorobenzene 106-46-7 (µg/L)	2,2-Oxybis (1-Chloropropane) 108-60-1 (µg/L)	2,4,5-Trichlorophenol 95-95-4 (µg/L)	2,4,6-Trichlorophenol 88-06-2 (µg/L)	2,4-Dichlorophenol 120-83-2 (µg/L)	2,4-Dimethylphenol 105-67-9 (µg/L)	2,4-Dinitrophenol 51-28-5 (µg/L)	2,4-Dinitrotoluene 121-14-2 (µg/L)	2,6-Dinitrotoluene 606-20-2 (µg/L)	2-Chloronaphthalene 91-58-7 (µg/L)	2-Chlorophenol 95-57-8 (µg/L)	2-Methylnaphthalene 91-57-6 (µg/L)	2-Methylphenol 95-48-7 (µg/L)
										Channel Cc2									
MW-2	11/6/2019	WV2-191106-	0.495 U	0.1 U	0.198 U	0.1 U	0.1 U	0.495 U	0.99 U	0.99 U	0.495 U	1.98 U	9.9 U	0.99 U	0.99 GU	0.495 U	0.495 U	0.0236 U	0.495 U
MW-2	11/6/2019	WV2-191106D	0.505 U	0.1 U	0.202 U	0.1 U	0.1 U	0.505 U	1.01 U	1.01 U	0.505 U	2.02 U	10.1 U	1.01 U	1.01 GU	0.505 U	0.505 U	0.026 U	0.505 U
MW-20	11/6/2019	WV20191106-	0.476 U	0.1 U	0.19 U	0.1 U	0.1 U	0.476 U	0.952 U	0.952 U	0.476 U	1.9 U	9.52 U	0.952 U	0.952 GU	0.476 U	0.476 U	0.0238 U	0.476 U
MW-21	11/6/2019	WV21191106-	0.476 U	0.1 U	0.19 U	0.1 U	0.1 U	0.476 U	0.952 U	0.952 U	0.476 U	1.9 U	9.52 U	0.952 U	0.952 GU	0.476 U	0.476 U	0.0236 U	0.476 U
MW-33	11/6/2019	WV33191106-	0.476 U	0.1 U	0.19 U	0.1 U	0.1 U	0.476 U	0.952 U	0.952 U	0.476 U	1.9 U	9.52 U	0.952 U	0.952 GU	0.476 U	0.476 U	0.024 U	0.476 U
MW-35	11/6/2019	WV35191106-	0.5 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	1 U	1 U	0.5 U	2 U	10 U	1 U	1 GU	0.5 U	0.5 U	0.025 U	0.5 U

Groundwater - SemiVOCs CAS # Site ID	Sample Date	Sample ID	2-Nitroaniline 88-74-4 (µg/L)	2-Nitrophenol 88-75-5 (µg/L)	3,3-Dichlorobenzidine 91-94-1 (µg/L)	3-Nitroaniline 99-09-2 (µg/L)	4,6-Dinitro-2-Methylphenol 534-52-1 (µg/L)	4-Bromophenyl Phenyl Ether 101-55-3 (µg/L)	4-Chloro-3-Methylphenol 59-50-7 (µg/L)	4-Chlorophenyl Phenyl Ether 7005-72-3 (µg/L)	4-Nitroaniline 100-01-6 (µg/L)	4-Nitrophenol 100-02-7 (µg/L)	Acenaphthylene 208-96-8 (µg/L)	Acenapthalene 83-32-9 (µg/L)	Anthracene 120-12-7 (µg/L)	Benzo(A)Anthracene 56-55-3 (µg/L)	Benzo(A)Pyrene 50-32-8 (µg/L)	Benzo(G,H,I)Perylene 191-24-2 (µg/L)	Benzoic Acid 65-85-0 (µg/L)
										Channel Cc2									
MW-2	11/6/2019	WV2-191106-	0.99 U	0.198 U	0.198 U	0.99 U	0.99 U	0.495 U	0.495 U	0.495 U	4.95 U	4.95 U	0.0236 U	0.0236 U	0.0472 U	0.0472 U	0.0472 U	0.0472 U	9.9 U
MW-2	11/6/2019	WV2-191106D	1.01 U	0.202 U	0.202 U	1.01 U	1.01 U	0.505 U	0.505 U	0.505 U	5.05 U	5.05 U	0.026 U	0.026 U	0.0521 U	0.0521 U	0.0521 U	0.0521 U	10.1 U
MW-20	11/6/2019	WV20191106-	0.952 U	0.19 U	0.19 U	0.952 U	0.952 U	0.476 U	0.476 U	0.476 U	4.76 U	4.76 U	0.0238 U	0.0238 U	0.0476 U	0.0476 U	0.0476 U	0.0476 U	9.52 U
MW-21	11/6/2019	WV21191106-	0.952 U	0.19 U	0.19 U	0.952 U	0.952 U	0.476 U	0.476 U	0.476 U	4.76 U	4.76 U	0.0236 U	0.0236 U	0.0472 U	0.0472 U	0.0472 U	0.0472 U	9.52 U
MW-33	11/6/2019	WV33191106-	0.952 U	0.19 U	0.19 U	0.952 U	0.952 U	0.476 U	0.476 U	0.476 U	4.76 U	4.76 U	0.024 U	0.024 U	0.0481 U	0.0481 U	0.0481 U	0.0481 U	9.52 U
MW-35	11/6/2019	WV35191106-	1 U	0.2 U	0.2 JU	1 U	1 U	0.5 U	0.5 U	0.5 U	5 U	5 U	0.025 U	0.025 U	0.05 U	0.05 U	0.05 U	0.05 U	10 U

Groundwater - SemiVOCs CAS # Site ID	Sample Date	Sample ID	Benzyl Alcohol 100-51-6 (µg/L)	Bis(2-Chloroethoxy)Methane 111-91-1 (µg/L)	Bis(2-Chloroethyl) Ether 111-44-4 (µg/L)	Bis(2-Ethylhexyl)Phthalate 117-81-7 (µg/L)	Butylbenzylphthalate 85-68-7 (µg/L)	Chrysene 218-01-9 (µg/L)	Dibenzo(A,H)Anthracene 53-70-3 (µg/L)	Dibenzofuran 132-64-9 (µg/L)	Diethylphthalate 84-66-2 (µg/L)	Dimethylphthalate 131-11-3 (µg/L)	Di-N-Butylphthalate 84-74-2 (µg/L)	Di-N-Octyl Phthalate 117-84-0 (µg/L)	Fluoranthene 206-44-0 (µg/L)	Fluorene 86-73-7 (µg/L)	Hexachlorobenzene 118-74-1 (µg/L)	Hexachlorobutadiene 87-68-3 (µg/L)	Hexachlorocyclopentadiene 77-47-4 (µg/L)
										Channel Cc2									
MW-2	11/6/2019	WV2-191106-	4.95 U	0.495 U	0.495 U	0.943 U	0.943 U	0.0472 U	0.0472 U	0.495 U	0.943 U	0.943 U	0.943 U	0.943 U	0.0472 U	0.0472 U	0.198 U	1.98 U	4.95 U
MW-2	11/6/2019	WV2-191106D	5.05 U	0.505 U	0.505 U	1.04 U	1.04 U	0.0521 U	0.0521 U	0.505 U	1.04 U	1.04 U	1.04 U	1.04 U	0.0521 U	0.0521 U	0.202 U	2.02 U	5.05 U
MW-20	11/6/2019	WV20191106-	4.76 U	0.476 U	0.476 U	0.952 U	0.952 U	0.0476 U	0.0476 U	0.476 U	0.952 U	0.952 U	0.952 U	0.952 U	0.0476 U	0.0476 U	0.19 U	1.9 U	4.76 U
MW-21	11/6/2019	WV21191106-	4.76 U	0.476 U	0.476 U	0.943 U	0.943 U	0.0472 U	0.0472 U	0.476 U	0.943 U	0.943 U	0.943 U	0.943 U	0.0472 U	0.0472 U	0.19 U	1.9 U	4.76 U
MW-33	11/6/2019	WV33191106-	4.76 U	0.476 U	3.15	0.962 U	0.962 U	0.0481 U	0.0481 U	0.476 U	1.96	0.962 U	0.962 U	0.962 U	0.0481 U	0.0481 U	0.19 U	1.9 U	4.76 U
MW-35	11/6/2019	WV35191106-	5 U	0.5 U	1.06	1 U	1 U	0.05 U	0.05 U	0.5 U	1 U	1 U	1 U	1 U	0.05 U	0.05 U	0.2 U	2 U	5 U

Groundwater - SemiVOCs CAS # Site ID	Sample Date	Sample ID	Hexachloroethane 67-72-1 (µg/L)	Indeno(1,2,3-C,D)Pyrene 193-39-5 (µg/L)	Isophorone 78-59-1 (µg/L)	Naphthalene 91-20-3 (µg/L)	Nitrobenzene 98-95-3 (µg/L)	N-Nitrosodimethylamine 62-75-9 (µg/L)	N-Nitrosodiphenylamine 86-30-6 (µg/L)	N-Nitrosodipropylamine 621-64-7 (µg/L)	P-Chloroaniline 106-47-8 (µg/L)	Pentachlorophenol 87-86-5 (µg/L)	Phenanthrene 85-01-8 (µg/L)	Phenol 108-95-2 (µg/L)	Pyrene 129-00-0 (µg/L)
										Channel Cc2					
MW-2	11/6/2019	WV2-191106-	4.95 U	0.0472 U	0.495 U	0.0236 U	0.495 U	0.495 U	0.495 U	0.495 U	0.99 U	1.98 U	0.0472 U	0.495 U	0.0472 U
MW-2	11/6/2019	WV2-191106D	5.05 U	0.0521 U	0.505 U	0.026 U	0.505 U	0.505 U	0.505 U	0.505 U	1.01 U	2.02 U	0.0521 U	0.505 U	0.0521 U
MW-20	11/6/2019	WV20191106-	4.76 U	0.0476 U	0.476 U	0.0238 U	0.476 U	0.476 U	0.476 U	0.476 U	0.952 U	1.9 U	0.0476 U	0.476 U	0.0476 U
MW-21	11/6/2019	WV21191106-	4.76 U	0.0472 U	0.476 U	0.0236 U	0.476 U	0.476 U	0.476 U	0.476 U	0.952 U	1.9 U	0.0472 U	0.476 U	0.0472 U
MW-33	11/6/2019	WV33191106-	4.76 U	0.0481 U	0.476 U	0.024 U	0.476 U	0.476 U	0.476 U	0.476 U	0.952 U	1.9 U	0.0481 U	0.476 U	0.0481 U
MW-35	11/6/2019	WV35191106-	5 U	0.05 U	0.5 U	0.025 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	2 U	0.05 U	0.5 U	0.05 U

Groundwater - Pesticides, Herbicides, & PCB's

Groundwater - Pesticides, Herbicides, & PCB's Site ID	Sample Date	Sample ID	2,4,5-T 93-76-5 (µg/L)	2,4,5-TP Silvex 93-72-1 (µg/L)	2,4-D 94-75-7 (µg/L)	4,4'DDD 72-54-8 (µg/L)	4,4'DDE 72-55-9 (µg/L)	4,4'DDT 50-29-3 (µg/L)	Aldrin 309-00-2 (µg/L)	Alpha BHC 319-84-6 (µg/L)	Alpha Chlordane 5103-71-9 (µg/L)	Aroclor 1016 12674-11-2 (µg/L)	Aroclor 1221 11104-28-2 (µg/L)	Aroclor 1232 11141-16-5 (µg/L)	Aroclor 1242 53469-21-9 (µg/L)	Aroclor 1248 12672-29-6 (µg/L)	Aroclor 1254 11097-69-1 (µg/L)	Aroclor 1260 11096-82-5 (µg/L)	Beta BHC 319-85-7 (µg/L)
										Channel Cc2									
MW-2	11/28/2018	WV2-181128-	0.0255 U	0.0255 U	0.051 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.005 U
MW-2	11/6/2019	WV2-191106D	0.0272 U	0.0272 U	0.0543 U	0.00526 U	0.00526 U	0.00526 U	0.00526 U	0.00526 U	0.00526 U	0.00638 U	0.00638 U	0.00638 U	0.00638 U	0.00638 U	0.00638 U	0.00638 U	0.00526 U
MW-20	11/28/2018	WV20181128-	0.0255 U	0.0255 U	0.051 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.005 U
MW-21	11/27/2018	WV21181127-	0.0253 U	0.0253 U	0.0505 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.005 U
MW-33	11/27/2018	WV33181127-	0.0253 U	0.041	0.0505 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.005 U
MW-35	11/27/2018	WV35181127-	0.0266 U	0.0378	0.0532 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.005 U

Groundwater - Pesticides, Herbicides, & PCB's Site ID	Sample Date	Sample ID	Delta BHC 319-86-8 (µg/L)	Dieldrin 60-57-1 (µg/L)	Dinoseb 88-85-7 (µg/L)	Endosulfan I 959-98-8 (µg/L)	Endosulfan II 33213-65-9 (µg/L)	Endosulfan Sulfate 1031-07-8 (µg/L)	Endrin 72-20-8 (µg/L)	Endrin Aldehyde 7421-93-4 (µg/L)	Heptachlor 76-44-8 (µg/L)	Heptachlor Epoxide 1024-57-3 (µg/L)	Isodrin 465-73-6 (µg/L)	Lindane (Gamma BHC) 58-89-9 (µg/L)	Methoxychlor 72-43-5 (µg/L)	Total Aroclors T_AROCLOR (µg/L)	Toxaphene 8001-35-2 (µg/L)	Trans-Chlordane 5103-74-2 (µg/L)
										Channel Cc2									
MW-2	11/28/2018	WV2-181128-	0.005 U	0.005 U	0.0255 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.025 U	0.00625 U	0.5 U	0.005 U
MW-2	11/6/2019	WV2-191106D	0.00526 U	0.00526 U	0.0272 U	0.00526 U	0.00526 U	0.00526 U	0.00526 U	0.00526 U	0.00526 U	0.00526 U	0.00526 U	0.00526 U	0.0263 U	0.00638 U	0.526 U	0.00526 U
MW-20	11/28/2018	WV20181128-	0.005 U	0.005 U	0.0255 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.025 U	0.00625 U	0.5 U	0.005 U
MW-21	11/27/2018	WV21181127-	0.005 U	0.005 U	0.0253 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.025 U	0.00625 U	0.5 U	0.005 U
MW-33	11/27/2018	WV33181127-	0.005 U	0.005 U	0.0253 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.025 U	0.00625 U	0.5 U	0.005 U
MW-35	11/27/2018	WV35181127-	0.005 U	0.005 U	0.0266 GU	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.025 U	0.00625 U	0.5 U	0.005 U

Appendix I

Ion Balance Summary and
Trilinear Diagrams

Table I-1

Channel Cc1: Ion Balance Summary for Groundwater

January 1, 2019 - March 31, 2019

		Well #	MW-3			MW-4			MW-10			MW-13		
		Sample Date	1/24/2019			2/27/2019			1/23/2019			1/23/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		5.79			6.53			7.39			7.22		
Conductance	--		93.6			165			145			164		
TDS	--		71.3			135			105			116		
Calcium	40.1	2	9.61	0.4795	51.5	12.6	0.6287	39.7	9.87	0.4925	31.7	10.4	0.5190	28.3
Magnesium	24.3	2	2.96	0.2436	26.1	8.2	0.6748	42.6	9.73	0.8007	51.6	12.1	0.9957	54.3
Potassium	39.1	1	2.27	0.0581	6.2	0.941	0.0241	1.5	1.5	0.0384	2.5	1.87	0.0478	2.6
Sodium	23.0	1	3.44	0.1496	16.1	5.87	0.2553	16.1	5.07	0.2205	14.2	6.23	0.2710	14.8
Iron	55.8	2	0.0161	0.0006	0.06	0.005	0.0002	0.01	0.005	0.0002	0.01	0.005	0.0002	0.01
Manganese	54.9	2	0.00155	0.0001	0.01	0.000193	0.0000	0.00	0.00005	0.0000	0.00	0.000257	0.0000	0.00
Ammonia-N	14.0	1	0.0021	0.0001	0.02	0.001	0.0001	0.00	0.001	0.0001	0.00	0.001	0.0001	0.00
	Total Cations (meq/L)			**0.9**			**1.6**			**1.6**			**1.8**	
Anion Parameters	Molecular Weight (g/mol)	n												
Alkalinity, Total	--		27			37.8			56			63.5		
Carbonate	60.0	2	0.001	0.0000	0.0041	0.008	0.0003	0.0170	0.082	0.0027	0.1914	0.063	0.0021	0.1292
Bicarbonate	61.0	1	32.9	0.5399	66.3	46.1	0.7556	50.1	68.2	1.1171	77.8	77.3	1.2677	77.6
Chloride	35.5	1	1.46	0.0412	5.1	10.4	0.2933	19.4	3.19	0.0900	6.3	3.02	0.0852	5.2
Nitrate-N	14.0	1	1.86	0.1328	16.300	1.84	0.1314	8.702	0.683	0.0488	3.395	0.246	0.0176	1.076
Sulfate	96.1	2	4.84	0.1008	12.4	15.8	0.3290	21.8	8.53	0.1776	12.4	12.5	0.2603	15.9
	Total Anions (meq/L)			**0.8**			**1.5**			**1.4**			**1.6**	
	Total Ions (meq/L)			**1.7**			**3.1**			**3.0**			**3.5**	
	Cation/Anion Ratio			**1.14**			**1.05**			**1.08**			**1.12**	
	Percent Difference			**6.70**			**2.38**			**3.89**			**5.80**	

Table I-1 *(continued)*

Channel Cc1: Ion Balance Summary for Groundwater

April 1, 2019 - June 30, 2019

		Well #		**MW-3**			**MW-4**			**MW-10**			**MW-13**	
		Sample Date		5/7/2019			5/8/2019			5/7/2019			5/7/2019	
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		5.82			6.9			7.3			7.2		
Conductance	--		60.6			149.5			147.9			159.4		
TDS	--		47.9			131			103			115		
Calcium	40.1	2	6.02	0.3004	47.1	11.8	0.5888	38.5	9.91	0.4945	31.9	10	0.4990	27.5
Magnesium	24.3	2	2.36	0.1942	30.4	8.03	0.6608	43.2	9.59	0.7891	50.9	12	0.9875	54.4
Potassium	39.1	1	1.41	0.0361	5.7	0.913	0.0234	1.5	1.49	0.0381	2.5	1.85	0.0473	2.6
Sodium	23.0	1	2.46	0.1070	16.8	5.92	0.2575	16.8	5.22	0.2271	14.7	6.42	0.2793	15.4
Iron	55.8	2	0.0117	0.0004	0.07	0.005	0.0002	0.01	0.005	0.0002	0.01	0.0113	0.0004	0.02
Manganese	54.9	2	0.000657	0.00002	0.004	0.000821	0.00003	0.0020	0.00005	0.000002	0.0001	0.00307	0.0001	0.01
Ammonia-N	14.0	1	0.001	0.0001	0.01	0.001	0.00007	0.0047	0.001	0.0001	0.0046	0.001	0.0001	0.004
	Total Cations (meq/L)			**0.6**			**1.5**			**1.5**			**1.8**	
Anion Parameters	Molecular Weight (g/mol)	n												
Alkalinity, Total	--		19.0			44.0			55.8			64.2		
Carbonate	59.9992	2	0.0008	0.00003	0.0046	0.0210	0.0007	0.0488	0.067	0.002	0.155	0.061	0.002	0.122
Bicarbonate	61.0092	1	23.178	0.380	68.977	53.637	0.879	61.231	67.940	1.114	77.385	78.200	1.282	76.870
Chloride	35.5	1	1.210	0.034	6.196	7.840	0.221	15.402	3.280	0.093	6.429	3.020	0.085	5.109
Nitrate-N	14.0	1	0.451	0.032	5.846	1.54	0.110	7.657	0.662	0.047	3.284	0.185	0.013	0.792
Sulfate	96.1	2	5.02	0.105	19.0	10.8	0.225	15.7	8.81	0.183	12.7	13.7	0.285	17.1
	Total Anions (meq/L)			**0.6**			**1.4**			**1.4**			**1.7**	
	Total Ions (meq/L)			**1.2**			**3.0**			**3.0**			**3.5**	
	Cation/Anion Ratio			**1.16**			**1.07**			**1.08**			**1.09**	
	Percent Difference			**7.35**			**3.20**			**3.68**			**4.20**	

Table I-1 *(continued)*

Channel Cc1: Ion Balance Summary for Groundwater

July 1, 2019 - September 30, 2019

		Well #	**MW-10**			**MW-13**		
		Sample Date	8/30/2019			8/16/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.15			6.99		
Conductance	--		147.3			166.4		
TDS	--		103			119		
Calcium	40.1	2	9.37	0.4676	31.7	9.46	0.4721	28.1
Magnesium	24.3	2	9.2	0.7570	51.3	11	0.9052	53.9
Potassium	39.1	1	1.43	0.0366	2.5	1.71	0.0437	2.6
Sodium	23.0	1	4.93	0.2144	14.5	5.94	0.2584	15.4
Iron	55.8	2	0.005	0.0002	0.01	0.0124	0.0004	0.03
Manganese	54.9	2	0.000222	0.0000	0.00	0.00256	0.0001	0.01
Ammonia-N	14.0	1	0.001	0.0001	0.00	0.0022	0.0002	0.01
	Total Cations (meq/L)			**1.5**			**1.7**	
Anion Parameters	Molecular Weight (g/mol)	n						
Alkalinity, Total	--		55.1			63.6		
Carbonate	60.0	2	0.047	0.0016	0.1098	0.037	0.0012	0.0760
Bicarbonate	61.0	1	67.1	1.1003	77.5	77.5	1.2706	77.5
Chloride	35.5	1	3.21	0.0905	6.4	2.93	0.0826	5.0
Nitrate-N	14.0	1	0.702	0.0501	3.531	0.219	0.0156	0.954
Sulfate	96.1	2	8.5	0.1770	12.5	12.9	0.2686	16.4
	Total Anions (meq/L)			**1.4**			**1.6**	
	Total Ions (meq/L)			**2.9**			**3.3**	
	Cation/Anion Ratio			**1.04**			**1.03**	
	Percent Difference			**1.95**			**1.25**	

NOTE: Water level at MW-3 well was below the pump - no samples were collected;
MW-4 went dry during purging - insufficient water to collect a sample.

Table I-1 *(continued)*

Channel Cc1: Ion Balance Summary for Groundwater

October 1, 2019 - December 31, 2019

		Well #	**MW-4**			**MW-10**			**MW-13**		
		Sample Date	11/4/2019			11/1/2019			11/4/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.8			7.14			7.12		
Conductance	--		160.2			148.2			159.3		
TDS	--		138			106			117		
Calcium	40.1	2	12.9	0.6437	40.1	9.85	0.4915	31.8	9.73	0.4855	28.6
Magnesium	24.3	2	8.37	0.6887	42.9	9.58	0.7883	51.1	11	0.9052	53.3
Potassium	39.1	1	0.951	0.0243	1.5	1.48	0.0379	2.5	1.77	0.0453	2.7
Sodium	23.0	1	5.74	0.2497	15.5	5.19	0.2258	14.6	6.06	0.2636	15.5
Iron	55.8	2	0.005	0.0002	0.01	0.005	0.0002	0.01	0.005	0.0002	0.01
Manganese	54.9	2	0.000977	0.0000	0.00	0.00005	0.0000	0.00	0.00043	0.0000	0.00
Ammonia-N	14.0	1	0.001	0.0001	0.00	0.001	0.0001	0.00	0.001	0.0001	0.00
	Total Cations (meq/L)			**1.6**			**1.5**			**1.7**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		48.1			57.7			63		
Carbonate	59.9992	2	0.01824113	0.00060805	0.03948449	0.04783619	0.00159456	0.10802158	0.04988251	0.00166277	0.1032222
Bicarbonate	61.0092	1	58.6449097	0.96124699	62.4202063	70.2967331	1.15223168	78.0565328	76.7585722	1.2581475	78.1037411
Chloride	35.5	1	7.01	0.1977	12.8	3.28	0.0925	6.3	2.93	0.0826	5.1
Nitrate-N	14.0	1	1.77	0.1264	8.206	0.635	0.0453	3.071	0.26	0.0186	1.152
Sulfate	96.1	2	12.2	0.2540	16.5	8.86	0.1845	12.5	12	0.2499	15.5
	Total Anions (meq/L)			**1.5**			**1.5**			**1.6**	
	Total Ions (meq/L)			**3.1**			**3.0**			**3.3**	
	Cation/Anion Ratio			**1.04**			**1.05**			**1.06**	
	Percent Difference			**2.12**			**2.24**			**2.69**	

NOTE: Water level at MW-3 well was below the pump - no samples were collected.

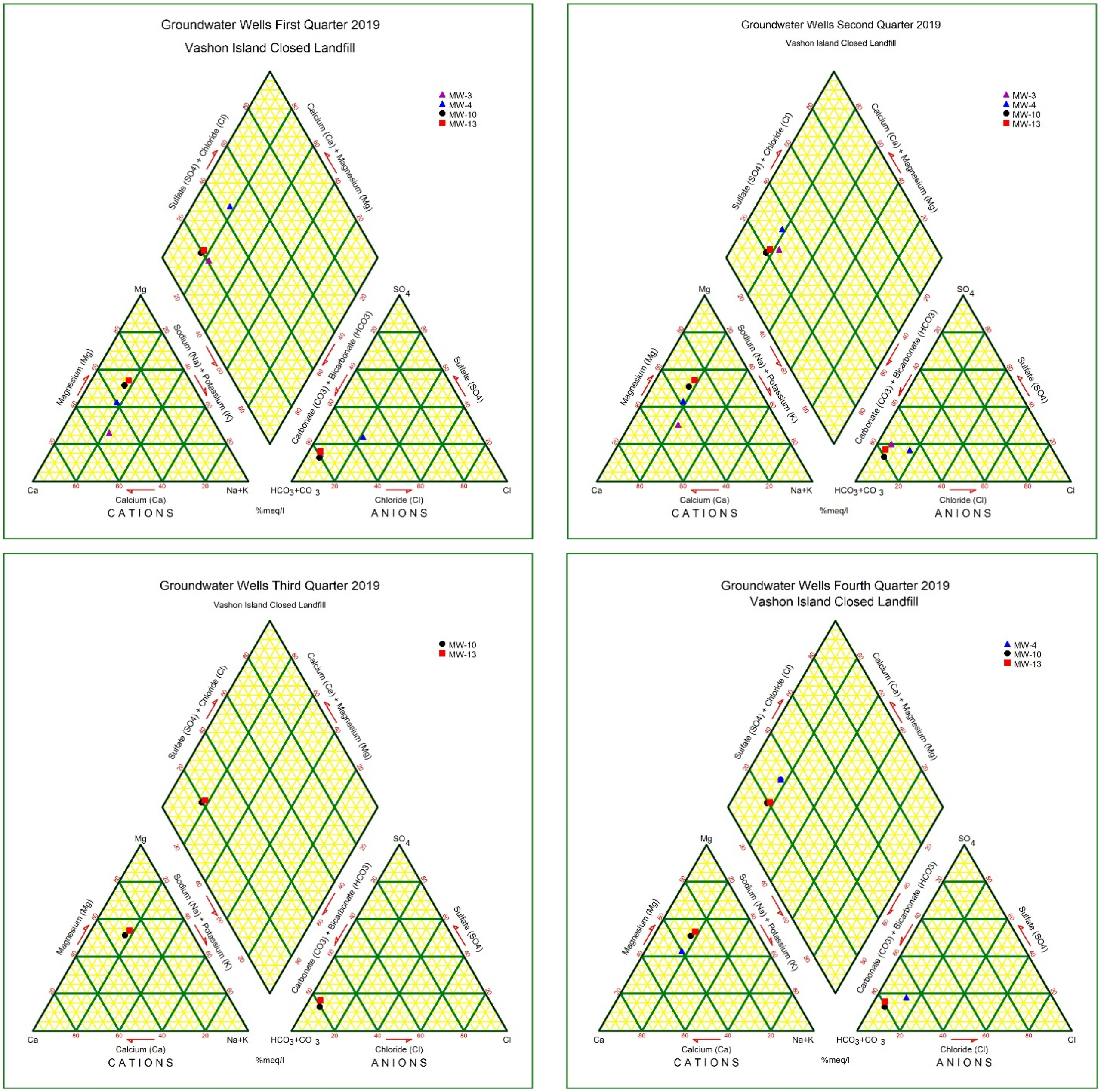

Figure I-1. Channel Cc1 Trilinear Diagrams

NOTE: Third Quarter, 2019: water levels at MW-3 and MW-4 were below the pump – no samples were collected.
Fourth Quarter, 2019: water level at MW-3 was below the pump - no sample was collected.

Table I-2

Channel Cc2: Ion Balance Summary for Groundwater

January 1, 2019 - March 31, 2019

		Well #	**MW-2**			**MW-9**			**MW-20**			**MW-21**			**MW-33**			**MW-35**		
		Sample Date	3/20/2019			1/28/2019			1/29/2019			2/27/2019			2/27/2019			2/27/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.16			7.27			7.31			6.95			6.64			6.61		
Conductance	--		304			176			199			270			762			644		
TDS	--		178			129			146			173			447			407		
Calcium	40.1	2	20	0.9980	31.2	13.8	0.6886	35.5	13.5	0.6737	31.2	19.6	0.9780	32.8	69.1	3.4481	37.5	63.1	3.1487	40.2
Magnesium	24.3	2	21.1	1.7363	54.3	11.3	0.9298	47.9	13.7	1.1273	52.1	17.7	1.4565	48.8	55.5	4.5670	49.6	39.9	3.2833	41.9
Potassium	39.1	1	2.05	0.0524	1.6	2.25	0.0575	3.0	2.26	0.0578	2.7	2.12	0.0542	1.8	3.5	0.0903	1.0	3.2	0.0816	1.0
Sodium	23.0	1	9.27	0.4032	12.6	6.06	0.2636	13.6	6.49	0.2823	13.1	11	0.4785	16.0	18.7	0.8134	8.8	15.2	0.6612	8.4
Iron	55.8	2	0.005	0.0002	0.01	0.005	0.0002	0.01	0.332	0.0119	0.55	0.256	0.0092	0.31	6.91	0.2475	2.69	15.80	0.5658	7.22
Manganese	54.9	2	0.154	0.0056	0.18	0.00005	0.0000	0.00	0.225	0.0082	0.38	0.165	0.0060	0.20	1.00	0.0363	0.39	2.39	0.0870	1.11
Ammonia-N	14.0	1	0.001	0.0001	0.00	0.001	0.0001	0.00	0.0143	0.0010	0.05	0.0093	0.0007	0.02	0.03	0.0023	0.02	0.07	0.0047	0.06
	Total Cations (meq/L)			**3.2**			**1.9**			**2.2**			**3.0**			**9.2**			**7.8**	
Anion Parameters	Molecular Weight (g/mol)	n																		
Alkalinity, Total	--		137			71.4			79.3			122			395			330		
Carbonate	60.0	2	0.119	0.0040	0.1273	0.080	0.0027	0.1470	0.097	0.0032	0.1608	0.065	0.0022	0.0784	0.104	0.0035	0.0413	0.081	0.0027	0.0377
Bicarbonate	61.0	1	166.9	2.7356	87.9	86.9	1.4251	78.7	96.5	1.5825	78.5	148.7	2.4375	87.7	481.7	7.8954	94.4	402.4	6.5963	92.2
Chloride	35.5	1	2.92	0.0824	2.6	4.4	0.1241	6.9	3.17	0.0894	4.4	2.29	0.0646	2.3	3.9	0.1100	1.3	4.1	0.1151	1.6
Nitrate-N	14.0	1	0.005	0.0004	0.011	0.355	0.0253	1.400	0.005	0.0004	0.018	0.193	0.0138	0.496	0.005	0.0004	0.004	0.005	0.0004	0.005
Sulfate	96.1	2	14	0.2915	9.4	11.2	0.2332	12.9	16.3	0.3394	16.8	12.5	0.2603	9.4	16.9	0.3519	4.2	21.1	0.4393	6.1
	Total Anions (meq/L)			**3.1**			**1.8**			**2.0**			**2.8**			**8.4**			**7.2**	
	Total Ions (meq/L)			**6.3**			**3.8**			**4.2**			**5.8**			**17.6**			**15.0**	
	Cation/Anion Ratio			**1.03**			**1.07**			**1.07**			**1.07**			**1.10**			**1.09**	
	Percent Difference			**1.30**			**3.45**			**3.53**			**3.55**			**4.80**			**4.53**	

Table I-2 (*continued*)

Channel Cc2: Ion Balance Summary for Groundwater

April 1, 2019 - June 30, 2019

		Well #	**MW-2**			**MW-9**			**MW-20**			**MW-21**			**MW-33**			**MW-35**		
		Sample Date	5/10/2019			5/8/2019			5/10/2019			5/10/2019			5/10/2019			5/10/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.22			6.88			7.57			6.61			6.83			6.62		
Conductance	--		310.5			186.9			194.9			278.7			762			688		
TDS	--		184			125			133			178			453			423		
Calcium	40.1	2	21.8	1.0878	31.6	14.3	0.7136	35.8	13.7	0.6836	31.6	20.3	1.0130	31.5	68.8	3.4331	36.5	66.1	3.2984	39.3
Magnesium	24.3	2	22.7	1.8679	54.3	11.5	0.9463	47.5	13.6	1.1191	51.7	19.8	1.6293	50.7	57.4	4.7233	50.3	43.9	3.6124	43.0
Potassium	39.1	1	2.31	0.0591	1.7	2.27	0.0581	2.9	2.2	0.0563	2.6	2.26	0.0578	1.8	3.6	0.0926	1.0	3.4	0.0857	1.0
Sodium	23.0	1	9.54	0.4150	12.1	6.33	0.2753	13.8	6.67	0.2901	13.4	11.4	0.4959	15.4	19.7	0.8569	9.1	16.9	0.7351	8.8
Iron	55.8	2	0.005	0.0002	0.01	0.005	0.0002	0.01	0.22	0.0079	0.36	0.27	0.0097	0.30	7.08	0.2535	2.70	15.90	0.5694	6.78
Manganese	54.9	2	0.224	0.0082	0.24	0.00005	0.000002	0.0001	0.174	0.0063	0.29	0.282	0.0103	0.32	1.01	0.0368	0.39	2.50	0.0910	1.08
Ammonia-N	14.0	1	0.0022	0.0002	0.005	0.001	0.0001	0.0036	0.0151	0.0011	0.05	0.0122	0.0009	0.03	0.03	0.0022	0.02	0.06	0.0046	0.06
	Total Cations (meq/L)			**3.4**			**2.0**			**2.2**			**3.2**			**9.4**			**8.4**	
Anion Parameters	Molecular Weight (g/mol)	n																		
Alkalinity, Total	--		146.0			71.2			75.0			128.0			398.0			342.0		
Carbonate	59.9992	2	0.145	0.005	0.148	0.032	0.001	0.059	0.167	0.006	0.288	0.031	0.001	0.036	0.162	0.005	0.064	0.086	0.003	0.039
Bicarbonate	61.0092	1	177.824	2.915	88.800	86.798	1.423	77.772	91.161	1.494	77.357	156.096	2.559	87.561	485.231	7.953	94.245	417.066	6.836	92.283
Chloride	35.5	1	2.810	0.079	2.415	4.560	0.129	7.031	3.190	0.090	4.658	2.350	0.066	2.268	3.950	0.111	1.320	4.210	0.119	1.603
Nitrate-N	14.0	1	0.005	0.0004	0.011	0.379	0.0271	1.479	0.005	0.0004	0.018	0.211	0.0151	0.516	0.005	0.0004	0.004	0.005	0.0004	0.005
Sulfate	96.1	2	13.6	0.2832	8.6	12	0.2499	13.7	16.4	0.3415	17.7	13.5	0.2811	9.6	17.7	0.3685	4.4	21.6	0.4497	6.1
	Total Anions (meq/L)			**3.3**			**1.8**			**1.9**			**2.9**			**8.4**			**7.4**	
	Total Ions (meq/L)			**6.7**			**3.8**			**4.1**			**6.1**			**17.8**			**15.8**	
	Cation/Anion Ratio			**1.05**			**1.09**			**1.12**			**1.10**			**1.11**			**1.13**	
	Percent Difference			**2.32**			**4.30**			**5.69**			**4.80**			**5.38**			**6.26**	

Table I-2 (*continued*)

Channel Cc2: Ion Balance Summary for Groundwater

July 1, 2019 - September 30, 2019

		Well #	**MW-2**			**MW-9**			**MW-20**			**MW-21**			**MW-33**			**MW-35**		
		Sample Date	8/30/2019			8/15/2019			8/30/2019			8/30/2019			8/30/2019			8/30/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.12			7.31			6.87			7.02			6.69			6.73		
Conductance	--		304.6			177.1			191.2			289.3			761.8			7.16		
TDS	--		170			124			130			179			443			427		
Calcium	40.1	2	19.5	0.9731	30.9	12.8	0.6387	36.2	12.8	0.6387	32.7	19.3	0.9631	31.2	65	3.2435	36.8	63.3	3.1587	39.8
Magnesium	24.3	2	20.9	1.7198	54.6	10.1	0.8311	47.1	12	0.9875	50.5	19.3	1.5882	51.4	53.3	4.3859	49.8	41.9	3.4479	43.4
Potassium	39.1	1	2.1	0.0537	1.7	2.07	0.0529	3.0	2.05	0.0524	2.7	2.18	0.0558	1.8	3.47	0.0888	1.0	3.12	0.0798	1.0
Sodium	23.0	1	9	0.3915	12.4	5.59	0.2432	13.8	6	0.2610	13.3	10.4	0.4524	14.7	18.8	0.8178	9.3	15.5	0.6742	8.5
Iron	55.8	2	0.005	0.0002	0.01	0.005	0.0002	0.01	0.261	0.0093	0.48	0.251	0.0090	0.29	6.51	0.2331	2.65	13.7	0.4906	6.18
Manganese	54.9	2	0.248	0.0090	0.29	5E-05	0.0000	0.00	0.154	0.0056	0.29	0.48	0.0175	0.57	0.945	0.0344	0.39	2.29	0.0834	1.05
Ammonia-N	14.0	1	0.0088	0.0006	0.02	0.001	0.0001	0.00	0.0166	0.0012	0.06	0.0145	0.0010	0.03	0.0341	0.0024	0.03	0.0707	0.0050	0.06
	Total Cations (meq/L)			**3.1**			**1.8**			**2.0**			**3.1**			**8.8**			**7.9**	
Anion Parameters	Molecular Weight (g/mol)	n																		
Alkalinity, Total	--		136			68.4			72.3			128			390			346		
Carbonate	60.0	2	0.108	0.0036	0.1173	0.084	0.0028	0.1606	0.032	0.0011	0.0575	0.081	0.0027	0.0914	0.115	0.0038	0.0463	0.112	0.0037	0.0496
Bicarbonate	61.0	1	165.7	2.7160	88.7	83.3	1.3650	78.5	88.1	1.4447	77.4	156.0	2.5569	87.1	475.6	7.7950	94.3	421.9	6.9152	92.2
Chloride	35.5	1	2.64	0.0745	2.4	4.29	0.1210	7.0	3.16	0.0891	4.8	2.4	0.0677	2.3	3.88	0.1094	1.3	4.2	0.1185	1.6
Nitrate-N	14.0	1	0.064	0.0046	0.149	0.359	0.0256	1.474	0.005	0.0004	0.019	0.356	0.0254	0.866	0.015	0.0011	0.013	0.005	0.0004	0.005
Sulfate	96.1	2	12.6	0.2623	8.6	10.8	0.2249	12.9	15.9	0.3311	17.7	13.6	0.2832	9.6	17.3	0.3602	4.4	22.2	0.4622	6.2
	Total Anions (meq/L)			**3.1**			**1.7**			**1.9**			**2.9**			**8.3**			**7.5**	
	Total Ions (meq/L)			**6.2**			**3.5**			**3.8**			**6.0**			**17.1**			**15.4**	
	Cation/Anion Ratio			**1.03**			**1.02**			**1.05**			**1.05**			**1.06**			**1.06**	
	Percent Difference			**1.40**			**0.77**			**2.34**			**2.51**			**3.14**			**2.85**	

Table I-2 (*continued*)

Channel Cc2: Ion Balance Summary for Groundwater

October 1, 2019 - December 31, 2019

Well #			**MW-2**			**MW-9**			**MW-20**			**MW-21**			**MW-33**			**MW-35**		
Sample Date			11/6/2019			11/4/2019			11/6/2019			11/6/2019			11/6/2019			11/6/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.5			7.19			7.58			6.59			6.63			6.68		
Conductance	--		315.6			172.6			189.7			300.8			748			749		
TDS	--		184			123			135			192			434			438		
Calcium	40.1	2	21.2	1.0579	30.3	13	0.6487	36.2	14.1	0.7036	33.3	21.8	1.0878	31.2	68.9	3.4381	37.1	72.8	3.6327	40.8
Magnesium	24.3	2	23.7	1.9502	55.9	10.2	0.8393	46.8	12.8	1.0533	49.9	22	1.8103	51.9	55.7	4.5834	49.5	46.6	3.8346	43.1
Potassium	39.1	1	2.32	0.0593	1.7	2.12	0.0542	3.0	2.27	0.0581	2.7	2.48	0.0634	1.8	3.8	0.0969	1.0	3.6	0.0921	1.0
Sodium	23.0	1	9.52	0.4141	11.9	5.75	0.2501	14.0	6.49	0.2823	13.4	11.3	0.4915	14.1	19.4	0.8439	9.1	16.9	0.7351	8.3
Iron	55.8	2	0.005	0.0002	0.01	0.005	0.0002	0.01	0.224	0.0080	0.38	0.42	0.0150	0.43	7.28	0.2607	2.82	14.50	0.5193	5.83
Manganese	54.9	2	0.187	0.0068	0.20	0.00005	0.0000	0.00	0.152	0.0055	0.26	0.52	0.0189	0.54	0.94	0.0344	0.37	2.38	0.0866	0.97
Ammonia-N	14.0	1	0.001	0.0001	0.00	0.001	0.0001	0.00	0.0137	0.0010	0.05	0.0117	0.0008	0.02	0.03	0.0019	0.02	0.06	0.0041	0.05
	Total Cations (meq/L)			**3.5**			**1.8**			**2.1**			**3.5**			**9.3**			**8.9**	
Anion Parameters	Molecular Weight (g/mol)	n																		
Alkalinity, Total	--		138			67.5			74.2			137			391			359		
Carbonate	59.9992	2	0.02623751	0.0008746	0.02773857	0.06277855	0.00209265	0.12196339	0.16901811	0.00563401	0.29650301	0.03204295	0.00106811	0.03411518	0.10027031	0.00334239	0.04031942	0.10329217	0.00344312	0.04439026
Bicarbonate	61.0092	1	168.30665	2.75870935	87.4949145	82.2223503	1.34770412	78.5467482	90.1803298	1.47814313	77.7907264	167.074846	2.73851888	87.4674428	476.816117	7.81547893	94.2785601	437.769973	7.17547473	92.5095189
Chloride	35.5	1	2.73	0.0770	2.4	4.26	0.1202	7.0	3.16	0.0891	4.7	2.4	0.0677	2.2	3.8	0.1083	1.3	4.2	0.1171	1.5
Nitrate-N	14.0	1	0.174	0.0124	0.394	0.323	0.0231	1.344	0.005	0.0004	0.019	0.45	0.0321	1.026	0.005	0.0004	0.004	0.005	0.0004	0.005
Sulfate	96.1	2	14.6	0.3040	9.6	10.7	0.2228	13.0	15.7	0.3269	17.2	14	0.2915	9.3	17.4	0.3623	4.4	22.1	0.4601	5.9
	Total Anions (meq/L)			**3.2**			**1.7**			**1.9**			**3.1**			**8.3**			**7.8**	
	Total Ions (meq/L)			**6.6**			**3.5**			**4.0**			**6.6**			**17.5**			**16.7**	
	Cation/Anion Ratio			**1.11**			**1.04**			**1.11**			**1.11**			**1.12**			**1.15**	
	Percent Difference			**5.05**			**2.19**			**5.27**			**5.39**			**5.52**			**6.89**	

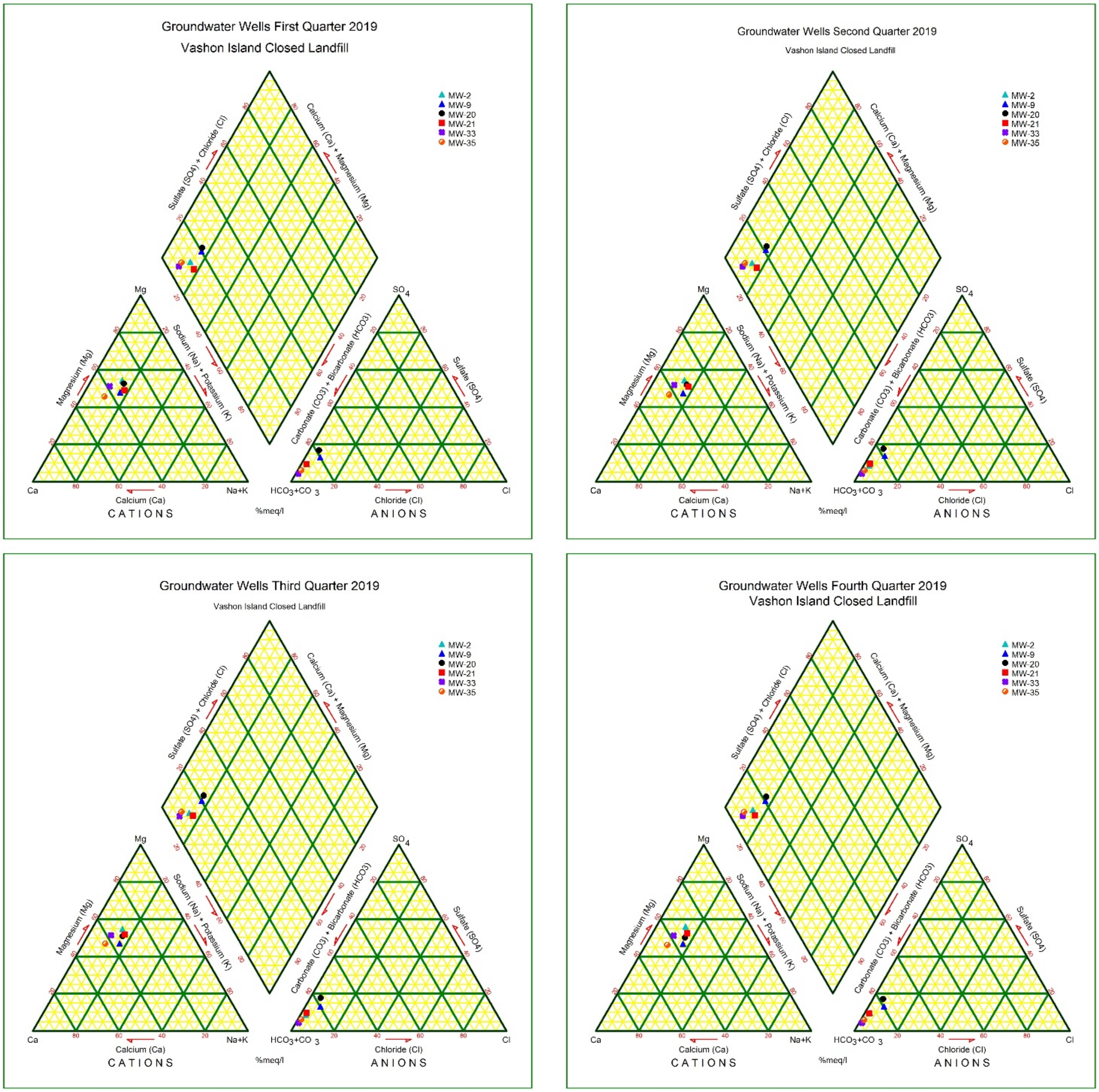

Figure I-2. Channel Cc2 Trilinear Diagrams

Table I-3

Channel Cc3: Ion Balance Summary for Groundwater

January 1, 2019 - March 31, 2019

		Well #	**MW-8**			**MW-36**		
		Sample Date	1/22/2019			1/23/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.79			7.78		
Conductance	--		164			172		
TDS	--		118			138		
Calcium	40.1	2	12.2	0.6088	36.3	14.5	0.7236	38.4
Magnesium	24.3	2	9.34	0.7686	45.9	9.76	0.8031	42.6
Potassium	39.1	1	1.17	0.0299	1.8	2.85	0.0729	3.9
Sodium	23.0	1	6.15	0.2675	16.0	6.51	0.2832	15.0
Iron	55.8	2	0.005	0.0002	0.01	0.005	0.0002	0.01
Manganese	54.9	2	0.00005	0.000002	0.0001	0.00158	0.00006	0.003
Ammonia-N	14.0	1	0.001	0.0001	0.004	0.0025	0.0002	0.009
	Total Cations (meq/L)			**1.7**			**1.9**	
Anion Parameters	Molecular Weight (g/mol)	n						
Alkalinity, Total	--		54.9			68.3		
Carbonate	60.0	2	0.020	0.0007	0.0425	0.246	0.0082	0.4781
Bicarbonate	61.0	1	66.9	1.0972	68.7	82.8	1.3576	79.2
Chloride	35.5	1	4.29	0.1210	7.6	2.96	0.0835	4.9
Nitrate-N	14.0	1	2.96	0.2113	13.242	0.021	0.0015	0.087
Sulfate	96.1	2	7.96	0.1657	10.4	12.7	0.2644	15.4
	Total Anions (meq/L)			**1.6**			**1.7**	
	Total Ions (meq/L)			**3.3**			**3.6**	
	Cation/Anion Ratio			**1.05**			**1.10**	
	Percent Difference			**2.42**			**4.67**	

Table I-3 (*continued*)

Channel Cc3: Ion Balance Summary for Groundwater

April 1, 2019 - June 30, 2019

		Well #	**MW-8**			**MW-36**		
		Sample Date	5/7/2019			5/7/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.68			7.44		
Conductance	--		167.5			171.5		
TDS	--		125			130		
Calcium	40.1	2	11.9	0.5938	34.9	14.1	0.7036	37.2
Magnesium	24.3	2	9.64	0.7933	46.6	9.97	0.8204	43.4
Potassium	39.1	1	1.16	0.0297	1.7	2.82	0.0721	3.8
Sodium	23.0	1	6.59	0.2866	16.8	6.77	0.2945	15.6
Iron	55.8	2	0.005	0.0002	0.01	0.005	0.0002	0.01
Manganese	54.9	2	0.00005	0.000002	0.0001	0.00127	0.00005	0.002
Ammonia-N	14.0	1	0.001	0.0001	0.004	0.001	0.0001	0.004
	Total Cations (meq/L)			**1.7**			**1.9**	
Anion Parameters	Molecular Weight (g/mol)	n						
Alkalinity, Total	--		54.6			68.0		
Carbonate	59.9992	2	0.016	0.001	0.033	0.112	0.004	0.217
Bicarbonate	61.0092	1	66.580	1.091	68.813	82.732	1.356	78.653
Chloride	35.5	1	4.520	0.127	8.039	3.050	0.086	4.990
Nitrate-N	14.0	1	2.79	0.1992	12.560	0.019	0.0014	0.079
Sulfate	96.1	2	8.04	0.1674	10.6	13.3	0.2769	16.1
	Total Anions (meq/L)			**1.6**			**1.7**	
	Total Ions (meq/L)			**3.3**			**3.6**	
	Cation/Anion Ratio			**1.07**			**1.10**	
	Percent Difference			**3.58**			**4.61**	

Table I-3 (*continued*)

Channel Cc3: Ion Balance Summary for Groundwater

July 1, 2019 - September 30, 2019

		Well #	**MW-8**			**MW-36**		
		Sample Date	8/14/2019			8/29/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.22			7.76		
Conductance	--		167			175.4		
TDS	--		127			121		
Calcium	40.1	2	11.3	0.5639	35.4	13.3	0.6637	38.0
Magnesium	24.3	2	8.93	0.7348	46.2	9.13	0.7513	43.0
Potassium	39.1	1	1.09	0.0279	1.8	2.59	0.0662	3.8
Sodium	23.0	1	6.09	0.2649	16.6	6.13	0.2666	15.3
Iron	55.8	2	0.005	0.0002	0.01	0.005	0.0002	0.01
Manganese	54.9	2	5E-05	0.000002	0.0001	0.00141	0.00005	0.003
Ammonia-N	14.0	1	0.001	0.0001	0.004	0.001	0.0001	0.004
	Total Cations (meq/L)			**1.6**			1.7	
Anion Parameters	Molecular Weight (g/mol)	n						
Alkalinity, Total	--		54.8			67.7		
Carbonate	60.0	2	0.005	0.0002	0.0114	0.233	0.0078	0.4530
Bicarbonate	61.0	1	66.8	1.0957	68.2	82.1	1.3460	78.5
Chloride	35.5	1	4.43	0.1250	7.8	3.05	0.0860	5.0
Nitrate-N	14.0	1	3.11	0.2220	13.830	0.02	0.0014	0.083
Sulfate	96.1	2	7.81	0.1626	10.1	13.1	0.2728	15.9
	Total Anions (meq/L)			**1.6**			**1.7**	
	Total Ions (meq/L)			**3.2**			**3.5**	
	Cation/Anion Ratio			**0.99**			**1.02**	
	Percent Difference			**-0.43**			**0.99**	

Table I-3 (*continued*)

Channel Cc3: Ion Balance Summary for Groundwater

October 1, 2019 - December 31, 2019

		Well #	**MW-8**			**MW-36**		
		Sample Date	11/1/2019			11/5/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.5			7.12		
Conductance	--		168.3			175.3		
TDS	--		121			131		
Calcium	40.1	2	12.2	0.6088	35.8	14.6	0.7285	38.3
Magnesium	24.3	2	9.58	0.7883	46.3	9.82	0.8081	42.5
Potassium	39.1	1	1.16	0.0297	1.7	2.9	0.0742	3.9
Sodium	23.0	1	6.33	0.2753	16.2	6.66	0.2897	15.2
Iron	55.8	2	0.005	0.0002	0.01	0.005	0.0002	0.01
Manganese	54.9	2	0.00005	0.000002	0.0001	0.0009	0.00003	0.002
Ammonia-N	14.0	1	0.001	0.0001	0.004	0.001	0.0001	0.004
	Total Cations (meq/L)			**1.7**			1.9	
Anion Parameters	Molecular Weight (g/mol)	n						
Alkalinity, Total	--		57.8			69.5		
Carbonate	59.9992	2	0.01098934	0.00036632	0.022152181	0.055029119	0.001834328	0.104605685
Bicarbonate	61.0092	1	70.493655	1.15545942	69.87393613	84.67810746	1.387956365	79.15056251
Chloride	35.5	1	4.57	0.1289	7.8	3.1	0.0874	5.0
Nitrate-N	14.0	1	2.77	0.1978	11.959	0.021	0.0015	0.085
Sulfate	96.1	2	8.22	0.1711	10.3	13.2	0.2748	15.7
	Total Anions (meq/L)			**1.7**			**1.8**	
	Total Ions (meq/L)			**3.4**			**3.7**	
	Cation/Anion Ratio			**1.03**			**1.08**	
	Percent Difference			**1.45**			**4.03**	

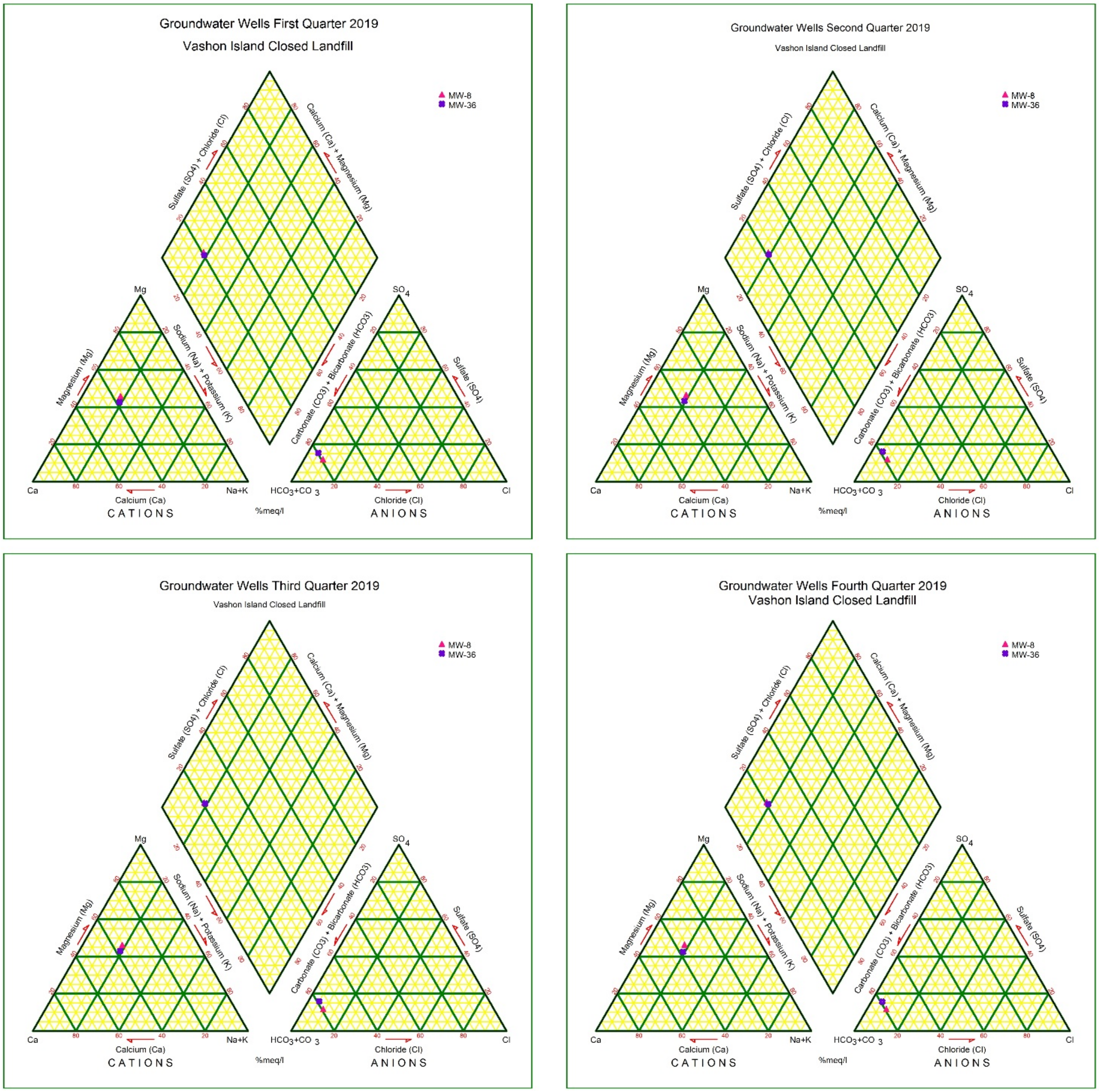

Figure I-3. Channel Cc3 Trilinear Diagrams

Table I-4

Unit D Aquifer: Ion Balance Summary for Groundwater

January 1, 2019 - March 31, 2019

		Well #	**MW-7**			**MW-12**			**MW-19**			**MW-26**			**MW-29**			**MW-34**		
		Sample Date	1/23/2019			1/24/2019			1/28/2019			1/24/2019			1/28/2019			1/22/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.64			7.38			7.7			8.29			7.62			7.09		
Conductance	--		186			167			217			189			239			197		
TDS	--		132			120			143			142			154			134		
Calcium	40.1	2	16.8	0.8383	40.1	12.3	0.6138	35.0	15.5	0.7735	32.9	17.9	0.8932	44.7	21	1.0479	39.1	14.4	0.7186	34.4
Magnesium	24.3	2	10.6	0.8722	41.7	10.1	0.8311	47.4	14.4	1.1849	50.4	7.63	0.6279	31.4	15.1	1.2425	46.3	12.6	1.0368	49.6
Potassium	39.1	1	2.95	0.0755	3.6	1.9	0.0486	2.8	2.62	0.0670	2.9	3.07	0.0785	3.9	2.32	0.0593	2.2	1.62	0.0414	2.0
Sodium	23.0	1	6.51	0.2832	13.5	6.01	0.2614	14.9	6.96	0.3027	12.9	8.64	0.3758	18.8	6.87	0.2988	11.1	6.72	0.2923	14.0
Iron	55.8	2	0.005	0.0002	0.01	0.005	0.0002	0.01	0.0473	0.0017	0.07	0.11	0.0039	0.20	0.848	0.0304	1.13	0.005	0.0002	0.01
Manganese	54.9	2	0.164	0.0060	0.29	0.00005	0.0000	0.00	0.51	0.0186	0.79	0.0678	0.0025	0.12	0.0989	0.0036	0.13	0.000138	0.0000	0.00
Ammonia-N	14.0	1	0.23	0.0164	0.79	0.001	0.0001	0.00	0.0291	0.0021	0.09	0.25	0.0178	0.89	0.0023	0.0002	0.01	0.001	0.0001	0.00
	Total Cations (meq/L)			**2.1**			**1.8**			**2.4**			**2.0**			**2.7**			**2.1**	
Anion Parameters	Molecular Weight (g/mol)	n																		
Alkalinity, Total	--		77.3			64.8			86			75.5			102			68.4		
Carbonate	60.0	2	0.202	0.0067	0.3612	0.093	0.0031	0.1871	0.258	0.0086	0.3885	0.868	0.0289	1.5300	0.255	0.0085	0.3444	0.05054778	0.0017	0.0870
Bicarbonate	61.0	1	93.9	1.5390	82.5	78.9	1.2927	77.8	104.4	1.7111	77.3	90.3	1.4808	78.3	123.9	2.0312	82.4	83.3	1.3661	70.5
Chloride	35.5	1	3.28	0.0925	5.0	3.15	0.0889	5.3	4.7	0.1326	6.0	3.69	0.1041	5.5	3.61	0.1018	4.1	4.92	0.1388	7.2
Nitrate-N	14.0	1	0.02	0.0014	0.077	0.727	0.0519	3.124	0.005	0.0004	0.016	0.016	0.0011	0.060	0.005	0.0004	0.014	2.23	0.1592	8.222
Sulfate	96.1	2	10.8	0.2249	12.1	10.8	0.2249	13.5	17.3	0.3602	16.3	13.3	0.2769	14.6	15.5	0.3227	13.1	13	0.2707	14.0
	Total Anions (meq/L)			**1.9**			**1.7**			**2.2**			**1.9**			**2.5**			**1.9**	
	Total Ions (meq/L)			**4.0**			**3.4**			**4.6**			**3.9**			**5.1**			**4.0**	
	Cation/Anion Ratio			**1.12**			**1.06**			**1.06**			**1.06**			**1.09**			**1.08**	
	Percent Difference			**5.74**			**2.74**			**3.02**			**2.77**			**4.24**			**3.80**	

Table I-4 (*continued*)

Unit D Aquifer: Ion Balance Summary for Groundwater

April 1, 2019 - June 30, 2019

		Well #	**MW-7**			**MW-12**			**MW-19**			**MW-26**			**MW-29**			**MW-34**		
		Sample Date	5/8/2019			5/7/2019			5/8/2019			5/10/2019			5/10/2019			5/7/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.53			6.85			7.46			8.07			7.61			6.71		
Conductance	--		187.6			168.1			219.3			192.8			243.2			192.3		
TDS	--		132			118			142			141			150			140		
Calcium	40.1	2	16.3	0.8134	39.9	12.1	0.6038	34.4	15.5	0.7735	33.1	18	0.8982	43.4	20.9	1.0429	38.2	13.8	0.6886	33.4
Magnesium	24.3	2	10.3	0.8476	41.6	10.1	0.8311	47.3	14.2	1.1685	50.0	7.99	0.6575	31.8	15.6	1.2837	47.1	12.5	1.0286	49.9
Potassium	39.1	1	2.85	0.0729	3.6	1.93	0.0494	2.8	2.57	0.0657	2.8	3.17	0.0811	3.9	2.28	0.0583	2.1	1.58	0.0404	2.0
Sodium	23.0	1	6.44	0.2801	13.7	6.24	0.2714	15.5	7.09	0.3084	13.2	9.37	0.4076	19.7	7.04	0.3062	11.2	6.96	0.3027	14.7
Iron	55.8	2	0.0112	0.0004	0.02	0.005	0.0002	0.01	0.0514	0.0018	0.08	0.168	0.0060	0.29	0.876	0.0314	1.15	0.005	0.0002	0.01
Manganese	54.9	2	0.159	0.0058	0.28	0.00005	0.000002	0.0001	0.438	0.0159	0.68	0.0679	0.0025	0.12	0.116	0.0042	0.15	0.00028	0.00001	0.0005
Ammonia-N	14.0	1	0.243	0.0173	0.85	0.001	0.0001	0.0041	0.0267	0.0019	0.08	0.25	0.0178	0.86	0.0026	0.0002	0.01	0.001	0.0001	0.0035
	Total Cations (meq/L)			**2.0**			**1.8**			**2.3**			**2.1**			**2.7**			**2.1**	
Anion Parameters	Molecular Weight (g/mol)	n																		
Alkalinity, Total	--		77.1			64.5			84.2			75.5			102.0			67.9		
Carbonate	59.9992	2	0.157	0.005	0.279	0.027	0.001	0.055	0.146	0.005	0.223	0.527	0.018	0.924	0.249	0.008	0.336	0.021	0.001	0.036
Bicarbonate	61.0092	1	93.744	1.537	82.011	78.634	1.289	77.590	102.428	1.679	77.294	91.038	1.492	78.442	123.934	2.031	82.325	82.795	1.357	69.929
Chloride	35.5	1	3.380	0.095	5.088	3.210	0.091	5.451	4.660	0.131	6.051	3.770	0.106	5.590	3.640	0.103	4.161	5.110	0.144	7.427
Nitrate-N	14.0	1	0.017	0.0012	0.065	0.696	0.0497	2.991	0.012	0.0009	0.039	0.013	0.0009	0.049	0.005	0.0004	0.014	2.15	0.1535	7.909
Sulfate	96.1	2	11.3	0.2353	12.6	11.1	0.2311	13.9	17.1	0.3560	16.4	13.7	0.2852	15.0	15.6	0.3248	13.2	13.7	0.2852	14.7
	Total Anions (meq/L)			**1.9**			**1.7**			**2.2**			**1.9**			**2.5**			**1.9**	
	Total Ions (meq/L)			**3.9**			**3.4**			**4.5**			**4.0**			**5.2**			**4.0**	
	Cation/Anion Ratio			**1.09**			**1.06**			**1.08**			**1.09**			**1.11**			**1.06**	
	Percent Difference			**4.19**			**2.77**			**3.63**			**4.24**			**4.99**			**3.00**	

Table I-4 (*continued*)

Unit D Aquifer: Ion Balance Summary for Groundwater

July 1, 2019 - September 30, 2019

		Well #	**MW-7**			**MW-12**			**MW-19**			**MW-26**			**MW-29**			**MW-34**		
		Sample Date	8/29/2019			8/15/2019			8/14/2019			8/30/2019			8/29/2019			8/29/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.61			7.23			7.56			7.75			7.25			7.1		
Conductance	--		189.3			168.9			218.7			192.1			242.3			197.9		
TDS	--		134			120			142			136			147			139		
Calcium	40.1	2	15.1	0.7535	39.3	11.6	0.5788	35.0	14.6	0.7285	33.0	16.6	0.8283	43.5	19.2	0.9581	38.4	13	0.6487	33.3
Magnesium	24.3	2	9.77	0.8039	41.9	9.45	0.7776	47.0	13.5	1.1109	50.3	7.27	0.5982	31.4	14.1	1.1603	46.6	11.8	0.9710	49.9
Potassium	39.1	1	2.65	0.0678	3.5	1.83	0.0468	2.8	2.38	0.0609	2.8	2.99	0.0765	4.0	2.11	0.0540	2.2	1.48	0.0379	1.9
Sodium	23.0	1	6.16	0.2679	14.0	5.73	0.2492	15.1	6.57	0.2858	12.9	8.64	0.3758	19.7	6.5	0.2827	11.3	6.61	0.2875	14.8
Iron	55.8	2	0.005	0.0002	0.01	0.005	0.0002	0.01	0.0412	0.0015	0.07	0.0968	0.0035	0.18	0.932	0.0334	1.34	0.005	0.0002	0.01
Manganese	54.9	2	0.126	0.0046	0.24	5E-05	0.0000	0.00	0.481	0.0175	0.79	0.0617	0.0022	0.12	0.0978	0.0036	0.14	0.000228	0.0000	0.00
Ammonia-N	14.0	1	0.261	0.0186	0.97	0.001	0.0001	0.00	0.0325	0.0023	0.11	0.298	0.0213	1.12	0.0024	0.0002	0.01	0.001	0.0001	0.00
	Total Cations (meq/L)			**1.9**			**1.7**			**2.2**			**1.9**			**2.5**			**1.9**	
Anion Parameters	Molecular Weight (g/mol)	n																		
Alkalinity, Total	--		76.5			66.3			84.5			74			99.4			67.4		
Carbonate	60.0	2	0.187	0.0062	0.3351	0.068	0.0023	0.1335	0.184	0.0061	0.2820	0.249	0.0083	0.4447	0.106	0.0035	0.1469	0.05096751	0.0017	0.0887
Bicarbonate	61.0	1	93.0	1.5235	82.1	80.7	1.3235	78.4	102.7	1.6836	77.5	89.8	1.4715	78.9	121.1	1.9842	82.4	82.1	1.3461	70.3
Chloride	35.5	1	3.36	0.0948	5.1	3.2	0.0903	5.3	4.59	0.1295	6.0	3.75	0.1058	5.7	3.6	0.1015	4.2	5.01	0.1413	7.4
Nitrate-N	14.0	1	0.016	0.0011	0.062	0.742	0.0530	3.139	0.005	0.0004	0.016	0.012	0.0009	0.046	0.005	0.0004	0.015	2.08	0.1485	7.756
Sulfate	96.1	2	11.1	0.2311	12.4	10.5	0.2186	13.0	17	0.3540	16.3	13.4	0.2790	15.0	15.3	0.3186	13.2	13.3	0.2769	14.5
	Total Anions (meq/L)			**1.9**			**1.7**			**2.2**			**1.9**			**2.4**			**1.9**	
	Total Ions (meq/L)			**3.8**			**3.3**			**4.4**			**3.8**			**4.9**			**3.9**	
	Cation/Anion Ratio			**1.03**			**0.98**			**1.02**			**1.02**			**1.03**			**1.02**	
	Percent Difference			**1.58**			**-1.04**			**0.77**			**1.07**			**1.71**			**0.80**	

Table I-4 (*continued*)

Unit D Aquifer: Ion Balance Summary for Groundwater

October 1, 2019 - December 31, 2019

		Well #	**MW-7**			**MW-12**			**MW-19**			**MW-26**			**MW-29**			**MW-34**		
		Sample Date	11/4/2019			11/4/2019			11/4/2019			11/5/2019			11/4/2019			11/5/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.13			6.89			7.56			7.82			7.32			6.87		
Conductance	--		189.4			168.3			219.5			191.6			242.4			197.1		
TDS	--		136			124			147			139			160			135		
Calcium	40.1	2	16.3	0.8134	40.7	12.3	0.6138	35.5	15.5	0.7735	33.5	18.7	0.9331	44.1	20.9	1.0429	39.7	14.6	0.7285	34.1
Magnesium	24.3	2	9.95	0.8188	41.0	9.74	0.8015	46.4	14	1.1520	49.9	8.06	0.6632	31.4	14.6	1.2014	45.7	12.8	1.0533	49.3
Potassium	39.1	1	2.83	0.0724	3.6	1.92	0.0491	2.8	2.51	0.0642	2.8	3.29	0.0841	4.0	2.26	0.0578	2.2	1.68	0.0430	2.0
Sodium	23.0	1	6.23	0.2710	13.6	6.04	0.2627	15.2	6.82	0.2967	12.9	9.4	0.4089	19.3	6.74	0.2932	11.2	7.18	0.3123	14.6
Iron	55.8	2	0.013	0.0005	0.02	0.005	0.0002	0.01	0.0445	0.0016	0.07	0.129	0.0046	0.22	0.842	0.0302	1.15	0.005	0.0002	0.01
Manganese	54.9	2	0.133	0.0048	0.24	0.00005	0.0000	0.00	0.494	0.0180	0.78	0.0686	0.0025	0.12	0.0883	0.0032	0.12	0.000232	0.0000	0.00
Ammonia-N	14.0	1	0.226	0.0161	0.81	0.001	0.0001	0.00	0.0295	0.0021	0.09	0.24	0.0171	0.81	0.0025	0.0002	0.01	0.001	0.0001	0.00
	Total Cations (meq/L)			**2.0**			**1.7**			**2.3**			**2.1**			**2.6**			**2.1**	
Anion Parameters	Molecular Weight (g/mol)	n																		
Alkalinity, Total	--		78.4			64.9			85.2			75.2			101			69.5		
Carbonate	59.9992	2	0.06352	0.00211736	0.11180293	0.03027528	0.00100919	0.06075963	0.18537157	0.00617913	0.28247183	0.29684682	0.00989503	0.5227845	0.12664675	0.00422161	0.17162851	0.03096303	0.00103211	0.0529709
Bicarbonate	61.0092	1	95.5188427	1.56564654	82.6707576	79.1164403	1.29679524	78.0753311	103.567078	1.69756492	77.6021698	91.1404115	1.4938798	78.9262414	122.962485	2.01547447	81.938525	84.7270418	1.38875845	71.2748148
Chloride	35.5	1	3.41	0.0962	5.1	3.2	0.0903	5.4	4.59	0.1295	5.9	3.8	0.1072	5.7	3.63	0.1024	4.2	5.03	0.1419	7.3
Nitrate-N	14.0	1	0.012	0.0009	0.045	0.731	0.0522	3.142	0.005	0.0004	0.016	0.01	0.0007	0.038	0.005	0.0004	0.015	1.93	0.1378	7.072
Sulfate	96.1	2	11	0.2290	12.1	10.6	0.2207	13.3	17	0.3540	16.2	13.5	0.2811	14.9	16.2	0.3373	13.7	13.4	0.2790	14.3
	Total Anions (meq/L)			**1.9**			**1.7**			**2.2**			**1.9**			**2.5**			**1.9**	
	Total Ions (meq/L)			**3.9**			**3.4**			**4.5**			**4.0**			**5.1**			**4.1**	
	Cation/Anion Ratio			**1.05**			**1.04**			**1.06**			**1.12**			**1.07**			**1.10**	
	Percent Difference			**2.65**			**1.96**			**2.68**			**5.51**			**3.32**			**4.62**	

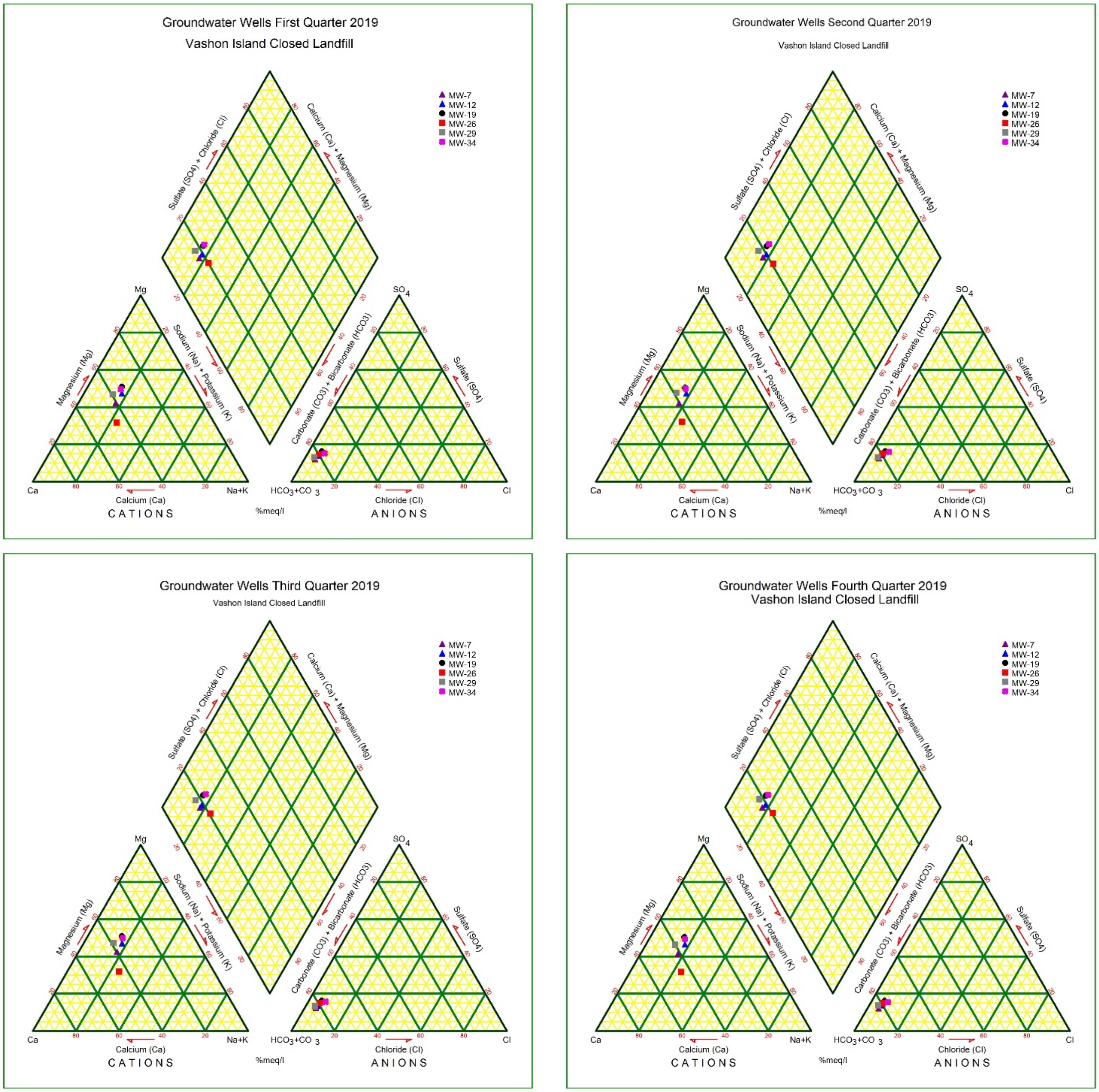

Figure I-4. Unit D Aquifer Trilinear Diagrams

Table I-5

Offiste Domestic Wells: Ion Balance Summary for Groundwater

January 1, 2019 - March 31, 2019

		Well #	**DW-85**			**DW-PA**		
		Sample Date	1/29/2019			1/29/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.54			7.31		
Conductance	--		151			186		
TDS	--		109			126		
Calcium	40.1	2	14.5	0.7236	44.4	13.4	0.6687	34.6
Magnesium	24.3	2	6.67	0.5489	33.7	11.3	0.9298	48.1
Potassium	39.1	1	2.67	0.0683	4.2	1.63	0.0417	2.2
Sodium	23.0	1	6.06	0.2636	16.2	6.77	0.2945	15.2
Iron	55.8	2	0.0763	0.0027	0.17	0.005	0.0002	0.01
Manganese	54.9	2	0.0547	0.0020	0.12	0.000332	0.0000	0.00
Ammonia-N	14.0	1	0.268	0.0191	1.18	0.001	0.0001	0.00
	Total Cations (meq/L)			**1.6**			**1.9**	
Anion Parameters	Molecular Weight (g/mol)	n						
Alkalinity, Total	--		69.8			68.4		
Carbonate	60.0	2	0.145	0.0048	0.3186	0.084	0.0028	0.151
Bicarbonate	61.0	1	84.9	1.3910	91.7	83.3	1.3650	73.9
Chloride	35.5	1	2.65	0.0747	4.9	5.72	0.1613	8.7
Nitrate-N	14.0	1	0.005	0.0004	0.024	1.19	0.0850	4.599
Sulfate	96.1	2	2.24	0.0466	3.1	11.2	0.2332	12.6
	Total Anions (meq/L)			**1.5**			**1.8**	
	Total Ions (meq/L)			**3.1**			**3.8**	
	Cation/Anion Ratio			**1.07**			**1.05**	
	Percent Difference			**3.52**			**2.32**	

Table I-5 (*continued*)

Offiste Domestic Wells: Ion Balance Summary for Groundwater

July 1, 2019 - September 30, 2019

		Well #	**DW-85**			**DW-PA**		
		Sample Date	8/16/2019			8/16/2019		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.19			6.88		
Conductance	--		152.6			187		
TDS	--		109			127		
Calcium	40.1	2	13.4	0.6687	44.2	12.7	0.6337	34.5
Magnesium	24.3	2	6.23	0.5127	33.9	10.8	0.8887	48.4
Potassium	39.1	1	2.44	0.0624	4.1	1.52	0.0389	2.1
Sodium	23.0	1	5.66	0.2462	16.3	6.33	0.2753	15.0
Iron	55.8	2	0.0626	0.0022	0.15	0.005	0.0002	0.01
Manganese	54.9	2	0.0527	0.0019	0.13	0.000455	0.0000	0.00
Ammonia-N	14.0	1	0.283	0.0202	1.33	0.001	0.0001	0.00
	Total Cations (meq/L)			**1.5**			**1.8**	
Anion Parameters	Molecular Weight (g/mol)	n						
Alkalinity, Total	--		68.8			67.6		
Carbonate	60.0	2	0.064	0.0021	0.1425	0.031	0.0010	0.056
Bicarbonate	61.0	1	83.8	1.3737	91.7	82.4	1.3508	74.0
Chloride	35.5	1	2.66	0.0750	5.0	5.62	0.1585	8.7
Nitrate-N	14.0	1	0.005	0.0004	0.024	1.19	0.0850	4.657
Sulfate	96.1	2	2.21	0.0460	3.1	11	0.2290	12.6
	Total Anions (meq/L)			**1.5**			**1.8**	
	Total Ions (meq/L)			**3.0**			**3.7**	
	Cation/Anion Ratio			**1.01**			**1.01**	
	Percent Difference			**0.57**			**0.34**	

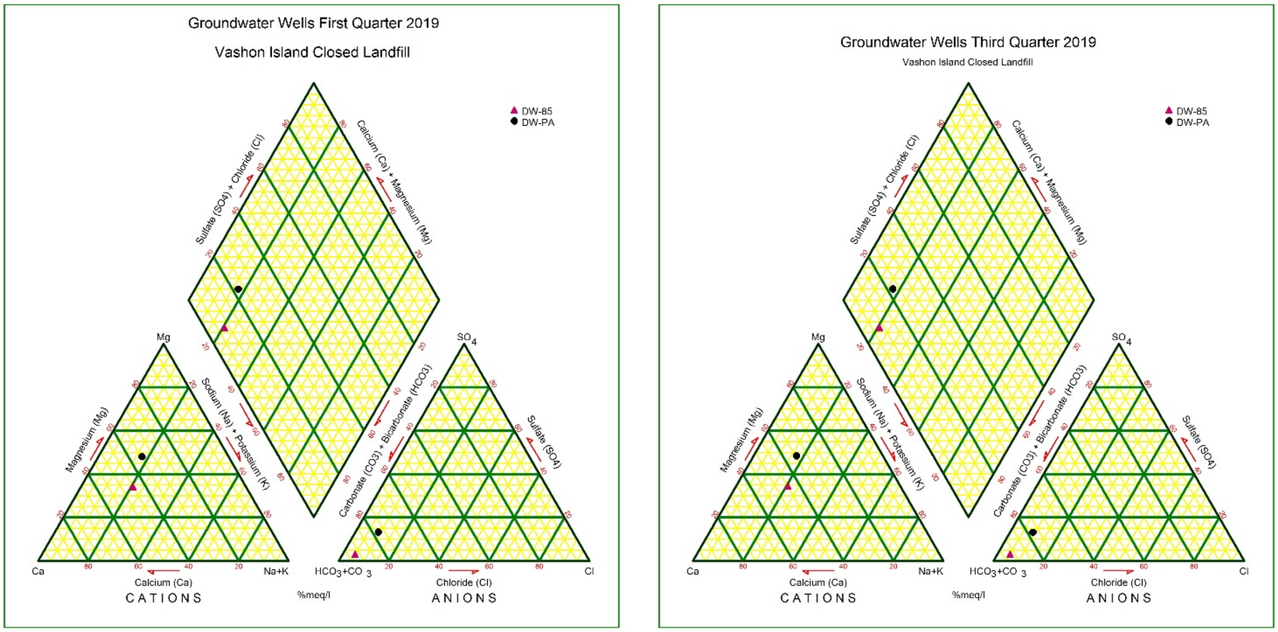

Figure I-5. Private Wells Trilinear Diagrams

Appendix J

Surface Water Monitoring Data

Table J-1
Surface Water - Field Parameters

Surface Water - Field Parameters			Specific Conductance (Field)	Dissolved Oxygen (DO) (Field)	Oxidation-Reduction Potential (ORP) (Field)	pH (Field)	Temperature (Field)	Turbidity (Field)
Site ID	Sample Date	Sample ID	(std. Units)	(mg/L)	(mV)	(µmhos/cm)	(°C)	(NTU)
SW-E	3/20/2019	SVE-190320Q	206.1	11.57	88.6	8.1	8.06	5.88
SW-E	6/18/2019	SVE-190618Q	220.4	10.72	227.4	7.28	12.17	8.28
SW-E	8/29/2019	SVE-190829Q	223.8	10.36	73.3	7.68	13.26	5.58
SW-E	11/7/2019	SVE-191107Q	217.4	13.22	220.8	7.05	9.1	3.11
SW-W1	3/20/2019	SVW1190320Q	194.7	9.79	-27.8	7.42	8.62	10.3
SW-W1	6/18/2019	SVW1190618Q	214.3	8.29	160.9	7.46	13.67	14.6
SW-W1	8/29/2019	SVW1190829Q	228.6	8.52	-26.5	7.86	15.38	8.94
SW-W1	11/7/2019	SVW1191107Q	216.1	11.32	-29.5	7.78	8.93	12.4
SW-W2	3/20/2019	SVW2190320Q	466.3	10.97	194.8	8.34	8.89	14.9
SW-W2	6/18/2019	SVW2190618Q	597.9	10.16	299	7.66	12.95	54.1
SW-W2	8/29/2019	SVW2190829Q	623	9.77	152.8	7.72	14.27	8.94
SW-W2	11/7/2019	SVW2191107D	608	13.01	126.4	7.66	8.77	0.42
SW-W2	11/7/2019	SVW2191107Q	608	13.01	126.4	7.66	8.77	0.42
SW-W3	3/20/2019	SVW3190320Q	267.3	10.72	46.8	7.94	9.39	8.14
SW-W3	6/18/2019	SVW3190618Q	295.6	10.24	259.5	7.63	12.48	37.5
SW-W3	8/29/2019	SVW3190829Q	307.2	9.93	181.2	7.05	13.36	3.21
SW-W3	11/7/2019	SVW3191107Q	304.3	12.48	31.3	7.77	9.99	31.8
FIELD BLANK	6/18/2019	SVE-190618F	1	--	--	7.94	--	--

Table J-2
Surface Water - Conventionals

Surface Water - Conventionals			Alkalinity, Total (as $CaCO_3$)	Ammonia as N	Biological Oxygen Demand - 5 Day	Chemical Oxygen Demand	Chloride	Coliforms, Fecal	Coliforms, Total	Cyanide	Fluoride	Hardness	Nitrate	Nitrate + Nitrite as N	Phosphorous, Soluble Reactive	Phosphorus, Total as P	Specific Conductance	Sulfate	Total Dissolved Solids	Total Kjeldahl Nitrogen	Total Organic Carbon	Total Solids	Total Suspended Solids	Turbidity
Site ID	Sample Date	Sample ID	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(CFU/100 mL)	(CFU/100 mL)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	µmhos/cm	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(NTU)
SW-E	3/20/2019	SVE-190320Q	--	--	--	--	--	--	--	--	--	92.9	--	--	--	--	212	--	--	--	--	--	--	7.11
SW-E	6/18/2019	SVE-190618Q	--	--	--	--	--	--	--	--	--	97.6	--	--	--	--	220	--	--	--	--	--	--	10.8
SW-E	8/29/2019	SVE-190829Q	--	--	--	--	--	--	--	--	--	103	--	--	--	--	221	--	--	--	--	--	--	5.55
SW-E	11/7/2019	SVE-191107Q	--	--	--	--	--	--	--	--	--	102	--	--	--	--	219	--	--	--	--	--	--	5.46
SW-W1	3/20/2019	SVW1190320Q	73.2	0.0169	2 U	13 T	6.98	1	220 C	0.002 SU	0.02 U	88.7	1.25	1.25	0.0281	0.0833	202	9.06	142 H	0.627	3.98	175	31.2	18.7
SW-W1	6/18/2019	SVW1190618Q	88	0.0196	2 R	13 T	7.07	300	630	0.002 U	0.02 U	88.8	0.644	0.644	0.0527	0.198	212	9.01	153	0.465	4.82	172	31.8	16.3
SW-W1	8/29/2019	SVW1190829Q	91.1	0.0278	2 U	16 T	6.7	20 C	270	0.002 U	0.02 U	103	0.286	0.286	0.056	0.192	223	9.56	155	0.275	4.26	188	12.6	12.7
SW-W1	11/7/2019	SVW1191107Q	84.6	0.0202	2 U	13 T	7.66	3	380	0.002 U	0.02 U	98.4	0.3	0.3	0.0487	0.157	215	10.5	157	0.266	4.29	170	10.4	8.21
SW-W2	3/20/2019	SVW2190320Q	276	0.0054 T	2 U	12 T	18.6	8	150	0.002 SU	0.02 U	296	0.182	0.183	0.00855	0.0657	592	15	359	0.256	4.71	392	29	19
SW-W2	6/18/2019	SVW2190618Q	311	0.0061 T	2 R	31.1	18.8	300	1600	0.002 U	0.02 U	315	0.128	0.128	0.0186	0.217	606	13.7	360	0.799	9.03	456	82.3	59.1
SW-W2	8/29/2019	SVW2190829Q	306	0.0055 T	2 U	16 T	17.3	14	180	0.002 U	0.02 U	333	0.089	0.0891	0.0149	0.0787	615	12.2	392	0.268	3.66	437	79.8	16.2
SW-W2	11/7/2019	SVW2191107D	296	0.0033 T	2 U	11 T	19	1 U	50 C	0.002 U	0.02 U	318	0.072	0.0724	0.0148	0.0383	604	15	379	0.222	5.25	397	7.3	4.85
SW-W2	11/7/2019	SVW2191107Q	295	0.0032 T	2 U	13 T	18.7	1	80	0.002 U	0.02 U	324	0.066	0.066	0.0148	0.0401	603	14.7	379	0.2 T	5.12	390	8	5.02
SW-W3	3/20/2019	SVW3190320Q	115	0.0065 T	2 U	12 T	8.47	1 U	20	0.002 U	0.026 T	129	0.417	0.417	0.0491	0.124	284	12.4	184	0.224	4.43	210	20.2	7.91
SW-W3	6/18/2019	SVW3190618Q	130	0.0085 T	2 R	43.9	8.45	13	110 C	0.002 U	0.02 U	142	0.254	0.254	0.0707	0.481	290	12.2	184 J	0.905	14.4	480 J	28.3 J	48.4
SW-W3	8/29/2019	SVW3190829Q	130	0.0055 T	2 U	11 T	8.65	1 C	99	0.002 U	0.02 U	143	0.228	0.228	0.078	0.125	300	11.7	204	0.14 T	3.61	219	12.8	4.95
SW-W3	11/7/2019	SVW3191107Q	136	0.0052 T	2 U	17 T	9.72	3	90	0.002 U	0.02 U	159	0.202	0.202	0.0645	0.213	315	13	214	0.231	3.45	313	130	31.2
FIELD BLANK	6/18/2019	SVE-190618F	--	--	--	--	--	--	--	--	--	0.331 U	--	--	--	--	1.4 T	--	--	--	--	--	--	0.2 U

Table J-3
Surface Water - Metals (Dissolved & Total)

Site ID	Sample Date	Sample ID	Aluminum, Dissolved (mg/L)	Aluminum, Total (mg/L)	Antimony, Dissolved (mg/L)	Antimony, Total (mg/L)	Arsenic, Dissolved (mg/L)	Arsenic, Total (mg/L)	Barium, Dissolved (mg/L)	Barium, Total (mg/L)	Beryllium, Dissolved (mg/L)	Beryllium, Total (mg/L)	Cadmium, Dissolved (mg/L)	Cadmium, Total (mg/L)
SW-E	3/20/2019	SVE-190320Q	0.0121	0.202	0.0003 U	0.0003 U	0.00169	0.00191	0.00488	0.00655	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-E	6/18/2019	SVE-190618Q	0.00909	0.233	0.0003 U	0.0003 U	0.00194	0.00234	0.00476	0.00762	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-E	8/29/2019	SVE-190829Q	0.0129	0.167	0.0003 U	0.0003 U	0.00218	0.00235	0.00495	0.00628	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-E	11/7/2019	SVE-191107Q	0.00871	0.155	0.0003 U	0.0003 U	0.00189	0.00197	0.00496	0.00579	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-W1	3/20/2019	SVW1190320Q	0.005 U	0.146	0.0003 U	0.0003 U	0.00208	0.00348	0.000759	0.00345	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-W1	6/18/2019	SVW1190618Q	0.005 U	0.189	0.0003 U	0.0003 U	0.00375	0.00635	0.00101	0.00523	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-W1	8/29/2019	SVW1190829Q	0.005 U	0.146	0.0003 U	0.0003 U	0.00502	0.00832	0.000834	0.00408	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-W1	11/7/2019	SVW1191107Q	0.005 U	0.116	0.0003 U	0.0003 U	0.00419	0.00703	0.000888	0.0032	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-W2	3/20/2019	SVW2190320Q	0.005 U	0.144	0.0003 U	0.0003 U	0.00116	0.00297	0.00356	0.00958	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-W2	6/18/2019	SVW2190618Q	0.005 U	0.501	0.0003 U	0.0003 U	0.00136	0.00861	0.00346	0.0281	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-W2	8/29/2019	SVW2190829Q	0.005 U	0.102	0.0003 U	0.0003 U	0.00157	0.0027	0.00386	0.00755	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-W2	11/7/2019	SVW2191107D	0.005 U	0.0516	0.0003 U	0.0003 U	0.00128	0.00178	0.00351	0.00518	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-W2	11/7/2019	SVW2191107Q	0.0134	0.0487	0.0003 U	0.0003 U	0.00128	0.00179	0.00354	0.00506	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-W3	3/20/2019	SVW3190320Q	0.005 U	0.204	0.0003 U	0.0003 U	0.00302	0.00419	0.00366	0.00732	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-W3	6/18/2019	SVW3190618Q	0.005 U	1.73	0.0003 U	0.0003 U	0.00333	0.00888	0.00297	0.0306	0.0001 U	0.0001 U	5E-05 U	0.0000554
SW-W3	8/29/2019	SVW3190829Q	0.005 U	0.0918	0.0003 U	0.0003 U	0.00366	0.00449	0.00327	0.00577	0.0001 U	0.0001 U	5E-05 U	5E-05 U
SW-W3	11/7/2019	SVW3191107Q	0.005 U	2.69	0.0003 U	0.0003 U	0.00369	0.00863	0.00475	0.0316	0.0001 U	0.0001 U	5E-05 U	5E-05 U
FIELD BLANK	6/18/2019	SVE-190618F	0.005 U	0.005 U	0.0003 U	0.0003 U	5E-05 U	5E-05 U	0.0005 U	0.0005 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U

Site ID	Sample Date	Sample ID	Calcium, Dissolved (mg/L)	Calcium, Total (mg/L)	Chromium, Dissolved (mg/L)	Chromium, Total (mg/L)	Cobalt, Dissolved (mg/L)	Cobalt, Total (mg/L)	Copper, Dissolved (mg/L)	Copper, Total (mg/L)	Iron, Dissolved (mg/L)	Iron, Total (mg/L)	Lead, Dissolved (mg/L)	Lead, Total (mg/L)	Magnesium, Dissolved (mg/L)	Magnesium, Total (mg/L)	Manganese, Dissolved (mg/L)	Manganese, Total (mg/L)
SW-E	3/20/2019	SVE-190320Q	15.2	15.2	0.0012	0.00178	5E-05 U	0.000147	0.000313	0.000626	0.0378	0.372	0.0001 U	0.000259	13.6	13.4	0.00616	0.0416
SW-E	6/18/2019	SVE-190618Q	15.4	16.3	0.0011	0.00198	5E-05 U	0.000185	0.000246	0.000732	0.0382	0.526	0.0001 U	0.000396	13.3	13.8	0.00767	0.0817
SW-E	8/29/2019	SVE-190829Q	16.5	16.6	0.0013	0.00187	5E-05 U	0.000126	0.000222	0.000508	0.0545	0.357	0.0001 U	0.000228	14.7	15	0.0104	0.0542
SW-E	11/7/2019	SVE-191107Q	17	16.7	0.00122	0.00171	5E-05 U	1.15E-04	0.00025	0.000459	0.0461	0.29	0.0001 U	0.000183	15	14.8	0.00953	0.0359
SW-W1	3/20/2019	SVW1190320Q	15.6	15.9	0.000328	0.000939	0.0000556	4.38E-04	0.000257	0.000708	0.127	1.39	0.0001 U	0.000496	11.8	11.9	0.165	0.476
SW-W1	6/18/2019	SVW1190618Q	16.3	16.4	0.000234	0.00112	0.0000926	6.37E-04	0.000266	0.000821	0.147	1.96	0.0001 U	0.000668	11.6	11.6	0.375	0.823
SW-W1	8/29/2019	SVW1190829Q	18.5	19	0.000224	0.000929	0.0000847	5.05E-04	0.0002 U	0.000658	0.249	2.33	0.0001 U	0.00044	13.4	13.6	0.497	0.96
SW-W1	11/7/2019	SVW1191107Q	18	17.8	0.0002 U	0.000768	0.0000882	4.15E-04	0.000258	0.000614	0.273	2.07	0.0001 U	0.000429	13.6	13.1	0.545	0.861
SW-W2	3/20/2019	SVW2190320Q	49.2	50.4	0.0002 U	0.000595	5E-05 U	2.14E-04	0.000223	0.000514	0.0127	2.35	0.0001 U	0.000278	41.6	41.3	0.0291	0.461
SW-W2	6/18/2019	SVW2190618Q	51.1	55.4	0.000219	0.00169	5E-05 U	7.22E-04	0.000342	0.00147	0.0115	9.07	0.0001 U	0.00114	41	42.9	0.021	1.9
SW-W2	8/29/2019	SVW2190829Q	57.1	54.9	0.000244	0.000455	5E-05 U	1.52E-04	0.0002 U	0.000429	0.0284	1.53	0.0001 U	0.000175	46.1	47.6	0.0657	0.356
SW-W2	11/7/2019	SVW2191107D	55.6	54	0.000205	0.000337	5E-05 U	1.03E-04	0.0002 U	0.000266	0.0275	0.732	0.0001 U	0.00013	46.5	44.5	0.056	0.223
SW-W2	11/7/2019	SVW2191107Q	56.1	54.7	0.000208	0.000328	5E-05 U	1.01E-04	0.000271	0.00027	0.031	0.708	0.0001 U	0.000122	46.6	45.6	0.0571	0.215
SW-W3	3/20/2019	SVW3190320Q	21.5	21.8	0.000241	0.000853	0.0000687	3.02E-04	0.000395	0.000671	0.0344	0.898	0.0001 U	0.000448	18.2	18	0.322	0.593
SW-W3	6/18/2019	SVW3190618Q	22.5	24.7	0.000259	0.00487	0.0000521	1.73E-03	0.000243	0.00321	0.0181	4.52	0.0001 U	0.00217	17.8	19.4	0.224	2.14
SW-W3	8/29/2019	SVW3190829Q	23.9	23.9	0.000252	0.000519	0.0000598	1.72E-04	0.000296	0.000962	0.0263	0.51	0.0001 U	0.000229	20.1	20.3	0.249	0.475
SW-W3	11/7/2019	SVW3191107Q	26.5	26.7	0.0002 U	0.0064	0.000107	2.00E-03	0.000201	0.00394	0.0198	5.43	0.0001 U	0.00177	22.3	22.4	0.581	2.02
FIELD BLANK	6/18/2019	SVE-190618F	0.05 U	0.05 U	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	0.05 U	0.05 U	0.0001 U	0.0001 U

Site ID	Sample Date	Sample ID	Mercury, Total (mg/L)	Nickel, Dissolved (mg/L)	Nickel, Total (mg/L)	Potassium, Dissolved (mg/L)	Potassium, Total (mg/L)	Selenium, Dissolved (mg/L)	Selenium, Total (mg/L)	Silver, Dissolved (mg/L)	Silver, Total (mg/L)	Sodium, Dissolved (mg/L)	Sodium, Total (mg/L)	Thallium, Dissolved (mg/L)	Thallium, Total (mg/L)	Tin, Dissolved (mg/L)	Tin, Total (mg/L)	Vanadium, Dissolved (mg/L)	Vanadium, Total (mg/L)	Zinc, Dissolved (mg/L)	Zinc, Total (mg/L)
SW-E	3/20/2019	SVE-190320Q	--	0.000545	0.0011	1.8	1.76	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.96	6.74	0.0001 U	0.0001 U	0.0005 U	0.0005 U	0.00274	0.00339	0.0005 U	0.000942
SW-E	6/18/2019	SVE-190618Q	--	0.000496	0.00128	1.89	1.95	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.61	6.94	0.0001 U	0.0001 U	0.0005 U	0.0005 U	0.00279	0.00372	0.00106	0.00119
SW-E	8/29/2019	SVE-190829Q	--	0.000534	0.00101	2.05	2.04	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.35	7.43	0.0001 U	0.0001 U	0.0005 U	0.0005 U	0.00304 D	0.00361 D	0.00131	0.00147
SW-E	11/7/2019	SVE-191107Q	--	0.000497	0.000989 D	2.14	1.99	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	7.65	7.26	0.0001 DU	0.0001 U	0.0005 U	0.0005 U	0.00257 D	0.00313	0.0005 U	0.00123
SW-W1	3/20/2019	SVW1190320Q	5E-05 U	0.000574	0.00214	0.945	0.944	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.2	7.22	0.0001 U	0.0001 U	0.0005 U	0.0005 U	0.000358	0.0012	0.000508	0.00162
SW-W1	6/18/2019	SVW1190618Q	5E-05 U	0.000707	0.00276	1.22	1.21	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.95	6.79	0.0001 U	0.0001 U	0.0005 U	0.0005 U	0.000422	0.00158	0.000999 J	0.00244
SW-W1	8/29/2019	SVW1190829Q	5E-05 U	0.000695	0.0022	1.34	1.34	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.75	7.92	0.0001 U	0.0001 U	0.0005 U	0.0005 U	0.000401 D	0.00137 D	0.000929	0.00261
SW-W1	11/7/2019	SVW1191107Q	5E-05 DU	0.000664	0.00197 D	1.32	1.22	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	7.68	7.53	0.0001 DU	0.0001 U	0.0005 U	0.0005 U	0.00036 D	0.00105	0.000732	0.00214
SW-W2	3/20/2019	SVW2190320Q	5E-05 U	0.00175	0.00243	2.82	2.88	0.0005 U	0.0005 U	4E-05 U	4E-05 U	15.4	15.4	0.0001 U	0.0001 U	0.0005 U	0.0005 U	0.000334	0.000853	0.0005 U	0.000955
SW-W2	6/18/2019	SVW2190618Q	5E-05 U	0.00183	0.00441	2.9	3.04	0.0005 U	0.0005 U	4E-05 U	4E-05 U	15	15.7	0.0001 U	0.0001 U	0.0005 U	0.0005 U	0.000322	0.00223	0.00105	0.00291
SW-W2	8/29/2019	SVW2190829Q	5E-05 U	0.00199	0.00249	3.41	3.34	0.0005 U	0.0005 U	4E-05 U	4E-05 U	16.9	17.3	0.0001 U	0.0001 U	0.0005 U	0.0005 U	0.000318 D	0.000655 D	0.000544	0.000966
SW-W2	11/7/2019	SVW2191107D	5E-05 DU	0.00203	0.00223 D	3.41	3.16	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	17.4	16.6	0.0001 DU	0.0001 U	0.0005 U	0.0005 U	0.000376 D	0.000551	0.000672	0.000527
SW-W2	11/7/2019	SVW2191107Q	5E-05 DU	0.00209	0.00216 D	3.45	3.22	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	17.5	16.9	0.0001 DU	0.0001 U	0.0005 U	0.0005 U	0.000382 D	0.000529	0.00147	0.000676
SW-W3	3/20/2019	SVW3190320Q	5E-05 U	0.000818	0.00179	1.93	1.92	0.0005 U	0.0005 U	4E-05 U	4E-05 U	8.6	8.65	0.0001 U	0.0001 U	0.0005 U	0.0005 U	0.000606	0.00144	0.000697	0.000994
SW-W3	6/18/2019	SVW3190618Q	5E-05 U	0.000826	0.00858	2.2	2.4	0.0005 U	0.0005 U	4E-05 U	4E-05 U	8.48	8.9	0.0001 U	0.0001 U	0.0005 U	0.0005 U	0.000559	0.00599	0.00115	0.00719
SW-W3	8/29/2019	SVW3190829Q	5E-05 U	0.000869	0.00132	2.42	2.39	0.0005 U	0.0005 U	4E-05 U	4E-05 U	9.48	9.47	0.0001 U	0.0001 U	0.0005 U	0.0005 U	0.000553 D	0.00105 D	0.000581	0.00066
SW-W3	11/7/2019	SVW3191107Q	5E-05 DU	0.00102	0.0104 D	2.56	2.56	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	9.99	9.53	0.0001 DU	0.0001 U	0.0005 U	0.0005 U	0.000655 D	0.00787	0.0005 U	0.00849
FIELD BLANK	6/18/2019	SVE-190618F	--	0.0001 U	0.0001 U	0.1 U	0.1 U	0.0005 U	0.0005 U	4E-05 U	4E-05 U	0.1 U	0.1 U	0.0001 U	0.0001 U	0.0005 U	0.0005 U	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U

Table J-4
Surface Water - Volatile Organic Compounds

Site ID	Sample Date	Sample ID	1,1,1,2-Tetrachloro-ethane 630-20-6 (µg/L)	1,1,1-Trichloro-ethane 71-55-6 (µg/L)	1,1,2,2-Tetrachloro-ethane 79-34-5 (µg/L)	1,1,2-Trichloro-ethane 79-00-5 (µg/L)	1,1-Dichloro-ethane 75-34-3 (µg/L)	1,1-Dichloro-ethene 75-35-4 (µg/L)	1,2,3-Trichloro-propane 96-18-4 (µg/L)	1,2-Dibromo-3-Chloro-propane 96-12-8 (µg/L)	1,2-Dibromo-ethane 106-93-4 (µg/L)	1,2-Dichloro-benzene 95-50-1 (µg/L)	1,2-Dichloro-ethane 107-06-2 (µg/L)	1,2-Dichloro-propane 78-87-5 (µg/L)	1,4-Dichloro-benzene 106-46-7 (µg/L)	2-Butanone 78-93-3 (µg/L)	2-Hexanone 591-78-6 (µg/L)	4-Methyl-2-Pentanone 108-10-1 (µg/L)	Acetone 67-64-1 (µg/L)	Acrylonitrile 107-13-1 (µg/L)	Benzene 71-43-2 (µg/L)	Bromo-chloro-methane 74-97-5 (µg/L)	Bromo-dichloro-methane 75-27-4 (µg/L)	Bromofor m 75-25-2 (µg/L)	Bromo-methane 74-83-9 (µg/L)	Carbon Disulfide 75-15-0 (µg/L)	Carbon Tetra-chloride 56-23-5 (µg/L)
SW-E	3/20/2019	SVE-190320Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SW-E	6/18/2019	SVE-190618Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SW-E	8/29/2019	SVE-190829Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SW-E	11/7/2019	SVE-191107Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SW-W1	3/20/2019	SVW1190320Q	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
SW-W1	6/18/2019	SVW1190618Q	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
SW-W1	8/29/2019	SVW1190829Q	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
SW-W1	11/7/2019	SVW1191107Q	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
SW-W2	3/20/2019	SVW2190320Q	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
SW-W2	6/18/2019	SVW2190618Q	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
SW-W2	8/29/2019	SVW2190829Q	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
SW-W2	11/7/2019	SVW2191107D	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
SW-W2	11/7/2019	SVW2191107Q	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
SW-W3	3/20/2019	SVW3190320Q	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
SW-W3	6/18/2019	SVW3190618Q	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	4.27 BJT	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
SW-W3	8/29/2019	SVW3190829Q	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
SW-W3	11/7/2019	SVW3191107Q	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
FIELD BLANK	6/18/2019	SVE-190618F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	3/19/2019	VTRP190320Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	3/19/2019	VTRP190320Y2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	6/17/2019	VTRP190618Y	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	6/17/2019	VTRP190618Y2	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	8/29/2019	VTRP190829X2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	8/29/2019	VTRP190829Y2	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U
VOA TRIP BLANK	11/6/2019	VTRP191107X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	11/7/2019	VTRP191107Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U

Site ID	Sample Date	Sample ID	Chloro-benzene 108-90-7 (µg/L)	Chloro-dibromo-methane 124-48-1 (µg/L)	Chloro-ethane 75-00-3 (µg/L)	Chloroform 67-66-3 (µg/L)	Chloro-methane 74-87-3 (µg/L)	Cis-1-2-Dichloro-ethene 156-59-2 (µg/L)	Cis-1,3-Dichloro-propene 10061-01-5 (µg/L)	Dibromo-methane 74-95-3 (µg/L)	Dichloro-difluoro-methane 75-71-8 (µg/L)	Ethyl-benzene 100-41-4 (µg/L)	M & P Xylene MPX (µg/L)	Methyl Iodide 74-88-4 (µg/L)	Methylene Chloride 75-09-2 (µg/L)	O-Xylene 95-47-6 (µg/L)	Styrene 100-42-5 (µg/L)	Tetrachloro-ethene 127-18-4 (µg/L)	Toluene 108-88-3 (µg/L)	Trans-1-2-Dichloro-ethene 156-60-5 (µg/L)	Trans-1-3-Dichloro-propene 10061-02-6 (µg/L)	Trans-1-4-Dichloro-2-Butene 110-57-6 (µg/L)	Trichloro-ethene 79-01-6 (µg/L)	Trichloro-fluoro-methane 75-69-4 (µg/L)	Vinyl Acetate 108-05-4 (µg/L)	Vinyl Chloride 75-01-4 (µg/L)
SW-E	3/20/2019	SVE-190320Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 U
SW-E	6/18/2019	SVE-190618Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 U
SW-E	8/29/2019	SVE-190829Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 DU
SW-E	11/7/2019	SVE-191107Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 DU
SW-W1	3/20/2019	SVW1190320Q	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.0103 JT
SW-W1	6/18/2019	SVW1190618Q	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.0151 JT
SW-W1	8/29/2019	SVW1190829Q	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.0158 DJT
SW-W1	11/7/2019	SVW1191107Q	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.0228 D
SW-W2	3/20/2019	SVW2190320Q	0.1 U	0.5 U	0.1 U	0.1 U	0.437 JT	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
SW-W2	6/18/2019	SVW2190618Q	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
SW-W2	8/29/2019	SVW2190829Q	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
SW-W2	11/7/2019	SVW2191107D	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
SW-W2	11/7/2019	SVW2191107Q	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
SW-W3	3/20/2019	SVW3190320Q	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.0294
SW-W3	6/18/2019	SVW3190618Q	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.0424
SW-W3	8/29/2019	SVW3190829Q	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.0324 D
SW-W3	11/7/2019	SVW3191107Q	0.1 U	0.5 U	0.1 U	0.1 U	0.469 JT	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.0573 D
FIELD BLANK	6/18/2019	SVE-190618F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 U
VOA TRIP BLANK	3/19/2019	VTRP190320Y	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	3/19/2019	VTRP190320Y2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 U
VOA TRIP BLANK	6/17/2019	VTRP190618Y	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 U
VOA TRIP BLANK	6/17/2019	VTRP190618Y2	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/29/2019	VTRP190829X2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 DU
VOA TRIP BLANK	8/29/2019	VTRP190829Y2	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	11/6/2019	VTRP191107X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 DU
VOA TRIP BLANK	11/7/2019	VTRP191107Y	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 DU

Table J-5
Surface Water - Pesticides & Herbicides

Surface Water - Pesticides & Herbicides			2,4,5-T	2,4,5-TP Silvex	2,4-D	Dinoseb	Endrin	Lindane (Gamma	Methoxychlor	Toxaphene
Site ID	Sample	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
SW-W1	03/20/19	SVW1190320	0.0269	0.0269 U	0.0538 U	0.0269 U	0.0125	0.0125 U	0.0625 U	1.25 U
SW-W1	06/18/19	SVW1190618	0.0275	0.0275 U	0.0549 U	0.0275 U	0.0125	0.0125 U	0.0625 U	1.25 U
SW-W1	08/29/19	SVW1190829	0.0275	0.0275 U	0.0549 U	0.0275 U	0.0125	0.0125 U	0.0625 U	1.25 U
SW-W1	11/07/19	SVW1191107	0.0253	0.0253 U	0.0505 U	0.0253 U	0.0125	0.0125 U	0.0625 U	1.25 U
SW-W2	03/20/19	SVW2190320	0.0272	0.0272 U	0.0543 U	0.0272 U	0.0125	0.0125 U	0.0625 U	1.25 U
SW-W2	06/18/19	SVW2190618	0.0275	0.0275 U	0.0549 U	0.0275 U	0.0125	0.0125 U	0.0625 U	1.25 U
SW-W2	08/29/19	SVW2190829	0.0275	0.0275 U	0.0549 U	0.0275 U	0.0125	0.0125 U	0.0625 U	1.25 U
SW-W2	11/07/19	SVW2191107	0.0253	0.0253 U	0.0505 U	0.0253 U	0.0125	0.0125 U	0.0625 U	1.25 U
SW-W2	11/07/19	SVW2191107	0.0253	0.0253 U	0.0505 U	0.0253 U	0.0125	0.0125 U	0.0625 U	1.25 U
SW-W3	3/20/2019	SVW3190320Q	0.0269 U	0.0269 U	0.0538 U	0.0269 U	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W3	6/18/2019	SVW3190618Q	0.0275 U	0.0275 U	0.0549 U	0.0275 U	0.013 U	0.013 U	0.0651 U	1.3 U
SW-W3	8/29/2019	SVW3190829Q	0.0275 U	0.0275 U	0.0549 U	0.0275 U	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W3	11/7/2019	SVW3191107Q	0.0253 U	0.0253 U	0.0505 U	0.0253 U	0.0125 U	0.0125 U	0.0625 U	1.25 U

Appendix K

Leachate Monitoring Data

Table K-1
Leachate - Field Parameters

Leachate - Field Parameters			Specific Conductance (Field)	pH (Field)	Temperature (Field)	Turbidity (Field)
Site ID	Sample Date	Sample ID	(µmhos/cm)	(Std. pH Units)	(° C)	ntu
LS-B	3/19/2019	LVB-190319Q	3170	6.19	13.5	--
LS-B	6/18/2019	LVB-190618Q	3850	6.89	15.9	0.98
LS-B	8/29/2019	LVB-190829Q	4030	6.57	19.5	--
LS-B	11/7/2019	LVB-191107Q	3360	7.11	14.6	--
LS-LVT	03/20/19	LVT-190320P	342.2	6.42	10.6	--
LS-LVT	6/19/2019	LVT-190619P	301	7.25	16.4	--
LS-LVT	9/19/2019	LVT-190919P	415	6.58	17.3	--
LS-LVT	11/22/19	LVT-191122P	498.5	7.08	8.4	
LS-PS1	03/19/19	LVP-190319Q	277.6	7.11	8.8	--
LS-PS1	06/18/19	LVP-190618D	293.1	6.44	16.5	--
LS-PS1	06/18/19	LVP-190618Q	293.1	6.44	16.5	--
LS-PS1	8/29/2019	LVP-190829Q	243.4	7.03	20	--
LS-PS1	11/07/19	LVP-191107Q	475.3	6.7	9	--

Table K-2
Leachate - Conventionals

Leachate - Conventionals Site ID	Sample Date	Sample ID	Alkalinity, Total (as $CaCO_3$) (mg/L)	Ammonia as N (mg/L)	Biological Oxygen Demand - 5 Day (mg/L)	Chemical Oxygen Demand (mg/L)	Chloride (mg/L)	Coliforms, Fecal (CFU/100 mL)	Coliforms, Total (CFU/100 mL)	Cyanide (mg/L)	Fluoride (mg/L)	Nitrate + Nitrite as N (mg/L)	Phosphorous, Soluble Reactive (mg/L)
LS-B	03/19/19	LVB-190319Q	137	0.0023 T	2 U	37.7	408	1 U	1 U	0.008 U	0.02 U	72.3	0.0273
LS-B	06/18/19	LVB-190618Q	462	0.0044 T	2 R	55.1	549	1 U	90 CU	0.008 SU	0.02 U	87.3	0.0221
LS-B	08/29/19	LVB-190829Q	323	0.049	3.25 EL	70.1	499	1 U	990	0.002 U	0.2 U	77.6	0.00814
LS-B	11/07/19	LVB-191107Q	136	0.0034 T	2 U	44	450	1 U	2000	0.002 SU	0.02 U	71.5	0.0282
LS-PS1	03/26/18	LVP-180326Q	61.4	0.0734	2 U	11 T	8.82	1 U	180	0.008 U	0.039 T	0.523	0.0215
LS-PS1	06/18/19	LVP-190618D	20.8	0.508	2 R	26	21.8	1 U	200	0.008 U	0.0401	0.166	0.0186
LS-PS1	06/18/19	LVP-190618Q	21.2	0.475	2 R	25.2	21.5	1 U	280	0.008 U	0.039 T	0.166	0.0238
LS-PS1	08/29/19	LVP-190829Q	51.7	0.48 T	3.76	33.2	24.4	5	1200	0.002 U	0.0408	0.214	0.0592
LS-PS1	11/07/19	LVP-191107Q	118	0.0044 T	4.79	12 T	41.9	1 U	99	0.002 U	0.0789	0.199	0.0005 T
LS-LVT	03/29/18	LVT-180329P	--	--	--	--	--	--	--	--	--	--	--
LS-LVT	6/19/2019	LVT-190619P	--	--	--	--	--	--	--	--	--	--	--
LS-LVT	9/19/2019	LVT-190919P	--	--	--	--	--	--	--	--	--	--	--
LS-LVT	11/22/2019	LVT-191122P											

Leachate - Conventionals Site ID	Sample Date	Sample ID	Phosphorus, Total as P (mg/l)	Specific Conductance (µohms/cm)	Sulfate (mg/L)	Sulfide, Total (mg/L)	Total Fats, Oil, & Grease (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Organic Carbon (mg/L)	Total Suspended Solids (mg/L)	Total Volatile Solids (mg/L)	Volatile Suspended Solids (mg/L)
LS-B	3/19/2019	LVB-190319Q	1 U	3090	692	0.016 T	1.5 U	0.794	14.2	0.5 U	666	0.5 U
LS-B	6/18/2019	LVB-190618Q	0.1 U	4350	904	0.01 U	1.5 T	1.95	21.5	1.3	941	1 B
LS-B	8/29/2019	LVB-190829Q	1 U	4190	813	0.01 U	1.5 U	1.9	26.3	1 U	844	1 U
LS-B	11/7/2019	LVB-191107Q	0.102	3320	746	0.01 U	1.5 U	1.48	24.5	1.1	668	0.5 T
LS-PS1	3/26/2018	LVP-180326Q	0.1 U	208	16.9	0.1 U	4.8 BT	0.456	3.53	0.9 T	34.9	0.9 T
LS-PS1	6/18/2019	LVP-190618D	0.103	276	68	0.01 U	1.6 U	1.54	6.98	4	53.3	3.8 B
LS-PS1	6/18/2019	LVP-190618Q	0.11	277	67.3	0.01 U	1.5 U	1.49	7.69	4.1	50	3.8 B
LS-PS1	8/29/2019	LVP-190829Q	1 U	242	22.8	0.0555	1.5 U	1.24	10	1.9	62	1.7 B
LS-PS1	11/7/2019	LVP-191107Q	0.117	491	59.2	0.01 U	1.4 U	1.17	12.1	17	93.3	9.6
LS-LVT	3/29/2018	LVT-180329P	--	--	--	--	5.9 BT	--	--	--	--	--
LS-LVT	6/19/2019	LVT-190619P	--	--	--	--	1.8 U	--	--	--	--	--
LS-LVT	9/19/2019	LVT-190919P	--	--	--	--	1.8 U	--	--	--	--	--
LS-LVT	11/22/2019	LVT-191122P	--	--	--	--	1.8 U	--	--	--	--	--

Table K-3
Leachate - Metals (Total)

Leachate - Metals			Aluminum, Total (mg/L)	Antimony, Total (mg/L)	Arsenic, Total (mg/L)	Barium, Total (mg/L)	Beryllium, Total (mg/L)	Cadmium, Total (mg/L)	Calcium, Total (mg/L)	Chromium, Total (mg/L)	Cobalt, Total (mg/L)	Copper, Total (mg/L)	Iron, Total (mg/L)	Lead, Total (mg/L)
Site ID	Sample Date	Sample ID												
LS-B	3/19/2019	LVB-190319Q	0.05 U	0.003 U	0.00209	0.0477	0.001 U	0.0005 U	205	0.002 U	0.00249	0.0039	0.1 U	0.001 U
LS-B	6/18/2019	LVB-190618Q	0.00837	0.000561	0.00224	0.101	0.0001 U	0.000171	360 D	0.000601	0.00452	0.00569	0.0365	0.0001 U
LS-B	8/29/2019	LVB-190829Q	0.05 U	0.003 U	0.00177	0.0859	0.001 U	0.0005 U	307	0.002 U	0.00523	0.00796	0.1 U	0.001 U
LS-B	11/7/2019	LVB-191107Q	0.00642	0.00115	0.00214	0.0463	0.0001 U	0.0000755	226	0.00143	0.00385	0.00467	0.0648	0.0001 U
LS-PS1	3/19/2019	LVP-190319Q	0.0606	0.003 U	0.000899	0.0229	0.001 U	0.0005 U	28.3	0.002 U	0.0005 U	0.00232	0.103	0.001 U
LS-PS1	6/18/2019	LVP-190618D	0.266	0.00292	0.00411	0.0411	0.0001 U	5E-05 U	21.7	0.000625	0.000586	0.00231	0.741	0.000229
LS-PS1	6/18/2019	LVP-190618Q	0.26	0.00291	0.00413	0.0408	0.0001 U	5E-05 U	21.7	0.000583	0.000572	0.00235	0.725	0.00028
LS-PS1	8/29/2019	LVP-190829Q	0.05 U	0.003 U	0.00308	0.0611	0.001 U	0.0005 U	17.4	0.002 U	0.0005 U	0.002 U	0.282	0.001 U
LS-PS1	11/7/2019	LVP-191107Q	0.157	0.0003 U	0.00134	0.0377	0.0001 U	5E-05 U	48.5	0.000491	0.000326	0.00316	0.351	0.000544
LS-LVT	3/20/2019	LVT-190320P	--	--	0.00166	--	--	0.0005 U	--	0.002 U	--	0.00786	--	0.00225
LS-LVT	6/19/2019	LVT-190619P	--	--	0.00374	--	--	0.0005 U	--	0.002 U	--	0.00415	--	0.001 U
LS-LVT	9/19/2019	LVT-190919P	--	--	0.00387	--	--	0.0005 U	--	0.002 U	--	0.0065	--	0.0026
LS-LVT	11/22/2019	LVT-191122P	--	--	0.00297	--	--	0.000501 U	--	0.00295	--	0.0128	--	0.00366

Leachate - Metals			Magnesium, Total (mg/L)	Manganese, Total (mg/L)	Mercury, Total (mg/L)	Nickel, Total (mg/L)	Potassium, Total (mg/L)	Selenium, Total (mg/L)	Silver, Total (mg/L)	Sodium, Total (mg/L)	Thallium, Total (mg/L)	Tin, Total (mg/L)	Vanadium, Total (mg/L)	Zinc, Total (mg/L)
Site ID	Sample Date	Sample ID												
LS-B	3/19/2019	LVB-190319Q	129	0.001 U	0.0001 U	0.0536	33.6	0.005 U	0.0004 U	262	0.001 U	0.005 U	0.00104	0.0109
LS-B	6/18/2019	LVB-190618Q	223 D	0.00755	0.0001 U	0.0808	49.7	0.000655	4E-05 U	402 D	0.0001 DU	0.0005 U	0.000894	0.0508
LS-B	8/29/2019	LVB-190829Q	195	0.00352	0.0001 U	0.0972	48.6	0.005 U	0.0004 U	394	0.001 U	0.005 U	0.00106	0.0695
LS-B	11/7/2019	LVB-191107Q	147	0.0147	5E-05 U	0.0607 D	38.2	0.000627	4E-05 DU	488 D	0.0001 U	0.0005 U	0.000749	0.0154
LS-PS1	3/19/2019	LVP-190319Q	7.84	0.0155	0.0001 U	0.00396	3	0.005 U	0.0004 U	14.2	0.001 U	0.005 U	0.00075 U	0.005 JU
LS-PS1	6/18/2019	LVP-190618D	8.14	0.957	0.0001 U	0.00745	3.49	0.0005 U	4E-05 U	15.3	0.0001 DU	0.0005 U	0.000782	0.0321
LS-PS1	6/18/2019	LVP-190618Q	8.16	0.957	0.0001 U	0.00747	3.48	0.0005 U	4E-05 U	14.9	0.0001 DU	0.0005 U	0.000803	0.0324
LS-PS1	8/29/2019	LVP-190829Q	8.05	0.281	0.0001 U	0.00472	3.94	0.005 U	0.0004 U	18.3	0.001 U	0.005 U	0.00149	0.0063
LS-PS1	11/7/2019	LVP-191107Q	16.2	0.147	5E-05 U	0.00711 D	4.8	0.0005 U	4E-05 DU	30.8	0.0001 U	0.0005 U	0.000511	0.0121
LS-LVT	3/20/2019	LVT-190320P	--	--	--	0.00756	--	--	0.0004 U	--	--	--	--	0.0453
LS-LVT	6/19/2019	LVT-190619P	--	--	--	0.00628	--	--	0.0004 U	--	--	--	--	0.0338
LS-LVT	9/19/2019	LVT-190919P	--	--	--	0.00914	--	--	0.0004 U	--	--	--	--	0.0432
LS-LVT	9/19/2019	LVT-190919P	--	--	--	0.00914	--	--	0.0004 U	--	--	--	--	0.0432

Table K-4
Leachate - Volatile Organic Compounds

Leachate - Volatile Organic Compounds			1,1,1,2-Tetrachloro-ethane	1,1,1-Trichloro-ethane	1,1,2,2-Tetrachloro-ethane	1,1,2-Trichloro-ethane	1,1-Dichloro-ethane	1,1-Dichloro-ethene	1,1-Dichloro-propene	1,2,3-Trichloro-propane	1,2-Dibromo-3-Chloro-propane	1,2-Dibromo-ethane	1,2-Dichloro-benzene	1,2-Dichloro-ethane	1,2-Dichloro-propane	1,3-Dichloro-benzene	1,3-Dichloro-propane	1,4-Dichloro-benzene	2,2-Dichloro-propane	2-Butanone	2-Hexanone	2-Methyl-1-Propanol	3-Chloro-propene	4-Methyl-2-Pentanone	Acetone	Acetonitrile	Acrolein
		CAS #	630-20-6	71-55-6	79-34-5	79-00-5	75-34-3	75-35-4	563-58-6	96-18-4	96-12-8	106-93-4	95-50-1	107-06-2	78-87-5	541-73-1	142-28-9	106-46-7	594-20-7	78-93-3	591-78-6	78-83-1	107-05-1	108-10-1	67-64-1	75-05-8	107-02-8
Well #	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/19/2019	LVB-190319Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	5 U	50 U	1 U	25 U	25 U	50 U	25 U
LS-B	6/18/2019	LVB-190618Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	5 U	50 U	1 U	25 U	25 U	50 U	25 U
LS-B	8/29/2019	LVB-190829Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	5 U	100 U	1 U	25 U	25 U	50 U	25 U
LS-B	11/7/2019	LVB-191107Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	5 U	50 U	1 U	25 U	25 U	50 U	25 U
LS-PS1	3/19/2019	LVP-190319Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	5 U	50 U	1 U	25 U	25 U	50 U	25 U
LS-PS1	6/18/2019	LVP-190618Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	5 U	50 U	1 U	25 U	25 U	50 U	25 U
LS-PS1	8/29/2019	LVP-190829Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	5 U	100 U	1 U	25 U	25 U	50 U	25 U
LS-PS1	11/7/2019	LVP-191107Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	5 U	50 U	1 U	25 U	25 U	50 U	25 U
VOA TRIP BLANK	3/18/2019	VTRP190319X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	12.6 L	0.1 U	2.5 U	2.5 U	5 U	2.5 U
VOA TRIP BLANK	6/17/2019	VTRP190618X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	5 U	0.1 U	2.5 U	2.5 U	5 U	2.5 U
VOA TRIP BLANK	6/17/2019	VTRP190618Z	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	5 U	0.1 U	2.5 U	2.5 U	5 U	2.5 U
VOA TRIP BLANK	8/29/2019	VTRP190829Z	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	10 U	0.1 U	2.5 U	2.5 U	5 U	2.5 U
VOA TRIP BLANK	11/6/2019	VTRP191107Z	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	5 U	0.1 U	2.5 U	2.5 U	5 U	2.5 U

Leachate - Volatile Organic Compounds			Acrylonitrile	Benzene	Bromo-chloro-methane	Bromo-dichloro-methane	Bromoform	Bromo-methane	Carbon Disulfide	Carbon Tetra-chloride	Chloro-benzene	Chloro-dibromo-methane	Chloro-ethane	Chloroform	Chloro-methane	Chloroprene	Cis-1-2-Dichloro-ethene	Cis-1,3-Dichloro-propene	Dibromo-methane	Dichloro-difluoro-methane	Ethyl-benzene	M & P Xylene	Methyl Iodide	Methyl Methacrylate	Methyl-acrylonitrile	Methylene Chloride	O-Xylene
		CAS #	107-13-1	71-43-2	74-97-5	75-27-4	75-25-2	74-83-9	75-15-0	56-23-5	108-90-7	124-48-1	75-00-3	67-66-3	74-87-3	126-99-8	156-59-2	10061-01-5	74-95-3	75-71-8	100-41-4	MPX	74-88-4	80-62-6	126-98-7	75-09-2	95-47-6
Well #	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/19/2019	LVB-190319Q	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	25 U	1 U
LS-B	6/18/2019	LVB-190618Q	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	25 U	1 U
LS-B	8/29/2019	LVB-190829Q	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	25 U	1 U
LS-B	11/7/2019	LVB-191107Q	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	25 U	1 U
LS-PS1	3/19/2019	LVP-190319Q	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	25 U	1 U
LS-PS1	6/18/2019	LVP-190618Q	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	25 U	1 U
LS-PS1	8/29/2019	LVP-190829Q	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1.92 JT	1 U	2.5 U	1 U	25 U	1 U
LS-PS1	11/7/2019	LVP-191107Q	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	25 U	1 U
VOA TRIP BLANK	3/18/2019	VTRP190319X	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U	2.5 U	0.1 U
VOA TRIP BLANK	6/17/2019	VTRP190618X	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U	2.5 U	0.1 U
VOA TRIP BLANK	6/17/2019	VTRP190618Z	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U	2.5 U	0.1 U
VOA TRIP BLANK	8/29/2019	VTRP190829Z	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U	2.5 U	0.1 U
VOA TRIP BLANK	11/6/2019	VTRP191107Z	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U	2.5 U	0.1 U

Leachate - Volatile Organic Compounds			Propionitrile	Styrene	Tetrachloro-ethene	Toluene	Trans-1-2-Dichloro-ethene	Trans-1-3-Dichloroprope ne	Trans-1-4-Dichloro-2-Butene	Trichloro-ethene	Trichloro-fluoro-methane	Vinyl Acetate	Vinyl Chloride
		CAS #	107-12-0	100-42-5	127-18-4	108-88-3	156-60-5	10061-02-6	110-57-6	79-01-6	75-69-4	108-05-4	75-01-4
Well #	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/19/2019	LVB-190319Q	5 U	1 U	1 U	1 U	1 U	5 U	5 U	1 U	1 U	1 U	0.1 U
LS-B	6/18/2019	LVB-190618Q	5 U	1 U	1 U	1 U	1 U	5 U	5 U	1 U	1 U	1 U	0.1 U
LS-B	8/29/2019	LVB-190829Q	5 U	1 U	1 U	1 U	1 U	5 U	5 U	1 U	1 U	1 U	0.1 U
LS-B	11/7/2019	LVB-191107Q	5 U	1 U	1 U	1 U	1 U	5 U	5 U	1 U	1 U	1 U	0.1 DU
LS-PS1	3/19/2019	LVP-190319Q	5 U	1 U	1 U	1 U	1 U	5 U	5 U	1 U	1 U	1 U	0.1 U
LS-PS1	6/18/2019	LVP-190618Q	5 U	1 U	1 U	1 U	1 U	5 U	5 U	1 U	1 U	1 U	0.1 U
LS-PS1	8/29/2019	LVP-190829Q	5 U	1 U	1 U	1 U	1 U	5 U	5 U	1 U	1 U	1 U	0.1 U
LS-PS1	11/7/2019	LVP-191107Q	5 U	1 U	1 U	1 U	1 U	5 U	5 U	1 U	1 U	1 U	0.1 DU
VOA TRIP BLANK	3/18/2019	VTRP190319X	0.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	6/17/2019	VTRP190618X	0.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	6/17/2019	VTRP190618Z	0.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/29/2019	VTRP190829Z	0.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	11/6/2019	VTRP191107Z	0.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.01 DU

0

Table K-5
Leachate - Pesticides, Herbicides, & Polychlorinated biphenyls (PCBs)

Leachate - Pesticides, Herbicides, & Polychlorinated biphenyls (PCBs)			2,4,5-T	2,4,5-TP Silvex	2,4-D	4,4'DDD	4,4'DDE	4,4'DDT	Aldrin	Alpha BHC	Alpha Chlordane	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Beta BHC
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	03/19/19	LVB-190319Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.01 U
LS-B	06/18/19	LVB-190618Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.01 U
LS-B	08/29/19	LVB-190829Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.01 U
LS-B	11/07/19	LVB-191107Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.01 U
LS-PS1	03/19/19	LVP-190319Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.01 U
LS-PS1	06/18/19	LVP-190618Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.01 U
LS-PS1	08/29/19	LVP-190829Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.01 U
LS-PS1	11/7/2019	LVP-191107Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.01 U

Leachate - Pesticides, Herbicides, & Polychlorinated biphenyls (PCBs)			Delta BHC	Dieldrin	Dinoseb	Endosulfan I	Endosulfan II	Endosulfan Sulfate	Endrin	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	Isodrin	Lindane (Gamma BHC)	Methoxychlor	Total Aroclors	Toxaphene	trans-Chlordane
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/19/2019	LVB-190319Q	0.01 U	0.01 U	0.25 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-B	6/18/2019	LVB-190618Q	0.01 U	0.01 U	0.25 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-B	8/29/2019	LVB-190829Q	0.01 U	0.01 U	0.25 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-B	11/7/2019	LVB-191107Q	0.01 U	0.01 U	0.25 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-PS1	3/19/2019	LVP-190319Q	0.01 U	0.01 U	0.25 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-PS1	6/18/2019	LVP-190618Q	0.01 U	0.01 U	0.25 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-PS1	8/29/2019	LVP-190829Q	0.01 U	0.01 U	0.25 U	0.01 DU	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-PS1	11/7/2019	LVP-191107Q	0.01 U	0.01 U	0.25 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.05 U	0.025 U	1 U	0.01 U

Appendix L

Landfill Gas Monitoring Data

Table L-1
Landfill Gas Monitoring Data
Environmental Monitoring Data Collected for First Quarter, 2019

Sample ID	Date/Time	CH4		CO2	O2	Static Pressure	Map Location (see Fig. 7)
		(% Vol)	(% LEL)	(% Vol)	(% Vol)	(in H2O)	
GP-001	1/22/2019	0	0	0.1	20.9	-0.4	GP-1
GP-001	2/20/2019	0	0	3	17.4	0.37	
GP-001	3/6/2019	0	0	3.2	18.4	1.4	
GP-002	1/22/2019	0	0	2	18.4	0.59	GP-2
GP-002	2/20/2019	0	0	2	17.9	0.1	
GP-002	3/6/2019	0	0	2.3	17.4	0.13	
GP-01D	1/22/2019	0	0	0.1	21	-2.62	NP-1
GP-01D	2/20/2019	0	0	0	20.5	1.21	
GP-01D	3/6/2019	0	0	0.5	17.2	4.71	
GP-01I	1/22/2019	0	0	0.1	21	-2.31	
GP-01I	2/20/2019	0	0	0.2	19.6	1.03	
GP-01I	3/6/2019	0	0	0.4	19.9	3.3	
GP-01S	1/22/2019	0	0	1.3	19.6	0.05	
GP-01S	2/20/2019	0	0	0.4	19.7	0	
GP-01S	3/6/2019	0	0	0.3	18.7	-0.01	
GP-02D	1/22/2019	0	0	0.1	21	-2.11	NP-2
GP-02D	2/20/2019	0	0	0.5	17.9	1.03	
GP-02D	3/6/2019	0	0	0.6	18.5	4	
GP-02I	1/22/2019	0	0	0.1	21	-2.01	
GP-02I	2/20/2019	0	0	0.3	17.8	0.85	
GP-02I	3/6/2019	0	0	0.4	18.5	3.84	
GP-02S	1/22/2019	0	0	0.6	20.5	-0.07	
GP-02S	2/20/2019	0	0	0.1	20.1	0.06	
GP-02S	3/6/2019	0	0	0.1	20.3	0	
GP-03D	1/22/2019	0	0	1.4	19.2	-1.55	NP-3
GP-03D	2/20/2019	0	0	1.4	17.3	0.71	
GP-03D	3/6/2019	0	0	1.4	18.3	3.2	
GP-03I	1/22/2019	0	0	1.1	20	-1.52	
GP-03I	2/20/2019	0	0	1	19.1	0.68	
GP-03I	3/6/2019	0	0	1.3	19.2	3.09	
GP-03S	1/22/2019	0	0	0.4	20.9	0.04	
GP-03S	2/20/2019	0	0	0.1	20.5	0	
GP-03S	3/6/2019	0	0	0.2	20.6	-0.01	
GP-04D	1/22/2019	0	0	0.7	20	-0.78	NP-4
GP-04D	2/20/2019	0	0	0.1	20.4	0.91	
GP-04D	3/6/2019	0	0	0.4	20.7	3.03	
GP-04I	1/22/2019	0	0	0.2	20.8	-0.53	
GP-04I	2/20/2019	0	0	0.1	20.3	0.46	
GP-04I	3/6/2019	0	0	0.4	20.6	1.71	
GP-04S	1/22/2019	0	0	1.1	20.1	0.71	
GP-04S	2/20/2019	0	0	2.6	17.8	2.93	
GP-04S	3/6/2019	0	0	2.4	18.5	1.59	

Table L-1 *(continued)*
Landfill Gas Monitoring Data
Environmental Monitoring Data Collected for First Quarter, 2019

Sample ID	Date/Time	CH4		CO2	O2	Static Pressure	Map Location (see Fig. 7)
		(% Vol)	(% LEL)	(% Vol)	(% Vol)	(in H2O)	
GP-05D	1/22/2019	0	0	2.1	18.8	0.28	NP-5
GP-05D	2/20/2019	0	0	1.8	18.1	-0.03	
GP-05D	3/6/2019	0	0	1.7	18.7	0.2	
GP-05I	1/22/2019	0	0	0.9	20.1	0.74	
GP-05I	2/20/2019	0	0	0.9	19.1	-0.03	
GP-05I	3/6/2019	0	0	1.1	19.4	0.1	
GP-05S	1/22/2019	0	0	0.4	20.5	0.12	
GP-05S	2/20/2019	0	0	2.1	17.9	-0.04	
GP-05S	3/6/2019	0	0	3.3	19.6	0.08	
GP-06D	1/22/2019	0	0	0.3	20.6	-0.05	NP-6
GP-06D	2/20/2019	0	0	0.1	20.4	0.1	
GP-06D	3/6/2019	0	0	0.3	20.7	1.07	
GP-06I	1/22/2019	0	0	0.3	20.5	-0.15	
GP-06I	2/20/2019	0	0	0.1	20.4	-0.11	
GP-06I	3/6/2019	0	0	1.1	19.9	0.21	
GP-06S	1/22/2019	0	0	2.7	17.9	0.01	
GP-06S	2/20/2019	0	0	2.4	17.6	0	
GP-06S	3/6/2019	0	0	2.5	17.8	0.09	
GP-07D	1/22/2019	0	0	1.1	19.6	0.29	NP-7
GP-07D	2/20/2019	0	0	2.3	16.8	2.27	
GP-07D	3/6/2019	0	0	0.8	19.7	0.03	
GP-07I	1/22/2019	0	0	0.1	20.7	-0.89	
GP-07I	2/20/2019	0	0	0.1	20.5	0.07	
GP-07I	3/6/2019	0	0	0.8	20.3	1.81	
GP-07S	1/22/2019	0	0	0.1	20.6	-0.78	
GP-07S	2/20/2019	0	0	0.1	20.5	0.53	
GP-07S	3/6/2019	0	0	0.9	19.1	2.59	
GP-08D	1/22/2019	0	0	0.8	14.1	-2.43	NP-8
GP-08D	2/20/2019	0	0	0.6	13.6	1.1	
GP-08D	3/6/2019	0	0	0.8	14	4.5	
GP-08I	1/22/2019	0	0	2	16.3	-2.36	
GP-08I	2/20/2019	0	0	2.7	14	0.11	
GP-08I	3/6/2019	0	0	3.2	15.4	4.11	
GP-08S	1/22/2019	0	0	1.9	18	1.32	
GP-08S	2/20/2019	0	0	2.5	14.8	0.97	
GP-08S	3/6/2019	0	0	0.4	20.3	0.06	

Table L-2
Landfill Gas Monitoring Data
Environmental Monitoring Data Collected for Second Quarter, 2019

Sample ID	Date/Time	CH4 (% Vol)	CH4 (% LEL)	CO2 (% Vol)	O2 (% Vol)	Static Pressure (in H2O)	Map Location (see Fig. 7)
GP-001	4/19/2019	0	0	0.1	20.1	0.1	GP-1
GP-001	5/8/2019	0	0	0	21	-0.38	
GP-001	6/14/2019	0	0	0.1	21	-0.61	
GP-002	4/19/2019	0	0	1.7	18.1	-0.02	GP-2
GP-002	5/8/2019	0	0	1.7	19.1	0.35	
GP-002	6/14/2019	0	0	1.8	18.4	0.12	
GP-01D	4/19/2019	0	0	0	20.1	0.76	NP-1
GP-01D	5/8/2019	0	0	0	21	-1.85	
GP-01D	6/14/2019	0	0	0.1	21	-1.15	
GP-01I	4/19/2019	0	0	0	20	0.52	
GP-01I	5/8/2019	0	0	0.1	21	-1.05	
GP-01I	6/14/2019	0	0	0.1	21	-0.74	
GP-01S	4/19/2019	0	0	0.1	20	0.03	
GP-01S	5/8/2019	0	0	0.8	20.3	0.17	
GP-01S	6/14/2019	0	0	0.5	20.3	-0.22	
GP-02D	4/19/2019	0	0	0.1	20	0.74	NP-2
GP-02D	5/8/2019	0	0	0.1	21	-1.57	
GP-02D	6/14/2019	0	0	0.1	21	-1.22	
GP-02I	4/19/2019	0	0	0.1	19.1	0.59	
GP-02I	5/8/2019	0	0	0.1	21	-1.58	
GP-02I	6/14/2019	0	0	0.1	21	-1.14	
GP-02S	4/19/2019	0	0	0	20.1	0.03	
GP-02S	5/8/2019	0	0	0.1	21	0.04	
GP-02S	6/14/2019	0	0	0.2	21	0.01	
GP-03D	4/19/2019	0	0	1.1	17.8	0.43	NP-3
GP-03D	5/8/2019	0	0	1.2	19.2	-1.34	
GP-03D	6/14/2019	0	0	1.4	18.5	-1.27	
GP-03I	4/19/2019	0	0	1.1	18.4	0.26	
GP-03I	5/8/2019	0	0	1.2	19.7	-1.43	
GP-03I	6/14/2019	0	0	1.5	19.1	-1.22	
GP-03S	4/19/2019	0	0	0.7	18.6	0.08	
GP-03S	5/8/2019	0	0	0.7	20.2	-0.1	
GP-03S	6/14/2019	0	0	1	19.4	0.01	
GP-04D	4/19/2019	0	0	0.1	20.2	0.72	NP-4
GP-04D	5/8/2019	0	0	0.2	21	-0.96	
GP-04D	6/14/2019	0	0	0.5	20.2	-1.31	
GP-04I	4/19/2019	0	0	0.2	20	0.17	
GP-04I	5/8/2019	0	0	0.3	21	-0.37	
GP-04I	6/14/2019	0	0	0.8	20.2	-0.74	
GP-04S	4/19/2019	0	0	0.9	19	0.16	
GP-04S	5/8/2019	0	0	0.9	20.3	-0.21	
GP-04S	6/14/2019	0	0	2.1	18.7	-0.29	

Table L-2 ***(continued)***
Landfill Gas Monitoring Data
Environmental Monitoring Data Collected for Second Quarter, 2019

Sample ID	Date/Time	CH4		CO2	O2	Static Pressure	Map Location (see Fig. 7)
		(% Vol)	(% LEL)	(% Vol)	(% Vol)	(in H2O)	
GP-05D	4/19/2019	0	0	1.6	18.8	-0.09	NP-5
GP-05D	5/8/2019	0	0	1.6	20.1	0.16	
GP-05D	6/14/2019	0	0	1.7	19.3	-0.23	
GP-05I	4/19/2019	0	0	0.8	19.7	-0.03	
GP-05I	5/8/2019	0	0	0.8	21	0.03	
GP-05I	6/14/2019	0	0	1	20.2	0.02	
GP-05S	4/19/2019	0	0	2	18.3	0	
GP-05S	5/8/2019	0	0	0.1	21	0.07	
GP-05S	6/14/2019	0	0	0.2	21	0.02	
GP-06D	4/19/2019	0	0	0.1	21	0.01	NP-6
GP-06D	5/8/2019	0	0	0.1	21	-0.33	
GP-06D	6/14/2019	0	0	0.2	21	0.67	
GP-06I	4/19/2019	0	0	0.1	21	-0.02	
GP-06I	5/8/2019	0	0	0.1	21	-0.07	
GP-06I	6/14/2019	0	0	0.2	20.9	-0.07	
GP-06S	4/19/2019	0	0	2.3	17.5	-0.01	
GP-06S	5/8/2019	0	0	2.9	17.4	0.07	
GP-06S	6/14/2019	0	0	3.2	17.2	0.1	
GP-07D	4/19/2019	0	0	1	18.5	-0.03	NP-7
GP-07D	5/8/2019	0	0	1.2	19.2	0.08	
GP-07D	6/14/2019	0	0	1.4	18.7	0.08	
GP-07I	4/19/2019	0	0	0.1	20.6	-0.02	
GP-07I	5/8/2019	0	0	0.1	21	-0.7	
GP-07I	6/14/2019	0	0	0.2	21	-0.55	
GP-07S	4/19/2019	0	0	0.1	20.6	0.5	
GP-07S	5/8/2019	0	0	0	21	-0.75	
GP-07S	6/14/2019	0	0	0.1	21	-0.75	
GP-08D	4/19/2019	0	0	0.1	19.8	0.72	NP-8
GP-08D	5/8/2019	0	0	0.1	21	-1.7	
GP-08D	6/14/2019	0	0	0.1	21	-1.08	
GP-08I	4/19/2019	0	0	3.3	14.5	0.65	
GP-08I	5/8/2019	0	0	0.1	21	-1.62	
GP-08I	6/14/2019	0	0	0.1	21	-1.07	
GP-08S	4/19/2019	0	0	5.9	4	0.02	
GP-08S	5/8/2019	0	0	6.3	3.6	-0.03	
GP-08S	6/14/2019	0	0	0.1	21	-0.04	

Table L-3
Landfill Gas Monitoring Data
Environmental Monitoring Data Collected for Third Quarter, 2019

Sample ID	Date/Time	CH4		CO2	O2	Static Pressure	Map Location (see Fig. 7)
		(% Vol)	(% LEL)	(% Vol)	(% Vol)	(in H2O)	
GP-001	7/19/2019	0	0	0.0	21.0	0.00	GP-1
GP-001	8/13/2019	0	0	0.0	21.0	0.00	
GP-001	9/5/2019	0	0	0.0	21.0	0.08	
GP-002	7/19/2019	0	0	1.7	18.3	0.03	GP-2
GP-002	8/13/2019	0	0	1.5	18.8	0.16	
GP-002	9/5/2019	0	0	1.7	19.1	0.02	
GP-01D	7/19/2019	0	0	0.1	20.7	-1.76	NP-1
GP-01D	8/13/2019	0	0	0.0	21.0	-0.58	
GP-01D	9/5/2019	0	0	0.1	21.0	-0.15	
GP-01I	7/19/2019	0	0	0.1	20.6	-1.28	
GP-01I	8/13/2019	0	0	0.0	20.9	-0.45	
GP-01I	9/5/2019	0	0	0.1	20.9	-0.03	
GP-01S	7/19/2019	0	0	0.9	18.9	0.01	
GP-01S	8/13/2019	0	0	0.8	19.3	0.07	
GP-01S	9/5/2019	0	0	1.1	18.9	-0.02	
GP-02D	7/19/2019	0	0	0.1	20.8	-1.59	NP-2
GP-02D	8/13/2019	0	0	0.0	21.0	-0.43	
GP-02D	9/5/2019	0	0	0.1	21.0	-0.19	
GP-02I	7/19/2019	0	0	0.1	20.7	-1.56	
GP-02I	8/13/2019	0	0	0.0	21.0	-0.49	
GP-02I	9/5/2019	0	0	0.1	21.0	-0.18	
GP-02S	7/19/2019	0	0	0.8	19.6	0.04	
GP-02S	8/13/2019	0	0	0.6	20.0	0.08	
GP-02S	9/5/2019	0	0	0.7	20.2	0.05	
GP-03D	7/19/2019	0	0	1.3	18.2	-1.37	NP-3
GP-03D	8/13/2019	0	0	1.3	18.8	-0.36	
GP-03D	9/5/2019	0	0	1.7	19.3	-0.16	
GP-03I	7/19/2019	0	0	0.1	20.6	-0.77	
GP-03I	8/13/2019	0	0	0.7	19.9	-0.32	
GP-03I	9/5/2019	0	0	1.2	19.3	0.01	
GP-03S	7/19/2019	0	0	0.9	19.0	-0.02	
GP-03S	8/13/2019	0	0	0.8	19.8	0.09	
GP-03S	9/5/2019	0	0	1.1	19.9	0.01	
GP-04D	7/19/2019	0	0	0.0	20.9	0.02	NP-4
GP-04D	8/13/2019	0	0	0.1	21.0	-0.09	
GP-04D	9/5/2019	0	0	0.3	20.7	0.02	
GP-04I	7/19/2019	0	0	0.1	20.8	-0.73	
GP-04I	8/13/2019	0	0	0.7	20.3	-0.01	
GP-04I	9/5/2019	0	0	0.9	20.0	0.30	
GP-04S	7/19/2019	0	0	1.8	18.8	-0.10	
GP-04S	8/13/2019	0	0	1.6	19.4	0.08	
GP-04S	9/5/2019	0	0	2.1	19.4	-0.03	

Table L-3 *(continued)*
Landfill Gas Monitoring Data
Environmental Monitoring Data Collected for Third Quarter, 2019

Sample ID	Date/Time	CH4		CO2	O2	Static Pressure	Map Location (see Fig. 7)
		(% Vol)	(% LEL)	(% Vol)	(% Vol)	(in H2O)	
GP-05D	7/19/2019	0	0	1.6	19.4	-0.07	NP-5
GP-05D	8/13/2019	0	0	1.4	19.5	0.03	
GP-05D	9/5/2019	0	0	1.7	19.5	0.09	
GP-05I	7/19/2019	0	0	1.1	20.2	-0.04	
GP-05I	8/13/2019	0	0	1.0	20.2	0.10	
GP-05I	9/5/2019	0	0	1.2	20.3	0.03	
GP-05S	7/19/2019	0	0	0.1	21.0	-0.03	
GP-05S	8/13/2019	0	0	0.3	21.0	0.13	
GP-05S	9/5/2019	0	0	0.9	20.7	0.02	
GP-06D	7/19/2019	0	0	0.2	20.8	-0.58	NP-6
GP-06D	8/13/2019	0	0	0.2	21.0	-0.04	
GP-06D	9/5/2019	0	0	0.2	21.0	0.04	
GP-06I	7/19/2019	0	0	0.1	20.9	0.02	
GP-06I	8/13/2019	0	0	0.2	21.0	0.16	
GP-06I	9/5/2019	0	0	0.1	21.0	0.02	
GP-06S	7/19/2019	0	0	3.1	17.3	0.03	
GP-06S	8/13/2019	0	0	3.0	17.9	0.16	
GP-06S	9/5/2019	0	0	3.2	18.3	0.03	
GP-07D	7/19/2019	0	0	1.4	18.8	-0.02	NP-7
GP-07D	8/13/2019	0	0	1.1	19.3	0.14	
GP-07D	9/5/2019	0	0	1.2	19.8	0.03	
GP-07I	7/19/2019	0	0	0.1	21.0	-0.76	
GP-07I	8/13/2019	0	0	0.0	21.0	-0.24	
GP-07I	9/5/2019	0	0	0.0	21.0	-0.13	
GP-07S	7/19/2019	0	0	0.1	21.0	-1.00	
GP-07S	8/13/2019	0	0	0.0	21.0	-0.22	
GP-07S	9/5/2019	0	0	0.1	21.0	0.12	
GP-08D	7/19/2019	0	0	0.1	20.5	0.00	NP-8
GP-08D	8/13/2019	0	0	0.0	20.9	-0.58	
GP-08D	9/5/2019	0	0	0.1	20.8	-0.03	
GP-08I	7/19/2019	0	0	0.1	20.5	-0.01	
GP-08I	8/13/2019	0	0	0.1	20.8	-0.58	
GP-08I	9/5/2019	0	0	0.1	20.8	-0.09	
GP-08S	7/19/2019	0	0	0.1	20.5	0.00	
GP-08S	8/13/2019	0	0	0.1	20.8	0.03	
GP-08S	9/5/2019	0	0	0.2	20.6	0.03	

Table L-4
Landfill Gas Monitoring Data
Environmental Monitoring Data Collected for Fourth Quarter, 2019

Sample ID	Date/Time	CH4		CO2	O2	Static Pressure	Map Location (see Fig. 7)
		(% Vol)	(% LEL)	(% Vol)	(% Vol)	(in H2O)	
GP-001	10/10/2019	0	0	0.2	20.9	-0.21	GP-1
GP-001	11/22/2019	0	0	0.1	20.8	-0.84	
GP-001	12/4/2019	0	0	0.6	20.7	0.21	
GP-002	10/10/2019	0	0	2.2	17.3	0.18	GP-2
GP-002	11/22/2019	0	0	2.1	18.2	-0.14	
GP-002	12/4/2019	0	0	2.7	18.9	-0.11	
GP-01D	10/10/2019	0	0	0.2	21.0	-2.22	NP-1
GP-01D	11/22/2019	0	0	0.1	20.9	-2.97	
GP-01D	12/4/2019	0	0	0.2	21.0	1.00	
GP-01I	10/10/2019	0	0	0.2	21.0	-2.03	
GP-01I	11/22/2019	0	0	0.2	20.9	-2.78	
GP-01I	12/4/2019	0	0	0.5	20.1	0.99	
GP-01S	10/10/2019	0	0	1.5	19.4	0.04	
GP-01S	11/22/2019	0	0	1.3	18.8	-0.08	
GP-01S	12/4/2019	0	0	1.8	18.5	0.02	
GP-02D	10/10/2019	0	0	0.2	20.9	-1.65	NP-2
GP-02D	11/22/2019	0	0	0.2	20.8	-2.65	
GP-02D	12/4/2019	0	0	0.3	20.9	0.88	
GP-02I	10/10/2019	0	0	0.3	20.9	-1.62	
GP-02I	11/22/2019	0	0	0.2	20.9	-2.54	
GP-02I	12/4/2019	0	0	0.5	19.1	0.76	
GP-02S	10/10/2019	0	0	0.7	20.3	0.03	
GP-02S	11/22/2019	0	0	0.6	20.4	-0.07	
GP-02S	12/4/2019	0	0	1.2	19.8	0.01	
GP-03D	10/10/2019	0	0	1.6	19.2	-0.95	NP-3
GP-03D	11/22/2019	0	0	1.3	18.8	-2.16	
GP-03D	12/4/2019	0	0	1.6	18.1	0.60	
GP-03I	10/10/2019	0	0	1.8	19.0	-0.92	
GP-03I	11/22/2019	0	0	1.4	19.2	-2.05	
GP-03I	12/4/2019	0	0	1.7	19.3	0.54	
GP-03S	10/10/2019	0	0	1.2	19.6	0.03	
GP-03S	11/22/2019	0	0	0.8	19.8	-0.14	
GP-03S	12/4/2019	0	0	1.2	19.8	0.02	
GP-04D	10/10/2019	0	0	0.8	19.7	-0.48	NP-4
GP-04D	11/22/2019	0	0	0.9	19.4	-1.93	
GP-04D	12/4/2019	0	0	1.0	19.8	0.80	
GP-04I	10/10/2019	0	0	0.6	20.3	-0.23	
GP-04I	11/22/2019	0	0	0.5	20.4	-1.01	
GP-04I	12/4/2019	0	0	0.7	20.6	0.29	
GP-04S	10/10/2019	0	0	2.1	19.2	-0.11	
GP-04S	11/22/2019	0	0	1.5	19.5	-0.49	
GP-04S	12/4/2019	0	0	1.8	19.8	0.08	

Table L-4 ***(continued)***
Landfill Gas Monitoring Data
Environmental Monitoring Data Collected for Fourth Quarter, 2019

Sample ID	Date/Time	CH4		CO2	O2	Static Pressure	Map Location (see Fig. 7)
		(% Vol)	(% LEL)	(% Vol)	(% Vol)	(in H2O)	
GP-05D	10/10/2019	0	0	2.1	18.6	0.19	NP-5
GP-05D	11/22/2019	0	0	1.8	18.7	-0.19	
GP-05D	12/4/2019	0	0	2.2	19.0	-0.03	
GP-05I	10/10/2019	0	0	1.5	19.5	0.06	
GP-05I	11/22/2019	0	0	1.3	19.5	-0.11	
GP-05I	12/4/2019	0	0	1.6	19.7	-0.03	
GP-05S	10/10/2019	0	0	0.6	20.3	0.08	
GP-05S	11/22/2019	0	0	0.2	20.7	-0.05	
GP-05S	12/4/2019	0	0	3.8	17.5	-0.01	
GP-06D	10/10/2019	0	0	0.3	20.0	0.13	NP-6
GP-06D	11/22/2019	0	0	0.3	20.7	-1.01	
GP-06D	12/4/2019	0	0	0.5	21.0	0.11	
GP-06I	10/10/2019	0	0	0.4	19.9	0.13	
GP-06I	11/22/2019	0	0	0.2	20.7	-0.03	
GP-06I	12/4/2019	0	0	0.8	21.0	-0.09	
GP-06S	10/10/2019	0	0	3.9	17.1	0.13	
GP-06S	11/22/2019	0	0	3.4	18.0	-0.05	
GP-06S	12/4/2019	0	0	4.2	18.5	-0.03	
GP-07D	10/10/2019	0	0	1.8	18.7	0.08	NP-7
GP-07D	11/22/2019	0	0	1.4	19.5	-0.31	
GP-07D	12/4/2019	0	0	1.8	19.4	-0.08	
GP-07I	10/10/2019	0	0	0.2	20.3	-0.48	
GP-07I	11/22/2019	0	0	0.2	20.9	-1.87	
GP-07I	12/4/2019	0	0	0.3	21.0	-0.08	
GP-07S	10/10/2019	0	0	0.2	20.2	-0.49	
GP-07S	11/22/2019	0	0	0.2	20.9	-1.87	
GP-07S	12/4/2019	0	0	0.3	20.9	0.38	
GP-08D	10/10/2019	0	0	0.2	21.0	-1.94	NP-8
GP-08D	11/22/2019	0	0	0.6	16.6	-2.80	
GP-08D	12/4/2019	0	0	0.9	15.2	1.03	
GP-08I	10/10/2019	0	0	0.2	21.0	-2.11	
GP-08I	11/22/2019	0	0	0.2	20.9	-2.71	
GP-08I	12/4/2019	0	0	3.5	15.0	0.84	
GP-08S	10/10/2019	0	0	0.2	21.0	-0.01	
GP-08S	11/22/2019	0	0	0.2	20.9	-0.51	
GP-08S	12/4/2019	0	0	7.4	11.8	0.10	

Appendix M

Inspection Survey Reports

SOLID WASTE INSPECTION REPORT

Public Health
Seattle & King County

PUBLIC HEALTH - SEATTLE & KING COUNTY	PURPOSE OF VISIT:
Downtown Office 401 - 5th Ave., Ste 1100 Seattle, WA 98104 206-263-9566	Routine Inspection/Field Review of a Closed Landfill - Permitted establishment (PE=1002)
ESTABLISHMENT INFORMATION:	**INSPECTION INFORMATION:**
VASHON LANDFILL VASHON LANDFILL 18900 SW WESTSIDE HWY SW VASHON ISLAND, WA 98070 206-296-4385 **Program Record:** PR0015723	**Date of Inspection:** Wednesday, May 22, 2019 **Time In:** 1:10 pm **Time Out:** 1:50 pm **Inspector:** Darshan Dhillon **Result:** **COMPLETE**

VIOLATIONS OBSERVED (if any)

OVERALL INSPECTION COMMENTS:

1.0 ACTIONS AND RECOMMENDATIONS:
1.1 Grass and weed and black berries overgrowing needs to be mowed and controlled by May 30, 2019
1.2 Both aerators were not functioning at the time of inspection. Please ensure that aerators are functioning according their designated time cycles by May 28, 2019.

2.0 OBSERVATIONS:
2.1 Access to the landfill is controlled by a locking gate.
2.2 All monitoring wells are secured with pad locks.
2.3 Storm water pond was full and turbidity was acceptable.
2.4 Perimeter fence was kept in good repair.

Dhillon Darn

Darshan Dhillon
HEI III

Scott Barden
Assistant Operations Manager

PIC Phone #: 206-263-8863 **Email:** Scott.Barden@kingcounty.gov

INSPECTION CHECKLIST

The following items are evaluated during inspections.
Violations cited as out of compliance during this inspection are highlighted below.
Out=out of compliance

OUT

Abandoned Landfill Sites BOH 10.09.040

- ☐ 0888-Abandoned landfills maintained so as to not create a risk to the public health.

Closer Landfill Leachate Managment for surface impoundment WAC-173-350-330

- ☐ 0754-Records kept of weekly inspections and liner inspections at least every 5 years
- ☐ 0763-Liners, embankments, tank piping and secondary containment maintained and logs kept
- ☐ 0766-Surface impoundments not equipped with a leak detection layer must meet WAC 173-350-500
- ☐ 0767-Surface impoundments w/a leak detection layer are subject to WAC 173-350-040 (5),173-350-330(b)

Closure Performance Standard WAC-173-304-407 (3)

- ☐ 0870-Closure must be performed in a manner to minimize maintenance
- ☐ 0871-Closure must be performed to control and prevent threats to human health and the environment
- ☐ 0872-Facility must be prepared for post-closure period

Closure Plan and Amendments WAC-173-304-407 (4)

- ☐ 0873-Facility must provide a closure plan amendments as directed by JHD
- ☐ 0874-Facility must be closed in accordance with the approved closure plan amendments

Closure Procedure WAC 173-304-407 (4)

- ☐ 0875-Closure plan sheets signed by WS PE showing as-built changes in final constn per closure plan

Closure Requirements WAC-173-351-500

- ☐ 0856-Final cover installed to minimize, infiltration and erosion per design
- ☐ 0857-Closure plan followed for areas of the MSWLF unit within 30 days of final receipt of wa-stes
- ☐ 0858-For closed areas, closure activities must be completed within 180 days

Financial Assurance Criteria WAC-173-351-600

- ☐ 0864-Financial assurance for post closure care per WAC 173-351-600 (3)

Landfill requirements for landfill closed under WAC 173-304-460

- ☐ 0882-Must prevent groundwater contamination per WAC 173-304-100
- ☐ 0883-Operation shall not result in explosive gas generation in facility structures
- ☐ 0884-Operation shall not result in explosive gas generated by the landfill at property boundary
- ☐ 0885-Landfill shall not cause violation of ambient air quality standard at property boundary
- ☐ 0886-Landfill shall not cause water quality violations

Methane Monitoring BOH 10.09.050

- ☐ 0889-Methane monitoring must be conducted per BOH 10.09.050
- ☐ 0890-Structures within 1,000 ft of landfill must be protected from potential methane migration

Performance Standards

- ☐ 0290-Must not pose a threat to human health or environment
- ☐ 0291-Protects from ground water contamination
- ☐ 0292-The facility must conform to the approved local comprehensive solid waste management plan
- ☐ 0293-Complies with RCW 70.94 Emission or ambient air quality standards
- ☐ 0294-Complies with all other local/state/federal laws and regulations

Permit Requirements

- ☐ 0891-Permit Required for Landfills operating under WAC 173-351

Post Closure care WAC-173-351-500

OUT

- ☐ 0859-For closed areas post closure care must be conducted per post-closure plan and WAC
- ☐ 0860-Final cover for closed areas must be maintained (vegetation, settlement, erosion,# run on/off)
- ☐ 0861-Leachate collection systems maintained and operated per post-closure plan and WAC 173-351-300
- ☐ 0862-Gas monitoring systems maintained and operated per post-closure plan and WAC 173-351-200

Post Closure Performance Standards WAC 173-304-407 (6)

- ☐ 0876-Post-closure activities must provide maintenance & monitoring of air/land/ water for stability

Post Closure Plan WAC 173-304-407 (7)

- ☐ 0877-Facility must keep and abide by approved plan of post closure
- ☐ 0878-Facility must provide an approved financial assurance instrument for all post closure costs
- ☐ 0879-Post-closure activities must be completed per the closure plan and schedule
- ☐ 0880-Owner/operator must implement post closure activities w/ a valid post closure plan and any requ

Post Closure Procedure WAC 173-304-407 (8)

- ☐ 0881-WA PE certification must be to the JHD of why post-closure activities are no longer necessary

Requirements sf Landfills BOH 10.09: for landfills closed under WAC 173-351/304&pre WAC173-.04

- ☐ 0887-Necessary maintenance, site inspections, and reporting provided for closed landfills

Appendix N

Financial Summary

King County Vashon Closed Landfill – Closed 2001 WAC 173-351

The minimum 30 year post closure required funding period is currently planned through 2031. Financial Assurance is derived from three sources: the established post-closure fund [WAC 173-351-600 (5) (a) (i), the recurring two-year operational and capital improvement program funds WAC 173-351-600 (5) (a) (ii)and the high security bonding options [WAC 173-351-600 (5) (a) (iii)] described in the April 18, 2014 letter from V. Okereke KCSWD to B. Lasby SKCDPH.

Landfill Systems being maintained during post-closure:

- Geomembrane cover
- Landfill gas collection with carbon treatment
- Leachate/Wastewater control and management
- Groundwater, surface water, leachate and landfill gas monitoring

Completion of the following projects will provide necessary information to reevaluate the current post-closure assumptions and financial assurance plans:

- Enhancements to landfill gas control and treatment
- Modifications to leachate and wastewater management
- Groundwater monitoring of natural attenuation and landfill gas control improvements
- Determination of remaining post-closure period

Account Description	2019 Budget	2020 Forecast
PCM Budget: Routine Maintenance, Operations, Compliance Reporting, Public Response (Excludes Capitol Improvement Project)		
LABOR	$ 181,098.00	$ 117,016.58
MISC OPERATING SUPPLIES	$ 492.00	$ 177.00
SMALL TOOLS NON CAP NON CONTROL	$ -	$ 23,350.00
OTHER CONTRACTUAL PROF SVCS	$ 37,667.00	$ -
UTILITIES SURFACE WATER UTILITY	$ 15.00	$ 15.00
DISPOSAL	$ 10,063.00	$ 16,722.56
LICENSES FEES PERMITS	$ 1,150.00	$ 8,526.64
LABORATORY ANALYSIS	$ 135,815.00	$ 87,224.00
PCM BUDGET SUBTOTAL	$ 366,299.00	$ 253,031.78
Capitol Improvement Program Budget: Environmental Investigation, Engineering Control Systems Modifications, Groundwater Monitoring Network Evaluation and Modifications		
CIP BUDGET SUBTOTAL	$603,000	