King County
Solid Waste Division
Department of Natural Resources and Parks
King Street Center
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April 1, 2024

TO: Jerome Cruz, Environmental Scientist III, Environmental Health Division, Public Health – Seattle and King County

VIA: Jamey Barker, P.E., Engineer IV

FM: Adrienne M. Scott, Engineer III – Lead Geologist

RE: King County Vashon Island Landfill 2023 Annual Groundwater Data Evaluation Report

The purpose of this letter is to transmit the *King County Vashon Island Landfill 2023 Annual Groundwater Data Evaluation Report*. The potentiometric maps and groundwater velocity calculations that have been included in the report were sealed by a licensed hydrogeologist and have been previously submitted with quarterly reports. This report also includes a site-specific summary, exceedances table, trend test table, time-concentration plots of parameters of interest, and descriptive statistics summary table.

The 2023 Annual Report has been updated to include environmental data collected through December 2023.

If you have questions or need additional information, please contact me at 206-263-0518, or via email at adscott@kingcounty.gov.

Enclosures

cc: Yolanda Pon, Solid Waste Program Supervisor, Environmental Health Division, Public Health Seattle & King County
Tim O'Connor, LG., LHG., Hydrogeologist III, Washington State Department of Ecology
Alan Noell, PhD., P.E., Solid Waste Engineer, Washington State Department of Ecology
Theresa Thurlow, P.E., Engineer Manager, SWD, DNRP
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Eric W. Ferguson, L.H.G., L.G., Water Quality Planner III, Science and Technical Support Section, Water and Land Resources Division
Jennifer Keune, Supervisor Environmental/Permit Compliance, SWD, DNRP
Naima Rushiddin, Records Management Specialist, SWD, DNRP

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April 1, 2024

Tim O'Connor, Hydrogeologist III
Washington State Department of Ecology
Northwest Regional Office
15700 Dayton Ave N
Shoreline, WA 98133

RE: King County Vashon Island Landfill 2023 Annual Groundwater Data Evaluation Report

Dear Mr. O'Connor:

The purpose of this letter is to transmit the *King County Vashon Island Closed Landfill 2022 Annual Groundwater Data Evaluation Report*. The potentiometric maps and groundwater velocity calculations that have been included in the report were sealed 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.

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Sincerely,

Adrienne M. Scott
Engineer III – Lead Geologist

Enclosures

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KING COUNTY
VASHON ISLAND CLOSED LANDFILL

2023 ANNUAL GROUNDWATER DATA EVALUATION REPORT

King County
Department of
Natural Resources and Parks
Solid Waste Division

Serving Community · Protecting Environment · Operating Excellence

April 2024

www.kingcounty.gov/solidwaste

CERTIFICATION

KING COUNTY VASHON ISLAND LANDFILL
2023 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.

Name: Jamey Barker, P.E.	**Title:** Supervising Engineer, Facility Engineering and Science Section	**Date:** April 1, 2024
Mailing Address: Solid Waste Division King County Department of Natural Resources & Parks 201 South Jackson Street, Suite 701 Seattle, WA 98104-3855		**Telephone Number:** 206-477-4625
Signature: Jamey Lynn Barker 4/1/2024		

JAMEY LYNN BARKER
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REGISTERED
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Jamey Lynn Barker
4/1/2024

CERTIFICATION

KING COUNTY VASHON ISLAND LANDFILL
2023 ANNUAL GROUNDWATER DATA EVALUATION REPORT CERTIFICATION

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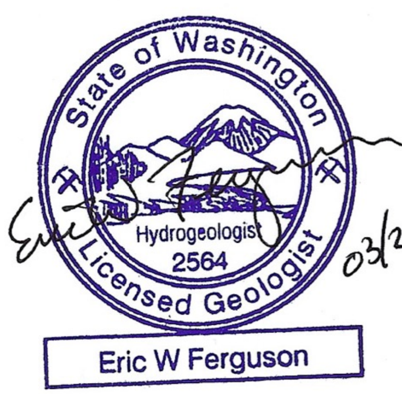
Name: Eric W. Ferguson, LHG, LG	**Title:** Water Quality Planner – Hydrogeologist; Science and Technical Support Section	**Date:** March 29, 2024
Mailing Address: Water and Land Resources Division King County Department of Natural Resources & Parks 201 South Jackson Street, Suite 5600 Seattle, WA 98104-3855		**Telephone Number:** 206-477-4690
Signature: Eric W Ferguson		



03/29/2024

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: 2023	Reference (section, subsection)	Included in this report	Location – section or appendix
***Quarterly Groundwater Reports**: 173-351-415(2) plus the referenced sections*			
Statistical calculations and summaries			
Statistical tests	420, (2)	☒	Tables 2, 3, 4, and 5; Appendix F
Notification of statistical increase (if applicable)	430, (4)	☒	Sect 4.3.5, 4.4.4, 4.4.6, 4.5.5, 4.6.4 & 4.6.6
Notification of concentrations above Chapter 173-200 WAC criteria (if any)	430, (4)	☒	Sect 4.3.3, 4.4.3, 4.4.4, 4.5.3, 4.6.3 & 4.6.4; Appendix F
Static water level readings	415, (2)	☒	Appendix A
Potentiometric surface elevation maps depicting flow direction	415, (2)	☒	Appendix C
Flow rate – calculated	415, (2)	☒	Appendix C
Cation-anion balances	430, (5a)	☒	Appendix D
Explanation of greater than 5% (or 10%) difference (if needed)	430, (5a)	☒	Sect 4.3.2, 4.4.2, 4.5.2, & 4.6.2
Trilinear diagrams	430, (5b)	☒	Appendix D
Leachate analyses (if sampled and tested)	415, (2)	☒	Appendix H
Data entered into EIM database (date entered by: TBD)	415, (3)	☒	
***Annual Groundwater Reports**: 173-351-415(1)* **YEAR:** 2023			
Summary of statistical results and trends Descriptive statistics	415, (1) 420, (1)	☒	Tables 2, 3, 4, and 5
Summary of groundwater flow rate and direction for the year	415, (1)	☒	Appendix D
Copy of all potentiometric maps for the year	415, (1)	☒	Appendix D
Summary geochemical evaluation	415, (1)	☒	Section 4
For Quarterly and Annual Reports			
Stamped by a licensed professional	RCW 18.220	☒	

Signature of Report Author	April 1, 2024	King County Vashon Island Closed Landfill
	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 LANDFILL

2023 ANNUAL GROUNDWATER DATA EVALUATION REPORT

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

April 2024

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1. PURPOSE

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

2. INTRODUCTION

The 2023 Annual Groundwater Data Evaluation Report presents the results of statistical analyses on the groundwater monitoring data collected at the VLF from January 1986 through December 2023. This annual report describes the hydrogeologic conditions at the landfill; specifically, the report depicts the potentiometric groundwater surface of each water bearing zone, and provides an evaluation and discussion of the groundwater quality results collected from upgradient and downgradient groundwater monitoring wells.

Pursuant to the reporting requirements of WAC 173-351, this annual report also includes water quality data from the seeps located west of the landfill, water quality data for domestic well monitoring, leachate data, landfill gas data, and a discussion of maintenance activities performed at the site during the reporting year. This report also includes a summary of previous site investigations and ongoing efforts.

The data in this report comply with Washington State Department of Ecology (Ecology) *Criteria for Municipal Solid Waste Landfills* (WAC 173-351-415), and the King County Board of Health Code, *Criteria for Municipal Solid Waste Landfills* (Section 10.09.020).

2.1. SITE LOCATION and REGIONAL SETTING

Vashon Island Landfill (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 vegetated to unwooded, gently rolling terrain at elevations of 300 to 400 feet mean sea level (ft MSL). 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 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.

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. 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 were expanded before cap placement during the Phase 2 closure, and the leachate lagoon was constructed. Between 1996 and 2001, additional horizontal trench collectors between refuse lifts were connected into the existing active landfill gas 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. The combined Phase 1 and Phase 2 landfill closure area is approximately 10.3 acres.

3. EVALUATION METHODS

The landfill environmental evaluation was conducted in accordance with WAC 173-351 and the *Environmental Monitoring Sampling and Analysis Plan and Quality Assurance Project Plan for Vashon Island Closed Landfill* (SAP).

3.1. DATA QUALITY

Five analytical labs have performed laboratory services for water samples collected at the VLF 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. All five laboratories have Washington State Department of Ecology accreditation through the Washington State Manchester Environmental Laboratory for the methods used at the time that 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 acetone, bis (2-ehtylhexyl) phthalate, toluene, and methylene chloride. Although improvements have reduced 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.

KCSWD conducts quality control and quality assurance (QA/QC) quarterly on analytical data. If the QA/QC process or any of the data evaluation methods above show any inconsistencies or outliers the lab is contacted and asked to verify results. Administrative errors, such as a sample switch, are corrected promptly. In some cases, the sample will be reanalyzed, and a new result provided. If no error can be identified by the lab, the monitoring location will be resampled. Results that are demonstrated to be incorrect are flagged as rejected in the database and data that is flagged rejected in the database is not used for data analysis.

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. This issue is 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.

A notable change in 2017 involved the methodology for the analytical testing covered by SW-846 (Test Methods for Evaluating Solid Waste). The previous Method Detection Limit (MDL) methodology was 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.

3.2. GROUNDWATER ELEVATIONS and FLOW DIRECTION

Groundwater levels are measured in each well. Prior to May 2019, all vertical well data surveyed at Vashon Island Landfill used the National Geodetic Vertical Datum of 1929 (NGVD29). NGVD29 was superseded by the North American Vertical Datum of 1988 (NAVD88). During May 2019, groundwater monitoring wells were resurveyed using NAVD88 and beginning in July of 2019, water level elevations were calculated from the updated reference elevations. To correct groundwater elevations prior to July 2019, survey benchmark monuments were referenced via the National Geodetic Survey Data Explorer. Five benchmark monuments were listed within a 16,000 foot radius of Vashon Island Landfill (stations SY0637, and SY0640-SY0643); the stations show a mean and median 3.44 foot correction between NGVD29 and NAVD88 control survey markers (US Department of Commerce, 2023). Therefore, all groundwater elevations reported prior to July 2019 were corrected by increasing the historic elevations by 3.44 feet. Well completion details are listed in Table 1, and all screen intervals are in reference to the NAVD88, unless otherwise indicated.

Groundwater static water levels are reviewed each quarter. Inconsistencies with historical data are carefully reviewed and evaluated for accuracy. Since water levels are taken prior to sampling, this provides a second data point for quality control. Static groundwater elevation, also called hydraulic head, is calculated by subtracting static water level measurements from the reference point elevation (surveyed in NAVD88). The updated conceptual hydrogeologic model delineated groundwater monitoring wells into their respective water-bearing units (Aspect, 2020). Upgradient and downgradient wells were determined by the hydraulic head at each well relative to the waste unit and other wells in the same water-bearing unit; upgradient wells have higher hydraulic head measurements relative to downgradient wells.

Quarterly groundwater potentiometric surface maps are generated using Surfer, a gridding, contouring, and 3D surface mapping program. Surfer was used to interpolate and smooth the irregularly spaced three-dimensional groundwater elevation data into grid values that represent modeled hydraulic head values across each aquifer. Next, the grid values are used to generate equipotential contours that represent the groundwater potentiometric surface for each aquifer. The hydraulic gradient is the change in hydraulic head over a distance, and the maximum hydraulic gradient will be perpendicular to the potentiometric contours; therefore, the maximum gradient determines the direction of groundwater flow, with groundwater moving from high hydraulic head values to low hydraulic head values.

3.3. TRILINEAR DIAGRAMS and ION BALANCE

Geochemical data is presented on trilinear diagrams. Major cations and anions are plotted on individual triangles as percentages of total milliequivalents per liter (meq/L). These diagrams illustrate differences in major ion chemistry between groundwater samples and can be used to categorize water composition into identifiable groundwater types or hydrochemical facies. These hydrochemical facies reflect distinct compositions of cation and anion concentrations. The value of the diagram lies in describing relationships that exist among individual samples. Leachate from station LS-B is included on the trilinear diagram for comparison.

Ion balances also provide information about the internal consistency of sample results. If the ion ratio is greater than ten percent, this is an indication of analytical error. When this disparity occurs, the individual results are reviewed, and any findings are included in this report. For the ion balance calculations non-detects values are evaluated as half the method detection limit.

3.4. GROUNDWATER and SURFACE WATER EXCEEDANCES

Groundwater quality monitoring results are compared to the *National Primary and Secondary Drinking Water Regulations* (40 CFR Parts 141 and 143; MCL) and *Water Quality Standards for Groundwaters of the State of Washington* (WAC 173-200; SGWC). Surface water quality monitoring results are compared to *Water Quality Standards for Surface Waters of the State of Washington* (WAC 173-201A) and *Water Quality Standards* (40 CFR Parts 131). Analytical results, not mean or median values, are compared to their respective standards. Exceedances are reported pursuant to the requirement in WAC 173-351-415(2)c to report concentrations above the criteria in WAC 173-200 (SGWC1 or SGWC2, as referred to in this report). It must be noted that not all parameters that are analyzed have standards.

In addition to providing information about the water quality relative to established standards, exceedances also provide a cursory evaluation of changes relative to historical data. When an established standard is exceeded for the first time or is a statistically significant increase compared to historical results, the data is reviewed more carefully.

3.5. VOLATILE ORGANIC COMPOUND DETECTIONS

Groundwater volatile organic compound (VOC) detections are used as a groundwater quality evaluation method since the majority of organic compounds are synthetic and VOC occurrences in groundwater may be an indication of an impact from landfilling activities.

3.6. PREDICTION LIMIT EXCEEDANCES

The prediction limit is a statistical interval calculated, during the first quarter, annually on past background samples to estimate future values. Sample results from monitoring wells screened within Channel Cc2 are compared to interwell prediction limits calculated using data from upgradient monitoring well MW-20, and data from wells screened within the Unit D Aquifer are compared to the calculated intrawell prediction limits.

Before calculating the Prediction Limit, the data set is tested for normality by application of the Shapiro-Wilk Test for Normality. If the data fail the test for normality, transformed data are tested. When normal or transformed normal data sets are determined, a parametric prediction limit is calculated, and future results compared to this value. The prediction limits generated for the annual report are based on a 5% false positive rate (type I error) and depend on the background distribution. If the normality test fails or if the dataset has fewer than 50% detections, then the prediction limit is calculated based on the maximum value from that dataset for the specific analyte. If the dataset is completely made up of non-detect data, then the current method detection limit is used as the prediction limit. For prediction limit calculations non-detects values are evaluated as half the method detection limit.

3.7. STATISTICAL AND TREND ANALYSES

3.7.1. Descriptive Statistics

The data from each monitoring well or surface water stations are divided into two groups for evaluation. The first group consists of all data in the period of record, excluding the eight most recent analyses. The second group consists of the eight most recent analyses. Monitoring wells that have not produced sufficient water for eight samples in the last two years are compiled as a long-term trend only. Descriptive statistics describe general measures of a sample population, the extremes (maximum, minimum,) central tendencies (mean, median), and variability (standard deviation). These descriptive statistics are compared to historical values to identify any significant changes. For the descriptive statistics calculations non-detects values are evaluated as half the method detection limit.

For the purpose of discussion, the more recent period is considered to have more importance, both because of the timeliness of the data and improvements in the quality of the data. Although both means and medians are reported in the summary tables, medians are used in the text because they tend to be a more reliable measure of central tendency in the case of nonnormal distributions, particularly when there are outliers, as is the case here. Natural waters are commonly characterized by non-normal distributions.

3.7.2. Trend Analysis

Trend testing was accomplished by using the Mann-Kendall test for trend. The Mann-Kendall trend test involves listing the observations in temporal order and computing all differences that may be formed between measurements and earlier measurements. The test statistic is the difference between the number of strictly positive differences and the number of strictly negative differences. The tabulated results presented in a table in the annual report are: number of analyses, number of detections, direction of trend, probability, and significance of trend at a 95% confidence level. For the trend analysis, non-detects values are evaluated as half the method detection limit.

The trend test evaluates data for long-term trends, which consists of all historical except the last eight samples, and short-term trends utilize 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 that have not produced sufficient water for eight samples in the last two years are compiled for a long-term trend test only. For the purpose of discussion, the more recent period is considered to have more importance, both because of the timeliness of the data and improvements in the quality of the data.

4. RESULTS and DISCUSSION

4.1. GROUNDWATER

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, 2020).

Groundwater 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). Well completion details are listed in Table 1. During the reporting period, four samples were taken from each well, with the exceptions of monitoring wells MW-3 and MW-4. Monitoring well MW-3 is seasonally dry and well MW-4 is damaged.

Appendix A contains the raw data collected during sampling, the laboratory analytical results, and the corresponding data qualifier descriptions. For each aquifer, the raw data is plotted as a function of time. Figures 3-7 show groundwater elevation over time, and Appendix B includes the time series graphs for the monitored constituents.

Potentiometric surface maps, horizontal groundwater velocity calculations, and flow directions are included in Appendix C. Appendix D contains the trilinear diagrams and the ionic balance calculations.

The *National Primary and Secondary Drinking Water Regulations* (40 CFR Parts 141 and 143; MCL) and *Water Quality Standards for Groundwaters of the State of Washington* (WAC 173-200; SGWC) can be found in Appendix E. The 2023 prediction limits are summarized in Appendix E. Exceedances of the state, federal, or prediction limits are determined by comparing the raw analytical data to the corresponding limit. Exceedances are tabulated and reported in Appendix F. All groundwater VOC detections are also reported in Appendix F.

Descriptive statistical summary tables are compiled for routine groundwater analytes in Table 2, trend test tables are compiled for routine groundwater analytes in Table 3. Only long-term trend tests are available for the MW-3 and MW-4 wells due to the reduced sampling mentioned above. Descriptive statistics for Appendix III analytes are included in Table 4, with the Appendix III trend tests in Table 5. Table 6 shows the range of 2023 general indicator parameters and metals results within the Unit D Aquifer next to estimated area background results from Carr (1983) and the Vashon-Maury Island Groundwater Management Plan (1998).

While reviewing historic data from the site, it is 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 8 µg/L (Ecology, 2022). Therefore, exceedances of the *Water Quality Standards for Groundwaters of the State of Washington* for these contaminants are believed to be representative of background groundwater quality unaffected by the VLF.

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

4.2. GROUNDWATER in UNIT B

Monitoring well MW-24 does not produce a sufficient volume of groundwater for sample collection, so only water level measurements are taken at this location (Figure 2).

4.2.1. Groundwater Elevations and Flow Direction

Groundwater elevation data for Unit B can found in Figure 3 and Appendix A. Due to monitoring well MW-24 being the only well screened in Unit B, there is not enough water level elevation data to calculate velocity and produce potentiometric maps for Unit B. Static water level data for monitoring well MW-24 is consistent with previous years.

4.3. GROUNDWATER in CHANNEL Cc1

There are four monitoring wells screened in Channel Cc1: MW-3, MW-4, MW-10, and MW-13. Water levels and water quality in Channel Cc1 is consistent with previous years unless stated otherwise below.

4.3.1. Groundwater Elevations and Flow Direction

Groundwater elevation data for Channel Cc1 can found in Figure 4 and Appendix A. 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. Due to minimal recharge rates in monitoring well MW-3. and well MW-4 being damaged, there is not enough water level elevation data to calculate velocity and produce potentiometric maps for Channel Cc1. Field permeability tests performed by Harper-Owes (1986) indicated that the average permeability of sand in Channel Cc1 was approximately 4.3 ft/day.

4.3.2. Trilinear Diagrams and Ion Balance

The Channel Cc1 trilinear diagrams and ion balances are located in Appendix D (Figure D-1 and Table D-1). Trilinear diagrams show samples plotted from monitoring wells MW-10 and MW-13 to have magnesium as the dominant cation and bicarbonate as the dominant anion. The Cc1 groundwater samples show that the alkaline earths exceed alkalis and that the weak acids exceed strong acids, with sample composition being approximately 80% hardness causing constituents (calcium and magnesium) and 80% weak acids (carbonate and bicarbonate). Ultimately, the Cc1 samples are plotted within the magnesium bicarbonate hydrochemical facies, which is consistent with historic samples.

The analytical leachate result from location LS-B (Figure D-1 in Appendix D) has been plotted on the trilinear diagram for comparison purposes. Leachate results from LS-B do not exhibit a dominant cation nor anion type. The sample shows that strong acids exceed weak acids and plot in a “mixed type” hydrogeochemical facies. Leachate quality does not represent natural waters, and sample LS-B is plotted in an area of the graph that is distinct from the Cc1 groundwater results described above.

Table D-1 (of Appendix D) contains the cation/anion balance for wells sampled this year within Channel Cc1. The cation-anion sums for monitoring wells MW-3, MW-10 and MW-13 are less than 5 meq/L, and are below the ten percent difference threshold limit. Based on the ion balances, it appears that the analytical results for wells in Channel Cc1 are valid.

4.3.3. Groundwater Exceedances

Exceedances of the *Water Quality Standards for Groundwaters of the State of Washington* (SGWC) and *National Primary and Secondary Drinking Water Regulations* (MCL) are summarized in tables in Appendix F. Total arsenic exceeded the primary SGWC for all samples collected in Channel Cc1 during 2023 (Appendix F, Table F-1). There were no new exceedances of the groundwater criteria for Channel Cc1 during 2023. Total arsenic concentrations for all wells screened within Cc1 are below the 8 ug/L Puget Sound Basin background value, therefore, it appears that arsenic exceedances are the result of background arsenic conditions. Groundwater exceedances are consistent with previous years.

4.3.4. Volatile Organic Compounds Detections

During 2023, there were no VOCs were detected in Channel Cc1.

4.3.5. Statistical and Trends Analyses

Statistical and trend analysis results for Channel Cc1 are summarized in Tables 2 and 3. As discussed in Section 4.1, monitoring wells MW-3 and MW-4 do not have sufficient data in the past two years to run short-term statistical and trend analyses. Unless otherwise noted, trend results for Channel Cc1 is stable or decreasing.

Well MW-10 has short-term increasing trends for specific conductance and dissolved sodium while well MW-13 has short-term increasing trends for specific conductance, alkalinity, and sodium. Sodium concentrations at both wells are below the advisory limits, specific conductance measurements at the subject wells are below the SGWC. Short term alkalinity trends for well MW-13 will continue to be monitored.

Long-term trend analyses show increasing trends for pH, nitrate, total sodium, and total calcium for monitoring well MW-4. Well MW-4 is currently under evaluation for a damaged concrete well pad. Well MW-10 has long-term increasing trends for specific conductance, chloride, nitrate, total dissolved solids, dissolved calcium, total calcium, dissolved magnesium, dissolved potassium, and dissolved sodium; the short-term trend for each of these parameters is stable except specific conductance and sodium, and the value of each is below the SGWC and advisory limits. Well MW-13 has long-term increasing trends for nitrate, dissolved arsenic, and total arsenic; the short-term trend for each of these constituents is stable.

4.3.6. Summary

During 2023, the groundwater quality for monitoring wells screened within Channel Cc1 is consistent with previous years.

Results for the trilinear diagrams, ion balance calculations, exceedance results, lack of VOC detections, and the results of the descriptive statistics, short-term and long-term trend statistics indicate that the groundwater quality in Channel Cc1 is good with no indication of landfill impacts.

4.4. GROUNDWATER in CHANNEL Cc2

Monitoring wells MW-2, MW-9, MW-20, MW-21, MW-33, MW-35, and MW-37 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).

Groundwater in Channel Cc2 has been impacted by landfill gas (Aspect et. al., 2020). Remediation of Channel Cc2 is being addressed through the site-wide independent cleanup under the *Model Toxics Control Act* (WAC 173-340). The *Vashon Island Closed Landfill Remedial Investigation Report* (Aspect, 2020; Remedial Investigation) was finalized in November 2020. The Remedial Investigation will be used to prepare a Feasibility Study (FS) and to develop the Cleanup Action Plan. Water levels and water quality in Channel Cc2 is consistent with previous years unless stated otherwise below.

4.4.1. Groundwater Elevations and Flow Direction

Groundwater elevation data for Channel Cc2 can found in Figure 5 and Appendix A. Quarterly velocity calculations and potentiometric maps are attached in Appendix C.

In 2023, water level fluctuations in monitoring wells MW-2, MW-9, MW-20, MW-21, MW-33, MW-35, and MW-37 were less than one foot (Figure 5 and Appendix C). This low or lack of response to the annual cycle of wet and dry seasons can be explained by the landfill location, which is in an area where significant recharge to the aquifer does not occur (Carr, 1983). Relatively low-permeability surficial deposits (till) and partial landfill closures in 1989 and 1999 contribute to the lack of significant recharge. The Cc2 channel deposit is a perched water-bearing zone that is not laterally extensive across the site and the water levels generally indicate unconfined groundwater conditions (Aspect, 2020).

4.4.2. Trilinear Diagrams and Ion Balance

The Channel Cc2 trilinear diagrams and ion balances are located in Appendix D (Figure D-2 and Table D-2). Trilinear diagrams show samples plotted from monitoring wells MW-2, MW-9, MW-20, MW-21, MW-33, MW-35, and MW-37 to have magnesium as the dominant cation and bicarbonate as the dominant anion. The Cc2 groundwater samples show that the alkaline earths exceed alkalis and that the weak acids exceed strong acids, with sample composition being >80% hardness causing constituents (calcium and magnesium) and >75% weak acids (carbonate and bicarbonate). Ultimately, the Cc2 samples are plotted within the magnesium bicarbonate hydrochemical facies, which is consistent with historic samples.

The analytical leachate result from location LS-B (Figure D-2 in Appendix D) has been plotted on the trilinear diagram for comparison purposes. Leachate results from LS-B do not exhibit a dominant cation nor anion type. The sample shows that strong acids exceed weak acids and plot in a "mixed type" hydrogeochemical facies. Leachate quality does not represent natural waters, and sample LS-B is plotted in an area of the graph that is distinct from the Cc2 groundwater results described above.

During 2023, groundwater monitoring well MW-35 had a total cation-anion sum greater than 5 meq/L that exceeded the five percent difference threshold during the second quarter; no other wells in Channel Cc2 exceeded the percent difference thresholds (Table D-2 of Appendix D). Although well MW-35 exceeds the percent difference threshold, it is likely that the laboratory results are valid given the consistency of the results. Well MW-35 exhibits elevated trace metals and metalloids such as arsenic, iron, and manganese. It is likely that the presence of the trace metals and metalloids has affected the ion balance calculation (discussed further in Sections 4.4.3 - 4.4.8).

Table D-2 (of Appendix D) contains the cation/anion balance for wells sampled this year within Channel Cc2. The cation-anion sums for monitoring wells MW-2, MW-9, MW-20, MW-21, MW-33, and MW-35 are less than 5 meq/L, and are below the ten percent difference threshold limit or are greater than 5 meq/L but below the five percent difference limit. Based on the ion balances, it appears that the analytical results for wells in Channel Cc2 are valid.

4.4.3. Groundwater Exceedances

Exceedances of the SGWC and MCL are summarized in Table F-2 of Appendix F.

During the first quarter of 2023, total manganese concentrations (86.90 ug/L) at well MW-37 exceeded the 50 ug/L SGWC and MCL limits for the first time. Well MW-37 was installed during 2022. Although well MW-37 exhibits exceedances of total arsenic, total iron, and total manganese during 2023, arsenic, iron, and manganese are constituents that occur naturally. Arsenic concentrations at well MW-37 are below the 8 ug/L arsenic background for the Puget Sound Basin, and it is possible that the iron and manganese concentrations are below background values as well.

New exceedances of bis(2-chloroethyl)ether occurred in well MW-21 during the first and second quarter of 2023, but both exceedances were flagged 'JT' denoting that the concentrations were estimated above the method detection limit, but below the reporting detection limit.

Excluding the exceedances described above, there are no new exceedances of the SGWC nor MCL in Channel Cc2. Groundwater exceedances are consistent with previous years and are the result of landfill gas impacts.

4.4.4. Prediction Limits Exceedances

Exceedances of the interwell prediction limits are summarized in Table F-5 in Appendix F. The prediction limits for monitoring wells in Channel Cc2 are compared to upgradient monitoring well MW-20.

During 2021, 2,4,5-TP Silvex, 2-methyl-1-propanol, bis(2-chloroethyl) ether, bis(2-ethylhexyl) phthalate, and diethyl phthalate may were added to the quarterly monitoring program for Channel Cc2. Samples from background well MW-20 are now analyzed for these parameters and prediction limits were calculated for the constituents in 2023.

During 2023, new interwell exceedances of 2,4,5-TP Silvex (MW-33 and MW-35), bis(2-chloroethyl) ether (MW-21, MW-33, and MW-35), bis(2-ethylhexyl) phthalate (MW-2), and diethyl phthalate (MW-2, MW-20, MW-21, MW-33, MW-35, and MW-37) occurred. A few of the diethyl phthalate detections and one bis(2-chloroethyl)ether detection were flagged 'JT,' denoting that the sample concentrations were estimates.

The prediction limit exceedances are generally consistent with previous years and are the result of landfill gas impacts. It must be noted that a majority of the interwell exceedance concentrations are below the SGWCs and MCLs.

4.4.5. Volatile Organic Compound Detections

Groundwater VOC detections are summarized in Table F-8 in Appendix F. Detections of VOCs in 2023 were consistent with previous years for samples collected from Channel Cc2 and are the result of landfill gas impacts.

4.4.6. Statistical and Trends Analyses

Statistical and trend analysis results for Channel Cc2 are summarized in Tables 2 and 3.

New short-term increasing trends occur for wells MW-2 (total manganese), MW-20 (alkalinity, dissolved sodium, and total sodium), at well MW-33 (ammonia, dissolved sodium), and well MW-37 (dissolved arsenic and dissolved sodium).

Sodium concentrations at well MW-20 is below the 7.38 mg/L prediction limit value. Although the sodium concentrations at wells MW-33, and MW-37 are above the prediction limit, their concentrations were below the 20 mg/L Environmental Protection Agency sodium advisory concentration. Dissolved arsenic concentrations at well MW-37 are below the 8 ug/L Puget Sound Basin background (Ecology, 2022). Manganese concentrations at well MW-2 are below the 548 ug/L prediction limit, and the alkalinity values at well MW-20 are below the 94.9 mg/L prediction limit.

New long-term increasing trends occurred for dissolved sodium, total sodium, and trichloroethene at well MW-35. The short-term trend for each of the subject constituents is stable. Additionally, the dissolved sodium and total sodium concentrations in well MW-35 are below the Environmental Protection Agency sodium advisory concentration.

The remaining trends shown in Table 3 are consistent with previous results. Trends will continue to be monitored.

4.4.7. Appendix III Sampling

In 2021, KCSWD added five appendix III analytes (2,4,5-TP Silvex, 2-methyl-1-propanol, bis(2-chloroethyl) ether, bis(2-ethylhexyl) phthalate, and diethyl phthalate) to the quarterly monitoring program for Channel Cc2 (not including monitoring well MW-9). These five analytes were previously detected during appendix III sampling.

Concentrations of bis(2-ethylhexyl) phthalate at well MW-2 exceeded the SGWC and MCL limits during the first quarter of 2023. There were no other Appendix III exceedances of the SGWC and MCL. There were four method blank detections for diethyl phthalate during the third quarter of 2023 (Table F-12 of Appendix F).

Descriptive statistics (Table 4) and trend analyses (Table 5) were conducted on the 2022 and 2023 results. Statistical results show that the trend for each of these parameters is stable.

4.4.8. Summary

The 2023 groundwater quality for monitoring wells MW-9 and MW-20 is consistent with previous years and appear to be of good quality with little evidence of landfilling impacts.

The redox condition of groundwater controls the mobility, persistence, and fate of anthropogenic and natural groundwater contaminants. Water with more dissolved oxygen is considered aerobic (or oxic), and water with less dissolved oxygen is considered anaerobic (or reduced). Redox state is generally inferred from groundwater quality data in an effort to characterize the predominant redox processes occurring in situ. Under aerobic aquifer conditions, constituents such like selenium and nitrate are expected to have elevated concentrations. In strongly reducing or anaerobic environments, constituents like sulfur, iron, manganese, and arsenic may have elevated concentrations. In western Washington, where Vashon Island Landfill is located, the host aquifer rocks naturally contain higher concentrations of arsenic and manganese; reduced groundwater conditions react with the aquifer materials and arsenic and manganese is released from the aquifer.

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. Oxidizing conditions decrease the mobility of arsenic, due to adsorption to ferric hydroxides.

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. Reducing conditions increase the mobility of arsenic, which result in higher concentrations of arsenic in these monitoring wells.

Groundwater conditions in Channel Cc2 are consistent with previous years. Impact from landfill activities is evident in monitoring wells MW-2, MW-21, MW-33, and MW-35. Historically, there was evidence of impacts from leachate; however, declines in concentration of general water quality indicators (specific conductance, dissolved solids, chlorides, metals, etc.) suggest that leachate impacts have been controlled with closure. Current groundwater impacts in Channel Cc2 are the result of landfill gas (Aspect et. al., 2020). In 2014, Vashon Island Landfill was entered into independent cleanup under MTCA, due to the contamination in the groundwater in Channel Cc2. These evaluations will aid in determining if any additional improvements are needed.

4.5. GROUNDWATER in CHANNEL Cc3

Monitoring wells MW-8 and MW-36 monitor the groundwater in Channel Cc3.

4.5.1. Groundwater Elevations and Flow Direction

Groundwater elevation data for Channel Cc3 can found in Figure 6 and Appendix A.

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 et. al., 2020), shows that monitoring wells MW-8, MW-36 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. There is not enough water level data in Channel Cc3, with only two wells, to produce potentiometric maps and water velocities.

4.5.2. Trilinear Diagrams and Ion Balance

The Channel Cc3 trilinear diagrams and ion balances are located in Appendix D (Figure D-3 and Table D-3). Trilinear diagrams show samples plotted from monitoring wells MW-8 and MW-36 to have magnesium as the dominant cation and bicarbonate as the dominant anion. The Cc3 groundwater samples show that the alkaline earths exceed alkalis and that the weak acids exceed strong acids, with sample composition being approximately 80% hardness causing constituents (calcium and magnesium) and roughly 80% weak acids (carbonate and bicarbonate). Ultimately, the Cc3 samples are plotted within the magnesium bicarbonate hydrochemical facies, which is consistent with historic samples.

The analytical leachate result from location LS-B (Figure D-3 in Appendix D) has been plotted on the trilinear diagram for comparison purposes. Leachate results from LS-B do not exhibit a dominant cation nor anion type. The sample shows that strong acids exceed weak acids and plot in a "mixed type" hydrogeochemical facies. Leachate quality does not represent natural waters, and sample LS-B is plotted in an area of the graph that is distinct from the Cc3 groundwater results described above.

Table D-3 (of Appendix D) contains the cation/anion balance for wells sampled this year within Channel Cc3. The cation-anion sums for monitoring wells MW-8 and MW-36 are less than 5 meq/L, and are below the ten percent difference threshold limit. Based on the ion balances, it appears that the analytical results for wells in Channel Cc3 are valid.

4.5.3. Groundwater Exceedances

Exceedances of the SGWC and MCL are summarized in Table F-3 in Appendix F. Total arsenic exceeded the primary SGWC for all samples collected in Channel Cc3 during 2023. There were no new or statistically significant increases in groundwater criteria exceedances for Channel Cc3 during 2023. Groundwater exceedances are consistent with previous years and are the result of background arsenic conditions.

4.5.4. Volatile Organic Compounds Detections

There were no VOCs detected this year in Channel Cc3 samples.

4.5.5. Statistical and Trends Analyses

Statistical and trend analysis results for Channel Cc3 are summarized in Tables 2 and 3.

There were statistically significant short-term increasing trends for specific conductance and chloride in monitoring well MW-8 during 2023. These increasing trends are not believed to represent a new landfill impact, and the measurements and concentrations are below their respective SGWCs.

There was a statistically significant short-term increasing trend for specific conductance, alkalinity, and dissolved sodium in monitoring well MW-36. The specific conductance measurements are below the SGWC. Alkalinity will continue to be monitored. The increasing trends are not believed to represent changing conditions in monitoring well MW-36.

Well MW-36 has a statistically significant long-term and short-term increasing trend for dissolved sodium. Sodium concentrations at the subject well are below the Environmental Protection Agency's advisory limit.

All other Channel Cc3 long-term increasing trends have stable short-term trends. Results from the trend analyses are consistent with past evaluations.

4.5.6. Summary

The 2023 groundwater quality within monitoring wells in Channel Cc3 is consistent with previous years and appear to be of good quality with little evidence of landfilling impacts.

4.6. 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.

4.6.1. Groundwater Elevations and Flow Direction

Groundwater elevation data for the Unit D Aquifer can found in Figure 7 and Appendix A. Quarterly velocity calculations and potentiometric maps are attached in Appendix C.

Construction differences make the determination of groundwater gradients and flow direction difficult in the area monitored by these wells. The 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 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 C). The water fluctuations for the monitoring wells are less than two ft. in 2023, and without considerable seasonal trends (Figure 7). This lack of response to the annual cycle of wet and dry seasons can be explained by the landfill location, which is in an area where there is insignificant recharge to the aquifer (Carr, 1983); which is attributable to relatively low-permeability surficial deposits (till) and landfill closures.

4.6.2. Trilinear Diagrams and Ion Balance

The Unit D trilinear diagrams and ion balances are located in Appendix D (Figure D-4 and Table D-4). Trilinear diagrams show samples plotted from monitoring wells MW-7, MW-12, MW-19, MW-29, and MW-34 to have magnesium as the dominant cation and bicarbonate as the dominant anion. Well MW-26 shows no dominant cation type due to slightly higher ratios of calcium, sodium, and potassium; bicarbonate is the dominant anion. The Unit D groundwater samples show that the alkaline earths exceed alkalis and that the weak acids exceed strong acids, with sample composition being >75% hardness causing constituents (calcium and magnesium) and >75% weak acids (carbonate and bicarbonate). Ultimately, the Unit D samples are plotted within the magnesium bicarbonate hydrochemical facies, which is consistent with historic samples.

The analytical leachate result from location LS-B (Figure D-4 in Appendix D) has been plotted on the trilinear diagram for comparison purposes. Leachate results from LS-B do not exhibit a dominant cation nor anion type. The sample shows that strong acids exceed weak acids and plot in a “mixed type” hydrogeochemical facies. Leachate quality does not represent natural waters, and sample LS-B is plotted in an area of the graph that is distinct from the Unit D groundwater results described above.

Table D-4 (of Appendix D) contains the cation/anion balance for wells sampled this year within the Unit D aquifer. The cation-anion sums for monitoring wells MW-7, MW-12, MW-19, MW-26, MW-29, and MW-34 are less than 5 meq/L, and are below the ten percent difference threshold limit or are greater than 5 meq/L but below the five percent difference limit. Based on the ion balances, it appears that the analytical results for wells in Unit D are valid.

4.6.3. Groundwater Exceedances

Exceedances of the SGWC and MCL are summarized in Table F-4 in Appendix F. Total arsenic concentrations exceeded the primary SGWC for all samples collected in the Unit D Aquifer and the primary MCL for two samples collected from monitoring well MW-29. There were no new or statistically significant increases in groundwater criteria exceedances for Unit D Aquifer in 2023. Groundwater exceedances are consistent with previous years and are the result of background conditions.

4.6.4. Prediction Limits Exceedances

Exceedances of the intrawell prediction limits are summarized in tables in Appendix F.

Monitoring well MW-7 exhibited intrawell prediction limit exceedances of alkalinity, ammonia, and dissolved iron during the fourth quarter of 2023; each of these prediction limit exceedances is a 1 of 4 exceedance and have entered the retesting protocol. There are no other constituents in the retesting protocol.

The Unit D prediction limit exceedances are consistent with previous results.

4.6.5. Volatile Organic Compounds Detections

There were no VOCs detected in Unit D samples this year.

4.6.6. Statistical and Trends Analyses

Statistical and trend analysis results for the Unit D Aquifer are summarized in Tables 2 and 3.

There were statistically significant short-term increasing trends for specific conductance (MW-7, MW-12, MW-26, MW-29, and MW-34), alkalinity (MW-7, MW-12, MW-19, MW-26, and MW-29), sulfate (MW-26), total iron (MW-19), dissolved magnesium (MW-26), dissolved sodium (MW-7, MW-19, MW-26, MW-29, and MW-34), and total sodium (MW-26). Of the short-term significantly increasing trends in the Unit D Aquifer, alkalinity at well MW-7 is the only parameter that exhibited a prediction limit exceedance during 2023. Alkalinity concentrations will continue to be monitored.

Excluding the trends described above, wells with significant long-term increasing trends show stable to decreasing short-term trends.

The Unit D Aquifer short-term and long-term trends are consistent his historic results.

4.6.7. Summary

Table 6 presents a water quality comparison of background conditions and the Unit D Aquifer characterized beneath the Vashon Landfill. VOCs are not summarized due to the absence of detections in these wells.

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.

4.7. WEIR and SURFACE WATER QUALITY

The seeps and weirs are located on the western ravine adjacent to the landfill (Figure 8). Identified seeps (SW-S1, SW-S2, SW-S3, SW-S4, and SW-S5) are monitored by downstream weir sampling locations SW-W1, SW-W2 and SW-W3. Surface water sampling location SW-E was installed further downstream of the landfill to verify that there are no impacts to Robinwood Creek (see location in Figure 1). 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-W2 contains groundwater seeping from Channel Cc2 and possibly Channel Cc3; and weir SW-W3 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 updated hydrogeological conceptual model further clarified the groundwater sources following out of the seeps and into the weirs with all three weirs being primarily sourced from Channel Cc2 seeps (Aspect et. al., 2020).

Appendix F contains the surface water exceedances, Appendix G contains the raw data collected during sampling, as well as the laboratory analytical results, and Table 7 shows the descriptive statistics for all surface water data.

4.7.1. Surface Water Exceedances

Exceedances of the WAC 173-201A (Washington State acute and chronic surface water quality criteria) and 40 CFR Parts 131 (federal acute and chronic surface water quality criteria) are summarized in Table F-12 of Appendix F. Weirs SW-W1, SW-W2, and SW-W3 had total iron exceedances of the federal chronic surface water criteria. Exceedances of total metal criteria is consistent with previous years.

4.7.2. Volatile Organic Compound Detections

Weir and surface water VOC detections can be found in Appendix G.

The VOC detections during 2023 were consistent with previous years. Vinyl chloride is the only VOC routinely detected in the surface water at the weirs. Vinyl chloride was detected in every quarter in SW-W1 and SW-W3, however, detections were flagged as ‘D,’ or ‘DJT’ by the laboratory. Vinyl chloride has never been detected in SW-E.

Acetone was detected at SW-W1, SW-W2, and SW-W3, with most detections flagged with ‘JT.’ Acetone is a common laboratory contaminant; weirs will continue to be monitored.

Surface water VOC detection results are consistent with the historic results.

4.7.3. Statistical Analysis

Statistical results for the weirs and station SW-E are summarized in Table 7. For indicator parameters like specific conductance, alkalinity, chloride, nitrate, calcium, and magnesium, short-term median values continue to be similar or lower than long-term median values, indicating stable or improving water quality conditions. Specific conductance, alkalinity, and chloride values continue to be higher in weir SW-W2, compared with SW-W1 and SW-W3, indicating that weir SW-W2 may still be impacted by leachate. Short- and long-term median values for station SW-E continue to be low and stable.

4.7.4. Summary

Raw analytical groundwater data weirs and surfaces water stations can be found in Appendix G.

Conditions in weir SW-W1 continues to show the least evidence of landfill impact, while weir SW-2 has more evidence of landfill impact. Weir SW-W3 exhibits a midrange impact based on conventional parameters and metals and showing detections of vinyl chloride. Water quality monitoring will continue at the weirs to provide water quality data for surface water flow leaving the property.

Station SW-E continues to show no evidence of landfill impact.

4.8. OFFSITE DOMESTIC WELL MONITORING

In 2002, King County 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*.

In 2005, King County Solid Waste Division agreed to monitor three of the eleven domestic 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 have been collected from off-property wells (DW-85 and DW-PA) 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. In 2021, a new offsite well (DW-LS) was added to the offsite monitoring program. Six samples were collected in 2022 from the three off property wells (DW-85, DW-LS, and DW-PA) (Figure 9). No evidence of contamination originating from the landfill was found.

The results from the domestic wells are included in Appendix A. The domestic well trilinear diagrams and ion balances are on Figure D-5 Appendix D for 2023. The trilinear diagram shows that the domestic wells generally have magnesium as the dominant anion and bicarbonate as the dominant anion. The domestic well samples are ultimately plotted within the magnesium bicarbonate hydrochemical facies, which is consistent with historic samples.

The analytical leachate result from location LS-B (Figure D-5 in Appendix D) has been plotted on the trilinear diagram for comparison purposes. Leachate results from LS-B do not exhibit a dominant cation nor anion type. The sample shows that strong acids exceed weak acids and plot in a “mixed type” hydrogeochemical facies. Leachate quality does not represent natural waters, and sample LS-B is plotted in an area of the graph that is distinct from the domestic groundwater well results described above.

Table D-5 (of Appendix D) contains the cation/anion balance for the domestic wells sampled this year. The cation-anion sums for the domestic wells are less than 5 meq/L, and are below the ten percent difference threshold limit or are greater than 5 meq/L but below the five percent difference limit. Based on the ion balances, it appears that the analytical results from the domestic wells are valid.

5. LEACHATE

The 2023 leachate results are compiled in Appendix H and include sample results for station LS-LVT (required monitoring under Wastewater Discharge Authorization No. 4366-01). See Figure 10 for a map of the leachate control system.

6. 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 11). The monitoring network comprises of nine ambient air stations, two groundwater monitoring wells, and twenty-six gas probes. Probes are monitored monthly. The results can be found in Appendix I. There were no methane detections in 2023 and there have been no methane detections at the compliance monitoring points since 2008.

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, 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 50 ft. for gas wells GW-9, GW-10, and GW-11, respectively (Aspect and Herrera, 2019). In March of 2022, the belt-drive landfill gas blower was replaced by two direct-drive landfill gas blower, after being offline for two years. Evaluations are ongoing.

7. SITE MAINTENANCE and SITE IMPROVEMENTS

Routine site maintenance was conducted at Vashon Landfill during 2023. The landfill cover was inspected systems were inspected and small repairs were conducted to ensure continued function of the environmental systems. Vegetation was maintained as needed, in accordance with the WACs. Investigation derived waste barrels from previous well investigations were removed from the site in accordance with local and state jurisdictions.

For a list of previous investigations and improvements at Vashon Island Landfill see Table 8. In 2021, the Feasibility Study was started, as part of the independent cleanup for Channel Cc2 being conducted under the Model Toxics Control Act (WAC 173-340). The Feasibility Study Outline, after review by the Washington State Department of Ecology and Public Health-Seattle & King County, was finalized on June 30, 2021. Since finalization of the Feasibility Study Outline, the KCSWD's Consultant began working on the Feasibility Study and an Agency Draft is currently expected in 2024.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1. CONCLUSIONS

Conditions at the Vashon Island 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. 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 and investigations, specifically levels of VOCs in monitoring wells MW-2, MW-21, MW-33, and MW-35, support transport of historic contaminants from landfill gas.
2. Results obtained from wells in Channel Cc1, Channel Cc2, and the 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.

8.2. RECOMMENDATIONS/PROPOSED ACTIONS

1. Continued monitoring of the groundwater quality and the potentiometric surfaces at the groundwater monitoring wells, as well as monitoring the unsaturated portion of the vadose zone at the landfill gas probes. Continued sampling at leachate sampling locations, surface water stations, and offsite domestic wells.
2. It is recommended that the *Environmental Monitoring Sampling and Analysis Plan and Quality Assurance Project Plan for Vashon Island Landfill* be updated.
3. Evaluation of the operating efficiency of the landfill gas collection system and probe network will continue into 2024 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.
4. Monitoring of the groundwater wells will continue for Appendix I and II parameters, with the addition of dichlorodifluoromethane and Appendix III parameters 2,4,5-TP Silvex, 2-methyl-1-propanol, bis(2-chloroethyl) ether, bis(2-ethylhexyl) phthalate, and diethyl phthalate for monitoring wells MW-2, MW-20, MW-21, MW-33, and MW-35. These new analytes will be added to the prediction limit exceedance check in 2023. The full Appendix III list is sampled every five years and the next sampling event will occur during the second quarter of 2024 and again during 2029.
5. The water-bearing zone in Channel Cc2 shall continue with assessment monitoring in accordance with WAC 173-351-430. The RI was completed in 2020. Work started on the Feasibility Study in 2021, and progress has been made towards completing a draft report for the Feasibility Study as of March 2024.
6. In 2024, KCSWD will continue trying to coordinate the addition of the offsite spring, DW-GW, to the offsite monitoring network.

7. Surface water sampling site SW-E will continue to be sampled quarterly for pH (field), specific conductance (field and laboratory), turbidity (field and laboratory), hardness, total metals, and vinyl chloride.
8. In accordance with WAC 173-350-330, the leachate lagoon at VLF is to be tested in 2025 for leaks.
9. In August 2021, KCSWD submitted a proposed schedule and framework for developing and implementing a program to test select leachate containment and conveyance structures at VLF in accordance with WAC 173-350-330. Public Health – Seattle & King County approved KCSWD's proposal in December 2021 and KCSWD established a Capital Improvement Program project intended to identify and validate asset-specific test methods. Work for this project is ongoing.
10. In March of 2022, two new direct drive blowers were installed to replace the previous belt drive blower and active landfill gas collection was resumed. KCSWD will continue to closely monitor the methane concentration in the landfill gas stack emissions and the groundwater response.

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TABLES and FIGURES

Table 1

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[a]	Bottom of Screen Elevation[a]	Top of Seal Elevation[a]	Bottom of Seal Elevation[a]	Seal Type	Top of Sand Pack (feet elev.)[a]	Bottom of Sand Pack (feet elev.)[a]	Sand Type	Reference[c]
MW-1[d]	8/9/1983	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	12/9/1983	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[b,d]	6/3/1986	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[b,d]	6/3/1986	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[b,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[b,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	12/6/1995	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	1/7/1995	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	12/6/1995	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	11/8/2003	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	6/8/2003	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[d]	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-30	12/14/2009	King County	235.67	Sch 40 PVC	2	0.010	230.40	225.40	234.42	223.42	Bentonite	231.42	225.40	10 x 20 Colorado Silica	J
MW-31	12/15/2009	King County	209.24	Sch 40 PVC	2	0.010	204.24	199.24	207.16	196.66	Bentonite	203.16	197.16	10 x 20 Colorado Silica	J
MW-32	12/14/2009	King County	254.72	Sch 40 PVC	2	0.010	242.82	232.82	252.82	232.82	Bentonite	244.82	232.82	10 x 20 Colorado Silica	J
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
MW-37	5/18/2022	Jacobs	294.70	Sch 40 PVC	4	0.020	222.10	212.10	291.10	224.10	Bentonite	224.10	212.10	12/20 Washed Silica	K
P-1S[b,d]	12/3/1986	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[b,d]	12/3/1986	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[b,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[b,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[b,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[b,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, J = King County, 2011, K = Jacobs, 2022.
[d]Well has been decommissioned.

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	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	40	55	105	8	110	8
No. of Detections	40	55	105	8	110	8
Minimum	5.17	5.94	6.75	6.98	6.63	6.65
Maximum	6.82	7.97	8.42	7.24	7.99	7.18
Mean	5.99	6.57	7.34	7.10	7.19	6.96
Standard Deviation	0.373	0.347	0.290	0.088	0.249	0.162
Median	5.93	6.46	7.34	7.11	7.20	6.93
Specific Conductance, Field [umhos/cm]						
No. of Analyses	40	55	105	8	109	8
No. of Detections	40	55	105	8	109	8
Minimum	46.30	149.50	100.00	127.30	130.00	101.00
Maximum	200.00	860.00	158.80	140.60	195.00	153.60
Mean	98.01	440.38	132.32	133.71	159.32	138.13
Standard Deviation	33.52	219.86	11.89	4.76	15.08	16.44
Median	97.00	460.00	130.00	133.60	160.00	139.70
Alkalinity [mg/L]						
No. of Analyses	33	34	105	8	107	8
No. of Detections	33	34	105	8	107	8
Minimum	15.60	37.80	52.00	56.50	30.00	62.30
Maximum	41.00	320.00	70.00	59.40	80.00	66.10
Mean	25.49	129.77	56.70	58.50	63.58	63.98
Standard Deviation	6.37	102.22	2.65	0.880	7.17	1.52
Median	24.00	67.05	56.50	58.80	63.60	63.25
Ammonia-N [mg/L]						
No. of Analyses	39	67	105	8	112	8
No. of Detections	11	25	15	0	12	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	0.650	0.332	0.060	ND	0.070	ND
Mean	0.081	0.042	0.009	ID	0.008	ID
Standard Deviation	0.179	0.069	0.011	ID	0.011	ID
Median	0.005	0.025	0.005	ID	0.005	ID
Chloride [mg/L]						
No. of Analyses	40	67	105	8	112	8
No. of Detections	40	65	104	8	112	8
Minimum	0.941	ND	ND	3.16	2.50	2.62
Maximum	11.00	19.00	30.90	3.59	10.60	3.01
Mean	2.51	8.91	3.38	3.41	3.43	2.84
Standard Deviation	2.02	4.03	2.74	0.131	0.996	0.124
Median	2.00	7.84	3.03	3.44	3.02	2.87
Nitrate-N [mg/L]						
No. of Analyses	40	67	105	8	112	8
No. of Detections	40	42	105	8	111	8
Minimum	0.200	ND	0.210	0.409	ND	0.210
Maximum	5.53	6.30	0.840	0.457	0.418	0.369
Mean	1.62	1.45	0.425	0.434	0.126	0.288
Standard Deviation	1.33	1.71	0.125	0.015	0.084	0.055
Median	1.25	0.300	0.400	0.437	0.094	0.284
Sulfate [mg/L]						
No. of Analyses	40	67	105	8	111	8
No. of Detections	40	67	105	8	111	8
Minimum	3.34	3.70	2.60	9.04	8.39	9.01
Maximum	19.00	46.00	11.00	10.20	26.81	12.20
Mean	8.69	17.08	9.43	9.53	17.69	10.88
Standard Deviation	4.22	8.66	0.881	0.355	3.51	1.13
Median	8.00	15.00	9.49	9.55	18.70	11.15
Total Dissolved Solids [mg/L]						
No. of Analyses	35	52	104	8	111	8
No. of Detections	35	52	104	8	111	8
Minimum	8.00	29.00	46.00	90.00	68.00	101.00
Maximum	90.00	500.00	131.00	107.00	150.00	115.00
Mean	61.59	284.38	98.62	101.75	115.91	108.13
Standard Deviation	16.63	129.86	12.92	5.44	13.62	4.05
Median	62.70	300.00	100.00	102.50	117.00	109.00
Arsenic, Dissolved [ug/L]						
No. of Analyses	40	67	105	8	112	8
No. of Detections	6	24	104	8	111	8
Minimum	ND	ND	ND	1.60	ND	1.89
Maximum	7.00	6.00	2.00	1.77	3.00	2.27
Mean	0.688	1.06	1.61	1.69	1.83	2.10
Standard Deviation	1.24	1.08	0.325	0.053	0.296	0.149
Median	0.500	0.500	1.65	1.69	1.90	2.17
Arsenic, Total [ug/L]						
No. of Analyses	18	19	33	8	36	8
No. of Detections	13	18	33	8	36	8
Minimum	ND	ND	1.47	1.59	1.55	1.92
Maximum	0.500	0.623	1.75	1.72	2.28	2.33
Mean	0.161	0.384	1.60	1.67	1.92	2.06
Standard Deviation	0.164	0.070	0.077	0.052	0.207	0.150
Median	0.091	0.366	1.60	1.69	1.96	2.00

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
Calcium, Dissolved [mg/L]						
No. of Analyses	34	44	105	8	112	8
No. of Detections	34	44	105	8	112	8
Minimum	4.55	11.10	4.30	9.54	6.50	8.98
Maximum	11.00	73.60	13.00	10.50	11.50	11.30
Mean	8.13	36.63	9.07	10.03	9.40	9.65
Standard Deviation	1.70	23.30	0.998	0.288	0.857	0.767
Median	8.37	33.50	9.10	10.10	9.50	9.30
Calcium, Total [mg/L]						
No. of Analyses	18	19	33	8	36	8
No. of Detections	18	19	33	8	36	8
Minimum	4.47	11.20	8.23	9.72	8.21	9.05
Maximum	9.67	26.00	11.20	10.40	11.50	9.92
Mean	7.13	14.67	9.62	10.10	9.59	9.46
Standard Deviation	1.57	4.12	0.653	0.232	0.802	0.335
Median	7.24	12.90	9.76	10.10	9.57	9.55
Iron, Dissolved [mg/L]						
No. of Analyses	40	67	105	8	112	8
No. of Detections	21	40	55	0	65	1
Minimum	ND	ND	ND	ND	ND	ND
Maximum	8.60	0.500	0.300	ND	0.490	0.030
Mean	0.714	0.066	0.028	ID	0.032	ID
Standard Deviation	2.03	0.100	0.046	ID	0.056	ID
Median	0.017	0.025	0.007	ID	0.012	ID
Iron, Total [mg/L]						
No. of Analyses	18	19	33	8	36	8
No. of Detections	18	14	19	1	30	1
Minimum	0.019	ND	ND	ND	ND	ND
Maximum	0.353	0.335	0.041	0.062	2.18	0.014
Mean	0.119	0.041	0.012	ID	0.119	ID
Standard Deviation	0.100	0.075	0.008	ID	0.363	ID
Median	0.077	0.016	0.012	ID	0.030	ID
Magnesium, Dissolved [mg/L]						
No. of Analyses	34	44	105	8	112	8
No. of Detections	34	44	105	8	112	8
Minimum	1.80	8.03	4.20	9.38	7.70	10.70
Maximum	3.10	56.80	12.00	10.10	14.00	13.10
Mean	2.36	27.55	8.46	9.61	10.71	11.46
Standard Deviation	0.292	18.08	0.981	0.265	1.18	0.807
Median	2.34	24.00	8.30	9.55	10.60	11.30
Magnesium, Total [mg/L]						
No. of Analyses	18	19	33	8	36	8
No. of Detections	18	19	33	8	36	8
Minimum	1.89	7.75	8.04	8.95	9.63	10.20
Maximum	2.94	17.70	10.90	9.70	13.60	11.90
Mean	2.39	10.40	9.36	9.43	11.33	10.98
Standard Deviation	0.307	2.58	0.663	0.244	1.10	0.509
Median	2.41	9.34	9.34	9.51	11.20	10.95
Manganese, Dissolved [ug/L]						
No. of Analyses	40	67	105	8	112	8
No. of Detections	33	60	11	2	70	6
Minimum	ND	ND	ND	ND	ND	ND
Maximum	2700.00	970.00	3.20	0.553	27.00	7.70
Mean	243.99	132.06	0.518	ID	2.52	1.67
Standard Deviation	728.74	205.05	0.431	ID	4.01	2.69
Median	0.854	28.00	0.500	ID	1.00	0.542
Manganese, Total [ug/L]						
No. of Analyses	18	19	33	8	36	8
No. of Detections	18	19	22	4	33	8
Minimum	0.808	1.08	ND	ND	ND	0.103
Maximum	35.70	169.00	1.91	4.26	65.00	3.93
Mean	7.93	22.00	0.520	0.627	5.90	0.854
Standard Deviation	9.26	40.06	0.469	1.47	11.27	1.28
Median	4.41	7.67	0.500	0.083	2.47	0.385
Potassium, Dissolved [mg/L]						
No. of Analyses	34	44	105	8	112	8
No. of Detections	34	44	105	8	112	8
Minimum	1.06	0.880	0.650	1.41	1.10	1.59
Maximum	4.10	2.70	2.00	1.56	2.24	2.15
Mean	2.52	1.54	1.37	1.46	1.71	1.79
Standard Deviation	0.951	0.541	0.146	0.061	0.161	0.186
Median	2.52	1.45	1.38	1.44	1.70	1.74
Potassium, Total [mg/L]						
No. of Analyses	18	19	33	8	36	8
No. of Detections	18	19	33	8	36	8
Minimum	1.04	0.901	1.28	1.41	1.48	1.59
Maximum	2.80	1.24	1.65	1.52	2.50	1.84
Mean	1.81	1.07	1.48	1.45	1.80	1.72
Standard Deviation	0.600	0.097	0.076	0.037	0.169	0.081
Median	1.62	1.04	1.48	1.45	1.78	1.75

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
Sodium, Dissolved [mg/L]						
No. of Analyses	34	44	105	8	112	8
No. of Detections	34	44	105	8	112	8
Minimum	1.81	5.40	2.30	4.45	4.90	5.31
Maximum	7.10	24.80	6.40	5.32	14.40	7.32
Mean	4.15	11.85	4.65	4.96	6.00	6.18
Standard Deviation	1.37	6.00	0.489	0.290	0.919	0.646
Median	4.15	10.20	4.60	5.02	5.90	6.03
Sodium, Total [mg/L]						
No. of Analyses	18	19	33	8	36	8
No. of Detections	18	19	33	8	36	8
Minimum	1.82	5.84	4.41	4.62	5.40	5.74
Maximum	7.73	9.18	5.72	5.33	15.80	6.65
Mean	3.61	7.11	5.04	5.00	6.40	6.03
Standard Deviation	1.67	0.906	0.303	0.220	1.66	0.331
Median	3.26	7.05	5.07	4.95	6.16	5.87
1,1-Dichloroethane [ug/L]						
No. of Analyses	40	67	105	8	112	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	0.405	ID	ID	ID	ID
Standard Deviation	ID	0.626	ID	ID	ID	ID
Median	ID	0.350	ID	ID	ID	ID
1,2-Dichloropropane [ug/L]						
No. of Analyses	40	67	105	8	112	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	40	67	105	8	112	8
No. of Detections	0	0	1	0	1	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	0.280	ND	0.220	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	40	67	105	8	112	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	0.816	ID	ID	ID	ID
Standard Deviation	ID	1.03	ID	ID	ID	ID
Median	ID	0.100	ID	ID	ID	ID
Tetrachloroethene [ug/L]						
No. of Analyses	40	67	105	8	112	8
No. of Detections	7	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	2.50	ND	ND	ND	ND	ND
Mean	0.213	ID	ID	ID	ID	ID
Standard Deviation	0.400	ID	ID	ID	ID	ID
Median	0.100	ID	ID	ID	ID	ID
***cis*-1,2-Dichloroethene [ug/L]**						
No. of Analyses	37	54	105	8	112	8
No. of Detections	0	27	0	0	1	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	16.00	ND	ND	0.790	ND
Mean	ID	1.05	ID	ID	ID	ID
Standard Deviation	ID	2.28	ID	ID	ID	ID
Median	ID	0.500	ID	ID	ID	ID
Dichlorodifluoromethane [ug/L]						
No. of Analyses	33	35	105	8	107	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	0.847	ID	ID	ID	ID
Standard Deviation	ID	1.30	ID	ID	ID	ID
Median	ID	0.050	ID	ID	ID	ID

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	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	40	67	105	8	112	8
No. of Detections	0	0	1	0	1	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	0.350	ND	0.780	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	39	59	105	8	112	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	40	67	105	8	112	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	34	45	105	8	112	8
No. of Detections	16	27	1	0	1	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	0.670	5.00	0.200	ND	1.00	ND
Mean	0.186	0.746	ID	ID	ID	ID
Standard Deviation	0.157	0.922	ID	ID	ID	ID
Median	0.100	0.240	ID	ID	ID	ID
Vinyl Chloride [ug/L]						
No. of Analyses	40	67	105	8	112	8
No. of Detections	0	23	1	0	1	0
Minimum	ND	ND	ND	ND	ND	ND
Maximum	ND	19.00	0.020	ND	0.100	ND
Mean	ID	2.68	ID	ID	ID	ID
Standard Deviation	ID	4.72	ID	ID	ID	ID
Median	ID	0.500	ID	ID	ID	ID

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc2												
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33		MW-35		MW-37
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
pH, Field [standard units]													
No. of Analyses	160	8	108	8	93	8	94	8	27	8	27	8	7
No. of Detections	160	8	108	8	93	8	94	8	27	8	27	8	7
Minimum	6.06	6.58	6.55	6.68	6.57	7.40	6.41	6.34	6.32	6.53	6.37	6.43	6.54
Maximum	7.75	7.07	7.98	7.21	8.56	7.82	8.24	6.91	6.89	6.84	6.91	6.70	6.92
Mean	6.86	6.81	7.30	6.99	7.76	7.60	6.87	6.64	6.69	6.72	6.64	6.54	6.75
Standard Deviation	0.234	0.163	0.264	0.176	0.434	0.163	0.237	0.215	0.131	0.105	0.161	0.091	0.146
Median	6.90	6.78	7.32	7.05	7.83	7.58	6.87	6.58	6.72	6.75	6.62	6.54	6.76
Specific Conductance, Field [umhos/cm]													
No. of Analyses	160	8	108	8	94	8	94	8	27	8	27	8	7
No. of Detections	160	8	108	8	94	8	94	8	27	8	27	8	7
Minimum	230.00	252.00	110.00	161.90	140.00	156.00	200.00	240.70	548.30	539.90	542.10	484.00	164.7
Maximum	1024.00	286.70	209.90	185.50	242.10	175.80	480.00	274.60	921.60	582.00	884.90	572.50	190.5
Mean	429.05	268.00	159.14	175.38	177.99	164.74	330.91	253.16	761.50	568.91	705.94	517.56	179.2
Standard Deviation	123.04	10.59	20.50	7.10	22.87	6.49	67.81	13.46	105.99	13.87	93.60	29.14	7.74
Median	410.00	267.45	160.00	175.90	170.00	163.15	310.00	247.50	772.90	572.65	696.90	512.95	179.9
Alkalinity [mg/L]													
No. of Analyses	108	8	107	8	93	8	93	8	27	8	27	8	7
No. of Detections	108	8	107	8	93	8	93	8	27	8	27	8	7
Minimum	110.00	135.00	56.00	67.50	58.50	68.50	116.00	127.00	319.00	316.00	309.00	277.00	84.8
Maximum	500.00	141.00	100.00	79.80	94.90	73.40	290.00	140.00	496.00	343.00	460.00	331.00	93.2
Mean	206.02	137.75	67.63	74.08	73.86	71.49	183.39	131.13	405.44	329.38	363.15	297.38	87.9
Standard Deviation	57.81	2.12	6.20	3.86	6.10	1.47	49.23	4.70	47.77	8.07	39.53	17.77	3.66
Median	195.00	137.50	68.00	74.40	72.00	71.85	173.00	130.50	400.00	330.00	347.00	293.50	85.1
Ammonia-N [mg/L]													
No. of Analyses	165	8	107	8	93	8	92	8	27	8	27	8	7
No. of Detections	26	1	12	0	61	8	55	8	27	8	27	8	1
Minimum	ND	ND	ND	ND	ND	0.016	ND	0.008	0.015	0.031	0.032	0.064	ND
Maximum	0.040	0.006	0.060	ND	0.100	0.028	0.130	0.010	0.065	0.037	0.095	0.069	0.0147
Mean	0.011	ID	0.009	ID	0.017	0.019	0.017	0.009	0.033	0.033	0.068	0.065	ID
Standard Deviation	0.009	ID	0.010	ID	0.012	0.004	0.018	0.001	0.008	0.002	0.010	0.002	ID
Median	0.005	ID	0.005	ID	0.015	0.019	0.013	0.009	0.032	0.032	0.068	0.065	ID
Chloride [mg/L]													
No. of Analyses	166	8	107	8	93	8	93	8	27	8	27	8	7
No. of Detections	163	8	107	8	93	8	93	8	27	8	27	8	7
Minimum	ND	2.06	3.00	4.54	2.99	3.02	1.85	1.76	3.29	3.47	3.83	3.01	2.86
Maximum	10.60	2.27	23.00	5.38	4.30	3.39	15.20	2.06	5.78	4.07	5.97	3.86	3.25
Mean	4.18	2.17	4.46	4.97	3.54	3.21	3.72	1.90	4.38	3.74	4.48	3.46	3.04
Standard Deviation	1.56	0.084	1.89	0.246	0.364	0.119	1.86	0.097	0.787	0.219	0.658	0.298	0.143
Median	4.00	2.20	4.17	4.95	3.45	3.19	3.45	1.90	4.22	3.77	4.20	3.36	3
Nitrate-N [mg/L]													
No. of Analyses	166	8	108	8	93	8	93	8	27	8	27	8	7
No. of Detections	82	8	107	8	15	0	60	8	2	1	1	1	7
Minimum	ND	0.154	ND	0.541	ND	ND	ND	0.099	ND	ND	ND	ND	0.77
Maximum	1.25	1.45	1.60	0.951	0.110	ND	0.555	0.380	0.043	0.010	0.050	0.013	0.9
Mean	0.146	0.798	0.278	0.719	0.014	ID	0.109	0.188	ID	ID	ID	ID	0.849
Standard Deviation	0.256	0.438	0.248	0.136	0.014	ID	0.110	0.107	ID	ID	ID	ID	0.053
Median	0.050	0.794	0.200	0.700	0.005	ID	0.079	0.130	ID	ID	ID	ID	0.868
Sulfate [mg/L]													
No. of Analyses	166	8	107	8	93	8	93	8	27	8	27	8	7
No. of Detections	166	8	107	8	93	8	93	8	27	8	27	8	7
Minimum	1.54	11.90	9.00	11.60	14.00	14.70	10.00	11.90	13.90	15.10	13.80	24.90	7.28
Maximum	18.80	14.20	18.00	13.70	18.00	16.50	19.00	13.20	17.90	18.60	29.90	31.90	8.47
Mean	12.68	13.19	12.77	12.70	16.04	15.61	13.95	12.54	16.05	16.83	21.55	28.59	8.00
Standard Deviation	2.72	0.785	1.31	0.685	1.09	0.572	2.55	0.529	1.22	1.04	3.73	2.59	0.451
Median	12.09	13.20	13.00	12.90	16.00	15.65	13.50	12.55	16.20	16.90	21.60	29.15	8.18
Total Dissolved Solids [mg/L]													
No. of Analyses	155	8	107	8	92	8	93	8	27	8	27	8	7
No. of Detections	155	8	107	8	92	8	93	8	27	8	27	8	7
Minimum	34.00	169.00	58.00	108.00	50.00	113.00	157.00	166.00	363.00	325.00	404.00	350.00	131
Maximum	480.00	181.00	160.00	139.00	160.00	131.00	307.00	174.00	519.00	394.00	539.00	405.00	154
Mean	262.47	176.88	114.49	126.25	125.55	125.00	220.95	170.63	456.22	366.00	447.07	374.38	137.43
Standard Deviation	66.88	3.83	17.87	8.92	17.39	6.16	36.86	2.67	47.18	21.45	32.70	24.04	7.91
Median	256.00	178.50	115.00	127.00	128.00	127.50	220.00	171.00	453.00	369.50	438.00	365.50	134
Arsenic, Dissolved [ug/L]													
No. of Analyses	166	8	107	8	93	8	93	8	27	8	27	8	7
No. of Detections	105	8	106	8	92	8	86	8	27	8	27	8	7
Minimum	ND	0.864	ND	2.24	ND	1.97	ND	0.741	32.70	34.50	22.90	22.20	0.851
Maximum	4.00	0.970	3.00	2.44	5.00	2.08	23.00	1.12	57.20	39.60	38.40	26.90	1.09
Mean	1.03	0.911	2.39	2.32	1.78	2.03	4.38	0.937	41.09	37.06	29.90	25.48	0.984
Standard Deviation	0.603	0.036	0.385	0.066	0.471	0.041	5.60	0.122	5.48	1.66	4.10	1.50	0.080
Median	1.00	0.905	2.34	2.31	1.70	2.04	1.67	0.949	39.40	37.30	29.00	25.65	0.989
Arsenic, Total [ug/L]													
No. of Analyses	36	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	20	8	35	8	35	8	32	8	27	8	27	8	7
Minimum	ND	0.860	2.17	2.18	1.30	1.93	ND	1.04	32.30	34.50	20.40	27.80	1.02
Maximum	2.50	1.02	2.50	2.40	4.40	2.20	8.73	1.49	47.10	38.60	55.30	51.80	1.48
Mean	0.769	0.908	2.31	2.30	2.20	2.09	3.01	1.25	39.93	37.25	31.80	34.18	1.20
Standard Deviation	0.358	0.053	0.083	0.072	0.717	0.082	1.91	0.175	3.35	1.51	7.29	7.60	0.163
Median	0.797	0.888	2.33	2.31	2.21	2.10	2.72	1.23	39.20	37.80	29.90	31.90	1.14

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc2												
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33		MW-35		MW-37
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
Calcium, Dissolved [mg/L]													
No. of Analyses	141	8	107	8	93	8	93	8	27	8	27	8	7
No. of Detections	141	8	107	8	93	8	93	8	27	8	27	8	7
Minimum	4.30	19.90	7.80	13.40	9.10	12.90	16.30	18.90	56.00	55.20	52.10	49.40	13.9
Maximum	47.90	21.80	15.80	15.60	18.00	13.50	40.00	21.40	77.10	58.00	77.40	61.30	16.2
Mean	30.63	20.69	12.10	14.49	12.46	13.19	24.89	20.15	66.27	56.54	63.40	53.61	14.9
Standard Deviation	9.63	0.660	1.58	0.745	1.52	0.230	5.97	0.800	5.91	1.21	5.36	4.19	0.739
Median	29.00	20.50	12.00	14.45	12.50	13.15	22.50	20.05	66.90	56.45	63.10	52.55	14.9
Calcium, Total [mg/L]													
No. of Analyses	35	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	35	8	35	8	35	8	35	8	27	8	27	8	7
Minimum	18.40	20.30	8.51	13.60	11.50	13.00	16.10	18.90	55.30	54.00	52.80	49.70	14.1
Maximum	27.10	21.70	16.70	16.00	14.60	13.50	24.90	21.40	78.70	58.40	73.20	67.20	16
Mean	22.06	20.83	13.38	14.68	13.32	13.21	20.45	20.15	67.90	56.70	65.06	54.65	14.8
Standard Deviation	2.25	0.582	1.59	0.732	0.764	0.173	1.92	0.701	6.41	1.46	4.42	6.32	0.680
Median	21.80	20.55	13.40	14.70	13.30	13.15	20.30	20.15	69.40	57.10	64.50	52.25	14.6
Iron, Dissolved [mg/L]													
No. of Analyses	166	8	107	8	93	8	93	8	27	8	27	8	7
No. of Detections	104	1	50	0	72	8	93	8	27	8	27	8	5
Minimum	ND	ND	ND	ND	ND	0.099	0.146	0.074	5.77	5.36	10.80	8.59	ND
Maximum	0.890	0.012	0.290	ND	0.510	0.160	5.20	0.457	8.19	5.79	16.40	12.80	0.0313
Mean	0.062	ID	0.030	ID	0.099	0.119	1.32	0.170	7.00	5.52	13.90	10.57	0.0171
Standard Deviation	0.105	ID	0.049	ID	0.105	0.024	1.24	0.120	0.751	0.143	1.71	1.35	0.0109
Median	0.025	ID	0.005	ID	0.064	0.109	0.855	0.149	7.15	5.47	13.70	10.30	0.0178
Iron, Total [mg/L]													
No. of Analyses	36	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	18	2	23	1	34	8	35	8	27	8	27	8	7
Minimum	ND	ND	ND	ND	ND	0.136	0.231	0.181	5.68	5.36	11.00	9.41	0.104
Maximum	0.150	0.022	0.346	0.051	5.12	0.209	3.28	0.739	9.10	5.72	23.80	17.10	0.594
Mean	0.017	ID	0.042	ID	0.633	0.164	1.20	0.354	7.13	5.56	15.44	12.28	0.333
Standard Deviation	0.026	ID	0.065	ID	0.908	0.030	0.708	0.169	0.861	0.125	2.79	2.25	0.178
Median	0.008	ID	0.018	ID	0.380	0.152	1.02	0.301	7.26	5.57	15.40	11.80	0.354
Magnesium, Dissolved [mg/L]													
No. of Analyses	141	8	107	8	93	8	93	8	27	8	27	8	7
No. of Detections	141	8	107	8	93	8	93	8	27	8	27	8	7
Minimum	3.90	20.60	6.60	10.20	7.70	10.90	15.20	18.10	44.10	41.40	37.80	38.60	12.5
Maximum	53.90	22.90	13.00	12.60	15.10	12.30	43.20	21.70	65.10	45.50	51.40	45.30	13.3
Mean	34.29	21.81	9.63	11.75	10.71	11.64	24.94	19.58	54.17	44.15	44.22	41.13	12.9
Standard Deviation	10.88	0.811	1.37	0.739	1.81	0.421	7.49	1.11	5.56	1.32	3.36	2.19	0.310
Median	33.00	21.70	9.40	11.90	10.20	11.60	23.00	19.50	55.60	44.40	43.40	40.60	13
Magnesium, Total [mg/L]													
No. of Analyses	35	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	35	8	35	8	35	8	35	8	27	8	27	8	7
Minimum	19.40	19.70	8.54	11.00	8.69	10.10	14.30	17.80	42.30	40.10	36.50	38.50	12.1
Maximum	31.80	22.60	14.00	13.20	15.70	12.00	25.70	21.80	61.10	45.90	59.60	47.20	13.6
Mean	24.50	21.61	11.09	11.80	12.49	11.44	19.98	19.41	53.39	43.75	44.56	41.09	12.9
Standard Deviation	3.47	0.942	1.07	0.713	1.72	0.580	2.96	1.33	5.10	1.94	4.29	2.84	0.525
Median	23.00	21.80	11.00	11.80	12.30	11.55	20.10	19.10	55.10	44.65	44.30	40.40	13
Manganese, Dissolved [ug/L]													
No. of Analyses	166	8	107	8	93	8	92	8	27	8	27	8	7
No. of Detections	165	8	10	1	93	8	92	8	27	8	27	8	7
Minimum	ND	33.60	ND	ND	53.10	126.00	165.00	144.00	877.00	858.00	1630.00	1900.00	4.23
Maximum	590.00	96.50	540.00	0.119	548.00	147.00	1600.00	404.00	1130.00	926.00	2560.00	2350.00	58.5
Mean	124.46	60.10	5.92	ID	206.16	137.00	545.80	226.00	996.19	885.00	2319.63	2121.25	19.5
Standard Deviation	76.59	23.56	52.29	ID	88.91	8.23	303.17	100.71	83.65	22.83	225.91	157.70	18.9
Median	110.00	53.25	0.500	ID	210.00	134.50	478.50	177.00	978.00	879.00	2380.00	2115.00	20.3
Manganese, Total [ug/L]													
No. of Analyses	36	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	36	8	27	7	35	8	35	8	27	8	27	8	7
Minimum	18.30	46.70	ND	ND	129.00	130.00	168.00	157.00	897.00	847.00	1940.00	1920.00	16.5
Maximum	306.00	110.00	14.60	1.32	2920.00	152.00	1050.00	447.00	1290.00	970.00	2790.00	2400.00	86.9
Mean	124.81	71.30	1.73	0.383	348.40	139.13	521.00	251.13	1023.44	888.50	2444.07	2153.75	53.6
Standard Deviation	67.67	23.80	2.82	0.413	463.39	8.29	228.45	114.62	110.65	37.55	199.83	162.30	28.2
Median	110.50	65.65	0.500	0.275	282.00	137.50	497.00	193.00	1030.00	882.00	2440.00	2190.00	55.2
Potassium, Dissolved [mg/L]													
No. of Analyses	141	8	107	8	93	8	93	8	27	8	27	8	7
No. of Detections	141	8	107	8	93	8	93	8	27	8	27	8	7
Minimum	0.590	2.01	1.20	2.01	1.50	1.99	1.80	2.04	3.03	3.02	3.03	3.09	1.4
Maximum	3.70	2.25	2.41	2.34	2.90	2.25	3.30	2.39	3.79	3.35	3.72	3.33	1.67
Mean	2.48	2.13	1.96	2.16	2.08	2.09	2.37	2.20	3.42	3.16	3.30	3.21	1.50
Standard Deviation	0.393	0.085	0.205	0.104	0.202	0.092	0.331	0.113	0.193	0.114	0.171	0.090	0.091
Median	2.40	2.13	1.98	2.12	2.09	2.08	2.28	2.18	3.43	3.15	3.26	3.21	1.47
Potassium, Total [mg/L]													
No. of Analyses	35	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	35	8	35	8	35	8	35	8	27	8	27	8	7
Minimum	2.07	2.06	1.92	2.06	1.91	2.01	2.02	2.08	3.00	2.95	3.07	3.03	1.39
Maximum	2.58	2.35	2.67	2.28	2.48	2.24	2.74	2.38	3.89	3.38	3.88	3.56	1.77
Mean	2.29	2.14	2.17	2.16	2.19	2.09	2.27	2.21	3.50	3.15	3.46	3.25	1.52
Standard Deviation	0.147	0.095	0.160	0.075	0.135	0.087	0.178	0.101	0.217	0.147	0.204	0.175	0.134
Median	2.29	2.11	2.12	2.14	2.19	2.06	2.24	2.17	3.54	3.14	3.43	3.23	1.48

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc2												
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33		MW-35		MW-37
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
Sodium, Dissolved [mg/L]													
No. of Analyses	141	8	107	8	93	8	93	8	27	8	27	8	7
No. of Detections	141	8	107	8	93	8	93	8	27	8	27	8	7
Minimum	2.20	8.10	4.50	5.34	4.20	5.41	8.35	9.48	15.40	15.50	13.80	16.20	7.25
Maximum	14.00	9.71	6.59	6.56	8.00	6.55	13.00	11.40	21.40	17.90	18.10	17.40	8.31
Mean	10.25	9.07	5.39	6.02	6.18	6.05	10.41	10.54	18.56	16.78	16.23	16.79	7.65
Standard Deviation	1.70	0.551	0.500	0.446	0.737	0.354	0.939	0.630	1.26	0.794	1.19	0.536	0.349
Median	9.80	9.15	5.30	6.19	6.14	6.05	10.30	10.70	18.80	16.90	16.50	16.80	7.6
Sodium, Total [mg/L]													
No. of Analyses	35	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	35	8	35	8	35	8	35	8	27	8	27	8	7
Minimum	8.15	7.73	5.19	5.69	4.85	4.99	9.16	9.66	16.30	14.60	13.20	15.10	7.5
Maximum	11.40	9.75	6.84	6.50	7.27	6.35	12.20	11.40	20.80	17.50	17.80	17.50	7.89
Mean	9.25	8.94	5.95	6.12	6.21	5.83	10.70	10.34	18.59	16.40	16.36	16.64	7.64
Standard Deviation	0.598	0.675	0.408	0.270	0.500	0.407	0.722	0.621	1.08	0.930	1.17	0.763	0.149
Median	9.21	9.06	5.94	6.08	6.19	5.99	10.80	10.24	18.80	16.55	16.70	16.70	7.55
1,1-Dichloroethane [ug/L]													
No. of Analyses	176	8	108	8	93	8	93	8	27	8	27	8	7
No. of Detections	8	0	0	0	0	0	0	0	27	8	27	8	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	1.29	0.727	0.120	0.144	ND
Maximum	0.500	ND	ND	ND	ND	ND	ND	ND	2.32	1.91	0.483	0.296	ND
Mean	0.179	ID	ID	ID	ID	ID	ID	ID	1.66	1.30	0.266	0.197	ID
Standard Deviation	0.163	ID	ID	ID	ID	ID	ID	ID	0.284	0.328	0.099	0.047	ID
Median	0.100	ID	ID	ID	ID	ID	ID	ID	1.60	1.28	0.270	0.191	ID
1,2-Dichloropropane [ug/L]													
No. of Analyses	176	8	108	8	93	8	93	8	27	8	27	8	7
No. of Detections	0	0	0	0	0	0	0	0	27	8	27	8	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	5.69	4.64	0.321	0.278	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	12.50	6.36	1.33	0.402	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	7.90	5.83	0.823	0.336	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	1.54	0.586	0.317	0.049	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	7.65	6.02	0.769	0.336	ID
Benzene [ug/L]													
No. of Analyses	176	8	108	8	93	8	93	8	27	8	27	8	7
No. of Detections	0	0	0	0	0	0	3	0	27	8	27	8	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	0.707	0.579	0.509	0.422	ND
Maximum	ND	ND	ND	ND	ND	ND	0.250	ND	1.76	0.811	1.17	0.485	ND
Mean	ID	ID	ID	ID	ID	ID	0.094	ID	1.10	0.706	0.834	0.453	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	0.031	ID	0.230	0.070	0.209	0.026	ID
Median	ID	ID	ID	ID	ID	ID	0.100	ID	1.01	0.719	0.873	0.452	ID
Chloroethane [ug/L]													
No. of Analyses	176	8	108	8	93	8	93	8	27	8	27	8	7
No. of Detections	26	0	0	0	0	0	0	0	21	3	1	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	2.50	ND	ND	ND	ND	ND	ND	ND	0.947	0.245	0.101	ND	ND
Mean	0.581	ID	ID	ID	ID	ID	ID	ID	0.372	0.113	ID	ID	ID
Standard Deviation	0.834	ID	ID	ID	ID	ID	ID	ID	0.215	0.088	ID	ID	ID
Median	0.100	ID	ID	ID	ID	ID	ID	ID	0.408	0.050	ID	ID	ID
Tetrachloroethene [ug/L]													
No. of Analyses	176	8	108	8	93	8	93	8	27	8	27	8	7
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
***cis*-1,2-Dichloroethene [ug/L]**													
No. of Analyses	151	8	108	8	93	8	93	8	27	8	27	8	7
No. of Detections	46	8	0	0	0	0	92	8	27	8	27	8	0
Minimum	ND	0.139	ND	ND	ND	ND	ND	0.431	23.90	22.70	2.70	2.55	ND
Maximum	0.600	0.338	ND	ND	ND	ND	8.70	0.560	52.70	32.50	11.20	3.26	ND
Mean	0.173	0.242	ID	ID	ID	ID	1.93	0.496	33.31	24.90	6.78	2.93	ID
Standard Deviation	0.127	0.066	ID	ID	ID	ID	2.05	0.042	7.58	3.20	2.77	0.280	ID
Median	0.100	0.233	ID	ID	ID	ID	1.00	0.491	32.80	23.90	6.02	2.90	ID
Dichlorodifluoromethane [ug/L]													
No. of Analyses	108	8	108	8	93	8	93	8	27	8	27	8	7
No. of Detections	106	8	0	0	28	5	92	8	27	8	27	8	7
Minimum	ND	1.59	ND	ND	ND	ND	ND	1.12	2.68	2.91	0.225	0.420	0.114
Maximum	ND	3.24	ND	ND	1.75	0.217	ND	2.20	8.82	4.60	1.13	0.909	0.165
Mean	ID	2.34	ID	ID	0.215	0.125	ID	1.57	4.90	3.77	0.604	0.605	0.137
Standard Deviation	ID	0.521	ID	ID	0.250	0.069	ID	0.365	1.44	0.599	0.265	0.164	0.018
Median	ID	2.20	ID	ID	0.100	0.130	ID	1.52	4.84	3.68	0.616	0.565	0.13

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc2												
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33		MW-35		MW-37
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
Toluene [ug/L]													
No. of Analyses	176	8	108	8	93	8	93	8	27	8	27	8	7
No. of Detections	2	0	0	0	1	0	0	0	7	0	7	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	2.50	ND	ND	ND	0.220	ND	ND	ND	2.25	ND	0.210	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	0.177	ID	0.083	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	0.423	ID	0.038	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	0.050	ID	0.100	ID	ID
***trans*-1,2-Dichloroethene [ug/L]**													
No. of Analyses	154	8	108	8	93	8	93	8	27	8	27	8	7
No. of Detections	0	0	0	0	0	0	17	0	27	8	27	8	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	0.632	0.469	0.222	0.183	ND
Maximum	ND	ND	ND	ND	ND	ND	0.410	ND	1.15	1.05	0.401	0.257	ND
Mean	ID	ID	ID	ID	ID	ID	0.119	ID	0.835	0.765	0.302	0.202	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	0.075	ID	0.163	0.159	0.055	0.029	ID
Median	ID	ID	ID	ID	ID	ID	0.100	ID	0.820	0.764	0.300	0.188	ID
Trichloroethene [ug/L]													
No. of Analyses	176	8	108	8	93	8	93	8	27	8	27	8	7
No. of Detections	0	0	0	0	0	0	0	0	16	8	27	8	7
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.146	0.856	0.920	0.179
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	0.183	0.192	1.45	1.29	0.293
Mean	ID	ID	ID	ID	ID	ID	ID	ID	0.127	0.162	1.06	1.06	0.236
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	0.039	0.015	0.141	0.116	0.042
Median	ID	ID	ID	ID	ID	ID	ID	ID	0.137	0.161	1.04	1.03	0.231
Trichlorofluoromethane [ug/L]													
No. of Analyses	141	8	108	8	93	8	93	8	27	8	27	8	7
No. of Detections	137	8	0	0	0	0	90	8	0	0	0	0	7
Minimum	ND	0.733	ND	ND	ND	ND	ND	0.519	ND	ND	ND	ND	0.28
Maximum	23.00	2.45	ND	ND	ND	ND	9.00	1.60	ND	ND	ND	ND	0.369
Mean	6.03	1.63	ID	ID	ID	ID	2.03	0.880	ID	ID	ID	ID	0.334
Standard Deviation	5.47	0.611	ID	ID	ID	ID	2.19	0.354	ID	ID	ID	ID	0.040
Median	3.90	1.71	ID	ID	ID	ID	0.945	0.765	ID	ID	ID	ID	0.357
Vinyl Chloride [ug/L]													
No. of Analyses	176	8	108	8	93	8	93	8	27	8	27	8	7
No. of Detections	162	7	0	0	0	0	93	8	27	8	27	8	0
Minimum	ND	ND	ND	ND	ND	ND	0.042	0.026	11.50	11.40	1.62	3.25	ND
Maximum	40.00	0.055	ND	ND	ND	ND	1.00	0.069	53.10	23.70	9.19	6.66	ND
Mean	5.81	0.027	ID	ID	ID	ID	0.306	0.041	29.69	19.53	4.34	4.26	ID
Standard Deviation	8.23	0.017	ID	ID	ID	ID	0.226	0.013	8.47	3.78	2.01	1.10	ID
Median	0.635	0.022	ID	ID	ID	ID	0.310	0.038	30.50	20.45	4.09	4.03	ID

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc3			
Well Location	MW-8		MW-36	
Time Interval	Long	Short	Long	Short
pH, Field [standard units]				
No. of Analyses	107	8	27	8
No. of Detections	107	8	27	8
Minimum	5.97	6.25	6.51	7.17
Maximum	7.95	6.60	8.95	7.71
Mean	6.80	6.40	7.64	7.45
Standard Deviation	0.334	0.123	0.384	0.249
Median	6.79	6.37	7.72	7.48
Specific Conductance, Field [umhos/cm]				
No. of Analyses	107	8	27	8
No. of Detections	107	8	27	8
Minimum	130.00	144.10	133.20	114.10
Maximum	650.00	153.20	190.40	166.90
Mean	168.24	147.83	171.93	154.13
Standard Deviation	48.94	3.19	10.98	16.79
Median	165.00	147.15	175.80	158.70
Alkalinity [mg/L]				
No. of Analyses	106	8	27	8
No. of Detections	106	8	27	8
Minimum	46.50	50.60	67.50	67.30
Maximum	78.00	55.90	70.90	70.70
Mean	58.89	53.56	69.18	69.58
Standard Deviation	5.73	1.72	1.04	1.22
Median	59.00	53.90	69.50	70.00
Ammonia-N [mg/L]				
No. of Analyses	106	8	27	8
No. of Detections	10	0	4	0
Minimum	ND	ND	ND	ND
Maximum	0.430	ND	0.005	ND
Mean	0.013	ID	0.002	ID
Standard Deviation	0.044	ID	0.002	ID
Median	0.005	ID	0.001	ID
Chloride [mg/L]				
No. of Analyses	106	8	27	8
No. of Detections	106	8	27	8
Minimum	3.00	4.15	2.89	2.86
Maximum	6.23	4.71	3.28	3.24
Mean	4.38	4.45	3.08	3.04
Standard Deviation	0.448	0.190	0.098	0.145
Median	4.29	4.44	3.08	3.05
Nitrate-N [mg/L]				
No. of Analyses	106	8	27	8
No. of Detections	105	8	27	8
Minimum	ND	2.80	0.014	0.020
Maximum	8.10	4.78	0.027	0.031
Mean	3.79	3.94	0.020	0.024
Standard Deviation	0.908	0.635	0.003	0.004
Median	3.69	4.07	0.020	0.024
Sulfate [mg/L]				
No. of Analyses	106	8	27	8
No. of Detections	106	8	27	8
Minimum	6.71	6.19	12.30	12.80
Maximum	11.00	7.20	14.20	14.60
Mean	8.39	6.72	13.20	14.05
Standard Deviation	0.851	0.316	0.510	0.619
Median	8.26	6.79	13.20	14.20
Total Dissolved Solids [mg/L]				
No. of Analyses	106	8	27	8
No. of Detections	106	8	27	8
Minimum	54.00	101.00	111.00	115.00
Maximum	150.00	121.00	141.00	132.00
Mean	117.37	113.13	129.04	125.13
Standard Deviation	14.96	6.22	6.22	6.10
Median	120.00	113.50	130.00	127.00
Arsenic, Dissolved [ug/L]				
No. of Analyses	106	8	27	8
No. of Detections	20	8	27	8
Minimum	ND	0.524	1.60	1.83
Maximum	2.10	0.572	2.04	2.08
Mean	0.513	0.541	1.76	1.94
Standard Deviation	0.156	0.016	0.113	0.092
Median	0.500	0.535	1.73	1.93
Arsenic, Total [ug/L]				
No. of Analyses	34	8	27	8
No. of Detections	19	8	27	8
Minimum	ND	0.520	1.57	1.79
Maximum	0.523	0.543	1.94	2.09
Mean	0.496	0.530	1.73	1.90
Standard Deviation	0.013	0.008	0.093	0.101
Median	0.500	0.529	1.71	1.90

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc3			
Well Location	MW-8		MW-36	
Time Interval	Long	Short	Long	Short
Calcium, Dissolved [mg/L]				
No. of Analyses	106	8	27	8
No. of Detections	106	8	27	8
Minimum	9.67	11.00	10.40	13.60
Maximum	15.90	12.40	14.70	15.10
Mean	11.93	11.61	13.43	14.10
Standard Deviation	1.11	0.479	1.00	0.481
Median	11.90	11.65	13.80	14.00
Calcium, Total [mg/L]				
No. of Analyses	34	8	27	8
No. of Detections	34	8	27	8
Minimum	9.51	11.20	11.50	13.90
Maximum	12.50	12.50	14.90	14.70
Mean	11.50	11.61	13.57	14.15
Standard Deviation	0.641	0.405	0.878	0.262
Median	11.60	11.55	13.70	14.10
Iron, Dissolved [mg/L]				
No. of Analyses	106	8	27	8
No. of Detections	52	0	1	0
Minimum	ND	ND	ND	ND
Maximum	0.170	ND	0.036	ND
Mean	0.026	ID	ID	ID
Standard Deviation	0.032	ID	ID	ID
Median	0.005	ID	ID	ID
Iron, Total [mg/L]				
No. of Analyses	34	8	27	8
No. of Detections	10	0	7	0
Minimum	ND	ND	ND	ND
Maximum	0.069	ND	0.334	ND
Mean	0.011	ID	0.026	ID
Standard Deviation	0.015	ID	0.066	ID
Median	0.005	ID	0.005	ID
Magnesium, Dissolved [mg/L]				
No. of Analyses	106	8	27	8
No. of Detections	106	8	27	8
Minimum	7.10	9.14	7.95	9.48
Maximum	11.90	9.97	10.00	10.30
Mean	9.30	9.43	9.29	9.85
Standard Deviation	0.736	0.318	0.538	0.259
Median	9.31	9.33	9.43	9.80
Magnesium, Total [mg/L]				
No. of Analyses	34	8	27	8
No. of Detections	34	8	27	8
Minimum	8.27	8.86	7.80	9.33
Maximum	10.00	9.64	10.30	9.84
Mean	9.27	9.27	9.40	9.52
Standard Deviation	0.432	0.234	0.586	0.149
Median	9.40	9.32	9.62	9.50
Manganese, Dissolved [ug/L]				
No. of Analyses	106	8	27	8
No. of Detections	4	2	27	8
Minimum	ND	ND	0.347	0.234
Maximum	2.90	1.38	35.60	0.481
Mean	0.477	ID	3.05	0.322
Standard Deviation	0.379	ID	6.69	0.099
Median	0.500	ID	1.41	0.276
Manganese, Total [ug/L]				
No. of Analyses	34	8	27	8
No. of Detections	9	0	27	8
Minimum	ND	ND	0.606	0.409
Maximum	2.20	ND	243.00	1.33
Mean	0.373	ID	20.49	0.750
Standard Deviation	0.454	ID	50.37	0.299
Median	0.227	ID	4.57	0.684
Potassium, Dissolved [mg/L]				
No. of Analyses	106	8	27	8
No. of Detections	106	8	27	8
Minimum	0.900	1.09	2.30	2.62
Maximum	1.50	1.21	2.90	3.03
Mean	1.10	1.15	2.68	2.79
Standard Deviation	0.104	0.042	0.156	0.151
Median	1.10	1.16	2.71	2.76
Potassium, Total [mg/L]				
No. of Analyses	34	8	27	8
No. of Detections	34	8	27	8
Minimum	1.02	1.08	2.49	2.63
Maximum	1.29	1.18	2.97	2.83
Mean	1.14	1.13	2.71	2.72
Standard Deviation	0.056	0.041	0.107	0.067
Median	1.14	1.13	2.70	2.72

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc3			
Well Location	MW-8		MW-36	
Time Interval	Long	Short	Long	Short
Sodium, Dissolved [mg/L]				
No. of Analyses	106	8	27	8
No. of Detections	106	8	27	8
Minimum	4.50	5.64	5.47	5.57
Maximum	7.31	6.58	6.99	7.03
Mean	6.15	6.25	6.29	6.40
Standard Deviation	0.469	0.335	0.397	0.487
Median	6.20	6.38	6.28	6.44
Sodium, Total [mg/L]				
No. of Analyses	34	8	27	8
No. of Detections	34	8	27	8
Minimum	5.64	5.98	5.22	5.99
Maximum	6.78	6.55	6.88	6.51
Mean	6.28	6.18	6.32	6.25
Standard Deviation	0.279	0.185	0.370	0.186
Median	6.30	6.13	6.45	6.26
1,1-Dichloroethane [ug/L]				
No. of Analyses	105	8	27	8
No. of Detections	0	0	0	0
Minimum	ND	ND	ND	ND
Maximum	ND	ND	ND	ND
Mean	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID
Median	ID	ID	ID	ID
1,2-Dichloropropane [ug/L]				
No. of Analyses	105	8	27	8
No. of Detections	0	0	0	0
Minimum	ND	ND	ND	ND
Maximum	ND	ND	ND	ND
Mean	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID
Median	ID	ID	ID	ID
Benzene [ug/L]				
No. of Analyses	105	8	27	8
No. of Detections	0	0	0	0
Minimum	ND	ND	ND	ND
Maximum	ND	ND	ND	ND
Mean	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID
Median	ID	ID	ID	ID
Chloroethane [ug/L]				
No. of Analyses	105	8	27	8
No. of Detections	0	0	0	0
Minimum	ND	ND	ND	ND
Maximum	ND	ND	ND	ND
Mean	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID
Median	ID	ID	ID	ID
Tetrachloroethene [ug/L]				
No. of Analyses	105	8	27	8
No. of Detections	0	0	0	0
Minimum	ND	ND	ND	ND
Maximum	ND	ND	ND	ND
Mean	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID
Median	ID	ID	ID	ID
***cis*-1,2-Dichloroethene [ug/L]**				
No. of Analyses	105	8	27	8
No. of Detections	0	0	0	0
Minimum	ND	ND	ND	ND
Maximum	ND	ND	ND	ND
Mean	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID
Median	ID	ID	ID	ID
Dichlorodifluoromethane [ug/L]				
No. of Analyses	105	8	27	8
No. of Detections	11	0	0	0
Minimum	ND	ND	ND	ND
Maximum	0.640	ND	ND	ND
Mean	0.122	ID	ID	ID
Standard Deviation	0.102	ID	ID	ID
Median	0.100	ID	ID	ID

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc3			
Well Location	MW-8		MW-36	
Time Interval	Long	Short	Long	Short
Toluene [ug/L]				
No. of Analyses	105	8	27	8
No. of Detections	1	0	0	0
Minimum	ND	ND	ND	ND
Maximum	0.330	ND	ND	ND
Mean	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID
Median	ID	ID	ID	ID
***trans*-1,2-Dichloroethene [ug/L]**				
No. of Analyses	105	8	27	8
No. of Detections	0	0	0	0
Minimum	ND	ND	ND	ND
Maximum	ND	ND	ND	ND
Mean	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID
Median	ID	ID	ID	ID
Trichloroethene [ug/L]				
No. of Analyses	105	8	27	8
No. of Detections	0	0	0	0
Minimum	ND	ND	ND	ND
Maximum	ND	ND	ND	ND
Mean	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID
Median	ID	ID	ID	ID
Trichlorofluoromethane [ug/L]				
No. of Analyses	105	8	27	8
No. of Detections	20	0	0	0
Minimum	ND	ND	ND	ND
Maximum	0.560	ND	ND	ND
Mean	0.140	ID	ID	ID
Standard Deviation	0.112	ID	ID	ID
Median	0.100	ID	ID	ID
Vinyl Chloride [ug/L]				
No. of Analyses	105	8	27	8
No. of Detections	0	0	0	0
Minimum	ND	ND	ND	ND
Maximum	ND	ND	ND	ND
Mean	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID
Median	ID	ID	ID	ID

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	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	Long	Short
pH, Field [standard units]												
No. of Analyses	106	8	106	8	107	8	78	8	78	8	27	8
No. of Detections	106	8	106	8	107	8	78	8	78	8	27	8
Minimum	6.76	7.36	6.59	6.92	6.84	7.13	7.07	7.74	6.65	7.03	6.47	6.33
Maximum	8.38	7.74	8.37	7.46	8.54	7.60	9.20	8.17	7.80	7.58	7.55	6.92
Mean	7.68	7.55	7.42	7.16	7.61	7.36	8.07	7.94	7.49	7.31	6.92	6.68
Standard Deviation	0.293	0.145	0.286	0.220	0.255	0.171	0.295	0.140	0.198	0.205	0.221	0.199
Median	7.74	7.55	7.45	7.16	7.62	7.38	8.08	7.94	7.51	7.31	6.93	6.72
Specific Conductance, Field [umhos/cm]												
No. of Analyses	106	8	106	8	107	8	78	8	78	8	27	8
No. of Detections	106	8	106	8	107	8	78	8	78	8	27	8
Minimum	100.00	160.20	115.00	102.50	100.00	184.30	136.10	167.70	165.00	206.90	150.00	172.10
Maximum	194.20	178.80	185.00	153.50	230.00	206.20	200.00	181.00	265.00	219.20	210.00	185.10
Mean	163.08	168.18	143.24	140.23	196.97	195.26	173.07	173.39	218.87	210.94	192.99	177.88
Standard Deviation	16.73	6.40	14.15	16.03	23.16	6.57	13.86	4.58	21.26	4.87	13.21	4.95
Median	160.00	165.30	140.00	144.15	200.00	194.15	170.00	172.80	215.00	209.05	197.90	177.90
Alkalinity [mg/L]												
No. of Analyses	106	8	106	8	107	8	78	8	78	8	27	8
No. of Detections	106	8	106	8	107	8	78	8	78	8	27	8
Minimum	58.00	76.70	30.00	62.00	64.00	82.80	67.20	74.80	88.00	97.20	67.40	68.90
Maximum	100.00	79.70	66.30	64.50	110.00	86.40	86.00	78.50	140.00	101.00	80.20	72.20
Mean	74.27	78.66	58.52	63.55	84.20	85.38	74.69	77.36	99.34	99.66	70.04	70.29
Standard Deviation	4.90	1.02	4.63	0.821	11.45	1.27	3.19	1.28	6.69	1.24	2.38	0.986
Median	74.00	78.80	59.00	63.75	84.80	85.70	75.15	77.90	100.00	99.90	69.80	70.15
Ammonia-N [mg/L]												
No. of Analyses	106	8	105	8	107	8	78	8	78	8	27	8
No. of Detections	106	8	8	1	92	8	78	8	20	7	4	0
Minimum	0.073	0.035	ND	ND	ND	0.029	0.030	0.027	ND	ND	ND	ND
Maximum	0.320	0.375	0.060	0.004	0.200	0.056	0.300	0.312	0.030	0.004	0.059	ND
Mean	0.210	0.233	0.008	ID	0.044	0.034	0.226	0.236	0.008	0.003	0.005	ID
Standard Deviation	0.049	0.094	0.008	ID	0.032	0.009	0.043	0.087	0.007	0.001	0.012	ID
Median	0.212	0.234	0.005	ID	0.035	0.032	0.238	0.254	0.005	0.003	0.001	ID
Chloride [mg/L]												
No. of Analyses	106	8	106	8	107	8	78	8	78	8	27	8
No. of Detections	106	8	106	8	107	8	78	8	78	8	27	8
Minimum	2.70	3.12	2.60	3.00	3.70	4.49	3.00	3.49	3.38	3.35	4.58	4.61
Maximum	5.00	3.56	5.00	3.28	37.60	4.87	9.11	3.94	17.40	3.79	5.24	5.25
Mean	3.22	3.36	3.09	3.14	5.38	4.68	3.91	3.74	4.01	3.58	4.99	4.91
Standard Deviation	0.312	0.136	0.339	0.099	3.20	0.135	0.747	0.138	1.57	0.139	0.172	0.199
Median	3.14	3.38	3.00	3.15	5.00	4.65	3.80	3.75	3.80	3.60	5.02	4.89
Nitrate-N [mg/L]												
No. of Analyses	106	8	106	8	107	8	78	8	78	8	27	8
No. of Detections	48	4	106	8	37	0	40	7	1	0	27	8
Minimum	ND	ND	0.550	0.619	ND	ND	ND	ND	ND	ND	1.59	1.75
Maximum	0.340	0.024	1.90	0.696	0.810	ND	0.232	0.028	0.082	ND	2.57	2.23
Mean	0.021	0.012	0.735	0.655	0.022	ID	0.025	0.018	ID	ID	2.05	2.05
Standard Deviation	0.036	0.008	0.136	0.023	0.078	ID	0.029	0.007	ID	ID	0.317	0.172
Median	0.016	0.009	0.733	0.653	0.010	ID	0.025	0.019	ID	ID	2.01	2.07
Sulfate [mg/L]												
No. of Analyses	106	8	106	8	107	8	78	8	78	8	27	8
No. of Detections	106	8	106	8	107	8	78	8	78	8	27	8
Minimum	8.70	10.60	9.00	9.69	12.00	16.10	11.00	13.20	14.90	14.10	12.00	12.00
Maximum	14.00	11.50	12.00	10.30	24.00	18.40	14.20	14.00	33.20	15.90	14.00	13.70
Mean	10.52	11.09	10.22	10.00	18.60	17.19	13.12	13.51	16.54	15.29	13.14	12.73
Standard Deviation	0.641	0.309	0.517	0.240	2.06	0.726	0.640	0.331	2.10	0.610	0.526	0.570
Median	10.50	11.15	10.00	9.97	18.00	17.20	13.10	13.45	16.20	15.40	13.20	12.70
Total Dissolved Solids [mg/L]												
No. of Analyses	106	8	106	8	107	8	78	8	78	8	27	8
No. of Detections	106	8	106	8	107	8	78	8	78	8	27	8
Minimum	63.00	123.00	53.00	105.00	80.00	124.00	90.00	124.00	90.00	139.00	117.00	109.00
Maximum	160.00	135.00	150.00	115.00	170.00	143.00	450.00	141.00	170.00	156.00	149.00	134.00
Mean	117.95	130.50	103.26	110.00	134.50	135.88	135.45	135.88	146.35	147.00	135.56	126.75
Standard Deviation	15.71	4.31	15.26	3.42	18.72	6.08	40.04	5.14	13.96	5.63	6.74	8.01
Median	120.00	132.00	105.00	110.50	140.00	137.50	133.00	137.00	150.00	148.50	135.00	128.50
Arsenic, Dissolved [ug/L]												
No. of Analyses	106	8	106	8	107	8	78	8	78	8	27	8
No. of Detections	106	8	106	8	107	8	78	8	78	8	27	8
Minimum	2.10	4.75	1.70	2.02	0.967	0.907	2.00	2.99	3.84	3.77	1.11	1.28
Maximum	22.00	5.11	5.60	2.17	27.00	1.01	3.41	3.15	8.00	4.25	1.41	1.40
Mean	6.74	4.94	2.11	2.10	3.36	0.955	2.90	3.07	4.53	4.11	1.31	1.33
Standard Deviation	2.98	0.126	0.380	0.046	3.65	0.034	0.383	0.051	0.659	0.176	0.059	0.035
Median	6.00	4.96	2.02	2.09	2.09	0.961	3.00	3.06	4.47	4.19	1.32	1.33
Arsenic, Total [ug/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	35	8	34	8	35	8	35	8	35	8	27	8
Minimum	4.55	4.73	1.85	1.95	1.02	1.05	2.94	2.94	3.54	6.45	1.16	1.23
Maximum	5.92	7.31	2.28	2.18	2.11	1.18	10.80	3.76	18.10	13.60	1.78	1.40
Mean	5.15	5.57	2.05	2.10	1.40	1.09	4.23	3.34	7.86	9.15	1.33	1.32
Standard Deviation	0.228	0.829	0.093	0.084	0.244	0.047	1.55	0.245	3.82	2.55	0.105	0.059
Median	5.13	5.37	2.05	2.12	1.35	1.07	3.65	3.34	6.82	8.18	1.31	1.33

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	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	Long	Short
Calcium, Dissolved [mg/L]												
No. of Analyses	106	8	106	8	107	8	78	8	78	8	27	8
No. of Detections	106	8	106	8	107	8	78	8	78	8	27	8
Minimum	9.20	15.60	7.70	11.10	9.20	14.70	11.20	17.10	13.60	19.30	10.80	13.20
Maximum	18.00	17.10	13.00	12.20	19.60	15.90	18.70	18.50	23.00	20.90	14.60	15.00
Mean	13.52	16.06	10.13	11.68	14.28	15.29	16.06	17.89	18.82	19.89	13.46	13.80
Standard Deviation	1.77	0.534	1.24	0.358	1.86	0.442	1.39	0.452	1.52	0.500	0.840	0.537
Median	13.20	15.90	9.92	11.75	14.60	15.15	16.00	17.90	18.85	19.80	13.60	13.65
Calcium, Total [mg/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	35	8	34	8	35	8	35	8	35	8	27	8
Minimum	12.20	15.50	7.97	11.30	13.50	14.80	14.90	16.90	17.60	19.50	11.90	13.40
Maximum	16.80	16.30	12.80	12.20	16.80	16.10	19.10	18.30	22.20	21.20	14.90	14.20
Mean	15.08	16.03	11.05	11.68	15.11	15.41	17.28	17.84	19.92	20.08	13.65	13.76
Standard Deviation	1.16	0.255	1.05	0.301	0.752	0.380	1.13	0.421	1.09	0.515	0.659	0.277
Median	15.60	16.05	11.40	11.65	15.20	15.35	17.60	17.95	20.00	20.00	13.70	13.85
Iron, Dissolved [mg/L]												
No. of Analyses	106	8	106	8	107	8	78	8	78	8	27	8
No. of Detections	77	8	51	1	105	8	78	8	78	8	0	0
Minimum	ND	0.012	ND	ND	ND	0.032	0.033	0.069	0.290	0.563	ND	ND
Maximum	0.220	0.078	0.420	0.011	0.191	0.079	0.230	0.181	0.975	0.825	ND	ND
Mean	0.037	0.029	0.031	ID	0.056	0.050	0.099	0.110	0.702	0.726	ID	ID
Standard Deviation	0.038	0.021	0.057	ID	0.037	0.016	0.034	0.032	0.126	0.082	ID	ID
Median	0.024	0.022	0.005	ID	0.047	0.049	0.096	0.103	0.725	0.736	ID	ID
Iron, Total [mg/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	34	8	21	2	35	8	35	8	35	8	15	1
Minimum	ND	0.062	ND	ND	0.061	0.107	0.140	0.222	0.729	1.63	ND	ND
Maximum	0.193	0.854	0.937	0.020	1.09	0.303	10.50	0.915	6.09	4.23	1.38	0.091
Mean	0.061	0.286	0.058	ID	0.330	0.212	2.17	0.528	2.40	2.80	0.085	ID
Standard Deviation	0.058	0.259	0.166	ID	0.260	0.073	2.65	0.225	1.59	1.01	0.274	ID
Median	0.034	0.203	0.014	ID	0.245	0.223	1.31	0.515	1.82	2.46	0.012	ID
Magnesium, Dissolved [mg/L]												
No. of Analyses	106	8	106	8	107	8	78	8	78	8	27	8
No. of Detections	106	8	106	8	107	8	78	8	78	8	27	8
Minimum	6.30	9.69	6.20	9.50	8.40	13.60	5.40	6.89	10.00	13.70	10.80	11.80
Maximum	11.00	10.40	10.10	10.10	17.10	15.00	8.06	7.73	16.20	15.00	13.70	13.10
Mean	8.43	10.05	8.06	9.78	12.91	14.34	6.83	7.31	13.28	14.36	12.13	12.29
Standard Deviation	0.991	0.236	1.06	0.207	1.84	0.496	0.649	0.230	1.36	0.374	0.701	0.426
Median	8.32	10.08	7.90	9.74	13.00	14.35	6.82	7.32	13.55	14.35	12.20	12.20
Magnesium, Total [mg/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	35	8	34	8	35	8	35	8	35	8	27	8
Minimum	7.81	9.45	7.86	9.21	12.20	13.40	6.13	6.98	11.90	13.70	11.00	11.60
Maximum	11.10	10.20	10.70	10.10	16.00	15.10	9.59	7.54	15.90	15.10	13.40	12.50
Mean	9.45	9.92	9.28	9.56	14.25	14.18	7.49	7.29	14.29	14.25	12.20	12.16
Standard Deviation	0.900	0.266	0.791	0.304	0.854	0.587	0.676	0.209	0.844	0.472	0.546	0.307
Median	9.78	10.00	9.41	9.47	14.30	14.15	7.50	7.24	14.40	14.15	12.30	12.25
Manganese, Dissolved [ug/L]												
No. of Analyses	106	8	106	8	106	8	78	8	78	8	27	8
No. of Detections	104	8	6	5	105	8	78	8	78	8	18	1
Minimum	ND	110.00	ND	ND	ND	464.00	42.00	58.40	67.80	81.90	ND	ND
Maximum	255.00	189.00	140.00	2.40	1350.00	520.00	84.60	63.80	123.00	102.00	15.80	0.193
Mean	141.01	153.00	1.79	0.510	439.86	486.13	63.39	61.38	92.68	93.34	0.826	ID
Standard Deviation	32.26	28.48	13.56	0.805	182.33	18.30	7.38	2.33	7.76	7.57	3.00	ID
Median	141.50	148.50	0.500	0.127	475.50	489.00	64.00	61.95	92.00	93.10	0.192	ID
Manganese, Total [ug/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	35	8	22	8	35	8	35	8	35	8	26	8
Minimum	147.00	185.00	ND	0.125	441.00	470.00	52.70	59.10	84.90	88.80	ND	0.151
Maximum	557.00	849.00	15.10	2.75	863.00	532.00	203.00	73.30	270.00	186.00	50.20	2.92
Mean	222.31	315.88	1.08	0.643	552.49	503.25	85.58	67.31	116.84	131.53	3.87	0.569
Standard Deviation	83.03	220.89	2.64	0.896	84.15	22.84	31.64	4.33	39.70	35.95	10.40	0.954
Median	189.00	239.50	0.500	0.221	539.00	508.50	77.30	67.90	101.00	125.00	0.500	0.226
Potassium, Dissolved [mg/L]												
No. of Analyses	106	8	106	8	107	8	78	8	78	8	27	8
No. of Detections	106	8	106	8	107	8	78	8	78	8	27	8
Minimum	1.60	2.63	1.40	1.79	1.70	2.32	2.10	2.92	1.55	2.07	1.35	1.46
Maximum	3.60	3.08	2.30	2.06	3.30	2.71	3.30	3.38	2.50	2.33	1.68	1.76
Mean	2.58	2.78	1.74	1.87	2.42	2.48	2.88	3.12	2.08	2.18	1.55	1.56
Standard Deviation	0.277	0.143	0.168	0.089	0.229	0.140	0.225	0.156	0.179	0.092	0.083	0.102
Median	2.59	2.74	1.78	1.84	2.43	2.48	2.92	3.08	2.11	2.15	1.55	1.53
Potassium, Total [mg/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	35	8	34	8	35	8	35	8	35	8	27	8
Minimum	2.12	2.67	1.67	1.76	2.29	2.31	2.76	2.97	2.02	2.10	1.46	1.47
Maximum	2.95	2.83	2.08	1.92	2.86	2.59	3.37	3.18	2.36	2.27	1.80	1.64
Mean	2.70	2.75	1.84	1.84	2.49	2.45	3.07	3.09	2.19	2.17	1.58	1.53
Standard Deviation	0.147	0.064	0.096	0.062	0.111	0.099	0.152	0.077	0.098	0.057	0.078	0.062
Median	2.70	2.77	1.83	1.84	2.47	2.43	3.06	3.11	2.17	2.17	1.57	1.52

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	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	Long	Short
Sodium, Dissolved [mg/L]												
No. of Analyses	106	8	106	8	106	8	78	8	78	8	27	8
No. of Detections	106	8	106	8	106	8	78	8	78	8	27	8
Minimum	4.77	5.87	4.30	5.35	4.80	6.07	6.50	8.59	5.08	6.04	5.90	5.81
Maximum	7.50	6.80	10.00	6.21	7.54	7.58	10.10	10.30	7.56	7.36	7.46	7.56
Mean	5.94	6.32	5.53	5.81	6.41	6.90	8.24	9.66	6.22	6.65	6.69	6.66
Standard Deviation	0.539	0.311	0.892	0.254	0.573	0.519	0.823	0.568	0.536	0.414	0.437	0.526
Median	6.00	6.32	5.40	5.85	6.44	6.88	8.33	9.76	6.28	6.62	6.74	6.70
Sodium, Total [mg/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	35	8	34	8	35	8	35	8	35	8	27	8
Minimum	5.36	5.89	5.02	5.41	6.09	6.49	7.06	9.02	5.33	6.16	5.92	6.38
Maximum	6.96	6.67	6.74	6.22	8.01	7.37	10.10	10.50	7.10	6.94	7.25	7.12
Mean	6.12	6.21	5.90	5.71	6.93	6.87	8.77	9.58	6.56	6.54	6.71	6.65
Standard Deviation	0.446	0.249	0.418	0.287	0.413	0.319	0.763	0.459	0.391	0.235	0.376	0.234
Median	6.19	6.12	5.91	5.64	6.98	6.77	8.84	9.49	6.60	6.54	6.77	6.55
1,1-Dichloroethane [ug/L]												
No. of Analyses	106	8	107	8	107	8	78	8	78	8	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
1,2-Dichloropropane [ug/L]												
No. of Analyses	106	8	107	8	107	8	78	8	78	8	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Benzene [ug/L]												
No. of Analyses	106	8	107	8	107	8	78	8	78	8	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Chloroethane [ug/L]												
No. of Analyses	106	8	107	8	107	8	78	8	78	8	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Tetrachloroethene [ug/L]												
No. of Analyses	106	8	107	8	107	8	78	8	78	8	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
***cis*-1,2-Dichloroethene [ug/L]**												
No. of Analyses	106	8	107	8	107	8	78	8	78	8	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Dichlorodifluoromethane [ug/L]												
No. of Analyses	106	8	107	8	107	8	78	8	78	8	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID

Table 2
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2023

	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	Long	Short
Toluene [ug/L]												
No. of Analyses	106	8	107	8	107	8	78	8	78	8	27	8
No. of Detections	0	0	0	0	1	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	0.946	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
***trans*-1,2-Dichloroethene [ug/L]**												
No. of Analyses	106	8	107	8	107	8	78	8	78	8	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Trichloroethene [ug/L]												
No. of Analyses	106	8	107	8	107	8	78	8	78	8	27	8
No. of Detections	0	0	1	0	1	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	0.350	ND	0.280	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Trichlorofluoromethane [ug/L]												
No. of Analyses	106	8	107	8	107	8	78	8	78	8	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Vinyl Chloride [ug/L]												
No. of Analyses	106	8	107	8	107	8	78	8	78	8	27	8
No. of Detections	0	0	0	0	1	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	0.100	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	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.
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
Summary of Trend Results for Groundwater Well Samples
Summary of Trend Analysis
Vashon Island Closed Landfill
1986 through 2023

	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	I	D	--	--	--
Specific Conductance, Field [umhos/cm]	D	D	I	I	D	I
Alkalinity [mg/L]	D	D	--	--	D	I
Ammonia-N [mg/L]	D	D	D	--	--	--
Chloride [mg/L]	D	--	I	--	--	--
Nitrate-N [mg/L]	--	I	I	--	I	--
Sulfate [mg/L]	D	--	D	--	D	--
Total Dissolved Solids [mg/L]	D	D	I	--	D	--
Arsenic, Dissolved [ug/L]	D	D	D	--	I	--
Arsenic, Total [ug/L]	D	--	--	D	I	--
Calcium, Dissolved [mg/L]	D	D	I	--	D	--
Calcium, Total [mg/L]	D	I	I	--	--	--
Iron, Dissolved [mg/L]	D	D	--	--	--	--
Iron, Total [mg/L]	--	D	D	--	D	--
Magnesium, Dissolved [mg/L]	--	D	I	--	D	--
Magnesium, Total [mg/L]	D	--	--	--	D	--
Manganese, Dissolved [ug/L]	D	D	D	--	--	--
Manganese, Total [ug/L]	--	--	D	--	D	--
Potassium, Dissolved [mg/L]	D	D	I	--	D	--
Potassium, Total [mg/L]	D	--	--	--	D	--
Sodium, Dissolved [mg/L]	D	D	I	I	--	--
Sodium, Total [mg/L]	D	I	--	--	--	I
1,1-Dichloroethane [ug/L]	--	D	--	--	--	--
1,2-Dichloropropane [ug/L]	--	--	--	--	--	--
Benzene [ug/L]	--	--	--	--	--	--
Chloroethane [ug/L]	--	D	--	--	--	--
Tetrachloroethene [ug/L]	D	--	--	--	--	--
***cis* -1,2-Dichloroethene [ug/L]**	--	--	--	--	--	--
Dichlorodifluoromethane [ug/L]	--	D	--	--	--	--
Toluene [ug/L]	--	--	--	--	--	--
***trans* -1,2-Dichloroethene [ug/L]**	--	--	--	--	--	--
Trichloroethene [ug/L]	--	--	--	--	--	--
Trichlorofluoromethane [ug/L]	D	D	--	--	--	--
Vinyl Chloride [ug/L]	--	D	--	--	--	--

Table 3
Summary of Trend Results for Groundwater Well Samples
Summary of Trend Analysis
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc2												
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33		MW-35		MW-37
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
pH, Field [standard units]	--	--	D	--	D	--	--	--	--	--	D	--	--
Specific Conductance, Field [umhos/cm]	D	--	I	--	--	--	--	--	D	--	D	--	--
Alkalinity [mg/L]	D	--	I	--	--	I	D	--	D	--	D	D	D
Ammonia-N [mg/L]	D	--	--	--	--	--	--	--	D	I	--	--	--
Chloride [mg/L]	D	--	--	--	D	--	D	--	D	--	D	D	--
Nitrate-N [mg/L]	--	--	I	--	--	--	I	--	--	--	--	--	--
Sulfate [mg/L]	D	--	D	--	D	--	D	--	I	--	I	--	--
Total Dissolved Solids [mg/L]	D	--	I	--	--	--	D	--	D	--	D	D	--
Arsenic, Dissolved [ug/L]	--	--	--	--	I	--	--	--	D	--	--	D	I
Arsenic, Total [ug/L]	I	--	I	--	I	D	--	D	--	--	I	--	--
Calcium, Dissolved [mg/L]	D	I	I	--	I	--	D	--	D	--	--	D	--
Calcium, Total [mg/L]	D	--	I	--	--	--	--	--	D	--	D	D	--
Iron, Dissolved [mg/L]	--	--	--	--	I	--	--	--	D	--	I	D	--
Iron, Total [mg/L]	D	--	D	--	I	--	I	--	D	--	I	D	--
Magnesium, Dissolved [mg/L]	D	I	I	--	I	--	D	--	D	--	--	D	--
Magnesium, Total [mg/L]	D	--	--	--	--	--	--	--	D	--	--	D	D
Manganese, Dissolved [ug/L]	--	--	D	--	--	--	--	--	D	--	--	D	D
Manganese, Total [ug/L]	--	I	D	--	D	--	--	--	D	--	--	D	--
Potassium, Dissolved [mg/L]	D	I	I	--	--	--	D	--	--	--	--	--	--
Potassium, Total [mg/L]	D	--	--	--	--	--	--	--	D	--	D	--	--
Sodium, Dissolved [mg/L]	--	I	I	--	--	I	--	--	D	I	I	--	I
Sodium, Total [mg/L]	--	I	I	--	--	I	--	--	D	--	I	--	--
1,1-Dichloroethane [ug/L]	--	--	--	--	--	--	--	--	--	--	D	--	--
1,2-Dichloropropane [ug/L]	--	--	--	--	--	--	--	--	--	--	D	--	--
Benzene [ug/L]	--	--	--	--	--	--	--	--	D	--	D	--	--
Chloroethane [ug/L]	--	--	--	--	--	--	--	--	D	--	--	--	--
Tetrachloroethene [ug/L]	--	--	--	--	--	--	--	--	--	--	--	--	--
***cis*-1,2-Dichloroethene [ug/L]**	--	--	--	--	--	--	D	--	--	--	D	--	--
Dichlorodifluoromethane [ug/L]	D	--	--	--	I	--	D	--	D	--	--	--	--
Toluene [ug/L]	--	--	--	--	--	--	--	--	D	--	D	--	--
***trans*-1,2-Dichloroethene [ug/L]**	--	--	--	--	--	--	--	--	--	--	D	--	--
Trichloroethene [ug/L]	--	--	--	--	--	--	--	--	I	--	I	--	--
Trichlorofluoromethane [ug/L]	D	--	--	--	--	--	D	--	--	--	--	--	--
Vinyl Chloride [ug/L]	D	--	--	--	--	--	D	--	D	--	--	--	--

Table 3
Summary of Trend Results for Groundwater Well Samples
Summary of Trend Analysis
Vashon Island Closed Landfill
1986 through 2023

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

Table 3
Summary of Trend Results for Groundwater Well Samples
Summary of Trend Analysis
Vashon Island Closed Landfill
1986 through 2023

	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	Long	Short
pH, Field [standard units]	D	--	D	--	D	--	D	--	D	--	D	--
Specific Conductance, Field [umhos/cm]	I	I	I	I	--	--	I	I	--	I	D	I
Alkalinity [mg/L]	I	I	I	I	D	I	--	I	D	I	--	--
Ammonia-N [mg/L]	--	--	D	--	D	--	I	--	D	--	D	--
Chloride [mg/L]	--	--	I	--	D	--	--	--	D	--	--	--
Nitrate-N [mg/L]	--	--	D	--	D	--	D	--	--	--	D	I
Sulfate [mg/L]	I	--	--	--	D	--	--	I	D	--	--	--
Total Dissolved Solids [mg/L]	I	--	I	--	D	--	I	--	--	--	--	--
Arsenic, Dissolved [ug/L]	D	--	D	--	D	--	D	--	D	--	--	--
Arsenic, Total [ug/L]	--	--	--	--	--	--	--	--	I	--	--	--
Calcium, Dissolved [mg/L]	I	--	I	--	--	--	I	--	I	I	--	--
Calcium, Total [mg/L]	I	--	I	--	--	--	--	--	I	--	--	--
Iron, Dissolved [mg/L]	I	--	--	--	--	--	I	--	I	--	--	--
Iron, Total [mg/L]	I	--	--	--	I	I	--	--	I	--	D	--
Magnesium, Dissolved [mg/L]	I	--	I	--	D	--	I	I	I	--	--	--
Magnesium, Total [mg/L]	I	--	I	--	--	--	--	--	I	--	I	--
Manganese, Dissolved [ug/L]	I	--	D	--	D	--	I	--	--	--	D	--
Manganese, Total [ug/L]	I	--	D	--	--	--	--	--	I	--	D	--
Potassium, Dissolved [mg/L]	I	--	I	--	D	--	I	--	I	--	--	--
Potassium, Total [mg/L]	I	--	--	--	--	--	--	--	--	--	D	--
Sodium, Dissolved [mg/L]	I	I	I	--	--	I	I	I	I	I	--	I
Sodium, Total [mg/L]	I	--	I	--	--	--	--	I	I	--	I	--
1,1-Dichloroethane [ug/L]	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane [ug/L]	--	--	--	--	--	--	--	--	--	--	--	--
Benzene [ug/L]	--	--	--	--	--	--	--	--	--	--	--	--
Chloroethane [ug/L]	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene [ug/L]	--	--	--	--	--	--	--	--	--	--	--	--
***cis*-1,2-Dichloroethene [ug/L]**	--	--	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane [ug/L]	--	--	--	--	--	--	--	--	--	--	--	--
Toluene [ug/L]	--	--	--	--	--	--	--	--	--	--	--	--
***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
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.

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

		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	40	50	50	8	50	8
	No. of Detections	40	50	50	8	50	8
	Trend	D	**I**	D	--	--	--
	S-value	-375	261	-392	-2	-178	-5
	Probability	0.000	0.030	0.001	0.902	0.139	0.618
	Significant	YES	YES	YES	NO	NO	NO
Specific Conductance, Field [umhos/cm]							
	No. of Analyses	40	50	50	8	50	8
	No. of Detections	40	50	50	8	50	8
	Trend	D	D	**I**	**I**	D	**I**
	S-value	-511	-772	318	28	-531	22
	Probability	0.000	0.000	0.008	0.001	0.000	0.009
	Significant	YES	YES	YES	YES	YES	YES
Alkalinity [mg/L]							
	No. of Analyses	33	34	50	8	50	8
	No. of Detections	33	34	50	8	50	8
	Trend	D	D	--	--	D	**I**
	S-value	-345	-265	-114	7	-756	23
	Probability	0.000	0.000	0.344	0.445	0.000	0.006
	Significant	YES	YES	NO	NO	YES	YES
Ammonia-N [mg/L]							
	No. of Analyses	39	50	50	8	50	8
	No. of Detections	11	23	8	0	1	0
	Trend	D	D	D	--	--	--
	S-value	-500	-740	-651	0	-589	0
	Probability	0.000	0.000	0.000	NaN	0.000	NaN
	Significant	YES	YES	YES	--	--	--
Chloride [mg/L]							
	No. of Analyses	40	50	50	8	50	8
	No. of Detections	40	49	50	8	50	8
	Trend	D	--	**I**	--	--	--
	S-value	-294	-40	297	8	-163	11
	Probability	0.001	0.744	0.013	0.386	0.175	0.212
	Significant	YES	NO	YES	NO	NO	NO
Nitrate-N [mg/L]							
	No. of Analyses	40	50	50	8	50	8
	No. of Detections	40	38	50	8	50	8
	Trend	--	**I**	**I**	--	**I**	--
	S-value	13	582	636	16	683	-6
	Probability	0.889	0.000	0.000	0.063	0.000	0.536
	Significant	NO	YES	YES	NO	YES	NO
Sulfate [mg/L]							
	No. of Analyses	40	50	50	8	50	8
	No. of Detections	40	50	50	8	50	8
	Trend	D	--	D	--	D	--
	S-value	-610	-64	-429	-6	-942	8
	Probability	0.000	0.598	0.000	0.536	0.000	0.386
	Significant	YES	NO	YES	NO	YES	NO
Total Dissolved Solids [mg/L]							
	No. of Analyses	35	50	50	8	50	8
	No. of Detections	35	50	50	8	50	8
	Trend	D	D	**I**	--	D	--
	S-value	-272	-715	331	-1	-628	3
	Probability	0.000	0.000	0.006	1.00	0.000	0.799
	Significant	YES	YES	YES	NO	YES	NO
Arsenic, Dissolved [ug/L]							
	No. of Analyses	40	50	50	8	50	8
	No. of Detections	6	23	50	8	50	8
	Trend	D	D	D	--	**I**	--
	S-value	-469	-535	-283	-12	481	8
	Probability	0.000	0.000	0.018	0.174	0.000	0.386
	Significant	YES	YES	YES	NO	YES	NO
Arsenic, Total [ug/L]							
	No. of Analyses	18	19	33	8	36	8
	No. of Detections	13	18	33	8	36	8
	Trend	D	--	--	D	**I**	--
	S-value	-66	5	102	-17	282	-3
	Probability	0.000	0.000	0.000	0.000	0.000	0.000
	Significant	YES	NO	NO	YES	YES	NO

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
Calcium, Dissolved [mg/L]						
No. of Analyses	34	44	50	8	50	8
No. of Detections	34	44	50	8	50	8
Trend	D	D	I	--	D	--
S-value	-329	-557	633	5	-325	10
Probability	0.000	0.000	0.000	0.610	0.007	0.266
Significant	YES	YES	YES	NO	YES	NO
Calcium, Total [mg/L]						
No. of Analyses	18	19	33	8	36	8
No. of Detections	18	19	33	8	36	8
Trend	D	I	I	--	--	--
S-value	-89	98	199	-4	-117	10
Probability	0.001	0.001	0.002	0.706	0.114	0.266
Significant	YES	YES	YES	NO	NO	NO
Iron, Dissolved [mg/L]						
No. of Analyses	40	50	50	8	50	8
No. of Detections	21	26	2	0	14	1
Trend	D	D	--	--	--	--
S-value	-439	-428	-63	0	93	-3
Probability	0.000	0.000	0.125	NaN	0.330	0.663
Significant	YES	YES	--	--	NO	--
Iron, Total [mg/L]						
No. of Analyses	18	19	33	8	36	8
No. of Detections	18	14	19	1	30	1
Trend	--	D	D	--	D	--
S-value	-34	-97	-161	-1	-385	-5
Probability	0.211	0.001	0.010	1.00	0.000	0.383
Significant	NO	YES	YES	--	YES	--
Magnesium, Dissolved [mg/L]						
No. of Analyses	34	44	50	8	50	8
No. of Detections	34	44	50	8	50	8
Trend	--	D	I	--	D	--
S-value	-28	-589	581	-3	-289	9
Probability	0.689	0.000	0.000	0.803	0.016	0.319
Significant	NO	YES	YES	NO	YES	NO
Magnesium, Total [mg/L]						
No. of Analyses	18	19	33	8	36	8
No. of Detections	18	19	33	8	36	8
Trend	D	--	--	--	D	--
S-value	-53	44	121	13	-146	1
Probability	0.049	0.132	0.063	0.135	0.048	1.00
Significant	YES	NO	NO	NO	YES	NO
Manganese, Dissolved [ug/L]						
No. of Analyses	40	50	50	8	50	8
No. of Detections	33	43	5	2	27	6
Trend	D	D	D	--	--	--
S-value	-453	-509	-599	-3	-32	-11
Probability	0.000	0.000	0.000	0.742	0.788	0.212
Significant	YES	YES	YES	--	NO	NO
Manganese, Total [ug/L]						
No. of Analyses	18	19	33	8	36	8
No. of Detections	18	19	22	4	33	8
Trend	--	--	D	--	D	--
S-value	-19	-27	-305	-14	-305	-12
Probability	0.495	0.363	0.000	0.084	0.000	0.174
Significant	NO	NO	YES	NO	YES	NO
Potassium, Dissolved [mg/L]						
No. of Analyses	34	44	50	8	50	8
No. of Detections	34	44	50	8	50	8
Trend	D	D	I	--	D	--
S-value	-446	-628	293	11	-263	10
Probability	0.000	0.000	0.014	0.212	0.028	0.266
Significant	YES	YES	YES	NO	YES	NO
Potassium, Total [mg/L]						
No. of Analyses	18	19	33	8	36	8
No. of Detections	18	19	33	8	36	8
Trend	D	--	--	--	D	--
S-value	-106	16	-50	-5	-302	-2
Probability	0.000	0.599	0.447	0.618	0.000	0.902
Significant	YES	NO	NO	NO	YES	NO

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
Sodium, Dissolved [mg/L]						
No. of Analyses	34	44	50	8	50	8
No. of Detections	34	44	50	8	50	8
Trend	D	D	I	I	--	--
S-value	-255	-563	526	22	12	16
Probability	0.000	0.000	0.000	0.009	0.927	0.063
Significant	YES	YES	YES	YES	NO	NO
Sodium, Total [mg/L]						
No. of Analyses	18	19	33	8	36	8
No. of Detections	18	19	33	8	36	8
Trend	D	I	--	--	--	I
S-value	-93	66	110	16	-84	21
Probability	0.000	0.023	0.091	0.063	0.258	0.013
Significant	YES	YES	NO	NO	NO	YES
1,1-Dichloroethane [ug/L]						
No. of Analyses	40	50	50	8	50	8
No. of Detections	0	17	0	0	0	0
Trend	--	D	--	--	--	--
S-value	0	-733	0	0	0	0
Probability	NaN	0.000	NaN	NaN	NaN	NaN
Significant	--	YES	--	--	--	--
1,2-Dichloropropane [ug/L]						
No. of Analyses	40	50	50	8	50	8
No. of Detections	0	0	0	0	0	0
Trend	--	--	--	--	--	--
S-value	0	0	0	0	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--
Benzene [ug/L]						
No. of Analyses	40	50	50	8	50	8
No. of Detections	0	0	0	0	0	0
Trend	--	--	--	--	--	--
S-value	0	0	0	0	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--
Chloroethane [ug/L]						
No. of Analyses	40	50	50	8	50	8
No. of Detections	0	6	0	0	0	0
Trend	--	D	--	--	--	--
S-value	0	-756	0	0	0	0
Probability	NaN	0.000	NaN	NaN	NaN	NaN
Significant	--	YES	--	--	--	--
Tetrachloroethene [ug/L]						
No. of Analyses	40	50	50	8	50	8
No. of Detections	7	0	0	0	0	0
Trend	D	--	--	--	--	--
S-value	-426	0	0	0	0	0
Probability	0.000	NaN	NaN	NaN	NaN	NaN
Significant	YES	--	--	--	--	--
***cis*-1,2-Dichloroethene [ug/L]**						
No. of Analyses	37	50	50	8	50	8
No. of Detections	0	27	0	0	0	0
Trend	--	--	--	--	--	--
S-value	0	111	0	0	0	0
Probability	NaN	0.354	NaN	NaN	NaN	NaN
Significant	--	NO	--	--	--	--

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc1					
Well Location	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Short	Long	Short
Dichlorodifluoromethane [ug/L]						
No. of Analyses	33	35	50	8	50	8
No. of Detections	0	12	0	0	0	0
Trend	--	D	--	--	--	--
S-value	0	-378	0	0	0	0
Probability	NaN	0.000	NaN	NaN	NaN	NaN
Significant	--	YES	--	--	--	--
Toluene [ug/L]						
No. of Analyses	40	50	50	8	50	8
No. of Detections	0	0	0	0	0	0
Trend	--	--	--	--	--	--
S-value	0	0	0	0	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--
***trans*-1,2-Dichloroethene [ug/L]**						
No. of Analyses	39	50	50	8	50	8
No. of Detections	0	1	0	0	0	0
Trend	--	--	--	--	--	--
S-value	0	-686	0	0	0	0
Probability	NaN	0.000	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--
Trichloroethene [ug/L]						
No. of Analyses	40	50	50	8	50	8
No. of Detections	0	0	0	0	0	0
Trend	--	--	--	--	--	--
S-value	0	0	0	0	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--
Trichlorofluoromethane [ug/L]						
No. of Analyses	34	45	50	8	50	8
No. of Detections	16	27	0	0	0	0
Trend	D	D	--	--	--	--
S-value	-185	-557	0	0	0	0
Probability	0.005	0.000	NaN	NaN	NaN	NaN
Significant	YES	YES	--	--	--	--
Vinyl Chloride [ug/L]						
No. of Analyses	40	50	50	8	50	8
No. of Detections	0	15	0	0	0	0
Trend	--	D	--	--	--	--
S-value	0	-796	0	0	0	0
Probability	NaN	0.000	NaN	NaN	NaN	NaN
Significant	--	YES	--	--	--	--

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc2												
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33		MW-35		MW-37
Time Interval	Long	Short	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	27	8	27	8	7
No. of Detections	50	8	50	8	50	8	50	8	27	8	27	8	7
Trend	--	--	D	--	D	--	--	--	--	--	D	--	--
S-value	-38	0	-465	4	-488	-10	-221	-16	-52	-2	-149	4	1
Probability	0.757	1.00	0.000	0.711	0.000	0.266	0.066	0.063	0.287	0.902	0.002	0.711	1
Significant	NO	NO	YES	NO	YES	NO	NO	NO	NO	NO	YES	NO	NO
Specific Conductance, Field [umhos/cm]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	50	8	50	8	50	8	50	8	27	8	27	8	7
Trend	D	--	I	--	--	--	--	--	D	--	D	--	--
S-value	-668	12	365	6	199	16	-141	4	-312	14	-235	-10	1
Probability	0.000	0.174	0.002	0.536	0.097	0.063	0.241	0.711	0.000	0.108	0.000	0.266	1
Significant	YES	NO	YES	NO	NO	NO	NO	NO	YES	NO	YES	NO	NO
Alkalinity [mg/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	50	8	50	8	50	8	50	8	27	8	27	8	7
Trend	D	--	I	--	--	I	D	--	D	--	D	D	D
S-value	-871	11	427	4	47	23	-578	-2	-317	-4	-260	-18	-14
Probability	0.000	0.212	0.000	0.711	0.700	0.006	0.000	0.898	0.000	0.711	0.000	0.035	0.041
Significant	YES	NO	YES	NO	NO	YES	YES	NO	YES	NO	YES	YES	YES
Ammonia-N [mg/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	11	1	2	0	49	8	39	8	27	8	27	8	1
Trend	D	--	--	--	--	--	--	--	D	I	--	--	--
S-value	-508	3	-595	0	0	10	149	2	-177	21	-93	11	-6
Probability	0.000	0.663	0.000	NaN	1.00	0.266	0.213	0.902	0.000	0.013	0.055	0.212	0.211
Significant	YES	--	--	--	NO	NO	NO	NO	YES	YES	NO	NO	--
Chloride [mg/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	50	8	50	8	50	8	50	8	27	8	27	8	7
Trend	D	--	--	--	D	--	D	--	D	--	D	D	--
S-value	-621	-7	206	-2	-580	3	-840	-1	-308	4	-166	-17	6
Probability	0.000	0.454	0.086	0.902	0.000	0.803	0.000	1.00	0.000	0.711	0.001	0.046	0.448
Significant	YES	NO	NO	NO	YES	NO	YES	NO	YES	NO	YES	YES	NO
Nitrate-N [mg/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	39	8	50	8	11	0	50	8	2	1	1	1	7
Trend	--	--	I	--	--	--	I	--	--	--	--	--	--
S-value	-29	6	705	-8	-143	0	497	4	21	5	61	5	-11
Probability	0.814	0.536	0.000	0.386	0.100	NaN	0.000	0.711	0.497	0.383	0.063	0.383	0.133
Significant	NO	NO	YES	NO	NO	--	YES	NO	--	--	--	--	NO
Sulfate [mg/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	50	8	50	8	50	8	50	8	27	8	27	8	7
Trend	D	--	D	--	D	--	D	--	I	--	I	--	--
S-value	-366	13	-530	-3	-558	3	-386	9	144	-1	266	-4	3
Probability	0.002	0.135	0.000	0.803	0.000	0.803	0.001	0.319	0.003	1.00	0.000	0.711	0.764
Significant	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	NO
Total Dissolved Solids [mg/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	50	8	50	8	50	8	50	8	27	8	27	8	7
Trend	D	--	I	--	--	--	D	--	D	--	D	D	--
S-value	-761	15	310	-1	159	7	-594	3	-287	-5	-201	-19	-12
Probability	0.000	0.075	0.010	1.00	0.186	0.454	0.000	0.796	0.000	0.618	0.000	0.025	0.095
Significant	YES	NO	YES	NO	NO	NO	YES	NO	YES	NO	YES	YES	NO
Arsenic, Dissolved [ug/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	35	8	50	8	50	8	43	8	27	8	27	8	7
Trend	--	--	--	--	I	--	--	--	D	--	--	D	I
S-value	-115	-2	-205	-3	574	4	-21	-12	-106	0	-29	-17	17
Probability	0.333	0.902	0.087	0.803	0.000	0.711	0.867	0.174	0.028	1.00	0.559	0.046	0.016261
Significant	NO	NO	NO	NO	YES	NO	NO	NO	YES	NO	NO	YES	YES
Arsenic, Total [ug/L]													
No. of Analyses	36	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	20	8	35	8	35	8	32	8	27	8	27	8	7
Trend	I	--	I	--	I	D	--	D	--	--	I	--	--
S-value	207	-12	170	-13	267	-18	64	-20	-39	-6	150	-16	-4
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.649
Significant	YES	NO	YES	NO	YES	YES	NO	YES	NO	NO	YES	NO	NO

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc2												
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33		MW-35		MW-37
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
Calcium, Dissolved [mg/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	50	8	50	8	50	8	50	8	27	8	27	8	7
Trend	D	I	I	--	I	--	D	--	D	--	--	D	--
S-value	-594	22	578	-2	443	16	-332	-3	-175	-6	24	-23	-10
Probability	0.000	0.009	0.000	0.902	0.000	0.059	0.006	0.803	0.000	0.530	0.632	0.006	0.172
Significant	YES	YES	YES	NO	YES	NO	YES	NO	YES	NO	NO	YES	NO
Calcium, Total [mg/L]													
No. of Analyses	35	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	35	8	35	8	35	8	35	8	27	8	27	8	7
Trend	D	--	I	--	--	--	--	--	D	--	D	D	--
S-value	-238	14	200	-5	12	13	-10	-8	-255	-7	-108	-23	-11
Probability	0.001	0.102	0.005	0.618	0.875	0.126	0.898	0.379	0.000	0.454	0.026	0.006	0.133
Significant	YES	NO	YES	NO	NO	NO	NO	NO	YES	NO	YES	YES	NO
Iron, Dissolved [mg/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	1	1	1	0	31	8	50	8	27	8	27	8	5
Trend	--	--	--	--	I	--	--	--	D	--	I	D	--
S-value	-13	-3	17	0	648	8	-168	-10	-257	5	103	-22	2
Probability	0.678	0.663	0.579	NaN	0.000	0.386	0.162	0.266	0.000	0.618	0.033	0.009	0.879
Significant	--	--	--	--	YES	NO	NO	NO	YES	NO	YES	YES	NO
Iron, Total [mg/L]													
No. of Analyses	36	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	18	2	23	1	34	8	35	8	27	8	27	8	7
Trend	D	--	D	--	I	--	I	--	D	--	I	D	--
S-value	-231	-3	-157	3	179	-10	148	-10	-272	-3	210	-23	-13
Probability	0.001	0.742	0.024	0.663	0.011	0.266	0.037	0.266	0.000	0.803	0.000	0.006	0.072
Significant	YES	--	YES	--	YES	NO	YES	NO	YES	NO	YES	YES	NO
Magnesium, Dissolved [mg/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	50	8	50	8	50	8	50	8	27	8	27	8	7
Trend	D	I	I	--	I	--	D	--	D	--	--	D	--
S-value	-769	19	614	-6	457	11	-332	4	-207	-6	-5	-18	-1
Probability	0.000	0.025	0.000	0.536	0.000	0.212	0.006	0.711	0.000	0.536	0.933	0.035	1
Significant	YES	YES	YES	NO	YES	NO	YES	NO	YES	NO	NO	YES	NO
Magnesium, Total [mg/L]													
No. of Analyses	35	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	35	8	35	8	35	8	35	8	27	8	27	8	7
Trend	D	--	--	--	--	--	--	--	D	--	--	D	D
S-value	-273	12	135	-4	54	3	3	6	-193	3	-9	-18	-14
Probability	0.000	0.174	0.056	0.711	0.451	0.803	0.977	0.536	0.000	0.803	0.867	0.035	0.048
Significant	YES	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	YES	YES
Manganese, Dissolved [ug/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	50	8	3	1	50	8	50	8	27	8	27	8	7
Trend	--	--	D	--	--	--	--	--	D	--	--	D	D
S-value	-49	16	-632	3	-137	13	166	2	-186	-1	84	-26	-21
Probability	0.688	0.063	0.000	0.663	0.255	0.135	0.167	0.902	0.000	1.00	0.083	0.002	0.003
Significant	NO	NO	YES	--	NO	NO	NO	NO	YES	NO	NO	YES	YES
Manganese, Total [ug/L]													
No. of Analyses	36	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	36	8	27	7	35	8	35	8	27	8	27	8	7
Trend	--	I	D	--	D	--	--	--	D	--	--	D	--
S-value	-105	20	-176	14	-390	2	97	2	-229	10	15	-26	-9
Probability	0.157	0.019	0.013	0.108	0.000	0.902	0.173	0.902	0.000	0.266	0.770	0.002	0.230
Significant	NO	YES	YES	NO	YES	NO	NO	NO	YES	NO	NO	YES	NO
Potassium, Dissolved [mg/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	50	8	50	8	50	8	50	8	27	8	27	8	7
Trend	D	I	I	--	--	--	D	--	--	--	--	--	--
S-value	-399	19	433	5	-11	16	-268	6	-76	14	-67	3	2
Probability	0.001	0.025	0.000	0.610	0.933	0.063	0.025	0.536	0.118	0.108	0.168	0.803	0.879
Significant	YES	YES	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO
Potassium, Total [mg/L]													
No. of Analyses	35	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	35	8	35	8	35	8	35	8	27	8	27	8	7
Trend	D	--	--	--	--	--	--	--	D	--	D	--	--
S-value	-299	5	-11	-10	-135	1	-56	-2	-154	-4	-142	-16	-11
Probability	0.000	0.618	0.887	0.266	0.057	1.00	0.434	0.902	0.001	0.711	0.003	0.063	0.133
Significant	YES	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	NO	NO

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc2												
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33		MW-35		MW-37
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
Sodium, Dissolved [mg/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	50	8	50	8	50	8	50	8	27	8	27	8	7
Trend	--	**I**	**I**	--	--	**I**	--	--	D	**I**	**I**	--	**I**
S-value	-123	22	526	16	-84	20	83	1	-118	21	102	12	17
Probability	0.307	0.009	0.000	0.063	0.487	0.019	0.492	1.00	0.015	0.013	0.035	0.167	0.016
Significant	NO	YES	YES	NO	NO	YES	NO	NO	YES	YES	YES	NO	YES
Sodium, Total [mg/L]													
No. of Analyses	35	8	35	8	35	8	35	8	27	8	27	8	7
No. of Detections	35	8	35	8	35	8	35	8	27	8	27	8	7
Trend	--	**I**	**I**	--	--	**I**	--	--	D	--	**I**	--	--
S-value	-134	18	142	10	81	20	1	0	-104	16	109	10	-3
Probability	0.059	0.035	0.045	0.266	0.256	0.019	1.00	1.00	0.031	0.063	0.024	0.258	0.764
Significant	NO	YES	YES	NO	NO	YES	NO	NO	YES	NO	YES	NO	NO
1,1-Dichloroethane [ug/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	0	0	0	0	0	0	0	0	27	8	27	8	0
Trend	--	--	--	--	--	--	--	--	--	--	D	--	--
S-value	0	0	0	0	0	0	0	0	-32	9	-96	-16	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.518	0.319	0.048	0.063	NaN
Significant	--	--	--	--	--	--	--	--	NO	NO	YES	NO	--
1,2-Dichloropropane [ug/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	0	0	0	0	0	0	0	0	27	8	27	8	0
Trend	--	--	--	--	--	--	--	--	--	--	D	--	--
S-value	0	0	0	0	0	0	0	0	-91	6	-186	-10	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.061	0.536	0.000	0.266	NaN
Significant	--	--	--	--	--	--	--	--	NO	NO	YES	NO	--
Benzene [ug/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	0	0	0	0	0	0	0	0	27	8	27	8	0
Trend	--	--	--	--	--	--	--	--	D	--	D	--	--
S-value	0	0	0	0	0	0	0	0	-206	2	-171	-14	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.000	0.902	0.000	0.108	NaN
Significant	--	--	--	--	--	--	--	--	YES	NO	YES	NO	--
Chloroethane [ug/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	0	0	0	0	0	0	0	0	21	3	1	0	0
Trend	--	--	--	--	--	--	--	--	D	--	--	--	--
S-value	0	0	0	0	0	0	0	0	-173	8	-122	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.000	0.316	0.002	NaN	NaN
Significant	--	--	--	--	--	--	--	--	YES	NO	--	--	--
Tetrachloroethene [ug/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	0	0	0	0	0	0	0	0	0	0	0	0
Probability	NaN	NaN	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	27	8	27	8	7
No. of Detections	15	8	0	0	0	0	50	8	27	8	27	8	0
Trend	--	--	--	--	--	--	D	--	--	--	D	--	--
S-value	114	8	0	0	0	0	-442	-16	-68	-4	-178	-15	0
Probability	0.296	0.386	NaN	NaN	NaN	NaN	0.000	0.063	0.162	0.711	0.000	0.081	NaN
Significant	NO	NO	--	--	--	--	YES	NO	NO	NO	YES	NO	--

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc2												
Well Location	MW-2		MW-9		MW-20		MW-21		MW-33		MW-35		MW-37
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Short
Dichlorodifluoromethane [ug/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	50	8	0	0	27	5	50	8	27	8	27	8	7
Trend	D	--	--	--	**I**	--	D	--	D	--	--	--	--
S-value	-606	-4	0	0	351	9	-556	0	-102	0	10	-12	5
Probability	0.000	0.711	NaN	NaN	0.002	0.308	0.000	1.00	0.035	1.00	0.851	0.174	0.548006
Significant	YES	NO	--	--	YES	NO	YES	NO	YES	NO	NO	NO	NO
Toluene [ug/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	0	0	0	0	1	0	0	0	7	0	7	0	0
Trend	--	--	--	--	--	--	--	--	D	--	D	--	--
S-value	0	0	0	0	-619	0	0	0	-157	0	-140	0	0
Probability	NaN	NaN	NaN	NaN	0.000	NaN	NaN	NaN	0.000	NaN	0.002	NaN	NaN
Significant	--	--	--	--	--	--	--	--	YES	--	YES	--	--
***trans*-1,2-Dichloroethene [ug/L]**													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	0	0	0	0	0	0	8	0	27	8	27	8	0
Trend	--	--	--	--	--	--	--	--	--	--	D	--	--
S-value	0	0	0	0	0	0	-201	0	-67	5	-99	-15	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	0.053	NaN	0.169	0.618	0.041	0.081	NaN
Significant	--	--	--	--	--	--	NO	--	NO	NO	YES	NO	--
Trichloroethene [ug/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	0	0	0	0	0	0	0	0	16	8	27	8	7
Trend	--	--	--	--	--	--	--	--	**I**	--	**I**	--	--
S-value	0	0	0	0	0	0	0	0	107	4	113	-10	11
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.025	0.711	0.019	0.258	0.133
Significant	--	--	--	--	--	--	--	--	YES	NO	YES	NO	NO
Trichlorofluoromethane [ug/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	50	8	0	0	0	0	50	8	0	0	0	0	7
Trend	D	--	--	--	--	--	D	--	--	--	--	--	--
S-value	-498	2	0	0	0	0	-350	2	0	0	0	0	9
Probability	0.000	0.902	NaN	NaN	NaN	NaN	0.004	0.902	NaN	NaN	NaN	NaN	0.230
Significant	YES	NO	--	--	--	--	YES	NO	--	--	--	--	NO
Vinyl Chloride [ug/L]													
No. of Analyses	50	8	50	8	50	8	50	8	27	8	27	8	7
No. of Detections	48	7	0	0	0	0	50	8	27	8	27	8	0
Trend	D	--	--	--	--	--	D	--	D	--	--	--	--
S-value	-733	10	0	0	0	0	-775	-2	-195	-4	-48	-14	0
Probability	0.000	0.266	NaN	NaN	NaN	NaN	0.000	0.902	0.000	0.711	0.327	0.108	NaN
Significant	YES	NO	--	--	--	--	YES	NO	YES	NO	NO	NO	--

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc3			
Well Location	MW-8		MW-36	
Time Interval	Long	Short	Long	Short
pH, Field [standard units]				
No. of Analyses	50	8	27	8
No. of Detections	50	8	27	8
Trend	--	--	D	--
S-value	-167	10	-113	-10
Probability	0.165	0.258	0.019	0.266
Significant	NO	NO	YES	NO
Specific Conductance, Field [umhos/cm]				
No. of Analyses	50	8	27	8
No. of Detections	50	8	27	8
Trend	--	I	D	I
S-value	171	18	-156	18
Probability	0.154	0.035	0.001	0.035
Significant	NO	YES	YES	YES
Alkalinity [mg/L]				
No. of Analyses	50	8	27	8
No. of Detections	50	8	27	8
Trend	--	--	D	I
S-value	-75	14	-130	22
Probability	0.536	0.108	0.007	0.009
Significant	NO	NO	YES	YES
Ammonia-N [mg/L]				
No. of Analyses	50	8	27	8
No. of Detections	3	0	4	0
Trend	D	--	D	--
S-value	-558	0	-156	0
Probability	0.000	NaN	0.000	NaN
Significant	YES	--	YES	--
Chloride [mg/L]				
No. of Analyses	50	8	27	8
No. of Detections	50	8	27	8
Trend	D	I	D	--
S-value	-325	17	-125	1
Probability	0.007	0.046	0.010	1.00
Significant	YES	YES	YES	NO
Nitrate-N [mg/L]				
No. of Analyses	50	8	27	8
No. of Detections	50	8	27	8
Trend	D	--	--	--
S-value	-432	-2	-26	6
Probability	0.000	0.902	0.598	0.536
Significant	YES	NO	NO	NO
Sulfate [mg/L]				
No. of Analyses	50	8	27	8
No. of Detections	50	8	27	8
Trend	D	--	I	--
S-value	-483	6	114	-9
Probability	0.000	0.536	0.018	0.319
Significant	YES	NO	YES	NO
Total Dissolved Solids [mg/L]				
No. of Analyses	50	8	27	8
No. of Detections	50	8	27	8
Trend	--	--	--	--
S-value	26	-8	27	-1
Probability	0.834	0.386	0.586	1.00
Significant	NO	NO	NO	NO
Arsenic, Dissolved [ug/L]				
No. of Analyses	50	8	27	8
No. of Detections	19	8	27	8
Trend	--	--	I	--
S-value	-162	7	124	6
Probability	0.122	0.454	0.010	0.536
Significant	NO	NO	YES	NO
Arsenic, Total [ug/L]				
No. of Analyses	34	8	27	8
No. of Detections	19	8	27	8
Trend	--	--	I	--
S-value	16	5	142	2
Probability	0.000	0.000	0.000	0.000
Significant	NO	NO	YES	NO

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc3			
Well Location	MW-8		MW-36	
Time Interval	Long	Short	Long	Short
Calcium, Dissolved [mg/L]				
No. of Analyses	50	8	27	8
No. of Detections	50	8	27	8
Trend	**I**	--	**I**	--
S-value	374	-3	182	12
Probability	0.002	0.803	0.000	0.158
Significant	YES	NO	YES	NO
Calcium, Total [mg/L]				
No. of Analyses	34	8	27	8
No. of Detections	34	8	27	8
Trend	**I**	--	**I**	--
S-value	204	-13	131	2
Probability	0.002	0.135	0.007	0.900
Significant	YES	NO	YES	NO
Iron, Dissolved [mg/L]				
No. of Analyses	50	8	27	8
No. of Detections	1	0	1	0
Trend	--	--	--	--
S-value	-1	0	-26	0
Probability	1.00	NaN	0.109	NaN
Significant	--	--	--	--
Iron, Total [mg/L]				
No. of Analyses	34	8	27	8
No. of Detections	10	0	7	0
Trend	--	--	--	--
S-value	-85	0	-73	0
Probability	0.120	NaN	0.050	NaN
Significant	NO	--	NO	--
Magnesium, Dissolved [mg/L]				
No. of Analyses	50	8	27	8
No. of Detections	50	8	27	8
Trend	--	--	**I**	--
S-value	211	-11	139	14
Probability	0.079	0.212	0.004	0.108
Significant	NO	NO	YES	NO
Magnesium, Total [mg/L]				
No. of Analyses	34	8	27	8
No. of Detections	34	8	27	8
Trend	**I**	--	**I**	--
S-value	199	-10	111	-10
Probability	0.003	0.266	0.022	0.266
Significant	YES	NO	YES	NO
Manganese, Dissolved [ug/L]				
No. of Analyses	50	8	27	8
No. of Detections	0	2	27	8
Trend	--	--	D	D
S-value	0	-3	-285	-18
Probability	NaN	0.742	0.000	0.035
Significant	--	--	YES	YES
Manganese, Total [ug/L]				
No. of Analyses	34	8	27	8
No. of Detections	9	0	27	8
Trend	D	--	D	D
S-value	-217	0	-171	-18
Probability	0.001	NaN	0.000	0.035
Significant	YES	--	YES	YES
Potassium, Dissolved [mg/L]				
No. of Analyses	50	8	27	8
No. of Detections	50	8	27	8
Trend	**I**	--	**I**	--
S-value	271	-2	118	14
Probability	0.023	0.898	0.015	0.108
Significant	YES	NO	YES	NO
Potassium, Total [mg/L]				
No. of Analyses	34	8	27	8
No. of Detections	34	8	27	8
Trend	--	--	--	--
S-value	21	-8	33	-8
Probability	0.764	0.379	0.503	0.379
Significant	NO	NO	NO	NO

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc3			
Well Location	MW-8		MW-36	
Time Interval	Long	Short	Long	Short
Sodium, Dissolved [mg/L]				
No. of Analyses	50	8	27	8
No. of Detections	50	8	27	8
Trend	**I**	--	**I**	**I**
S-value	281	12	126	20
Probability	0.019	0.174	0.009	0.019
Significant	YES	NO	YES	YES
Sodium, Total [mg/L]				
No. of Analyses	34	8	27	8
No. of Detections	34	8	27	8
Trend	**I**	--	**I**	--
S-value	192	4	125	16
Probability	0.005	0.711	0.010	0.063
Significant	YES	NO	YES	NO
1,1-Dichloroethane [ug/L]				
No. of Analyses	50	8	27	8
No. of Detections	0	0	0	0
Trend	--	--	--	--
S-value	0	0	0	0
Probability	NaN	NaN	NaN	NaN
Significant	--	--	--	--
1,2-Dichloropropane [ug/L]				
No. of Analyses	50	8	27	8
No. of Detections	0	0	0	0
Trend	--	--	--	--
S-value	0	0	0	0
Probability	NaN	NaN	NaN	NaN
Significant	--	--	--	--
Benzene [ug/L]				
No. of Analyses	50	8	27	8
No. of Detections	0	0	0	0
Trend	--	--	--	--
S-value	0	0	0	0
Probability	NaN	NaN	NaN	NaN
Significant	--	--	--	--
Chloroethane [ug/L]				
No. of Analyses	50	8	27	8
No. of Detections	0	0	0	0
Trend	--	--	--	--
S-value	0	0	0	0
Probability	NaN	NaN	NaN	NaN
Significant	--	--	--	--
Tetrachloroethene [ug/L]				
No. of Analyses	50	8	27	8
No. of Detections	0	0	0	0
Trend	--	--	--	--
S-value	0	0	0	0
Probability	NaN	NaN	NaN	NaN
Significant	--	--	--	--
***cis*-1,2-Dichloroethene [ug/L]**				
No. of Analyses	50	8	27	8
No. of Detections	0	0	0	0
Trend	--	--	--	--
S-value	0	0	0	0
Probability	NaN	NaN	NaN	NaN
Significant	--	--	--	--

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	Channel Cc3			
Well Location	MW-8		MW-36	
Time Interval	Long	Short	Long	Short
Dichlorodifluoromethane [ug/L]				
No. of Analyses	50	8	27	8
No. of Detections	0	0	0	0
Trend	--	--	--	--
S-value	0	0	0	0
Probability	NaN	NaN	NaN	NaN
Significant	--	--	--	--
Toluene [ug/L]				
No. of Analyses	50	8	27	8
No. of Detections	1	0	0	0
Trend	--	--	--	--
S-value	-615	0	0	0
Probability	0.000	NaN	NaN	NaN
Significant	--	--	--	--
***trans*-1,2-Dichloroethene [ug/L]**				
No. of Analyses	50	8	27	8
No. of Detections	0	0	0	0
Trend	--	--	--	--
S-value	0	0	0	0
Probability	NaN	NaN	NaN	NaN
Significant	--	--	--	--
Trichloroethene [ug/L]				
No. of Analyses	50	8	27	8
No. of Detections	0	0	0	0
Trend	--	--	--	--
S-value	0	0	0	0
Probability	NaN	NaN	NaN	NaN
Significant	--	--	--	--
Trichlorofluoromethane [ug/L]				
No. of Analyses	50	8	27	8
No. of Detections	0	0	0	0
Trend	--	--	--	--
S-value	0	0	0	0
Probability	NaN	NaN	NaN	NaN
Significant	--	--	--	--
Vinyl Chloride [ug/L]				
No. of Analyses	50	8	27	8
No. of Detections	0	0	0	0
Trend	--	--	--	--
S-value	0	0	0	0
Probability	NaN	NaN	NaN	NaN
Significant	--	--	--	--

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	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	Long	Short
pH, Field [standard units]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	27	8
Trend	D	--	D	--	D	--	D	--	D	--	D	--
S-value	-310	15	-524	-13	-400	-10	-297	-2	-348	4	-129	-8
Probability	0.010	0.081	0.000	0.135	0.001	0.266	0.013	0.902	0.004	0.711	0.008	0.386
Significant	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
Specific Conductance, Field [umhos/cm]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	27	8
Trend	I	I	I	I	--	--	I	I	--	I	D	I
S-value	452	19	490	22	-214	14	295	26	162	18	-205	24
Probability	0.000	0.025	0.000	0.009	0.074	0.108	0.014	0.002	0.178	0.035	0.000	0.004
Significant	YES	YES	YES	YES	NO	NO	YES	YES	NO	YES	YES	YES
Alkalinity [mg/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	27	8
Trend	I	I	I	I	D	I	--	I	D	I	--	--
S-value	699	21	701	21	-935	20	57	17	-249	20	-75	0
Probability	0.000	0.013	0.000	0.013	0.000	0.017	0.639	0.042	0.035	0.017	0.122	1.00
Significant	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	NO	NO
Ammonia-N [mg/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	50	8	3	1	50	8	50	8	17	7	4	0
Trend	--	--	D	--	D	--	I	--	D	--	D	--
S-value	-25	7	-566	-3	-637	13	257	6	-578	-3	-142	0
Probability	0.841	0.454	0.000	0.663	0.000	0.135	0.032	0.536	0.000	0.803	0.000	NaN
Significant	NO	NO	YES	--	YES	NO	YES	NO	YES	NO	YES	--
Chloride [mg/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	27	8
Trend	--	--	I	--	D	--	--	--	D	--	--	--
S-value	180	4	246	3	-753	5	-124	10	-408	8	-47	0
Probability	0.134	0.711	0.040	0.803	0.000	0.618	0.303	0.266	0.001	0.386	0.337	1.00
Significant	NO	NO	YES	NO	YES	NO	NO	NO	YES	NO	NO	NO
Nitrate-N [mg/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	25	4	50	8	19	0	38	7	0	0	27	8
Trend	--	--	D	--	D	--	D	--	--	--	D	I
S-value	178	-12	-275	-12	-321	0	-291	-6	0	0	-115	24
Probability	0.113	0.144	0.022	0.174	0.002	NaN	0.014	0.536	NaN	NaN	0.017	0.004
Significant	NO	NO	YES	NO	YES	--	YES	NO	--	--	YES	YES
Sulfate [mg/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	27	8
Trend	I	--	--	--	D	--	--	I	D	--	--	--
S-value	422	3	22	13	-450	5	204	17	-566	-11	33	-5
Probability	0.000	0.799	0.860	0.135	0.000	0.618	0.088	0.042	0.000	0.212	0.504	0.618
Significant	YES	NO	NO	NO	YES	NO	NO	YES	YES	NO	NO	NO
Total Dissolved Solids [mg/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	27	8
Trend	I	--	I	--	D	--	I	--	--	--	--	--
S-value	557	3	423	3	-602	-5	308	1	110	-6	-21	-6
Probability	0.000	0.800	0.000	0.803	0.000	0.618	0.010	1.00	0.361	0.521	0.676	0.530
Significant	YES	NO	YES	NO	YES	NO	YES	NO	NO	NO	NO	NO
Arsenic, Dissolved [ug/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	27	8
Trend	D	--	D	--	D	--	D	--	D	--	--	--
S-value	-829	-8	-354	-16	-1042	-4	-627	-1	-688	1	-79	2
Probability	0.000	0.386	0.003	0.059	0.000	0.711	0.000	1.00	0.000	1.00	0.102	0.894
Significant	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	NO	NO
Arsenic, Total [ug/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	35	8	34	8	35	8	35	8	35	8	27	8
Trend	--	--	--	--	--	--	--	--	I	--	--	--
S-value	-4	-8	120	-10	-90	0	105	-11	151	2	-19	-11
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Significant	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	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	Long	Short
Calcium, Dissolved [mg/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	27	8
Trend	**I**	--	**I**	--	--	--	**I**	--	**I**	**I**	--	--
S-value	764	11	701	0	-234	16	531	9	482	18	80	5
Probability	0.000	0.212	0.000	1.00	0.051	0.059	0.000	0.319	0.000	0.033	0.099	0.618
Significant	YES	NO	YES	NO	NO	NO	YES	NO	YES	YES	NO	NO
Calcium, Total [mg/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	35	8	34	8	35	8	35	8	35	8	27	8
Trend	**I**	--	**I**	--	--	--	--	--	**I**	--	--	--
S-value	318	3	257	0	43	-3	125	7	145	-1	26	-12
Probability	0.000	0.800	0.000	1.00	0.550	0.803	0.078	0.454	0.040	1.00	0.601	0.158
Significant	YES	NO	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO
Iron, Dissolved [mg/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	22	8	0	1	49	8	50	8	50	8	0	0
Trend	**I**	--	--	--	--	--	**I**	--	**I**	--	--	--
S-value	545	4	0	-3	-43	14	401	1	397	2	0	0
Probability	0.000	0.711	NaN	0.663	0.725	0.108	0.001	1.00	0.001	0.902	NaN	NaN
Significant	YES	NO	--	--	NO	NO	YES	NO	YES	NO	--	--
Iron, Total [mg/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	34	8	21	2	35	8	35	8	35	8	15	1
Trend	**I**	--	--	--	**I**	**I**	--	--	**I**	--	D	--
S-value	421	-6	-10	-5	174	18	85	-8	174	2	-129	-3
Probability	0.000	0.536	0.891	0.511	0.014	0.035	0.233	0.386	0.014	0.902	0.005	0.663
Significant	YES	NO	NO	--	YES	YES	NO	NO	YES	NO	YES	--
Magnesium, Dissolved [mg/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	27	8
Trend	**I**	--	**I**	--	D	--	**I**	**I**	**I**	--	--	--
S-value	659	11	710	-8	-239	12	646	17	388	15	78	1
Probability	0.000	0.203	0.000	0.386	0.046	0.174	0.000	0.046	0.001	0.081	0.108	1.00
Significant	YES	NO	YES	NO	YES	NO	YES	YES	YES	NO	NO	NO
Magnesium, Total [mg/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	35	8	34	8	35	8	35	8	35	8	27	8
Trend	**I**	--	**I**	--	--	--	--	--	**I**	--	**I**	--
S-value	300	-8	226	9	-53	-5	125	-10	149	-5	104	-10
Probability	0.000	0.369	0.001	0.319	0.459	0.618	0.078	0.266	0.035	0.618	0.031	0.258
Significant	YES	NO	YES	NO	NO	NO	NO	NO	YES	NO	YES	NO
Manganese, Dissolved [ug/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	50	8	4	5	50	8	50	8	50	8	18	1
Trend	**I**	--	D	--	D	--	**I**	--	--	--	D	--
S-value	278	11	-566	3	-437	0	288	8	123	13	-221	-3
Probability	0.020	0.212	0.000	0.799	0.000	1.00	0.016	0.386	0.307	0.135	0.000	0.663
Significant	YES	NO	YES	NO	YES	NO	YES	NO	NO	NO	YES	--
Manganese, Total [ug/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	35	8	22	8	35	8	35	8	35	8	26	8
Trend	**I**	--	D	--	--	--	--	--	**I**	--	D	--
S-value	203	-6	-202	-1	105	-4	118	-6	165	-2	-191	-6
Probability	0.004	0.536	0.002	1.00	0.140	0.711	0.097	0.536	0.020	0.902	0.000	0.536
Significant	YES	NO	YES	NO	NO	NO	NO	NO	YES	NO	YES	NO
Potassium, Dissolved [mg/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	27	8
Trend	**I**	--	**I**	--	D	--	**I**	--	**I**	--	--	--
S-value	529	15	586	0	-259	16	273	13	257	16	45	9
Probability	0.000	0.081	0.000	1.00	0.031	0.063	0.023	0.135	0.032	0.063	0.358	0.319
Significant	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	NO	NO
Potassium, Total [mg/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	35	8	34	8	35	8	35	8	35	8	27	8
Trend	**I**	--	--	--	--	--	--	--	--	--	D	--
S-value	227	-6	129	2	-99	-5	-46	-5	-9	-14	-138	-6
Probability	0.001	0.536	0.057	0.900	0.164	0.618	0.522	0.618	0.909	0.108	0.004	0.536
Significant	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	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	Long	Short
Sodium, Dissolved [mg/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	50	8	50	8	50	8	50	8	50	8	27	8
Trend	**I**	**I**	**I**	--	--	**I**	**I**	**I**	**I**	**I**	--	**I**
S-value	350	20	619	7	117	20	298	21	351	22	88	18
Probability	0.003	0.019	0.000	0.454	0.332	0.019	0.013	0.013	0.003	0.009	0.070	0.035
Significant	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	NO	YES
Sodium, Total [mg/L]												
No. of Analyses	35	8	34	8	35	8	35	8	35	8	27	8
No. of Detections	35	8	34	8	35	8	35	8	35	8	27	8
Trend	**I**	--	**I**	--	--	--	--	**I**	**I**	--	**I**	--
S-value	210	11	157	10	91	12	97	18	175	14	136	9
Probability	0.003	0.212	0.021	0.266	0.201	0.174	0.173	0.035	0.013	0.108	0.005	0.319
Significant	YES	NO	YES	NO	NO	NO	NO	YES	YES	NO	YES	NO
1,1-Dichloroethane [ug/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	0	0	0	0	0	0	0	0	0	0	0
Probability	NaN	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	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	0	0	0	0	0	0	0	0	0	0	0
Probability	NaN	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	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	0	0	0	0	0	0	0	0	0	0	0
Probability	NaN	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	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	0	0	0	0	0	0	0	0	0	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene [ug/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	0	0	0	0	0	0	0	0	0	0	0
Probability	NaN	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	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	0	0	0	0	0	0	0	0	0	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--	--

Table 3
Summary of Trend Analyses for Groundwater Well Samples Groundwater
Trends in Individual Wells
Vashon Island Closed Landfill
1986 through 2023

	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	Long	Short
Dichlorodifluoromethane [ug/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	0	0	0	0	0	0	0	0	0	0	0
Probability	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--	--
Toluene [ug/L]												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	0	0	0	0	1	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	0	0	0	-609	0	0	0	0	0	0	0
Probability	NaN	NaN	NaN	NaN	0.000	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--	--	--	--	--	--	--
***trans*-1,2-Dichloroethene [ug/L]**												
No. of Analyses	50	8	50	8	50	8	50	8	50	8	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	0	0	0	0	0	0	0	0	0	0	0
Probability	NaN	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	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	0	0	0	0	0	0	0	0	0	0	0
Probability	NaN	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	27	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	0	0	0	0	0	0	0	0	0	0	0
Probability	NaN	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	27	8
No. of Detections	0	0	0	0	1	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	0	0	0	-529	0	0	0	0	0	0	0
Probability	NaN	NaN	NaN	NaN	0.000	NaN	NaN	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.

Table 4
Summary of Statistical Analyses for Appendix III Analytes
Channel Cc2
Vashon Closed Landfill
January 1, 2022 - December 31, 2023

	Channel Cc2					
Well Location	MW-2	MW-20	MW-21	MW-33	MW-35	MW-37
Time Interval	Short	Short	Short	Short	Short	Short
2,4,5-TP Silvex [ug/L]						
No. of Analyses	8	8	8	8	8	7
No. of Detections	0	0	0	8	3	0
Minimum	ND	ND	ND	0.027	ND	ND
Maximum	ND	ND	ND	0.050	0.047	ND
Mean	ID	ID	ID	0.034	0.017	ID
Standard Deviation	ID	ID	ID	0.007	0.017	ID
Median	ID	ID	ID	0.032	0.006	ID
2-Methyl-1-Propanol [ug/L]						
No. of Analyses	8	8	8	8	8	7
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
Bis(2-Chloroethyl)Ether [ug/L]						
No. of Analyses	8	8	8	8	8	7
No. of Detections	0	0	2	8	7	0
Minimum	ND	ND	ND	2.46	ND	ND
Maximum	ND	ND	0.540	6.46	2.11	ND
Mean	ID	ID	ID	3.75	1.03	ID
Standard Deviation	ID	ID	ID	1.18	0.566	ID
Median	ID	ID	ID	3.46	0.928	ID
Bis(2-Ethylhexyl)Phthalate [ug/L]						
No. of Analyses	8	8	8	8	8	7
No. of Detections	2	3	2	4	3	2
Minimum	ND	ND	ND	ND	ND	ND
Maximum	45.50	7.40	4.72	15.20	2.75	7.27
Mean	ID	1.78	ID	2.74	0.749	ID
Standard Deviation	ID	2.65	ID	5.13	0.857	ID
Median	ID	0.404	ID	0.654	0.397	ID
Diethyl Phthalate [ug/L]						
No. of Analyses	8	8	8	8	8	7
No. of Detections	1	1	2	7	1	2
Minimum	ND	ND	ND	ND	ND	ND
Maximum	2.53	2.48	2.53	3.36	2.45	2.525
Mean	ID	ID	ID	1.69	ID	ID
Standard Deviation	ID	ID	ID	0.866	ID	ID
Median	ID	ID	ID	1.37	ID	ID

NOTES:

Short - eight most recent analyses in the last two years.
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 5
Summary of Trend Analyses for Appendix III Analytes
Channel Cc2
Vashon Closed Landfill
January 1, 2022 - December 31, 2023

	Channel Cc2					
Well Location	MW-2	MW-20	MW-21	MW-33	MW-35	MW-37
Time Interval	Short	Short	Short	Short	Short	Short
2,4,5-TP Silvex [ug/L]						
No. of Analyses	8	8	8	8	8	7
No. of Detections	0	0	0	8	3	0
Trend	--	--	--	--	--	--
S-value	-3	-17	-2	-8	-12	4
Probability	NaN	NaN	NaN	0.386	0.174	NaN
Significant	--	--	--	NO	NO	--
2-Methyl-1-Propanol [ug/L]						
No. of Analyses	8	8	8	8	8	7
No. of Detections	0	0	0	0	0	0
Trend	--	--	--	--	--	--
S-value	15	15	15	15	15	12
Probability	NaN	NaN	NaN	NaN	NaN	NaN
Significant	--	--	--	--	--	--
Bis(2-Chloroethyl)Ether [ug/L]						
No. of Analyses	8	8	8	8	8	7
No. of Detections	0	0	2	8	7	0
Trend	--	--	--	--	--	--
S-value	7	-8	3	0	10	4
Probability	NaN	NaN	0.803	1.00	0.266	NaN
Significant	--	--	--	NO	NO	--
Bis(2-Ethylhexyl)Phthalate [ug/L]						
No. of Analyses	8	8	8	8	8	7
No. of Detections	2	3	2	4	3	2
Trend	--	--	--	--	--	--
S-value	6	-13	9	-6	-14	-8
Probability	0.536	0.135	0.319	0.536	0.108	0.272
Significant	--	NO	--	NO	NO	--
Diethyl Phthalate [ug/L]						
No. of Analyses	8	8	8	8	8	7
No. of Detections	1	1	2	7	1	2
Trend	--	--	--	--	--	--
S-value	15	8	13	14	14	5
Probability	0.081	0.386	0.135	0.108	0.108	0.548
Significant	--	--	--	NO	--	--

NOTES:

Short - eight most recent analyses in the last two years.
-- - 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
ug/L - microgram per liter

Table 6
Comparison of Background Conditions and Unit D Aquifer
Vashon Island Closed Landfill

Constituent	Area Background Range*	Unit D Aquifer Jan. 2023 - Dec. 2023
General Indicators		
pH (Field)	6.5 to 8.3	6.33 to 8.08
Specific Conductance (Field)	80 to 545	145.5 to 219.2
Chloride [mg/L]	1.6 to 14	3.10 to 5.06
Nitrate [mg/L]	<0.2 to 5.8	<0.01 to 2.23
Sulfate [mg/L]	<0.50 to 41	9.99 to 17.7
Metals		
Arsenic, Total [ug/L]	<1 to 17	1.05 to 11.7
Iron, Total [mg/L]	0.040 to 10	<0.010 to 4.04
Manganese, Total [ug/L]	5 to 960	0.141 to 510
Sodium, Total [mg/L]	5 to 62	5.54 to 10.5

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)

Table 7
Summary of Statistical Analyses for West Hillslope Seep/Weir Surface Water Samples
Vashon Island Closed Landfill
1986 through 2023

	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	88	8	121	8	121	8	36	8
No. of Detections	88	8	121	8	121	8	36	8
Minimum	6.54	7.23	6.88	7.66	ND	7.6	6.42	7.44
Maximum	8.76	7.71	8.89	8.19	ND	7.86	10.18	7.97
Mean	7.54	7.49	7.95	7.97	ID	7.75	7.63	7.75
Standard Deviation	0.41	0.13	0.36	0.16	ID	0.10	0.64	0.17
Median	7.58	7.48	8.02	7.975	ID	7.775	7.68	7.805
Specific Conductance, Field [umhos/cm]								
No. of Analyses	89	8	122	8	122	8	35	8
No. of Detections	89	8	122	8	122	8	35	8
Minimum	70	157	236.2	420.7	76.4	220.5	110	152.8
Maximum	860	202.6	1200	522	1034	279.4	370	211
Mean	299.27	174.94	716.36	474.06	420.66	244.09	190.32	180.54
Standard Deviation	158.12	15.01	190.43	34.10	166.41	19.93	43.90	17.98
Median	228.6	173.7	700	469.35	392	242.5	190	179.65
Alkalinity [mg/L]								
No. of Analyses	60	8	80	8	79	8		
No. of Detections	60	8	80	8	79	8		
Minimum	64.2	65.1	222	240	86.6	112		
Maximum	150	86.2	530	280	290	130		
Mean	87.43	74.59	371.43	255.13	164.32	118.63		
Standard Deviation	17.45	7.45	77.76	13.22	51.27	6.86		
Median	84.55	73.8	370	253	145	115.5		
Ammonia-N [mg/L]								
No. of Analyses	88	8	122	8	121	8		
No. of Detections	59	8	58	8	46	8		
Minimum	ND	0.0114	ND	0.0022	ND	0.0054		
Maximum	0.14	0.04	45	0.0102	0.2	0.014		
Mean	0.024	0.017	0.383	0.006	0.015	0.009		
Standard Deviation	0.025	0.010	4.073	0.003	0.023	0.003		
Median	0.0175	0.01385	0.00765	0.00585	0.0074	0.00855		
Chemical Oxygen Demand [mg/L]								
No. of Analyses	88	8	121	8	120	8		
No. of Detections	81	7	119	8	106	8		
Minimum	ND	ND	ND	13	ND	9		
Maximum	100	34.7	130	29.1	160	21.2		
Mean	19.84	17.55	20.79	18.70	17.56	13.83		
Standard Deviation	16.53	9.52	17.16	5.21	19.31	4.29		
Median	15	17	16	18.5	14	13.5		
Chloride [mg/L]								
No. of Analyses	88	8	120	8	120	8		
No. of Detections	88	8	118	8	118	8		
Minimum	3	5.73	ND	8.33	ND	7.75		
Maximum	15	6.7	79	18.5	48	8.3		
Mean	6.07	6.35	29.46	15.64	11.57	8.11		
Standard Deviation	1.74	0.30	11.61	3.06	5.77	0.19		
Median	5.695	6.395	30	16.45	9.705	8.175		
Nitrate-N [mg/L]								
No. of Analyses	88	8	122	8	121	8		
No. of Detections	80	8	93	8	113	8		
Minimum	ND	0.394	ND	0.0705	ND	0.196		
Maximum	4.26	2.43	9	0.214	1.4	0.525		
Mean	1.48	1.20	0.22	0.14	0.35	0.32		
Standard Deviation	1.05	0.69	0.81	0.05	0.27	0.13		
Median	1.4	1.058	0.12	0.127	0.29	0.272		
Sulfate [mg/L]								
No. of Analyses	88	8	122	8	121	8		
No. of Detections	87	8	122	8	121	8		
Minimum	ND	6.32	4.6	11.9	6	11		
Maximum	35.9	8.74	29.9	17	109	12.4		
Mean	11.00	7.92	9.45	15.63	12.09	11.84		
Standard Deviation	4.70	0.71	3.64	1.67	9.08	0.54		
Median	9.975	8.14	9.02	16.2	11.6	12		
Arsenic, Dissolved [mg/L]								
No. of Analyses	56	8	59	8	59	8	35	8
No. of Detections	53	8	57	8	59	8	35	8
Minimum	ND	0.00172	ND	0.00115	0.0017	0.00272	0.00112	0.00163
Maximum	0.0086	0.0033	0.0160	0.0017	0.0039	0.0037	0.0023	0.0022
Mean	0.0028	0.0025	0.0017	0.0014	0.0029	0.0031	0.0018	0.0019
Standard Deviation	0.0018	0.0006	0.0019	0.0002	0.0006	0.0003	0.0003	0.0002
Median	0.0024	0.0025	0.0014	0.0014	0.0029	0.0031	0.0019	0.0018

Table 7
Summary of Statistical Analyses for West Hillslope Seep/Weir Surface Water Samples
Vashon Island Closed Landfill
1986 through 2023

	West Hillslope Seep/Weir							
Well Location	**SW-W1**		**SW-W2**		**SW-W3**		**SW-E**	
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short
Arsenic, Total [mg/L]								
No. of Analyses	89	8	121	8	120	8	35	8
No. of Detections	89	8	121	8	119	8	35	8
Minimum	0.00197	0.00322	0.00151	0.00219	ND	0.00359	0.00149	0.00187
Maximum	0.0830	0.0065	0.0170	0.0044	0.0520	0.0050	0.0106	0.0026
Mean	0.0105	0.0046	0.0045	0.0032	0.0058	0.0044	0.0024	0.0022
Standard Deviation	0.0111	0.0013	0.0028	0.0008	0.0058	0.0005	0.0015	0.0003
Median	0.0066	0.0039	0.0035	0.0034	0.0046	0.0044	0.0022	0.0022
Calcium, Dissolved [mg/L]								
No. of Analyses	56	8	59	8	59	8	35	8
No. of Detections	56	8	59	8	59	8	35	8
Minimum	12.2	13.6	35	42.4	17.2	20.5	7.78	12.8
Maximum	18.5	16.5	74.3	52.3	33	24.3	17	16.2
Mean	15.49	14.95	55.34	46.28	23.63	21.94	13.95	14.84
Standard Deviation	1.58	1.15	8.03	3.04	3.31	1.36	2.57	1.17
Median	15.35	14.9	55	46.1	23	21.65	15	14.85
Calcium, Total [mg/L]								
No. of Analyses	84	8	115	8	114	8	35	8
No. of Detections	84	8	115	8	114	8	35	8
Minimum	12.4	14.2	27	42.9	17.3	20.1	8.51	12.8
Maximum	84.8	16.8	127	52.9	93	24.2	18.9	16.5
Mean	27.31	15.33	71.41	46.93	39.12	22.24	14.59	15.10
Standard Deviation	19.10	0.92	20.95	3.13	18.93	1.18	2.57	1.24
Median	18	15.3	67	47.6	32.65	22.25	15.3	15.25
Iron, Dissolved [mg/L]								
No. of Analyses	56	8	59	8	59	8	35	8
No. of Detections	55	8	59	8	59	8	35	8
Minimum	ND	0.0758	0.0115	0.0127	0.018	0.0352	0.033	0.0445
Maximum	1.43	0.26	8.97	0.0484	0.215	0.0987	0.221	0.0924
Mean	0.2634	0.1567	0.2196	0.0243	0.0704	0.0542	0.0716	0.0596
Standard Deviation	0.2713	0.0749	1.1630	0.0120	0.0491	0.0198	0.0452	0.0195
Median	0.1795	0.1480	0.0270	0.0215	0.0505	0.0471	0.0517	0.0500
Iron, Total [mg/L]								
No. of Analyses	89	8	121	8	120	8	35	8
No. of Detections	89	8	121	8	120	8	35	8
Minimum	0.682	0.446	0.364	1.03	0.407	0.564	0.226	0.299
Maximum	76	3.43	27.9	2.98	37.5	2.14	14.9	2.97
Mean	7.15	1.74	4.13	1.95	3.27	1.08	1.23	0.76
Standard Deviation	10.12	1.02	4.66	0.76	5.12	0.51	2.58	0.90
Median	3.50	1.61	2.64	1.94	1.80	1.00	0.57	0.46
Magnesium, Dissolved [mg/L]								
No. of Analyses	56	8	59	8	59	8	35	8
No. of Detections	56	8	59	8	59	8	35	8
Minimum	10.1	11	28.9	34.4	11.7	16.4	6.36	10.5
Maximum	16	12.8	63.6	41.2	25.8	19.7	15.8	14.3
Mean	12.53	11.79	46.91	37.91	19.43	18.34	12.44	13.11
Standard Deviation	1.24	0.64	7.51	2.12	2.80	1.05	2.50	1.22
Median	12.40	11.55	46.00	37.90	19.40	18.45	12.80	13.45
Magnesium, Total [mg/L]								
No. of Analyses	84	8	115	8	115	8	35	8
No. of Detections	84	8	115	8	115	8	35	8
Minimum	10.1	11	20	34.9	14.5	16.9	6.98	10.8
Maximum	55.3	12.8	104	41.7	89	19.6	15.7	14.3
Mean	18.12	11.79	60.45	37.36	30.87	18.15	12.87	13.09
Standard Deviation	9.67	0.56	18.83	2.14	14.34	0.94	2.26	1.11
Median	14.00	11.65	56.00	36.80	25.10	18.00	13.60	13.15
Manganese, Dissolved [mg/L]								
No. of Analyses	56	8	59	8	59	8	35	8
No. of Detections	56	8	59	8	59	8	35	8
Minimum	0.0113	0.137	0.0155	0.0193	0.112	0.326	0.00616	0.00874
Maximum	3.18	0.373	2.4	0.0796	0.631	0.461	0.0188	0.0121
Mean	0.405	0.241	0.105	0.043	0.324	0.374	0.010	0.011
Standard Deviation	0.472	0.097	0.309	0.022	0.110	0.048	0.002	0.001
Median	0.280	0.224	0.050	0.039	0.310	0.364	0.010	0.011
Manganese, Total [mg/L]								
No. of Analyses	89	8	120	8	119	8	35	8
No. of Detections	89	8	120	8	119	8	35	8
Minimum	0.325	0.363	0.107	0.265	0.254	0.5	0.0238	0.0301
Maximum	18	1.17	17.9	0.6	8.56	0.692	1.14	0.0992
Mean	2.221	0.665	1.833	0.423	1.150	0.582	0.099	0.059
Standard Deviation	2.685	0.267	2.431	0.136	1.399	0.071	0.185	0.021
Median	1.250	0.610	0.931	0.408	0.760	0.557	0.063	0.060

Table 7
Summary of Statistical Analyses for West Hillslope Seep/Weir Surface Water Samples
Vashon Island Closed Landfill
1986 through 2023

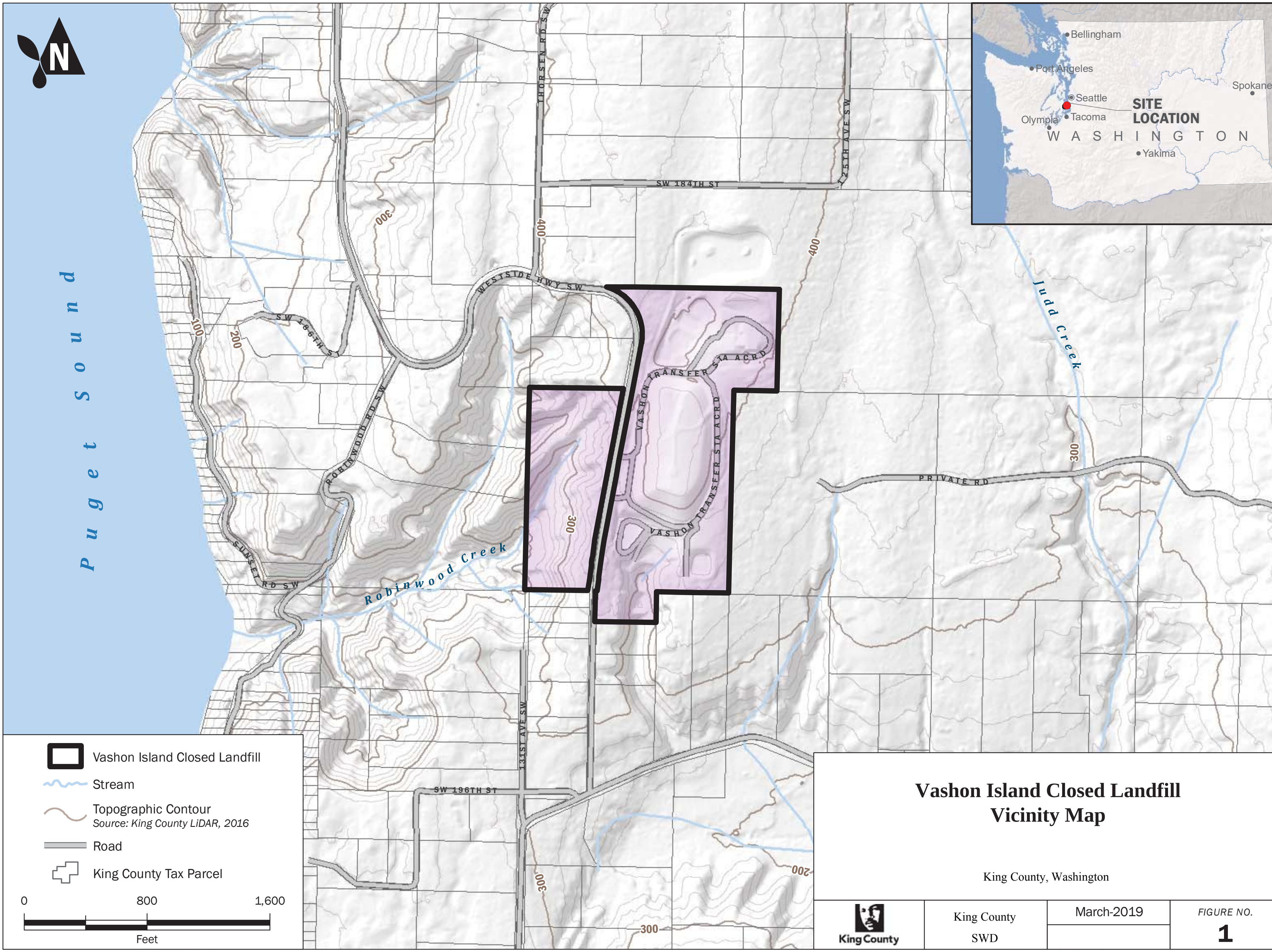
	West Hillslope Seep/Weir							
Well Location	**SW-W1**		**SW-W2**		**SW-W3**		**SW-E**	
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short
Potassium, Dissolved [mg/L]								
No. of Analyses	56	8	59	8	59	8	35	8
No. of Detections	55	8	59	8	58	8	35	8
Minimum	ND	0.783	1.2	2.7	ND	1.95	1.68	1.78
Maximum	1.53	1.14	4.05	3.14	2.8	2.27	2.78	1.99
Mean	1.11	0.97	3.14	2.96	2.14	2.14	1.97	1.90
Standard Deviation	0.21	0.13	0.39	0.15	0.36	0.11	0.20	0.08
Median	1.11	0.96	3.15	3.00	2.17	2.17	1.96	1.92
Potassium, Total [mg/L]								
No. of Analyses	84	8	116	8	115	8	35	8
No. of Detections	84	8	116	8	115	8	35	8
Minimum	0.82	0.805	1.8	2.72	1.7	1.95	1.65	1.76
Maximum	2.8	1.24	5.6	3.28	17	2.45	3.38	2.05
Mean	1.34	0.99	3.41	2.98	2.61	2.17	1.99	1.94
Standard Deviation	0.39	0.15	0.52	0.19	1.43	0.16	0.28	0.09
Median	1.22	0.97	3.33	2.96	2.40	2.13	1.98	1.96
Sodium, Dissolved [mg/L]								
No. of Analyses	56	8	59	8	59	8	35	8
No. of Detections	56	8	59	8	59	8	35	8
Minimum	5.44	6.22	9.55	14.4	6.21	8.36	4.47	5.84
Maximum	8.04	7.47	19.3	17.1	11.1	9.83	7.8	7.57
Mean	6.90	6.82	15.30	15.56	8.74	8.90	6.54	6.83
Standard Deviation	0.58	0.42	1.70	0.85	0.86	0.47	0.86	0.53
Median	6.87	6.76	15.40	15.50	8.71	8.79	6.65	6.80
Sodium, Total [mg/L]								
No. of Analyses	84	8	116	8	114	8	35	8
No. of Detections	84	8	116	8	114	8	35	8
Minimum	5.33	6.28	7.8	14	6.52	8.25	4.73	5.9
Maximum	17.2	7.57	25	16.5	18.2	9.61	7.57	7.46
Mean	8.49	6.79	15.99	15.16	10.85	8.80	6.62	6.78
Standard Deviation	2.83	0.43	2.32	0.93	2.81	0.49	0.79	0.53
Median	7.26	6.74	16.00	15.15	10.00	8.67	6.74	6.80
Vinyl Chloride [ug/L]								
No. of Analyses	86	8	119	8	118	8	35	8
No. of Detections	23	7	2	0	91	8	0	0
Minimum	ND	ND	ND	ND	ND	0.0277	ND	ND
Maximum	1	0.015	ND	ND	1	0.0642	ND	ND
Mean	0.054	0.011	ID	ID	0.073	0.037	ID	ID
Standard Deviation	0.182	0.003	ID	ID	0.152	0.012	ID	ID
Median	0.010	0.012	ID	ID	0.044	0.034	ID	ID

NOTES:

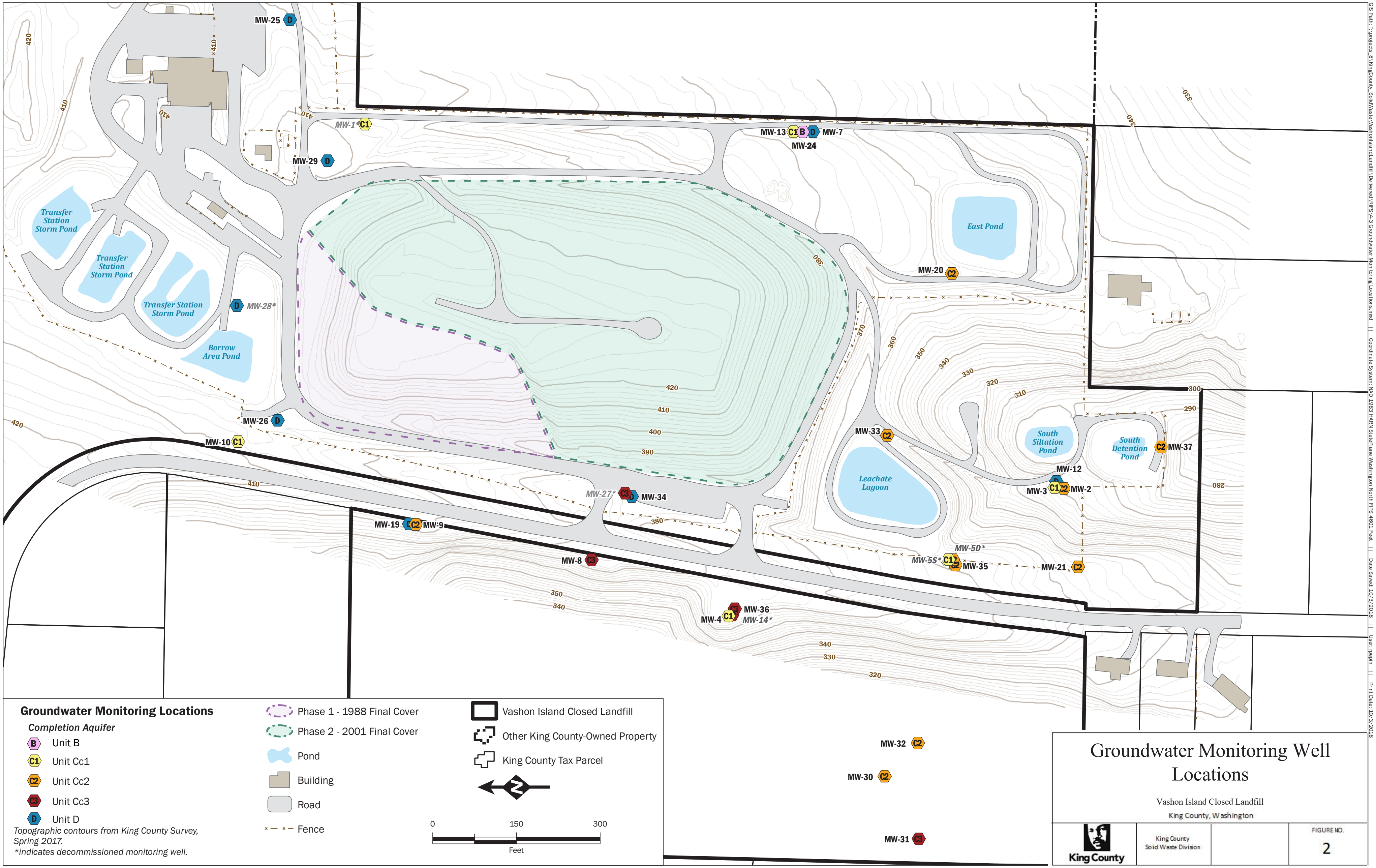
Short	- eight most recent analyses in the last two years.
Long	- historical data up to the last eight samples, but no greater than 50 samples.
umhos/cm	- microSiemens per centimeter
mg/L	- milligram per liter
ug/L	- microgram per liter
ID	- insufficient Data (i.e. the number of detections is less than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

Table 8
Previous Investigations and Site Improvements

Reference	Deliverable	Major Work Conducted
R.W. Beck and Associates (1983)	Preliminary Report, King County Landfills, Groundwater Geology Investigations	Installation of monitoring wells MW-1, MW-2, MW-3, and MW-4 and groundwater investigation.
R.W. Beck and Associates and Sweet, Edwards and Associates (1984)	Groundwater Geology/Quality Investigations for the Rural Landfills	
Harper-Owes (1985)	Vashon Landfill Leachate Control, Task 1A: Conceptual Alternatives Development	Evaluation of water quality conditions and design and installation of leachate control in preparation for Phase 1 closure.
Harper-Owes (1986)	Vashon Leachate Control, Task 1B: Geotechnical and Water Quality Investigations	
Harper-Owes et al. (1988)	Vashon Island Landfill Leachate Control Facilities Construction Record Drawings	
CH2M Hill (1995)	Groundwater Monitoring Well Construction Work Plan	Installation of eight groundwater monitoring wells (MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-14, and MW-19) and eight gas probes were installed around the perimeter of the refuse area.
CH2M Hill (1996)	Vashon Island Landfill Monitoring Well Construction Report	
CH2M Hill (1997a)	Vashon Island Landfill Interior Gas Collection and Treatment System, Record Drawings	Converting the landfill gas system from passive to active and changing the treatment system from flares to activated carbon
CH2M Hill (1997b)	Vashon Island Landfill Interior Gas Collection and Treatment System, Record Drawings	
Berryman & Henigar (1999)	Stormwater Improvements Technical Information Report	Stormwater system improvements as part of closure.
Berryman & Henigar et al. (2000)	Vashon Island Landfill Hydrogeologic Report	An evaluation of the site hydrogeology.
Berryman & Henigar and Udaloy Environmental Services (UES) (2004)	Vashon Island Landfill Hydrogeologic Report Update	Installation of three additional monitoring wells (MW-26, MW-27 and MW-28) and one piezometer (MW-25) and a revision to the 2000 hydrogeologic report incorporating these new wells into the hydrogeologic interpretation of the site
Berryman & Henigar and Udaloy Environmental Services (UES) (2006a)	Vashon Island Closed Landfill Environmental Evaluation	An evaluation of the landfill environmental control systems and their interaction with the hydrogeologic environment.
Berryman & Henigar and UES (2006b)	Vashon Island Closed Landfill: Potential Effects of Landfill Gas and Leachate on Vashon Landfill Groundwater and Springs	A chemistry-based evaluation of the source of volatile organic compounds (VOCs) found in some of the wells present at the time.
King County (2011)	Vashon Closed Landfill Western Hillslope Investigation	Reconnaissance of the West Hillslope to help design a stratigraphic model for the VLF, including the installation of monitoring wells MW-30, MW-31, and MW-32.
Aspect and Herrera (2019)	Landfill Gas System Evaluation Summary Report	This Report summarizes findings from an extent of refuse investigation and landfill gas extended influence testing performed at the VLF, and provides recommendations based on LFG control system and treatment technology performance.
Aspect et. al. (2020)	Vashon Island Closed Landfill Remedial Investigation Report	The report documenting the results of the remedial investigation, conducted to define the distribution of contaminants at a site and the associated potential threat to human health and the environment.



N
Bellingham
Port Angeles
Seattle
Spokane
SITE LOCATION
Olympia
Tacoma
W A S H I N G T O N
Yakima
Puget Sound
THORSEN RD SW
SW 184TH ST
125TH AVE SW
WESTSIDE HWY SW
SW 186TH ST
ROBINWOOD RD SW
SUNSET RD SW
Robinwood Creek
VASHON TRANSFER STA ACRD
Judd Creek
PRIVATE RD
131ST AVE SW
SW 196TH ST
100
200
300
400
Vashon Island Closed Landfill
Stream
Topographic Contour
Source: King County LiDAR, 2016
Road
King County Tax Parcel
0
800
1,600
Feet
Vashon Island Closed Landfill
Vicinity Map
King County, Washington
King County
King County
SWD
March-2019
FIGURE NO.
1



Groundwater Monitoring Well Locations
Vashon Island Closed Landfill
King County, Washington
King County
King County Solid Waste Division
FIGURE NO.
2
Groundwater Monitoring Locations
Completion Aquifer
Unit B
Unit Cc1
Unit Cc2
Unit Cc3
Unit D
Topographic contours from King County Survey, Spring 2017.
*indicates decommissioned monitoring well.
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
0
150
300
Feet
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
MW-25
MW-1*
MW-29
MW-28*
MW-26
MW-10
MW-13
MW-7
MW-24
MW-20
MW-33
MW-37
MW-12
MW-3
MW-2
MW-27*
MW-34
MW-19
MW-9
MW-8
MW-5D*
MW-5S*
MW-35
MW-21
MW-36
MW-4
MW-14*
MW-32
MW-30
MW-31

Figure 3 - Groundwater Elevations in Unit B Aquifer

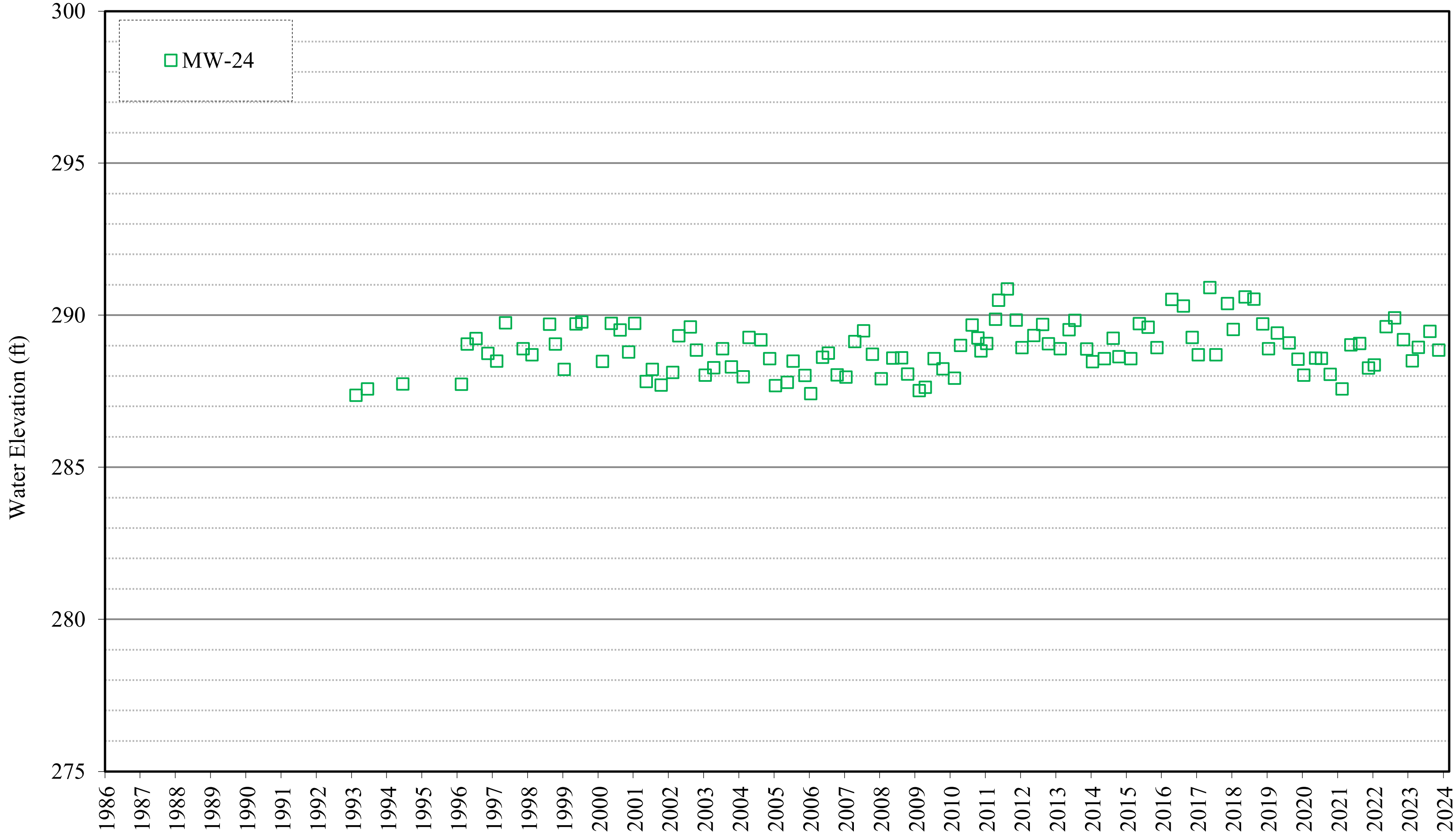


Figure 4 - Groundwater Elevations in Channel Cc1

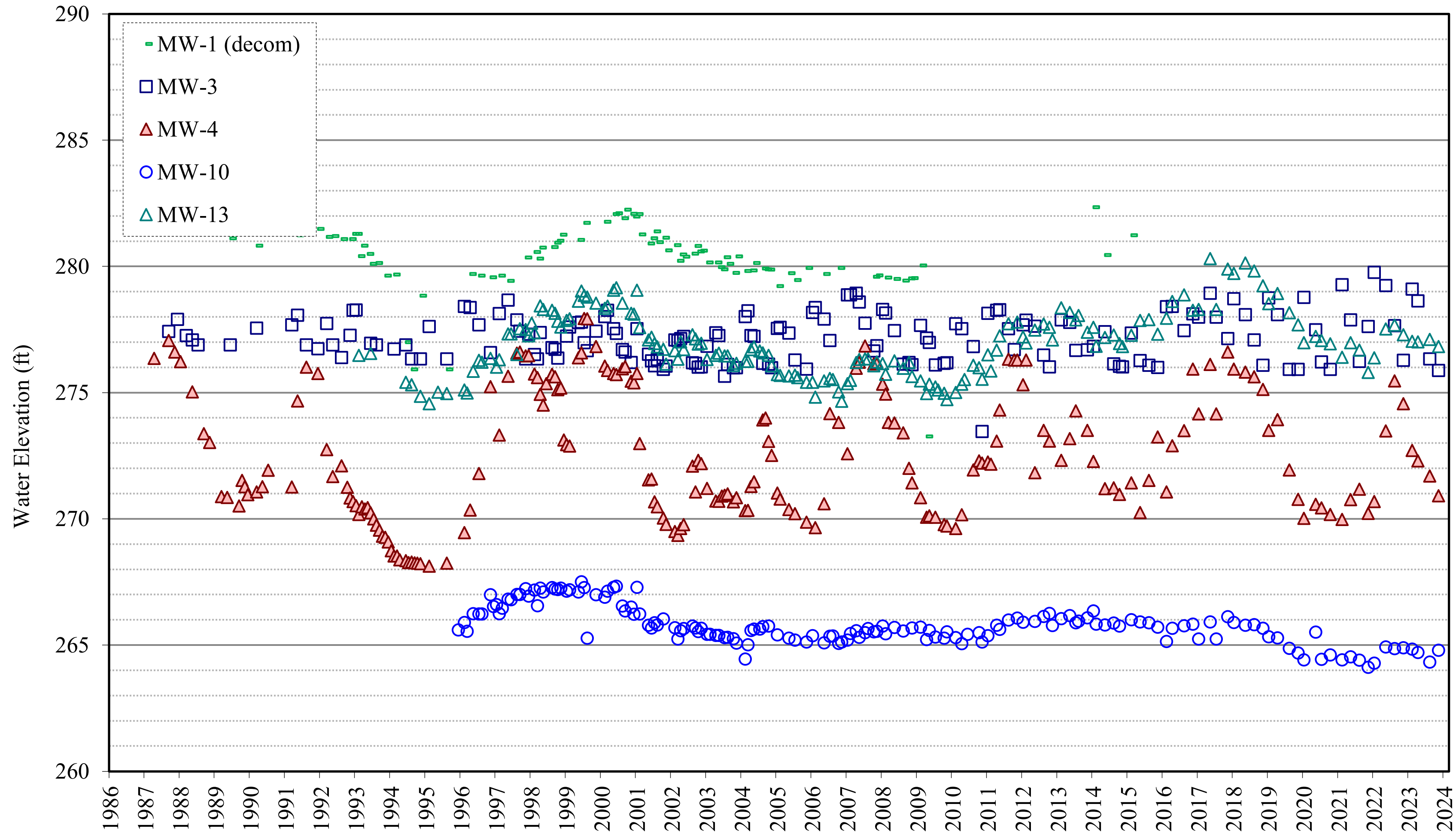


Figure 5 - Groundwater Elevations in Channel Cc2

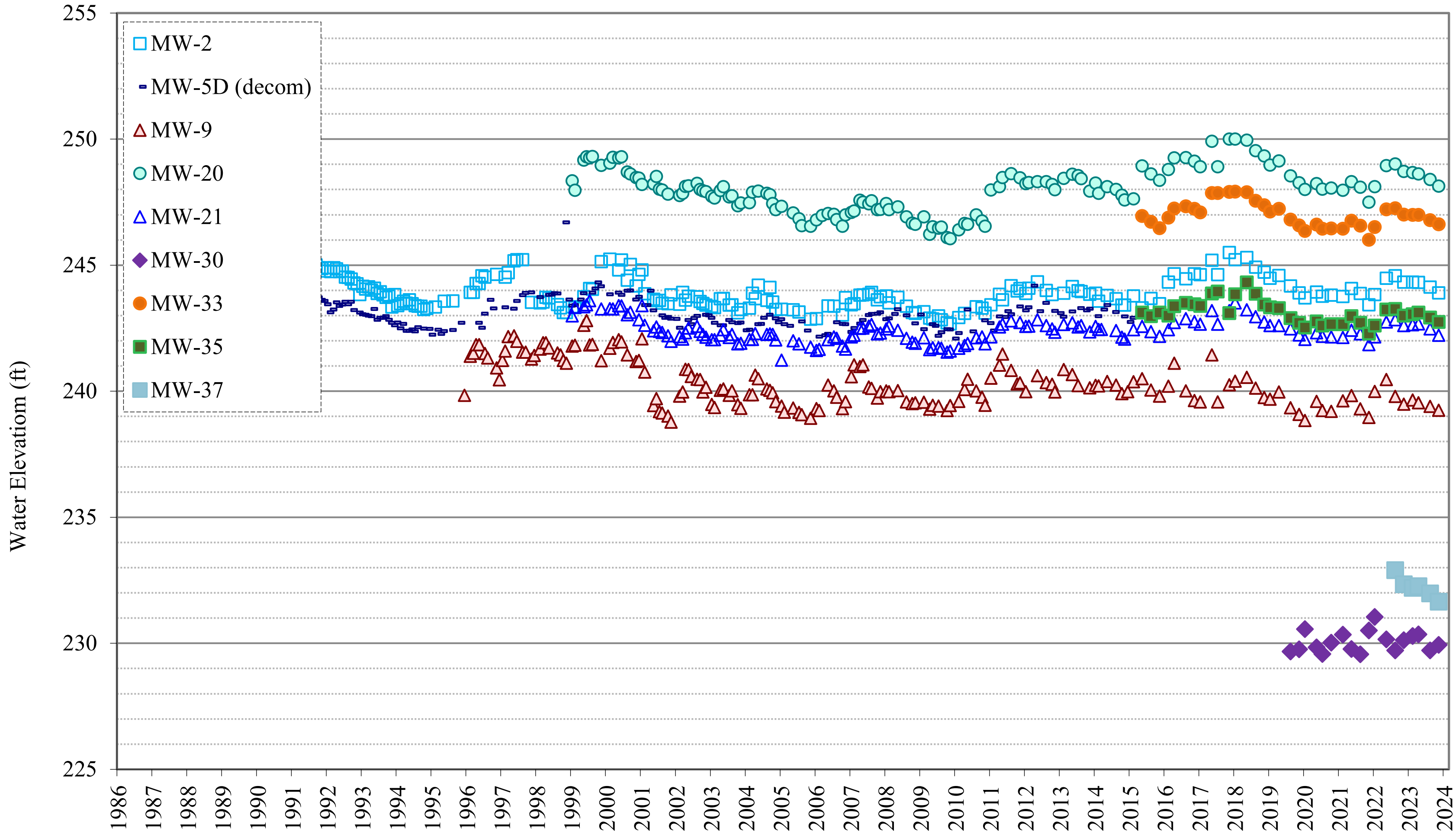


Figure 6 - Groundwater Elevations in Channel Cc3

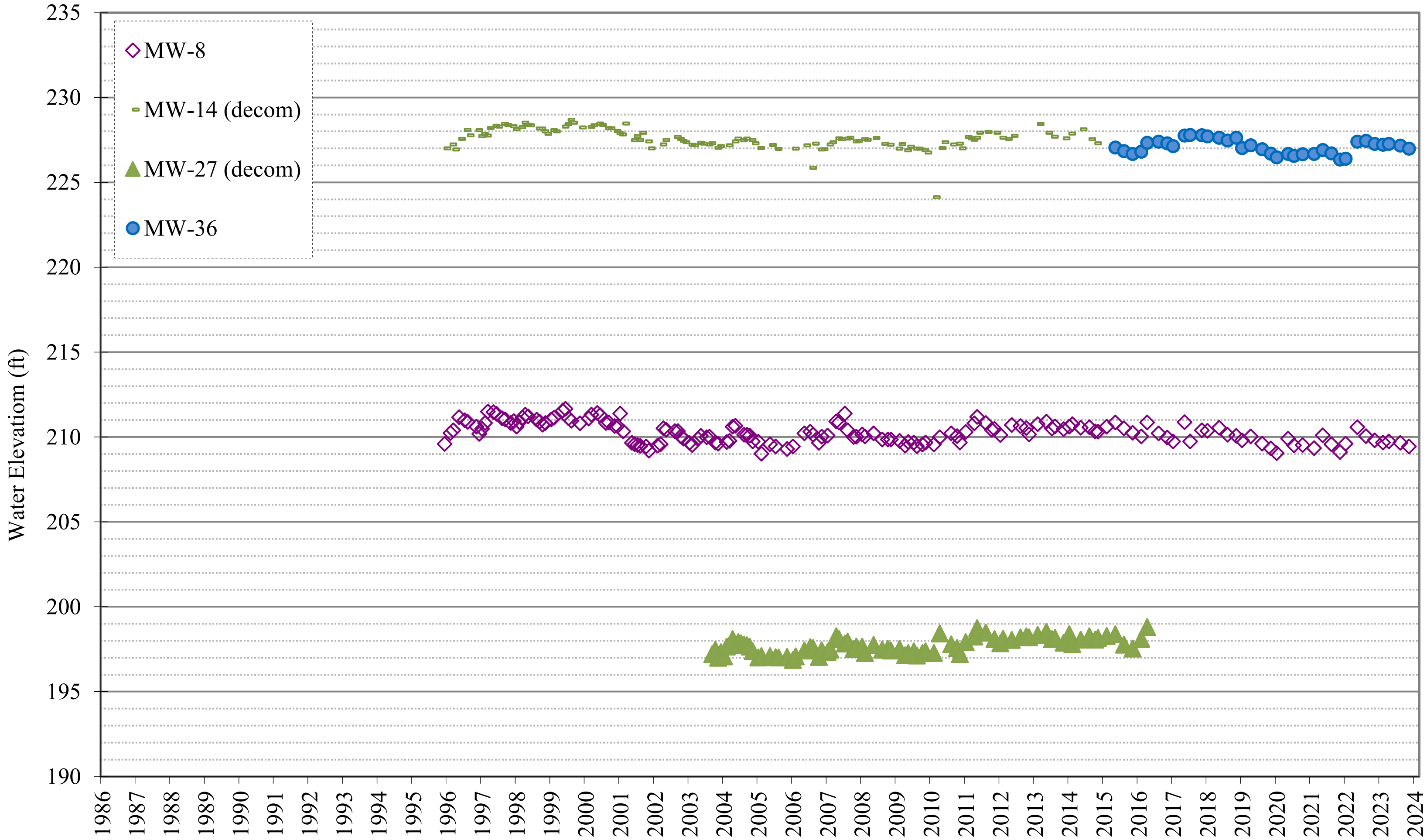
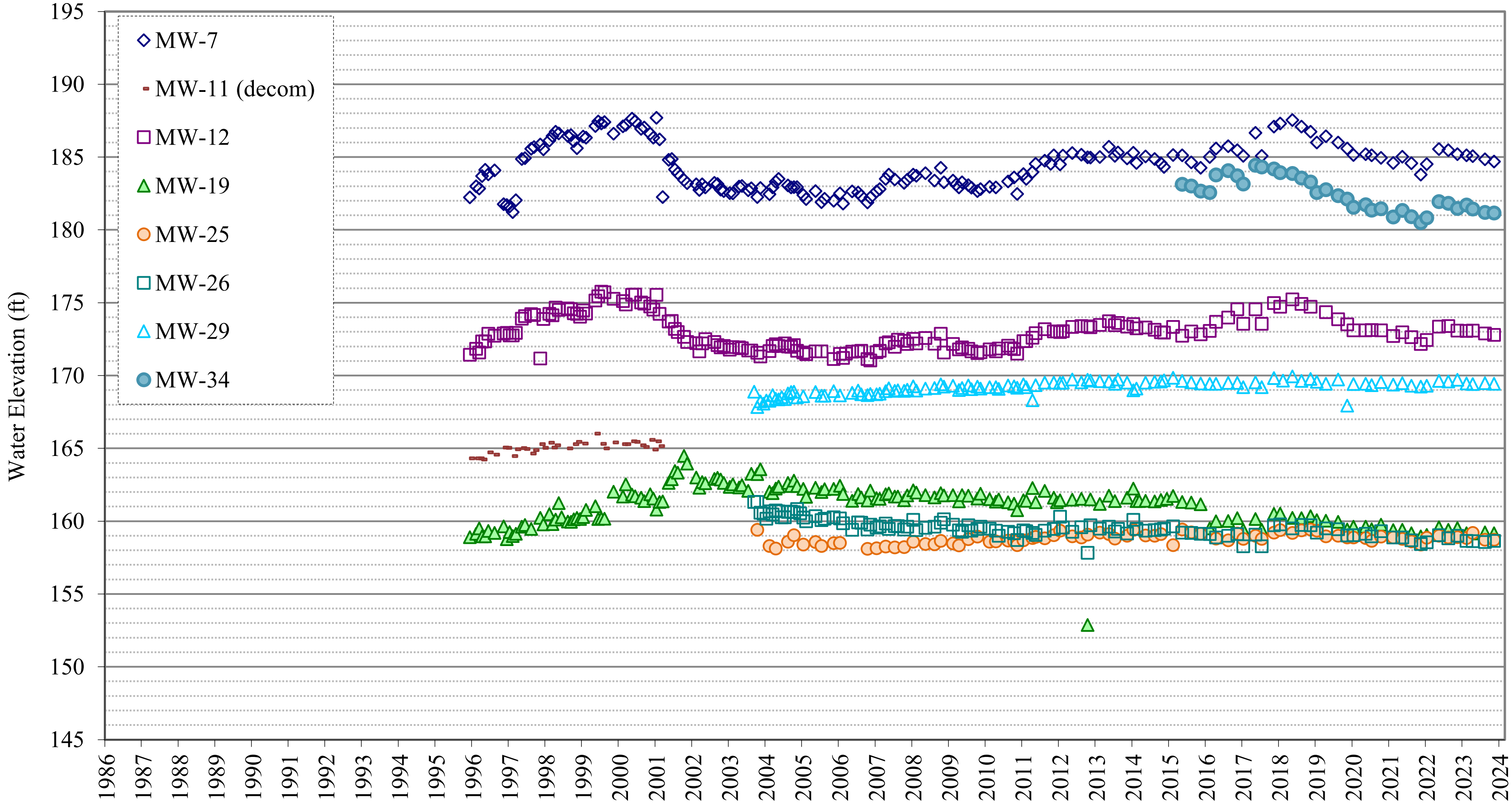
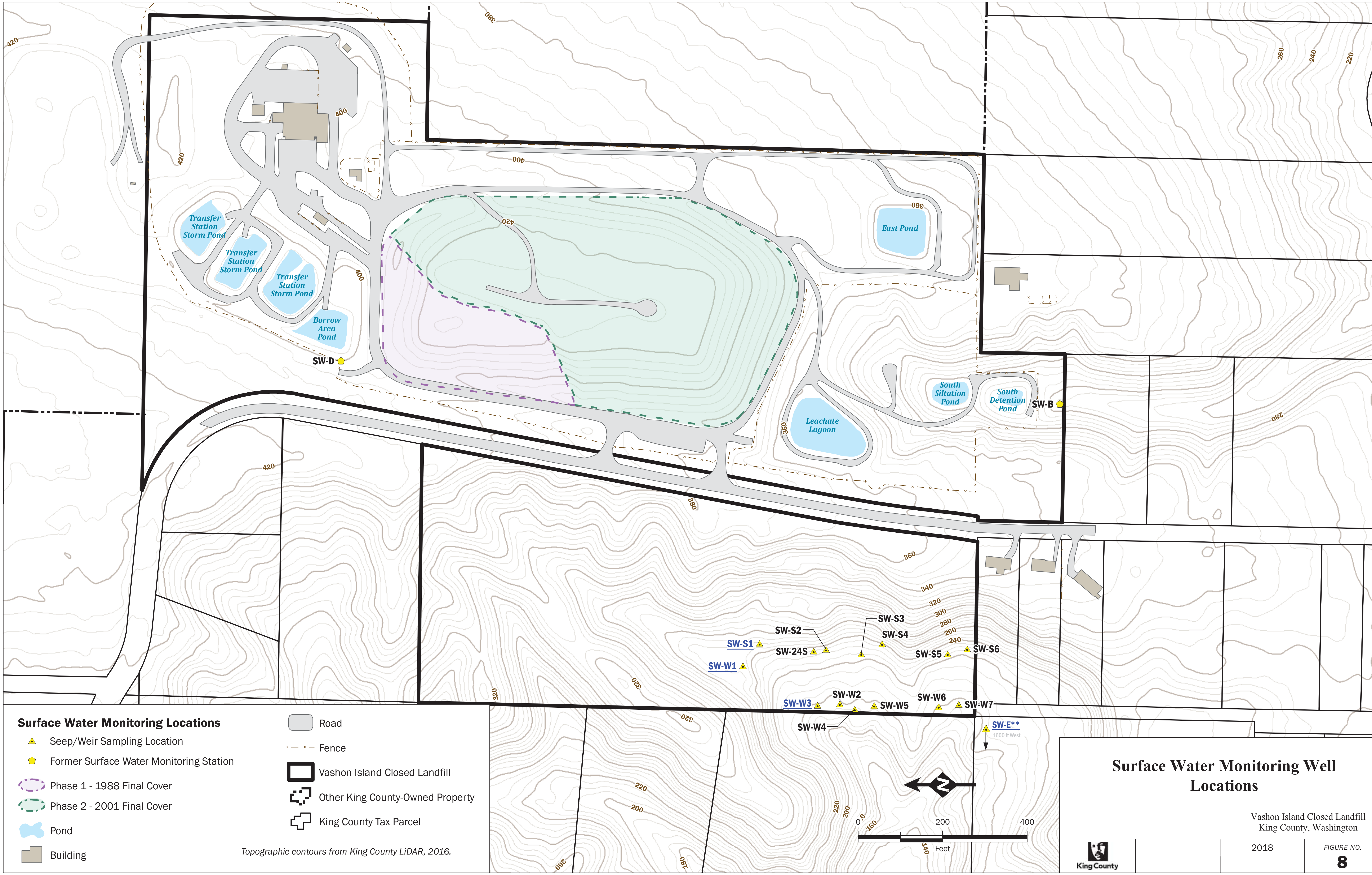
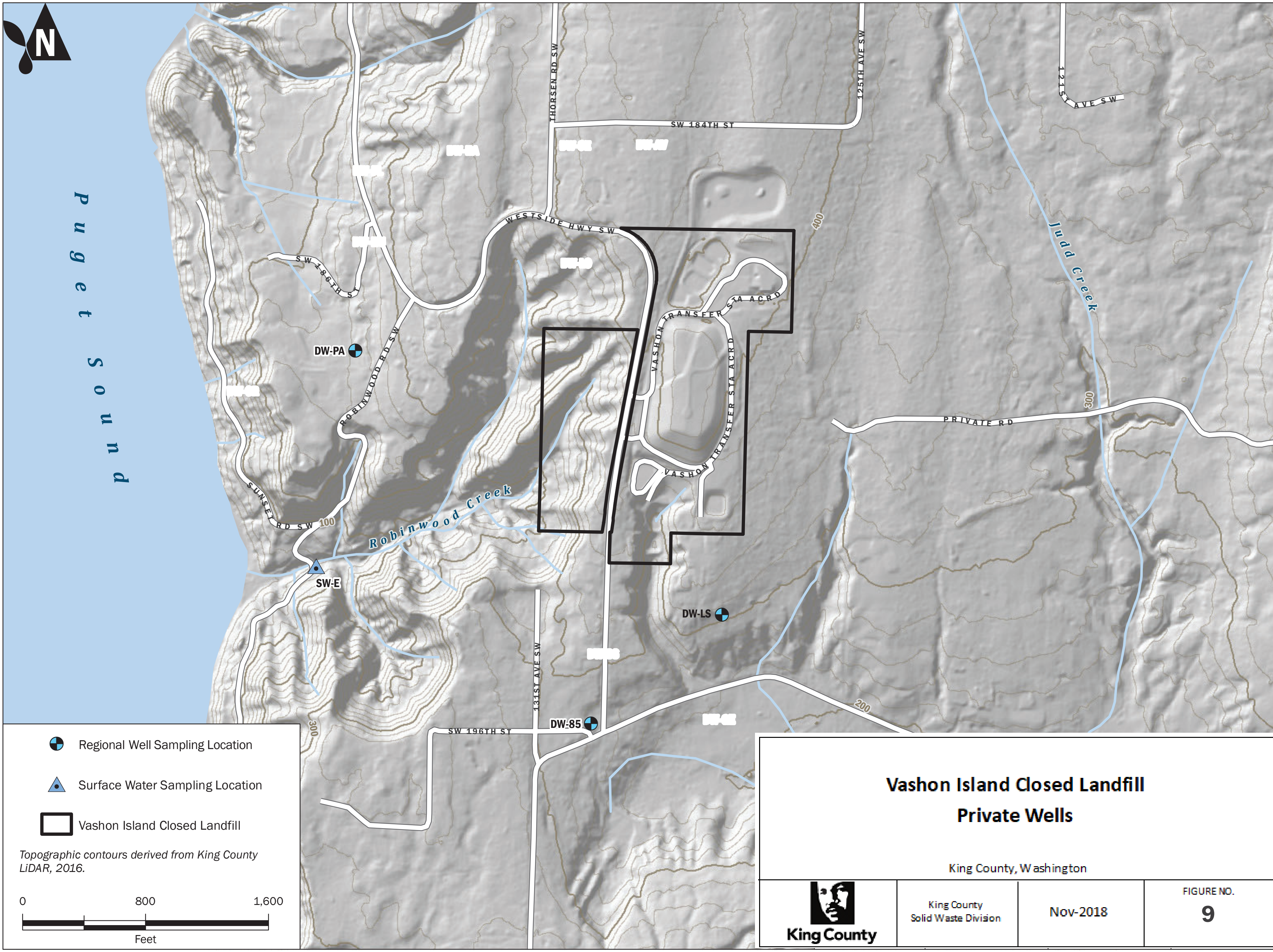


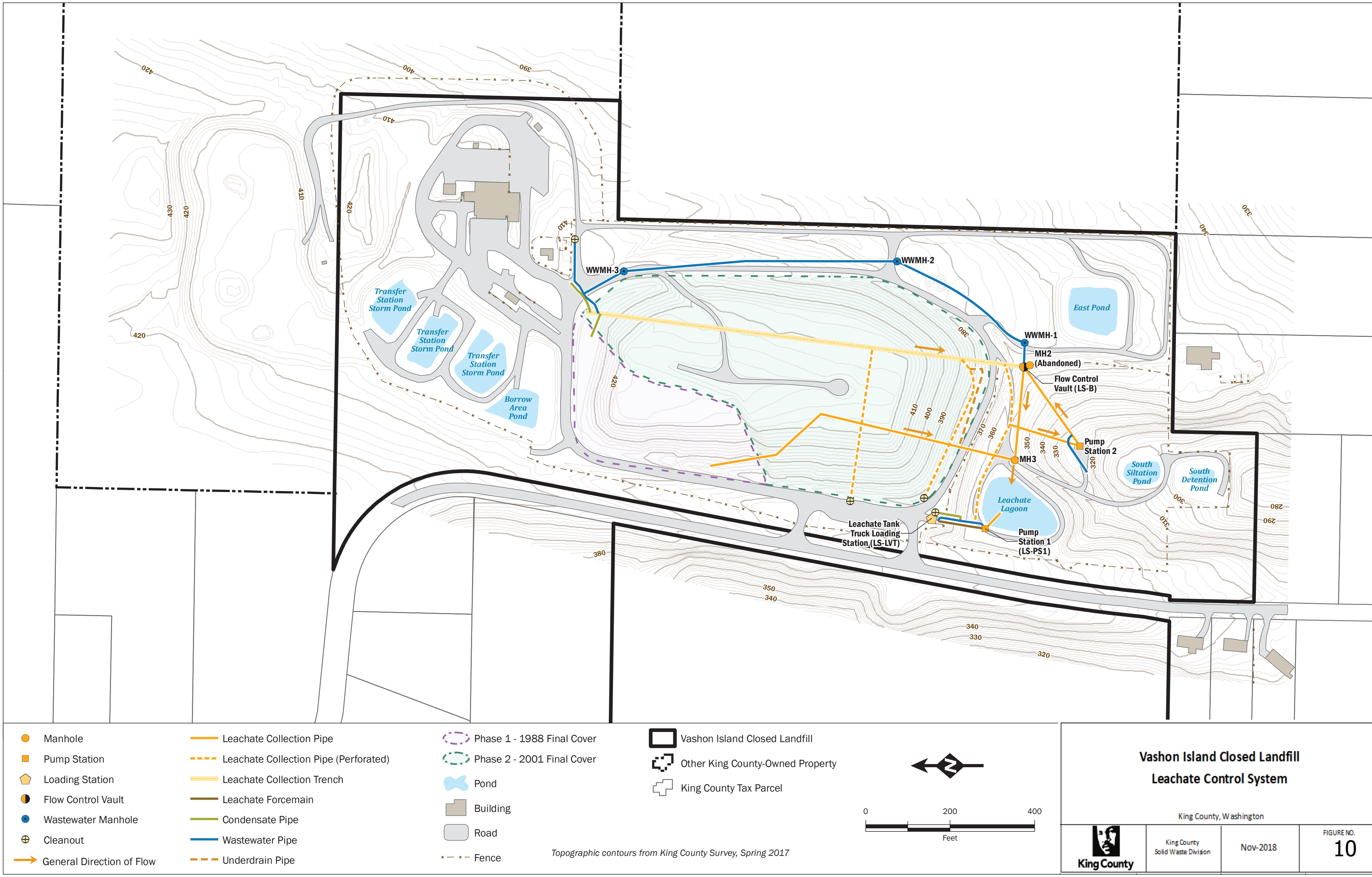
Figure 7 - Groundwater Elevations in Unit D Aquifer



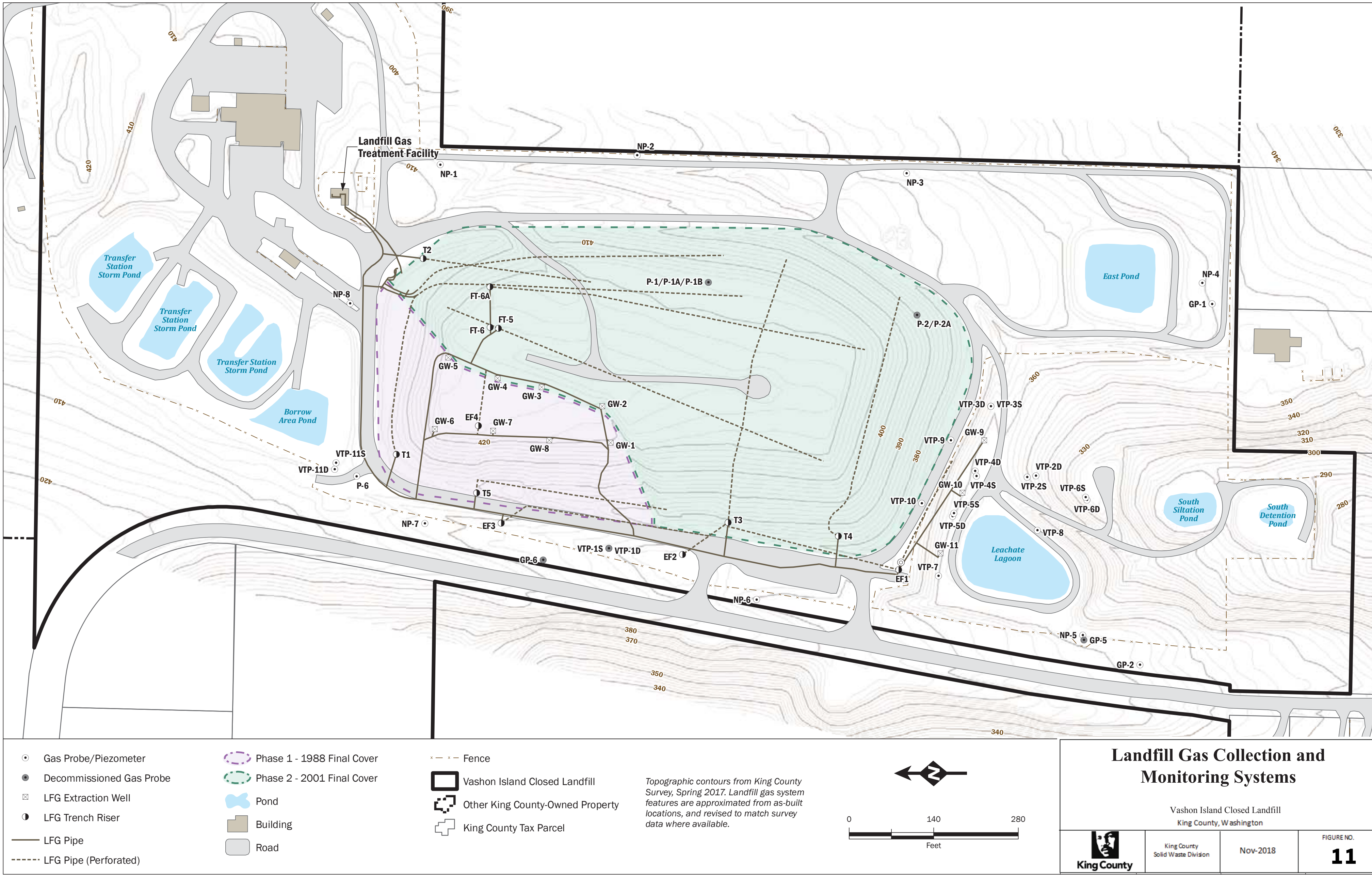


Transfer Station Storm Pond
Transfer Station Storm Pond
Transfer Station Storm Pond
Borrow Area Pond
East Pond
South Siltation Pond
South Detention Pond
Leachate Lagoon
SW-D
SW-B
SW-S1
SW-S2
SW-S3
SW-S4
SW-24S
SW-S5
SW-S6
SW-W1
SW-W2
SW-W3
SW-W4
SW-W5
SW-W6
SW-W7
SW-E**
1600 ft West
Surface Water Monitoring Locations
Seep/Weir Sampling Location
Former Surface Water Monitoring Station
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 LiDAR, 2016.
0
200
400
Feet
Surface Water Monitoring Well Locations
Vashon Island Closed Landfill
King County, Washington
King County
2018
FIGURE NO.
8


N
Puget Sound
Robinwood Creek
Judd Creek
WESTSIDE HWY SW
THORSEN RD SW
SW 184TH ST
125TH AVE SW
121ST AVE SW
SW 186TH ST
ROBINWOOD RD SW
SUNSET RD SW
VASHON TRANSFER STA ACRD
PRIVATE RD
131ST AVE SW
SW 196TH ST
100
200
300
400
DW-PA
DW-LS
DW-85
SW-E
Regional Well Sampling Location
Surface Water Sampling Location
Vashon Island Closed Landfill
Topographic contours derived from King County LiDAR, 2016.
0
800
1,600
Feet
Vashon Island Closed Landfill
Private Wells
King County, Washington
King County
King County
Solid Waste Division
Nov-2018
FIGURE NO.
9



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
WWMH-3
WWMH-2
WWMH-1
MH2 (Abandoned)
Flow Control Vault (LS-B)
Pump Station 2
MH3
Leachate Tank Truck Loading Station (LS-LVT)
Pump Station 1 (LS-PS1)
Manhole
Pump Station
Loading Station
Flow Control Vault
Wastewater Manhole
Cleanout
General Direction of Flow
Leachate Collection Pipe
Leachate Collection Pipe (Perforated)
Leachate Collection Trench
Leachate Forcemain
Condensate Pipe
Wastewater Pipe
Underdrain Pipe
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
0
200
400
Feet
Topographic contours from King County Survey, Spring 2017
Vashon Island Closed Landfill
Leachate Control System
King County, Washington
King County
King County Solid Waste Division
Nov-2018
FIGURE NO.
10



Landfill Gas Treatment Facility
Transfer Station Storm Pond
Transfer Station Storm Pond
Transfer Station Storm Pond
Borrow Area Pond
East Pond
South Siltation Pond
South Detention Pond
Leachate Lagoon
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-2S
VTP-2D
VTP-3S
VTP-3D
VTP-4S
VTP-4D
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
Landfill Gas Collection and Monitoring Systems
Vashon Island Closed Landfill
King County, Washington
King County
King County Solid Waste Division
Nov-2018
FIGURE NO.
11

Appendix A

Groundwater Monitoring Data

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)

Table A-1
Groundwater - Static Water Levels

Groundwater - Static Water Levels Well #	Measurement Date	Top of PVC Casing Elevation (feet)	Depth to Groundwater (feet)	Groundwater Elevation (feet above MSL)
Unit B				
MW-24	2/10/2023	377.48	88.98	288.50
MW-24	4/25/2023	377.48	88.54	288.94
MW-24	8/4/2023	377.48	88.01	289.47
MW-24	11/1/2023	377.48	88.63	288.85
Channel Cc1				
MW-3	2/10/2023	318.02	38.92	279.10
MW-3	4/25/2023	318.02	39.39	278.63
MW-3	8/4/2023	318.02	41.69	276.33
MW-3	11/1/2023	318.02	42.14	275.88
MW-4	2/10/2023	377.18	104.47	272.71
MW-4	4/25/2023	377.18	104.88	272.30
MW-4	8/4/2023	377.18	105.48	271.70
MW-4	11/1/2023	377.18	106.27	270.91
MW-10	2/10/2023	409.94	145.10	264.84
MW-10	4/25/2023	409.94	145.23	264.71
MW-10	8/4/2023	409.94	145.61	264.33
MW-10	11/1/2023	409.94	145.15	264.79
MW-13	2/10/2023	377.28	100.25	277.03
MW-13	4/25/2023	377.28	100.27	277.01
MW-13	8/4/2023	377.28	100.17	277.11
MW-13	11/1/2023	377.28	100.46	276.82
Channel Cc2				
MW-2	2/10/2023	317.97	73.64	244.33
MW-2	4/25/2023	317.97	73.65	244.32
MW-2	8/4/2023	317.97	73.84	244.13
MW-2	11/1/2023	317.97	74.07	243.90
MW-9	2/10/2023	405.17	165.52	239.65
MW-9	4/25/2023	405.17	165.63	239.54
MW-9	8/4/2023	405.17	165.77	239.40
MW-9	11/1/2023	405.17	165.92	239.25
MW-20	2/10/2023	370.32	121.65	248.67
MW-20	4/25/2023	370.32	121.70	248.62
MW-20	8/4/2023	370.32	121.92	248.40
MW-20	11/1/2023	370.32	122.18	248.14
MW-21	2/10/2023	349.05	106.41	242.64
MW-21	4/25/2023	349.05	106.38	242.67
MW-21	8/4/2023	349.05	106.58	242.47
MW-21	11/1/2023	349.05	108.76	240.29
MW-30	2/10/2023	235.67	5.38	230.29
MW-30	4/25/2023	235.67	5.31	230.36
MW-30	8/4/2023	235.67	5.95	229.72
MW-30	11/1/2023	235.67	5.73	229.94
MW-33	2/10/2023	359.17	112.17	247.00
MW-33	4/25/2023	359.17	112.17	247.00
MW-33	8/4/2023	359.17	112.38	246.79
MW-33	11/1/2023	359.17	112.55	246.62
MW-35	2/10/2023	361.34	118.28	243.06
MW-35	4/25/2023	361.34	118.22	243.12
MW-35	8/4/2023	361.34	118.42	242.92
MW-35	11/1/2023	361.34	118.59	242.75
MW-37	2/10/2023	294.70	62.50	232.20
MW-37	4/25/2023	294.70	62.44	232.26
MW-37	8/4/2023	294.70	62.72	231.98
MW-37	11/1/2023	294.70	63.05	231.65

Table A-1
Groundwater - Static Water Levels

Groundwater - Static Water Levels Well #	 Measurement Date	Top of PVC Casing Elevation (feet)	Depth to Groundwater (feet)	Groundwater Elevation (feet above MSL)
Channel Cc3				
MW-8	2/10/2023	386.00	176.33	209.67
MW-8	4/25/2023	386.00	176.26	209.74
MW-8	8/4/2023	386.00	176.35	209.65
MW-8	11/1/2023	386.00	176.55	209.45
MW-36	2/10/2023	378.19	150.97	227.22
MW-36	4/25/2023	378.19	150.92	227.27
MW-36	8/4/2023	378.19	151.03	227.16
MW-36	11/1/2023	378.19	151.21	226.98
Unit D Aquifer				
MW-7	2/10/2023	376.75	191.62	185.13
MW-7	4/25/2023	376.75	191.68	185.07
MW-7	8/4/2023	376.75	191.90	184.85
MW-7	11/1/2023	376.75	192.05	184.70
MW-12	2/10/2023	315.53	142.47	173.06
MW-12	4/25/2023	315.53	142.45	173.08
MW-12	8/4/2023	315.53	142.65	172.88
MW-12	11/1/2023	315.53	142.73	172.80
MW-19	2/10/2023	405.43	246.25	159.18
MW-19	4/25/2023	405.43	246.27	159.16
MW-19	8/4/2023	405.43	246.19	159.24
MW-19	11/1/2023	405.43	246.26	159.17
MW-25	2/10/2023	402.33	243.49	158.84
MW-25	4/25/2023	402.33	243.14	159.19
MW-25	8/4/2023	402.33	243.60	158.73
MW-25	11/1/2023	402.33	243.60	158.73
MW-26	2/10/2023	406.54	247.89	158.65
MW-26	4/25/2023	406.54	247.92	158.62
MW-26	8/4/2023	406.54	247.97	158.57
MW-26	11/1/2023	406.54	247.90	158.64
MW-29	2/10/2023	413.85	244.39	169.46
MW-29	4/25/2023	413.85	244.43	169.42
MW-29	8/4/2023	413.85	244.38	169.47
MW-29	11/1/2023	413.85	244.41	169.44
MW-34	2/10/2023	385.96	204.26	181.70
MW-34	4/25/2023	385.96	204.53	181.43
MW-34	8/4/2023	385.96	204.76	181.20
MW-34	11/1/2023	385.96	204.80	181.16

Table A-2
Groundwater - Sampling Water Levels

Groundwater - Sampling Water Levels Well #	Measurement Date	Top of PVC Casing Elevation (feet)	Depth to Groundwater (feet)	Groundwater Elevation (feet above MSL)
Channel Cc1				
MW-3	2/13/2023	318.02	38.81	279.21
MW-3	5/1/2023	318.02	39.40	278.62
MW-3	8/7/2023	318.02	DRY	DRY
MW-3	11/2/2023	318.02	42.14	275.88
MW-4	2/13/2023	377.18	104.30	272.88
MW-4	5/1/2023	377.18	DRY	DRY
MW-4	8/4/2023	377.18	DRY	DRY
MW-4	11/1/2023	377.18	106.27	270.91
MW-10	2/13/2023	409.94	144.96	264.98
MW-10	5/1/2023	409.94	145.07	264.87
MW-10	8/7/2023	409.94	145.11	264.83
MW-10	11/2/2023	409.94	144.92	265.02
MW-13	2/13/2023	377.28	99.93	277.35
MW-13	5/2/2023	377.28	99.84	277.44
MW-13	8/8/2023	377.28	100.03	277.25
MW-13	11/13/2023	377.28	100.72	276.56
Channel Cc2				
MW-2	2/21/2023	317.97	73.36	244.61
MW-2	5/4/2023	317.97	73.55	244.42
MW-2	8/10/2023	317.97	73.88	244.09
MW-2	11/14/2023	317.97	74.12	243.85
MW-9	2/14/2023	405.17	165.59	239.58
MW-9	5/2/2023	405.17	165.49	239.68
MW-9	8/7/2023	405.17	165.78	239.39
MW-9	11/2/2023	405.17	165.90	239.27
MW-20	2/21/2023	370.32	121.22	249.10
MW-20	5/4/2023	370.32	121.46	248.86
MW-20	8/10/2023	370.32	121.85	248.47
MW-20	11/14/2023	370.32	122.30	248.02
MW-21	2/21/2023	349.05	106.25	242.80
MW-21	5/4/2023	349.05	106.38	242.67
MW-21	8/10/2023	349.05	106.68	242.37
MW-21	11/14/2023	349.05	106.83	242.22
MW-33	2/21/2023	359.17	111.90	247.27
MW-33	5/4/2023	359.17	111.97	247.20
MW-33	8/10/2023	359.17	112.38	246.79
MW-33	11/14/2023	359.17	112.63	246.54
MW-35	2/21/2023	361.34	118.06	243.28
MW-35	5/4/2023	361.34	118.21	243.13
MW-35	8/10/2023	361.34	118.55	242.79
MW-35	11/14/2023	361.34	118.63	242.71
MW-37	2/21/2023	294.70	62.25	232.45
MW-37	5/4/2023	294.70	62.35	232.35
MW-37	8/10/2023	294.70	62.69	232.01
MW-37	11/14/2023	294.70	63.11	231.59

Table A-2
Groundwater - Sampling Water Levels

Groundwater - Sampling Water Levels Well #	 Measurement Date	Top of PVC Casing Elevation (feet)	Depth to Groundwater (feet)	Groundwater Elevation (feet above MSL)
Channel Cc3				
MW-8	2/13/2023	386.00	176.22	209.78
MW-8	5/1/2023	386.00	176.18	209.82
MW-8	8/7/2023	386.00	176.39	209.61
MW-8	11/2/2023	386.00	176.45	209.55
MW-36	2/14/2023	378.19	151.11	227.08
MW-36	5/1/2023	378.19	150.95	227.24
MW-36	8/10/2023	378.19	151.01	227.18
MW-36	11/13/2023	378.19	151.41	226.78
Unit D Aquifer				
MW-7	2/13/2023	376.75	191.22	185.53
MW-7	5/1/2023	376.75	191.22	185.53
MW-7	8/8/2023	376.75	191.77	184.98
MW-7	11/13/2023	376.75	192.30	184.45
MW-12	2/13/2023	315.53	142.23	173.30
MW-12	5/1/2023	315.53	142.17	173.36
MW-12	8/7/2023	315.53	142.52	173.01
MW-12	11/2/2023	315.53	142.57	172.96
MW-19	2/14/2023	405.43	246.17	159.26
MW-19	5/2/2023	405.43	245.98	159.45
MW-19	8/7/2023	405.43	246.21	159.22
MW-19	11/13/2023	405.43	246.16	159.27
MW-26	2/14/2023	406.54	247.82	158.72
MW-26	5/2/2023	406.54	247.83	158.71
MW-26	8/8/2023	406.54	247.72	158.82
MW-26	11/13/2023	406.54	248.00	158.54
MW-29	2/14/2023	413.85	244.34	169.51
MW-29	5/2/2023	413.85	244.42	169.43
MW-29	8/8/2023	413.85	244.22	169.63
MW-29	11/13/2023	413.85	244.46	169.39
MW-34	2/14/2023	385.96	204.66	181.30
MW-34	5/2/2023	385.96	204.28	181.68
MW-34	8/7/2023	385.96	204.52	181.44
MW-34	11/2/2023	385.96	204.60	181.36

Table A-3
Groundwater - Field Parameters

Groundwater - Field Parameters			Dissolved Oxygen (DO) (Field)	Oxidation-Reduction Potential	pH (Field)	Specific Conductance (Field)	Temperature (Field)	Turbidity (Field)	Volume Purged
Well #	Sample Date	Sample ID	(mg/L)	(mV)	(std. units)	(μmhos/cm)	(°C)	(NTU)	(gal)
Channel Cc1									
MW-3	2/13/2023	WV3-230213-	9.15	260.6	5.59	71.1	8.72	1.92	2
MW-3	5/1/2023	WV3-230501-	7.8	434	5.17	56.5	9.08	1.1	3.5
MW-3	8/7/2023	WV3-230807-*	--	--	--	--	--	--	--
MW-3	11/2/2023	WV3-231102-*	--	--	--	--	--	--	--
MW-4	2/13/2023	WV4-230213-*	--	--	--	--	--	--	--
MW-4	5/1/2023	VW4-230501-*	--	--	--	--	--	--	--
MW-4	8/4/2023	WV4-230804-*	--	--	--	--	--	--	--
MW-4	11/1/2023	WV4-231101-*	--	--	--	--	--	--	--
MW-10	2/13/2023	WV10230213-	4.65	202.7	7.24	134	10.13	0.14	3.1
MW-10	5/1/2023	WV10230501-	4.43	232.8	7.13	137.3	9.52	0.33	4.25
MW-10	8/7/2023	WV10230807-	4.67	441.3	6.99	138.2	10.88	0.52	2.75
MW-10	11/2/2023	WV10231102-	4.6	227.2	7.1	140.6	9.895	10.7	3
MW-13	2/13/2023	WV13230213-	7.5	390.1	7.06	139.1	10.2	0.9	1.7
MW-13	5/2/2023	WV13230502-	5.24	385.9	6.9	147.3	10.5	0.3	4.25
MW-13	8/8/2023	WV13230808-	5.25	177.7	6.9	151.2	10.32	1.07	4.5
MW-13	8/8/2023	WV13230808D	5.25	177.7	6.9	151.2	10.32	1.07	4.5
MW-13	11/13/2023	WV13231113-	6.63	303	6.94	153.6	10.561	0.34	3.25
Channel Cc2									
MW-2	2/21/2023	WV2-230221-	0.81	124	6.98	252	8.72	1.15	2
MW-2	5/4/2023	WV2-230504-	0.91	265.4	6.76	271.9	8.84	0.53	2.25
MW-2	8/10/2023	WV2-230810-	0.95	368.3	6.58	275.2	10	0.83	2.5
MW-2	11/14/2023	WV2-231114-	0.99	222.4	6.91	286.7	8.833	0.76	2.75
MW-9	2/14/2023	WV9-230214-	8.65	376.2	7.07	172.6	9.7	0.68	5.25
MW-9	2/14/2023	WV9-230214D	8.65	376.2	7.07	172.6	9.7	0.68	5.25
MW-9	5/2/2023	WV9-230502-	8.86	170.7	7.11	176.5	9.5	3.69	3
MW-9	8/7/2023	WV9-230807-	8.8	181.6	6.82	178.3	9.77	0.98	3.75
MW-9	11/2/2023	WV9-231102-	8.13	283.4	7.1	175.3	9.789	0.79	2.75
MW-20	2/21/2023	WV20230221-	1.5	-50.1	7.54	156	9.49	1.02	2
MW-20	5/4/2023	WV20230504-	0.92	127.8	7.4	167.4	10.77	0.61	3.25
MW-20	8/10/2023	WV20230810-	0.66	-104.1	7.43	171.5	10.48	0.48	4.25
MW-20	11/14/2023	WV20231114-	1.64	-60.5	7.62	175.8	10.763	0.55	2
MW-21	2/21/2023	WV21230221-	3.19	158.8	6.59	240.7	9.526	1.98	3.2
MW-21	5/4/2023	WV21230504-	1.49	64.5	6.43	241.2	9.83	0.9	4.5
MW-21	8/10/2023	WV21230810-	1.39	108	6.34	259.4	10.79	1.65	2.9
MW-21	11/14/2023	WV21231114-	1.22	78.1	6.57	274.6	9.585	2.19	2.5
MW-33	2/21/2023	WV33230221-	0.35	-51	6.81	581.8	12.998	0.46	2.25
MW-33	5/4/2023	WV33230504-	0.25	16.8	6.73	569.8	12.7	0.22	4.75
MW-33	8/10/2023	WV33230810-	0.53	-63.2	6.53	582	13	0.6	3
MW-33	11/14/2023	WV33231114-	0.54	-64.4	6.77	575.5	13.285	1.17	2.25
MW-35	2/21/2023	WV35230221-	0.26	-27.2	6.64	513.9	10.208	12.6	2.1
MW-35	5/4/2023	WV35230504-	0.13	-45.7	6.5	484	10.63	7.14	2.25
MW-35	8/10/2023	WV35230810-	0.16	-53.1	6.54	506.7	11.4	3.09	3.25
MW-35	11/14/2023	WV35231114-	1.54	-33.9	6.53	516.6	10.36	7.45	2.25
MW-37	2/21/2023	WV37230221-	5.12	123.7	6.88	164.7	8.31	7.37	0.75
MW-37	5/4/2023	WV37230504-	4.84	262.4	6.76	176.7	9.11	3.18	1.25
MW-37	8/10/2023	WV37230810-	4.4	405.4	6.6	179.1	11.22	4.16	1.25
MW-37	11/14/2023	WV37231114-	4.95	238.8	6.86	182.9	8.898	5.3	1
Channel Cc3									
MW-8	2/13/2023	WV8-230213-	10	226.5	6.32	147.2	10.48	0.24	2
MW-8	5/1/2023	WV8-230501-	10.35	257.9	6.32	150.1	9.86	0.49	4
MW-8	5/1/2023	WV8-230501D	10.35	257.9	6.32	150.1	9.86	0.49	4
MW-8	8/7/2023	WV8-230807-	10.24	236.9	6.42	150.6	10.33	1.35	3.5
MW-8	11/2/2023	WV8-231102-	10.19	291.8	6.6	153.2	10.162	0.66	3
MW-36	2/14/2023	WV36230214-	3.56	121.7	7.71	152.4	10.85	0.75	2.5
MW-36	5/1/2023	WV36230501-	2.96	174.1	7.22	159.8	11.77	0.34	3
MW-36	8/10/2023	WV36230810-	3.27	348.7	7.18	164.5	12.13	0.28	4.75
MW-36	11/13/2023	WV36231113-	3.38	290.4	7.17	166.9	11.166	0.53	3

Table A-3
Groundwater - Field Parameters

Groundwater - Field Parameters			Dissolved Oxygen (DO) (Field)	Oxidation-Reduction Potential	pH (Field)	Specific Conductance (Field)	Temperature (Field)	Turbidity (Field)	Volume Purged
Well #	Sample Date	Sample ID	(mg/L)	(mV)	(std. units)	(µmhos/cm)	(^{o}C)	(NTU)	(gal)
Unit D Aquifer									
MW-7	2/13/2023	WV7-230213-	1.2	-1.9	7.74	160.2	9.74	1.13	6
MW-7	5/1/2023	WV7-230501-	0.64	187	7.6	172.4	10.68	0.63	5
MW-7	8/8/2023	WV7-230808-	1.18	-21.8	7.55	174.9	10.59	3.73	4
MW-7	11/13/2023	WV7-231113-	1.34	33.9	7.73	178.8	10.737	2.12	5.5
MW-12	2/13/2023	WV12230213-	5.19	348.4	7.2	145.5	9.07	0.87	4
MW-12	5/1/2023	WV12230501-	5.14	438.8	6.92	147.7	9.25	0.4	2.3
MW-12	8/7/2023	WV12230807-	5.08	436.9	6.92	150.4	9.97	0.71	2.75
MW-12	11/2/2023	WV12231102-	5.05	378.4	6.93	153.5	9.59	0.46	5.75
MW-19	2/14/2023	WV19230214-	1.04	-9.8	7.52	184.3	8.98	1.54	4
MW-19	5/2/2023	WV19230502-	0.79	10.1	7.45	198.3	9.28	1.42	6
MW-19	8/7/2023	WV19230807-	1.2	2.5	7.24	200.8	9.73	2.28	4
MW-19	11/13/2023	WV19231113-	1.58	60	7.13	206.2	10.047	1.67	3.25
MW-26	2/14/2023	WV26230214-	0.57	-7.2	7.93	173.4	9.97	3.88	6
MW-26	5/2/2023	WV26230502-	1	-57.3	8.08	173.6	10.73	3.7	4
MW-26	8/8/2023	WV26230808-	0.73	290.4	7.74	179	11.27	4.66	5.5
MW-26	11/13/2023	WV26231113-	0.77	-52.7	7.88	181	9.708	1.43	8.25
MW-29	2/14/2023	WV29230214-	0.81	-65.1	7.58	210.5	10.11	9.07	4.25
MW-29	5/2/2023	WV29230502-	0.66	-67.1	7.22	211.3	10.69	15.5	5.5
MW-29	8/8/2023	WV29230808-	0.96	162.8	7.03	217.5	11.59	15.5	5
MW-29	11/13/2023	WV29231113-	1.13	-71.6	7.44	219.2	10.056	8.64	4.5
MW-34	2/14/2023	WV34230214-	6.39	419.7	6.85	177.4	11.6	1.02	2
MW-34	5/2/2023	WV34230502-	6.03	370.6	6.53	180.1	11.69	0.26	3.5
MW-34	8/7/2023	WV34230807-	6.13	386.3	6.33	183.7	13.32	0.36	2.75
MW-34	11/2/2023	WV34231102-	6.28	366	6.69	185.1	12.752	0.42	2.75
Field Blanks									
FIELD BLANK	2/21/2023	WV20230221F	--	--	7.21	0.6	10.43	--	--
FIELD BLANK	5/4/2023	WV20230504F	--	--	7.45	0.7	15.45	--	--
FIELD BLANK	8/10/2023	WV21230810F	--	--	6.45	0.9	19.88	--	--
FIELD BLANK	11/13/2023	WV26231113F	--	--	6.3	1.2	11.197	--	--
Offsite Domestic Wells									
DW-85	2/16/2023	WV85230216-	0.36	-139.7	8.04	128.4	9.338	0.88	60
DW-85	8/9/2023	WV85230809-	0.25	-148.3	7.77	140.4	9.42	0.52	60
DW-LS	2/16/2023	WVLS230216-	8.8	137.3	7.22	235.9	8.792	1.61	60
DW-LS	8/9/2023	WVLS230809-	7.8	356	6.62	257.1	12.75	0.64	60
DW-PA	2/16/2023	WVPA230216-	9.14	150.7	7.1	156.2	8.41	1.16	60
DW-PA	8/9/2023	WVPA230809-	8.59	169.4	6.9	171.4	12.09	0.36	60

Notes:

-- = parameter is not tested

*Insufficient water to collect a sample

Table A-4
Groundwater - Conventionals

Groundwater - Conventionals Well #	 Sample Date	 Sample ID	Alkalinity, Total (as $CACO_3$) (mg/L)	Ammonia as N (mg/L)	Chloride (Total) (mg/L)	Coliforms, Fecal cfu/100mL	Coliforms, Total cfu/100mL	Nitrate (mg/L)	Specific Conductance (Lab) (µmhos/cm)	Sulfate (Total) (mg/L)	Total Dissolved Solids (mg/L)	Total Organic Carbon (mg/L)	Total Solids (mg/L)	Total Suspended Solids (mg/L)
Channel Cc1														
MW-3	2/13/2023	WV3-230213-	19.9	0.002 U	2.97	--	--	2.55	82.2	3.34	59.3	0.82 T	69.3	0.8 T
MW-3	5/1/2023	WV3-230501-	15.7	0.002 U	3.14	--	--	0.72	61.7	4.09	46	0.95 T	44.7	1.4 T
MW-3	8/7/2023	WV3-230807-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	11/2/2023	WV3-231102-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/13/2023	WV4-230213-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	5/1/2023	VW4-230501-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	8/4/2023	WV4-230804-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	11/1/2023	WV4-231101-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	2/13/2023	WV10230213-	58.8	0.002 U	3.47	--	--	0.457	147	9.64	101	0.5 U	105	0.5 U
MW-10	5/1/2023	WV10230501-	59	0.002 U	3.59	--	--	0.445	150	9.69	107	0.5 U	98.7	0.5 U
MW-10	8/7/2023	WV10230807-	58.8	0.002 U	3.49	--	--	0.44	149	9.45	100	0.5 U	105	0.5 U
MW-10	11/2/2023	WV10231102-	58.5	0.002 U	3.41	--	--	0.439	148	9.2	101	0.5 U	105	0.5 U
MW-13	2/13/2023	WV13230213-	63.4	0.002 U	2.83	--	--	0.346	153	10.4	107	0.5 U	109	0.5 U
MW-13	5/2/2023	WV13230502-	65.6	0.002 U	3.01	--	--	0.23	163	12.1	115	0.5 U	111	0.5 U
MW-13	8/8/2023	WV13230808-	66.1	0.002 U	2.92	--	--	0.21	164	12.2	109	0.55 T	115	0.53 U
MW-13	8/8/2023	WV13230808D	66.2	0.002 U	2.94	--	--	0.208	164	12.2	111	0.64 T	117	0.5 U
MW-13	11/13/2023	WV13231113-	65.6	0.002 U	2.89	--	--	0.27	160	11.2	105	0.5 U	110	0.5 U
Channel Cc2														
MW-2	2/21/2023	WV2-230221-	140	0.002 U	2.26	--	--	0.708	290	14	181	0.82 T	183	3.3
MW-2	5/4/2023	WV2-230504-	138	0.0055 T	2.23	--	--	0.731	299	13.7	176	0.89 T	183	0.6 T
MW-2	8/10/2023	WV2-230810-	137	0.002 U	2.06	--	--	0.98	301	13.2	179	0.66 T	191	0.9 T
MW-2	11/14/2023	WV2-231114-	139	0.002 U	2.2	--	--	1.45	304	14.2	179	0.79 T	184	0.5 U
MW-9	2/14/2023	WV9-230214-	74.1	0.002 U	4.9	--	--	0.65	190	13	123	0.5 U	129	0.5 SU
MW-9	2/14/2023	WV9-230214D	74.1	0.002 U	4.9	--	--	0.646	189	13	119	0.5 U	130	0.5 SU
MW-9	5/2/2023	WV9-230502-	74.7	0.002 U	5.16	--	--	0.703	194	13.1	128	0.5 U	127	0.5 U
MW-9	8/7/2023	WV9-230807-	74.9	0.002 U	5.06	--	--	0.697	193	12.8	127	0.5 U	129	0.5 T
MW-9	11/2/2023	WV9-231102-	72.1	0.002 U	4.83	--	--	0.602	185	11.6	125	0.58 T	123	0.5 U
MW-20	2/21/2023	WV20230221-	72	0.0189	3.21	--	--	0.01 U	176	15.9	131	0.54 T	133	1.1
MW-20	5/4/2023	WV20230504-	72.3	0.0281	3.39	--	--	0.01 U	184	16.5	130	0.72 T	130	0.5 U
MW-20	8/10/2023	WV20230810-	72.3	0.02	3.02	--	--	0.01 U	184	14.7	121	0.5 U	136	0.51 U
MW-20	11/14/2023	WV20231114-	73.4	0.0184	3.21	--	--	0.01 U	184	15.8	127	0.5 U	124	0.5 U
MW-21	2/21/2023	WV21230221-	127	0.0075 T	1.88	--	--	0.124	262	11.9	171	0.93 T	173	1.7
MW-21	5/4/2023	WV21230504-	127	0.008 T	2.06	--	--	0.126	272	13.1	171	1 T	169	0.9 T
MW-21	8/10/2023	WV21230810-	130	0.0098 T	1.78	--	--	0.134	279	12	169	0.82 T	178	1.2 T
MW-21	11/14/2023	WV21231114-	136	0.0094 T	1.9	--	--	0.38	289	13.2	171	0.77 T	173	1.2 T
MW-33	2/21/2023	WV33230221-	332	0.0341	3.9	--	--	0.01 U	611	17.3	387	3.02	383	3.27
MW-33	5/4/2023	WV33230504-	333	0.0309	3.88	--	--	0.01 U	629	17.3	369	2.61	382	10.2
MW-33	8/10/2023	WV33230810-	325	0.0344	3.5	--	--	0.01 T	626	15.1	355	2.48	400	2.84
MW-33	11/14/2023	WV33231114-	324	0.0366	3.79	--	--	0.01 U	609	16.7	355	2.11	368	5.8
MW-35	2/21/2023	WV35230221-	281	0.0649	3.32	--	--	0.01 U	552	31.1	352	3.58	408	49.7
MW-35	5/4/2023	WV35230504-	277	0.0638	3.4	--	--	0.01 U	558	30.3	355	3.78	413	78.3
MW-35	8/10/2023	WV35230810-	290	0.0668	3.01	--	--	0.013 T	576	24.9	360	2.9	416	44.4
MW-35	11/14/2023	WV35231114-	287	0.0687	3.28	--	--	0.01 U	564	26.2	350	3.24	392	50.2
MW-37	2/21/2023	WV37230221-	85.1	0.002 U	2.97	--	--	0.87	189	7.8	131	0.56 T	140	9.8
MW-37	5/4/2023	WV37230504-	85.1	0.002 U	3.25	--	--	0.868	196	8.25	134	0.66 T	136	4.44
MW-37	8/10/2023	WV37230810-	84.8	0.002 U	3	--	--	0.77	196	7.59	132	0.5 U	143	2.6
MW-37	11/14/2023	WV37231114-	85.1	0.002 U	3.23	--	--	0.854	196	8.47	134	0.5 T	140	6.8

Table A-4
Groundwater - Conventionals

Well #	Sample Date	Sample ID	Alkalinity, Total (as $CACO_3$) (mg/L)	Ammonia as N (mg/L)	Chloride (Total) (mg/L)	Coliforms, Fecal cfu/100mL	Coliforms, Total cfu/100mL	Nitrate (mg/L)	Specific Conductance (Lab) (µmhos/cm)	Sulfate (Total) (mg/L)	Total Dissolved Solids (mg/L)	Total Organic Carbon (mg/L)	Total Solids (mg/L)	Total Suspended Solids (mg/L)
Channel Cc3														
MW-8	2/13/2023	WV8-230213-	53.8	0.002 U	4.35	--	--	3.56	159	6.8	114	0.59 T	116	1 U
MW-8	5/1/2023	WV8-230501-	54	0.002 U	4.55	--	--	4.78	162	6.78	116	0.51 T	113	0.5 U
MW-8	5/1/2023	WV8-230501D	54	0.002 U	4.56	--	--	4.01	163	6.8	113	0.57 T	110	0.5 U
MW-8	8/7/2023	WV8-230807-	54.2	0.002 U	4.71	--	--	4.32	162	6.81	112	0.52 T	119	1 U
MW-8	11/2/2023	WV8-231102-	55.2	0.002 U	4.66	--	--	2.8	161	6.99	109	0.55 T	114	0.5 U
MW-36	2/14/2023	WV36230214-	70.3	0.002 U	3.22	--	--	0.031 T	176	14.5	127	0.5 U	130	0.5 SU
MW-36	5/1/2023	WV36230501-	70.2	0.002 U	3.24	--	--	0.023 T	177	14.6	129	0.5 U	127	0.5 U
MW-36	8/10/2023	WV36230810-	70.5	0.002 U	2.86	--	--	0.025 T	177	12.8	119	0.51 T	130	0.5 U
MW-36	11/13/2023	WV36231113-	70.7	0.002 U	3.02	--	--	0.022 T	175	13.7	121	0.5 U	124	0.5 U
Unit D Aquifer														
MW-7	2/13/2023	WV7-230213-	79	0.249	3.41	--	--	0.01 U	184	11.3	127	0.5 U	134	0.5 U
MW-7	5/1/2023	WV7-230501-	79.6	0.0347	3.56	--	--	0.01 U	189	11.5	135	0.54 T	132	0.6 T
MW-7	8/8/2023	WV7-230808-	79.5	0.275	3.43	--	--	0.01 U	188	11.3	132	0.5 U	132	1 U
MW-7	11/13/2023	WV7-231113-	79.7	0.375	3.32	--	--	0.01 U	186	10.9	127	0.5 U	131	1.1 T
MW-12	2/13/2023	WV12230213-	63.7	0.002 U	3.17	--	--	0.655	158	10.2	107	0.5 U	112	0.51 U
MW-12	5/1/2023	WV12230501-	64.1	0.002 U	3.28	--	--	0.646	161	10.3	115	0.5 U	111	0.5 U
MW-12	8/7/2023	WV12230807-	64.5	0.002 U	3.17	--	--	0.619	162	10.3	111	1.1 T	115	0.5 U
MW-12	11/2/2023	WV12231102-	64.1	0.002 U	3.1	--	--	0.664	161	9.99	107	0.5 U	108	0.5 U
MW-19	2/14/2023	WV19230214-	85.5	0.0318	4.68	--	--	0.01 U	211	17.5	134	0.5 U	143	1 SU
MW-19	5/2/2023	WV19230502-	86.3	0.0324	4.87	--	--	0.01 U	217	17.7	140	0.5 U	146	1.7 T
MW-19	8/7/2023	WV19230807-	86.4	0.0318	4.81	--	--	0.01 U	217	17.5	137	0.5 U	147	1 U
MW-19	11/13/2023	WV19231113-	86.4	0.0336	4.61	--	--	0.01 U	215	16.9	131	0.5 U	139	0.8 T
MW-26	2/14/2023	WV26230214-	77.9	0.251	3.8	--	--	0.015 T	190	13.7	136	0.77 T	142	4.3 S
MW-26	5/2/2023	WV26230502-	78.2	0.0267	3.94	--	--	0.028 T	193	13.9	141	0.67 T	141	5.2
MW-26	8/8/2023	WV26230808-	78.5	0.266	3.85	--	--	0.014 T	193	14	137	0.58 T	175	39.2
MW-26	11/13/2023	WV26231113-	77.9	0.277	3.73	--	--	0.017 T	191	13.6	135	0.51 T	140	3.7
MW-29	2/14/2023	WV29230214-	100	0.0021 T	3.64	--	--	0.01 U	232	15.7	149	0.5 U	154	8.5 S
MW-29	5/2/2023	WV29230502-	101	0.0029 T	3.79	--	--	0.01 U	235	15.5	147	0.5 U	158	11.7
MW-29	8/8/2023	WV29230808-	100	0.002 U	3.71	--	--	0.01 U	233	15.3	149	0.52 T	162	11.2
MW-29	11/13/2023	WV29231113-	101	0.0032 T	3.59	--	--	0.01 U	233	15	139	0.5 U	145	6.2
MW-34	2/14/2023	WV34230214-	70.3	0.002 U	4.75	--	--	2.08	194	12.8	125	0.5 U	131	0.5 SU
MW-34	5/2/2023	WV34230502-	70.8	0.002 U	5.06	--	--	2.19	198	13.1	131	0.5 U	131	0.53 U
MW-34	8/7/2023	WV34230807-	70	0.002 U	4.92	--	--	2.23	196	12.6	126	0.6 T	139	0.5 U
MW-34	11/2/2023	WV34231102-	68.9	0.002 U	4.86	--	--	2.2	195	12.4	125	0.61 T	129	0.5 U
Field Blanks														
FIELD BLANK	2/21/2023	WV20230221F	1 U	0.002 U	0.061 T	--	--	0.01 U	1 U	0.1 U	10 U	0.5 U	10 U	0.5 U
FIELD BLANK	5/4/2023	WV20230504F	1 U	0.002 U	0.05 U	--	--	0.01 U	1.1 T	0.1 U	10 U	0.5 U	10 U	1 U
FIELD BLANK	8/10/2023	WV21230810F	1 U	0.002 U	0.05 U	--	--	0.01 U	1.3 T	0.1 U	10 U	0.5 U	10 U	0.5 U
FIELD BLANK	11/13/2023	WV26231113F	1 U	0.002 U	0.05 U	--	--	0.01 U	1.1 T	0.1 U	10 U	0.5 U	10 U	0.5 U
Offsite Domestic Wells														
DW-85	2/16/2023	WV85230216-	70.4	0.256	2.65	--	--	0.01 U	146	2.04	105	0.5 U	102	1 U
DW-85	8/9/2023	WV85230809-	70.6	0.303	2.77	--	--	0.01 U	151	2.27	99.3	0.53 T	105	0.5 U
DW-LS	2/16/2023	WVLS230216-	116	0.002 U	5.83	--	--	2.07	274	12.4	174	0.86 T	177	4.2
DW-LS	8/9/2023	WVLS230809-	116	0.002 U	5.68	--	--	1.86	278	12.7	164	0.88 T	180	0.5 U
DW-PA	2/16/2023	WVPA230216-	69	0.002 U	5.83	--	--	0.88	181	11.8	120	0.5 U	122	0.5 U
DW-PA	8/9/2023	WVPA230809-	69.2	0.002 U	5.99	1 U	1 U	0.959	185	11.2	115	0.54 T	127	0.5 U

Notes:
-- = parameter is not tested
*Insufficient water to collect a sample

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

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	Antimony, Dissolved (mg/L)	Antimony, Total (mg/L)	Arsenic, Dissolved (ug/L)	Arsenic, Total (ug/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)
			Channel Cc1											
MW-3	2/13/2023	WV3-230213-	0.0003 U	0.0003 U	0.05 U	0.0911	0.0211	0.0227	0.0001 U	0.0001 U	5E-05 U	5E-05 U	7.61	7.55
MW-3	5/1/2023	WV3-230501-	0.0003 U	0.0003 U	0.0509	0.058	0.0152	0.0153	0.0001 U	0.0001 U	5E-05 U	5E-05 U	5.66	5.46
MW-3	8/7/2023	WV3-230807-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	11/2/2023	WV3-231102-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/13/2023	WV4-230213-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	5/1/2023	VW4-230501-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	8/4/2023	WV4-230804-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	11/1/2023	WV4-231101-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	2/13/2023	WV10230213-	0.0003 U	0.0003 U	1.6	1.59	0.00332	0.00333	0.0001 U	0.0001 U	5E-05 U	5E-05 U	10.1	9.93
MW-10	5/1/2023	WV10230501-	0.0003 U	0.0003 U	1.68	1.65	0.00319	0.00334	0.0001 U	0.0001 U	5E-05 U	5E-05 U	10.5	10.4
MW-10	8/7/2023	WV10230807-	0.0003 U	0.0003 U	1.63	1.68	0.00338	0.00333	0.0001 U	0.0001 U	5E-05 U	5E-05 U	10.1	10.1
MW-10	11/2/2023	WV10231102-	0.0003 U	0.0003 U	1.71	1.61	0.00303	0.00328	0.0001 U	0.0001 U	5E-05 U	5E-05 U	9.54	9.98
MW-13	2/13/2023	WV13230213-	0.0003 U	0.0003 U	2.15	2.13	0.0042	0.00465	0.0001 U	0.0001 U	5E-05 U	5E-05 U	9.2	9.08
MW-13	5/2/2023	WV13230502-	0.0003 U	0.0003 U	2.19	1.92	0.00548	0.0049	0.0001 U	0.0001 U	5E-05 U	5E-05 U	11.3	9.64
MW-13	8/8/2023	WV13230808-	0.0003 U	0.0003 U	1.93	1.94	0.00493	0.00496	0.0001 U	0.0001 U	5E-05 U	5E-05 U	9.85	9.92
MW-13	8/8/2023	WV13230808D	0.0003 U	0.0003 U	1.9	1.9	0.00498	0.00515	0.0001 U	0.0001 U	5E-05 U	5E-05 U	9.83	9.69
MW-13	11/13/2023	WV13231113-	0.0003 U	0.0003 U	2.21	2.03	0.0051	0.00507	0.0001 U	0.0001 U	5E-05 U	5E-05 U	10.1	9.75
			Channel Cc2											
MW-2	2/21/2023	WV2-230221-	0.0003 U	0.0003 U	0.89	0.868	0.00641	0.00644	0.0001 U	0.0001 U	5E-05 U	5E-05 U	20.6	20.3
MW-2	5/4/2023	WV2-230504-	0.0003 U	0.0003 U	0.864	0.86	0.00678	0.00648	0.0001 U	0.0001 U	5E-05 U	5E-05 U	21.4	21.5
MW-2	8/10/2023	WV2-230810-	0.0003 U	0.0003 U	0.93	0.947	0.0065	0.00644	0.0001 U	0.0001 U	5E-05 U	5E-05 U	21	21.3
MW-2	11/14/2023	WV2-231114-	0.0003 U	0.0003 U	0.947	0.885	0.00677	0.00703	0.0001 U	0.0001 U	5E-05 U	5E-05 U	21.8	21.7
MW-9	2/14/2023	WV9-230214-	0.0003 U	0.0003 U	2.24	2.24	0.00366	0.00394	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14	14.4
MW-9	2/14/2023	WV9-230214D	0.0003 U	0.0003 U	2.25	2.19	0.00383	0.00394	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.5	14.2
MW-9	5/2/2023	WV9-230502-	0.0003 U	0.0003 U	2.36	2.38	0.00397	0.00407	0.0001 U	0.0001 U	5E-05 U	5E-05 U	15	14.8
MW-9	8/7/2023	WV9-230807-	0.0003 U	0.0003 U	2.28	2.31	0.00401	0.00399	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.8	14.6
MW-9	11/2/2023	WV9-231102-	0.0003 U	0.0003 U	2.35	2.18	0.0035	0.00383	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.9	14
MW-20	2/21/2023	WV20230221-	0.0003 U	0.0003 U	2.04	2.08	0.00528	0.00523	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.3	13
MW-20	5/4/2023	WV20230504-	0.0003 U	0.0003 U	2.03	2.03	0.00531	0.00532	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.5	13.5
MW-20	8/10/2023	WV20230810-	0.0003 U	0.0003 U	2.07	2.11	0.00543	0.00538	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.2	13.3
MW-20	11/14/2023	WV20231114-	0.0003 U	0.0003 U	2.01	1.93	0.00526	0.00513	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.5	13.4
MW-21	2/21/2023	WV21230221-	0.0003 U	0.0003 U	1.01	1.32	0.00515	0.00531	0.0001 U	0.0001 U	5E-05 U	5E-05 U	18.9	18.9
MW-21	5/4/2023	WV21230504-	0.0003 U	0.0003 U	0.999	1.04	0.00597	0.0059	0.0001 U	0.0001 U	5E-05 U	5E-05 U	20.3	19.9
MW-21	8/10/2023	WV21230810-	0.0003 U	0.0003 U	0.789	1.11	0.00597	0.00645	0.0001 U	0.0001 U	5E-05 U	5E-05 U	19.6	19.9
MW-21	11/14/2023	WV21231114-	0.0003 U	0.0003 U	0.741	1.07	0.00692	0.00718	0.0001 U	0.0001 U	5E-05 U	5E-05 U	21.4	20.5
MW-33	2/21/2023	WV33230221-	0.0003 U	0.0003 U	38.2	37.9	0.0206	0.0211	0.0001 U	0.0001 U	5E-05 U	5E-05 U	55.3	54
MW-33	5/4/2023	WV33230504-	0.0003 U	0.0003 U	34.5	34.5	0.0226	0.0218	0.0001 U	0.0001 U	5E-05 U	5E-05 U	57.8	57
MW-33	8/10/2023	WV33230810-	0.0003 U	0.0003 U	35.5	36.1	0.0222	0.0222	0.0001 U	0.0001 U	5E-05 U	5E-05 U	56.2	57.7
MW-33	11/14/2023	WV33231114-	0.0003 U	0.0003 U	39.6	38.5	0.0208	0.0195	0.0001 U	0.0001 U	5E-05 U	5E-05 U	55.3	55.2
MW-35	2/21/2023	WV35230221-	0.0003 U	0.0003 U	25.1	36.7	0.0172	0.021	0.0001 U	0.0001 U	5E-05 U	5E-05 U	49.6	49.9
MW-35	5/4/2023	WV35230504-	0.0003 U	0.0003 U	25.8	32	0.018	0.0243	0.0001 U	0.0001 U	5E-05 U	5E-05 U	50.9	49.9
MW-35	8/10/2023	WV35230810-	0.0003 U	0.0003 U	25.5	28.9	0.0176	0.0211	0.0001 U	0.0001 U	5E-05 U	5E-05 U	50.9	50.3
MW-35	11/14/2023	WV35231114-	0.0003 U	0.0003 U	22.2	27.8	0.016	0.0198	0.0001 U	0.0001 U	5E-05 U	5E-05 U	49.4	49.7
MW-37	2/21/2023	WV37230221-	0.0003 U	0.0003 U	0.961	1.37	0.00586	0.00754	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.9	14.1
MW-37	5/4/2023	WV37230504-	0.0003 U	0.0003 U	1.05	1.14	0.00616	0.00665	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.8	14.6
MW-37	8/10/2023	WV37230810-	0.0003 U	0.0003 U	1.02	1.14	0.00571	0.00643	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.2	14.3
MW-37	11/14/2023	WV37231114-	0.0003 U	0.0003 U	1.09	1.09	0.00569	0.00678	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.9	14.4

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

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	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)
							Channel Cc1							
MW-3	2/13/2023	WV3-230213-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.000245	0.01 U	0.0554	0.0001 U	0.0001 U	2.79	2.8
MW-3	5/1/2023	WV3-230501-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.000204	0.01 U	0.0383	0.0001 U	0.0001 U	2.28	2.1
MW-3	8/7/2023	WV3-230807-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	11/2/2023	WV3-231102-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/13/2023	WV4-230213-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	5/1/2023	VW4-230501-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	8/4/2023	WV4-230804-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	11/1/2023	WV4-231101-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	2/13/2023	WV10230213-	0.00292	0.00285	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	9.38	9.29
MW-10	5/1/2023	WV10230501-	0.00282	0.00291	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	9.93	9.61
MW-10	8/7/2023	WV10230807-	0.00287	0.00323	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	9.52	9.7
MW-10	11/2/2023	WV10231102-	0.00289	0.00278	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	9.4	9.46
MW-13	2/13/2023	WV13230213-	0.00305	0.00304	5E-05 U	5E-05 U	0.000242	0.000234	0.01 U	0.01 U	0.0001 U	0.0001 U	10.8	10.2
MW-13	5/2/2023	WV13230502-	0.00244	0.00224	5E-05 U	5E-05 U	0.000294	0.000232	0.01 U	0.01 U	0.0001 U	0.0001 U	13.1	11.4
MW-13	8/8/2023	WV13230808-	0.00223	0.00248	5E-05 U	5E-05 U	0.000271	0.000292	0.01 U	0.01 U	0.0001 U	0.0001 U	11.5	11.9
MW-13	8/8/2023	WV13230808D	0.00227	0.00208	5E-05 U	5E-05 U	0.00037	0.000245	0.01 U	0.01 U	0.0001 U	0.0001 U	11.7	11.2
MW-13	11/13/2023	WV13231113-	0.00287	0.00279	5E-05 U	5E-05 U	0.000256	0.000232	0.01 U	0.01 U	0.0001 U	0.0001 U	12.1	10.8
							Channel Cc2							
MW-2	2/21/2023	WV2-230221-	0.0002 U	0.000279	5E-05 U	5E-05 U	0.0002 U	0.000222	0.01 U	0.0155	0.0001 U	0.0001 U	21.5	21.3
MW-2	5/4/2023	WV2-230504-	0.0002 U	0.000247	5E-05 U	5E-05 U	0.000206	0.0002 U	0.01 DU	0.01 U	0.0001 U	0.0001 U	21.9	22.1
MW-2	8/10/2023	WV2-230810-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.000246	0.00021	0.01 U	0.01 U	0.0001 U	0.0001 U	22.6	22.6
MW-2	11/14/2023	WV2-231114-	0.0002 U	0.0002 U	5.9E-05	5.48E-05	0.000252	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	22.9	22.4
MW-9	2/14/2023	WV9-230214-	0.00356	0.00357	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	11.7	11.3
MW-9	2/14/2023	WV9-230214D	0.00361	0.00356	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	11.5	11.2
MW-9	5/2/2023	WV9-230502-	0.00389	0.00402	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.0513	0.0001 U	0.0001 U	12	11.7
MW-9	8/7/2023	WV9-230807-	0.00415	0.00462	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	11.8	12.2
MW-9	11/2/2023	WV9-231102-	0.00455	0.00432	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	11.3	11
MW-20	2/21/2023	WV20230221-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.115	0.141	0.0001 U	0.0001 U	11.4	11.5
MW-20	5/4/2023	WV20230504-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.1 D	0.136	0.0001 U	0.0001 U	11.5	11.6
MW-20	8/10/2023	WV20230810-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.125	0.15	0.0001 U	0.0001 U	12	12
MW-20	11/14/2023	WV20231114-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.16	0.154	0.0001 U	0.0001 U	12.3	11.3
MW-21	2/21/2023	WV21230221-	0.0002 U	0.0002 U	8.95E-05	0.000129	0.0002 U	0.0002 U	0.0742	0.255	0.0001 U	0.0001 U	18.1	18.3
MW-21	5/4/2023	WV21230504-	0.0002 U	0.0002 U	9.65E-05	9.7E-05	0.0002 U	0.0002 U	0.143 D	0.181	0.0001 U	0.0001 U	18.5	18.6
MW-21	8/10/2023	WV21230810-	0.0002 U	0.000507	0.000105	0.00014	0.000223	0.0002 U	0.105	0.297	0.0001 U	0.0001 U	19.8	19.9
MW-21	11/14/2023	WV21231114-	0.0002 U	0.0002 U	0.000152	0.000173	0.0002 U	0.0002 U	0.155	0.399	0.0001 U	0.0001 U	21.7	20.7
MW-33	2/21/2023	WV33230221-	0.0002 U	0.0002 U	0.00102	0.000985	0.0002 U	0.0002 U	5.61	5.54	0.0001 U	0.0001 U	43.9	44.6
MW-33	5/4/2023	WV33230504-	0.0002 U	0.0002 U	0.000971	0.000941	0.0002 U	0.0002 U	5.42 D	5.65	0.0001 U	0.0001 U	44.3	44.7
MW-33	8/10/2023	WV33230810-	0.0002 U	0.000268	0.00095	0.000935	0.0002 U	0.0002 U	5.46	5.6	0.0001 U	0.0001 U	44.8	45.1
MW-33	11/14/2023	WV33231114-	0.000222	0.0002 U	0.000974	0.000927	0.0002 U	0.0002 U	5.79	5.54	0.0001 U	0.0001 U	43.4	41.9
MW-35	2/21/2023	WV35230221-	0.0002 U	0.00104	0.00169	0.0019	0.0002 U	0.000635	9.68	11.2	0.0001 U	0.000131	39.7	39.6
MW-35	5/4/2023	WV35230504-	0.0002 U	0.0022	0.00164	0.00215	0.0002 U	0.0012	10.1 D	11.9	0.0001 U	0.000277	38.6	38.5
MW-35	8/10/2023	WV35230810-	0.0002 U	0.00132	0.0016	0.00182	0.0002 U	0.000654	10.2	11.2	0.0001 U	0.000148	39.5	39.5
MW-35	11/14/2023	WV35231114-	0.0002 U	0.000914	0.00151	0.00164	0.0002 U	0.000556	8.59	9.41	0.0001 U	0.000115	40	38.7
MW-37	2/21/2023	WV37230221-	0.00485	0.00996	5E-05 U	0.000261	0.0002 U	0.000436	0.0308	0.387	0.0001 U	0.0001 U	12.5	12.5
MW-37	5/4/2023	WV37230504-	0.00746	0.00863	5E-05 U	9.69E-05	0.0002 U	0.000206	0.01 DU	0.15	0.0001 U	0.0001 U	12.6	12.5
MW-37	8/10/2023	WV37230810-	0.00782	0.00843	5E-05 U	7.02E-05	0.0002 U	0.0002 U	0.0178	0.104	0.0001 U	0.0001 U	13	13
MW-37	11/14/2023	WV37231114-	0.00739	0.00841	5E-05 U	0.000157	0.0002 U	0.000401	0.0179	0.251	0.0001 U	0.0001 U	13.3	12.1

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

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	Manganese, Dissolved (ug/L)	Manganese, Total (ug/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)
							Channel Cc1							
MW-3	2/13/2023	WV3-230213-	0.463	5.38	5E-05 U	5E-05 U	0.000173	0.000291	1.47	1.55	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-3	5/1/2023	WV3-230501-	0.448	3.03	5E-05 U	5E-05 DU	0.000238 D	0.000225	1.26	1.16	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-3	8/7/2023	WV3-230807-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	11/2/2023	WV3-231102-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/13/2023	WV4-230213-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	5/1/2023	VW4-230501-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	8/4/2023	WV4-230804-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	11/1/2023	WV4-231101-*	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	2/13/2023	WV10230213-	0.1 U	0.1 U	5E-05 U	5E-05 U	0.000322	0.000284	1.43	1.52	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-10	5/1/2023	WV10230501-	0.1 U	0.1 U	5E-05 U	5E-05 DU	0.000291 D	0.000328	1.56	1.48	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-10	8/7/2023	WV10230807-	0.1 U	0.1 U	5E-05 U	5E-05 U	0.000302	0.000332	1.48	1.44	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-10	11/2/2023	WV10231102-	0.1 U	0.1 U	5E-05 DU	5E-05 DU	0.00032	0.000278	1.44	1.42	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-13	2/13/2023	WV13230213-	0.1 U	0.17	5E-05 U	5E-05 U	0.000941	0.000927	1.68	1.79	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-13	5/2/2023	WV13230502-	0.435	0.433	5E-05 U	5E-05 DU	0.00105 D	0.000974	2.15	1.76	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-13	8/8/2023	WV13230808-	0.649	0.677	5E-05 U	5E-05 U	0.000992	0.00104	1.77	1.75	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-13	8/8/2023	WV13230808D	0.626	0.678	5E-05 U	5E-05 U	0.000967	0.000995	1.76	1.75	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-13	11/13/2023	WV13231113-	0.1 U	0.103	5E-05 U	5E-05 U	0.00104	0.000976	1.92	1.67	0.0005 U	0.0005 U	4E-05 U	4E-05 U
							Channel Cc2							
MW-2	2/21/2023	WV2-230221-	48.4	66.4	5E-05 DU	5E-05 U	0.00236	0.00252	2.09	2.09	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-2	5/4/2023	WV2-230504-	50.8	64.9	5E-05 DU	5E-05 U	0.00224	0.00226	2.17	2.15	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-2	8/10/2023	WV2-230810-	96.4	110	5E-05 U	5E-05 U	0.00344	0.00337	2.25	2.35	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-2	11/14/2023	WV2-231114-	96.5	105	5E-05 U	5E-05 U	0.0037	0.00351	2.22	2.08	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-9	2/14/2023	WV9-230214-	0.1 U	0.11	5E-05 U	5E-05 U	0.000126	0.000141	2.1	2.23	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-9	2/14/2023	WV9-230214D	0.1 U	0.1 U	5E-05 U	5E-05 U	0.000134	0.000139	2.1	2.23	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-9	5/2/2023	WV9-230502-	0.119	1.32	5E-05 U	5E-05 DU	0.000146 D	0.000242	2.34	2.16	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-9	8/7/2023	WV9-230807-	0.1 U	0.489	5E-05 U	5E-05 U	0.00017	0.000255	2.21	2.11	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-9	11/2/2023	WV9-231102-	0.1 U	0.421	5E-05 DU	5E-05 DU	0.000139	0.000133	2.12	2.06	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-20	2/21/2023	WV20230221-	146	150	5E-05 DU	5E-05 U	0.000153	0.000167	2.06	2.03	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-20	5/4/2023	WV20230504-	132	131	5E-05 DU	5E-05 U	0.000192	0.000161	2.1	2.08	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-20	8/10/2023	WV20230810-	136	141	5E-05 U	5E-05 U	0.000192	0.000149	2.25	2.24	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-20	11/14/2023	WV20231114-	147	140	5E-05 U	5E-05 U	0.000171	0.000201	2.2	2.01	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-21	2/21/2023	WV21230221-	144	168	5E-05 DU	5E-05 U	0.000863	0.00104	2.04	2.08	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-21	5/4/2023	WV21230504-	157	157	5E-05 DU	5E-05 U	0.000957	0.000949	2.18	2.13	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-21	8/10/2023	WV21230810-	230	267	5E-05 U	5E-05 U	0.00121	0.00149	2.32	2.38	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-21	11/14/2023	WV21231114-	404	447	5E-05 U	5E-05 U	0.0019	0.002	2.39	2.17	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-33	2/21/2023	WV33230221-	912	970	5E-05 DU	5E-05 U	0.00518	0.00498	3.06	3.02	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-33	5/4/2023	WV33230504-	858	847	5E-05 DU	5E-05 U	0.00493	0.00483	3.23	3.16	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-33	8/10/2023	WV33230810-	866	887	5E-05 U	5E-05 U	0.0048	0.00474	3.35	3.38	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-33	11/14/2023	WV33231114-	926	904	5E-05 U	5E-05 U	0.00498	0.00466	3.24	2.95	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-35	2/21/2023	WV35230221-	2090 D	2200 D	5E-05 DU	5E-05 U	0.00348	0.00451	3.09	3.14	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-35	5/4/2023	WV35230504-	2080	2050	5E-05 DU	5E-05 U	0.00338	0.00623	3.15	3.08	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-35	8/10/2023	WV35230810-	1900	1970	5E-05 U	5E-05 U	0.00286	0.00431	3.33	3.37	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-35	11/14/2023	WV35231114-	1930	1920	5E-05 U	5E-05 U	0.00295	0.00394	3.28	3.03	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-37	2/21/2023	WV37230221-	20.3	86.9	5E-05 DU	5E-05 U	0.0015	0.00292	1.4	1.39	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-37	5/4/2023	WV37230504-	7.03	31	5E-05 DU	5E-05 U	0.00141	0.00196	1.47	1.44	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-37	8/10/2023	WV37230810-	4.62	16.5	5E-05 U	5E-05 U	0.00138	0.00169	1.53	1.53	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-37	11/14/2023	WV37231114-	4.23	30.5	5E-05 U	5E-05 U	0.00138	0.00236	1.56	1.4	0.0005 U	0.0005 U	4E-05 U	4E-05 U

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

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	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	2/13/2023	WV3-230213-	2.58	2.53	7.5E-05 U	7.5E-05 U	0.000165	0.0003 D	0.0005 U	0.0005 U
MW-3	5/1/2023	WV3-230501-	2.25	1.97	7.5E-05 U	7.5E-05 U	0.000136	0.000209	0.0005 U	0.0005 U
MW-3	8/7/2023	WV3-230807-*	--	--	--	--	--	--	--	--
MW-3	11/2/2023	WV3-231102-*	--	--	--	--	--	--	--	--
MW-4	2/13/2023	WV4-230213-*	--	--	--	--	--	--	--	--
MW-4	5/1/2023	VW4-230501-*	--	--	--	--	--	--	--	--
MW-4	8/4/2023	WV4-230804-*	--	--	--	--	--	--	--	--
MW-4	11/1/2023	WV4-231101-*	--	--	--	--	--	--	--	--
MW-10	2/13/2023	WV10230213-	5.07	4.94	7.5E-05 U	7.5E-05 U	0.00414	0.0042	0.0005 U	0.0005 U
MW-10	5/1/2023	WV10230501-	5.32	5.18	7.5E-05 U	7.5E-05 U	0.00415	0.00405	0.0005 U	0.0005 U
MW-10	8/7/2023	WV10230807-	5.1	5.33	7.5E-05 U	7.5E-05 U	0.00423 D	0.00429	0.0005 U	0.0005 U
MW-10	11/2/2023	WV10231102-	5.26	5.16	7.5E-05 U	7.5E-05 U	0.00427	0.0042	0.0005 U	0.0005 U
MW-13	2/13/2023	WV13230213-	6.17	5.87	7.5E-05 U	7.5E-05 U	0.00687	0.00663	0.0005 U	0.0005 U
MW-13	5/2/2023	WV13230502-	7.32	6.34	7.5E-05 U	7.5E-05 U	0.00687	0.00568	0.0005 U	0.0005 U
MW-13	8/8/2023	WV13230808-	6.31	6.65	7.5E-05 U	7.5E-05 U	0.00588	0.00607	0.0005 U	0.0005 U
MW-13	8/8/2023	WV13230808D	6.5	6.33	7.5E-05 U	7.5E-05 U	0.00598	0.00581	0.0005 U	0.0005 U
MW-13	11/13/2023	WV13231113-	6.86	6.18	7.5E-05 U	7.5E-05 U	0.00675	0.00629	0.0005 U	0.0005 U
			Channel Cc2							
MW-2	2/21/2023	WV2-230221-	9.28	9.47	7.5E-05 U	7.5E-05 U	0.00327	0.00324	0.0005 U	0.0005 U
MW-2	5/4/2023	WV2-230504-	9.43	9.48	7.5E-05 U	7.5E-05 U	0.00315	0.00312	0.0005 U	0.0005 U
MW-2	8/10/2023	WV2-230810-	9.71	9.75	7.5E-05 U	7.5E-05 U	0.00371	0.00373	0.000656	0.000647
MW-2	11/14/2023	WV2-231114-	9.63	9.17	7.5E-05 U	7.5E-05 U	0.00358	0.00337	0.000605	0.0005 U
MW-9	2/14/2023	WV9-230214-	6.16	6	7.5E-05 U	7.5E-05 U	0.00477	0.0049 D	0.0005 U	0.0005 U
MW-9	2/14/2023	WV9-230214D	6.09	5.97	7.5E-05 U	7.5E-05 U	0.00485	0.00504 D	0.0005 U	0.0005 U
MW-9	5/2/2023	WV9-230502-	6.56	6.36	7.5E-05 U	7.5E-05 U	0.00483	0.00484	0.0005 U	0.0005 U
MW-9	8/7/2023	WV9-230807-	6.36	6.5	7.5E-05 U	7.5E-05 U	0.0051 D	0.00493	0.0005 U	0.0005 U
MW-9	11/2/2023	WV9-231102-	6.21	6.07	7.5E-05 U	7.5E-05 U	0.00479	0.00471	0.0005 U	0.0005 U
MW-20	2/21/2023	WV20230221-	5.99	5.98	7.5E-05 U	7.5E-05 U	0.000117	0.000129	0.0005 U	0.0005 U
MW-20	5/4/2023	WV20230504-	6.17	6.01	7.5E-05 U	7.5E-05 U	0.000264	0.000164	0.0005 U	0.0005 U
MW-20	8/10/2023	WV20230810-	6.4	6.35	7.5E-05 U	7.5E-05 U	0.00044	0.000353	0.0005 U	0.0005 U
MW-20	11/14/2023	WV20231114-	6.55	6.03	7.5E-05 U	7.5E-05 U	0.000254	0.000145	0.0005 U	0.0005 U
MW-21	2/21/2023	WV21230221-	11.4	11.4	7.5E-05 U	7.5E-05 U	0.000661	0.000796	0.0005 U	0.0005 U
MW-21	5/4/2023	WV21230504-	10.9	10.7	7.5E-05 U	7.5E-05 U	0.000769	0.000715	0.0005 U	0.0005 U
MW-21	8/10/2023	WV21230810-	10.5	10.6	7.5E-05 U	7.5E-05 U	0.000842	0.000904	0.0005 U	0.0005 U
MW-21	11/14/2023	WV21231114-	10.4	9.66	7.5E-05 U	7.5E-05 U	0.000865	0.000878	0.0005 U	0.0005 U
MW-33	2/21/2023	WV33230221-	17.2	17	7.5E-05 U	7.5E-05 U	0.000672	0.000673	0.0005 U	0.0005 U
MW-33	5/4/2023	WV33230504-	17.2	17.2	7.5E-05 U	7.5E-05 U	0.000694	0.000663	0.0005 U	0.0005 U
MW-33	8/10/2023	WV33230810-	17.4	17.5	7.5E-05 U	7.5E-05 U	0.00068	0.000666	0.0005 U	0.000601
MW-33	11/14/2023	WV33231114-	17.9	16.4	7.5E-05 U	7.5E-05 U	0.000707	0.000667	0.0005 U	0.0005 U
MW-35	2/21/2023	WV35230221-	17.3	17.5	7.5E-05 U	7.5E-05 U	0.00022	0.000883	0.00206	0.00484
MW-35	5/4/2023	WV35230504-	17.4	16.8	7.5E-05 U	7.5E-05 U	0.000263	0.00166	0.00118	0.00737
MW-35	8/10/2023	WV35230810-	17.3	17.5	7.5E-05 U	7.5E-05 U	0.000315	0.00101	0.001	0.0039
MW-35	11/14/2023	WV35231114-	17.1	16.6	7.5E-05 U	7.5E-05 U	0.000266	0.000872	0.000986	0.00341
MW-37	2/21/2023	WV37230221-	7.6	7.71	7.5E-05 U	7.5E-05 U	0.00443	0.00585	0.000772	0.00163
MW-37	5/4/2023	WV37230504-	7.69	7.54	7.5E-05 U	7.5E-05 U	0.005	0.00533	0.00109	0.00123
MW-37	8/10/2023	WV37230810-	7.84	7.89	7.5E-05 U	7.5E-05 U	0.00509	0.00549	0.0005 U	0.000688
MW-37	11/14/2023	WV37231114-	8.31	7.52	7.5E-05 U	7.5E-05 U	0.00535	0.00552	0.000659	0.00162

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

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	Antimony, Dissolved (mg/L)	Antimony, Total (mg/L)	Arsenic, Dissolved (ug/L)	Arsenic, Total (ug/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)
							Channel Cc3							
MW-8	2/13/2023	WV8-230213-	0.0003 U	0.0003 U	0.524	0.525	0.00345	0.00349	0.0001 U	0.0001 U	5E-05 U	5E-05 U	11.8	11.2
MW-8	5/1/2023	WV8-230501-	0.0003 U	0.0003 U	0.55	0.535	0.00362	0.00352	0.0001 U	0.0001 U	5E-05 U	5E-05 U	12	11.6
MW-8	5/1/2023	WV8-230501D	0.0003 U	0.0003 U	0.542	0.538	0.00359	0.00353	0.0001 U	0.0001 U	5E-05 U	5E-05 U	11.9	11.6
MW-8	8/7/2023	WV8-230807-	0.0003 U	0.0003 U	0.535	0.543	0.00422	0.00353	0.0001 U	0.0001 U	5E-05 U	5E-05 U	11.6	11.6
MW-8	11/2/2023	WV8-231102-	0.0003 U	0.0003 U	0.572	0.524	0.0034	0.00352	0.0001 U	0.0001 U	5E-05 U	5E-05 U	11	11.3
MW-36	2/14/2023	WV36230214-	0.0003 U	0.0003 U	1.84	1.8	0.00742	0.00765	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.8	13.9
MW-36	5/1/2023	WV36230501-	0.0003 U	0.0003 U	2.01	1.92	0.00772	0.00743	0.0001 U	0.0001 U	5E-05 U	5E-05 U	15.1	14.2
MW-36	8/10/2023	WV36230810-	0.0003 U	0.0003 U	2.04	1.98	0.00747	0.00769	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14	14
MW-36	11/13/2023	WV36231113-	0.0003 U	0.0003 U	1.94	1.83	0.00745	0.00718	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.5	14.3
							Unit D Aquifer							
MW-7	2/13/2023	WV7-230213-	0.0003 U	0.0003 U	4.8	4.73	0.0129	0.0139	0.0001 U	0.0001 U	5E-05 U	5E-05 U	15.6	15.5
MW-7	5/1/2023	WV7-230501-	0.0003 U	0.0003 U	4.86	4.98	0.0138	0.0144	0.0001 U	0.0001 U	5E-05 U	5E-05 U	17.1	16.1
MW-7	8/8/2023	WV7-230808-	0.0003 U	0.0003 U	4.75	4.96	0.0135	0.0145	0.0001 U	0.0001 U	5E-05 U	5E-05 U	16.1	16.1
MW-7	11/13/2023	WV7-231113-	0.0003 U	0.0003 U	5.11	5.21	0.0141	0.0159	0.0001 U	0.0001 U	5E-05 U	5E-05 U	16.6	16.3
MW-12	2/13/2023	WV12230213-	0.0003 U	0.0003 U	2.02	1.99	0.00448	0.00459	0.0001 U	0.0001 U	5E-05 U	5E-05 U	11.4	11.3
MW-12	5/1/2023	WV12230501-	0.0003 U	0.0003 U	2.08	2.12	0.0046	0.00459	0.0001 U	0.0001 U	5E-05 U	5E-05 U	12.2	11.9
MW-12	8/7/2023	WV12230807-	0.0003 U	0.0003 U	2.07	2.13	0.00471	0.00472	0.0001 U	0.0001 U	5E-05 U	5E-05 U	11.8	12.2
MW-12	11/2/2023	WV12231102-	0.0003 U	0.0003 U	2.08	1.95	0.00438	0.0045	0.0001 U	0.0001 U	5E-05 U	5E-05 U	11.4	11.4
MW-19	2/14/2023	WV19230214-	0.0003 U	0.0003 U	0.907	1.05	0.0155	0.0171	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.9	14.8
MW-19	5/2/2023	WV19230502-	0.0003 U	0.0003 U	1.01	1.18	0.0164	0.0182	0.0001 U	0.0001 U	5E-05 U	5E-05 U	15.9	16.1
MW-19	8/7/2023	WV19230807-	0.0003 U	0.0003 U	0.914	1.12	0.0164	0.0175	0.0001 U	0.0001 U	5E-05 U	5E-05 U	15.5	15.3
MW-19	11/13/2023	WV19231113-	0.0003 U	0.0003 U	0.966	1.05	0.0162	0.0164	0.0001 U	0.0001 U	5E-05 U	5E-05 U	15.9	15.5
MW-26	2/14/2023	WV26230214-	0.0003 U	0.0003 U	3.02	2.94	0.00887	0.00952	0.0001 U	0.0001 U	5E-05 U	5E-05 U	17.5	16.9
MW-26	5/2/2023	WV26230502-	0.0003 U	0.0003 U	2.99	3.46	0.00899	0.0105	0.0001 U	0.0001 U	5E-05 U	5E-05 U	18.5	18
MW-26	8/8/2023	WV26230808-	0.0003 U	0.0003 U	3.08	3.31	0.00933	0.0107	0.0001 U	0.0001 U	5E-05 U	5E-05 U	17.8	18
MW-26	11/13/2023	WV26231113-	0.0003 U	0.0003 U	3.15	3.12	0.00897	0.00978	0.0001 U	0.0001 U	5E-05 U	5E-05 U	18.4	18.3
MW-29	2/14/2023	WV29230214-	0.0003 U	0.0003 U	3.77	8.21	0.00936	0.013	0.0001 U	0.0001 U	5E-05 U	5E-05 U	19.4	19.5
MW-29	5/2/2023	WV29230502-	0.0003 U	0.0003 U	4.04	10.7	0.00985	0.0132	0.0001 U	0.0001 U	5E-05 U	5E-05 U	20.1	20
MW-29	8/8/2023	WV29230808-	0.0003 U	0.0003 U	4.25	11.7	0.00989	0.0143	0.0001 U	0.0001 U	5E-05 U	5E-05 U	20.1	20.2
MW-29	11/13/2023	WV29231113-	0.0003 U	0.0003 U	4.22	7.3	0.0102	0.0117	0.0001 U	0.0001 U	5E-05 U	5E-05 U	20.9	20.1
MW-34	2/14/2023	WV34230214-	0.0003 U	0.0003 U	1.28	1.23	0.0043	0.00454	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.2	13.4
MW-34	5/2/2023	WV34230502-	0.0003 U	0.0003 U	1.4	1.31	0.00448	0.0043	0.0001 U	0.0001 U	5E-05 U	5E-05 U	15	13.8
MW-34	8/7/2023	WV34230807-	0.0003 U	0.0003 U	1.3	1.33	0.00444	0.00438	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.8	13.9
MW-34	11/2/2023	WV34231102-	0.0003 U	0.0003 U	1.34	1.24	0.00423	0.00419	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.6	13.4
							Field Blanks							
FIELD BLANK	2/21/2023	WV20230221F	0.0003 U	0.0003 U	0.05 U	0.05 U	0.0005 U	0.0005 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.05 U	0.05 U
FIELD BLANK	5/4/2023	WV20230504F	0.0003 U	0.0003 U	0.05 U	0.05 U	0.0005 U	0.0005 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.05 U	0.05 U
FIELD BLANK	8/10/2023	WV21230810F	0.0003 U	0.0003 U	0.05 U	0.05 U	0.0005 U	0.0005 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.05 U	0.05 U
FIELD BLANK	11/13/2023	WV26231113F	0.0003 U	0.0003 U	0.05 U	0.05 U	0.0005 U	0.0005 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.05 U	0.05 U
							Offsite Domestic Wells							
DW-85	2/16/2023	WV85230216-	0.0003 U	0.0003 U	0.434	0.446	0.00927	0.0101	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.3	14
DW-85	8/9/2023	WV85230809-	0.0003 U	0.0003 U	0.434	0.442	0.0099	0.0101	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.3	14.3
DW-LS	2/16/2023	WVLS230216-	0.0003 U	0.0003 U	1.65	1.64	0.00612	0.0062	0.0001 U	0.0001 U	5E-05 U	5E-05 U	23.2	22.9
DW-LS	8/9/2023	WVLS230809-	0.0003 U	0.0003 U	1.65	1.69	0.00614	0.0061	0.0001 U	0.0001 U	5E-05 U	5E-05 U	23.1	22.8
DW-PA	2/16/2023	WVPA230216-	0.0003 U	0.0003 U	1.3	1.36	0.00383	0.00386	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.1	13.1
DW-PA	8/9/2023	WVPA230809-	0.0003 U	0.0003 U	1.48	1.5	0.00406	0.00397	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.4	13

Notes:
-- = parameter is not tested
*Insufficient water to collect a sample

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

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	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)
							Channel Cc3							
MW-8	2/13/2023	WV8-230213-	0.00201	0.00184	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	9.43	8.86
MW-8	5/1/2023	WV8-230501-	0.00208	0.002	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	9.58	9.31
MW-8	5/1/2023	WV8-230501D	0.00199	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	9.46	9.2
MW-8	8/7/2023	WV8-230807-	0.00198	0.00225	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	9.14	9.41
MW-8	11/2/2023	WV8-231102-	0.00204	0.00213	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	9.15	9.08
MW-36	2/14/2023	WV36230214-	0.000649	0.000561	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	9.92	9.44
MW-36	5/1/2023	WV36230501-	0.000597	0.000665	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	10.1	9.84
MW-36	8/10/2023	WV36230810-	0.000603	0.000586	5E-05 U	5E-05 U	0.0002 U	0.000202	0.01 U	0.01 U	0.0001 U	0.0001 U	9.74	9.45
MW-36	11/13/2023	WV36231113-	0.000699	0.00069	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	10.3	9.33
							Unit D Aquifer							
MW-7	2/13/2023	WV7-230213-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0181	0.0623	0.0001 U	0.0001 U	9.86	9.45
MW-7	5/1/2023	WV7-230501-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0215	0.106	0.0001 U	0.0001 U	10.4	10
MW-7	8/8/2023	WV7-230808-	0.000223	0.000369	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0221	0.103	0.0001 U	0.0001 U	10.2	10.2
MW-7	11/13/2023	WV7-231113-	0.0002 U	0.0002 U	5E-05 U	6.1E-05	0.0002 U	0.0002 U	0.0782	0.237	0.0001 U	0.0001 U	10.2	9.61
MW-12	2/13/2023	WV12230213-	0.00382	0.00376	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	9.65	9.26
MW-12	5/1/2023	WV12230501-	0.00396	0.00401	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	10.1	9.87
MW-12	8/7/2023	WV12230807-	0.00383	0.00434	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	9.8	10.1
MW-12	11/2/2023	WV12231102-	0.00389	0.0038	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	9.5	9.47
MW-19	2/14/2023	WV19230214-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.052	0.217	0.0001 U	0.0001 U	13.8	13.4
MW-19	5/2/2023	WV19230502-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0787	0.303	0.0001 U	0.0001 U	14.8	15.1
MW-19	8/7/2023	WV19230807-	0.0002 U	0.000275	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0389	0.277	0.0001 U	0.0001 U	14.5	14.6
MW-19	11/13/2023	WV19231113-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0624	0.272	0.0001 U	0.0001 U	15	13.6
MW-26	2/14/2023	WV26230214-	0.0002 U	0.000241	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.102	0.281	0.0001 U	0.0001 U	7.33	6.98
MW-26	5/2/2023	WV26230502-	0.0002 U	0.000203	5E-05 U	5.44E-05	0.0002 U	0.000283	0.103	0.697	0.0001 U	0.0001 U	7.39	7.1
MW-26	8/8/2023	WV26230808-	0.000346	0.000693	5E-05 U	0.000115	0.0002 U	0.000392	0.181	0.569	0.0001 U	0.0001 U	7.31	7.54
MW-26	11/13/2023	WV26231113-	0.0002 U	0.000235	5E-05 U	6.01E-05	0.0002 U	0.0002 U	0.0687	0.222	0.0001 U	0.0001 U	7.73	7.19
MW-29	2/14/2023	WV29230214-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.563	2.49	0.0001 U	0.0001 U	14.4	13.9
MW-29	5/2/2023	WV29230502-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.73	3.57	0.0001 U	0.0001 U	14.2	14.4
MW-29	8/8/2023	WV29230808-	0.000231	0.000299	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.825	4.04	0.0001 U	0.0001 U	14.6	14.7
MW-29	11/13/2023	WV29231113-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.724	2.11	0.0001 U	0.0001 U	15	13.7
MW-34	2/14/2023	WV34230214-	0.000928	0.000927	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	12.3	11.6
MW-34	5/2/2023	WV34230502-	0.00106	0.00103	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	13.1	12.2
MW-34	8/7/2023	WV34230807-	0.00108	0.00126	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	12.2	12.5
MW-34	11/2/2023	WV34231102-	0.00106	0.00101	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U	11.8	11.8
							Field Blanks							
FIELD BLANK	2/21/2023	WV20230221F	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
FIELD BLANK	5/4/2023	WV20230504F	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.000587	0.000451	0.01 DU	0.01 U	0.0001 U	0.0001 U	0.05 U	0.05 U
FIELD BLANK	8/10/2023	WV21230810F	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
FIELD BLANK	11/13/2023	WV26231113F	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
							Offsite Domestic Wells							
DW-85	2/16/2023	WV85230216-	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0034	0.0636	0.0637	0.0001 U	0.000176	6.68	6.47
DW-85	8/9/2023	WV85230809-	0.000292	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.065	0.064	0.0001 U	0.0001 U	6.59	6.37
DW-LS	2/16/2023	WVLS230216-	0.00418	0.00434	5E-05 U	5E-05 U	0.0388	0.0493	0.01 U	0.0427	0.0001 U	0.000256	17.6	17.2
DW-LS	8/9/2023	WVLS230809-	0.00489	0.00488	5E-05 U	5E-05 U	0.0392	0.0382	0.01 U	0.0235	0.0001 U	0.00022	17.6	17.2
DW-PA	2/16/2023	WVPA230216-	0.00145	0.00154	5E-05 U	5E-05 U	0.00834	0.00896	0.01 U	0.0273	0.000132	0.000218	11.1	11.1
DW-PA	8/9/2023	WVPA230809-	0.00208	0.00184	5E-05 U	5E-05 U	0.00905	0.027	0.01 U	0.01 U	0.00013	0.000806	11.4	11.1

Notes:
-- = parameter is not tested
*Insufficient water to collect a sample

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

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	Manganese, Dissolved (ug/L)	Manganese, Total (ug/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)
Channel Cc3														
MW-8	2/13/2023	WV8-230213-	0.1 U	0.1 U	5E-05 U	5E-05 U	0.000567	0.000545	1.17	1.18	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-8	5/1/2023	WV8-230501-	0.1 U	0.1 U	5E-05 U	5E-05 DU	0.00057 D	0.000558	1.21	1.14	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-8	5/1/2023	WV8-230501D	0.1 U	0.1 U	5E-05 U	5E-05 DU	0.000551 D	0.000567	1.21	1.14	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-8	8/7/2023	WV8-230807-	0.1 U	0.1 U	5E-05 U	5E-05 U	0.000586	0.000596	1.15	1.11	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-8	11/2/2023	WV8-231102-	0.1 U	0.1 U	5E-05 DU	5E-05 DU	0.000567	0.000584	1.13	1.09	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-36	2/14/2023	WV36230214-	0.234	0.748	5E-05 U	5E-05 U	0.000124	0.0001 U	2.7	2.83	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-36	5/1/2023	WV36230501-	0.276	0.487	5E-05 U	5E-05 DU	0.0001 DU	0.000108	3.03	2.75	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-36	8/10/2023	WV36230810-	0.275	0.643	5E-05 U	5E-05 U	0.0001 U	0.000729	2.91	2.68	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-36	11/13/2023	WV36231113-	0.241	0.409	5E-05 U	5E-05 U	0.000123	0.0001 U	2.92	2.65	0.0005 U	0.0005 U	4E-05 U	4E-05 U
Unit D Aquifer														
MW-7	2/13/2023	WV7-230213-	189	198	5E-05 U	5E-05 U	0.0001 U	0.000131	2.71	2.82	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-7	5/1/2023	WV7-230501-	181	207	5E-05 U	5E-05 DU	0.0001 DU	0.000128	3.08	2.79	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-7	8/8/2023	WV7-230808-	152	185	5E-05 U	5E-05 U	0.0001 U	0.000119	2.77	2.75	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-7	11/13/2023	WV7-231113-	181	272	5E-05 U	5E-05 U	0.0001 U	0.000129	2.88	2.68	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-12	2/13/2023	WV12230213-	0.1 U	0.185	5E-05 U	5E-05 U	0.000202	0.000228	1.8	1.92	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-12	5/1/2023	WV12230501-	0.692	0.67	5E-05 U	5E-05 DU	0.000231 D	0.000248	2.06	1.89	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-12	8/7/2023	WV12230807-	0.138	0.256	5E-05 U	5E-05 U	0.00024	0.000253	1.9	1.89	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-12	11/2/2023	WV12231102-	0.116	0.141	5E-05 DU	5E-05 DU	0.000247	0.000238	1.83	1.78	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-19	2/14/2023	WV19230214-	495	470	5E-05 U	5E-05 U	0.0001 U	0.000121	2.42	2.54	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-19	5/2/2023	WV19230502-	520	532	5E-05 U	5E-05 DU	0.0001 DU	0.000128	2.71	2.53	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-19	8/7/2023	WV19230807-	475	510 D	5E-05 U	5E-05 U	0.000123	0.000154	2.55	2.43	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-19	11/13/2023	WV19231113-	464	477	5E-05 U	5E-05 U	0.000103	0.000118	2.6	2.35	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-26	2/14/2023	WV26230214-	61.8	59.1	5E-05 U	5E-05 U	0.000254	0.00036	3.09	3.15	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-26	5/2/2023	WV26230502-	58.8	63.7	5E-05 U	5E-05 DU	0.000141 D	0.000272	3.38	3.15	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-26	8/8/2023	WV26230808-	63.5	70.4	5E-05 U	5E-05 U	0.000213	0.000542	3.07	3.07	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-26	11/13/2023	WV26231113-	63.8	66.9	5E-05 U	5E-05 U	0.000208	0.000337	3.24	3.02	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-29	2/14/2023	WV29230214-	90.2	168	5E-05 U	5E-05 U	0.000136	0.000204	2.14	2.22	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-29	5/2/2023	WV29230502-	102	156	5E-05 U	5E-05 DU	0.000167 D	0.000206	2.33	2.15	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-29	8/8/2023	WV29230808-	102	140	5E-05 U	5E-05 U	0.000199	0.000171	2.18	2.14	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-29	11/13/2023	WV29231113-	96	110	5E-05 U	5E-05 U	0.000192	0.000201	2.3	2.1	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-34	2/14/2023	WV34230214-	0.1 U	0.375	5E-05 U	5E-05 U	0.00123	0.0012	1.48	1.61	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-34	5/2/2023	WV34230502-	0.1 U	0.154	5E-05 U	5E-05 DU	0.00128 D	0.00132	1.76	1.54	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-34	8/7/2023	WV34230807-	0.1 U	0.33	5E-05 U	5E-05 U	0.00124	0.0013	1.58	1.52	0.0005 U	0.0005 U	4E-05 U	4E-05 U
MW-34	11/2/2023	WV34231102-	0.1 U	0.151	5E-05 DU	5E-05 DU	0.00127	0.00116	1.56	1.48	0.0005 U	0.0005 U	4E-05 U	4E-05 U
Field Blanks														
FIELD BLANK	2/21/2023	WV20230221F	0.1 U	0.1 U	5E-05 DU	5E-05 U	0.000106	0.0001 U	0.1 U	0.1 U	0.0005 U	0.0005 U	4E-05 U	4E-05 U
FIELD BLANK	5/4/2023	WV20230504F	0.1 U	0.1 U	5E-05 DU	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
FIELD BLANK	8/10/2023	WV21230810F	0.1 U	0.1 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
FIELD BLANK	11/13/2023	WV26231113F	0.1 U	0.1 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
Offsite Domestic Wells														
DW-85	2/16/2023	WV85230216-	55.3	54.8	5E-05 U	5E-05 U	0.0001 U	0.0001 U	2.55	2.46	0.0005 U	0.0005 U	4E-05 U	4E-05 U
DW-85	8/9/2023	WV85230809-	55.2	53.3	5E-05 U	5E-05 U	0.0001 U	0.0001 U	2.5	2.54	0.0005 U	0.0005 U	4E-05 U	4E-05 U
DW-LS	2/16/2023	WVLS230216-	0.52	0.872	5E-05 U	5E-05 U	0.000566	0.000927	1.75	1.73	0.0005 U	0.0005 U	4E-05 U	4E-05 U
DW-LS	8/9/2023	WVLS230809-	0.251	0.276	5E-05 U	5E-05 U	0.000473	0.000573	1.69	1.67	0.0005 U	0.0005 U	4E-05 U	4E-05 U
DW-PA	2/16/2023	WVPA230216-	0.809	0.909	5E-05 U	5E-05 U	0.000587	0.000577	1.56	1.53	0.0005 U	0.0005 U	4E-05 U	4E-05 U
DW-PA	8/9/2023	WVPA230809-	0.144	0.241	5E-05 U	5E-05 U	0.000552	0.000584	1.54	1.52	0.0005 U	0.0005 U	4E-05 U	4E-05 U

Notes:
-- = parameter is not tested
*Insufficient water to collect a sample

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

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	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	2/13/2023	WV8-230213-	6.51	5.98	7.5E-05 U	7.5E-05 U	0.00264	0.00258	0.0005 U	0.0005 U
MW-8	5/1/2023	WV8-230501-	6.58	6.32	7.5E-05 U	7.5E-05 U	0.00258	0.00244	0.0005 U	0.0005 U
MW-8	5/1/2023	WV8-230501D	6.57	6.42	7.5E-05 U	7.5E-05 U	0.00254	0.00254	0.0005 U	0.0005 U
MW-8	8/7/2023	WV8-230807-	6.34	6.55	7.5E-05 U	7.5E-05 U	0.0024 D	0.00266	0.0005 U	0.0005 U
MW-8	11/2/2023	WV8-231102-	6.53	6.17	7.5E-05 U	7.5E-05 U	0.00262	0.00259	0.0005 U	0.0005 U
MW-36	2/14/2023	WV36230214-	6.58	6.33	7.5E-05 U	7.5E-05 U	0.00186	0.00213 D	0.0005 U	0.000533
MW-36	5/1/2023	WV36230501-	6.96	6.51	7.5E-05 U	7.5E-05 U	0.00193	0.00178	0.0005 U	0.0005 U
MW-36	8/10/2023	WV36230810-	6.53	6.4	7.5E-05 U	7.5E-05 U	0.00206	0.0018	0.0005 U	0.000984
MW-36	11/13/2023	WV36231113-	7.03	6.39	7.5E-05 U	7.5E-05 U	0.002	0.00181	0.0005 U	0.0005 U
					Unit D Aquifer					
MW-7	2/13/2023	WV7-230213-	6.44	6.04	7.5E-05 U	7.5E-05 U	0.000159	0.000301 D	0.0005 U	0.0005 U
MW-7	5/1/2023	WV7-230501-	6.8	6.37	7.5E-05 U	7.5E-05 U	0.000183	0.000167	0.0005 U	0.00107
MW-7	8/8/2023	WV7-230808-	6.48	6.67	7.5E-05 U	7.5E-05 U	0.000156	0.000214	0.0005 U	0.0005 U
MW-7	11/13/2023	WV7-231113-	6.58	6.38	7.5E-05 U	7.5E-05 U	0.000278	0.00017	0.0005 U	0.000718
MW-12	2/13/2023	WV12230213-	5.74	5.54	7.5E-05 U	7.5E-05 U	0.00511	0.00508	0.0005 U	0.0005 U
MW-12	5/1/2023	WV12230501-	6.21	6	7.5E-05 U	7.5E-05 U	0.00516	0.00504	0.0005 U	0.0005 U
MW-12	8/7/2023	WV12230807-	5.97	6.22	7.5E-05 U	7.5E-05 U	0.00493 D	0.00535	0.0005 U	0.0005 U
MW-12	11/2/2023	WV12231102-	5.85	5.7	7.5E-05 U	7.5E-05 U	0.00503	0.00501	0.0005 U	0.0005 U
MW-19	2/14/2023	WV19230214-	6.85	6.68	7.5E-05 U	7.5E-05 U	7.9E-05	0.000297 D	0.0005 U	0.0005 U
MW-19	5/2/2023	WV19230502-	7.49	7.37	7.5E-05 U	7.5E-05 U	0.000133	0.000149	0.0005 U	0.0005 U
MW-19	8/7/2023	WV19230807-	7.2	7.29	7.5E-05 U	7.5E-05 U	0.000228 D	0.000126	0.0005 U	0.0005 U
MW-19	11/13/2023	WV19231113-	7.58	6.95	7.5E-05 U	7.5E-05 U	0.000204	9.17E-05	0.000522	0.0005 U
MW-26	2/14/2023	WV26230214-	9.88	9.31	7.5E-05 U	7.5E-05 U	0.00012	0.000473 D	0.000598	0.00549
MW-26	5/2/2023	WV26230502-	10.3	9.92	7.5E-05 U	7.5E-05 U	0.000116	0.000208	0.0005 U	0.0136
MW-26	8/8/2023	WV26230808-	10.3	10.5	7.5E-05 U	7.5E-05 U	0.000203	0.000478	0.00304	0.0185
MW-26	11/13/2023	WV26231113-	9.83	9.6	7.5E-05 U	7.5E-05 U	0.000192	0.000238	0.0005 U	0.00679
MW-29	2/14/2023	WV29230214-	6.78	6.48	7.5E-05 U	7.5E-05 U	9.44E-05	0.000433 D	0.000997	0.000802
MW-29	5/2/2023	WV29230502-	6.92	6.69	7.5E-05 U	7.5E-05 U	0.000119	0.000189	0.0005 U	0.000829
MW-29	8/8/2023	WV29230808-	6.87	6.94	7.5E-05 U	7.5E-05 U	7.5E-05 U	0.000173	0.0005 U	0.000909
MW-29	11/13/2023	WV29231113-	7.36	6.63	7.5E-05 U	7.5E-05 U	0.000149	0.000145	0.000789	0.00053
MW-34	2/14/2023	WV34230214-	6.89	6.53	7.5E-05 U	7.5E-05 U	0.00268	0.00298 D	0.0005 U	0.0005 U
MW-34	5/2/2023	WV34230502-	7.56	6.83	7.5E-05 U	7.5E-05 U	0.00291	0.00263	0.0005 U	0.0005 U
MW-34	8/7/2023	WV34230807-	6.85	7.12	7.5E-05 U	7.5E-05 U	0.00282 D	0.00284	0.000756	0.000803
MW-34	11/2/2023	WV34231102-	6.9	6.72	7.5E-05 U	7.5E-05 U	0.00278	0.00269	0.0005 U	0.000583
					Field Blanks					
FIELD BLANK	2/21/2023	WV20230221F	0.1 U	0.1 U	7.5E-05 U	7.5E-05 U	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U
FIELD BLANK	5/4/2023	WV20230504F	0.1 U	0.1 U	7.5E-05 U	7.5E-05 U	0.000134	8.45E-05	0.0005 U	0.0005 U
FIELD BLANK	8/10/2023	WV21230810F	0.1 U	0.1 U	7.5E-05 U	7.5E-05 U	7.5E-05 U	0.000153	0.0005 U	0.0005 U
FIELD BLANK	11/13/2023	WV26231113F	0.1 U	0.1 U	7.5E-05 U	7.5E-05 U	0.000141	7.5E-05 U	0.0005 U	0.0005 U
					Offsite Domestic Wells					
DW-85	2/16/2023	WV85230216-	6.28	6.07	7.5E-05 U	7.5E-05 U	0.000166	0.000143	0.00184	0.00778
DW-85	8/9/2023	WV85230809-	6.26	6.09	7.5E-05 U	7.5E-05 U	0.000155	0.000135	0.000861	0.000539
DW-LS	2/16/2023	WVLS230216-	8.37	8.21	7.5E-05 U	7.5E-05 U	0.00483	0.00479	0.0644	0.0688
DW-LS	8/9/2023	WVLS230809-	8.24	7.94	7.5E-05 U	7.5E-05 U	0.0048	0.00475	0.0519	0.0441
DW-PA	2/16/2023	WVPA230216-	6.73	6.85	7.5E-05 U	7.5E-05 U	0.00301	0.00306	0.00266	0.0029
DW-PA	8/9/2023	WVPA230809-	6.84	6.68	7.5E-05 U	7.5E-05 U	0.00337	0.00328	0.00197	0.00328

Notes:

-- = parameter is not tested

*Insufficient water to collect a sample

Table A-6
Groundwater - Volatile Organic Compounds

Groundwater - 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	1,2,3-Trichloro-propane	1,2-Dibromo-3-Chloropro-pane	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
	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
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)
Channel Cc1																		
MW-3	2/13/2023	WV3-230213-	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
MW-3	5/1/2023	WV3-230501-	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	0.5 U	0.5 U	2.5 U
MW-3	8/7/2023	WV3-230807-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	11/2/2023	WV3-231102-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/13/2023	WV4-230213-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	5/1/2023	VW4-230501-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	8/4/2023	WV4-230804-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	11/1/2023	WV4-231101-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	2/13/2023	WV10230213-	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
MW-10	5/1/2023	WV10230501-	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	0.5 U	0.5 U	2.5 U
MW-10	8/7/2023	WV10230807-	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	0.5 U	0.5 U	2.5 U
MW-10	11/2/2023	WV10231102-	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
MW-13	2/13/2023	WV13230213-	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
MW-13	5/2/2023	WV13230502-	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	0.5 U	0.5 U	2.5 U
MW-13	8/8/2023	WV13230808-	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	0.5 U	0.5 U	2.5 U
MW-13	8/8/2023	WV13230808D	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	0.5 U	0.5 U	2.5 U
MW-13	11/13/2023	WV13231113-	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
Channel Cc2																		
MW-2	2/21/2023	WV2-230221-	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
MW-2	5/4/2023	WV2-230504-	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	0.5 U	0.5 U	2.5 U
MW-2	8/10/2023	WV2-230810-	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	0.5 U	0.5 U	2.5 U
MW-2	11/14/2023	WV2-231114-	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
MW-9	2/14/2023	WV9-230214-	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
MW-9	2/14/2023	WV9-230214D	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
MW-9	5/2/2023	WV9-230502-	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	0.5 U	0.5 U	2.5 U
MW-9	8/7/2023	WV9-230807-	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	0.5 U	0.5 U	2.5 U
MW-9	11/2/2023	WV9-231102-	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
MW-20	2/21/2023	WV20230221-	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
MW-20	5/4/2023	WV20230504-	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	0.5 U	0.5 U	2.5 U
MW-20	8/10/2023	WV20230810-	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	0.5 U	0.5 U	2.5 U
MW-20	11/14/2023	WV20231114-	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
MW-21	2/21/2023	WV21230221-	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
MW-21	5/4/2023	WV21230504-	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	0.5 U	0.5 U	2.5 U
MW-21	8/10/2023	WV21230810-	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	0.5 U	0.5 U	2.5 U
MW-21	11/14/2023	WV21231114-	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
MW-33	2/21/2023	WV33230221-	0.25 U	0.1 U	0.1 U	0.1 U	1.24	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	5.99	0.1 U	1 U	0.5 U	2.5 U
MW-33	5/4/2023	WV33230504-	0.25 U	0.1 U	0.1 U	0.1 U	1.24	0.126 T	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	5.6	0.1 U	0.5 U	0.5 U	2.5 U
MW-33	8/10/2023	WV33230810-	0.25 U	0.1 U	0.1 U	0.1 U	1.37	0.13 JT	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	6.31	0.1 U	0.5 U	0.5 U	2.5 U
MW-33	11/14/2023	WV33231114-	0.25 U	0.1 U	0.1 U	0.1 U	1.45	0.128 JT	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	6.25	0.1 U	1 U	0.5 U	2.5 U
MW-35	2/21/2023	WV35230221-	0.25 U	0.1 U	0.1 U	0.1 U	0.144 JT	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.281	0.1 U	1 U	0.5 U	2.5 U
MW-35	5/4/2023	WV35230504-	0.25 U	0.1 U	0.1 U	0.1 U	0.154 T	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.278	0.1 U	0.5 U	0.5 U	2.5 U
MW-35	8/10/2023	WV35230810-	0.25 U	0.1 U	0.1 U	0.1 U	0.186 JT	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.343	0.1 U	0.5 U	0.5 U	2.5 U
MW-35	11/14/2023	WV35231114-	0.25 U	0.1 U	0.1 U	0.1 U	0.182 JT	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.295	0.1 U	1 U	0.5 U	2.5 U
MW-37	2/21/2023	WV37230221-	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
MW-37	5/4/2023	WV37230504-	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	0.5 U	0.5 U	2.5 U
MW-37	8/10/2023	WV37230810-	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	0.5 U	0.5 U	2.5 U
MW-37	11/14/2023	WV37231114-	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

Table A-6
Groundwater - Volatile Organic Compounds

Groundwater - Volatile Organic Compounds			Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromo-dichloro-methane	Bromoform	Bromo-methane	Carbon Disulfide	Carbon Tetra-chloride	Chloro-benzene	Chloro-dibromo-methane	Chloro-ethane	Chloroform	Chloro-methane	Cis-1-2-Dichloro-ethene	Cis-1,3-Dichloro-propene
	CAS #		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	108-90-7	124-48-1	75-00-3	67-66-3	74-87-3	156-59-2	10061-01-5
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)
Channel Cc1																		
MW-3	2/13/2023	WV3-230213-	2.5 U	0.035 DU	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	0.25 U
MW-3	5/1/2023	WV3-230501-	2.5 U	0.035 DU	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	0.25 U
MW-3	8/7/2023	WV3-230807-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	11/2/2023	WV3-231102-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/13/2023	WV4-230213-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	5/1/2023	VW4-230501-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	8/4/2023	WV4-230804-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	11/1/2023	WV4-231101-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	2/13/2023	WV10230213-	2.5 U	0.035 DU	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	0.25 U
MW-10	5/1/2023	WV10230501-	2.5 U	0.035 DU	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	0.25 U
MW-10	8/7/2023	WV10230807-	2.5 U	0.035 DU	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	0.25 U
MW-10	11/2/2023	WV10231102-	2.5 U	0.035 DU	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	0.25 U
MW-13	2/13/2023	WV13230213-	2.5 U	0.035 DU	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	0.25 U
MW-13	5/2/2023	WV13230502-	2.5 U	0.035 DU	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	0.25 U
MW-13	8/8/2023	WV13230808-	2.5 U	0.035 DU	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	0.25 U
MW-13	8/8/2023	WV13230808D	2.5 U	0.035 DU	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	0.25 U
MW-13	11/13/2023	WV13231113-	2.5 U	0.035 DU	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	0.25 U
Channel Cc2																		
MW-2	2/21/2023	WV2-230221-	2.5 U	0.035 DU	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	0.227	0.25 U
MW-2	5/4/2023	WV2-230504-	2.5 U	0.035 DU	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	0.239	0.25 U
MW-2	8/10/2023	WV2-230810-	2.5 U	0.035 DU	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	0.338	0.25 U
MW-2	11/14/2023	WV2-231114-	2.5 U	0.035 DU	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	0.196 JT	0.25 U
MW-9	2/14/2023	WV9-230214-	2.5 U	0.035 DU	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	0.25 U
MW-9	2/14/2023	WV9-230214D	2.5 U	0.035 DU	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	0.25 U
MW-9	5/2/2023	WV9-230502-	2.5 U	0.035 DU	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	0.25 U
MW-9	8/7/2023	WV9-230807-	2.5 U	0.035 DU	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	0.25 U
MW-9	11/2/2023	WV9-231102-	2.5 U	0.035 DU	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	0.25 U
MW-20	2/21/2023	WV20230221-	2.5 U	0.035 DU	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	0.25 U
MW-20	5/4/2023	WV20230504-	2.5 U	0.035 DU	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	0.25 U
MW-20	8/10/2023	WV20230810-	2.5 U	0.035 DU	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	0.25 U
MW-20	11/14/2023	WV20231114-	5 U	0.035 DU	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	0.25 U
MW-21	2/21/2023	WV21230221-	2.5 U	0.035 DU	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	0.517	0.25 U
MW-21	5/4/2023	WV21230504-	2.5 U	0.035 DU	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	0.477	0.25 U
MW-21	8/10/2023	WV21230810-	2.5 U	0.035 DU	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	0.503	0.25 U
MW-21	11/14/2023	WV21231114-	2.5 U	0.035 DU	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	0.431	0.25 U
MW-33	2/21/2023	WV33230221-	2.5 U	0.035 DU	0.716	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	23.6	0.25 U
MW-33	5/4/2023	WV33230504-	2.5 U	0.035 DU	0.657	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.245	0.1 U	0.25 U	22.7	0.25 U
MW-33	8/10/2023	WV33230810-	2.5 U	0.035 DU	0.753	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	25	0.25 U
MW-33	11/14/2023	WV33231114-	2.5 U	0.035 DU	0.721	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.213	0.1 U	0.25 U	24.2	0.25 U
MW-35	2/21/2023	WV35230221-	2.5 U	0.035 DU	0.422	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	2.73	0.25 U
MW-35	5/4/2023	WV35230504-	2.5 U	0.035 DU	0.428	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	2.55	0.25 U
MW-35	8/10/2023	WV35230810-	2.5 U	0.035 DU	0.454	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	2.89	0.25 U
MW-35	11/14/2023	WV35231114-	2.5 U	0.035 DU	0.425	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	2.64	0.25 U
MW-37	2/21/2023	WV37230221-	2.5 U	0.035 DU	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	0.25 U
MW-37	5/4/2023	WV37230504-	2.5 U	0.035 DU	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	0.25 U
MW-37	8/10/2023	WV37230810-	2.5 U	0.035 DU	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	0.25 U
MW-37	11/14/2023	WV37231114-	2.5 U	0.035 DU	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	0.25 U

Table A-6
Groundwater - Volatile Organic Compounds

Groundwater - Volatile Organic Compounds			Dibromo-methane	Dichloro-difluoro-methane	Ethyl-benzene	M & P Xylene	Methyl Iodide	Methylene Chloride	O-Xylene	Styrene	Tetra-chloroethene	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 #		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
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)
			Channel Cc1																
MW-3	2/13/2023	WV3-230213-	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	5/1/2023	WV3-230501-	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	8/7/2023	WV3-230807-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	11/2/2023	WV3-231102-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/13/2023	WV4-230213-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	5/1/2023	VW4-230501-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	8/4/2023	WV4-230804-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	11/1/2023	WV4-231101-*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	2/13/2023	WV10230213-	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	5/1/2023	WV10230501-	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	8/7/2023	WV10230807-	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
MW-10	11/2/2023	WV10231102-	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
MW-13	2/13/2023	WV13230213-	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	5/2/2023	WV13230502-	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	8/8/2023	WV13230808-	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
MW-13	8/8/2023	WV13230808D	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
MW-13	11/13/2023	WV13231113-	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
			Channel Cc2																
MW-2	2/21/2023	WV2-230221-	0.1 U	2	0.1 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	1.56	0.1 U	0.0206 D
MW-2	5/4/2023	WV2-230504-	0.1 U	2.09	0.1 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	1.59	0.1 U	0.0188 DT
MW-2	8/10/2023	WV2-230810-	0.1 U	2.54	0.1 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	1.82	0.1 U	0.0551 D
MW-2	11/14/2023	WV2-231114-	0.1 U	2.24	0.1 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	1 U	0.1 U	2.14	0.2 U	0.0283 D
MW-9	2/14/2023	WV9-230214-	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	2/14/2023	WV9-230214D	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	5/2/2023	WV9-230502-	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	8/7/2023	WV9-230807-	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
MW-9	11/2/2023	WV9-231102-	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
MW-20	2/21/2023	WV20230221-	0.1 U	0.144 JT	0.1 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	5/4/2023	WV20230504-	0.1 U	0.116 JT	0.1 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-20	8/10/2023	WV20230810-	0.1 U	0.183 JT	0.1 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-20	11/14/2023	WV20231114-	0.1 U	0.189 JT	0.1 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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
MW-21	2/21/2023	WV21230221-	0.1 U	1.12	0.1 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	0.658	0.1 U	0.026 D
MW-21	5/4/2023	WV21230504-	0.1 U	1.38	0.1 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	0.745	0.1 U	0.0315 D
MW-21	8/10/2023	WV21230810-	0.1 U	1.84	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.784	0.1 U	0.0442 D
MW-21	11/14/2023	WV21231114-	0.1 U	1.78	0.1 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	1 U	0.1 U	0.956	0.2 U	0.0417 D
MW-33	2/21/2023	WV33230221-	0.1 U	3.16	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.714	0.5 U	5 U	0.16 JT	0.1 U	0.1 U	18.5 D
MW-33	5/4/2023	WV33230504-	0.1 U	3.84	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.733	0.5 U	0.5 U	0.152 T	0.1 U	0.1 U	19.8 D
MW-33	8/10/2023	WV33230810-	0.1 U	4.6	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.805	0.5 U	0.5 U	0.162 JT	0.1 U	0.1 U	23.7 D
MW-33	11/14/2023	WV33231114-	0.1 U	3.5	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.821	0.5 U	1 U	0.17 JT	0.1 U	0.2 U	18 D
MW-35	2/21/2023	WV35230221-	0.1 U	0.42	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.187 JT	0.5 U	5 U	1	0.1 U	0.1 U	3.29 D
MW-35	5/4/2023	WV35230504-	0.1 U	0.472	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.186 T	0.5 U	0.5 U	1.03	0.1 U	0.1 U	3.25 D
MW-35	8/10/2023	WV35230810-	0.1 U	0.666	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.188 JT	0.5 U	0.5 U	1	0.1 U	0.1 U	4.62 D
MW-35	11/14/2023	WV35231114-	0.1 U	0.528	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.183 JT	0.5 U	1 U	1.03	0.1 U	0.2 U	3.65 D
MW-37	2/21/2023	WV37230221-	0.1 U	0.144 JT	0.1 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	0.202	0.369	0.1 U	0.01 DU
MW-37	5/4/2023	WV37230504-	0.1 U	0.128 JT	0.1 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	0.249	0.357	0.1 U	0.01 DU
MW-37	8/10/2023	WV37230810-	0.1 U	0.165 JT	0.1 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	0.293	0.368	0.1 U	0.01 DU
MW-37	11/14/2023	WV37231114-	0.1 U	0.13 JT	0.1 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	1 U	0.284	0.363	0.2 U	0.01 DU

Table A-6
Groundwater - Volatile Organic Compounds

Groundwater - 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	1,2,3-Trichloro-propane	1,2-Dibromo-3-Chloropro-pane	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
	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
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)
			Channel Cc3															
MW-8	2/13/2023	WV8-230213-	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
MW-8	5/1/2023	WV8-230501-	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	0.5 U	0.5 U	2.5 U
MW-8	5/1/2023	WV8-230501D	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	0.5 U	0.5 U	2.5 U
MW-8	8/7/2023	WV8-230807-	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	0.5 U	0.5 U	2.5 U
MW-8	11/2/2023	WV8-231102-	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
MW-36	2/14/2023	WV36230214-	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
MW-36	5/1/2023	WV36230501-	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	0.5 U	0.5 U	2.5 U
MW-36	8/10/2023	WV36230810-	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	0.5 U	0.5 U	2.5 U
MW-36	11/13/2023	WV36231113-	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
			Unit D Aquifer															
MW-7	2/13/2023	WV7-230213-	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
MW-7	5/1/2023	WV7-230501-	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	0.5 U	0.5 U	2.5 U
MW-7	8/8/2023	WV7-230808-	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	0.5 U	0.5 U	2.5 U
MW-7	11/13/2023	WV7-231113-	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
MW-12	2/13/2023	WV12230213-	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
MW-12	5/1/2023	WV12230501-	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	0.5 U	0.5 U	2.5 U
MW-12	8/7/2023	WV12230807-	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	0.5 U	0.5 U	2.5 U
MW-12	11/2/2023	WV12231102-	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
MW-19	2/14/2023	WV19230214-	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
MW-19	5/2/2023	WV19230502-	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	0.5 U	0.5 U	2.5 U
MW-19	8/7/2023	WV19230807-	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	0.5 U	0.5 U	2.5 U
MW-19	11/13/2023	WV19231113-	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
MW-26	2/14/2023	WV26230214-	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
MW-26	5/2/2023	WV26230502-	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	0.5 U	0.5 U	2.5 U
MW-26	8/8/2023	WV26230808-	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	0.5 U	0.5 U	2.5 U
MW-26	11/13/2023	WV26231113-	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
MW-29	2/14/2023	WV29230214-	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
MW-29	5/2/2023	WV29230502-	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	0.5 U	0.5 U	2.5 U
MW-29	8/8/2023	WV29230808-	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	0.5 U	0.5 U	2.5 U
MW-29	11/13/2023	WV29231113-	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
MW-34	2/14/2023	WV34230214-	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
MW-34	5/2/2023	WV34230502-	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	0.5 U	0.5 U	2.5 U
MW-34	8/7/2023	WV34230807-	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	0.5 U	0.5 U	2.5 U
MW-34	11/2/2023	WV34231102-	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
			Field Blanks															
FIELD BLANK	2/21/2023	WV20230221F	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
FIELD BLANK	5/4/2023	WV20230504F	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	0.5 U	0.5 U	2.5 U
FIELD BLANK	8/10/2023	WV21230810F	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	0.5 U	0.5 U	2.5 U
FIELD BLANK	11/13/2023	WV26231113F	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
			Offsite Domestic Wells															
DW-85	2/16/2023	WV85230216-	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
DW-85	8/9/2023	WV85230809-	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	0.5 U	0.5 U	2.5 U
DW-LS	2/16/2023	WVLS230216-	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
DW-LS	8/9/2023	WVLS230809-	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	0.5 U	0.5 U	2.5 U
DW-PA	2/16/2023	WVPA230216-	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
DW-PA	8/9/2023	WVPA230809-	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	0.5 U	0.5 U	2.5 U

Notes:
-- = parameter is not tested
*Insufficient water to collect a sample

Table A-6
Groundwater - Volatile Organic Compounds

Groundwater - Volatile Organic Compounds			Acetone	Acrylo-nitrile	Benzene	Bromochloro-methane	Bromo-dichloro-methane	Bromoform	Bromo-methane	Carbon Disulfide	Carbon Tetra-chloride	Chloro-benzene	Chloro-dibromo-methane	Chloro-ethane	Chloroform	Chloro-methane	Cis-1-2-Dichloro-ethene	Cis-1,3-Dichloro-propene
	CAS #		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	108-90-7	124-48-1	75-00-3	67-66-3	74-87-3	156-59-2	10061-01-5
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)
			Channel Cc3															
MW-8	2/13/2023	WV8-230213-	2.5 U	0.035 DU	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	0.25 U
MW-8	5/1/2023	WV8-230501-	2.5 U	0.035 DU	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	0.25 U
MW-8	5/1/2023	WV8-230501D	2.5 U	0.035 DU	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	0.25 U
MW-8	8/7/2023	WV8-230807-	2.5 U	0.035 DU	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	0.25 U
MW-8	11/2/2023	WV8-231102-	2.5 U	0.035 DU	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	0.25 U
MW-36	2/14/2023	WV36230214-	2.5 U	0.035 DU	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	0.25 U
MW-36	5/1/2023	WV36230501-	2.5 U	0.035 DU	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	0.25 U
MW-36	8/10/2023	WV36230810-	2.5 U	0.035 DU	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	0.25 U
MW-36	11/13/2023	WV36231113-	2.5 U	0.035 DU	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	0.25 U
			Unit D Aquifer															
MW-7	2/13/2023	WV7-230213-	2.5 U	0.035 DU	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	0.25 U
MW-7	5/1/2023	WV7-230501-	2.5 U	0.035 DU	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	0.25 U
MW-7	8/8/2023	WV7-230808-	2.5 U	0.035 DU	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	0.25 U
MW-7	11/13/2023	WV7-231113-	2.5 U	0.035 DU	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	0.25 U
MW-12	2/13/2023	WV12230213-	2.5 U	0.035 DU	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	0.25 U
MW-12	5/1/2023	WV12230501-	2.5 U	0.035 DU	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	0.25 U
MW-12	8/7/2023	WV12230807-	2.5 U	0.035 DU	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	0.25 U
MW-12	11/2/2023	WV12231102-	2.5 U	0.035 DU	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	0.25 U
MW-19	2/14/2023	WV19230214-	2.5 U	0.035 DU	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	0.25 U
MW-19	5/2/2023	WV19230502-	2.5 U	0.035 DU	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	0.25 U
MW-19	8/7/2023	WV19230807-	2.5 U	0.035 DU	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	0.25 U
MW-19	11/13/2023	WV19231113-	2.5 U	0.035 DU	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	0.25 U
MW-26	2/14/2023	WV26230214-	2.5 U	0.035 DU	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	0.25 U
MW-26	5/2/2023	WV26230502-	2.5 U	0.035 DU	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	0.25 U
MW-26	8/8/2023	WV26230808-	2.5 U	0.035 DU	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	0.25 U
MW-26	11/13/2023	WV26231113-	2.5 U	0.035 DU	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	0.25 U
MW-29	2/14/2023	WV29230214-	2.5 U	0.035 DU	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	0.25 U
MW-29	5/2/2023	WV29230502-	2.5 U	0.035 DU	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	0.25 U
MW-29	8/8/2023	WV29230808-	2.5 U	0.035 DU	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	0.25 U
MW-29	11/13/2023	WV29231113-	2.5 U	0.035 DU	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	0.25 U
MW-34	2/14/2023	WV34230214-	2.5 U	0.035 DU	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	0.25 U
MW-34	5/2/2023	WV34230502-	2.5 U	0.035 DU	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	0.25 U
MW-34	8/7/2023	WV34230807-	2.5 U	0.035 DU	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	0.25 U
MW-34	11/2/2023	WV34231102-	2.5 U	0.035 DU	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	0.25 U
			Field Blanks															
FIELD BLANK	2/21/2023	WV20230221F	2.5 U	0.035 DU	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	0.25 U
FIELD BLANK	5/4/2023	WV20230504F	2.5 U	0.035 DU	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	0.25 U
FIELD BLANK	8/10/2023	WV21230810F	2.5 U	0.035 DU	0.182 JT	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	0.25 U
FIELD BLANK	11/13/2023	WV26231113F	2.5 U	0.035 DU	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	0.146 JT	0.25 U	0.1 U	0.25 U
			Offsite Domestic Wells															
DW-85	2/16/2023	WV85230216-	2.5 U	0.035 DU	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	0.25 U
DW-85	8/9/2023	WV85230809-	2.5 U	0.035 DU	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	0.25 U
DW-LS	2/16/2023	WVLS230216-	2.5 U	0.035 DU	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	0.25 U
DW-LS	8/9/2023	WVLS230809-	2.5 U	0.035 DU	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	0.25 U
DW-PA	2/16/2023	WVPA230216-	2.5 U	0.035 DU	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	0.25 U
DW-PA	8/9/2023	WVPA230809-	2.5 U	0.035 DU	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	0.25 U

Notes:
-- = parameter is not tested
*Insufficient water to collect a sample

Table A-6
Groundwater - Volatile Organic Compounds

Groundwater - Volatile Organic Compounds			Dibromo-methane	Dichloro-difluoro-methane	Ethyl-benzene	M & P Xylene	Methyl Iodide	Methylene Chloride	O-Xylene	Styrene	Tetra-chloroethene	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 #		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
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)
Channel Cc3																			
MW-8	2/13/2023	WV8-230213-	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	5/1/2023	WV8-230501-	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	5/1/2023	WV8-230501D	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	8/7/2023	WV8-230807-	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
MW-8	11/2/2023	WV8-231102-	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
MW-36	2/14/2023	WV36230214-	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	5/1/2023	WV36230501-	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	8/10/2023	WV36230810-	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
MW-36	11/13/2023	WV36231113-	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
Unit D Aquifer																			
MW-7	2/13/2023	WV7-230213-	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	5/1/2023	WV7-230501-	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	8/8/2023	WV7-230808-	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
MW-7	11/13/2023	WV7-231113-	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
MW-12	2/13/2023	WV12230213-	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	5/1/2023	WV12230501-	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	8/7/2023	WV12230807-	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
MW-12	11/2/2023	WV12231102-	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
MW-19	2/14/2023	WV19230214-	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-19	5/2/2023	WV19230502-	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-19	8/7/2023	WV19230807-	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
MW-19	11/13/2023	WV19231113-	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
MW-26	2/14/2023	WV26230214-	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	5/2/2023	WV26230502-	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	8/8/2023	WV26230808-	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
MW-26	11/13/2023	WV26231113-	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
MW-29	2/14/2023	WV29230214-	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	5/2/2023	WV29230502-	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	8/8/2023	WV29230808-	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
MW-29	11/13/2023	WV29231113-	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
MW-34	2/14/2023	WV34230214-	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	5/2/2023	WV34230502-	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
MW-34	8/7/2023	WV34230807-	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
MW-34	11/2/2023	WV34231102-	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
Field Blanks																			
FIELD BLANK	2/21/2023	WV20230221F	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
FIELD BLANK	5/4/2023	WV20230504F	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
FIELD BLANK	8/10/2023	WV21230810F	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
FIELD BLANK	11/13/2023	WV26231113F	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
Offsite Domestic Wells																			
DW-85	2/16/2023	WV85230216-	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
DW-85	8/9/2023	WV85230809-	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
DW-LS	2/16/2023	WVLS230216-	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
DW-LS	8/9/2023	WVLS230809-	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
DW-PA	2/16/2023	WVPA230216-	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
DW-PA	8/9/2023	WVPA230809-	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

Notes:
-- = parameter is not tested
*Insufficient water to collect a sample

Table A-7
Groundwater - Volatile Organic Compounds Trip Blanks

Groundwater - Volatile Organic Compounds Trip Blanks			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
		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
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)
VOA TRIP BLANK	2/9/2023	VTRP230213Y	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
VOA TRIP BLANK	2/9/2023	VTRP230213Z	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
VOA TRIP BLANK	2/9/2023	VTRP230214Z	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
VOA TRIP BLANK	2/13/2023	VTRP230214Y	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
VOA TRIP BLANK	2/14/2023	VTRP230216Y	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
VOA TRIP BLANK	2/16/2023	VTRP230221Y	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
VOA TRIP BLANK	2/16/2023	VTRP230221Z	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
VOA TRIP BLANK	4/27/2023	VTRP230501X	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	4/27/2023	VTRP230501Y	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	4/27/2023	VTRP230501Z	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	5/1/2023	VTRP230502X	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	5/1/2023	VTRP230502Y	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	5/1/2023	VTRP230502Z	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	5/3/2023	VTRP230504X	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	5/3/2023	VTRP230504Y	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	5/3/2023	VTRP230504Z	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	8/3/2023	VTRP230807X	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	8/3/2023	VTRP230807Y	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	8/3/2023	VTRP230808X	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	8/7/2023	VTRP230808Y	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	8/8/2023	VTRP230809X2	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	8/8/2023	VTRP230809Y	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	8/9/2023	VTRP230810X	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	8/9/2023	VTRP230810X2	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	8/9/2023	VTRP230810Y	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	8/9/2023	VTRP230810Z	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	0.5 U	0.5 U	2.5 U
VOA TRIP BLANK	10/31/2023	VTRP231102Y	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
VOA TRIP BLANK	10/31/2023	VTRP231102X	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
VOA TRIP BLANK	11/8/2023	VTRP231113Y	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
VOA TRIP BLANK	11/8/2023	VTRP231113X	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
VOA TRIP BLANK	11/13/2023	VTRP231114Y	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
VOA TRIP BLANK	11/13/2023	VTRP231114X	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

Notes:

-- = parameter is not tested

Table A-7
Groundwater - Volatile Organic Compounds Trip Blanks

Groundwater - Volatile Organic Compounds Trip Blanks			Acetone	Acrylonitrile	Benzene	Bromochloro-methane	Bromodichloro-methane	Bromoform	Bromo-methane	Carbon Disulfide	Carbon Tetrachloride	Chloro-benzene	Chloro-dibromo-methane	Chloro-ethane	Chloroform	Chloro-methane	Cis-1-2-Dichloro-ethene	Cis-1,3-Dichloro-propene
		CAS #	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	108-90-7	124-48-1	75-00-3	67-66-3	74-87-3	156-59-2	10061-01-5
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)
VOA TRIP BLANK	2/9/2023	VTRP230213Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	2/9/2023	VTRP230213Z	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	2/9/2023	VTRP230214Z	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	2/13/2023	VTRP230214Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	2/14/2023	VTRP230216Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	2/16/2023	VTRP230221Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	2/16/2023	VTRP230221Z	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	4/27/2023	VTRP230501X	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	4/27/2023	VTRP230501Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	4/27/2023	VTRP230501Z	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	5/1/2023	VTRP230502X	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	5/1/2023	VTRP230502Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	5/1/2023	VTRP230502Z	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	5/3/2023	VTRP230504X	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	5/3/2023	VTRP230504Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	5/3/2023	VTRP230504Z	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	8/3/2023	VTRP230807X	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	8/3/2023	VTRP230807Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	8/3/2023	VTRP230808X	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	8/7/2023	VTRP230808Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	8/8/2023	VTRP230809X2	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	8/8/2023	VTRP230809Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	8/9/2023	VTRP230810X	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	8/9/2023	VTRP230810X2	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	8/9/2023	VTRP230810Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	8/9/2023	VTRP230810Z	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	10/31/2023	VTRP231102Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	10/31/2023	VTRP231102X	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	11/8/2023	VTRP231113Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	11/8/2023	VTRP231113X	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	11/13/2023	VTRP231114Y	2.5 U	0.035 DU	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	0.25 U
VOA TRIP BLANK	11/13/2023	VTRP231114X	2.5 U	0.035 DU	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	0.25 U

Notes:

-- = parameter is not tested

Table A-7
Groundwater - Volatile Organic Compounds Trip Blank

Groundwater - Volatile Organic Compounds Trip Blanks			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 #	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)
VOA TRIP BLANK	2/9/2023	VTRP230213Y	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	2/9/2023	VTRP230213Z	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	2/9/2023	VTRP230214Z	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	2/13/2023	VTRP230214Y	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	2/14/2023	VTRP230216Y	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	2/16/2023	VTRP230221Y	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	2/16/2023	VTRP230221Z	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	4/27/2023	VTRP230501X	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	4/27/2023	VTRP230501Y	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	4/27/2023	VTRP230501Z	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	5/1/2023	VTRP230502X	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	5/1/2023	VTRP230502Y	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	5/1/2023	VTRP230502Z	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	5/3/2023	VTRP230504X	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	5/3/2023	VTRP230504Y	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	5/3/2023	VTRP230504Z	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	8/3/2023	VTRP230807X	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	8/3/2023	VTRP230807Y	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	8/3/2023	VTRP230808X	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	8/7/2023	VTRP230808Y	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	8/8/2023	VTRP230809X2	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	8/8/2023	VTRP230809Y	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	8/9/2023	VTRP230810X	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	8/9/2023	VTRP230810X2	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	8/9/2023	VTRP230810Y	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	8/9/2023	VTRP230810Z	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	10/31/2023	VTRP231102Y	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
VOA TRIP BLANK	10/31/2023	VTRP231102X	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
VOA TRIP BLANK	11/8/2023	VTRP231113Y	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
VOA TRIP BLANK	11/8/2023	VTRP231113X	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
VOA TRIP BLANK	11/13/2023	VTRP231114Y	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
VOA TRIP BLANK	11/13/2023	VTRP231114X	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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU

Notes:

-- = parameter is not tested

Table A-8
Groundwater - Quarterly Appendix III Analytes for Channel Cc2 Wells

Groundwater - Quarterly Appendix III Analytes for Channel Cc2 Wells			2,4,5-TP Silvex	2-Methyl-1-Propanol	Bis(2-chloroethyl) Ether	Bis(2-ethylhexyl) Phthalate	Diethyl Phthalate
		CAS #	93-72-1	78-83-1	111-44-4	117-81-7	84-66-2
Well #	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Channel Cc2							
MW-2	2/21/2023	WV2-230221-	0.0109 U	2 U	0.5 U	45.5	1 U
MW-2	5/4/2023	WV2-230504-	0.0098 U	10 U	0.24 U	0.481 U	1.03
MW-2	8/10/2023	WV2-230810-	0.01 U	10 U	0.253 U	0.505 U	5.05 U
MW-2	11/14/2023	WV2-231114-	0.01 U	10 U	0.25 U	0.5 U	0.5 U
MW-20	2/21/2023	WV20230221-	0.0112 U	2 U	0.532 U	1.06 U	1.06 U
MW-20	5/4/2023	WV20230504-	0.0101 U	10 U	0.25 U	0.5 U	0.949 JT
MW-20	8/10/2023	WV20230810-	0.0098 U	10 U	0.248 U	0.495 U	4.95 U
MW-20	11/14/2023	WV20231114-	0.0098 U	10 U	0.25 U	0.5 U	0.5 U
MW-21	2/21/2023	WV21230221-	0.0109 U	2 U	0.54 JT	0.971 U	0.971 U
MW-21	5/4/2023	WV21230504-	0.00971 U	10 U	0.273 JT	0.481 U	0.672 JT
MW-21	8/10/2023	WV21230810-	0.0099 U	10 U	0.253 U	0.505 U	5.05 U
MW-21	11/14/2023	WV21231114-	0.0098 U	10 U	0.238 U	0.594 JT	0.476 U
MW-33	2/21/2023	WV33230221-	0.0305	2 U	6.46	1.03 U	3.36
MW-33	5/4/2023	WV33230504-	0.0323	10 U	3.95	3.09	2.16
MW-33	8/10/2023	WV33230810-	0.0284	10 U	3.15	0.472 U	4.72 U
MW-33	11/14/2023	WV33231114-	0.0357	10 U	3.41	0.5 U	1.28
MW-35	2/21/2023	WV35230221-	0.011 U	2 U	2.11	1.06 U	1.06 U
MW-35	5/4/2023	WV35230504-	0.01 U	10 U	1.29	0.481 U	1.58
MW-35	8/10/2023	WV35230810-	0.00971 U	10 U	0.995	0.49 U	4.9 U
MW-35	11/14/2023	WV35231114-	0.0273	10 U	1.25	0.505 U	0.505 U
MW-37	2/21/2023	WV37230221-	0.0113 U	2 U	0.556 U	1.11 U	1.11 U
MW-37	5/4/2023	WV37230504-	0.00962 U	10 U	0.253 U	0.505 U	0.895 JT
MW-37	8/10/2023	WV37230810-	0.0101 U	10 U	0.253 U	0.505 U	5.05 U
MW-37	11/14/2023	WV37231114-	0.0101 U	10 U	0.253 U	0.505 U	0.505 U
Field Blanks							
FIELD BLANK	2/21/2023	WV20230221F	0.0117 U	2 U	0.526 U	2.75	1.05 U
FIELD BLANK	5/4/2023	WV20230504F	0.0099 U	10 U	0.25 U	0.5 U	0.5 U
FIELD BLANK	8/10/2023	WV21230810F	0.0099 U	10 U	0.243 U	0.788 JT	4.85 U

Appendix B

Channel Cc1

Groundwater Time Concentration Plots

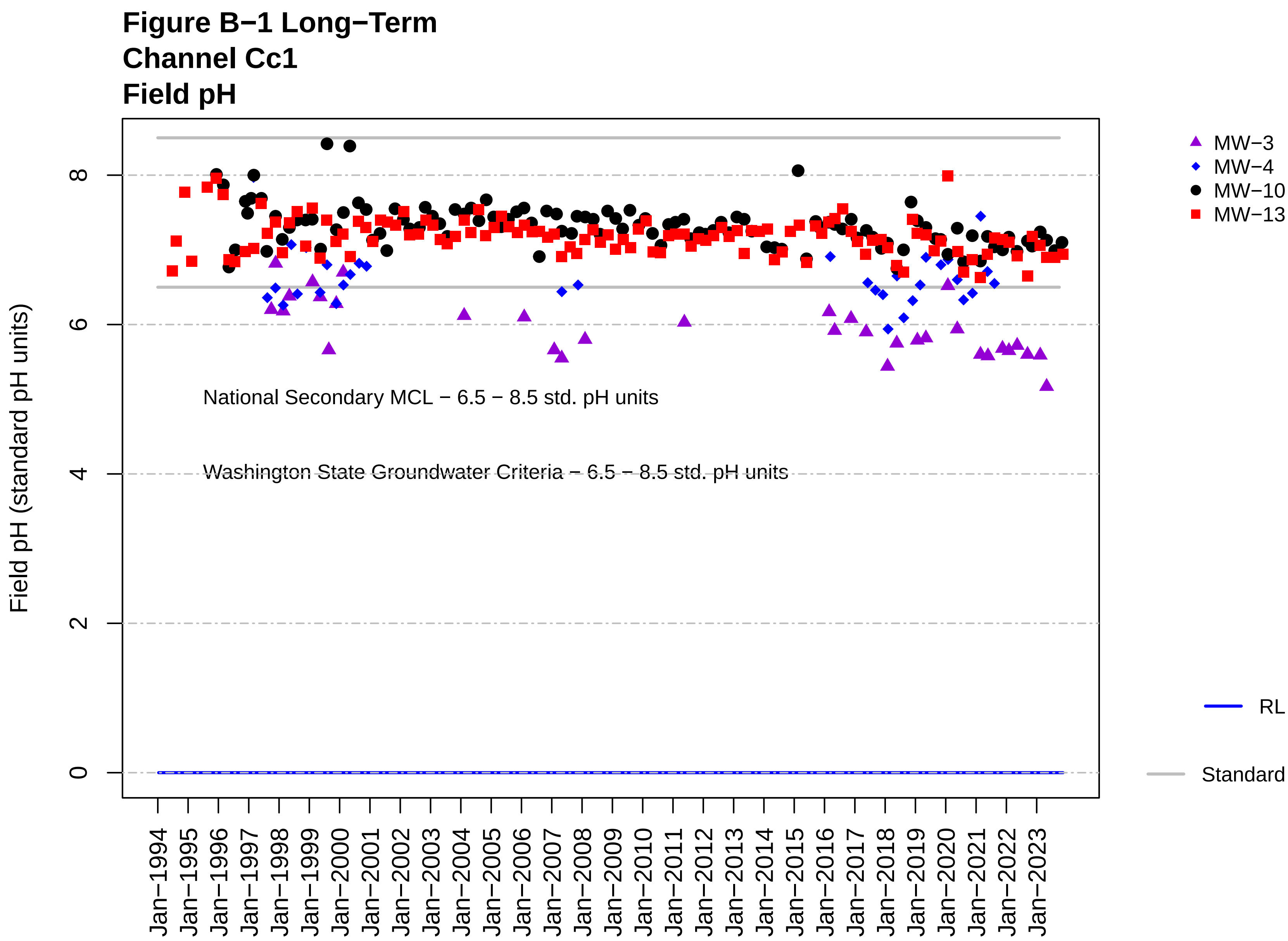


Figure B−1 Long−Term
Channel Cc1
Field pH
Field pH (standard pH units)
0
2
4
6
8
National Secondary MCL − 6.5 − 8.5 std. pH units
Washington State Groundwater Criteria − 6.5 − 8.5 std. pH units
MW−3
MW−4
MW−10
MW−13
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
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
Jan−2021
Jan−2022
Jan−2023

Figure B−2 Long−Term
Channel Cc1
Field Specific Conductance

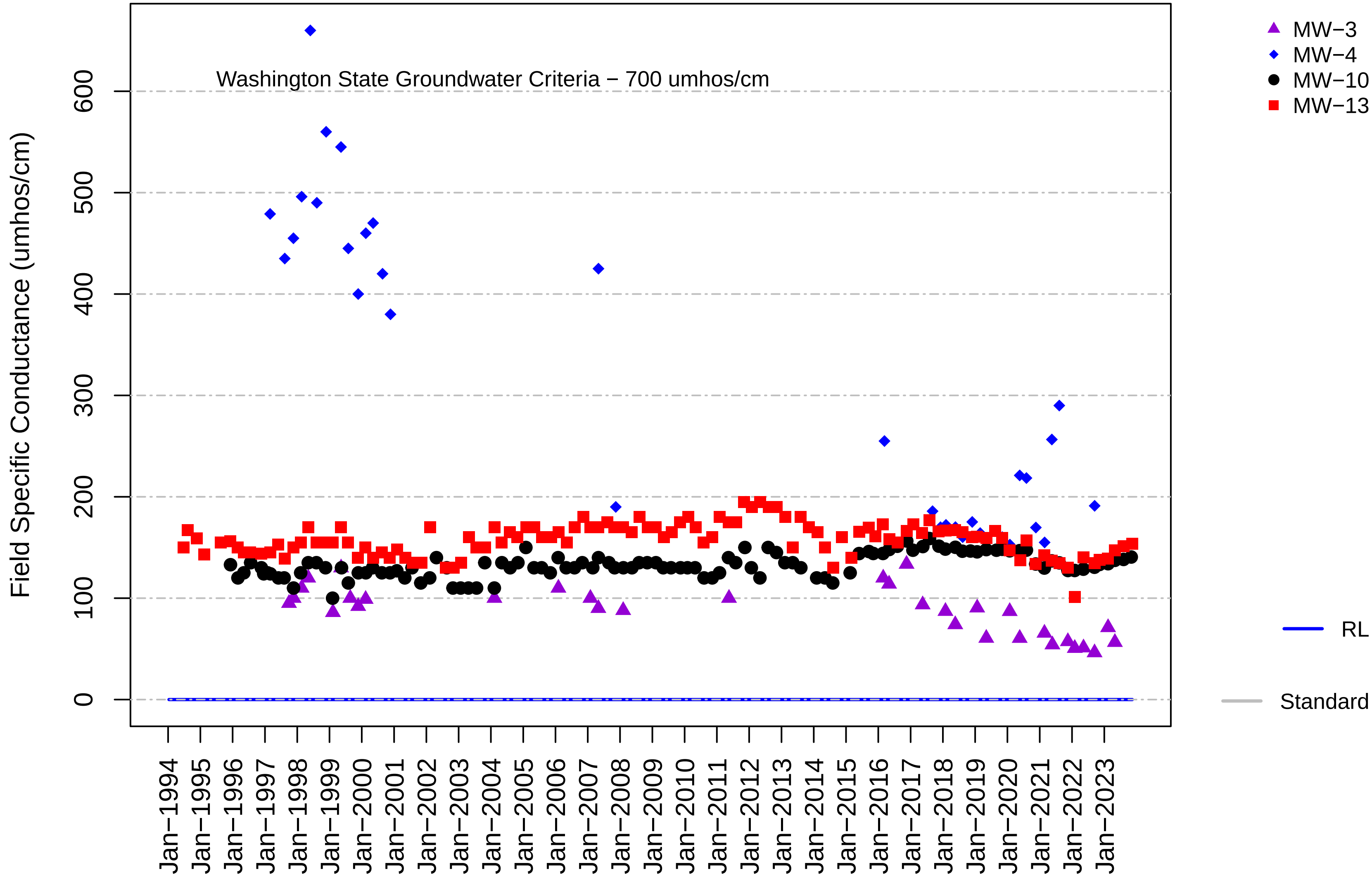


Figure B−3 Long−Term
Channel Cc1
Alkalinity

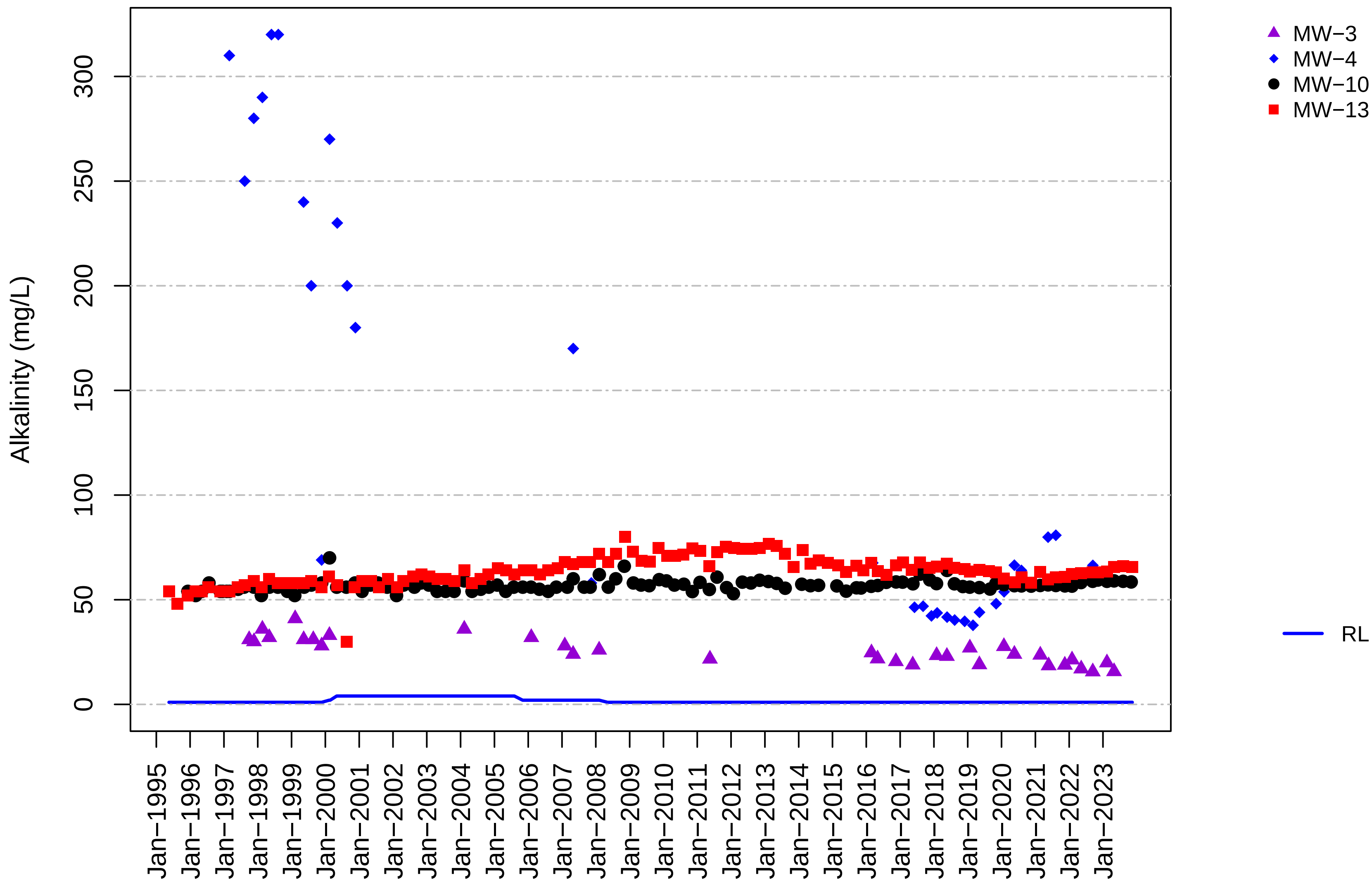


Figure B−4 Long−Term
Channel Cc1
Ammonia

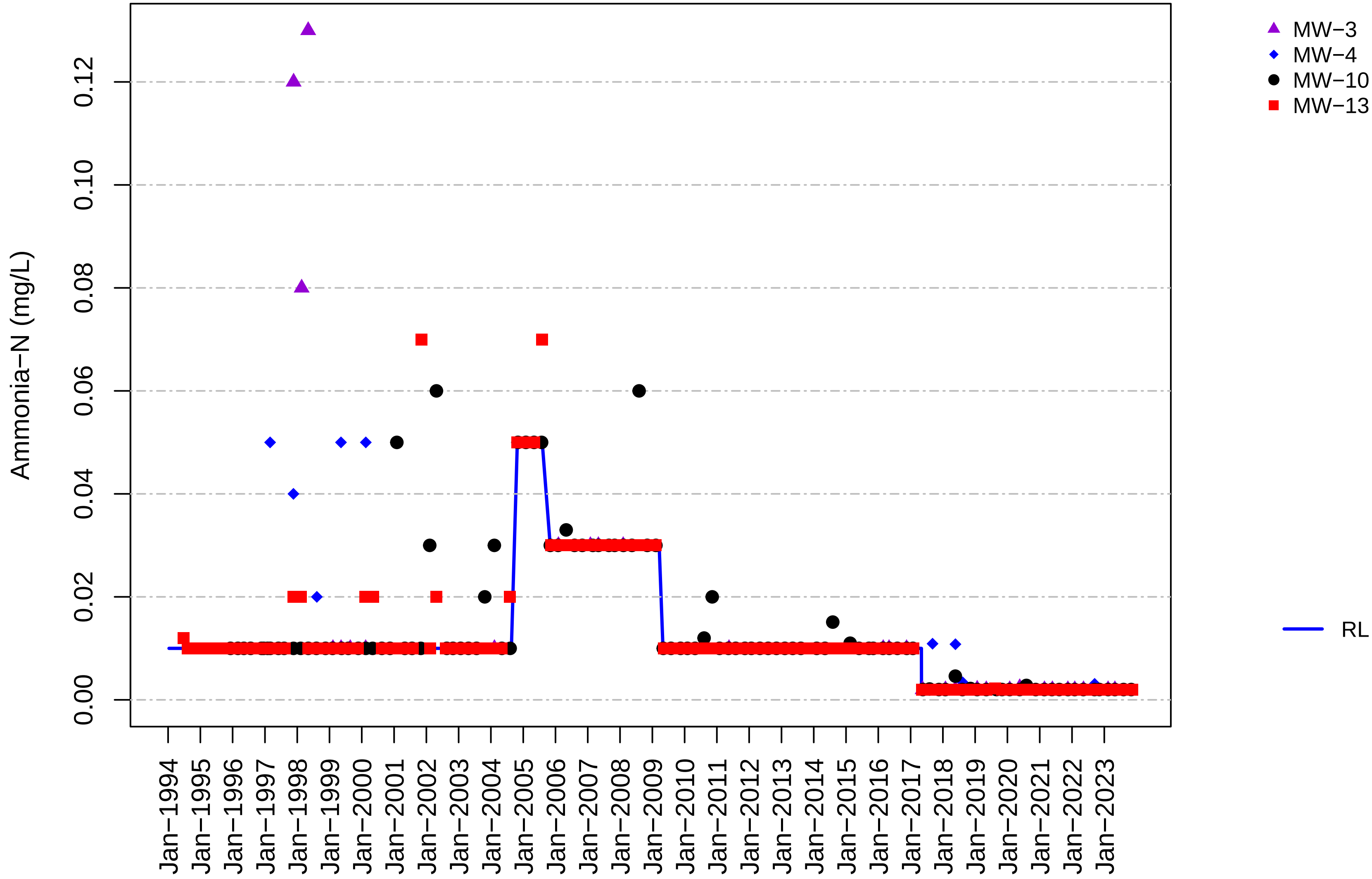


Figure B−5 Long−Term
Channel Cc1
Chloride

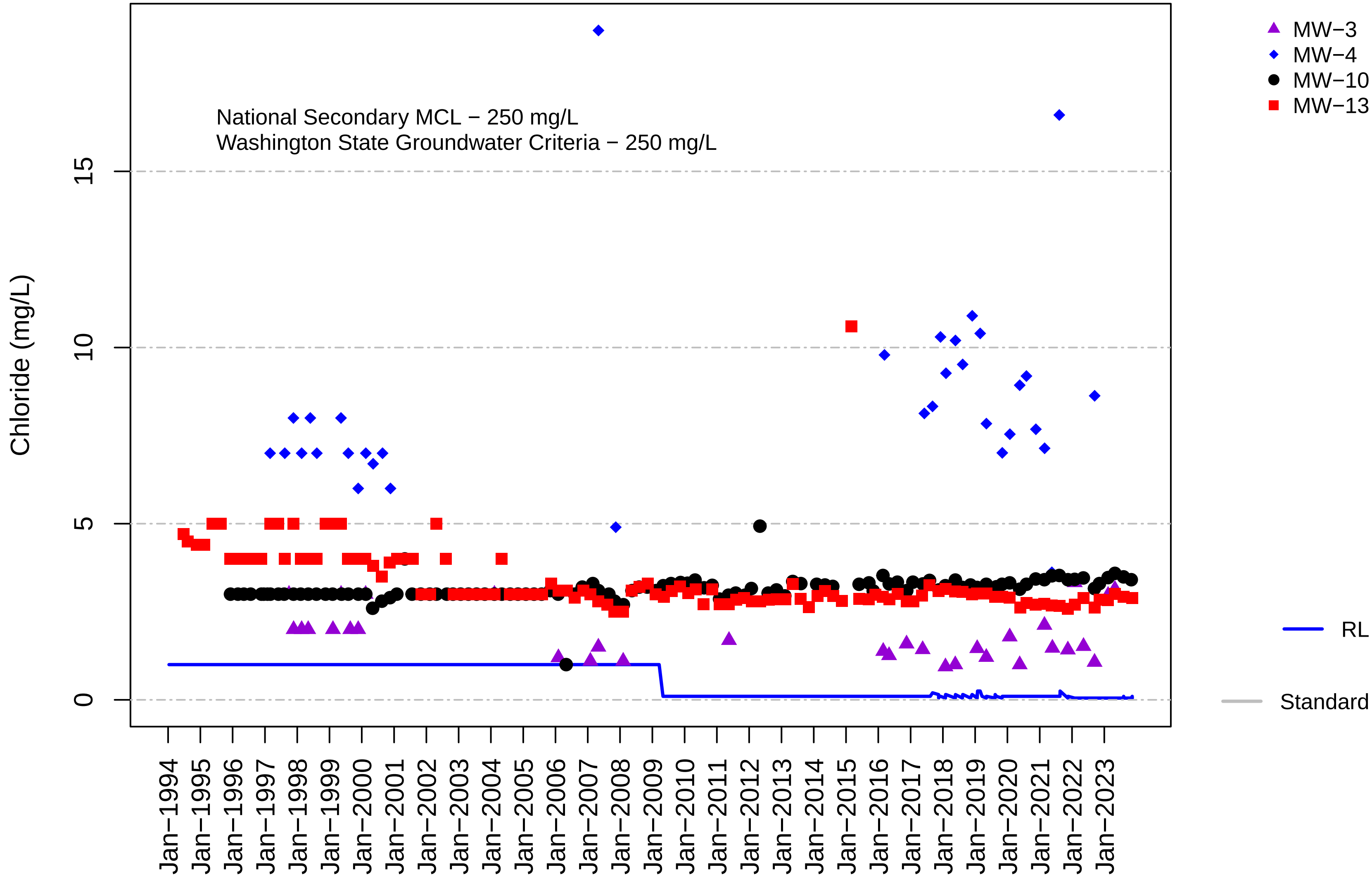


Figure B−6 Long−Term
Channel Cc1
Nitrate

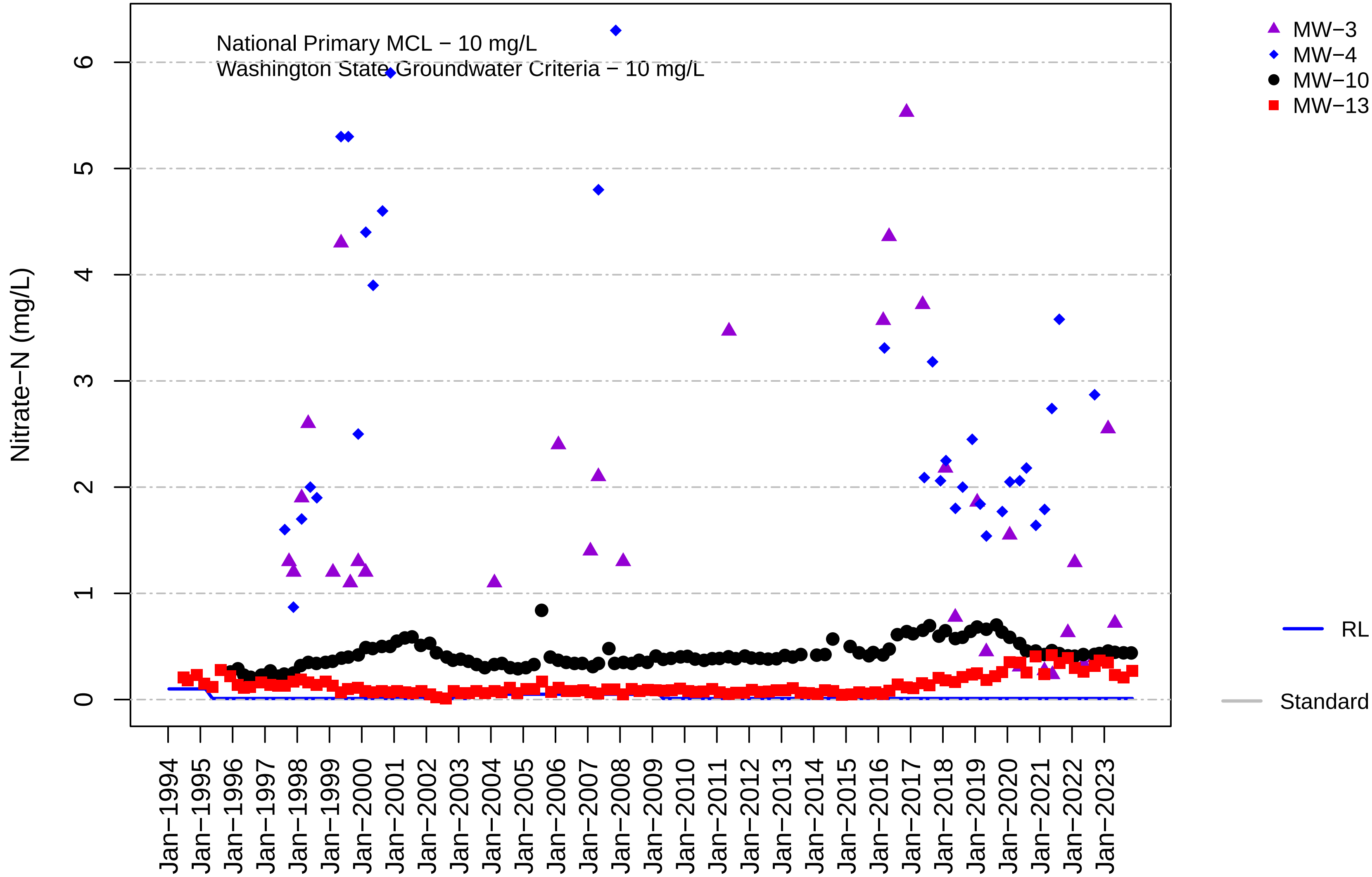


Figure B−7 Long−Term
Channel Cc1
Sulfate

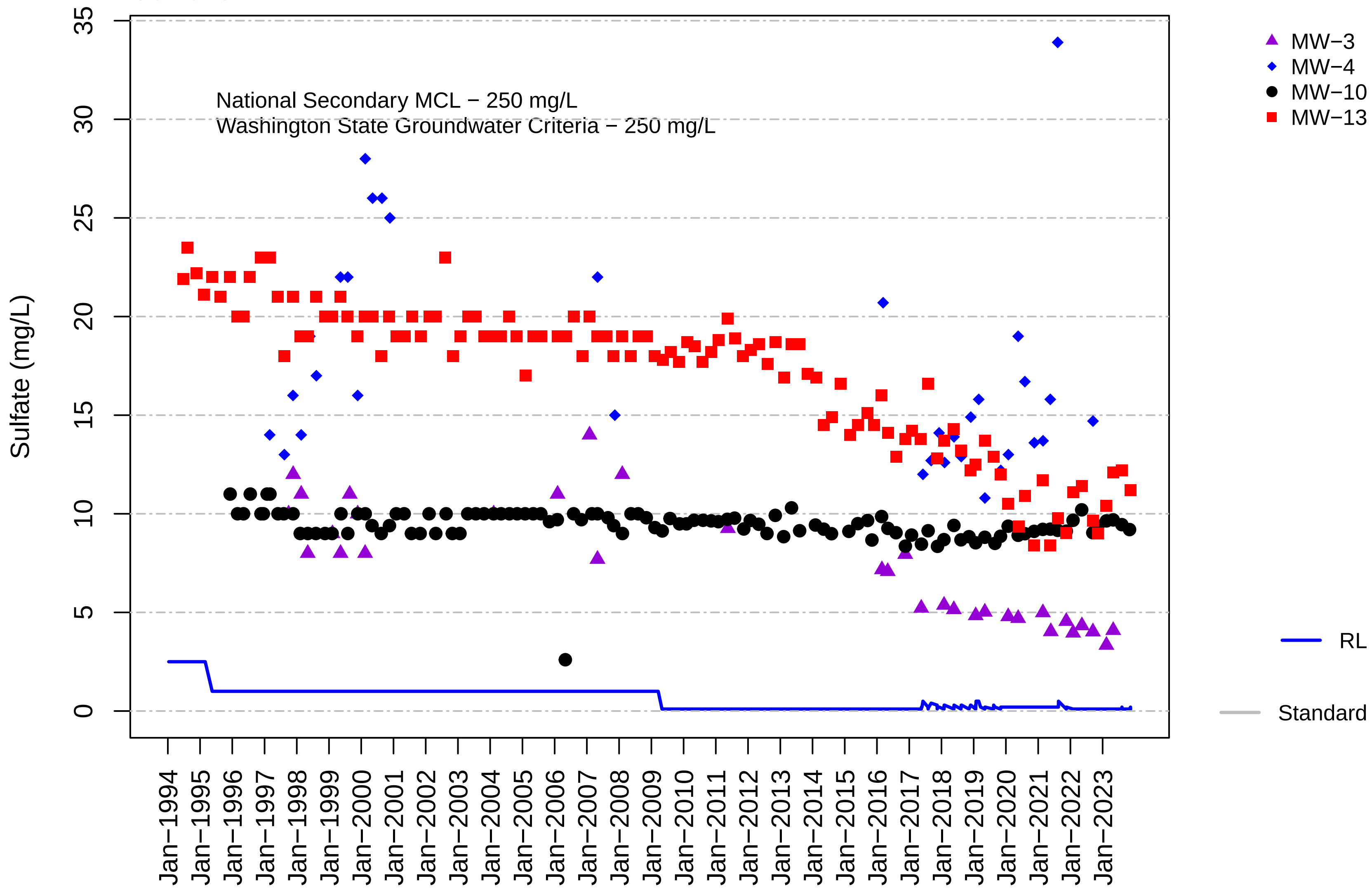


Figure B−8 Long−Term
Channel Cc1
Total Dissolved Solids

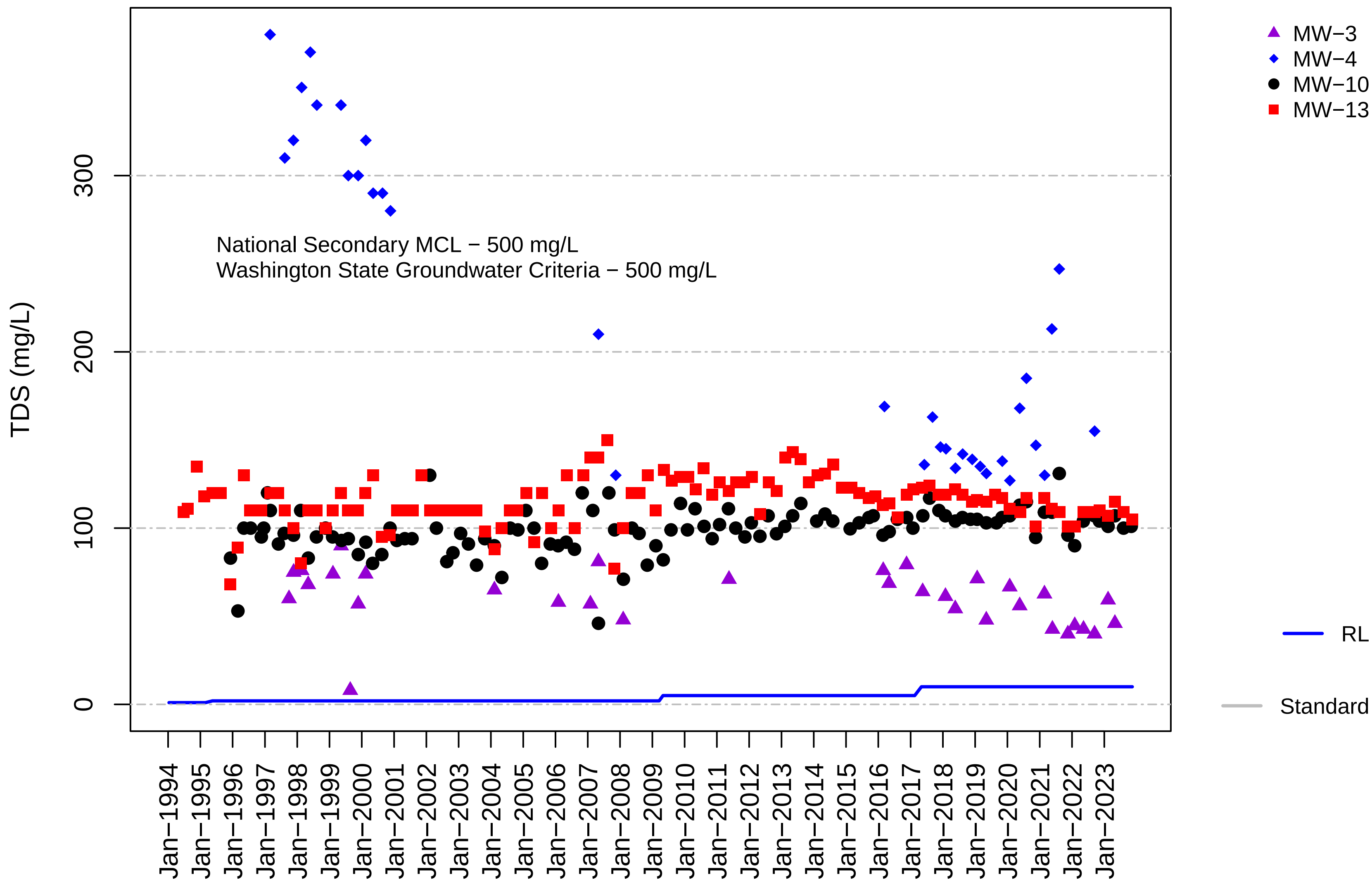
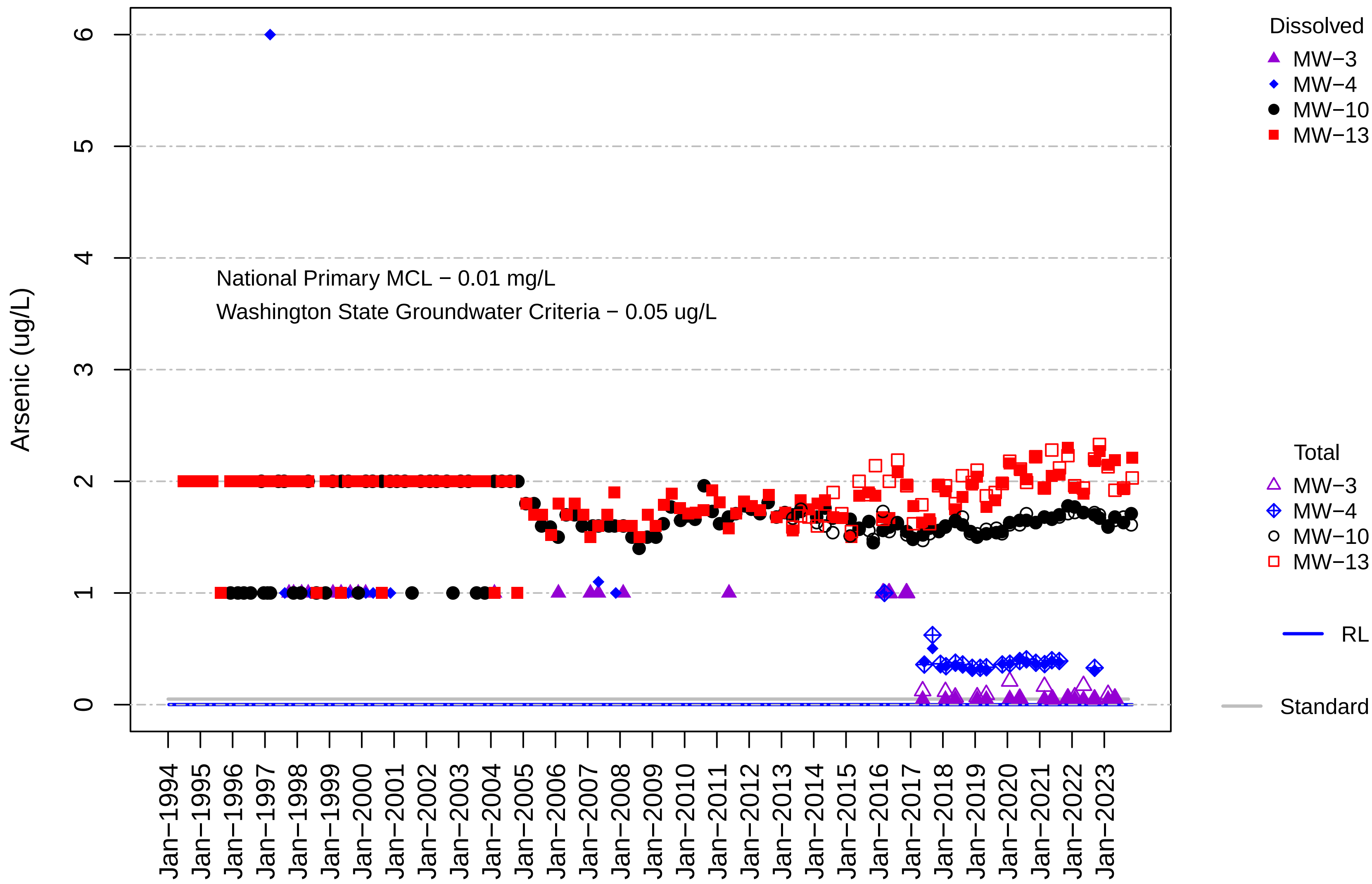


Figure B−9 Long−Term
Channel Cc1
Arsenic



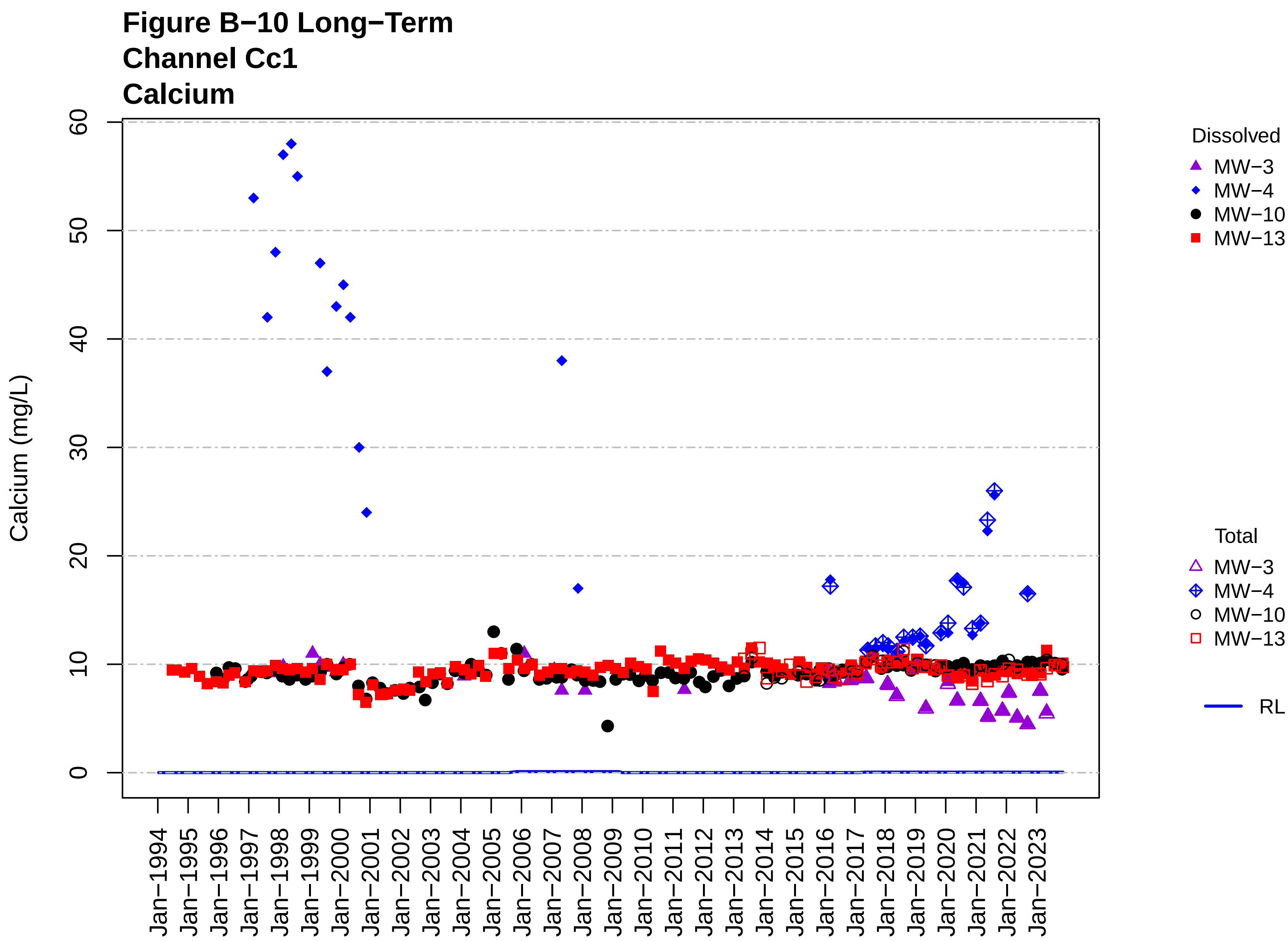


Figure B−10 Long−Term
Channel Cc1
Calcium
Calcium (mg/L)
0
10
20
30
40
50
60
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
Dissolved
MW−3
MW−4
MW−10
MW−13
Total
MW−3
MW−4
MW−10
MW−13
RL

Figure B−11 Long−Term
Channel Cc1
Iron

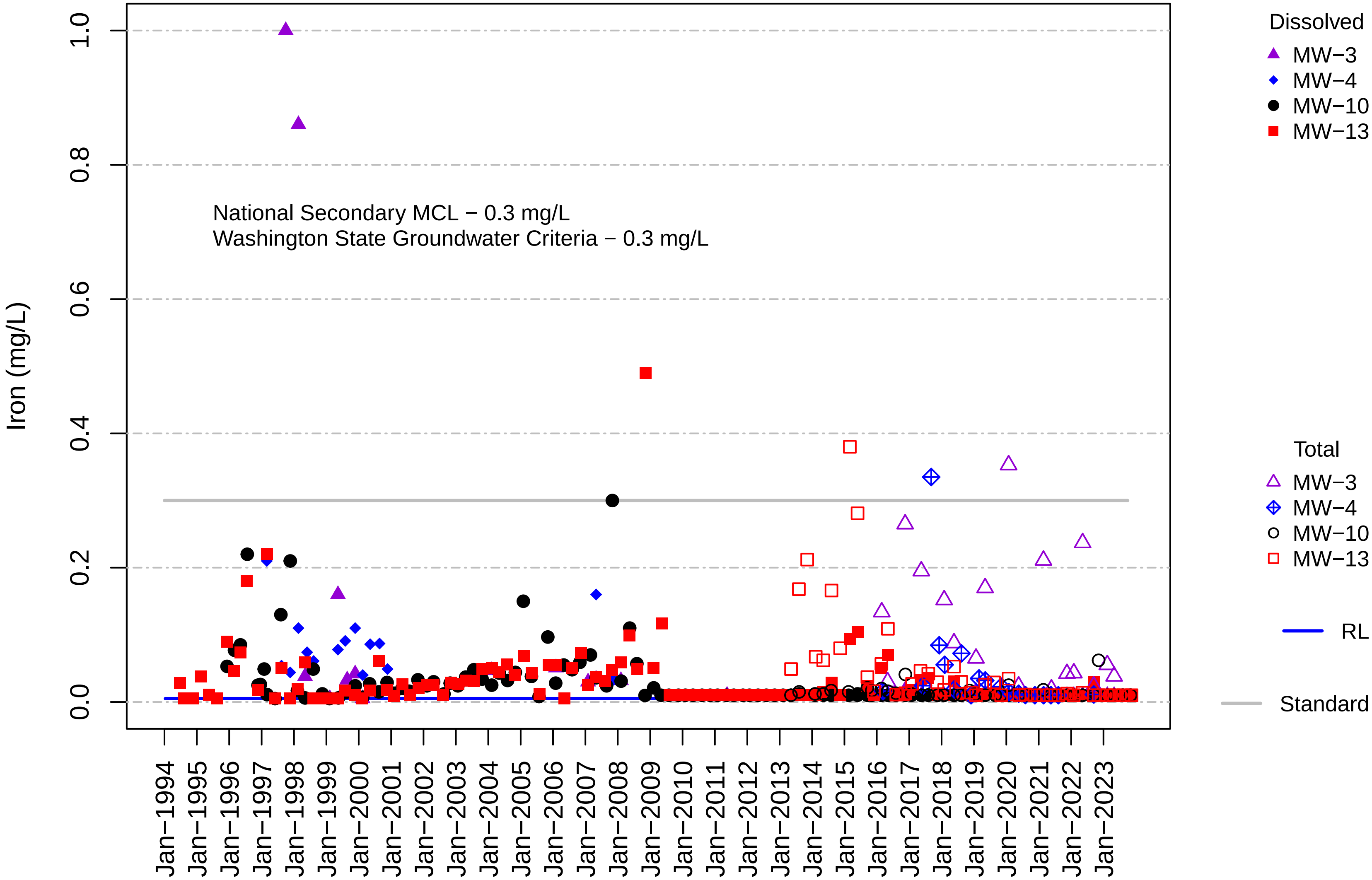
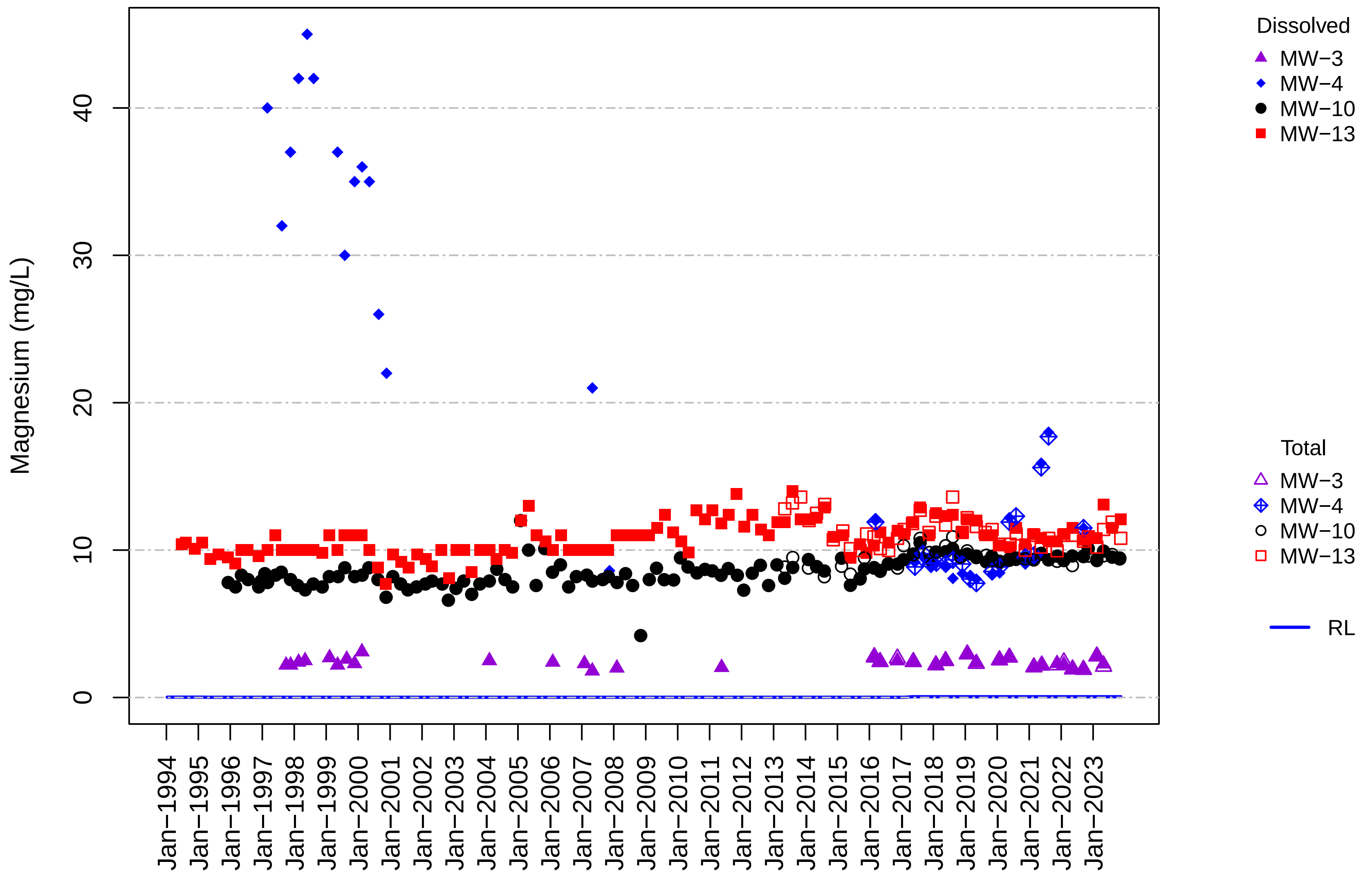


Figure B−12 Long−Term
Channel Cc1
Magnesium



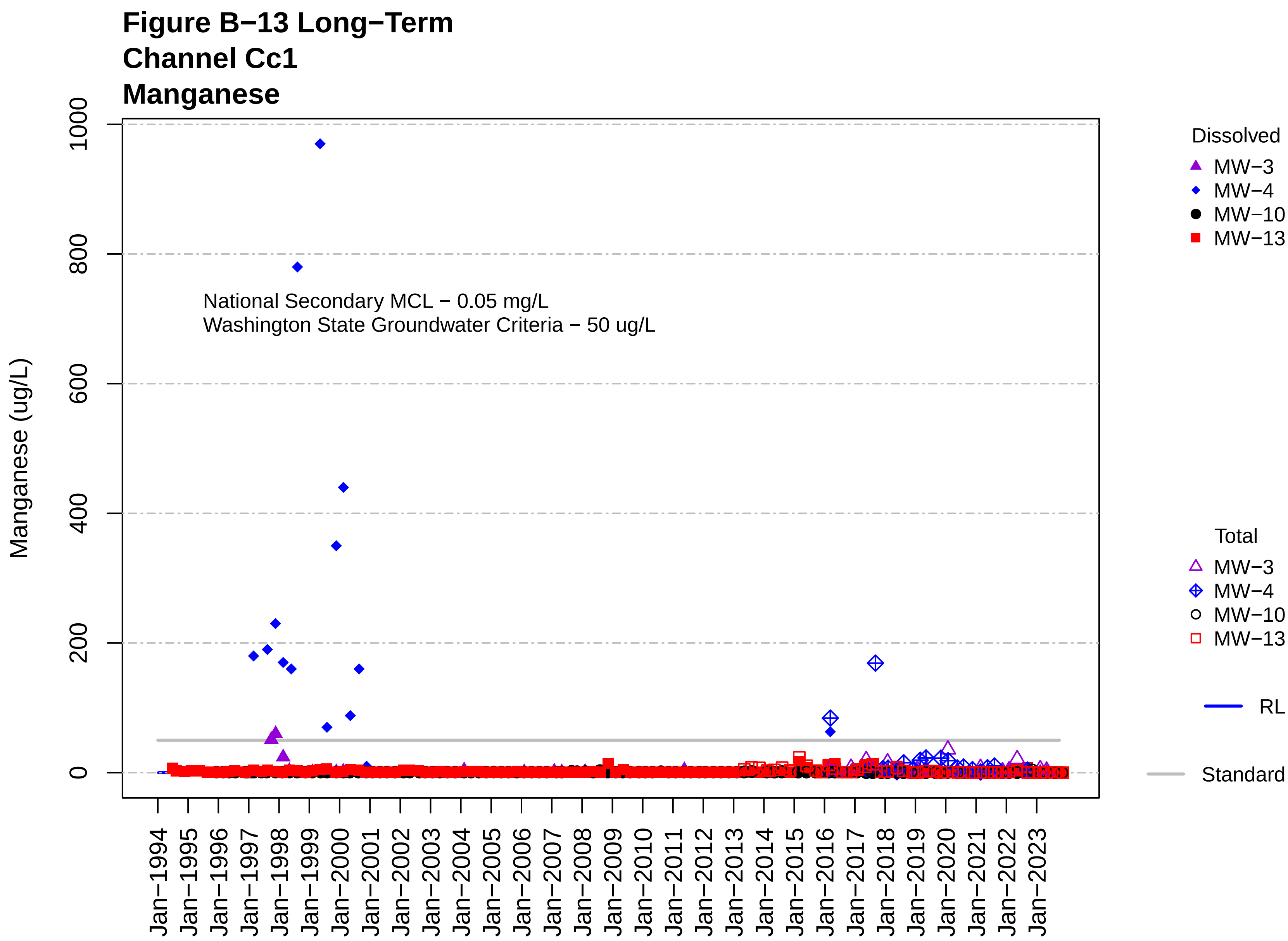


Figure B−13 Long−Term
Channel Cc1
Manganese
Manganese (ug/L)
1000
800
600
400
200
0
National Secondary MCL − 0.05 mg/L
Washington State Groundwater Criteria − 50 ug/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
Dissolved
MW−3
MW−4
MW−10
MW−13
Total
MW−3
MW−4
MW−10
MW−13
RL
Standard

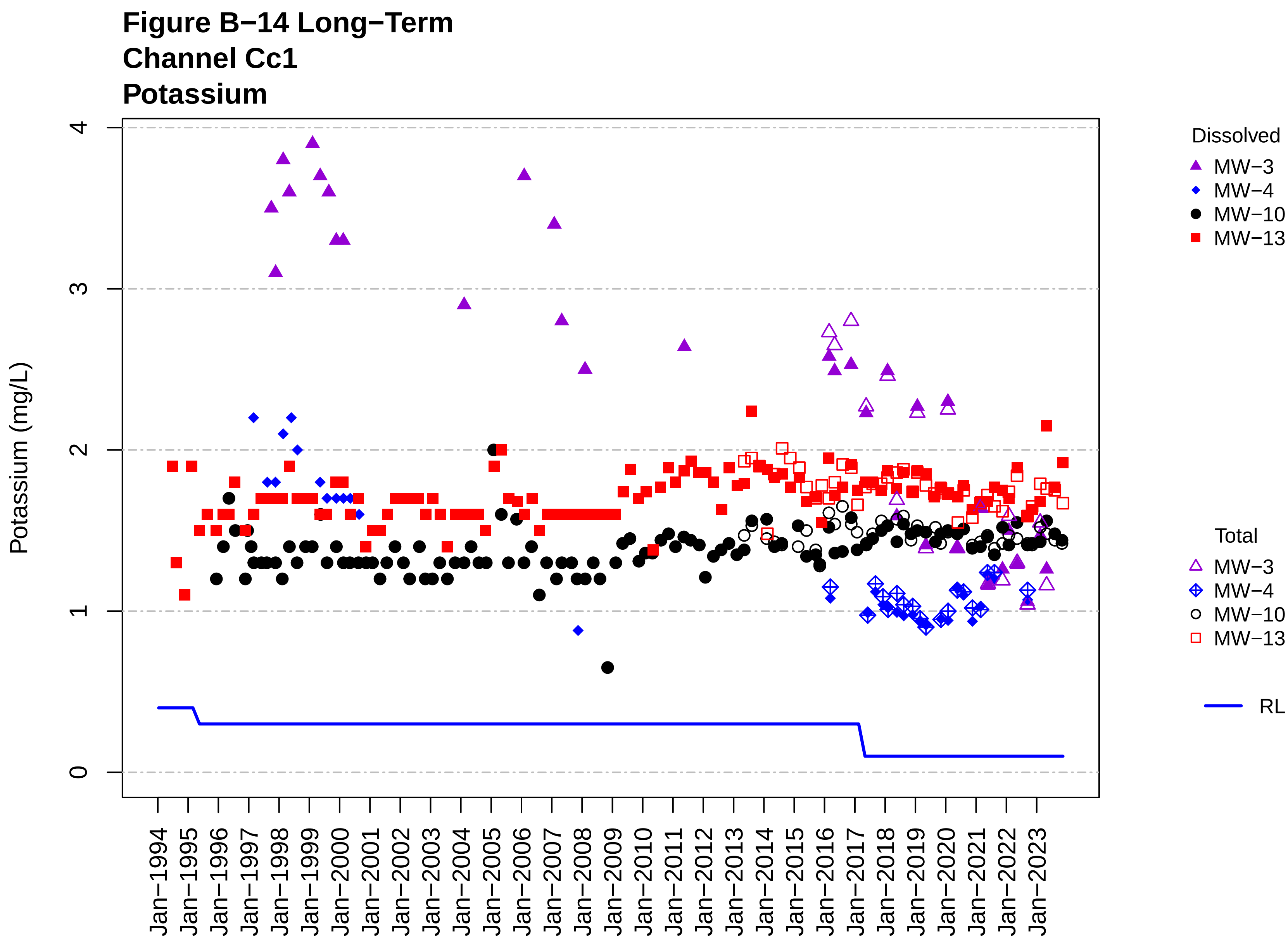


Figure B−14 Long−Term
Channel Cc1
Potassium
Potassium (mg/L)
0
1
2
3
4
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
Dissolved
MW−3
MW−4
MW−10
MW−13
Total
MW−3
MW−4
MW−10
MW−13
RL

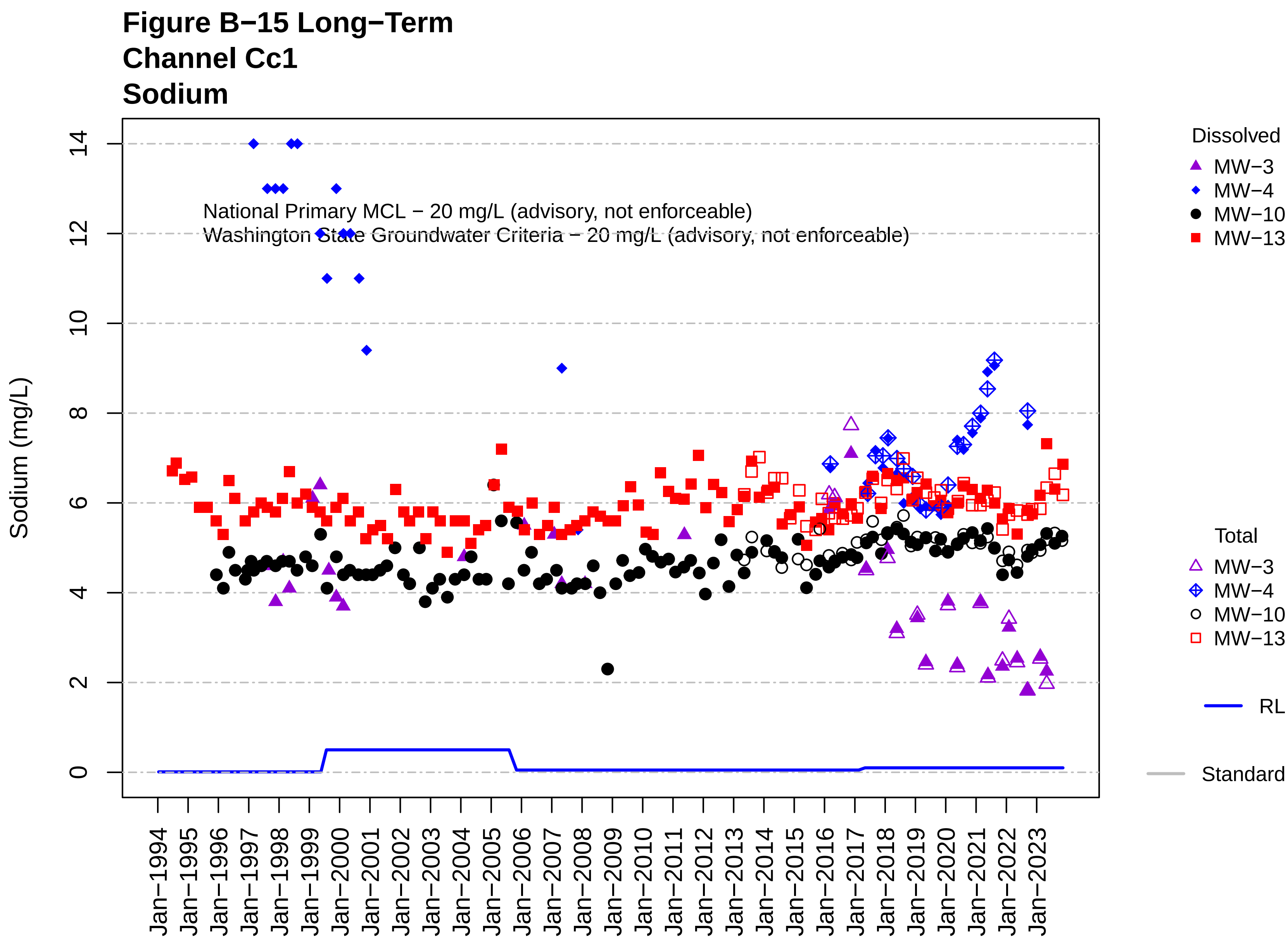


Figure B−15 Long−Term
Channel Cc1
Sodium
National Primary MCL − 20 mg/L (advisory, not enforceable)
Washington State Groundwater Criteria − 20 mg/L (advisory, not enforceable)
Sodium (mg/L)
0
2
4
6
8
10
12
14
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
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
Jan−2021
Jan−2022
Jan−2023
Dissolved
MW−3
MW−4
MW−10
MW−13
Total
MW−3
MW−4
MW−10
MW−13
RL
Standard

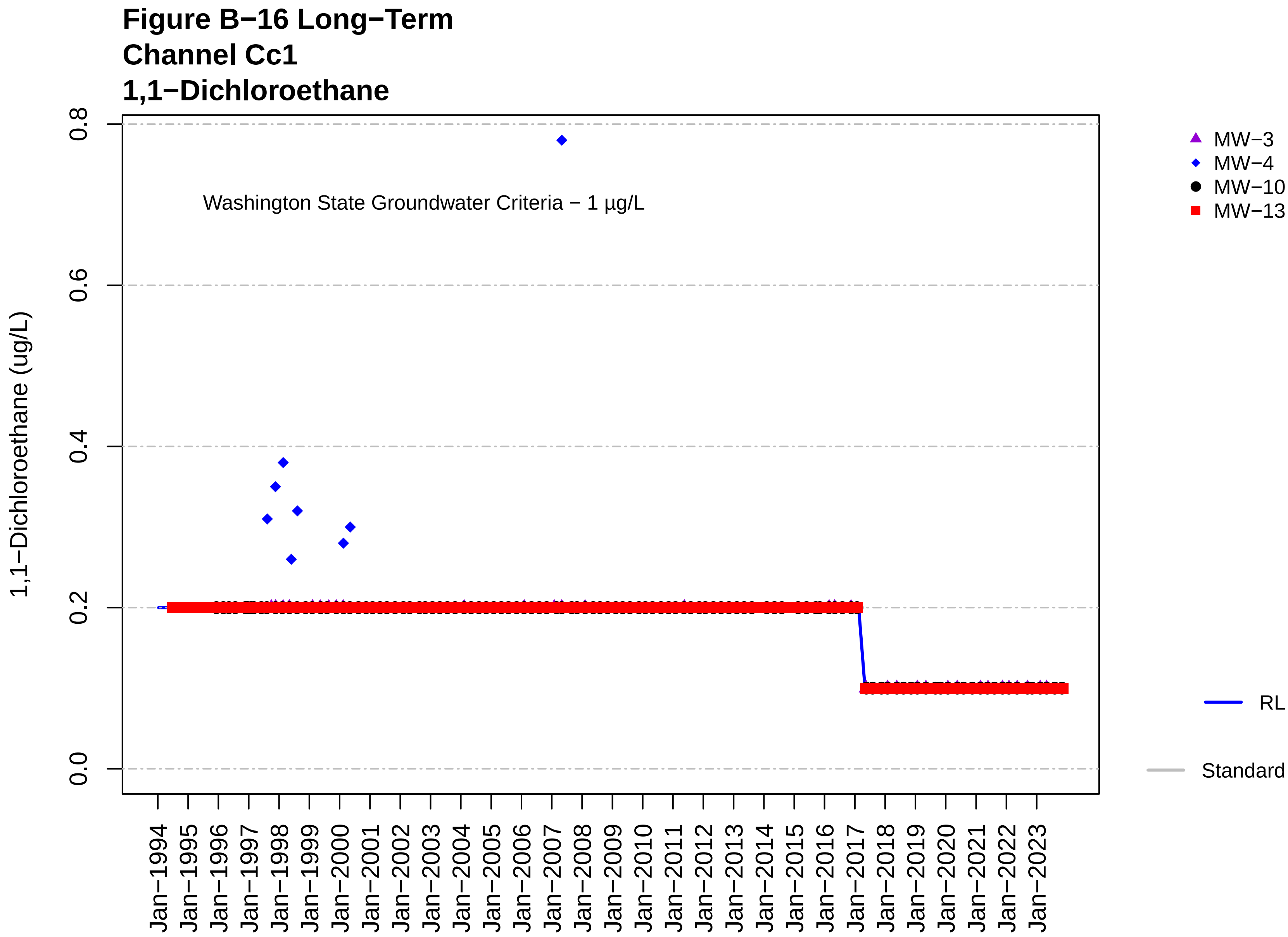


Figure B−16 Long−Term
Channel Cc1
1,1−Dichloroethane
Washington State Groundwater Criteria − 1 µg/L
1,1−Dichloroethane (ug/L)
0.0
0.2
0.4
0.6
0.8
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
MW−3
MW−4
MW−10
MW−13
RL
Standard

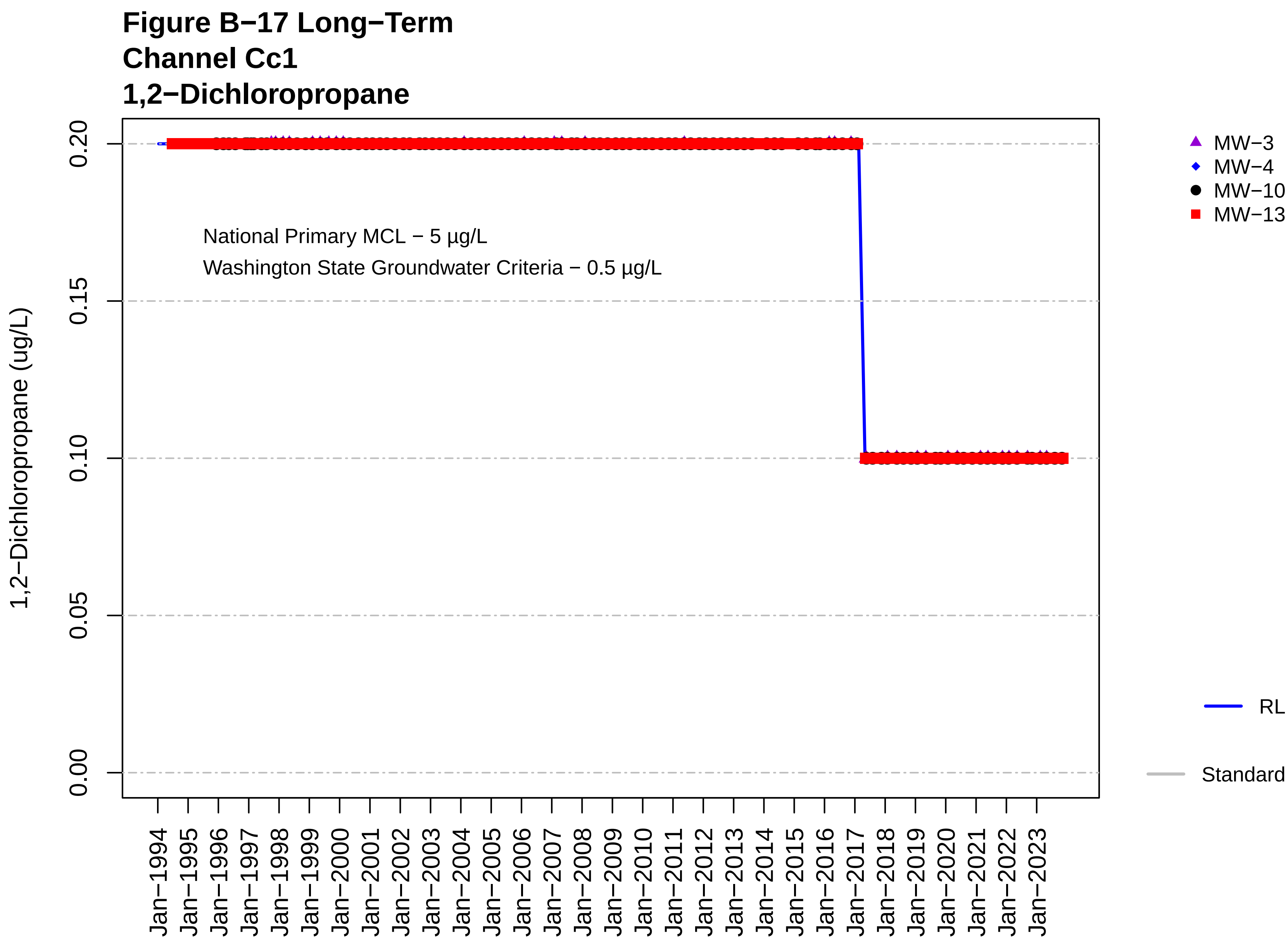
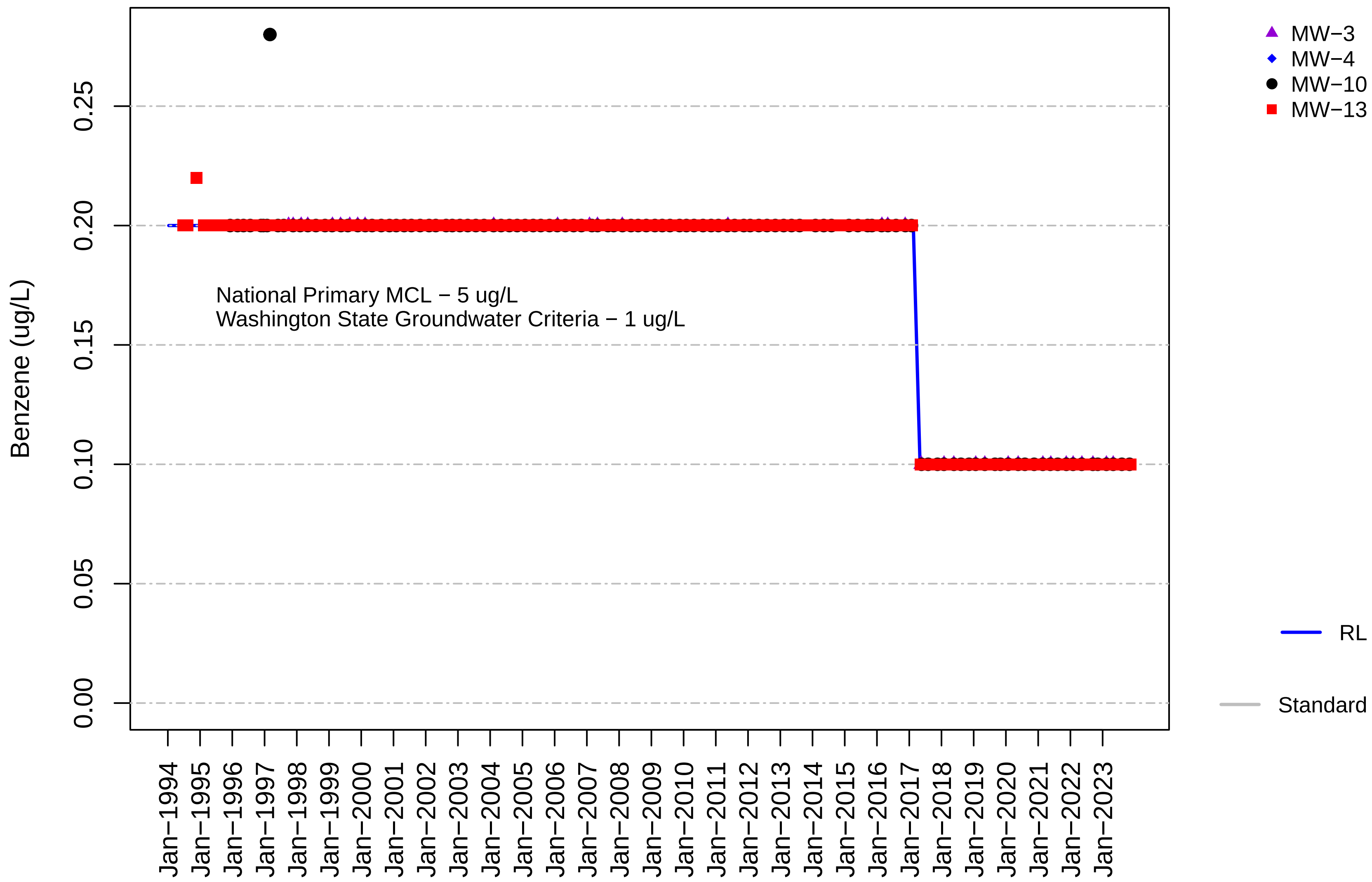


Figure B−17 Long−Term
Channel Cc1
1,2−Dichloropropane
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.5 µg/L
1,2−Dichloropropane (ug/L)
0.20
0.15
0.10
0.05
0.00
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
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
Jan−2021
Jan−2022
Jan−2023
MW−3
MW−4
MW−10
MW−13
RL
Standard

Figure B−18 Long−Term
Channel Cc1
Benzene



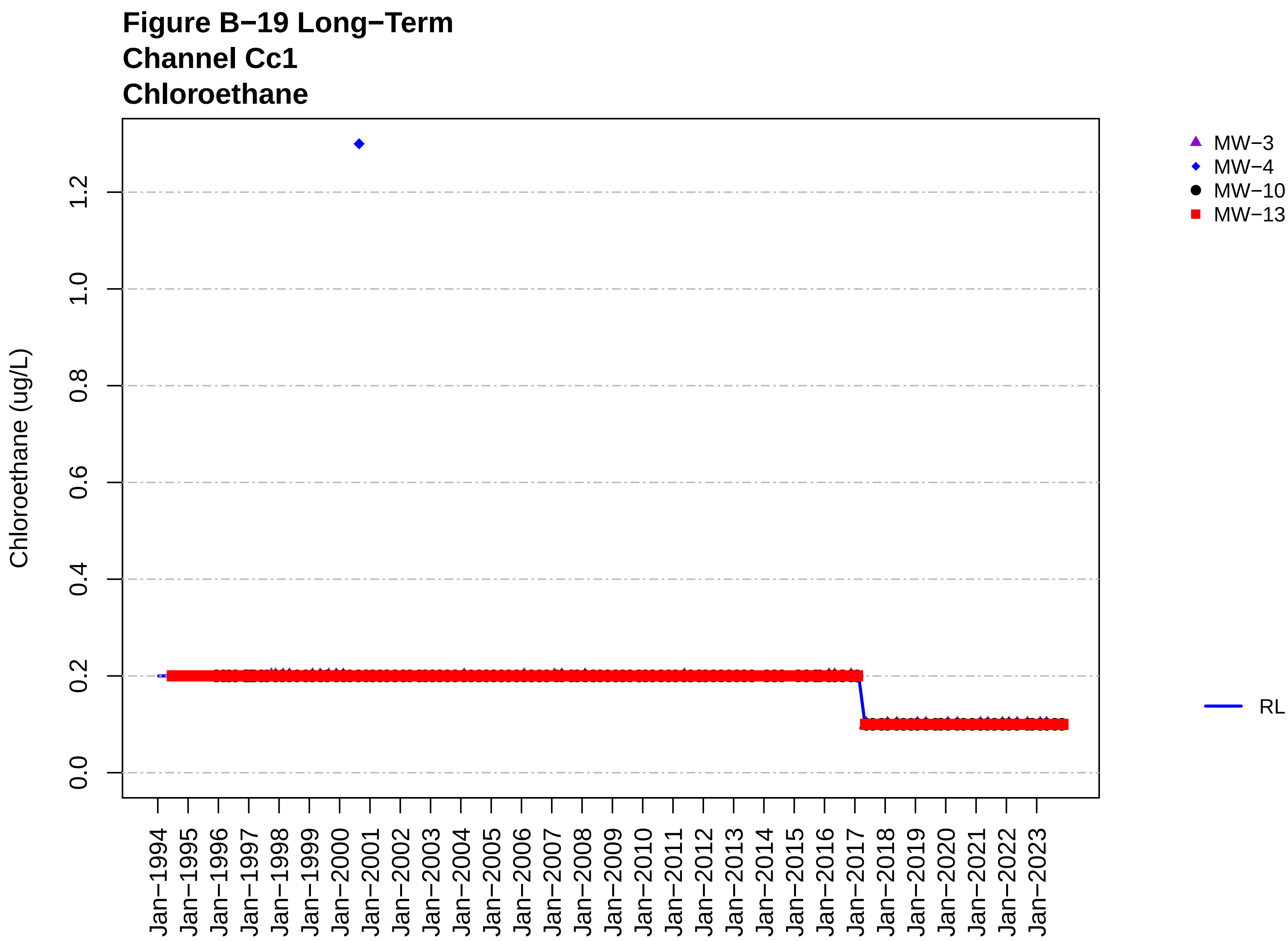


Figure B−19 Long−Term
Channel Cc1
Chloroethane
Chloroethane (ug/L)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
MW−3
MW−4
MW−10
MW−13
RL

Figure B−20 Long−Term
Channel Cc1
cis−1,2−Dichloroethene

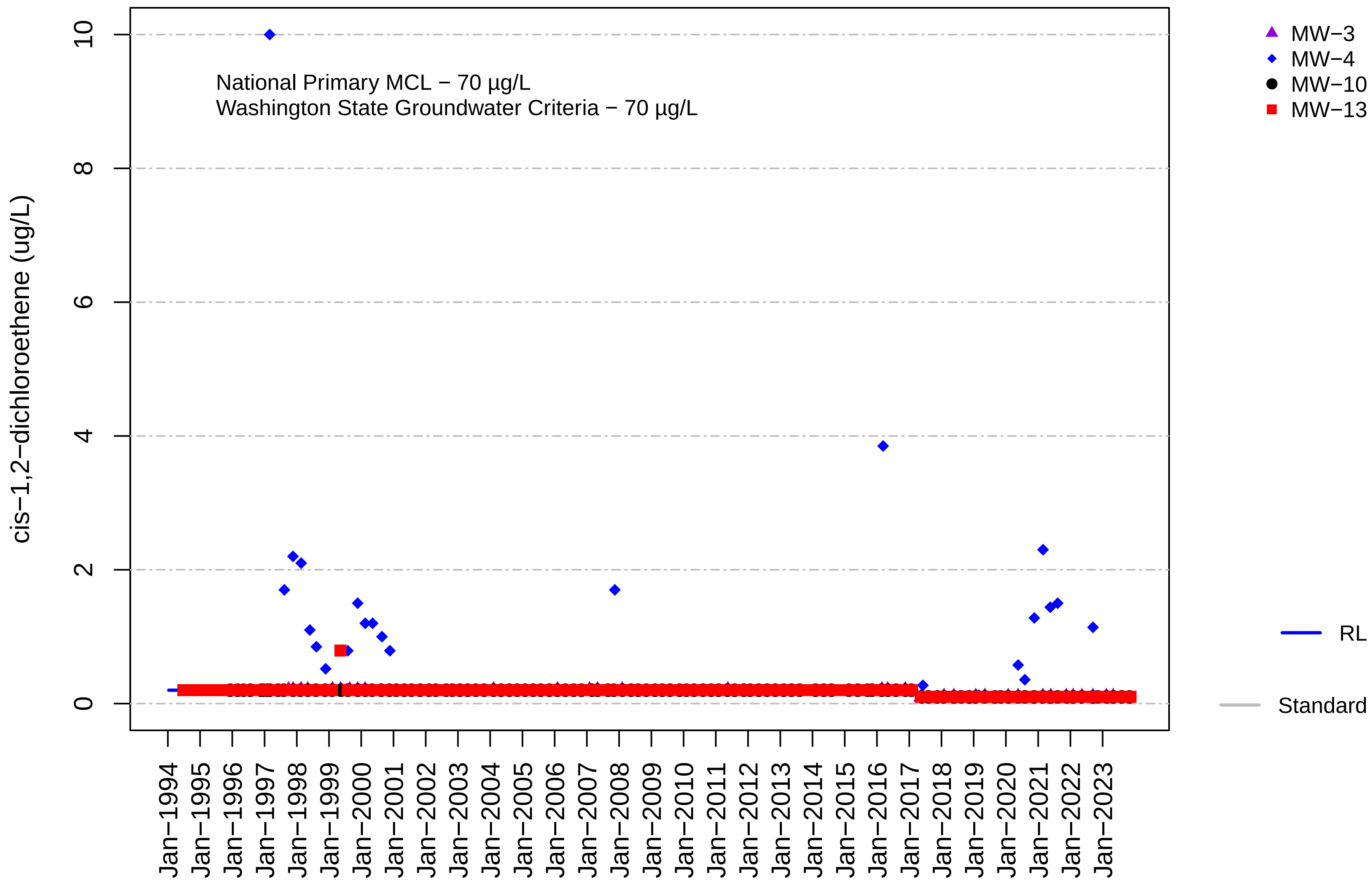


Figure B−21 Long−Term
Channel Cc1
Dichlorodifluoromethane

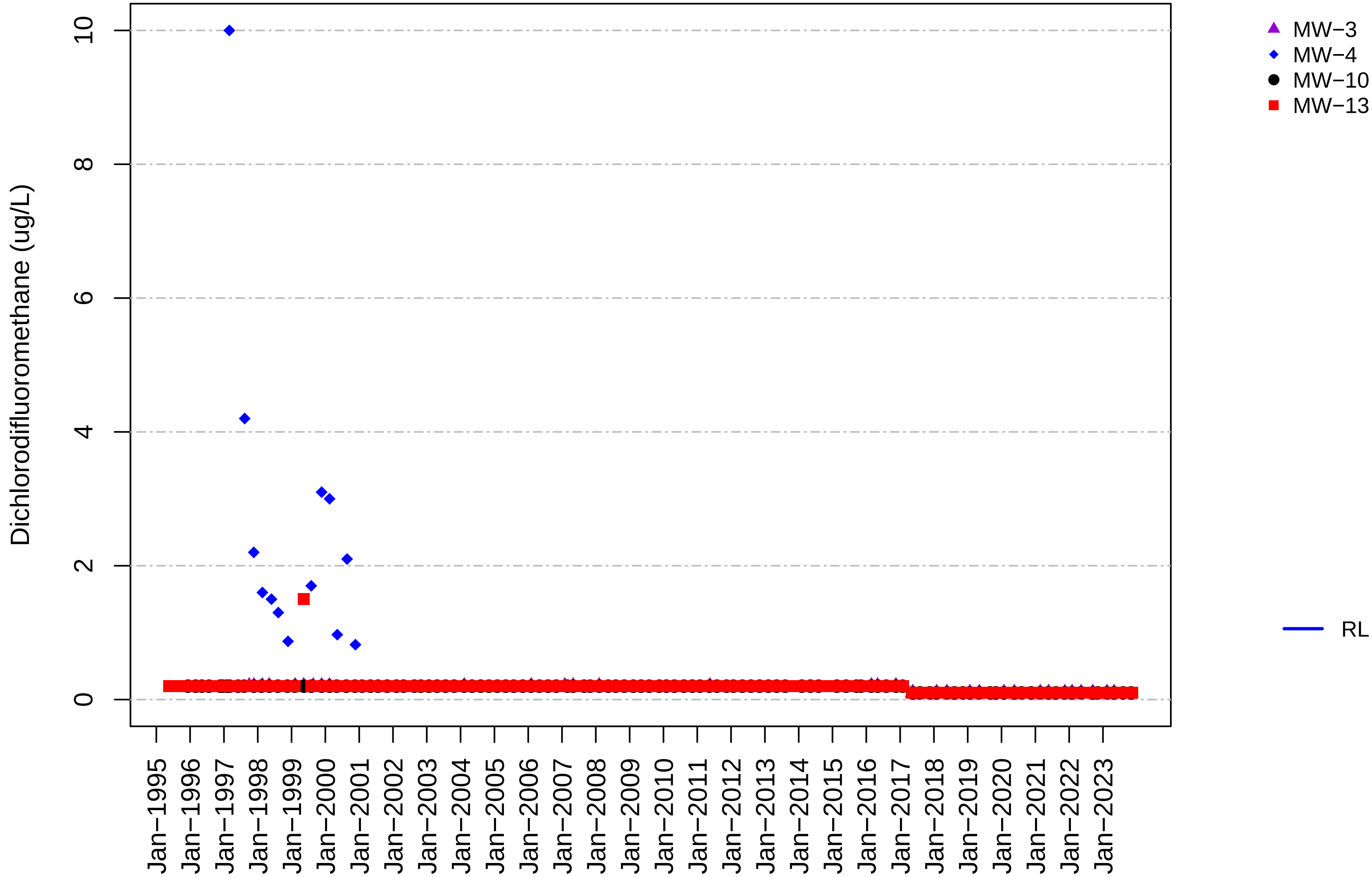


Figure B−22 Long−Term
Channel Cc1
Tetrachloroethene

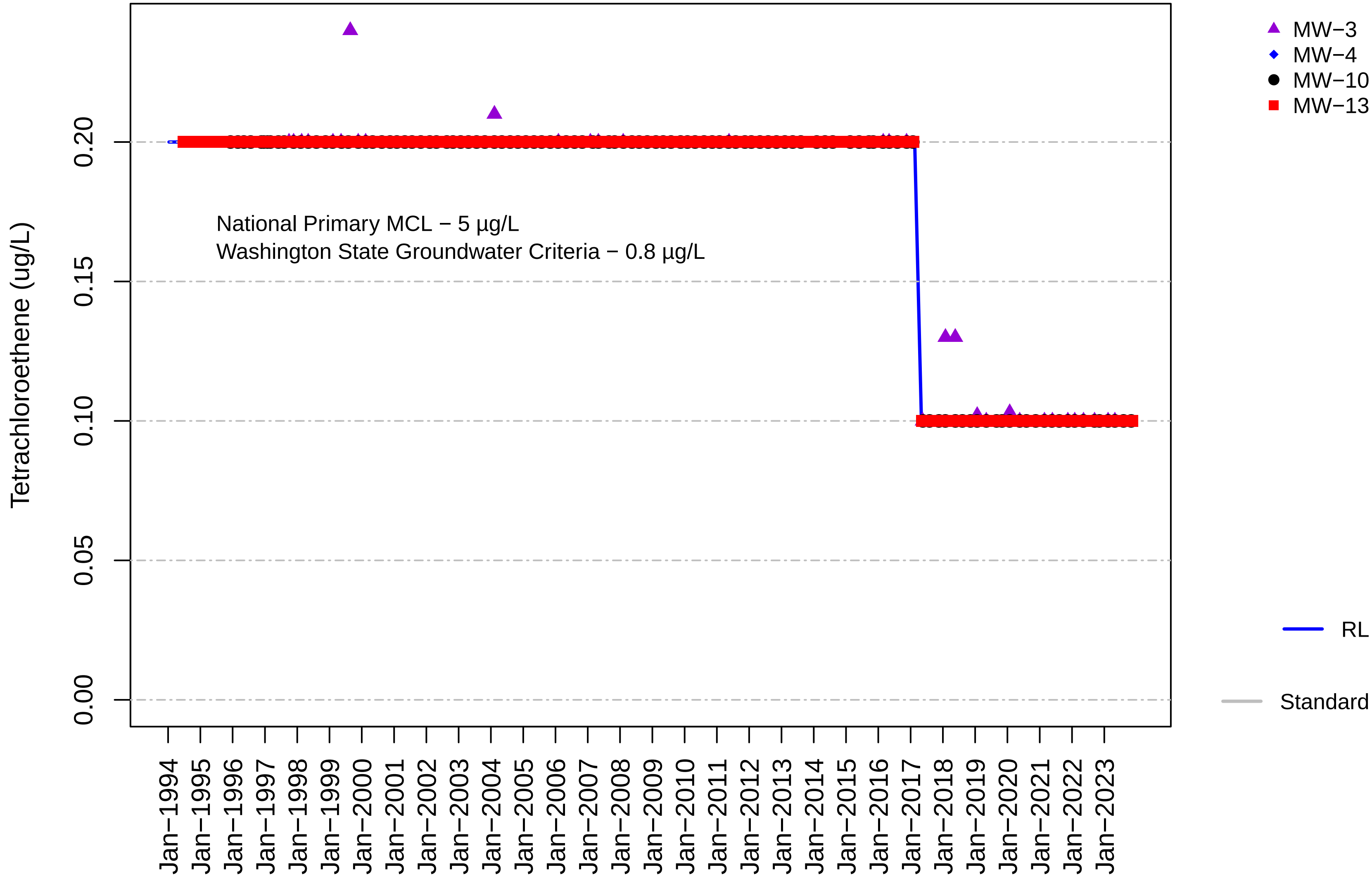


Figure B−23 Long−Term
Channel Cc1
Toluene

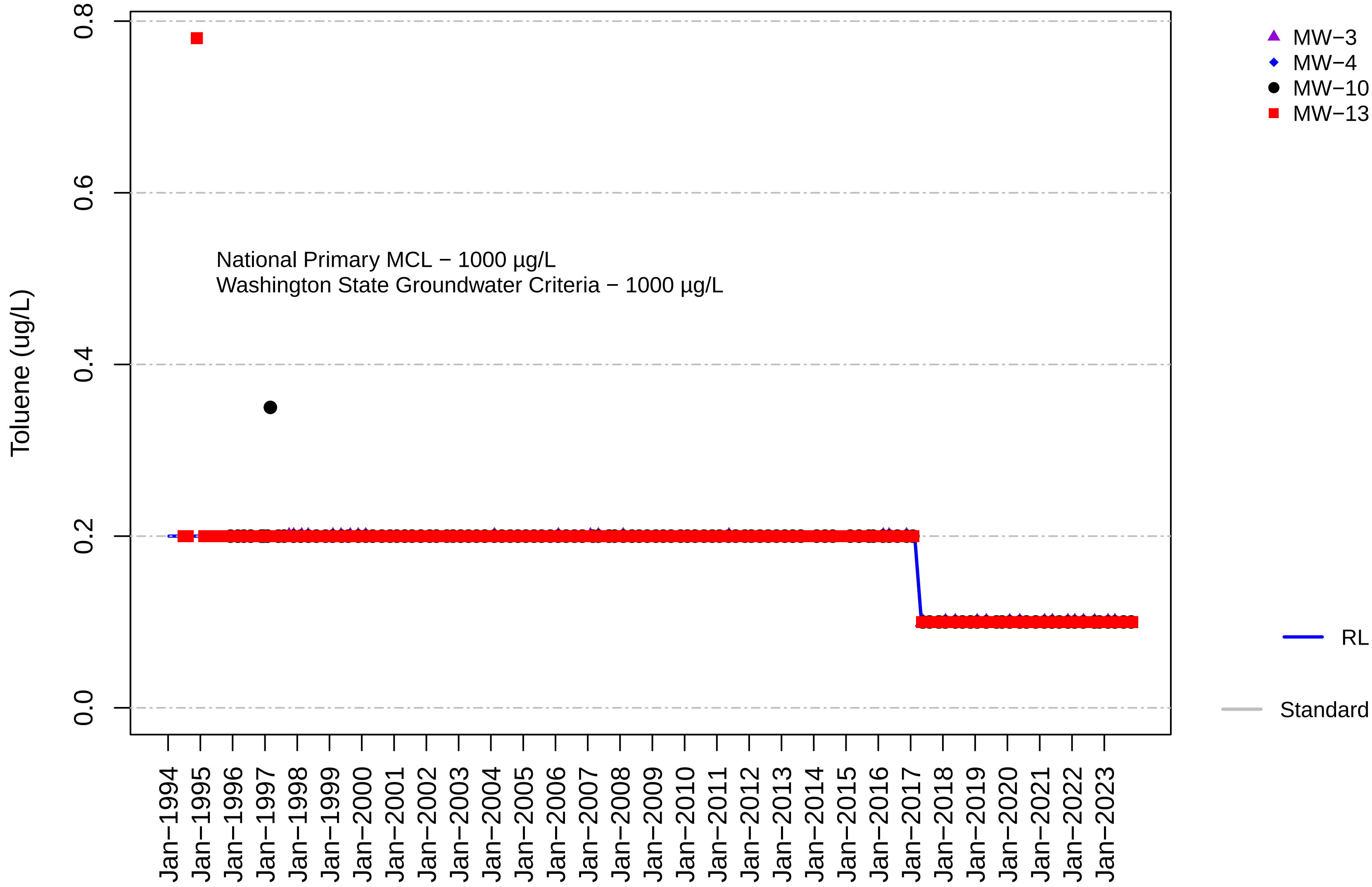
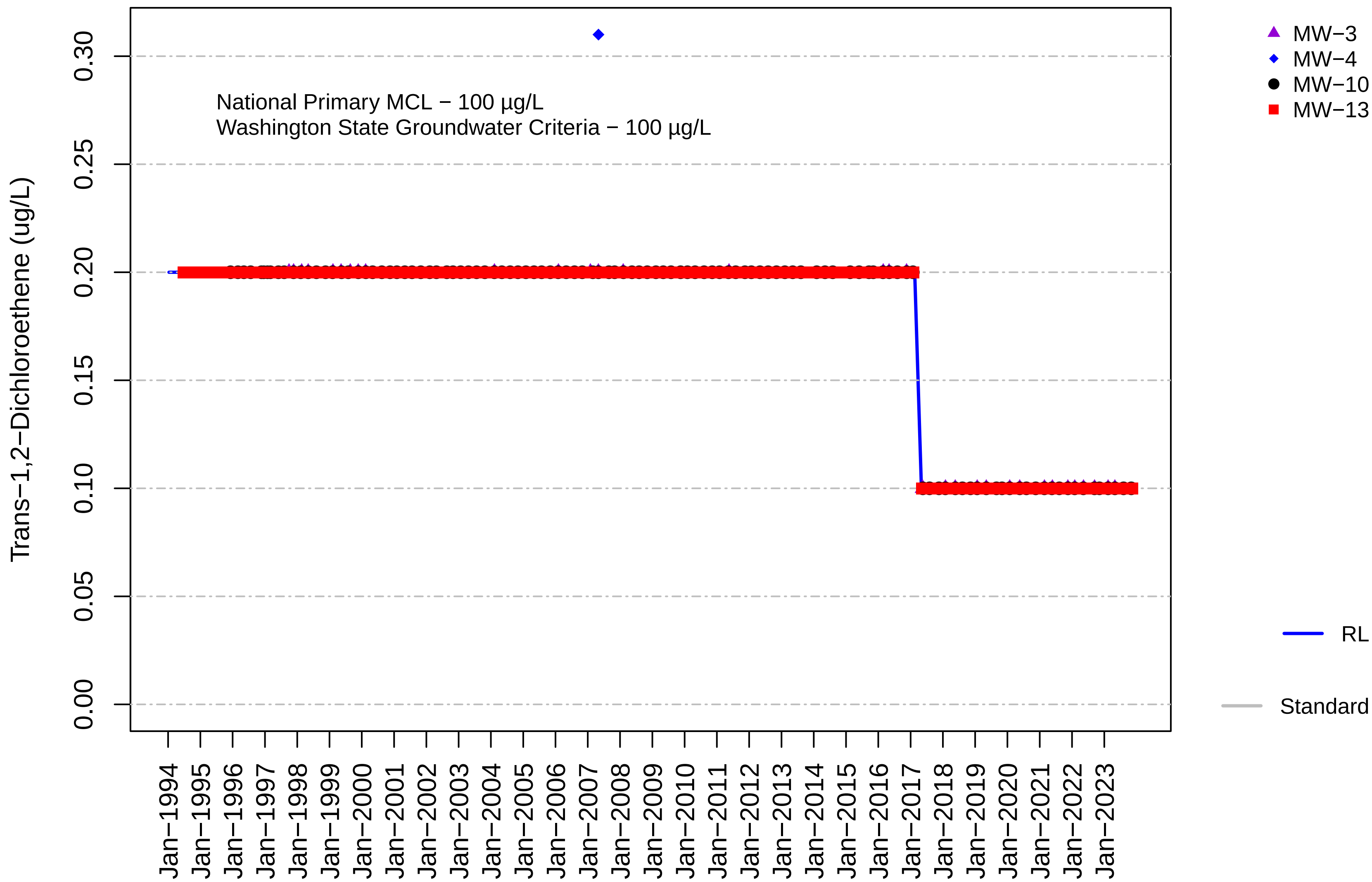


Figure B−24 Long−Term
Channel Cc1
Trans−1,2−Dichloroethene



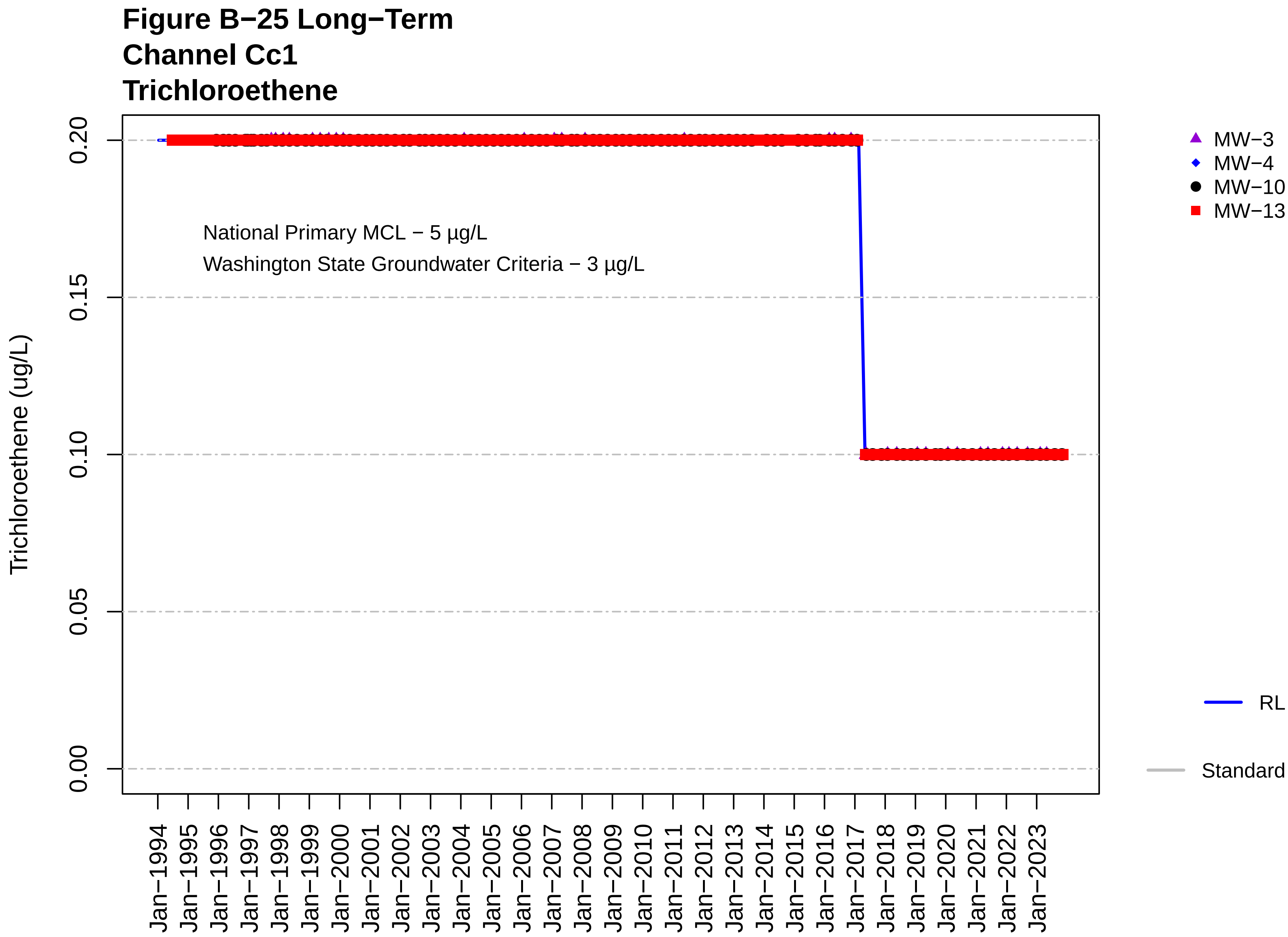
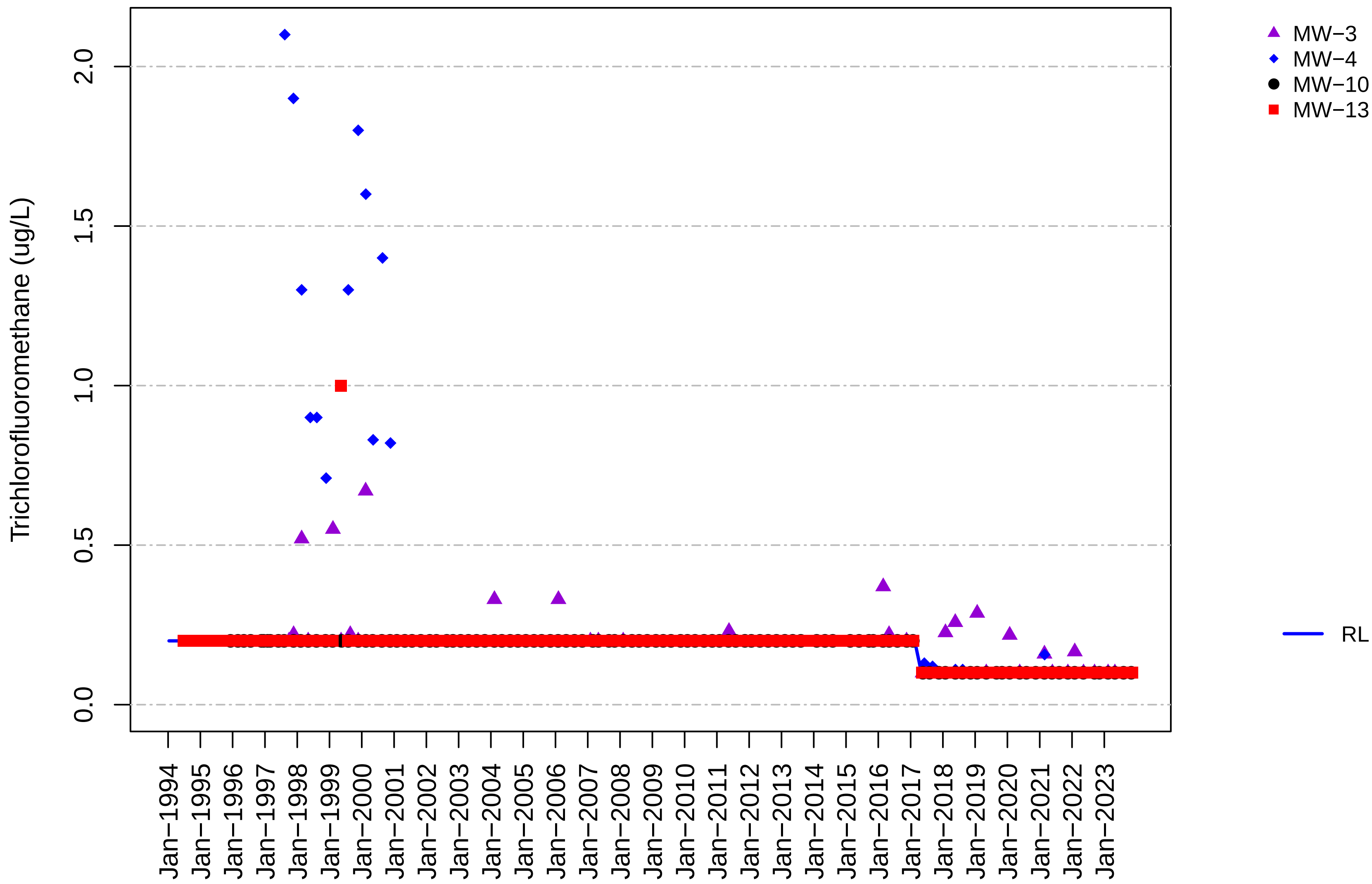


Figure B−25 Long−Term
Channel Cc1
Trichloroethene
Trichloroethene (ug/L)
0.20
0.15
0.10
0.05
0.00
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 3 µg/L
MW−3
MW−4
MW−10
MW−13
RL
Standard
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
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
Jan−2021
Jan−2022
Jan−2023

Figure B−26 Long−Term
Channel Cc1
Trichlorofluoromethane



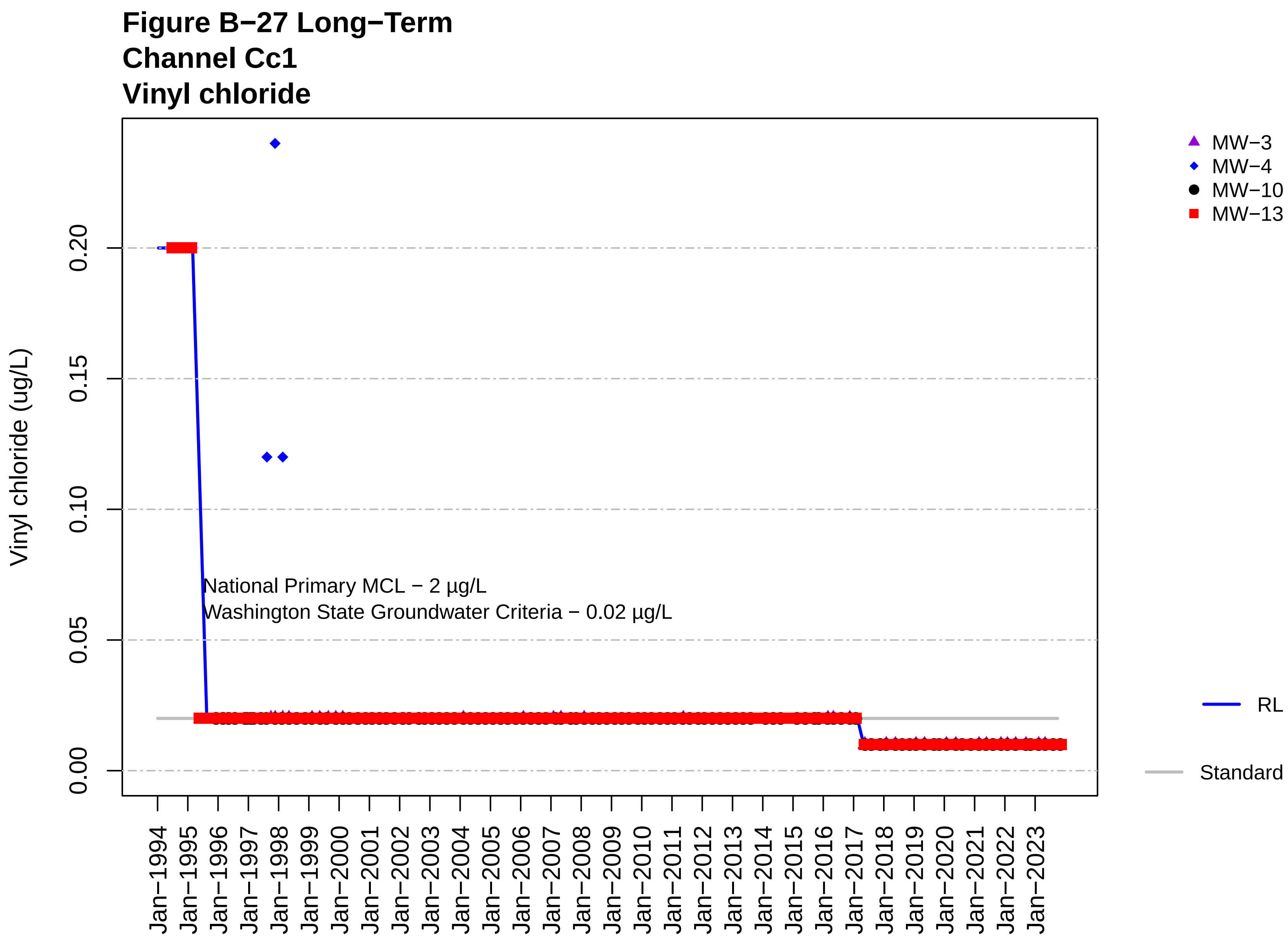


Figure B−27 Long−Term
Channel Cc1
Vinyl chloride
Vinyl chloride (ug/L)
0.00
0.05
0.10
0.15
0.20
National Primary MCL − 2 µg/L
Washington State Groundwater Criteria − 0.02 µg/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
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
Jan−2021
Jan−2022
Jan−2023
MW−3
MW−4
MW−10
MW−13
RL
Standard

Figure B−1 Short−Term
Channel Cc1
Field pH

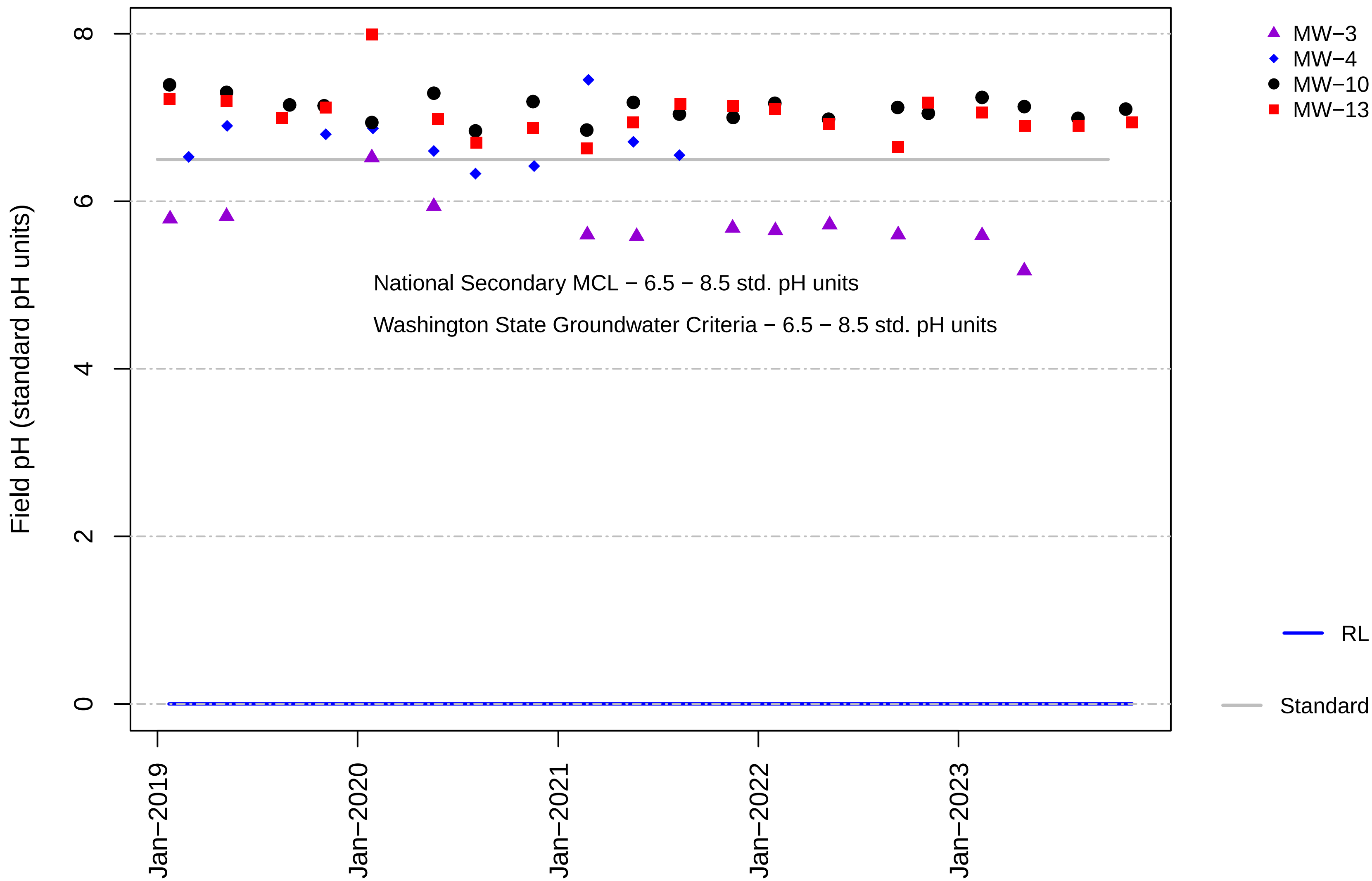


Figure B−2 Short−Term
Channel Cc1
Field Specific Conductance

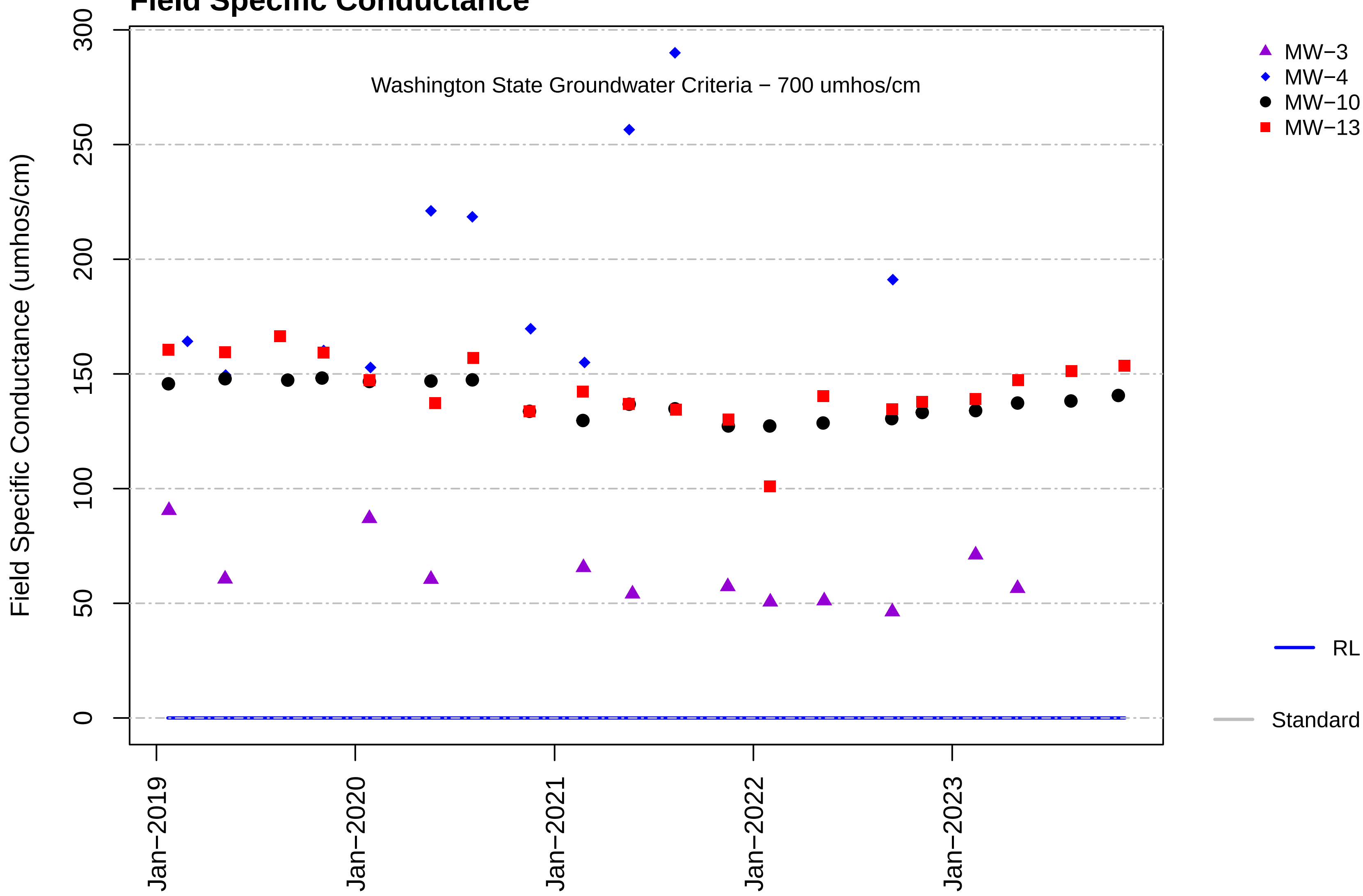


Figure B−3 Short−Term
Channel Cc1
Alkalinity

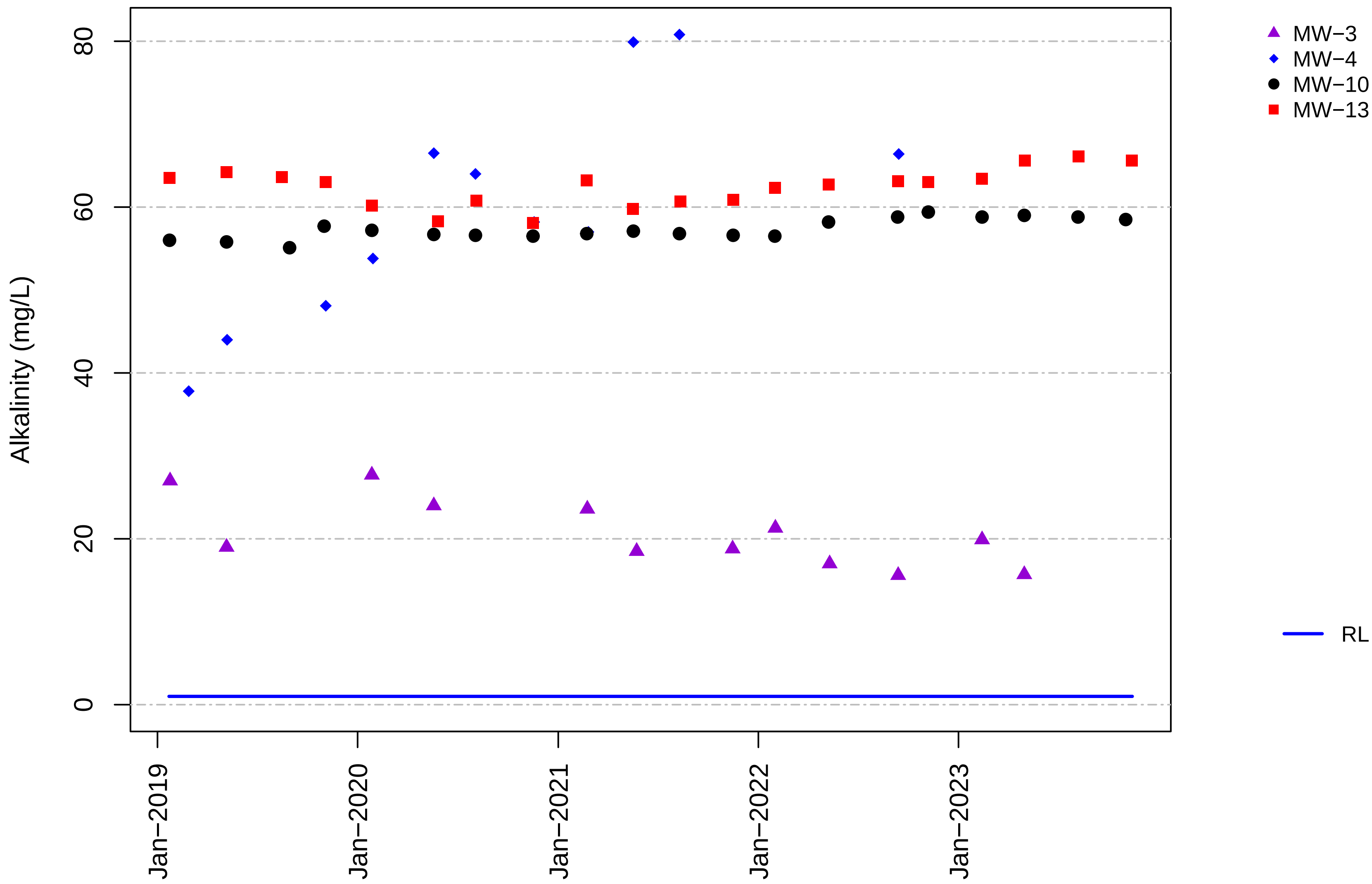


Figure B−4 Short−Term
Channel Cc1
Ammonia

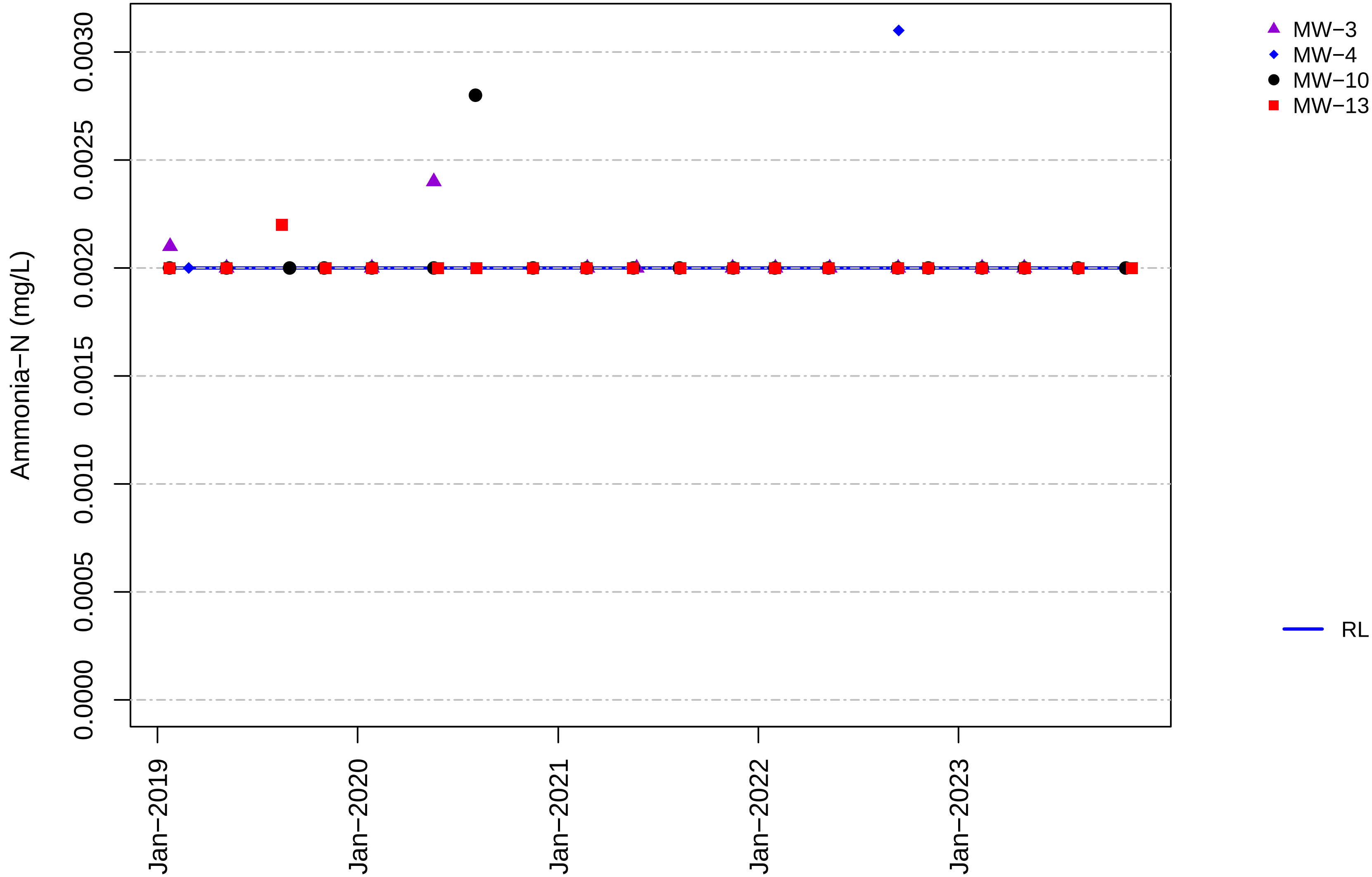


Figure B−5 Short−Term
Channel Cc1
Chloride

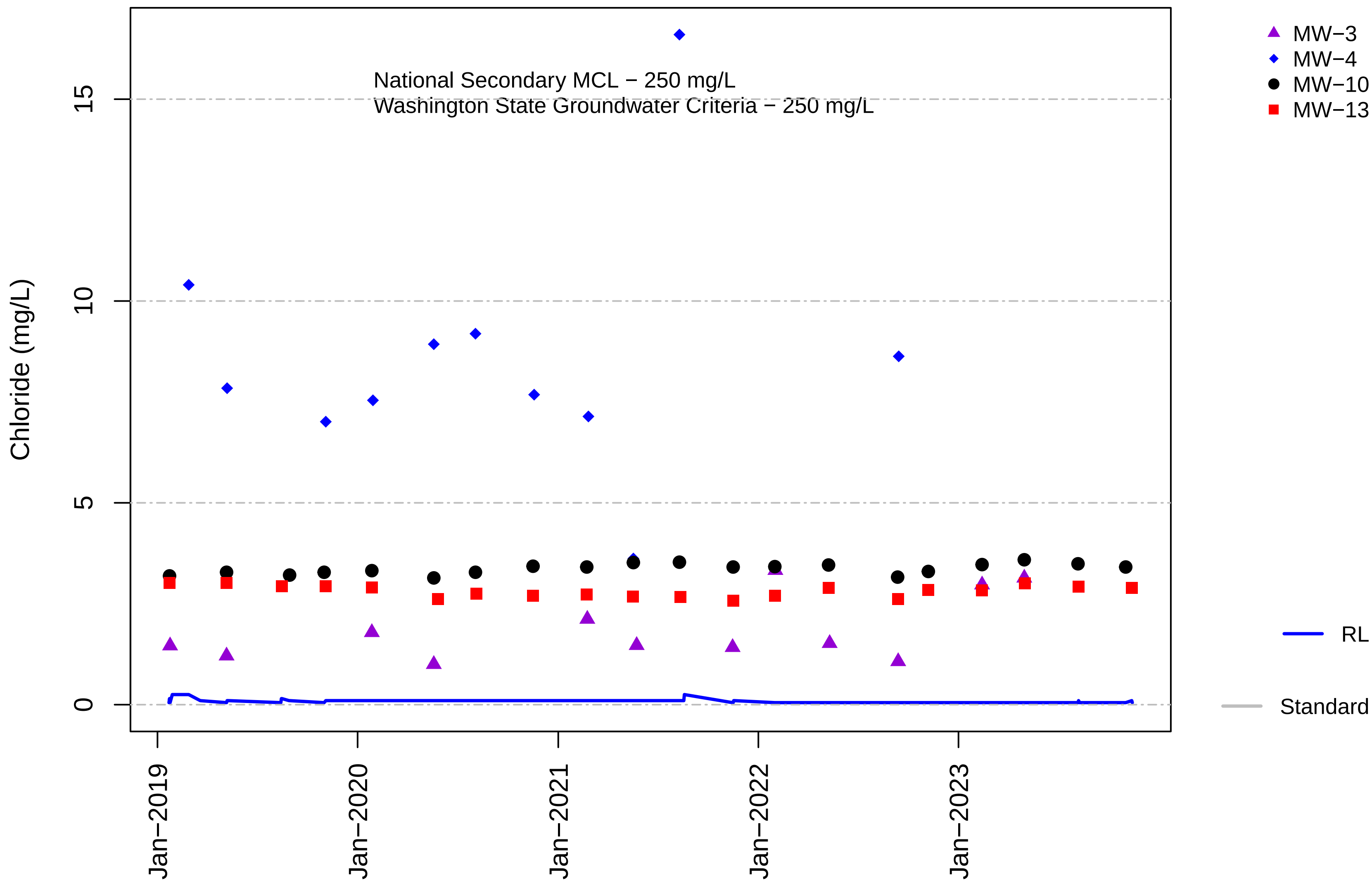


Figure B−6 Short−Term
Channel Cc1
Nitrate

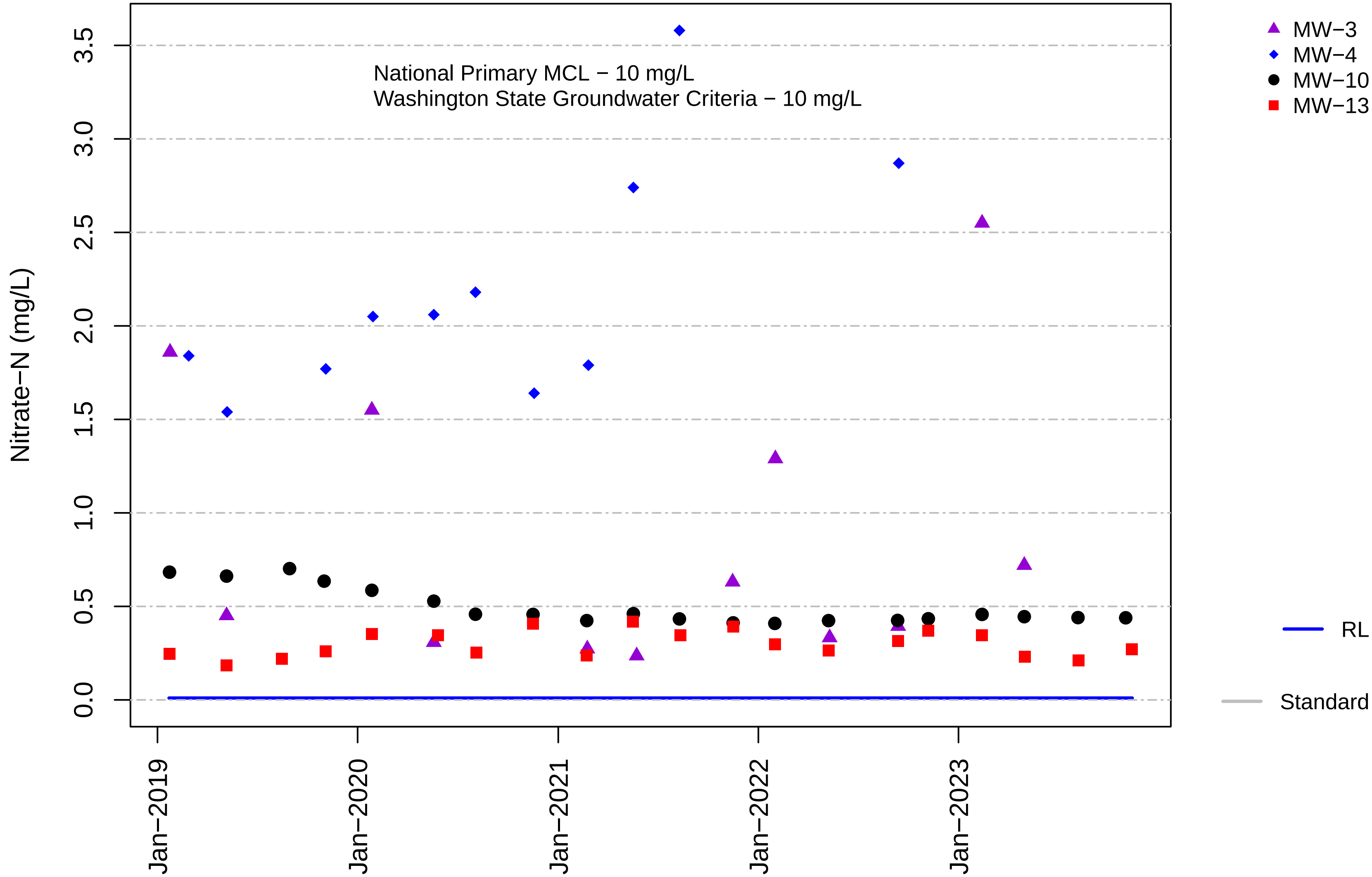


Figure B−7 Short−Term
Channel Cc1
Sulfate

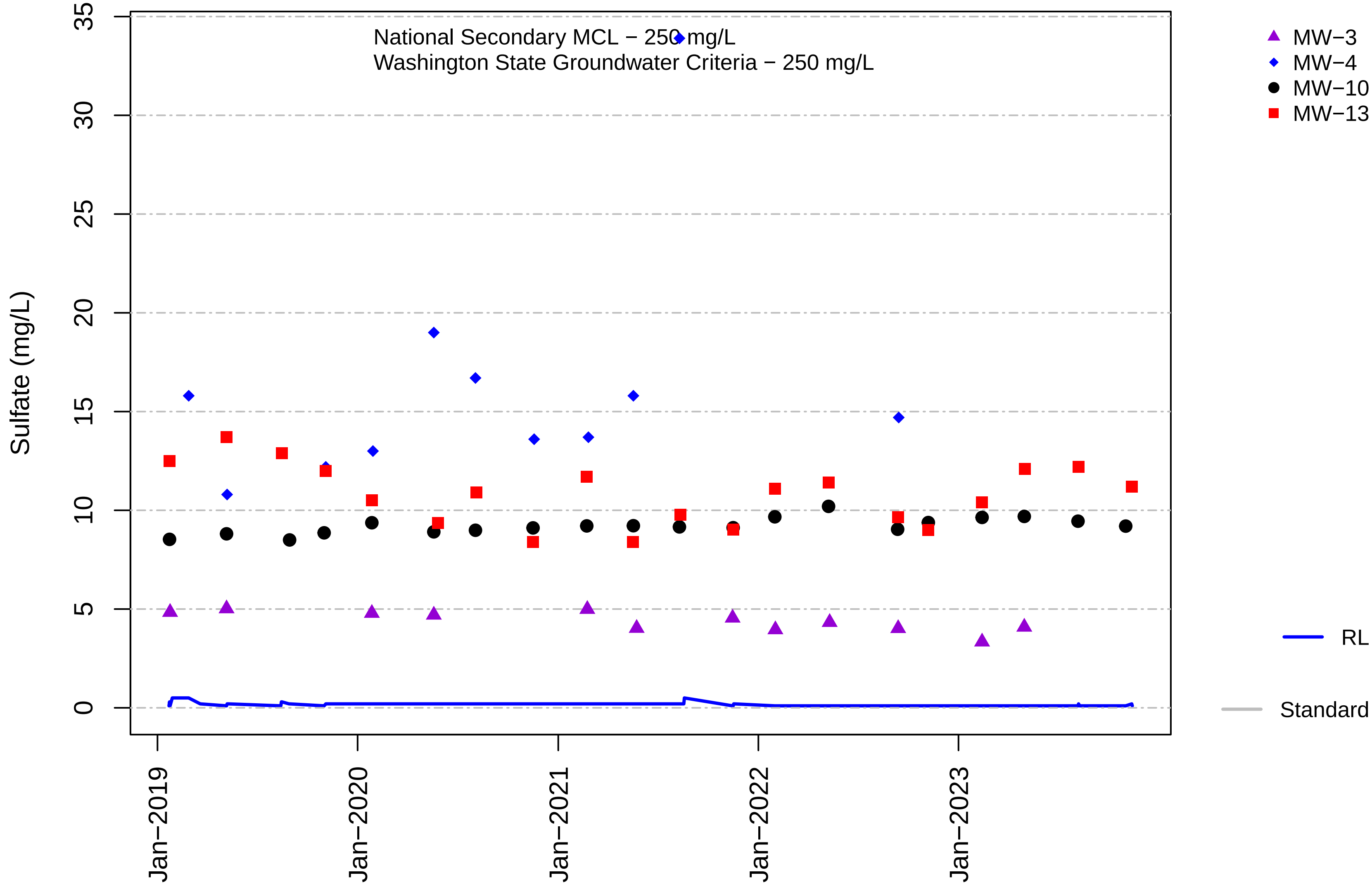


Figure B−8 Short−Term
Channel Cc1
Total Dissolved Solids

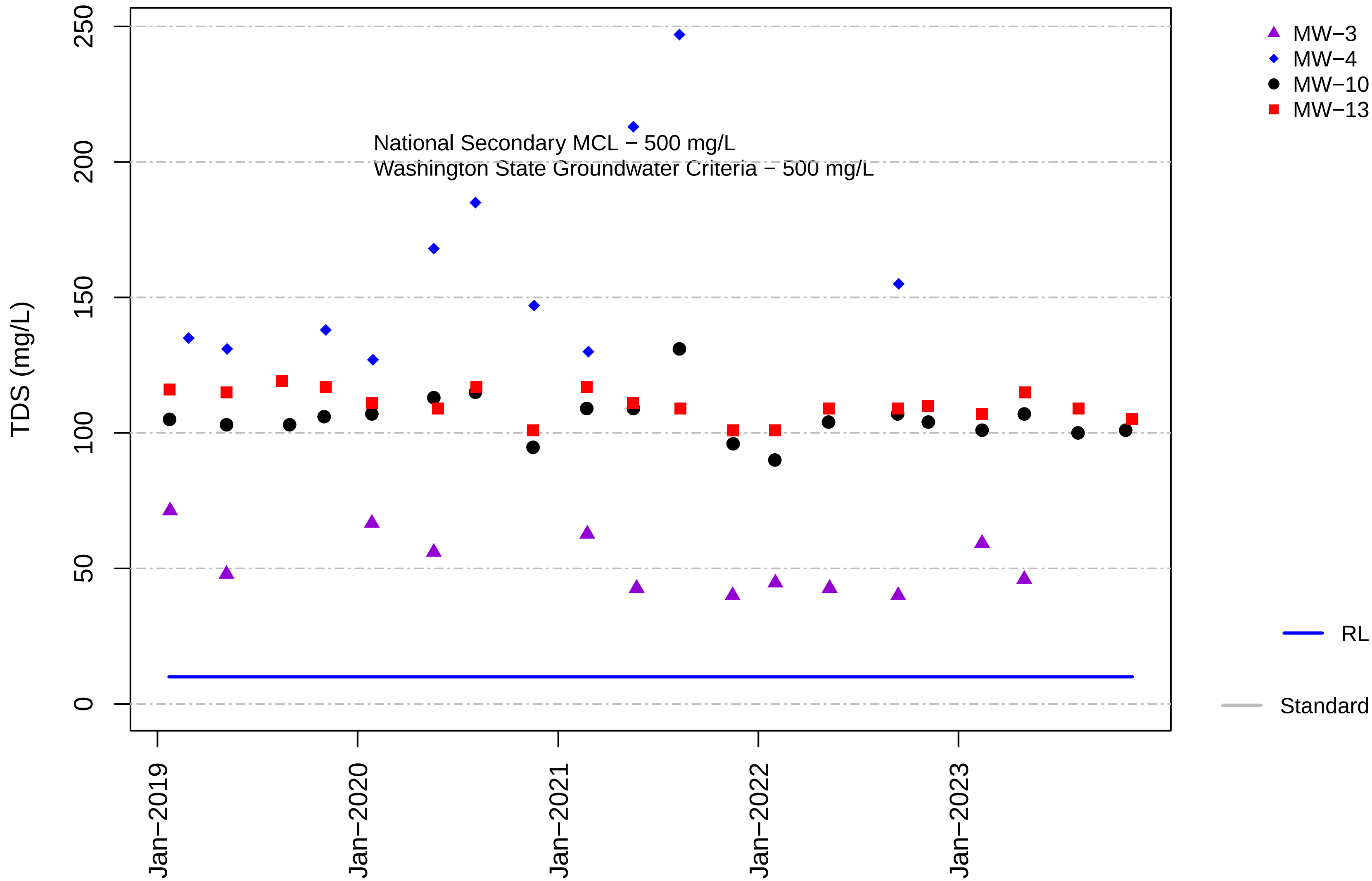


Figure B−9 Short−Term
Channel Cc1
Arsenic

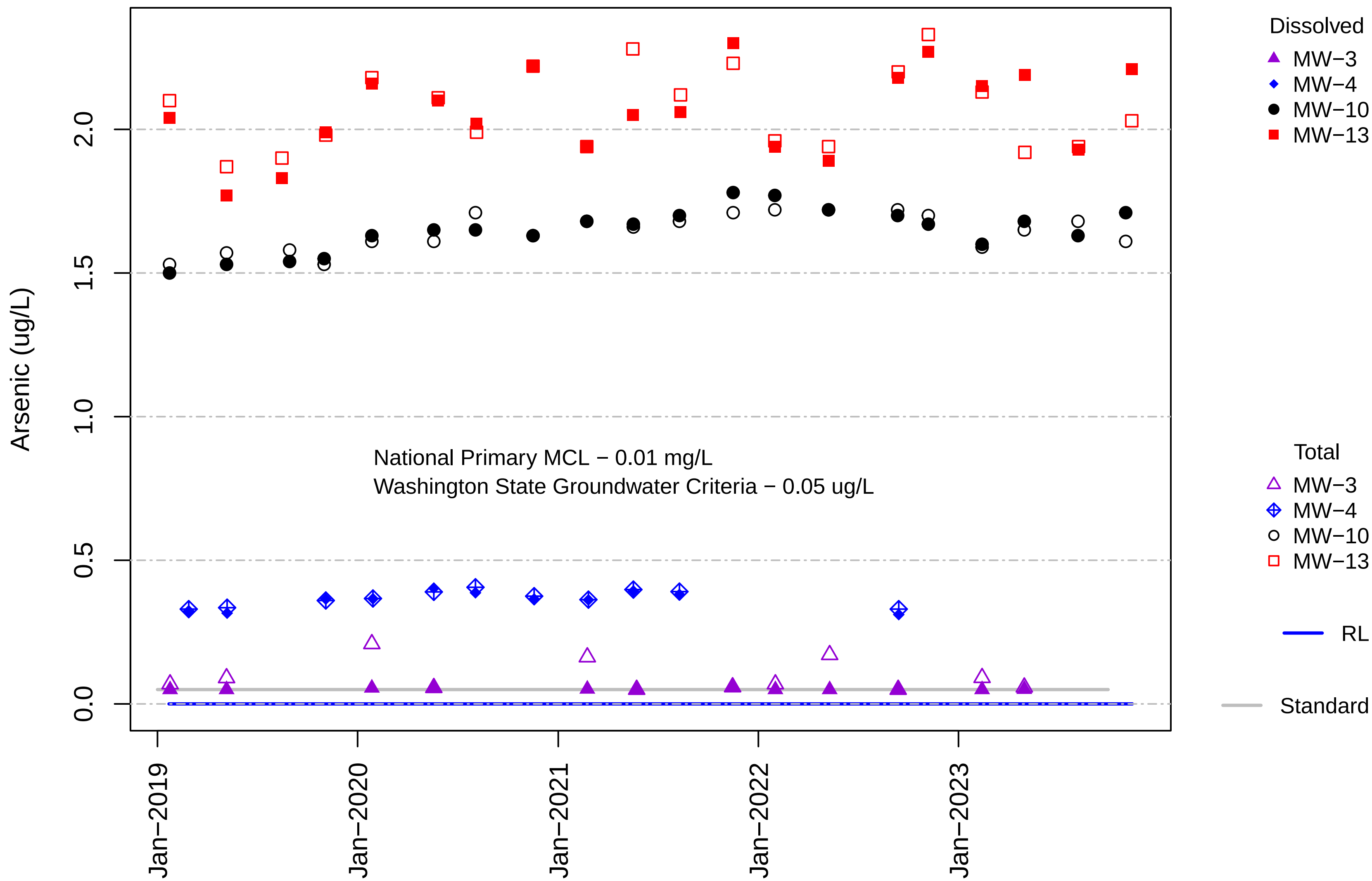


Figure B−10 Short−Term
Channel Cc1
Calcium

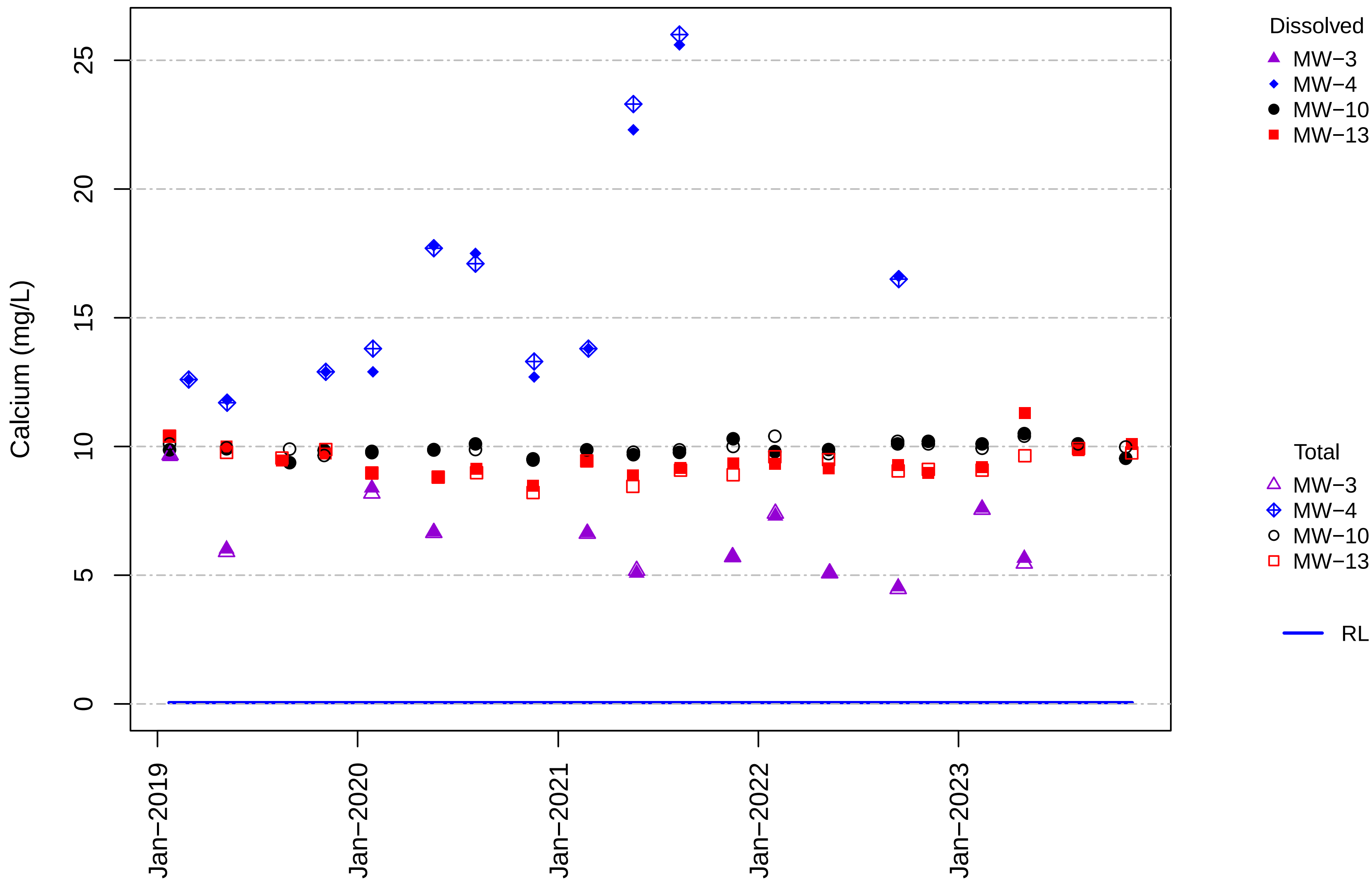


Figure B−11 Short−Term
Channel Cc1
Iron

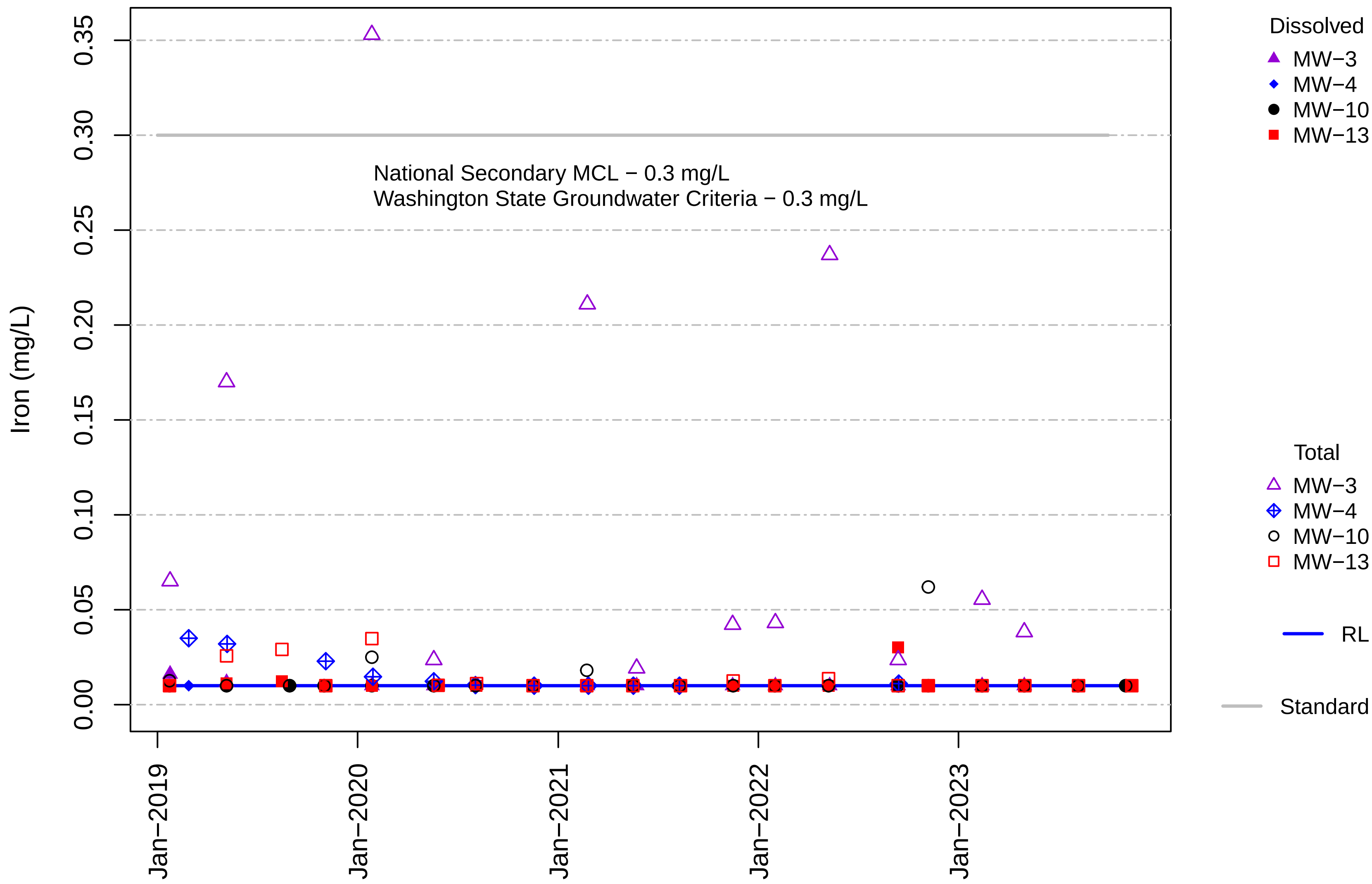


Figure B−12 Short−Term
Channel Cc1
Magnesium

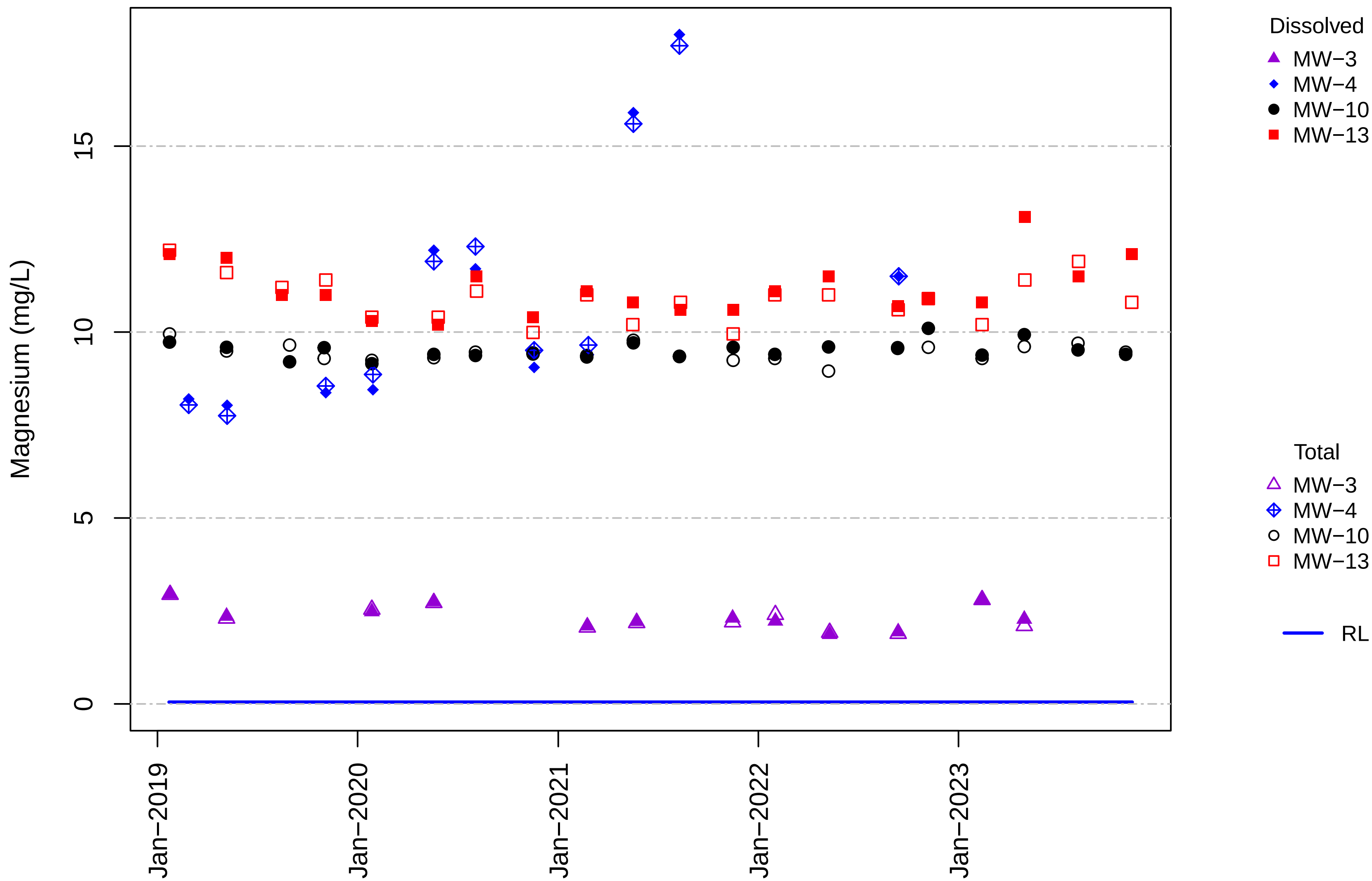
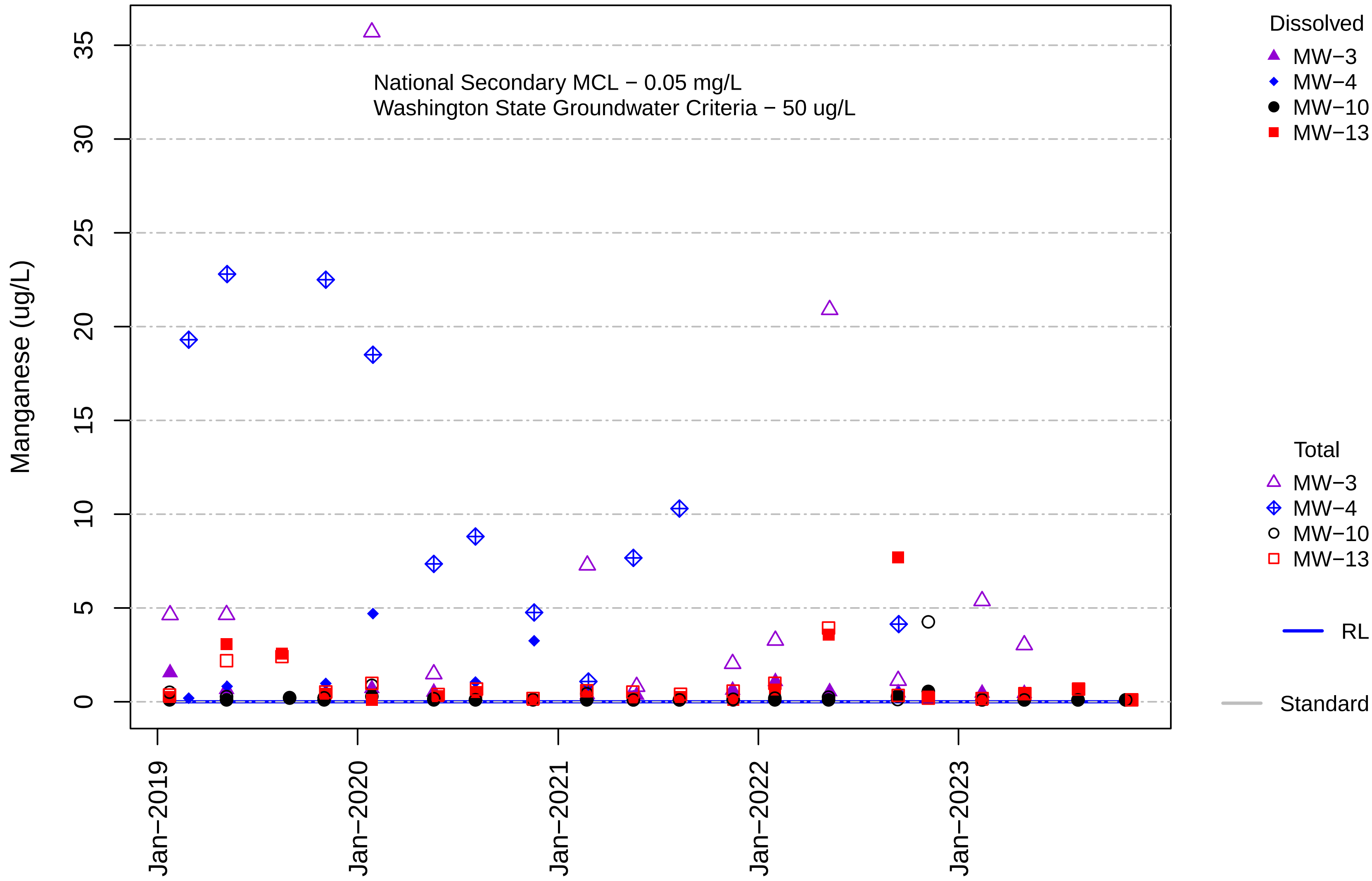


Figure B−13 Short−Term
Channel Cc1
Manganese



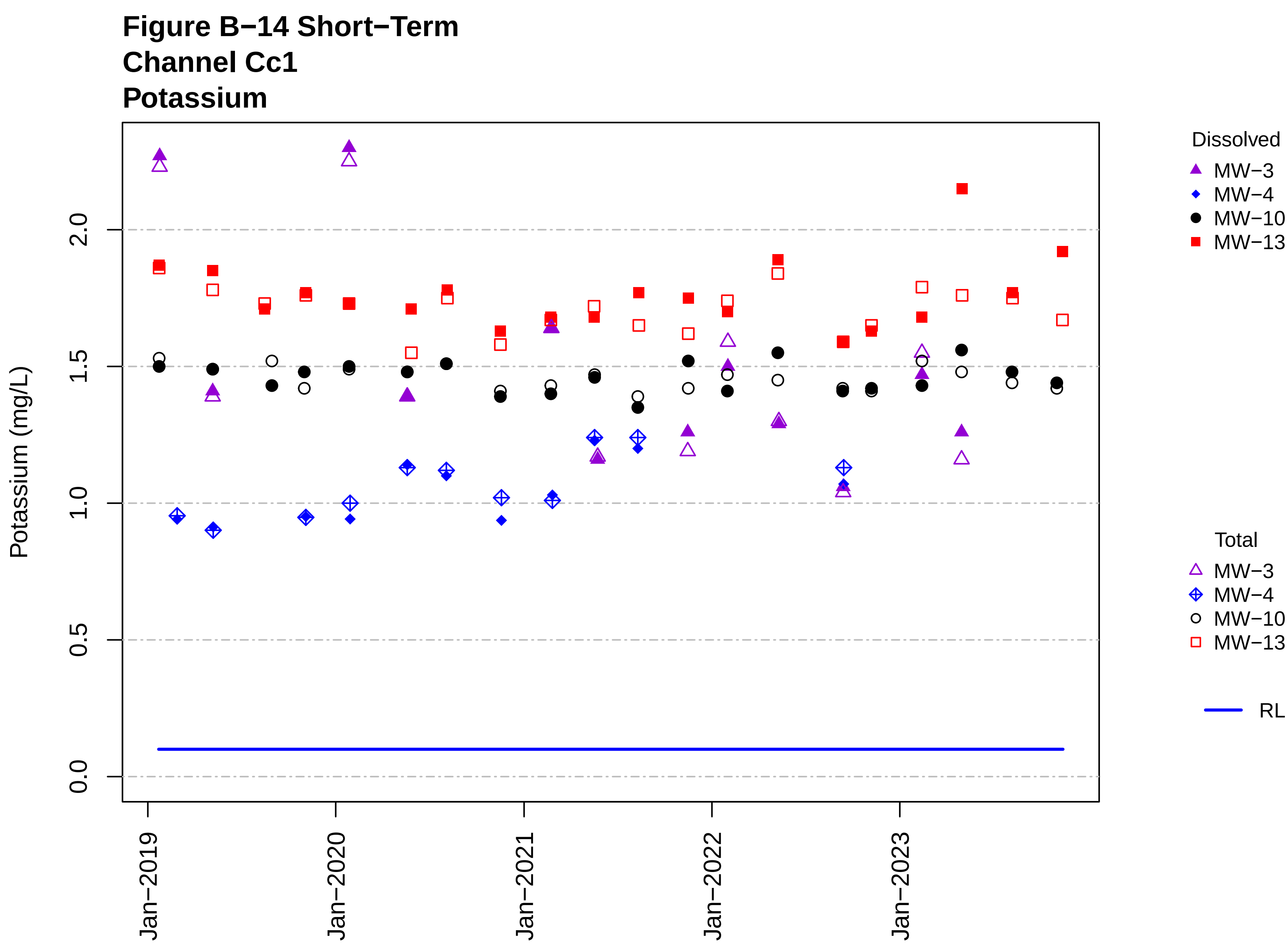


Figure B−14 Short−Term
Channel Cc1
Potassium
Potassium (mg/L)
0.0
0.5
1.0
1.5
2.0
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
Dissolved
MW−3
MW−4
MW−10
MW−13
Total
MW−3
MW−4
MW−10
MW−13
RL

Figure B−15 Short−Term Channel Cc1 Sodium

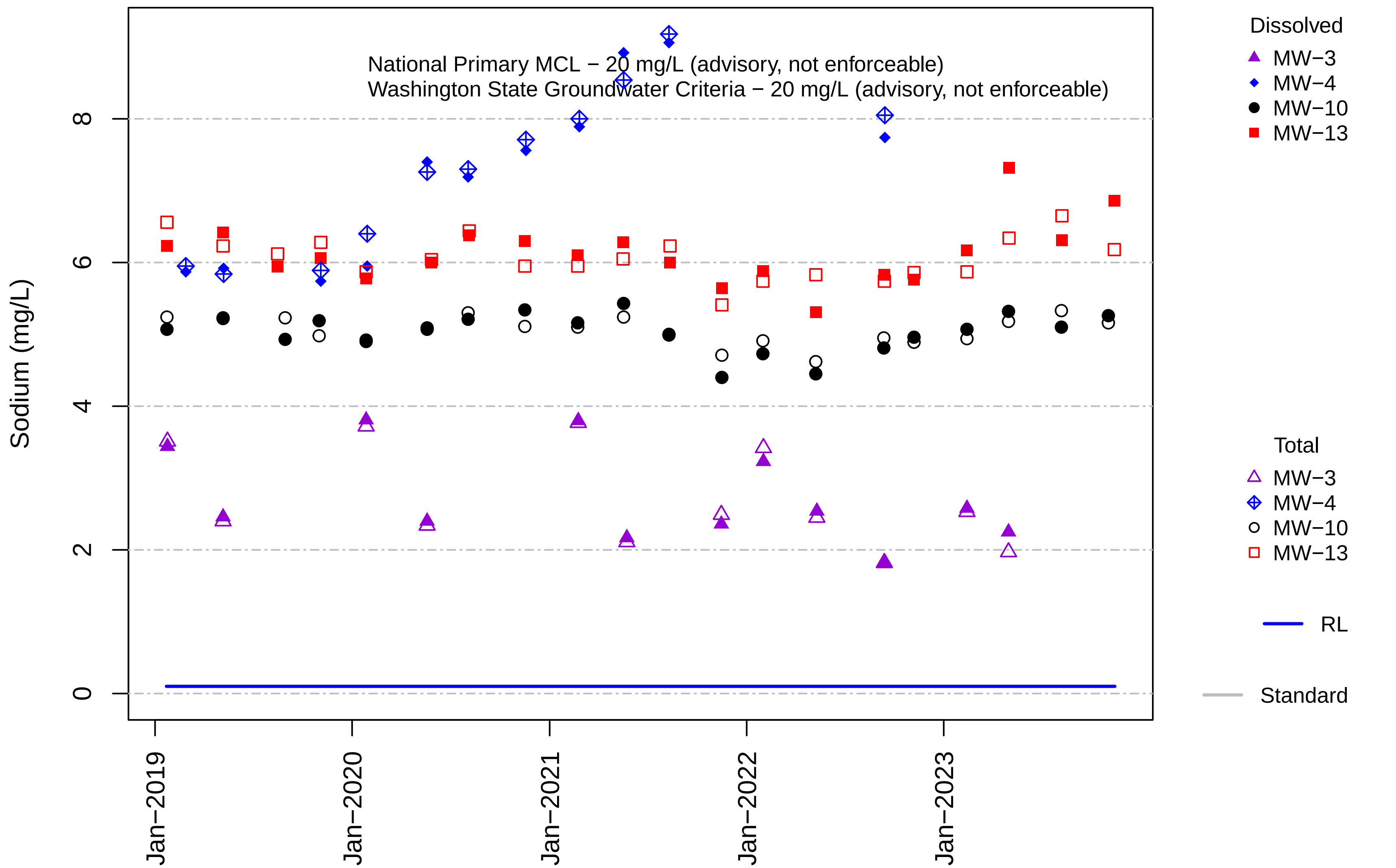
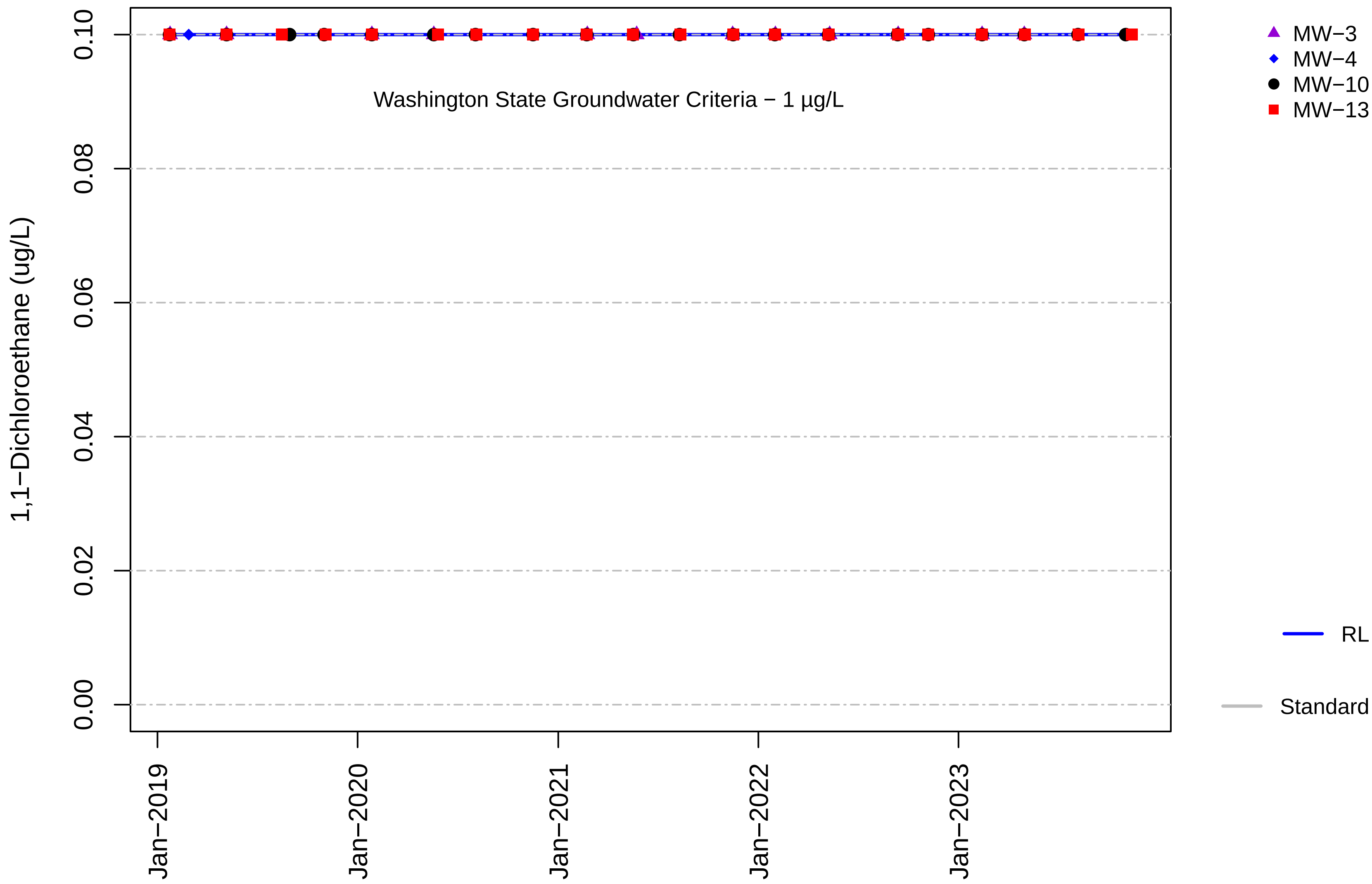


Figure B−16 Short−Term
Channel Cc1
1,1−Dichloroethane



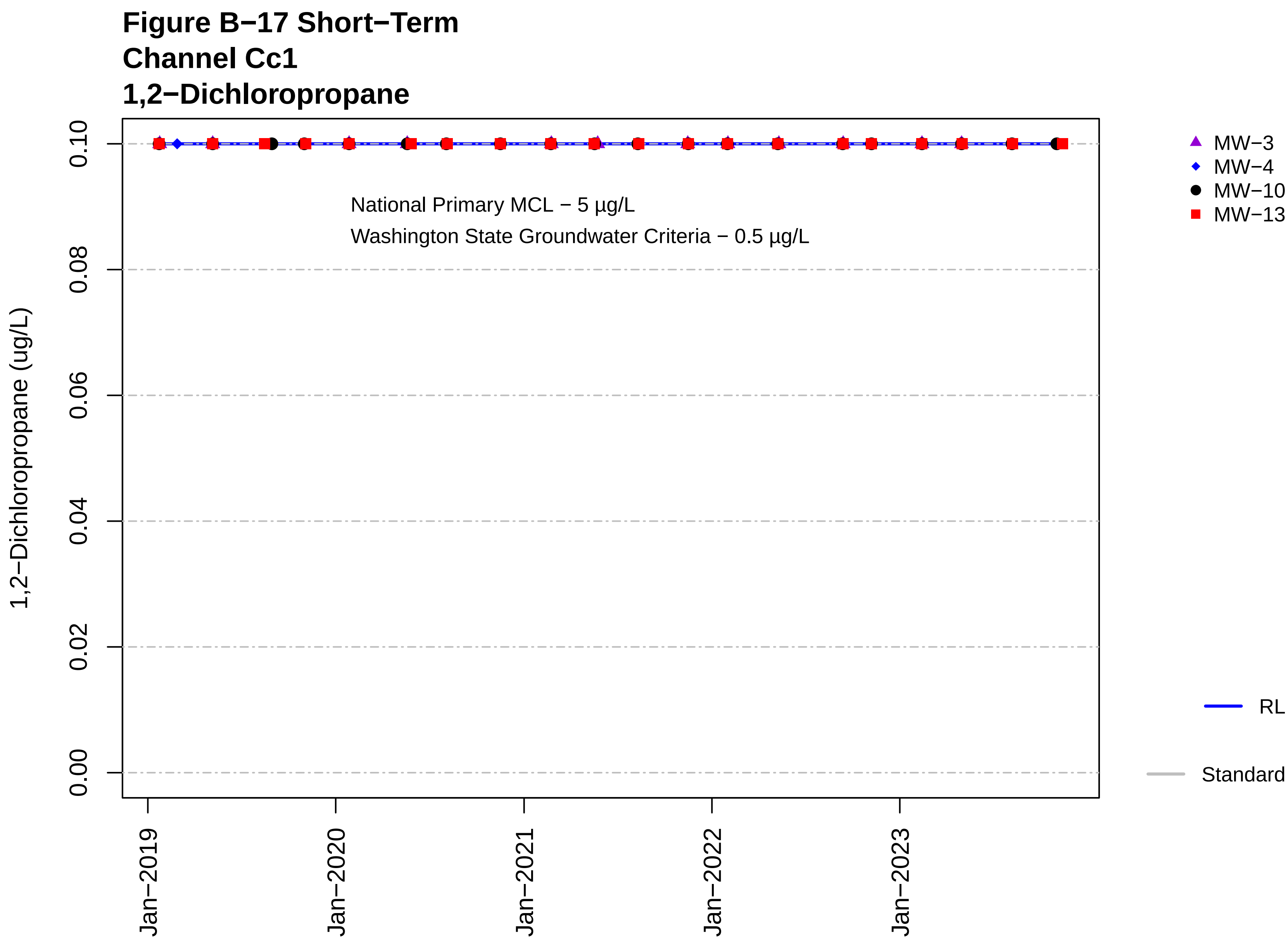


Figure B−17 Short−Term
Channel Cc1
1,2−Dichloropropane
1,2−Dichloropropane (ug/L)
0.00
0.02
0.04
0.06
0.08
0.10
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.5 µg/L
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
MW−3
MW−4
MW−10
MW−13
RL
Standard

Figure B−18 Short−Term
Channel Cc1
Benzene

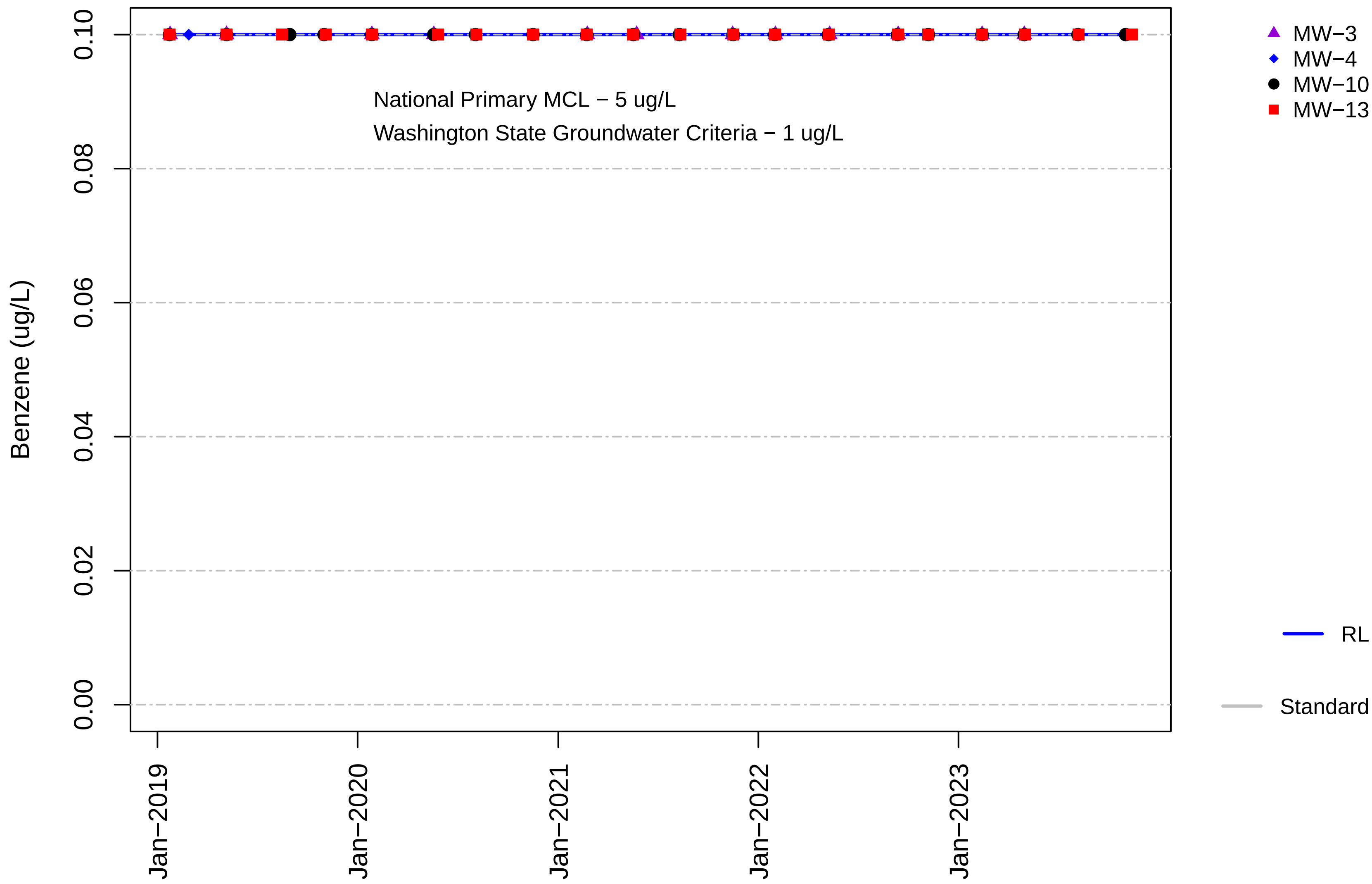


Figure B−19 Short−Term
Channel Cc1
Chloroethane

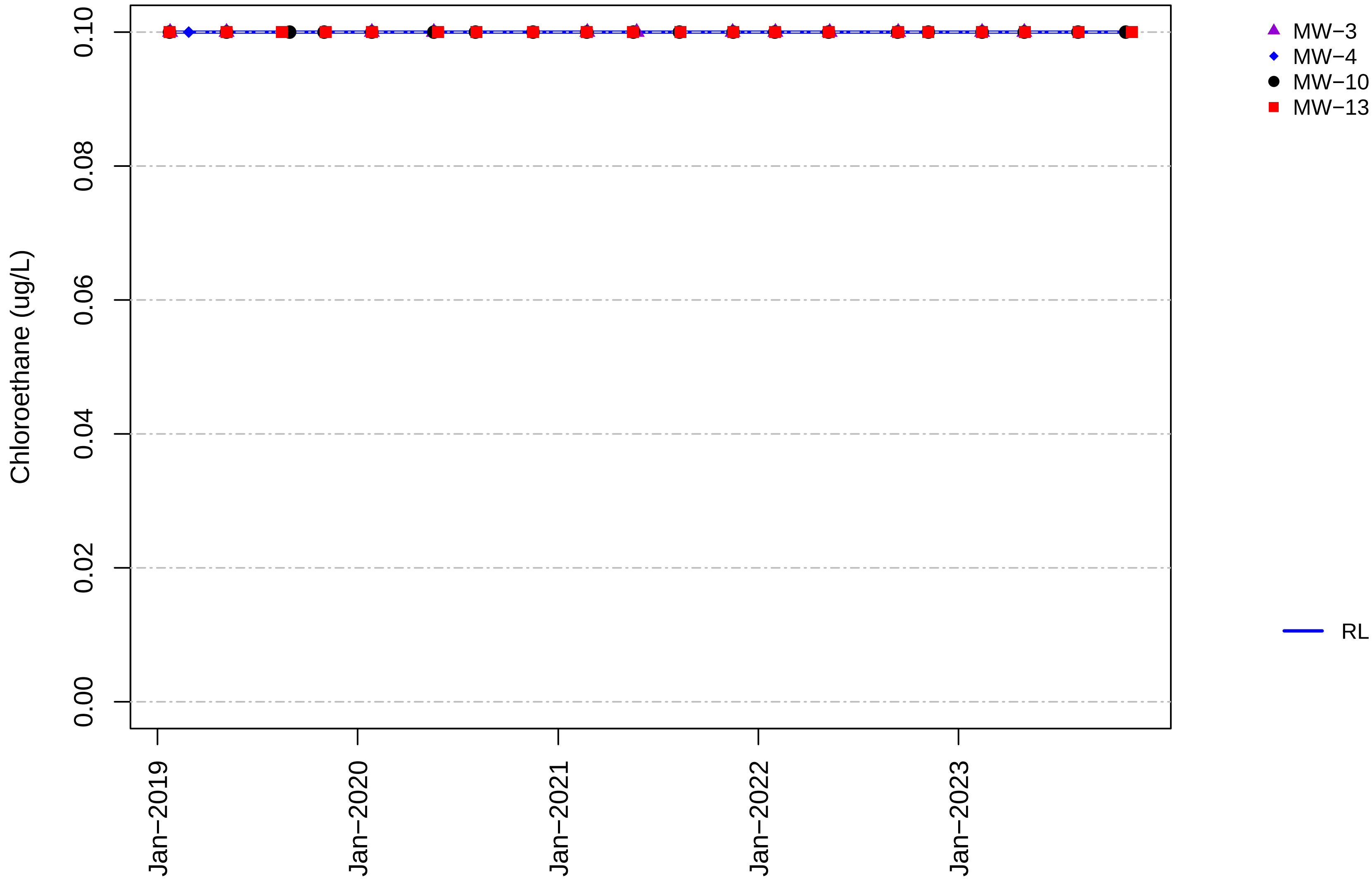
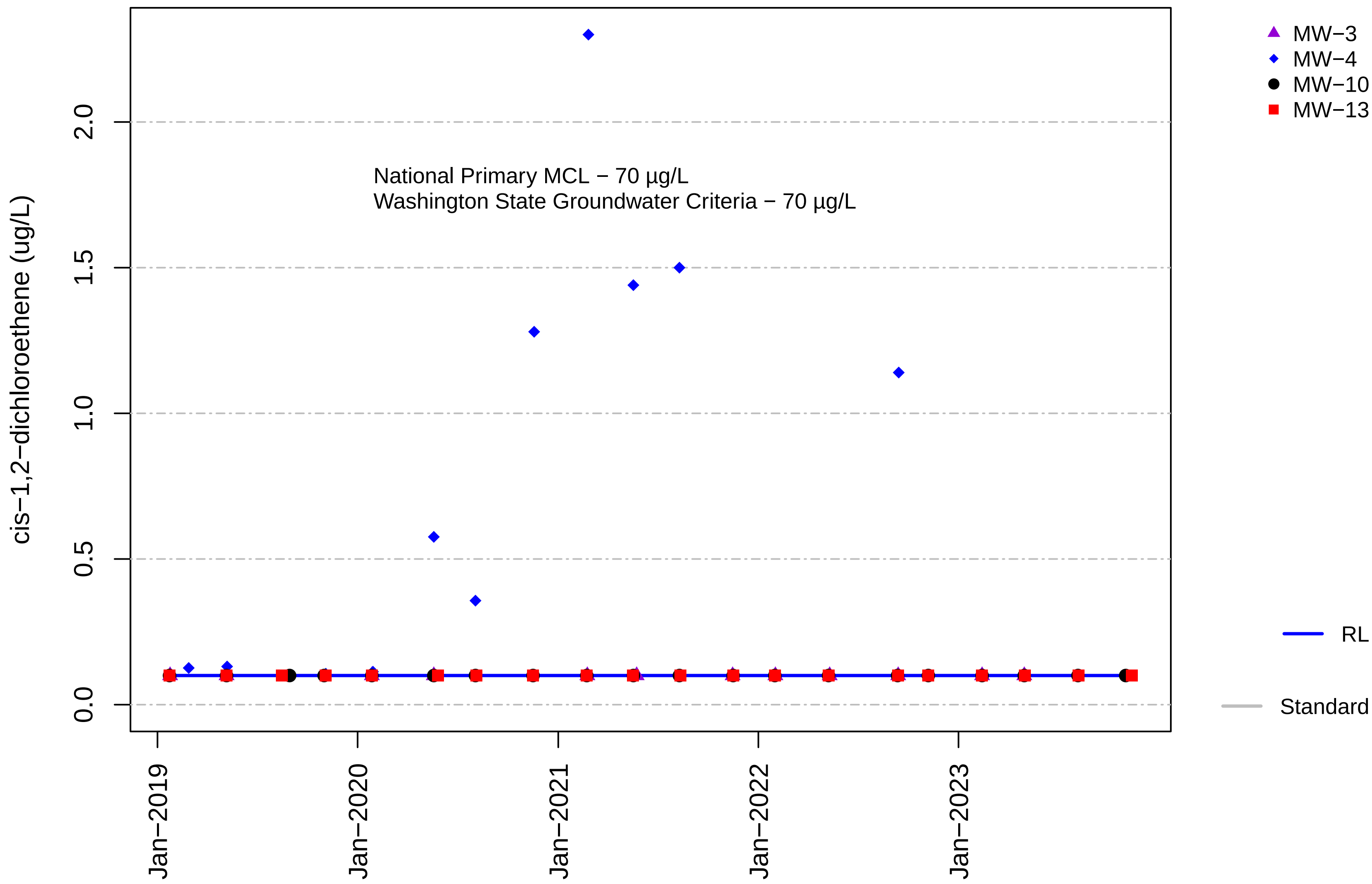


Figure B−20 Short−Term
Channel Cc1
cis−1,2−Dichloroethene



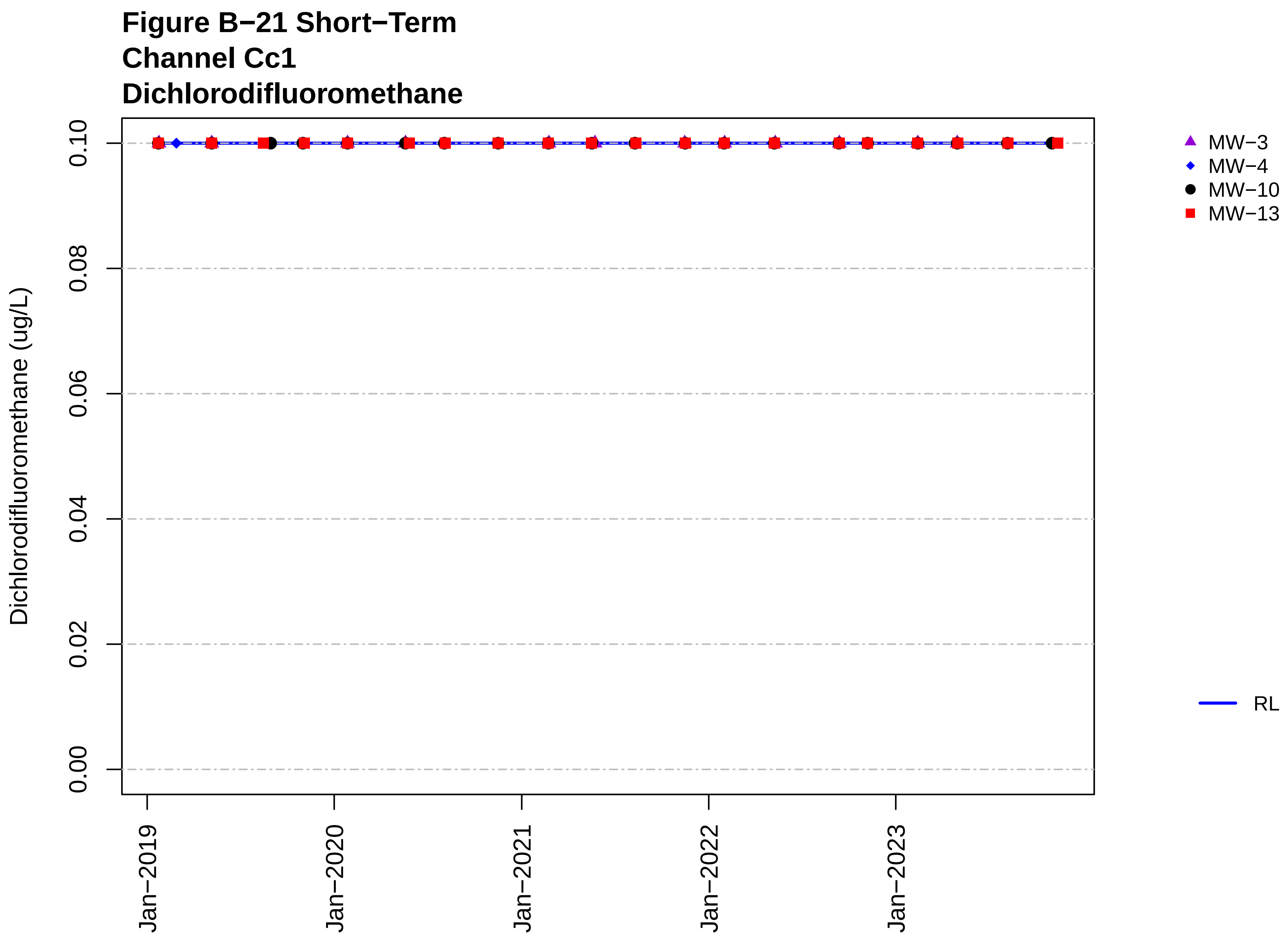


Figure B−21 Short−Term
Channel Cc1
Dichlorodifluoromethane
Dichlorodifluoromethane (ug/L)
0.00
0.02
0.04
0.06
0.08
0.10
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
MW−3
MW−4
MW−10
MW−13
RL

Figure B−22 Short−Term
Channel Cc1
Tetrachloroethene

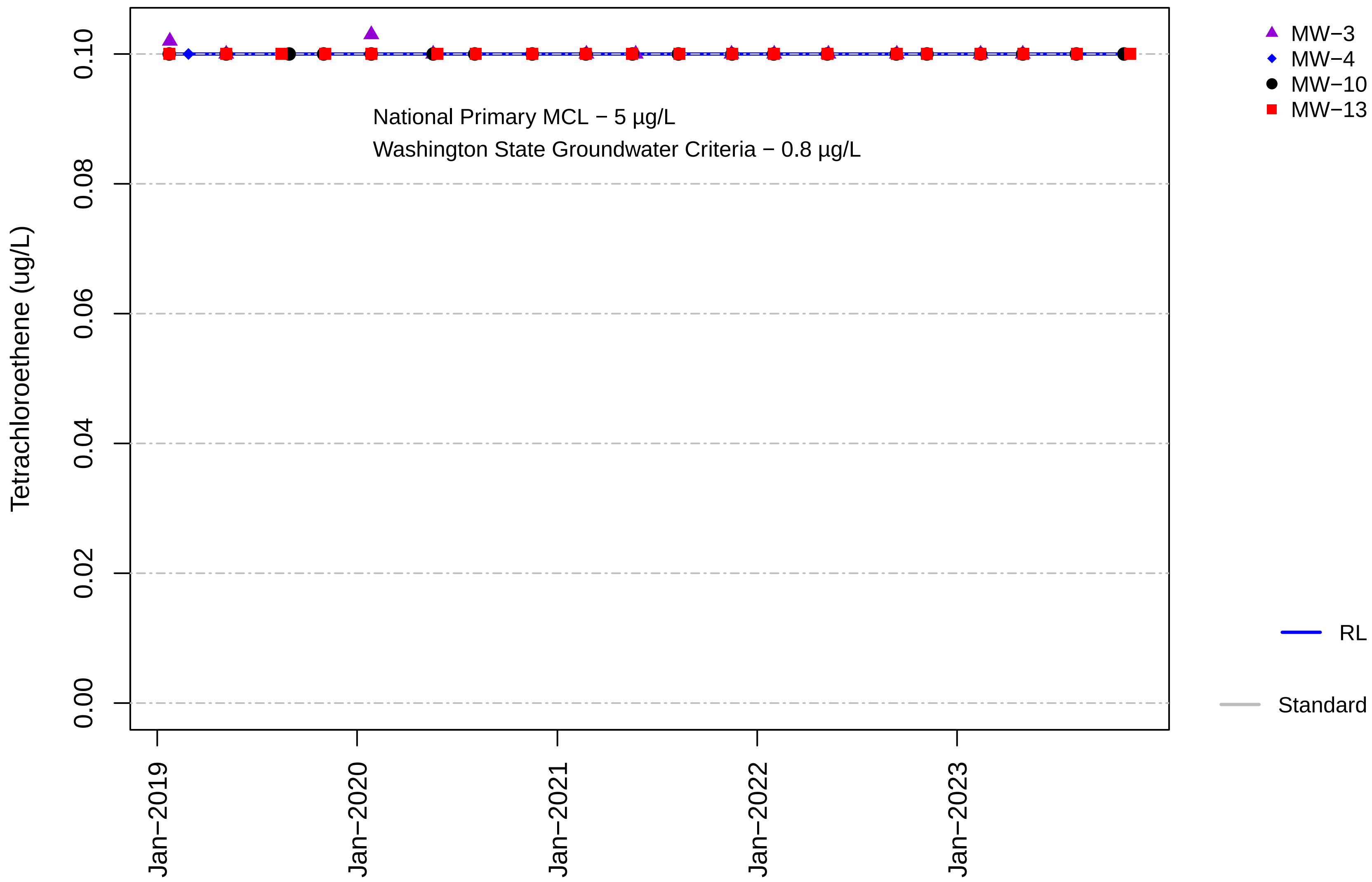


Figure B−23 Short−Term
Channel Cc1
Toluene

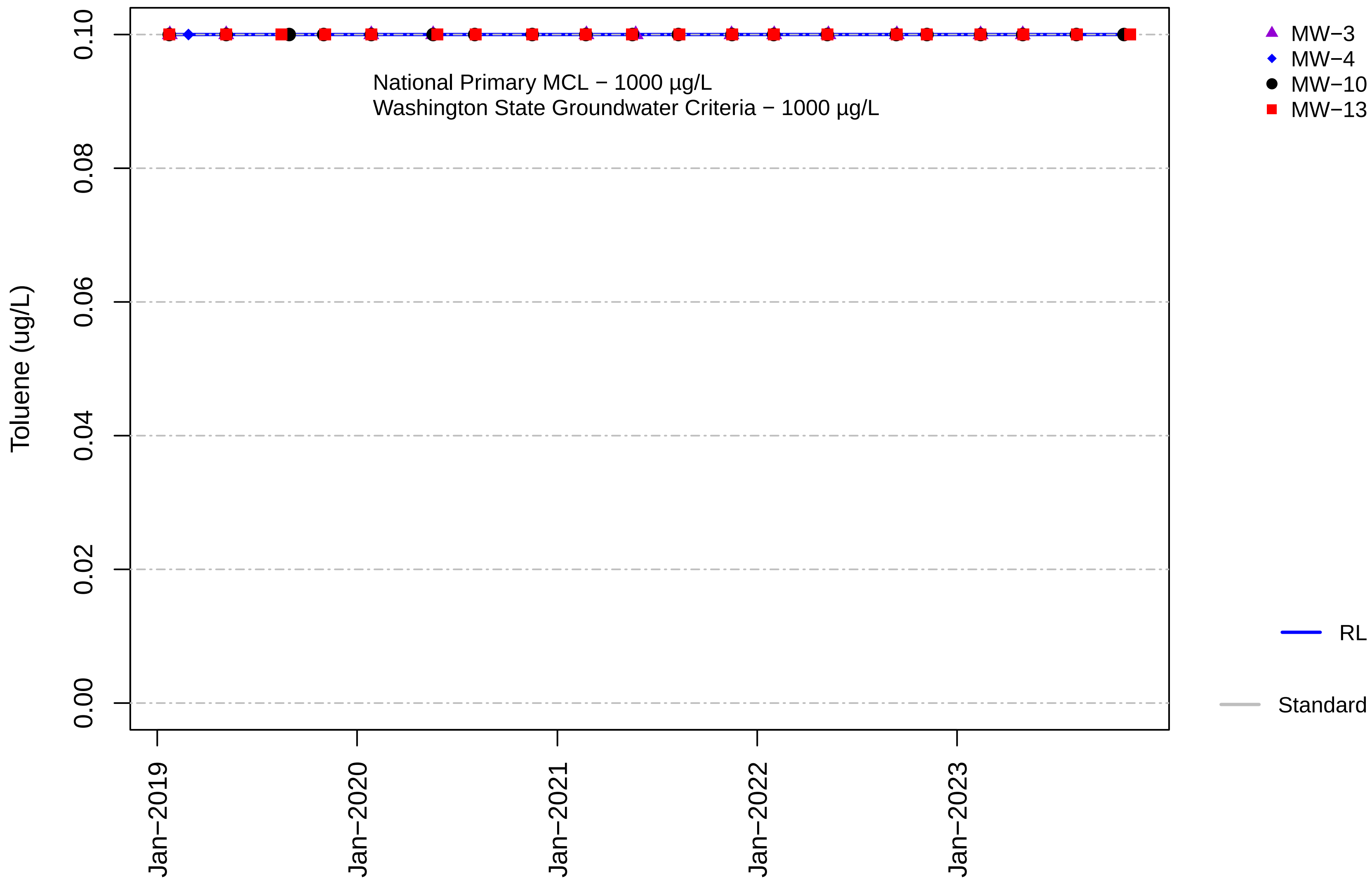


Figure B−24 Short−Term
Channel Cc1
Trans−1,2−Dichloroethene

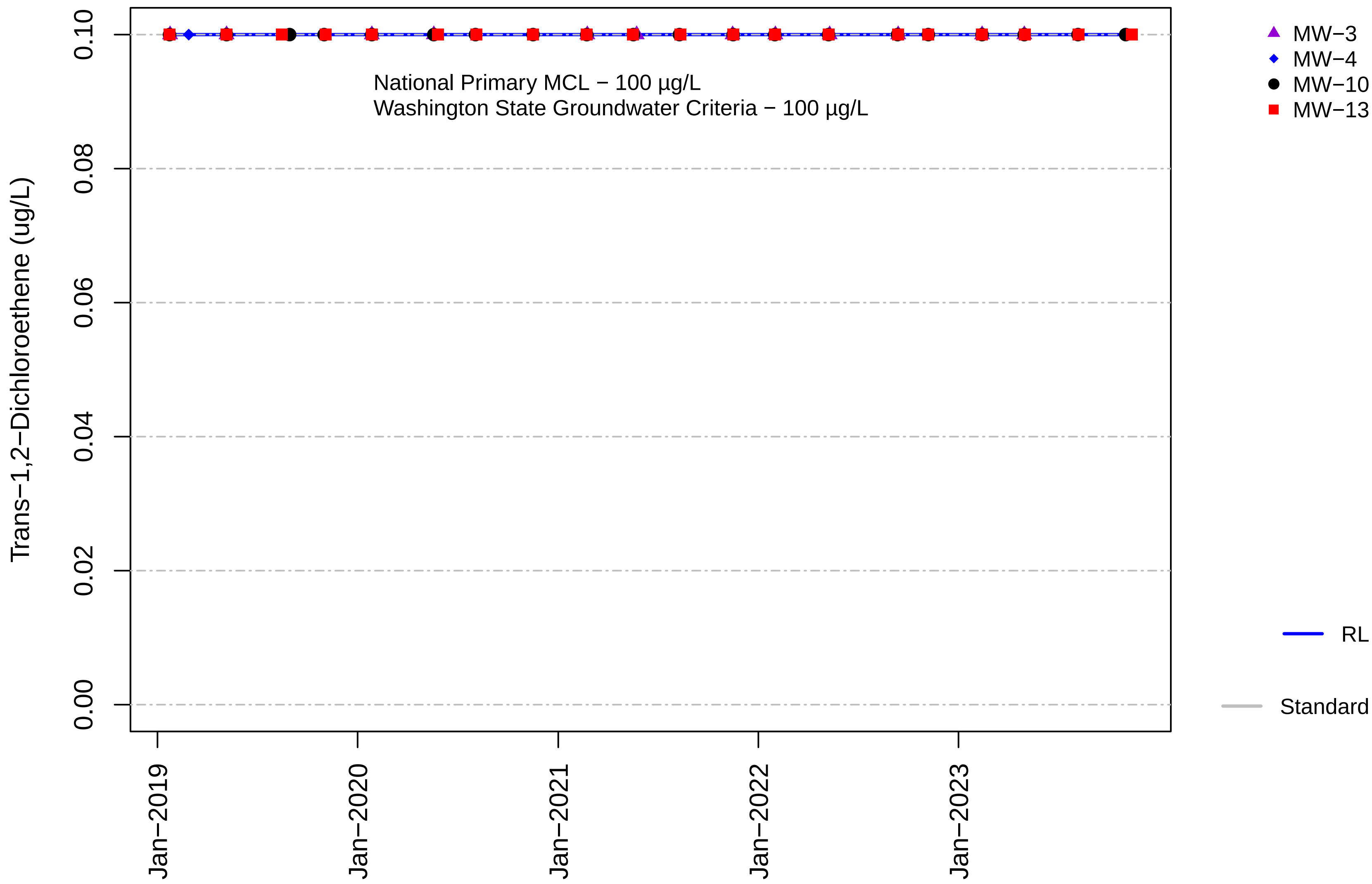


Figure B−25 Short−Term
Channel Cc1
Trichloroethene

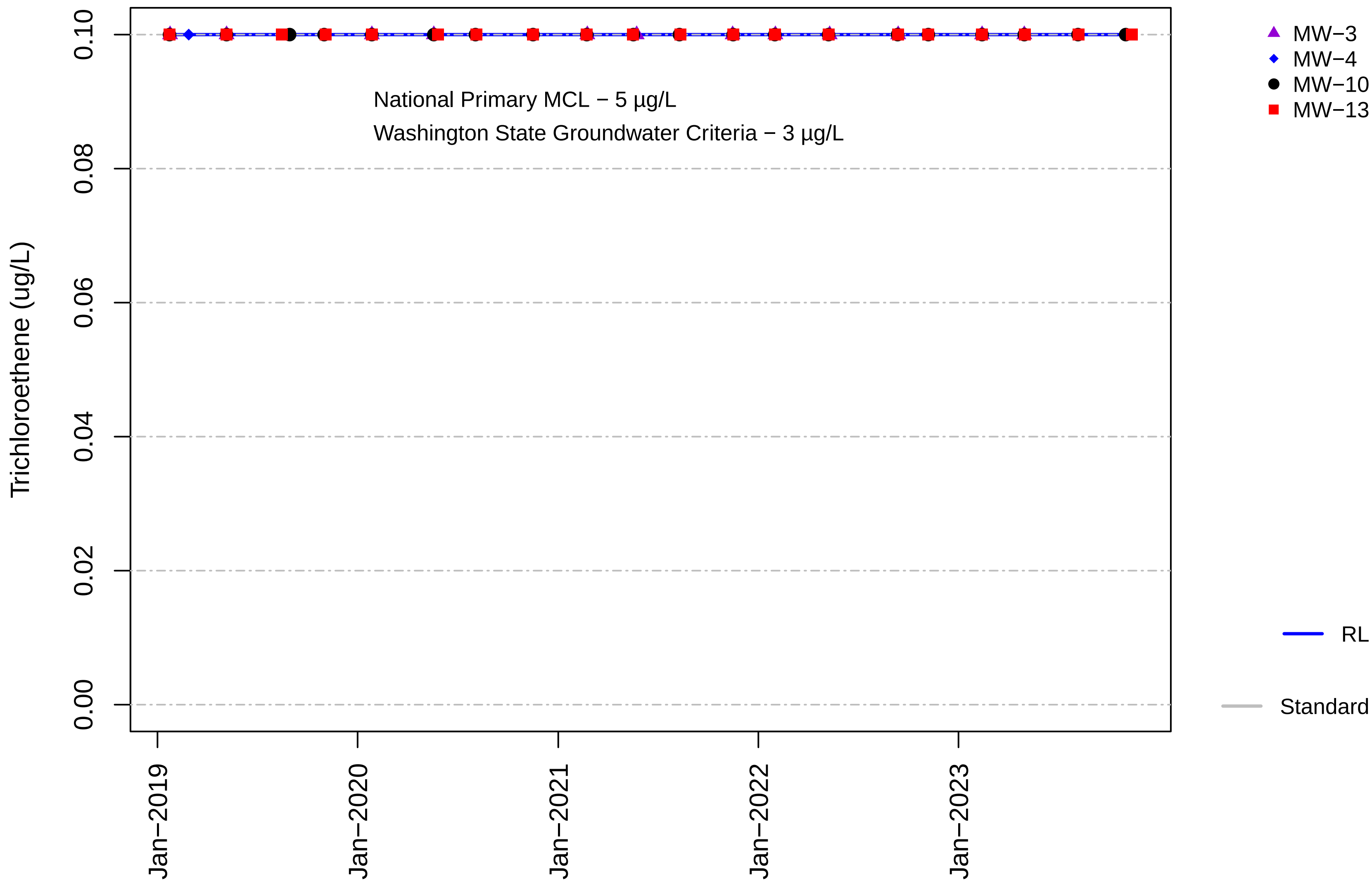


Figure B−26 Short−Term
Channel Cc1
Trichlorofluoromethane

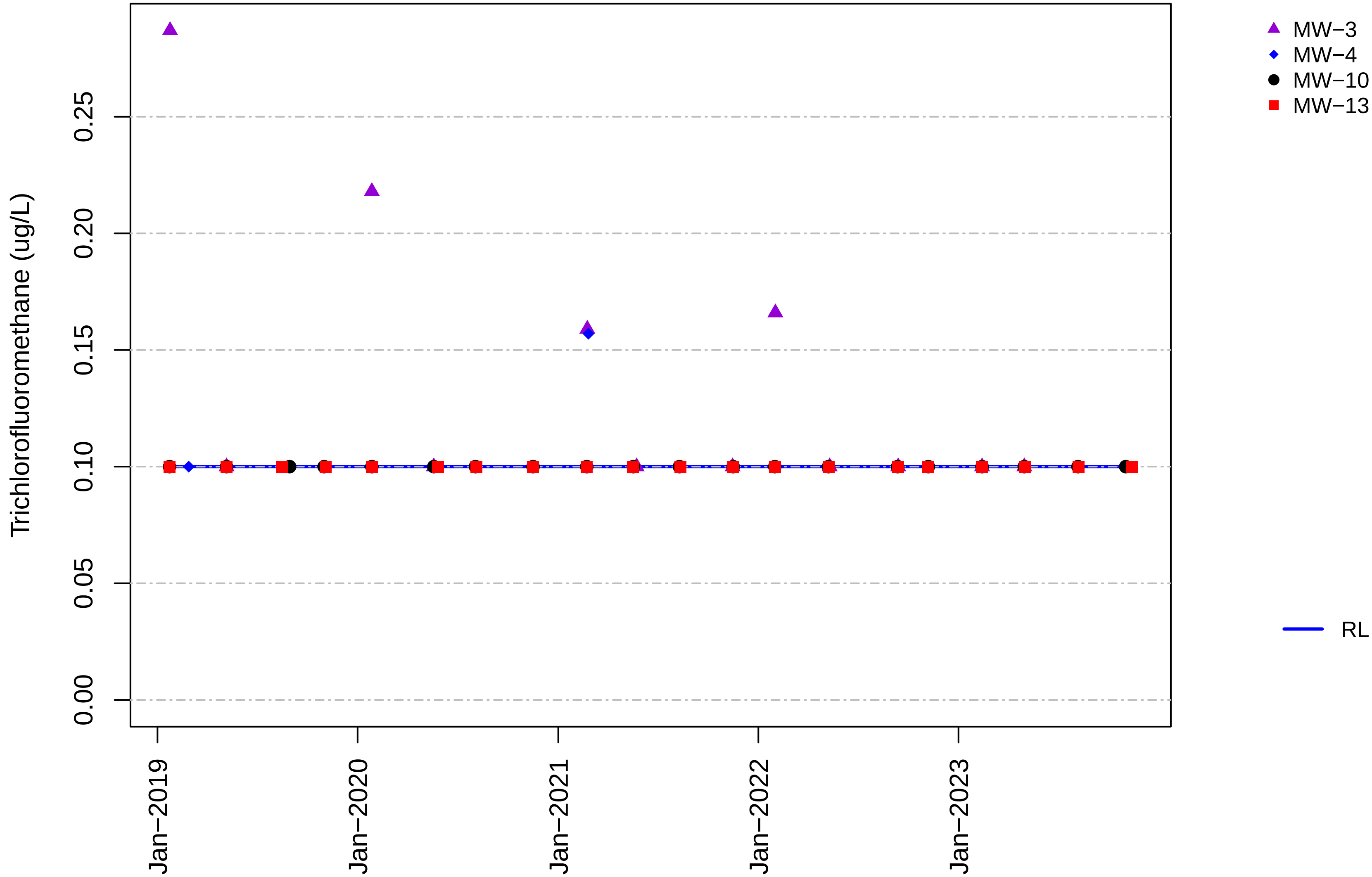
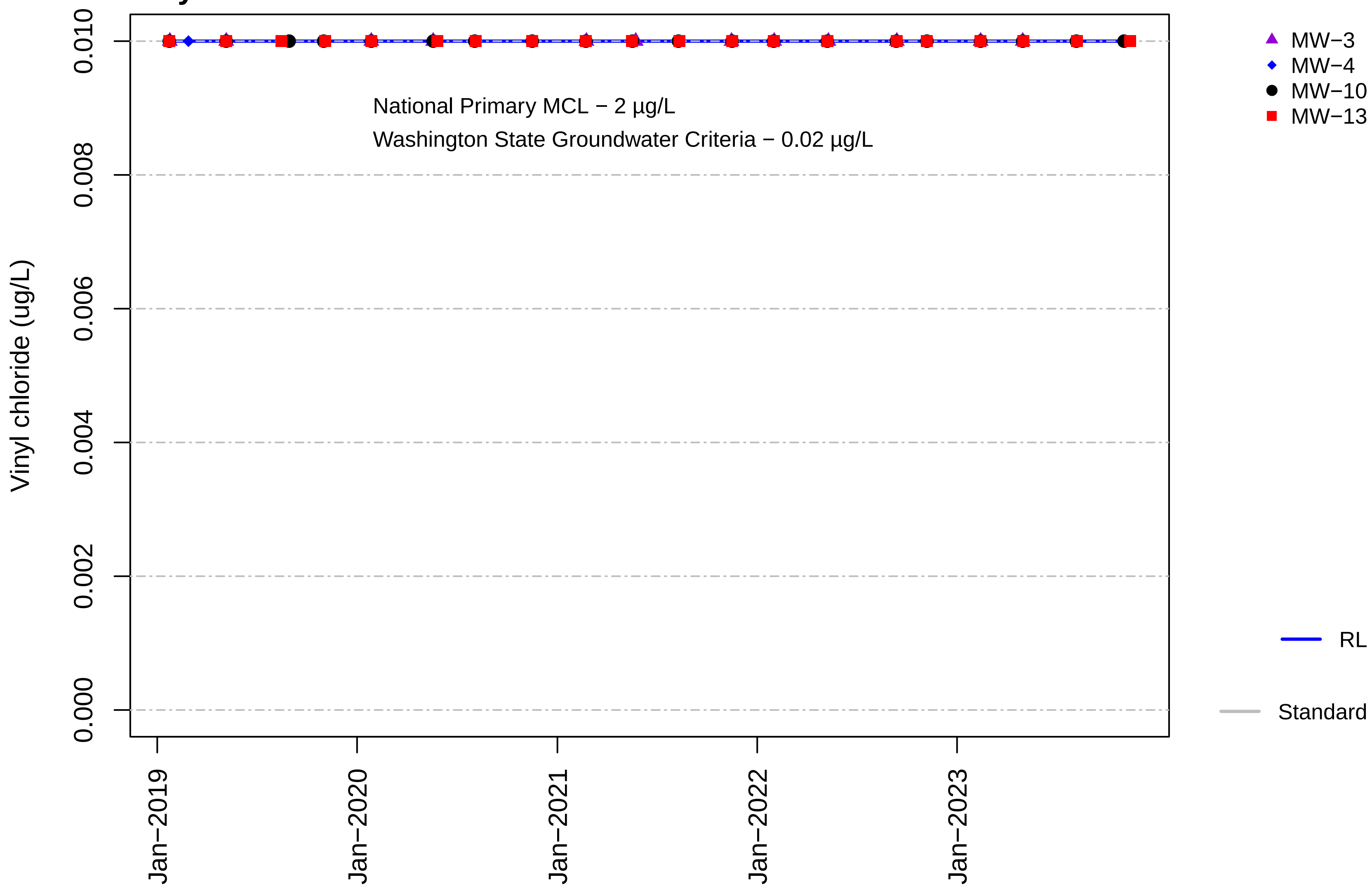


Figure B−27 Short−Term
Channel Cc1
Vinyl chloride



Appendix B

Channel Cc2

Groundwater Time Concentration Plots

Figure B−28 Long−Term
Channel Cc2
Field pH

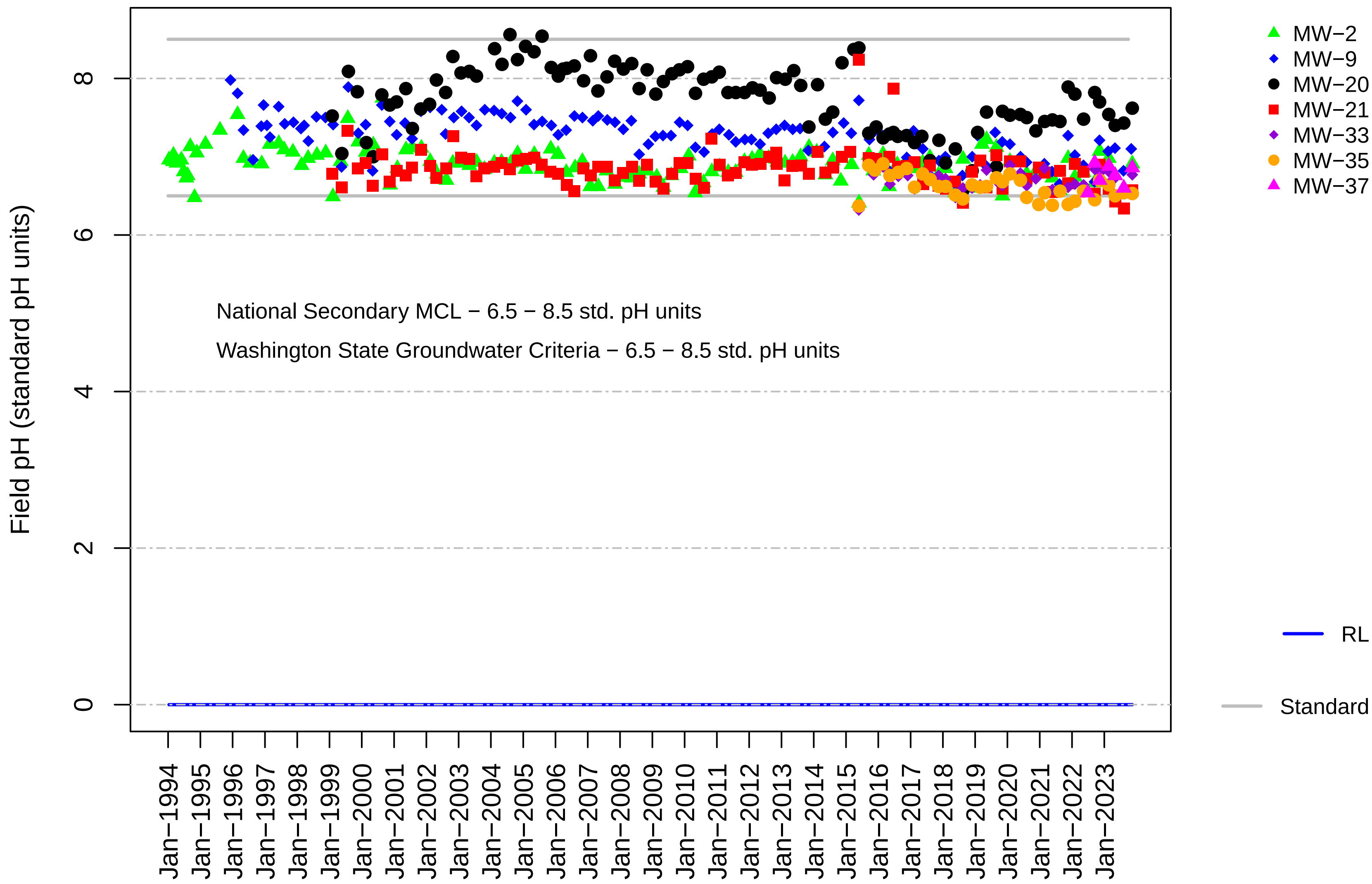


Figure B−29 Long−Term
Channel Cc2
Field Specific Conductance

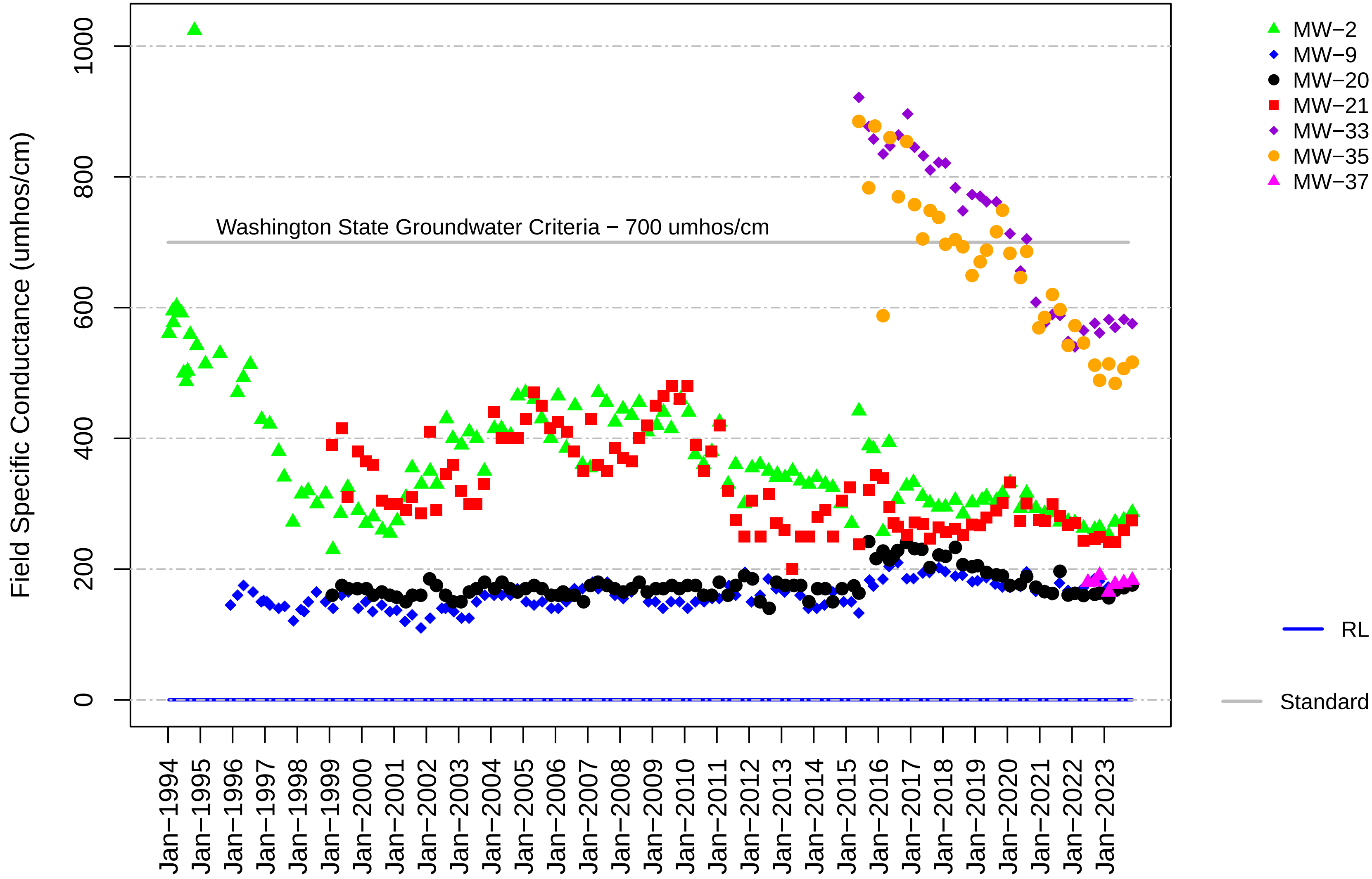


Figure B−30 Long−Term
Channel Cc2
Alkalinity

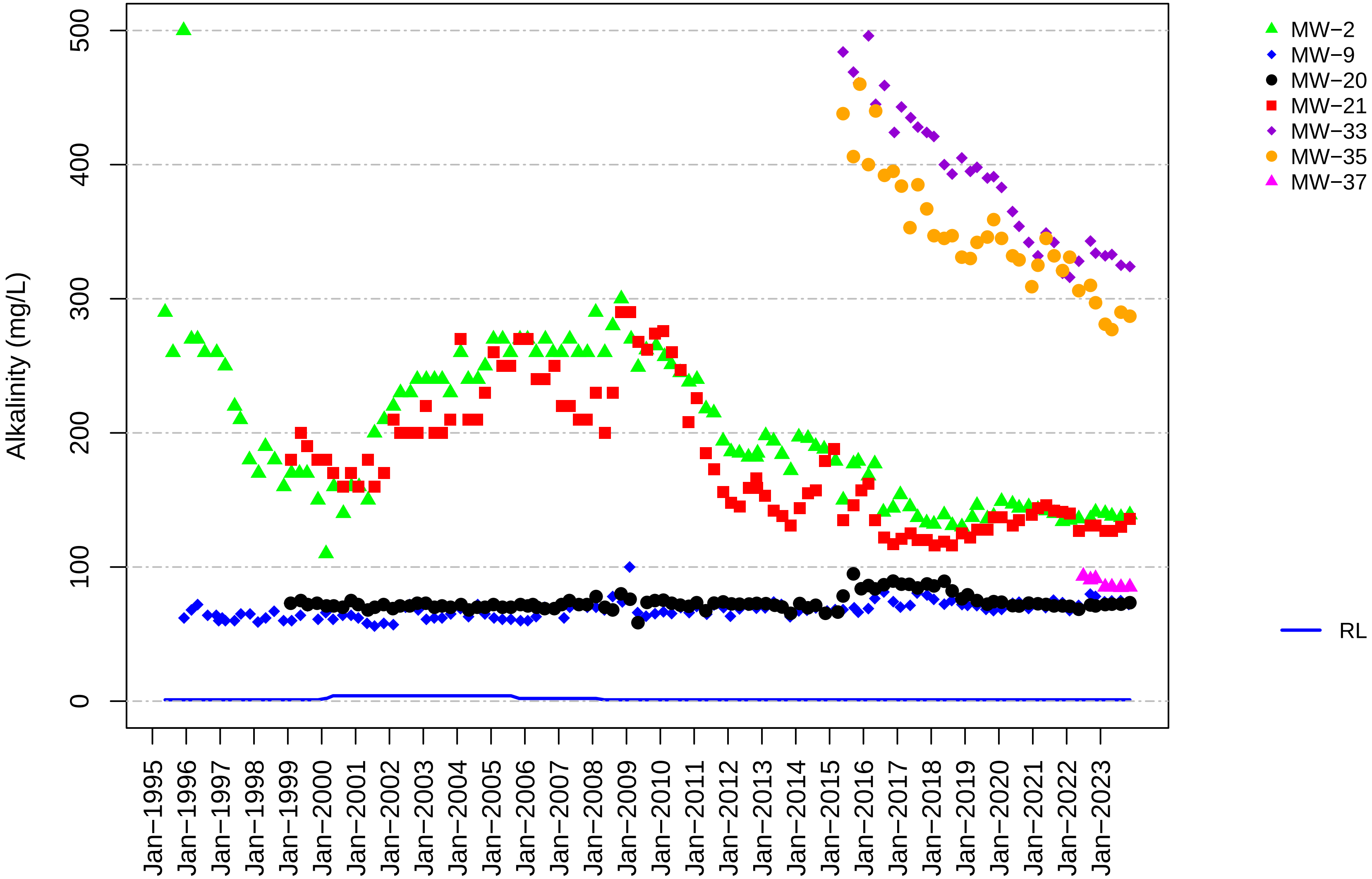


Figure B−31 Long−Term
Channel Cc2
Ammonia

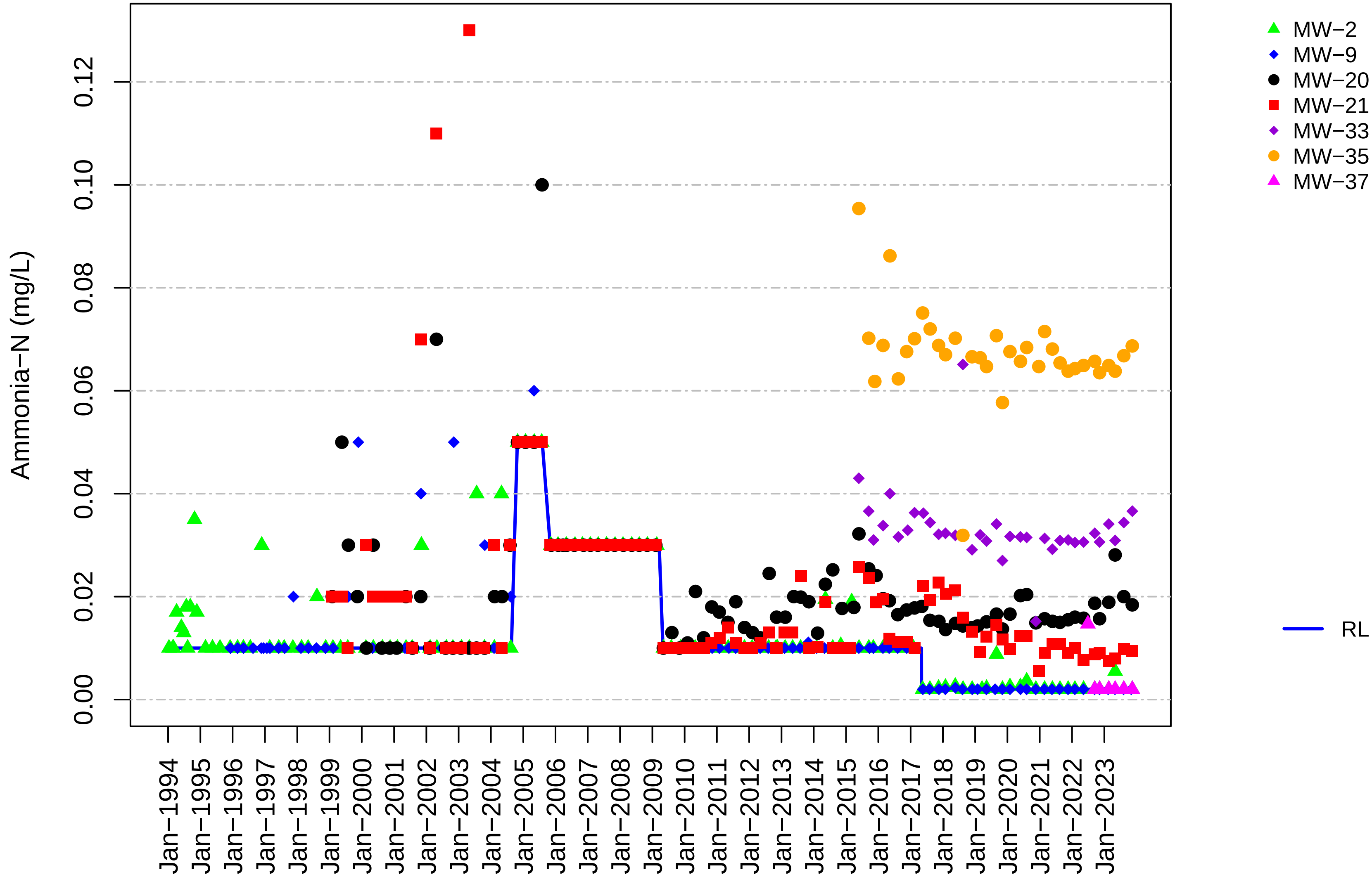


Figure B−32 Long−Term
Channel Cc2
Chloride

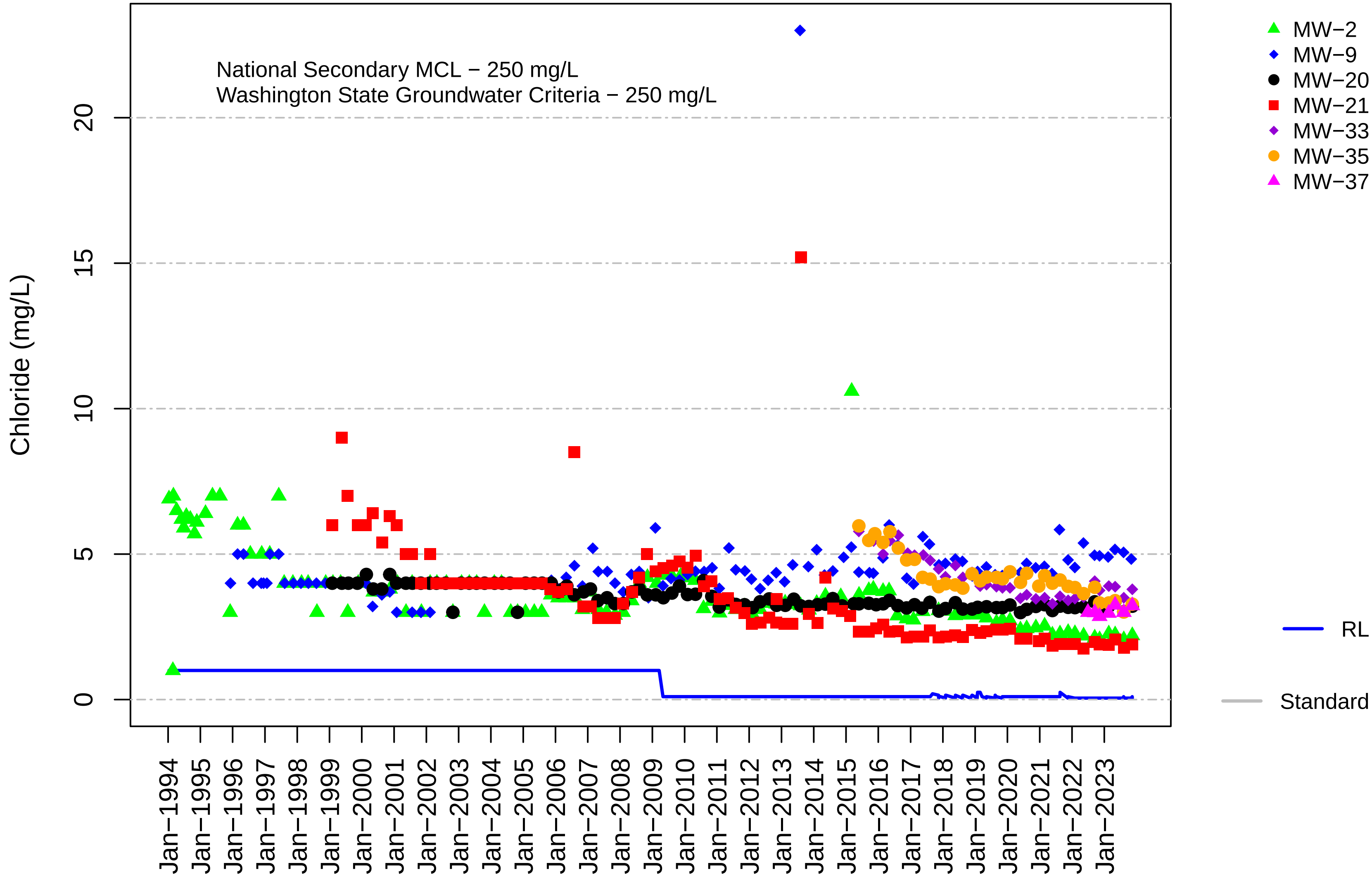


Figure B−33 Long−Term
Channel Cc2
Nitrate

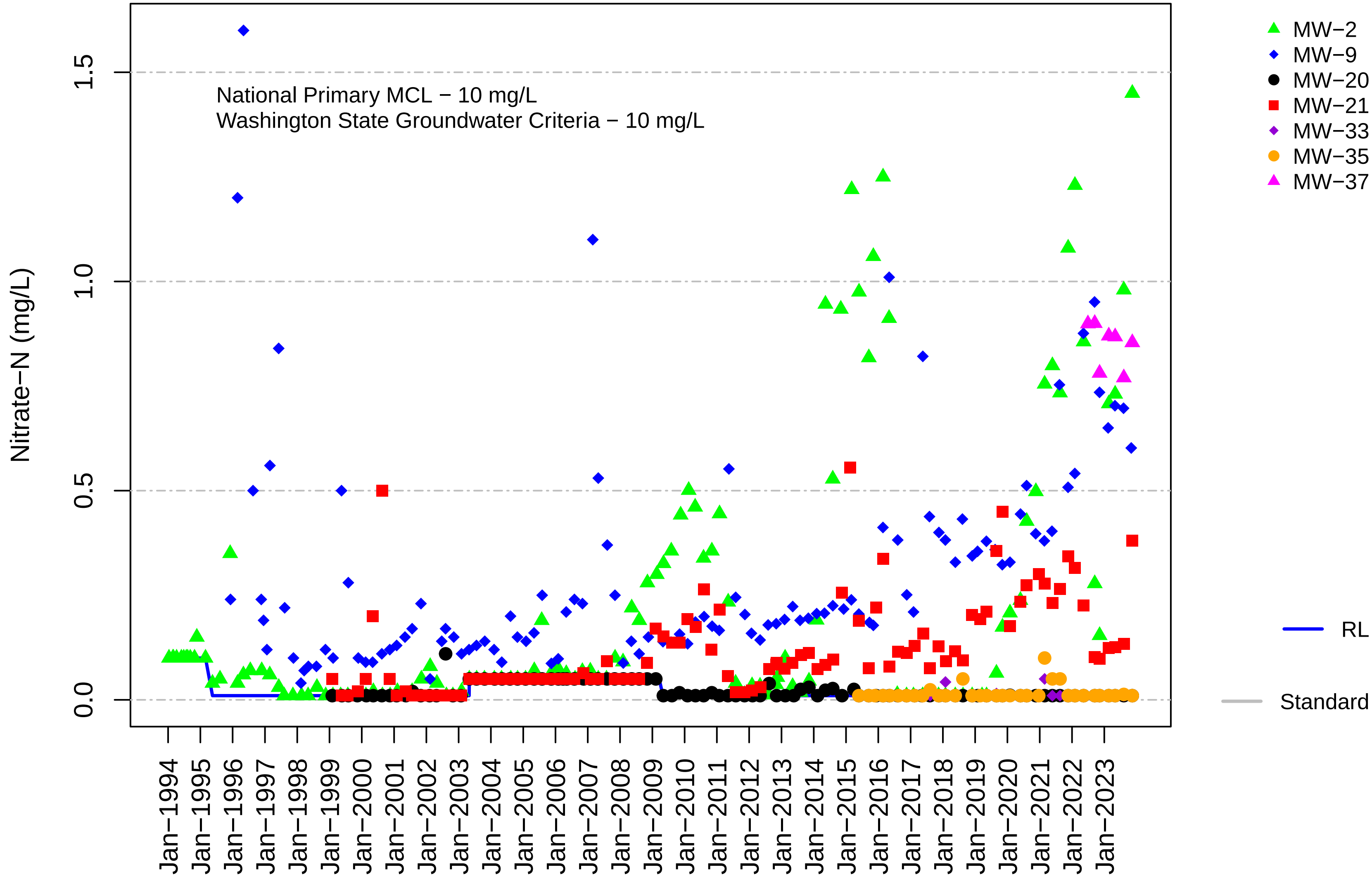


Figure B−34 Long−Term
Channel Cc2
Sulfate

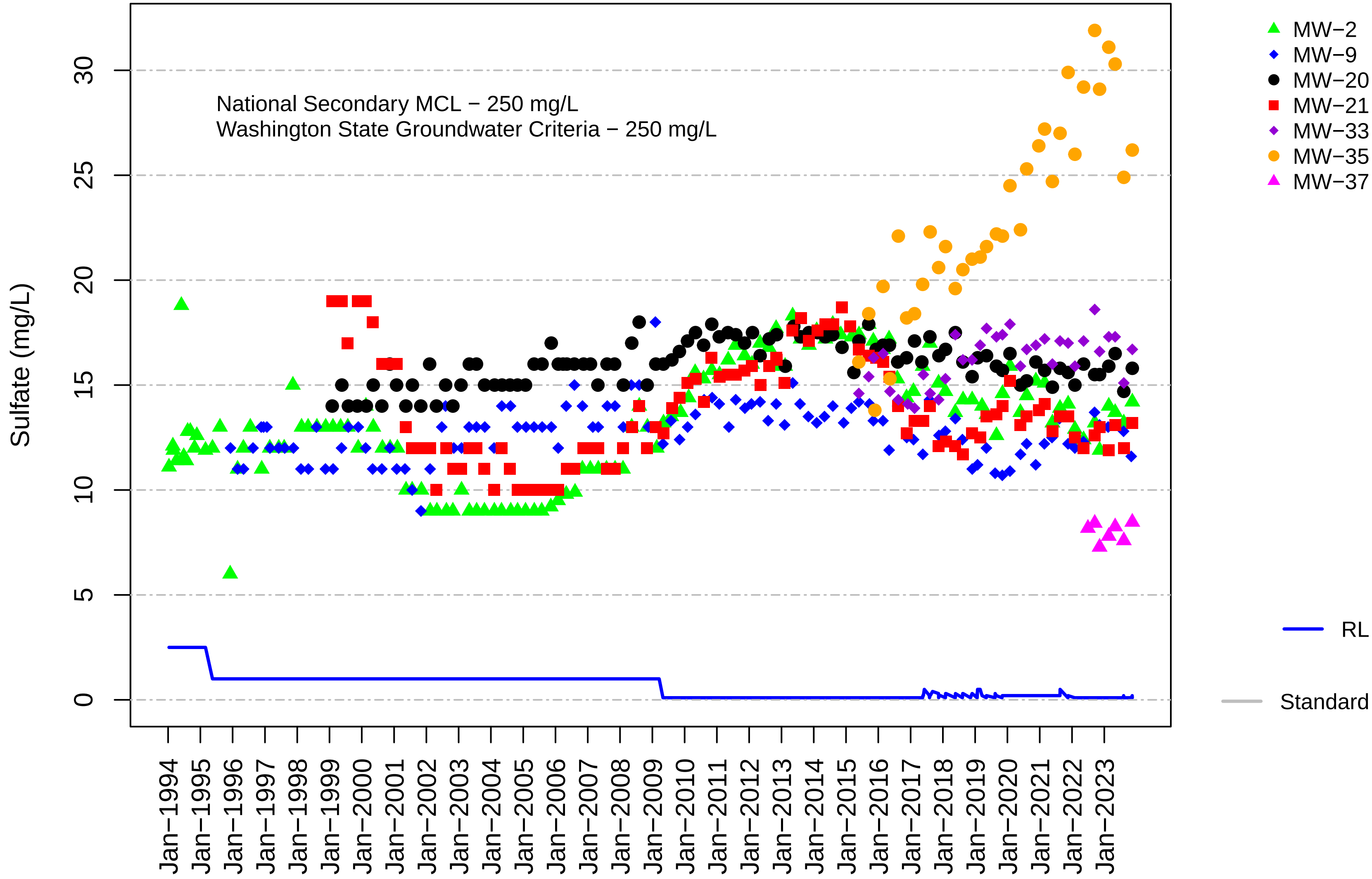


Figure B−35 Long−Term
Channel Cc2
Total Dissolved Solids

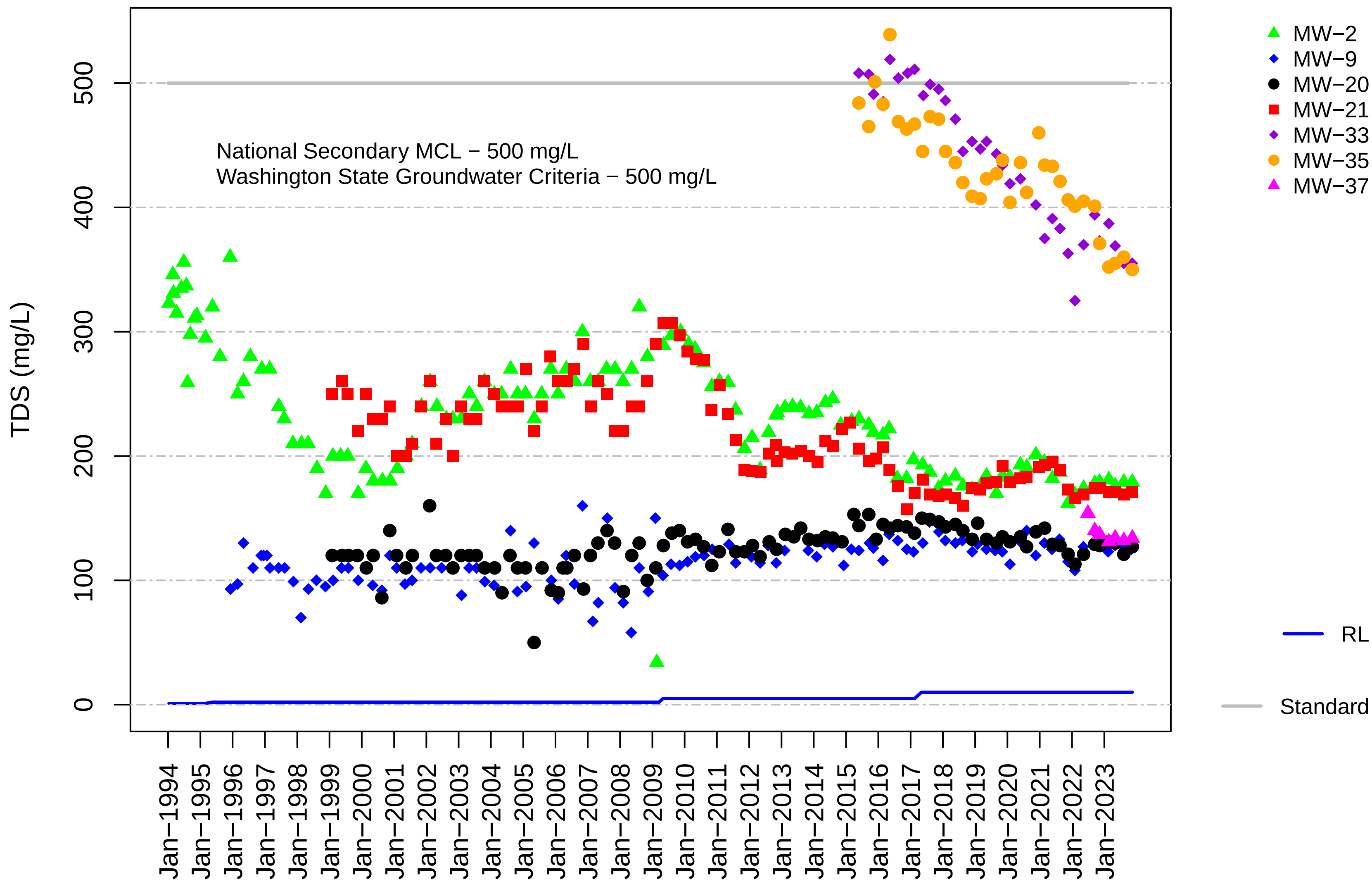


Figure B−36 Long−Term
Channel Cc2
Arsenic

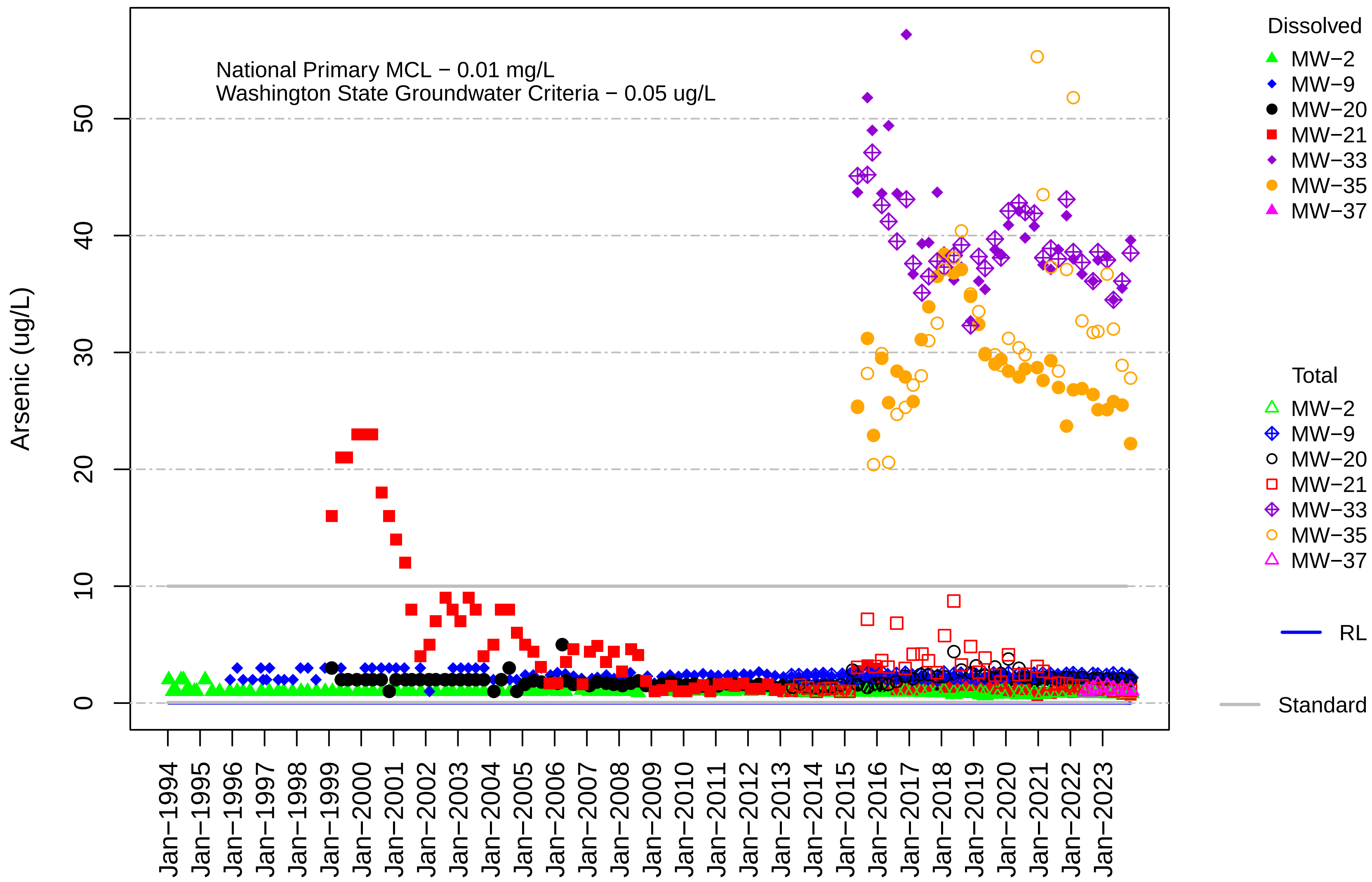


Figure B−37 Long−Term
Channel Cc2
Calcium

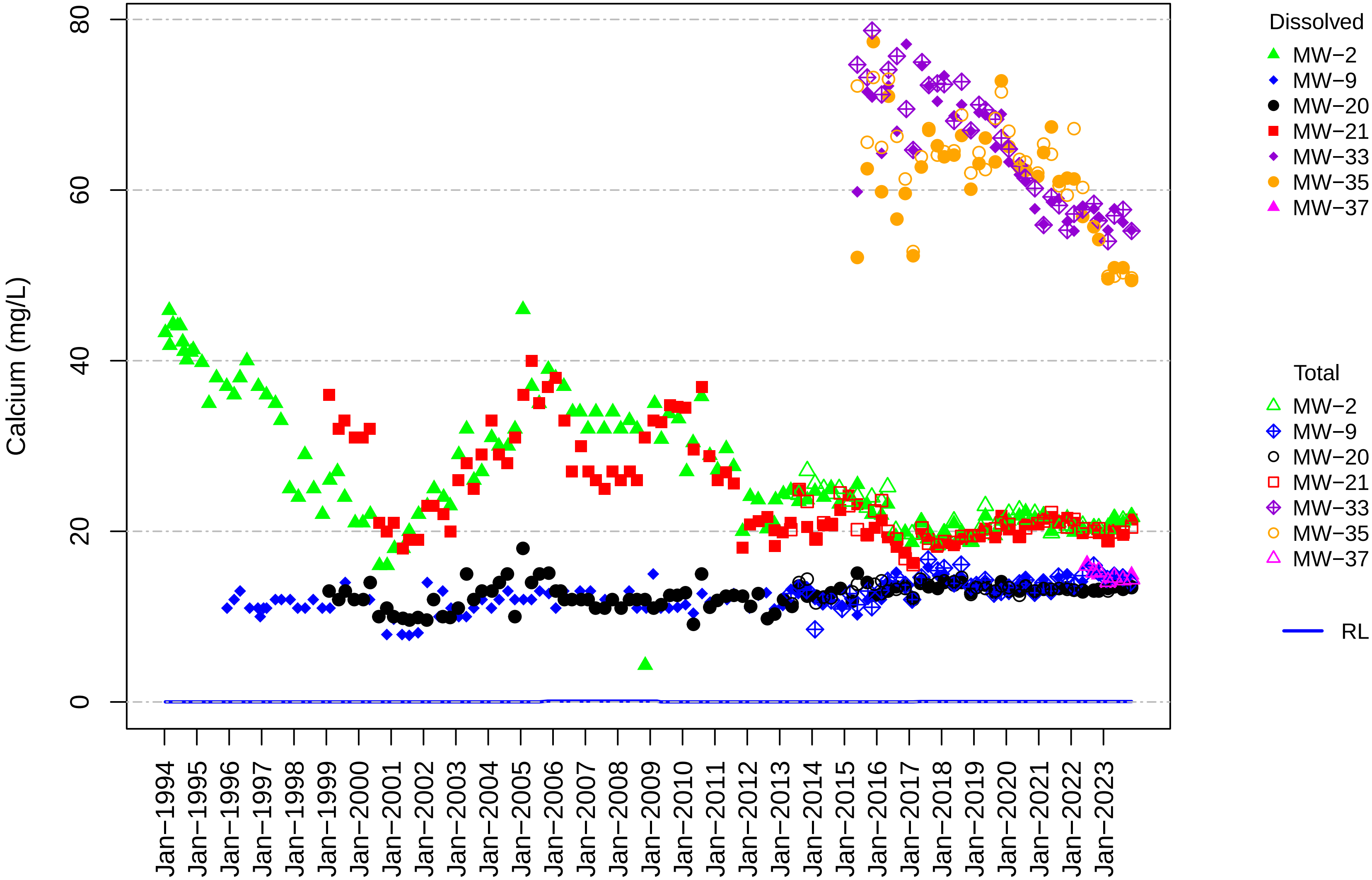


Figure B−38 Long−Term
Channel Cc2
Iron

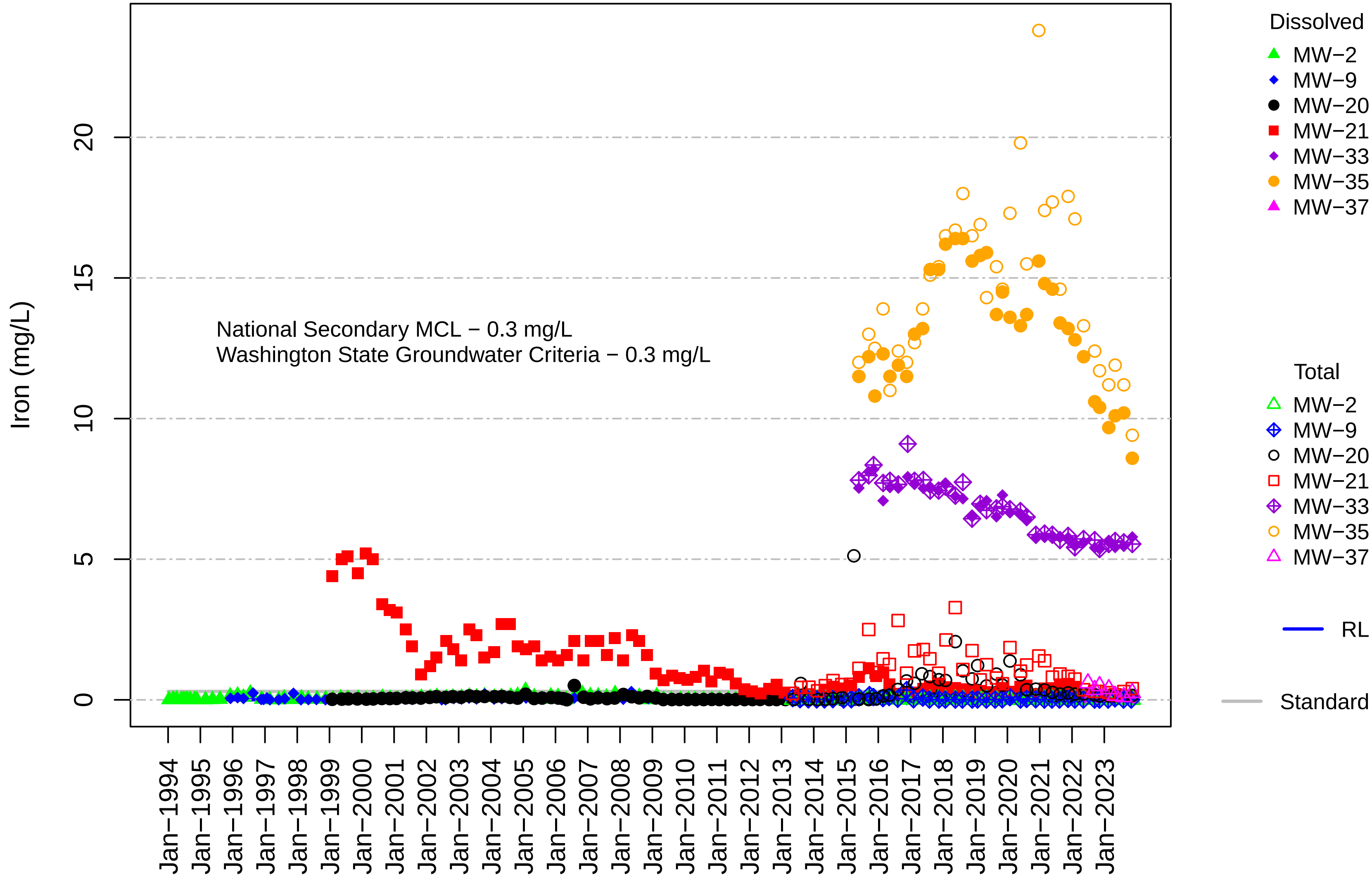
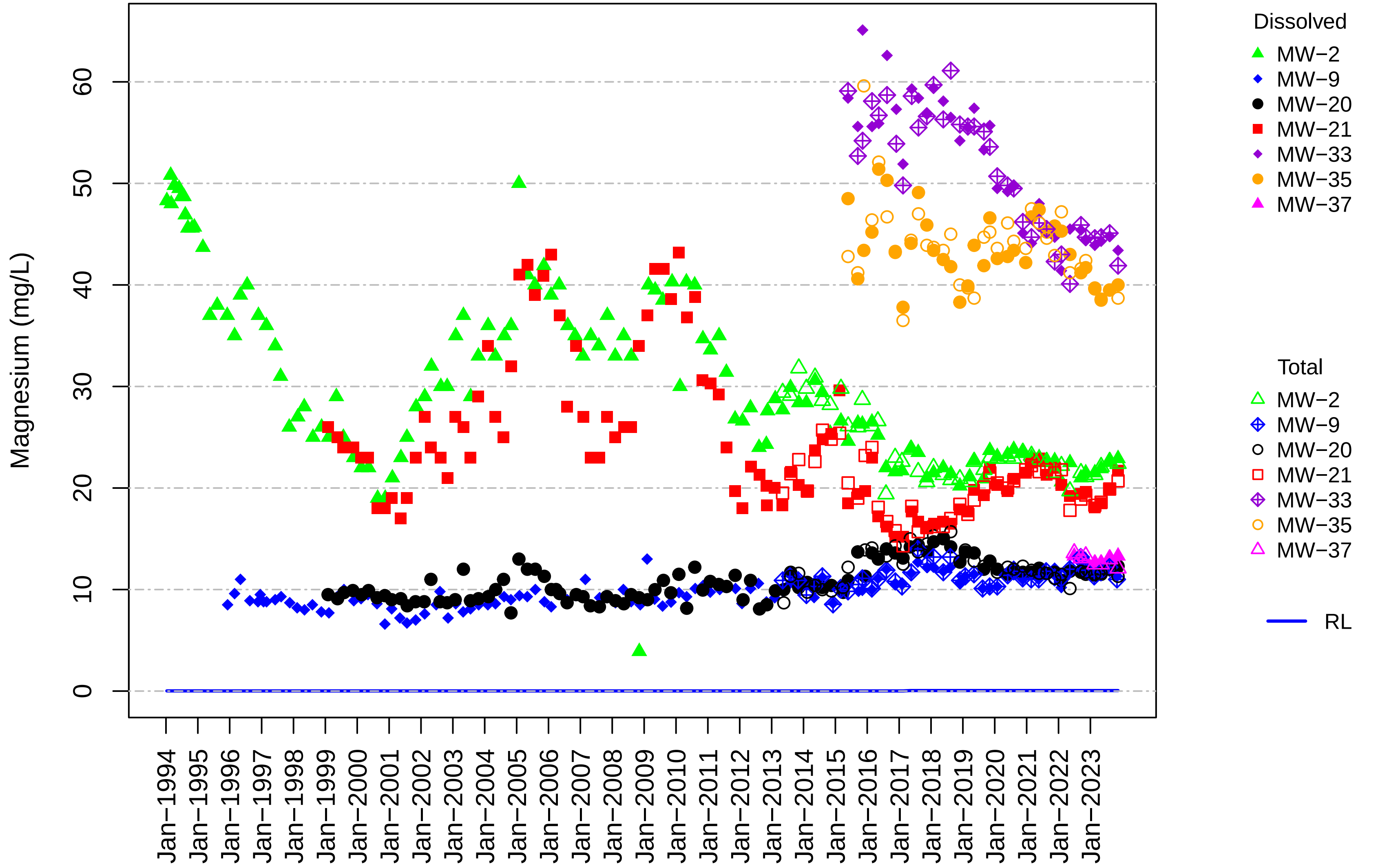


Figure B−39 Long−Term
Channel Cc2
Magnesium



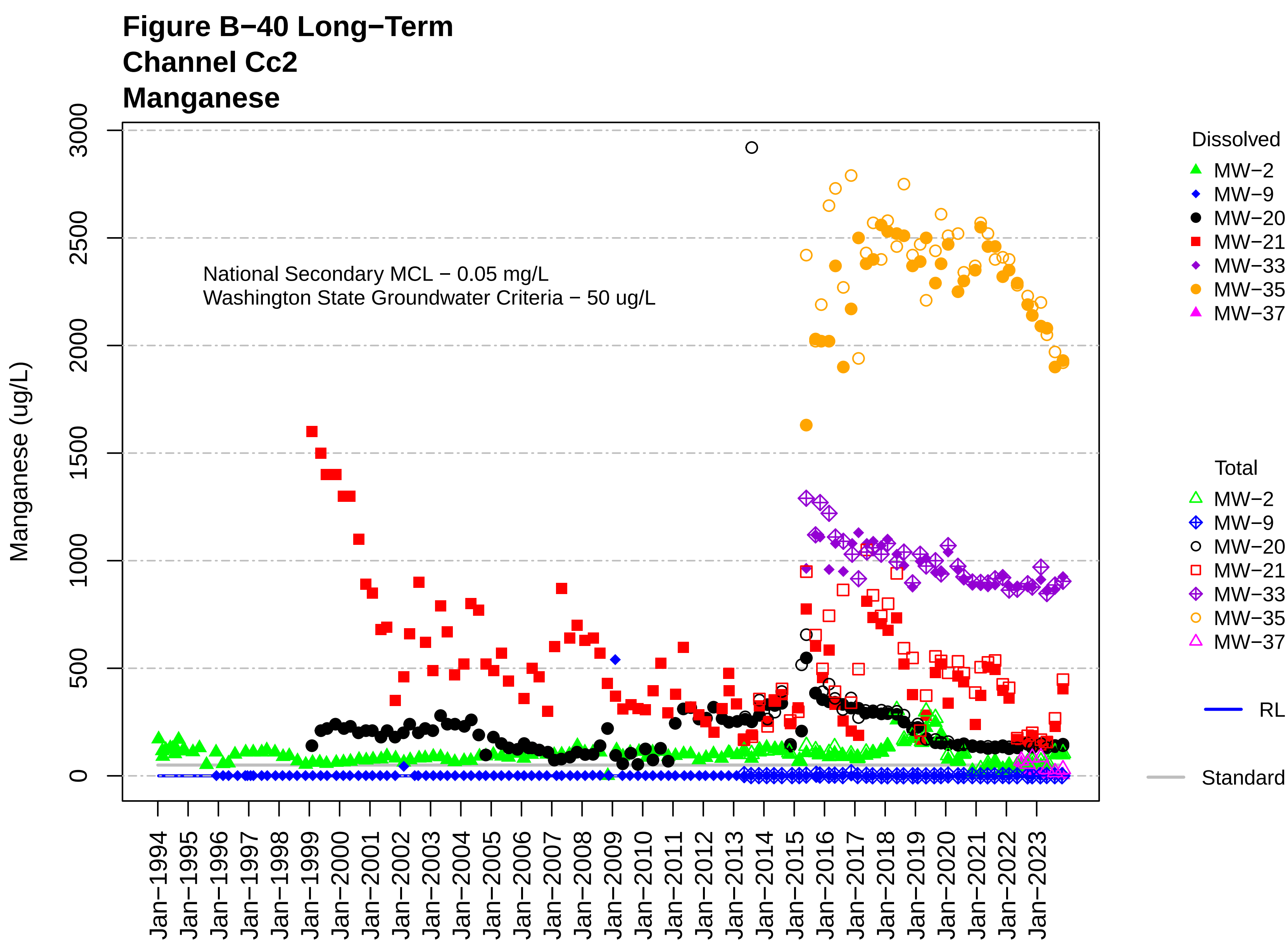


Figure B−40 Long−Term
Channel Cc2
Manganese
Manganese (ug/L)
0
500
1000
1500
2000
2500
3000
National Secondary MCL − 0.05 mg/L
Washington State Groundwater Criteria − 50 ug/L
Jan−1994
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
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
Jan−2021
Jan−2022
Jan−2023
Dissolved
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
MW−37
Total
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
MW−37
RL
Standard

Figure B−41 Long−Term
Channel Cc2
Potassium

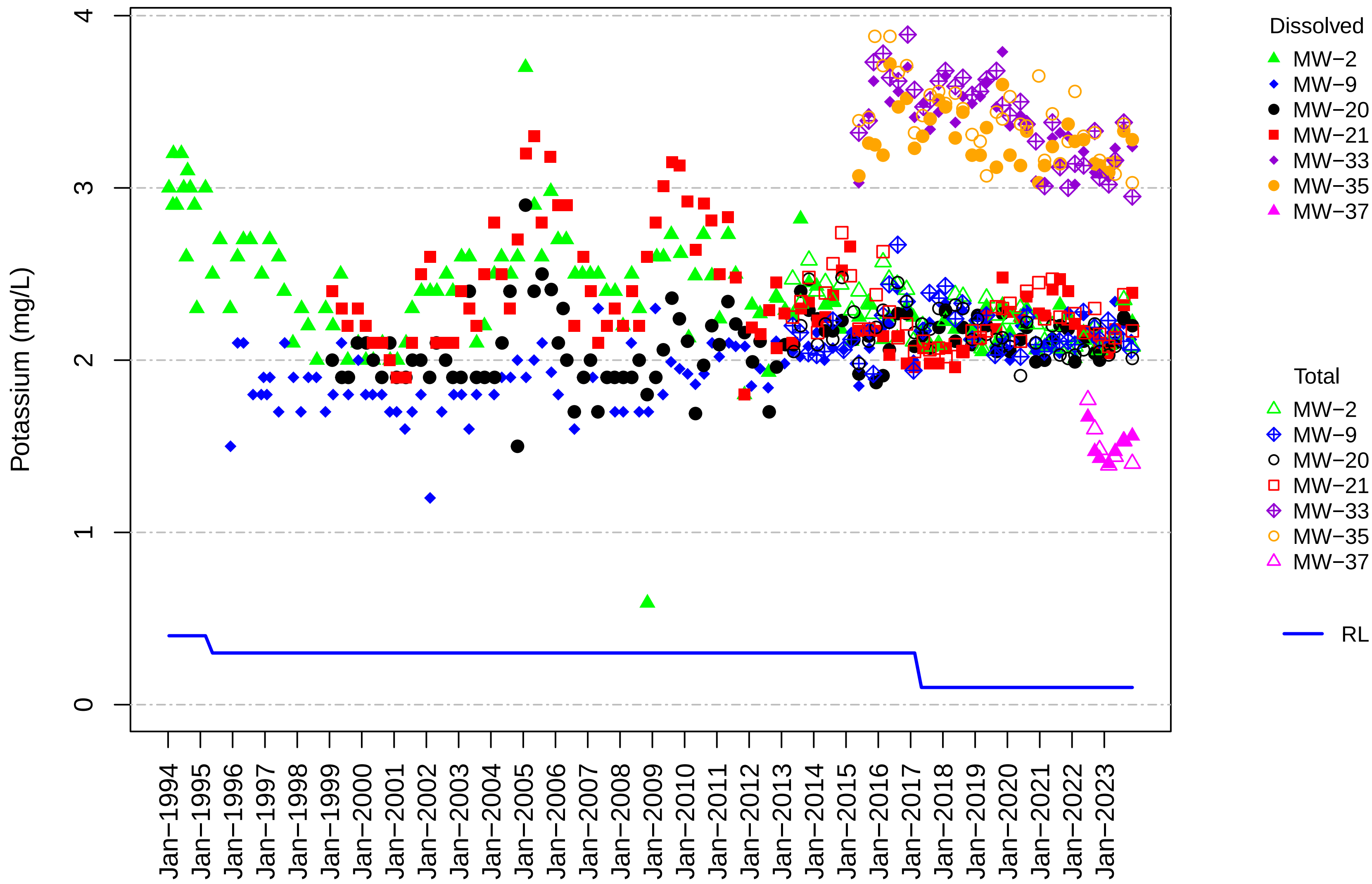


Figure B−42 Long−Term
Channel Cc2
Sodium

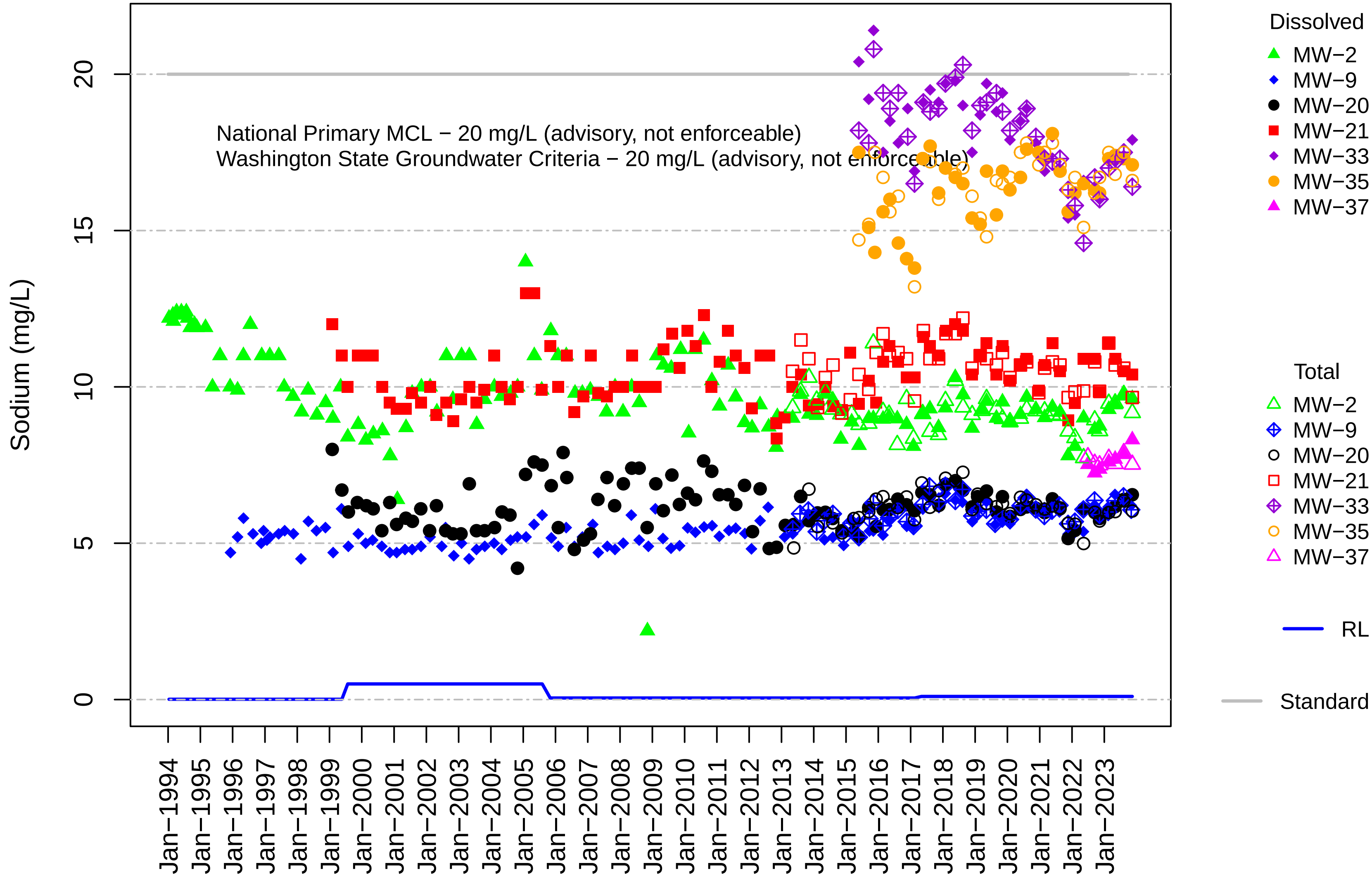


Figure B−43 Long−Term
Channel Cc2
1,1−Dichloroethane

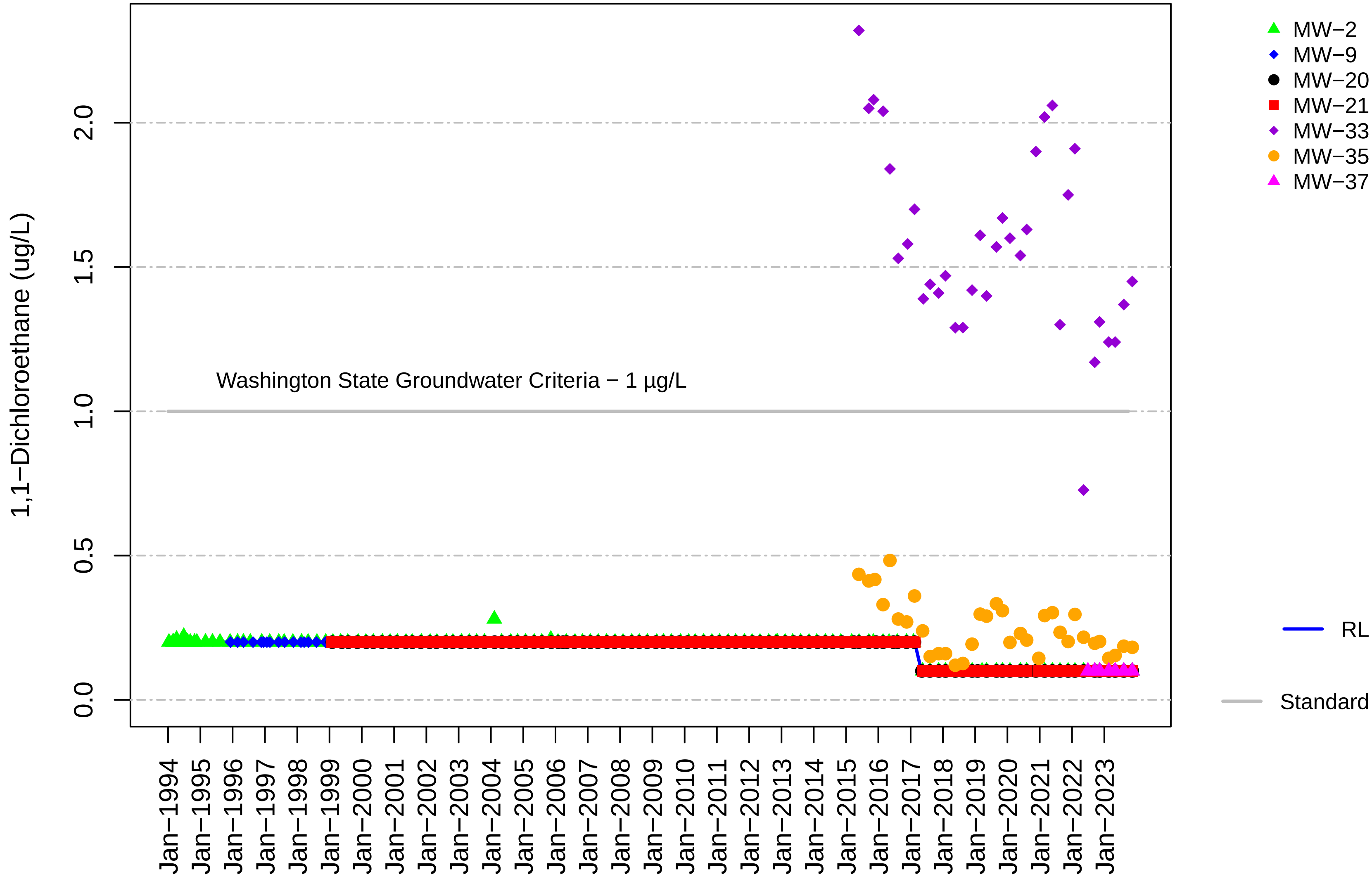


Figure B−44 Long−Term
Channel Cc2
1,2−Dichloropropane

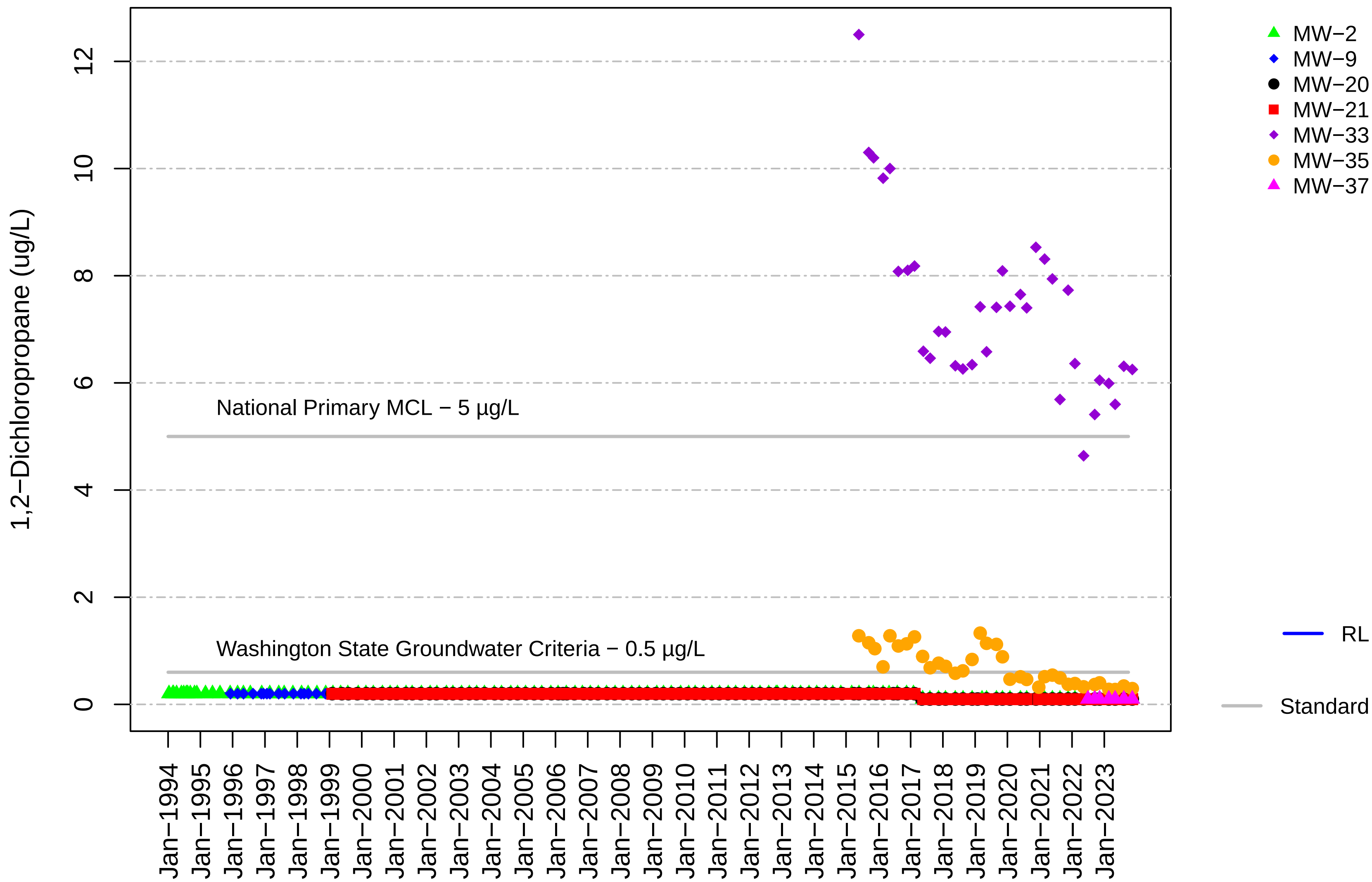


Figure B−45 Long−Term
Channel Cc2
Benzene

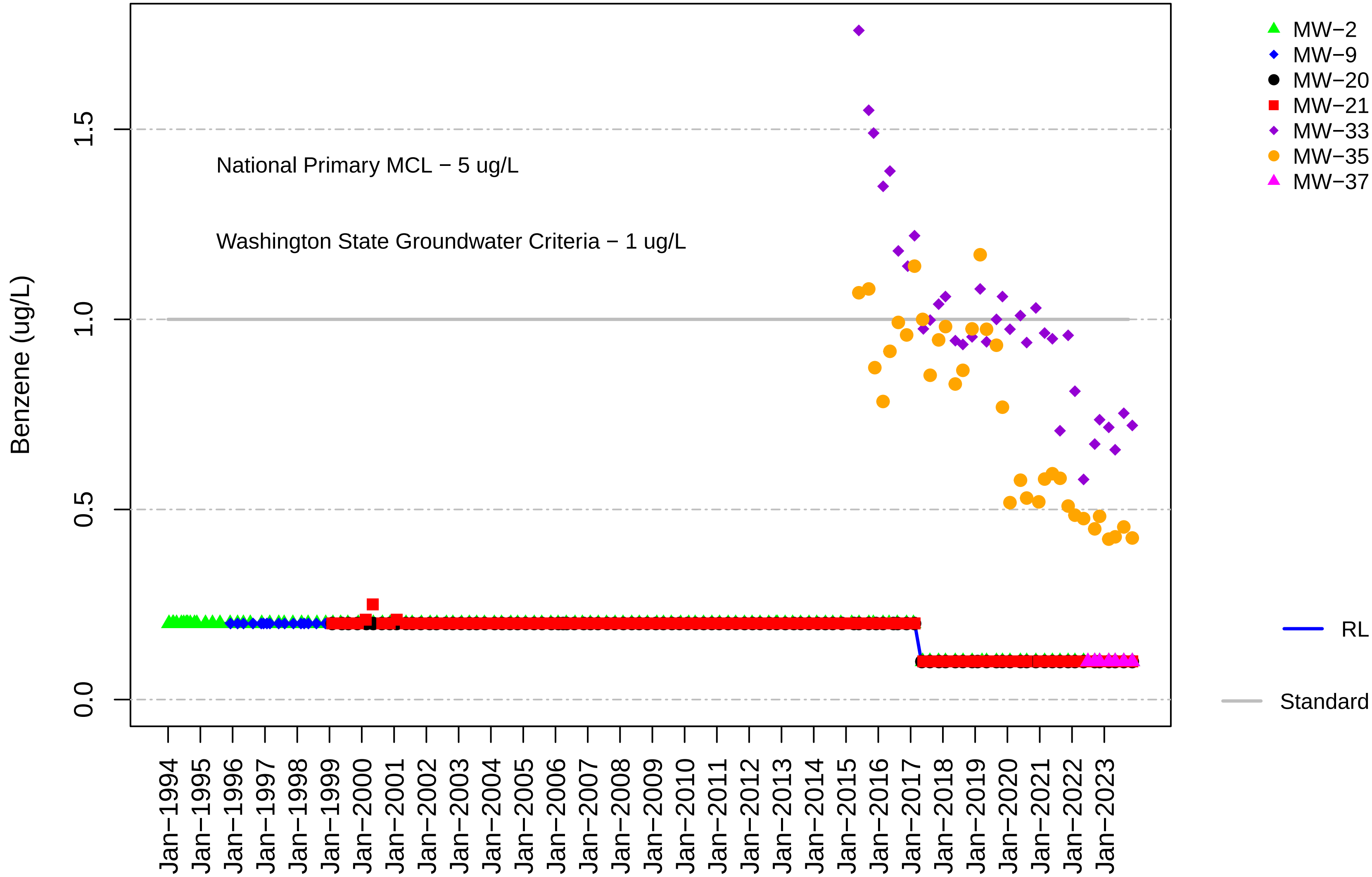


Figure B−46 Long−Term
Channel Cc2
Chloroethane

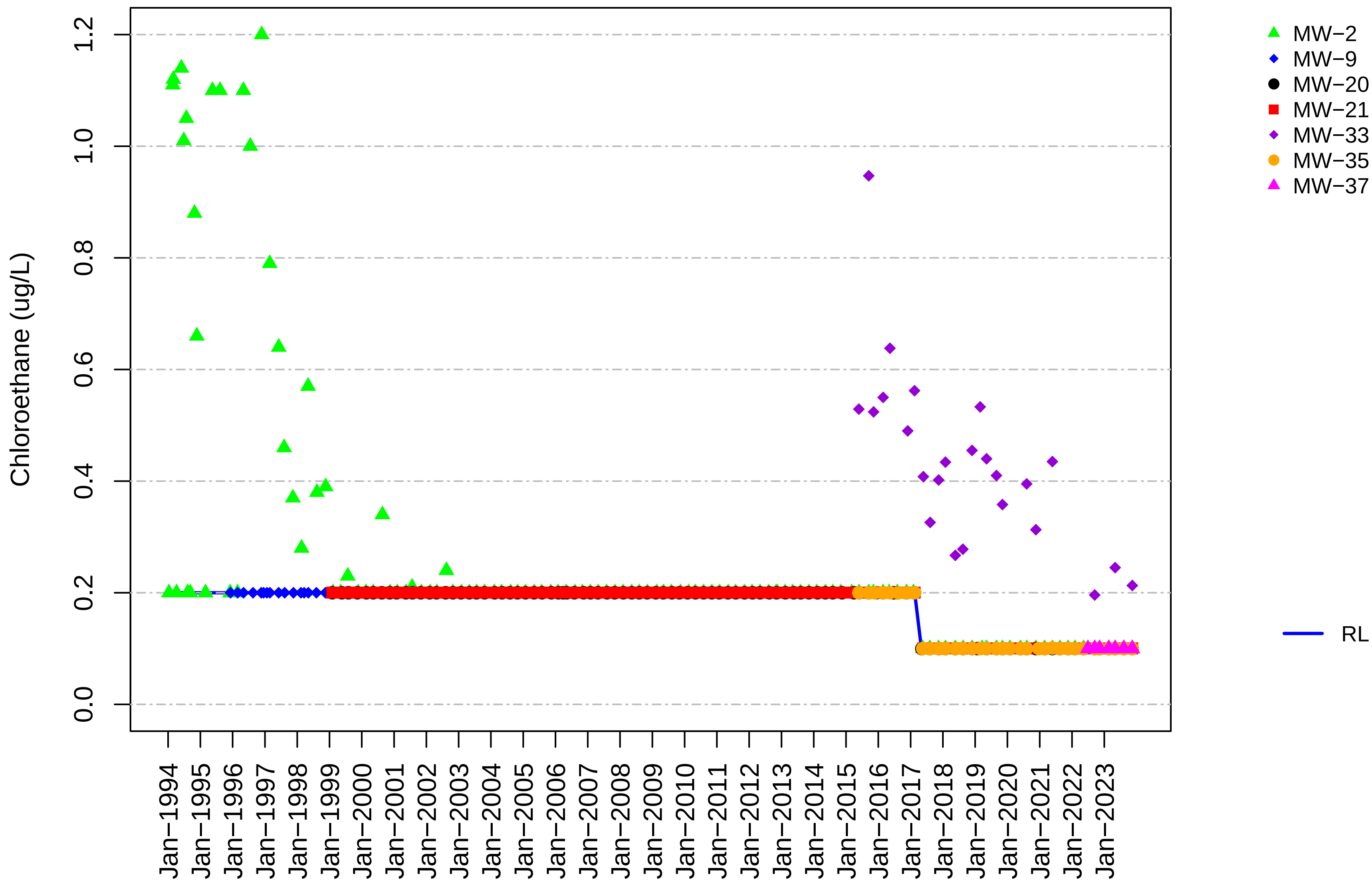


Figure B−47 Long−Term
Channel Cc2
cis−1,2−Dichloroethene

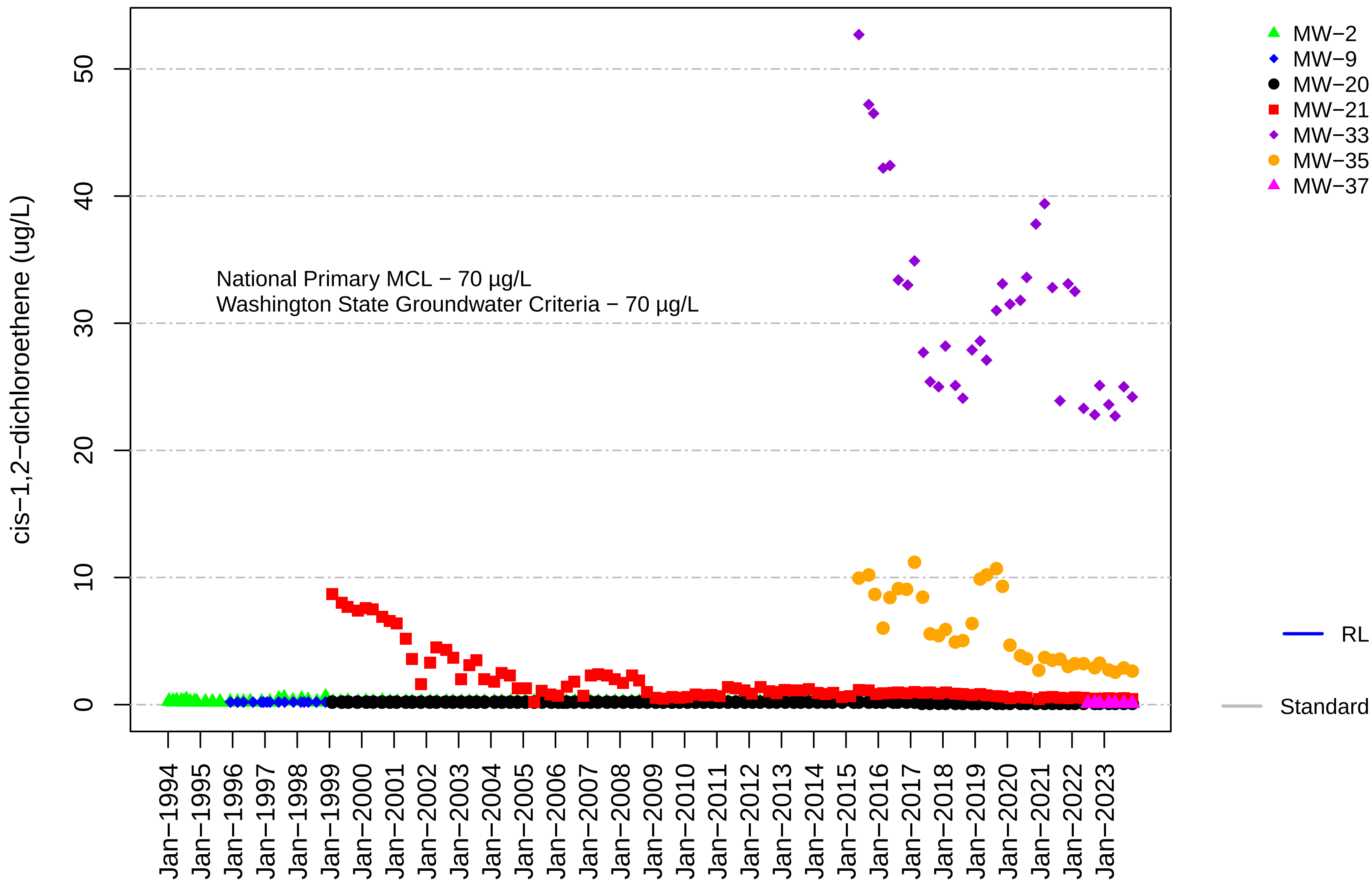


Figure B−48 Long−Term
Channel Cc2
Dichlorodifluoromethane

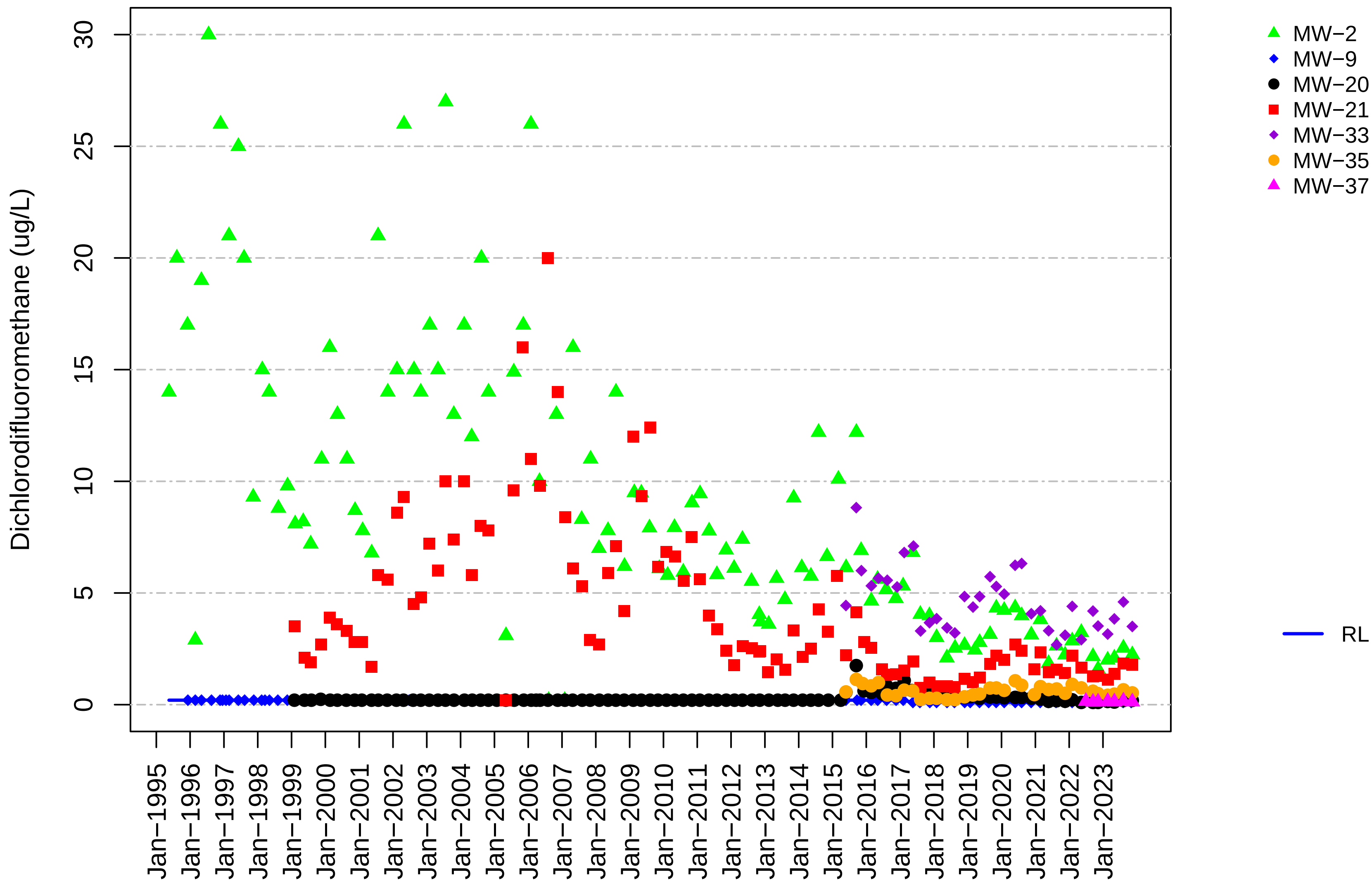


Figure B−49 Long−Term
Channel Cc2
Tetrachloroethene

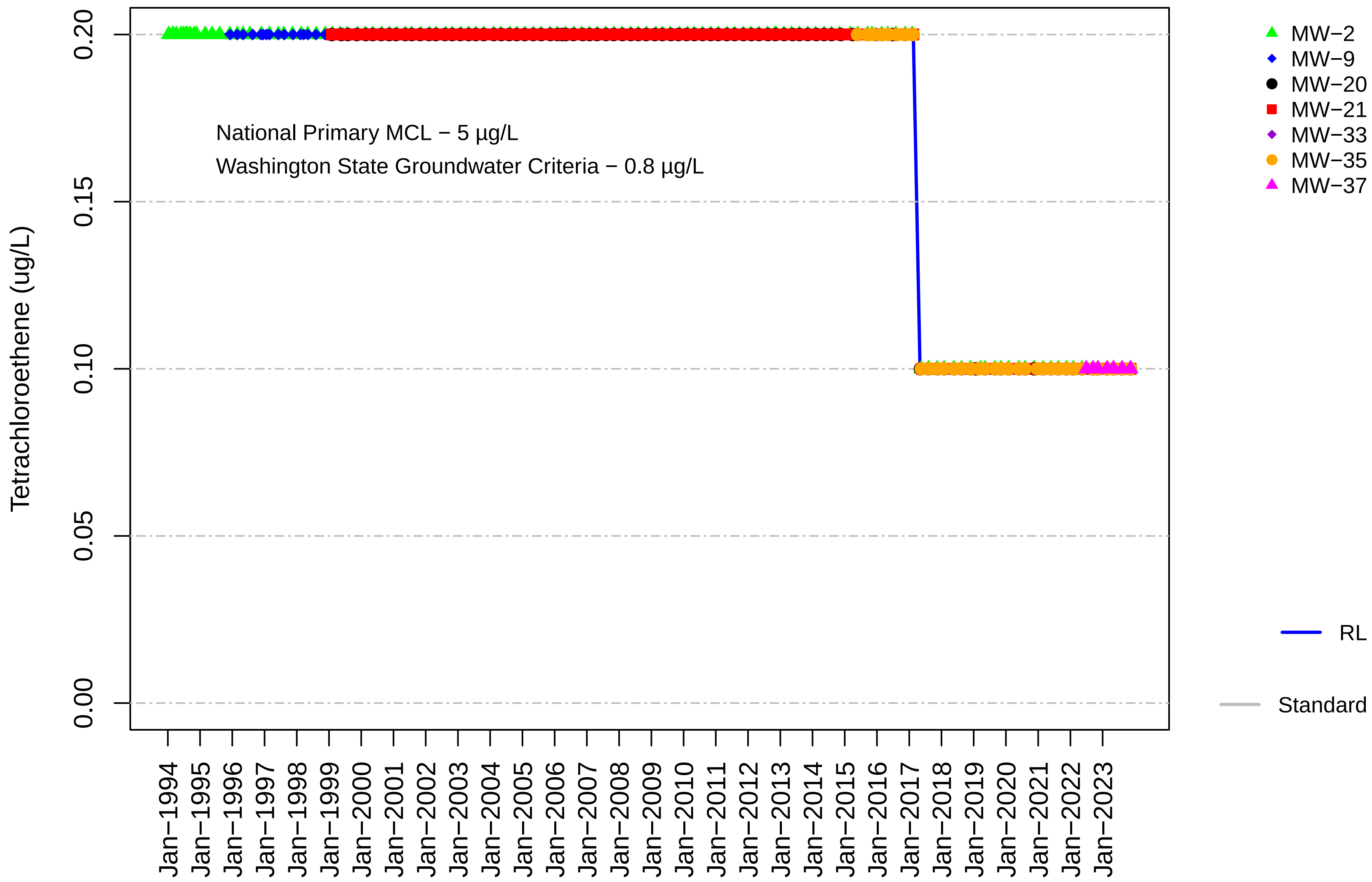


Figure B−50 Long−Term
Channel Cc2
Toluene

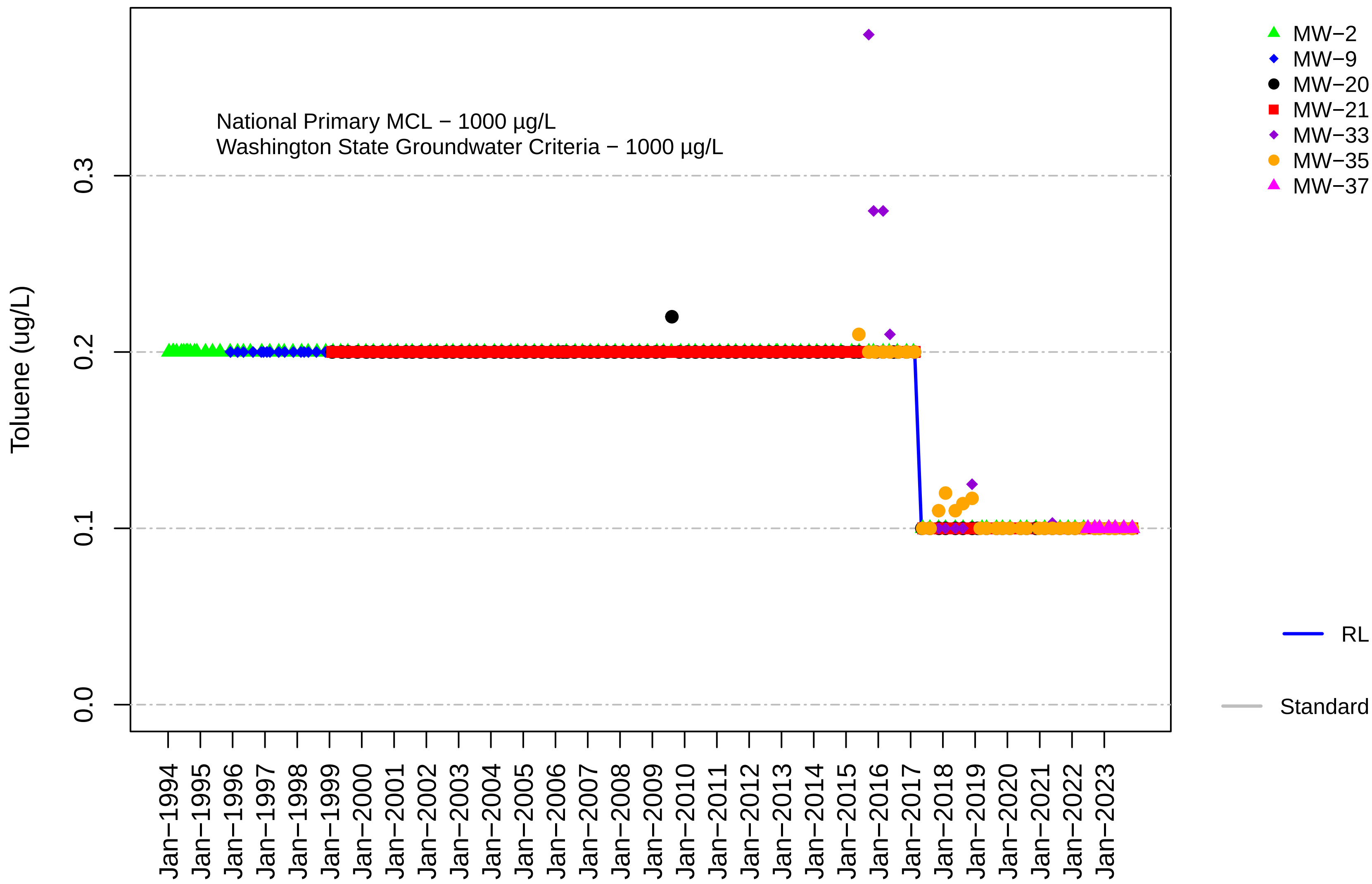


Figure B−51 Long−Term
Channel Cc2
Trans−1,2−Dichloroethene

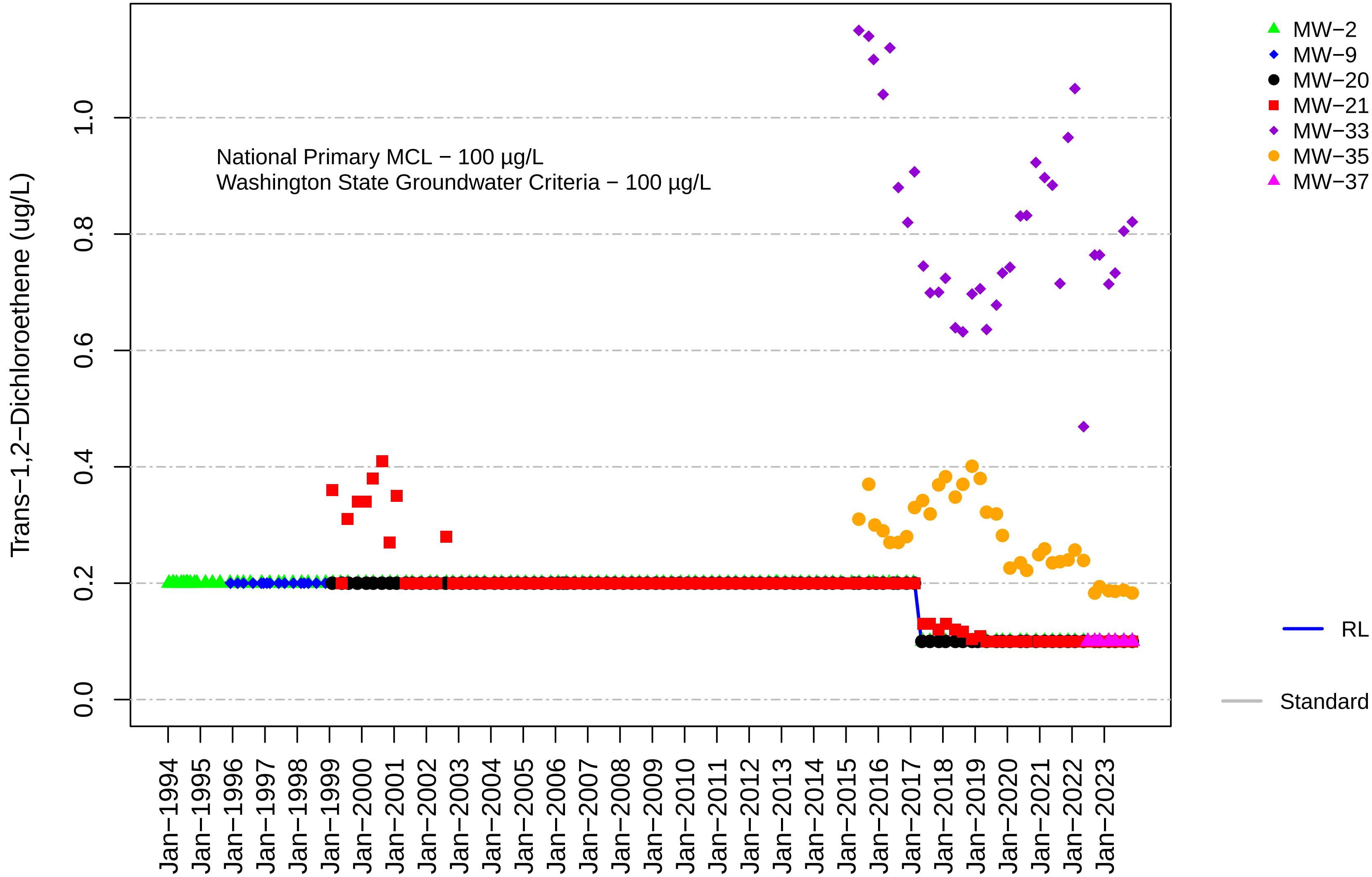


Figure B−52 Long−Term
Channel Cc2
Trichloroethene

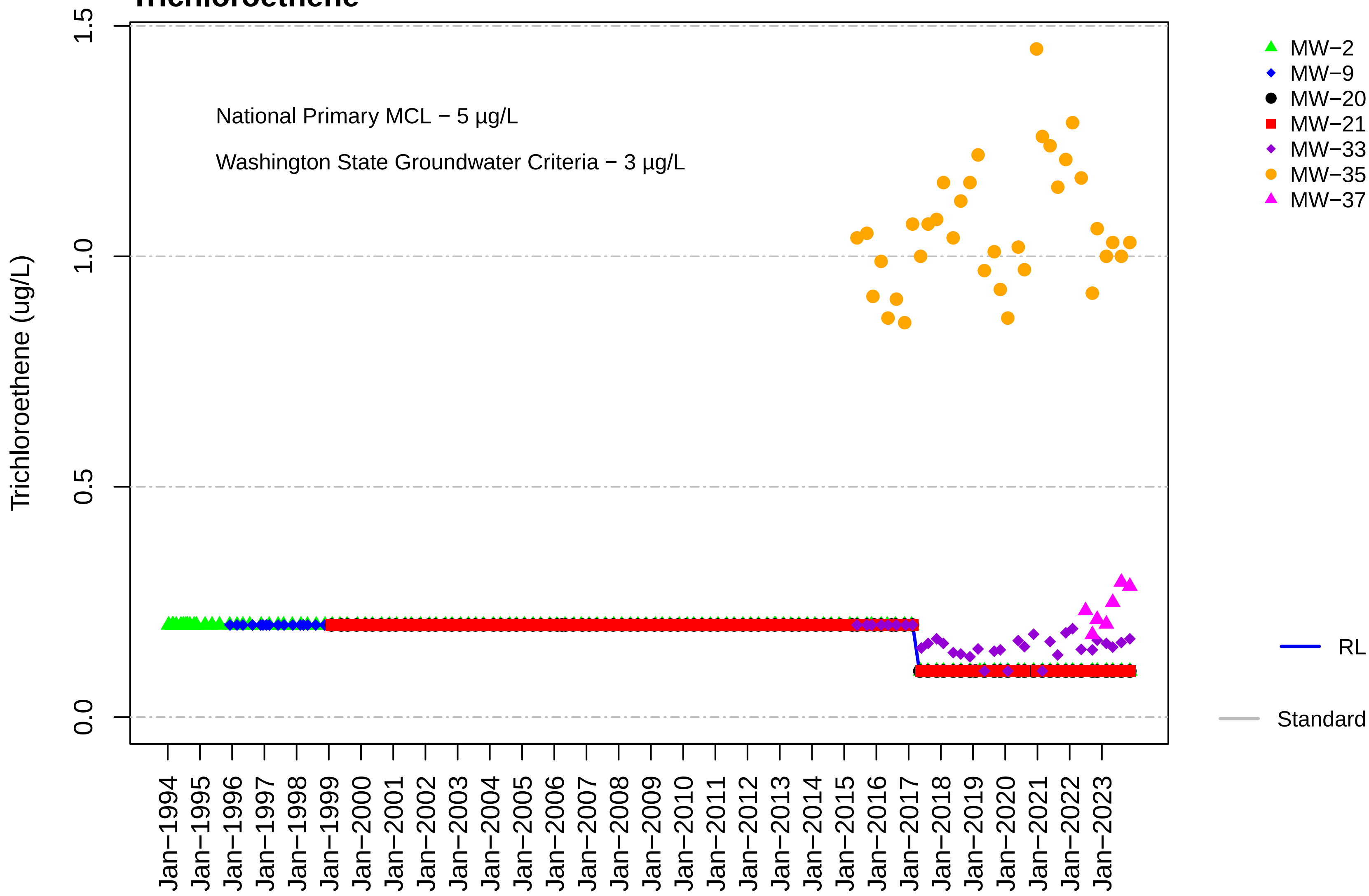


Figure B−53 Long−Term
Channel Cc2
Trichlorofluoromethane

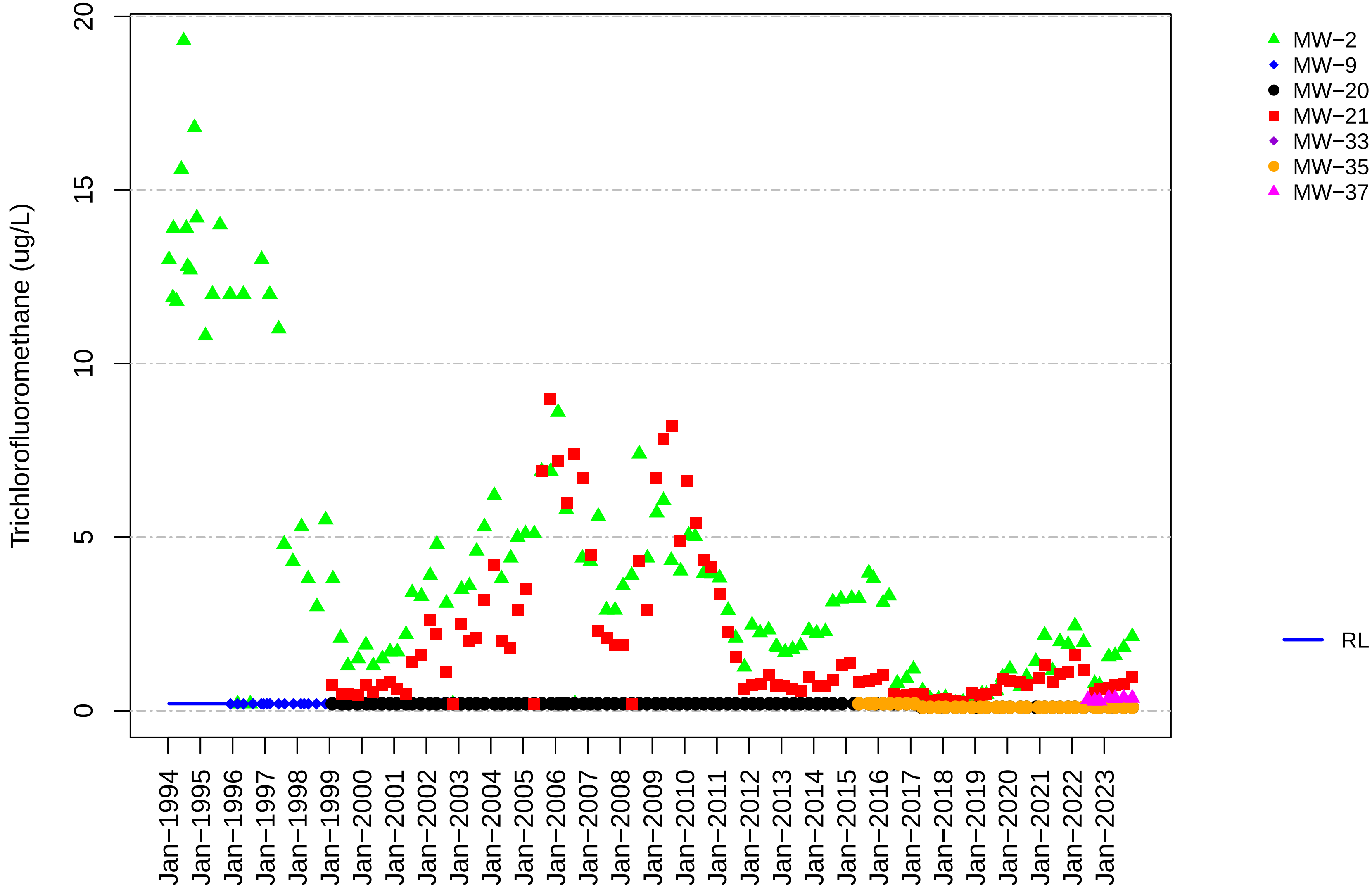


Figure B−54 Long−Term
Channel Cc2
Vinyl chloride

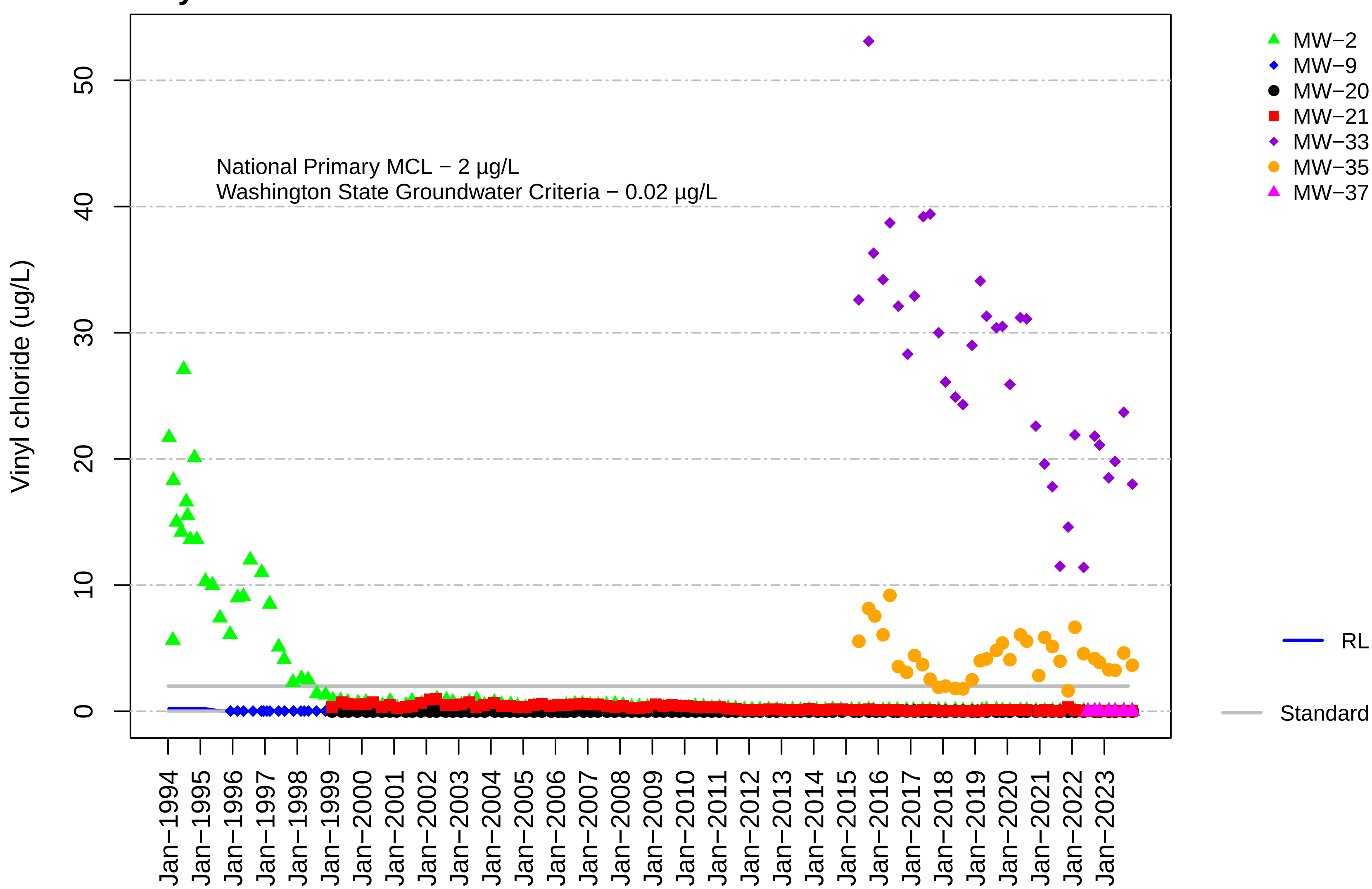


Figure B−28 Short−Term
Channel Cc2
Field pH

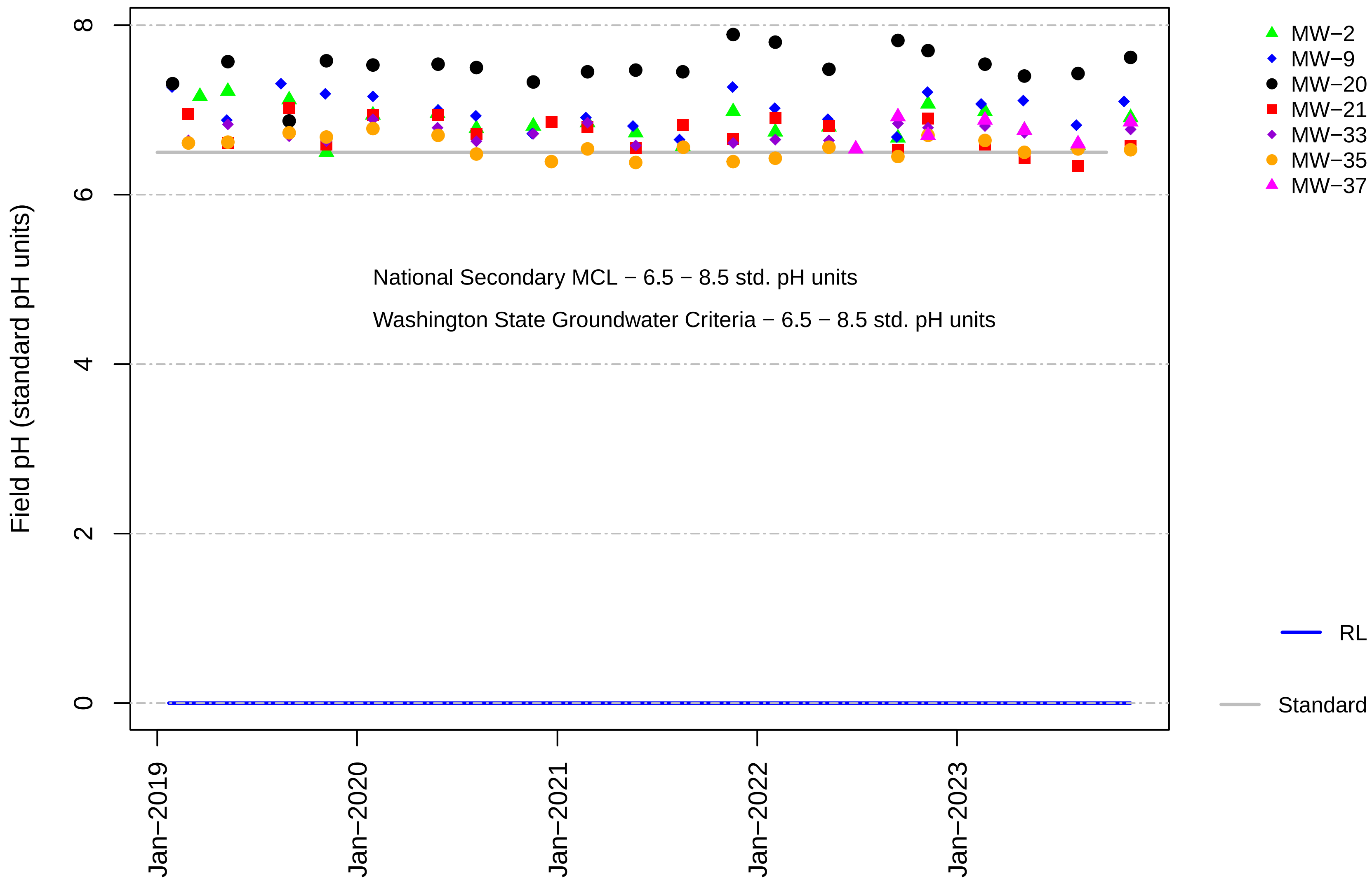


Figure B−29 Short−Term
Channel Cc2
Field Specific Conductance

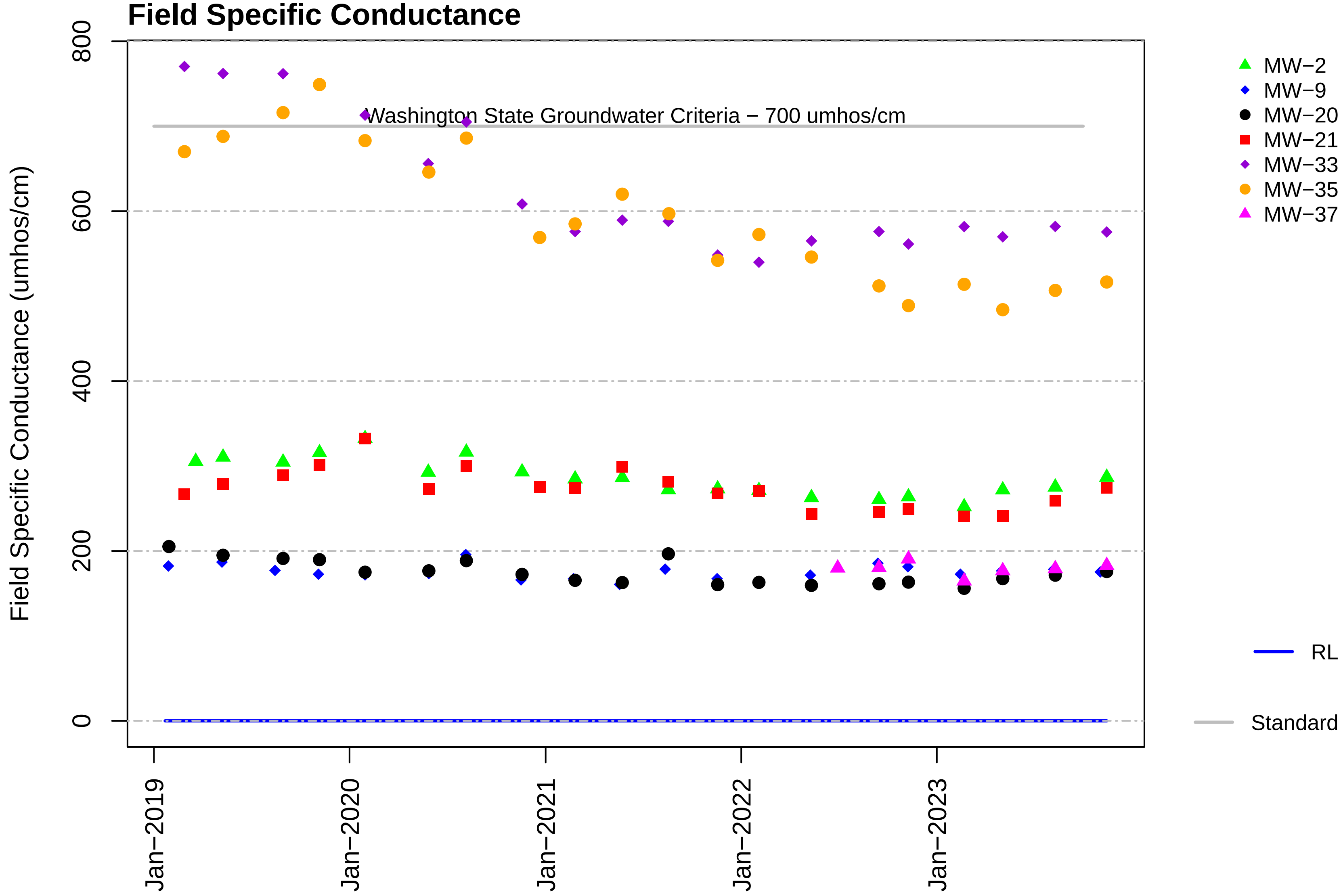


Figure B−30 Short−Term
Channel Cc2
Alkalinity

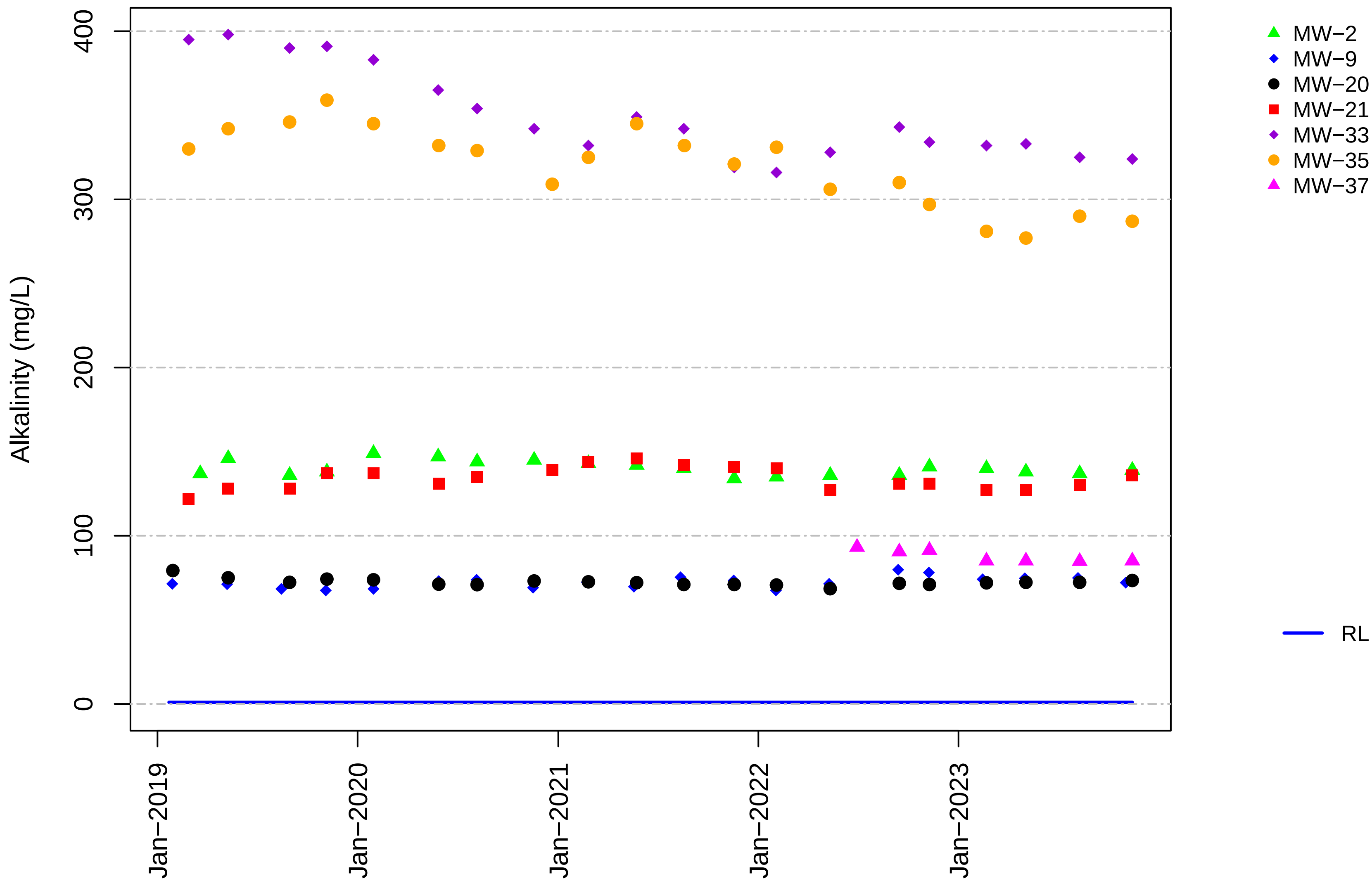


Figure B−31 Short−Term
Channel Cc2
Ammonia

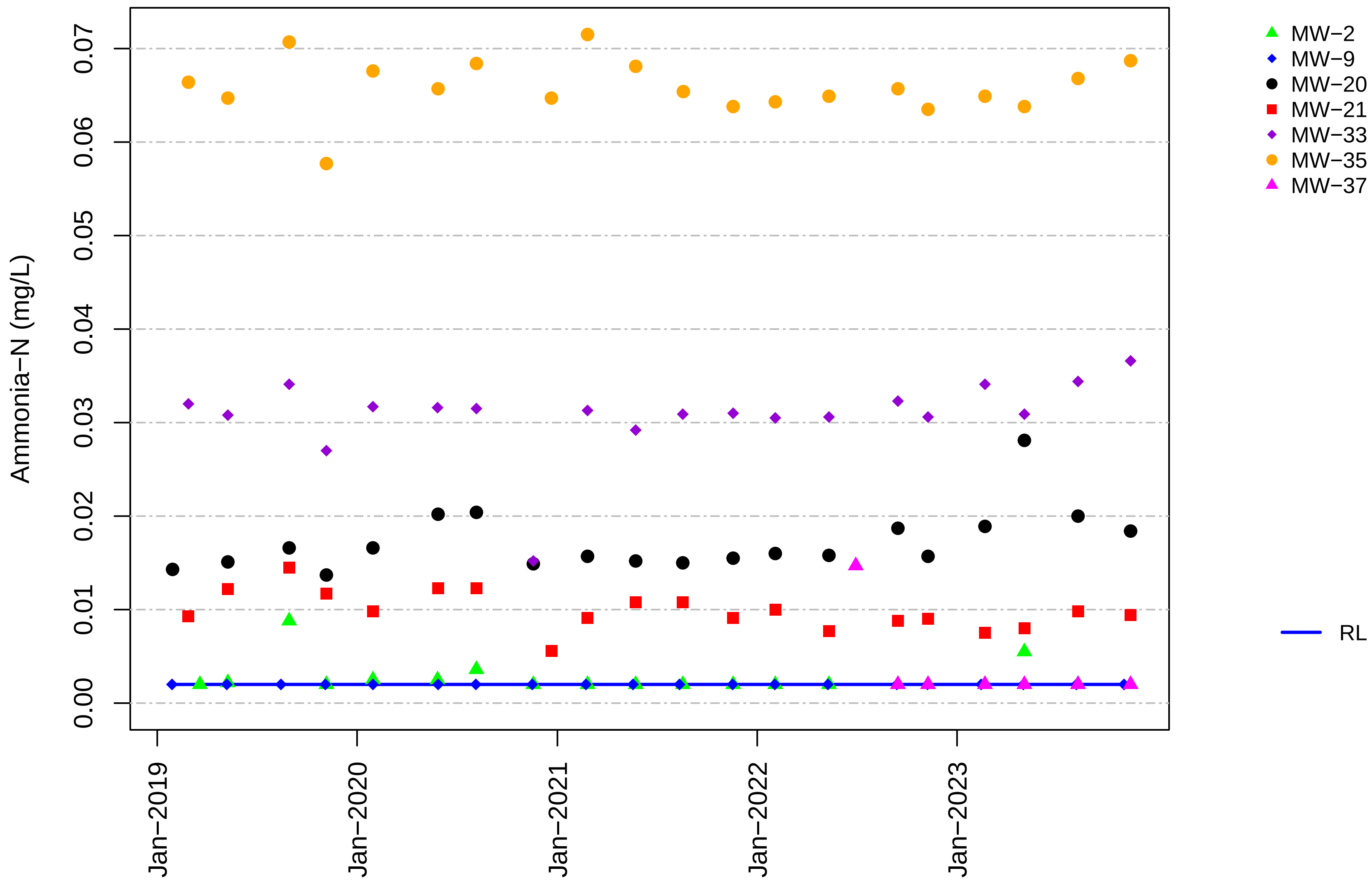


Figure B−32 Short−Term
Channel Cc2
Chloride

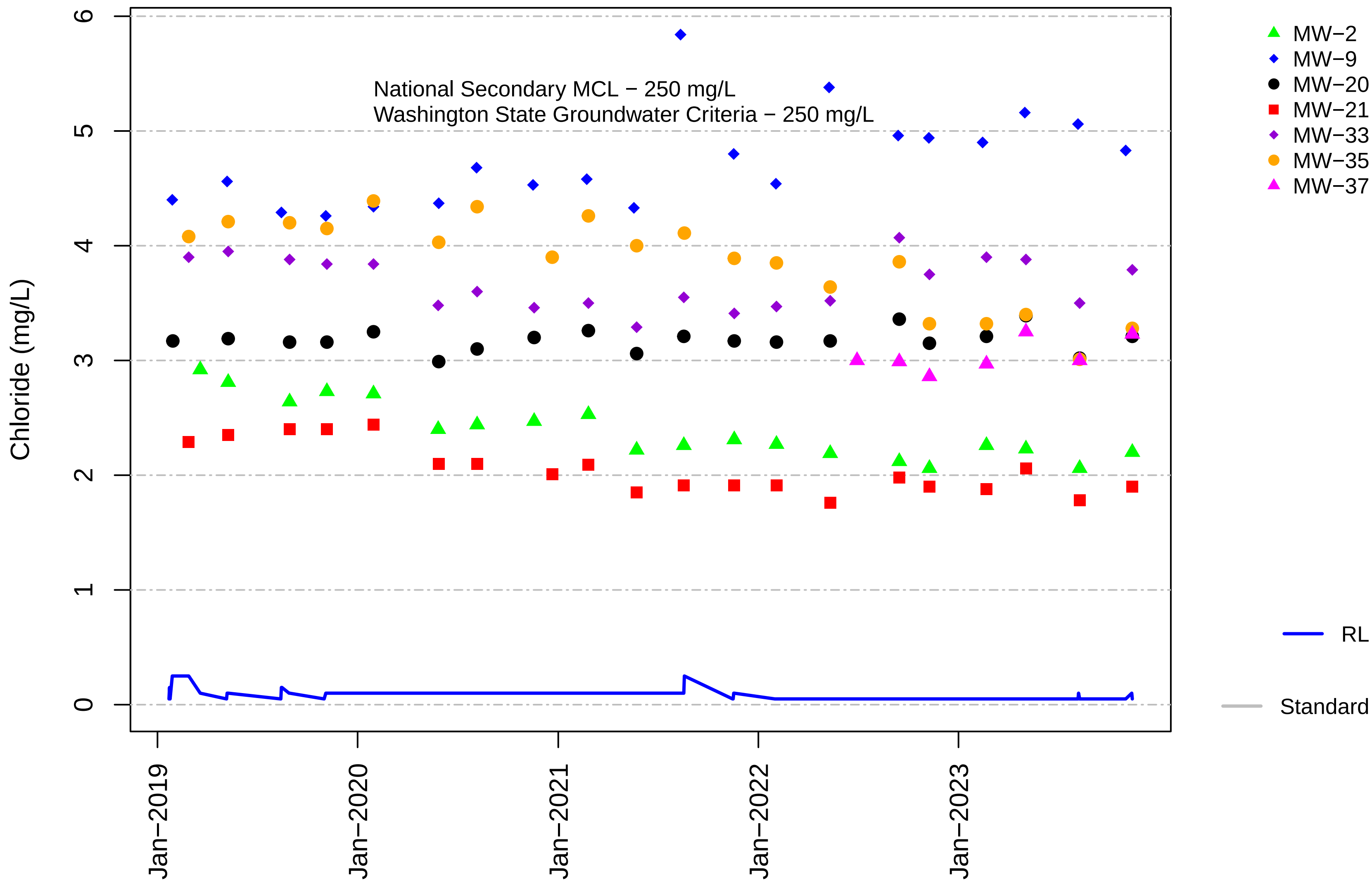


Figure B−33 Short−Term
Channel Cc2
Nitrate

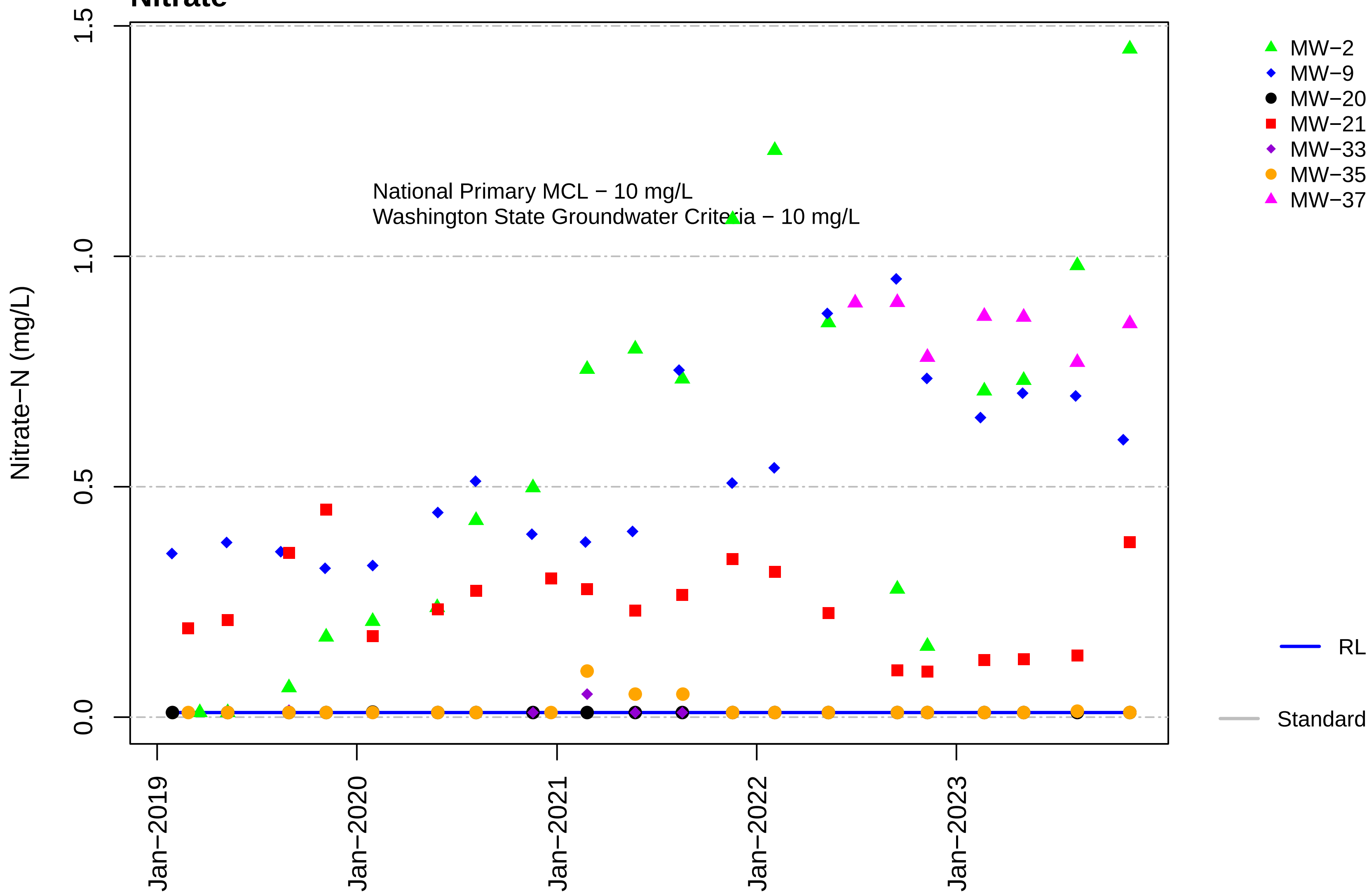


Figure B−34 Short−Term
Channel Cc2
Sulfate

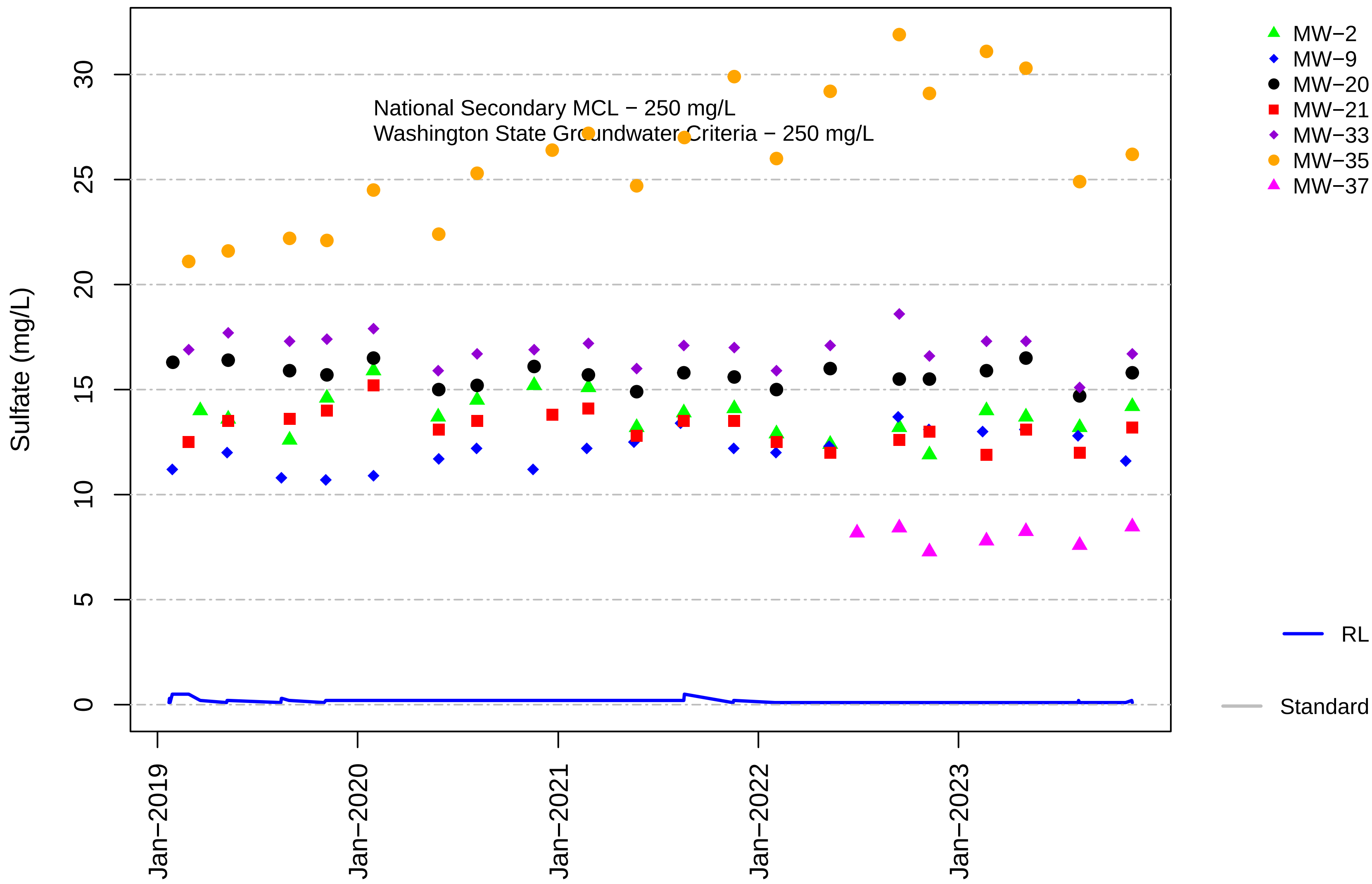


Figure B−35 Short−Term
Channel Cc2
Total Dissolved Solids

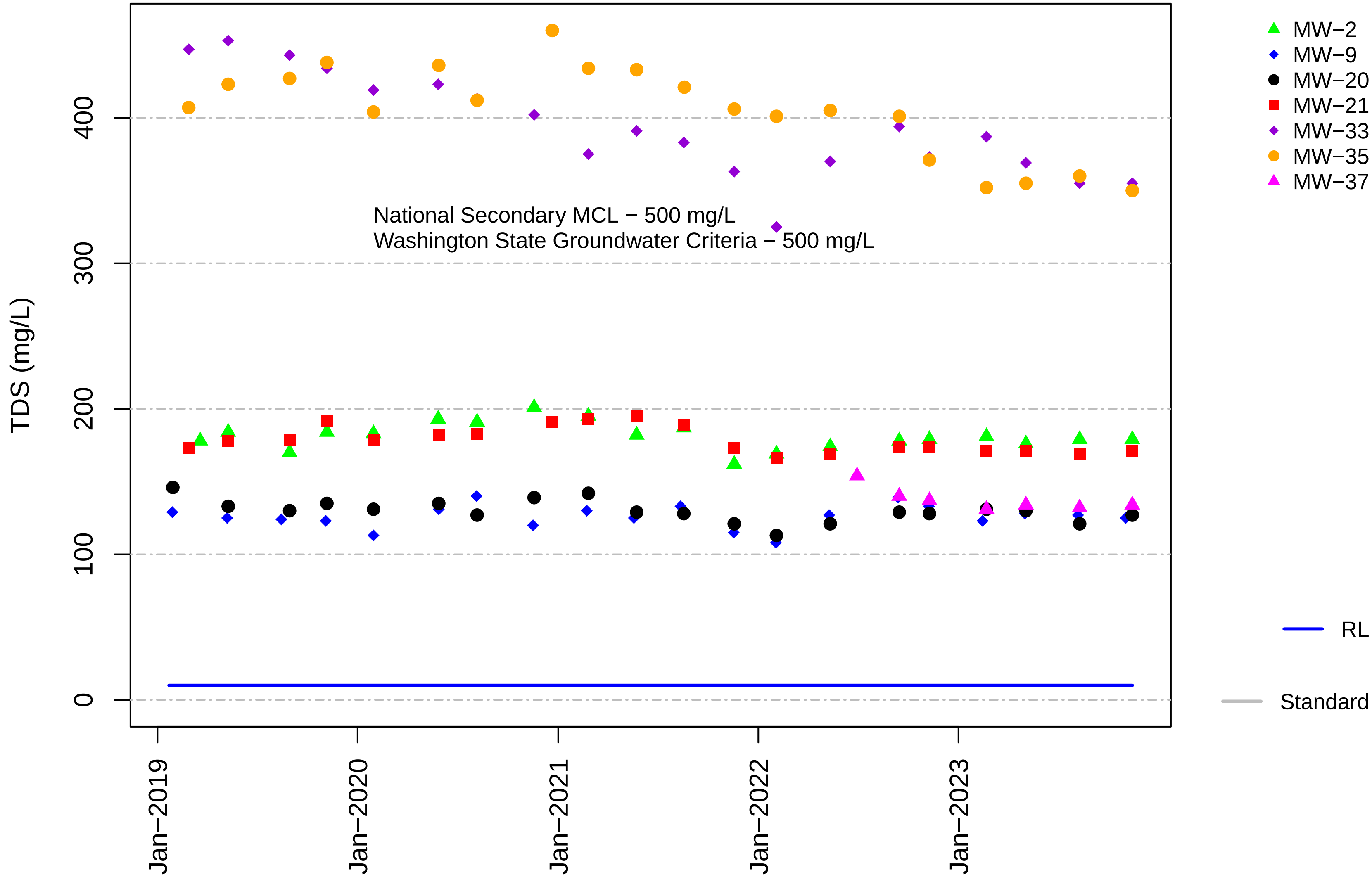
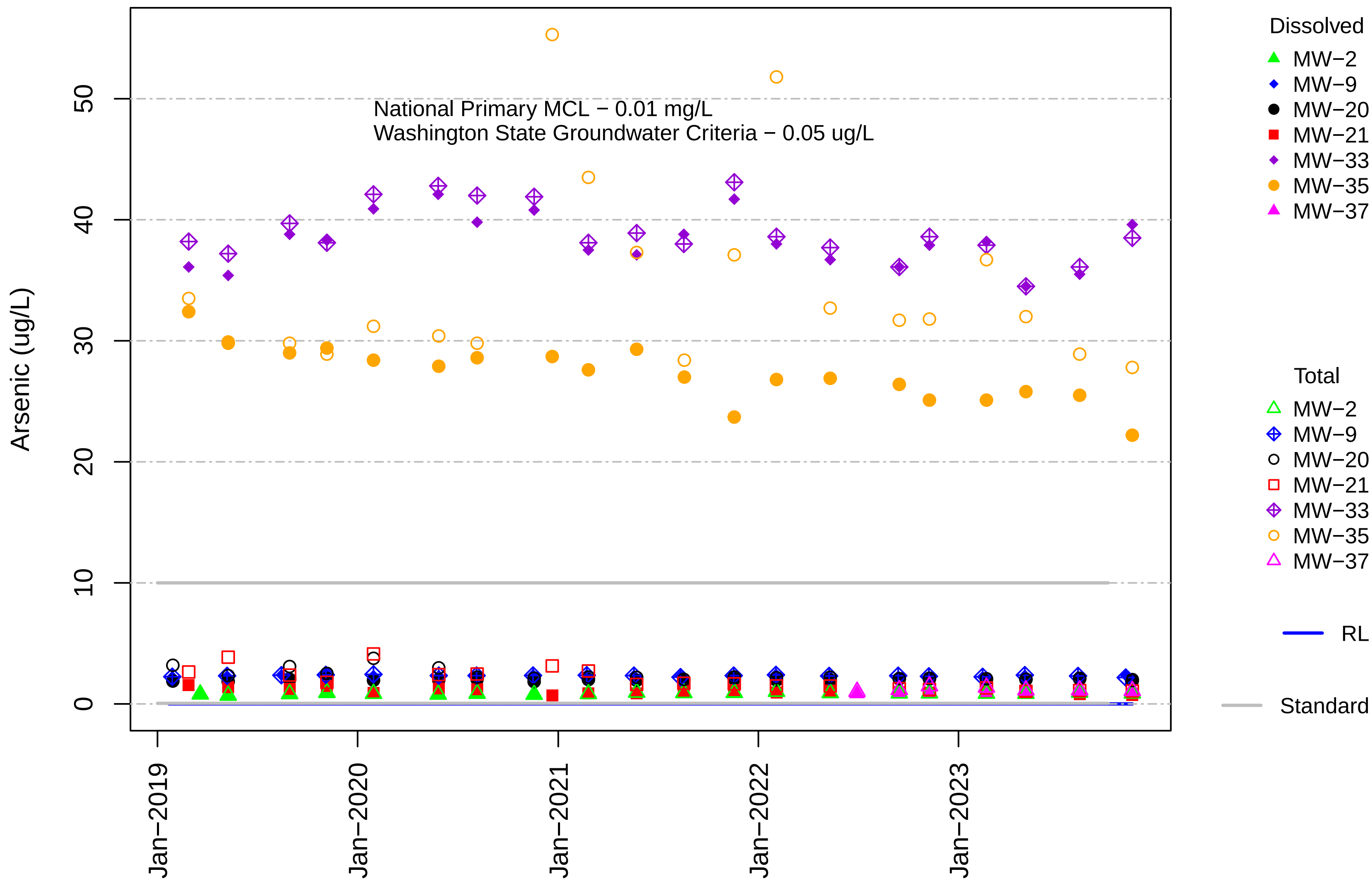


Figure B−36 Short−Term
Channel Cc2
Arsenic



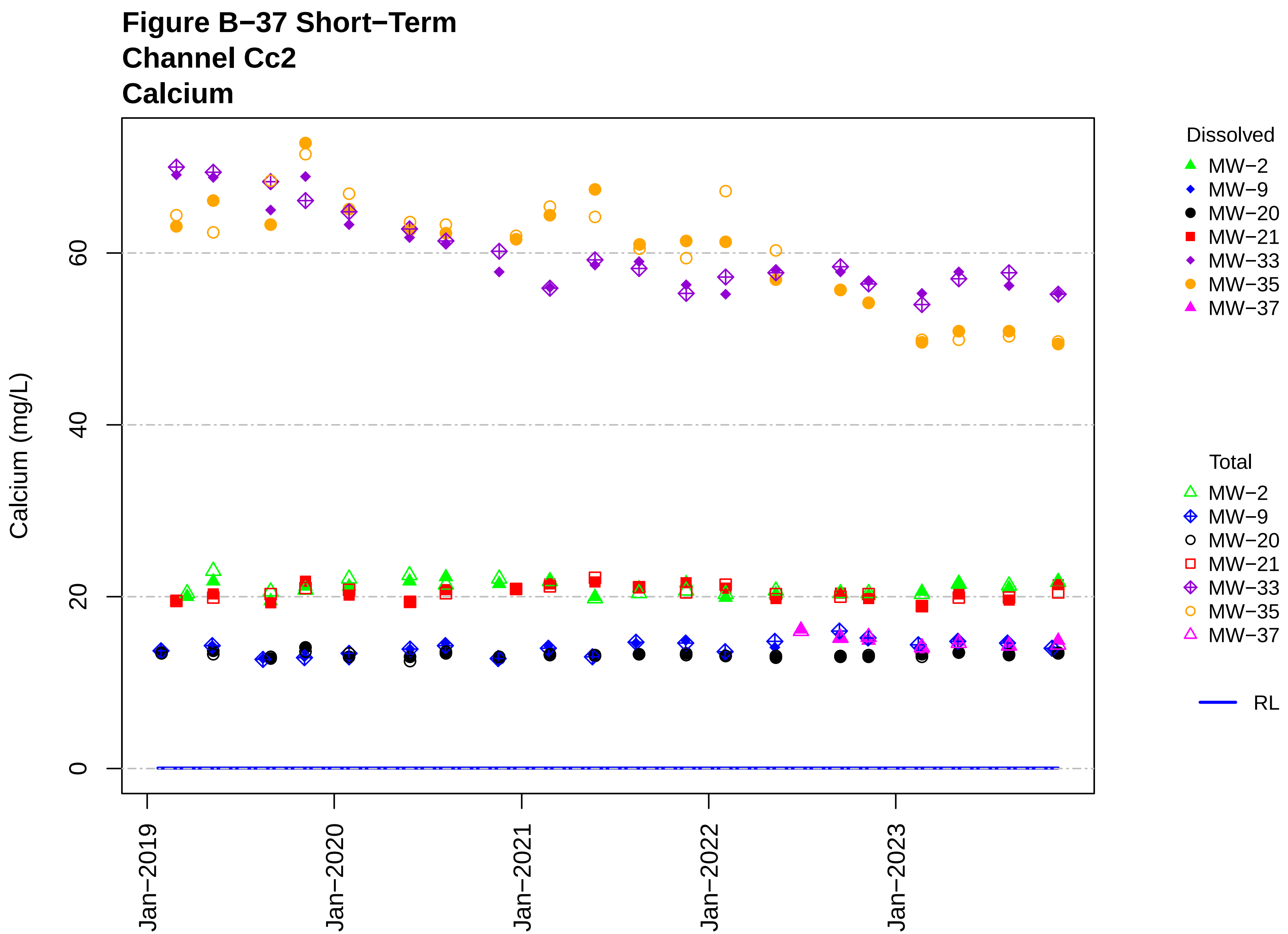


Figure B−37 Short−Term
Channel Cc2
Calcium
Calcium (mg/L)
0
20
40
60
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
Dissolved
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
MW−37
Total
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
MW−37
RL

Figure B−38 Short−Term Channel Cc2 Iron

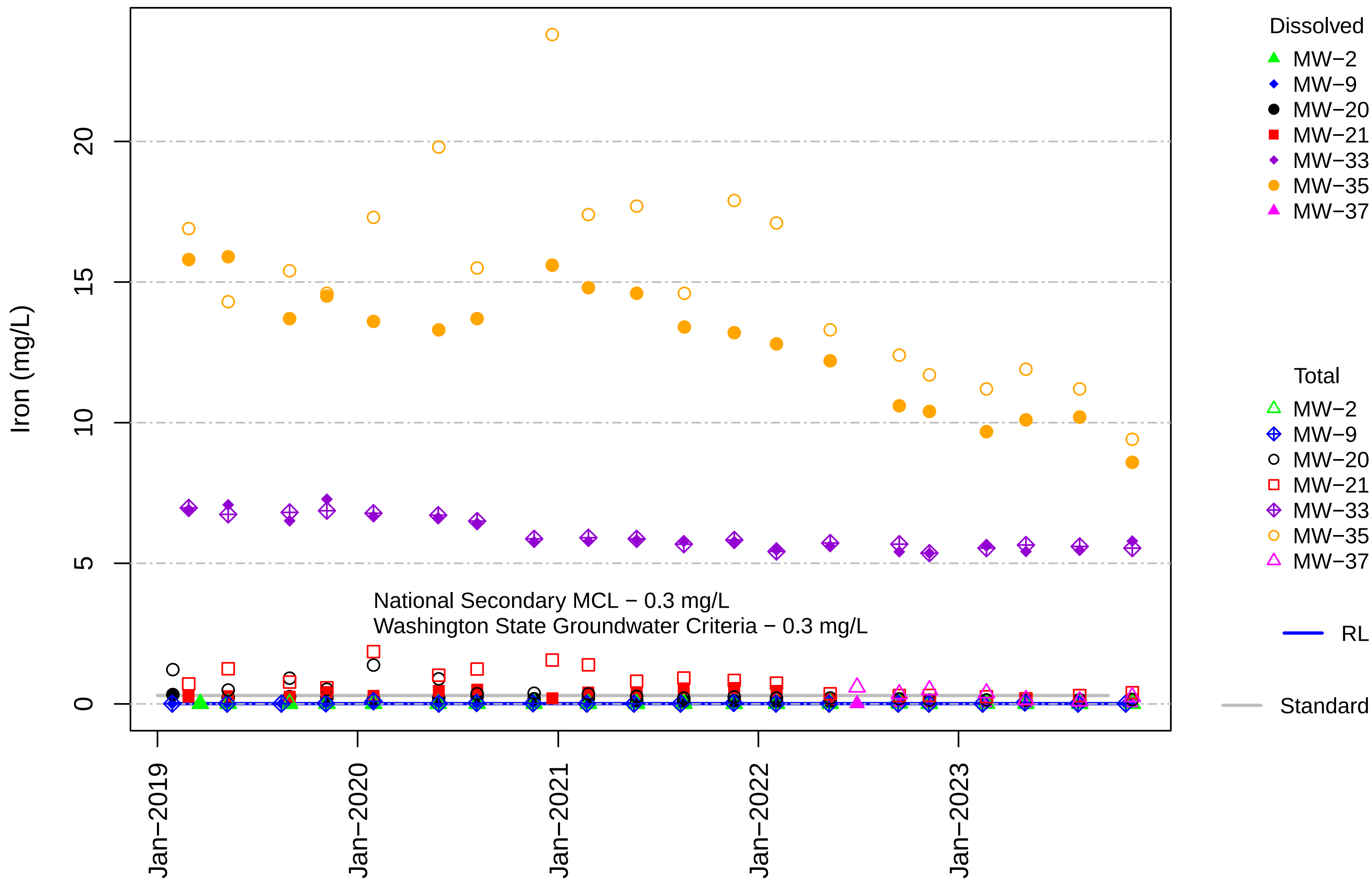


Figure B−39 Short−Term
Channel Cc2
Magnesium

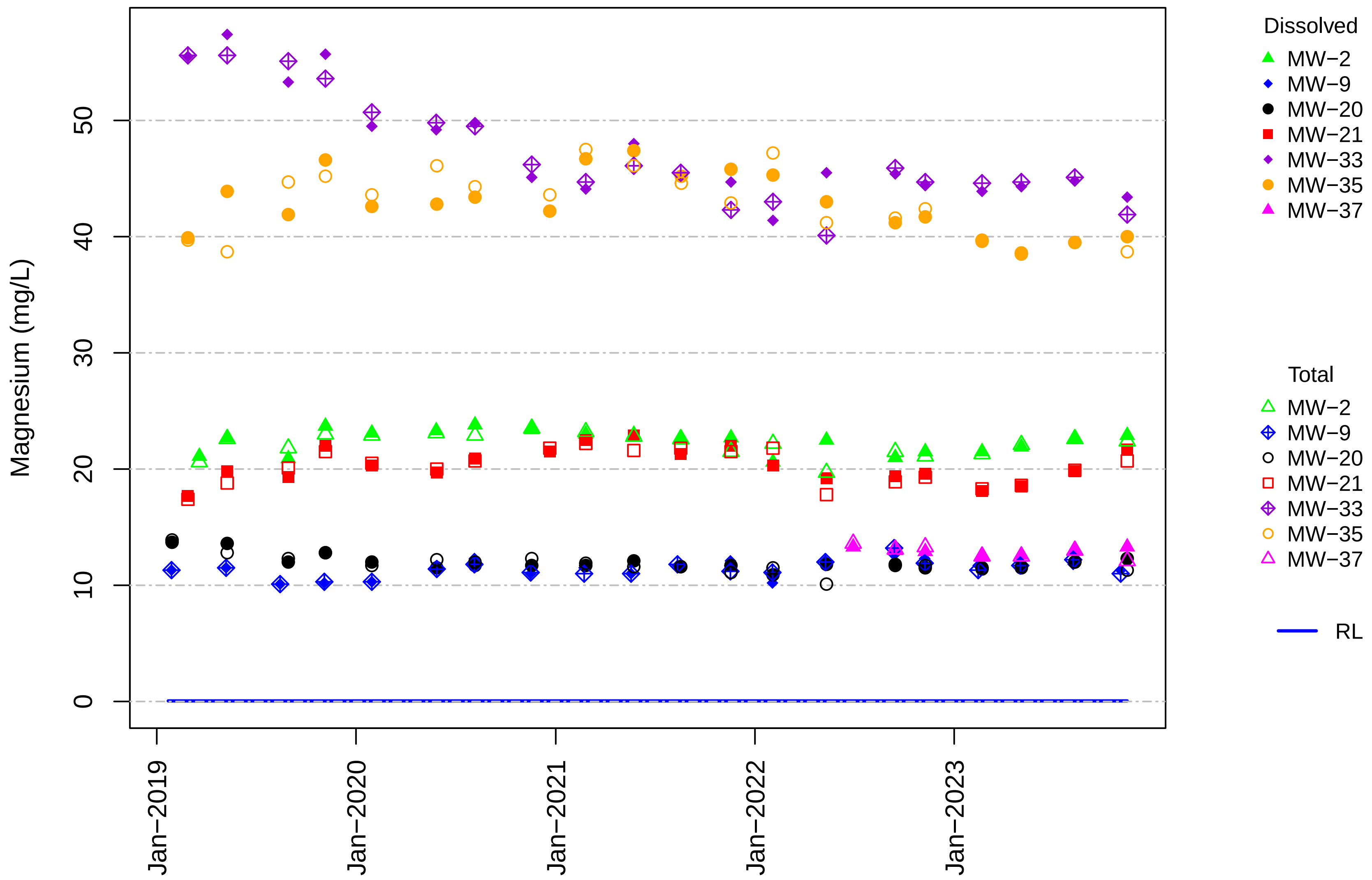


Figure B−40 Short−Term
Channel Cc2
Manganese

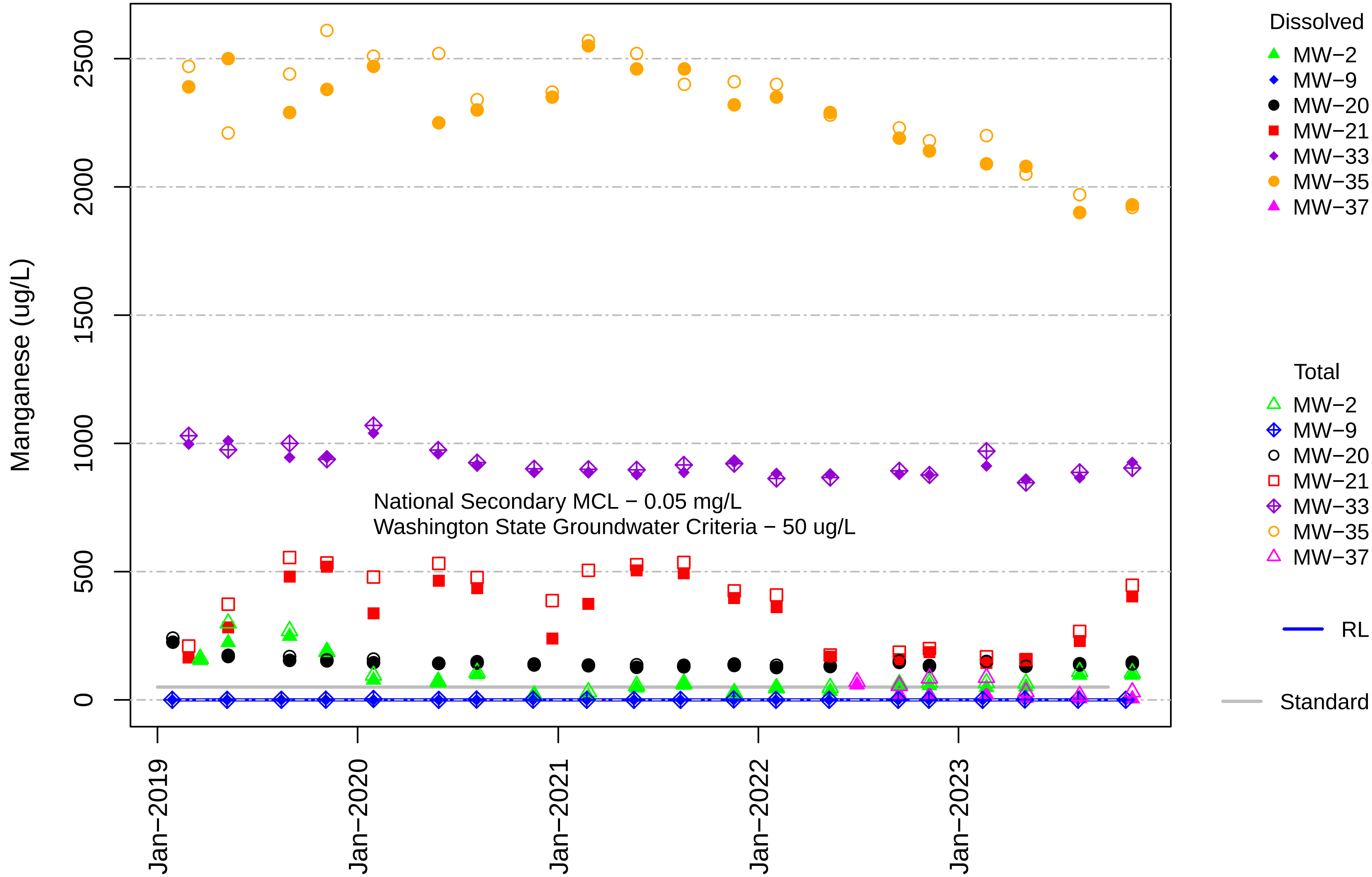


Figure B−41 Short−Term Channel Cc2 Potassium

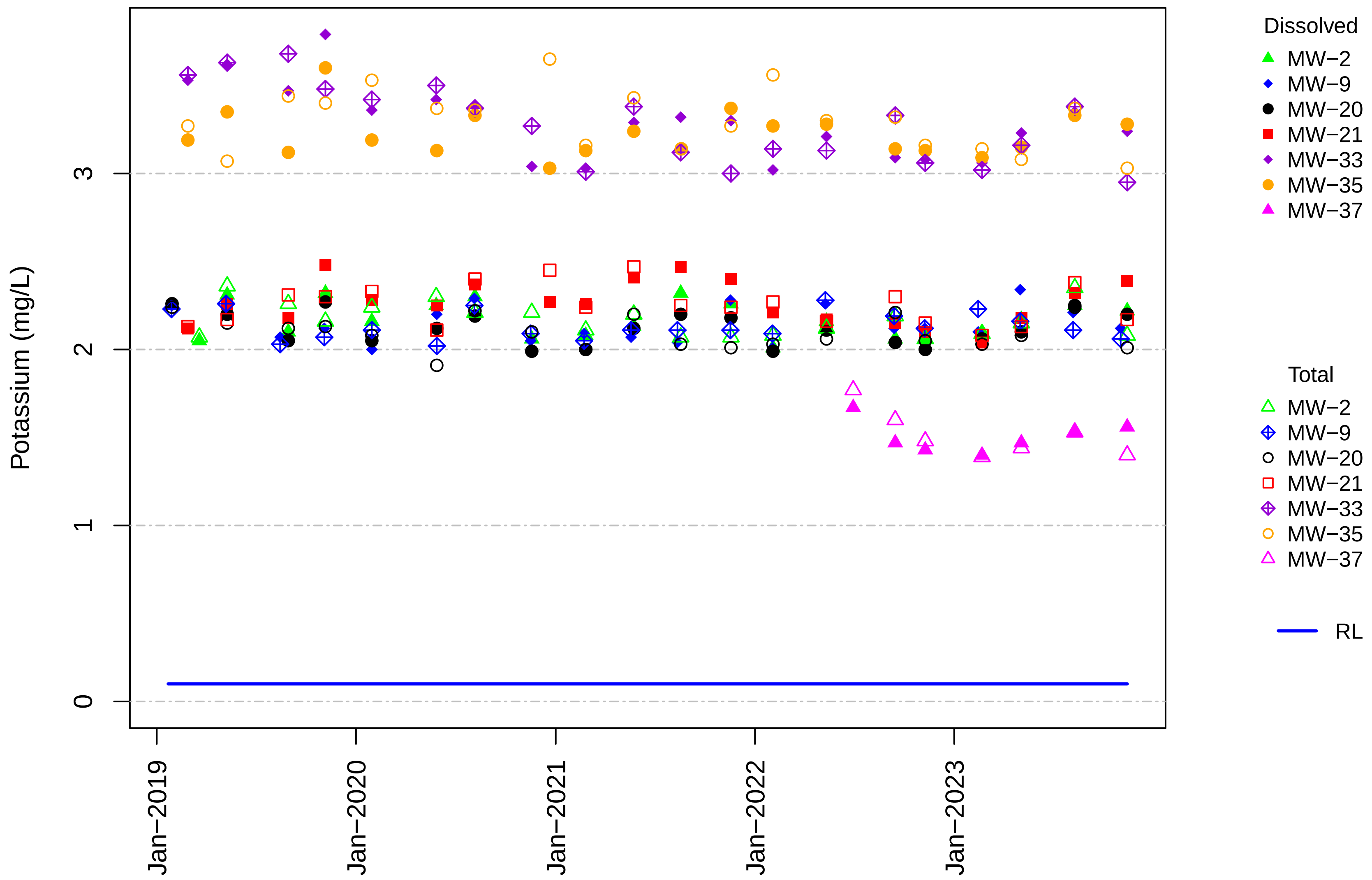


Figure B−42 Short−Term
Channel Cc2
Sodium

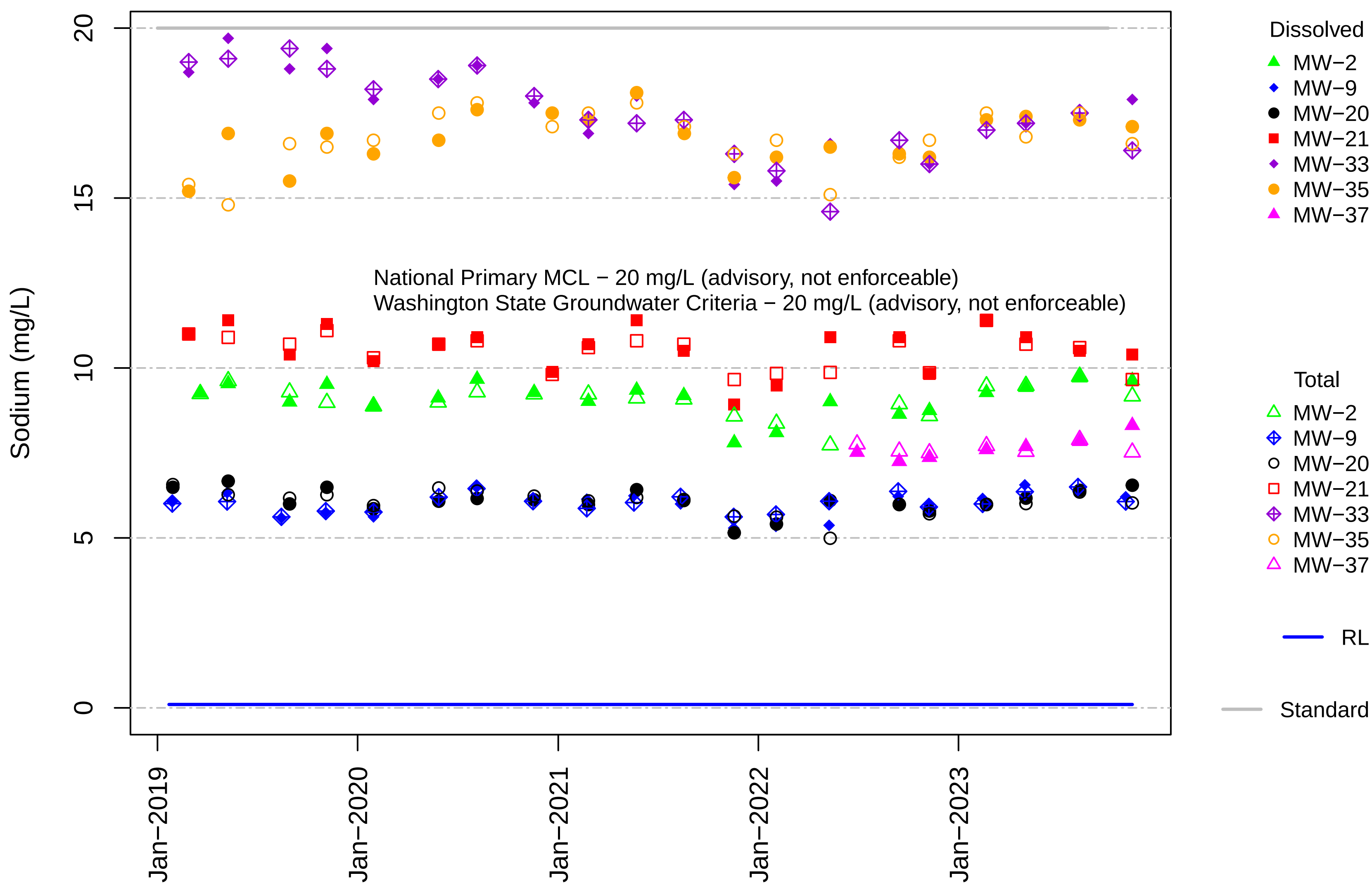


Figure B−43 Short−Term Channel Cc2 1,1−Dichloroethane

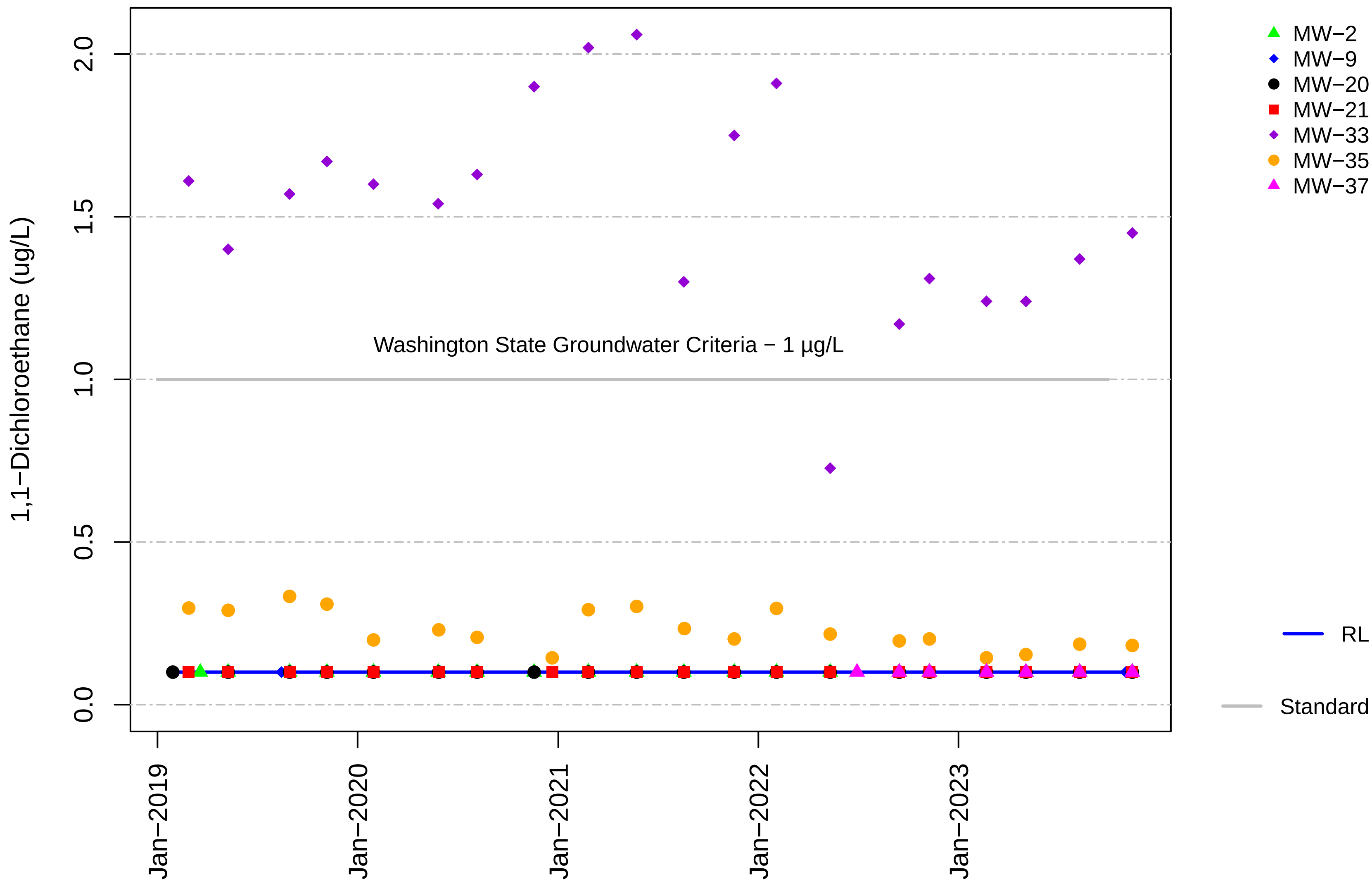


Figure B−44 Short−Term
Channel Cc2
1,2−Dichloropropane

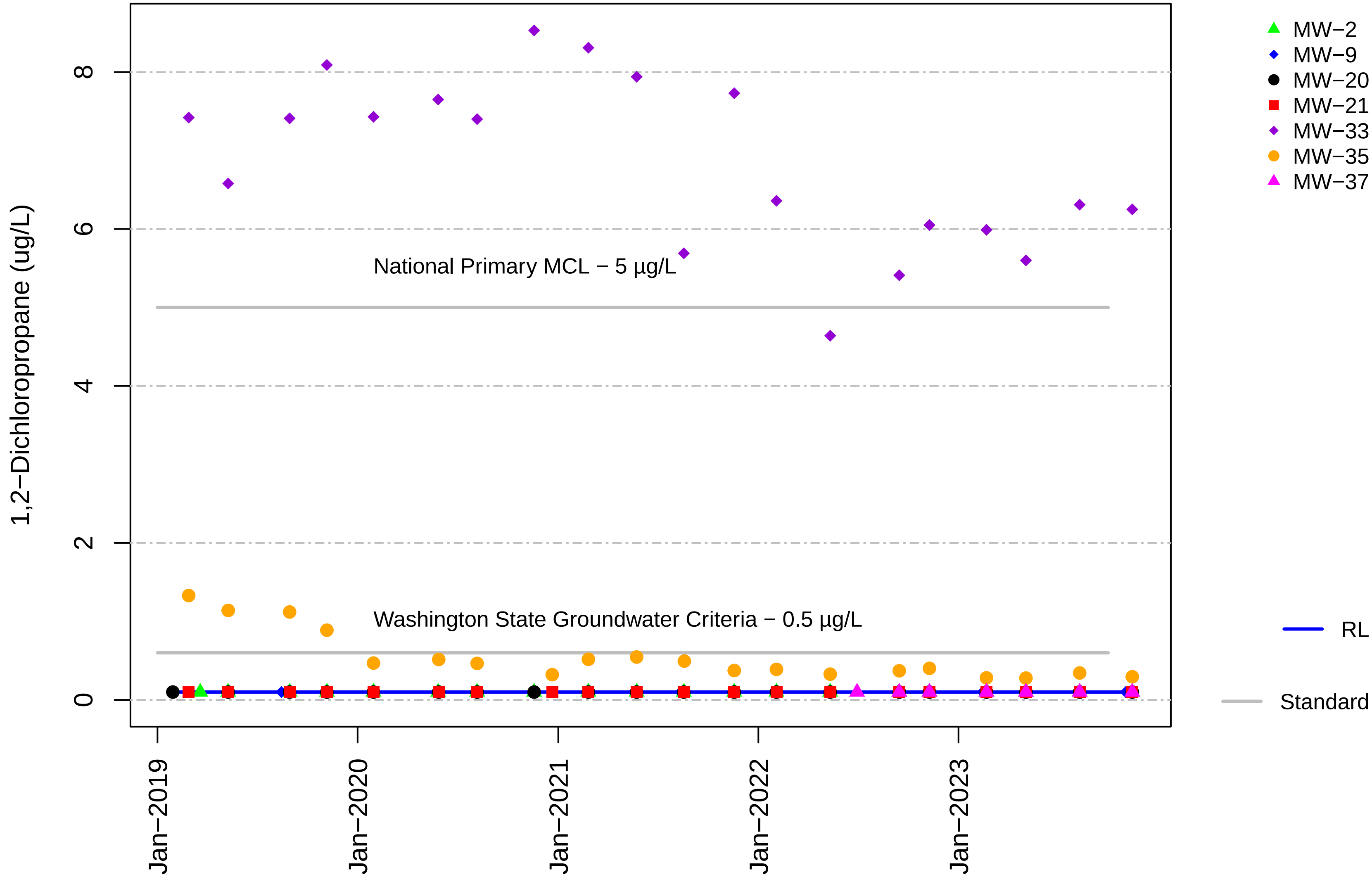
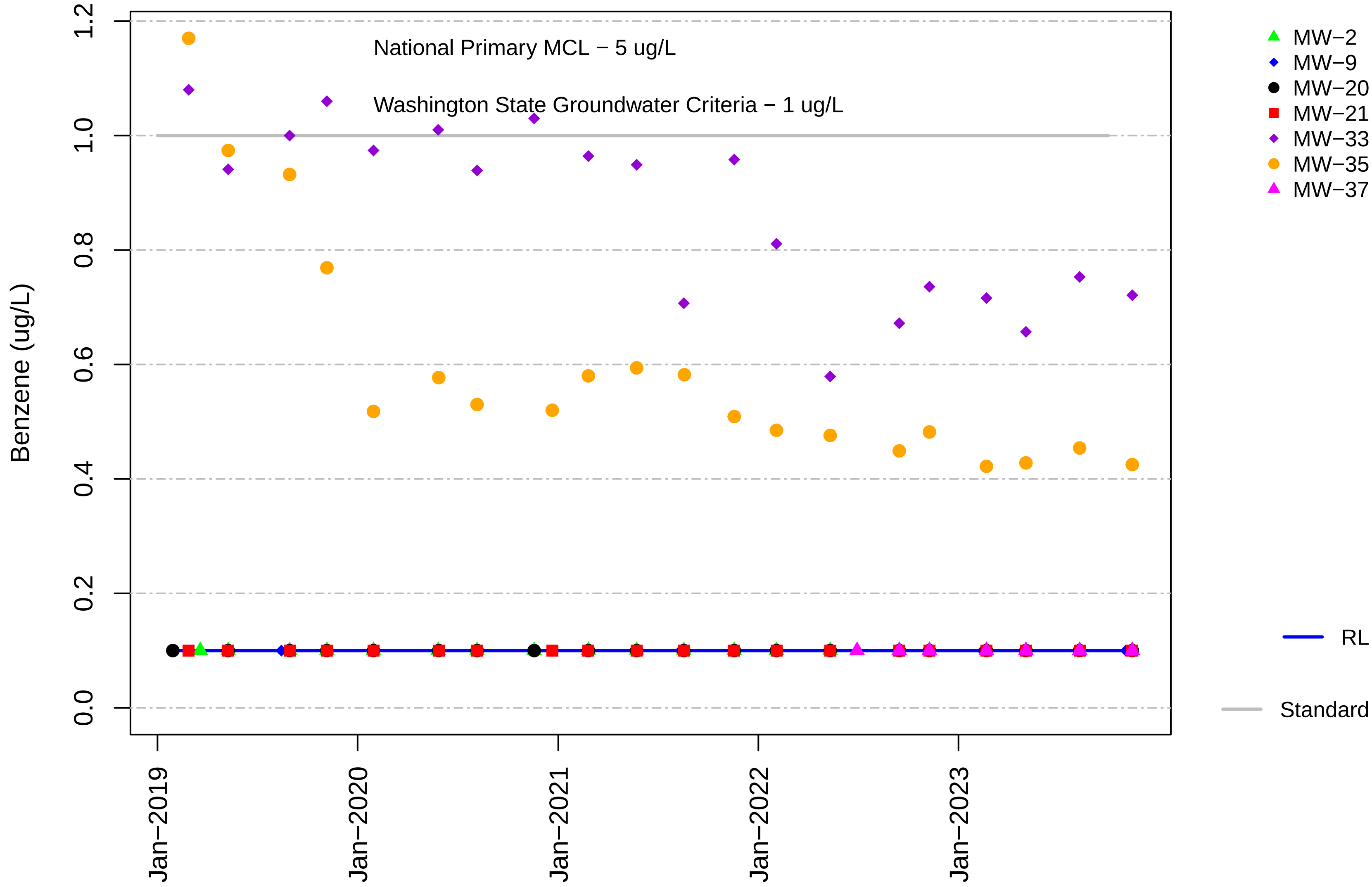


Figure B−45 Short−Term
Channel Cc2
Benzene



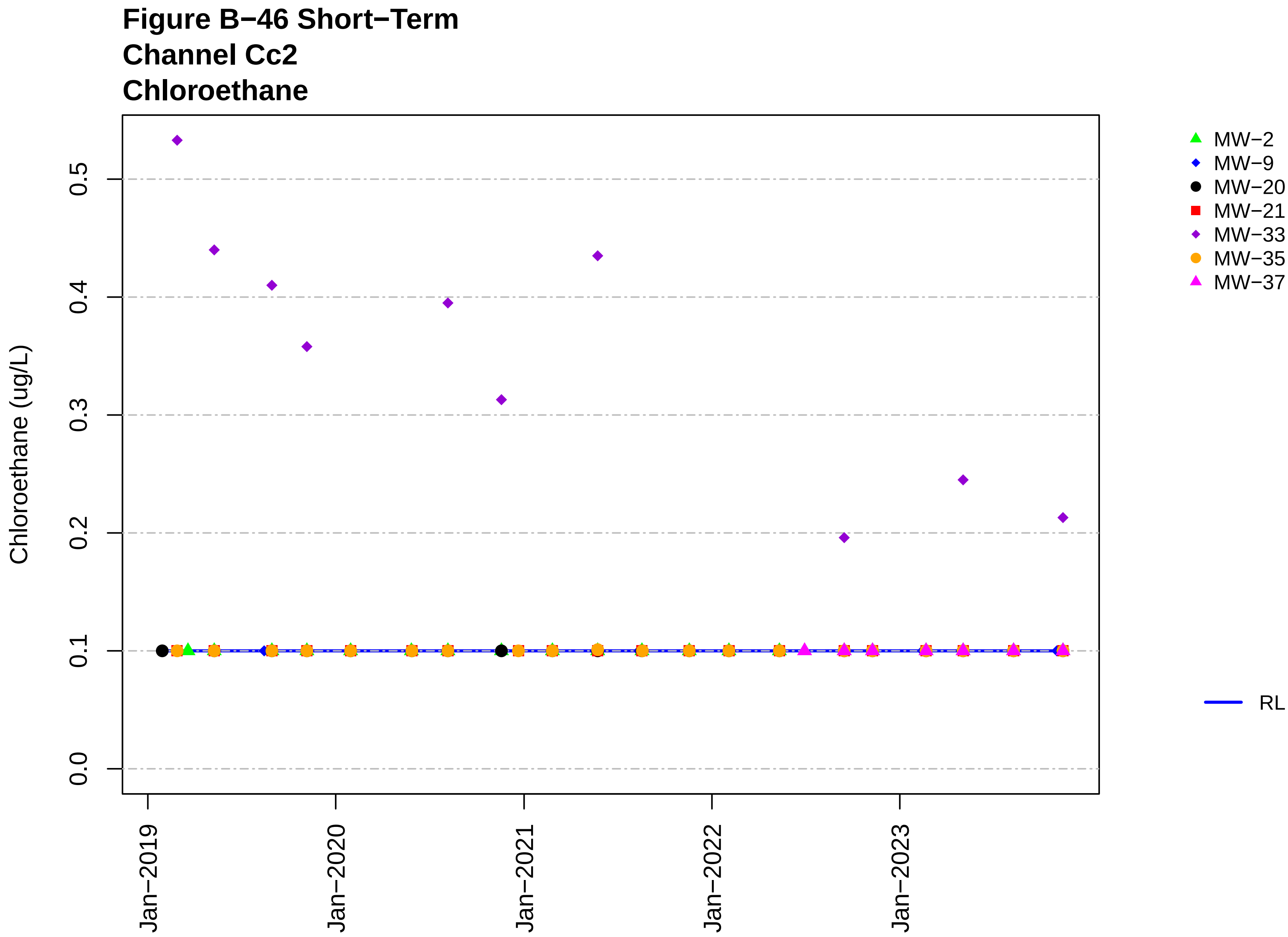


Figure B−46 Short−Term
Channel Cc2
Chloroethane
Chloroethane (ug/L)
0.0
0.1
0.2
0.3
0.4
0.5
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
MW−37
RL

Figure B−47 Short−Term
Channel Cc2
cis−1,2−Dichloroethene

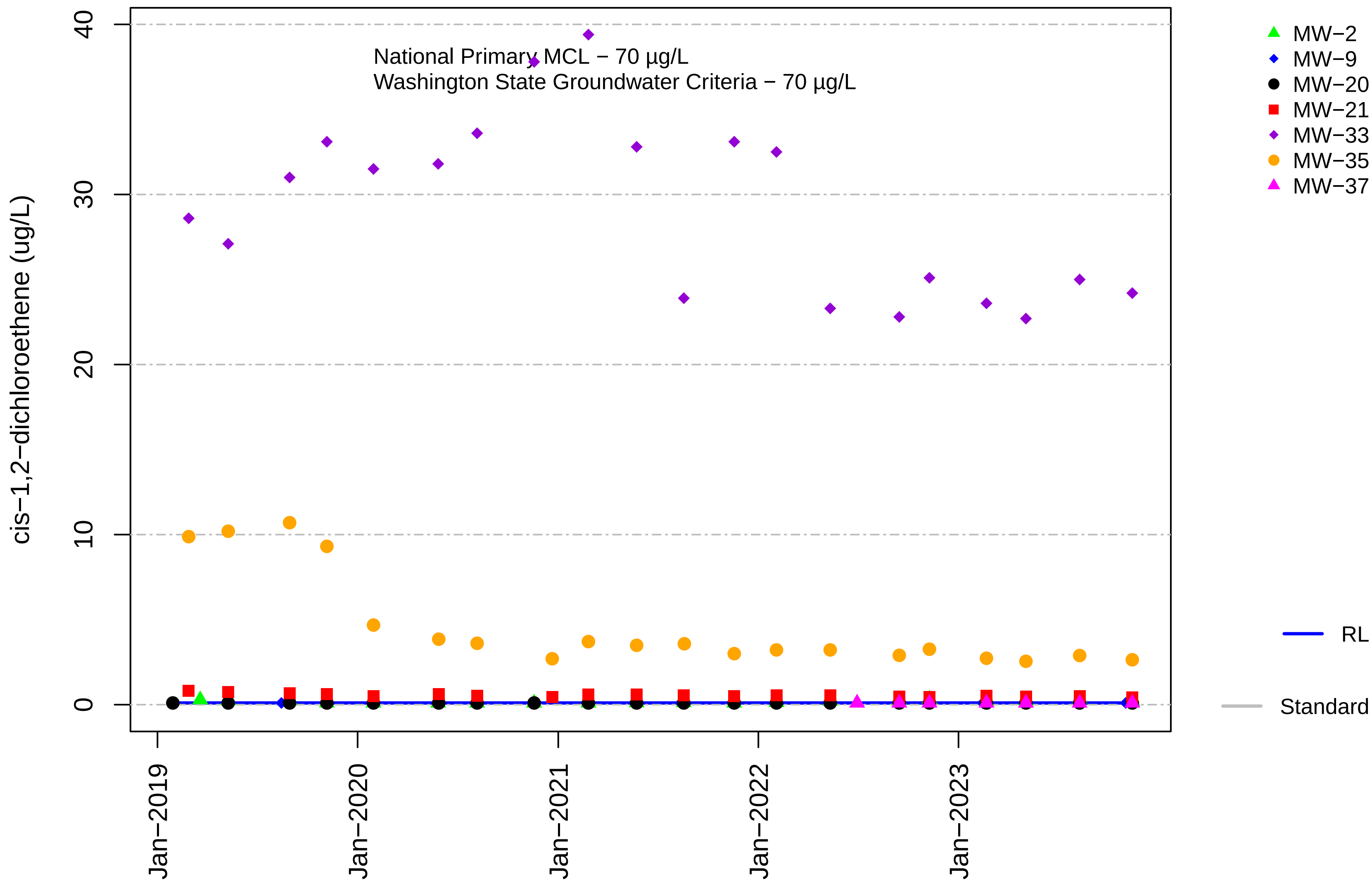
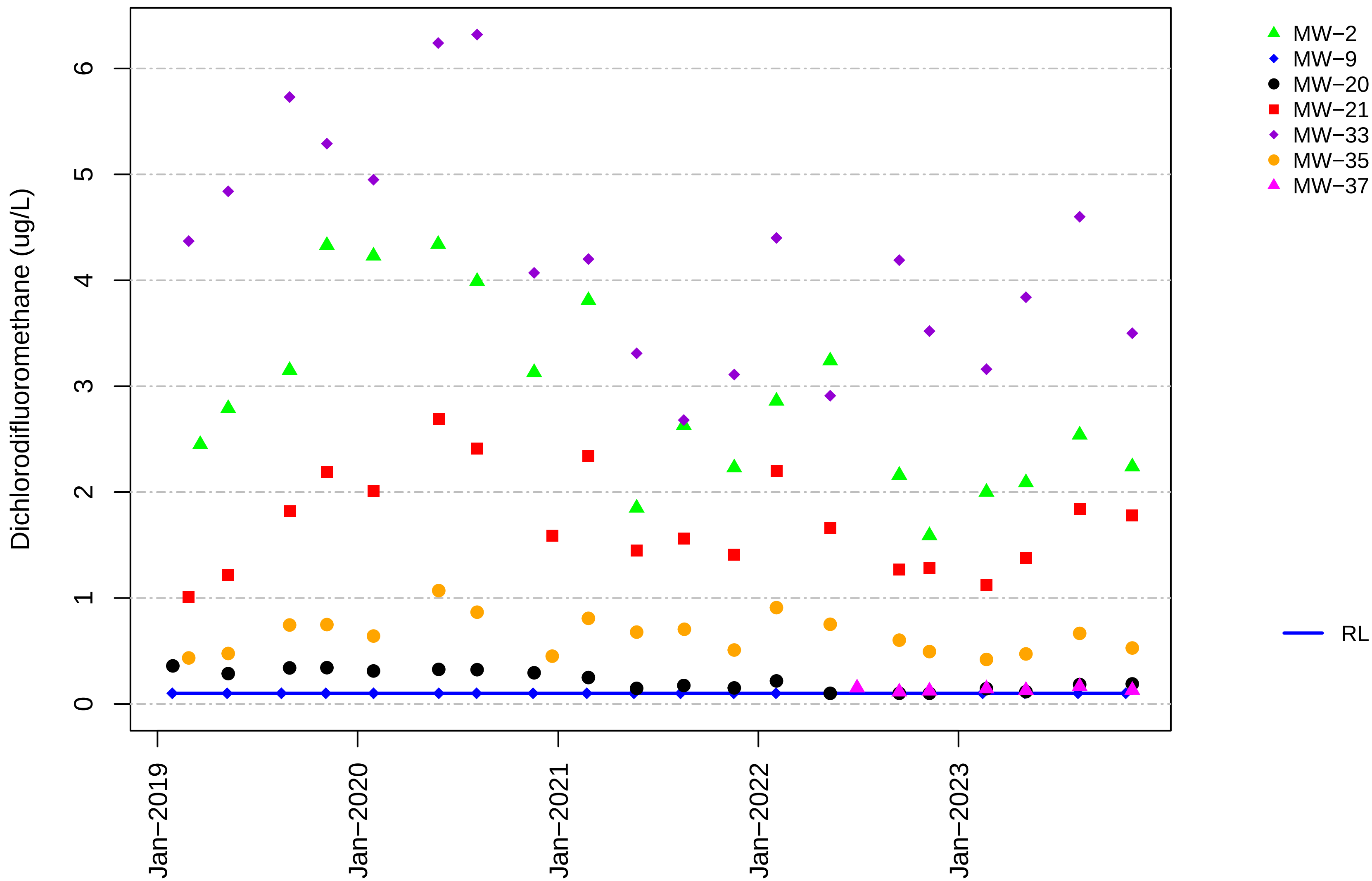


Figure B−48 Short−Term
Channel Cc2
Dichlorodifluoromethane



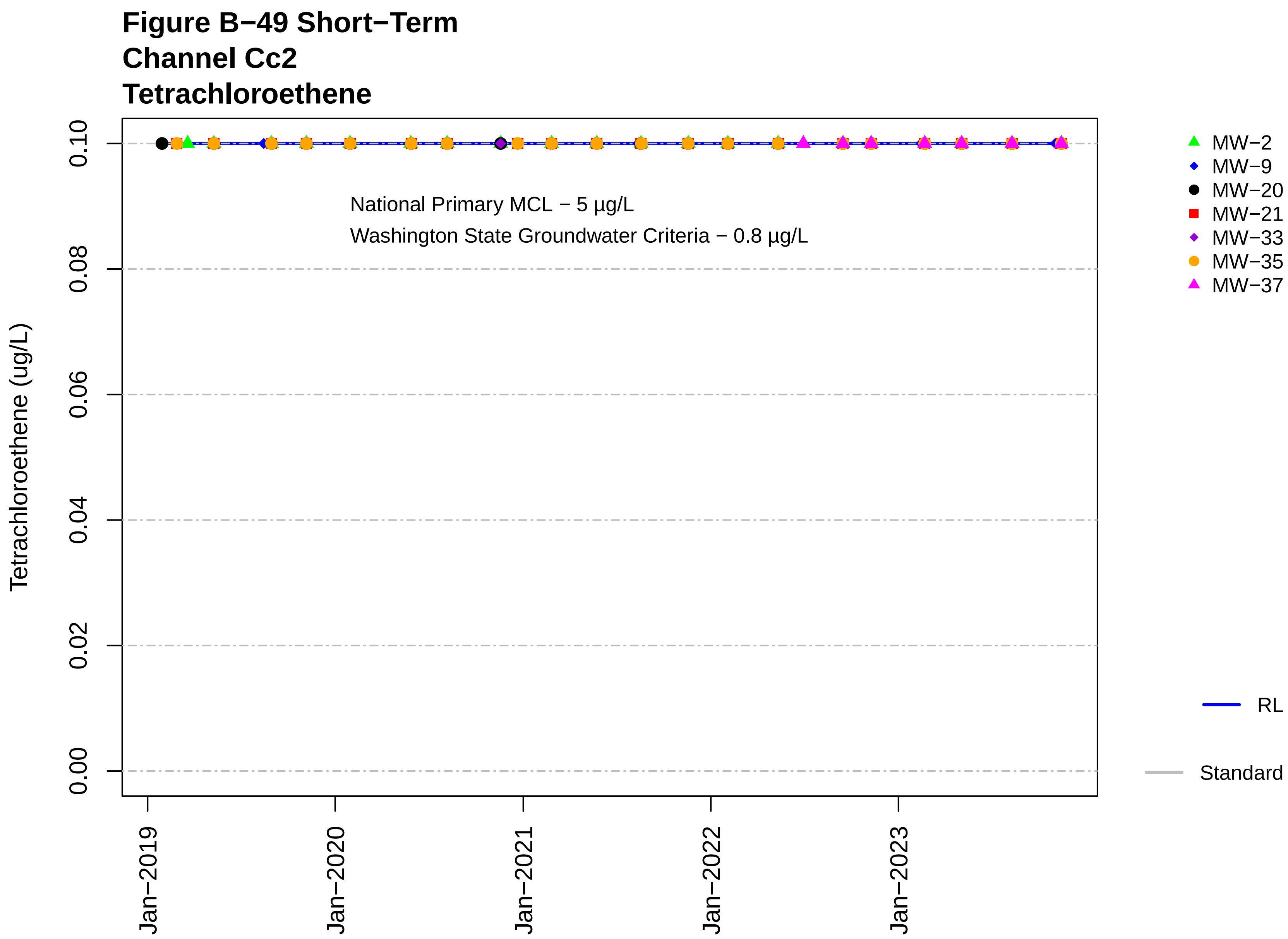


Figure B−49 Short−Term
Channel Cc2
Tetrachloroethene
Tetrachloroethene (ug/L)
0.00
0.02
0.04
0.06
0.08
0.10
National Primary MCL − 5 µg/L
Washington State Groundwater Criteria − 0.8 µg/L
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
MW−2
MW−9
MW−20
MW−21
MW−33
MW−35
MW−37
RL
Standard

Figure B−50 Short−Term
Channel Cc2
Toluene

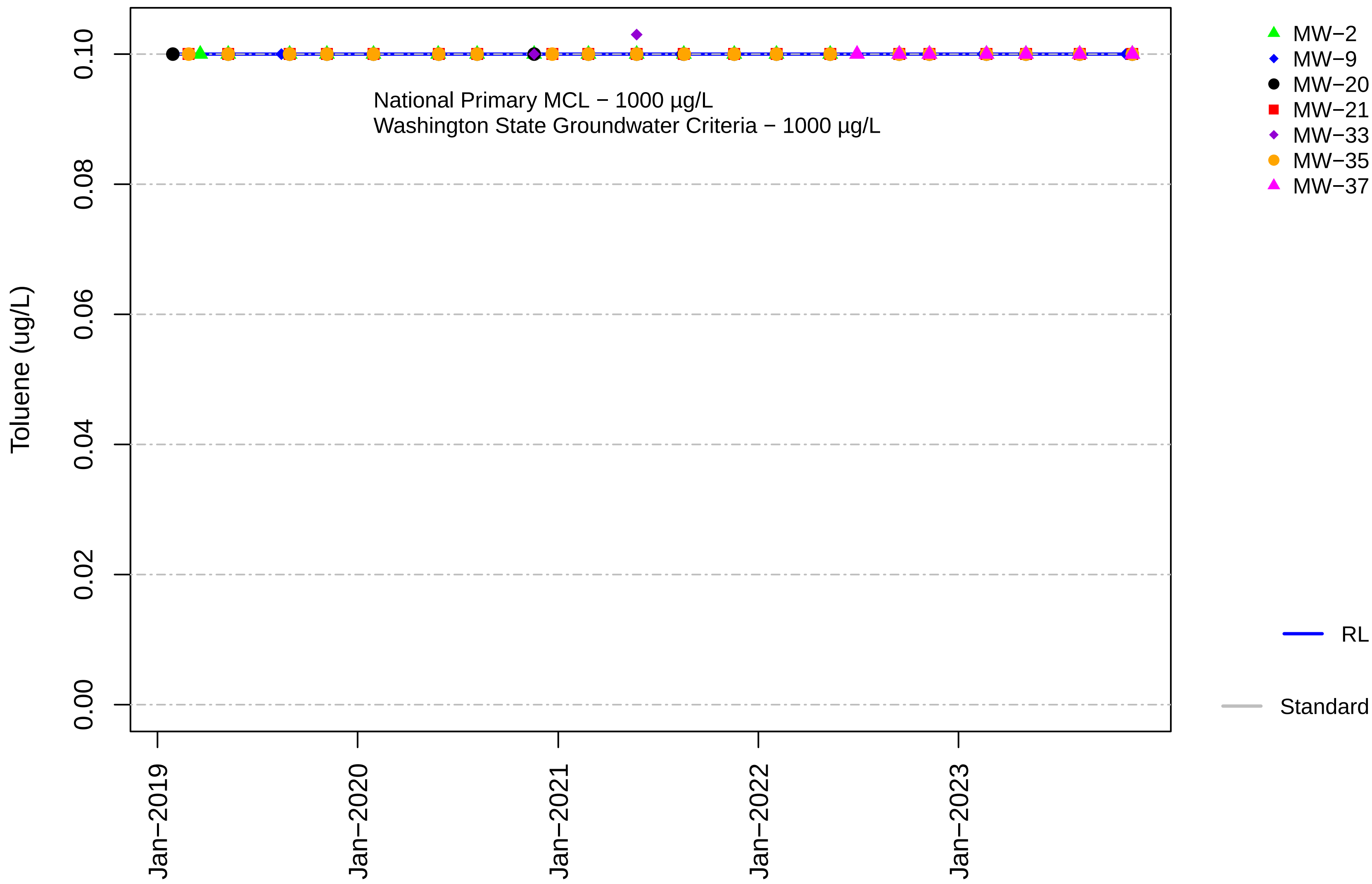


Figure B−51 Short−Term
Channel Cc2
Trans−1,2−Dichloroethene

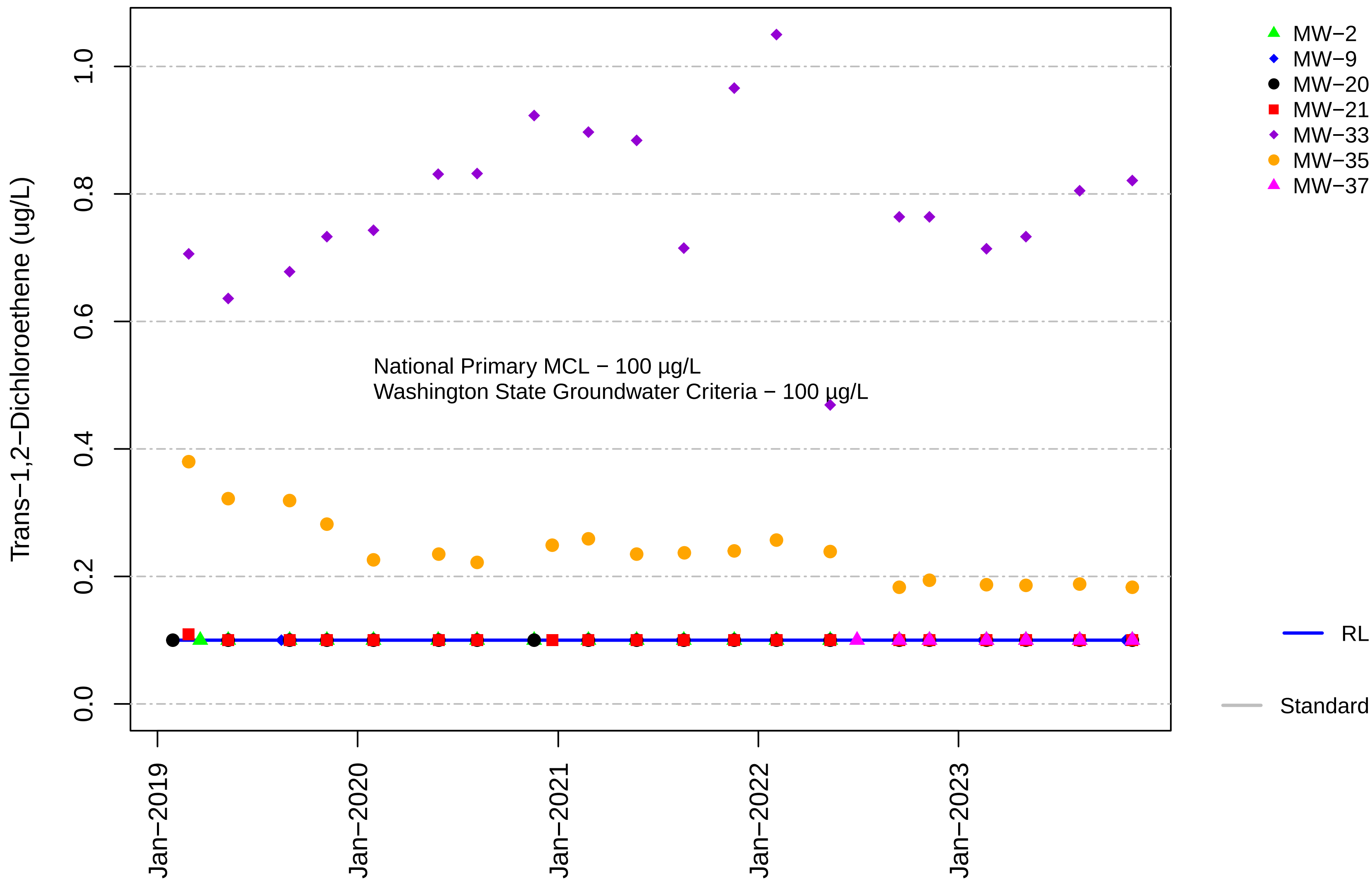


Figure B−52 Short−Term Channel Cc2 Trichloroethene

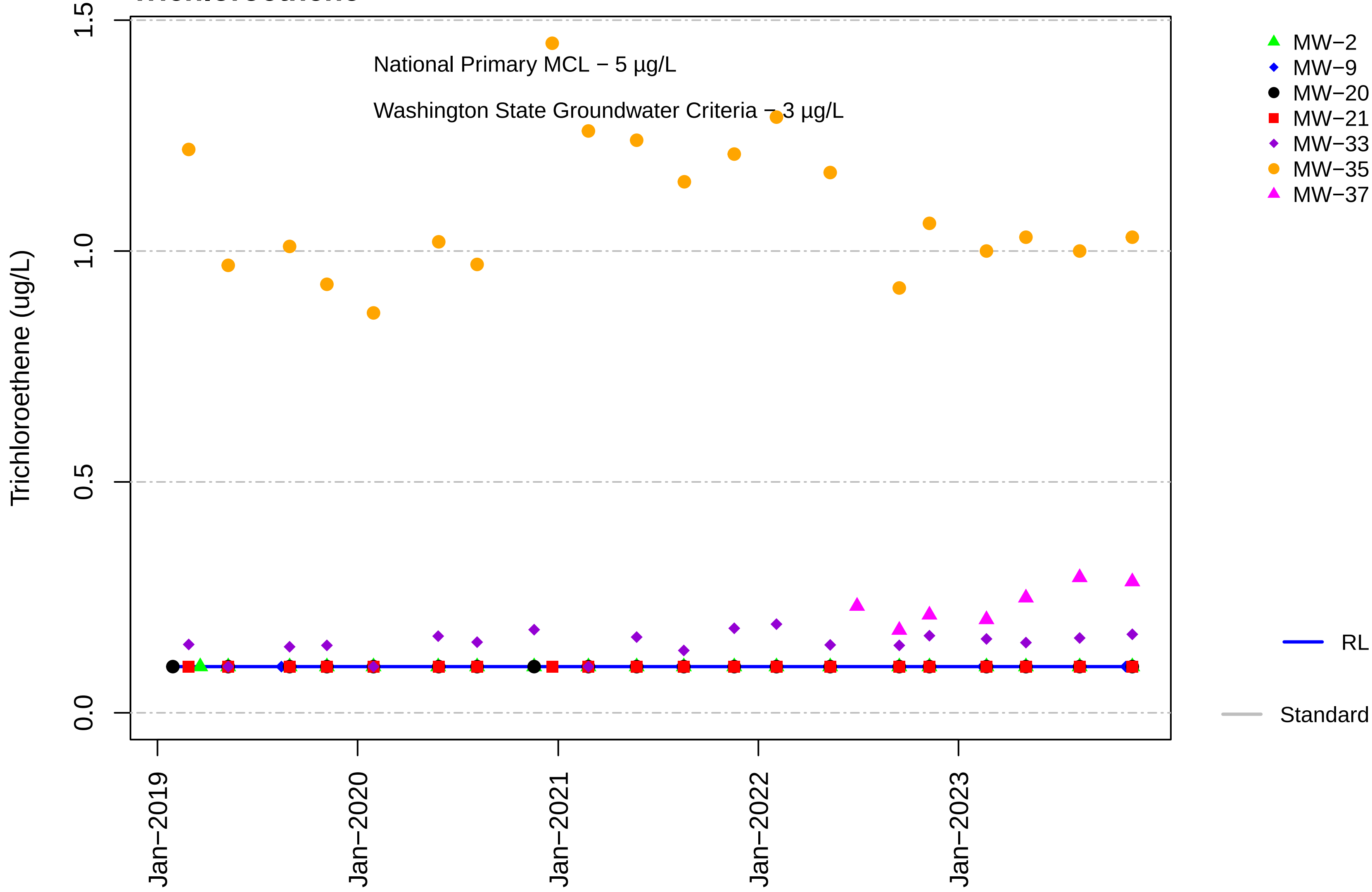


Figure B−53 Short−Term
Channel Cc2
Trichlorofluoromethane

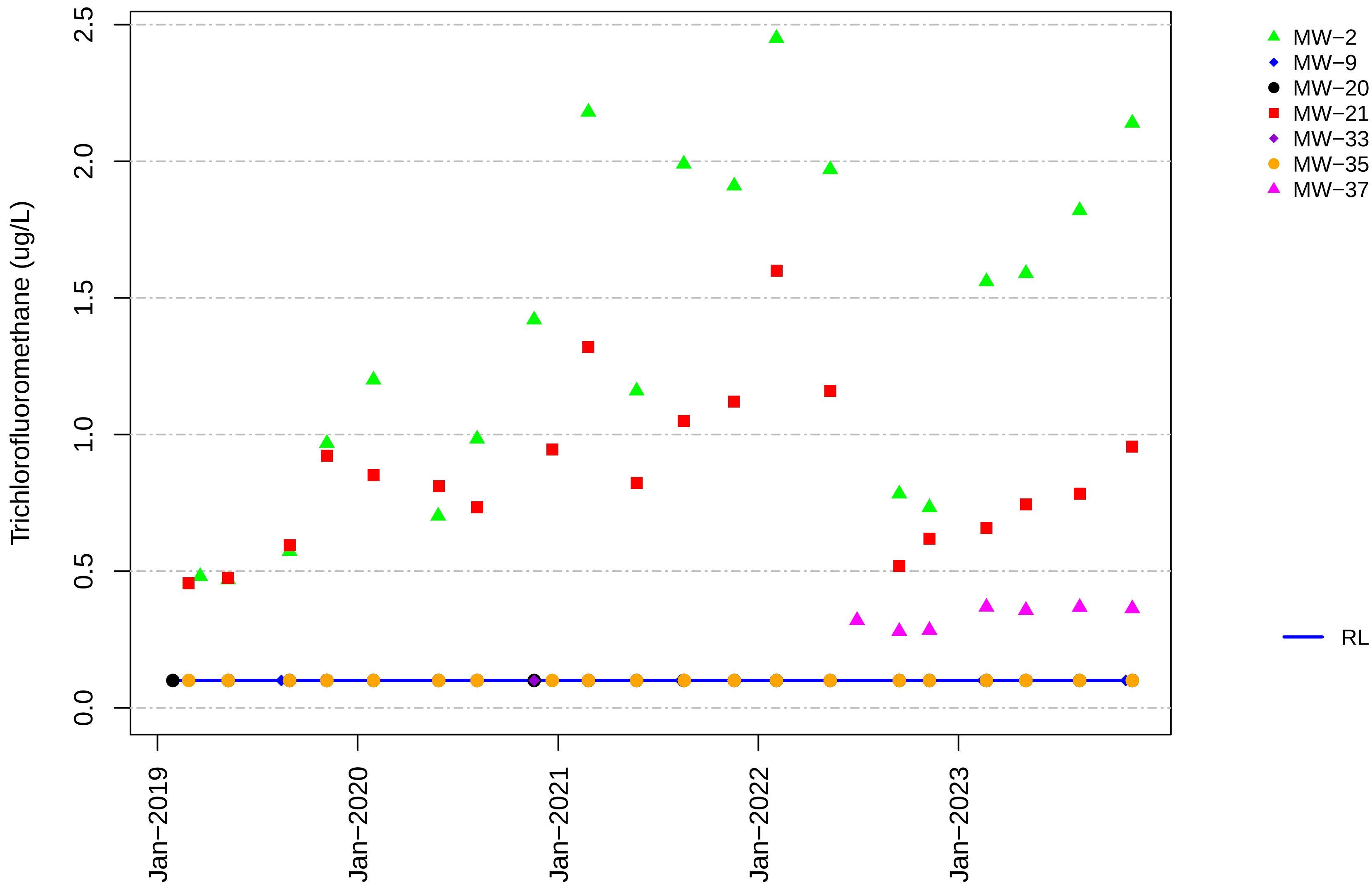


Figure B−54 Short−Term Channel Cc2 Vinyl chloride

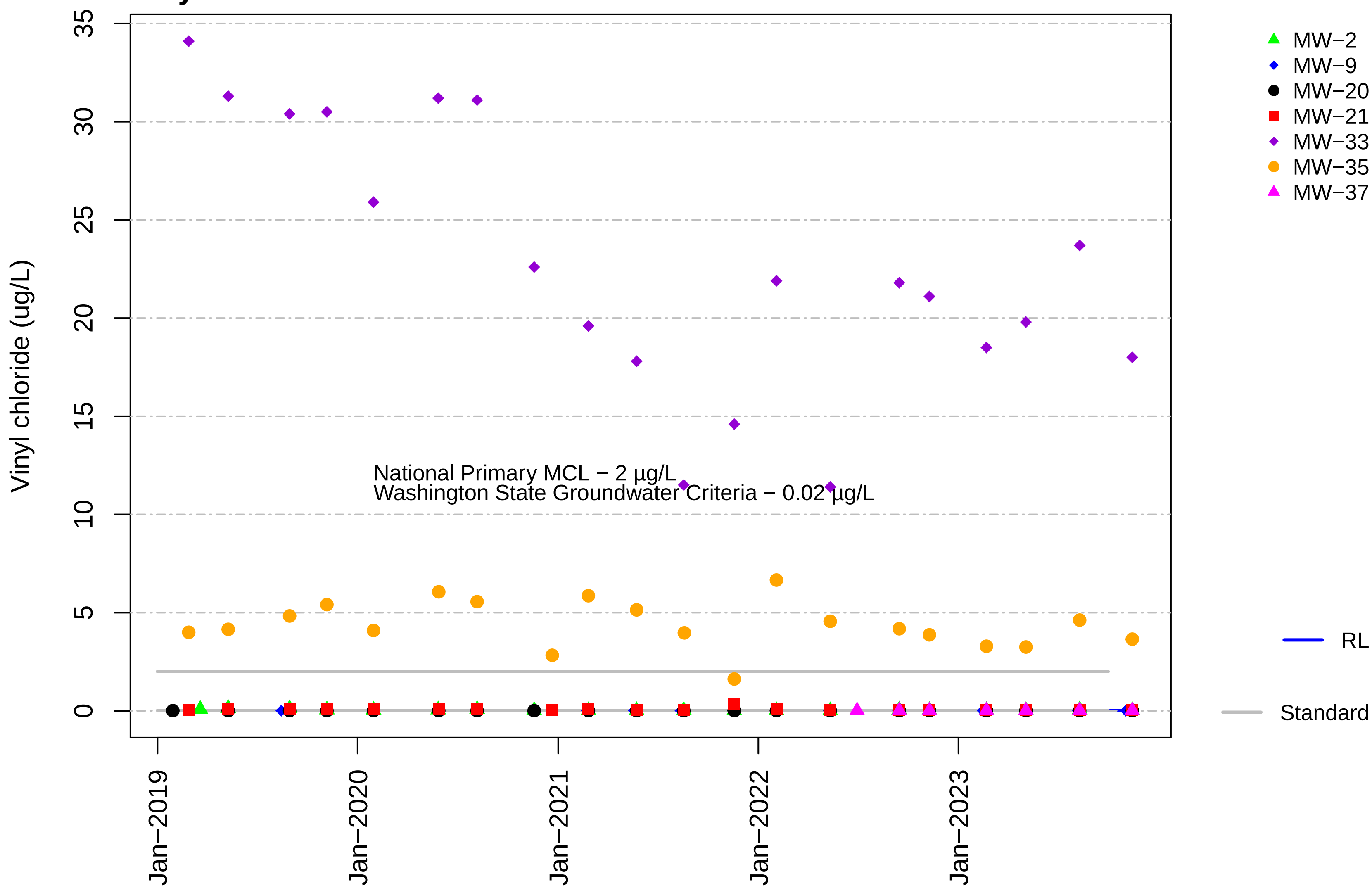


Figure B−55
Channel Cc2
2,4,5−TP Silvex

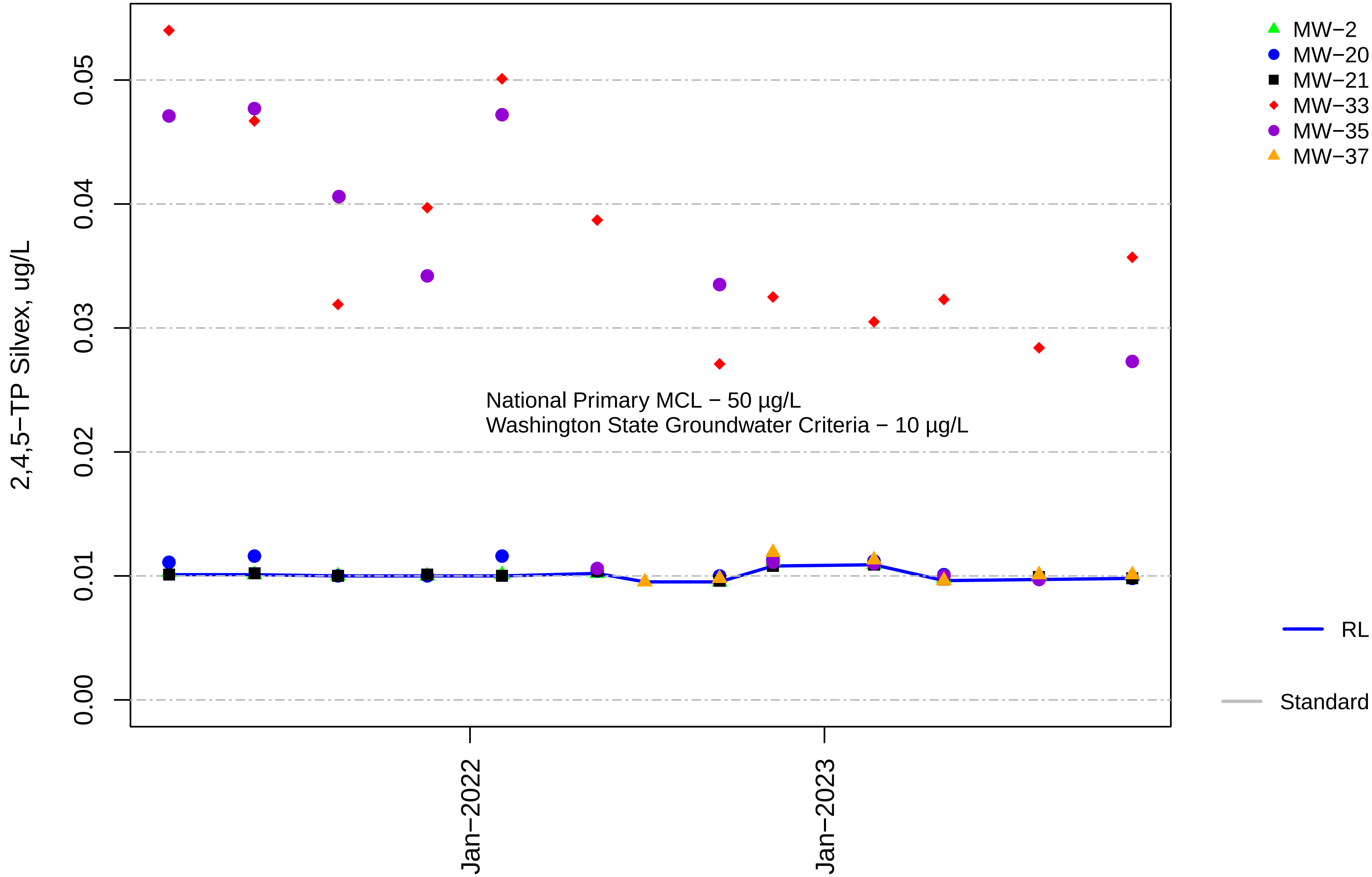


Figure B−56
Channel Cc2
2−Methyl−1−Propanol

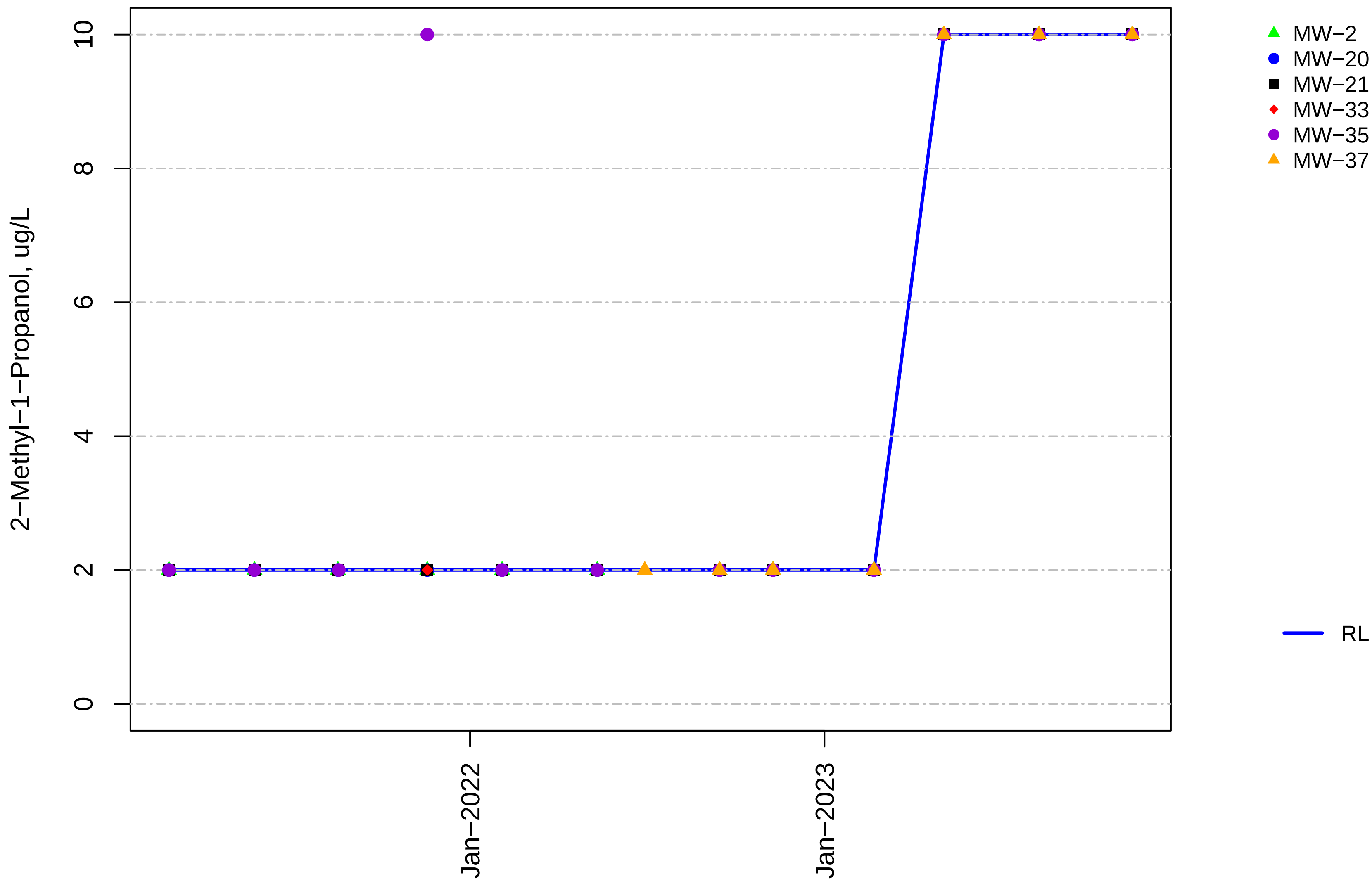


Figure B−57
Channel Cc2
Bis(2−Chloroethyl)Ether

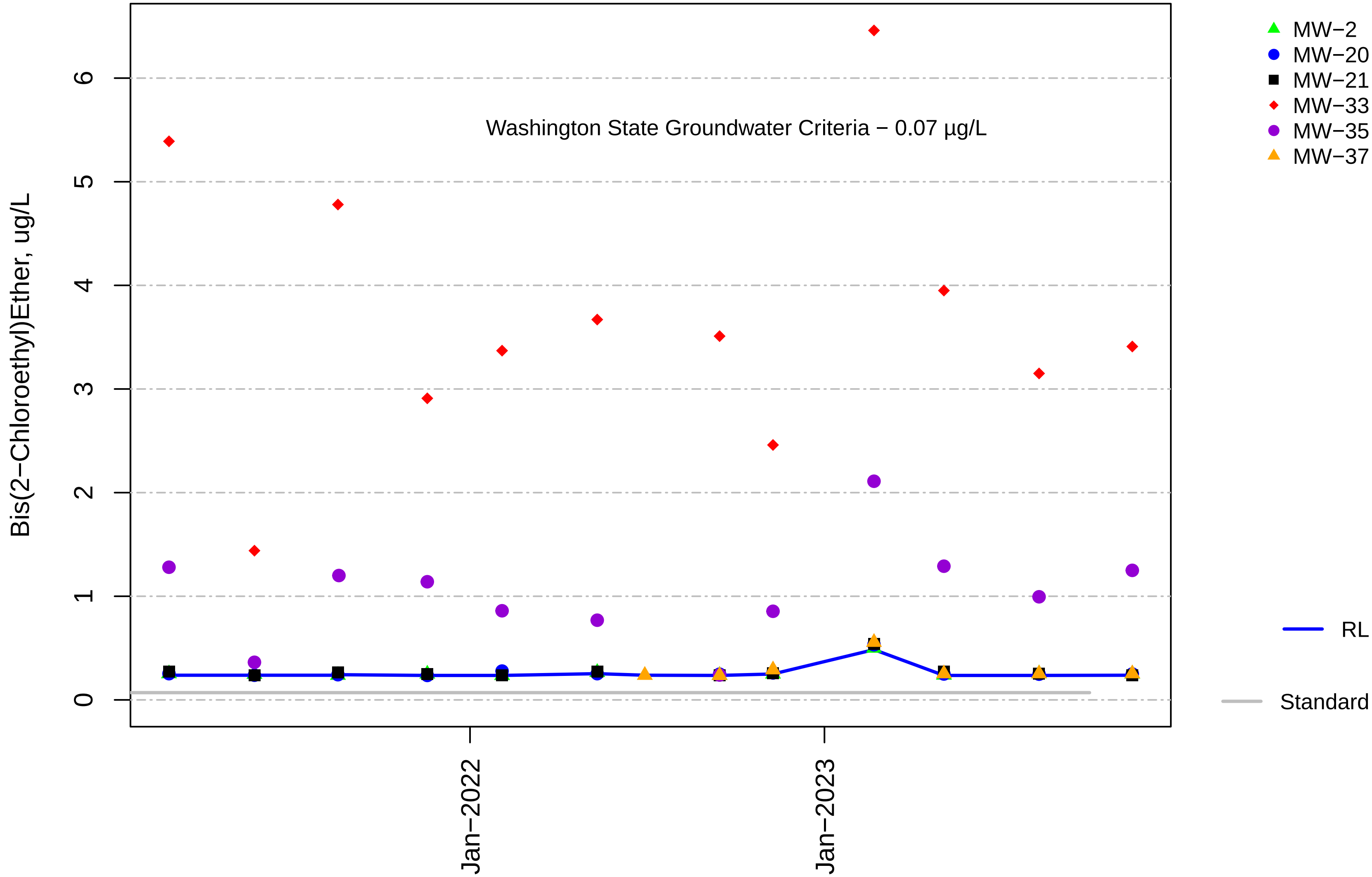


Figure B−58
Channel Cc2
Bis(2−Ethylhexyl)Phthalate

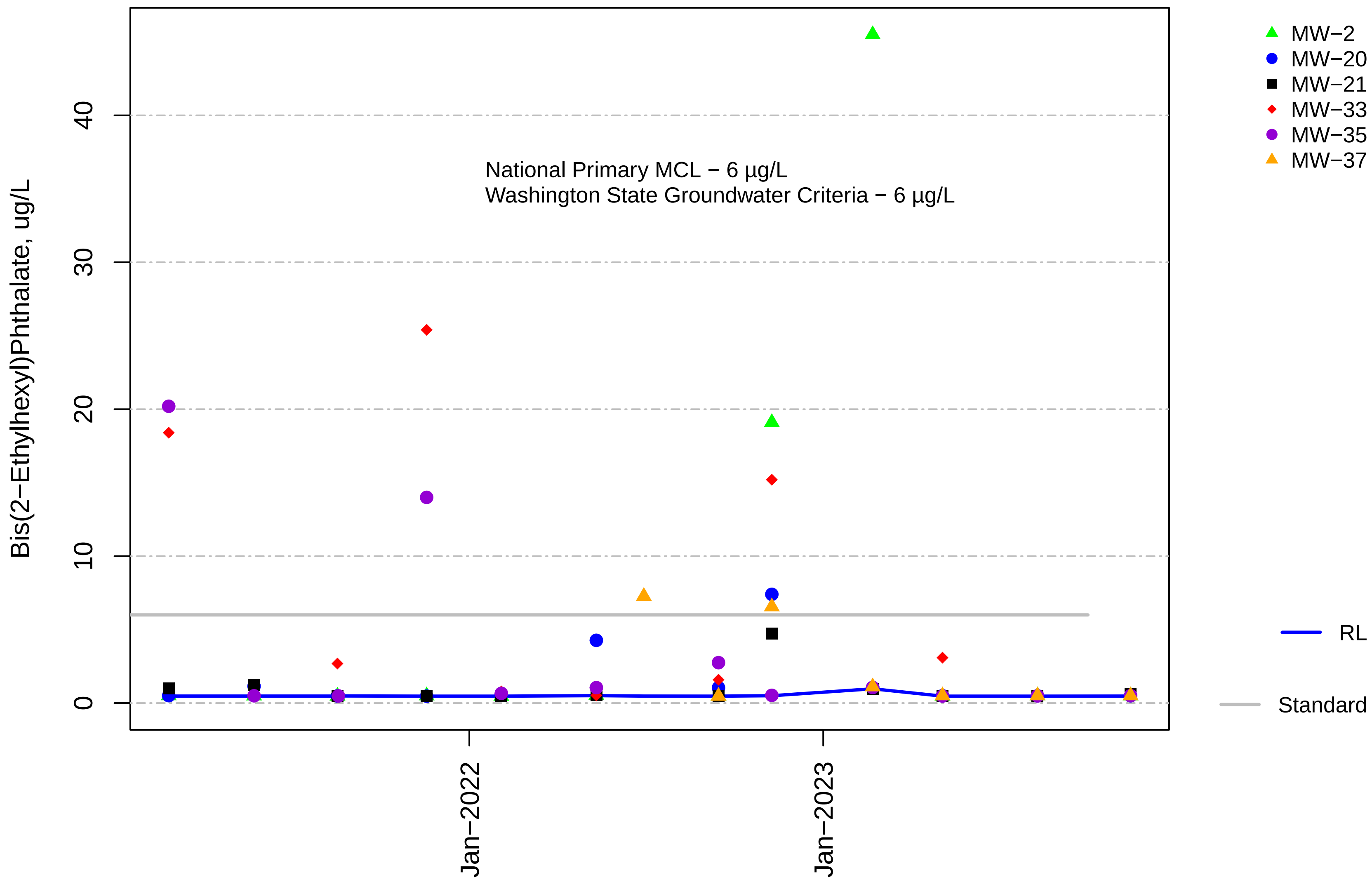
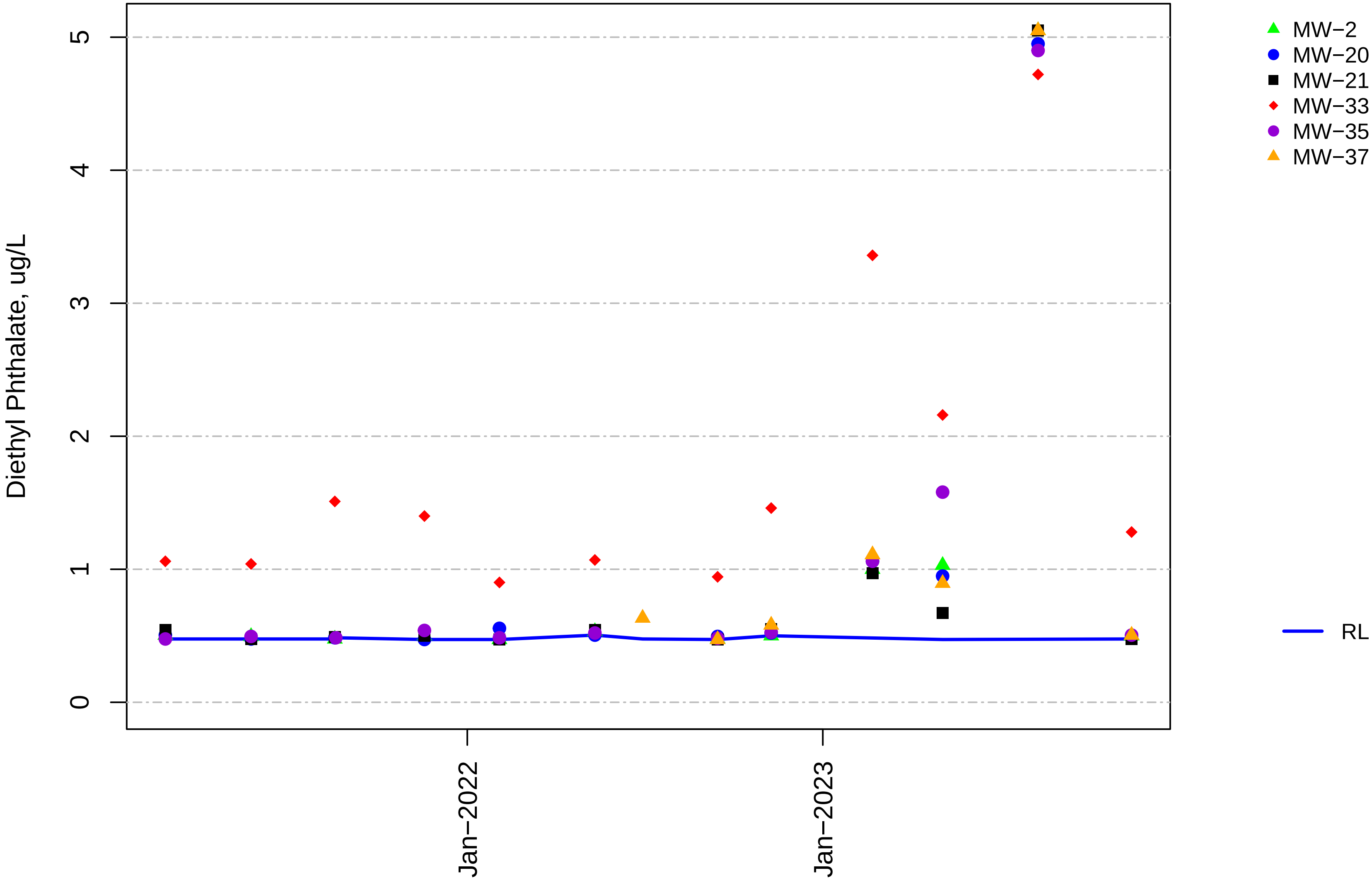


Figure B−59
Channel Cc2
Diethyl Phthalate



Appendix B

Channel Cc3

Groundwater Time Concentration Plots

Figure B−60 Long−Term
Channel Cc3
Field pH

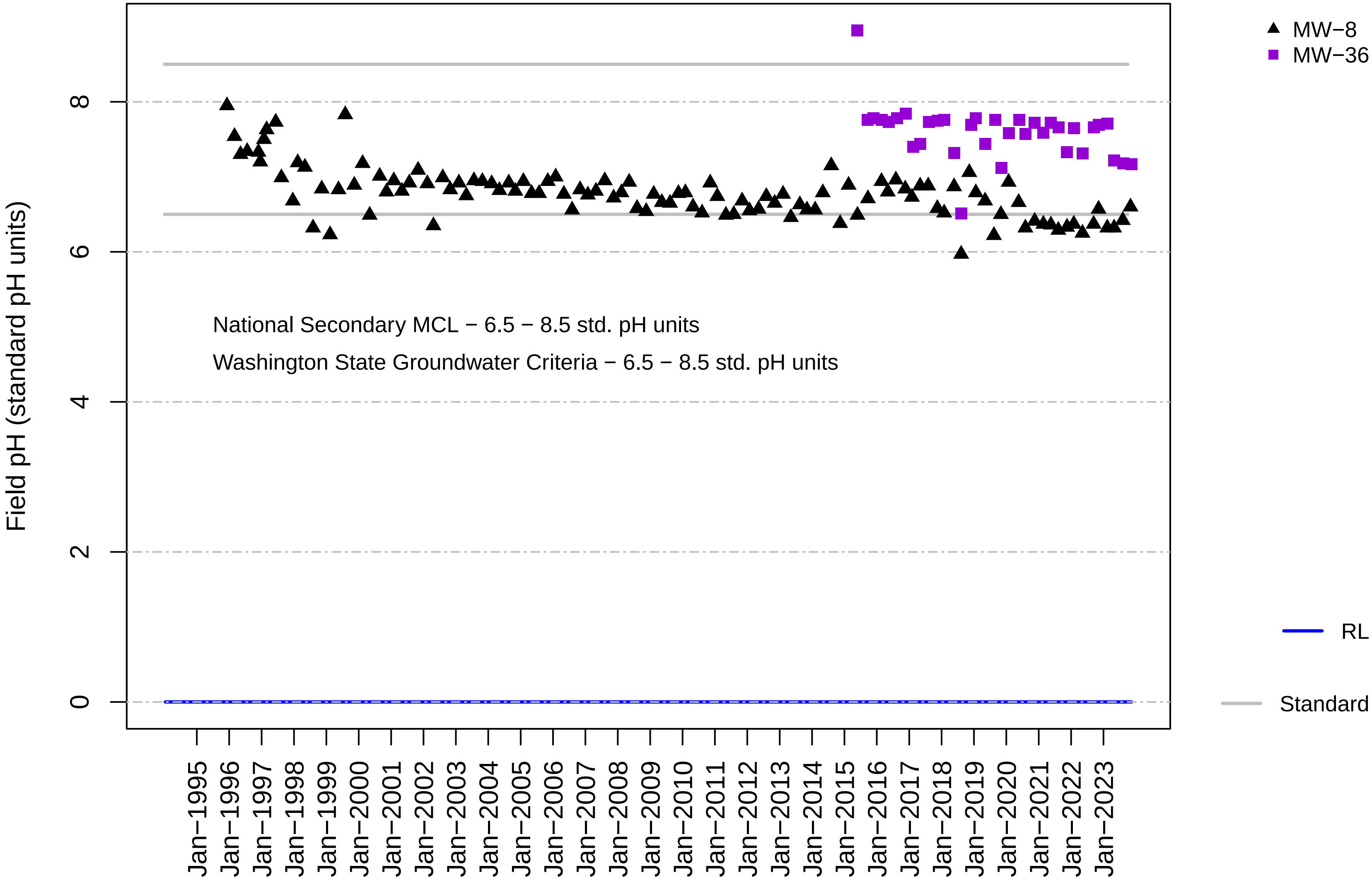


Figure B−61 Long−Term
Channel Cc3
Field Specific Conductance

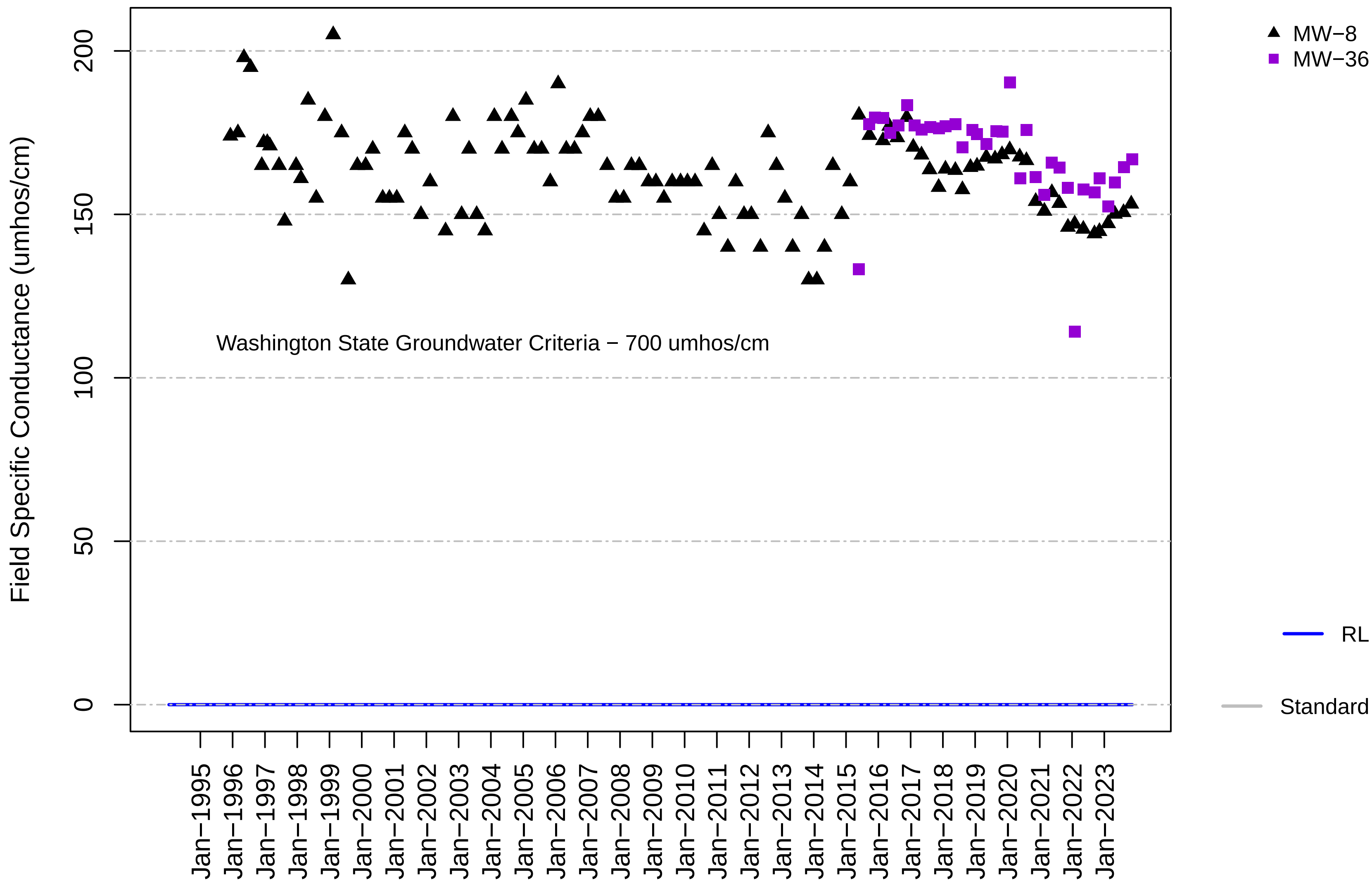


Figure B−62 Long−Term
Channel Cc3
Alkalinity

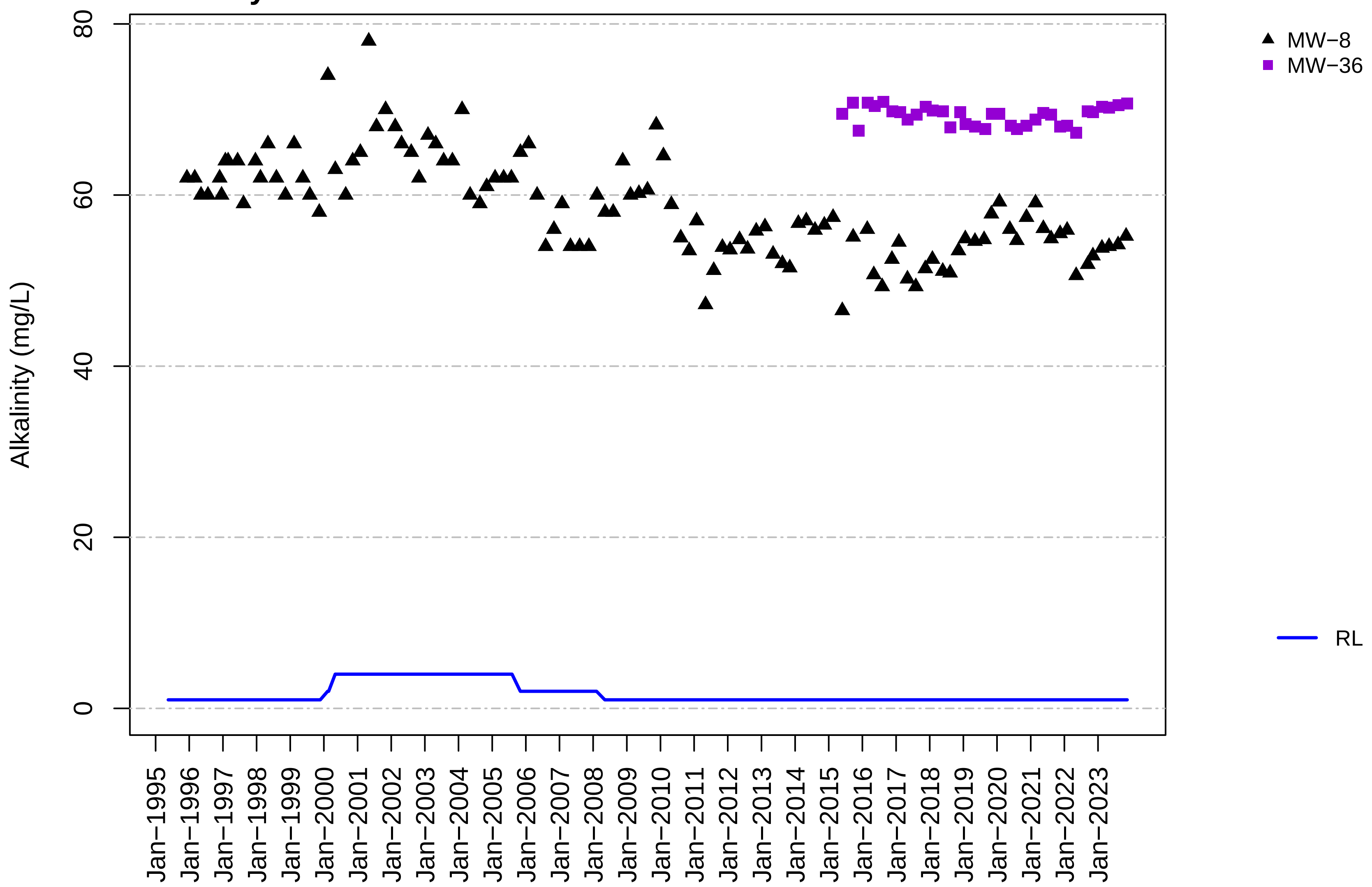


Figure B−63 Long−Term
Channel Cc3
Ammonia

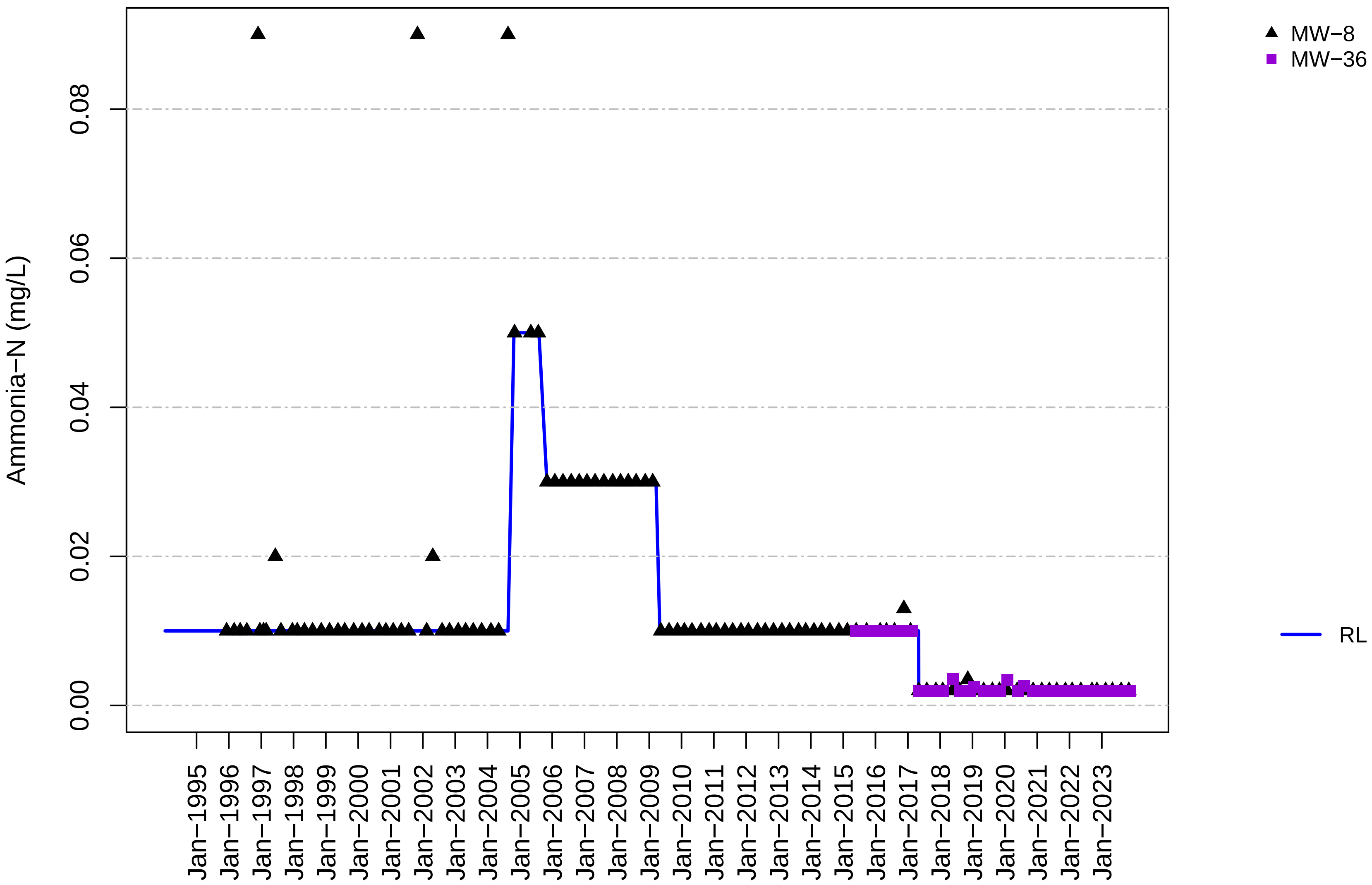


Figure B−64 Long−Term
Channel Cc3
Chloride

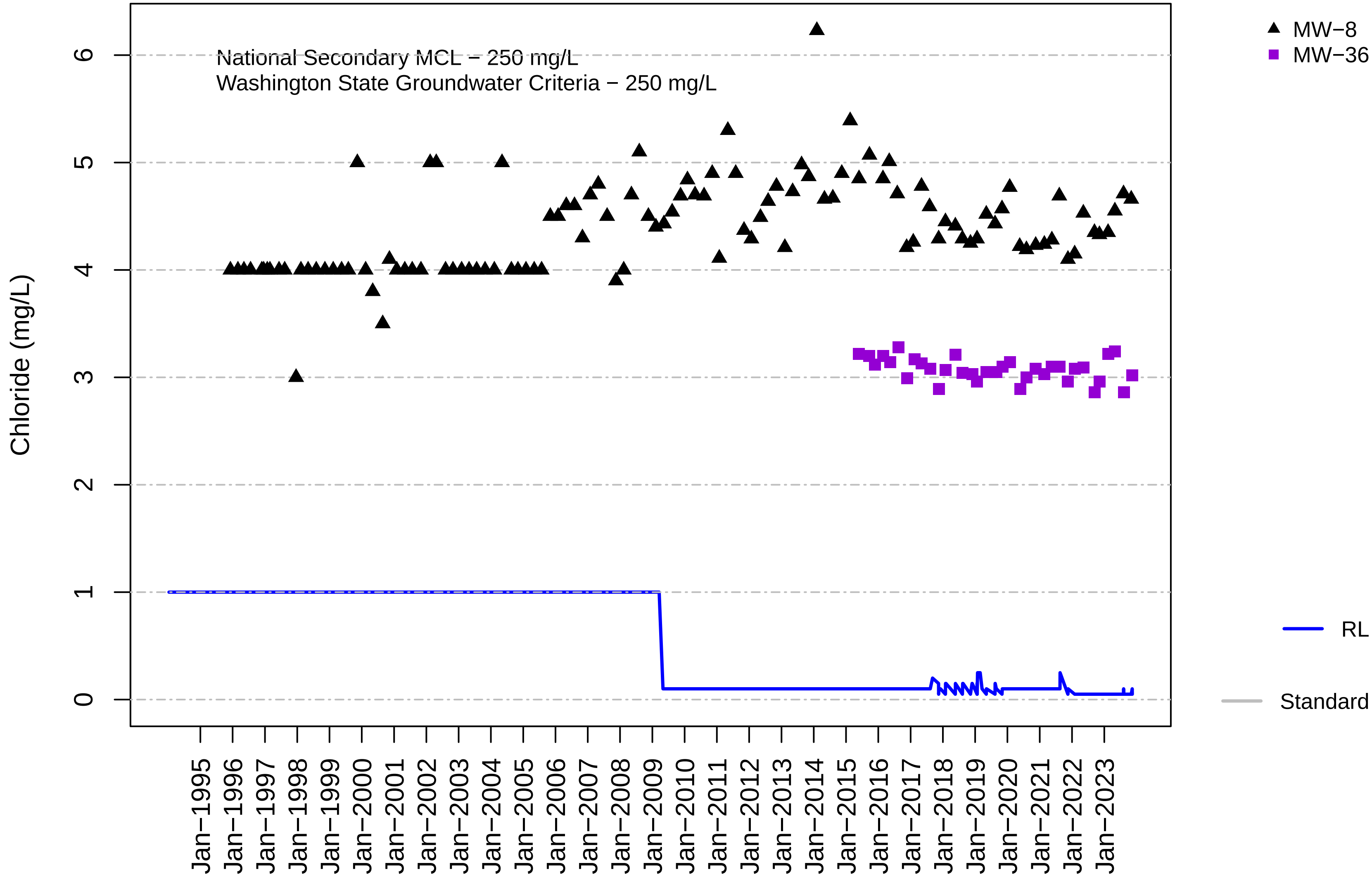


Figure B−65 Long−Term
Channel Cc3
Nitrate

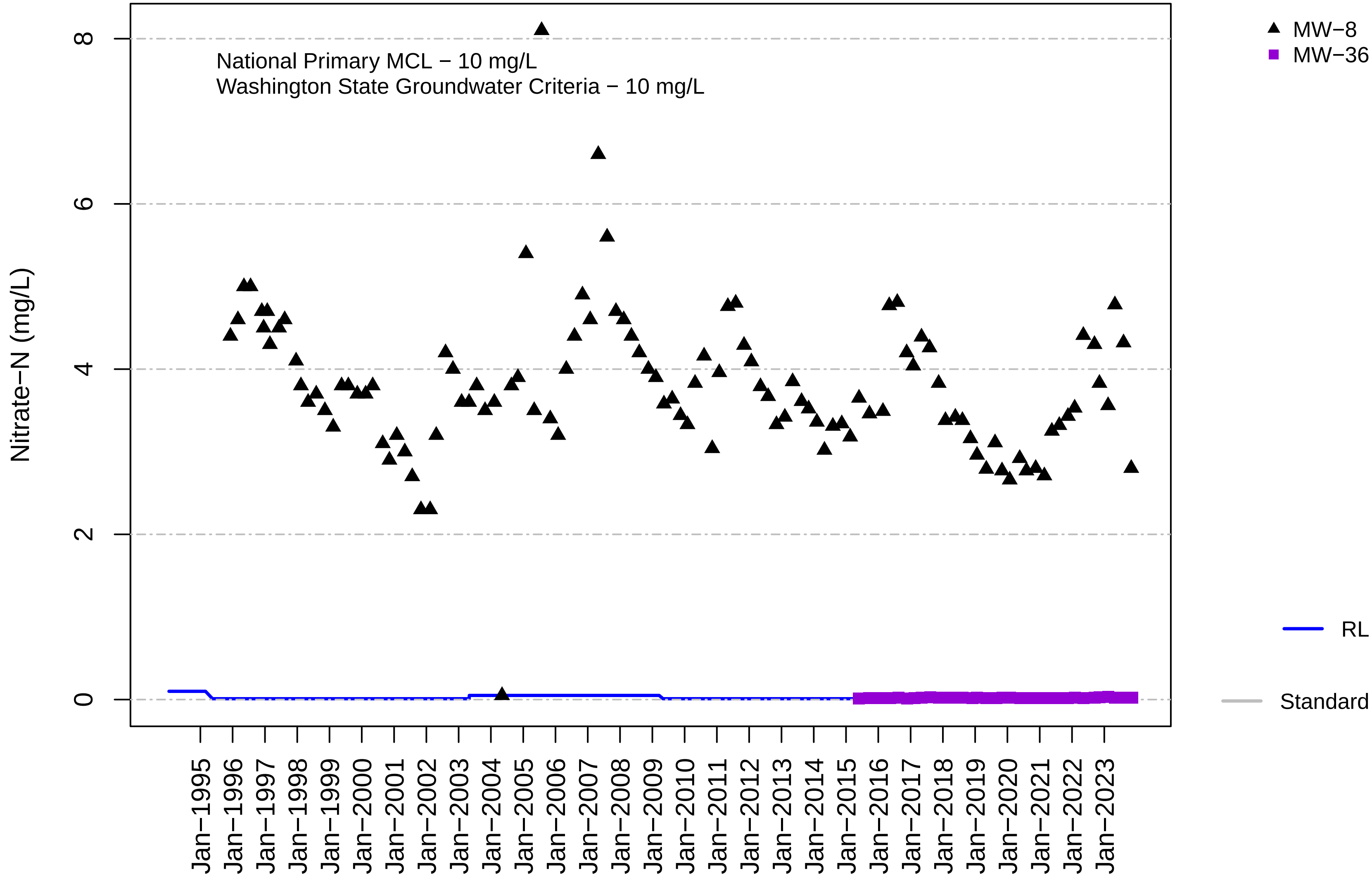
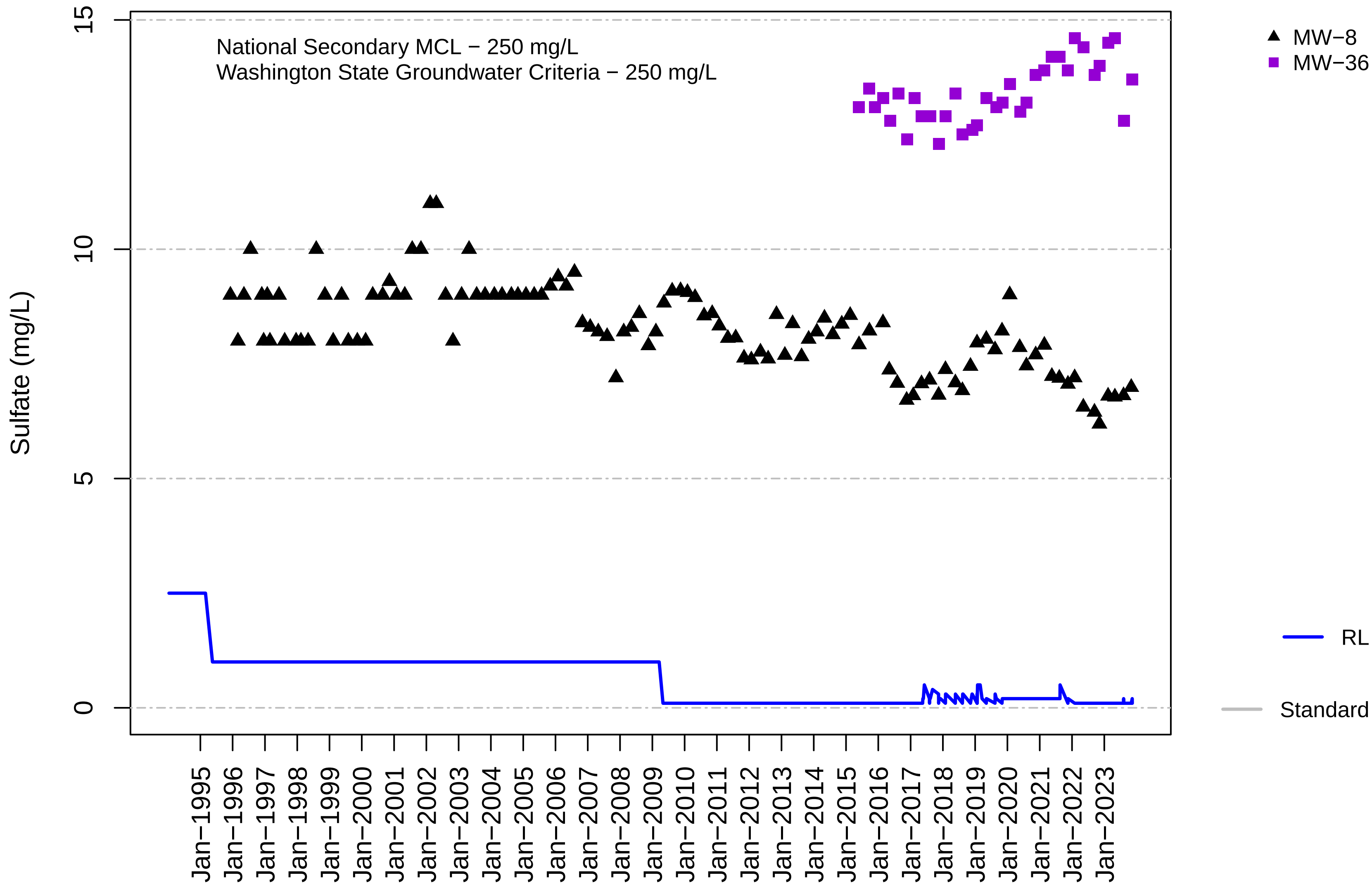


Figure B−66 Long−Term
Channel Cc3
Sulfate



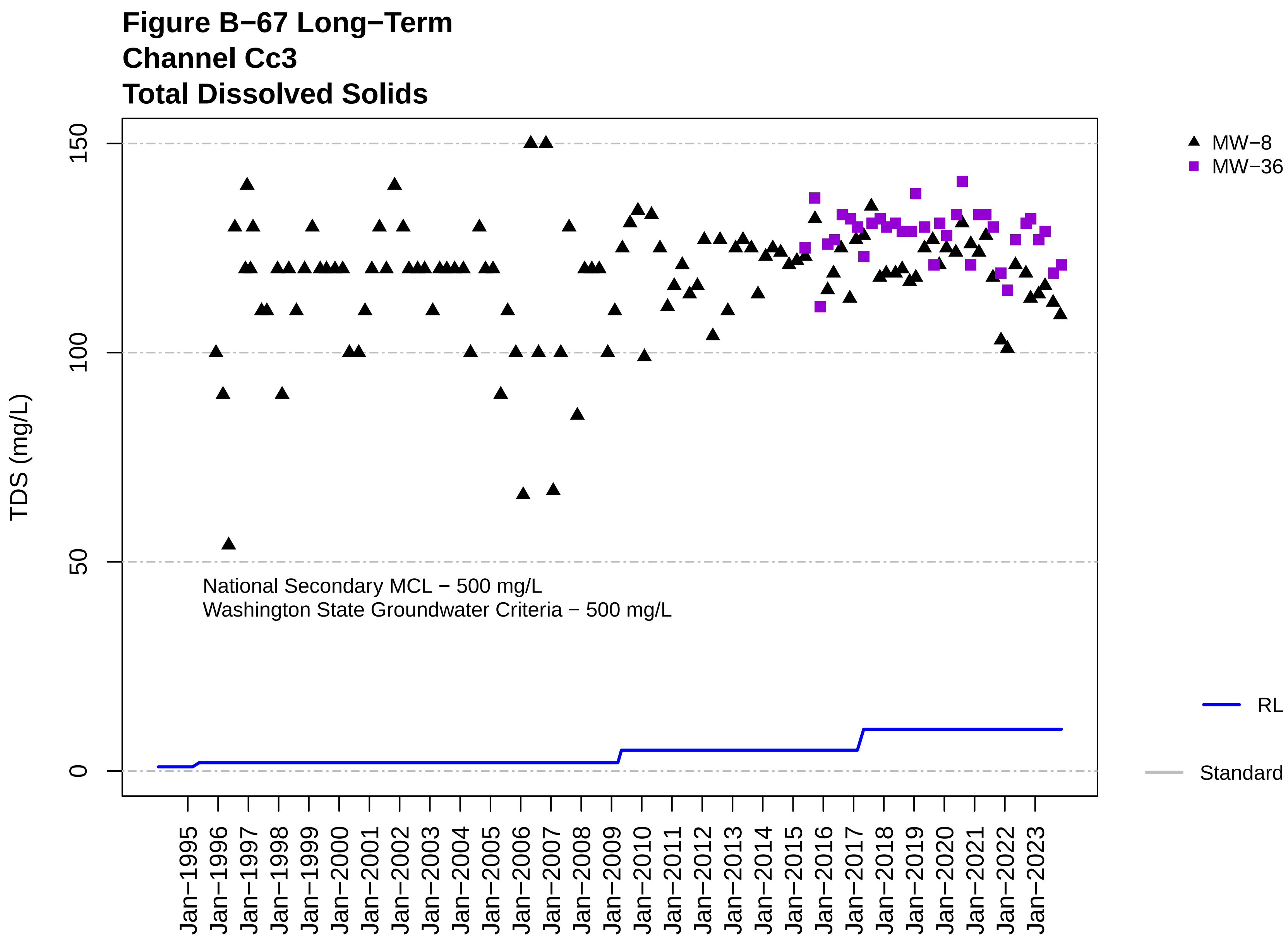


Figure B−67 Long−Term
Channel Cc3
Total Dissolved Solids
TDS (mg/L)
150
100
50
0
National Secondary MCL − 500 mg/L
Washington State Groundwater Criteria − 500 mg/L
MW−8
MW−36
RL
Standard
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
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
Jan−2021
Jan−2022
Jan−2023

Figure B−68 Long−Term
Channel Cc3
Arsenic

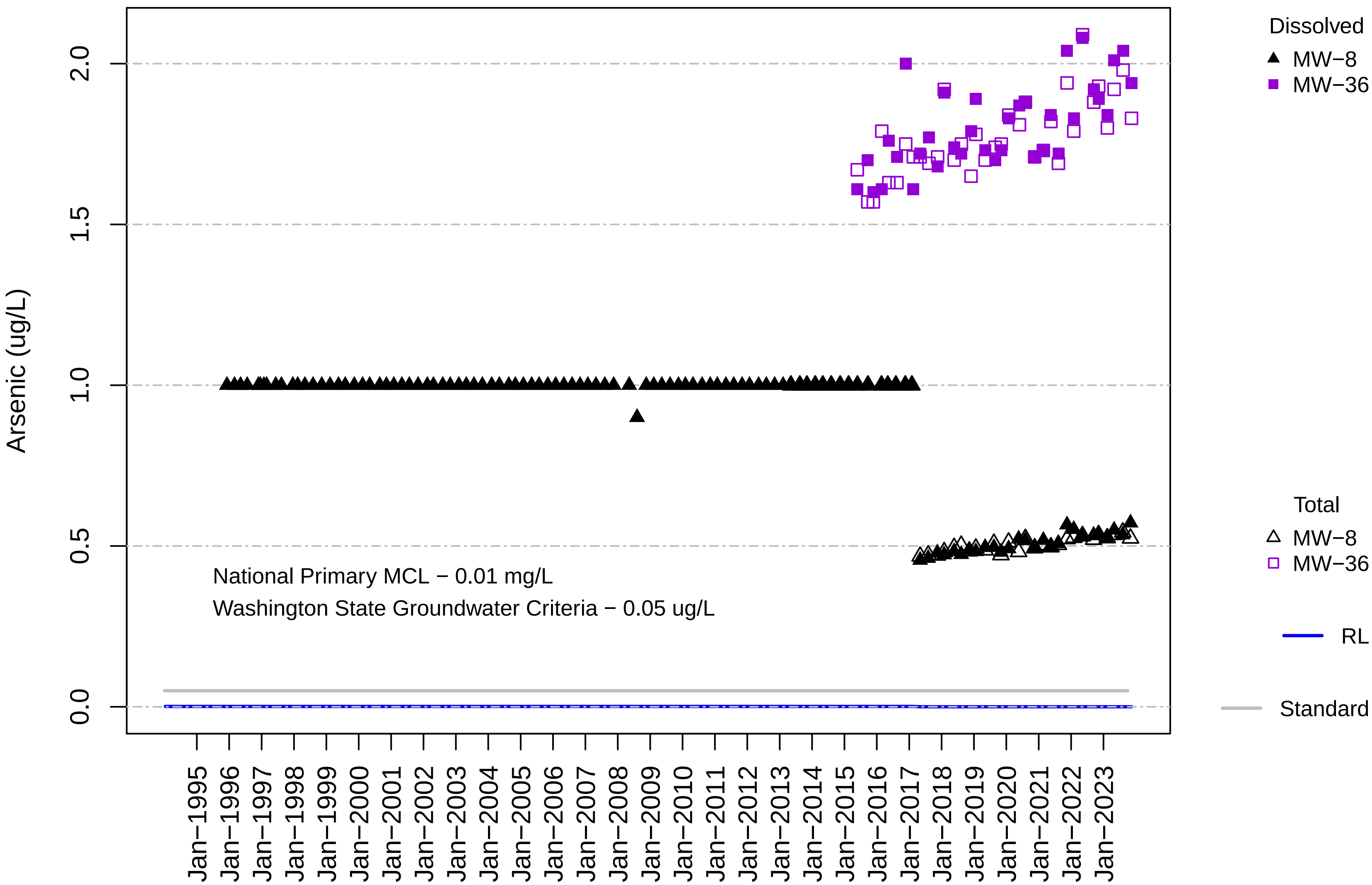


Figure B−69 Long−Term
Channel Cc3
Calcium

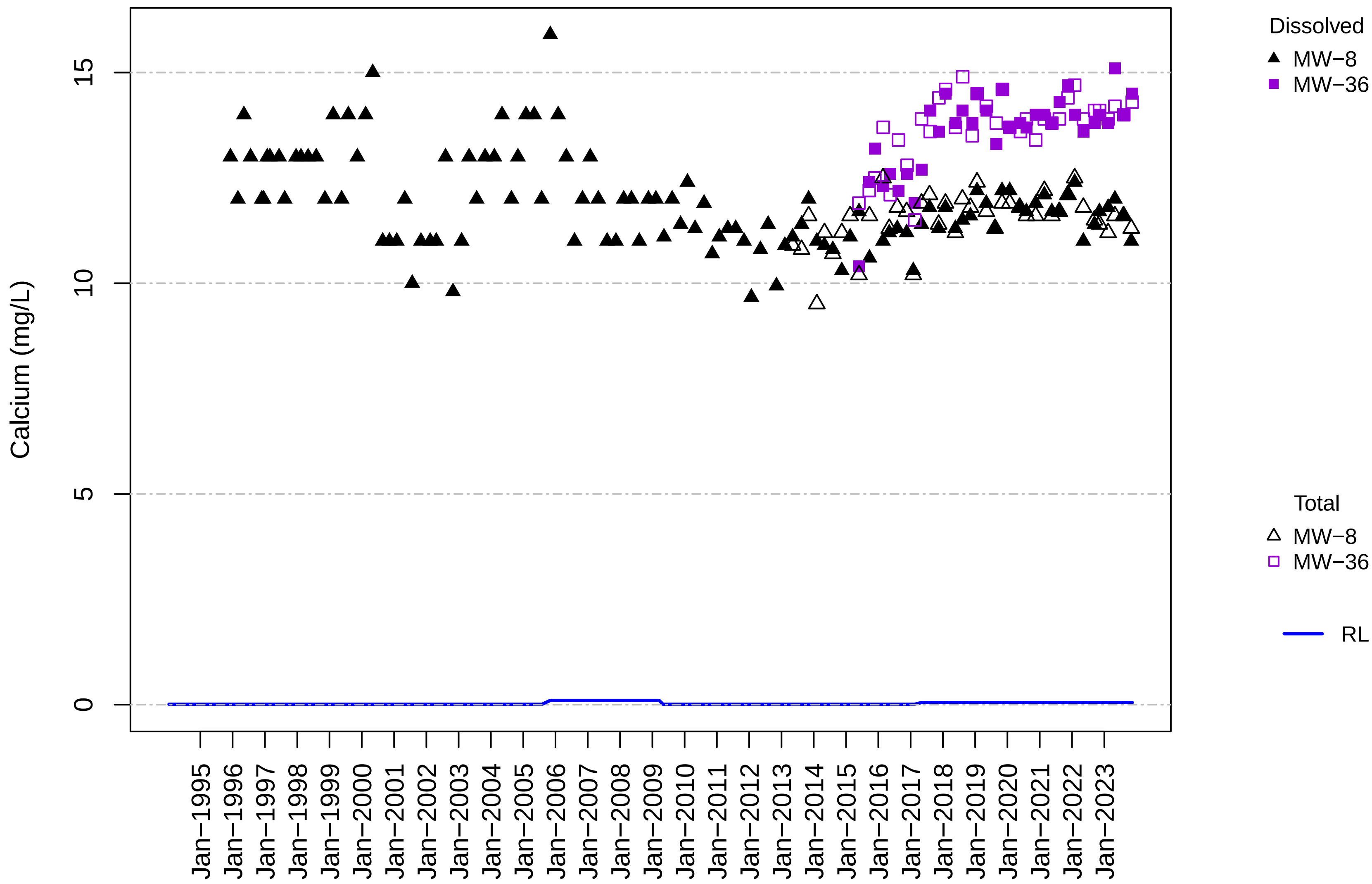


Figure B−70 Long−Term
Channel Cc3
Iron

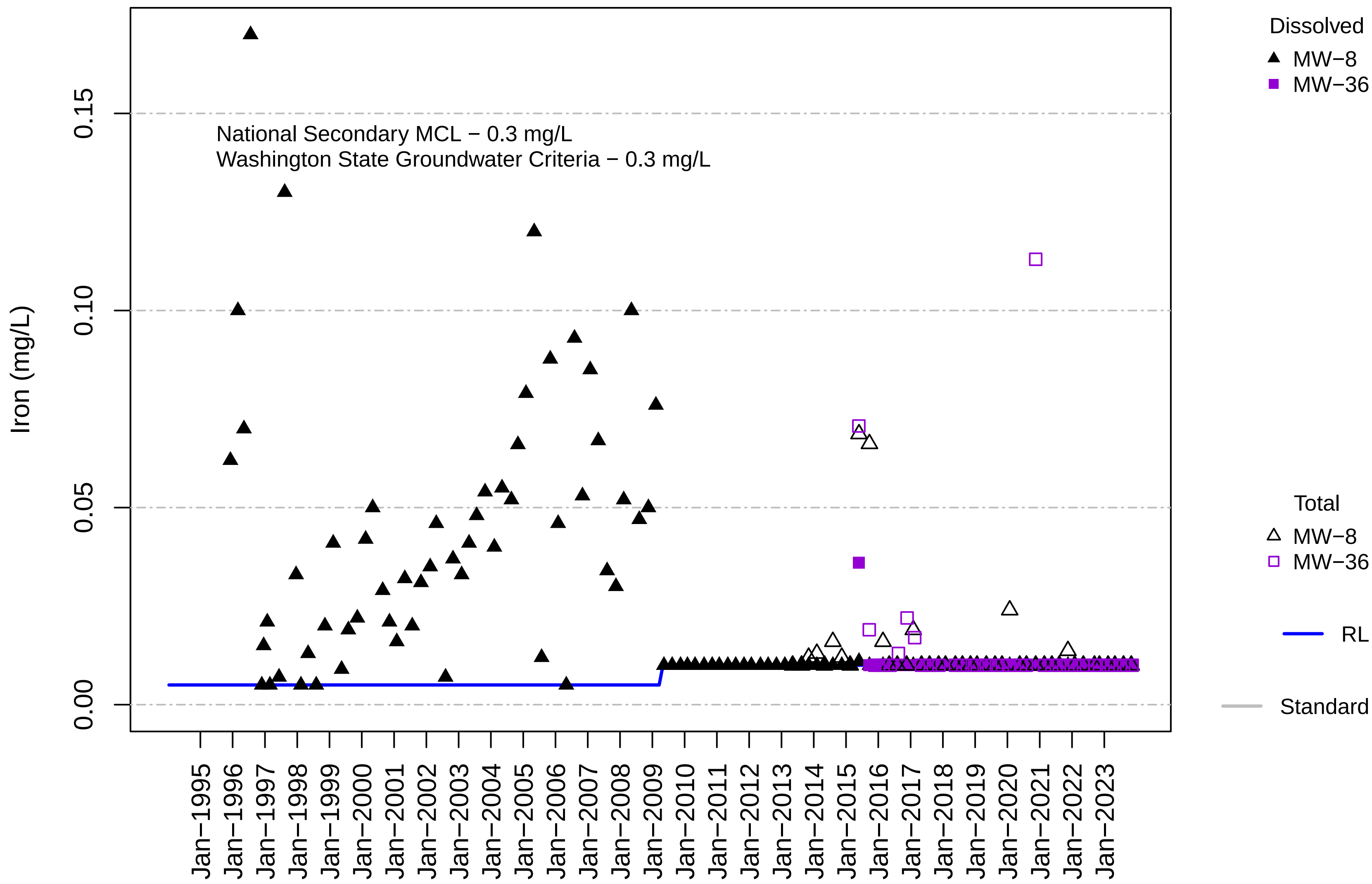


Figure B−71 Long−Term
Channel Cc3
Magnesium

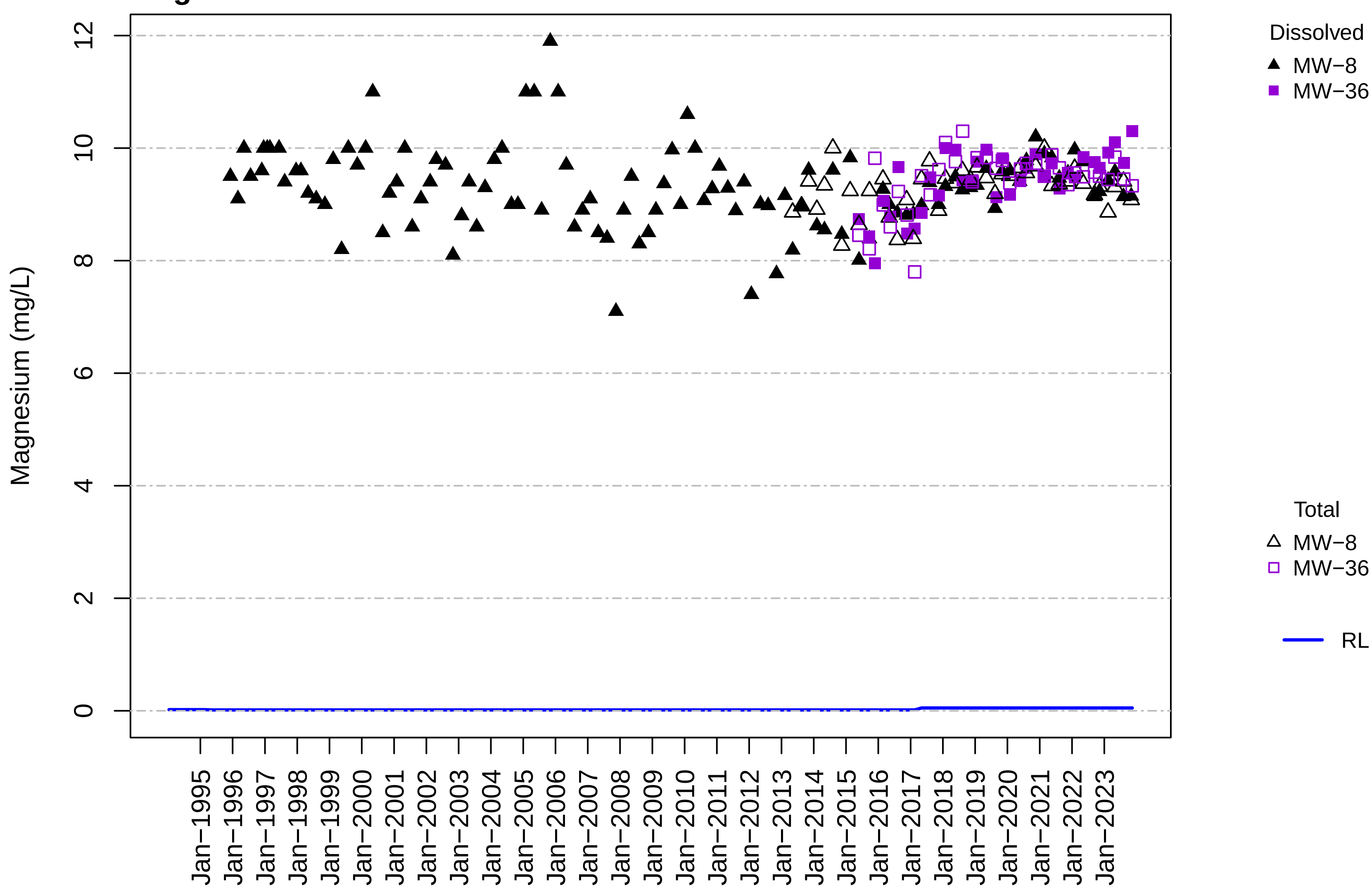
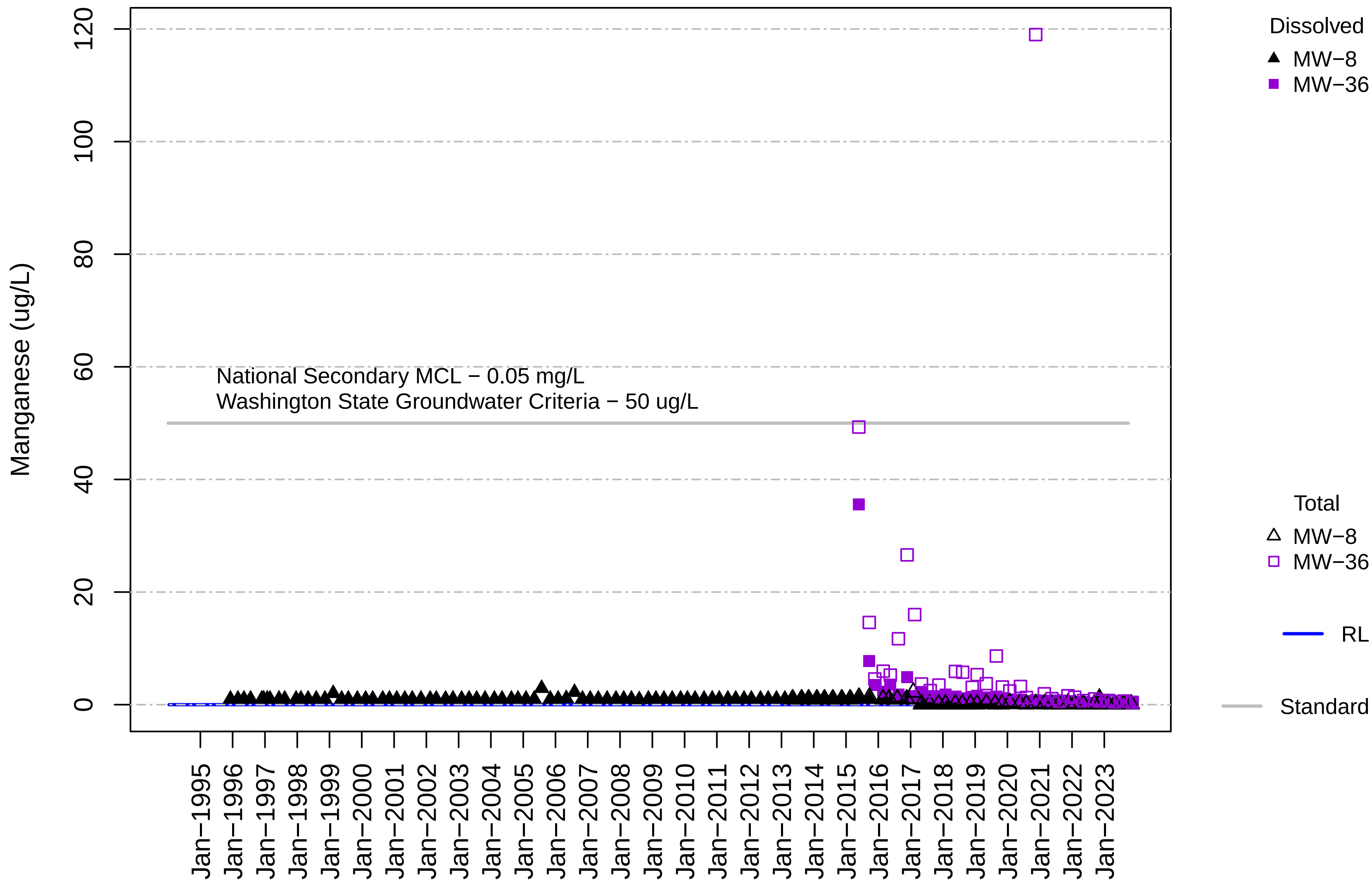


Figure B−72 Long−Term
Channel Cc3
Manganese



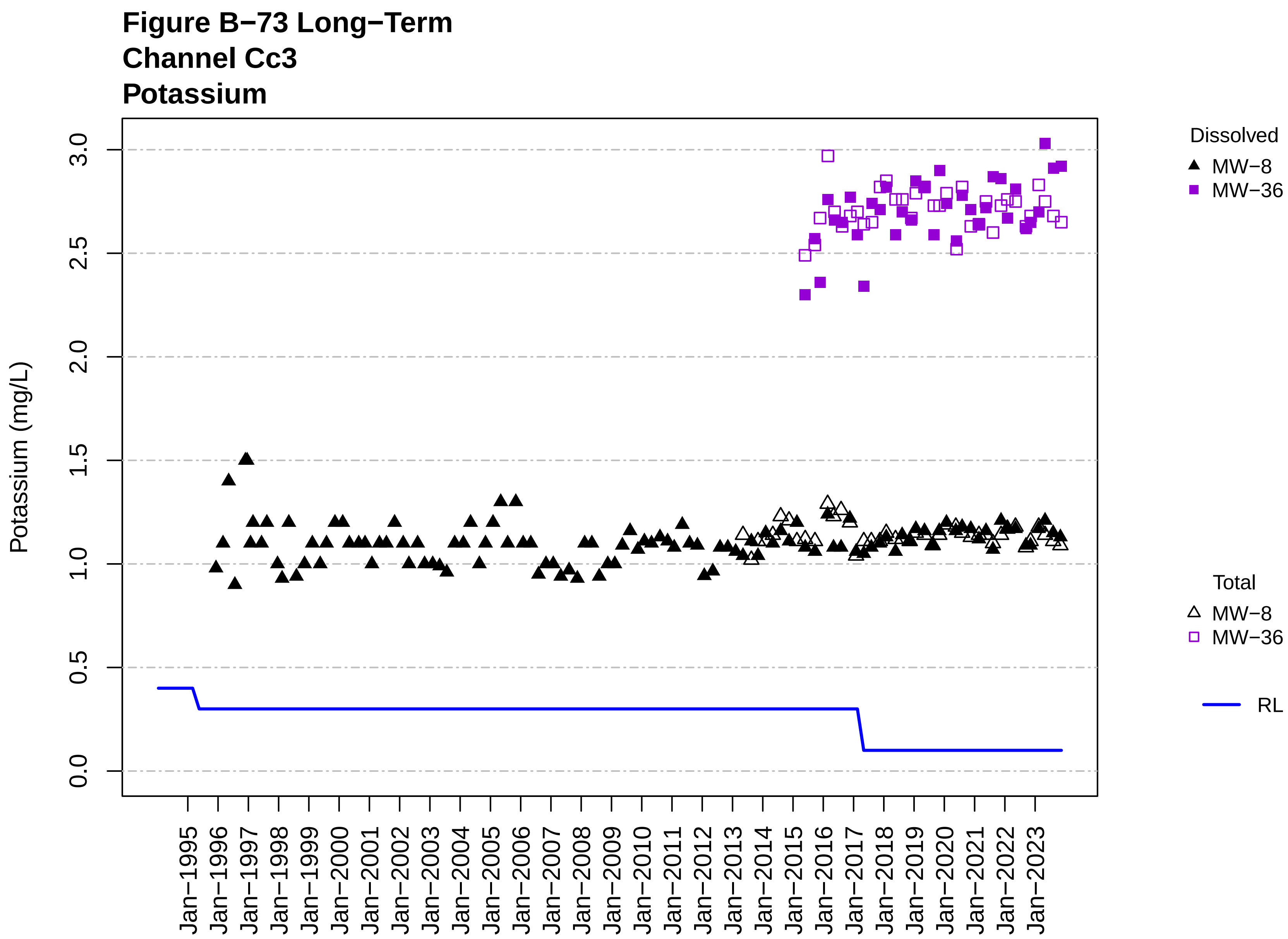


Figure B−73 Long−Term
Channel Cc3
Potassium
Potassium (mg/L)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
Dissolved
MW−8
MW−36
Total
MW−8
MW−36
RL

Figure B−74 Long−Term
Channel Cc3
Sodium

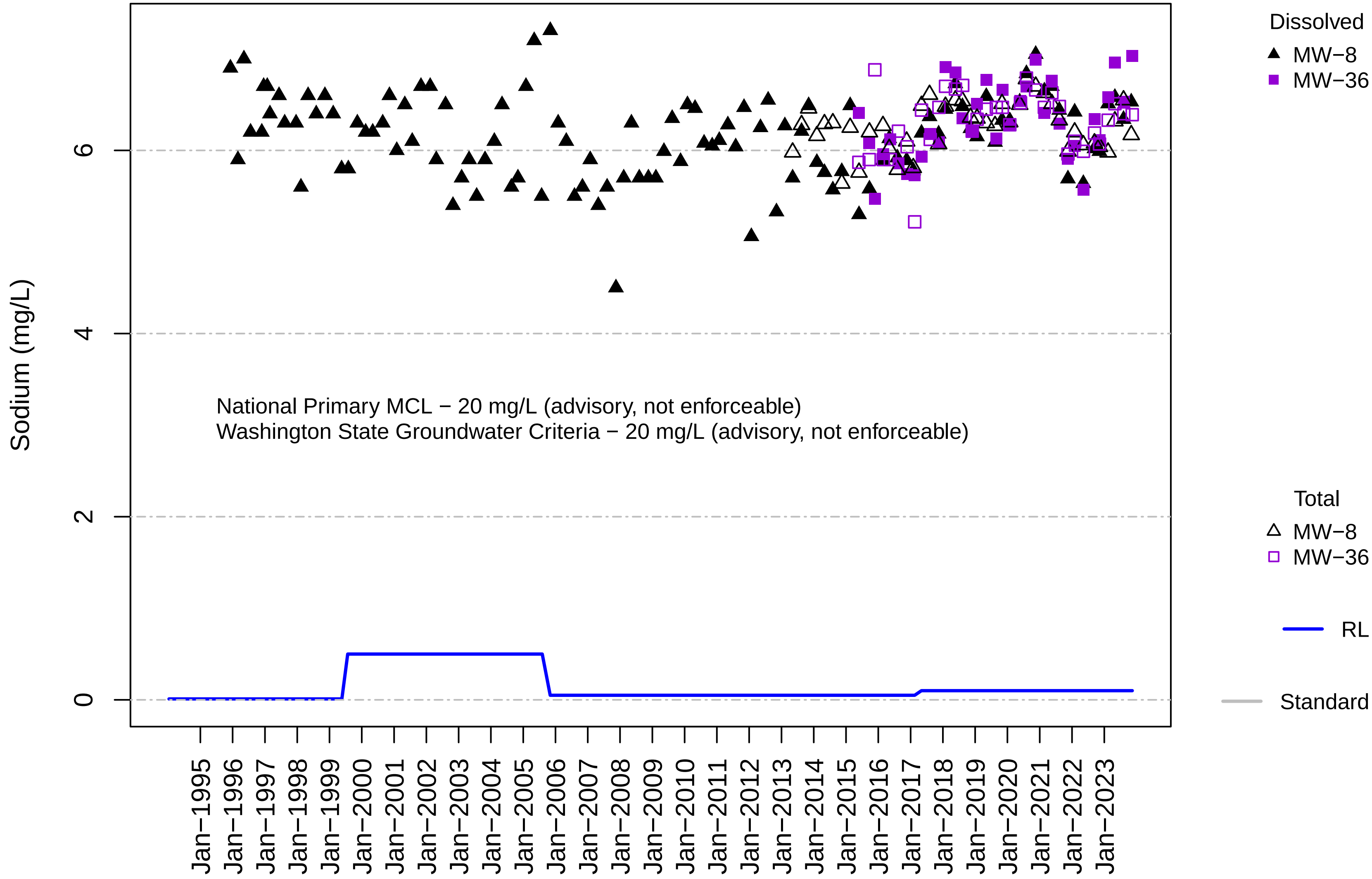


Figure B−75 Long−Term
Channel Cc3
1,1−Dichloroethane

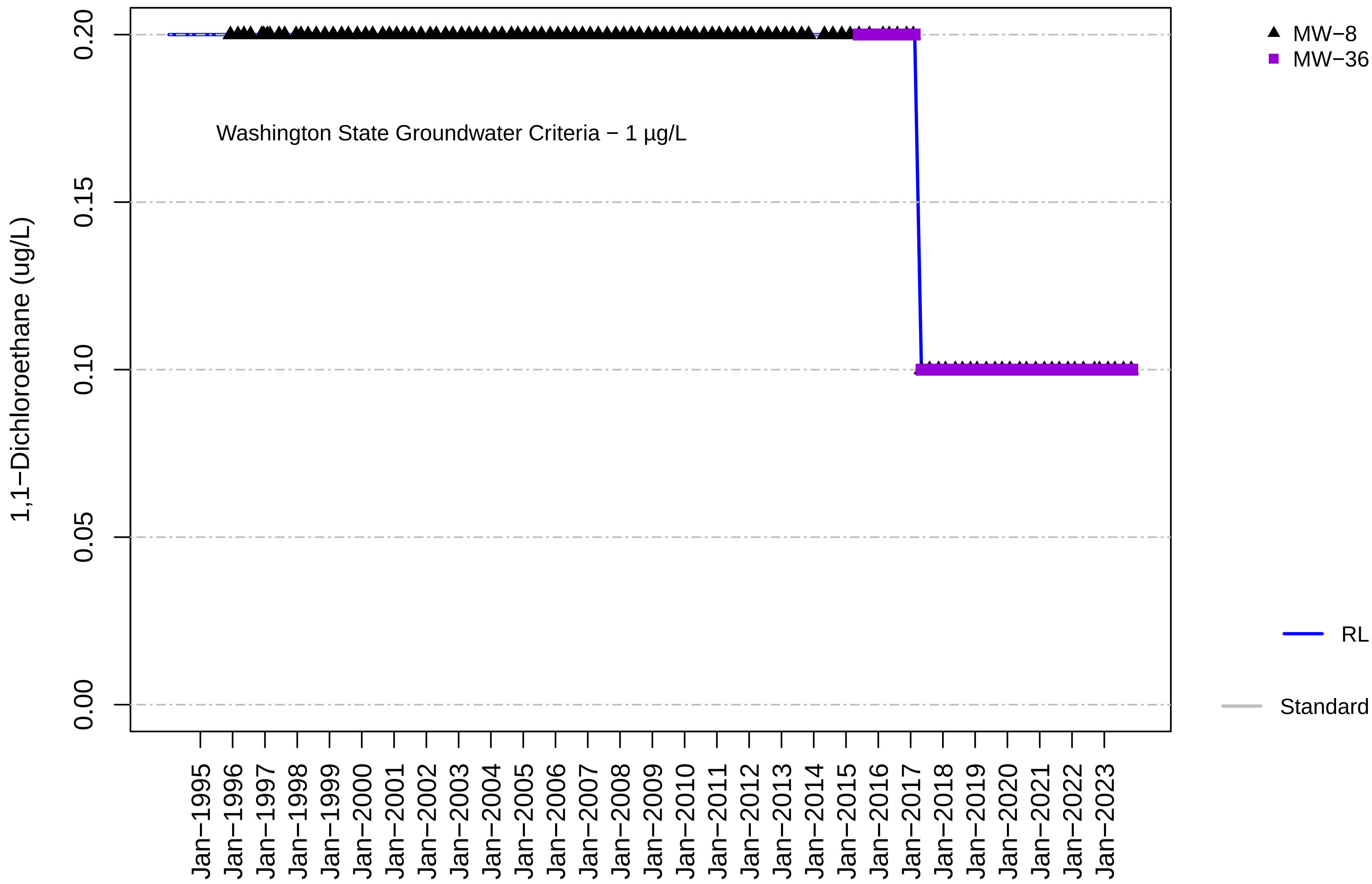


Figure B−76 Long−Term
Channel Cc3
1,2−Dichloropropane

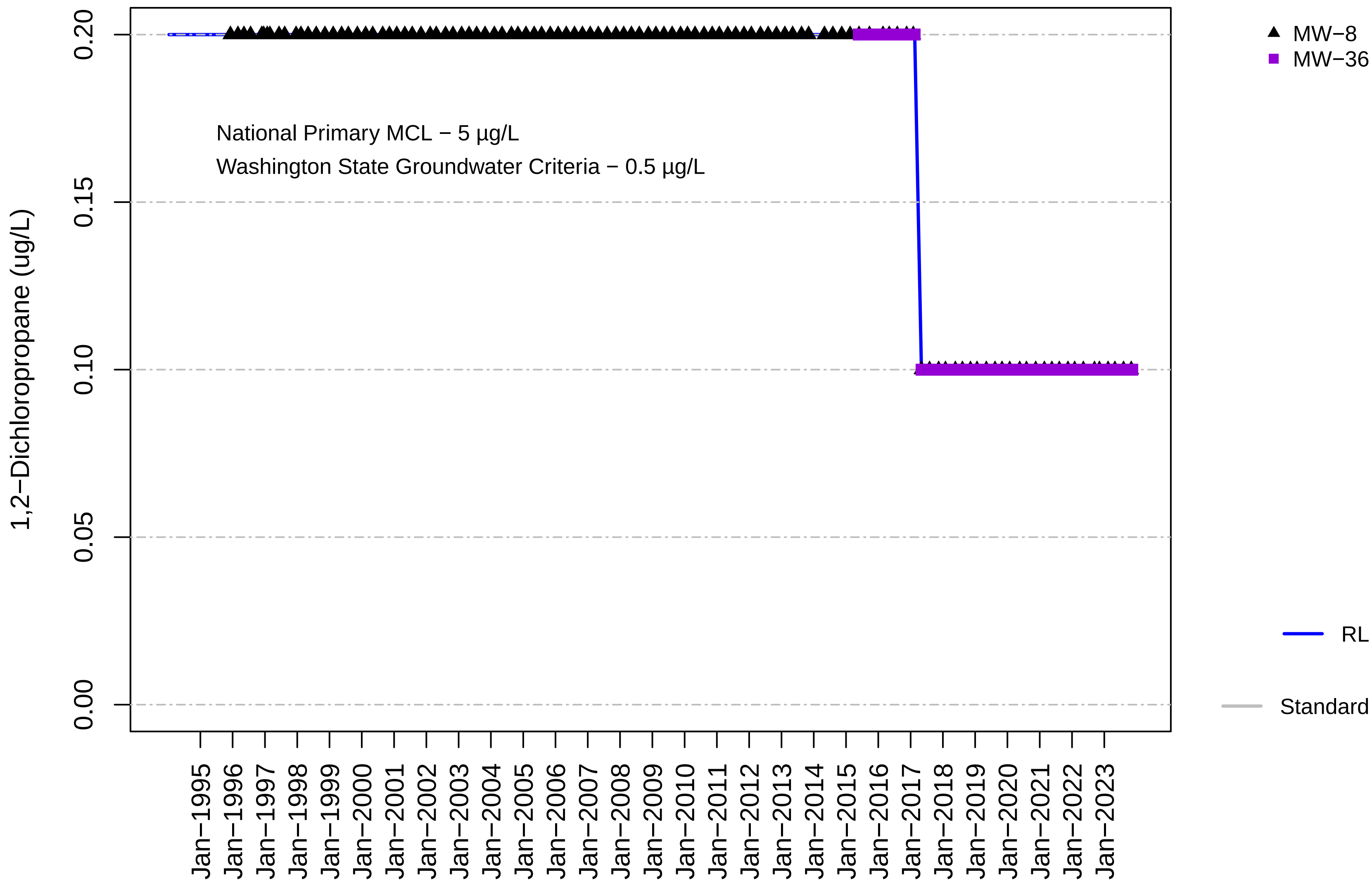


Figure B−77 Long−Term
Channel Cc3
Benzene

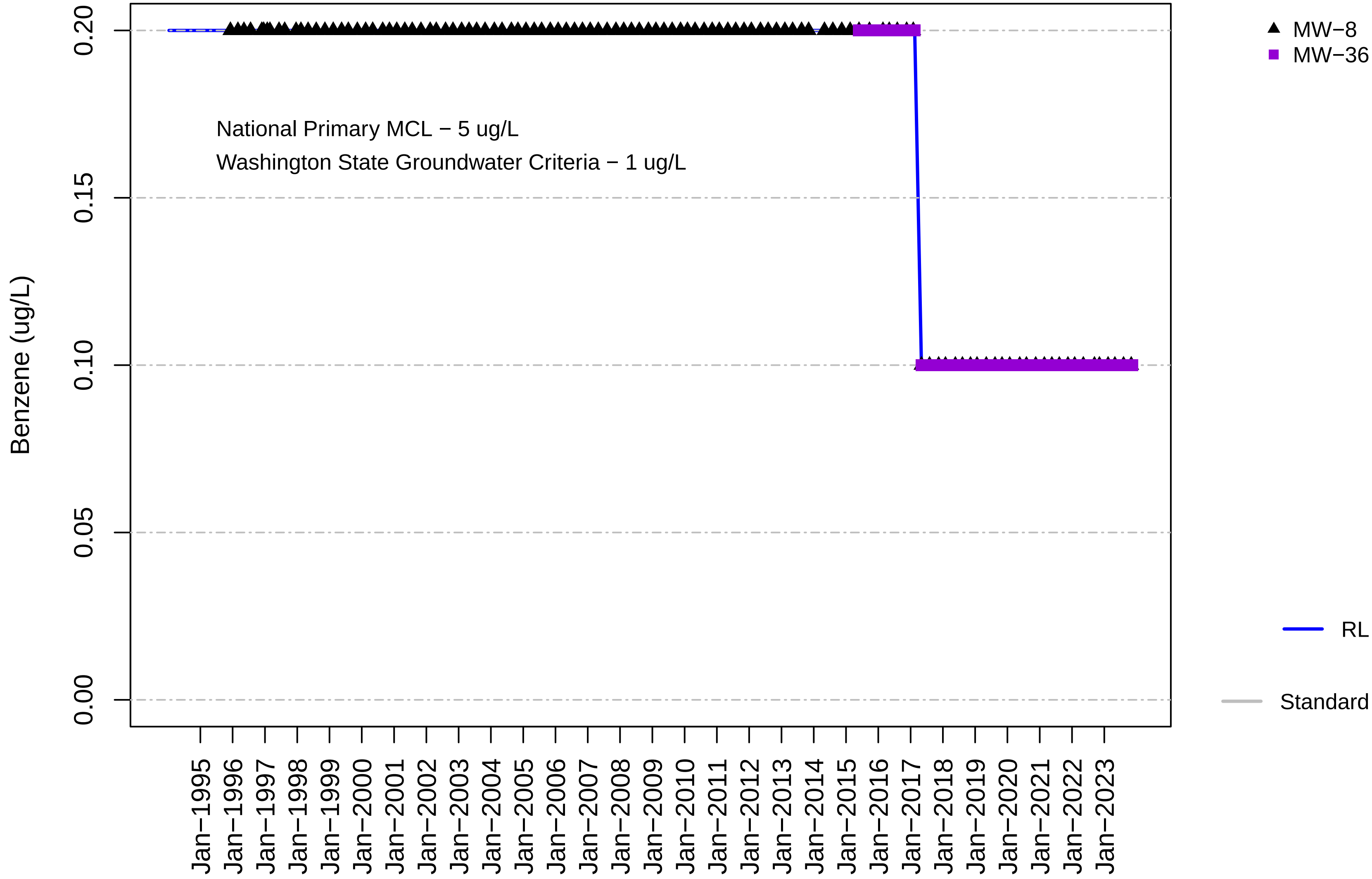


Figure B−78 Long−Term
Channel Cc3
Chloroethane

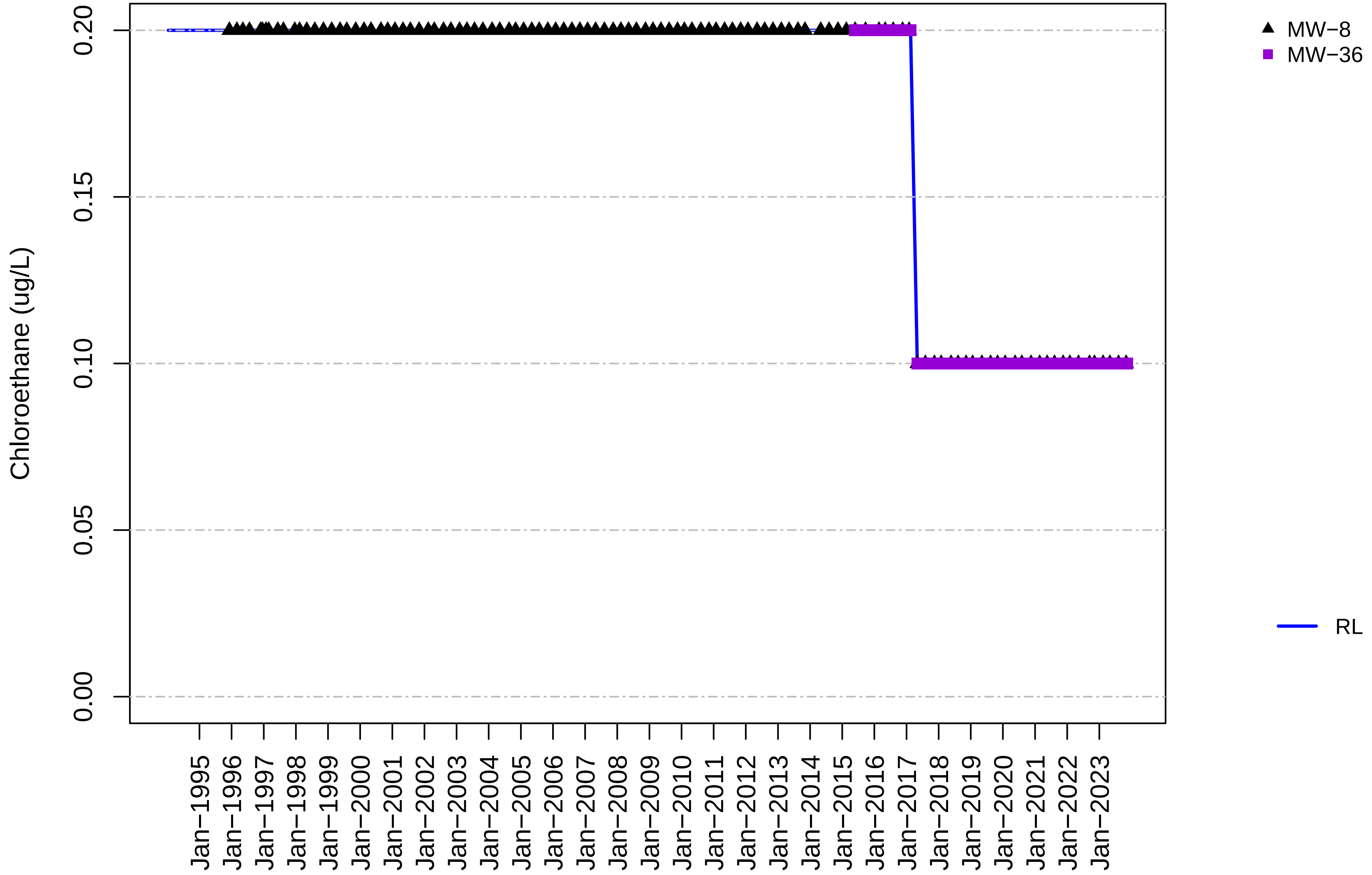


Figure B−79 Long−Term
Channel Cc3
cis−1,2−Dichloroethene

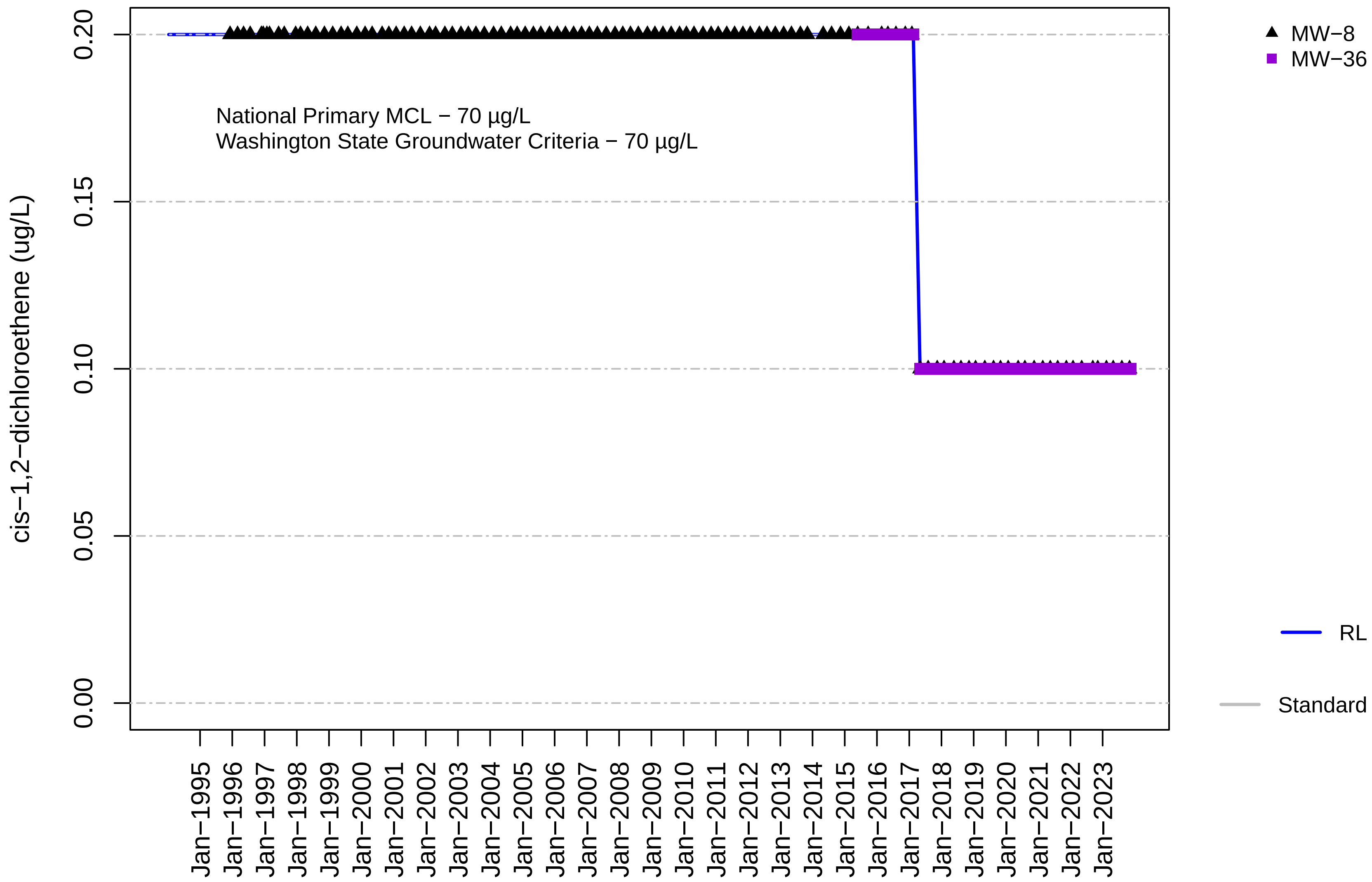


Figure B−80 Long−Term
Channel Cc3
Dichlorodifluoromethane

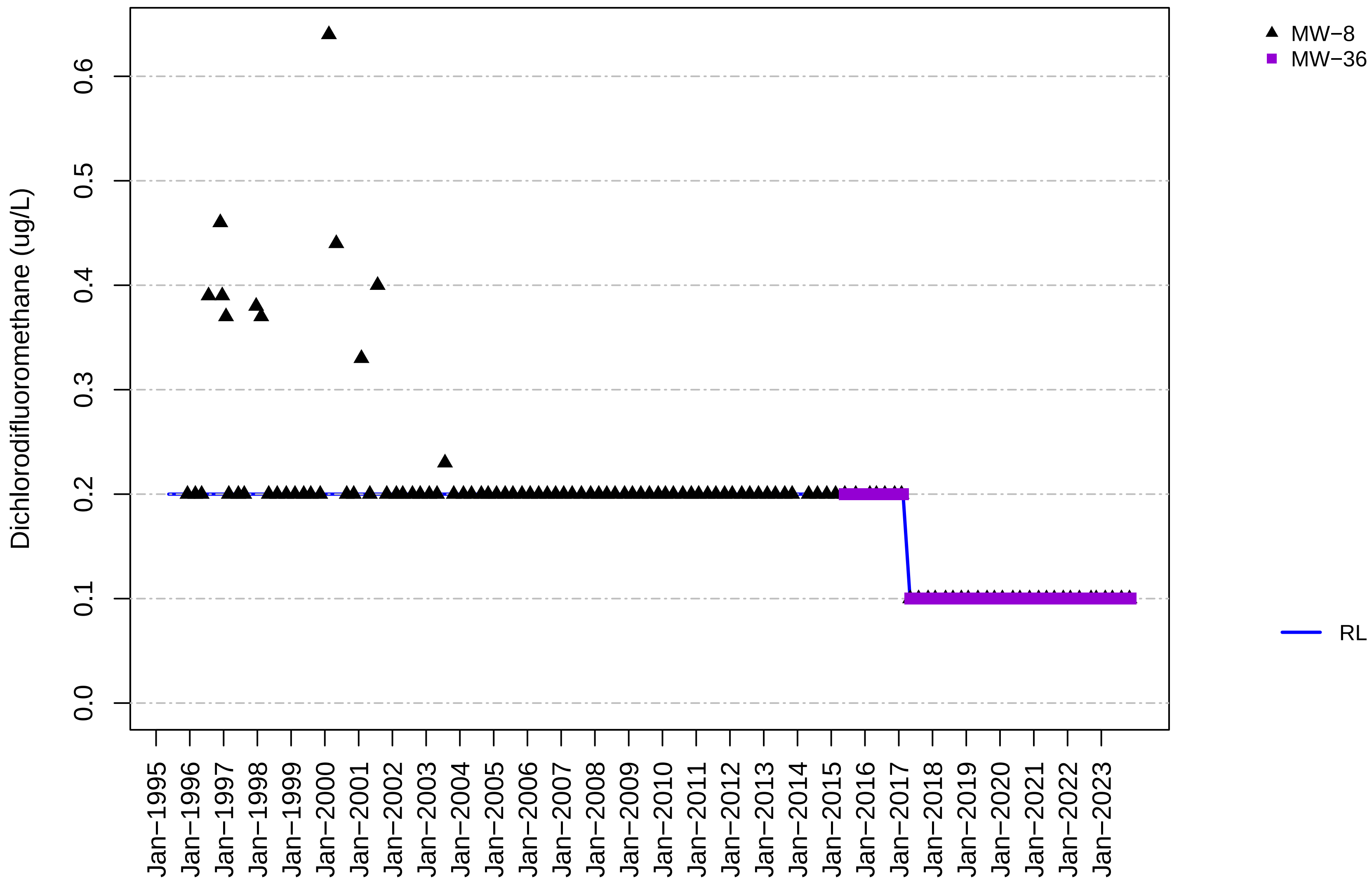


Figure B−81 Long−Term
Channel Cc3
Tetrachloroethene

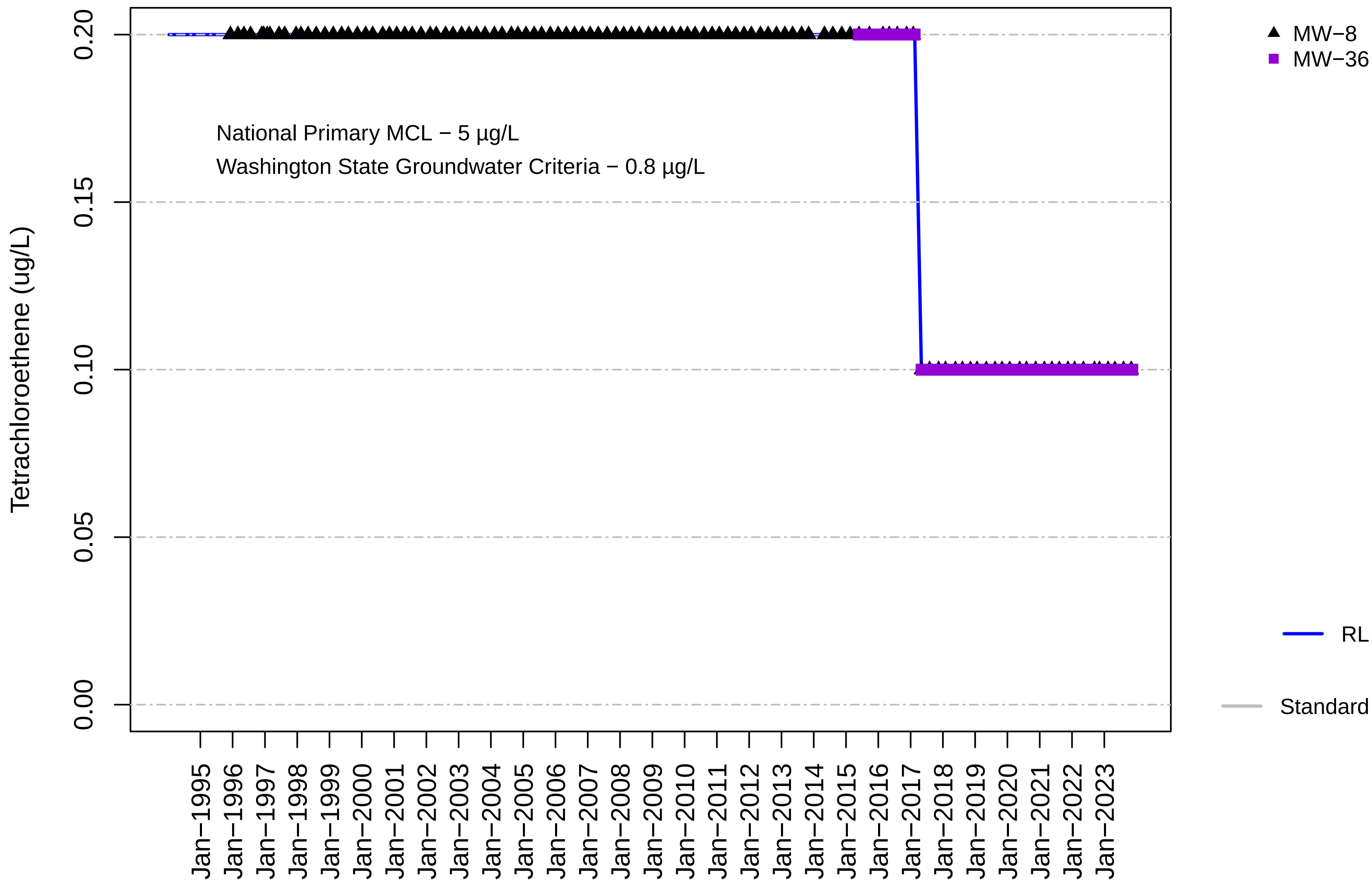


Figure B−82 Long−Term
Channel Cc3
Toluene

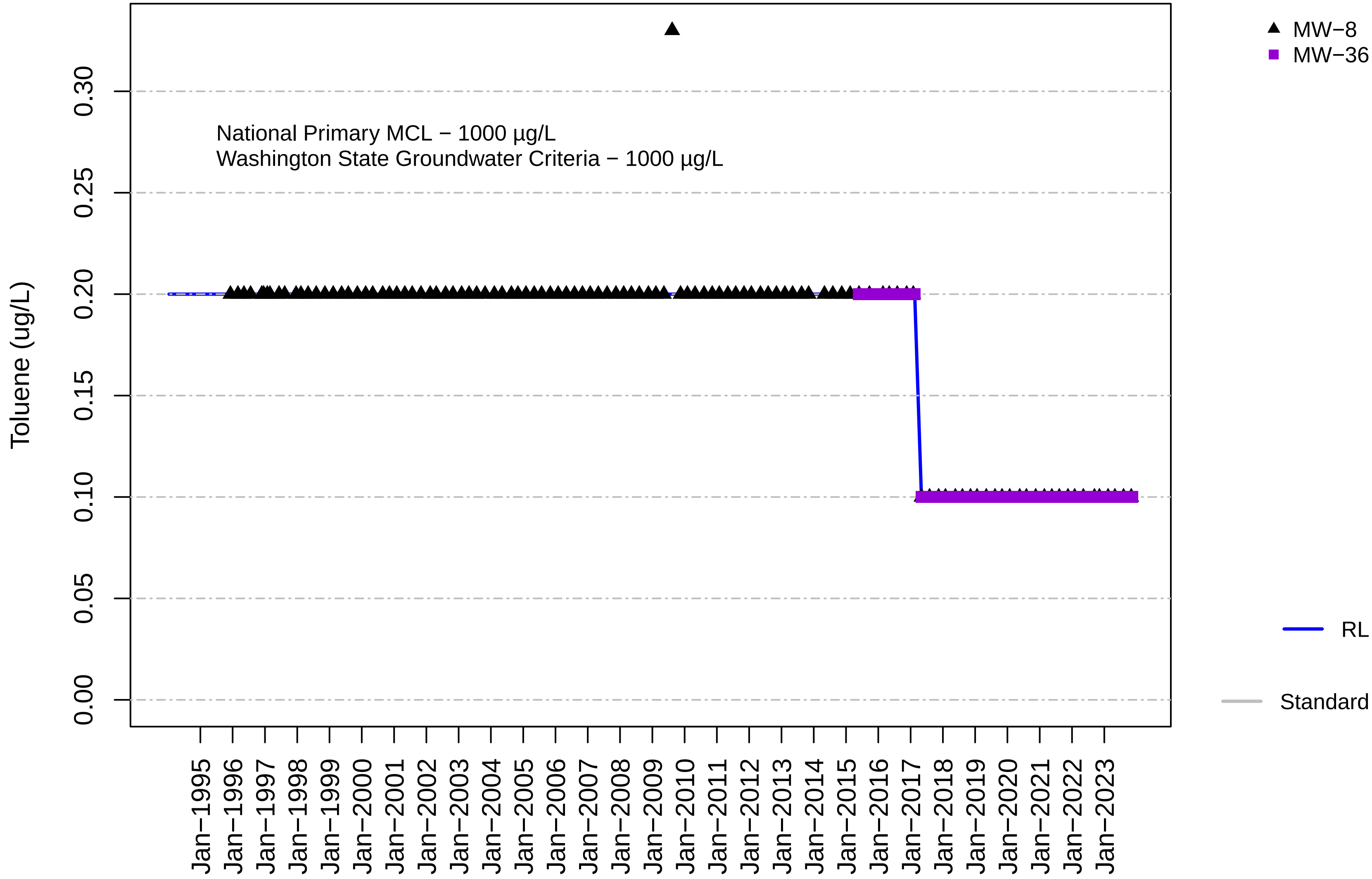


Figure B−83 Long−Term
Channel Cc3
Trans−1,2−Dichloroethene

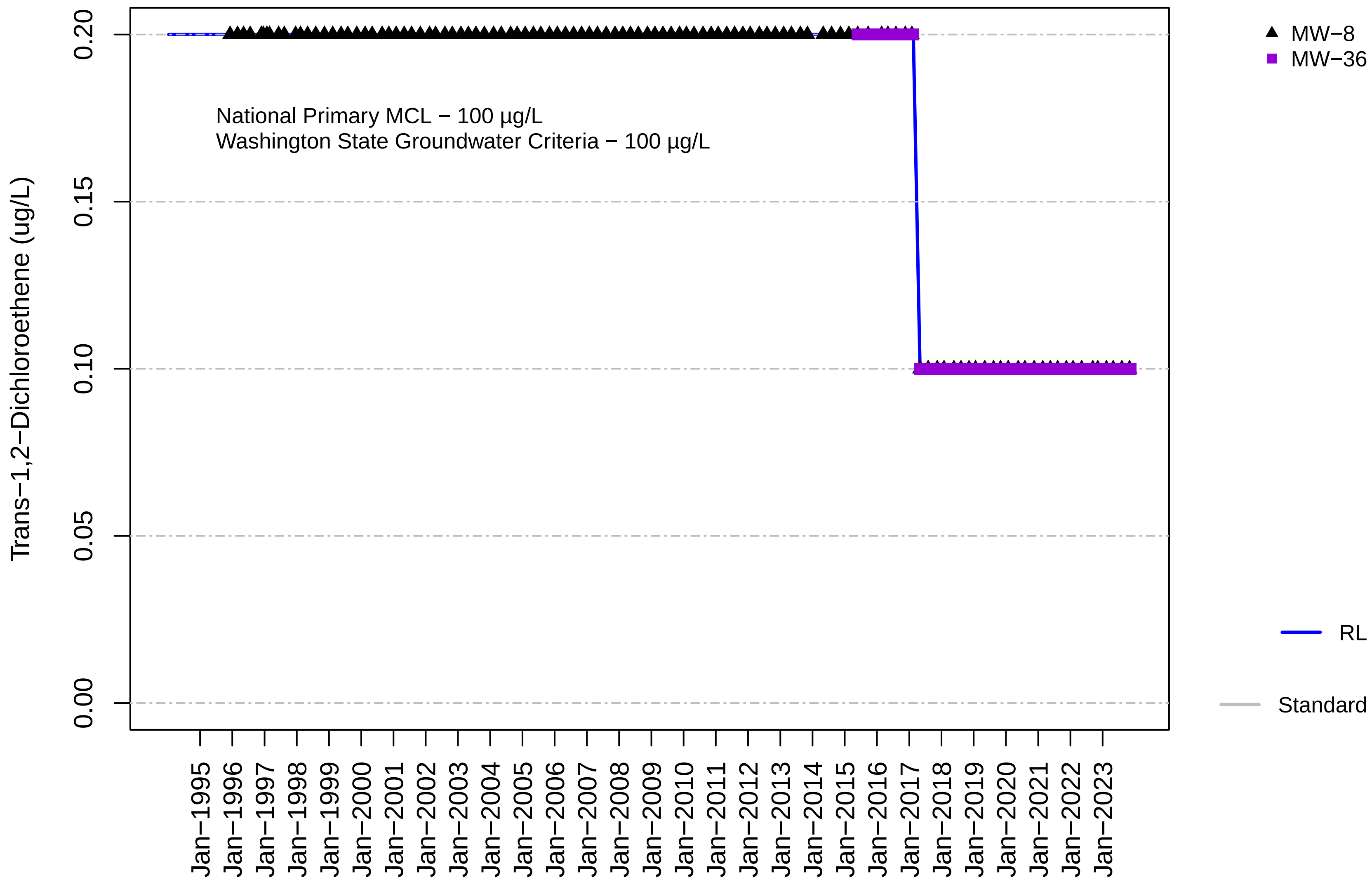


Figure B−84 Long−Term
Channel Cc3
Trichloroethene

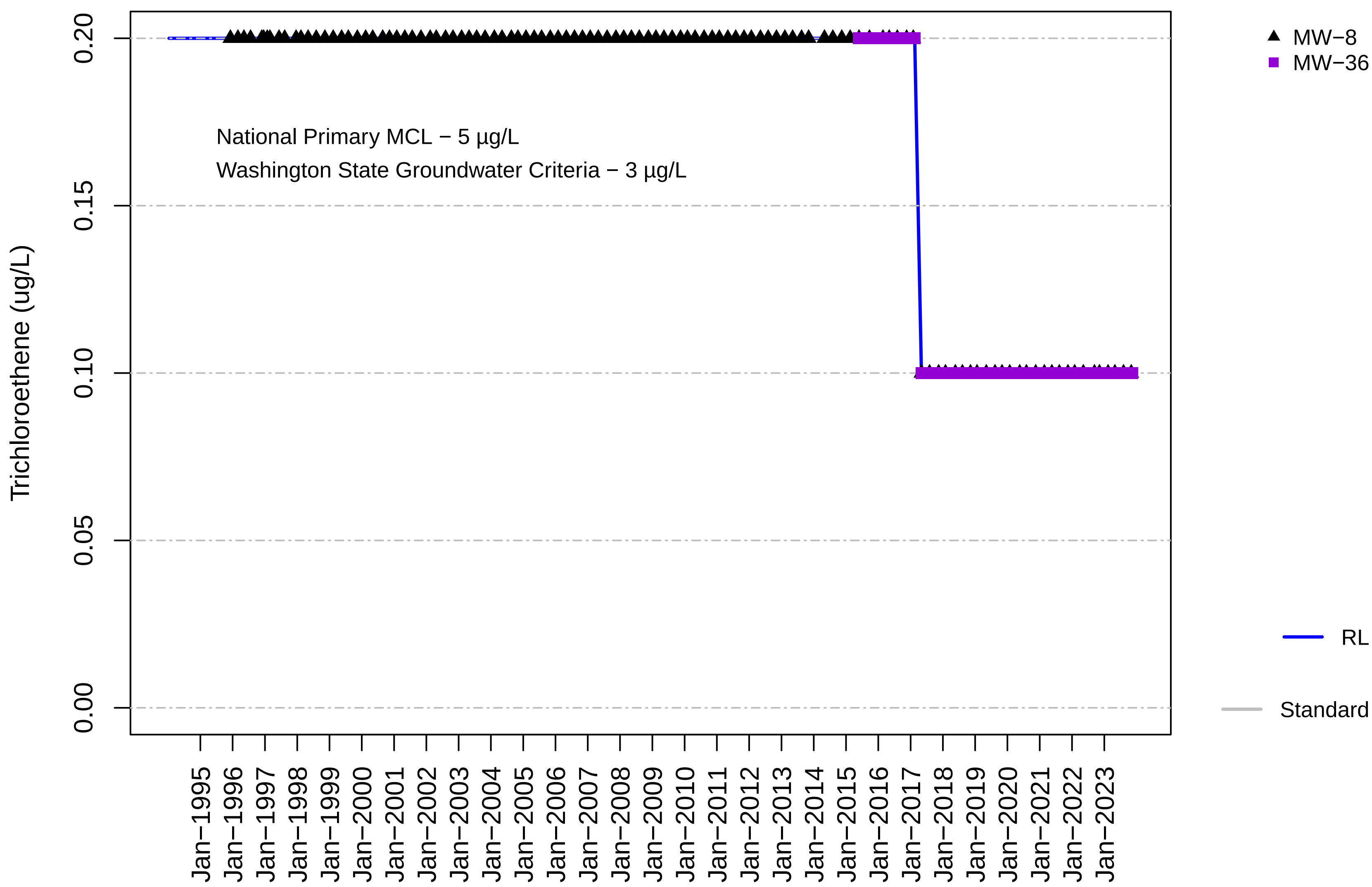


Figure B−85 Long−Term
Channel Cc3
Trichlorofluoromethane

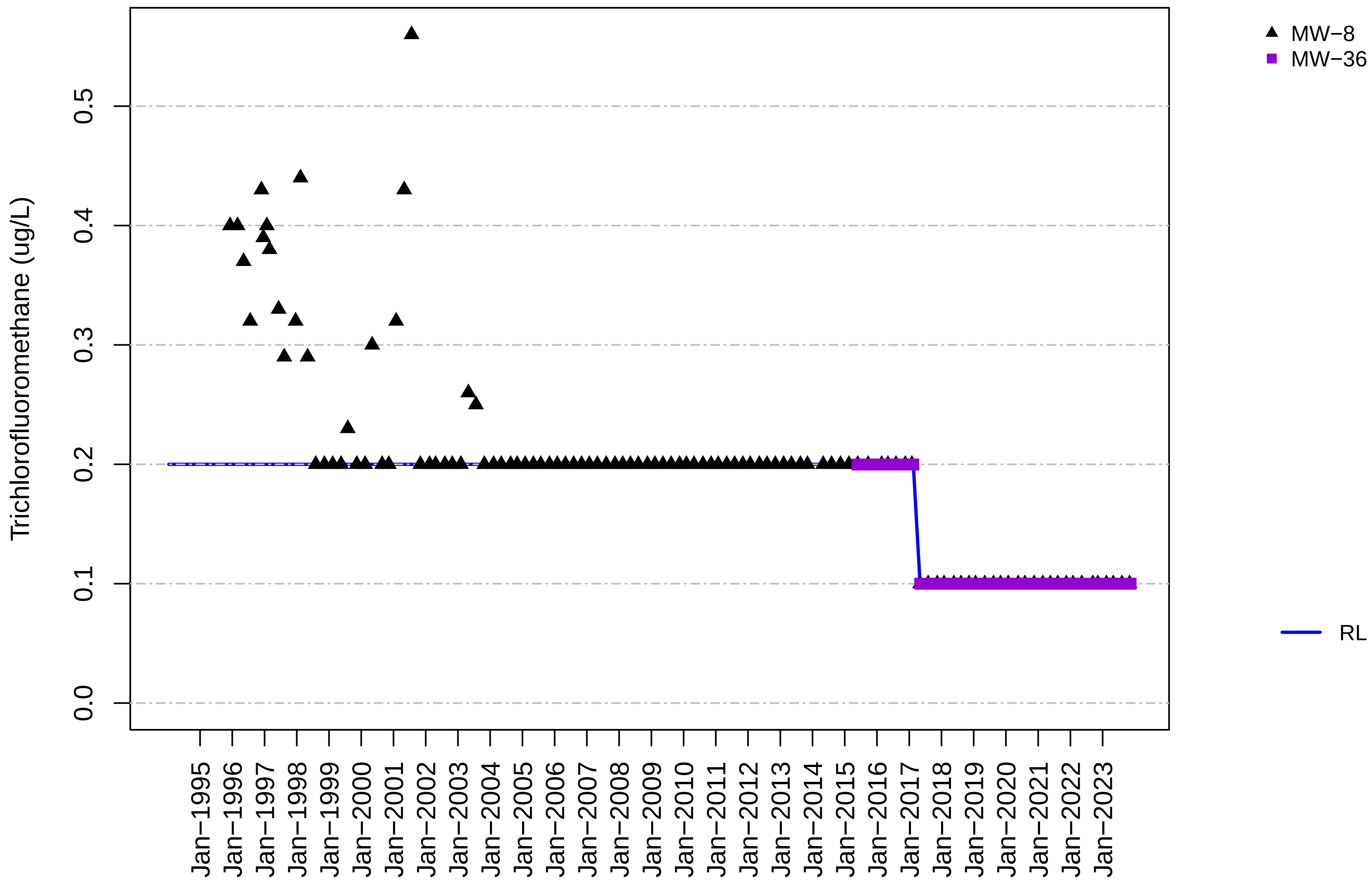


Figure B−86 Long−Term
Channel Cc3
Vinyl chloride

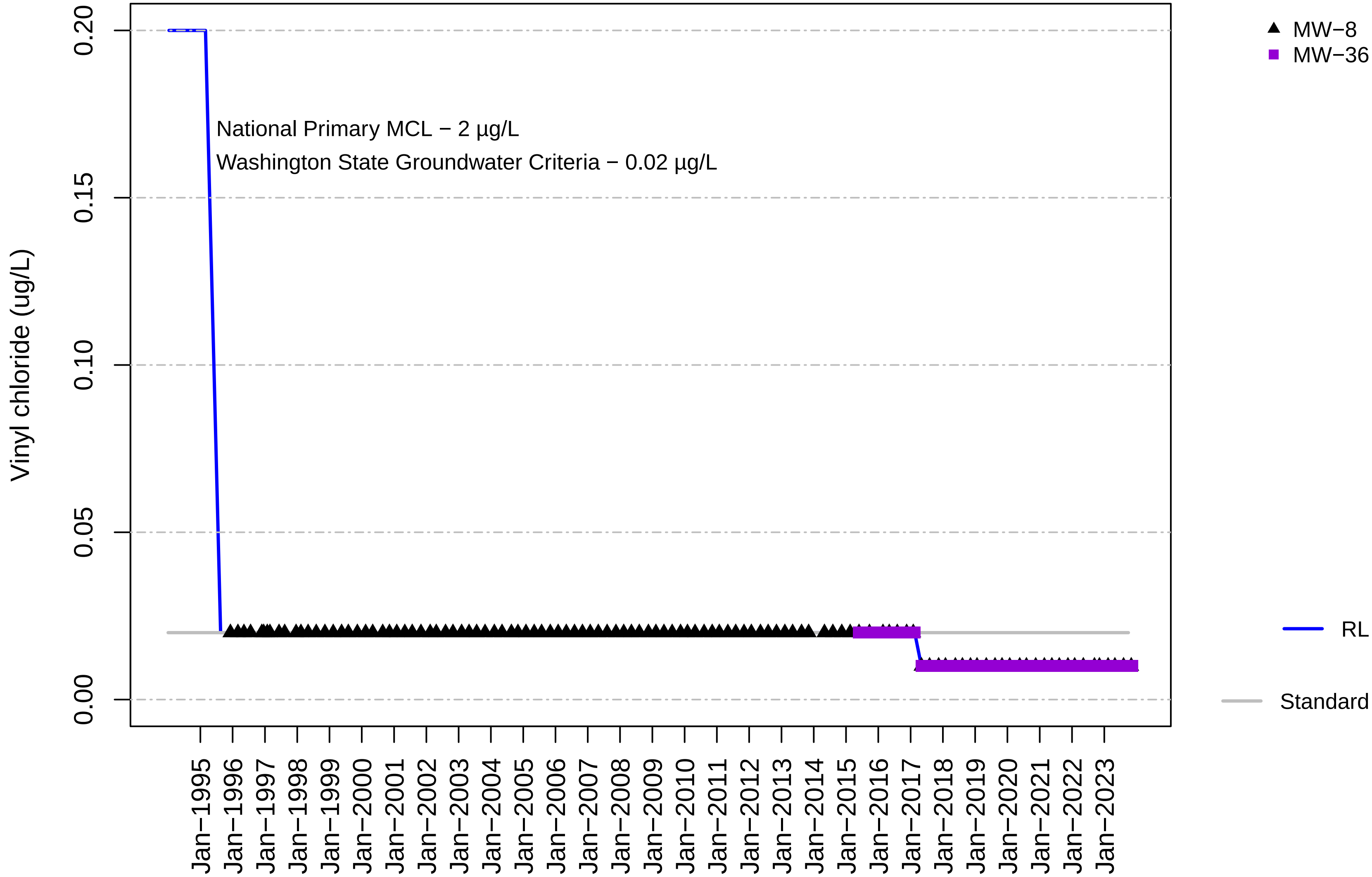


Figure B−61 Short−Term
Channel Cc3
Field pH

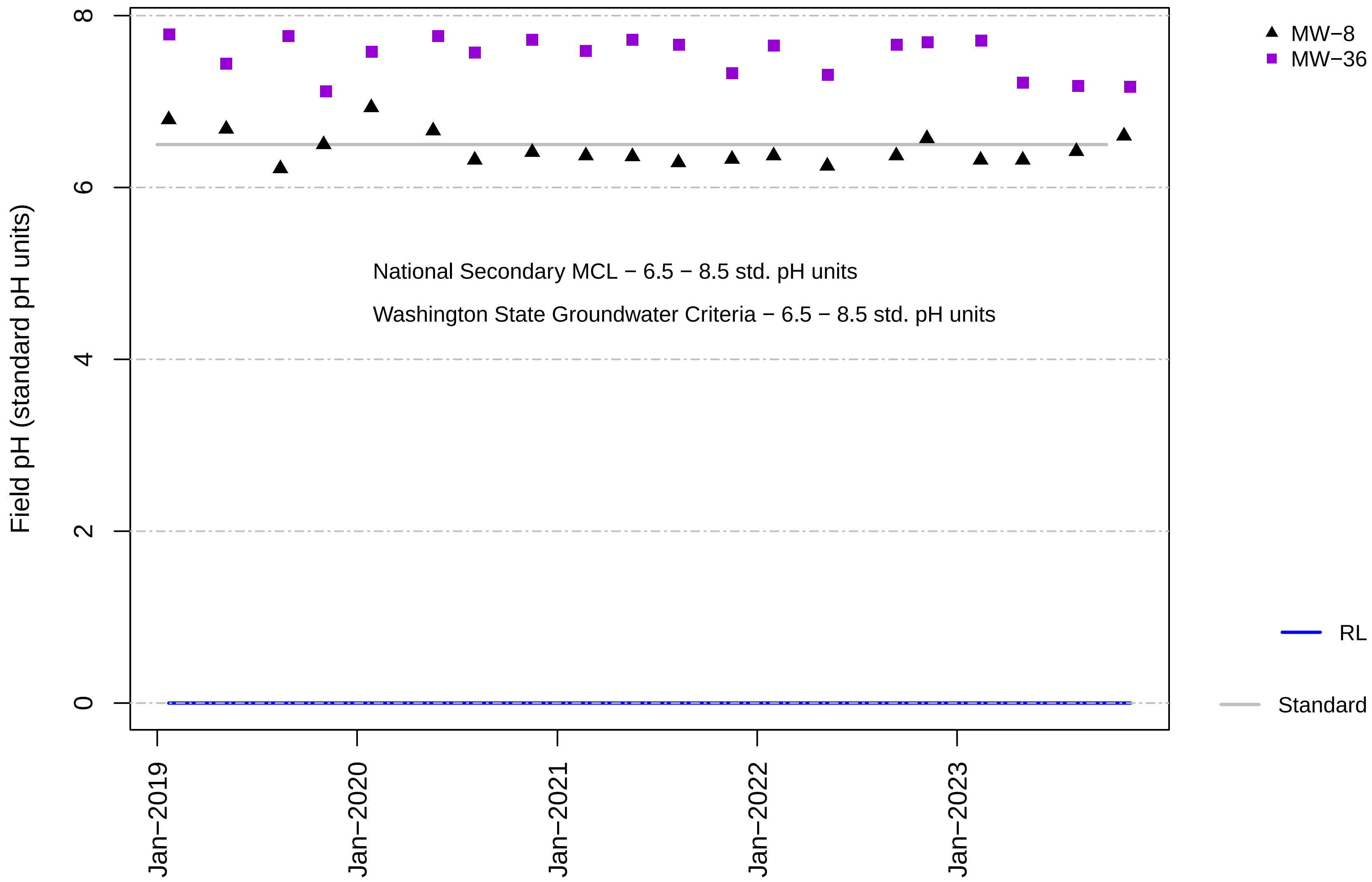
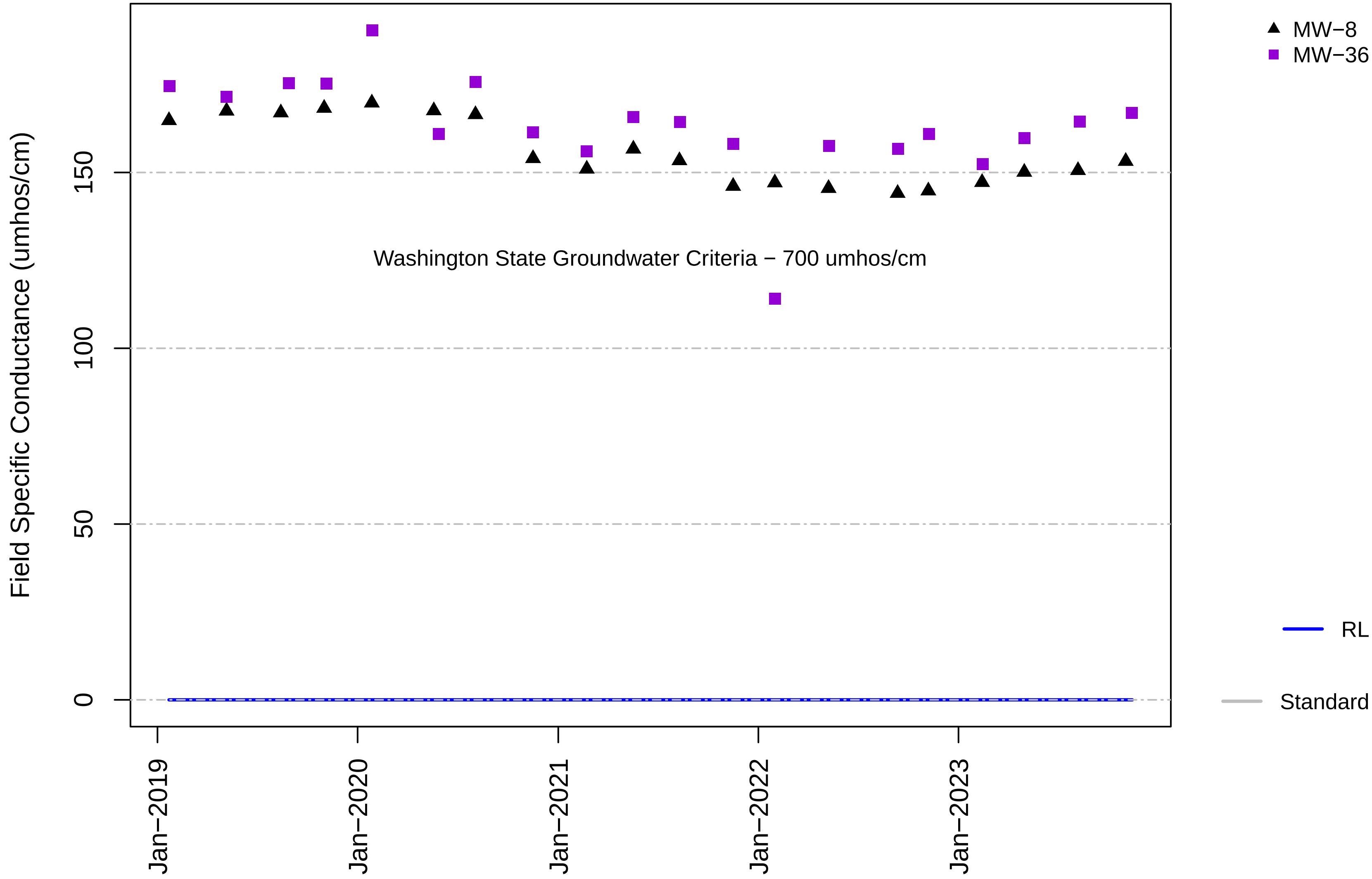


Figure B−62 Short−Term
Channel Cc3
Field Specific Conductance



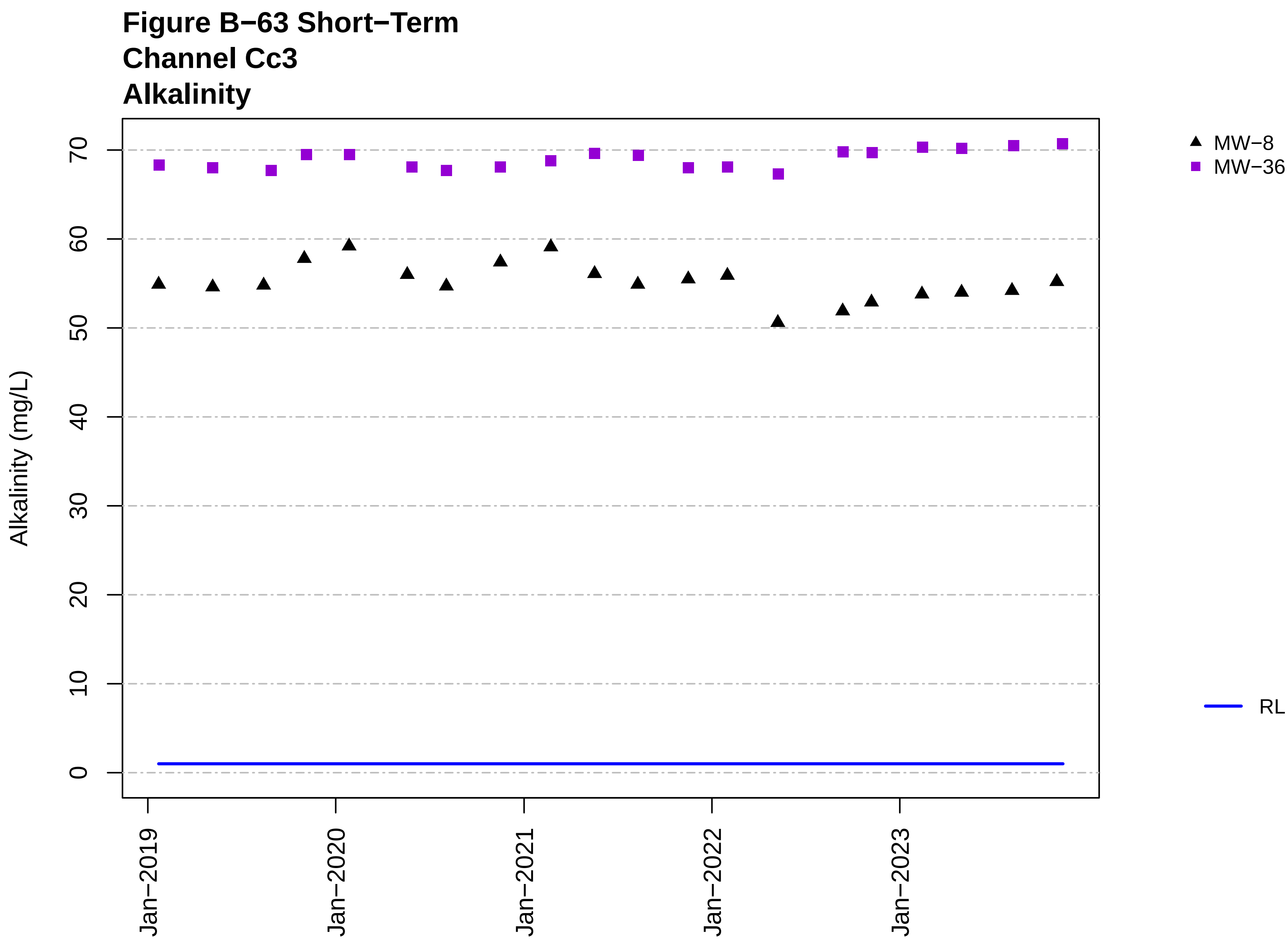


Figure B−63 Short−Term
Channel Cc3
Alkalinity
Alkalinity (mg/L)
0
10
20
30
40
50
60
70
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
MW−8
MW−36
RL

Figure B−64 Short−Term Channel Cc3 Ammonia

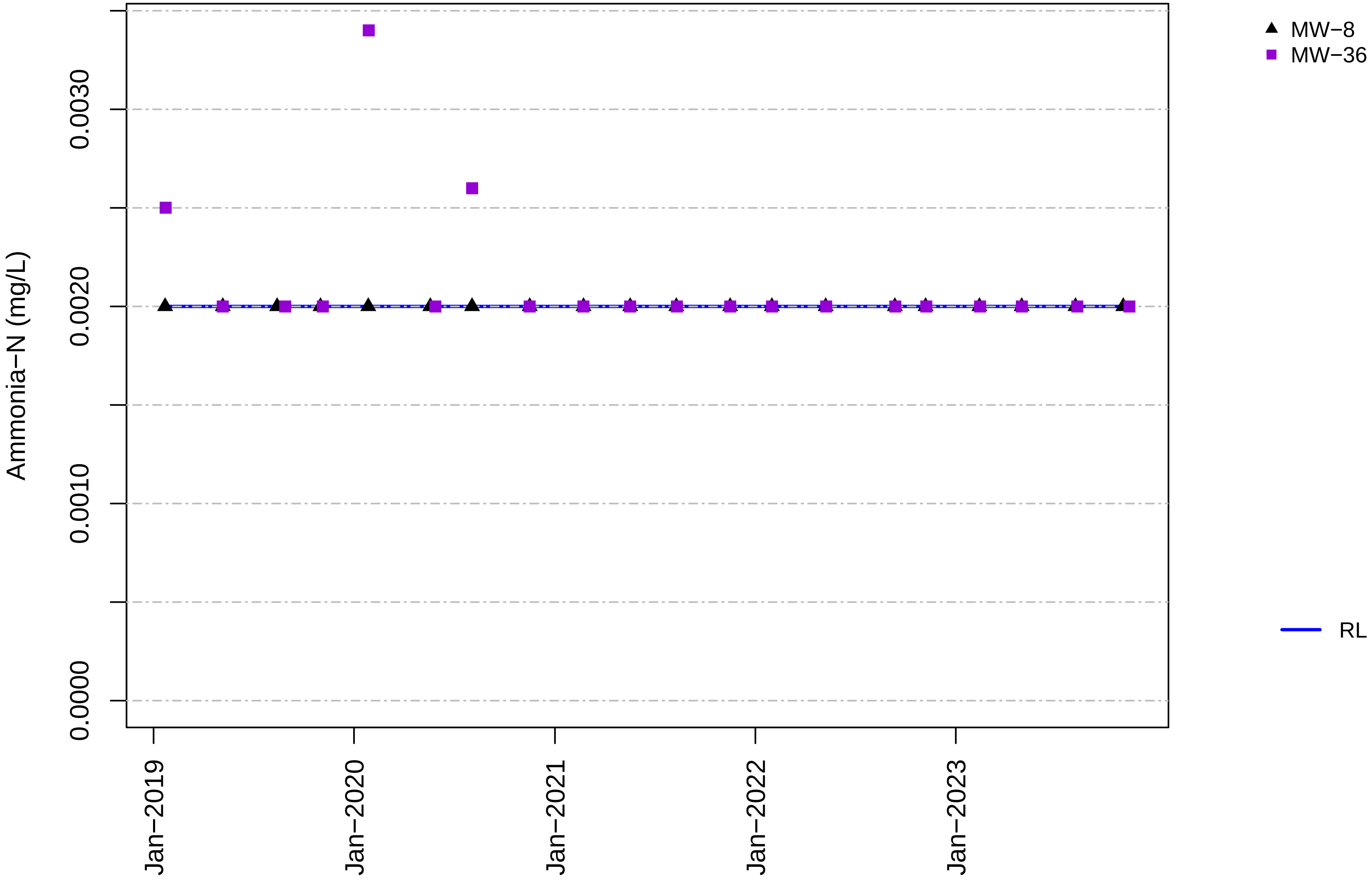


Figure B−65 Short−Term
Channel Cc3
Chloride

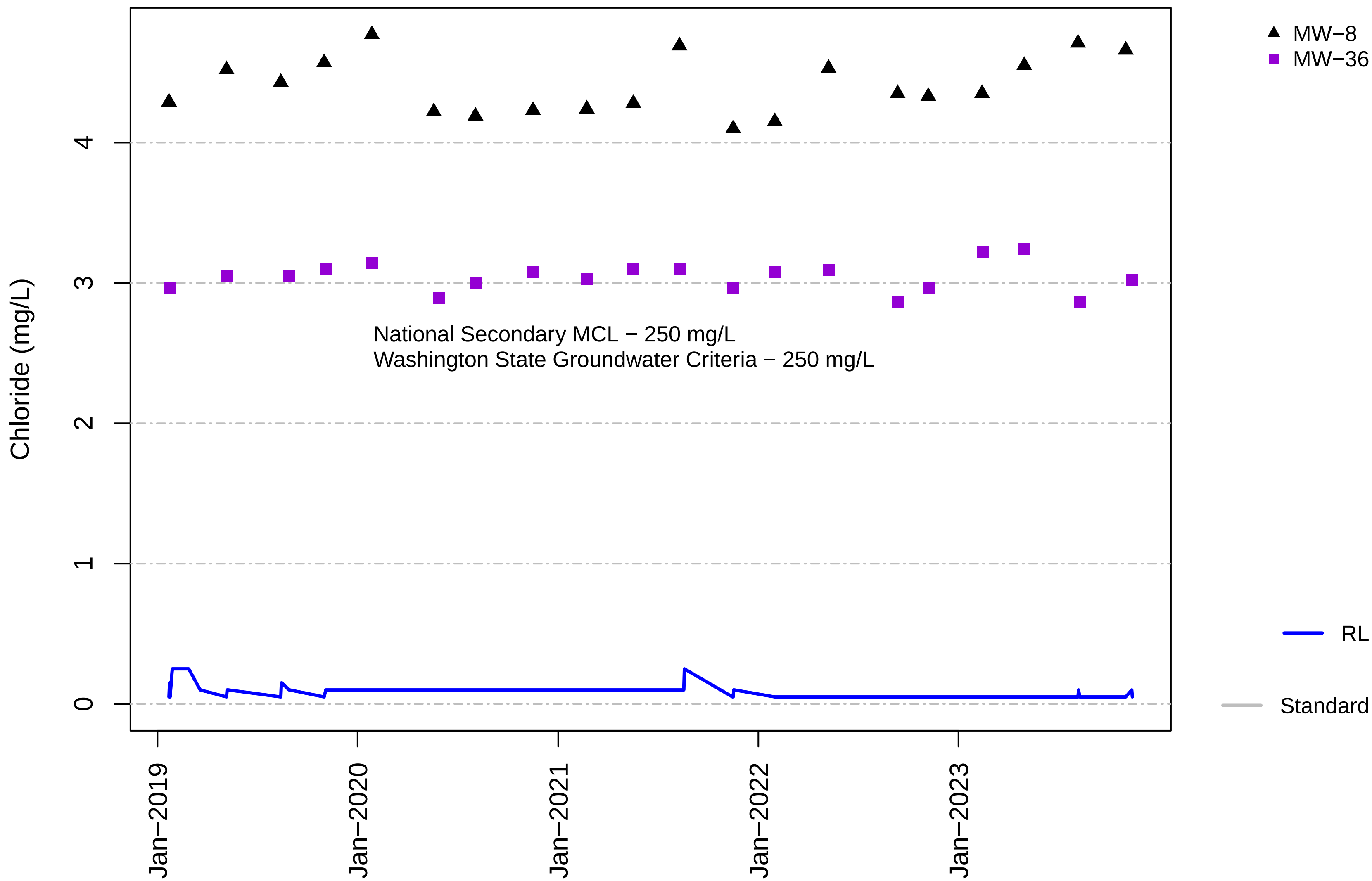


Figure B−66 Short−Term
Channel Cc3
Nitrate

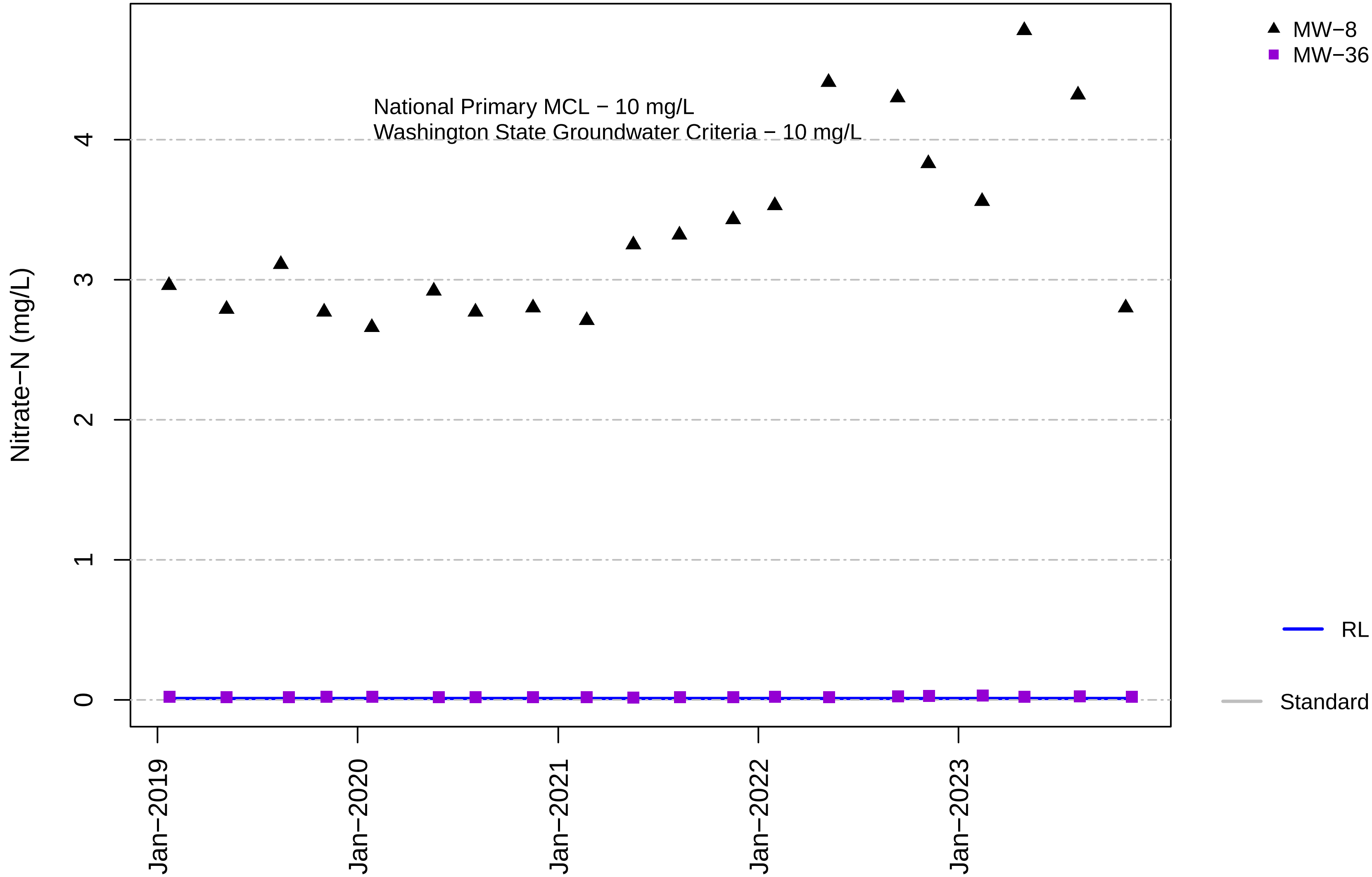


Figure B−67 Short−Term
Channel Cc3
Sulfate

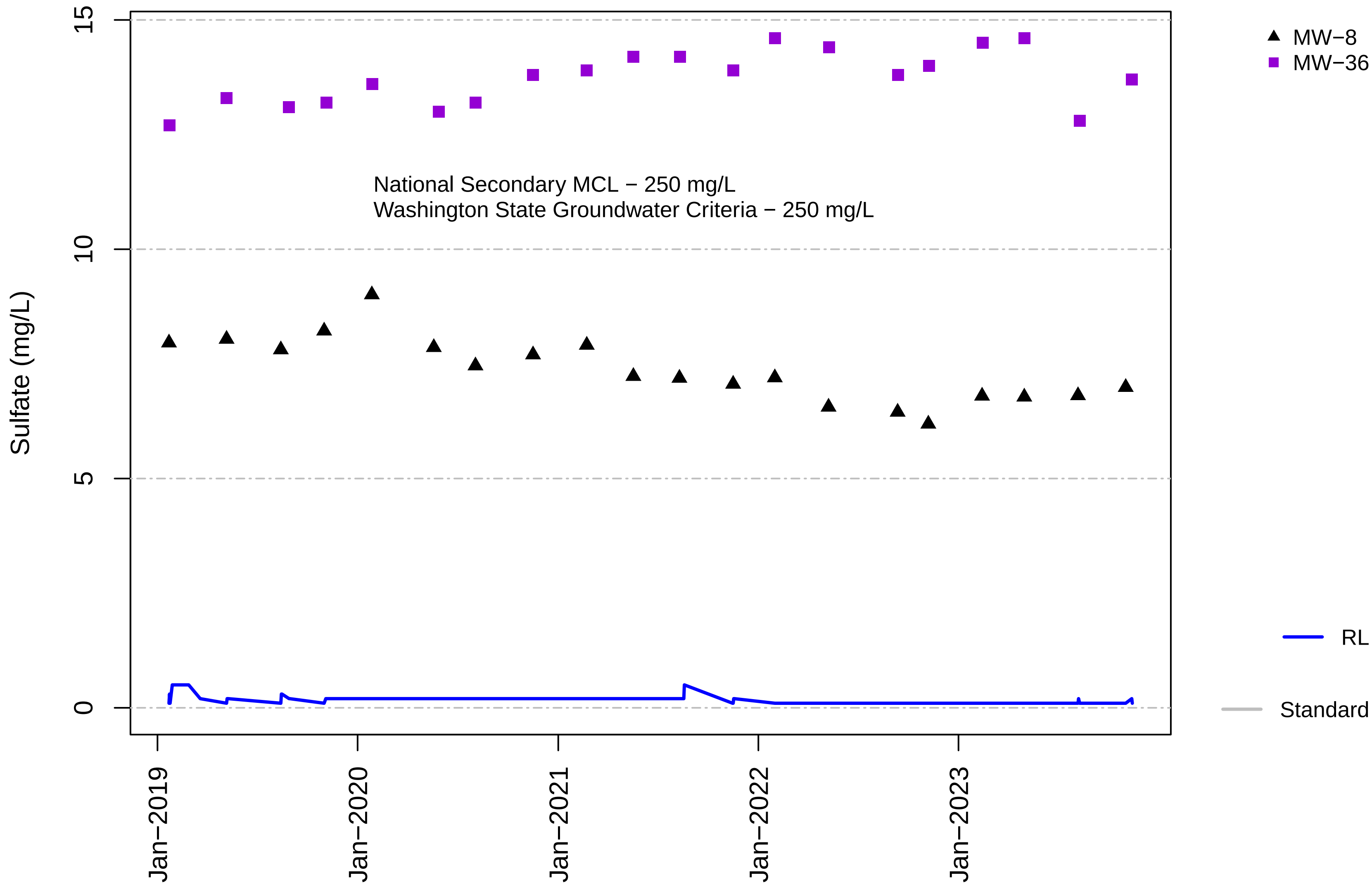


Figure B−68 Short−Term
Channel Cc3
Total Dissolved Solids

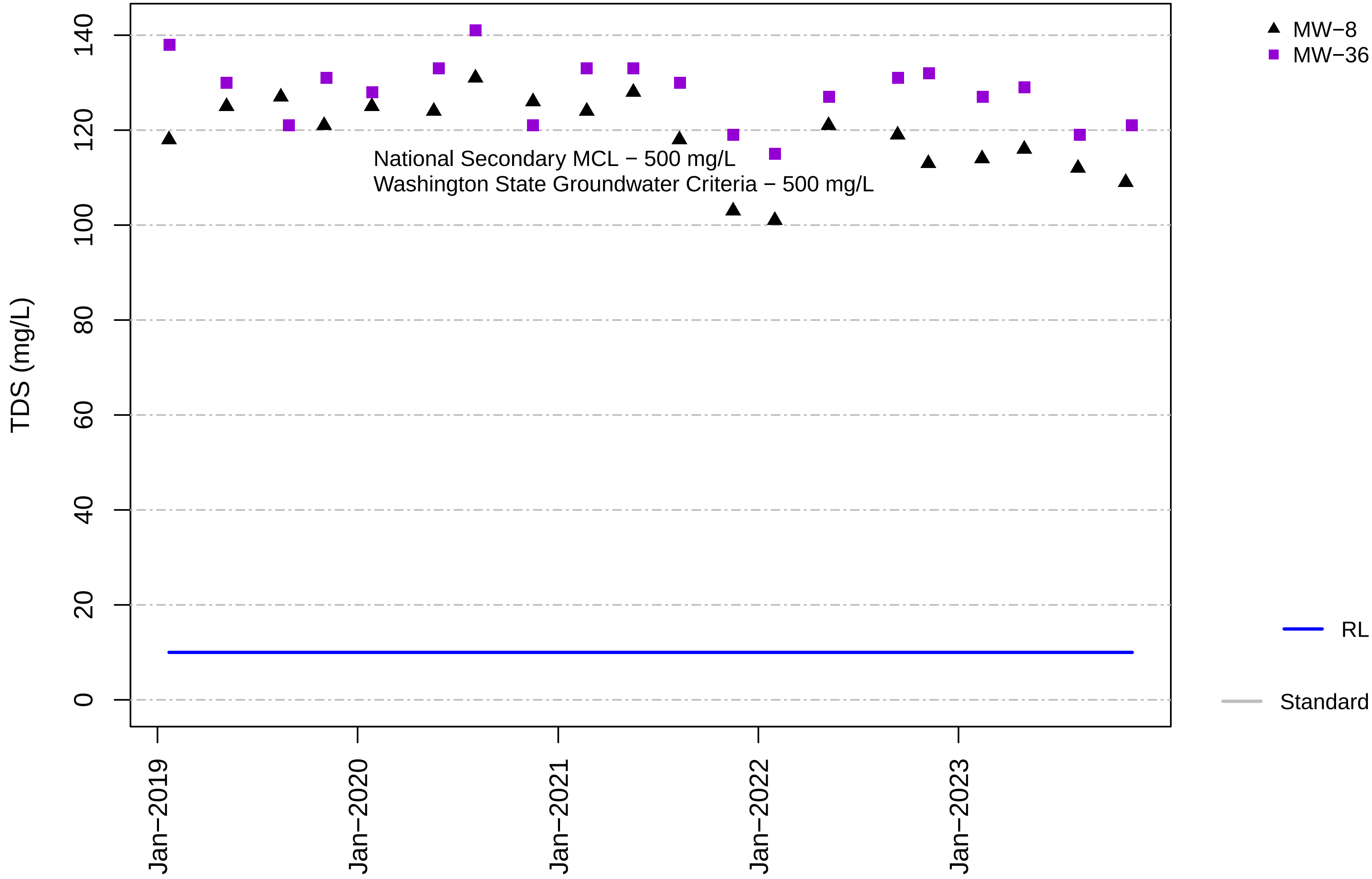


Figure B−69 Short−Term
Channel Cc3
Arsenic

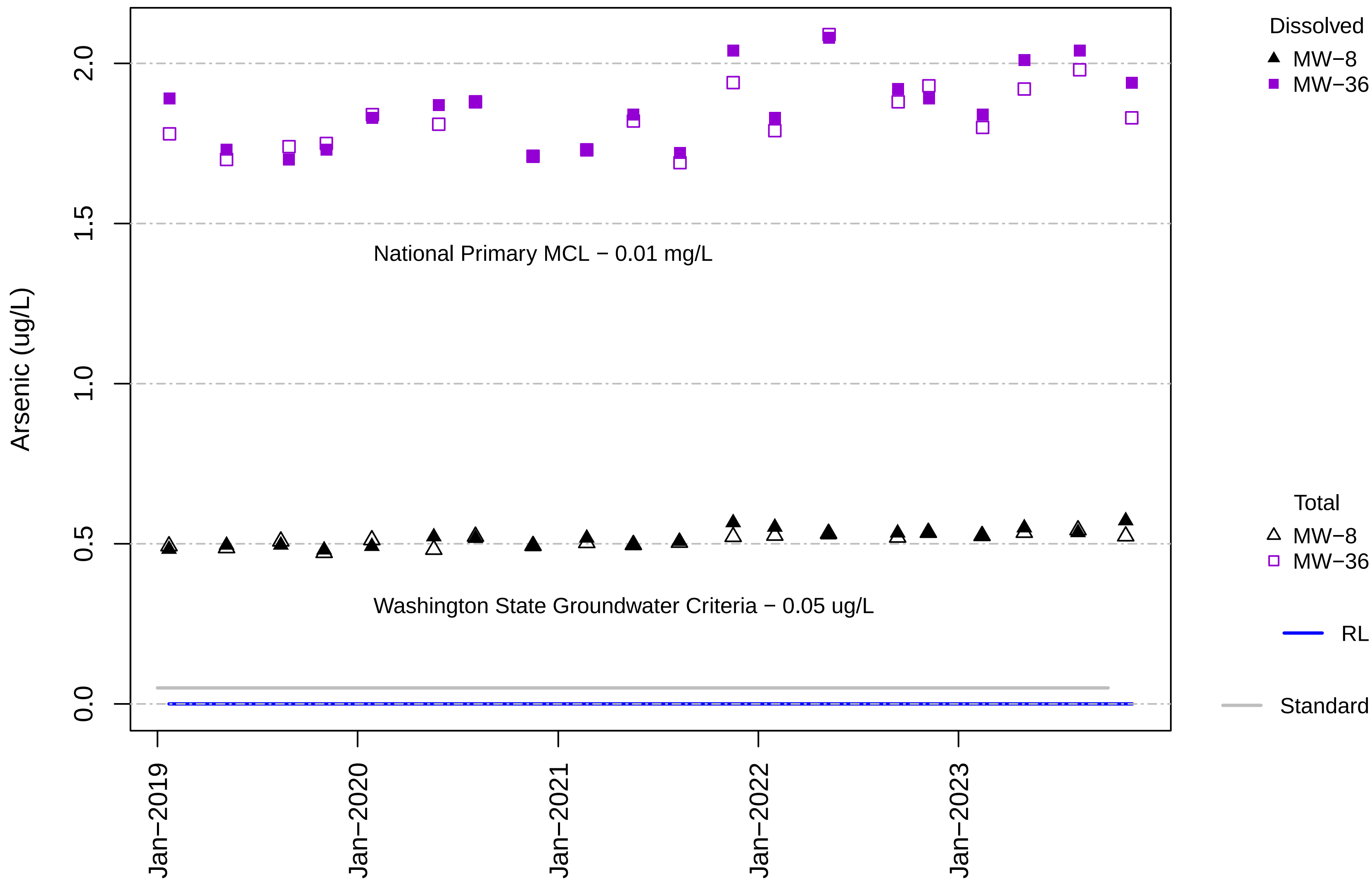


Figure B−70 Short−Term
Channel Cc3
Calcium

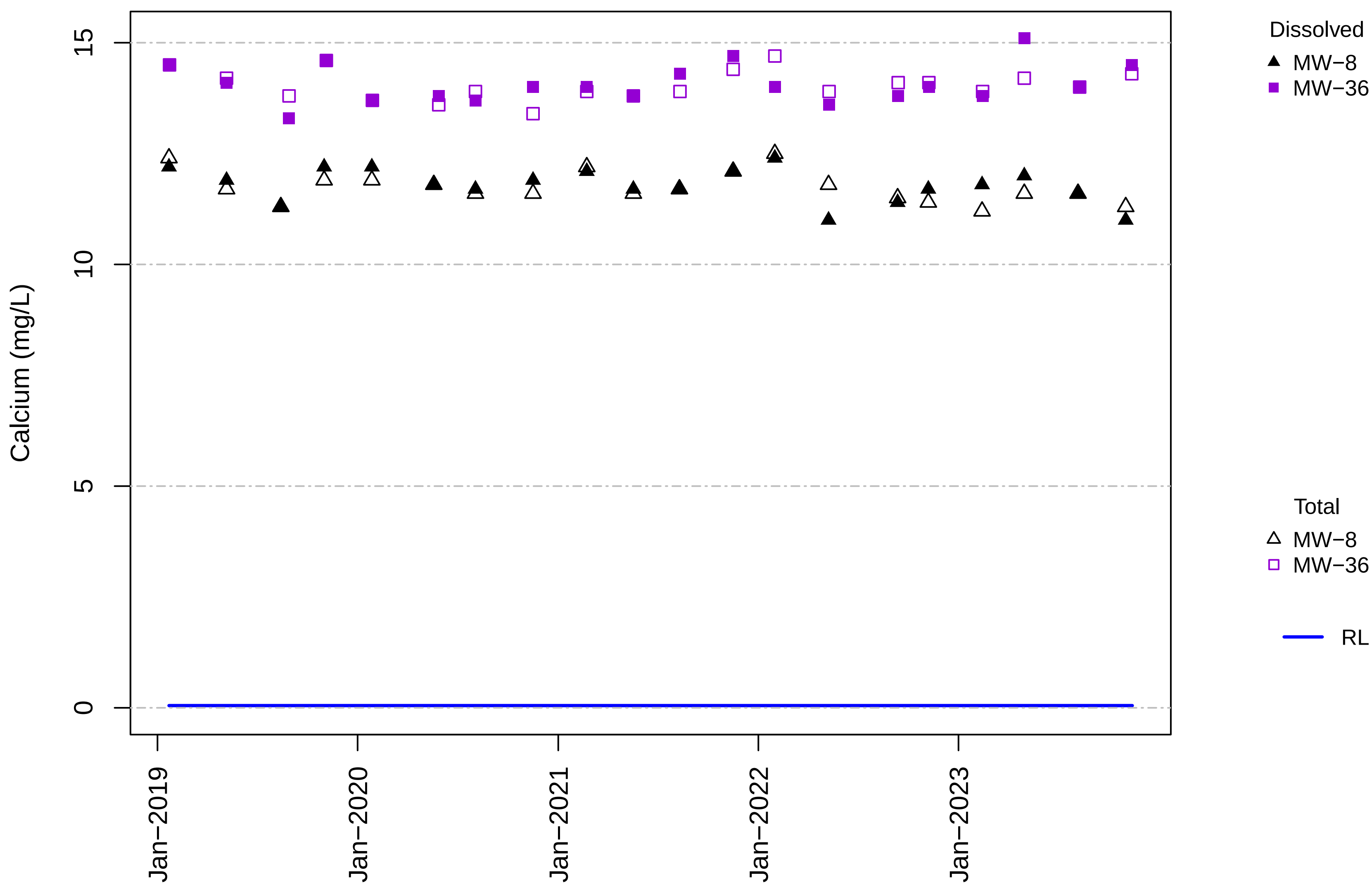


Figure B−71 Short−Term
Channel Cc3
Iron

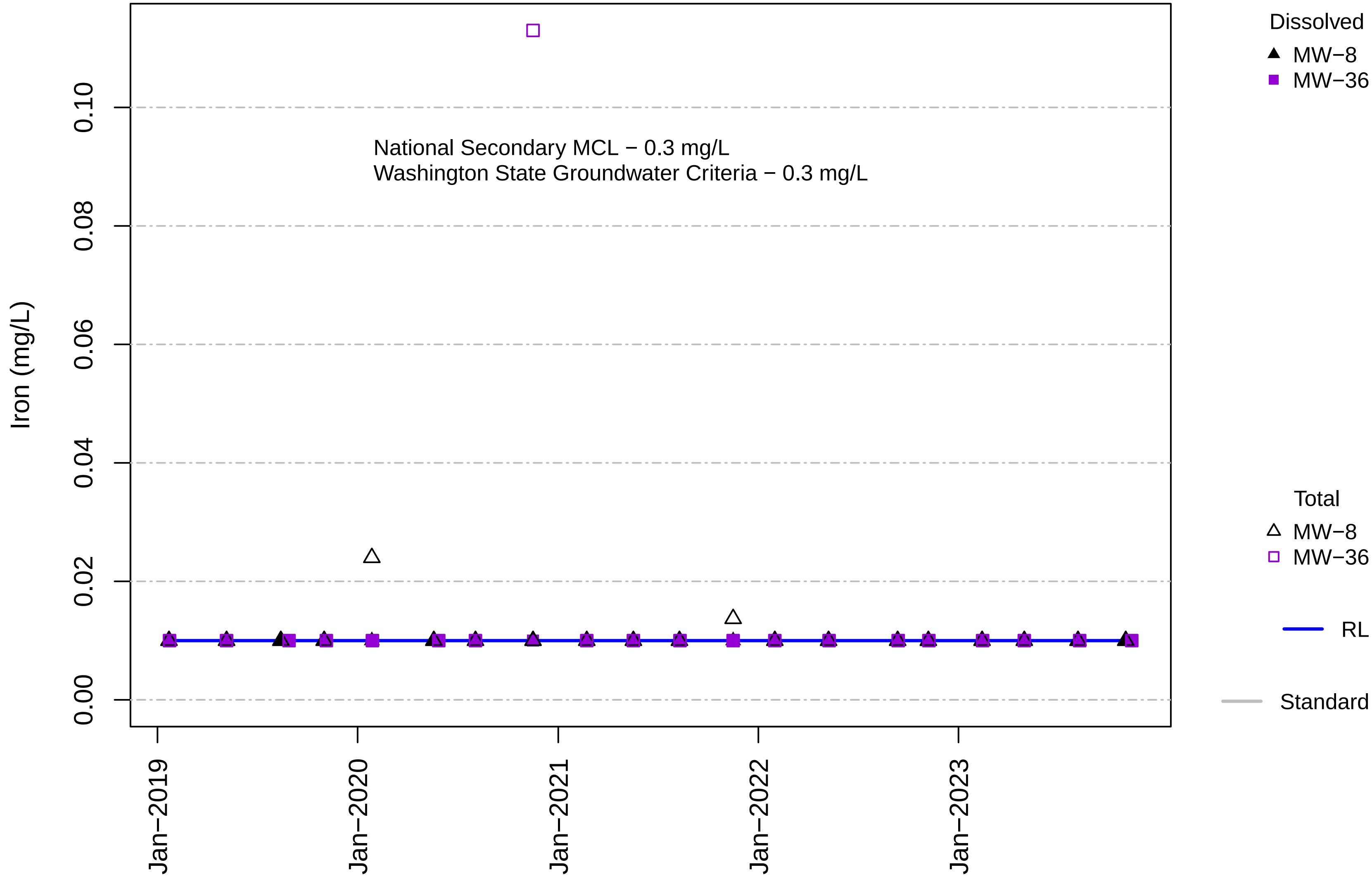


Figure B−72 Short−Term
Channel Cc3
Magnesium

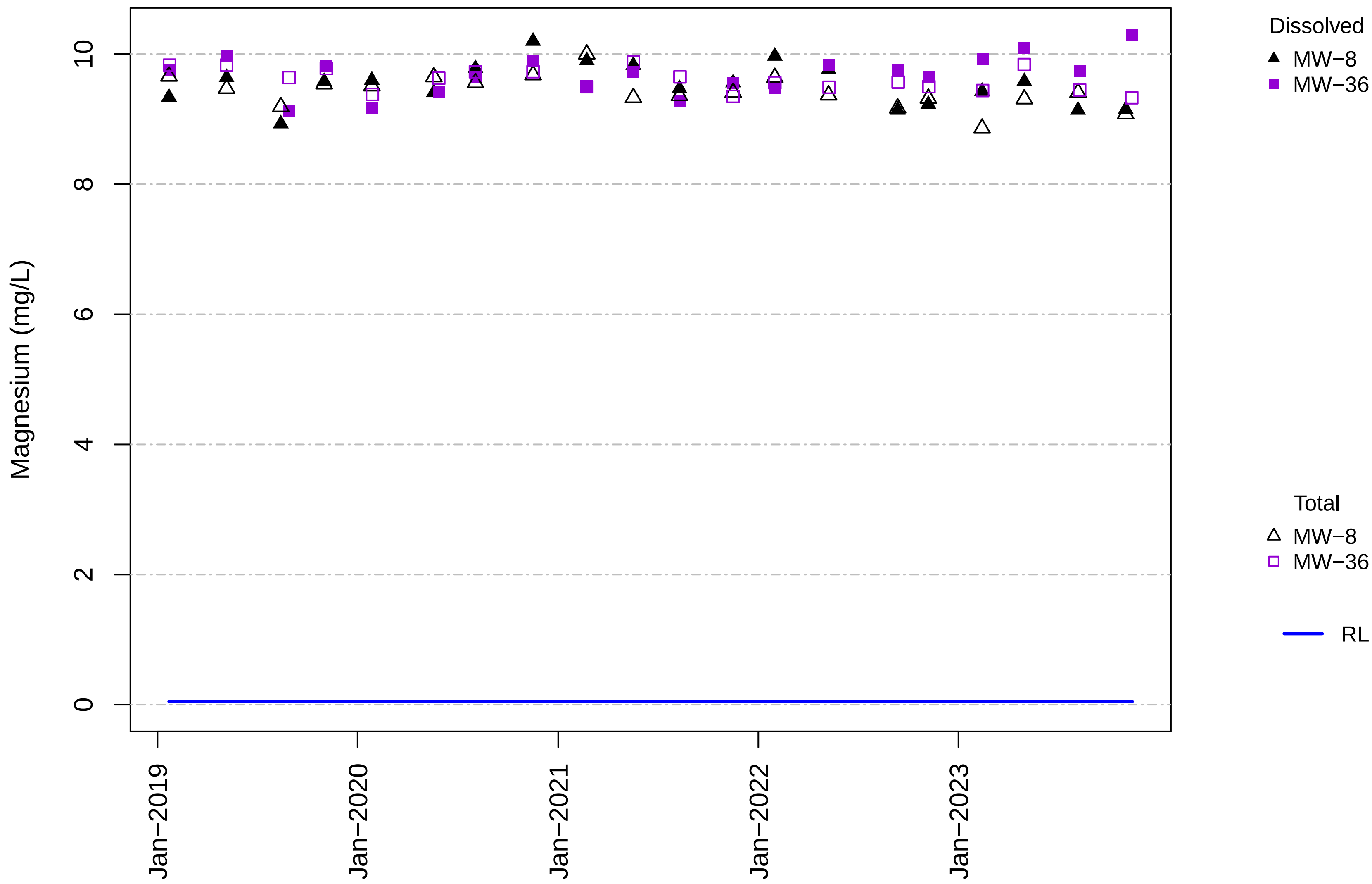


Figure B−73 Short−Term
Channel Cc3
Manganese

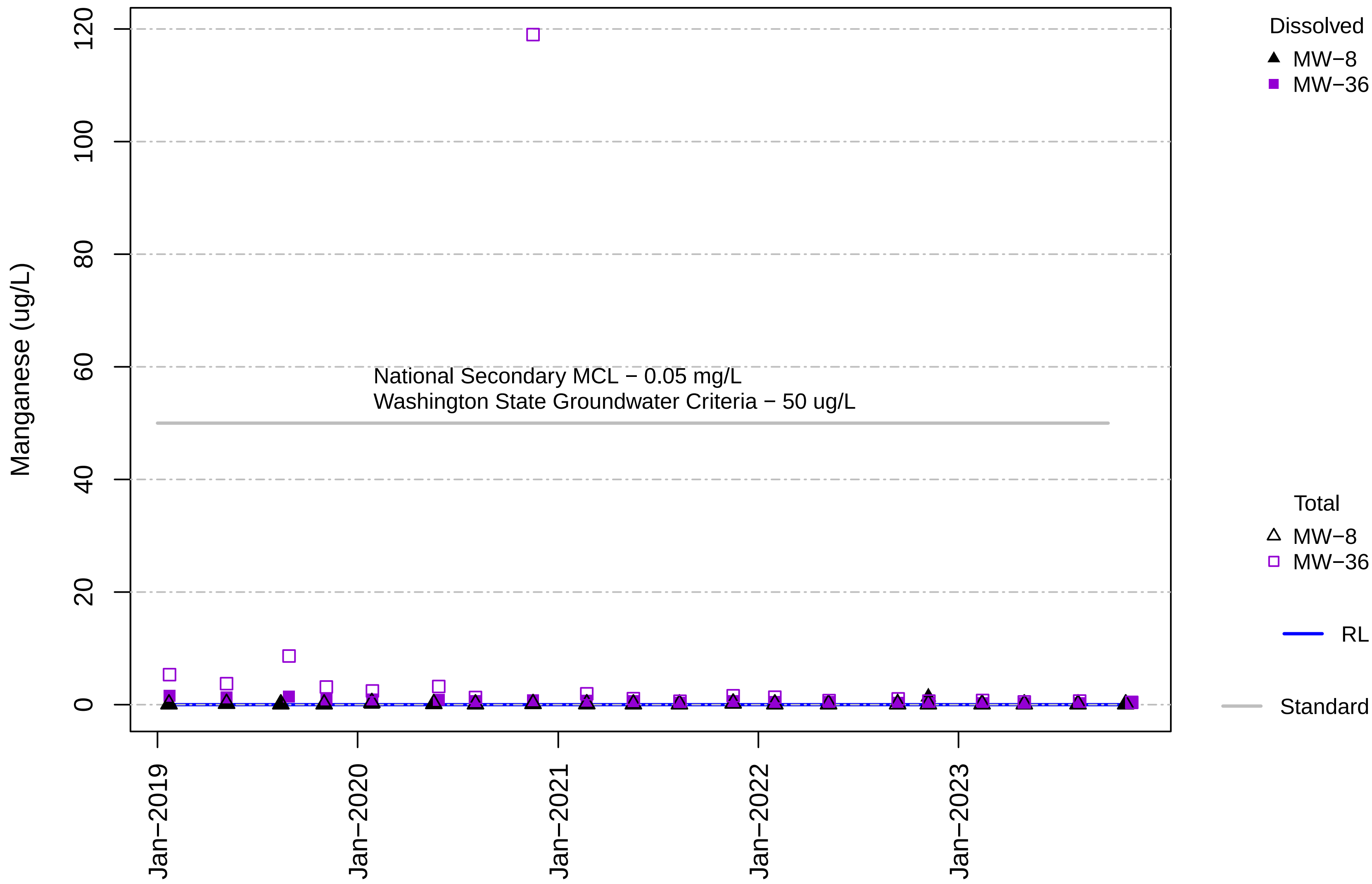


Figure B−74 Short−Term
Channel Cc3
Potassium

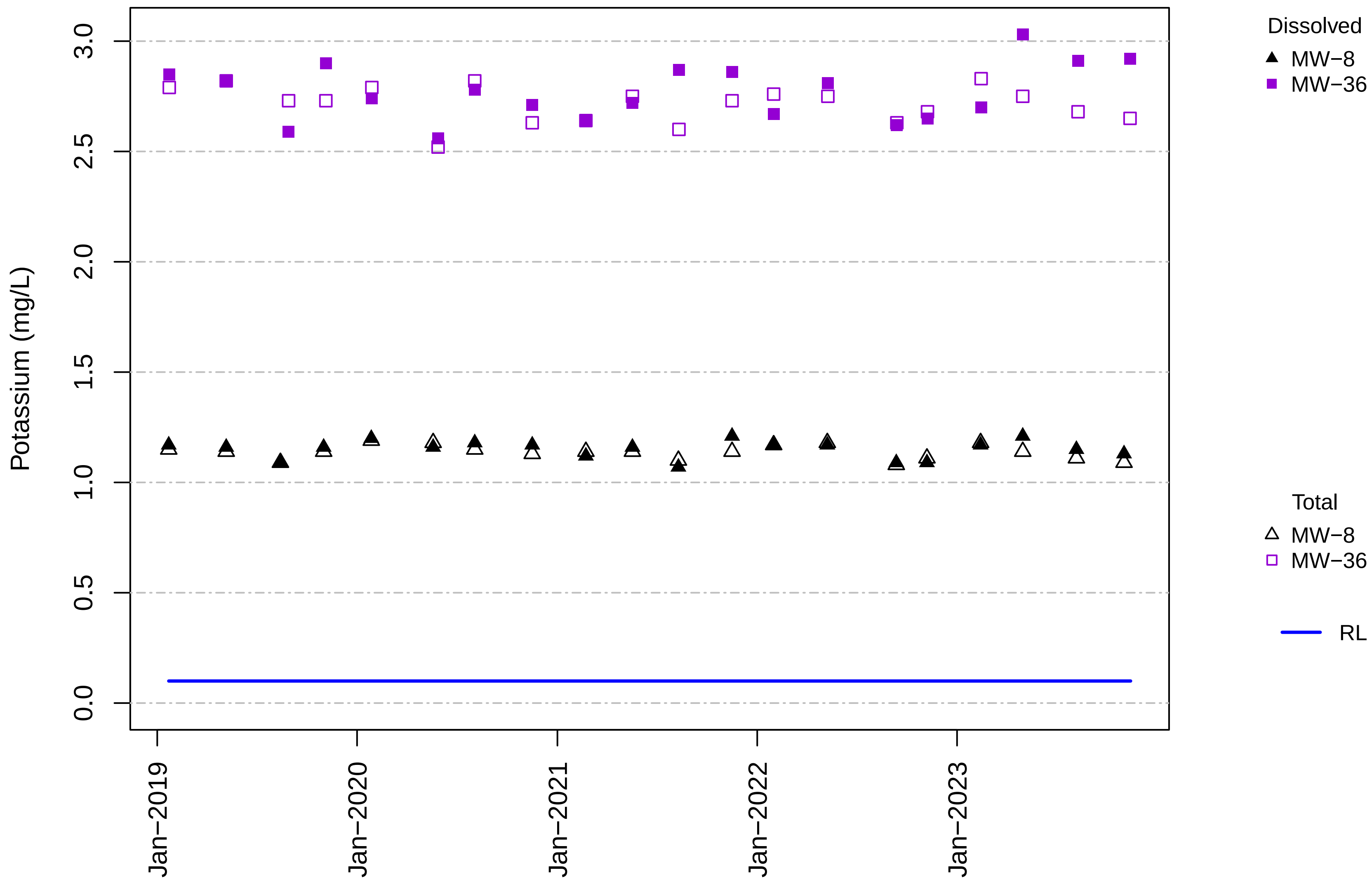


Figure B−75 Short−Term Channel Cc3 Sodium

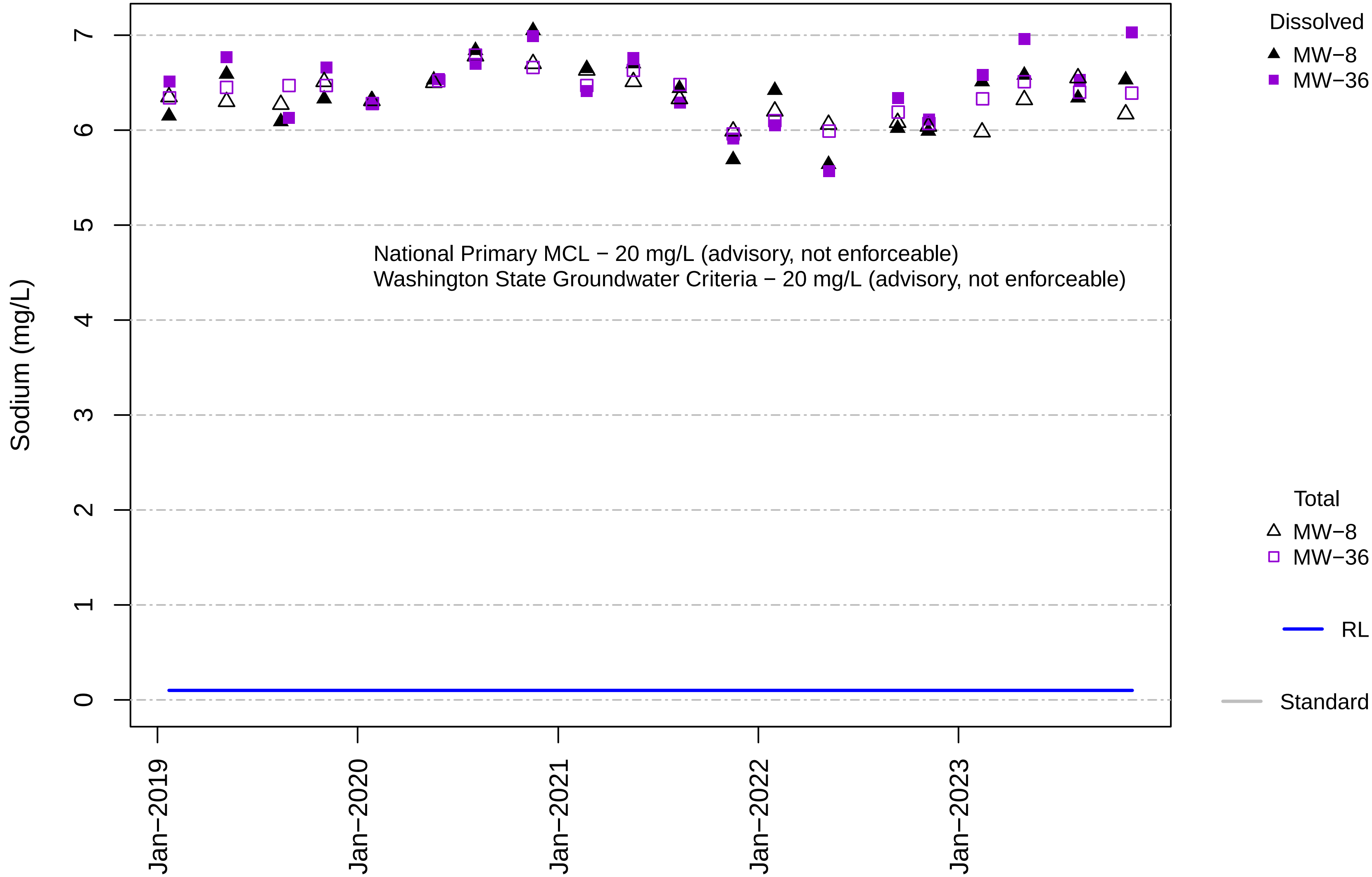


Figure B−76 Short−Term
Channel Cc3
1,1−Dichloroethane

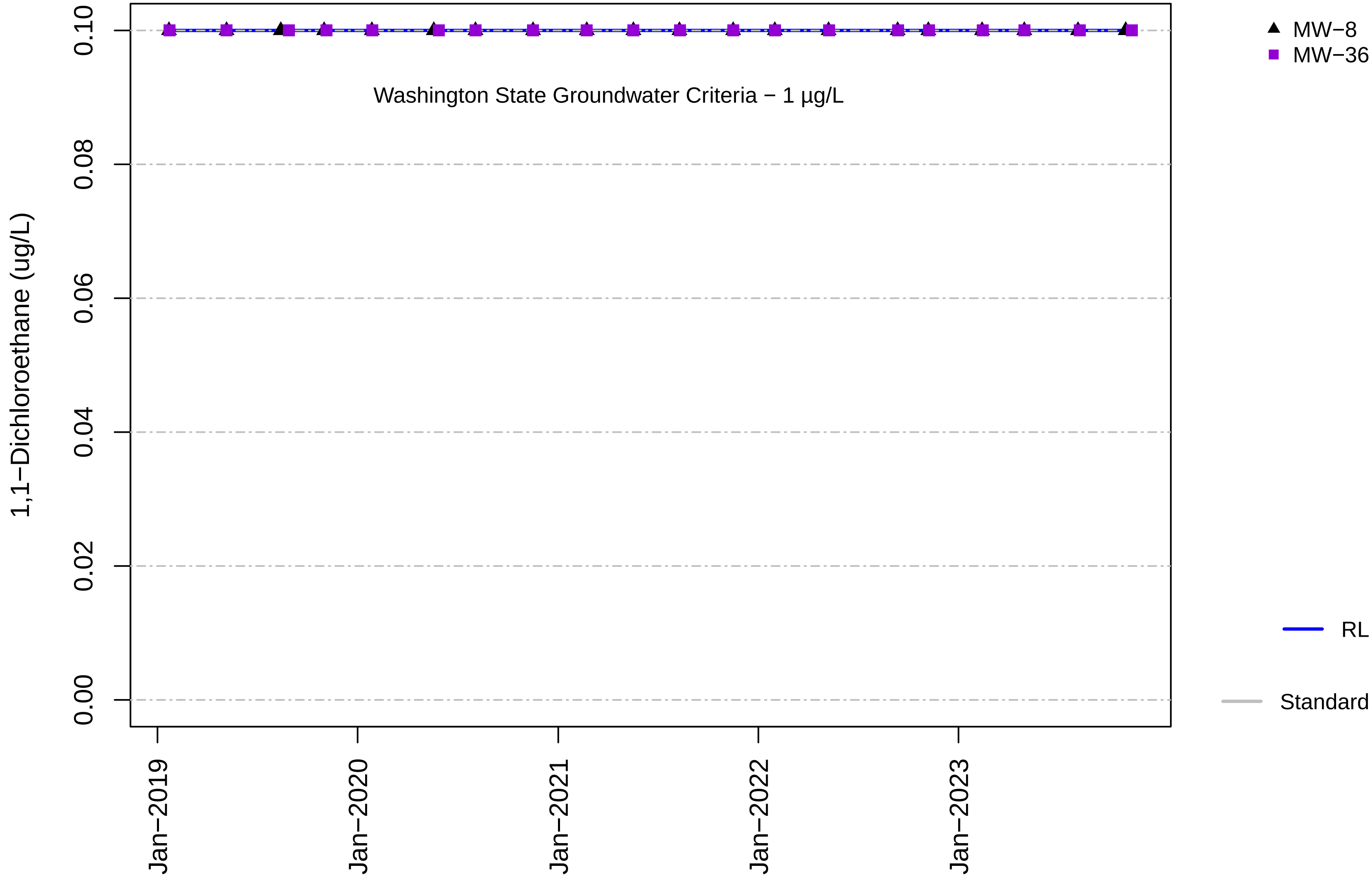


Figure B−77 Short−Term
Channel Cc3
1,2−Dichloropropane

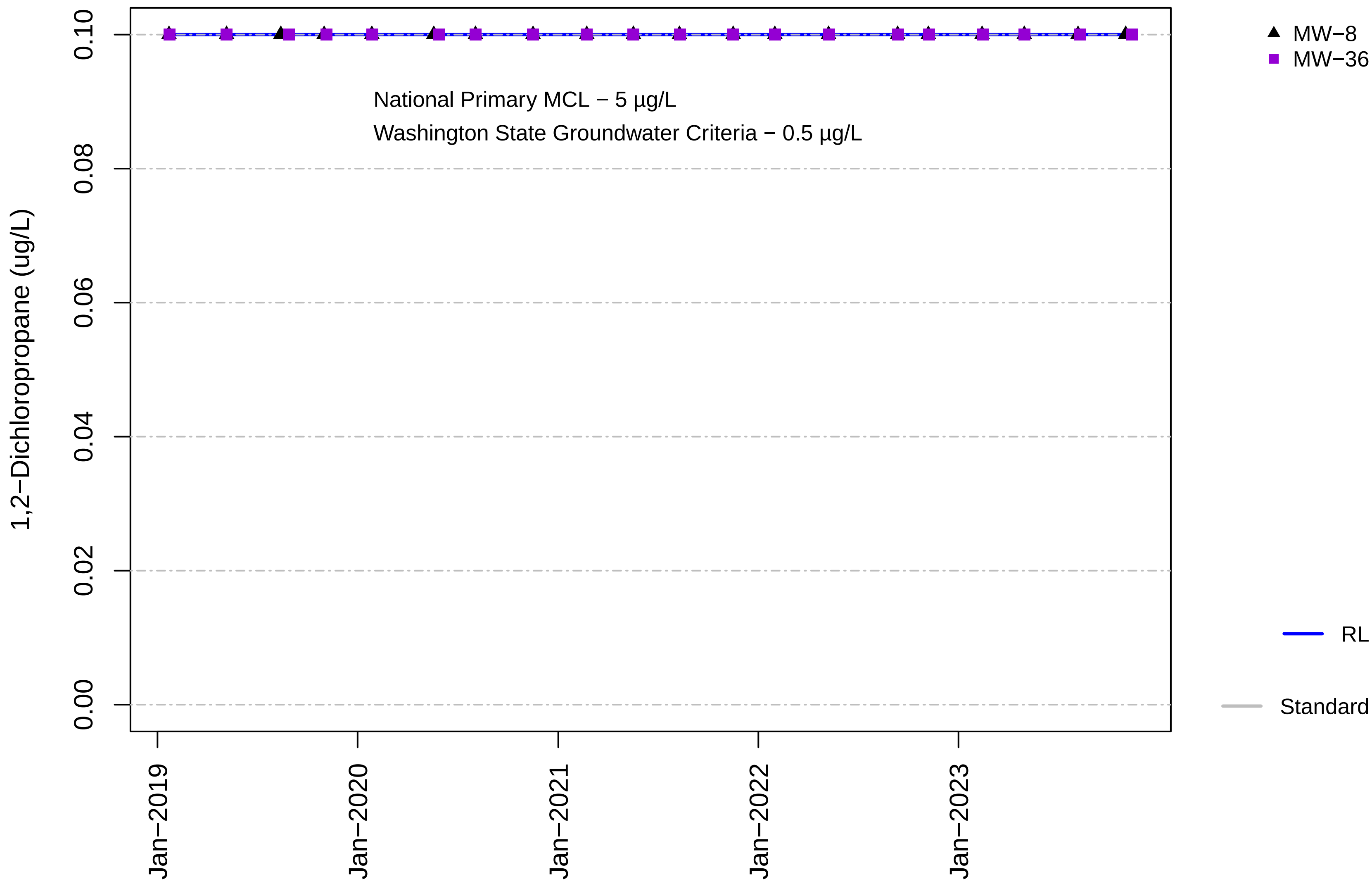


Figure B−78 Short−Term
Channel Cc3
Benzene

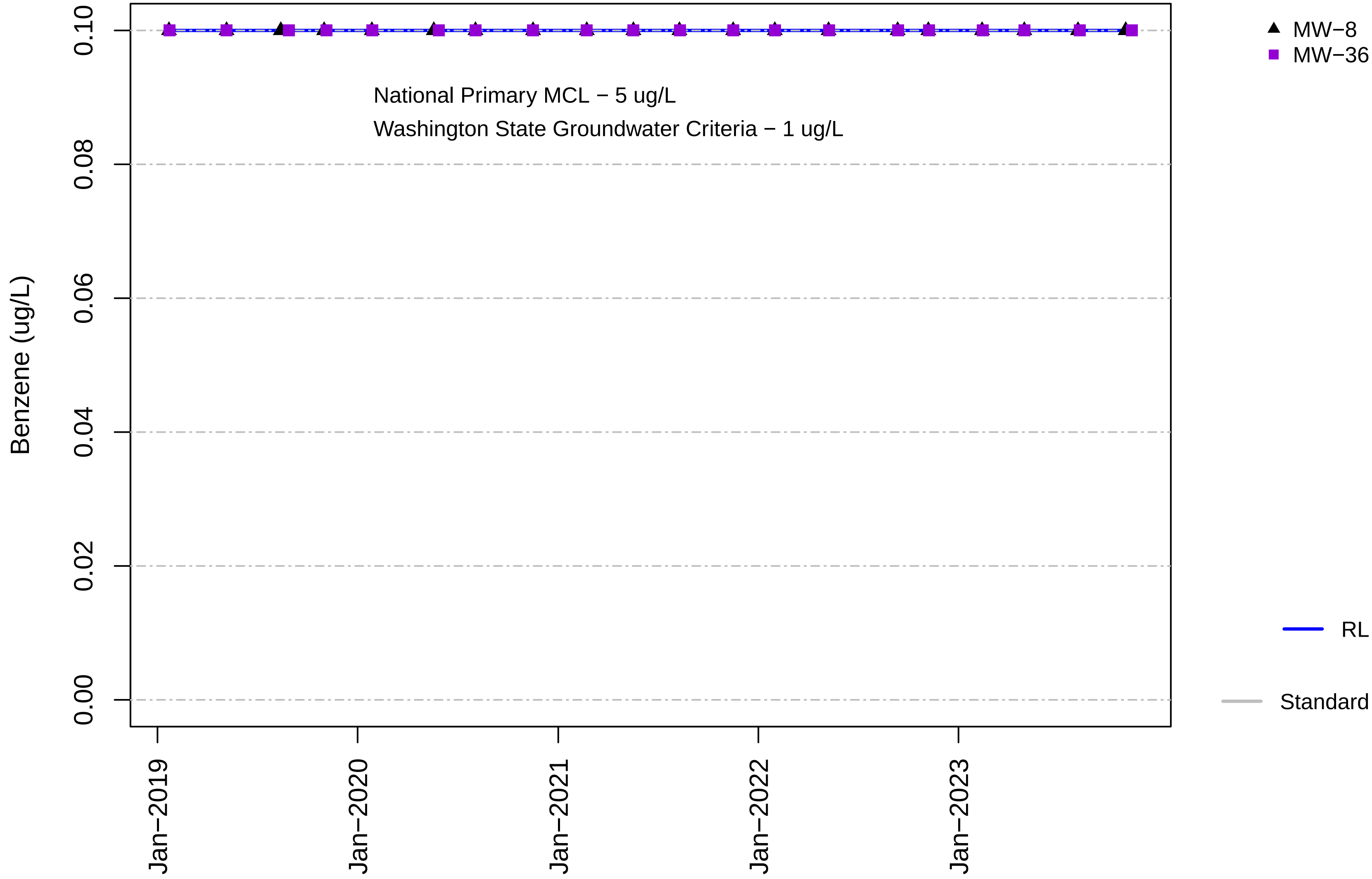


Figure B−79 Short−Term
Channel Cc3
Chloroethane

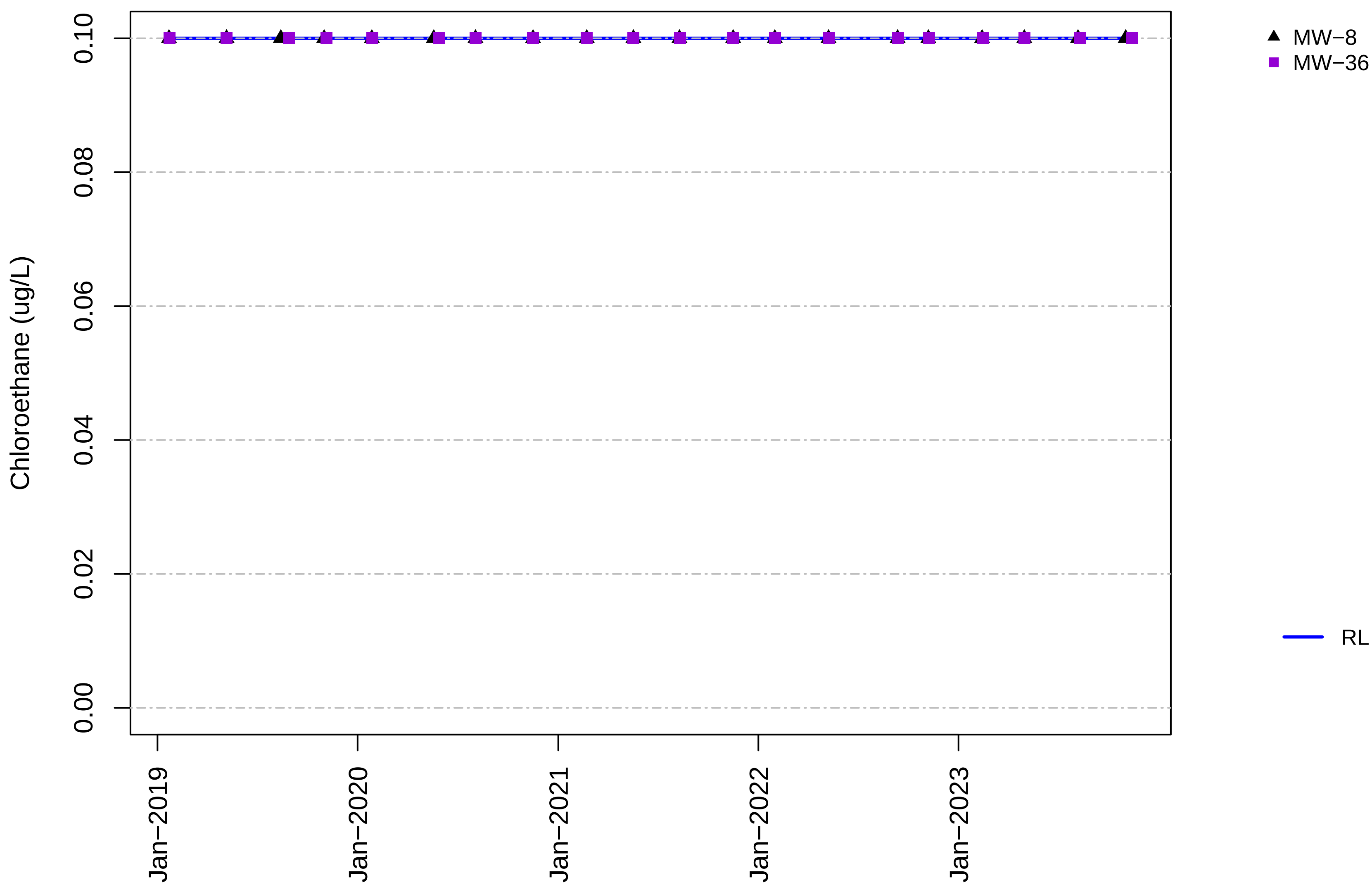


Figure B−80 Short−Term Channel Cc3 cis−1,2−Dichloroethene

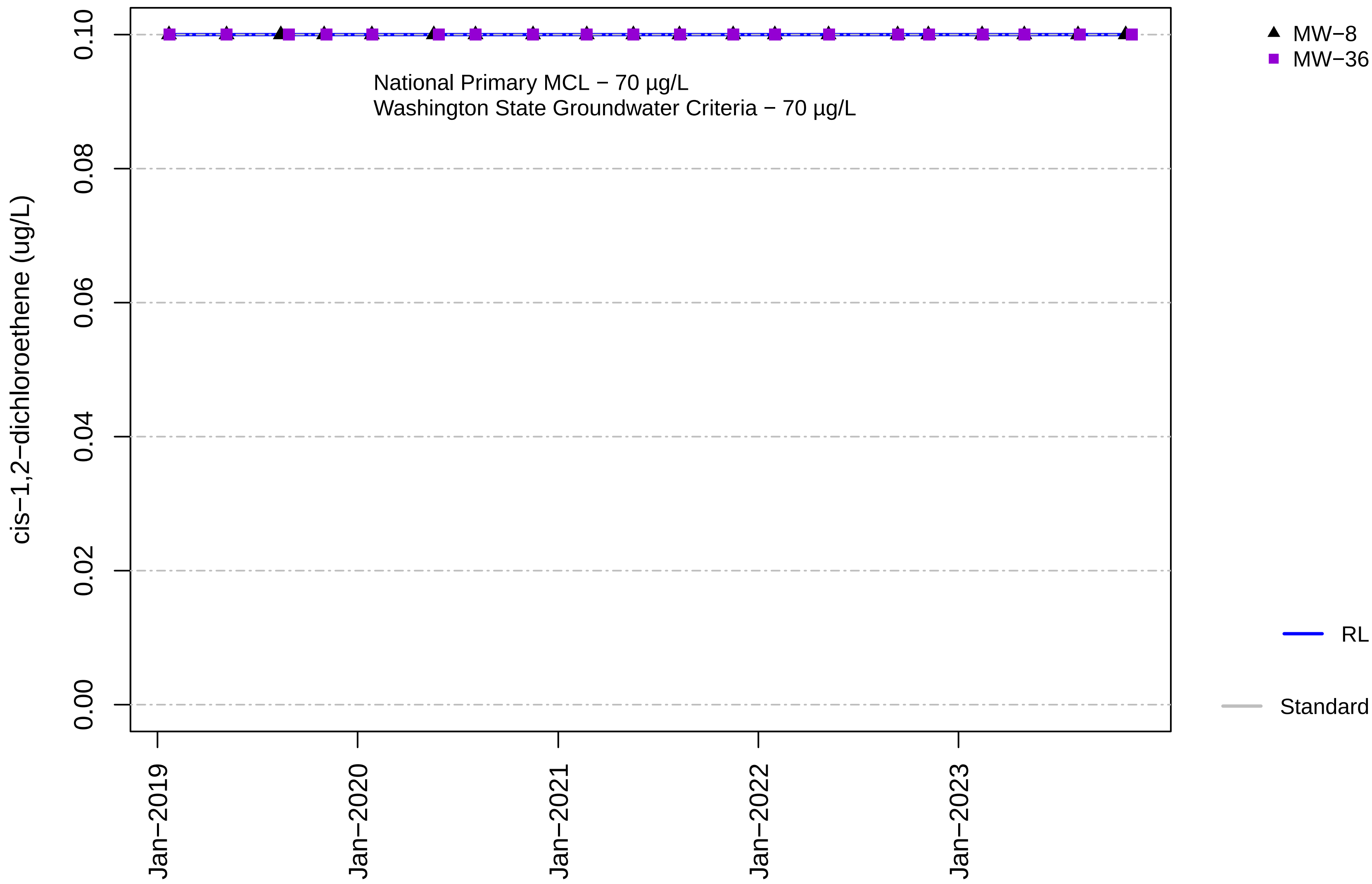


Figure B−81 Short−Term
Channel Cc3
Dichlorodifluoromethane

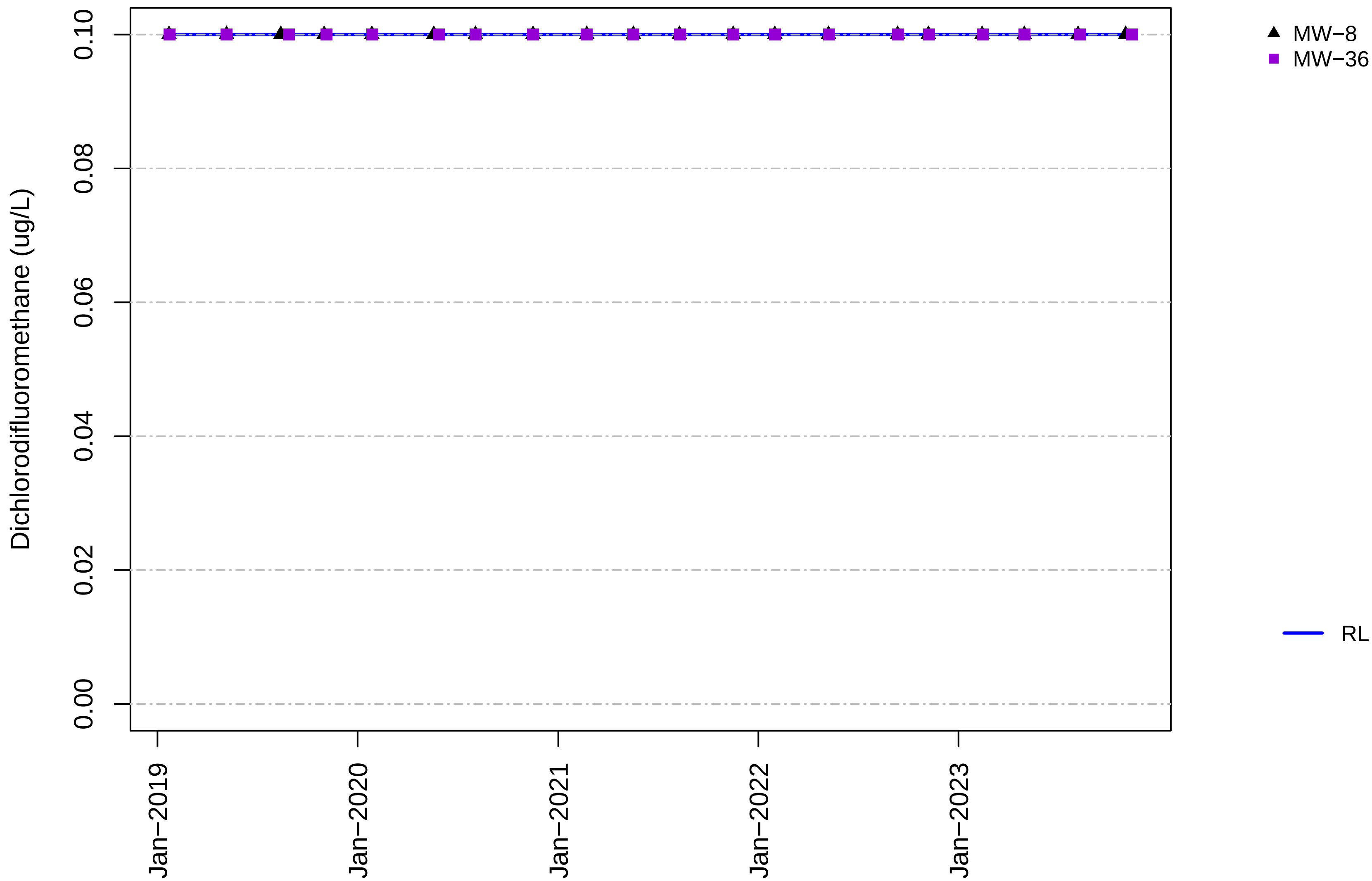


Figure B−82 Short−Term Channel Cc3 Tetrachloroethene

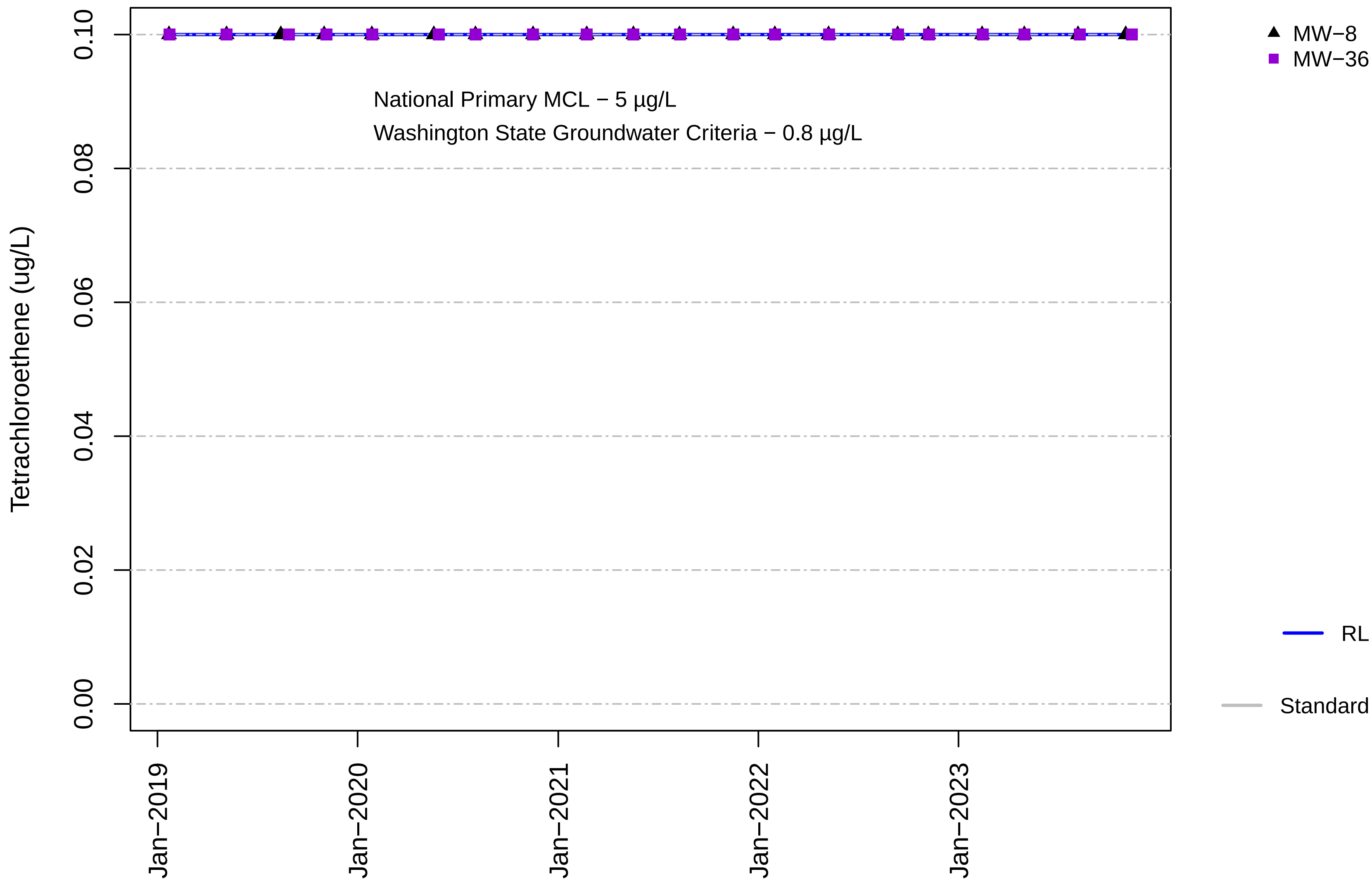


Figure B−83 Short−Term
Channel Cc3
Toluene

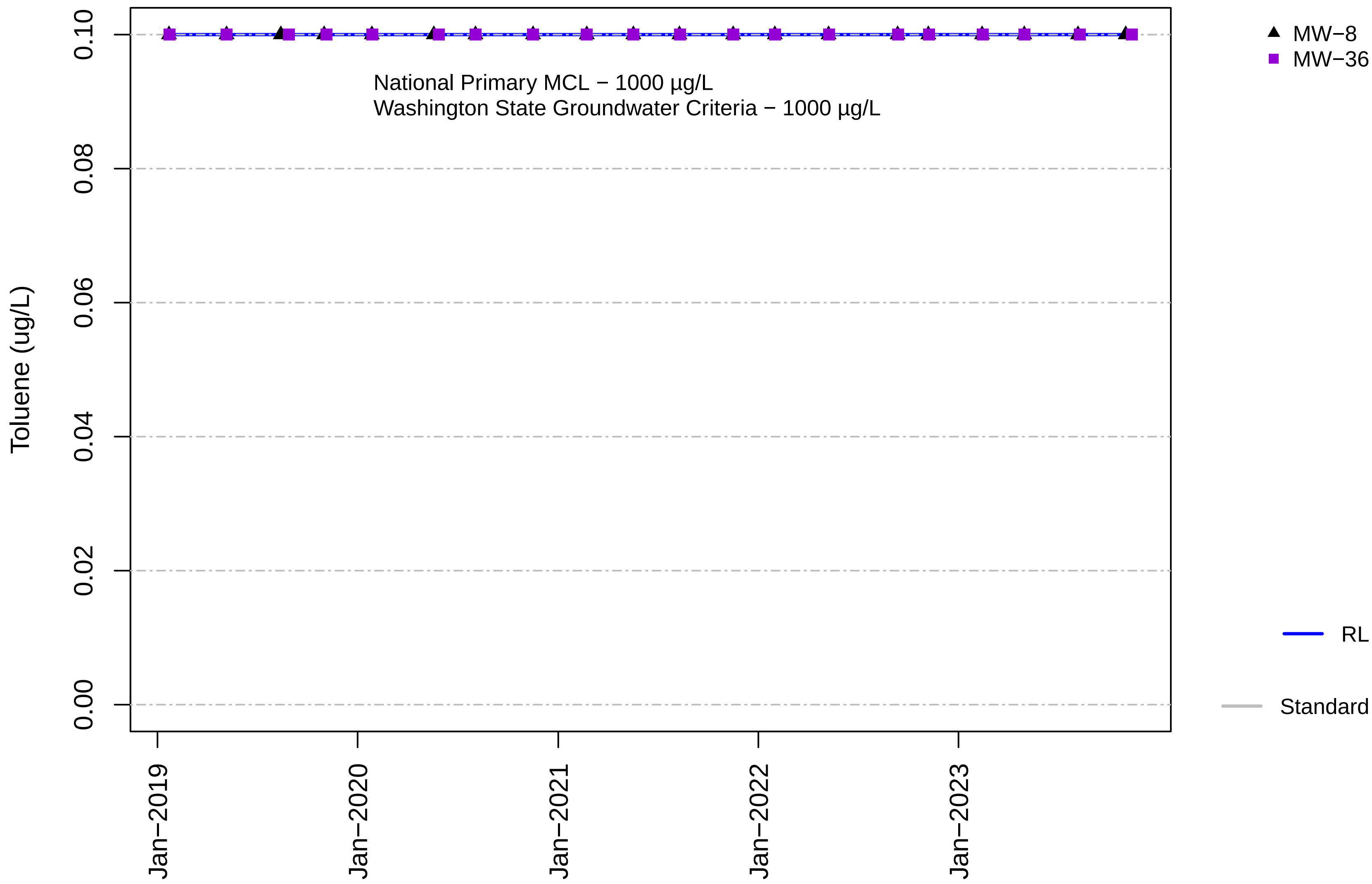


Figure B−84 Short−Term
Channel Cc3
Trans−1,2−Dichloroethene

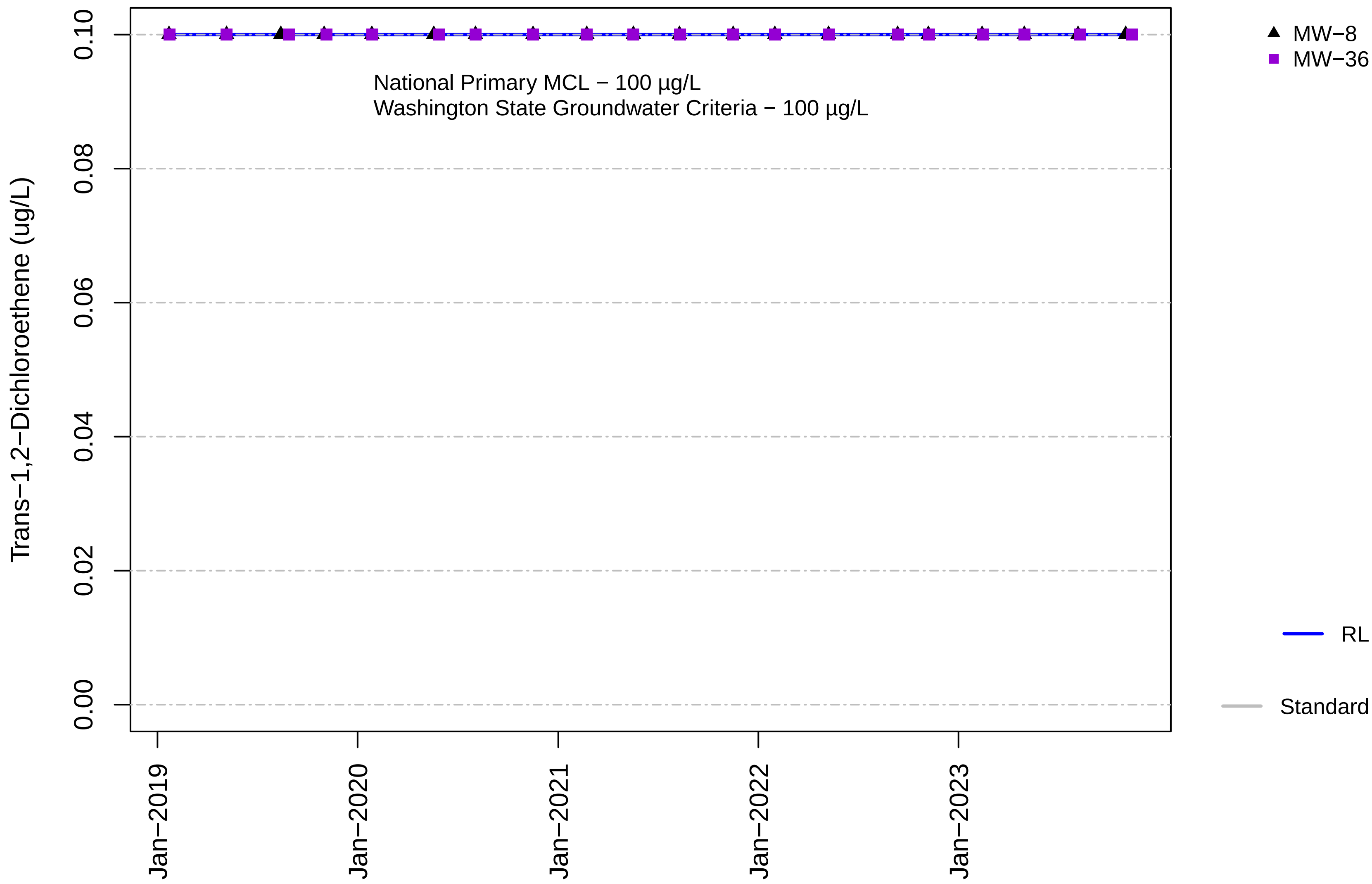


Figure B−85 Short−Term
Channel Cc3
Trichloroethene

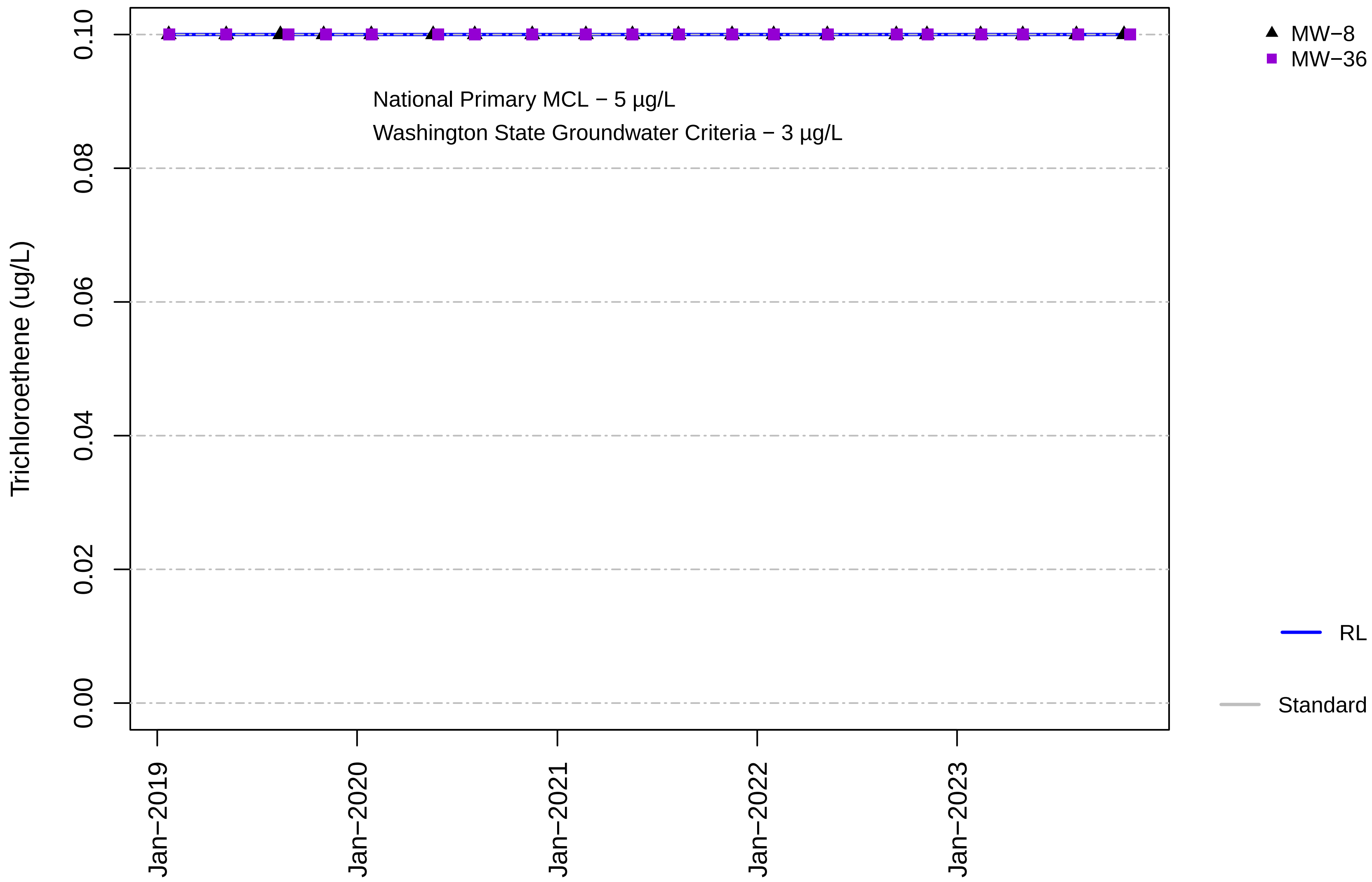
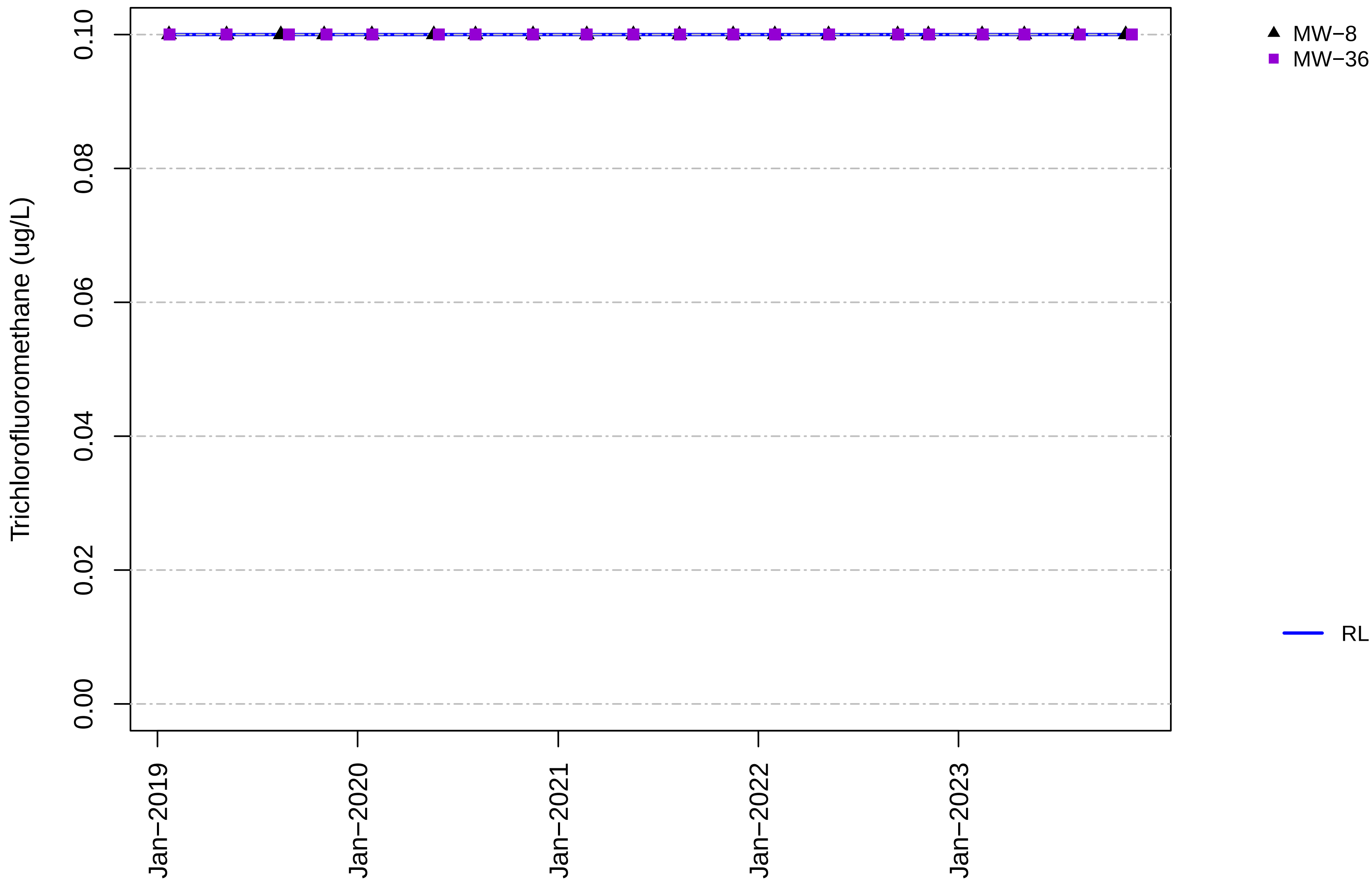


Figure B−86 Short−Term
Channel Cc3
Trichlorofluoromethane



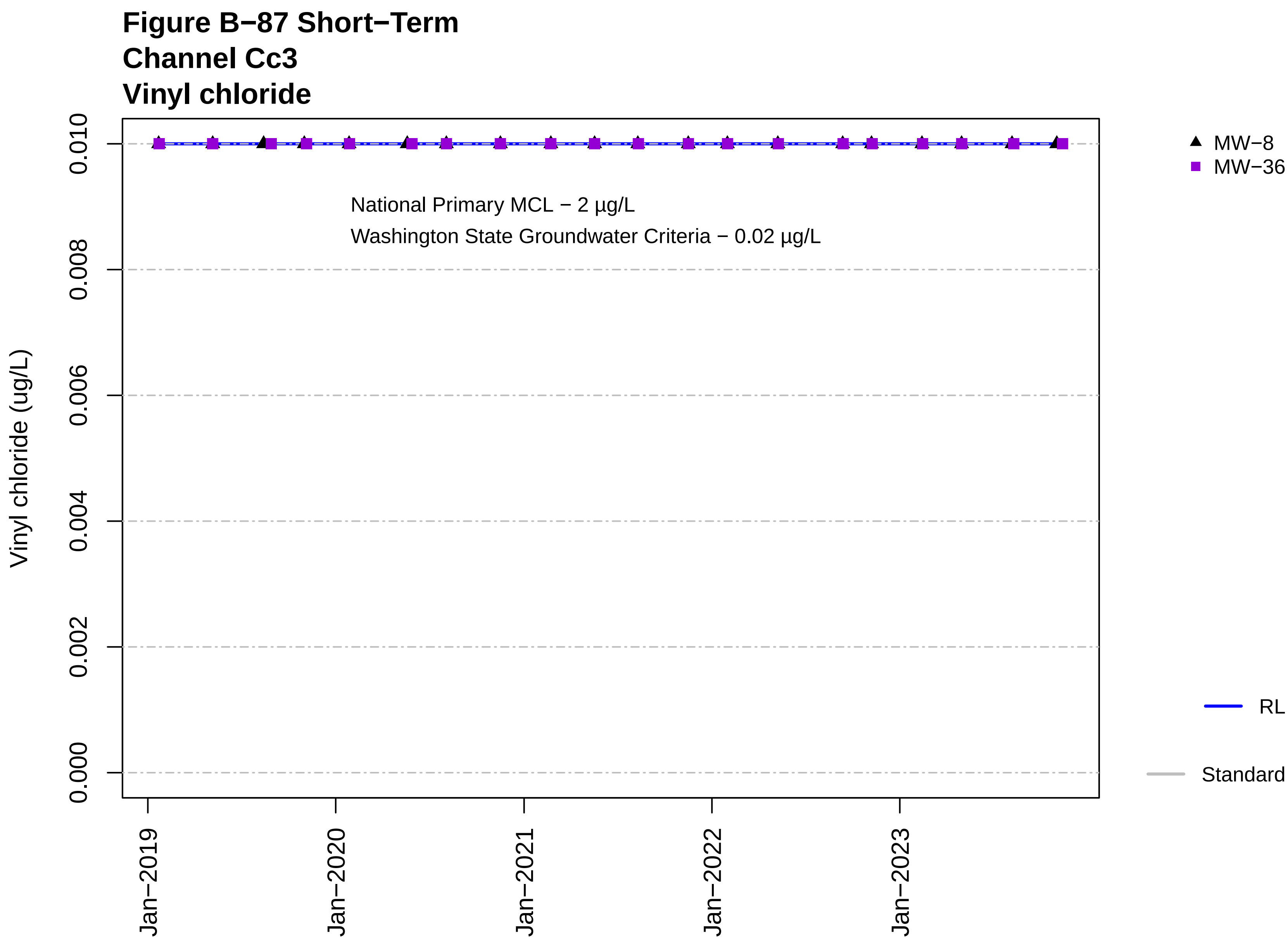


Figure B−87 Short−Term
Channel Cc3
Vinyl chloride
Vinyl chloride (ug/L)
0.000
0.002
0.004
0.006
0.008
0.010
National Primary MCL − 2 µg/L
Washington State Groundwater Criteria − 0.02 µg/L
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
MW−8
MW−36
RL
Standard

Appendix B

Unit D

Groundwater Time Concentration Plots

Figure B−88 Long−Term
Unit D
Field pH

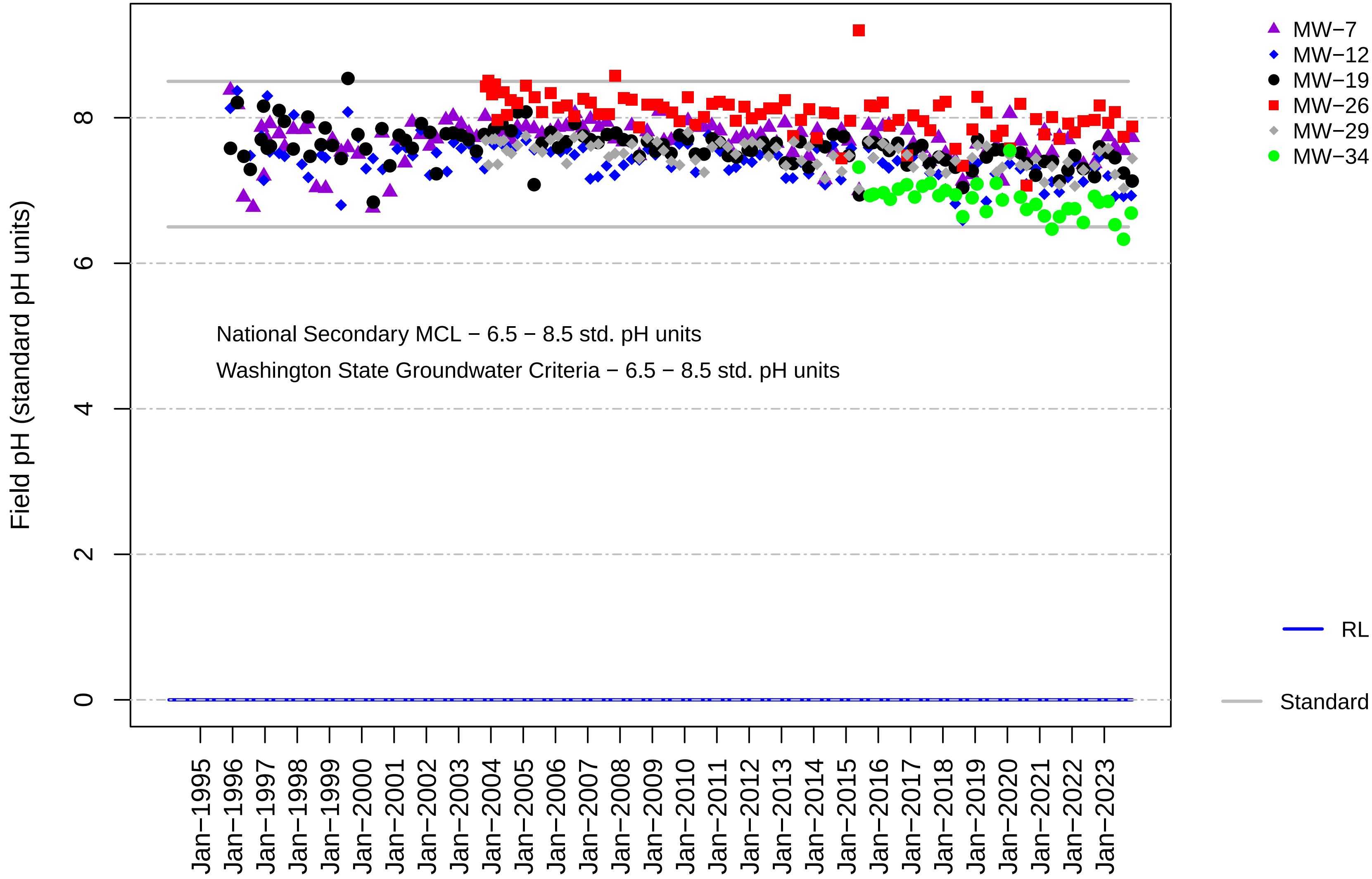


Figure B−89 Long−Term
Unit D
Field Specific Conductance

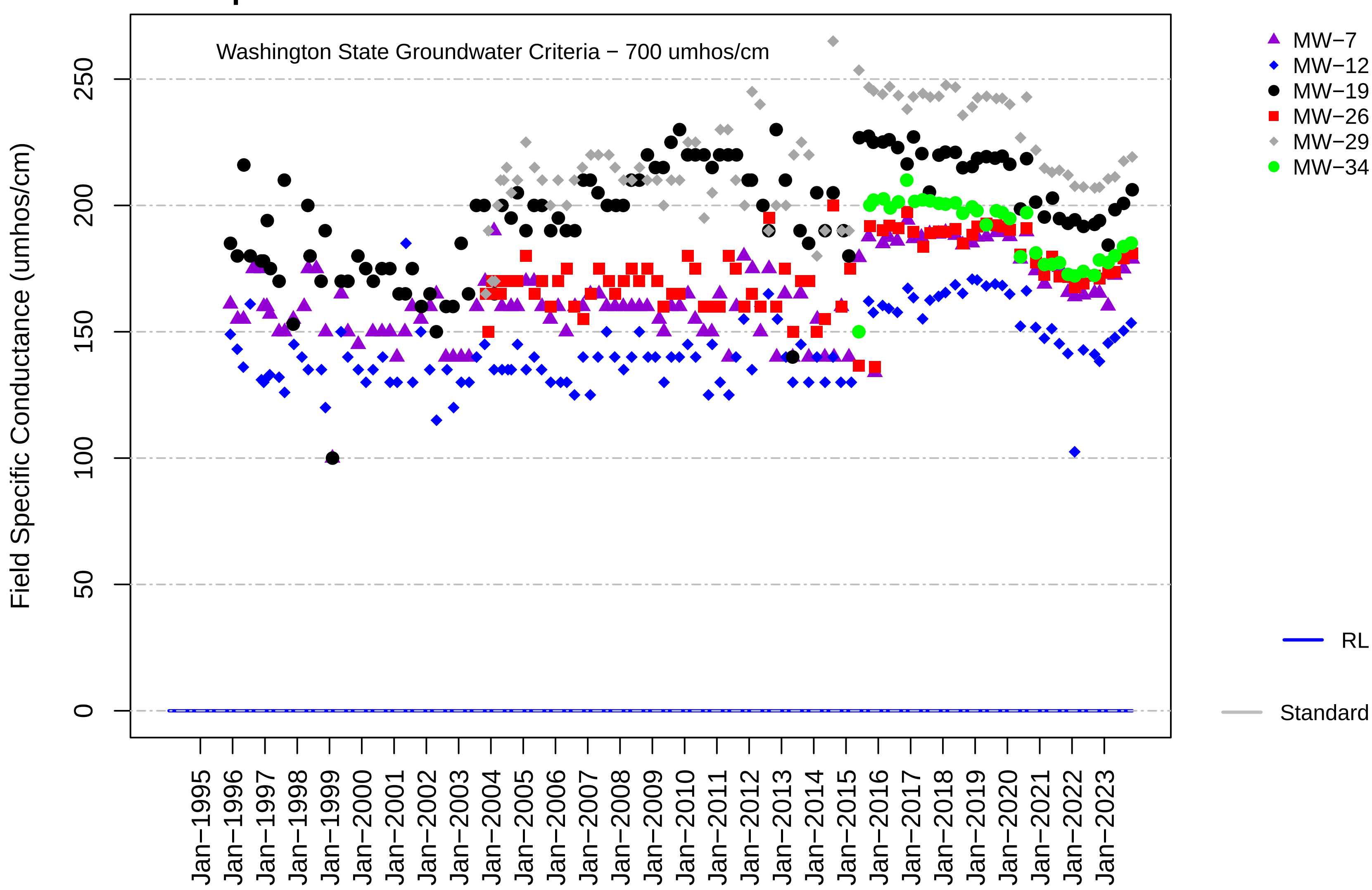
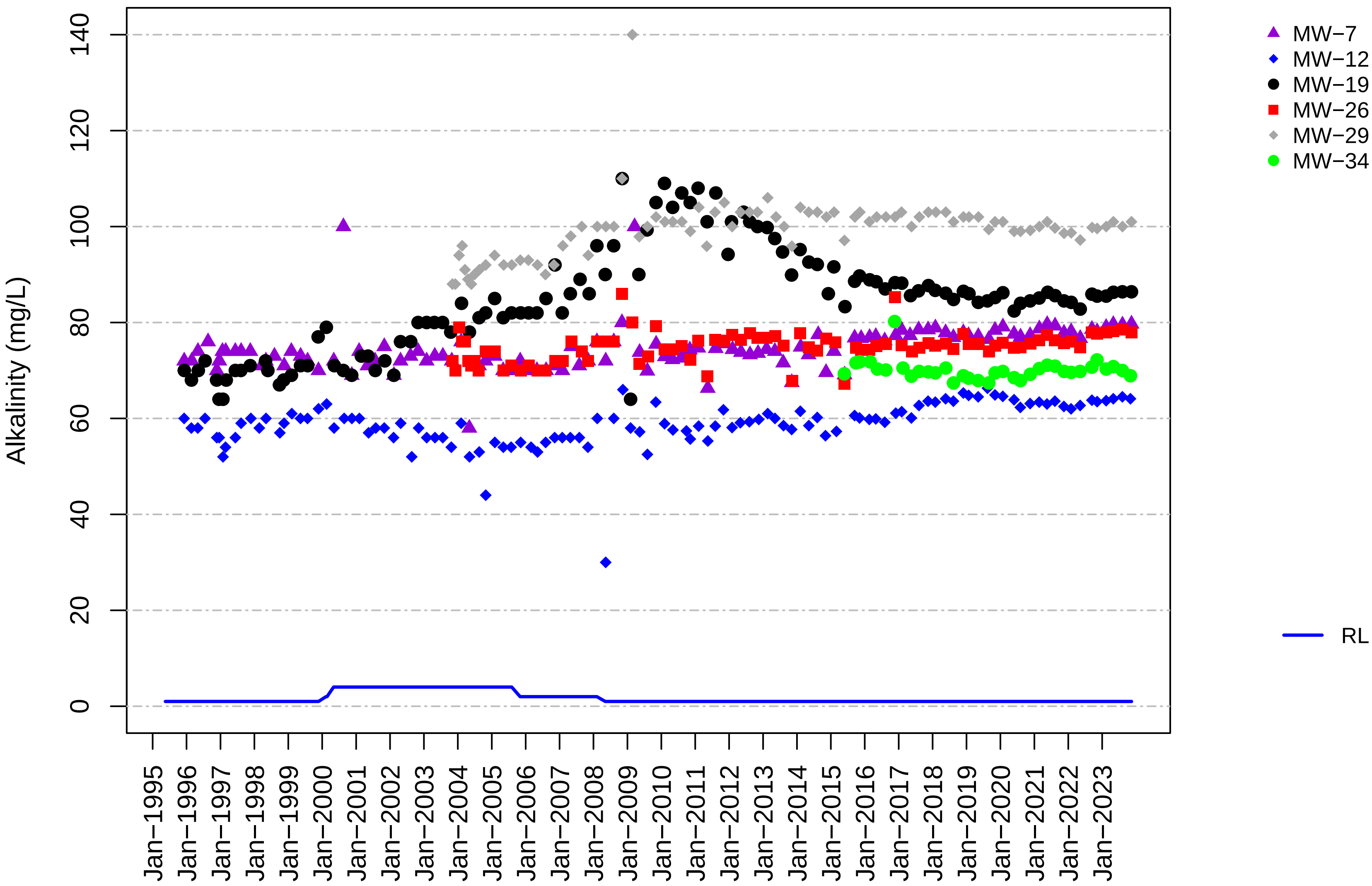


Figure B−90 Long−Term
Unit D
Alkalinity



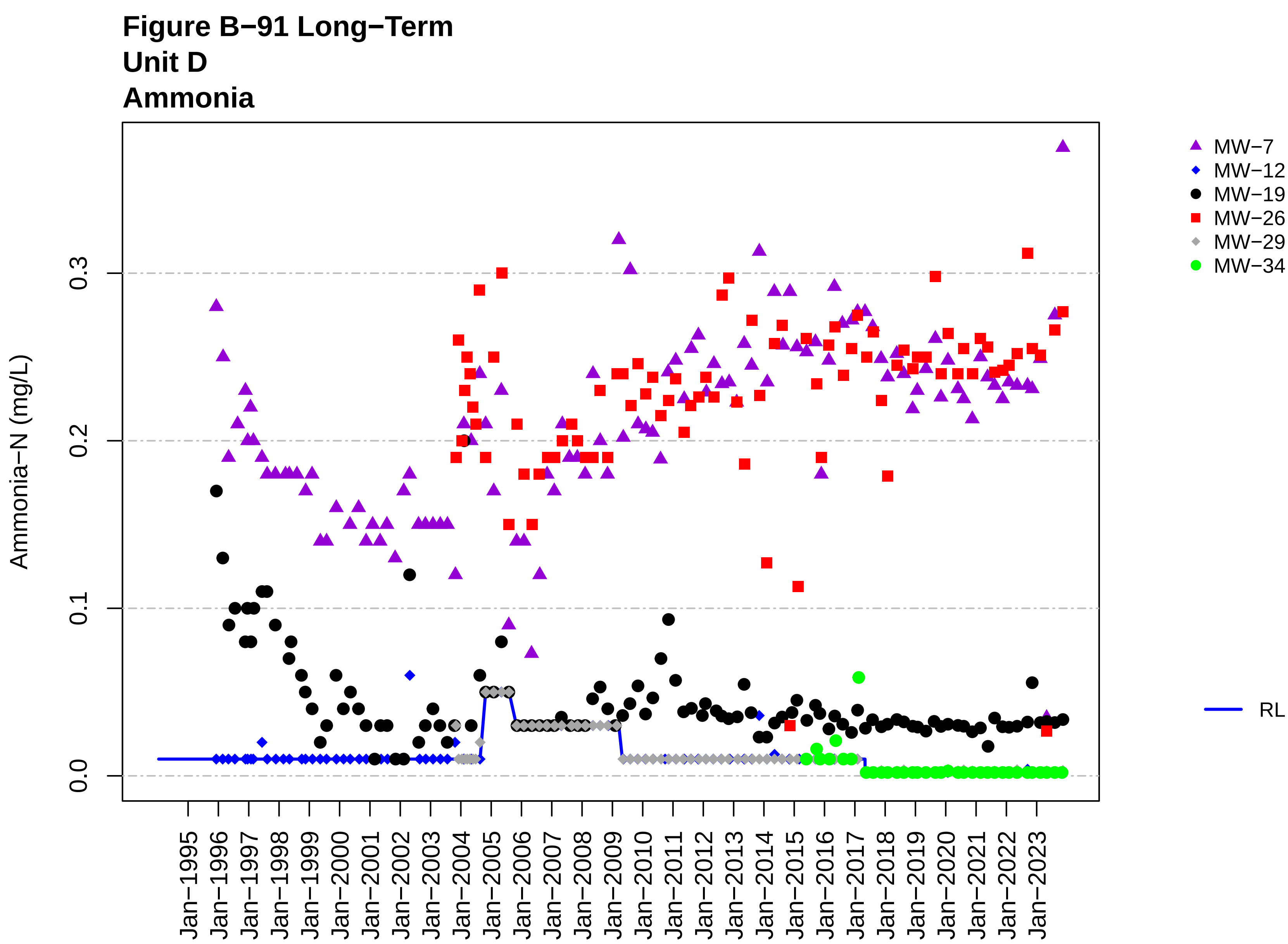
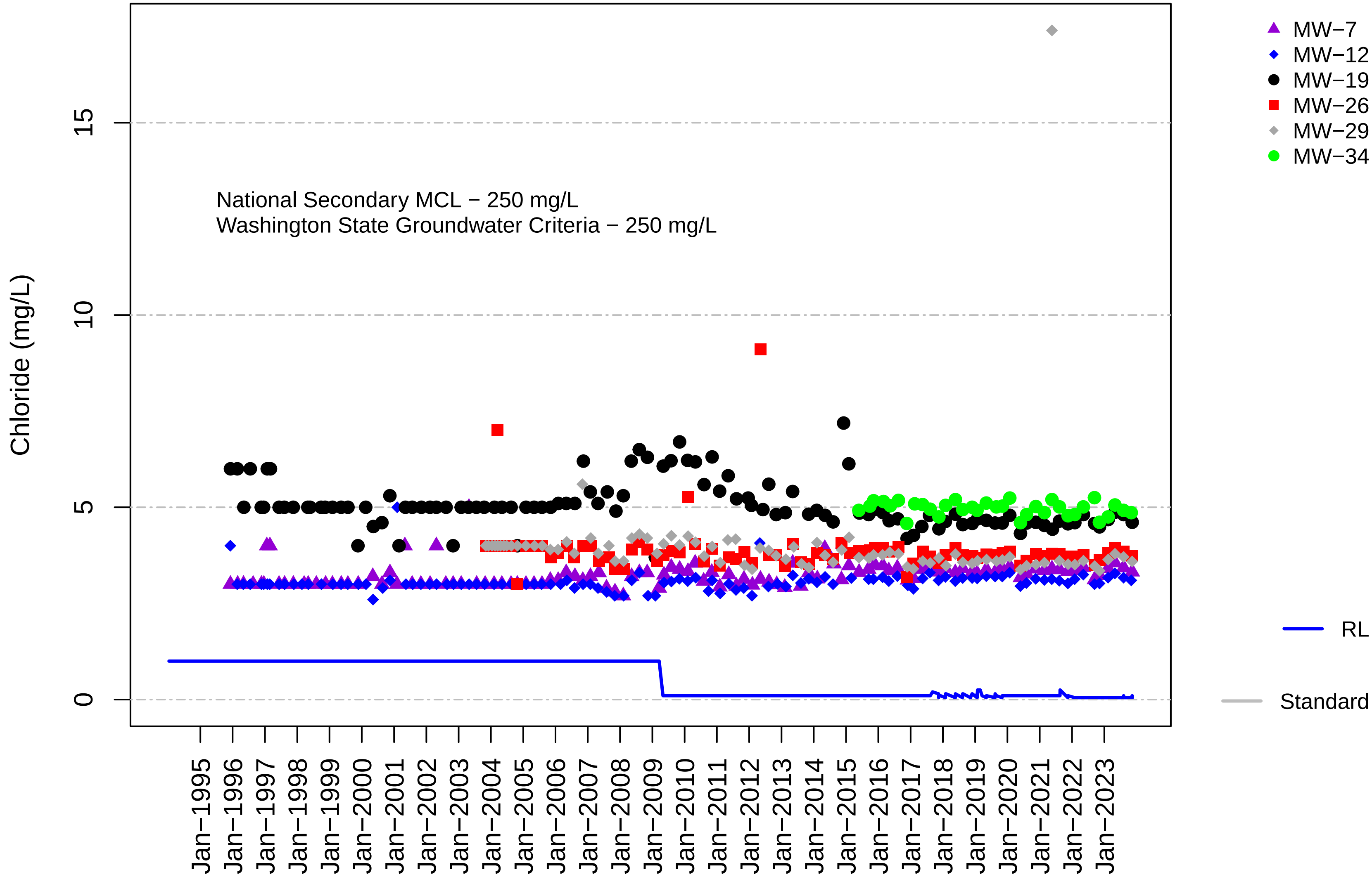


Figure B−91 Long−Term
Unit D
Ammonia
Ammonia−N (mg/L)
0.0
0.1
0.2
0.3
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL

Figure B−92 Long−Term
Unit D
Chloride



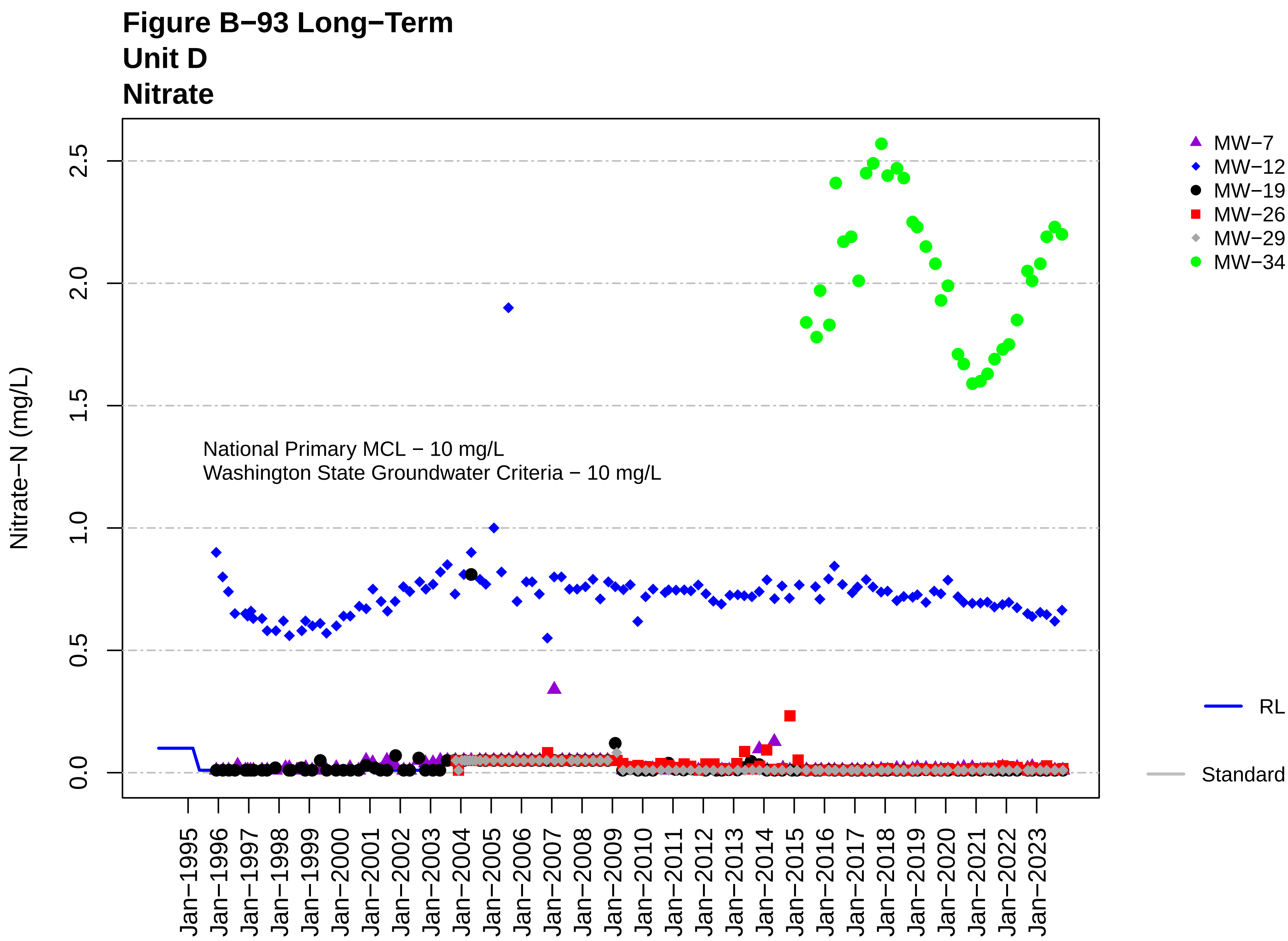
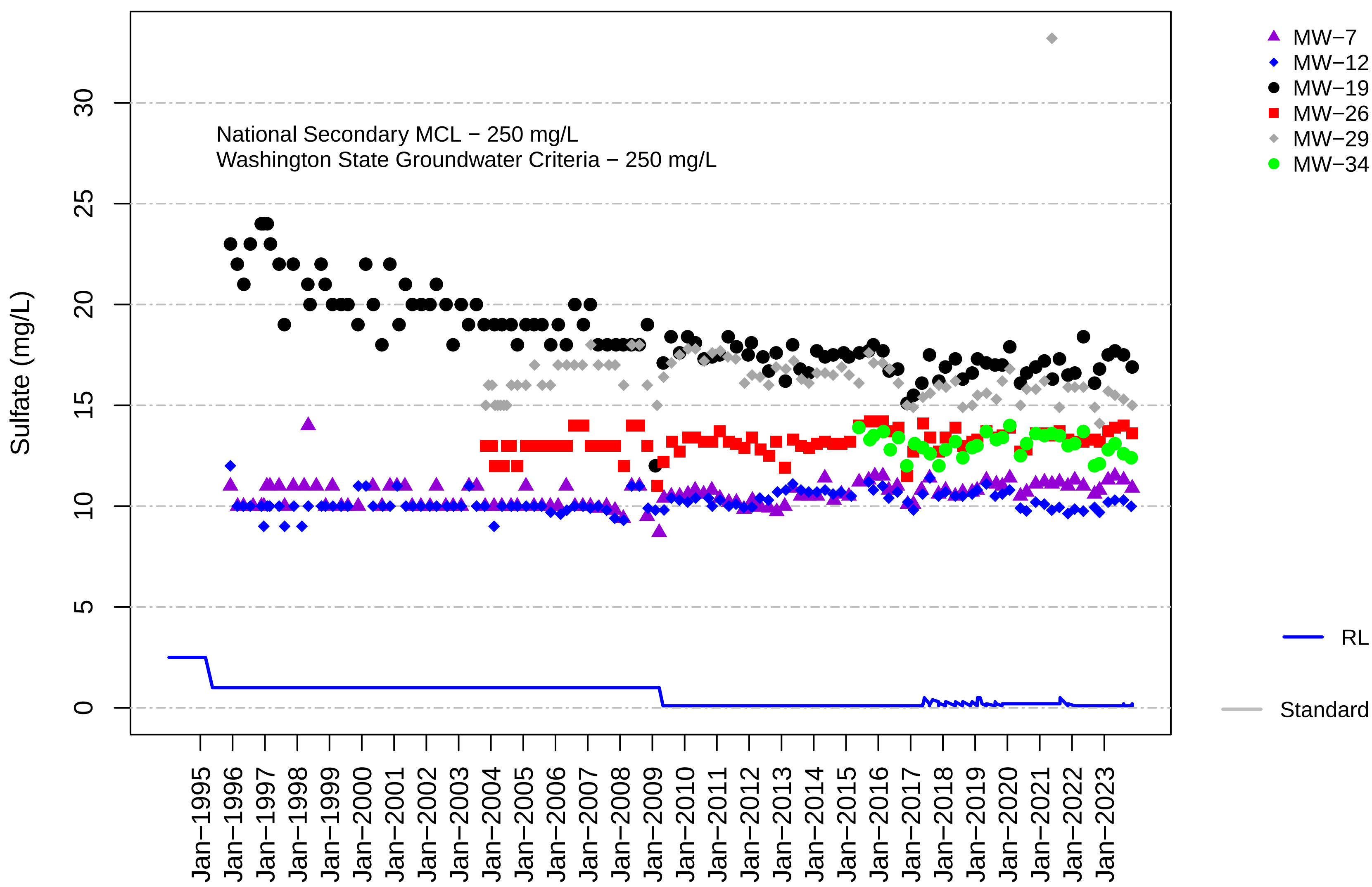


Figure B−93 Long−Term
Unit D
Nitrate
Nitrate−N (mg/L)
0.0
0.5
1.0
1.5
2.0
2.5
National Primary MCL − 10 mg/L
Washington State Groundwater Criteria − 10 mg/L
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
Jan−2006
Jan−2007
Jan−2008
Jan−2009
Jan−2010
Jan−2011
Jan−2012
Jan−2013
Jan−2014
Jan−2015
Jan−2016
Jan−2017
Jan−2018
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

Figure B−94 Long−Term
Unit D
Sulfate



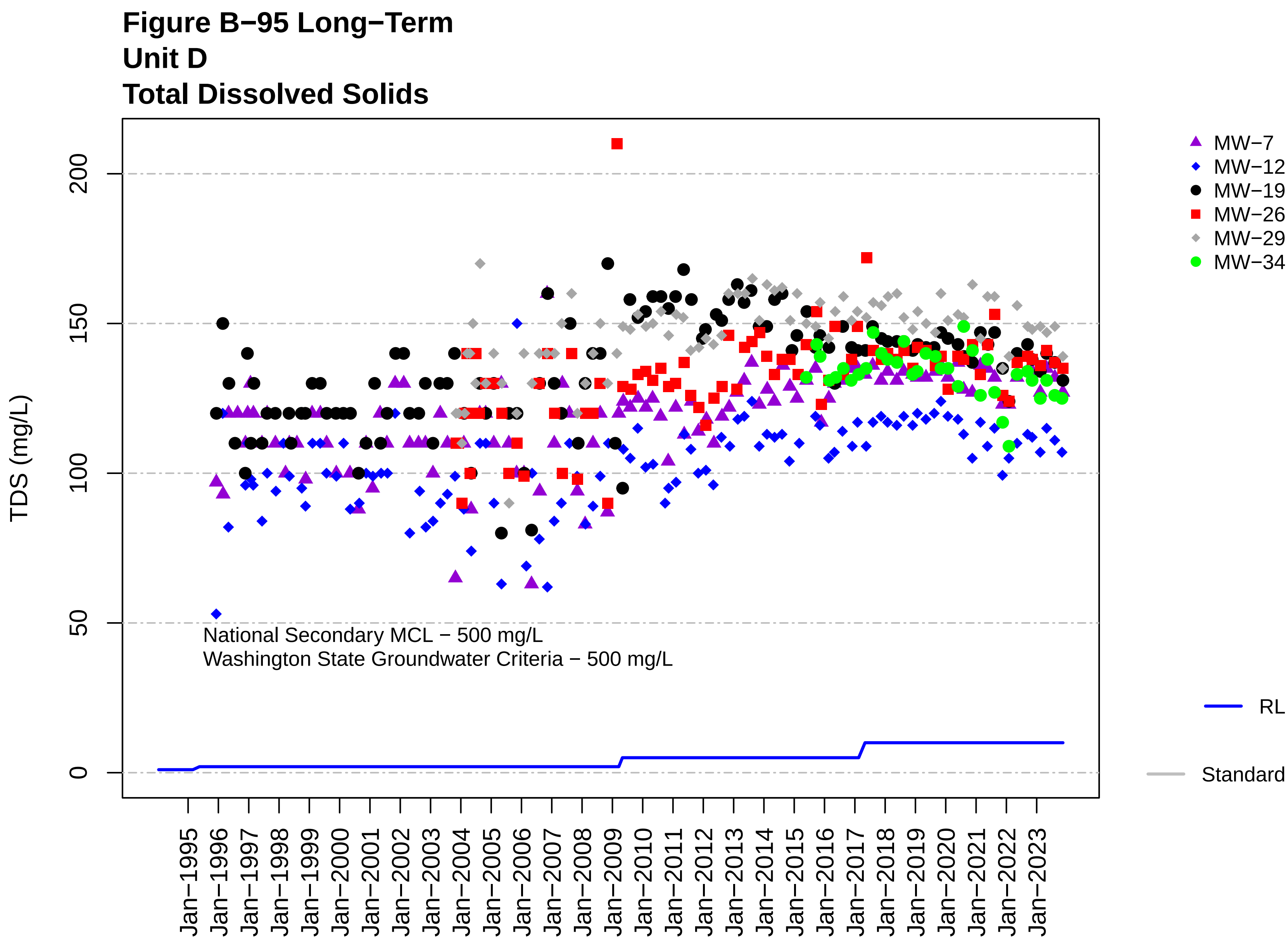


Figure B−95 Long−Term
Unit D
Total Dissolved Solids
TDS (mg/L)
0
50
100
150
200
National Secondary MCL − 500 mg/L
Washington State Groundwater Criteria − 500 mg/L
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard
Jan−1995
Jan−1996
Jan−1997
Jan−1998
Jan−1999
Jan−2000
Jan−2001
Jan−2002
Jan−2003
Jan−2004
Jan−2005
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
Jan−2021
Jan−2022
Jan−2023

Figure B−96 Long−Term
Unit D
Arsenic

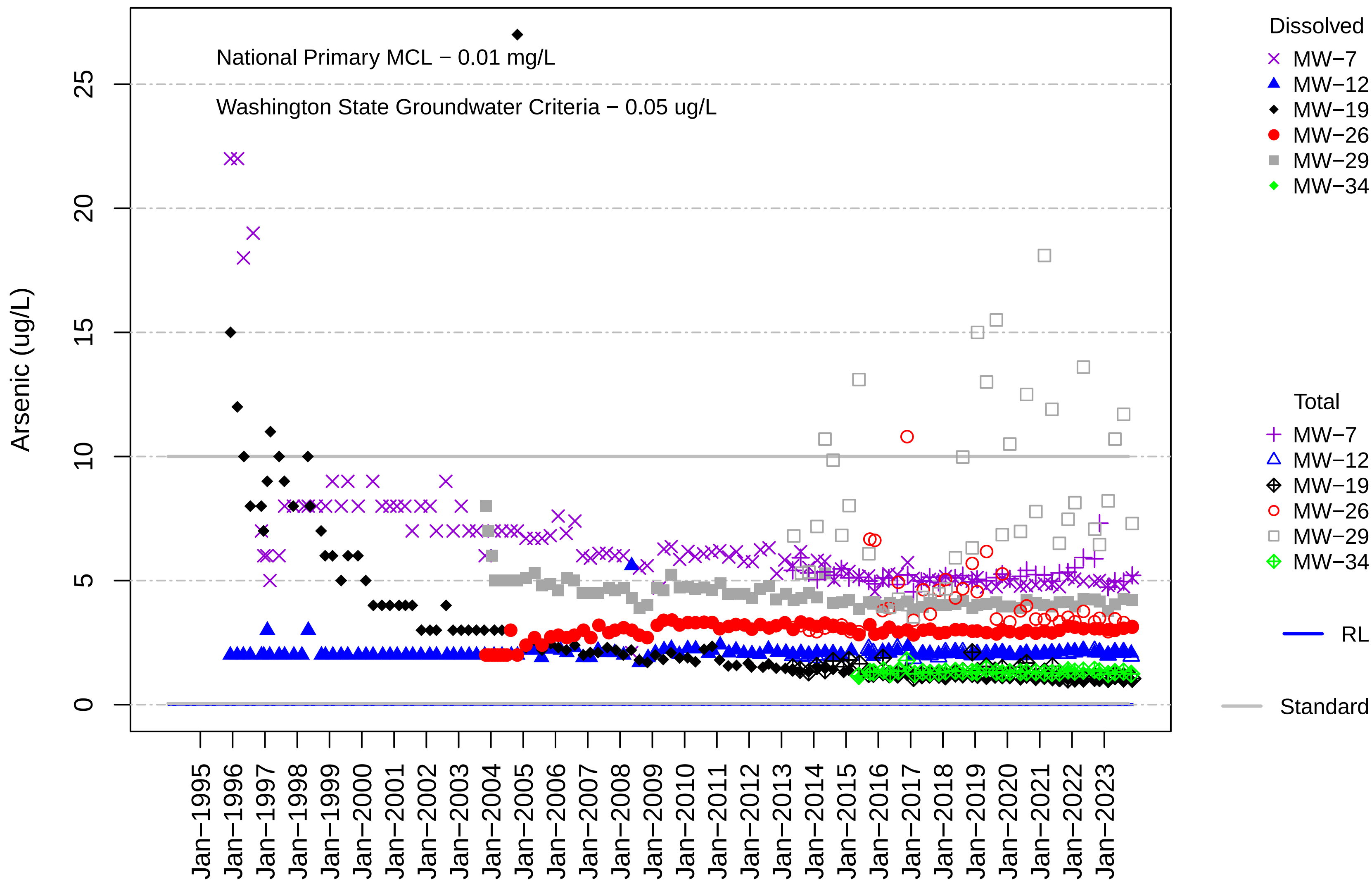


Figure B−97 Long−Term
Unit D
Calcium

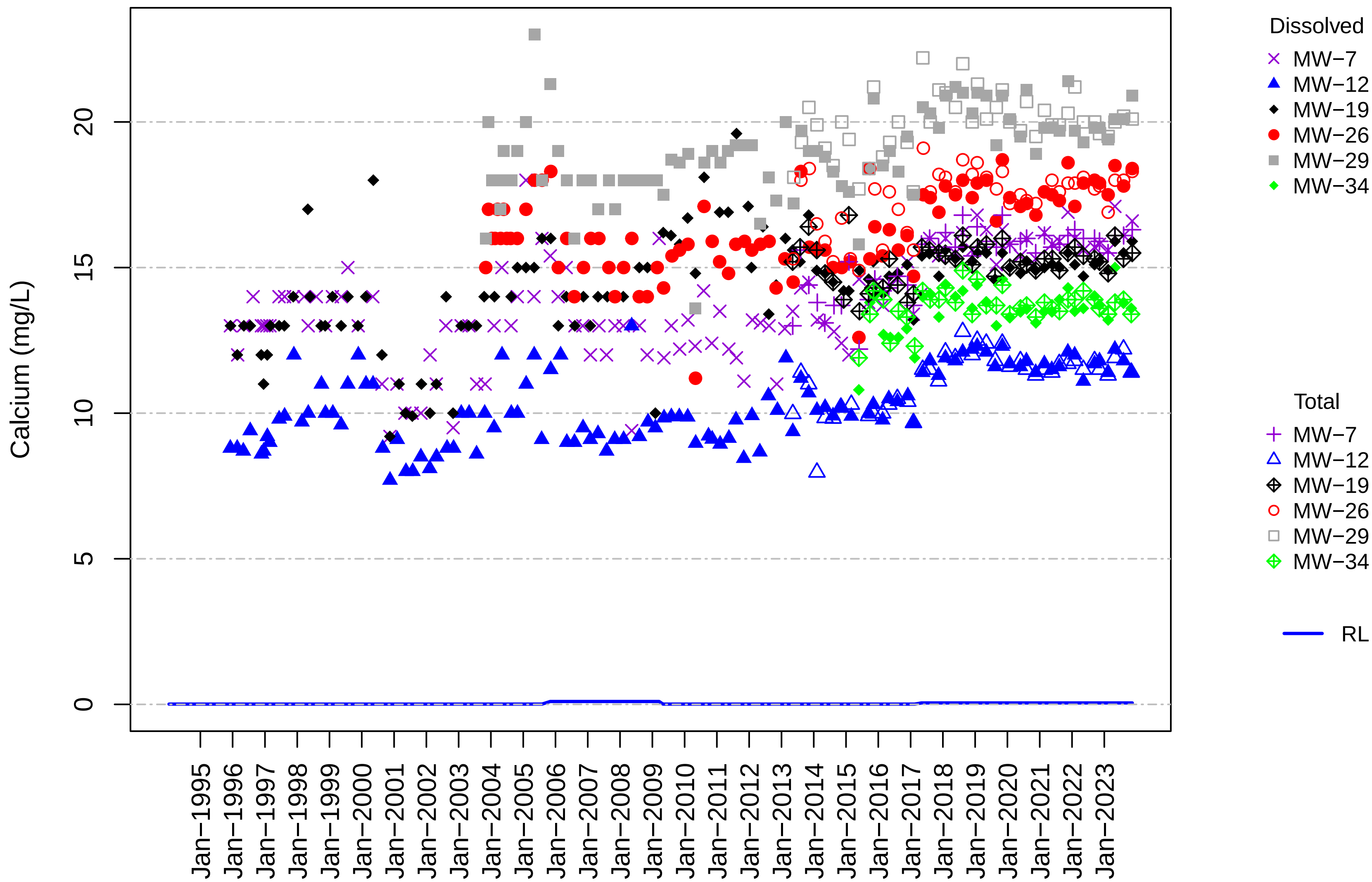


Figure B−98 Long−Term
Unit D
Iron

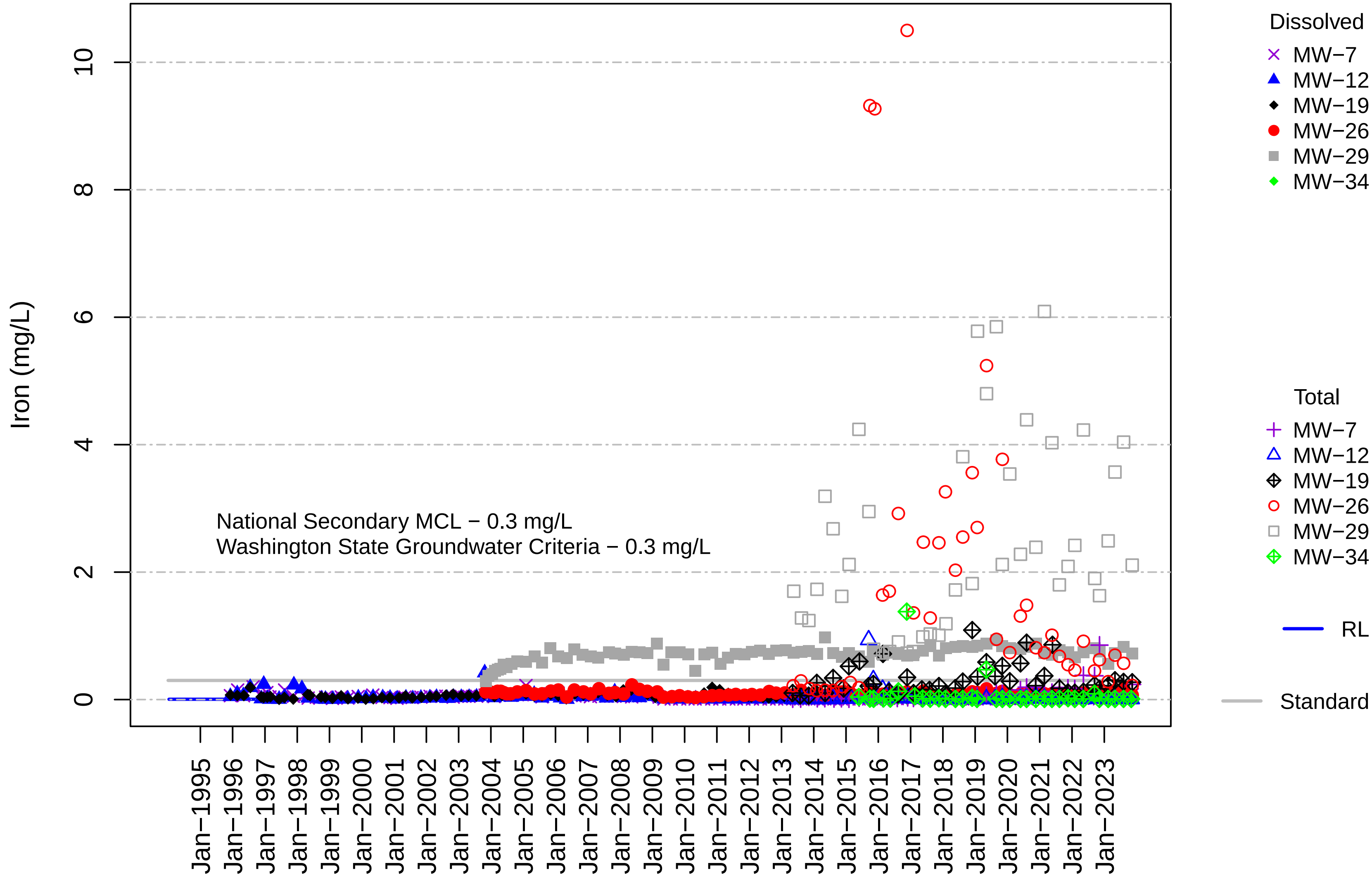


Figure B−99 Long−Term
Unit D
Magnesium

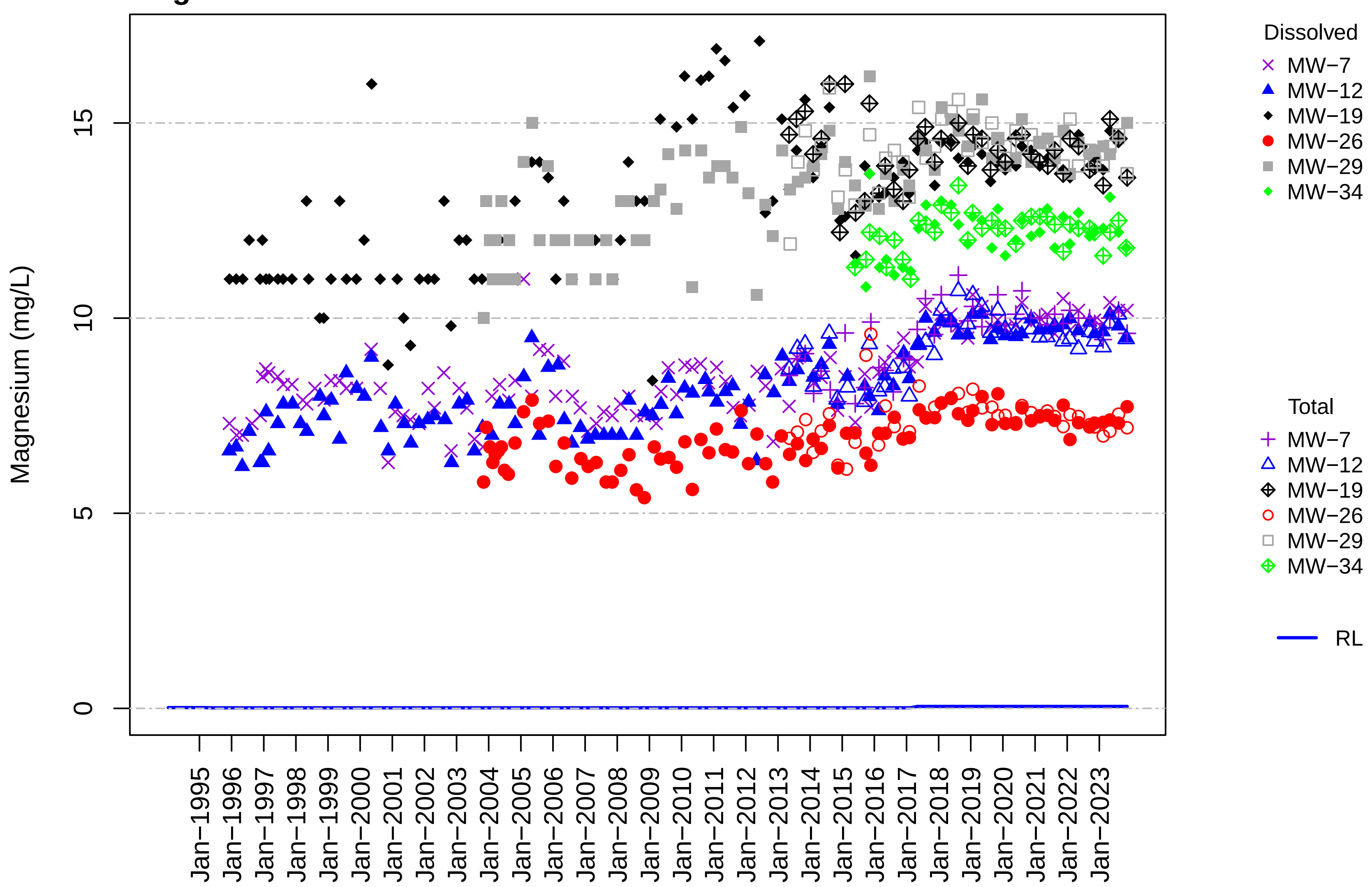


Figure B−100 Long−Term
Unit D
Manganese

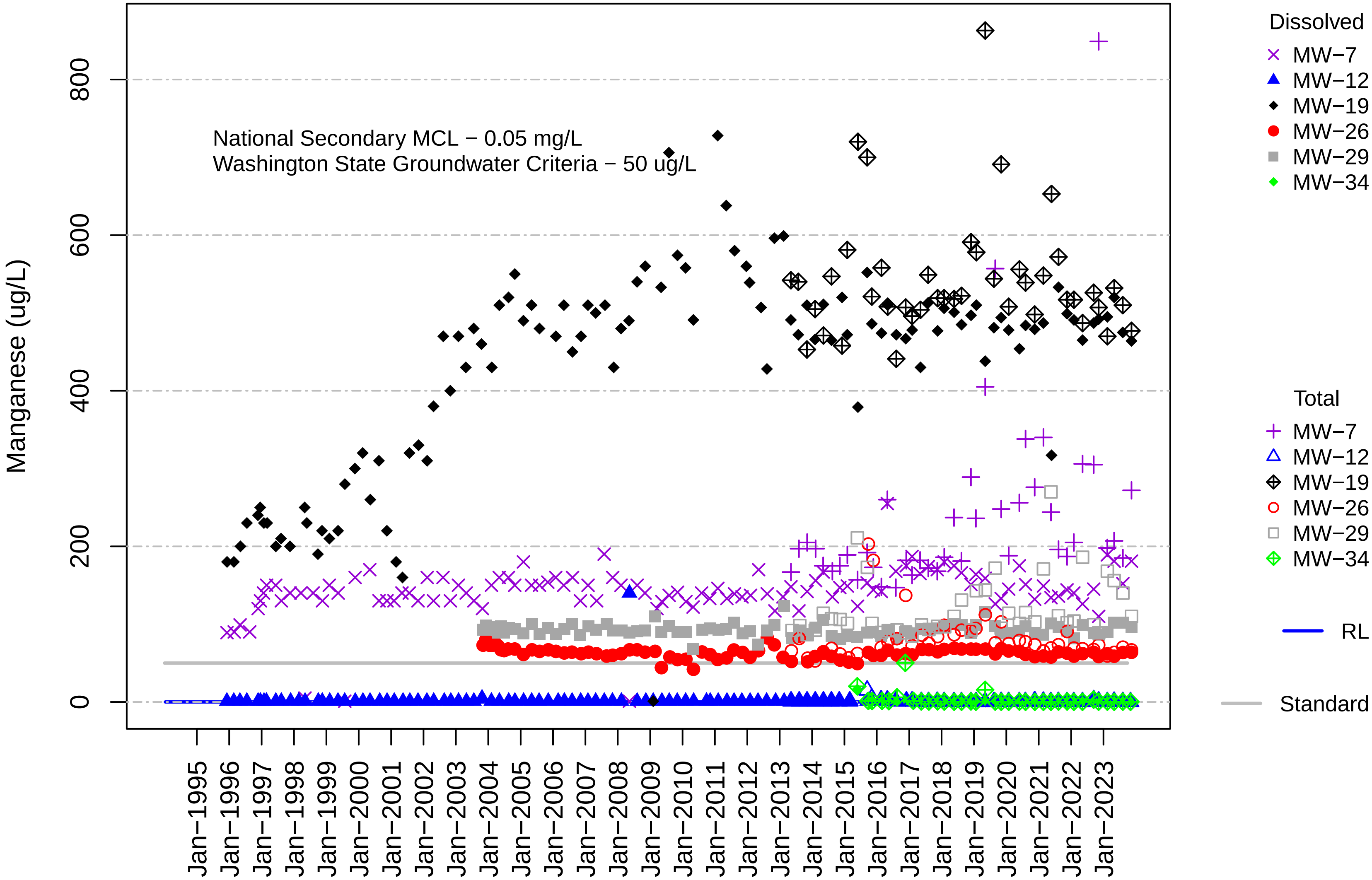


Figure B−101 Long−Term
Unit D
Potassium

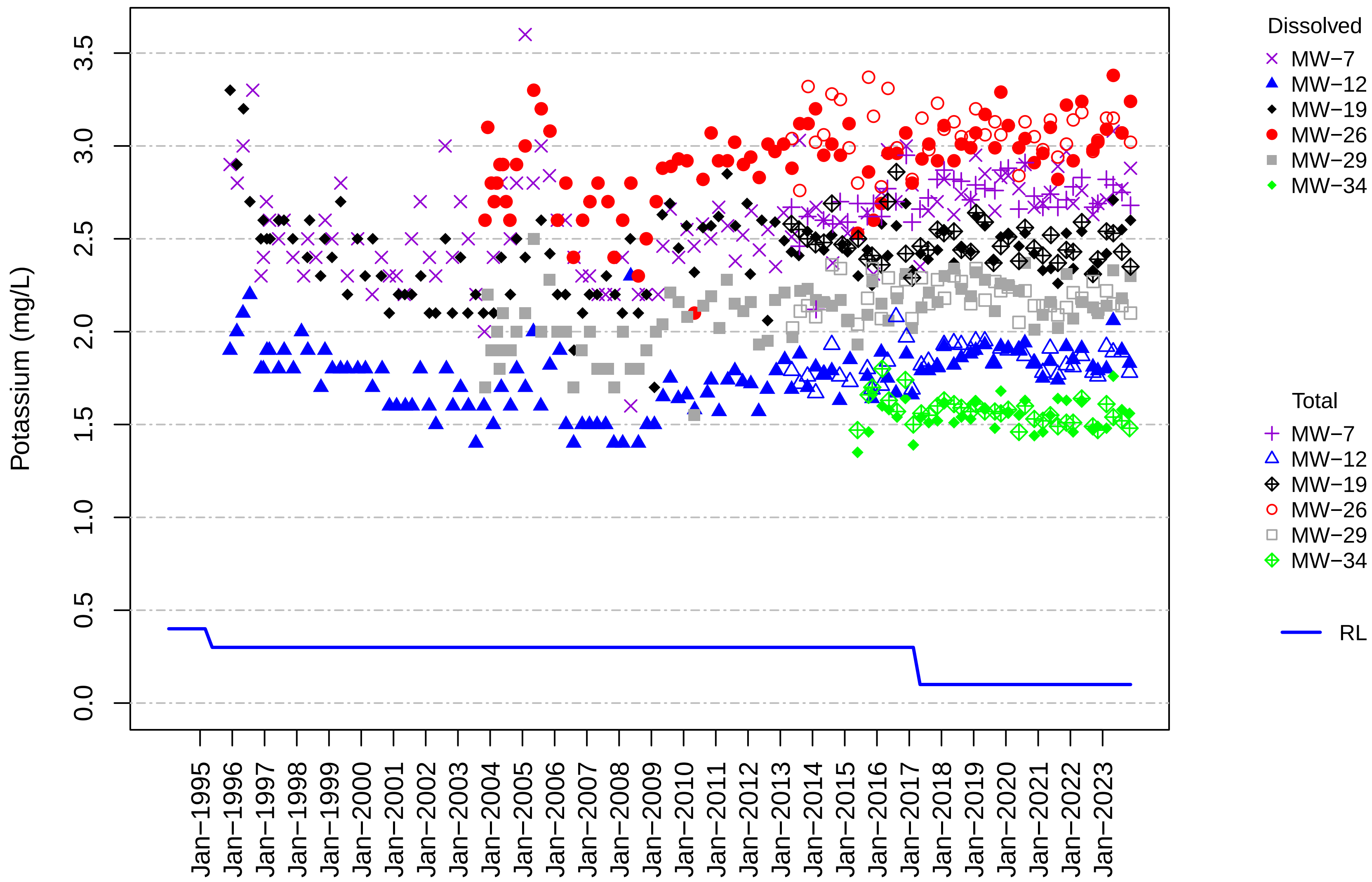


Figure B−102 Long−Term
Unit D
Sodium

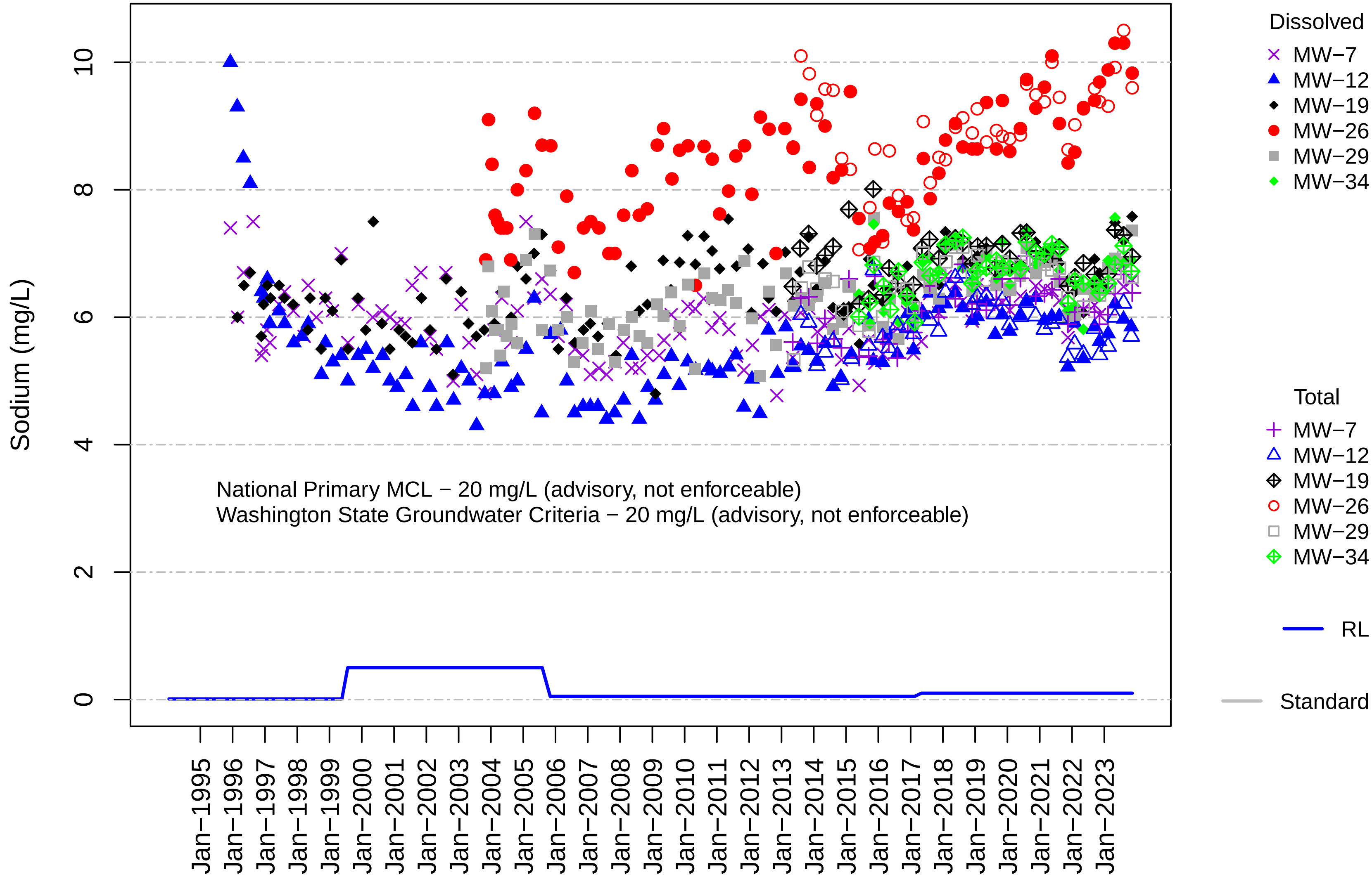


Figure B−103 Long−Term
Unit D
1,1−Dichloroethane

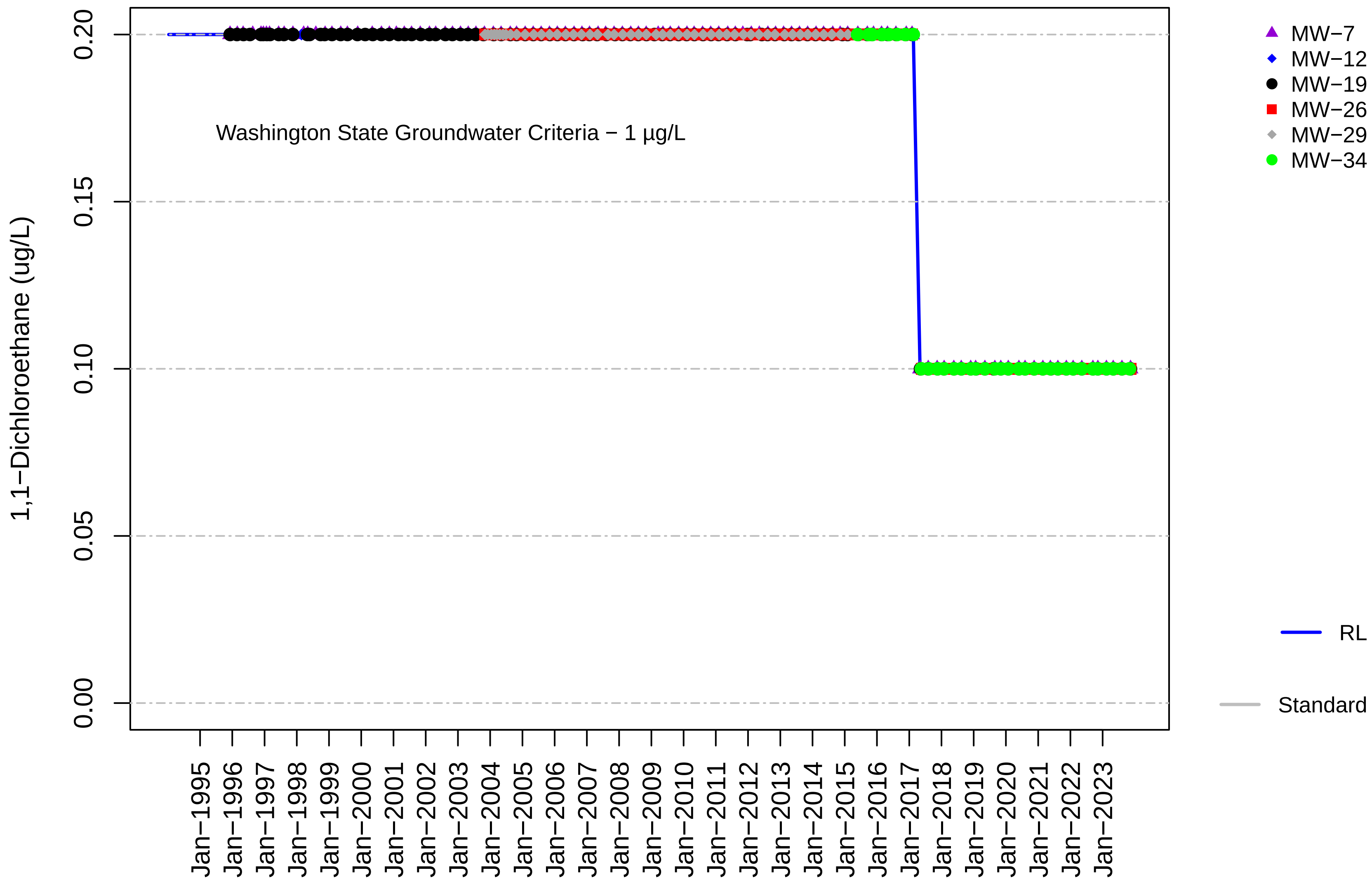


Figure B−104 Long−Term
Unit D
1,2−Dichloropropane

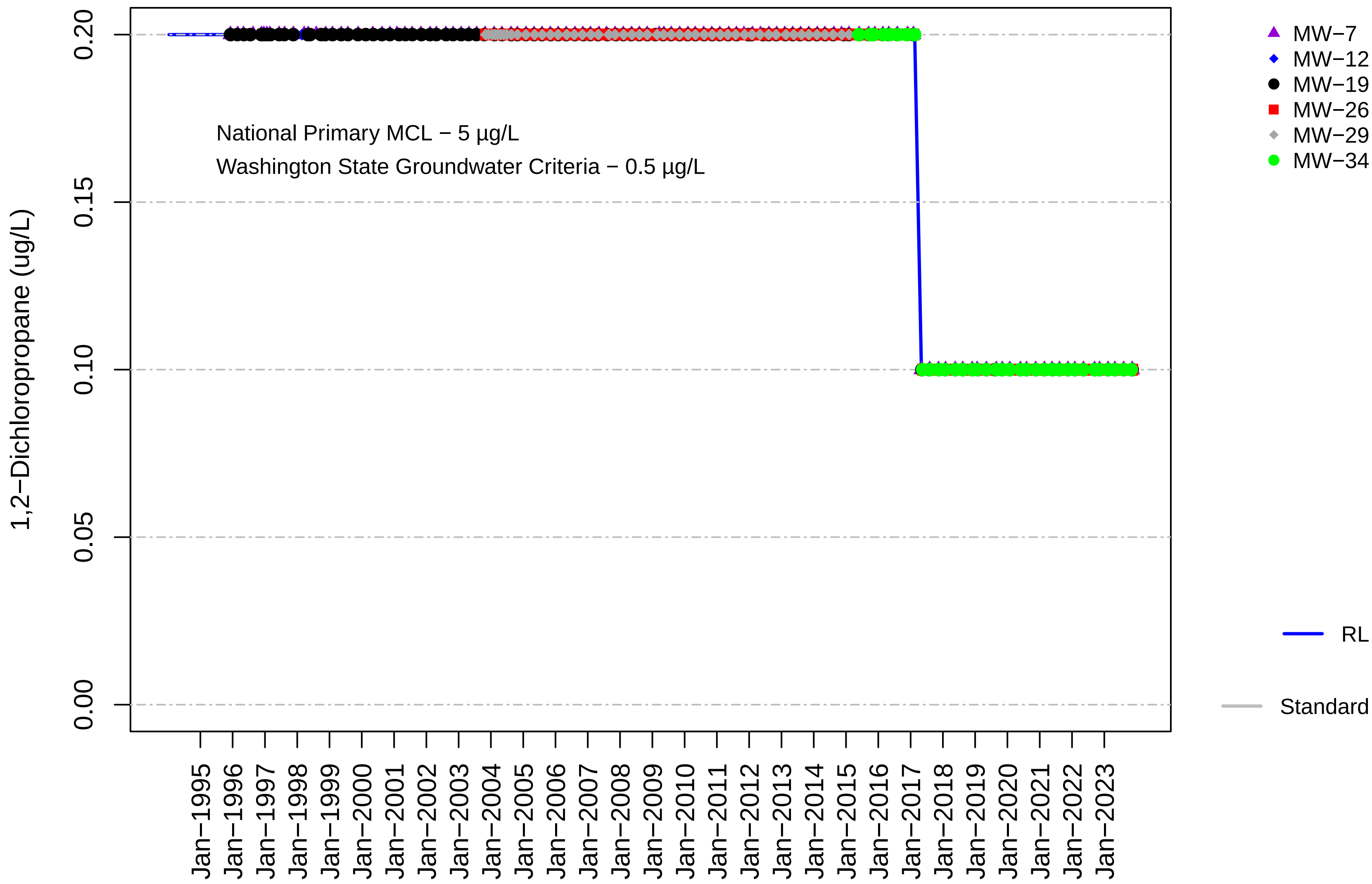


Figure B−105 Long−Term
Unit D
Benzene

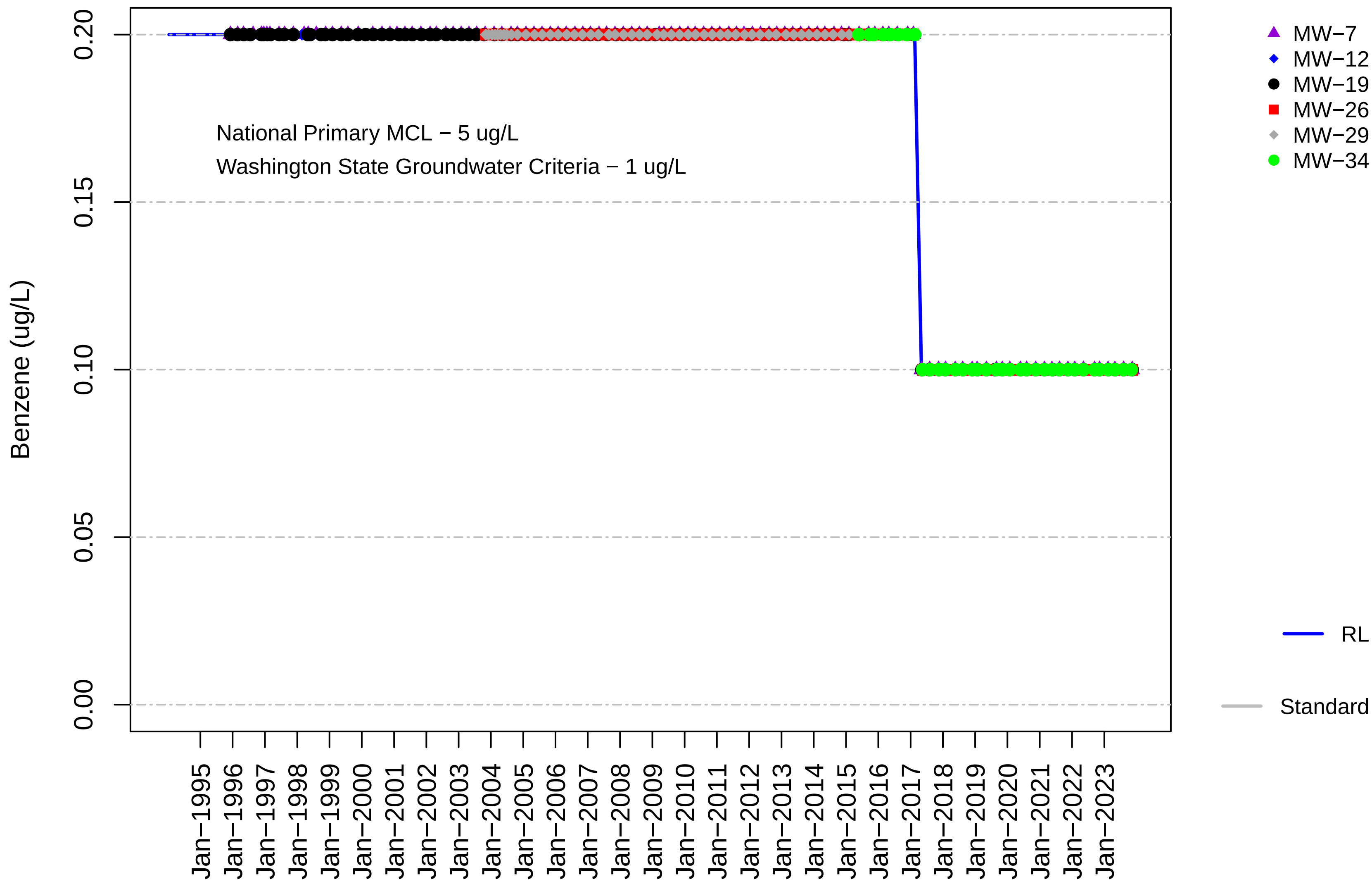


Figure B−106 Long−Term
Unit D
Chloroethane

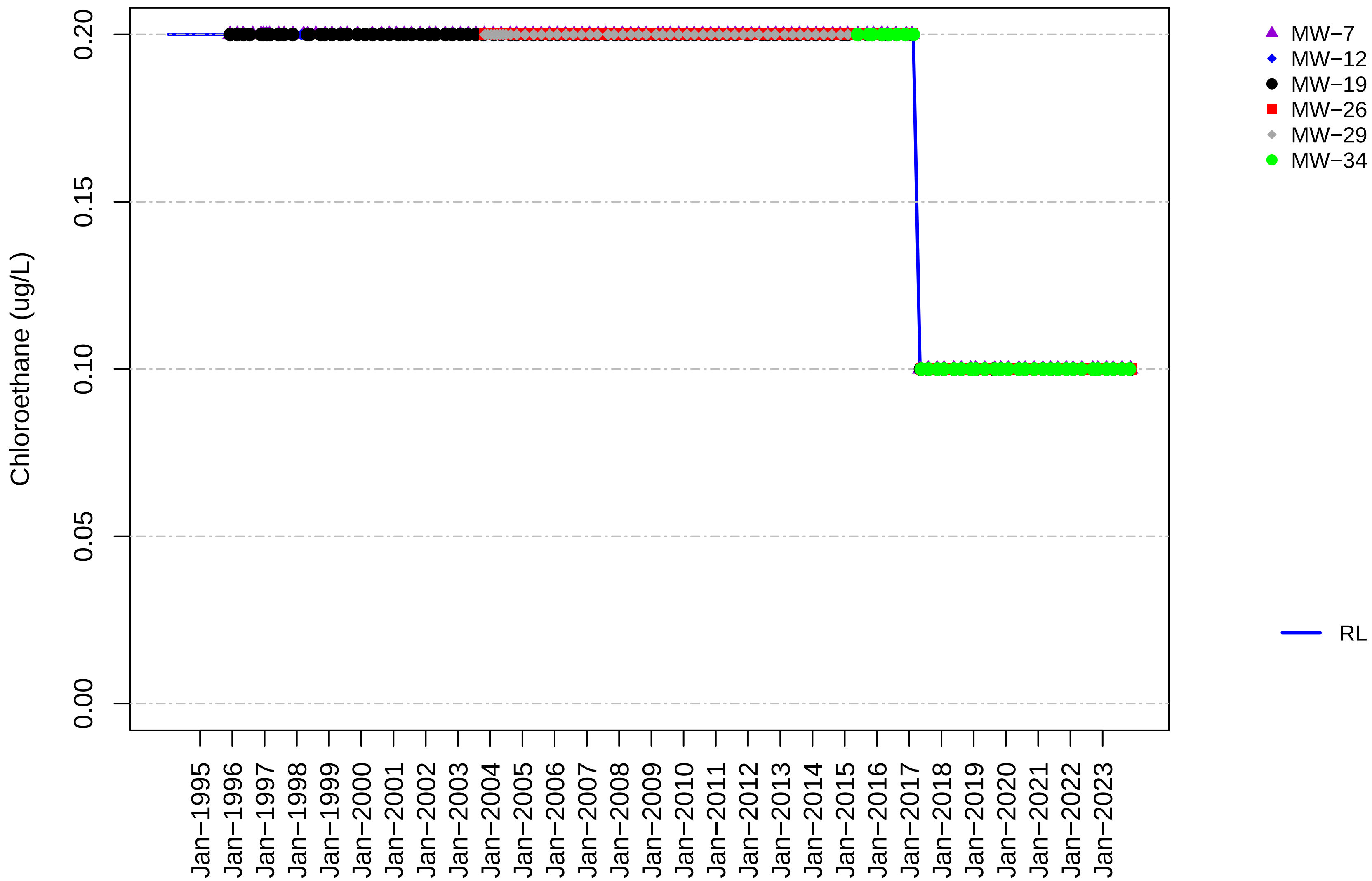


Figure B−107 Long−Term
Unit D
cis−1,2−Dichloroethene

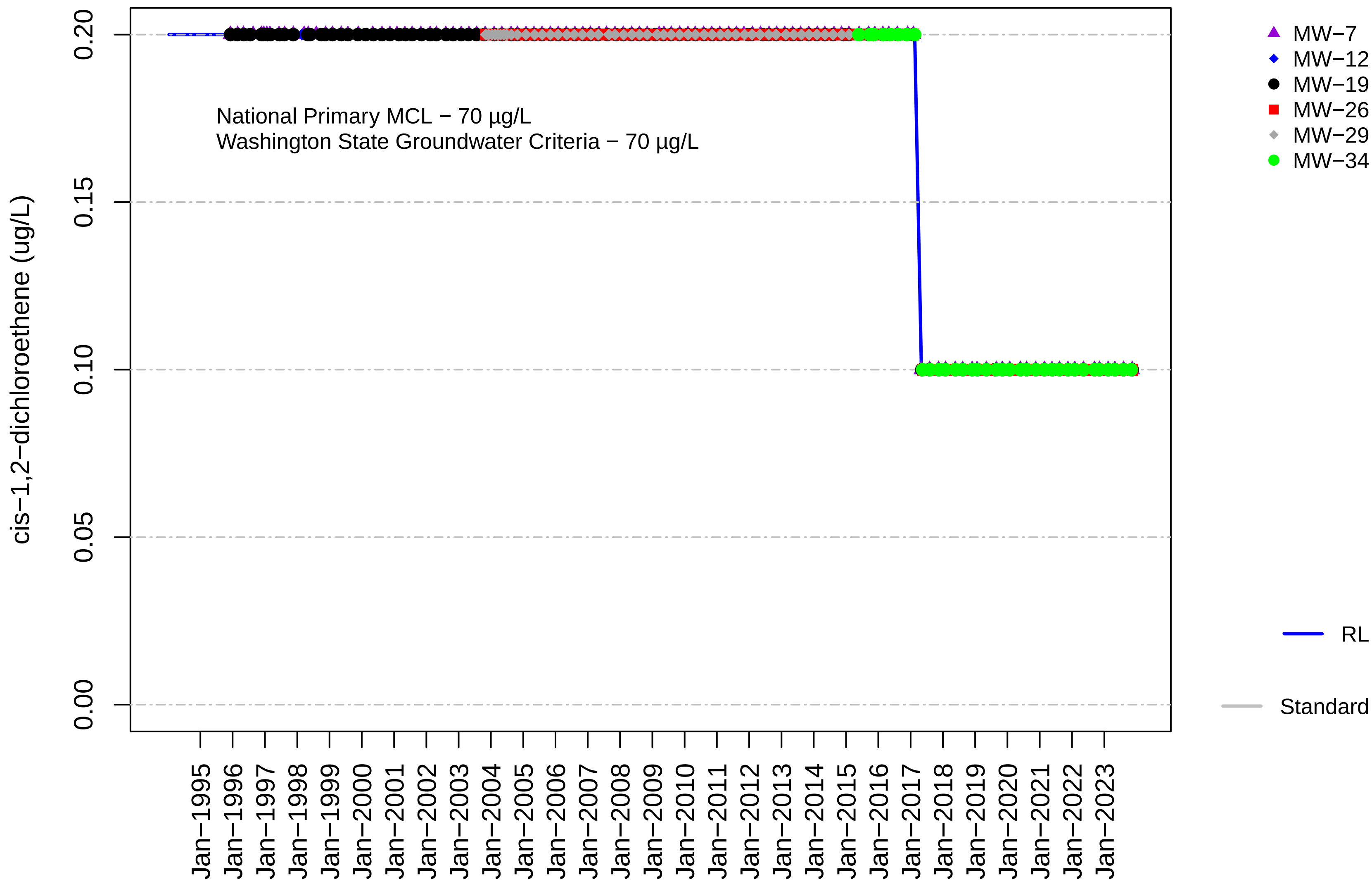


Figure B−108 Long−Term
Unit D
Dichlorodifluoromethane

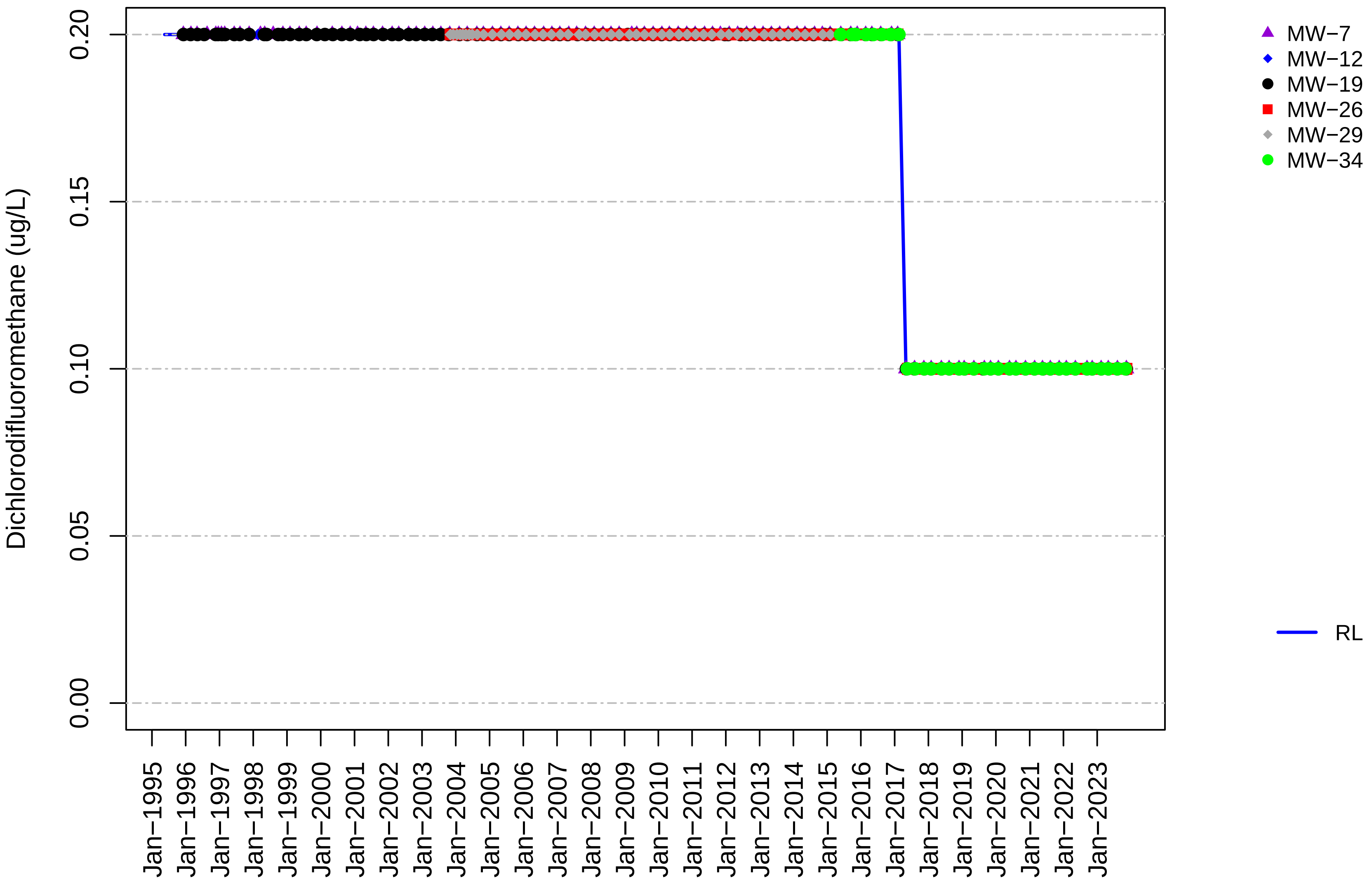


Figure B−109 Long−Term
Unit D
Tetrachloroethene

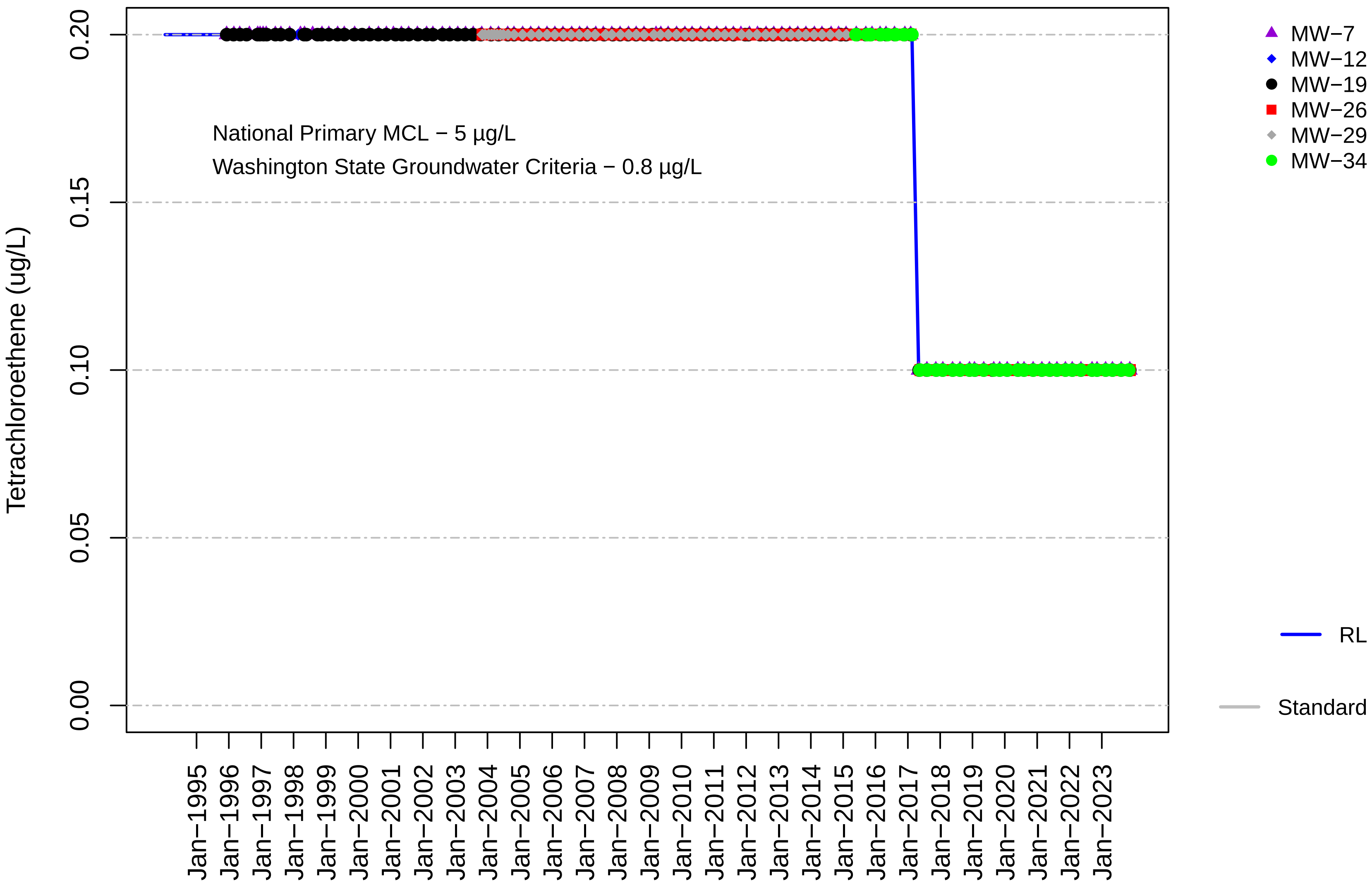


Figure B−110 Long−Term
Unit D
Toluene

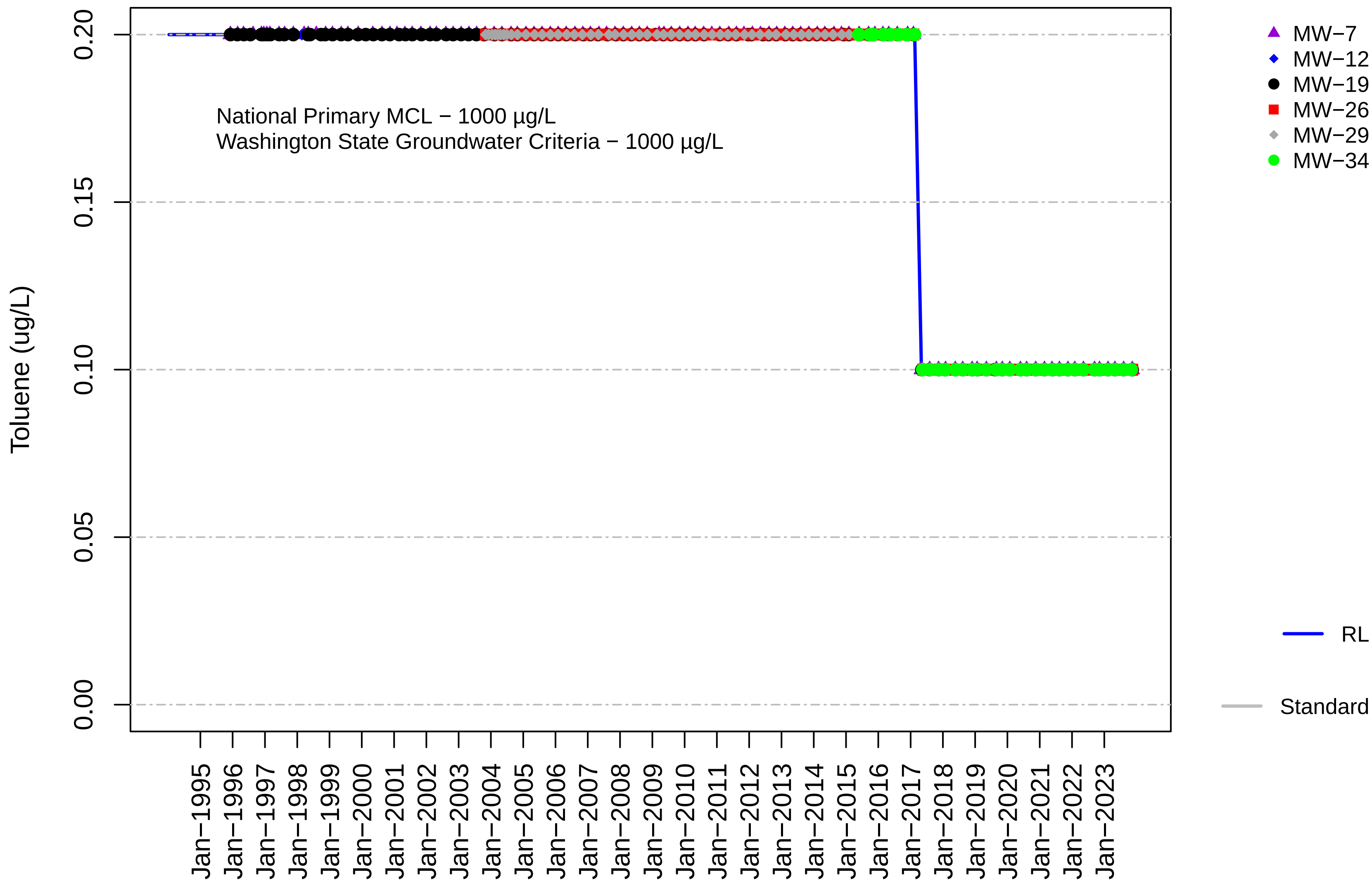


Figure B−111 Long−Term
Unit D
Trans−1,2−Dichloroethene

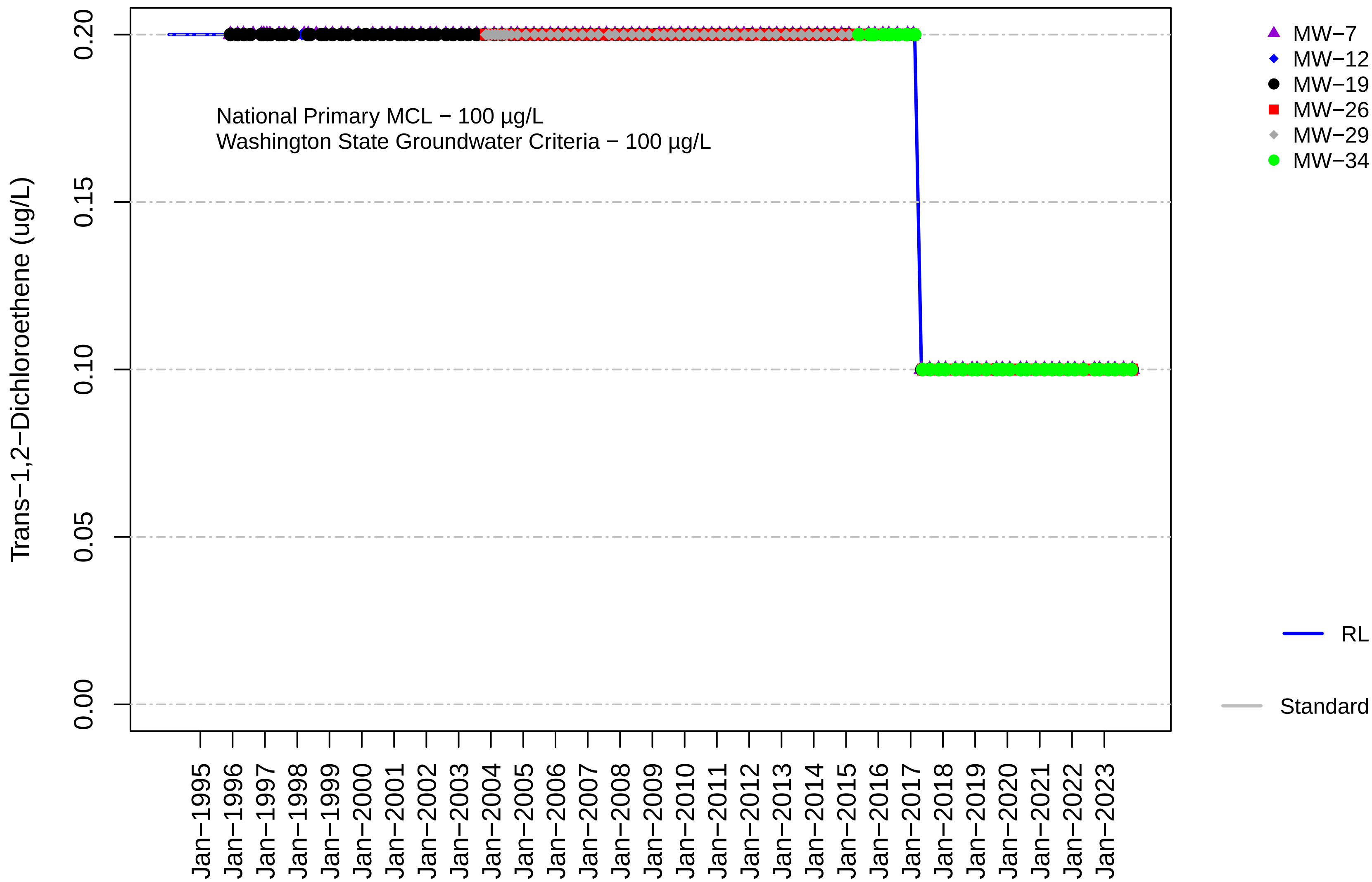


Figure B−112 Long−Term
Unit D
Trichloroethene

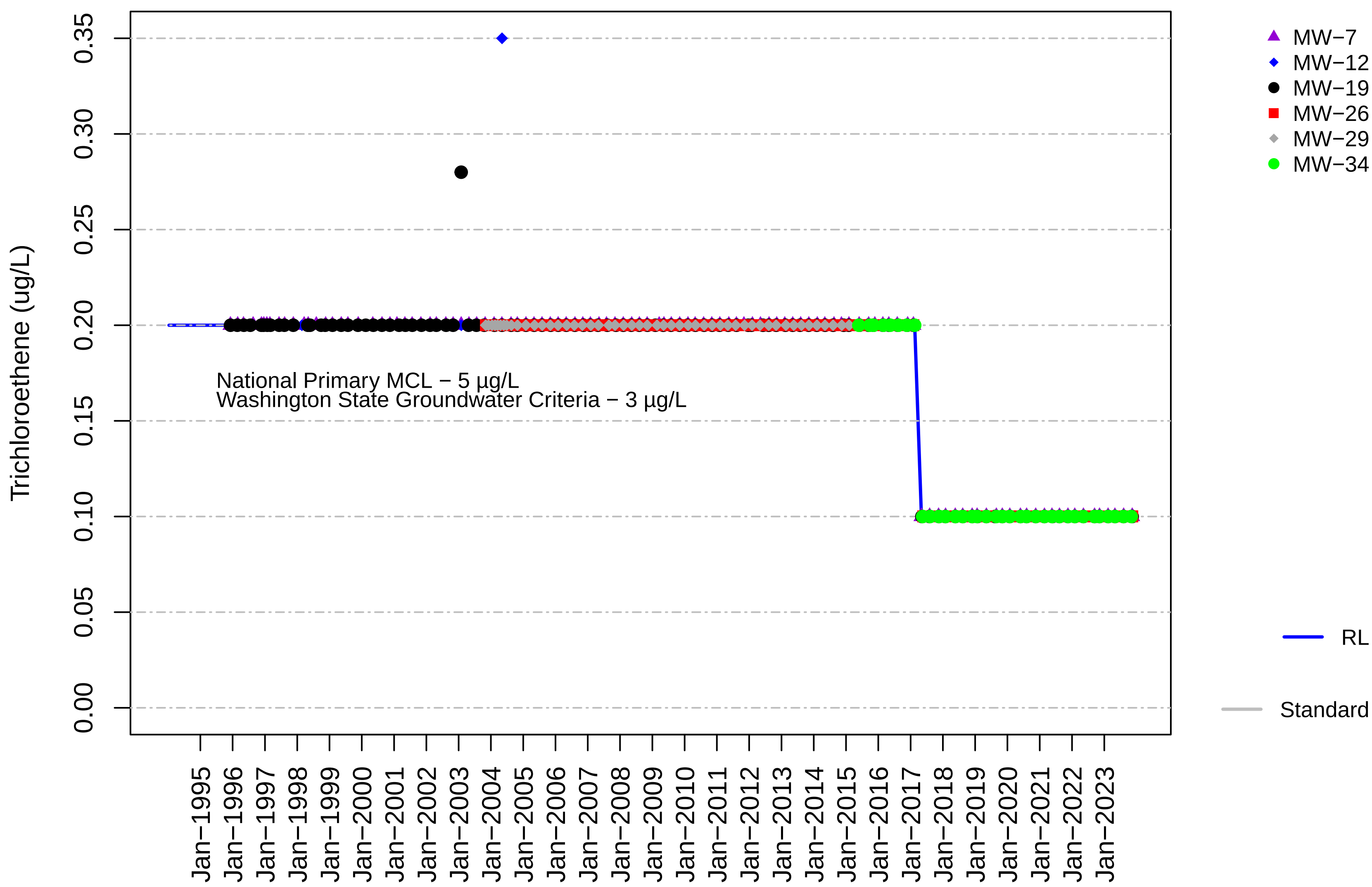


Figure B−113 Long−Term
Unit D
Trichlorofluoromethane

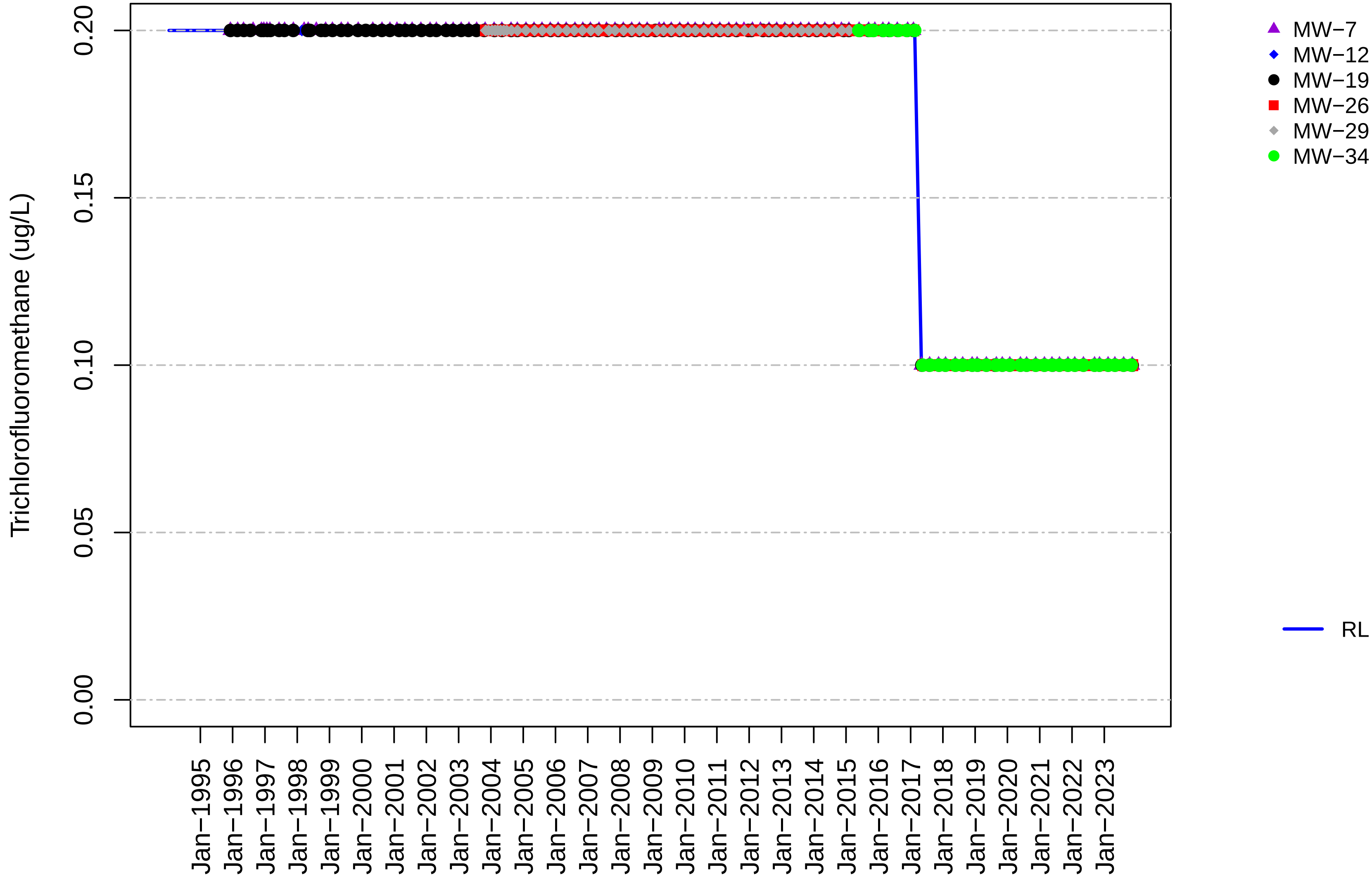


Figure B−114 Long−Term
Unit D
Vinyl chloride

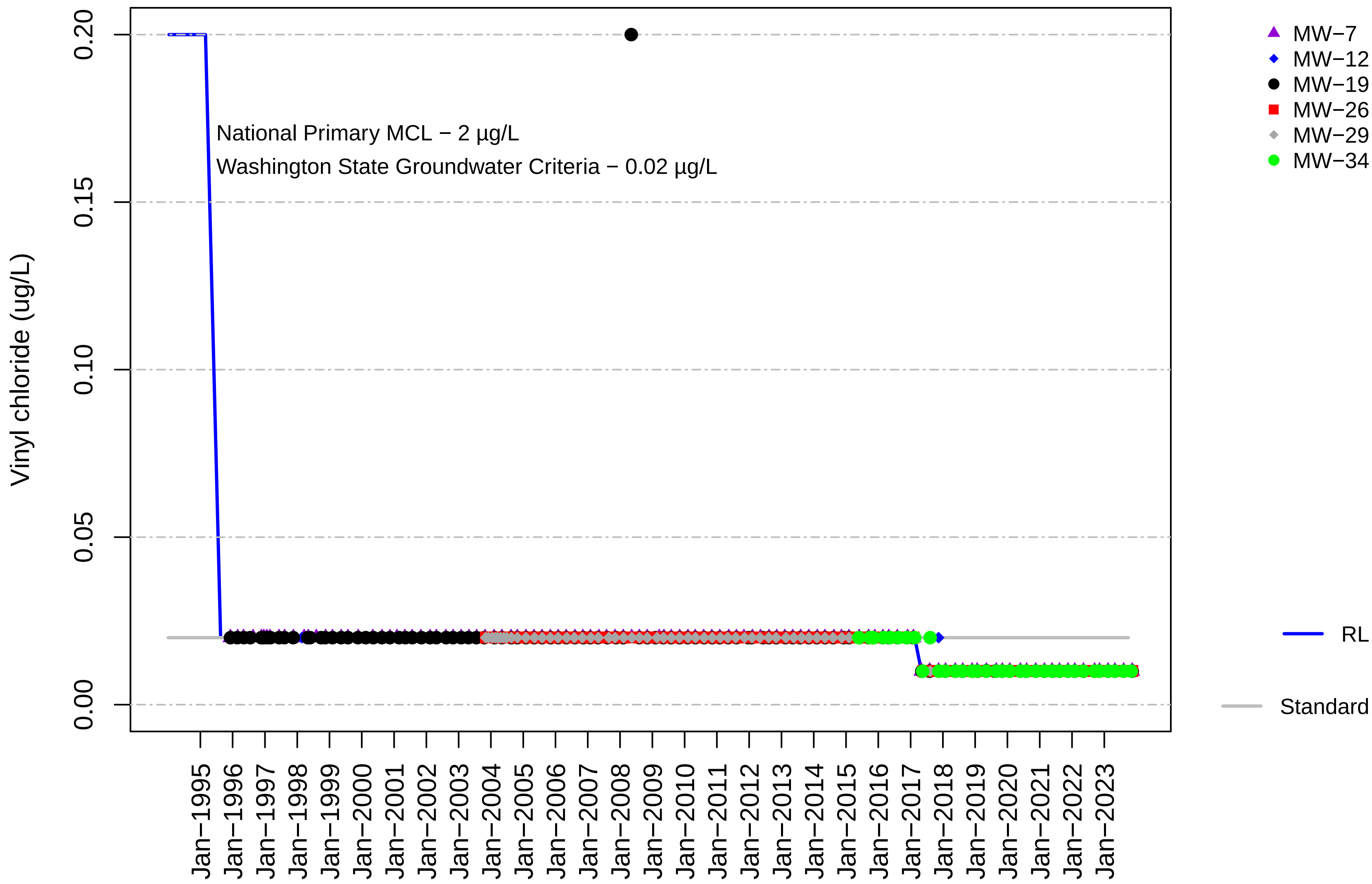
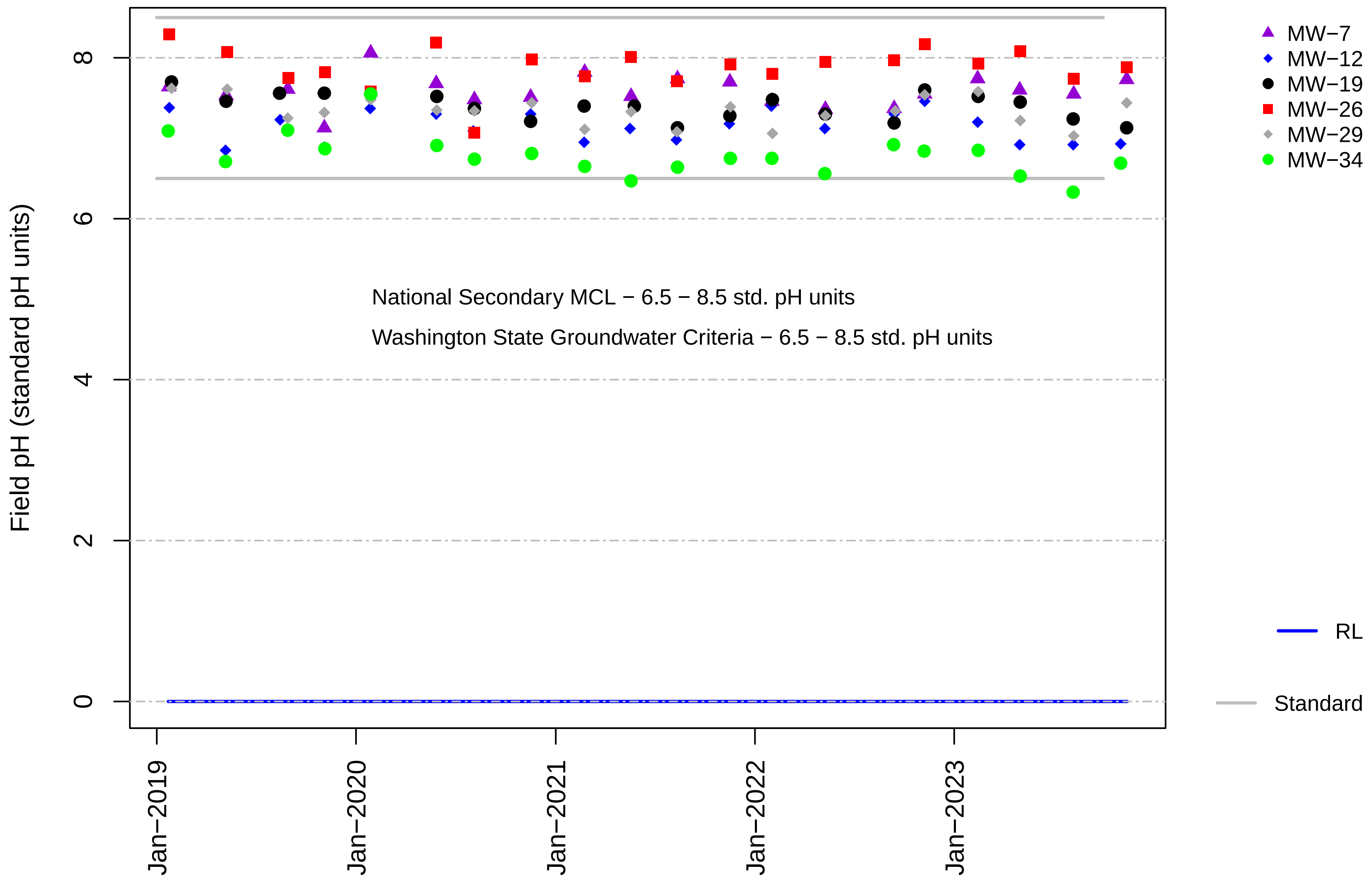


Figure B−89 Short−Term
Unit D
Field pH



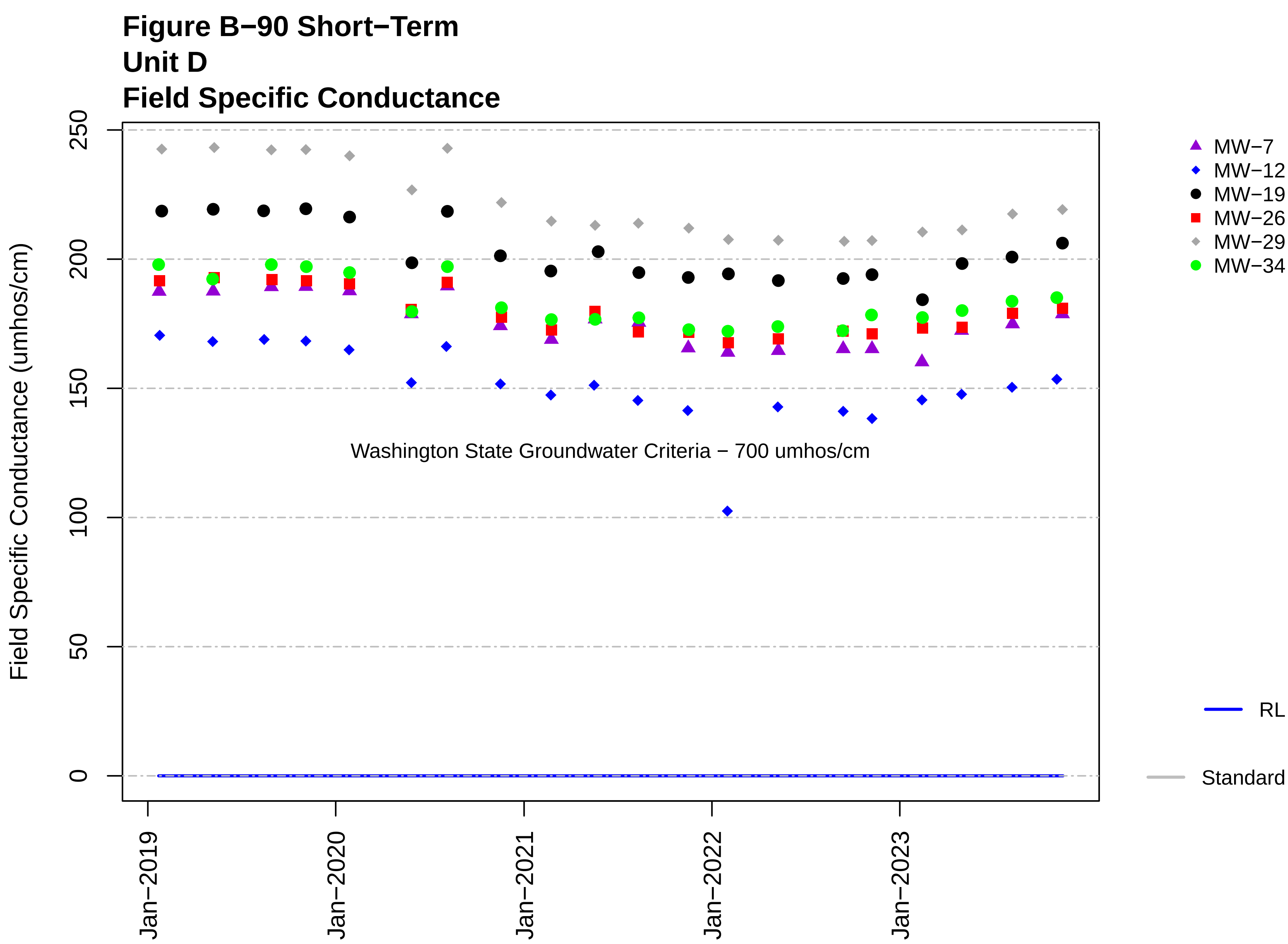
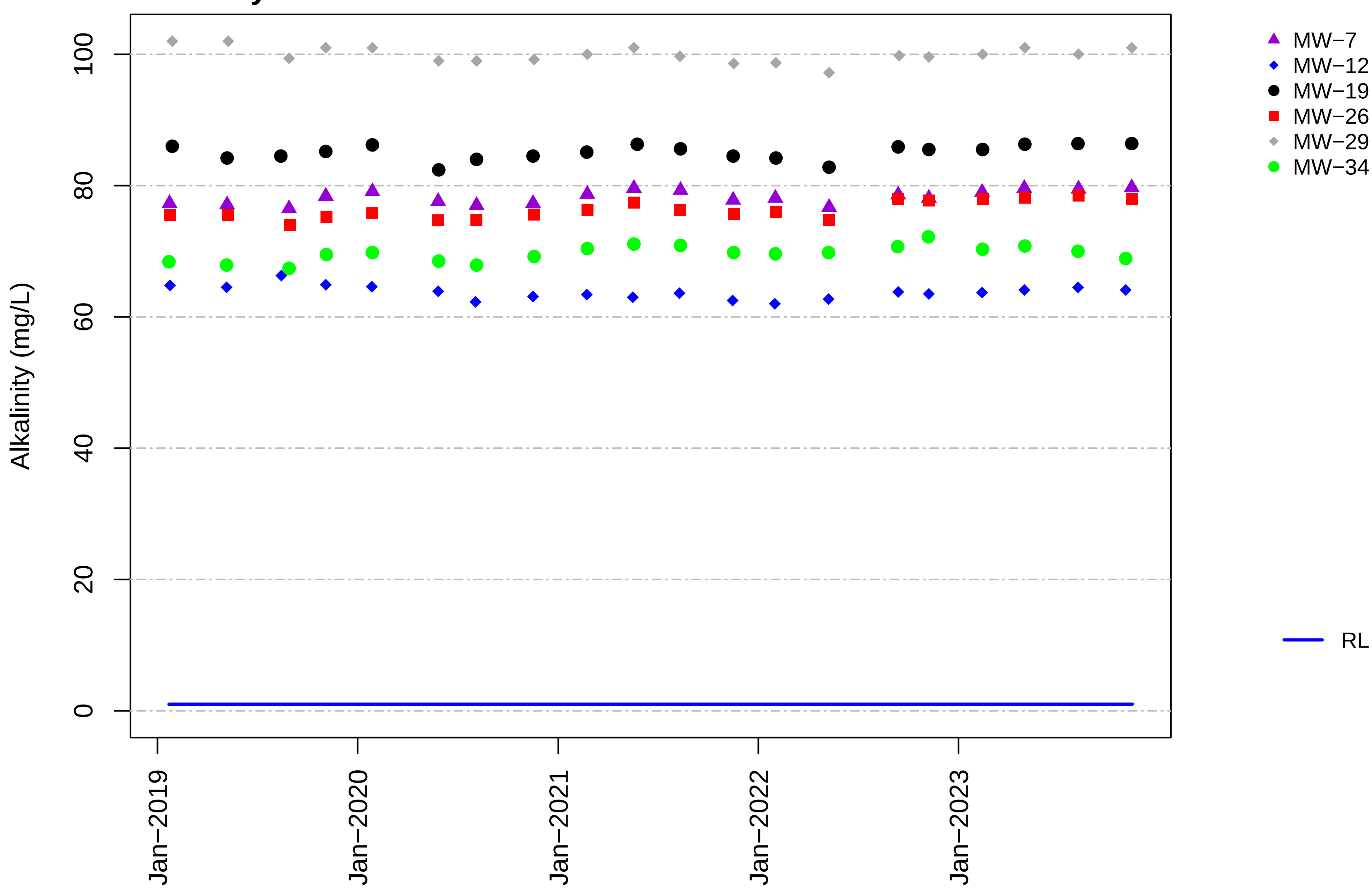


Figure B−90 Short−Term
Unit D
Field Specific Conductance
Field Specific Conductance (umhos/cm)
Washington State Groundwater Criteria − 700 umhos/cm
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard
0
50
100
150
200
250
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023

Figure B−91 Short−Term
Unit D
Alkalinity



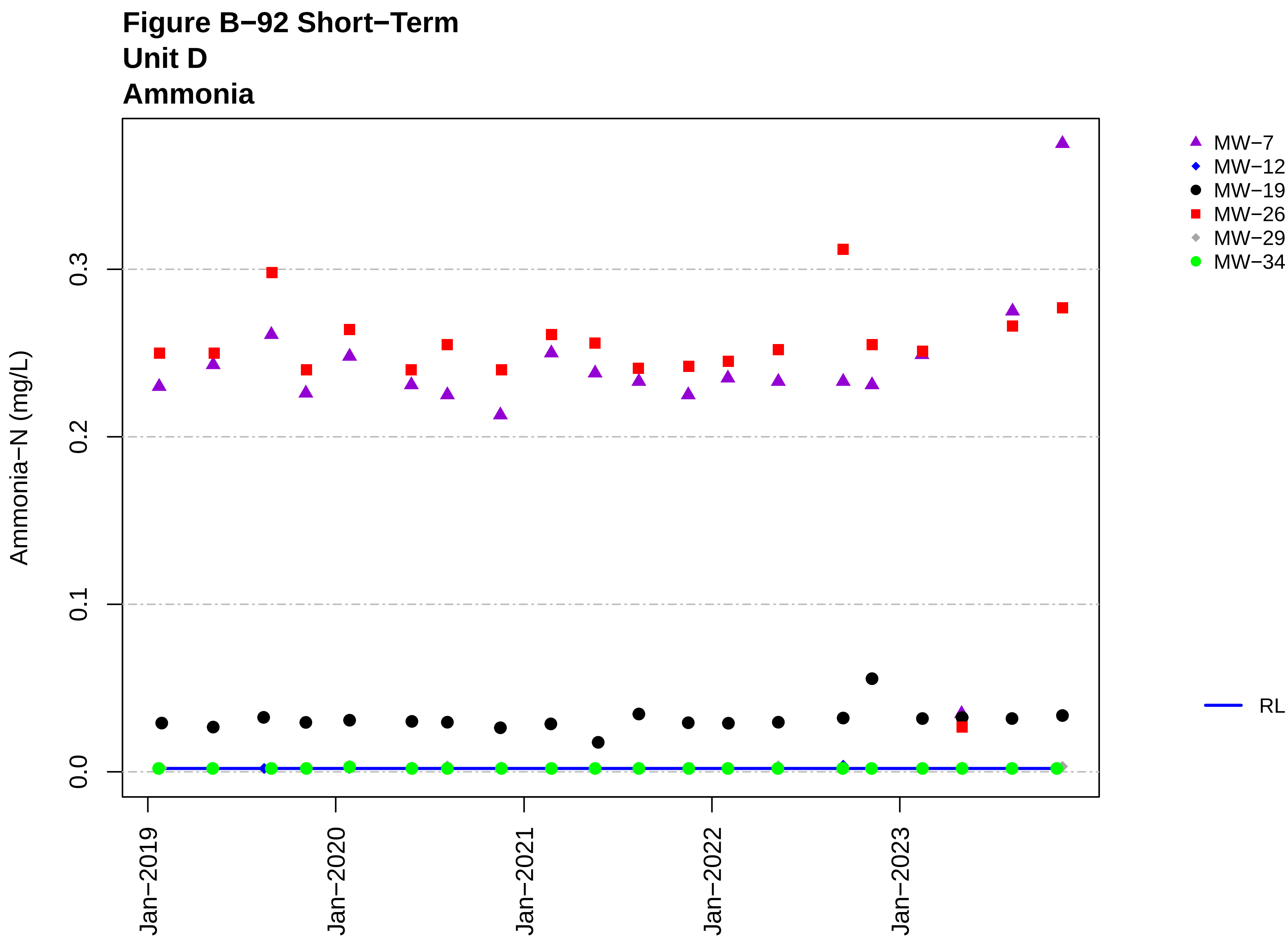
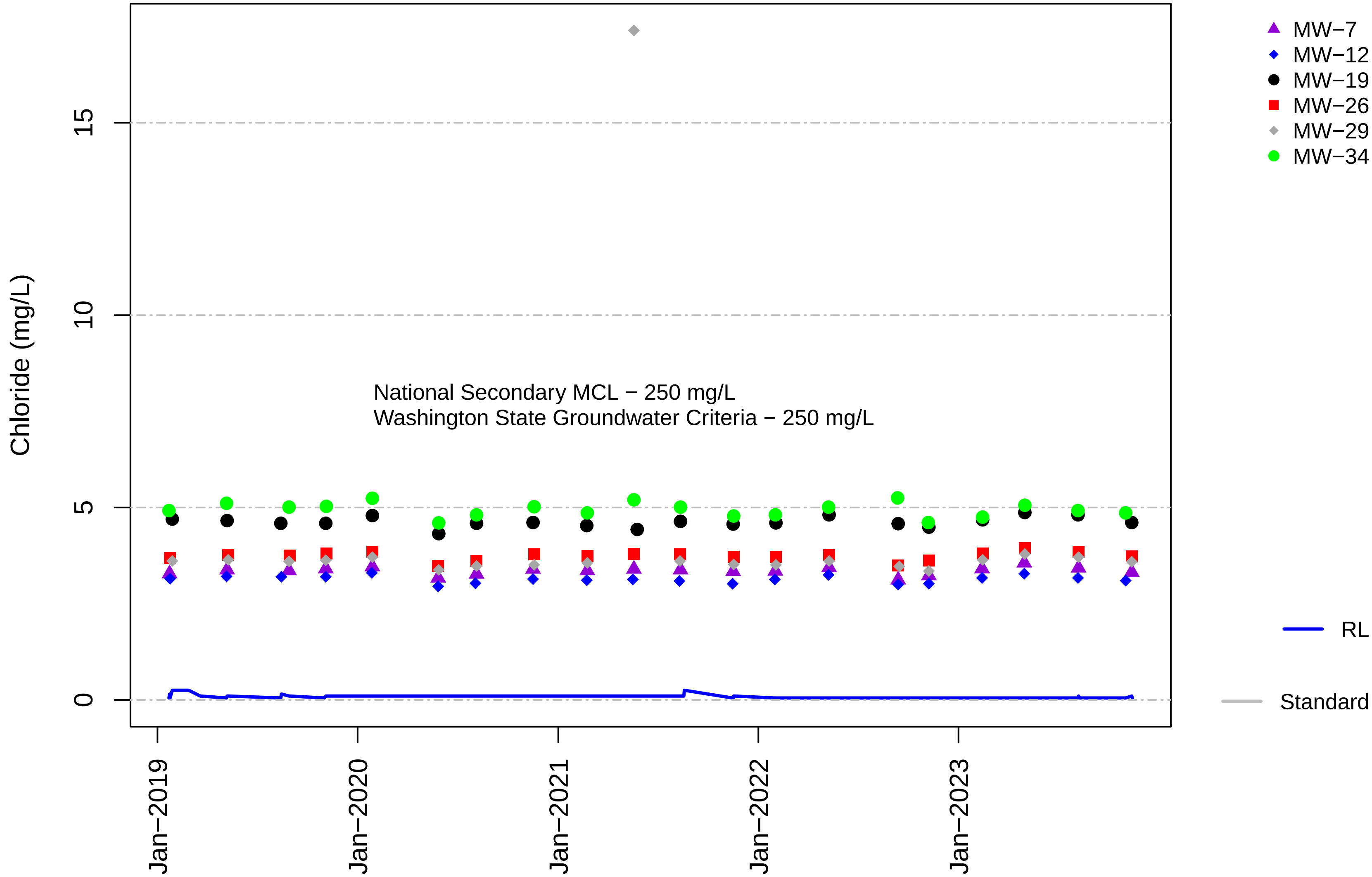


Figure B−92 Short−Term
Unit D
Ammonia
Ammonia−N (mg/L)
0.0
0.1
0.2
0.3
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL

Figure B−93 Short−Term
Unit D
Chloride



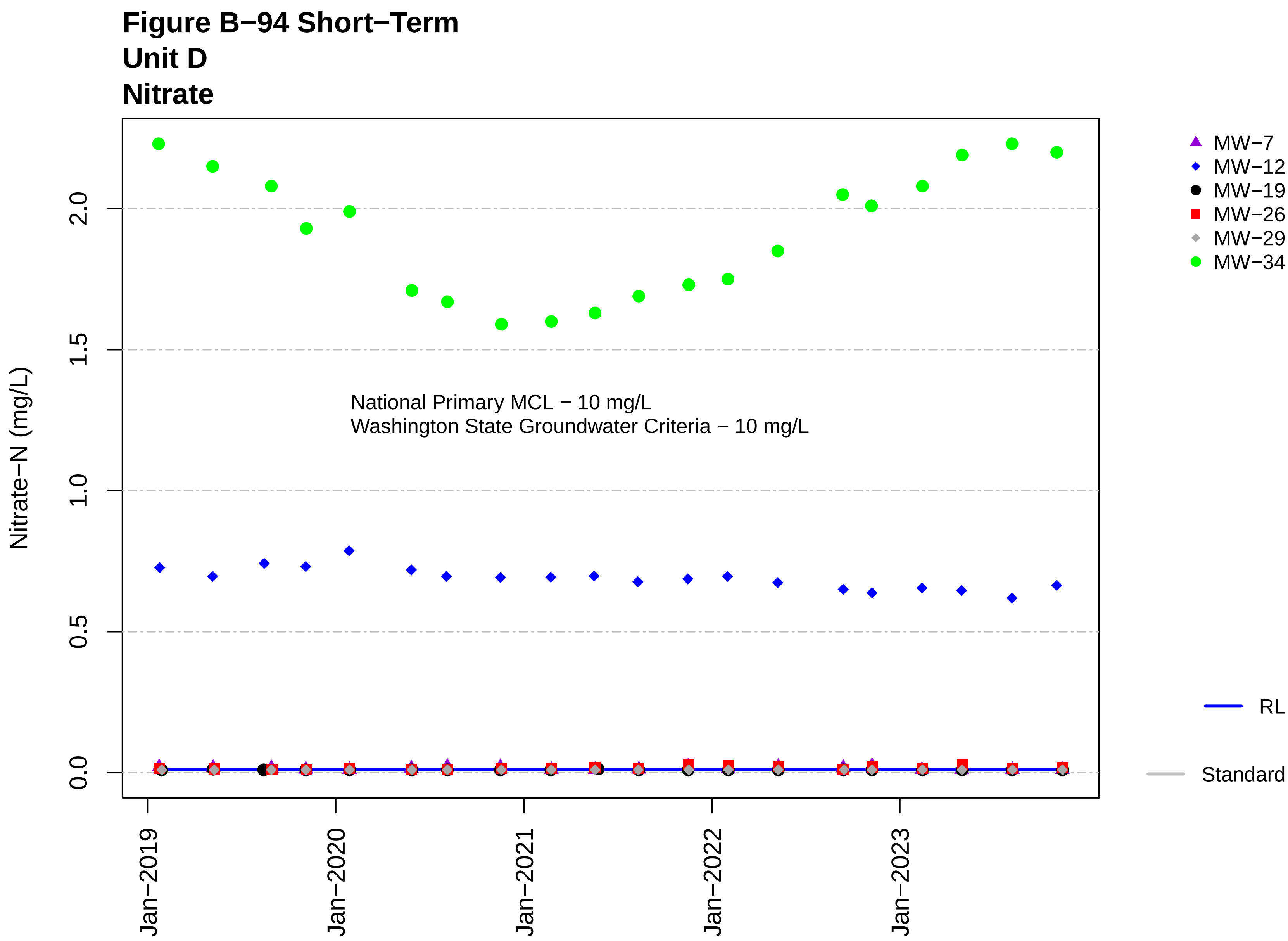


Figure B−94 Short−Term
Unit D
Nitrate
Nitrate−N (mg/L)
0.0
0.5
1.0
1.5
2.0
National Primary MCL − 10 mg/L
Washington State Groundwater Criteria − 10 mg/L
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL
Standard

Figure B−95 Short−Term
Unit D
Sulfate

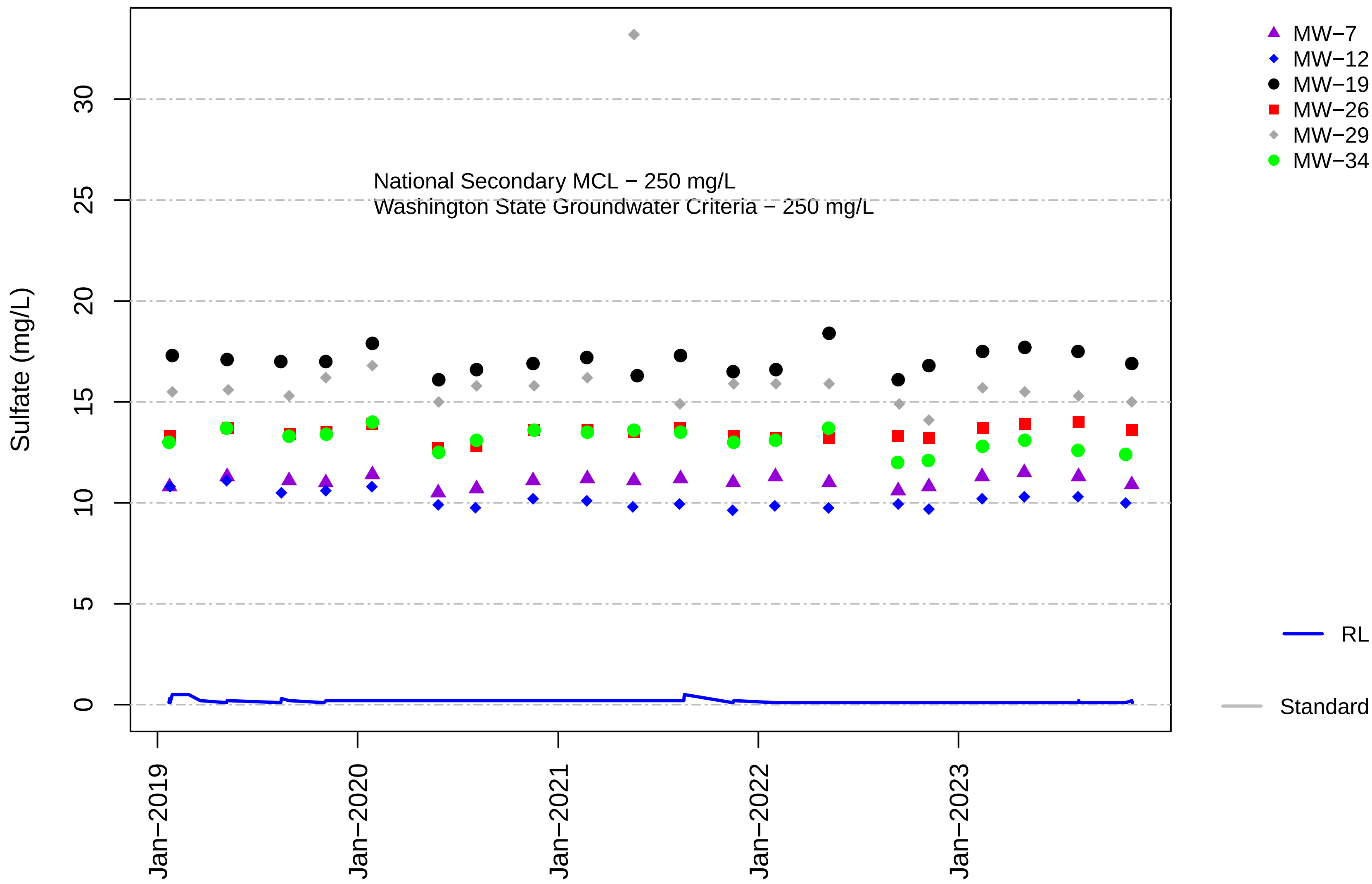


Figure B−96 Short−Term
Unit D
Total Dissolved Solids

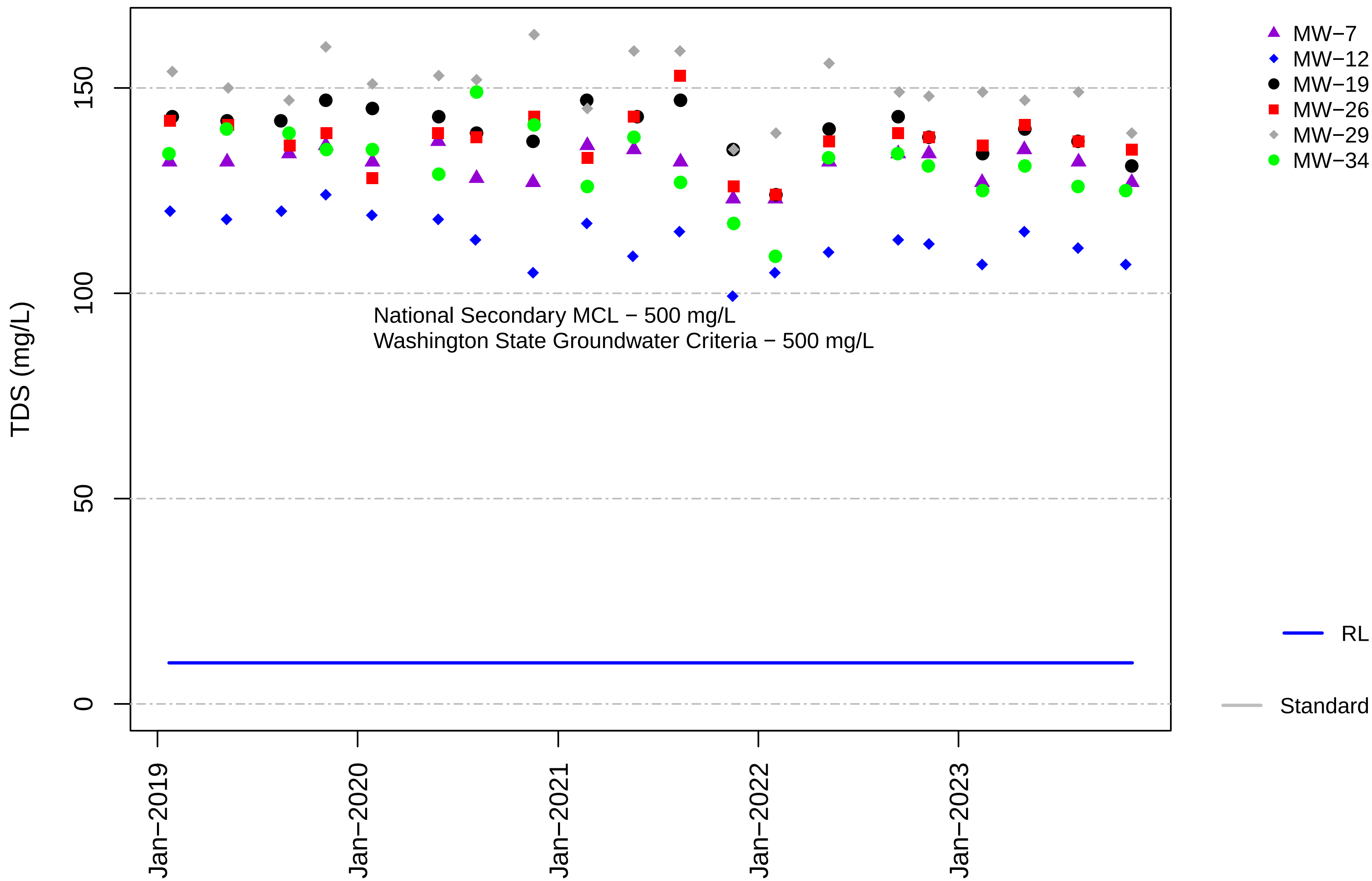


Figure B−97 Short−Term
Unit D
Arsenic

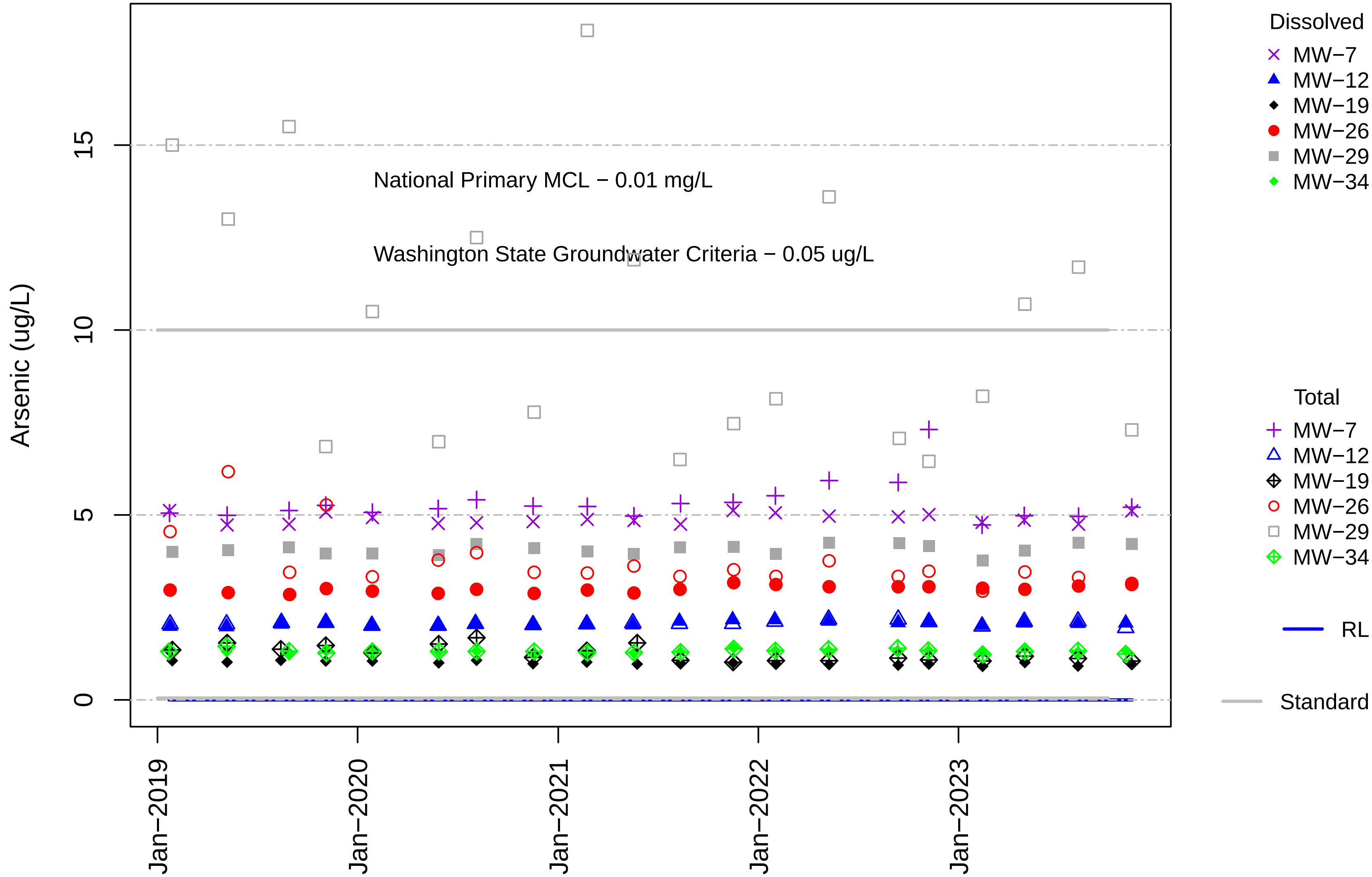


Figure B−98 Short−Term
Unit D
Calcium

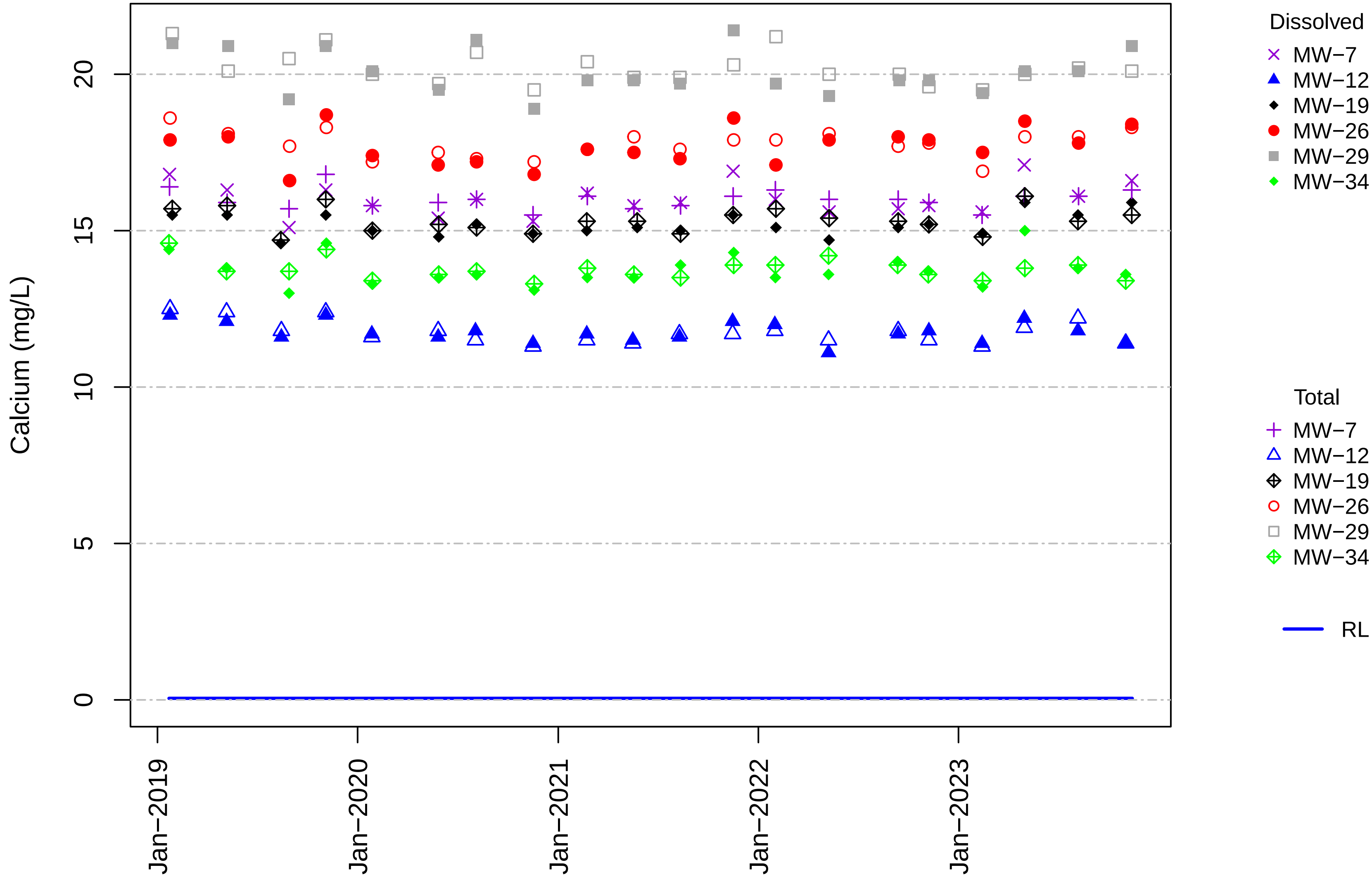


Figure B−99 Short−Term
Unit D
Iron

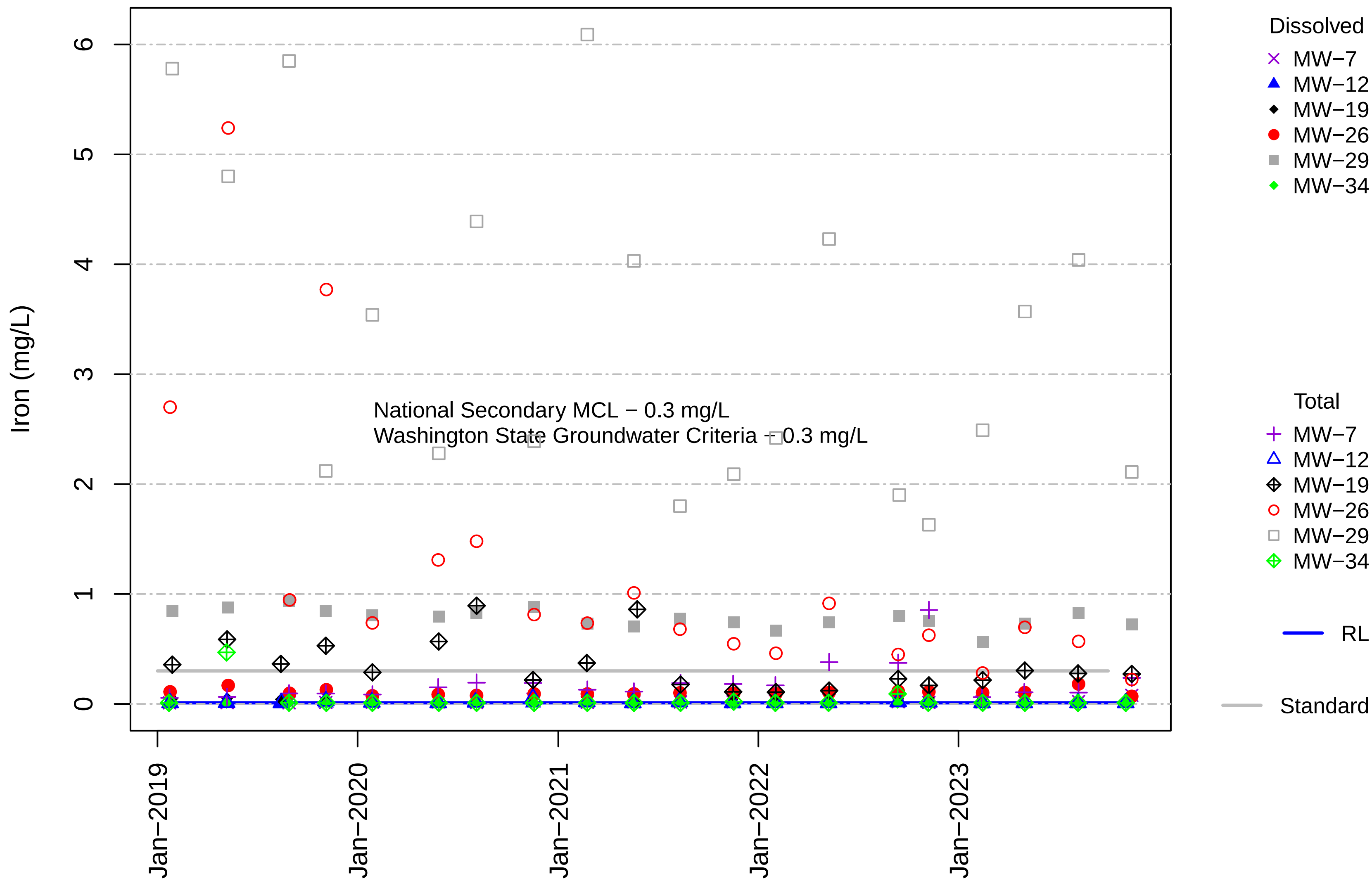


Figure B−100 Short−Term Unit D Magnesium

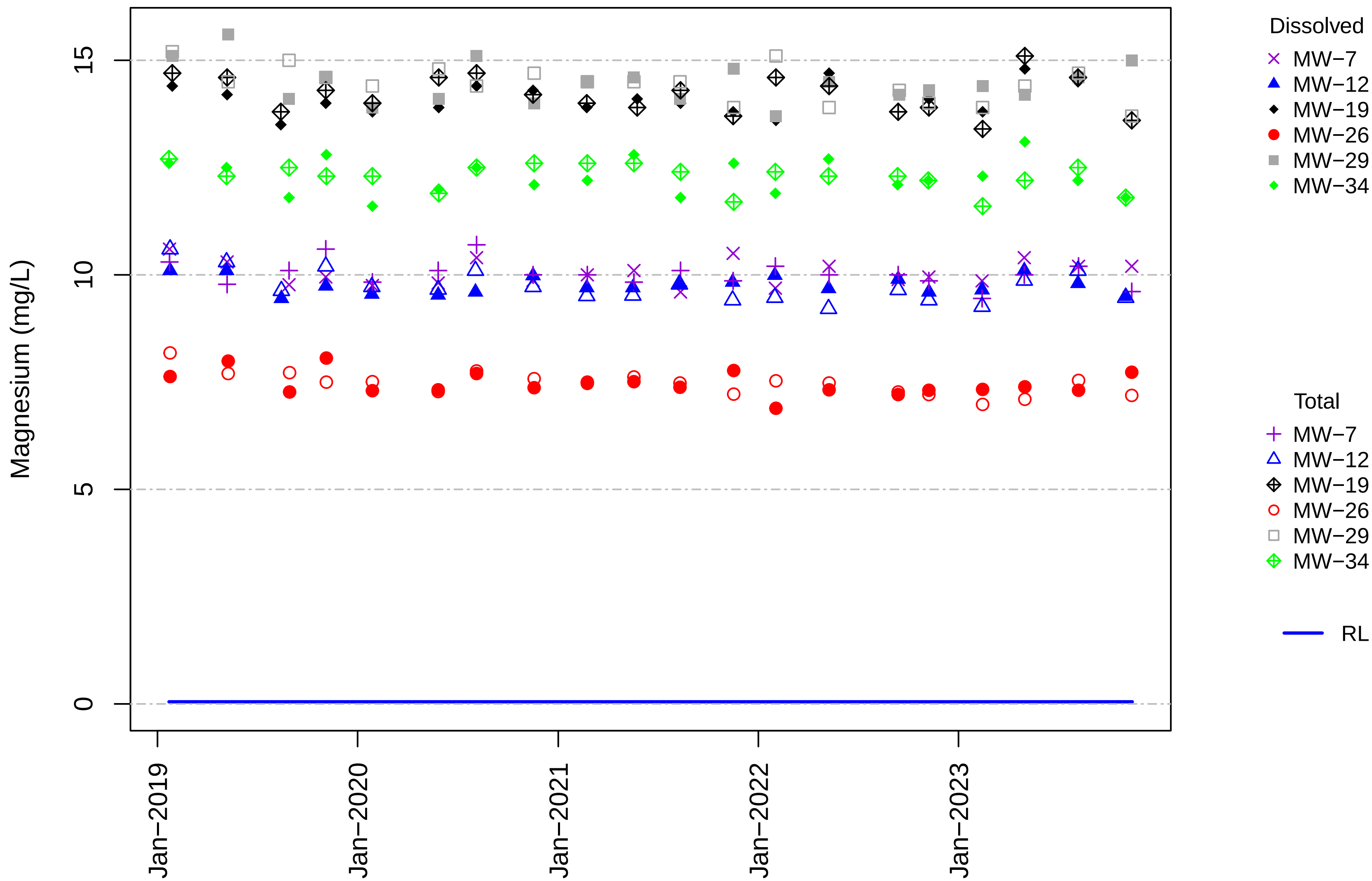
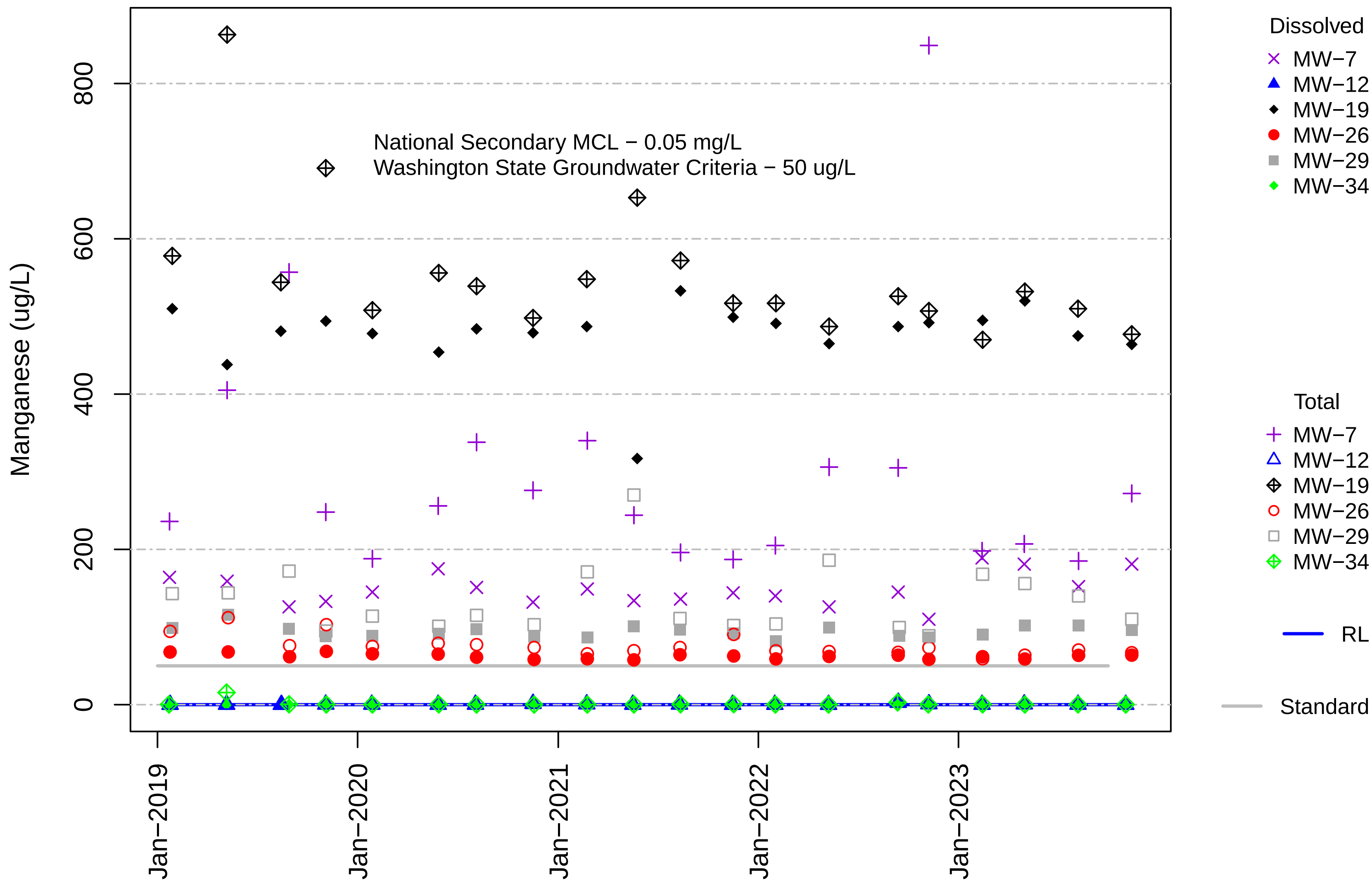


Figure B−101 Short−Term
Unit D
Manganese



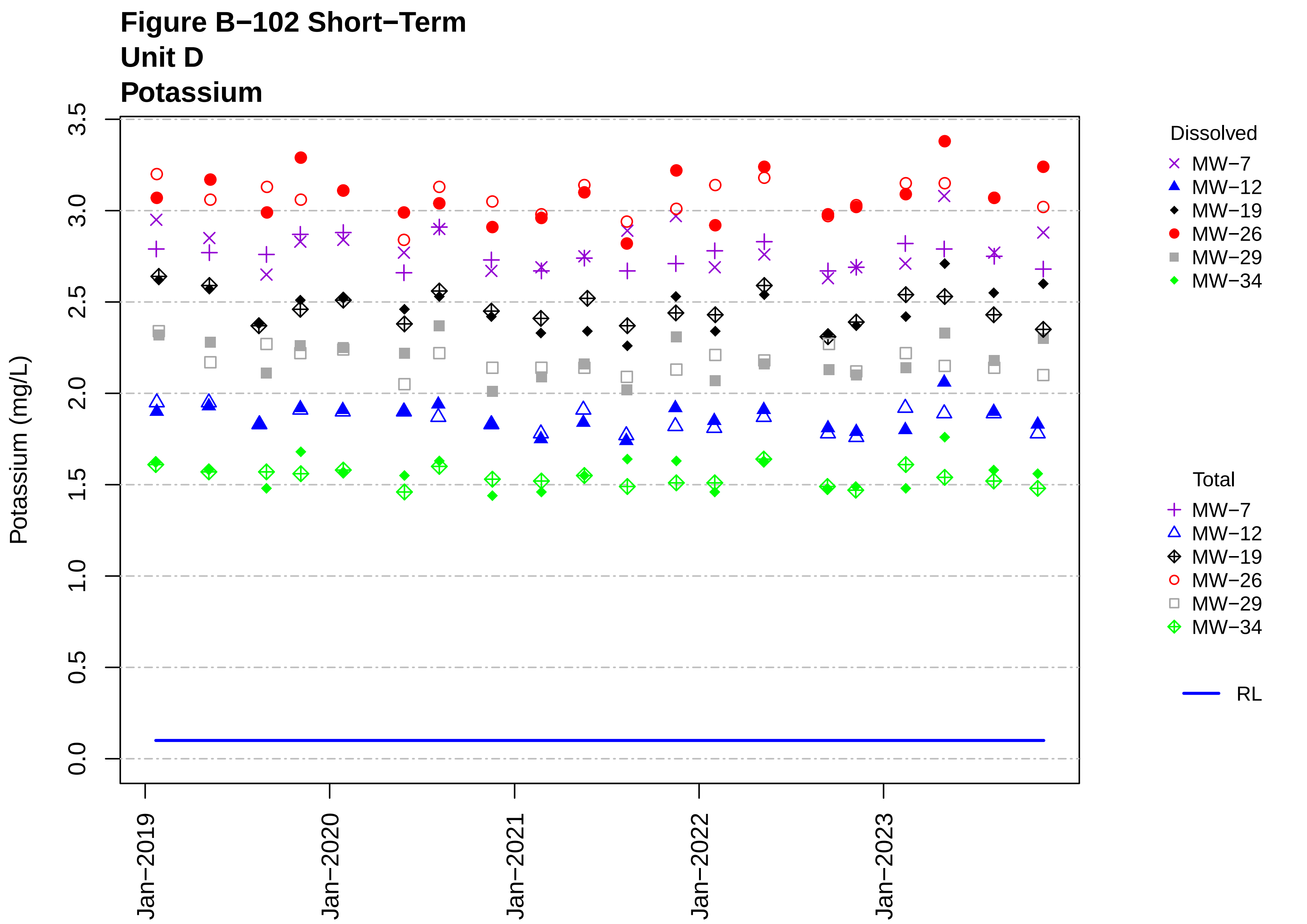


Figure B−102 Short−Term
Unit D
Potassium
Potassium (mg/L)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
Jan−2019
Jan−2020
Jan−2021
Jan−2022
Jan−2023
Dissolved
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
Total
MW−7
MW−12
MW−19
MW−26
MW−29
MW−34
RL

Figure B−103 Short−Term
Unit D
Sodium

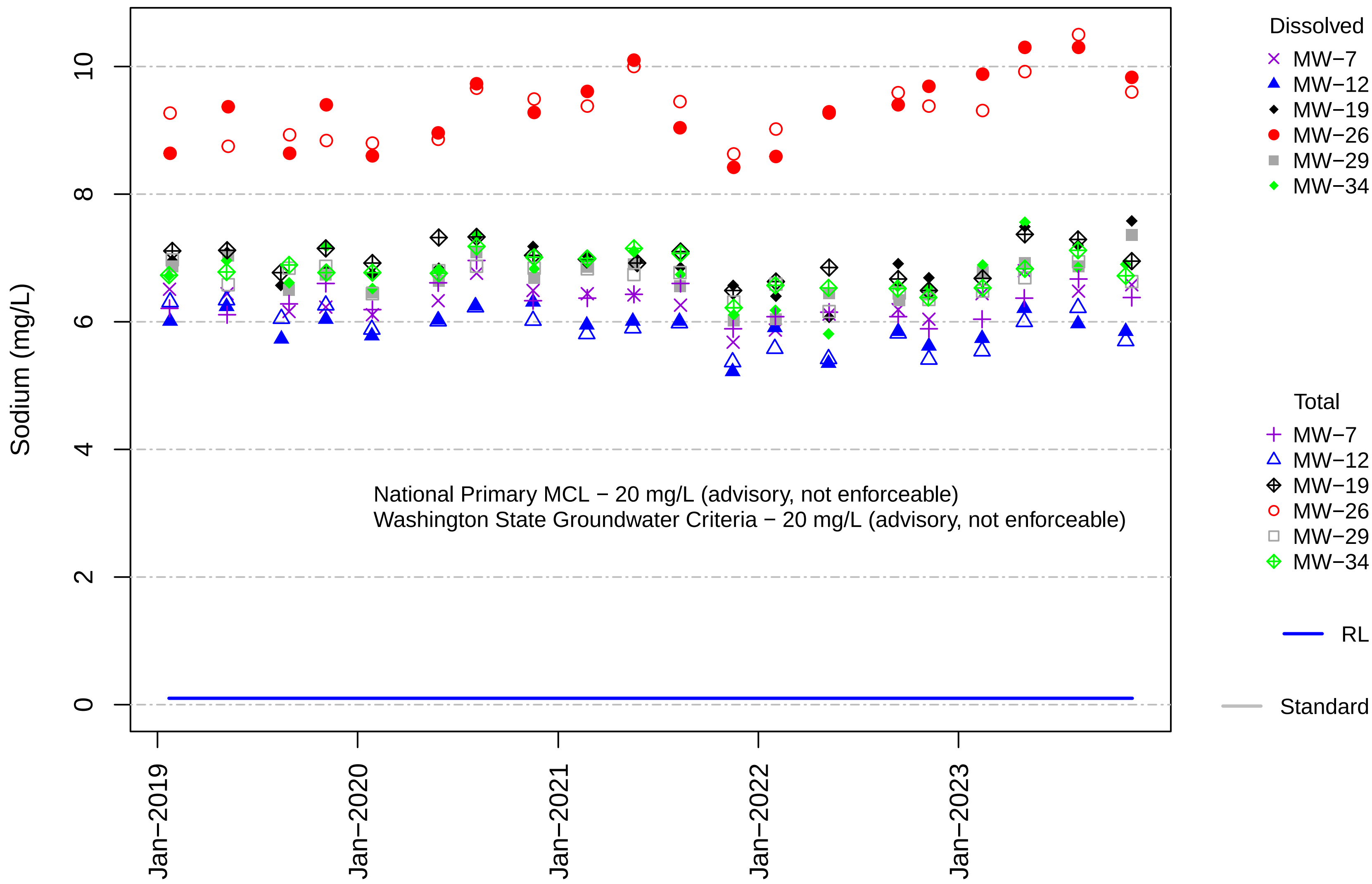


Figure B−104 Short−Term
Unit D
1,1−Dichloroethane

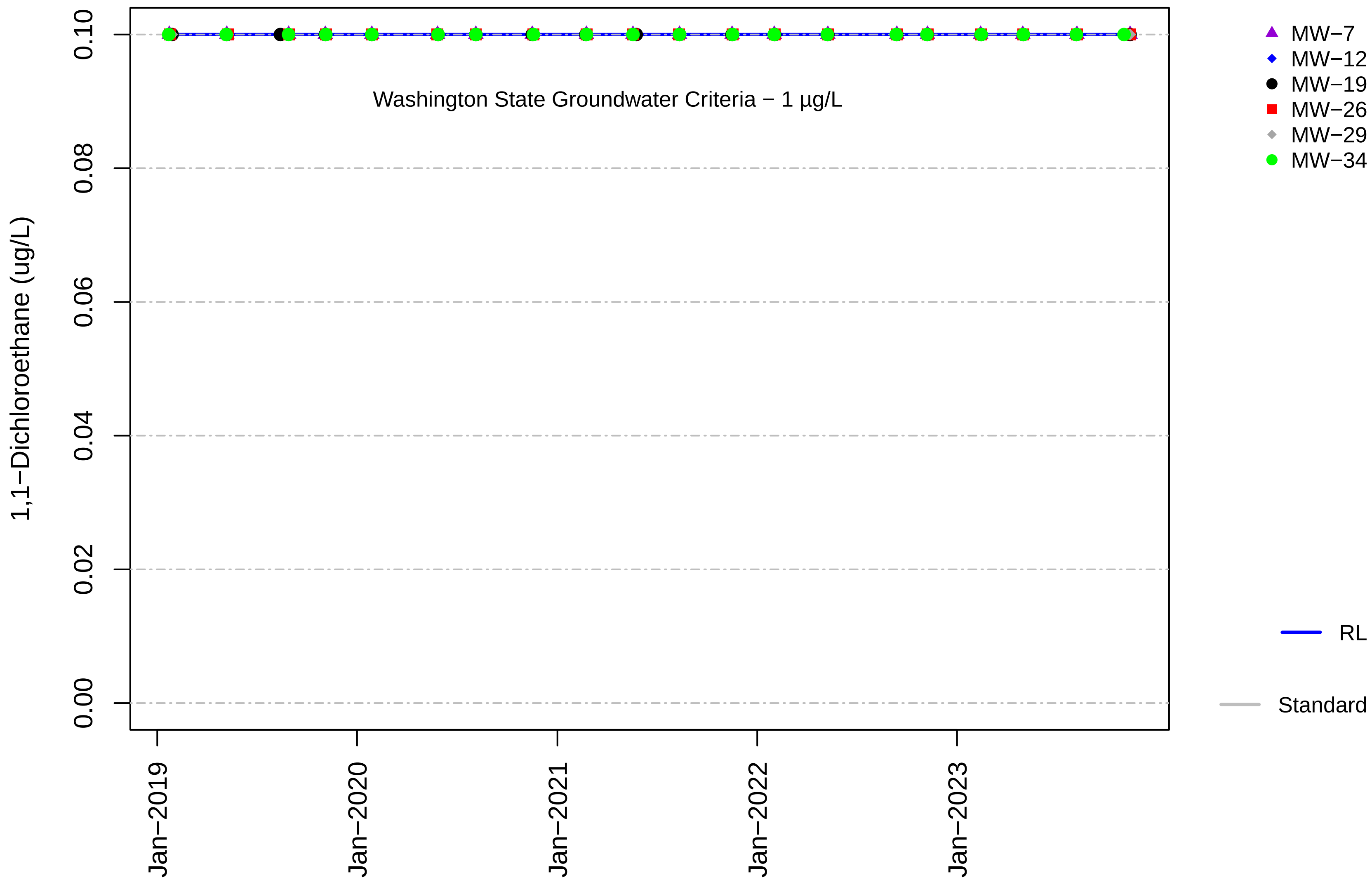


Figure B−105 Short−Term
Unit D
1,2−Dichloropropane

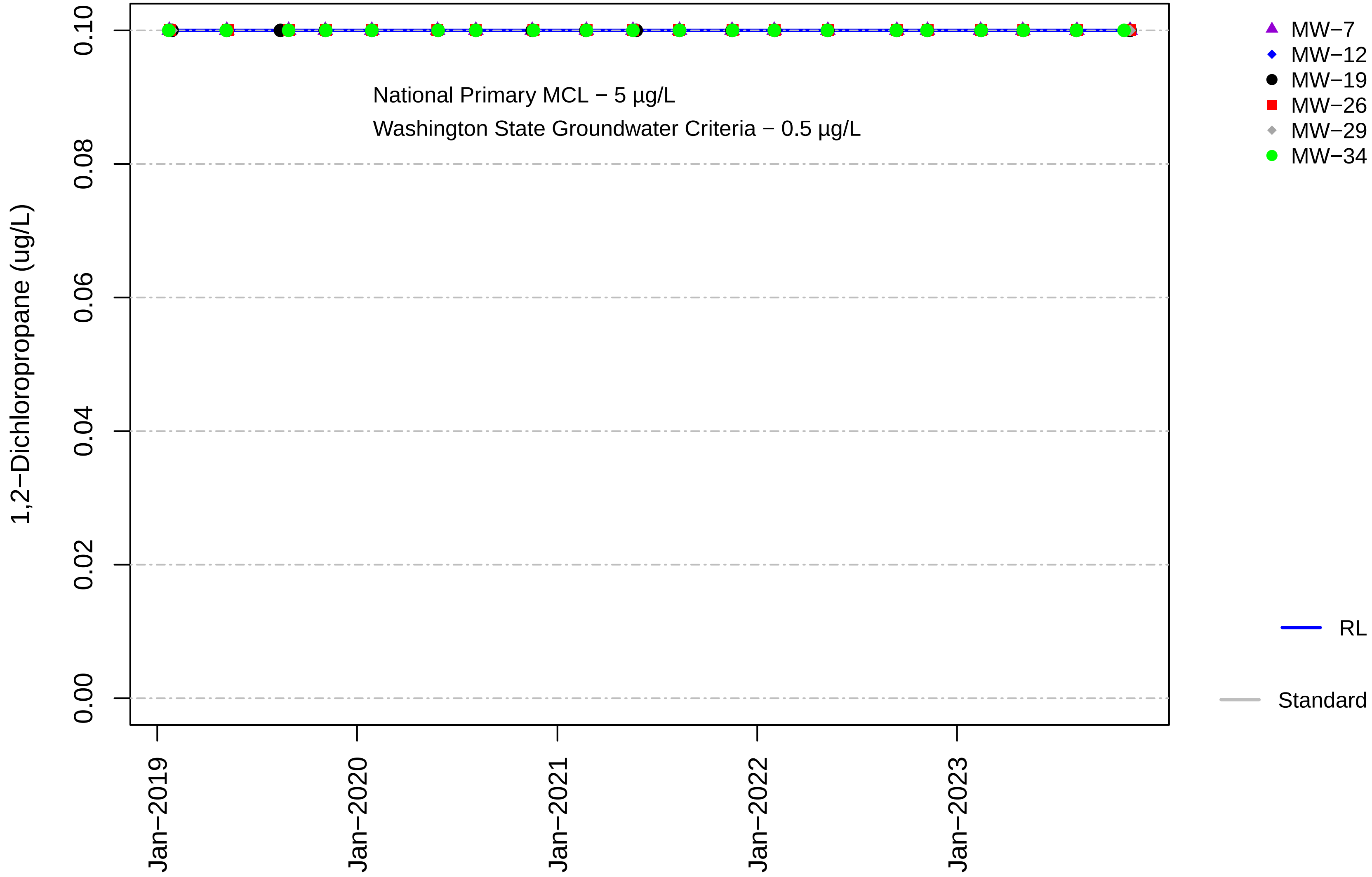


Figure B−106 Short−Term
Unit D
Benzene

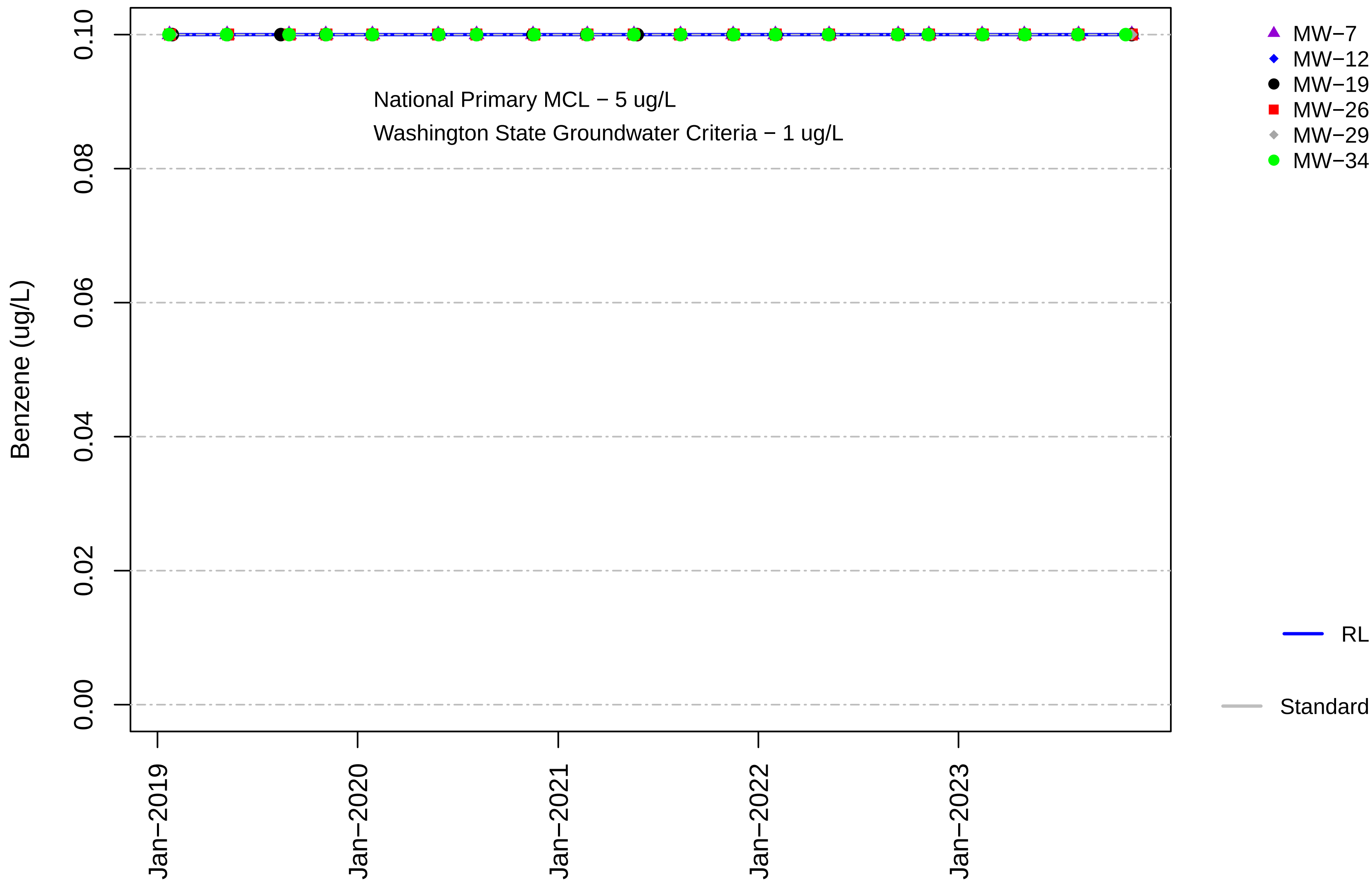


Figure B−107 Short−Term
Unit D
Chloroethane

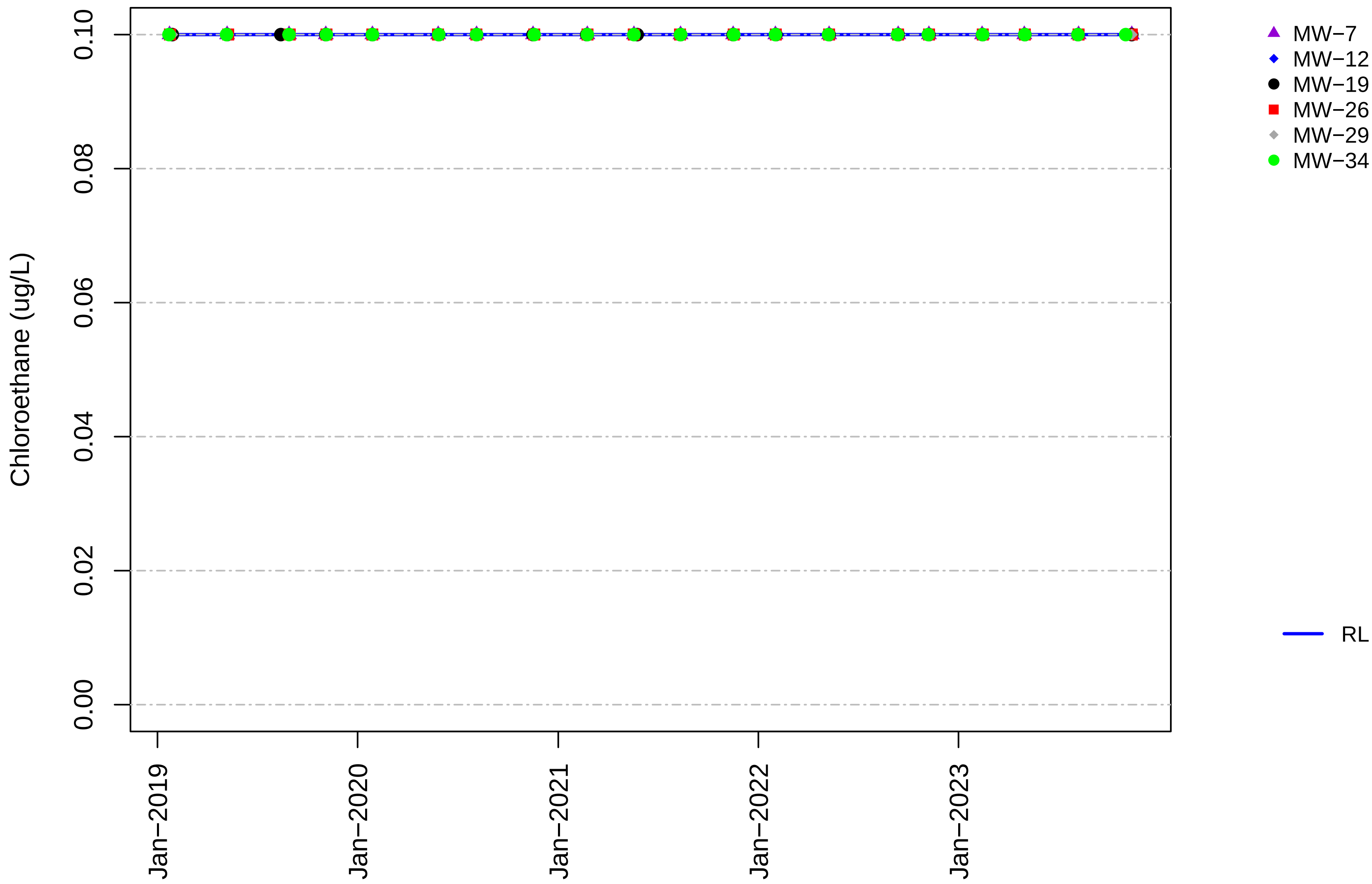


Figure B−108 Short−Term
Unit D
cis−1,2−Dichloroethene

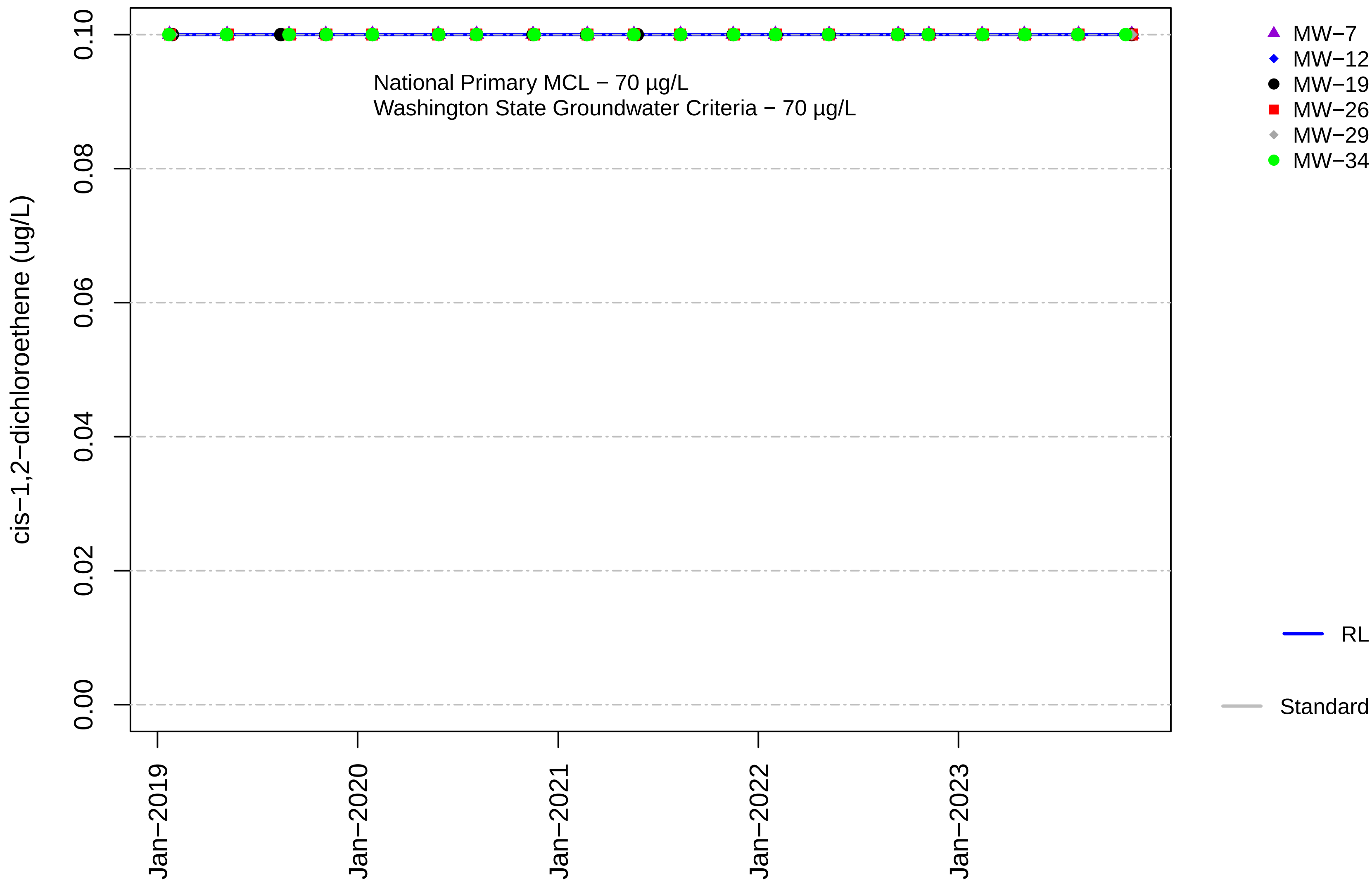


Figure B−109 Short−Term
Unit D
Dichlorodifluoromethane

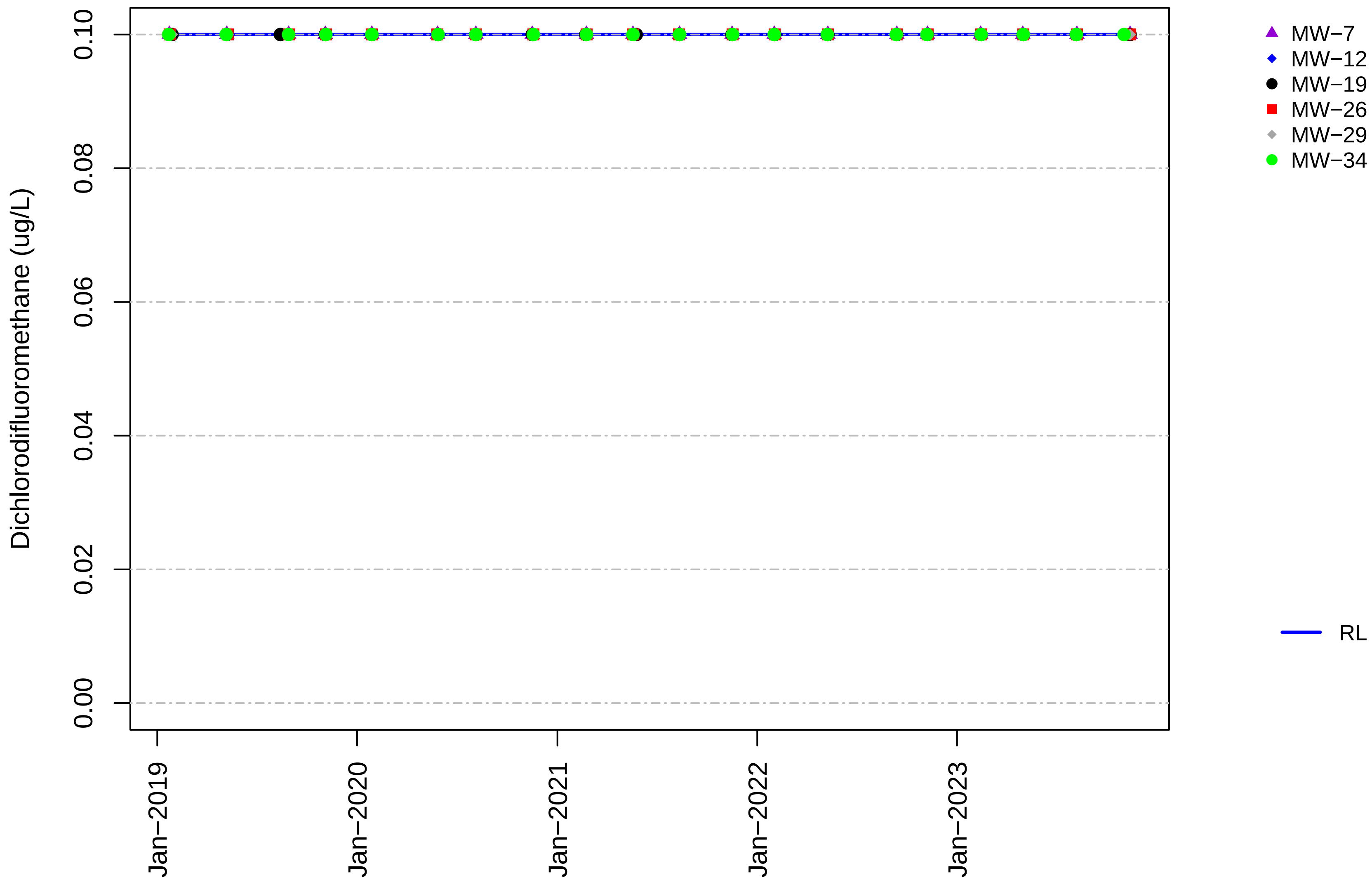


Figure B−110 Short−Term
Unit D
Tetrachloroethene

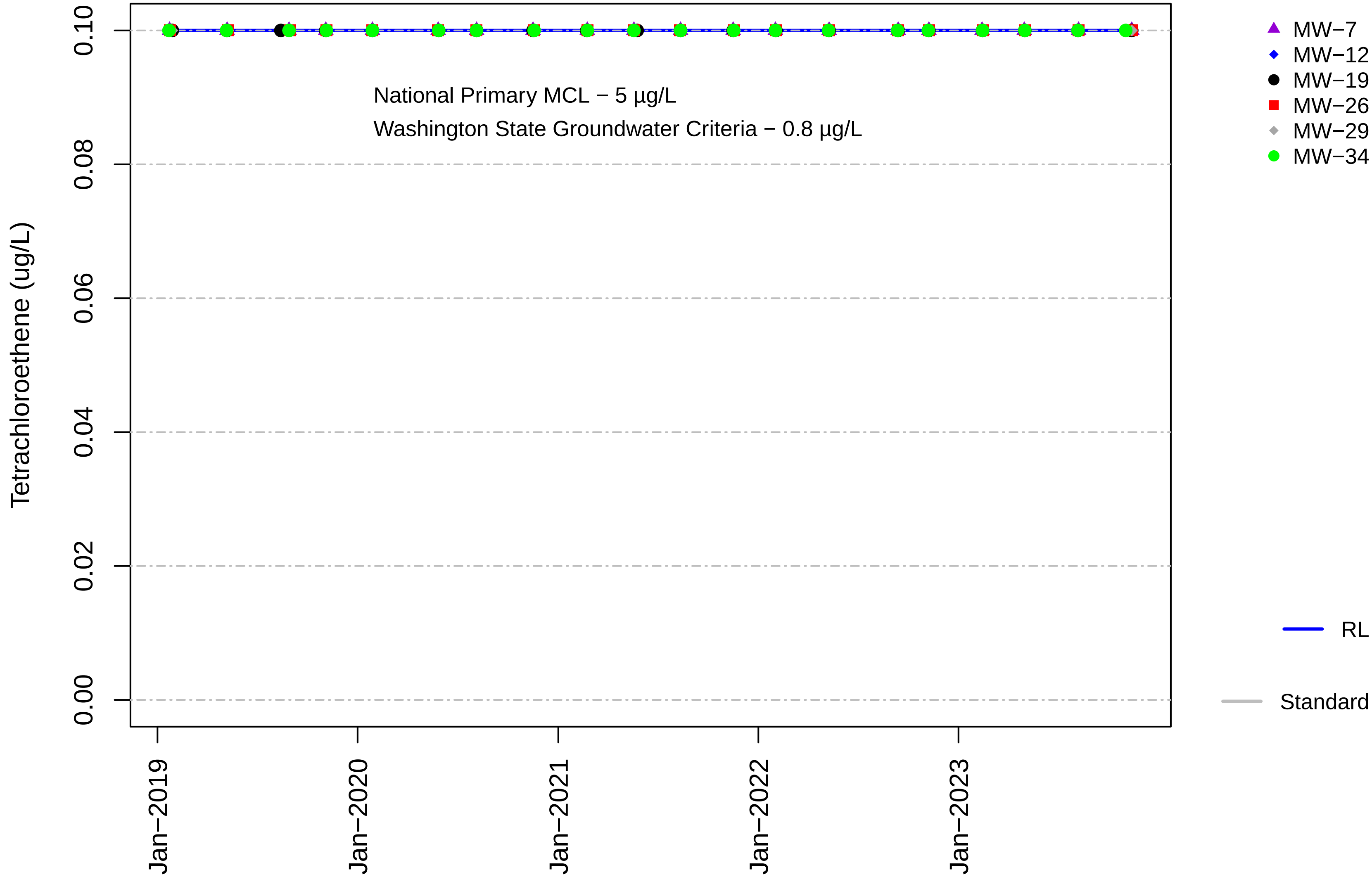


Figure B−111 Short−Term
Unit D
Toluene

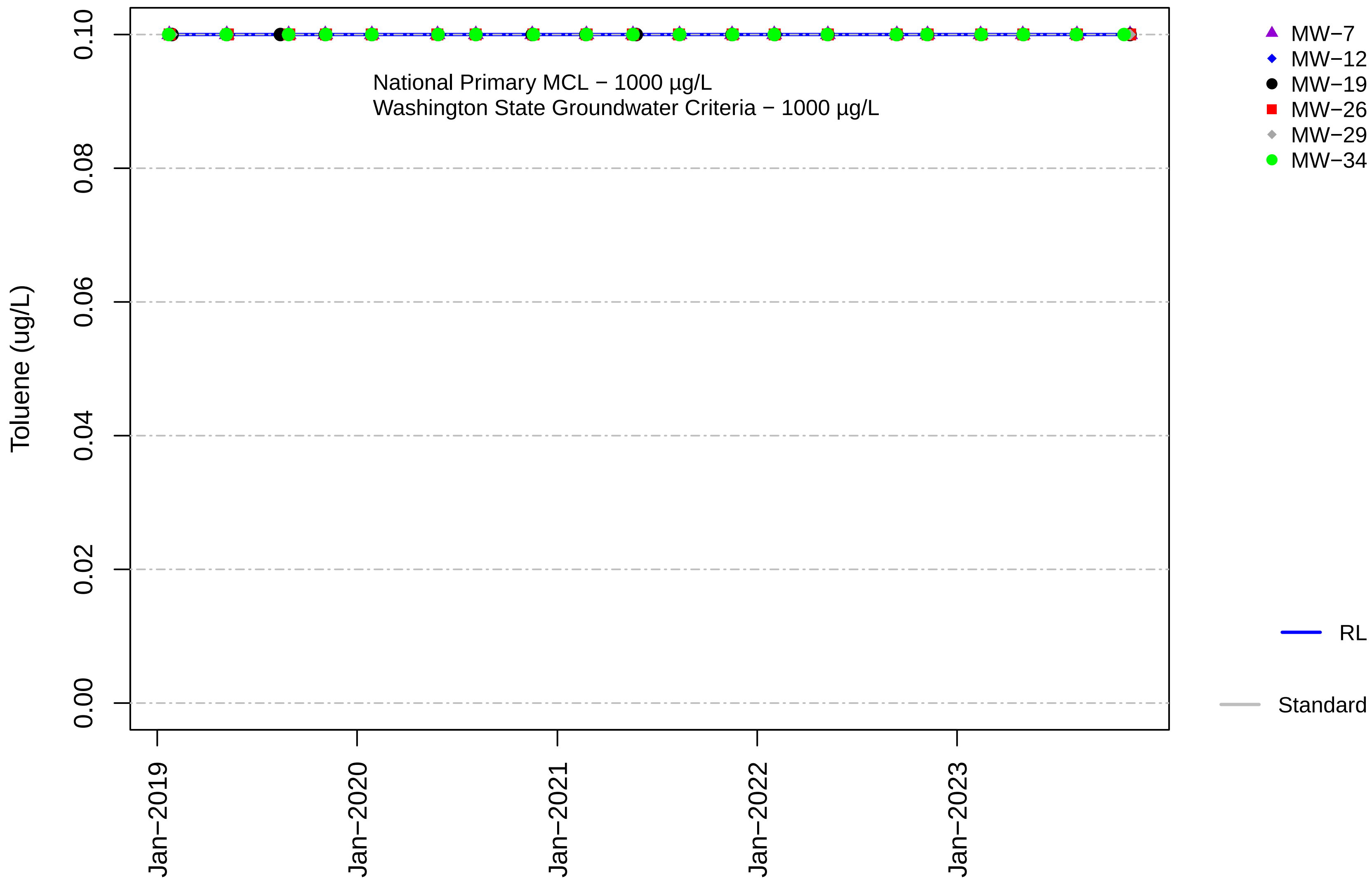


Figure B−112 Short−Term
Unit D
Trans−1,2−Dichloroethene

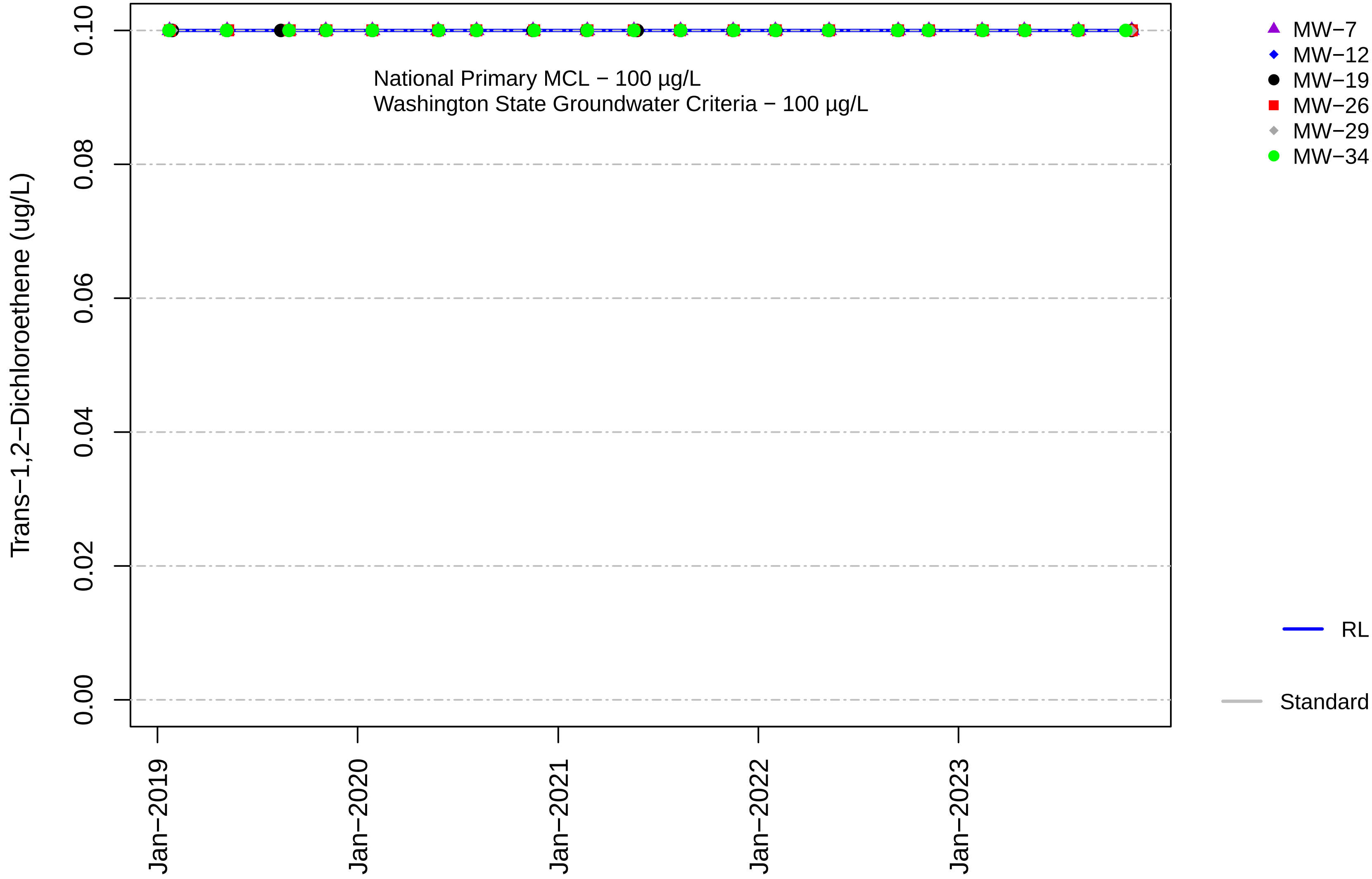


Figure B−113 Short−Term
Unit D
Trichloroethene

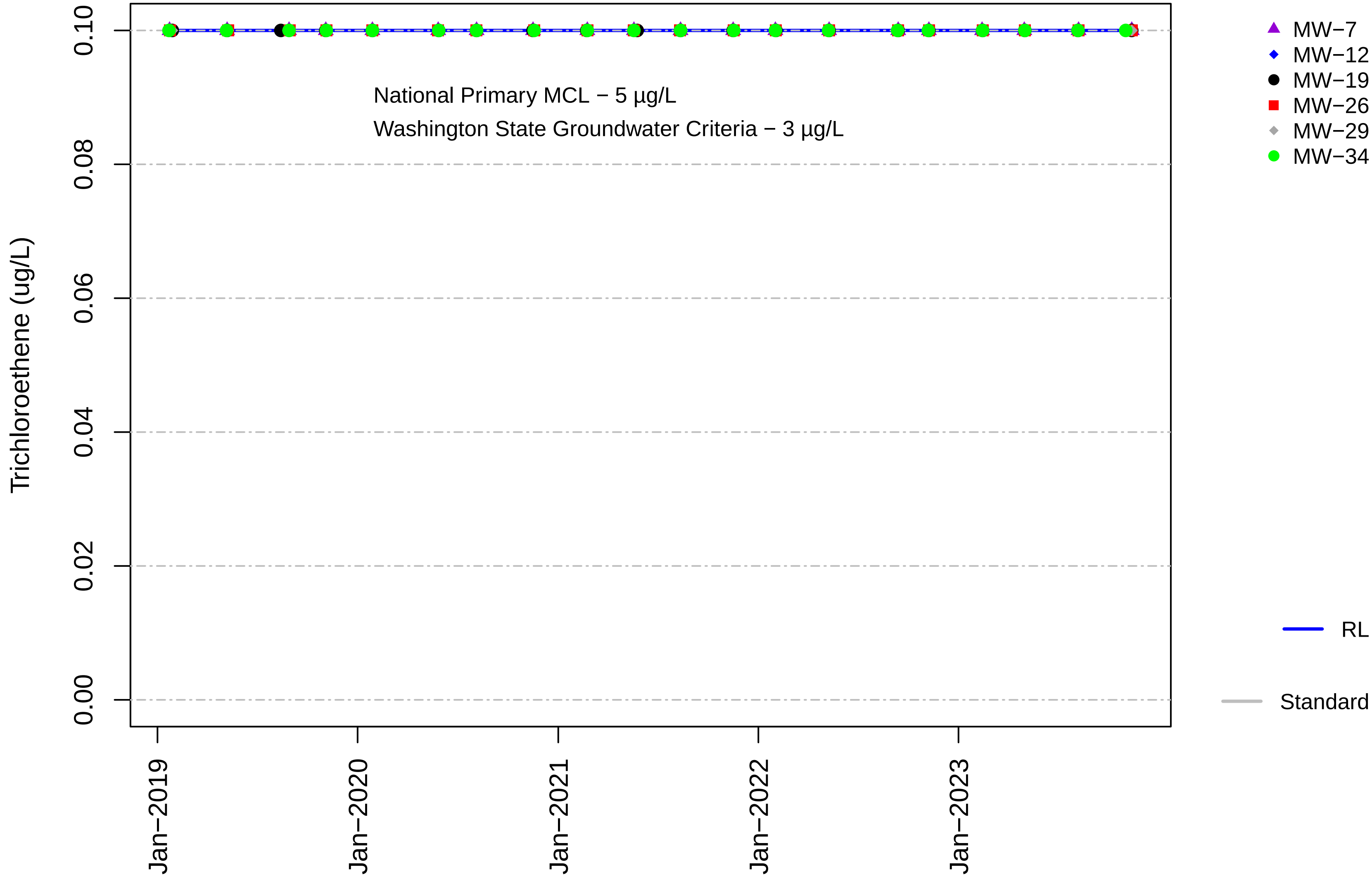


Figure B−114 Short−Term
Unit D
Trichlorofluoromethane

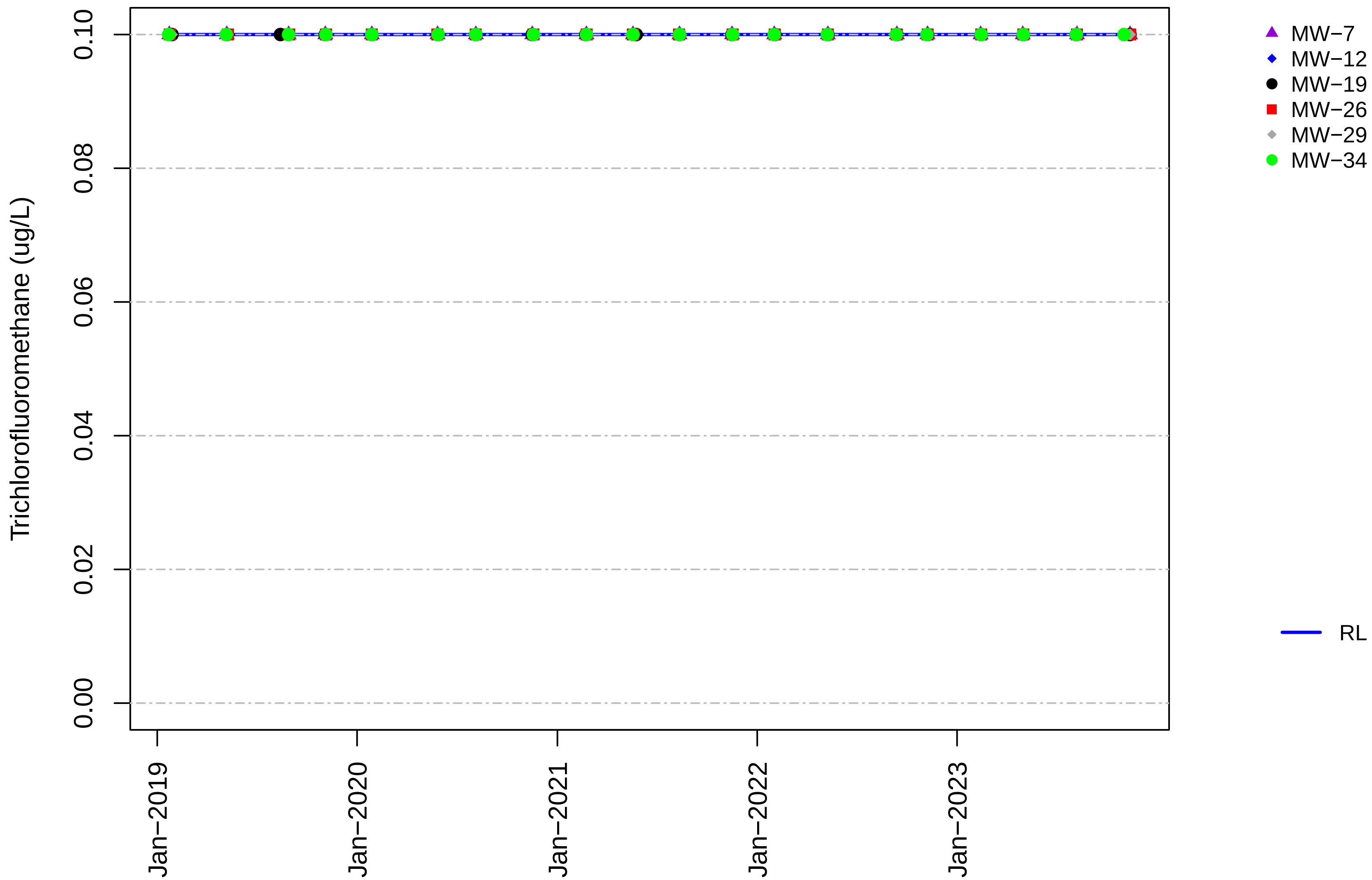
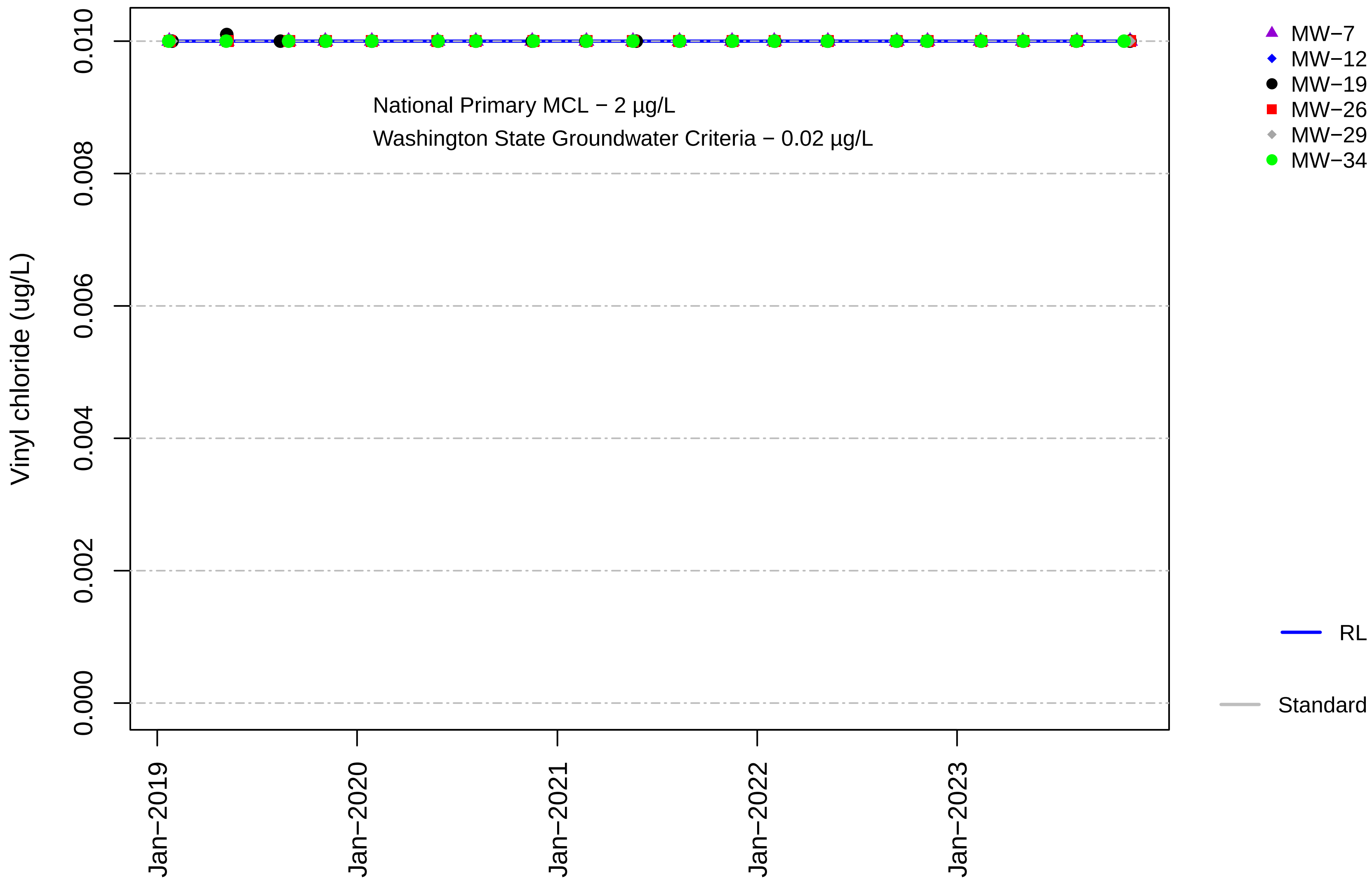


Figure B−115 Short−Term
Unit D
Vinyl chloride



Appendix C

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 5600
Seattle, WA 98104-3855

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TTY Relay: 711

TECHNICAL MEMORANDUM

June 9, 2023

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

VIA: Eric Ferguson, Water Quality Planner – Hydrogeologist, Science and Technical Support Section, Water and Land Resources Division, DNRP

FM: Adrienne Scott, Engineer III – Geologist, Facility Engineering and Science Section, Solid Waste Division, DNRP

RE: Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations
First Quarter 2023 Results
Vashon Island Closed Landfill, King County, Washington
Project No. 1033601 – Task 29.14.137.45

The King County Water and Land Resources Division (WLRD) submits this memorandum report on groundwater conditions during the first quarter of 2023 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 *Scope of Work for Services to King County Solid Waste Division – Facility Engineering and Sciences Section* (WLRD, 2023). King County Solid Waste Division (SWD) personnel measured groundwater levels at the Landfill on February 10, 2023; the measurements 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 groundwater conditions for the Cc2 perched zone and the Unit D aquifer since the report submitted for the fourth quarter of 2022.

Groundwater Elevation Data

On February 10, 2023, the first quarter of 2023, SWD recorded groundwater level measurements for 15 monitoring wells at the Landfill. These wells are 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 2020).

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

Cc2 Perched Zone

Three separate coarse-grained perched zones are identified within variable fine-grained sediment in the Cc2 perched zone (Aspect 2020). 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 2020). Groundwater in this perched zone is monitored by wells MW-2, MW-9, MW-20, MW-21, MW-30, MW-33, and MW-35 (Aspect 2020). Subsequent to the 2020 Aspect report, monitoring well MW-37 was successfully completed within the Cc2 perched zone.

According to Aspect (2020), 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 two wells are above coarse-grained layers indicating confined conditions (Aspect 2020). During this quarter, the water level in monitoring well MW-33 measured approximately 17.37 feet above the top of the screen and may be influenced by confining conditions.

Figure A-1 shows calculated groundwater elevations at monitoring well locations and interpreted groundwater potentiometric surface contours for the Cc2 perched zone based on measurements taken on February 10, 2023.

Unit D Aquifer

Groundwater in the Unit D aquifer is monitored by wells MW-7, MW-12, MW-19, MW-25, MW-26, MW-29, and MW-34 (Aspect 2020). Measured water levels in monitoring wells MW-7, MW-12, MW-19, MW-25, and MW-34 were at least 16.03 feet above the top of the screen and may be influenced by vertical gradients, permeability differences (Aspect 2020), or confining conditions in the Unit D aquifer.

Figure A-2 shows the first quarter 2023 calculated groundwater elevations at monitoring well locations and interpreted groundwater flow directions based on the potentiometric surface contours for the Unit D aquifer.

Direction of Groundwater Flow

Interpreted groundwater flow directions in the Cc2 perched zone and Unit D aquifer, based on measurements taken on February 10, 2023, are shown in Figures A-1 and A-2. Table A-2 lists the flow direction for the Cc2 perched zone and Unit D aquifer beneath the Landfill based on measurements and mapping of groundwater elevation contours taken during the first quarter of 2023.

Cc2 Perched Zone

Calculated groundwater elevations and interpreted groundwater potentiometric surface contours indicate that groundwater in the Cc2 perched zone generally flows towards the south-southeast in the south slope area with a component of west-northwest flow for the remainder of the property (Figure A-1).

Unit D Aquifer

As per Aspect (2020), groundwater flow direction in Unit D is strongly influenced by the typically higher water levels in MW-7 and MW-34 and this is seen in quarterly mapping of the potentiometric surface forming a groundwater divide running generally west-east beneath the southern area of the landfill footprint. Calculated groundwater elevations and groundwater potentiometric surface contours during the first quarter of 2023 indicate that groundwater in the Unit D aquifer flows southwesterly in the area south of the divide and northerly in the area 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

Table A-2 presents a summary of the groundwater parameters. Hydraulic conductivity and effective porosity values are based on the ranges referred to in *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Aspect 2020).

The average horizontal hydraulic conductivity for the Cc2 perched zone beneath the Landfill is reported to be 8.21 feet per day (ft/d) property wide and 5.81 ft/d in the south slope area (Aspect 2020). The average horizontal hydraulic conductivity in the Unit D aquifer beneath the landfill is reported to be 10.2 ft/d (Aspect 2020). The effective porosity is reported as 20 percent for both the Cc2 perched zone and the Unit D aquifer (Aspect 2020).

Average hydraulic gradients for the Cc2 perched zone are approximately 0.023 ft/ft property wide and 0.051 ft/ft for the south slope area based on measurements made during the first quarter of 2023. The average hydraulic gradients for the Unit D aquifer, based on measurements made during the first quarter of 2023, are approximately 0.032 and 0.016 ft/ft in the northerly and southerly flow directions, respectively.

Average horizontal groundwater velocities calculated for the Cc2 perched zone and Unit D aquifer beneath the Landfill, are based on spatial differences in aquifer parameters, hydraulic gradients, and calculations 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]

The average horizontal groundwater velocities in the Cc2 perched zone are approximately 0.92 ft/d west-northwest across the property, and are 1.47 ft/d south-southeast for the south slope area. The average horizontal groundwater velocities in the Unit D aquifer are approximately 1.62 and 0.83 ft/d in the northerly and southerly direction, respectively.

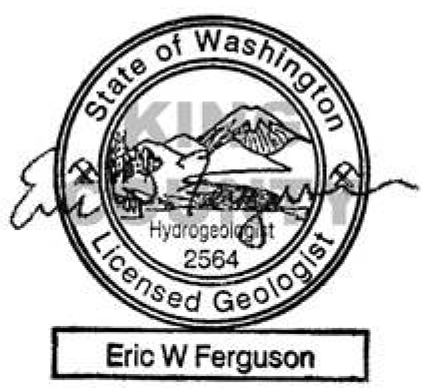
References

Aspect Consulting, LLC. (Aspect). 2020. Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1 (Contract Number E00102E08; Task No. 310.3 – D310.3.1.3). AGENCY DRAFT. November 6. FINAL.

King County Water and Land Resources Division (WLRD). 2023. Scope of Work for Services to King County Solid Waste Division – Facility Engineering and Science Section. March.

Thank you for the opportunity to provide hydrogeologic services to SWD. If you have any questions, please feel free to contact me at 206-477-4690 (eric.ferguson@kingcounty.gov).

Sincerely,



Eric W Ferguson, WA LHG
Water Quality Planner - Hydrogeologist
King County Water and Land Resources Division

Enclosures:

Table A-1:	Well Details and Groundwater Elevations – First Quarter 2023
Table A-2:	Groundwater Parameters – First Quarter 2023
Figure A-1:	Groundwater Potentiometric Surface Map – First Quarter 2023 – Cc2 Perched Zone
Figure A-2:	Groundwater Potentiometric Surface Map – First Quarter 2023 – Unit D Aquifer

Table A-1: Well Details and Groundwater Elevations – First Quarter 2023

Vashon Island Closed Landfill
King County, Washington

	Well Identification	Easting[2] (ft)	Northing[2] (ft)	Top of Casing Elevation[4] (ft MSL)	Top of Screen Elevation[4] (ft MSL)	Bottom of Screen Elevation[4] (ft MSL)	February 10, 2023 Measured Depth to Water[1] (ft)	February 10, 2023 Groundwater Elevations[4] (ft MSL)
Cc2 Perched Zone	MW-2	1227788.53	162365.91	317.97	237.06	232.06	73.64	244.33
	MW-9	1227723.68	163527.21	405.17	236.22	224.22	165.52	239.65
	MW-20	1228173.43	162566.52	370.32	241.41	236.41	121.65	248.67
	MW-21	1227647.90	162340.10	349.05	246.45	237.05	106.41	242.64
	MW-30	1227273.26	162671.10	235.67	230.40	225.40	5.38	230.29
	MW-33	1227883.53	162682.24	359.17	229.63	219.63	112.17	247.00
	MW-35	1227651.53	162559.82	361.34	244.20	234.20	118.28	243.06
	MW-37	1227855.76	162186.41	294.70	222.10	212.10	62.50	232.20
Unit D Aquifer	MW-7	1228427.68	162811.30	376.75	154.40	144.40	191.62	185.13
	MW-12	1227800.99	162375.28	315.53	142.72	132.72	142.47	173.06
	MW-19	1227725.02	163535.12	405.43	143.14	131.64	246.25	159.18
	MW-25	1228628.13	163749.00	402.33	141.76	137.76	243.49	158.84
	MW-26	1227910.18	163770.66	406.54	153.55	144.15	247.89	158.65
	MW-29[3]	1228375.59	163681.26	413.85	172.83	158.63	244.39	169.46
	MW-34	1227774.04	163135.04	385.96	147.94	137.94	204.26	181.70

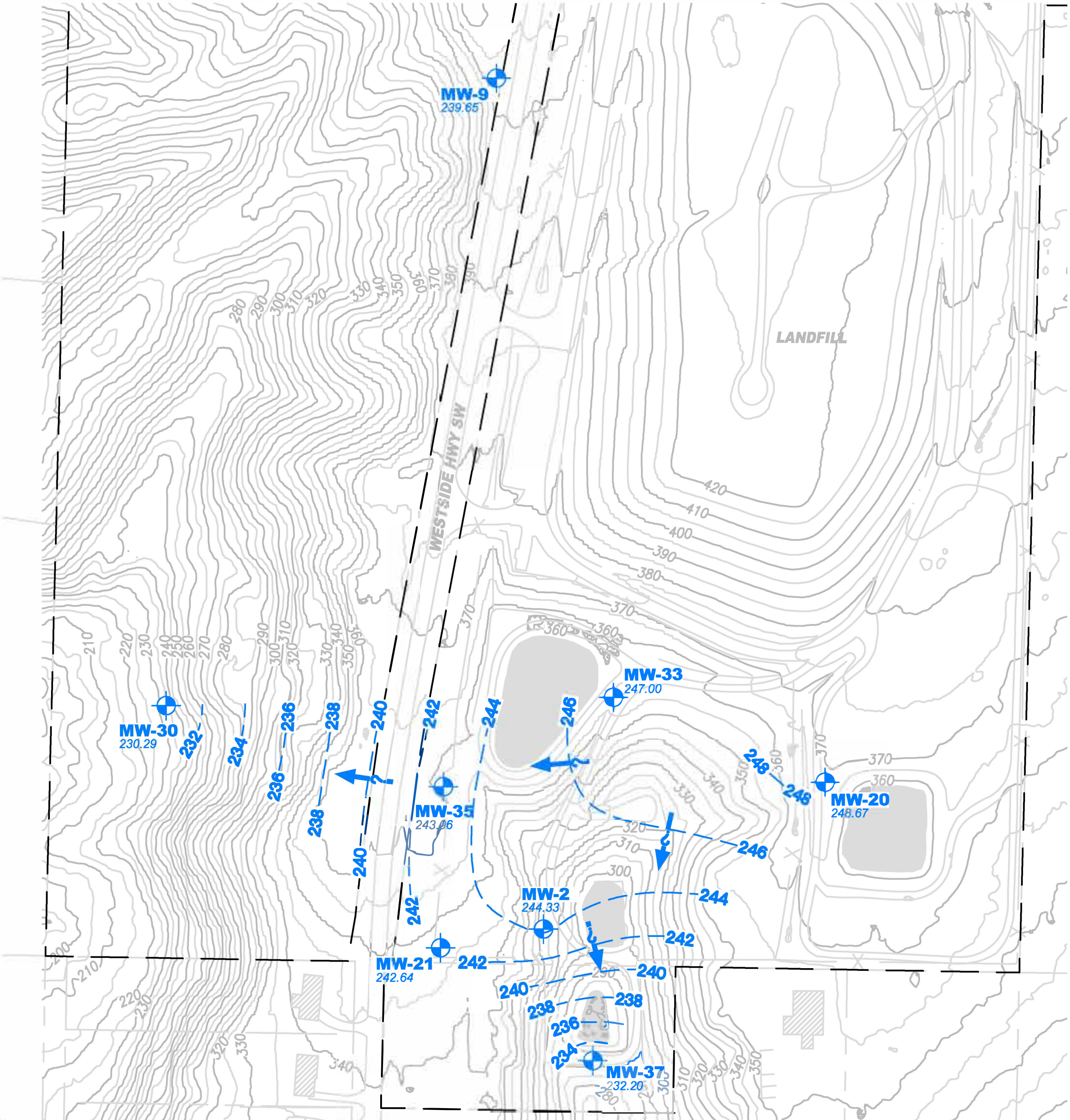
Notes:

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-29 top and bottom of screen elevations were reported differently in Table A-1 of previous reports. This did not impact outcomes for generated groundwater maps and data reported in Table A-2 of related reports.
4. Elevations are reported in feet (ft) above mean sea level (MSL) based on the North American Vertical Datum of 1988 (NAVD88).

Table A-2: Groundwater Parameters – First Quarter 2023
Vashon Island Closed Landfill
King County, Washington

	Horizontal Hydraulic Conductivity (K)[1,2]			Effective Porosity (n_{eff})[1]	February 10, 2023 Horizontal Hydraulic Gradient (DH/DL)[3]	February 10, 2023 Horizontal Groundwater Velocity (v)	February 10, 2023 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	20%	0.013	0.10	West-northwest
	High	1.6E-02	46.1		0.032	7.37	
	Average[6]	2.9E-03	8.21		0.023	0.92	
Unit Cc2 - South Slope Area[5,6]	Low	5.7E-04	1.61		0.036	0.29	South-southeast
	High	6.8E-03	19.4		0.065	6.29	
	Average[6]	2.1E-03	5.81		0.051	1.47	
Unit D - Northerly flow direction	Low	1.5E-03	4.4		0.032	0.70	North - with flow to the northeast and northwest
	High	1.6E-02	46.1			7.34	
	Average	3.6E-03	10.2			1.62	
Unit D - Southerly flow direction	Low	1.5E-03	4.4		0.016	0.36	Southwest - away from divide
	High	1.6E-02	46.1			3.77	
	Average	3.6E-03	10.2			0.83	

Notes:
1. Horizontal hydraulic conductivity values and effective porosity values from Aspect 2020.
2. Average horizontal hydraulic conductivity values are the geometric mean of values reported per well and unit (Aspect 2020).
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 2020).
5. Calculations for South Slope Area Unit Cc2 horizontal hydraulic conductivities include data from wells MW-2, MW-20, MW-21, MW-33, MW-35, and MW-35, and MW-37.
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 2020).



Legend

MW-X XXX.XX	Monitoring Well Completed in Unit Cc2 Perched Zone Elevation *(feet mean sea level (MSL))*
240	Perched Zone Groundwater Elevation Contour *(feet MSL)*
?	Inferred Horizontal Groundwater Flow Path
	Pond
	Road
	Ditch
	Fence
	King County Landfill Property
	Building

Note:
1. Groundwater measurements made on February 10, 2023.

N

0 200 400 *Feet*

Contour Interval 2 Feet

Locations surveyed on Washington State Plane Coordinate System. North Zone (NAD 83/11)

Elevations reported in feet above mean sea level based on the North American Vertical Datum of 1988 (NAVD 88).

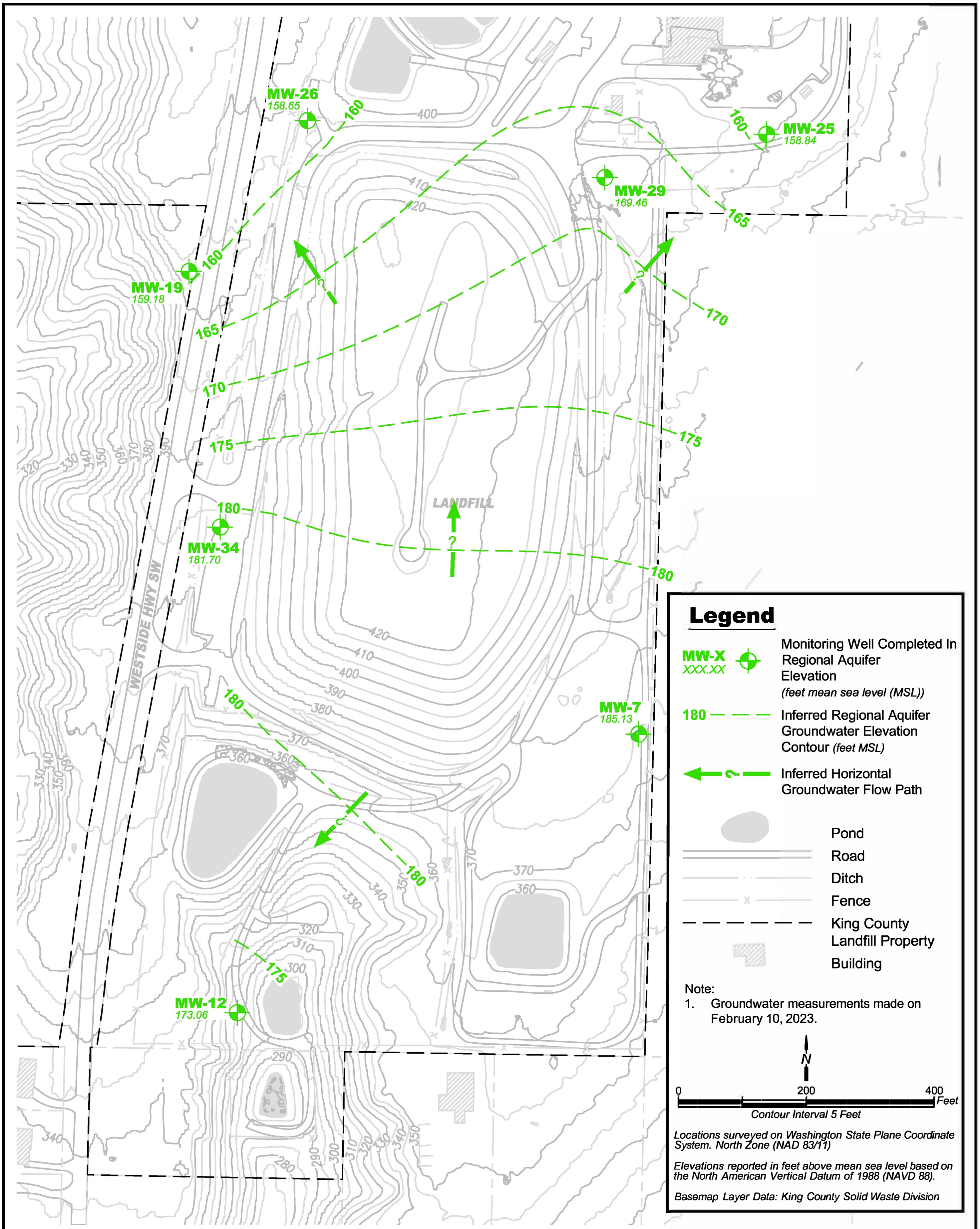
Basemap Layer Data: King County Solid Waste Division

King County

Groundwater Potentiometric Surface Map
First Quarter 2023 - Cc2 Perched Zone
Vashon Island Closed Landfill
King County, Washington

DATE:	April 2023
DESIGNED BY:	AMS
DRAWN BY:	KK
REVISED BY:	EWL
PROJECT NO.	1033601
FIGURE NO.	C-1

VI_1Q2023_Cc2Perched.dwg



King County

Groundwater Potentiometric Surface Map

First Quarter 2023 - Unit D Aquifer

Vashon Island Closed Landfill

King County, Washington

DATE: April 2023	PROJECT NO. 1033601
DESIGNED BY: AMS	
DRAWN BY: KK	FIGURE NO. C-2
REVISED BY: EWS	

VI_1Q2023_UnitD.dwg

King County

Water and Land Resources Division

Department of Natural Resources and Parks
King Street Center
201 South Jackson Street, Suite 5600
Seattle, WA 98104-3855

206-477-4800 Fax 206-296-0192
TTY Relay: 711

TECHNICAL MEMORANDUM

September 29, 2023

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

VIA: Eric Ferguson, Water Quality Planner – Hydrogeologist, Science and Technical Support Section, Water and Land Resources Division, DNRP

FM: Adrienne Scott, Engineer III – Lead Geologist, Facility Engineering and Science Section, Solid Waste Division, DNRP

RE: Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations
Second Quarter 2023 Results
Vashon Island Closed Landfill, King County, Washington
Project No. 1033601 – Task 29.14.137.45

The King County Water and Land Resources Division (WLRD) submits this memorandum report on groundwater conditions during the second quarter of 2023 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 *Scope of Work for Services to King County Solid Waste Division – Facility Engineering and Sciences Section* (WLRD, 2023). King County Solid Waste Division (SWD) personnel measured groundwater levels at the Landfill on April 25, 2023; for each aquifer, the measurements were used to:

1. Evaluate the potentiometric groundwater surface elevations;
2. Determine groundwater flow directions and horizontal gradients; and
3. Calculate the groundwater velocities.

There have been no significant changes in the interpreted groundwater conditions for the Cc2 perched zone and the Unit D aquifer since the report submitted for the first quarter of 2023.

Groundwater Elevation Data

The SWD recorded groundwater level measurements for 15 monitoring wells during the second quarter of 2023. These wells are 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 2020).

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

Cc2 Perched Zone

Three separate coarse-grained perched zones are identified within variable fine-grained sediment in the Cc2 perched zone (Aspect 2020). 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 2020). Groundwater in this perched zone is monitored by wells MW-2, MW-9, MW-20, MW-21, MW-30, MW-33, and MW-35 (Aspect 2020). Subsequent to the 2020 Aspect report, monitoring well MW-37 was successfully completed within the Cc2 perched zone.

According to Aspect (2020), 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 two wells are above coarse-grained layers indicating confined conditions (Aspect 2020). During this quarter, the water level in monitoring well MW-33 measured approximately 17.37 feet above the top of the screen and may be influenced by confining conditions.

Figure A-1 shows the groundwater elevation at each well location, groundwater movement arrows, and the potentiometric surface contours for the Cc2 perched zone for the current quarter.

Unit D Aquifer

Groundwater in the Unit D aquifer is monitored by wells MW-7, MW-12, MW-19, MW-25, MW-26, MW-29, and MW-34 (Aspect 2020). Measured water levels in monitoring wells MW-7, MW-12, MW-19, MW-25, and MW-34 were at least 16.01 feet above the top of the screen and may be influenced by vertical gradients, permeability differences (Aspect 2020), or confining conditions in the Unit D aquifer.

Figure A-2 shows the groundwater elevation at each well location, groundwater movement arrows, and the potentiometric surface contours for the Unit D aquifer for the current quarter.

Direction of Groundwater Flow

Potentiometric surface maps represent the modeled groundwater surface at depth. The potentiometric maps are generated by interpolating data between the calculated groundwater elevations at the monitored wells. Each potentiometric contour represents a line of equal hydraulic head where the groundwater elevation remains constant. Groundwater is expected to flow from high elevations to low elevations, with the direction of flow perpendicular to the potentiometric contour.

Cc2 Perched Zone

Figure A-1 shows groundwater flow directions in the Cc2 perched zone. The figure shows that groundwater generally moves toward the south-southeast in the south slope area with a component of west-northwest movement for the remainder of the property.

Unit D Aquifer

Groundwater flow direction in Unit D is strongly influenced by the higher water levels in wells MW-7 and MW-34; the raised potentiometric surface in this area forms a groundwater divide that trends west-east beneath the southern area of the landfill footprint (Aspect, 2020).

Figure A-2 shows groundwater flow directions in the Unit D aquifer. The figure shows that groundwater generally moves southwesterly in the area south of the groundwater divide and northerly in the area north of the groundwater divide with components of flow to the northeast and northwest. The groundwater gradient south of the divide is less steep than that north of the divide.

Groundwater Parameters

Table A-2 presents a summary of the groundwater parameters. Hydraulic conductivity and effective porosity values are based on the ranges referred to in *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Aspect 2020).

The average horizontal hydraulic conductivity for the Cc2 perched zone beneath the Landfill is reported to be 8.21 feet per day (ft/d) property wide and 5.81 ft/d in the south slope area (Aspect 2020). The average horizontal hydraulic conductivity in the Unit D aquifer beneath the landfill is reported to be 10.2 ft/d (Aspect 2020). The effective porosity is reported as 20 percent for both the Cc2 perched zone and the Unit D aquifer (Aspect 2020).

Average hydraulic gradients for the Cc2 perched zone are approximately 0.023 ft/ft property wide and 0.051 ft/ft for the south slope area during the second quarter of 2023. The average hydraulic gradients for the Unit D aquifer were approximately 0.028 and 0.015 ft/ft for the northerly and southerly flow directions, respectively.

Average horizontal groundwater velocities calculated for the Cc2 perched zone and Unit D aquifer are based on spatial differences in aquifer parameters, hydraulic gradients, and calculations 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]

The average horizontal groundwater velocities in the Cc2 perched zone are approximately 0.92 ft/d west-northwest across the property, and are 1.47 ft/d south-southeast for the south slope area. The average horizontal groundwater velocities in the Unit D aquifer are approximately 1.41 and 0.78 ft/d in the northerly and southerly direction, respectively.

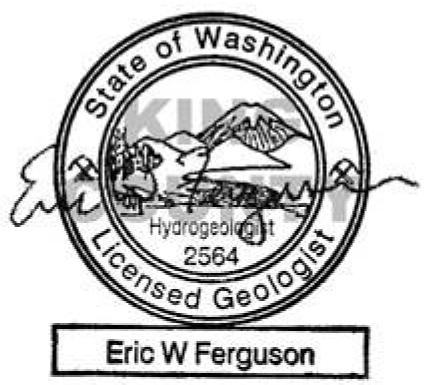
References

Aspect Consulting, LLC. (Aspect). 2020. Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1 (Contract Number E00102E08; Task No. 310.3 – D310.3.1.3). AGENCY DRAFT. November 6. FINAL.

King County Water and Land Resources Division (WLRD). 2023. Scope of Work for Services to King County Solid Waste Division – Facility Engineering and Science Section. March.

Thank you for the opportunity to provide hydrogeologic services to SWD. If you have any questions, please feel free to contact me at 206-477-4690 (eric.ferguson@kingcounty.gov).

Sincerely,



Eric W Ferguson, WA LHG
Water Quality Planner - Hydrogeologist
King County Water and Land Resources Division

Enclosures:

- Table A-1: Well Details and Groundwater Elevations – Second Quarter 2023
- Table A-2: Groundwater Parameters – First Quarter 2023
- Figure A-1: Groundwater Potentiometric Surface Map – Second Quarter 2023 – Cc2 Perched Zone
- Figure A-2: Groundwater Potentiometric Surface Map – Second Quarter 2023 – Unit D Aquifer

Table A-1: Well Details and Groundwater Elevations – Second Quarter 2023

Vashon Island Closed Landfill
King County, Washington

	Well Identification	Easting[2] (ft)	Northing[2] (ft)	Top of Casing Elevation[4] (ft MSL)	Top of Screen Elevation[4] (ft MSL)	Bottom of Screen Elevation[4] (ft MSL)	April 25, 2023: Measured Depth to Water[1] (ft)	April 25, 2023: Groundwater Elevations[4] (ft MSL)
Cc2 Perched Zone	MW-2	1227788.53	162365.91	317.97	237.06	232.06	73.65	244.32
	MW-9	1227723.68	163527.21	405.17	236.22	224.22	165.63	239.54
	MW-20	1228173.43	162566.52	370.32	241.41	236.41	121.7	248.62
	MW-21	1227647.90	162340.10	349.05	246.45	237.05	106.38	242.67
	MW-30	1227273.26	162671.10	235.67	230.40	225.40	5.31	230.36
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	MW-35	1227651.53	162559.82	361.34	244.20	234.20	118.22	243.12
	MW-37	1227855.76	162186.41	294.70	222.10	212.10	62.44	232.26
Unit D Aquifer	MW-7	1228427.68	162811.30	376.75	154.40	144.40	191.68	185.07
	MW-12	1227800.99	162375.28	315.53	142.72	132.72	142.45	173.08
	MW-19	1227725.02	163535.12	405.43	143.14	131.64	246.27	159.16
	MW-25	1228628.13	163749.00	402.33	141.76	137.76	243.14	159.19
	MW-26	1227910.18	163770.66	406.54	153.55	144.15	247.92	158.62
	MW-29[3]	1228375.59	163681.26	413.85	172.83	158.63	244.43	169.42
	MW-34	1227774.04	163135.04	385.96	147.94	137.94	204.53	181.43

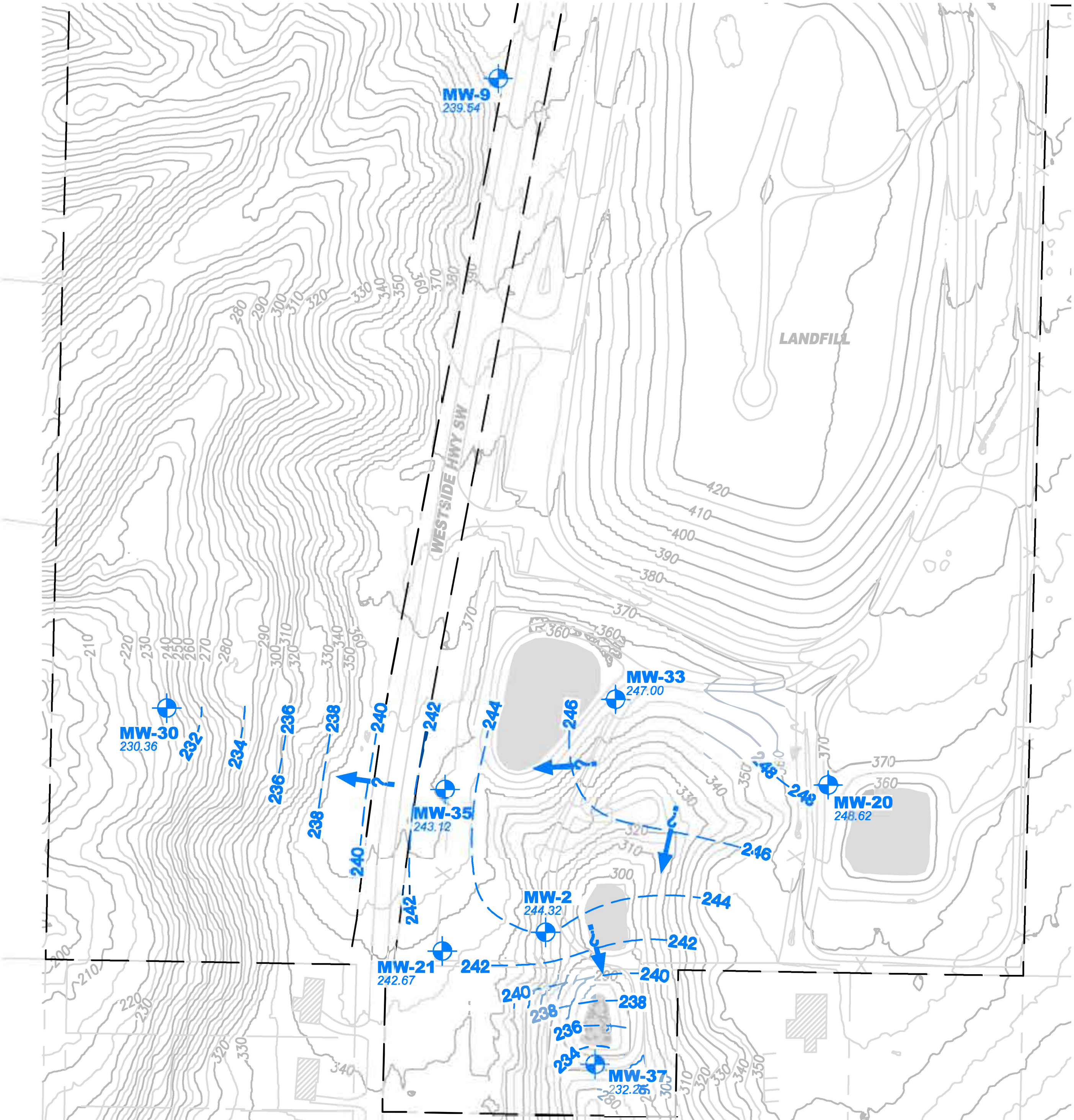
Notes:

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-29 top and bottom of screen elevations were reported differently in Table A-1 of previous reports. This did not impact outcomes for generated groundwater maps and data reported in Table A-2 of related reports.
4. Elevations are reported in feet (ft) above mean sea level (MSL) based on the North American Vertical Datum of 1988 (NAVD88).

Table A-2: Groundwater Parameters – Second Quarter 2023
Vashon Island Closed Landfill
King County, Washington

Water Bearing Zone	Horizontal Hydraulic Conductivity (K)[1,2] Range	(cm/s)	(ft/d)	Effective Porosity (n_{eff})[1]	April 25, 2023 Horizontal Hydraulic Gradient (DH/DL)[3] (ft/ft)	Horizontal Groundwater Velocity (v) (ft/d)	General Groundwater Flow Direction
Unit Cc2 - Property Wide[4,6]	Low	5.7E-04	1.61	20%	0.013	0.10	West-northwest
	High	1.6E-02	46.1		0.032	7.37	
	Average[6]	2.9E-03	8.21		0.023	0.92	
Unit Cc2 - South Slope Area[5,6]	Low	5.7E-04	1.61		0.036	0.29	South-southeast
	High	6.8E-03	19.4		0.065	6.29	
	Average[6]	2.1E-03	5.81		0.051	1.47	
Unit D - Northerly flow direction	Low	1.5E-03	4.4		0.028	0.60	North - with flow to the northeast and northwest
	High	1.6E-02	46.1			6.37	
	Average	3.6E-03	10.2			1.41	
Unit D - Southerly flow direction	Low	1.5E-03	4.4		0.015	0.33	Southwest - away from divide
	High	1.6E-02	46.1			3.51	
	Average	3.6E-03	10.2			0.78	

Notes:
1. Horizontal hydraulic conductivity values and effective porosity values from Aspect 2020.
2. Average horizontal hydraulic conductivity values are the geometric mean of values reported per well and unit (Aspect 2020).
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 2020).
5. Calculations for South Slope Area Unit Cc2 horizontal hydraulic conductivities include data from wells MW-2, MW-20, MW-21, MW-33, MW-35, and MW-35, and MW-37.
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 2020).



Legend

MW-X XXX.XX	Monitoring Well Completed in Unit Cc2 Perched Zone Elevation *(feet mean sea level (MSL))*
240	Perched Zone Groundwater Elevation Contour *(feet MSL)*
?	Inferred Horizontal Groundwater Flow Path
	Pond
	Road
	Ditch
	Fence
	King County Landfill Property
	Building

N

0 200 400 *Feet*

Contour Interval 2 Feet

Locations surveyed on Washington State Plane Coordinate System. North Zone (NAD 83/11)

Elevations reported in feet above mean sea level based on the North American Vertical Datum of 1988 (NAVD 88).

Basemap Layer Data: King County Solid Waste Division

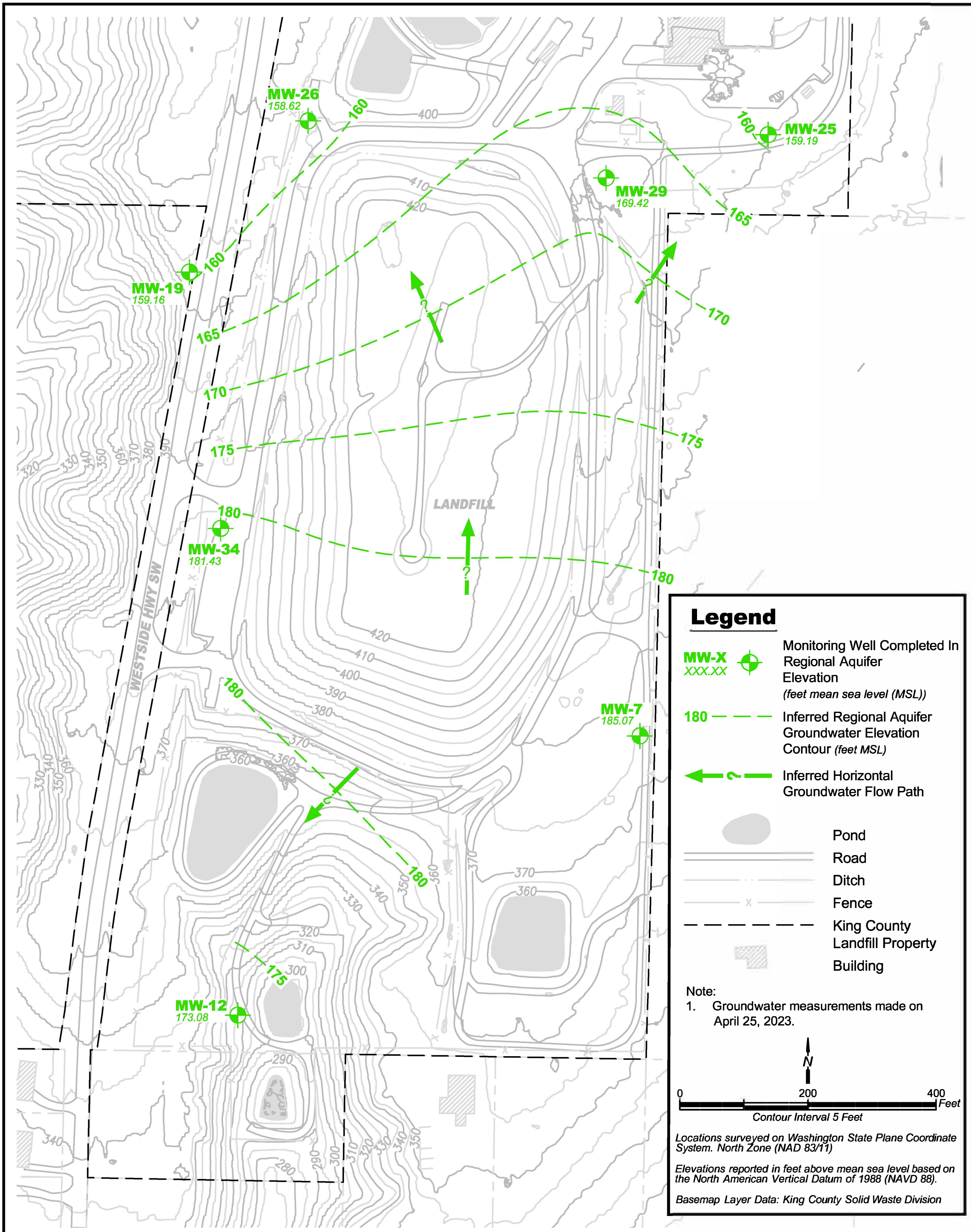
Note:
1. Groundwater measurements made on April 25, 2023.

King County

Groundwater Potentiometric Surface Map
Second Quarter 2023 - Cc2 Perched Zone
Vashon Island Closed Landfill
King County, Washington

DATE: August 2023	PROJECT NO.	1033601
DESIGNED BY: AMS		
DRAWN BY: KK	FIGURE NO.	
REVISED BY: EWI		C-1

VI_2Q2023_Cc2Perched.dwg



King County

Groundwater Potentiometric Surface Map
Second Quarter 2023 - Unit D Aquifer
Vashon Island Closed Landfill
King County, Washington

DATE: August 2023	PROJECT NO.	1033601
DESIGNED BY: AMS		
DRAWN BY: KK	FIGURE NO.	
REVISED BY: EWS	C-2	

VI_2Q2023_UnitD.dwg

King County

Water and Land Resources Division

Department of Natural Resources and Parks
King Street Center
201 South Jackson Street, Suite 5600
Seattle, WA 98104-3855

206-477-4800 Fax 206-296-0192
TTY Relay: 711

TECHNICAL MEMORANDUM

November 16, 2023

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

VIA: Eric Ferguson, Water Quality Planner – Hydrogeologist, Science and Technical Support Section, Water and Land Resources Division, DNRP

FM: Adrienne Scott, Engineer III – Lead Geologist, Facility Engineering and Science Section, Solid Waste Division, DNRP

RE: Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations
Third Quarter 2023 Results
Vashon Island Closed Landfill, King County, Washington
Project No. 1033601 – Task 29.14.137.45

The King County Water and Land Resources Division (WLRD) submits this memorandum report on groundwater conditions during the third quarter of 2023 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 *Scope of Work for Services to King County Solid Waste Division – Facility Engineering and Sciences Section* (WLRD, 2023). King County Solid Waste Division (SWD) personnel measured groundwater levels at the Landfill on August 4, 2023; for each aquifer, the measurements were used to:

1. Evaluate the potentiometric groundwater surface elevations;
2. Determine groundwater flow directions and horizontal gradients; and
3. Calculate the groundwater velocities.

There have been no significant changes in the interpreted groundwater conditions for the Cc2 perched zone and the Unit D aquifer since the report submitted for the second quarter of 2023.

Groundwater Elevation Data

The SWD recorded groundwater level measurements for 15 monitoring wells during the third quarter of 2023. These wells are 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 2020).

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

Cc2 Perched Zone

Three separate coarse-grained perched zones are identified within variable fine-grained sediment in the Cc2 perched zone (Aspect 2020). 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 2020). Groundwater in this perched zone is monitored by wells MW-2, MW-9, MW-20, MW-21, MW-30, MW-33, and MW-35 (Aspect 2020). Subsequent to the 2020 Aspect report, monitoring well MW-37 was successfully completed within the Cc2 perched zone.

According to Aspect (2020), 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 two wells are above coarse-grained layers indicating confined conditions (Aspect 2020). During this quarter, the water level in monitoring well MW-33 measured 17.16 feet above the top of the screen and may be influenced by confining conditions.

Figure A-1 shows the groundwater elevation at each well location, groundwater movement arrows, and the potentiometric surface contours for the Cc2 perched zone for the current quarter.

Unit D Aquifer

Groundwater in the Unit D aquifer is monitored by wells MW-7, MW-12, MW-19, MW-25, MW-26, MW-29, and MW-34 (Aspect 2020). Measured water levels in monitoring wells MW-7, MW-12, MW-19, MW-25, and MW-34 were at least 16.09 feet above the top of the screen and may be influenced by vertical gradients, permeability differences (Aspect 2020), or confining conditions in the Unit D aquifer.

Figure A-2 shows the groundwater elevation at each well location, groundwater movement arrows, and the potentiometric surface contours for the Unit D aquifer for the current quarter.

Direction of Groundwater Flow

Potentiometric surface maps represent the modeled groundwater surface at depth. The potentiometric maps are generated by interpolating data between the calculated groundwater elevations at the monitored wells. Each potentiometric contour represents a line of equal hydraulic head where the groundwater elevation remains constant. Groundwater is expected to flow from high elevations to low elevations, with the direction of flow perpendicular to the potentiometric contour.

Cc2 Perched Zone

Figure A-1 shows groundwater flow directions in the Cc2 perched zone. The figure shows that groundwater generally moves toward the south-southeast in the south slope area with a component of west-northwest movement for the remainder of the property.

Unit D Aquifer

Groundwater flow direction in Unit D is strongly influenced by the higher water levels in wells MW-7 and MW-34; the raised potentiometric surface in this area forms a groundwater divide that trends west-east beneath the southern area of the landfill footprint (Aspect, 2020).

Figure A-2 shows groundwater flow directions in the Unit D aquifer. The figure shows that groundwater generally moves southwesterly in the area south of the groundwater divide and northerly in the area north of the groundwater divide with components of flow to the northeast and northwest. The groundwater gradient south of the divide is less steep than that north of the divide.

Groundwater Parameters

Table A-2 presents a summary of the groundwater parameters. Hydraulic conductivity and effective porosity values are based on the ranges referred to in *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Aspect 2020).

The average horizontal hydraulic conductivity for the Cc2 perched zone beneath the Landfill is reported to be 8.21 feet per day (ft/d) property wide and 5.81 ft/d in the south slope area (Aspect 2020). The average horizontal hydraulic conductivity in the Unit D aquifer beneath the landfill is reported to be 10.2 ft/d (Aspect 2020). The effective porosity is reported as 20 percent for both the Cc2 perched zone and the Unit D aquifer (Aspect 2020).

Average hydraulic gradients for the Cc2 perched zone are approximately 0.023 ft/ft property wide and 0.050 ft/ft for the south slope area during the third quarter of 2023. The average hydraulic gradients for the Unit D aquifer were approximately 0.028 and 0.015 ft/ft for the northerly and southerly flow directions, respectively.

Average horizontal groundwater velocities calculated for the Cc2 perched zone and Unit D aquifer are based on spatial differences in aquifer parameters, hydraulic gradients, and calculations 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]

The average horizontal groundwater velocities in the Cc2 perched zone are approximately 0.92 ft/d west-northwest across the property, and are 1.45 ft/d south-southeast for the south slope area. The average horizontal groundwater velocities in the Unit D aquifer are approximately 1.44 and 0.75 ft/d in the northerly and southerly direction, respectively.

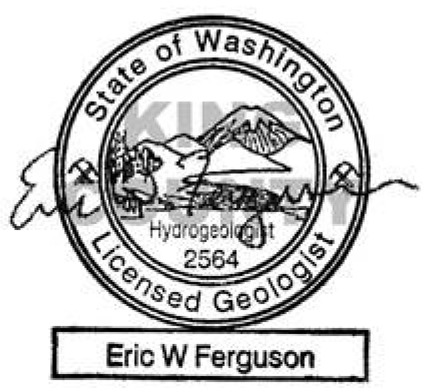
References

Aspect Consulting, LLC. (Aspect). 2020. Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1 (Contract Number E00102E08; Task No. 310.3 – D310.3.1.3). AGENCY DRAFT. November 6. FINAL.

King County Water and Land Resources Division (WLRD). 2023. Scope of Work for Services to King County Solid Waste Division – Facility Engineering and Science Section. March.

Thank you for the opportunity to provide hydrogeologic services to SWD. If you have any questions, please feel free to contact me at 206-477-4690 (eric.ferguson@kingcounty.gov).

Sincerely,



Eric W Ferguson, WA LHG
Water Quality Planner - Hydrogeologist
King County Water and Land Resources Division

Enclosures:

Table A-1:	Well Details and Groundwater Elevations – Third Quarter 2023
Table A-2:	Groundwater Parameters – Third Quarter 2023
Figure A-1:	Groundwater Potentiometric Surface Map – Third Quarter 2023 – Cc2 Perched Zone
Figure A-2:	Groundwater Potentiometric Surface Map – Third Quarter 2023 – Unit D Aquifer

Table A-1: Well Details and Groundwater Elevations – Third Quarter 2023

Vashon Island Closed Landfill
King County, Washington

	Well Identification	Easting[2] (ft)	Northing[2] (ft)	Top of Casing Elevation[4] (ft MSL)	Top of Screen Elevation[4] (ft MSL)	Bottom of Screen Elevation[4] (ft MSL)	August 4, 2023 Measured Depth to Water[1] (ft)	August 4, 2023 Groundwater Elevations[4] (ft MSL)
Cc2 Perched Zone	MW-2	1227788.53	162365.91	317.97	237.06	232.06	73.84	244.13
	MW-9	1227723.68	163527.21	405.17	236.22	224.22	165.77	239.40
	MW-20	1228173.43	162566.52	370.32	241.41	236.41	121.92	248.40
	MW-21	1227647.90	162340.10	349.05	246.45	237.05	106.58	242.47
	MW-30	1227273.26	162671.10	235.67	230.40	225.40	5.95	229.72
	MW-33	1227883.53	162682.24	359.17	229.63	219.63	112.38	246.79
	MW-35	1227651.53	162559.82	361.34	244.20	234.20	118.42	242.92
	MW-37	1227855.76	162186.41	294.70	222.10	212.10	62.72	231.98
Unit D Aquifer	MW-7	1228427.68	162811.30	376.75	154.40	144.40	191.9	184.85
	MW-12	1227800.99	162375.28	315.53	142.72	132.72	142.65	172.88
	MW-19	1227725.02	163535.12	405.43	143.14	131.64	246.19	159.24
	MW-25	1228628.13	163749.00	402.33	141.76	137.76	243.6	158.73
	MW-26	1227910.18	163770.66	406.54	153.55	144.15	247.97	158.57
	MW-29[3]	1228375.59	163681.26	413.85	172.83	158.63	244.38	169.47
	MW-34	1227774.04	163135.04	385.96	147.94	137.94	204.76	181.20

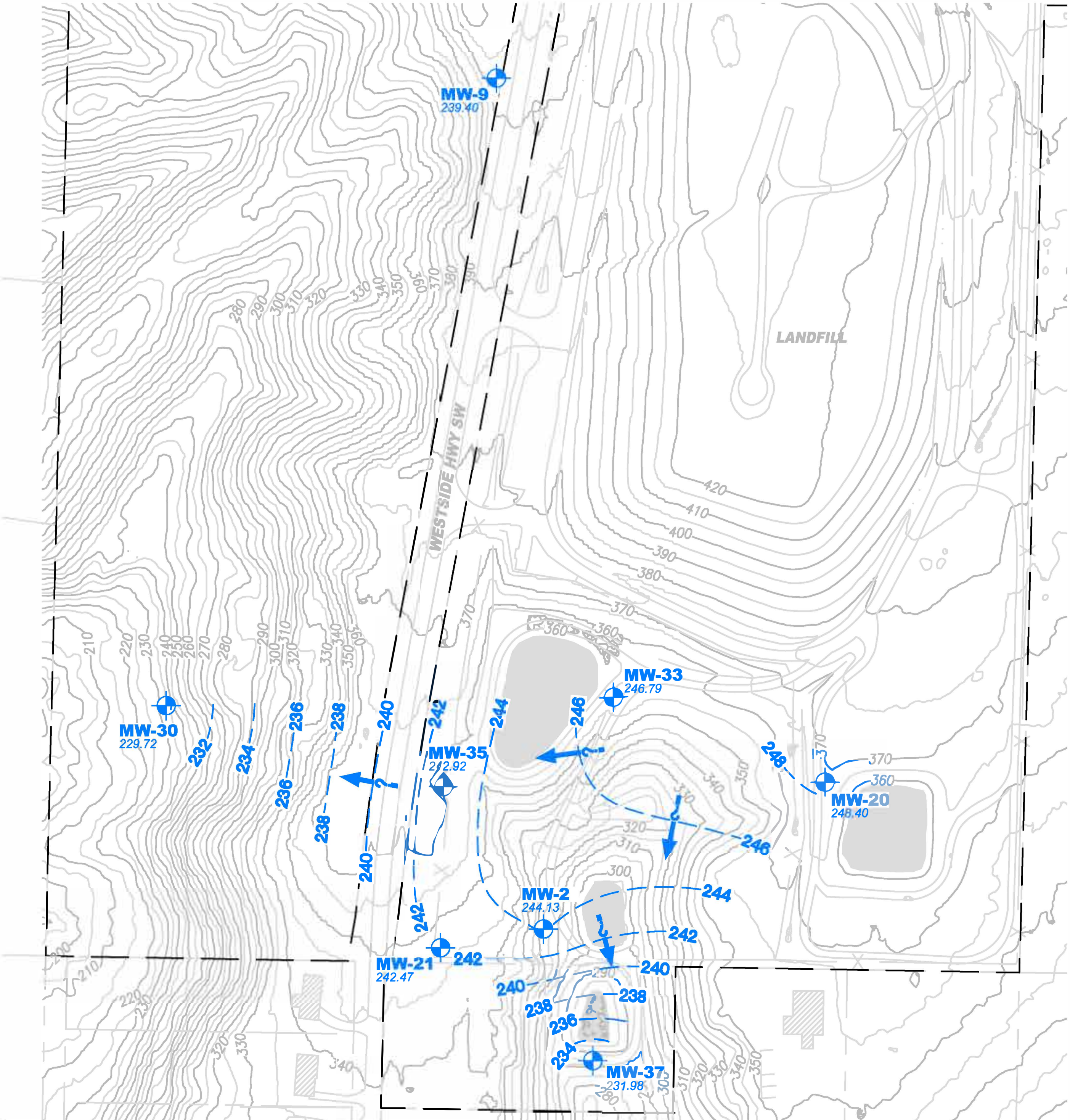
Notes:

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-29 top and bottom of screen elevations were reported differently in Table A-1 of previous reports. This did not impact outcomes for generated groundwater maps and data reported in Table A-2 of related reports.
4. Elevations are reported in feet (ft) above mean sea level (MSL) based on the North American Vertical Datum of 1988 (NAVD88).

Table A-2: Groundwater Parameters – Third Quarter 2023
Vashon Island Closed Landfill
King County, Washington

Water Bearing Zone	Horizontal Hydraulic Conductivity (K)[1,2] Range	(cm/s)	(ft/d)	Effective Porosity (n_{eff})[1]	August 4, 2023: Horizontal Hydraulic Gradient (DH/DL)[3] (ft/ft)	August 4, 2023: Horizontal Groundwater Velocity (v) (ft/d)	August 4, 2023: General Groundwater Flow Direction
Unit Cc2 - Property Wide[4,6]	Low	5.7E-04	1.61	20%	0.013	0.10	West-northwest
	High	1.6E-02	46.1		0.033	7.49	
	Average[6]	2.9E-03	8.21		0.023	0.92	
Unit Cc2 - South Slope Area[5,6]	Low	5.7E-04	1.61		0.035	0.28	South-southeast
	High	6.8E-03	19.4		0.065	6.29	
	Average[6]	2.1E-03	5.81		0.050	1.45	
Unit D - Northerly flow direction	Low	1.5E-03	4.4		0.028	0.62	North - with flow to the northeast and northwest
	High	1.6E-02	46.1			6.51	
	Average	3.6E-03	10.2			1.44	
Unit D - Southerly flow direction	Low	1.5E-03	4.4		0.015	0.32	Southwest - away from divide
	High	1.6E-02	46.1			3.40	
	Average	3.6E-03	10.2			0.75	

Notes:
1. Horizontal hydraulic conductivity values and effective porosity values from Aspect 2020.
2. Average horizontal hydraulic conductivity values are the geometric mean of values reported per well and unit (Aspect 2020).
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 2020).
5. Calculations for South Slope Area Unit Cc2 horizontal hydraulic conductivities include data from wells MW-2, MW-20, MW-21, MW-33, MW-35, and MW-35, and MW-37.
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 2020).



Legend

MW-X XXX.XX — Monitoring Well Completed in Unit Cc2 Perched Zone Elevation *(feet mean sea level (MSL))*

240 — Perched Zone Groundwater Elevation Contour *(feet MSL)*

? — Inferred Horizontal Groundwater Flow Path

Pond

Road

Ditch

Fence

King County Landfill Property

Building

N

0 200 400 *Feet*

Contour Interval 2 Feet

Locations surveyed on Washington State Plane Coordinate System. North Zone (NAD 83/11)

Elevations reported in feet above mean sea level based on the North American Vertical Datum of 1988 (NAVD 88).

Basemap Layer Data: King County Solid Waste Division

Note:
1. Groundwater measurements made on August 4, 2023.

King County

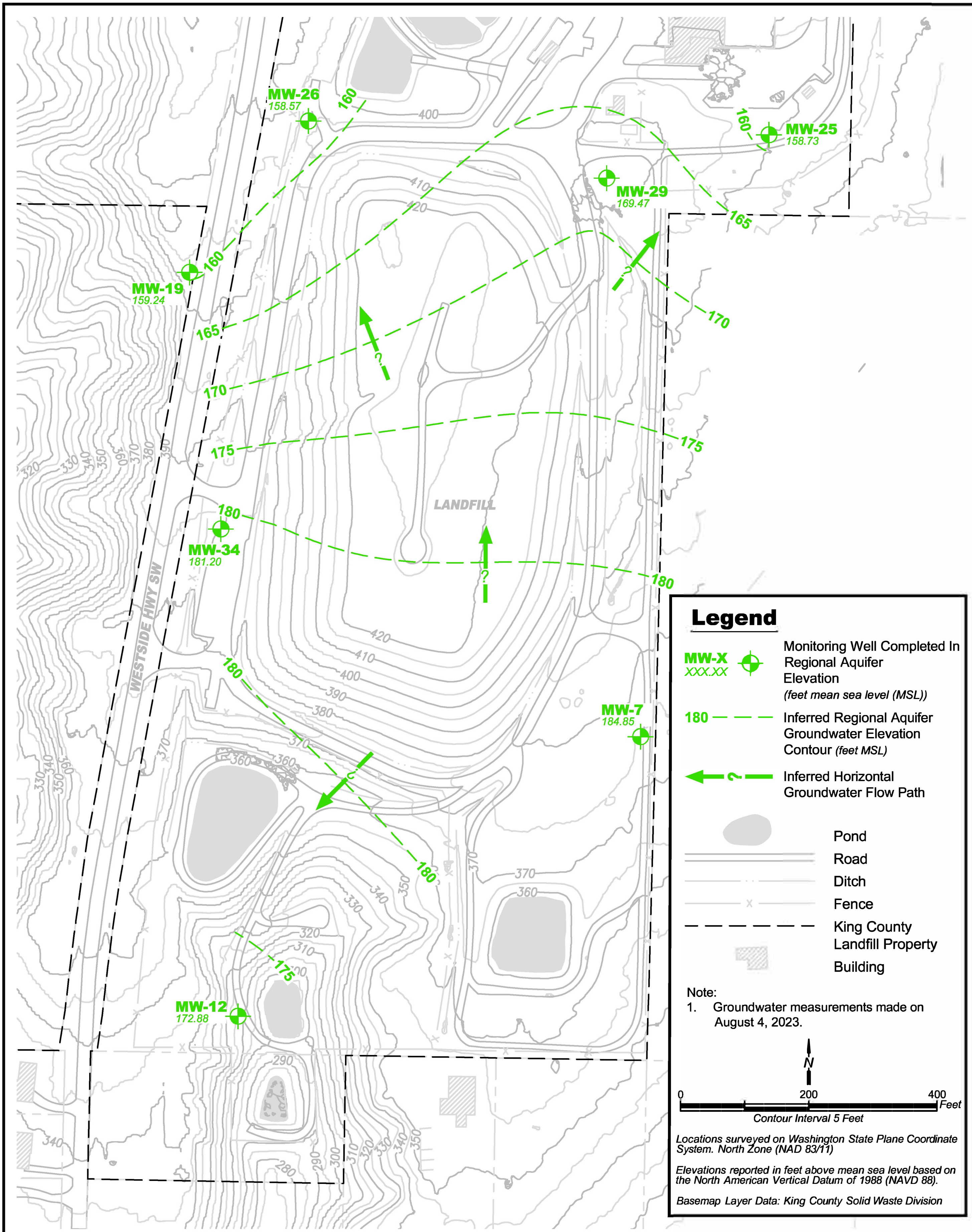
Groundwater Potentiometric Surface Map
Third Quarter 2023 - Cc2 Perched Zone

Vashon Island Closed Landfill

King County, Washington

DATE: November 2023	PROJECT NO. 1033601
DESIGNED BY: AMS	
DRAWN BY: KK	FIGURE NO. C-1
REVISED BY: EWS	

VI_3Q2023_Cc2Perched.dwg



King County

Groundwater Potentiometric Surface Map
Third Quarter 2023 - Unit D Aquifer
Vashon Island Closed Landfill
King County, Washington

DATE: November 2023	PROJECT NO. 1033601
DESIGNED BY: AMS	
DRAWN BY: KK	FIGURE NO.
REVISED BY: EWS	C-2

VI_3Q2023_UnitD.dwg

King County

Water and Land Resources Division

Department of Natural Resources and Parks
King Street Center
201 South Jackson Street, Suite 5600
Seattle, WA 98104-3855

206-477-4800 Fax 206-296-0192
TTY Relay: 711

TECHNICAL MEMORANDUM

March 21, 2024

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

VIA: Eric Ferguson, Water Quality Planner – Hydrogeologist, Science and Technical Support Section, Water and Land Resources Division, DNRP

FM: Adrienne Scott, Engineer III – Lead Geologist, Facility Engineering and Science Section, Solid Waste Division, DNRP

RE: Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations
Fourth Quarter 2023 Results
Vashon Island Closed Landfill, King County, Washington
Project No. 1033601 – Task 29.14.137.45

The King County Water and Land Resources Division (WLRD) submits this memorandum report on groundwater conditions during the fourth quarter of 2023 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 *Scope of Work for Services to King County Solid Waste Division – Facility Engineering and Sciences Section* (WLRD, 2023). King County Solid Waste Division (SWD) personnel measured groundwater levels at the Landfill on November 1, 2023; for each aquifer, the measurements were used to:

1. Evaluate the potentiometric groundwater surface elevations;
2. Determine groundwater flow directions and horizontal gradients; and
3. Calculate the groundwater velocities.

There have been no significant changes in the interpreted groundwater conditions for the Cc2 perched zone and the Unit D aquifer since the report submitted for the third quarter of 2023.

Groundwater Elevation Data

The SWD recorded groundwater level measurements for 15 monitoring wells during the fourth quarter of 2023. These wells are 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 2020).

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

Cc2 Perched Zone

Three separate coarse-grained perched zones are identified within variable fine-grained sediment in the Cc2 perched zone (Aspect 2020). 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 2020). Groundwater in this perched zone is monitored by wells MW-2, MW-9, MW-20, MW-21, MW-30, MW-33, and MW-35 (Aspect 2020). Subsequent to the 2020 Aspect report, monitoring well MW-37 was successfully completed within the Cc2 perched zone.

According to Aspect (2020), 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 two wells are above coarse-grained layers indicating confined conditions (Aspect 2020). During this quarter, the water level in monitoring well MW-33 measured 16.99 feet above the top of the screen and may be influenced by confining conditions.

Figure A-1 shows the groundwater elevation at each well location, groundwater movement arrows, and the potentiometric surface contours for the Cc2 perched zone for the current quarter.

Unit D Aquifer

Groundwater in the Unit D aquifer is monitored by wells MW-7, MW-12, MW-19, MW-25, MW-26, MW-29, and MW-34 (Aspect 2020). Measured water levels in monitoring wells MW-7, MW-12, MW-19, MW-25, and MW-34 were at least 16.02 feet above the top of the screen and may be influenced by vertical gradients, permeability differences (Aspect 2020), or confining conditions in the Unit D aquifer.

Figure A-2 shows the groundwater elevation at each well location, groundwater movement arrows, and the potentiometric surface contours for the Unit D aquifer for the current quarter.

Direction of Groundwater Flow

Potentiometric surface maps represent the modeled groundwater surface at depth. The potentiometric maps are generated by interpolating data between the calculated groundwater elevations at the monitored wells. Each potentiometric contour represents a line of equal hydraulic head where the groundwater elevation remains constant. Groundwater is expected to flow from high elevations to low elevations, with the direction of flow perpendicular to the potentiometric contour.

Cc2 Perched Zone

Figure A-1 shows groundwater flow directions in the Cc2 perched zone. The figure shows that groundwater generally moves toward the south-southeast in the south slope area with a component of west-northwest movement for the remainder of the property.

Unit D Aquifer

Groundwater flow direction in Unit D is strongly influenced by the higher water levels in wells MW-7 and MW-34; the raised potentiometric surface in this area forms a groundwater divide that trends west-east beneath the southern area of the landfill footprint (Aspect, 2020).

Figure A-2 shows groundwater flow directions in the Unit D aquifer. The figure shows that groundwater generally moves southwesterly in the area south of the groundwater divide and northerly in the area north of the groundwater divide with components of flow to the northeast and northwest. The groundwater gradient south of the divide is less steep than that north of the divide.

Groundwater Parameters

Table A-2 presents a summary of the groundwater parameters. Hydraulic conductivity and effective porosity values are based on the ranges referred to in *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Aspect 2020).

The average horizontal hydraulic conductivity for the Cc2 perched zone beneath the Landfill is reported to be 8.21 feet per day (ft/d) property wide and 5.81 ft/d in the south slope area (Aspect 2020). The average horizontal hydraulic conductivity in the Unit D aquifer beneath the landfill is reported to be 10.2 ft/d (Aspect 2020). The effective porosity is reported as 20 percent for both the Cc2 perched zone and the Unit D aquifer (Aspect 2020).

Average hydraulic gradients for the Cc2 perched zone are approximately 0.023 ft/ft property wide and 0.049 ft/ft for the south slope area during the fourth quarter of 2023. The average hydraulic gradients for the Unit D aquifer were approximately 0.029 and 0.015 ft/ft for the northerly and southerly flow directions, respectively.

Average horizontal groundwater velocities calculated for the Cc2 perched zone and Unit D aquifer are based on spatial differences in aquifer parameters, hydraulic gradients, and calculations 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]

The average horizontal groundwater velocities in the Cc2 perched zone are approximately 0.94 ft/d west-northwest across the property, and are 1.41 ft/d south-southeast for the south slope area. The average horizontal groundwater velocities in the Unit D aquifer are approximately 1.45 and 0.75 ft/d in the northerly and southerly direction, respectively.

References

Aspect Consulting, LLC. (Aspect). 2020. Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1 (Contract Number E00102E08; Task No. 310.3 – D310.3.1.3). AGENCY DRAFT. November 6. FINAL.

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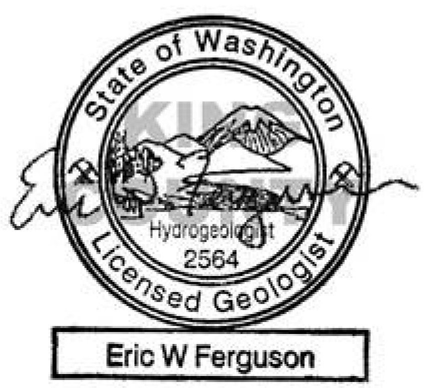

Eric W Ferguson, WA LHG
Water Quality Planner - Hydrogeologist
King County Water and Land Resources Division

Enclosures:

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Table A-2:	Groundwater Parameters – Fourth Quarter 2023
Figure A-1:	Groundwater Potentiometric Surface Map – Fourth Quarter 2023 – Cc2 Perched Zone
Figure A-2:	Groundwater Potentiometric Surface Map – Fourth Quarter 2023 – Unit D Aquifer

Table A-1: Well Details and Groundwater Elevations – Fourth Quarter 2023
Vashon Island Closed Landfill
King County, Washington

	Well Identification	Easting[2] (ft)	Northing[2] (ft)	Top of Casing Elevation[4] (ft MSL)	Top of Screen Elevation[4] (ft MSL)	Bottom of Screen Elevation[4] (ft MSL)	November 1, 2023 Measured Depth to Water[1] (ft)	November 1, 2023 Groundwater Elevations[4] (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	165.92	239.25
	MW-20	1228173.43	162566.52	370.32	241.41	236.41	122.18	248.14
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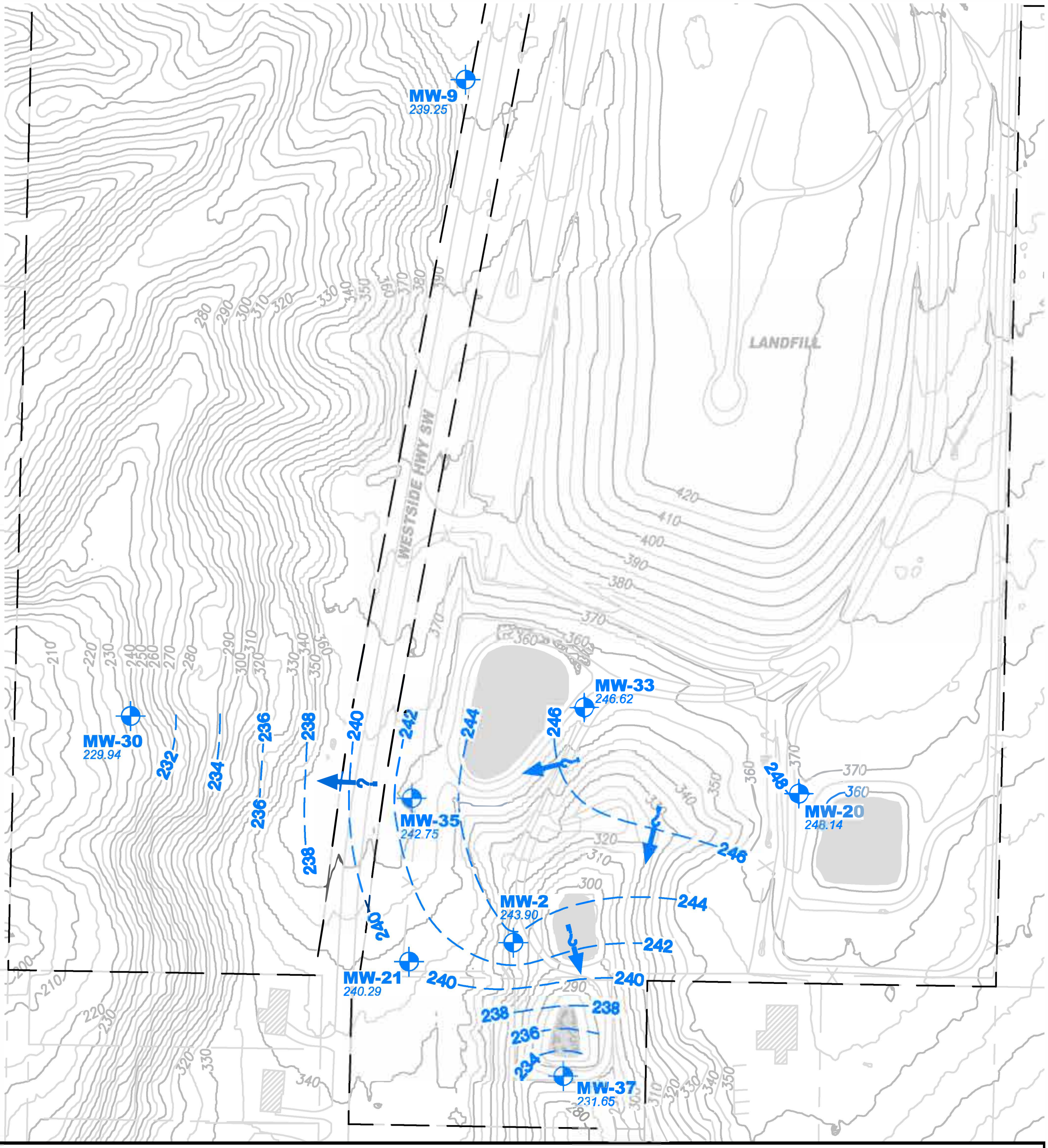
	MW-30	1227273.26	162671.10	235.67	230.40	225.40	5.73	229.94
	MW-33	1227883.53	162682.24	359.17	229.63	219.63	112.55	246.62
	MW-35	1227651.53	162559.82	361.34	244.20	234.20	118.59	242.75
	MW-37	1227855.76	162186.41	294.70	222.10	212.10	63.05	231.65
Unit D Aquifer	MW-7	1228427.68	162811.30	376.75	154.40	144.40	192.05	184.70
	MW-12	1227800.99	162375.28	315.53	142.72	132.72	142.73	172.80
	MW-19	1227725.02	163535.12	405.43	143.14	131.64	246.26	159.17
	MW-25	1228628.13	163749.00	402.33	141.76	137.76	243.6	158.73
	MW-26	1227910.18	163770.66	406.54	153.55	144.15	247.9	158.64
	MW-29[3]	1228375.59	163681.26	413.85	172.83	158.63	244.41	169.44
	MW-34	1227774.04	163135.04	385.96	147.94	137.94	204.8	181.16

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-21 measured depth to water occurred on November 11, 2023.
3. MW-29 top and bottom of screen elevations were reported differently in Table A-1 of previous reports. This did not impact outcomes for generated groundwater maps and data reported in Table A-2 of related reports.
4. Elevations are reported in feet (ft) above mean sea level (MSL) based on the North American Vertical Datum of 1988 (NAVD88).

Table A-2: Groundwater Parameters – Fourth Quarter 2023
Vashon Island Closed Landfill
King County, Washington

Water Bearing Zone	Horizontal Hydraulic Conductivity (K)[1,2] Range	Horizontal Hydraulic Conductivity (K)[1,2] (cm/s)	Horizontal Hydraulic Conductivity (K)[1,2] (ft/d)	Effective Porosity (n_{eff})[1]	November 1, 2023: Horizontal Hydraulic Gradient (DH/DL)[3] (ft/ft)	November 1, 2023: Horizontal Groundwater Velocity (v) (ft/d)	November 1, 2023: General Groundwater Flow Direction
Unit Cc2 - Property Wide[4,6]	Low	5.7E-04	1.61	20%	0.013	0.10	West-northwest
	High	1.6E-02	46.1		0.033	7.60	
	Average[6]	2.9E-03	8.21		0.023	0.92	
Unit Cc2 - South Slope Area[5,6]	Low	5.7E-04	1.61		0.032	0.26	South-southeast
	High	6.8E-03	19.4		0.065	6.29	
	Average[6]	2.1E-03	5.81		0.049	1.41	
Unit D - Northerly flow direction	Low	1.5E-03	4.4		0.029	0.62	North - with flow to the northeast and northwest
	High	1.6E-02	46.1			6.57	
	Average	3.6E-03	10.2			1.45	
Unit D - Southerly flow direction	Low	1.5E-03	4.4		0.015	0.32	Southwest - away from divide
	High	1.6E-02	46.1			3.37	
	Average	3.6E-03	10.2			0.75	

Notes:
1. Horizontal hydraulic conductivity values and effective porosity values from Aspect 2020.
2. Average horizontal hydraulic conductivity values are the geometric mean of values reported per well and unit (Aspect 2020).
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 2020).
5. Calculations for South Slope Area Unit Cc2 horizontal hydraulic conductivities include data from wells MW-2, MW-20, MW-21, MW-33, MW-35, and MW-35, and MW-37.
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 2020).



Legend

MW-X XXX.XX — Monitoring Well Completed in Unit Cc2 Perched Zone Elevation *(feet mean sea level (MSL))*

240 — Perched Zone Groundwater Elevation Contour *(feet MSL)*

Inferred Horizontal Groundwater Flow Path

Pond

Road

Ditch

Fence

King County Landfill Property

Building

N

0 200 400 *Feet*

Contour Interval 2 Feet

Locations surveyed on Washington State Plane Coordinate System. North Zone (NAD 83/11)

Elevations reported in feet above mean sea level based on the North American Vertical Datum of 1988 (NAVD 88).

Basemap Layer Data: King County Solid Waste Division

Note:
1. Groundwater measurements made on November 1, 2023.

King County

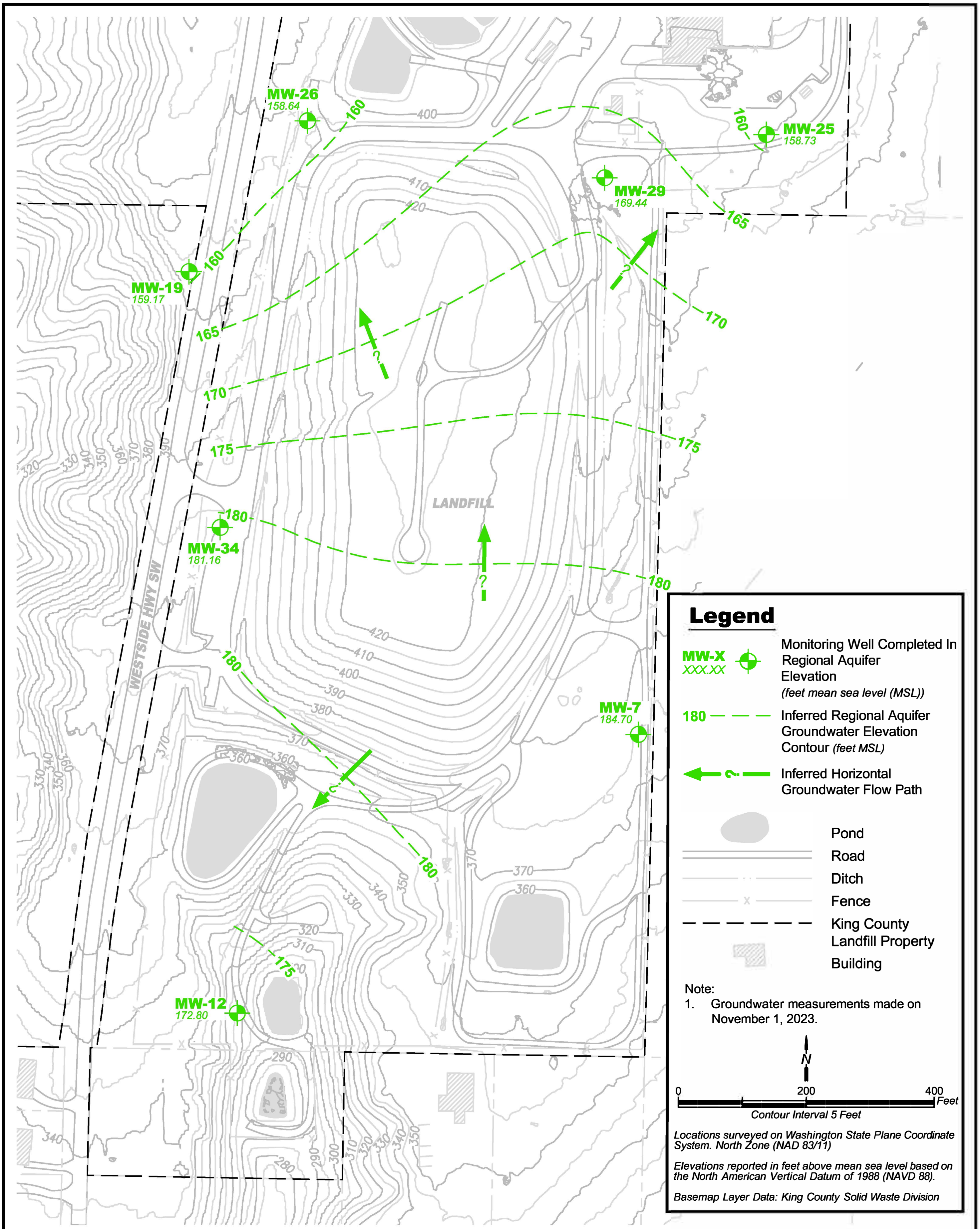
Groundwater Potentiometric Surface Map
Fourth Quarter 2023 - Cc2 Perched Zone

Vashon Island Closed Landfill

King County, Washington

DATE: March 2024	PROJECT NO.	1033601
DESIGNED BY: AMS		
DRAWN BY: KK	FIGURE NO.	
REVISED BY: EWS		C-1

VI_4Q2023_Cc2Perched.dwg



King County

Groundwater Potentiometric Surface Map
Fourth Quarter 2023 - Unit D Aquifer

Vashon Island Closed Landfill

King County, Washington

DATE: March 2024	PROJECT NO. 1033601
DESIGNED BY: AMS	
DRAWN BY: KK	FIGURE NO.
REVISED BY: EWI	C-2

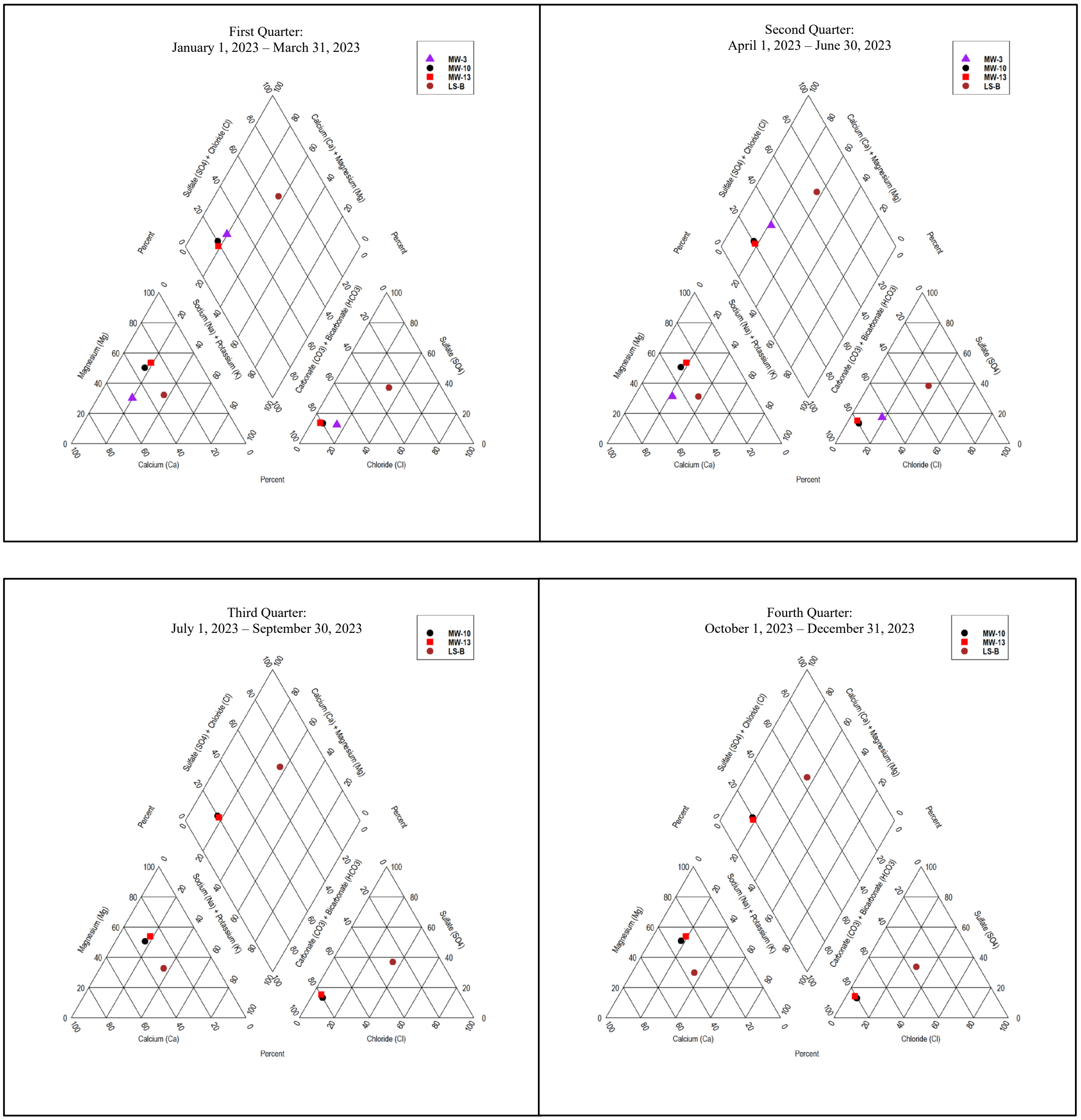
VI_4Q2023_UnitD.dwg

Appendix D

Ion Balance Summary and
Trilinear Diagrams

Figure D-1. Channel Cc1 Trilinear Diagrams

January 1, 2023 - December 31, 2023



NOTE:

1. MW-4 is being evaluated to ensure that representative samples are collected from Channel Cc1 in the vicinity of MW-4. No groundwater samples were collected from MW-4 in 2023.

2. MW-3 was not sampled during the 3rd and 4th quarters of 2023; the well was dry.

Table D-1
Channel Cc1: Ion Balance Summary for Groundwater
January 1, 2023 - March 31, 2023

		Well #	MW-3			MW-10			MW-13		
		Sample Date	2/13/2023			2/13/2023			2/13/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		5.59			7.24			7.06		
Conductance	--		71.10			134.0			139.10		
TDS	--		59.30			101.0			107.0		
Calcium	40.1	2	7.61	0.3797	50.0	10.10	0.5040	32.87	9.20	0.4591	27.66
Magnesium	24.3	2	2.79	0.2296	30.23	9.38	0.7719	50.34	10.80	0.8887	53.56
Potassium	39.1	1	1.47	0.0376	4.95	1.43	0.0366	2.39	1.68	0.0430	2.59
Sodium	23.0	1	2.58	0.1122	14.78	5.07	0.2205	14.38	6.17	0.2684	16.17
Iron	55.8	2	0.0050	0.0002	0.0236	0.0050	0.0002	0.0117	0.0050	0.0002	0.0108
Manganese	54.9	2	0.0005	0.0000	0.0022	0.0001	0.0000	0.0001	0.0001	0.0000	0.0001
Ammonia-N	14.0	1	0.0010	0.0001	0.0094	0.0010	0.0001	0.0047	0.0010	0.0001	0.0043
Total Cations (meq/L)				**0.7594**			**1.53**			**1.66**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		19.90			58.80			63.40		
Carbonate	60.0	2	0.0005	0.0000	0.0021	0.0613	0.0020	0.1357	0.0437	0.0015	0.0917
Bicarbonate	61.0	1	24.28	0.3979	54.26	71.61	1.17	77.89	77.26	1.27	79.70
Chloride	35.5	1	2.97	0.0838	11.43	3.47	0.0979	6.50	2.83	0.0798	5.02
Nitrate-N	14.0	1	2.55	0.1820	24.83	0.4570	0.0326	2.16	0.3460	0.0247	1.55
Sulfate	96.1	2	3.34	0.0695	9.48	9.64	0.2007	13.32	10.40	0.2165	13.63
Total Anions (meq/L)				**0.7333**			**1.51**			**1.59**	
Total Ions (meq/L)				**1.49**			**3.04**			**3.25**	
Cation/Anion Ratio				**1.04**			**1.02**			**1.04**	
Percent Difference				**1.75**			**0.8642**			**2.17**	

Table D-1 (continued)
Channel Cc1: Ion Balance Summary for Groundwater
April 1, 2023 - June 30, 2023

		Well #	MW-3			MW-10			MW-13		
		Sample Date	5/1/2023			5/1/2023			5/2/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		5.17			7.13			6.90		
Conductance	--		56.50			137.30			147.30		
TDS	--		46.0			107.0			115.0		
Calcium	40.1	2	5.66	0.2824	47.04	10.50	0.5240	32.49	11.30	0.5639	27.98
Magnesium	24.3	2	2.28	0.1876	31.25	9.93	0.8171	50.67	13.10	1.08	53.48
Potassium	39.1	1	1.26	0.0322	5.37	1.56	0.0399	2.47	2.15	0.0550	2.73
Sodium	23.0	1	2.25	0.0979	16.30	5.32	0.2314	14.35	7.32	0.3184	15.80
Iron	55.8	2	0.0050	0.0002	0.0298	0.0050	0.0002	0.0111	0.0050	0.0002	0.0089
Manganese	54.9	2	0.0004	0.0000	0.0027	0.0001	0.0000	0.0001	0.0004	0.0000	0.0008
Ammonia-N	14.0	1	0.0010	0.0001	0.0119	0.0010	0.0001	0.0044	0.0010	0.0001	0.0035
	Total Cations (meq/L)			**0.6004**			**1.61**			**2.02**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		15.70			59.0			65.60		
Carbonate	60.0	2	0.0001	0.0000	0.0009	0.0478	0.0016	0.1052	0.0313	0.0010	0.0627
Bicarbonate	61.0	1	19.15	0.3139	58.24	71.88	1.18	77.79	79.97	1.31	78.72
Chloride	35.5	1	3.14	0.0886	16.43	3.59	0.1013	6.69	3.01	0.0849	5.10
Nitrate-N	14.0	1	0.7200	0.0514	9.54	0.4450	0.0318	2.10	0.2300	0.0164	0.9862
Sulfate	96.1	2	4.09	0.0852	15.80	9.69	0.2017	13.32	12.10	0.2519	15.13
	Total Anions (meq/L)			**0.5391**			**1.51**			**1.66**	
	Total Ions (meq/L)			**1.14**			**3.13**			**3.68**	
	Cation/Anion Ratio			**1.11**			**1.06**			**1.21**	
	Percent Difference			**5.38**			**3.14**			**9.53**	

Table D-1 (continued)

Channel Cc1: Ion Balance Summary for Groundwater

July 1, 2023 - September 30, 2023

		Well #	MW-10			MW-13		
		Sample Date	8/7/2023			8/7/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.99			6.90		
Conductance	--		138.20			151.20		
TDS	--		100.00			109.00		
Calcium	40.1	2	10.10	0.5040	32.57	9.85	0.4915	27.96
Magnesium	24.3	2	9.52	0.7834	50.63	11.50	0.9463	53.83
Potassium	39.1	1	1.48	0.0379	2.45	1.77	0.0453	2.58
Sodium	23.0	1	5.10	0.2219	14.34	6.31	0.2745	15.61
Iron	55.8	2	0.0050	0.0002	0.0116	0.0050	0.0002	0.0102
Manganese	54.9	2	0.0001	0.0000	0.0001	0.0006	0.0000	0.0013
Ammonia-N	14.0	1	0.0010	0.0001	0.0046	0.0010	0.0001	0.0041
	Total Cations (meq/L)			**1.55**			**1.76**	
Anion Parameters	Molecular Weight (g/mol)	n						
Alkalinity, Total	--		58.80			66.10		
Carbonate	60.0	2	0.0345	0.0012	0.0766	0.0316	0.0011	0.0629
Bicarbonate	61.0	1	71.67	1.17	78.18	80.58	1.32	78.94
Chloride	35.5	1	3.49	0.0985	6.55	2.92	0.0824	4.92
Nitrate-N	14.0	1	0.4400	0.0314	2.09	0.2100	0.0150	0.8961
Sulfate	96.1	2	9.45	0.1967	13.10	12.20	0.2540	15.18
	Total Anions (meq/L)			**1.50**			**1.67**	
	Total Ions (meq/L)			**3.05**			**3.43**	
	Cation/Anion Ratio			**1.03**			**1.05**	
	Percent Difference			**1.48**			**2.47**	

Table D-1 (continued)

Channel Cc1: Ion Balance Summary for Groundwater

October 1, 2023 - December 31, 2023

		Well #	MW-10			MW-13		
		Sample Date	11/2/2023			11/13/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.10			6.94		
Conductance	--		140.60			153.60		
TDS	--		101.00			105.00		
Calcium	40.1	2	9.54	0.4760	31.41	10.10	0.5040	27.28
Magnesium	24.3	2	9.40	0.7735	51.04	12.10	0.9957	53.90
Potassium	39.1	1	1.44	0.0368	2.43	1.92	0.0491	2.66
Sodium	23.0	1	5.26	0.2288	15.10	6.86	0.2984	16.15
Iron	55.8	2	0.0050	0.0002	0.0118	0.0050	0.0002	0.0097
Manganese	54.9	2	0.0001	0.0000	0.0001	0.0001	0.0000	0.0001
Ammonia-N	14.0	1	0.0010	0.0001	0.0047	0.0010	0.0001	0.0039
Total Cations (meq/L)				**1.52**			**1.85**	
Anion Parameters	Molecular Weight (g/mol)	n						
Alkalinity, Total	--		58.50			65.60		
Carbonate	60.0	2	0.0442	0.0015	0.0990	0.0343	0.0011	0.0695
Bicarbonate	61.0	1	71.28	1.17	78.47	79.96	1.31	79.64
Chloride	35.5	1	3.41	0.0962	6.46	2.89	0.0815	4.95
Nitrate-N	14.0	1	0.4390	0.0313	2.11	0.2700	0.0193	1.17
Sulfate	96.1	2	9.20	0.1915	12.87	11.20	0.2332	14.17
Total Anions (meq/L)				**1.49**			**1.65**	
Total Ions (meq/L)				**3.00**			**3.49**	
Cation/Anion Ratio				**1.02**			**1.12**	
Percent Difference				**0.8866**			**5.78**	

Figure D-2. Channel Cc2 Trilinear Diagrams

January 1, 2023 - December 31, 2023

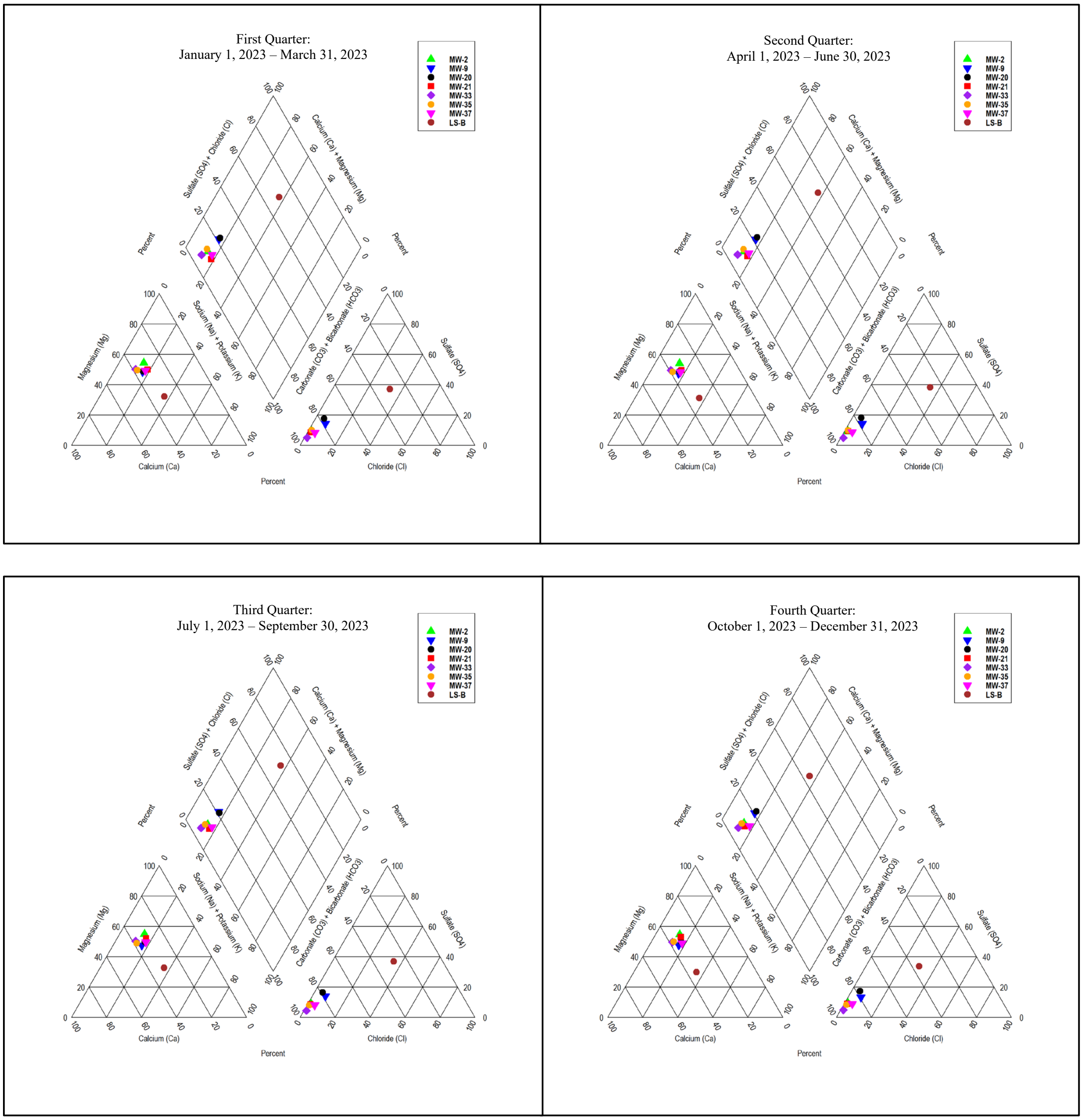


Table D-2

Channel Cc2: Ion Balance Summary for Groundwater

January 1, 2023 - March 31, 2023

		Well #	MW-2			MW-9			MW-20			MW-21		
		Sample Date	2/21/2023			2/14/2023			2/21/2023			2/21/2023		
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	--		6.98			7.07			7.54			6.59		
Conductance	--		252.0			172.60			156.0			240.70		
TDS	--		181.0			123.0			131.0			171.0		
Calcium	40.1	2	20.60	1.03	31.57	14.0	0.6986	35.22	13.30	0.6637	34.46	18.90	0.9431	31.55
Magnesium	24.3	2	21.50	1.77	54.33	11.70	0.9628	48.54	11.40	0.9381	48.71	18.10	1.49	49.83
Potassium	39.1	1	2.09	0.0535	1.64	2.10	0.0537	2.71	2.06	0.0527	2.74	2.04	0.0522	1.75
Sodium	23.0	1	9.28	0.4037	12.40	6.16	0.2680	13.51	5.99	0.2606	13.53	11.40	0.4959	16.59
Iron	55.8	2	0.0050	0.0002	0.0055	0.0050	0.0002	0.0090	0.1150	0.0041	0.2138	0.0742	0.0027	0.0889
Manganese	54.9	2	0.0484	0.0018	0.0541	0.0001	0.0000	0.0001	0.1460	0.0053	0.2760	0.1440	0.0052	0.1754
Ammonia-N	14.0	1	0.0010	0.0001	0.0022	0.0010	0.0001	0.0036	0.0189	0.0013	0.0701	0.0075	0.0005	0.0179
Total Cations (meq/L)				**3.26**			**1.98**			**1.93**			**2.99**	
Anion Parameters	Molecular Weight (g/mol)	n												
Alkalinity, Total	--		140.0			74.10			72.0			127.0		
Carbonate	60.0	2	0.0803	0.0027	0.0835	0.0523	0.0017	0.0900	0.1496	0.0050	0.2679	0.0297	0.0010	0.0347
Bicarbonate	61.0	1	170.64	2.80	87.26	90.30	1.48	76.40	87.54	1.43	77.07	154.88	2.54	89.10
Chloride	35.5	1	2.26	0.0638	1.99	4.90	0.1382	7.14	3.21	0.0906	4.86	1.88	0.0530	1.86
Nitrate-N	14.0	1	0.7080	0.0505	1.58	0.6500	0.0464	2.40	0.0050	0.0004	0.0192	0.1240	0.0089	0.3107
Sulfate	96.1	2	14.0	0.2915	9.09	13.0	0.2707	13.97	15.90	0.3310	17.78	11.90	0.2478	8.70
Total Anions (meq/L)				**3.21**			**1.94**			**1.86**			**2.85**	
Total Ions (meq/L)				**6.46**			**3.92**			**3.79**			**5.84**	
Cation/Anion Ratio				**1.02**			**1.02**			**1.03**			**1.05**	
Percent Difference				**0.7914**			**1.18**			**1.69**			**2.40**	

Table D-2 (continued)
Channel Cc2: Ion Balance Summary for Groundwater
January 1, 2023 - March 31, 2023

		Well #	MW-33			MW-35			MW-37		
		Sample Date	2/21/2023			2/21/2023			2/21/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.81			6.64			6.88		
Conductance	--		581.80			513.90			164.70		
TDS	--		387.0			352.0			131.0		
Calcium	40.1	2	55.30	2.76	37.11	49.60	2.48	35.35	13.90	0.6936	33.18
Magnesium	24.3	2	43.90	3.61	48.59	39.70	3.27	46.66	12.50	1.03	49.20
Potassium	39.1	1	3.06	0.0783	1.05	3.09	0.0790	1.13	1.40	0.0358	1.71
Sodium	23.0	1	17.20	0.7482	10.06	17.30	0.7526	10.75	7.60	0.3306	15.81
Iron	55.8	2	5.61	0.2009	2.70	9.68	0.3466	4.95	0.0308	0.0011	0.0528
Manganese	54.9	2	0.9120	0.0332	0.4465	2.09	0.0761	1.09	0.0203	0.0007	0.0353
Ammonia-N	14.0	1	0.0341	0.0024	0.0327	0.0649	0.0046	0.0662	0.0010	0.0001	0.0034
	Total Cations (meq/L)			**7.44**			**7.0**			**2.09**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		332.0			281.0			85.10		
Carbonate	60.0	2	0.1288	0.0043	0.0604	0.0737	0.0025	0.0386	0.0388	0.0013	0.0643
Bicarbonate	61.0	1	404.78	6.63	93.32	342.67	5.62	88.30	103.74	1.70	84.60
Chloride	35.5	1	3.90	0.1100	1.55	3.32	0.0937	1.47	2.97	0.0838	4.17
Nitrate-N	14.0	1	0.0050	0.0004	0.0050	0.0050	0.0004	0.0056	0.8700	0.0621	3.09
Sulfate	96.1	2	17.30	0.3602	5.07	31.10	0.6475	10.18	7.80	0.1624	8.08
	Total Anions (meq/L)			**7.11**			**6.36**			**2.01**	
	Total Ions (meq/L)			**14.54**			**13.36**			**4.10**	
	Cation/Anion Ratio			**1.05**			**1.10**			**1.04**	
	Percent Difference			**2.24**			**4.79**			**1.97**	

Table D-2 (continued)
Channel Cc2: Ion Balance Summary for Groundwater
April 1, 2023 - June 30, 2023

		Well #	MW-2			MW-9			MW-20			MW-21		
		Sample Date	5/4/2023			5/2/2023			5/4/2023			5/4/2023		
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	--		6.76			7.11			7.40			6.43		
Conductance	--		271.90			176.50			167.40			241.20		
TDS	--		176.0			128.0			130.0			171.0		
Calcium	40.1	2	21.40	1.07	31.99	15.0	0.7485	35.96	13.50	0.6737	34.50	20.30	1.01	32.92
Magnesium	24.3	2	21.90	1.80	53.99	12.0	0.9875	47.44	11.50	0.9463	48.47	18.50	1.52	49.48
Potassium	39.1	1	2.17	0.0555	1.66	2.34	0.0599	2.88	2.10	0.0537	2.75	2.18	0.0558	1.81
Sodium	23.0	1	9.43	0.4102	12.29	6.56	0.2854	13.71	6.17	0.2684	13.75	10.90	0.4742	15.41
Iron	55.8	2	0.0050	0.0002	0.0054	0.0050	0.0002	0.0086	0.1000	0.0036	0.1834	0.1430	0.0051	0.1664
Manganese	54.9	2	0.0508	0.0018	0.0554	0.0001	0.0000	0.0002	0.1320	0.0048	0.2461	0.1570	0.0057	0.1857
Ammonia-N	14.0	1	0.0055	0.0004	0.0118	0.0010	0.0001	0.0034	0.0281	0.0020	0.1027	0.0080	0.0006	0.0186
Total Cations (meq/L)				**3.34**			**2.08**			**1.95**			**3.08**	
Anion Parameters	Molecular Weight (g/mol)	n												
Alkalinity, Total	--		138.0			74.70			72.30			127.0		
Carbonate	60.0	2	0.0477	0.0016	0.0503	0.0578	0.0019	0.0982	0.1090	0.0036	0.1926	0.0206	0.0007	0.0238
Bicarbonate	61.0	1	168.26	2.76	87.28	91.02	1.49	76.03	87.98	1.44	76.49	154.90	2.54	88.17
Chloride	35.5	1	2.23	0.0629	1.99	5.16	0.1456	7.42	3.39	0.0956	5.07	2.06	0.0581	2.02
Nitrate-N	14.0	1	0.7310	0.0522	1.65	0.7030	0.0502	2.56	0.0050	0.0004	0.0189	0.1260	0.0090	0.3124
Sulfate	96.1	2	13.70	0.2852	9.03	13.10	0.2727	13.90	16.50	0.3435	18.22	13.10	0.2727	9.47
Total Anions (meq/L)				**3.16**			**1.96**			**1.89**			**2.88**	
Total Ions (meq/L)				**6.50**			**4.04**			**3.84**			**5.96**	
Cation/Anion Ratio				**1.06**			**1.06**			**1.04**			**1.07**	
Percent Difference				**2.75**			**2.95**			**1.75**			**3.31**	

Table D-2 (continued)

Channel Cc2: Ion Balance Summary for Groundwater

April 1, 2023 - June 30, 2023

		Well #	MW-33			MW-35			MW-37		
		Sample Date	5/4/2023			5/4/2023			5/4/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.73			6.50			6.76		
Conductance	--		569.80			484.0			176.70		
TDS	--		369.0			355.0			134.0		
Calcium	40.1	2	57.80	2.88	38.01	50.90	2.54	36.31	14.80	0.7385	34.38
Magnesium	24.3	2	44.30	3.65	48.04	38.60	3.18	45.40	12.60	1.04	48.27
Potassium	39.1	1	3.23	0.0826	1.09	3.15	0.0806	1.15	1.47	0.0376	1.75
Sodium	23.0	1	17.20	0.7482	9.86	17.40	0.7569	10.82	7.69	0.3345	15.57
Iron	55.8	2	5.42	0.1941	2.56	10.10	0.3617	5.17	0.0050	0.0002	0.0083
Manganese	54.9	2	0.8580	0.0312	0.4116	2.08	0.0757	1.08	0.0070	0.0003	0.0119
Ammonia-N	14.0	1	0.0309	0.0022	0.0291	0.0638	0.0046	0.0651	0.0010	0.0001	0.0033
Total Cations (meq/L)				**7.59**			**7.0**			**2.15**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		333.0			277.0			85.10		
Carbonate	60.0	2	0.1075	0.0036	0.0503	0.0527	0.0018	0.0280	0.0294	0.0010	0.0484
Bicarbonate	61.0	1	406.04	6.66	93.36	337.83	5.54	88.37	103.76	1.70	83.90
Chloride	35.5	1	3.88	0.1095	1.54	3.40	0.0959	1.53	3.25	0.0917	4.52
Nitrate-N	14.0	1	0.0050	0.0004	0.0050	0.0050	0.0004	0.0057	0.8680	0.0620	3.06
Sulfate	96.1	2	17.30	0.3602	5.05	30.30	0.6308	10.07	8.25	0.1718	8.47
Total Anions (meq/L)				**7.13**			**6.27**			**2.03**	
Total Ions (meq/L)				**14.72**			**13.26**			**4.18**	
Cation/Anion Ratio				**1.06**			**1.12**			**1.06**	
Percent Difference				**3.12**			**5.50**			**2.90**	

Table D-2 (continued)

Channel Cc2: Ion Balance Summary for Groundwater

July 1, 2023 - September 30, 2023

		Well #	MW-2			MW-9			MW-20			MW-21		
		Sample Date	8/10/2023			8/7/2023			8/10/2023			8/10/2023		
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	--		6.58			6.82			7.43			6.34		
Conductance	--		275.20			178.30			171.50			259.40		
TDS	--		179.00			127.00			121.00			169.00		
Calcium	40.1	2	21.00	1.05	30.90	14.80	0.7385	36.15	13.20	0.6587	33.05	19.60	0.9780	31.18
Magnesium	24.3	2	22.60	1.86	54.84	11.80	0.9710	47.53	12.00	0.9875	49.55	19.80	1.63	51.95
Potassium	39.1	1	2.25	0.0576	1.70	2.21	0.0565	2.77	2.25	0.0576	2.89	2.32	0.0593	1.89
Sodium	23.0	1	9.71	0.4224	12.45	6.36	0.2767	13.54	6.40	0.2784	13.97	10.50	0.4568	14.56
Iron	55.8	2	0.0050	0.0002	0.0053	0.0050	0.0002	0.0088	0.1250	0.0045	0.2246	0.1050	0.0038	0.1199
Manganese	54.9	2	0.0964	0.0035	0.1035	0.0001	0.0000	0.0001	0.1360	0.0050	0.2484	0.2300	0.0084	0.2669
Ammonia-N	14.0	1	0.0010	0.0001	0.0021	0.0010	0.0001	0.0035	0.0200	0.0014	0.0716	0.0098	0.0007	0.0223
Total Cations (meq/L)				**3.39**			**2.04**			**1.99**			**3.14**	
Anion Parameters	Molecular Weight (g/mol)	n												
Alkalinity, Total	--		137.00			74.90			72.30			130.00		
Carbonate	60.0	2	0.0313	0.0010	0.0332	0.0297	0.0010	0.0507	0.1167	0.0039	0.2117	0.0171	0.0006	0.0196
Bicarbonate	61.0	1	167.08	2.74	87.15	91.32	1.50	76.49	87.97	1.44	78.47	158.57	2.60	89.34
Chloride	35.5	1	2.06	0.0581	1.85	5.06	0.1427	7.30	3.02	0.0852	4.64	1.78	0.0502	1.73
Nitrate-N	14.0	1	0.9800	0.0700	2.23	0.6970	0.0498	2.54	0.0050	0.0004	0.0194	0.1340	0.0096	0.3288
Sulfate	96.1	2	13.20	0.2748	8.75	12.80	0.2665	13.62	14.70	0.3061	16.66	12.00	0.2498	8.59
Total Anions (meq/L)				**3.14**			**1.96**			**1.84**			**2.91**	
Total Ions (meq/L)				**6.53**			**4.00**			**3.83**			**6.05**	
Cation/Anion Ratio				**1.08**			**1.04**			**1.08**			**1.08**	
Percent Difference				**3.81**			**2.16**			**4.06**			**3.76**	

Table D-2 (continued)

Channel Cc2: Ion Balance Summary for Groundwater

July 1, 2023 - September 30, 2023

		Well #	MW-33			MW-35			MW-37		
		Sample Date	8/10/2023			8/10/2023			8/10/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.53			6.54			6.60		
Conductance	--		582.00			506.70			179.10		
TDS	--		355.00			360.00			132.00		
Calcium	40.1	2	56.20	2.80	37.08	50.90	2.54	35.94	14.20	0.7086	32.81
Magnesium	24.3	2	44.80	3.69	48.74	39.50	3.25	45.99	13.00	1.07	49.54
Potassium	39.1	1	3.35	0.0857	1.13	3.33	0.0852	1.21	1.53	0.0391	1.81
Sodium	23.0	1	17.40	0.7569	10.01	17.30	0.7526	10.65	7.84	0.3410	15.79
Iron	55.8	2	5.46	0.1955	2.59	10.20	0.3653	5.17	0.0178	0.0006	0.0295
Manganese	54.9	2	0.8660	0.0315	0.4168	1.90	0.0692	0.9786	0.0046	0.0002	0.0078
Ammonia-N	14.0	1	0.0344	0.0025	0.0325	0.0668	0.0048	0.0675	0.0010	0.0001	0.0033
	Total Cations (meq/L)			**7.56**			**7.07**			**2.16**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		325.00			290.00			84.80		
Carbonate	60.0	2	0.0662	0.0022	0.0319	0.0605	0.0020	0.0315	0.0203	0.0007	0.0339
Bicarbonate	61.0	1	396.37	6.50	93.98	353.68	5.80	90.53	103.41	1.69	85.03
Chloride	35.5	1	3.50	0.0987	1.43	3.01	0.0849	1.33	3.00	0.0846	4.25
Nitrate-N	14.0	1	0.0100	0.0007	0.0103	0.0130	0.0009	0.0145	0.7700	0.0550	2.76
Sulfate	96.1	2	15.10	0.3144	4.55	24.90	0.5184	8.10	7.59	0.1580	7.93
	Total Anions (meq/L)			**6.91**			**6.40**			**1.99**	
	Total Ions (meq/L)			**14.48**			**13.47**			**4.15**	
	Cation/Anion Ratio			**1.09**			**1.10**			**1.08**	
	Percent Difference			**4.49**			**4.93**			**4.00**	

Table D-2 (continued)

Channel Cc2: Ion Balance Summary for Groundwater

October 1, 2023 - December 31, 2023

		Well #	MW-2			MW-9			MW-20			MW-21		
		Sample Date	11/14/2023			11/2/2023			11/14/2023			11/14/2023		
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	--		6.91			7.10			7.62			6.57		
Conductance	--		286.70			175.30			175.80			274.60		
TDS	--		179.00			125.00			127.00			171.00		
Calcium	40.1	2	21.80	1.09	31.52	13.90	0.6936	35.60	13.50	0.6737	33.03	21.40	1.07	31.52
Magnesium	24.3	2	22.90	1.88	54.59	11.30	0.9299	47.73	12.30	1.01	49.63	21.70	1.79	52.71
Potassium	39.1	1	2.22	0.0568	1.65	2.12	0.0542	2.78	2.20	0.0563	2.76	2.39	0.0611	1.80
Sodium	23.0	1	9.63	0.4189	12.14	6.21	0.2701	13.87	6.55	0.2849	13.97	10.40	0.4524	13.35
Iron	55.8	2	0.0050	0.0002	0.0052	0.0050	0.0002	0.0092	0.1600	0.0057	0.2809	0.1550	0.0056	0.1638
Manganese	54.9	2	0.0965	0.0035	0.1018	0.0001	0.0000	0.0001	0.1470	0.0054	0.2624	0.4040	0.0147	0.4340
Ammonia-N	14.0	1	0.0010	0.0001	0.0021	0.0010	0.0001	0.0037	0.0184	0.0013	0.0644	0.0094	0.0007	0.0198
		Total Cations (meq/L)		**3.45**			**1.95**			**2.04**			**3.39**	
Anion Parameters	Molecular Weight (g/mol)	n												
Alkalinity, Total	--		139.00			72.10			73.40			136.00		
Carbonate	60.0	2	0.0679	0.0023	0.0698	0.0545	0.0018	0.0976	0.1833	0.0061	0.3236	0.0304	0.0010	0.0329
Bicarbonate	61.0	1	169.44	2.78	85.70	87.85	1.44	77.31	89.18	1.46	77.43	165.86	2.72	88.40
Chloride	35.5	1	2.20	0.0621	1.92	4.83	0.1363	7.32	3.21	0.0906	4.80	1.90	0.0536	1.74
Nitrate-N	14.0	1	1.45	0.1035	3.19	0.6020	0.0430	2.31	0.0050	0.0004	0.0189	0.3800	0.0271	0.8822
Sulfate	96.1	2	14.20	0.2956	9.12	11.60	0.2415	12.97	15.80	0.3290	17.43	13.20	0.2748	8.94
		Total Anions (meq/L)		**3.24**			**1.86**			**1.89**			**3.07**	
		Total Ions (meq/L)		**6.69**			**3.81**			**3.93**			**6.46**	
		Cation/Anion Ratio		**1.07**			**1.05**			**1.08**			**1.10**	
		Percent Difference		**3.15**			**2.25**			**3.87**			**4.84**	

Table D-2 (continued)
Channel Cc2: Ion Balance Summary for Groundwater
October 1, 2023 - December 31, 2023

		Well #	MW-33			MW-35			MW-37		
		Sample Date	11/14/2023			11/14/2023			11/14/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.77			6.53			6.86		
Conductance	--		575.50			516.60			182.90		
TDS	--		355.00			350.00			134.00		
Calcium	40.1	2	55.30	2.76	37.11	49.40	2.47	35.38	14.90	0.7435	33.19
Magnesium	24.3	2	43.40	3.57	48.03	40.00	3.29	47.24	13.30	1.09	48.85
Potassium	39.1	1	3.24	0.0829	1.11	3.28	0.0839	1.20	1.56	0.0399	1.78
Sodium	23.0	1	17.90	0.7787	10.47	17.10	0.7439	10.68	8.31	0.3615	16.14
Iron	55.8	2	5.79	0.2073	2.79	8.59	0.3076	4.42	0.0179	0.0006	0.0286
Manganese	54.9	2	0.9260	0.0337	0.4533	1.93	0.0703	1.01	0.0042	0.0002	0.0069
Ammonia-N	14.0	1	0.0366	0.0026	0.0351	0.0687	0.0049	0.0704	0.0010	0.0001	0.0032
	Total Cations (meq/L)			**7.44**			**6.97**			**2.24**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		324.00			287.00			85.10		
Carbonate	60.0	2	0.1147	0.0038	0.0551	0.0585	0.0019	0.0306	0.0371	0.0012	0.0608
Bicarbonate	61.0	1	395.05	6.47	93.38	350.02	5.74	89.96	103.75	1.70	83.76
Chloride	35.5	1	3.79	0.1069	1.54	3.28	0.0925	1.45	3.23	0.0911	4.49
Nitrate-N	14.0	1	0.0050	0.0004	0.0051	0.0050	0.0004	0.0056	0.8540	0.0610	3.00
Sulfate	96.1	2	16.70	0.3477	5.01	26.20	0.5455	8.55	8.47	0.1763	8.69
	Total Anions (meq/L)			**6.93**			**6.38**			**2.03**	
	Total Ions (meq/L)			**14.37**			**13.34**			**4.27**	
	Cation/Anion Ratio			**1.07**			**1.09**			**1.10**	
	Percent Difference			**3.50**			**4.42**			**4.92**	

Figure D-3. Channel Cc3 Trilinear Diagrams

January 1, 2023 - December 31, 2023

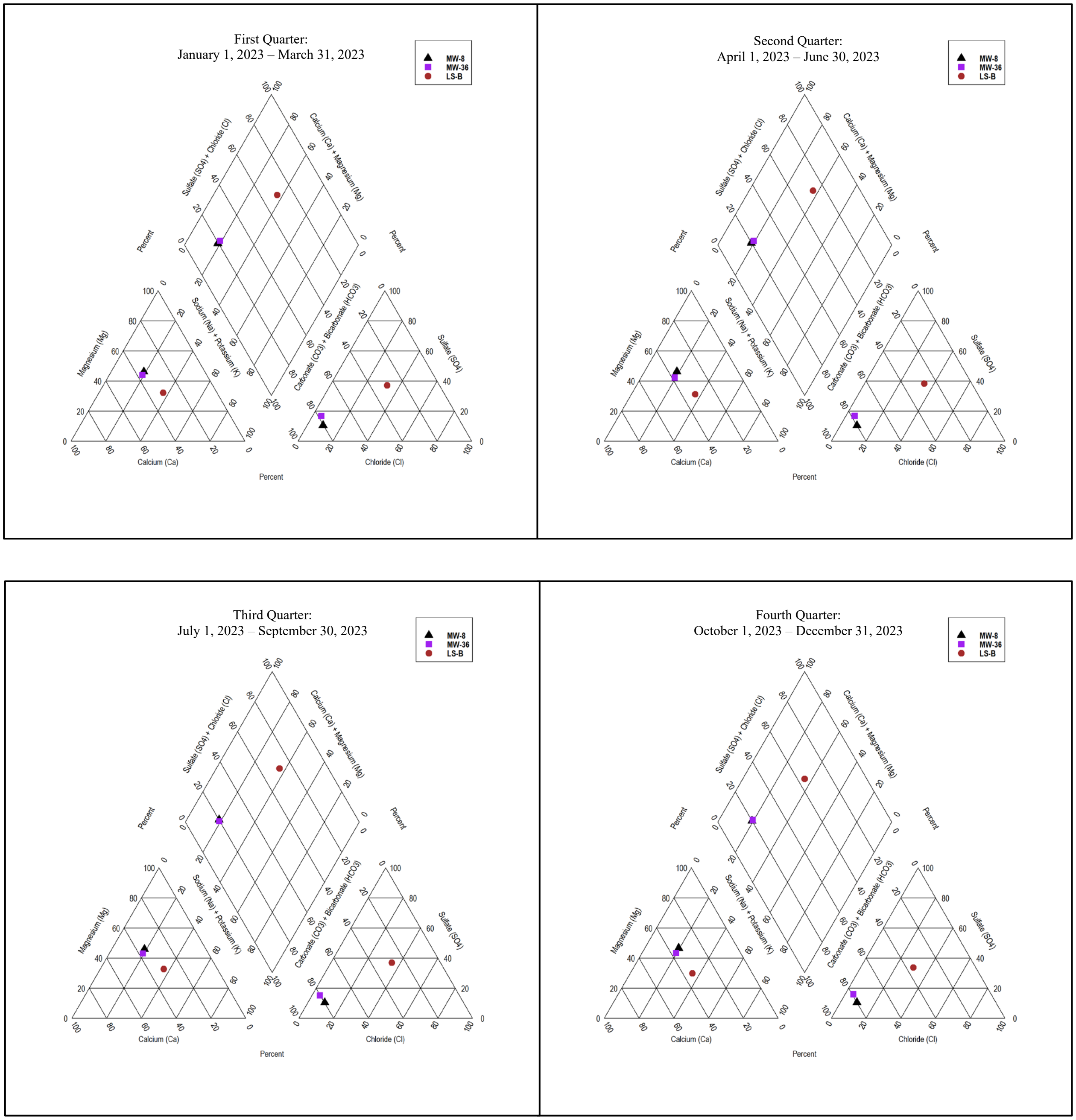


Table D-3

Channel Cc3: Ion Balance Summary for Groundwater

January 1, 2023 - March 31, 2023

		Well #	MW-8			MW-36		
		Sample Date	2/13/2023			2/14/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.32			7.71		
Conductance	--		147.20			152.40		
TDS	--		114.0			127.0		
Calcium	40.1	2	11.80	0.5888	35.09	13.80	0.6886	37.01
Magnesium	24.3	2	9.43	0.7760	46.24	9.92	0.8163	43.88
Potassium	39.1	1	1.17	0.0299	1.78	2.70	0.0691	3.71
Sodium	23.0	1	6.51	0.2832	16.87	6.58	0.2862	15.38
Iron	55.8	2	0.0050	0.0002	0.0107	0.0050	0.0002	0.0096
Manganese	54.9	2	0.0001	0.0000	0.0001	0.0002	0.0000	0.0005
Ammonia-N	14.0	1	0.0010	0.0001	0.0043	0.0010	0.0001	0.0038
Total Cations (meq/L)				**1.68**			**1.86**	
Anion Parameters	Molecular Weight (g/mol)	n						
Alkalinity, Total	--		53.80			70.30		
Carbonate	60.0	2	0.0068	0.0002	0.0141	0.2157	0.0072	0.3993
Bicarbonate	61.0	1	65.62	1.08	67.47	85.33	1.40	77.67
Chloride	35.5	1	4.35	0.1227	7.70	3.22	0.0908	5.04
Nitrate-N	14.0	1	3.56	0.2541	15.94	0.0310	0.0022	0.1229
Sulfate	96.1	2	6.80	0.1416	8.88	14.50	0.3019	16.77
Total Anions (meq/L)				**1.59**			**1.80**	
Total Ions (meq/L)				**3.27**			**3.66**	
Cation/Anion Ratio				**1.05**			**1.03**	
Percent Difference				**2.57**			**1.63**	

Table D-3 (continued)

Cc3: Ion Balance Summary for Grou

April 1, 2023 - June 30, 2023

		Well #	MW-8			MW-36		
		Sample Date	5/1/2023			5/1/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.32			7.22		
Conductance	--		150.10			159.80		
TDS	--		116.0			129.0		
Calcium	40.1	2	12.0	0.5988	35.13	15.10	0.7535	38.34
Magnesium	24.3	2	9.58	0.7883	46.25	10.10	0.8311	42.29
Potassium	39.1	1	1.21	0.0310	1.82	3.03	0.0775	3.94
Sodium	23.0	1	6.58	0.2862	16.79	6.96	0.3028	15.41
Iron	55.8	2	0.0050	0.0002	0.0105	0.0050	0.0002	0.0091
Manganese	54.9	2	0.0001	0.0000	0.0001	0.0003	0.0000	0.0005
Ammonia-N	14.0	1	0.0010	0.0001	0.0042	0.0010	0.0001	0.0036
Total Cations (meq/L)				**1.70**			**1.97**	
Anion Parameters	Molecular Weight (g/mol)	n						
Alkalinity, Total	--		54.0			70.20		
Carbonate	60.0	2	0.0068	0.0002	0.0134	0.0700	0.0023	0.1295
Bicarbonate	61.0	1	65.87	1.08	63.86	85.50	1.40	77.82
Chloride	35.5	1	4.55	0.1284	7.59	3.24	0.0914	5.08
Nitrate-N	14.0	1	4.78	0.3412	20.19	0.0230	0.0016	0.0912
Sulfate	96.1	2	6.78	0.1412	8.35	14.60	0.3040	16.88
Total Anions (meq/L)				**1.69**			**1.80**	
Total Ions (meq/L)				**3.40**			**3.77**	
Cation/Anion Ratio				**1.01**			**1.09**	
Percent Difference				**0.4135**			**4.37**	

Table D-3 (continued)
Channel Cc3: Ion Balance Summary for Groundwater
July 1, 2023 - September 30, 2023

		Well #	MW-8			MW-36		
		Sample Date	8/7/2023			8/10/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.42			7.18		
Conductance	--		150.60			164.50		
TDS	--		112.00			119.00		
Calcium	40.1	2	11.60	0.5788	35.37	14.00	0.6986	37.58
Magnesium	24.3	2	9.14	0.7521	45.96	9.74	0.8015	43.12
Potassium	39.1	1	1.15	0.0294	1.80	2.91	0.0744	4.00
Sodium	23.0	1	6.34	0.2758	16.85	6.53	0.2841	15.28
Iron	55.8	2	0.0050	0.0002	0.0109	0.0050	0.0002	0.0096
Manganese	54.9	2	0.0001	0.0000	0.0001	0.0003	0.0000	0.0005
Ammonia-N	14.0	1	0.0010	0.0001	0.0044	0.0010	0.0001	0.0038
	Total Cations (meq/L)			**1.64**			**1.86**	
Anion Parameters	Molecular Weight (g/mol)	n						
Alkalinity, Total	--		54.20			70.50		
Carbonate	60.0	2	0.0086	0.0003	0.0171	0.0641	0.0021	0.1214
Bicarbonate	61.0	1	66.11	1.08	65.00	85.88	1.41	80.04
Chloride	35.5	1	4.71	0.1329	7.97	2.86	0.0807	4.59
Nitrate-N	14.0	1	4.32	0.3084	18.50	0.0250	0.0018	0.1015
Sulfate	96.1	2	6.81	0.1418	8.51	12.80	0.2665	15.15
	Total Anions (meq/L)			**1.67**			**1.76**	
	Total Ions (meq/L)			**3.30**			**3.62**	
	Cation/Anion Ratio			**0.9818**			**1.06**	
	Percent Difference			**-0.9203**			**2.77**	

Table D-3 (continued)
Channel Cc3: Ion Balance Summary for Groundwater
October 1, 2023 - December 31, 2023

		Well #	**MW-8**			**MW-36**		
		Sample Date	11/2/2023			11/13/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		6.60			7.17		
Conductance	--		153.20			166.90		
TDS	--		109.00			121.00		
Calcium	40.1	2	11.00	0.5489	33.99	14.50	0.7236	37.07
Magnesium	24.3	2	9.15	0.7530	46.62	10.30	0.8476	43.42
Potassium	39.1	1	1.13	0.0289	1.79	2.92	0.0747	3.83
Sodium	23.0	1	6.53	0.2841	17.59	7.03	0.3058	15.67
Iron	55.8	2	0.0050	0.0002	0.0111	0.0050	0.0002	0.0092
Manganese	54.9	2	0.0001	0.0000	0.0001	0.0002	0.0000	0.0004
Ammonia-N	14.0	1	0.0010	0.0001	0.0044	0.0010	0.0001	0.0037
Total Cations (meq/L)				**1.62**			**1.95**	
Anion Parameters	Molecular Weight (g/mol)	n						
Alkalinity, Total	--		55.20			70.70		
Carbonate	60.0	2	0.0132	0.0004	0.0279	0.0628	0.0021	0.1172
Bicarbonate	61.0	1	67.32	1.10	69.80	86.13	1.41	79.05
Chloride	35.5	1	4.66	0.1315	8.32	3.02	0.0852	4.77
Nitrate-N	14.0	1	2.80	0.1999	12.65	0.0220	0.0016	0.0880
Sulfate	96.1	2	6.99	0.1455	9.21	13.70	0.2852	15.97
Total Anions (meq/L)				**1.58**			**1.79**	
Total Ions (meq/L)				**3.20**			**3.74**	
Cation/Anion Ratio				**1.02**			**1.09**	
Percent Difference				**1.08**			**4.45**	

Figure D-4. Unit D Aquifer Trilinear Diagrams

January 1, 2023 - December 31, 2023

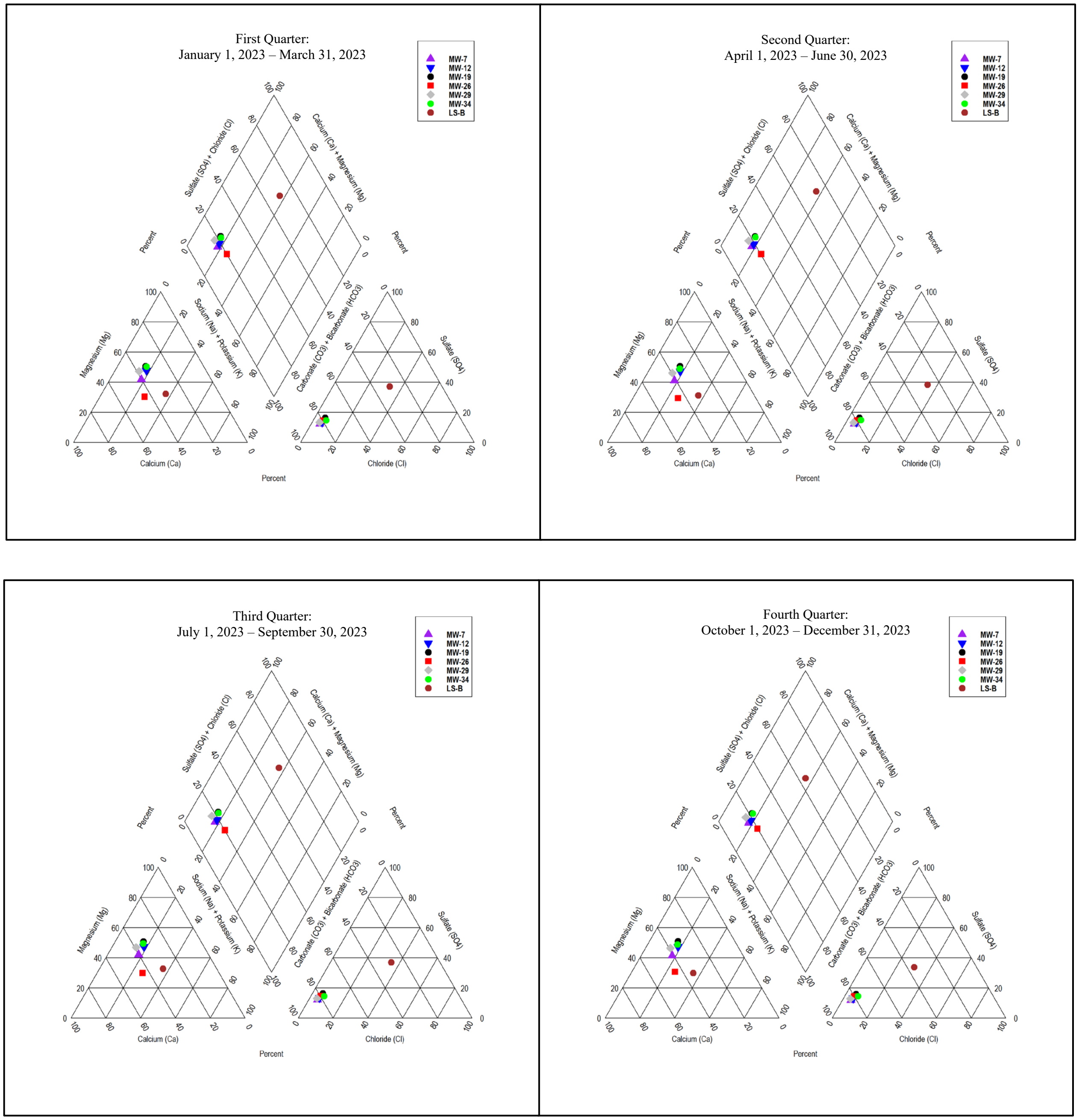


Table D-4
Unit D Aquifer: Ion Balance Summary for Groundwater
January 1, 2023 - March 31, 2023

		Well #	MW-7			MW-12			MW-19		
		Sample Date	2/13/2023			2/13/2023			2/14/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.74			7.20			7.52		
Conductance	--		160.20			145.50			184.30		
TDS	--		127.0			107.0			134.0		
Calcium	40.1	2	15.60	0.7784	39.62	11.40	0.5689	34.29	14.90	0.7435	32.88
Magnesium	24.3	2	9.86	0.8114	41.30	9.65	0.7941	47.87	13.80	1.14	50.22
Potassium	39.1	1	2.71	0.0693	3.53	1.80	0.0460	2.78	2.42	0.0619	2.74
Sodium	23.0	1	6.44	0.2801	14.26	5.74	0.2497	15.05	6.85	0.2980	13.18
Iron	55.8	2	0.0181	0.0006	0.0330	0.0050	0.0002	0.0108	0.0520	0.0019	0.0824
Manganese	54.9	2	0.1890	0.0069	0.3502	0.0001	0.0000	0.0001	0.4950	0.0180	0.7969
Ammonia-N	14.0	1	0.2490	0.0178	0.9048	0.0010	0.0001	0.0043	0.0318	0.0023	0.1004
Total Cations (meq/L)				**1.96**			**1.66**			**2.26**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		79.0			63.70			85.50		
Carbonate	60.0	2	0.2597	0.0087	0.4528	0.0606	0.0020	0.1245	0.1697	0.0057	0.2564
Bicarbonate	61.0	1	95.85	1.57	82.19	77.59	1.27	78.39	103.96	1.70	77.23
Chloride	35.5	1	3.41	0.0962	5.03	3.17	0.0894	5.51	4.68	0.1320	5.98
Nitrate-N	14.0	1	0.0050	0.0004	0.0187	0.6550	0.0468	2.88	0.0050	0.0004	0.0162
Sulfate	96.1	2	11.30	0.2353	12.31	10.20	0.2124	13.09	17.50	0.3644	16.51
Total Anions (meq/L)				**1.91**			**1.62**			**2.21**	
Total Ions (meq/L)				**3.88**			**3.28**			**4.47**	
Cation/Anion Ratio				**1.03**			**1.02**			**1.02**	
Percent Difference				**1.37**			**1.12**			**1.23**	

Table D-4 (continued)

Unit D Aquifer: Ion Balance Summary for Groundwater

January 1, 2023 - March 31, 2023

		Well #	MW-26			MW-29			MW-34		
		Sample Date	2/14/2023			2/14/2023			2/14/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.93			7.58			6.85		
Conductance	--		173.40			210.50			177.40		
TDS	--		136.0			149.0			125.0		
Calcium	40.1	2	17.50	0.8733	43.47	19.40	0.9681	38.32	13.20	0.6587	32.79
Magnesium	24.3	2	7.33	0.6032	30.02	14.40	1.18	46.91	12.30	1.01	50.39
Potassium	39.1	1	3.09	0.0790	3.93	2.14	0.0547	2.17	1.48	0.0379	1.88
Sodium	23.0	1	9.88	0.4298	21.39	6.78	0.2949	11.67	6.89	0.2997	14.92
Iron	55.8	2	0.1020	0.0037	0.1818	0.5630	0.0202	0.7980	0.0050	0.0002	0.0089
Manganese	54.9	2	0.0618	0.0022	0.1120	0.0902	0.0033	0.1300	0.0001	0.0000	0.0001
Ammonia-N	14.0	1	0.2510	0.0179	0.8919	0.0021	0.0001	0.0059	0.0010	0.0001	0.0036
Total Cations (meq/L)				**2.01**			**2.53**			**2.01**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		77.90			100.0			70.30		
Carbonate	60.0	2	0.3954	0.0132	0.6754	0.2278	0.0076	0.3125	0.0299	0.0010	0.0510
Bicarbonate	61.0	1	94.23	1.54	79.16	121.54	1.99	81.99	85.71	1.40	71.86
Chloride	35.5	1	3.80	0.1072	5.49	3.64	0.1027	4.23	4.75	0.1340	6.86
Nitrate-N	14.0	1	0.0150	0.0011	0.0549	0.0050	0.0004	0.0147	2.08	0.1485	7.60
Sulfate	96.1	2	13.70	0.2852	14.62	15.70	0.3269	13.45	12.80	0.2665	13.63
Total Anions (meq/L)				**1.95**			**2.43**			**1.95**	
Total Ions (meq/L)				**3.96**			**4.96**			**3.96**	
Cation/Anion Ratio				**1.03**			**1.04**			**1.03**	
Percent Difference				**1.46**			**1.95**			**1.36**	

Table D-4 (continued)
Unit D Aquifer: Ion Balance Summary for Groundwater
April 1, 2023 - June 30, 2023

		Well #	MW-7			MW-12			MW-19		
		Sample Date	5/1/2023			5/1/2023			5/2/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.60			6.92			7.45		
Conductance	--		172.40			147.70			198.30		
TDS	--		135.0			115.0			140.0		
Calcium	40.1	2	17.10	0.8533	40.76	12.20	0.6088	34.53	15.90	0.7934	32.64
Magnesium	24.3	2	10.40	0.8558	40.88	10.10	0.8311	47.14	14.80	1.22	50.11
Potassium	39.1	1	3.08	0.0788	3.76	2.06	0.0527	2.99	2.71	0.0693	2.85
Sodium	23.0	1	6.80	0.2958	14.13	6.21	0.2701	15.32	7.49	0.3258	13.41
Iron	55.8	2	0.0215	0.0008	0.0368	0.0050	0.0002	0.0102	0.0787	0.0028	0.1160
Manganese	54.9	2	0.1810	0.0066	0.3147	0.0007	0.0000	0.0014	0.5200	0.0189	0.7788
Ammonia-N	14.0	1	0.0347	0.0025	0.1183	0.0010	0.0001	0.0040	0.0324	0.0023	0.0952
Total Cations (meq/L)				**2.09**			**1.76**			**2.43**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		79.60			64.10			86.30		
Carbonate	60.0	2	0.1898	0.0063	0.3275	0.0320	0.0011	0.0653	0.1459	0.0049	0.2178
Bicarbonate	61.0	1	96.73	1.59	82.06	78.14	1.28	78.34	104.99	1.72	77.10
Chloride	35.5	1	3.56	0.1004	5.20	3.28	0.0925	5.66	4.87	0.1374	6.16
Nitrate-N	14.0	1	0.0050	0.0004	0.0185	0.6460	0.0461	2.82	0.0050	0.0004	0.0160
Sulfate	96.1	2	11.50	0.2394	12.39	10.30	0.2144	13.12	17.70	0.3685	16.51
Total Anions (meq/L)				**1.93**			**1.63**			**2.23**	
Total Ions (meq/L)				**4.03**			**3.40**			**4.66**	
Cation/Anion Ratio				**1.08**			**1.08**			**1.09**	
Percent Difference				**4.02**			**3.77**			**4.26**	

Table D-4 (continued)
Unit D Aquifer: Ion Balance Summary for Groundwater
April 1, 2023 - June 30, 2023

Well #			MW-26			MW-29			MW-34		
Sample Date			5/2/2023			5/2/2023			5/2/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		8.08			7.22			6.53		
Conductance	--		173.60			211.30			180.10		
TDS	--		141.0			147.0			131.0		
Calcium	40.1	2	18.50	0.9232	44.52	20.10	1.0	39.15	15.0	0.7485	34.01
Magnesium	24.3	2	7.39	0.6081	29.33	14.20	1.17	45.61	13.10	1.08	48.99
Potassium	39.1	1	3.38	0.0865	4.17	2.33	0.0596	2.33	1.76	0.0450	2.05
Sodium	23.0	1	10.30	0.4481	21.61	6.92	0.3010	11.75	7.56	0.3289	14.94
Iron	55.8	2	0.1030	0.0037	0.1779	0.7300	0.0261	1.02	0.0050	0.0002	0.0081
Manganese	54.9	2	0.0588	0.0021	0.1032	0.1020	0.0037	0.1449	0.0001	0.0000	0.0001
Ammonia-N	14.0	1	0.0267	0.0019	0.0919	0.0029	0.0002	0.0081	0.0010	0.0001	0.0032
Total Cations (meq/L)				**2.07**			**2.56**			**2.20**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		78.20			101.0			70.80		
Carbonate	60.0	2	0.5587	0.0186	0.9471	0.1006	0.0034	0.1369	0.0144	0.0005	0.0242
Bicarbonate	61.0	1	94.27	1.55	78.58	123.02	2.02	82.31	86.35	1.42	71.21
Chloride	35.5	1	3.94	0.1111	5.65	3.79	0.1069	4.36	5.06	0.1427	7.18
Nitrate-N	14.0	1	0.0280	0.0020	0.1017	0.0050	0.0004	0.0146	2.19	0.1563	7.87
Sulfate	96.1	2	13.90	0.2894	14.72	15.50	0.3227	13.17	13.10	0.2727	13.72
Total Anions (meq/L)				**1.97**			**2.45**			**1.99**	
Total Ions (meq/L)				**4.04**			**5.01**			**4.19**	
Cation/Anion Ratio				**1.05**			**1.05**			**1.11**	
Percent Difference				**2.66**			**2.25**			**5.09**	

Table D-4 (continued)
Unit D Aquifer: Ion Balance Summary for Groundwater
July 1, 2023 - September 30, 2023

Well #			MW-7			MW-12			MW-19		
Sample Date			8/8/2023			8/7/2023			8/7/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.55			6.92			7.24		
Conductance	--		174.90			150.40			200.80		
TDS	--		132.00			111.00			137.00		
Calcium	40.1	2	16.10	0.8034	39.74	11.80	0.5888	34.56	15.50	0.7735	32.69
Magnesium	24.3	2	10.20	0.8394	41.52	9.80	0.8064	47.33	14.50	1.19	50.43
Potassium	39.1	1	2.77	0.0709	3.51	1.90	0.0486	2.85	2.55	0.0652	2.76
Sodium	23.0	1	6.48	0.2819	13.94	5.97	0.2597	15.24	7.20	0.3132	13.24
Iron	55.8	2	0.0221	0.0008	0.0392	0.0050	0.0002	0.0105	0.0389	0.0014	0.0589
Manganese	54.9	2	0.1520	0.0055	0.2737	0.0001	0.0000	0.0003	0.4750	0.0173	0.7308
Ammonia-N	14.0	1	0.2750	0.0196	0.9712	0.0010	0.0001	0.0042	0.0318	0.0023	0.0959
Total Cations (meq/L)				**2.02**			**1.70**			**2.37**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		79.50			64.50			86.40		
Carbonate	60.0	2	0.1690	0.0056	0.2931	0.0322	0.0011	0.0656	0.0901	0.0030	0.1349
Bicarbonate	61.0	1	96.65	1.58	82.41	78.62	1.29	78.68	105.22	1.72	77.41
Chloride	35.5	1	3.43	0.0968	5.03	3.17	0.0894	5.46	4.81	0.1357	6.09
Nitrate-N	14.0	1	0.0050	0.0004	0.0186	0.6190	0.0442	2.70	0.0050	0.0004	0.0160
Sulfate	96.1	2	11.30	0.2353	12.24	10.30	0.2144	13.09	17.50	0.3644	16.35
Total Anions (meq/L)				**1.92**			**1.64**			**2.23**	
Total Ions (meq/L)				**3.94**			**3.34**			**4.59**	
Cation/Anion Ratio				**1.05**			**1.04**			**1.06**	
Percent Difference				**2.52**			**1.98**			**3.00**	

Table D-4 (continued)
Unit D Aquifer: Ion Balance Summary for Groundwater
July 1, 2023 - September 30, 2023

		Well #	MW-26			MW-29			MW-34		
		Sample Date	8/8/2023			8/8/2023			8/7/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.74			7.03			6.33		
Conductance	--		179.00			217.50			183.70		
TDS	--		137.00			149.00			126.00		
Calcium	40.1	2	17.80	0.8882	43.45	20.10	1.00	38.69	13.80	0.6886	33.90
Magnesium	24.3	2	7.31	0.6015	29.43	14.60	1.20	46.35	12.20	1.00	49.43
Potassium	39.1	1	3.07	0.0785	3.84	2.18	0.0558	2.15	1.58	0.0404	1.99
Sodium	23.0	1	10.30	0.4481	21.92	6.87	0.2988	11.53	6.85	0.2980	14.67
Iron	55.8	2	0.1810	0.0065	0.3171	0.8250	0.0295	1.14	0.0050	0.0002	0.0088
Manganese	54.9	2	0.0635	0.0023	0.1131	0.1020	0.0037	0.1432	0.0001	0.0000	0.0001
Ammonia-N	14.0	1	0.2660	0.0190	0.9290	0.0010	0.0001	0.0028	0.0010	0.0001	0.0035
	Total Cations (meq/L)			**2.04**			**2.59**			**2.03**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		78.50			100.00			70.00		
Carbonate	60.0	2	0.2580	0.0086	0.4364	0.0644	0.0021	0.0885	0.0090	0.0003	0.0153
Bicarbonate	61.0	1	95.25	1.56	79.21	121.87	2.00	82.43	85.38	1.40	71.40
Chloride	35.5	1	3.85	0.1086	5.51	3.71	0.1047	4.32	4.92	0.1388	7.08
Nitrate-N	14.0	1	0.0140	0.0010	0.0507	0.0050	0.0004	0.0147	2.23	0.1592	8.12
Sulfate	96.1	2	14.00	0.2915	14.79	15.30	0.3185	13.15	12.60	0.2623	13.38
	Total Anions (meq/L)			**1.97**			**2.42**			**1.96**	
	Total Ions (meq/L)			**4.01**			**5.02**			**3.99**	
	Cation/Anion Ratio			**1.04**			**1.07**			**1.04**	
	Percent Difference			**1.83**			**3.37**			**1.78**	

Table D-4 (continued)
Unit D Aquifer: Ion Balance Summary for Groundwater
October 1, 2023 - December 31, 2023

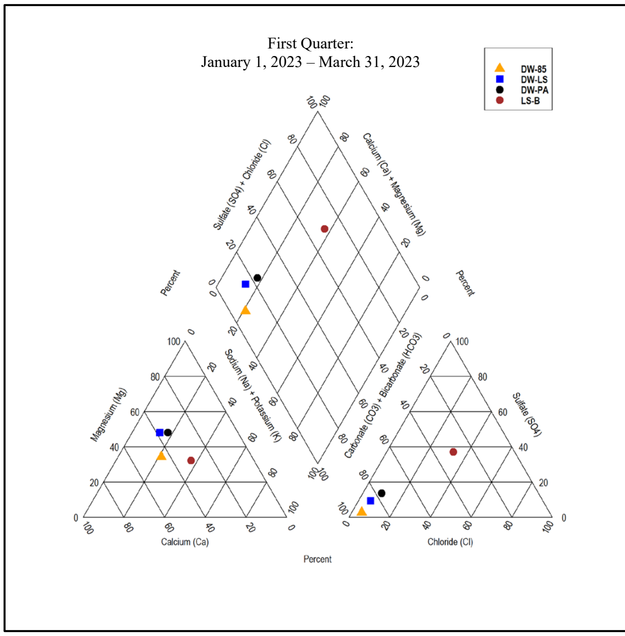
		Well #	MW-7			MW-12			MW-19		
		Sample Date	11/13/2023			11/2/2023			11/13/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.73			6.93			7.13		
Conductance	--		178.80			153.50			206.20		
TDS	--		127.00			107.00			131.00		
Calcium	40.1	2	16.60	0.8283	40.14	11.40	0.5689	34.43	15.90	0.7934	32.44
Magnesium	24.3	2	10.20	0.8394	40.67	9.50	0.7818	47.32	15.00	1.23	50.47
Potassium	39.1	1	2.88	0.0737	3.57	1.83	0.0468	2.83	2.60	0.0665	2.72
Sodium	23.0	1	6.58	0.2862	13.87	5.85	0.2545	15.40	7.58	0.3297	13.48
Iron	55.8	2	0.0782	0.0028	0.1357	0.0050	0.0002	0.0108	0.0624	0.0022	0.0914
Manganese	54.9	2	0.1810	0.0066	0.3192	0.0001	0.0000	0.0003	0.4640	0.0169	0.6906
Ammonia-N	14.0	1	0.3750	0.0268	1.30	0.0010	0.0001	0.0043	0.0336	0.0024	0.0981
Total Cations (meq/L)				**2.06**			**1.65**			**2.45**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		79.70			64.10			86.40		
Carbonate	60.0	2	0.2560	0.0085	0.4457	0.0328	0.0011	0.0673	0.0700	0.0023	0.1056
Bicarbonate	61.0	1	96.71	1.59	82.79	78.14	1.28	78.83	105.27	1.73	78.07
Chloride	35.5	1	3.32	0.0937	4.89	3.10	0.0875	5.38	4.61	0.1300	5.88
Nitrate-N	14.0	1	0.0050	0.0004	0.0186	0.6640	0.0474	2.92	0.0050	0.0004	0.0162
Sulfate	96.1	2	10.90	0.2269	11.85	9.99	0.2080	12.80	16.90	0.3519	15.92
Total Anions (meq/L)				**1.91**			**1.62**			**2.21**	
Total Ions (meq/L)				**3.98**			**3.28**			**4.66**	
Cation/Anion Ratio				**1.08**			**1.02**			**1.11**	
Percent Difference				**3.75**			**0.8417**			**5.06**	

Table D-4 (continued)
Unit D Aquifer: Ion Balance Summary for Groundwater
October 1, 2023 - December 31, 2023

		Well #	MW-26			MW-29			MW-34		
		Sample Date	11/13/2023			11/13/2023			11/2/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.88			7.44			6.69		
Conductance	--		181.00			219.20			185.10		
TDS	--		135.00			139.00			125.00		
Calcium	40.1	2	18.40	0.9182	43.95	20.90	1.04	38.83	13.60	0.6786	34.10
Magnesium	24.3	2	7.73	0.6361	30.45	15.00	1.23	45.96	11.80	0.9710	48.80
Potassium	39.1	1	3.24	0.0829	3.97	2.30	0.0588	2.19	1.56	0.0399	2.01
Sodium	23.0	1	9.83	0.4276	20.47	7.36	0.3202	11.92	6.90	0.3002	15.08
Iron	55.8	2	0.0687	0.0025	0.1177	0.7240	0.0259	0.9653	0.0050	0.0002	0.0090
Manganese	54.9	2	0.0638	0.0023	0.1112	0.0960	0.0035	0.1301	0.0001	0.0000	0.0001
Ammonia-N	14.0	1	0.2770	0.0198	0.9465	0.0032	0.0002	0.0085	0.0010	0.0001	0.0036
Total Cations (meq/L)				**2.09**			**2.69**			**1.99**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		77.90			101.00			68.90		
Carbonate	60.0	2	0.3527	0.0118	0.6037	0.1668	0.0056	0.2285	0.0203	0.0007	0.0350
Bicarbonate	61.0	1	94.32	1.55	79.39	122.88	2.01	82.76	84.02	1.38	71.35
Chloride	35.5	1	3.73	0.1052	5.40	3.59	0.1013	4.16	4.86	0.1371	7.10
Nitrate-N	14.0	1	0.0170	0.0012	0.0623	0.0050	0.0004	0.0147	2.20	0.1571	8.14
Sulfate	96.1	2	13.60	0.2832	14.54	15.00	0.3123	12.83	12.40	0.2582	13.38
Total Anions (meq/L)				**1.95**			**2.43**			**1.93**	
Total Ions (meq/L)				**4.04**			**5.12**			**3.92**	
Cation/Anion Ratio				**1.07**			**1.10**			**1.03**	
Percent Difference				**3.52**			**4.93**			**1.53**	

Figure D-5. Private Wells Trilinear Diagrams

January 1, 2023- December 31, 2023



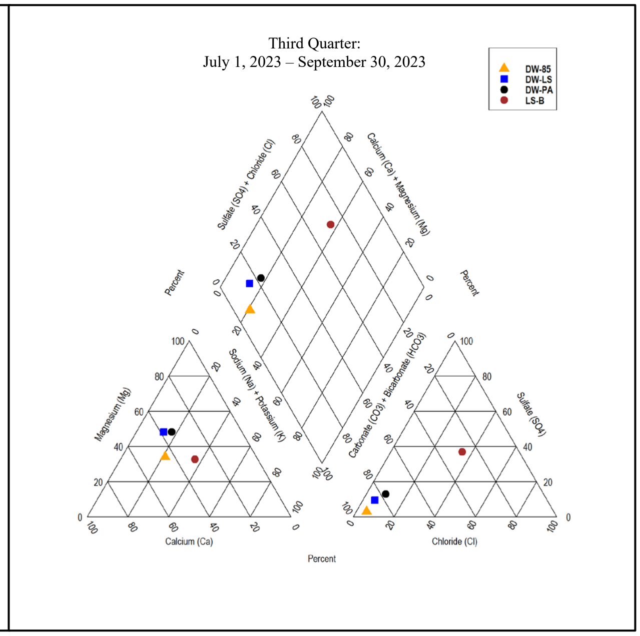


Table D-5
Private Wells: Ion Balance Summary for Groundwater
January 1, 2023 - March 31, 2023

Well #			DW-85			DW-LS			DW-PA		
Sample Date			2/7/2022			2/7/2022			2/7/2022		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.62			7.0			6.90		
Conductance	--		135.20			248.80			164.80		
TDS	--		88.0			156.0			103.0		
Calcium	40.1	2	14.50	0.7236	44.74	23.30	1.16	38.98	13.40	0.6687	35.09
Magnesium	24.3	2	6.60	0.5431	33.58	17.40	1.43	48.0	11.10	0.9134	47.94
Potassium	39.1	1	2.68	0.0686	4.24	1.79	0.0458	1.53	1.64	0.0420	2.20
Sodium	23.0	1	5.92	0.2575	15.92	7.87	0.3423	11.48	6.46	0.2810	14.75
Iron	55.8	2	0.0654	0.0023	0.1448	0.0050	0.0002	0.0060	0.0050	0.0002	0.0094
Manganese	54.9	2	0.0529	0.0019	0.1191	0.0026	0.0001	0.0032	0.0007	0.0000	0.0013
Ammonia-N	14.0	1	0.2820	0.0201	1.24	0.0010	0.0001	0.0024	0.0010	0.0001	0.0037
Total Cations (meq/L)				**1.62**			**2.98**			**1.91**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		68.90			113.0			67.60		
Carbonate	60.0	2	0.1720	0.0057	0.3851	0.0679	0.0023	0.0800	0.0323	0.0011	0.0604
Bicarbonate	61.0	1	83.71	1.37	92.16	137.72	2.26	79.81	82.41	1.35	75.81
Chloride	35.5	1	2.55	0.0719	4.83	6.63	0.1870	6.61	5.23	0.1475	8.28
Nitrate-N	14.0	1	0.0050	0.0004	0.0240	2.17	0.1549	5.48	0.8050	0.0575	3.23
Sulfate	96.1	2	1.86	0.0387	2.60	10.90	0.2269	8.02	10.80	0.2249	12.62
Total Anions (meq/L)				**1.49**			**2.83**			**1.78**	
Total Ions (meq/L)				**3.11**			**5.81**			**3.69**	
Cation/Anion Ratio				**1.09**			**1.05**			**1.07**	
Percent Difference				**4.13**			**2.66**			**3.36**	

Table D-5 (continued)
Private Wells: Ion Balance Summary for Groundwater
July 1, 2023 - September 30, 2023

		Well #	DW-85			DW-LS			DW-PA		
		Sample Date	8/9/2023			8/9/2023			8/9/2023		
Cation Parameters	Molecular Weight (g/mol)	n	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)	mg/L	meq/L	% (meq)
pH	--		7.77			6.62			6.90		
Conductance	--		140.40			257.10			171.40		
TDS	--		99.30			164.00			115.00		
Calcium	40.1	2	14.30	0.7136	44.10	23.10	1.15	38.39	13.40	0.6687	34.40
Magnesium	24.3	2	6.59	0.5423	33.51	17.60	1.45	48.23	11.40	0.9381	48.26
Potassium	39.1	1	2.50	0.0640	3.95	1.69	0.0432	1.44	1.54	0.0394	2.03
Sodium	23.0	1	6.26	0.2723	16.83	8.24	0.3584	11.94	6.84	0.2975	15.31
Iron	55.8	2	0.0650	0.0023	0.1439	0.0050	0.0002	0.0060	0.0050	0.0002	0.0092
Manganese	54.9	2	0.0552	0.0020	0.1242	0.0003	0.0000	0.0003	0.0001	0.0000	0.0003
Ammonia-N	14.0	1	0.3030	0.0216	1.34	0.0010	0.0001	0.0024	0.0010	0.0001	0.0037
Total Cations (meq/L)				**1.62**			**3.00**			**1.94**	
Anion Parameters	Molecular Weight (g/mol)	n									
Alkalinity, Total	--		70.60			116.00			69.20		
Carbonate	60.0	2	0.2486	0.0083	0.5388	0.0291	0.0010	0.0337	0.0330	0.0011	0.0594
Bicarbonate	61.0	1	85.63	1.40	91.28	141.46	2.32	80.59	84.36	1.38	74.56
Chloride	35.5	1	2.77	0.0781	5.08	5.68	0.1602	5.57	5.99	0.1690	9.11
Nitrate-N	14.0	1	0.0050	0.0004	0.0232	1.86	0.1328	4.62	0.9590	0.0685	3.69
Sulfate	96.1	2	2.27	0.0473	3.07	12.70	0.2644	9.19	11.20	0.2332	12.58
Total Anions (meq/L)				**1.54**			**2.88**			**1.85**	
Total Ions (meq/L)				**3.16**			**5.88**			**3.80**	
Cation/Anion Ratio				**1.05**			**1.04**			**1.05**	
Percent Difference				**2.56**			**2.14**			**2.36**	

Appendix E

Standards and 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	0.05	ug/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	10	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	50	ug/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 01/12/1994. Revised 3/15/2023

Prediction Limit Transformations for 2023

	Unit	Prediction Limits for MW-20			Prediction Limits for MW-7			Prediction Limits for MW-12			Prediction Limits for MW-19			Prediction Limits for MW-26			Prediction Limits for MW-29			Prediction Limits for MW-34		
		Transformation Used	Lower Prediction Limit	Upper Prediction Limit	Transformation Used	Lower Prediction Limit	Upper Prediction Limit	Transformation Used	Lower Prediction Limit	Upper Prediction Limit	Transformation Used	Lower Prediction Limit	Upper Prediction Limit	Transformation Used	Lower Prediction Limit	Upper Prediction Limit	Transformation Used	Lower Prediction Limit	Upper Prediction Limit	Transformation Used	Lower Prediction Limit	Upper Prediction Limit
pH (Field)	(std. Units)	Normal	6.62	8.49	Squared Transform	6.99	8.15	Normal	6.74	7.84	cubed Transform	6.98	7.88	Not Normal	7.07	9.20	Not Normal	6.65	7.68	Normal	6.38	7.43
Conductance (Field)	(µmhos/cm)	Log Transform		258.8	Not Normal		194.2	Not Normal		170.8	Not Normal		230.0	Not Normal		200.0	Not Normal		265.0	Not Normal		210
Alkalinity, Total ($CaCO_3$)	(mg/L)	Not Normal		94.9	Not Normal		80	Normal		67.51	Not Normal		108.0	Not Normal		85.3	Normal		106	Not Normal		80.2
Ammonia	(mg/L)	Not Normal		0.0	Normal		0.30	<=50% Detected		0.036	Not Normal		0.093	cubed Transform		0.30	<=50% Detected		0.01	<=50% Detected		0.059
Chloride	(mg/L)	Not Normal		4.09	Not Normal		3.93	Not Normal		4.07	Not Normal		37.6	Not Normal		9.11	Not Normal		17.4	Normal		5.42
Nitrate (NO3 as N)	(mg/L)	<=50% Detected		0.039	<=50% Detected		0.13	Normal		0.82	<=50% Detected		0.05	Not Normal		0.23	Not Detected		0.010	Normal		2.76
Sulfate	(mg/L)	Squared Transform		18.41	Normal		11.82	Normal		11.43	Normal		18.74	cubed Transform		14.4	Not Normal		33.20	Normal		14.45
Total Dissolved Solids	(mg/L)	Normal		157.23	Not Normal		137.00	Squared Transform		128	Normal		167.0	Log Transform		160	Normal		168.8	Squared Transform		151.91
Total Organic Carbon	(mg/L)	<=50% Detected		2.33	<=50% Detected		1.83	<=50% Detected		1.2	<=50% Detected		18.4	<=50% Detected		1.6	<=50% Detected		2.43	<=50% Detected		1
Total Solids	(mg/L)	Not Normal		286	cubed Transform		147.47	Log Transform		141	Not Normal		221.0	Log Transform		192.8	Not Normal		207	Not Normal		183.00
Total Suspended Solids	(mg/L)	Not Normal		8.6	<=50% Detected		16.0	<=50% Detected		12.6	<=50% Detected		12.6	Not Normal		117	Not Normal		30.2	<=50% Detected		41.7
Antimony, Total	(mg/L)	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001
Arsenic, Total	(mg/L)	Log Transform		0.00421	Not Normal		0.0073	Normal		0.00228	Log Transform		0.00204	Not Normal		0.0108	Log Transform		0.02072	Not Normal		0.002
Barium, Total	(mg/L)	Not Normal		0.0384	Not Normal		0.02650	Not Normal		0.0101	Not Normal		0.0233	Not Normal		0.0636	Not Normal		0.0189	Not Normal		0.010
Beryllium, Total	(mg/L)	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001
Cadmium, Total	(mg/L)	Not Detected		0.002	Not Detected		0.002	Not Detected		0.002	<=50% Detected		0.002	<=50% Detected		0.002	Not Detected		0.002	Not Detected		0.002
Calcium, Total	(mg/L)	Normal		15.01	Not Normal		16.8	Squared Transform		13.2649	Normal		16.8	fifthpower Transform		19.33	Normal		22.45	cubed Transform		15.01
Chromium, Total	(mg/L)	<=50% Detected		0.0111	<=50% Detected		0.005	Not Normal		0.004	<=50% Detected		0.005	Not Normal		0.012	<=50% Detected		0.005	Not Normal		0.00316
Cobalt, Total	(mg/L)	<=50% Detected		0.003	<=50% Detected		0.003	Not Detected		0.003	<=50% Detected		0.003	Not Normal		0.00379	<=50% Detected		0.003	<=50% Detected		0.003
Copper, Total	(mg/L)	<=50% Detected		0.0114	<=50% Detected		0.002	<=50% Detected		0.00476	<=50% Detected		0.002	Not Normal		0.0202	<=50% Detected		0.00279	<=50% Detected		0.002
Iron, Dissolved	(mg/L)	Not Normal		0.39	Not Normal		0.0427	Special Case		0.01	Not Normal		0.191	Normal		0.2	Normal		0.94	Not Detected		0.01
Lead, Total	(mg/L)	<=50% Detected		0.00188	<=50% Detected		0.001	Not Detected		0.001	<=50% Detected		0.001	<=50% Detected		0.00513	Not Detected		0.001	<=50% Detected		0.001
Magnesium, Total	(mg/L)	Normal		16.35	cubed Transform		11.24	Normal		11.07	Normal		16.17	Log Transform		9.09	Normal		16.21	Normal		13.44
Manganese, Dissovled	(mg/L)	Not Normal		0.55	Not Normal		0.255	<=50% Detected		0.002	Not Normal		1.350	Log Transform		0.0798	Log Transform		0.112964842	Not Normal		0.016
Mercury, Total	(mg/L)	Not Detected		0.0001	Not Detected		0.0001	Not Detected		0.0001	Not Detected		0.0001	Not Detected		0.0001	Not Detected		0.0001	Not Detected		0.0001
Nickel, Total	(mg/L)	Not Normal		0.0119	Not Normal		0.01	Not Normal		0.01	<=50% Detected		0.01	Not Normal		0.0179	Not Normal		0.01	Not Normal		0.005
Potassium, Total	(mg/L)	Normal		2.49	fourthpower Transform		2.97	Normal		2.05	Log Transform		2.76	Normal		3.41	Normal		2.41	Normal		1.76
Selenium, Total	(mg/L)	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001
Silver, Total	(mg/L)	Not Detected		0.003	Not Detected		0.003	<=50% Detected		0.003	Not Detected		0.003	Not Detected		0.003	Not Detected		0.003	Not Detected		0.003
Sodium, Total	(mg/L)	Normal		7.38	Normal		7.11	Normal		6.84	Normal		7.85	Normal		10.59	Squared Transform		7.37	Normal		7.54
Thallium, Total	(mg/L)	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001	Not Detected		0.001
Vanadium, Total	(mg/L)	Not Normal		0.00767	Not Normal		0.001	Not Normal		0.00651	<=50% Detected		0.002	Not Normal		0.0142	Not Normal		0.00313	Not Normal		0.0047
Zinc, Dissolved	(mg/L)	<=50% Detected		0.004	<=50% Detected		0.00400	<=50% Detected		0.004	<=50% Detected		0.004	<=50% Detected		0.00481	<=50% Detected		0.004	Not Normal		0.00217
Vinyl Chloride	(ug/L)	Not Detected		0.02	Not Detected		0.02	Not Detected		0.02	<=50% Detected		0.02	Not Detected		0.02	Not Detected		0.02	Not Detected		0.02

Appendix F

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 F-1
Channel Cc1: Summary of groundwater quality criteria exceedances
January 01, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded
pH, Field	pH units	MW-3	02/13/2023	5.59	MCL2; SGWC2	< 6.5
		MW-3	05/01/2023	5.17		
Arsenic, Total	ug/L	MW-3	02/13/2023	0.091	SGWC1	0.05
		MW-3	05/01/2023	0.058		
		MW-10	02/13/2023	1.59		
		MW-10	05/01/2023	1.65		
		MW-10	08/07/2023	1.68		
		MW-10	11/02/2023	1.61		
		MW-13	02/13/2023	2.13		
		MW-13	05/02/2023	1.92		
		MW-13	08/08/2023	1.94		
		MW-13	11/13/2023	2.03		

MCL2 = National Secondary Drinking Water Regulation Maximum Contaminant Level

SGWC1 = Washington State Primary Groundwater Quality Criteria

SGWC2 = Washington State Secondary Groundwater Quality Criteria

Natural background for arsenic in the Puget Sound Basin is 0.008 mg/L (Ecology, 2022)

See Appendix E for Data Qualifier Information and Unit Definitions

Table F-2
Channel Cc2: Summary of groundwater quality criteria exceedances
January 01, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded
pH, Field	pH units	MW-21	05/04/2023	6.43	MCL2; SGWC2	< 6.5
		MW-21	08/10/2023	6.34		
Arsenic, Total	ug/L	MW-2	02/21/2023	0.868	SGWC1	0.05
		MW-2	05/04/2023	0.860		
		MW-2	08/10/2023	0.947		
		MW-2	11/14/2023	0.885		
		MW-9	02/14/2023	2.24		
		MW-9	05/02/2023	2.38		
		MW-9	08/07/2023	2.31		
		MW-9	11/02/2023	2.18		
		MW-20	02/21/2023	2.08		
		MW-20	05/04/2023	2.03		
		MW-20	08/10/2023	2.11		
		MW-20	11/14/2023	1.93		
		MW-21	02/21/2023	1.32		
		MW-21	05/04/2023	1.04		
		MW-21	08/10/2023	1.11		
		MW-21	11/14/2023	1.07		
		MW-33	02/21/2023	37.90	MCL1; SGWC1	10[1]; 0.05
		MW-33	05/04/2023	34.50		
		MW-33	08/10/2023	36.10		
		MW-33	11/14/2023	38.50		
		MW-35	02/21/2023	36.70		
		MW-35	05/04/2023	32.00		
		MW-35	08/10/2023	28.90		
		MW-35	11/14/2023	27.80		
		MW-37	02/21/2023	1.37	SGWC1	0.05
		MW-37	05/04/2023	1.14		
		MW-37	08/10/2023	1.14		
		MW-37	11/14/2023	1.09		
Iron, Total	mg/L	MW-21	11/14/2023	0.399	MCL2; SGWC2	0.3
		MW-33	02/21/2023	5.54		
		MW-33	05/04/2023	5.65		
		MW-33	08/10/2023	5.60		
		MW-33	11/14/2023	5.54		
		MW-35	02/21/2023	11.20		

Table F-2 (*continued*)
Channel Cc2: Summary of groundwater quality criteria exceedances
January 01, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded
Iron, Total	mg/L	MW-35	05/04/2023	11.90	MCL2; SGWC2	0.3
		MW-35	08/10/2023	11.20		
		MW-35	11/14/2023	9.41		
		MW-37	02/21/2023	0.387		
Manganese, Total	ug/L	MW-2	02/21/2023	66.40	MCL2; SGWC2	50[1]; 50
		MW-2	05/04/2023	64.90		
		MW-2	08/10/2023	110.00		
		MW-2	11/14/2023	105.00		
		MW-20	02/21/2023	150.00		
		MW-20	05/04/2023	131.00		
		MW-20	08/10/2023	141.00		
		MW-20	11/14/2023	140.00		
		MW-21	02/21/2023	168.00		
		MW-21	05/04/2023	157.00		
		MW-21	08/10/2023	267.00		
		MW-21	11/14/2023	447.00		
		MW-33	02/21/2023	970.00		
		MW-33	05/04/2023	847.00		
		MW-33	08/10/2023	887.00		
		MW-33	11/14/2023	904.00		
		MW-35	02/21/2023	2200.00 D		
		MW-35	05/04/2023	2050.00		
		MW-35	08/10/2023	1970.00		
		MW-35	11/14/2023	1920.00		
		MW-37	02/21/2023	86.90		
1,1-Dichloroethane	ug/L	MW-33	02/21/2023	1.24	SGWC1	1
		MW-33	05/04/2023	1.24		
		MW-33	08/10/2023	1.37		
		MW-33	11/14/2023	1.45		
1,2-Dichloropropane	ug/L	MW-33	02/21/2023	5.99	MCL1; SGWC1	5; 0.6
		MW-33	05/04/2023	5.60		
		MW-33	08/10/2023	6.31		
		MW-33	11/14/2023	6.25		

Table F-2 (*continued*)
Channel Cc2: Summary of groundwater quality criteria exceedances
January 01, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded
Bis(2-Chloroethyl)Ether	ug/L	MW-21	02/21/2023	0.540 JT	SGWC1	0.07
		MW-21	05/04/2023	0.273 JT		
		MW-33	02/21/2023	6.46		
		MW-33	05/04/2023	3.95		
		MW-33	08/10/2023	3.15		
		MW-33	11/14/2023	3.41		
		MW-35	02/21/2023	2.11		
		MW-35	05/04/2023	1.29		
		MW-35	08/10/2023	0.995		
		MW-35	11/14/2023	1.25		
Bis(2-Ethylhexyl)Phthalate	ug/L	MW-2	02/21/2023	45.50	MCL1; SGWC1	6
Vinyl Chloride	ug/L	MW-2	02/21/2023	0.021 D	SGWC1	0.02
		MW-2	08/10/2023	0.055 D		
		MW-2	11/14/2023	0.028 D		
		MW-21	02/21/2023	0.026 D		
		MW-21	05/04/2023	0.032 D		
		MW-21	08/10/2023	0.044 D		
		MW-21	11/14/2023	0.042 D		
		MW-33	02/21/2023	18.50 D	MCL1; SGWC1	2; 0.02
		MW-33	05/04/2023	19.80 D		
		MW-33	08/10/2023	23.70 D		
		MW-33	11/14/2023	18.00 D		
		MW-35	02/21/2023	3.29 D		
		MW-35	05/04/2023	3.25 D		
		MW-35	08/10/2023	4.62 D		
		MW-35	11/14/2023	3.65 D		

[1]MCL1 for arsenic is 0.010 mg/L. MCL2 for manganese is 0.05 mg/L. Converted standards to ug/L in the table.

MCL1 = National Primary Drinking Water Regulation Maximum Contaminant Level

MCL2 = National Secondary Drinking Water Regulation Maximum Contaminant Level

SGWC1 = Washington State Primary Groundwater Quality Criteria

SGWC2 = Washington State Secondary Groundwater Quality Criteria

Natural background for arsenic in the Puget Sound Basin is 0.008 mg/L (Ecology, 2022)

See Appendix E for Data Qualifier Information and Unit Definitions

Table F-3
Channel Cc3: Summary of groundwater quality criteria exceedances
January 01, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded
pH, Field	pH units	MW-8	02/13/2023	6.32	MCL2; SGWC2	< 6.5
		MW-8	05/01/2023	6.32		
		MW-8	08/07/2023	6.42		
Arsenic, Total	ug/L	MW-8	02/13/2023	0.525	SGWC1	0.05
		MW-8	05/01/2023	0.535		
		MW-8	08/07/2023	0.543		
		MW-8	11/02/2023	0.524		
		MW-36	02/14/2023	1.80		
		MW-36	05/01/2023	1.92		
		MW-36	08/10/2023	1.98		
		MW-36	11/13/2023	1.83		

MCL2 = National Secondary Drinking Water Regulation Maximum Contaminant Level

SGWC1 = Washington State Primary Groundwater Quality Criteria

SGWC2 = Washington State Secondary Groundwater Quality Criteria

Natural background for arsenic in the Puget Sound Basin is 0.008 mg/L (Ecology, 2022)

See Appendix E for Data Qualifier Information and Unit Definitions

Table F-4
Unit D Aquifer: Summary of groundwater quality criteria exceedances
January 01, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded
pH, Field	pH units	MW-34	08/07/2023	6.33	MCL2; SGWC2	< 6.5
Arsenic, Total	ug/L	MW-7	02/13/2023	4.73	SGWC1	0.05
		MW-7	05/01/2023	4.98		
		MW-7	08/08/2023	4.96		
		MW-7	11/13/2023	5.21		
		MW-12	02/13/2023	1.99		
		MW-12	05/01/2023	2.12		
		MW-12	08/07/2023	2.13		
		MW-12	11/02/2023	1.95		
		MW-19	02/14/2023	1.05		
		MW-19	05/02/2023	1.18		
		MW-19	08/07/2023	1.12		
		MW-19	11/13/2023	1.05		
		MW-26	02/14/2023	2.94		
		MW-26	05/02/2023	3.46		
		MW-26	08/08/2023	3.31		
		MW-26	11/13/2023	3.12		
		MW-29	02/14/2023	8.21		
		MW-29	05/02/2023	10.70	MCL1; SGWC1	10[1]; 0.05
		MW-29	08/08/2023	11.70		
		MW-29	11/13/2023	7.30	SGWC1	0.05
		MW-34	02/14/2023	1.23		
		MW-34	05/02/2023	1.31		
		MW-34	08/07/2023	1.33		
		MW-34	11/02/2023	1.24		
Iron, Total	mg/L	MW-19	05/02/2023	0.303	MCL2; SGWC2	0.3
		MW-26	05/02/2023	0.697		
		MW-26	08/08/2023	0.569		
		MW-29	02/14/2023	2.49		
		MW-29	05/02/2023	3.57		
		MW-29	08/08/2023	4.04		
		MW-29	11/13/2023	2.11		

Table F-4 (*continued*)
Unit D Aquifer: Summary of groundwater quality criteria exceedances
January 01, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded
Manganese, Total	ug/L	MW-7	02/13/2023	198.00	MCL2; SGWC2	50[1]; 50
		MW-7	05/01/2023	207.00		
		MW-7	08/08/2023	185.00		
		MW-7	11/13/2023	272.00		
		MW-19	02/14/2023	470.00		
		MW-19	05/02/2023	532.00		
		MW-19	08/07/2023	510.00 D		
		MW-19	11/13/2023	477.00		
		MW-26	02/14/2023	59.10		
		MW-26	05/02/2023	63.70		
		MW-26	08/08/2023	70.40		
		MW-26	11/13/2023	66.90		
		MW-29	02/14/2023	168.00		
		MW-29	05/02/2023	156.00		
		MW-29	08/08/2023	140.00		
		MW-29	11/13/2023	110.00		

[1]MCL1 for arsenic is 0.010 mg/L. MCL2 for manganese is 0.05 mg/L. Converted standards to ug/L in the table.

MCL1 = National Primary Drinking Water Regulation Maximum Contaminant Level

MCL2 = National Secondary Drinking Water Regulation Maximum Contaminant Level

SGWC1 = Washington State Primary Groundwater Quality Criteria

SGWC2 = Washington State Secondary Groundwater Quality Criteria

Natural background for arsenic in the Puget Sound Basin is 0.008 mg/L (Ecology, 2022)

See Appendix E for Data Qualifier Information and Unit Definitions

Table F-5

Channel Cc2: Summary of groundwater prediction limit exceedances

Interwell

January 1, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Prediction Limit (PL) Value
pH (Field)	std. pH Units	MW-2	8/10/2023	6.58	< 6.62
		MW-21	2/21/2023	6.59	
		MW-21	5/4/2023	6.43	
		MW-21	8/10/2023	6.34	
		MW-21	11/14/2023	6.57	
		MW-33	8/10/2023	6.53	
		MW-35	5/4/2023	6.50	
		MW-35	8/10/2023	6.54	
		MW-35	11/14/2023	6.53	
		MW-37	8/10/2023	6.60	
Specific Conductance (Field)	umhos/cm	MW-2	5/4/2023	271.90	258.81
		MW-2	8/10/2023	275.20	
		MW-2	11/14/2023	286.70	
		MW-21	8/10/2023	259.40	
		MW-21	11/14/2023	274.60	
		MW-33	2/21/2023	581.80	
		MW-33	5/4/2023	569.80	
		MW-33	8/10/2023	582.00	
		MW-33	11/14/2023	575.50	
		MW-35	2/21/2023	513.90	
		MW-35	5/4/2023	484.00	
		MW-35	8/10/2023	506.70	
		MW-35	11/14/2023	516.60	
Alkalinity	mg/L	MW-2	2/21/2023	140.00	94.90
		MW-2	5/4/2023	138.00	
		MW-2	8/10/2023	137.00	
		MW-2	11/14/2023	139.00	
		MW-21	2/21/2023	127.00	
		MW-21	5/4/2023	127.00	
		MW-21	8/10/2023	130.00	
		MW-21	11/14/2023	136.00	
		MW-33	2/21/2023	332.00	
		MW-33	5/4/2023	333.00	
		MW-33	8/10/2023	325.00	
		MW-33	11/14/2023	324.00	
		MW-35	2/21/2023	281.00	
		MW-35	5/4/2023	277.00	
		MW-35	8/10/2023	290.00	
		MW-35	11/14/2023	287.00	

See Data Qualifiers Section in Appendix E for Qualifier Information.

Table F-5 (*continued*)

Channel Cc2: Summary of groundwater prediction limit exceedances

Interwell

January 1, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Prediction Limit (PL) Value
Ammonia	mg/L	MW-33	2/21/2023	0.034	0.032
		MW-33	8/10/2023	0.034	
		MW-33	11/14/2023	0.037	
		MW-35	2/21/2023	0.065	
		MW-35	5/4/2023	0.064	
		MW-35	8/10/2023	0.067	
		MW-35	11/14/2023	0.069	
Chloride	mg/L	MW-9	2/14/2023	4.90	4.09
		MW-9	5/2/2023	5.16	
		MW-9	8/7/2023	5.06	
		MW-9	11/2/2023	4.83	
Nitrate	mg/L	MW-2	2/21/2023	0.708	0.039
		MW-2	5/4/2023	0.731	
		MW-2	8/10/2023	0.980	
		MW-2	11/14/2023	1.45	
		MW-9	2/14/2023	0.650	
		MW-9	5/2/2023	0.703	
		MW-9	8/7/2023	0.697	
		MW-9	11/2/2023	0.602	
		MW-21	2/21/2023	0.124	
		MW-21	5/4/2023	0.126	
		MW-21	8/10/2023	0.134	
		MW-21	11/14/2023	0.380	
		MW-37	2/21/2023	0.870	
		MW-37	5/4/2023	0.868	
		MW-37	8/10/2023	0.770	
		MW-37	11/14/2023	0.854	
Sulfate	mg/L	MW-35	2/21/2023	31.10	18.41
		MW-35	5/4/2023	30.30	
		MW-35	8/10/2023	24.90	
		MW-35	11/14/2023	26.20	

See Data Qualifiers Section in Appendix E for Qualifier Information.

Table F-5 (*continued*)

Channel Cc2: Summary of groundwater prediction limit exceedances

Interwell

January 1, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Prediction Limit (PL) Value
Total Dissolved Solids	mg/L	MW-2	2/21/2023	181.00	157.23
		MW-2	5/4/2023	176.00	
		MW-2	8/10/2023	179.00	
		MW-2	11/14/2023	179.00	
		MW-21	2/21/2023	171.00	
		MW-21	5/4/2023	171.00	
		MW-21	8/10/2023	169.00	
		MW-21	11/14/2023	171.00	
		MW-33	2/21/2023	387.00	
		MW-33	5/4/2023	369.00	
		MW-33	8/10/2023	355.00	
		MW-33	11/14/2023	355.00	
		MW-35	2/21/2023	352.00	
		MW-35	5/4/2023	355.00	
		MW-35	8/10/2023	360.00	
		MW-35	11/14/2023	350.00	
Total Organic Carbon	mg/L	MW-33	2/21/2023	3.02	2.33
		MW-33	5/4/2023	2.61	
		MW-33	8/10/2023	2.48	
		MW-35	2/21/2023	3.58	
		MW-35	5/4/2023	3.78	
		MW-35	8/10/2023	2.90	
		MW-35	11/14/2023	3.24	
Total Solids	mg/L	MW-33	2/21/2023	383.00	286.00
		MW-33	5/4/2023	382.00	
		MW-33	8/10/2023	400.00	
		MW-33	11/14/2023	368.00	
		MW-35	2/21/2023	408.00	
		MW-35	5/4/2023	413.00	
		MW-35	8/10/2023	416.00	
		MW-35	11/14/2023	392.00	
Total Suspended Solids	mg/L	MW-33	5/4/2023	10.20	8.60
		MW-35	2/21/2023	49.70	
		MW-35	5/4/2023	78.30	
		MW-35	8/10/2023	44.40	
		MW-35	11/14/2023	50.20	
		MW-37	2/21/2023	9.80	

See Data Qualifiers Section in Appendix E for Qualifier Information.

Table F-5 (*continued*)

Channel Cc2: Summary of groundwater prediction limit exceedances

Interwell

January 1, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Prediction Limit (PL) Value
Arsenic, Total	ug/L	MW-33	2/21/2023	37.90	4.21
		MW-33	5/4/2023	34.50	
		MW-33	8/10/2023	36.10	
		MW-33	11/14/2023	38.50	
		MW-35	2/21/2023	36.70	
		MW-35	5/4/2023	32.00	
		MW-35	8/10/2023	28.90	
		MW-35	11/14/2023	27.80	
Calcium, Total	mg/L	MW-2	2/21/2023	20.30	15.01
		MW-2	5/4/2023	21.50	
		MW-2	8/10/2023	21.30	
		MW-2	11/14/2023	21.70	
		MW-21	2/21/2023	18.90	
		MW-21	5/4/2023	19.90	
		MW-21	8/10/2023	19.90	
		MW-21	11/14/2023	20.50	
		MW-33	2/21/2023	54.00	
		MW-33	5/4/2023	57.00	
		MW-33	8/10/2023	57.70	
		MW-33	11/14/2023	55.20	
		MW-35	2/21/2023	49.90	
		MW-35	5/4/2023	49.90	
		MW-35	8/10/2023	50.30	
		MW-35	11/14/2023	49.70	
Iron, Dissolved	mg/L	MW-33	2/21/2023	5.61	0.386
		MW-33	5/4/2023	5.42 D	
		MW-33	8/10/2023	5.46	
		MW-33	11/14/2023	5.79	
		MW-35	2/21/2023	9.68	
		MW-35	5/4/2023	10.10 D	
		MW-35	8/10/2023	10.20	
		MW-35	11/14/2023	8.59	

See Data Qualifiers Section in Appendix E for Qualifier Information.

Table F-5 (*continued*)

Channel Cc2: Summary of groundwater prediction limit exceedances

Interwell

January 1, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Prediction Limit (PL) Value
Magnesium, Total	mg/L	MW-2	2/21/2023	21.30	16.35
		MW-2	5/4/2023	22.10	
		MW-2	8/10/2023	22.60	
		MW-2	11/14/2023	22.40	
		MW-21	2/21/2023	18.30	
		MW-21	5/4/2023	18.60	
		MW-21	8/10/2023	19.90	
		MW-21	11/14/2023	20.70	
		MW-33	2/21/2023	44.60	
		MW-33	5/4/2023	44.70	
		MW-33	8/10/2023	45.10	
		MW-33	11/14/2023	41.90	
		MW-35	2/21/2023	39.60	
		MW-35	5/4/2023	38.50	
		MW-35	8/10/2023	39.50	
		MW-35	11/14/2023	38.70	
Manganese, Dissolved	ug/L	MW-33	2/21/2023	912.00	548.00
		MW-33	5/4/2023	858.00	
		MW-33	8/10/2023	866.00	
		MW-33	11/14/2023	926.00	
		MW-35	2/21/2023	2090.00	
		MW-35	5/4/2023	2080.00	
		MW-35	8/10/2023	1900.00	
		MW-35	11/14/2023	1930.00	
Potassium, Total	mg/L	MW-33	2/21/2023	3.02	2.49
		MW-33	5/4/2023	3.16	
		MW-33	8/10/2023	3.38	
		MW-33	11/14/2023	2.95	
		MW-35	2/21/2023	3.14	
		MW-35	5/4/2023	3.08	
		MW-35	8/10/2023	3.37	
		MW-35	11/14/2023	3.03	

See Data Qualifiers Section in Appendix E for Qualifier Information.

Table F-5 (*continued*)

Channel Cc2: Summary of groundwater prediction limit exceedances

Interwell

January 1, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Prediction Limit (PL) Value
Sodium, Total	mg/L	MW-2	2/21/2023	9.47	7.38
		MW-2	5/4/2023	9.48	
		MW-2	8/10/2023	9.75	
		MW-2	11/14/2023	9.17	
		MW-21	2/21/2023	11.40	
		MW-21	5/4/2023	10.70	
		MW-21	8/10/2023	10.60	
		MW-21	11/14/2023	9.66	
		MW-33	2/21/2023	17.00	
		MW-33	5/4/2023	17.20	
		MW-33	8/10/2023	17.50	
		MW-33	11/14/2023	16.40	
		MW-35	2/21/2023	17.50	
		MW-35	5/4/2023	16.80	
		MW-35	8/10/2023	17.50	
		MW-35	11/14/2023	16.60	
		MW-37	2/21/2023	7.71	
		MW-37	5/4/2023	7.54	
		MW-37	8/10/2023	7.89	
		MW-37	11/14/2023	7.52	
2,4,5-TP Silvex	ug/L	MW-33	2/21/2023	0.031	0.012
		MW-33	5/4/2023	0.032	
		MW-33	8/10/2023	0.028	
		MW-33	11/14/2023	0.036	
		MW-35	11/14/2023	0.027	
Bis (2-Chloroethyl) Ether	ug/L	MW-21	2/21/2023	0.540 JT	0.278
		MW-33	2/21/2023	6.46	
		MW-33	5/4/2023	3.95	
		MW-33	8/10/2023	3.15	
		MW-33	11/14/2023	3.41	
		MW-35	2/21/2023	2.11	
		MW-35	5/4/2023	1.29	
		MW-35	8/10/2023	0.995	
		MW-35	11/14/2023	1.25	
Bis (2-Ethylhexyl) Phthalate	ug/L	MW-2	2/21/2023	45.50	7.40

See Data Qualifiers Section in Appendix E for Qualifier Information.

Table F-5 (*continued*)

Channel Cc2: Summary of groundwater prediction limit exceedances

Interwell

January 1, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Prediction Limit (PL) Value
Diethylphthalate	ug/L	MW-2	5/4/2023	1.03	0.556
		MW-20	5/4/2023	0.949 JT	
		MW-21	2/21/2023	0.971	
		MW-21	5/4/2023	0.672 JT	
		MW-33	2/21/2023	3.36	
		MW-33	5/4/2023	2.16	
		MW-33	11/14/2023	1.28	
		MW-35	5/4/2023	1.58	
		MW-37	5/4/2023	0.895 JT	
Vinyl Chloride	ug/L	MW-2	2/21/2023	0.0206 D	0.020
		MW-2	8/10/2023	0.0551 D	
		MW-2	11/14/2023	0.0283 D	
		MW-21	2/21/2023	0.026 D	
		MW-21	5/4/2023	0.0315 D	
		MW-21	8/10/2023	0.0442 D	
		MW-21	11/14/2023	0.0417 D	
		MW-33	2/21/2023	18.5 D	
		MW-33	5/4/2023	19.8 D	
		MW-33	8/10/2023	23.7 D	
		MW-33	11/14/2023	18 D	
		MW-35	2/21/2023	3.29 D	
		MW-35	5/4/2023	3.25 D	
		MW-35	8/10/2023	4.62 D	
		MW-35	11/14/2023	3.65 D	

See Data Qualifiers Section in Appendix E for Qualifier Information.

Table F-6

Unit D Aquifer: Summary of groundwater prediction limit exceedances

Intrawell

January 1, 2023 - December 31, 2023

Parameter	Units	Well	Sample Date	Sample Value	Prediction Limit (PL) Value
pH, Field	std. pH Units	MW-34	8/7/2023	6.33	< 6.38
Alkalinity	mg/L	MW-7	11/13/2023	79.70	79.60
Ammonia	mg/L	MW-7	11/13/2023	0.375	0.302
Chromium, Total	mg/L	MW-12	5/1/2023	0.00401	0.00395
		MW-12	8/7/2023	0.00434	
Iron, Dissolved	mg/L	MW-26	8/8/2023	0.181	0.151
		MW-7	11/13/2023	0.078	0.043

See Data Qualifiers Section in Appendix E for Qualifier Information.

Table F-7

Channel Cc1: Summary of groundwater volatile organic compound detections

January 1, 2023 - December 31, 2023

Compound	Units	Well	Date	Sample Value	Regulatory Standard
There were no volatile organic compounds detected this year in Channel Cc1 samples.					

Table F-8

Channel Cc2: Summary of groundwater volatile organic compound detections

January 1, 2023 - December 31, 2023

Compound	Units	Well	Date	Sample Value	Regulatory Standard[1]
1-1-Dichloroethane	ug/L	MW-33	2/21/2023	1.24	1
		MW-33	5/4/2023	1.24	
		MW-33	8/10/2023	1.37	
		MW-33	11/14/2023	1.45	
		MW-35	2/21/2023	0.144 JT	
		MW-35	5/4/2023	0.154 T	
		MW-35	8/10/2023	0.186 JT	
		MW-35	11/14/2023	0.182 JT	
		MW-33	5/4/2023	0.126 T	
		MW-33	8/10/2023	0.13 JT	
		MW-33	11/14/2023	0.128 JT	
1,2-Dichloropropane	ug/L	MW-33	2/21/2023	5.99	0.6
		MW-33	5/4/2023	5.60	
		MW-33	8/10/2023	6.31	
		MW-33	11/14/2023	6.25	
		MW-35	2/21/2023	0.281	
		MW-35	5/4/2023	0.278	
		MW-35	8/10/2023	0.343	
		MW-35	11/14/2023	0.295	
Benzene	ug/L	MW-33	2/21/2023	0.716	1
		MW-33	5/4/2023	0.657	
		MW-33	8/10/2023	0.753	
		MW-33	11/14/2023	0.721	
		MW-35	2/21/2023	0.422	
		MW-35	5/4/2023	0.428	
		MW-35	8/10/2023	0.454	
		MW-35	11/14/2023	0.425	
Chloroethane	ug/L	MW-33	5/4/2023	0.245	NA
		MW-33	11/14/2023	0.213	
Cis-1,2-Dichloroethene	ug/L	MW-2	2/21/2023	0.227	70
		MW-2	5/4/2023	0.239	
		MW-2	8/10/2023	0.338	
		MW-2	11/14/2023	0.196 JT	
		MW-21	2/21/2023	0.517	
		MW-21	5/4/2023	0.477	
		MW-21	8/10/2023	0.503	
		MW-21	11/14/2023	0.431	

See Data Qualifiers Section in Appendix E for Qualifier Information.

[1] Water Quality Standards For Groundwaters of the State Of Washington (WAC 173-200).

NA - No regulatory standard.

Table F-8 (continued)

Channel Cc2: Summary of groundwater volatile organic compound detections

January 1, 2023 - December 31, 2023

Compound	Units	Well	Date	Sample Value	Regulatory Standard[1]
Cis-1,2-Dichloroethene	ug/L	MW-33	2/21/2023	23.60	70
		MW-33	5/4/2023	22.70	
		MW-33	8/10/2023	25.00	
		MW-33	11/14/2023	24.20	
		MW-35	2/21/2023	2.73	
		MW-35	5/4/2023	2.55	
		MW-35	8/10/2023	2.89	
		MW-35	11/14/2023	2.64	
Dichlorodifluoromethane	ug/L	MW-2	2/21/2023	2.00	NA
		MW-2	5/4/2023	2.09	
		MW-2	8/10/2023	2.54	
		MW-2	11/14/2023	2.24	
		MW-20	2/21/2023	0.144 JT	
		MW-20	5/4/2023	0.116 JT	
		MW-20	8/10/2023	0.183 JT	
		MW-20	11/14/2023	0.189 JT	
		MW-21	2/21/2023	1.12	
		MW-21	5/4/2023	1.38	
		MW-21	8/10/2023	1.84	
		MW-21	11/14/2023	1.78	
		MW-33	2/21/2023	3.16	
		MW-33	5/4/2023	3.84	
		MW-33	8/10/2023	4.60	
		MW-33	11/14/2023	3.50	
		MW-35	2/21/2023	0.420	
		MW-35	5/4/2023	0.472	
		MW-35	8/10/2023	0.666	
		MW-35	11/14/2023	0.528	
		MW-37	2/21/2023	0.144 JT	
		MW-37	5/4/2023	0.128 JT	
		MW-37	8/10/2023	0.165 JT	
		MW-37	11/14/2023	0.13 JT	
Trans-1,2-Dichloroethene	ug/L	MW-33	2/21/2023	0.714	100
		MW-33	5/4/2023	0.733	
		MW-33	8/10/2023	0.805	
		MW-33	11/14/2023	0.821	
		MW-35	2/21/2023	0.187 JT	
		MW-35	5/4/2023	0.186 T	
		MW-35	8/10/2023	0.188 JT	
		MW-35	11/14/2023	0.183 JT	

See Data Qualifiers Section in Appendix E for Qualifier Information.

[1] Water Quality Standards For Groundwaters of the State Of Washington (WAC 173-200)

NA - No regulatory standard.

Table F-8 (continued)

Channel Cc2: Summary of groundwater volatile organic compound detections

January 1, 2023 - December 31, 2023

Compound	Units	Well	Date	Sample Value	Regulatory Standard[1]
Trichloroethene	ug/L	MW-33	2/21/2023	0.16 JT	3
		MW-33	5/4/2023	0.152 T	
		MW-33	8/10/2023	0.162 JT	
		MW-33	11/14/2023	0.17 JT	
		MW-35	2/21/2023	1.00	
		MW-35	5/4/2023	1.03	
		MW-35	8/10/2023	1.00	
		MW-35	11/14/2023	1.03	
		MW-37	2/21/2023	0.202	
		MW-37	5/4/2023	0.249	
		MW-37	8/10/2023	0.293	
		MW-37	11/14/2023	0.284	
Trichlorofluoromethane	ug/L	MW-2	2/21/2023	1.56	NA
		MW-2	5/4/2023	1.59	
		MW-2	8/10/2023	1.82	
		MW-2	11/14/2023	2.14	
		MW-21	2/21/2023	0.658	
		MW-21	5/4/2023	0.745	
		MW-21	8/10/2023	0.784	
		MW-21	11/14/2023	0.956	
		MW-37	2/21/2023	0.369	
		MW-37	5/4/2023	0.357	
		MW-37	8/10/2023	0.368	
		MW-37	11/14/2023	0.363	
Vinyl Chloride	ug/L	MW-2	2/21/2023	0.0206 D	0.02
		MW-2	5/4/2023	0.0188 DT	
		MW-2	8/10/2023	0.0551 D	
		MW-2	11/14/2023	0.0283 D	
		MW-21	2/21/2023	0.026 D	
		MW-21	5/4/2023	0.0315 D	
		MW-21	8/10/2023	0.0442 D	
		MW-21	11/14/2023	0.0417 D	
		MW-33	2/21/2023	18.5 D	
		MW-33	5/4/2023	19.8 D	
		MW-33	8/10/2023	23.7 D	
		MW-33	11/14/2023	18 D	
		MW-35	2/21/2023	3.29 D	
		MW-35	5/4/2023	3.25 D	
		MW-35	8/10/2023	4.62 D	
		MW-35	11/14/2023	3.65 D	

See Data Qualifiers Section in Appendix E for Qualifier Information.

[1] Water Quality Standards For Groundwaters of the State Of Washington (WAC 173-200)

NA - No regulatory standard.

Table F-9

Channel Cc2: Summary of groundwater appendix III analyte detections

January 1, 2023 - December 31, 2023

Compound	Units	Well	Date	Sample Value	Regulatory Standard
2,4,5-TP Silvex	ug/l	MW-33	2/21/2023	0.0305	10
		MW-33	5/4/2023	0.0323	
		MW-33	8/10/2023	0.0284	
		MW-33	11/14/2023	0.0357	
		MW-35	11/14/2023	0.0273	
Bis(2-Chloroethyl)Ether	ug/l	MW-21	2/21/2023	0.54 JT	0.07
		MW-21	5/4/2023	0.273 JT	
		MW-33	2/21/2023	6.46	
		MW-33	5/4/2023	3.95	
		MW-33	8/10/2023	3.15	
		MW-33	11/14/2023	3.41	
		MW-35	2/21/2023	2.11	
		MW-35	5/4/2023	1.29	
		MW-35	8/10/2023	0.995	
		MW-35	11/14/2023	1.25	
Bis(2-Ethylhexyl)Phthalate	ug/l	MW-2	2/21/2023	45.5	6
		MW-21	11/14/2023	0.594 JT	
		MW-33	5/4/2023	3.09	
Diethylphthalate	ug/l	MW-2	5/4/2023	1.03	NA
		MW-20	5/4/2023	0.949 JT	
		MW-21	5/4/2023	0.672 JT	
		MW-33	2/21/2023	3.36	
		MW-33	5/4/2023	2.16	
		MW-33	11/14/2023	1.28	
		MW-35	5/4/2023	1.58	
		MW-37	5/4/2023	0.895 JT	

See Data Qualifiers Section in Appendix E for Qualifier Information.

[1] Water Quality Standards For Groundwaters of the State Of Washington (WAC 173-200)

NA - No regulatory standard.

Table F-10

Channel Cc3: Summary of groundwater volatile organic compound detections

January 1, 2023 - December 31, 2023

Compound	Units	Well	Date	Sample Value	Regulatory Standard
There were no volatile organic compounds detected this year in Channel Cc3 samples.					

Table F-11

Unit D Aquifer: Summary of groundwater volatile organic compound detections

January 1, 2023 - December 31, 2023

Compound	Units	Well	Date	Sample Value	Regulatory Standard
There were no volatile organic compounds detected this year in Unit D Aquifer samples.					

Table F-12

Summary of Trip, Field, and Method Blanks Volatile Organic Compound Detections

January 1, 2023 - December 31, 2023

Summary of trip blank volatile organic compound detections

Compound	Units	Sample ID	Date	Sample Value
There were no volatile organic compounds detected this year in trip blanks.				

Summary of field blank volatile organic compound detections

Compound	**Units**	**Sample ID**	**Date**	**Sample Value**
Benzene	ug/L	WV21230810F	8/10/2023	0.182 JT
Chloroform	ug/L	WV26231113F	11/13/2023	0.146 JT

See Data Qualifiers Section in Appendix E for Qualifier Information.

Summary of method blank volatile organic compound detections

Compound	Units	Workgroup ID	Date	Sample Value
Diethylphthalate	ug/L	WG189490-1	8/23/2023	0.938 BJT
		WG189490-2	8/23/2023	4.61 BJL
		WG189490-3	8/23/2023	2.37 BJ
		WG189490-4	8/23/2023	4.86 BJL

See Data Qualifiers Section in Appendix E for Qualifier Information.

Table F-12

Summary of surface water monitoring location exceedances vs. SW quality standard

West Hillslope Seeps & Site Surface Water Discharge

Vashon Island Closed Landfill

January 1, 2023 - December 31, 2023

Compound	Units	Site ID	Sample Date	Sample Value	Reg. Limit	Standard(s) Exceeded
Iron, Total	mg/L	SW-W1	2/15/2023	1.3	1	FC
		SW-W1	5/3/2023	2.71		
		SW-W1	11/6/2023	2.27		
		SW-W2	2/15/2023	1.42		
		SW-W2	5/3/2023	2.96		
		SW-W2	8/9/2023	1.83		
		SW-W2	11/6/2023	1.09		
		SW-W3	5/3/2023	1.12		
		SW-W3	11/6/2023	1.3		

FC = Federal chronic surface water quality criteria

FA = Federal Acute Surface Water Criteria

SSWC = Washington State chronic surface water quality criteria

See Data Qualifiers Section in Appendix E for Qualifier Information.

Appendix G

Surface Water Monitoring Data

Table G-1
Surface Water - Field Parameters

Surface Water - Field Parameters			Dissolved Oxygen (DO) (Field)	Oxidation-Reduction Potential (ORP) (Field)	pH (Field)	Specific Conductance (Field)	Temperature (Field)	Turbidity (Field)
Site ID	Sample Date	Sample ID	(mg/L)	(mV)	(µmhos/cm)	(std. Units)	(°C)	(NTU)
SW-W1	2/15/2023	SVW1230215Q	12.14	40.8	7.47	157	4.073	7.71
SW-W1	5/3/2023	SVW1230503Q	10.14	152.2	7.23	170.8	10.157	22.7
SW-W1	8/9/2023	SVW1230809Q	8.99	4.2	7.47	202.6	15.431	1.99
SW-W1	11/6/2023	SVW1231106Q	9.72	58.9	7.45	185.4	9.881	12.5
SW-W2	2/15/2023	SVW2230215D	12.89	44.8	8.09	420.7	4.057	9.01
SW-W2	2/15/2023	SVW2230215Q	12.89	44.8	8.09	420.7	4.057	9.01
SW-W2	5/3/2023	SVW2230503Q	10.85	78.8	8.04	470.2	10.335	15.7
SW-W2	5/30/2023	SVW2230530R	11.05	252.6	7.66	442.6	10.206	7.42
SW-W2	8/9/2023	SVW2230809Q	9.87	37.7	7.97	522	14.344	10.2
SW-W2	11/6/2023	SVW2231106Q	10.57	230.7	7.98	468.5	9.926	8.28
SW-W3	2/15/2023	SVW3230215Q	12.06	91.9	7.86	220.5	6.516	5.68
SW-W3	5/3/2023	SVW3230503Q	10.8	73.4	7.81	250.9	10.177	8.56
SW-W3	8/9/2023	SVW3230809Q	9.98	47.4	7.69	279.4	13.373	2.99
SW-W3	11/6/2023	SVW3231106Q	10.28	184	7.6	244.6	10.05	11.5
SW-E	2/15/2023	SVE-230215Q	13.19	99.8	7.82	165.7	4.478	4.94
SW-E	5/3/2023	SVE-230503Q	11.31	144.3	7.84	185.5	9.817	7.83
SW-E	8/9/2023	SVE-230809Q	10.32	197.9	7.44	211	14.526	6.26
SW-E	11/6/2023	SVE-231106Q*	--	--	--	--	--	--

Note:
* Sampling at SW-E was discontinued in the fourth quarter of 2023 due to property access restrictions.
-- = parameter is not tested

Table G-2
Surface Water - Conventionals

Surface Water - Conventionals			Alkalinity, Total (as $CaCO_3$)	Ammonia as N	Biological Oxygen Demand - 5 Dav	Chemical Oxygen Demand	Chloride (Total)	Coliforms, Fecal	Coliforms, Total	Cyanide	Fluoride	Hardness	Nitrate	Nitrate + Nitrite as N	Phosphorous, Soluble Reactive	Phosphorus, Total as P	Specific Conductance	Sulfate (Total)	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-W1	2/15/2023	SVW1230215Q	69.5	0.0125	2 U	34.7	6.23	20	130	0.002 U	0.0473	83.7	1.47	1.47	0.026	0.134	182	8.18	139	0.568	7.88	156	19.3 S	9.97
SW-W1	5/3/2023	SVW1230503Q	72.9	0.0153	2 U	23.9	6.5	5	110 C	0.002 U	0.049 T	85.9	1.21	1.21	0.0326	0.113	185	8.12	140	0.543	6.96	178	31.7	16.7
SW-W1	8/9/2023	SVW1230809Q	86.2	0.0191	2 U	10 T	6.59	19	330	0.002 U	0.058 T	94.6	0.541	0.54	0.044	0.0752	211	8.26	151	0.16 T	3.13	158	4.2	2.02
SW-W1	11/6/2023	SVW1231106Q	80.1	0.04	2 U	20.3	6.7	230	1600	0.002 U	0.05 T	87.8	0.394	0.393	0.0395	0.122	191	8.74	137	0.39 T	6.92	166	28.6	7.85
SW-W2	2/15/2023	SVW2230215D	241	0.0057 T	2 U	23	15.7	1 U	40	0.002 U	0.0443	250	0.218	0.218	0.0107	0.0813	504	17	319	0.463	5.76	380	83.8 S	14.9
SW-W2	2/15/2023	SVW2230215Q	240	0.0057 T	2 U	29.1	15.7	1 U	20	0.002 U	0.0433	255	0.214	0.214	0.011	0.0764	503	17	318	0.434	5.67	380	142 S	18.2
SW-W2	5/3/2023	SVW2230503Q	250	0.0087 T	2 U	20.1	16.7	9	80 C	0.002 U	0.04 T	260	0.196	0.196	0.0151	0.0706	519	16.6	316	0.428	6.73	348	40.4	18.3
SW-W2	8/9/2023	SVW2230809Q	268	0.0054 T	2 U	18 T	8.33	12 C	150	0.002 U	0.065 T	279	0.125	0.125	0.0173	0.0758	555	11.9	335	0.27 T	5.38	380	24.3	8.56
SW-W2	11/6/2023	SVW2231106Q	242	0.0102	2 U	19 T	16.6	300	1100	0.002 U	0.046 T	253	0.0705	0.0706	0.0117	0.0443	503	16.8	317	0.31 T	7.9	322	16.2	5.82
SW-W3	2/15/2023	SVW3230215Q	112	0.0082 T	2 U	15 T	8.01	2	11	0.002 U	0.0551	122	0.409	0.409	0.0505	0.1	263	12.3	178	0.257	5.1	186	14.6 S	3.62
SW-W3	5/3/2023	SVW3230503Q	117	0.0089 T	2 U	15 T	8.1	4	130 C	0.002 U	0.055 T	127	0.319	0.319	0.0604	0.124	272	12.2	172	0.25 T	5.6	208	28.6	10.7
SW-W3	8/9/2023	SVW3230809Q	128	0.0074 T	2 U	12 T	7.75	15	120	0.002 U	0.059 T	137	0.196	0.196	0.0709	0.132	294	11	187	0.17 T	3.98	210	14	2.64
SW-W3	11/6/2023	SVW3231106Q	114	0.014	2 U	21.2	8.26	180 C	910	0.002 U	0.058 T	125	0.198	0.198	0.0664	0.14	262	11.1	167	0.3 T	7.97	200	30.3	8.03
SW-E	2/15/2023	SVE-230215Q	--	--	--	--	--	--	--	--	--	88.7	--	--	--	--	195	--	--	--	--	--	--	3.73
SW-E	5/3/2023	SVE-230503Q	--	--	--	--	--	--	--	--	--	93.7	--	--	--	--	200	--	--	--	--	--	--	8.26
SW-E	8/9/2023	SVE-230809Q	--	--	--	--	--	--	--	--	--	98.1	--	--	--	--	215	--	--	--	--	--	--	4.41
SW-E	11/6/2023	SVE-231106Q*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Note:
* Sampling at SW-E was discontinued in the fourth quarter of 2023 due to property access restrictions.
-- = parameter is not tested

Table G-3
Surface Water - Metals (Dissolved & Total)

Surface Water - Metals (Dissolved & Total)			Aluminum, Dissolved	Aluminum, Total	Antimony, Dissolved	Antimony, Total	Arsenic, Dissolved	Arsenic, Total	Barium, Dissolved	Barium, Total	Beryllium, Dissolved	Beryllium, Total	Cadmium, Dissolved	Cadmium, Total	Calcium, Dissolved	Calcium, Total	Chromium, Dissolved	Chromium, Total	Cobalt, Dissolved	Cobalt, Total
		CAS #	7429-90-5	7429-90-5	7440-36-0	7440-36-0	7440-38-2	7440-38-2	7440-39-3	7440-39-3	7440-41-7	7440-41-7	7440-43-9	7440-43-9	7440-70-2	7440-70-2	7440-47-3	7440-47-3	7440-48-4	7440-48-4
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(ug/L)	(ug/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SW-W1	2/15/2023	SVW1230215Q	0.005 U	0.129	0.0003 U	0.0003 U	1.8	3.22	0.000726	0.00356	0.0001 U	0.0001 U	5E-05 U	5E-05 U	13.9	14.2	0.000335	0.00118	5.47E-05	0.000455
SW-W1	5/3/2023	SVW1230503Q	0.005 U	0.334	0.0003 U	0.0003 U	2.31	5.23	0.000887	0.00757	0.0001 U	0.0001 U	5E-05 U	5E-05 U	15	15.3	0.000407	0.00245	5.73E-05	0.001
SW-W1	8/9/2023	SVW1230809Q	0.005 U	0.0228	0.0003 U	0.0003 U	3.24	3.66	0.000768	0.00131	0.0001 U	0.0001 U	5E-05 U	5E-05 U	16.4	16.8	0.000586	0.00045	5.8E-05	0.000132
SW-W1	11/6/2023	SVW1231106Q	0.005 U	0.209	0.0003 U	0.0003 U	3.28	6.52	0.000909	0.00506	0.0001 U	0.0001 U	5E-05 U	5E-05 U	15.6	15.8	0.000446	0.00133	8.83E-05	0.000706
SW-W2	2/15/2023	SVW2230215D	0.005 U	0.0751	0.0003 U	0.0003 U	1.12	2.31	0.00307	0.00614	0.0001 U	0.0001 U	5E-05 U	5E-05 U	42.7	41.7	0.000241	0.000457	5E-05 U	0.000139
SW-W2	2/15/2023	SVW2230215Q	0.005 U	0.0953	0.0003 U	0.0003 U	1.15	2.43	0.00292	0.00637	0.0001 U	0.0001 U	5E-05 U	5E-05 U	42.4	42.9	0.0002 U	0.000479	5E-05 U	0.000163
SW-W2	5/3/2023	SVW2230503Q	0.005 U	0.192	0.0003 U	0.0003 U	1.57	4.43	0.00314	0.0117	0.0001 U	0.0001 U	5E-05 U	5E-05 U	46	45	0.000239	0.000844	5E-05 U	0.000301
SW-W2	8/9/2023	SVW2230809Q	0.005 U	0.0881	0.0003 U	0.0003 U	1.7	3.36	0.00394	0.00803	0.0001 U	0.0001 U	5E-05 U	5E-05 U	48.3	47.8	0.000369	0.000484	5E-05 U	0.000175
SW-W2	11/6/2023	SVW2231106Q	0.005 U	0.115	0.0003 U	0.0003 U	1.41	2.45	0.0034	0.00678	0.0001 U	0.0001 U	5E-05 U	5E-05 U	43.8	43.7	0.000302	0.000574	5E-05 U	0.000162
SW-W3	2/15/2023	SVW3230215Q	0.005 U	0.126	0.0003 U	0.0003 U	2.72	3.59	0.00386	0.0063	0.0001 U	0.0001 U	5E-05 U	5E-05 U	20.6	20.1	0.00023	0.000731	9.69E-05	0.000249
SW-W3	5/3/2023	SVW3230503Q	0.005 U	0.227	0.0003 U	0.0003 U	3.03	4.39	0.00422	0.0084	0.0001 U	0.0001 U	5E-05 U	5E-05 U	21.9	21.6	0.000349	0.00105	9.06E-05	0.000347
SW-W3	8/9/2023	SVW3230809Q	0.005 U	0.101	0.0003 U	0.0003 U	3.35	4.12	0.00438	0.00694	0.0001 U	0.0001 U	5E-05 U	5E-05 U	23.1	22.9	0.00052	0.000574	8.44E-05	0.000216
SW-W3	11/6/2023	SVW3231106Q	0.0069	0.342	0.0003 U	0.0003 U	3.08	4.92	0.00397	0.009	0.0001 U	0.0001 U	5E-05 U	6.34E-05	20.5	22.3	0.000354	0.00139	9.36E-05	0.000374
SW-E	2/15/2023	SVE-230215Q	0.0118	0.151	0.0003 U	0.0003 U	1.63	1.87	0.00473	0.0061	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.2	14	0.00121	0.00205	5E-05 U	0.000132
SW-E	5/3/2023	SVE-230503Q	0.0121	0.263	0.0003 U	0.0003 U	1.91	2.29	0.00534	0.00795	0.0001 U	0.0001 U	5E-05 U	5E-05 U	15.7	15.5	0.00132	0.00252	5E-05 U	0.000202
SW-E	8/9/2023	SVE-230809Q	0.00811	0.2	0.0003 U	0.0003 U	2.17	2.45	0.00503	0.0071	0.0001 U	0.0001 U	5E-05 U	5E-05 U	16	16	0.00152	0.00217	5E-05 U	0.000166
SW-E	11/6/2023	SVE-231106Q*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Surface Water - Metals (Dissolved & Total)			Copper, Dissolved	Copper, Total	Iron, Dissolved	Iron, Total	Lead, Dissolved	Lead, Total	Magnesium, Dissolved	Magnesium, Total	Manganese, Dissolved	Manganese, Total	Mercury, Total	Nickel, Dissolved	Nickel, Total	Potassium, Dissolved	Potassium, Total	Selenium, Dissolved	Selenium, Total	Silver, Dissolved
		CAS #	7440-50-8	7440-50-8	7439-89-6	7439-89-6	7439-92-1	7439-92-1	7439-95-4	7439-95-4	7439-96-5	7439-96-5	7439-97-6	7440-02-0	7440-02-0	7440-09-7	7440-09-7	7782-49-2	7782-49-2	7440-22-4
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(ug/L)	(ug/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SW-W1	2/15/2023	SVW1230215Q	0.000316	0.000875	0.113	1.3	0.0001 U	0.000559	11	11.7	186	502	5E-05 U	0.000627	0.00247	0.783	0.818	0.0005 U	0.0005 U	4E-05 U
SW-W1	5/3/2023	SVW1230503Q	0.000368	0.00155	0.0878 D	2.71	0.0001 U	0.00138	11.6	11.6	155	831	5E-05 U	0.000649	0.00467	0.993	0.982	0.0005 U	0.0005 U	4E-05 U
SW-W1	8/9/2023	SVW1230809Q	0.000248	0.000328	0.19	0.446	0.0001 U	0.0001 U	12.8	12.8	309	363	5E-05 U	0.000603	0.000909	1.11	1.14	0.0005 U	0.0005 U	4E-05 U
SW-W1	11/6/2023	SVW1231106Q	0.000324	0.00118	0.253	2.27	0.0001 U	0.000622	11.5	11.7	355	808	5E-05 U	0.00075	0.00312	1.14	1.24	0.0005 U	0.0005 U	4E-05 U
SW-W2	2/15/2023	SVW2230215D	0.00023	0.00041	0.0178	1.24	0.0001 U	0.000176	33	35.4	35	263	5E-05 U	0.00179	0.00226	2.8	2.62	0.0005 U	0.0005 U	4E-05 U
SW-W2	2/15/2023	SVW2230215Q	0.000232	0.00045	0.0164	1.42	0.0001 U	0.00019	34.4	36	34.8	300	5E-05 U	0.00171	0.00245	2.7	2.72	0.0005 U	0.0005 U	4E-05 U
SW-W2	5/3/2023	SVW2230503Q	0.000265	0.000744	0.0148 D	2.96	0.0001 U	0.000491	37.8	35.9	19.3	588	5E-05 U	0.00198	0.00286	2.97	2.87	0.0005 U	0.0005 U	4E-05 U
SW-W2	8/9/2023	SVW2230809Q	0.000501	0.000488	0.0286	1.83	0.0001 U	0.000236	40	38.8	61.4	404	5E-05 U	0.00218	0.00256	2.97	2.91	0.0005 U	0.0005 U	4E-05 U
SW-W2	11/6/2023	SVW2231106Q	0.000383	0.000798	0.0484	1.09	0.0001 U	0.000283	36	34.9	59.9	288	5E-05 U	0.00199	0.00247	3.14	3.28	0.0005 U	0.0005 U	4E-05 U
SW-W3	2/15/2023	SVW3230215Q	0.000265	0.000645	0.0432	0.709	0.0001 U	0.000372	17.4	17.4	353	500	5E-05 U	0.000911	0.00162	1.95	1.95	0.0005 U	0.0005 U	4E-05 U
SW-W3	5/3/2023	SVW3230503Q	0.000311	0.000903	0.0441 D	1.12	0.0001 U	0.000642	18.5	17.6	329	555	5E-05 U	0.00098	0.00216	2.16	2.08	0.0005 U	0.0005 U	4E-05 U
SW-W3	8/9/2023	SVW3230809Q	0.000219	0.000511	0.0352	0.564	0.0001 U	0.000282	19.7	19.3	339	506	5E-05 U	0.000924	0.0015	2.24	2.23	0.0005 U	0.0005 U	4E-05 U
SW-W3	11/6/2023	SVW3231106Q	0.000484	0.00162	0.0987	1.3	0.0001 U	0.000738	16.4	16.9	326	559	5E-05 U	0.00119	0.00268	2.18	2.45	0.0005 U	0.0005 U	4E-05 U
SW-E	2/15/2023	SVE-230215Q	0.000372	0.000718	0.0465	0.299	0.0001 U	0.000241	12.5	13	9.99	40.5	5E-05 U	0.000586	0.00117	1.78	1.76	0.0005 U	0.0005 U	4E-05 U
SW-E	5/3/2023	SVE-230503Q	0.000418	0.000868	0.0461 D	0.534	0.0001 U	0.00046	13.8	13.3	9.93	68.7	5E-05 U	0.00066	0.00161	1.99	1.96	0.0005 U	0.0005 U	4E-05 U
SW-E	8/9/2023	SVE-230809Q	0.000358	0.000688	0.0445	0.446	0.0001 U	0.00034	14.3	14.1	11.8	66.1	5E-05 U	0.000537	0.00125	1.95	1.96	0.0005 U	0.0005 U	4E-05 U
SW-E	11/6/2023	SVE-231106Q*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table G-3
Surface Water - Metals (Dissolved & Total)

Surface Water - Metals (Dissolved & Total)			Silver, Total	Sodium, Dissolved	Sodium, Total	Thallium, Dissolved	Thallium, Total	Tin, Dissolved	Tin, Total	Vanadium, Dissolved	Vanadium, Total	Zinc, Dissolved	Zinc, Total
		CAS #	7440-22-4	7440-23-5	7440-23-5	7440-28-0	7440-28-0	7440-31-5	7440-31-5	7440-62-2	7440-62-2	7440-66-6	7440-66-6
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SW-W1	2/15/2023	SVW1230215Q	4E-05 U	6.52	6.96	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.000434	0.00141	0.0006	0.00203
SW-W1	5/3/2023	SVW1230503Q	4E-05 U	7.05	6.81	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.00058	0.00283	0.000562	0.00511
SW-W1	8/9/2023	SVW1230809Q	4E-05 U	7.47	7.57	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.000597	0.000736	0.000642	0.000923
SW-W1	11/6/2023	SVW1231106Q	4E-05 U	6.69	6.67	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.000424	0.00163	0.0005 U	0.00235
SW-W2	2/15/2023	SVW2230215D	4E-05 U	14	14.8	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.000402	0.000614	0.0005 U	0.000911
SW-W2	2/15/2023	SVW2230215Q	4E-05 U	14.4	15.4	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.000317	0.000639	0.0005 U	0.00215
SW-W2	5/3/2023	SVW2230503Q	4E-05 U	16.1	15.2	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.000399	0.00111	0.0005 U	0.00149
SW-W2	8/9/2023	SVW2230809Q	4E-05 U	17.1	16.5	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.000367	0.000682	0.00132	0.00118
SW-W2	11/6/2023	SVW2231106Q	4E-05 U	15.3	15.1	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.000405	0.000832	0.0005 U	0.000891
SW-W3	2/15/2023	SVW3230215Q	4E-05 U	8.76	8.67	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.000633	0.00127	0.000784	0.0011
SW-W3	5/3/2023	SVW3230503Q	4E-05 U	9.27	8.74	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.000819	0.00183	0.0005 U	0.00176
SW-W3	8/9/2023	SVW3230809Q	4E-05 U	9.83	9.61	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.000705	0.00116	0.0005 U	0.000876
SW-W3	11/6/2023	SVW3231106Q	4E-05 U	8.73	8.67	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.000951	0.00239	0.0005 U	0.00187
SW-E	2/15/2023	SVE-230215Q	4E-05 U	6.63	7.01	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.00252	0.00312	0.000536	0.000959
SW-E	5/3/2023	SVE-230503Q	4E-05 U	7.43	7.06	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.00319	0.00405	0.0005 U	0.00145
SW-E	8/9/2023	SVE-230809Q	4E-05 U	7.57	7.46	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U	0.00326	0.00396	0.0005 U	0.00114
SW-E	11/6/2023	SVE-231106Q*	--	--	--	--	--	--	--	--	--	--	--

Note:
* Sampling at SW-E was discontinued in the fourth quarter of 2023 due to property access restrictions.
-- = parameter is not tested

Table G-4
Surface Water - Volatile Organic Compounds

Surface Water - 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	1,2,3-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
		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
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)
SW-W1	2/15/2023	SVW1230215Q	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
SW-W1	5/3/2023	SVW1230503Q	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	0.5 U	0.5 U	2.5 U	2.5 U
SW-W1	8/9/2023	SVW1230809Q	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	0.5 U	0.5 U	2.5 U	2.5 U
SW-W1	11/6/2023	SVW1231106Q	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	3.25 JT
SW-W2	2/15/2023	SVW2230215D	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	2.87 JT
SW-W2	2/15/2023	SVW2230215Q	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	3.04 JT
SW-W2	5/30/2023	SVW2230530R	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	0.5 U	0.5 U	2.5 U	2.5 U
SW-W2	8/9/2023	SVW2230809Q	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	0.5 U	0.5 U	2.5 U	2.5 U
SW-W2	11/6/2023	SVW2231106Q	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	3.21 JT
SW-W3	2/15/2023	SVW3230215Q	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
SW-W3	5/3/2023	SVW3230503Q	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	0.5 U	0.5 U	2.5 U	2.5 U
SW-W3	8/9/2023	SVW3230809Q	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	0.5 U	0.5 U	2.5 U	2.5 U
SW-W3	11/6/2023	SVW3231106Q	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	5.06
SW-E	2/15/2023	SVE-230215Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SW-E	5/3/2023	SVE-230503Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SW-E	8/9/2023	SVE-230809Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SW-E	11/6/2023	SVE-231106Q*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	2/14/2023	VTRP230215Z	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
VOA TRIP BLANK	2/14/2023	VTRP230215Z2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	5/2/2023	VTRP230503Y	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	0.5 U	0.5 U	2.5 U	2.5 U
VOA TRIP BLANK	5/2/2023	VTRP230503X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	5/26/2023	VTRP230530Y	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	0.5 U	0.5 U	2.5 U	2.5 U
VOA TRIP BLANK	8/8/2023	VTRP230809Z	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	8/8/2023	VTRP230809X	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	0.5 U	0.5 U	2.5 U	2.5 U
VOA TRIP BLANK	11/3/2023	VTRP231106X	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

Table G-4
Surface Water - Volatile Organic Compounds

Surface Water - 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	Cis-1-2-Dichloro-ethene	Cis-1,3-Dichloro-propene	Dibromo-methane	Dichloro-difluoro-methane
		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	156-59-2	10061-01-5	74-95-3	75-71-8
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)
SW-W1	2/15/2023	SVW1230215Q	0.035 DU	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	0.25 U	0.1 U	0.1 U
SW-W1	5/3/2023	SVW1230503Q	0.035 DU	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	0.25 U	0.1 U	0.1 U
SW-W1	8/9/2023	SVW1230809Q	0.035 DU	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	0.25 U	0.1 U	0.1 U
SW-W1	11/6/2023	SVW1231106Q	0.035 DU	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	0.25 U	0.1 U	0.1 U
SW-W2	2/15/2023	SVW2230215D	0.035 DU	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	0.25 U	0.1 U	0.1 U
SW-W2	2/15/2023	SVW2230215Q	0.035 DU	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	0.25 U	0.1 U	0.1 U
SW-W2	5/30/2023	SVW2230530R	0.035 DU	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	0.25 U	0.1 U	0.1 U
SW-W2	8/9/2023	SVW2230809Q	0.035 DU	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	0.25 U	0.1 U	0.1 U
SW-W2	11/6/2023	SVW2231106Q	0.035 DU	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	0.25 U	0.1 U	0.1 U
SW-W3	2/15/2023	SVW3230215Q	0.035 DU	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	0.25 U	0.1 U	0.1 U
SW-W3	5/3/2023	SVW3230503Q	0.035 DU	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	0.25 U	0.1 U	0.1 U
SW-W3	8/9/2023	SVW3230809Q	0.035 DU	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	0.25 U	0.1 U	0.1 U
SW-W3	11/6/2023	SVW3231106Q	0.035 DU	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	0.25 U	0.1 U	0.1 U
SW-E	2/15/2023	SVE-230215Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SW-E	5/3/2023	SVE-230503Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SW-E	8/9/2023	SVE-230809Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SW-E	11/6/2023	SVE-231106Q*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	2/14/2023	VTRP230215Z	0.035 DU	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	0.25 U	0.1 U	0.1 U
VOA TRIP BLANK	2/14/2023	VTRP230215Z2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	5/2/2023	VTRP230503Y	0.035 DU	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	0.25 U	0.1 U	0.1 U
VOA TRIP BLANK	5/2/2023	VTRP230503X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	5/26/2023	VTRP230530Y	0.035 DU	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	0.25 U	0.1 U	0.1 U
VOA TRIP BLANK	8/8/2023	VTRP230809Z	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	8/8/2023	VTRP230809X	0.035 DU	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	0.25 U	0.1 U	0.1 U
VOA TRIP BLANK	11/3/2023	VTRP231106X	0.035 DU	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	0.25 U	0.1 U	0.1 U

Table G-4
Surface Water - Volatile Organic Compounds

Surface Water - Volatile Organic Compounds			Ethyl-benzene	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 #	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)
SW-W1	2/15/2023	SVW1230215Q	0.1 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	0.0116 DJT
SW-W1	5/3/2023	SVW1230503Q	0.1 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	0.0107 DJT
SW-W1	8/9/2023	SVW1230809Q	0.1 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	0.0134 DJT
SW-W1	11/6/2023	SVW1231106Q	0.1 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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
SW-W2	2/15/2023	SVW2230215D	0.1 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	2/15/2023	SVW2230215Q	0.1 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	5/30/2023	SVW2230530R	0.1 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
SW-W2	8/9/2023	SVW2230809Q	0.1 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
SW-W2	11/6/2023	SVW2231106Q	0.1 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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU
SW-W3	2/15/2023	SVW3230215Q	0.1 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	0.0277 D
SW-W3	5/3/2023	SVW3230503Q	0.1 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	0.0308 D
SW-W3	8/9/2023	SVW3230809Q	0.1 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	0.0339 D
SW-W3	11/6/2023	SVW3231106Q	0.1 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	1 U	0.1 U	0.1 U	0.2 U	0.0291 D
SW-E	2/15/2023	SVE-230215Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 DU
SW-E	5/3/2023	SVE-230503Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 DU
SW-E	8/9/2023	SVE-230809Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 DU
SW-E	11/6/2023	SVE-231106Q*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	2/14/2023	VTRP230215Z	0.1 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	2/14/2023	VTRP230215Z2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 DU
VOA TRIP BLANK	5/2/2023	VTRP230503Y	0.1 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	5/2/2023	VTRP230503X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 DU
VOA TRIP BLANK	5/26/2023	VTRP230530Y	0.1 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	8/8/2023	VTRP230809Z	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01 DU
VOA TRIP BLANK	8/8/2023	VTRP230809X	0.1 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	11/3/2023	VTRP231106X	0.1 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	1 U	0.1 U	0.1 U	0.2 U	0.01 DU

Note:

* Sampling at SW-E was discontinued in the fourth quarter of 2023 due to property access restrictions.

-- = parameter is not tested

Table G-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
		CAS #	93-76-5	93-72-1	94-75-7	88-85-7	72-20-8	58-89-9	72-43-5	8001-35-2
Site ID	Sample	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
SW-W1	2/15/2023	SVW1230215Q	0.025 U	0.025 U	0.05 U	0.025 U	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W1	5/3/2023	SVW1230503Q	0.024 U	0.024 U	0.0481 U	0.024 U	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W1	8/9/2023	SVW1230809Q	0.0243 U	0.0243 U	0.0485 U	0.0243 U	0.0118 U	0.0118 U	0.059 U	1.18 U
SW-W1	11/6/2023	SVW1231106Q	0.025 U	0.025 U	0.05 U	0.025 U	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W2	2/15/2023	SVW2230215D	0.025 U	0.025 U	0.05 U	0.025 U	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W2	2/15/2023	SVW2230215Q	0.025 U	0.025 U	0.05 U	0.025 U	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W2	5/3/2023	SVW2230503Q	0.0236 U	0.0236 U	0.0472 U	0.0236 U	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W2	8/9/2023	SVW2230809Q	0.0248 U	0.0248 U	0.0495 U	0.0248 U	0.0136 U	0.0136 U	0.0679 U	1.36 U
SW-W2	11/6/2023	SVW2231106Q	0.025 U	0.025 U	0.05 U	0.025 U	0.0126 U	0.0126 U	0.0631 U	1.26 U
SW-W3	2/15/2023	SVW3230215Q	0.025 U	0.025 U	0.05 U	0.025 U	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W3	5/3/2023	SVW3230503Q	0.0236 U	0.0236 U	0.0472 U	0.0236 U	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W3	8/9/2023	SVW3230809Q	0.0248 U	0.0248 U	0.0495 U	0.0248 U	0.0118 U	0.0118 U	0.059 U	1.18 U
SW-W3	11/6/2023	SVW3231106Q	0.025 U	0.025 U	0.05 U	0.025 U	0.0125 U	0.0125 U	0.0625 U	1.25 U

Appendix H

Leachate Monitoring Data

Table H-1
Leachate - Field Parameters

Leachate - Field Parameters			Dissolved Sulfide	pH (Field)	Specific Conductance (Field)	Temperature (Field)
Site ID	Sample Date	Sample ID	ppm	(Std. pH Units)	(µmhos/cm)	(°C)
LS-PS1	2/15/2023	LVP-230215Q	--	7.46	281.2	6.4
LS-PS1	5/3/2023	LVP-230503Q	--	7.69	278	14.4
LS-PS1	8/9/2023	LVP-230809Q	--	7.45	155.5	21.1
LS-PS1	11/6/2023	LVP-231106Q	--	6.66	79.8	12.6
LS-B	2/15/2023	LVB-230215Q	--	6.87	2519	9.2
LS-B	5/3/2023	LVB-230503Q	--	7.12	2734	13.4
LS-B	8/9/2023	LVB-230809Q	--	7.02	4046	18.3
LS-B	11/6/2023	LVB-231106Q	--	6.37	1596	16.2
LS-LVT	3/13/2023	LVT-230313P	0.1 U	7.26	324.7	16.3
LS-LVT	6/22/2023	LVT-230622P	0.1 U	7.93	284.6	19.4
LS-LVT	9/12/2023	LVT-230912P	0.1 U	7.98	323.9	19.3
LS-LVT	12/12/2023	LVT-231212P	0.1 U	7.66	285.8	7.1

Note:

-- = parameter is not tested

Table H-2
Leachate - Conventionals

Leachate - Conventionals			Alkalinity, Total (as $CaCO_3$)	Ammonia as N	Biological Oxygen Demand - 5 Day	Chemical Oxygen Demand	Chloride (Total)	Coliforms, Fecal	Coliforms, Total	Cyanide	Fluoride	Nitrate + Nitrite as N	Phosphorous, Soluble Reactive
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)
LS-PS1	2/15/2023	LVP-230215Q	88	0.004 T	2.65	27.5	24.2	1 U	18	0.002 U	0.056	0.031 T	0.0019 T
LS-PS1	5/3/2023	LVP-230503Q	93	0.0274	2 U	13 T	21.5	2	24 C	0.002 U	0.071 T	0.038 T	0.0267
LS-PS1	8/9/2023	LVP-230809Q	72	0.0325	2 U	9.6 T	3.45	26	15000	0.002 U	0.109	0.0684	0.156
LS-PS1	11/6/2023	LVP-231106Q	38.1	0.0164	2 U	5.8 T	2.01	1 U	2900	0.002 U	0.056 T	0.0859	0.0457
LS-B	2/15/2023	LVB-230215Q	477	0.102	2 U	80.5	369	1 U	90 CU	0.0054 T	0.18 T	0.01 U	0.0012 T
LS-B	5/3/2023	LVB-230503Q	453	0.0381	2 U	72.9	405	1 U	90 CU	0.003 T	0.19 T	0.0724	0.00366
LS-B	8/9/2023	LVB-230809Q	731	0.0063 T	2 U	140	647	1 U	200	0.002 U	0.26 T	0.52	0.0017 T
LS-B	11/6/2023	LVB-231106Q	331	0.0071 T	2 U	42.2	199	23	410 C	0.0046 T	0.23 T	0.498	0.00052 T
LS-LVT	3/13/2023	LVT-230313P	--	--	--	--	--	--	--	--	--	--	--
LS-LVT	6/22/2023	LVT-230622P	--	--	--	--	--	--	--	--	--	--	--
LS-LVT	9/12/2023	LVT-230912P	--	--	--	--	--	--	--	--	--	--	--
LS-LVT	12/12/2023	LVT-231212P	--	--	--	--	--	--	--	--	--	--	--

Leachate - Conventionals			Phosphorus, Total as P	Specific Conductance	Sulfate (Total)	Sulfide, Total	Total Fats, Oil, & Grease	Total Kjeldahl Nitrogen	Total Organic Carbon	Total Suspended Solids	Total Volatile Solids	Volatile Suspended Solids
Site ID	Sample Date	Sample ID	(mg/l)	(µohms/cm)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
LS-PS1	02/15/23	LVP-230215Q	0.99 U	319	31.6	0.01 U	1.8 GU	0.759	8.31	2.9	62.7	2.1
LS-PS1	05/03/23	LVP-230503Q	0.99 U	302	25.2	0.01 U	2 U	0.474	6.39	0.6 T	51.3	0.6 T
LS-PS1	08/09/23	LVP-230809Q	0.189	159	2.76	0.011 T	2 U	0.14 T	1.4 T	0.6 T	27 T	0.5 U
LS-PS1	11/06/23	LVP-231106Q	0.992 U	85.9	1.96	0.01 U	2 T	0.21 T	2.71	1.9 T	25 T	0.7 T
LS-B	02/15/23	LVB-230215Q	0.994 U	2820	566	0.05 U	2 U	1.56	26.1	3.82	436	1.1 T
LS-B	05/03/23	LVB-230503Q	0.994 U	2930	614	0.02 U	1.9 U	1.46	28.7	1 U	556	1 U
LS-B	08/09/23	LVB-230809Q	0.1 U	4370	926	0.01 U	2 U	2.15	44.3	3.2 T	997	1.4 T
LS-B	11/06/23	LVB-231106Q	0.989 U	1710	301	0.01 U	2.9 T	0.872	15.9	0.6 T	269	0.6 T
LS-LVT	03/13/23	LVT-230313P	--	--	--	--	1.9 U	--	--	--	--	--
LS-LVT	06/22/23	LVT-230622P	--	--	--	--	2.6 T	--	--	--	--	--
LS-LVT	09/12/23	LVT-230912P	--	--	--	--	2.1 T	--	--	--	--	--
LS-LVT	12/12/23	LVT-231212P	--	--	--	--	2.5 T	--	--	--	--	--

Note:

-- = parameter is not tested

Table H-3
Leachate - Metals (Total)

Leachate - Metals		CAS #	Aluminum, Total 7429-90-5	Antimony, Total 7440-36-0	Arsenic, Total 7440-38-2	Barium, Total 7440-39-3	Beryllium, Total 7440-41-7	Cadmium, Total 7440-43-9	Calcium, Total 7440-70-2	Chromium, Total 7440-47-3	Cobalt, Total 7440-48-4	Copper, Total 7440-50-8	Iron, Total 7439-89-6	Lead, Total 7439-92-1
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(ug/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
LS-PS1	2/15/2023	LVP-230215Q	0.0713	0.00297 U	0.866	0.0186	0.00099 U	0.000495 U	31	0.00198 U	0.000495 U	0.0025	0.157	0.00099 U
LS-PS1	5/3/2023	LVP-230503Q	0.0495 U	0.00297 U	1.03	0.0216	0.00099 U	0.000495 U	30.5	0.00198 U	0.000495 U	0.00198 U	0.099 U	0.00099 U
LS-PS1	8/9/2023	LVP-230809Q	0.0488	0.0003 U	1.4	0.0333	0.0001 U	5E-05 U	16.5	0.000245	7.24E-05	0.00183	0.0842	0.0001 U
LS-PS1	11/6/2023	LVP-231106Q	0.255 D	0.00298 U	0.588	0.00987	0.000992 U	0.000496 U	9.62	0.00198 U	0.000496 U	0.0034	0.246 D	0.000992 U
LS-B	2/15/2023	LVB-230215Q	0.0497 U	0.00298 U	3.21	0.103	0.000994 U	0.000497 U	203	0.00199 U	0.0489	0.00199 U	1.88	0.000994 U
LS-B	5/3/2023	LVB-230503Q	0.0497 U	0.00298 U	2.96	0.0949	0.000994 U	0.00054	218	0.00199 U	0.0174	0.00506	1.13	0.000994 U
LS-B	8/9/2023	LVB-230809Q	0.005 U	0.0003 U	2.42	0.101	0.0001 U	0.000136	341 D	0.000845	0.0193	0.00223	0.102	0.0001 U
LS-B	11/6/2023	LVB-231106Q	0.0494 DU	0.00297 U	0.746	0.0629	0.000989 U	0.000494 U	125	0.00198 U	0.0141	0.00352	0.0989 DU	0.000989 U
LS-LVT	3/13/2023	LVT-230313P	--	--	1.1	--	--	5E-05 U	--	0.000753	--	0.00325	--	0.000701
LS-LVT	6/22/2023	LVT-230622P	--	--	1.94	--	--	0.000497 U	--	0.00199 U	--	0.00436	--	0.000993 U
LS-LVT	9/12/2023	LVT-230912P	--	--	2.32	--	--	0.000498 U	--	0.00199 U	--	0.00365	--	0.000996 U
LS-LVT	12/12/2023	LVT-231212P	--	--	1.03	--	--	0.000501 U	--	0.002 U	--	0.00268	--	0.001 U

Leachate - Metals			Magnesium, Total 7439-95-4	Manganese, Total 7439-96-5	Mercury, Total 7439-97-6	Nickel, Total 7440-02-0	Potassium, Total 7440-09-7	Selenium, Total 7782-49-2	Silver, Total 7440-22-4	Sodium, Total 7440-23-5	Thallium, Total 7440-28-0	Tin, Total 7440-31-5	Vanadium, Total 7440-62-2	Zinc, Total 7440-66-6
Site ID	Sample Date	Sample ID	(mg/L)	(ug/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
LS-PS1	2/15/2023	LVP-230215Q	9.72	278	0.0001 U	0.00634	3.78	0.00495 U	0.000396 U	18.1	0.000743 U	0.00495 U	0.00101	0.00739
LS-PS1	5/3/2023	LVP-230503Q	9.24	162	0.0001 U	0.00468	3.61	0.00495 U	0.000396 U	15.3	0.000742 U	0.00495 U	0.000941	0.00729
LS-PS1	8/9/2023	LVP-230809Q	6.1	23.6	0.0001 U	0.000833	2.85	0.0005 U	4E-05 U	7.08	7.5E-05 U	0.0005 U	0.00261	0.00335
LS-PS1	11/6/2023	LVP-231106Q	2.63	12.4	0.0001 U	0.00122	1.49	0.00496 U	0.000397 U	3.74	0.000744 U	0.00496 U	0.00204	0.00786
LS-B	2/15/2023	LVB-230215Q	129	10400	0.0001 U	0.206	28.8	0.00497 U	0.000397 U	260	0.000745 U	0.00497 U	0.000908	0.122
LS-B	5/3/2023	LVB-230503Q	129	4600	0.0001 U	0.158	31.1	0.00497 U	0.000398 U	267	0.000745 U	0.00497 U	0.000909	0.181
LS-B	8/9/2023	LVB-230809Q	219 D	5600 D	0.0001 U	0.215	48	0.000749	4E-05 U	432 D	7.5E-05 U	0.0005 U	0.000461	0.0403
LS-B	11/6/2023	LVB-231106Q	66	3040	0.0001 U	0.105	17.6	0.00494 U	0.000395 U	138	0.000741 U	0.00494 U	0.000741 U	0.19
LS-LVT	3/13/2023	LVT-230313P	--	--	--	0.00605	--	--	4E-05 U	--	--	--	--	0.017
LS-LVT	6/22/2023	LVT-230622P	--	--	--	0.00589	--	--	0.000397 U	--	--	--	--	0.0222 D
LS-LVT	9/12/2023	LVT-230912P	--	--	--	0.00676	--	--	0.000398 U	--	--	--	--	0.039
LS-LVT	12/12/2023	LVT-231212P	--	--	--	0.00636	--	--	0.000401 U	--	--	--	--	0.00756

Note:

-- = parameter is not tested

Table H-4
Leachate - Volatile Organic Compounds

Leachate - Volatile Organic Compounds Site ID	 Sample Date	CAS # 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)	1,1-Dichloro-propene 563-58-6 (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)	1,3-Dichloro-benzene 541-73-1 (µg/L)
LS-PS1	2/15/2023	LVP-230215Q	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
LS-PS1	5/3/2023	LVP-230503Q	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
LS-PS1	8/9/2023	LVP-230809Q	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
LS-PS1	11/6/2023	LVP-231106Q	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
LS-B	2/15/2023	LVB-230215Q	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
LS-B	5/3/2023	LVB-230503Q	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
LS-B	8/9/2023	LVB-230809Q	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
LS-B	11/6/2023	LVB-231106Q	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
VOA TRIP BLANK	2/14/2023	VTRP230215Y	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
VOA TRIP BLANK	5/2/2023	VTRP230503Z	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
VOA TRIP BLANK	8/7/2023	VTRP230809Z2	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
VOA TRIP BLANK	11/3/2023	VTRP231106X2	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

Leachate - Volatile Organic Compounds Site ID	 Sample Date	CAS # Sample ID	1,3-Dichloro-propane 142-28-9 (µg/L)	1,4-Dichloro-benzene 106-46-7 (µg/L)	2,2-Dichloro-propane 594-20-7 (µg/L)	2-Butanone 78-93-3 (µg/L)	2-Hexanone 591-78-6 (µg/L)	2-Methyl-1-Propanol 78-83-1 (µg/L)	3-Chloro-propene 107-05-1 (µg/L)	4-Methyl-2-Pentanone 108-10-1 (µg/L)	Acetone 67-64-1 (µg/L)	Acetonitrile 75-05-8 (µg/L)	Acrolein 107-02-8 (µg/L)	Acrylonitrile 107-13-1 (µg/L)	Benzene 71-43-2 (µg/L)	Bromo-chloro-methane 74-97-5 (µg/L)
LS-PS1	2/15/2023	LVP-230215Q	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	5 DU	0.1 U	2.5 U	2.5 U	5 U	2.5 U	0.035 DU	0.1 U	0.1 U
LS-PS1	5/3/2023	LVP-230503Q	1 U	1 U	1 U	5 U	5 U	100 DU	1 U	25 U	25 U	50 U	25 U	0.35 DU	1 U	1 U
LS-PS1	8/9/2023	LVP-230809Q	1 U	1 U	1 U	5 U	5 U	100 DU	1 U	25 U	25 U	50 U	25 U	0.35 DU	1 U	1 U
LS-PS1	11/6/2023	LVP-231106Q	1 U	1 U	1 U	10 U	5 U	100 DU	1 U	25 U	25 U	50 U	25 U	0.35 DU	1 U	1 U
LS-B	2/15/2023	LVB-230215Q	1 U	1 U	1 U	2.5 U	5 U	50 DU	1 U	25 U	25 U	50 U	25 U	0.35 DU	1 U	1 U
LS-B	5/3/2023	LVB-230503Q	1 U	1 U	1 U	5 U	5 U	100 DU	1 U	25 U	41 JT	50 U	25 U	0.35 DU	1 U	1 U
LS-B	8/9/2023	LVB-230809Q	1 U	1 U	1 U	5 U	5 U	100 DU	1 U	25 U	25 U	50 U	25 U	0.35 DU	1 U	1 U
LS-B	11/6/2023	LVB-231106Q	1 U	1 U	1 U	10 U	5 U	100 DU	1 U	25 U	25 U	50 U	25 U	0.35 DU	1 U	1 U
VOA TRIP BLANK	2/14/2023	VTRP230215Y	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	5 DU	0.1 U	2.5 U	2.5 U	5 U	2.5 U	0.035 DU	0.1 U	0.1 U
VOA TRIP BLANK	5/2/2023	VTRP230503Z	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	10 DU	0.1 U	2.5 U	2.5 U	5 U	2.5 U	0.035 DU	0.1 U	0.1 U
VOA TRIP BLANK	8/7/2023	VTRP230809Z2	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	10 DU	0.1 U	2.5 U	2.5 U	5 U	2.5 U	0.035 DU	0.1 U	0.1 U
VOA TRIP BLANK	11/3/2023	VTRP231106X2	0.1 U	0.1 U	0.1 U	1 U	0.5 U	10 DU	0.1 U	2.5 U	2.5 U	5 U	2.5 U	0.035 DU	0.1 U	0.1 U

Leachate - Volatile Organic Compounds Site ID	 Sample Date	CAS # Sample ID	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)	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)	Chloroprene 126-99-8 (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)
LS-PS1	2/15/2023	LVP-230215Q	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
LS-PS1	5/3/2023	LVP-230503Q	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
LS-PS1	8/9/2023	LVP-230809Q	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
LS-PS1	11/6/2023	LVP-231106Q	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
LS-B	2/15/2023	LVB-230215Q	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
LS-B	5/3/2023	LVB-230503Q	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
LS-B	8/9/2023	LVB-230809Q	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
LS-B	11/6/2023	LVB-231106Q	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
VOA TRIP BLANK	2/14/2023	VTRP230215Y	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
VOA TRIP BLANK	5/2/2023	VTRP230503Z	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
VOA TRIP BLANK	8/7/2023	VTRP230809Z2	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
VOA TRIP BLANK	11/3/2023	VTRP231106X2	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

Table H-4
Leachate - Volatile Organic Compounds

Leachate - Volatile Organic Compounds			Dichloro-difluoro-methane	Ethyl-benzene	M & P Xylene	Methyl Iodide	Methyl Methacrylate	Methyl-acrylonitrile	Methylene Chloride	O-Xylene	Propionitrile	Styrene	Tetrachloro-ethene	Toluene	Trans-1-2-Dichloro-ethene	Trans-1-3-Dichloropropene
		CAS #	75-71-8	100-41-4	MPX	74-88-4	80-62-6	126-98-7	75-09-2	95-47-6	107-12-0	100-42-5	127-18-4	108-88-3	156-60-5	10061-02-6
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)
LS-PS1	2/15/2023	LVP-230215Q	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U	2.5 U	0.1 U	0.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U
LS-PS1	5/3/2023	LVP-230503Q	1 U	1 U	1 U	1 U	2.5 U	1 U	25 U	1 U	10 U	1 U	1 U	1 U	1 U	5 U
LS-PS1	8/9/2023	LVP-230809Q	1 U	1 U	1 U	1 GU	2.5 U	1 U	25 U	1 U	10 U	1 U	1 U	1 U	1 U	5 U
LS-PS1	11/6/2023	LVP-231106Q	1 U	1 U	1 U	1 U	2.5 U	1 U	25 U	1 U	20 U	1 U	1 U	1 U	1 U	5 U
LS-B	2/15/2023	LVB-230215Q	1 U	1 U	1 U	1 U	2.5 U	1 U	25 U	1 U	5 GU	1 U	1 U	1 U	1 U	5 U
LS-B	5/3/2023	LVB-230503Q	1 U	1 U	1 U	1 U	2.5 U	1 U	30.7 JT	1 U	10 U	1 U	1 U	1 U	1 U	5 U
LS-B	8/9/2023	LVB-230809Q	1 U	1 U	1 U	1 GU	2.5 U	1 U	25 U	1 U	10 U	1 U	1 U	1 U	1 U	5 U
LS-B	11/6/2023	LVB-231106Q	1 U	1 U	1 U	1 U	2.5 U	1 U	25 U	1 U	20 U	1 U	1 U	1 U	1 U	5 U
VOA TRIP BLANK	2/14/2023	VTRP230215Y	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U	2.5 U	0.1 U	0.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U
VOA TRIP BLANK	5/2/2023	VTRP230503Z	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U	2.5 U	0.1 U	1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U
VOA TRIP BLANK	8/7/2023	VTRP230809Z2	0.1 U	0.1 U	0.1 U	0.1 GU	0.25 U	0.1 U	2.5 U	0.1 U	1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U
VOA TRIP BLANK	11/3/2023	VTRP231106X2	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U	2.5 U	0.1 U	2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U

Leachate - Volatile Organic Compounds			Trans-1-4-Dichloro-2-Butene	Trichloro-ethene	Trichloro-fluoro-methane	Vinyl Acetate	Vinyl Chloride
		CAS #	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)
LS-PS1	2/15/2023	LVP-230215Q	0.5 U	0.1 U	0.1 U	0.1 U	0.01 DU
LS-PS1	5/3/2023	LVP-230503Q	5 U	1 U	1 U	1 U	0.1 DU
LS-PS1	8/9/2023	LVP-230809Q	5 U	1 U	1 U	1 U	0.1 DU
LS-PS1	11/6/2023	LVP-231106Q	10 U	1 U	1 U	2 U	0.1 DU
LS-B	2/15/2023	LVB-230215Q	5 U	1 U	1 U	1 U	0.1 DU
LS-B	5/3/2023	LVB-230503Q	5 U	1 U	1 U	1 U	0.1 DU
LS-B	8/9/2023	LVB-230809Q	5 U	1 U	1 U	1 U	0.1 DU
LS-B	11/6/2023	LVB-231106Q	10 U	1 U	1 U	2 U	0.1 DU
VOA TRIP BLANK	2/14/2023	VTRP230215Y	0.5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	5/2/2023	VTRP230503Z	0.5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	8/7/2023	VTRP230809Z2	0.5 U	0.1 U	0.1 U	0.1 U	0.01 DU
VOA TRIP BLANK	11/3/2023	VTRP231106X2	1 U	0.1 U	0.1 U	0.2 U	0.01 DU

Table H-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
		CAS #	93-76-5	93-72-1	94-75-7	72-54-8	72-55-9	50-29-3	309-00-2	319-84-6	5103-71-9	12674-11-2	11104-28-2	11141-16-5	53469-21-9	12672-29-6	11097-69-1	11096-82-5	319-85-7
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-PS1	2/15/2023	LVP-230215Q	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	5/3/2023	LVP-230503Q	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	8/9/2023	LVP-230809Q	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	11/6/2023	LVP-231106Q	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	2/15/2023	LVB-230215Q	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	5/3/2023	LVB-230503Q	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	8/9/2023	LVB-230809Q	0.25 U	0.25 U	0.5 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.04 U
LS-B	11/6/2023	LVB-231106Q	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)	Methoxy-chlor	Total Aroclors	Toxaphene	trans-Chlordane
		CAS #	319-86-8	60-57-1	88-85-7	959-98-8	33213-65-9	1031-07-8	72-20-8	7421-93-4	76-44-8	1024-57-3	465-73-6	58-89-9	72-43-5	T_AROCLOR	8001-35-2	5103-74-2
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-PS1	02/15/23	LVP-230215Q	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	05/03/23	LVP-230503Q	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	08/09/23	LVP-230809Q	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	11/06/23	LVP-231106Q	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	02/15/23	LVB-230215Q	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	0.02 U	0.01 U	0.05 U	0.025 U	1 U	0.05 U
LS-B	05/03/23	LVB-230503Q	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	0.02 U	0.05 U	0.025 U	1 U	0.02 U
LS-B	08/09/23	LVB-230809Q	0.04 U	0.04 U	0.25 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.2 U	0.025 U	4 U	0.12 U
LS-B	11/06/23	LVB-231106Q	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 I

Landfill Gas Monitoring Data

Table I-1

Landfill Gas Monitoring Data

January 1, 2023 - March 31, 2023

Sample ID	Date/Time	CH4 (% Vol)	CH4 (% LEL)	CO2 (% Vol)	O2 (% Vol)	Static Pressure (in H2O)	Map Location (see Fig. 7)
GP-001	1/26/2023	0	0	0.1	20	-1.17	GP-1
GP-001	2/17/2023	0	0	0.2	20.7	-0.08	
GP-001	3/9/2023	0	0	0.2	20.3	1.2	
GP-002	1/26/2023	0	0	1.9	17.8	0.27	GP-2
GP-002	2/17/2023	0	0	2.1	18.2	-0.05	
GP-002	3/9/2023	0	0	2.1	18	0.6	
GP-01D	1/26/2023	0	0	0.1	20.2	-1.31	NP-1
GP-01D	2/17/2023	0	0	0.2	20.7	-0.74	
GP-01D	3/9/2023	0	0	0.1	21	1.12	
GP-01I	1/26/2023	0	0	0.1	20.1	-0.66	
GP-01I	2/17/2023	0	0	0.2	20.7	-0.44	
GP-01I	3/9/2023	0	0	0.1	21	0.54	
GP-01S	1/26/2023	0	0	0.8	19.1	-0.03	
GP-01S	2/17/2023	0	0	0.5	21	0.06	
GP-01S	3/9/2023	0	0	0.3	21	0.32	
GP-02D	1/26/2023	0	0	0.1	20.1	-0.58	NP-2
GP-02D	2/17/2023	0	0	0.2	20.7	-0.62	
GP-02D	3/9/2023	0	0	0.1	20.7	1.37	
GP-02I	1/26/2023	0	0	0.1	20.1	-0.65	
GP-02I	2/17/2023	0	0	0.2	20.7	-0.66	
GP-02I	3/9/2023	0	0	0.1	20.7	1.23	
GP-02S	1/26/2023	0	0	0.6	19.8	0.01	
GP-02S	2/17/2023	0	0	0.2	20.7	-0.02	
GP-02S	3/9/2023	0	0	0.1	20.7	-0.14	
GP-03D	1/26/2023	0	0	1.5	17.7	-0.28	NP-3
GP-03D	2/17/2023	0	0	1	19	-0.46	
GP-03D	3/9/2023	0	0	1.4	18.1	1.38	
GP-03I	1/26/2023	0	0	1.5	18	-0.05	
GP-03I	2/17/2023	0	0	1.8	18.4	-0.5	
GP-03I	3/9/2023	0	0	1.7	18.4	1.31	
GP-03S	1/26/2023	0	0	0.2	19.9	0.09	
GP-03S	2/17/2023	0	0	0.6	19.9	-0.13	
GP-03S	3/9/2023	0	0	1.1	18.8	0.46	
GP-04D	1/26/2023	0	0	0.1	19.9	0.27	NP-4
GP-04D	2/17/2023	0	0	0.2	20.6	-0.47	
GP-04D	3/9/2023	0	0	0.1	20.3	1.76	
GP-04I	1/26/2023	0	0	0.2	19.6	-1.1	
GP-04I	2/17/2023	0	0	0.8	20	-0.22	
GP-04I	3/9/2023	0	0	0.9	19.5	1.49	
GP-04S	1/26/2023	0	0	2.3	18.4	1.43	
GP-04S	2/17/2023	0	0	1	20.1	-0.08	
GP-04S	3/9/2023	0	0	1.4	18.7	1.09	

Table I-1

Landfill Gas Monitoring Data

January 1, 2023 - March 31, 2023

Sample ID	Date/Time	CH4		CO2	O2	Static Pressure	Map Location (see Fig. 7)
		(% Vol)	(% LEL)	(% Vol)	(% Vol)	(in H2O)	
GP-05D	1/26/2023	0	0	3.1	16.2	0.46	NP-5
GP-05D	2/17/2023	0	0	3	17.4	-0.05	
GP-05D	3/9/2023	0	0	3.2	16.6	1.23	
GP-05I	1/26/2023	0	0	2.3	17.3	0.37	
GP-05I	2/17/2023	0	0	2.6	18.1	0.01	
GP-05I	3/9/2023	0	0	2.7	17.6	0.42	
GP-05S	1/26/2023	0	0	2.6	16.6	0.08	
GP-05S	2/17/2023	0	0	0.7	19.7	0.01	
GP-05S	3/9/2023	0	0	3.1	15.8	0.34	
GP-06D	1/26/2023	0	0	1	18.2	-1.13	NP-6
GP-06D	2/17/2023	0	0	0.5	20	-0.35	
GP-06D	3/9/2023	0	0	0.5	20	1.63	
GP-06I	1/26/2023	0	0	0.1	20.1	-0.06	
GP-06I	2/17/2023	0	0	0.4	20.1	-0.18	
GP-06I	3/9/2023	0	0	0.3	20.4	0.47	
GP-06S	1/26/2023	0	0	0.1	20	-1.36	
GP-06S	2/17/2023	0	0	2.5	16.6	-0.07	
GP-06S	3/9/2023	0	0	2.7	16.4	0.25	
GP-07D	1/26/2023	0	0	0.3	19.7	0.01	NP-7
GP-07D	2/17/2023	0	0	1.6	17.4	-0.09	
GP-07D	3/9/2023	0	0	2.4	15.1	0.4	
GP-07I	1/26/2023	0	0	0.2	19.3	0.29	
GP-07I	2/17/2023	0	0	0.2	20.4	-0.38	
GP-07I	3/9/2023	0	0	0.1	20.7	1.41	
GP-07S	1/26/2023	0	0	0.9	18.4	-0.06	
GP-07S	2/17/2023	0	0	0.2	20.3	-0.51	
GP-07S	3/9/2023	0	0	0.1	20.7	1.62	
GP-08D	1/26/2023	0	0	0.1	20.3	-1.22	NP-8
GP-08D	2/17/2023	0	0	0.2	21	-0.77	
GP-08D	3/9/2023	0	0	0.1	21	0.69	
GP-08I	1/26/2023	0	0	0.2	20.3	-1.07	
GP-08I	2/17/2023	0	0	1.1	19.5	-0.77	
GP-08I	3/9/2023	0	0	0.3	21	0.63	
GP-08S	1/26/2023	0	0	0.1	20.3	-6.52	
GP-08S	2/17/2023	0	0	6.6	4.9	-0.48	
GP-08S	3/9/2023	0	0	7.1	1.5	0.84	

Table I-2

Landfill Gas Monitoring Data

April 1, 2023 - June 30, 2023

Sample ID	Date/Time	CH4 (% Vol)	CH4 (% LEL)	CO2 (% Vol)	O2 (% Vol)	Static Pressure (in H2O)	Map Location (see Fig. 7)
GP-01	4/4/2023	0	0	0.2	21	-0.67	GP-1
GP-01	5/5/2023	0	0	1	19.6	-0.35	
GP-01	6/6/2023	0	0	0.6	20.5	0.86	
GP-02	4/4/2023	0	0	0.2	21	0.68	GP-2
GP-02	5/5/2023	0	0	2.1	17.8	-0.09	
GP-02	6/6/2023	0	0	2	17.7	0.1	
GP-1D	4/4/2023	0	0	0.2	21	-1.82	NP-1
GP-1D	5/5/2023	0	0	0.5	17.5	-0.16	
GP-1D	6/6/2023	0	0	0.1	21	2.16	
GP-1I	4/4/2023	0	0	0.2	21	-0.88	
GP-1I	5/5/2023	0	0	0.4	18.7	-0.1	
GP-1I	6/6/2023	0	0	0.2	19.9	0.77	
GP-1S	4/4/2023	0	0	0.3	21	0.19	
GP-1S	5/5/2023	0	0	0.3	20.6	-0.06	
GP-1S	6/6/2023	0	0	0.9	18.8	-0.01	
GP-2D	4/4/2023	0	0	0.2	21	-1.64	NP-2
GP-2D	5/5/2023	0	0	0.5	19.1	-0.28	
GP-2D	6/6/2023	0	0	0.5	18.7	1.91	
GP-2I	4/4/2023	0	0	0.2	21	-1.64	
GP-2I	5/5/2023	0	0	0.4	18.8	-0.25	
GP-2I	6/6/2023	0	0	0.4	17.5	1.74	
GP-2S	4/4/2023	0	0	0.2	21	0.18	
GP-2S	5/5/2023	0	0	0.2	20.3	0.04	
GP-2S	6/6/2023	0	0	0.1	21	-0.05	
GP-3D	4/4/2023	0	0	1.4	19.1	-1.41	NP-3
GP-3D	5/5/2023	0	0	1.5	18	-0.38	
GP-3D	6/6/2023	0	0	1.4	18.6	1.68	
GP-3I	4/4/2023	0	0	1.8	19.1	-1.41	
GP-3I	5/5/2023	0	0	1.9	18.2	-0.39	
GP-3I	6/6/2023	0	0	1.8	18.5	1.66	
GP-3S	4/4/2023	0	0	0.9	20.2	0.11	
GP-3S	5/5/2023	0	0	1.2	18.7	-0.07	
GP-3S	6/6/2023	0	0	1	19.5	0.07	
GP-4D	4/4/2023	0	0	0.6	20.7	-1.4	NP-4
GP-4D	5/5/2023	0	0	0.7	19.5	-0.51	
GP-4D	6/6/2023	0	0	0.4	20.4	1.7	
GP-4I	4/4/2023	0	0	0.8	20.8	-0.81	
GP-4I	5/5/2023	0	0	1.3	19.2	-0.34	
GP-4I	6/6/2023	0	0	0.9	20	1.27	
GP-4S	4/4/2023	0	0	1	20.7	-0.72	
GP-4S	5/5/2023	0	0	1.9	18.6	-0.38	
GP-4S	6/6/2023	0	0	2	18.1	0.59	

Table I-2

Landfill Gas Monitoring Data

April 1, 2023 - June 30, 2023

Sample ID	Date/Time	CH4		CO2	O2	Static Pressure	Map Location (see Fig. 7)
		(% Vol)	(% LEL)	(% Vol)	(% Vol)	(in H2O)	
GP-5D	4/4/2023	0	0	2.8	18	-0.44	NP-5
GP-5D	5/5/2023	0	0	2.8	17	-0.33	
GP-5D	6/6/2023	0	0	2.7	17.7	0.48	
GP-5I	4/4/2023	0	0	2.5	19.2	-0.13	
GP-5I	5/5/2023	0	0	2.7	18	-0.21	
GP-5I	6/6/2023	0	0	2.5	18.7	0.25	
GP-5S	4/4/2023	0	0	0.3	21	0.05	
GP-5S	5/5/2023	0	0	0.5	19.8	-0.07	
GP-5S	6/6/2023	0	0	3.4	16.4	0.13	
GP-6D	4/4/2023	0	0	0.5	20.7	-0.8	NP-6
GP-6D	5/5/2023	0	0	0.7	19.4	-0.46	
GP-6D	6/6/2023	0	0	0.5	20.2	0.96	
GP-6I	4/4/2023	0	0	0.3	20.9	-0.18	
GP-6I	5/5/2023	0	0	1.4	18.6	-0.26	
GP-6I	6/6/2023	0	0	0.6	20	0.38	
GP-6S	4/4/2023	0	0	2.5	16.7	0.13	
GP-6S	5/5/2023	0	0	2.4	16.2	-0.03	
GP-6S	6/6/2023	0	0	2.7	15.8	0.09	
GP-7D	4/4/2023	0	0	1.4	17.9	0.08	NP-7
GP-7D	5/5/2023	0	0	1.3	17.6	-0.09	
GP-7D	6/6/2023	0	0	1.4	15.9	0.08	
GP-7I	4/4/2023	0	0	0.2	21	-1.07	
GP-7I	5/5/2023	0	0	1.8	17.6	-0.34	
GP-7I	6/6/2023	0	0	0.2	20.7	1.04	
GP-7S	4/4/2023	0	0	0.2	21	-1.29	
GP-7S	5/5/2023	0	0	0.5	19.4	-0.38	
GP-7S	6/6/2023	0	0	0.1	21	1.49	
GP-8D	4/4/2023	0	0	0.3	20.9	-1.73	NP-8
GP-8D	5/5/2023	0	0	0.2	20.1	-0.1	
GP-8D	6/6/2023	0	0	0.6	15.1	2.03	
GP-8I	4/4/2023	0	0	7.6	1.4	-0.37	
GP-8I	5/5/2023	0	0	0.2	19.8	-0.15	
GP-8I	6/6/2023	0	0	3	16	2	
GP-8S	4/4/2023	0	0	0.2	21	-1.59	
GP-8S	5/5/2023	0	0	6.2	6.2	-1.99	
GP-8S	6/6/2023	0	0	6.3	3.9	1.75	

Table I-3

Landfill Gas Monitoring Data

July 1, 2023 - September 30, 2023

Sample ID	Date/Time	CH4		CO2	O2	Static Pressure	Map Location (see Fig. 7)
		(% Vol)	(% LEL)	(% Vol)	(% Vol)	(in H2O)	
GP-01	7/18/2023	0	0	0.1	20.5	-0.38	GP-1
GP-01	8/4/2023	0	0	0.1	20.3	-0.21	
GP-01	9/21/2023	0	0	0.2	21	-0.12	
GP-02	7/18/2023	0	0	2	18.1	0	GP-2
GP-02	8/4/2023	0	0	1.7	17.4	0.1	
GP-02	9/21/2023	0	0	1.9	18.5	0.03	
GP-1D	7/12/2023	0	0	0	20.8	-0.17	NP-1
GP-1D	8/4/2023	0	0	0.1	19.7	-0.83	
GP-1D	9/21/2023	0	0	0.2	21	-0.64	
GP-1I	7/12/2023	0	0	0	20.8	-0.24	
GP-1I	8/4/2023	0	0	0.1	19.7	-0.62	
GP-1I	9/21/2023	0	0	0.2	21	-0.59	
GP-1S	7/12/2023	0	0	0.8	18.8	0.09	
GP-1S	8/4/2023	0	0	0.9	17.5	0.07	
GP-1S	9/21/2023	0	0	1.3	18.4	-0.03	
GP-2D	7/12/2023	0	0	0.1	20.7	-0.15	NP-2
GP-2D	8/4/2023	0	0	0.1	19.9	-0.79	
GP-2D	9/21/2023	0	0	0.2	21	-0.52	
GP-2I	7/12/2023	0	0	0.1	20.8	-0.09	
GP-2I	8/4/2023	0	0	0.1	19.8	-0.7	
GP-2I	9/21/2023	0	0	0.2	21	-0.66	
GP-2S	7/12/2023	0	0	0.2	20.4	0.2	
GP-2S	8/4/2023	0	0	0.8	18.9	0.01	
GP-2S	9/21/2023	0	0	0.2	21	-0.11	
GP-3D	7/12/2023	0	0	1.6	18	0	NP-3
GP-3D	8/4/2023	0	0	1.6	17.6	-0.64	
GP-3D	9/21/2023	0	0	1.9	19	-0.46	
GP-3I	7/12/2023	0	0	2	17.9	0.03	
GP-3I	8/4/2023	0	0	1.8	17.3	-0.57	
GP-3I	9/21/2023	0	0	2.1	18.3	-0.44	
GP-3S	7/12/2023	0	0	1.2	18.7	-0.01	
GP-3S	8/4/2023	0	0	1	18.6	0	
GP-3S	9/21/2023	0	0	1.6	19.3	-0.09	
GP-4D	7/18/2023	0	0	0.7	19.3	-0.82	NP-4
GP-4D	8/4/2023	0	0	0.7	18.8	-0.59	
GP-4D	9/21/2023	0	0	0.6	20.5	-0.44	
GP-4I	7/18/2023	0	0	1.1	19.4	-0.45	
GP-4I	8/4/2023	0	0	1	19.1	-0.25	
GP-4I	9/21/2023	0	0	1.1	20.1	-0.26	
GP-4S	7/18/2023	0	0	2.6	18.2	-0.21	
GP-4S	8/4/2023	0	0	2	18.2	0.04	
GP-4S	9/21/2023	0	0	2.4	19.5	-0.04	

Table I-3

Landfill Gas Monitoring Data

July 1, 2023 - September 30, 2023

Sample ID	Date/Time	CH4		CO2	O2	Static Pressure	Map Location (see Fig. 7)
		(% Vol)	(% LEL)	(% Vol)	(% Vol)	(in H2O)	
GP-5D	7/18/2023	0	0	3	16.7	-0.01	NP-5
GP-5D	8/4/2023	0	0	2.7	16.7	0.02	
GP-5D	9/21/2023	0	0	2.7	17.4	0.16	
GP-5I	7/18/2023	0	0	2.9	17.5	0.05	
GP-5I	8/4/2023	0	0	2.6	17.5	0.04	
GP-5I	9/21/2023	0	0	2.7	17.9	0.01	
GP-5S	7/18/2023	0	0	0.3	19.9	0.15	
GP-5S	8/4/2023	0	0	0.4	19.6	0.15	
GP-5S	9/21/2023	0	0	0.7	20	0.01	
GP-6D	7/18/2023	0	0	0.5	20.3	-0.23	NP-6
GP-6D	8/4/2023	0	0	0.4	19.2	-0.05	
GP-6D	9/21/2023	0	0	0.6	19.9	0.12	
GP-6I	7/18/2023	0	0	0.2	21	-0.06	
GP-6I	8/4/2023	0	0	0.2	19.7	0.13	
GP-6I	9/21/2023	0	0	0.4	20.2	0	
GP-6S	7/18/2023	0	0	3.5	16	-0.07	
GP-6S	8/4/2023	0	0	3.1	16	0.08	
GP-6S	9/21/2023	0	0	4	17	0	
GP-7D	7/18/2023	0	0	1.9	14.8	-0.01	NP-7
GP-7D	8/4/2023	0	0	1.6	14.7	0.09	
GP-7D	9/21/2023	0	0	0.3	20.5	-0.05	
GP-7I	7/18/2023	0	0	0.1	21	-0.44	
GP-7I	8/4/2023	0	0	0.1	19.9	-0.15	
GP-7I	9/21/2023	0	0	0.2	20.9	-0.1	
GP-7S	7/18/2023	0	0	0.1	21	-0.58	
GP-7S	8/4/2023	0	0	0.1	20	-0.27	
GP-7S	9/21/2023	0	0	0.1	21	-0.02	
GP-8D	7/12/2023	0	0	0.1	20.7	-0.34	NP-8
GP-8D	8/4/2023	0	0	0.1	20	-0.47	
GP-8D	9/21/2023	0	0	0.2	21	-0.58	
GP-8I	7/12/2023	0	0	0	20.7	-0.32	
GP-8I	8/4/2023	0	0	0.1	20	-0.47	
GP-8I	9/21/2023	0	0	0.2	21	-0.59	
GP-8S	7/12/2023	0	0	0.2	20.5	-0.06	
GP-8S	8/4/2023	0	0	0.1	19.9	0.06	
GP-8S	9/21/2023	0	0	0.2	20.9	-0.1	

Table I-4

Landfill Gas Monitoring Data

October 1, 2023 - December 31, 2023

Sample ID	Date/Time	CH4		CO2	O2	Static Pressure	Map Location (see Fig. 7)
		(% Vol)	(% LEL)	(% Vol)	(% Vol)	(in H2O)	
GP-01	10/26/2023	0	0	0.1	21	-1.33	GP-1
GP-01	11/3/2023	0	0	0.2	21.6	-0.67	
GP-01	12/19/2023	0	0	2.7	18.4	0.73	
GP-02	10/26/2023	0	0	1.8	18.1	-0.03	GP-2
GP-02	11/3/2023	0	0	2.1	18.5	0.06	
GP-02	12/19/2023	0	0	2.4	17.8	-0.29	
GP-1D	10/26/2023	0	0	0.1	20.8	-3.85	NP-1
GP-1D	11/3/2023	0	0	0.2	21.6	-1.64	
GP-1D	12/19/2023	0	0	0.6	17.4	4.16	
GP-1I	10/26/2023	0	0	0.1	20.7	0	
GP-1I	11/3/2023	0	0	0.2	21.6	-1.47	
GP-1I	12/19/2023	0	0	0.6	16.6	4.04	
GP-1S	10/26/2023	0	0	1.2	18.2	-0.05	
GP-1S	11/3/2023	0	0	1.4	18.9	-0.05	
GP-1S	12/19/2023	0	0	1.7	16.5	-0.08	
GP-2D	10/26/2023	0	0	0.1	20.9	-3.37	NP-2
GP-2D	11/3/2023	0	0	0.3	21.6	-1.57	
GP-2D	12/19/2023	0	0	0.6	18.8	3.4	
GP-2I	10/26/2023	0	0	0.1	20.8	-2.8	
GP-2I	11/3/2023	0	0	0.3	21.6	-1.5	
GP-2I	12/19/2023	0	0	0.5	18.1	3.18	
GP-2S	10/26/2023	0	0	0.6	20.2	0	
GP-2S	11/3/2023	0	0	0.2	21.6	0.01	
GP-2S	12/19/2023	0	0	2.4	18.7	0.04	
GP-3D	10/26/2023	0	0	0.2	20.8	-2.8	NP-3
GP-3D	11/3/2023	0	0	1.5	19.1	-1.2	
GP-3D	12/19/2023	0	0	1.5	18.9	2.3	
GP-3I	10/26/2023	0	0	0.1	20.8	-2.6	
GP-3I	11/3/2023	0	0	1	20.4	-1.3	
GP-3I	12/19/2023	0	0	1.7	19.1	2.15	
GP-3S	10/26/2023	0	0	0.9	19.5	-0.04	
GP-3S	11/3/2023	0	0	1	20.2	-0.07	
GP-3S	12/19/2023	0	0	0.6	20.8	-0.14	
GP-4D	10/26/2023	0	0	0.1	21	-2.76	NP-4
GP-4D	11/3/2023	0	0	0.8	20.3	-1.48	
GP-4D	12/19/2023	0	0	1.1	19.6	1.77	
GP-4I	10/26/2023	0	0	0.1	21	-1.43	
GP-4I	11/3/2023	0	0	0.5	21.1	-0.74	
GP-4I	12/19/2023	0	0	1.5	19.6	1.21	
GP-4S	10/26/2023	0	0	0.2	20.9	-0.1	
GP-4S	11/3/2023	0	0	2	19.8	-0.28	
GP-4S	12/19/2023	0	0	3	18.6	7.23	

Table I-4

Landfill Gas Monitoring Data

October 1, 2023 - December 31, 2023

Sample ID	Date/Time	CH4 (% Vol)	CH4 (% LEL)	CO2 (% Vol)	O2 (% Vol)	Static Pressure (in H2O)	Map Location (see Fig. 7)
GP-5D	10/26/2023	0	0	2.8	17.2	-0.55	NP-5
GP-5D	11/3/2023	0	0	3.2	17.5	-0.23	
GP-5D	12/19/2023	0	0	3.3	17.4	-0.18	
GP-5I	10/26/2023	0	0	2.5	18.2	-0.06	
GP-5I	11/3/2023	0	0	3	18.3	-0.03	
GP-5I	12/19/2023	0	0	2.6	18.8	-0.15	
GP-5S	10/26/2023	0	0	0.3	20.4	-0.15	
GP-5S	11/3/2023	0	0	0.5	21	0.02	
GP-5S	12/19/2023	0	0	1	20.7	0.13	
GP-6D	10/26/2023	0	0	0.3	20.4	-1.19	NP-6
GP-6D	11/3/2023	0	0	0.5	20.9	-0.39	
GP-6D	12/19/2023	0	0	0.8	20.3	0.54	
GP-6I	10/26/2023	0	0	0.2	20.5	-0.07	
GP-6I	11/3/2023	0	0	0.3	21.3	-0.12	
GP-6I	12/19/2023	0	0	5.5	14.6	0.58	
GP-6S	10/26/2023	0	0	4.2	16.7	0.01	
GP-6S	11/3/2023	0	0	3.8	17.7	-0.08	
GP-6S	12/19/2023	0	0	3.1	19.1	-0.01	
GP-7D	10/26/2023	0	0	2.2	16.7	-0.04	NP-7
GP-7D	11/3/2023	0	0	2.3	17.3	0.04	
GP-7D	12/19/2023	0	0	2.8	16.7	-0.06	
GP-7I	10/26/2023	0	0	0.1	20.7	-1.13	
GP-7I	11/3/2023	0	0	0.3	21.3	-0.47	
GP-7I	12/19/2023	0	0	2.6	16.6	1.44	
GP-7S	10/26/2023	0	0	0.1	20.7	-2.1	
GP-7S	11/3/2023	0	0	0.3	21.3	-0.61	
GP-7S	12/19/2023	0	0	0.9	19.9	1.23	
GP-8D	10/26/2023	0	0	0.1	20.7	-3.36	NP-8
GP-8D	11/3/2023	0	0	0.2	21.4	-1.51	
GP-8D	12/19/2023	0	0	0.8	16.2	3.54	
GP-8I	10/26/2023	0	0	0.1	20.7	-3.03	
GP-8I	11/3/2023	0	0	0.5	21	-1.38	
GP-8I	12/19/2023	0	0	0.3	21.3	0.16	
GP-8S	10/26/2023	0	0	0.1	20.7	-0.03	
GP-8S	11/3/2023	0	0	0.2	21.2	-0.38	
GP-8S	12/19/2023	0	0	3.6	15.7	3.32	

Appendix J

Financial Summary

King County Solid Waste Division
Vashon Island Closed Landfill
2023 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 KCSWD to 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

Vashon Island Closed Landfill Financial Assurance

Post Closure Maintenance Fund	**Annual Budget**
SALARIES & WAGES	$212,209
SUPPLIES	$2,000
SERVICES	$114,964
LABORATORY SERVICES	$135,000
EQUIPMENT	$18,830
INTRAGOVERNMENTAL SERVICES	$29,580
Post Closure Maintenance Fund Total	**$512,583**
Capital Improvement Project	**Approved Budget**
Solid Waste Vashon Feasibilty Study	**$8,240,503**