King County
Solid Waste Division
Department of Natural Resources and Parks
King Street Center
201 South Jackson Street, Suite 701
Seattle, WA 98104-3855
206-477-4466
711 TTY Relay
www.kingcounty.gov/solidwaste

April 1, 2019

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

VIA: Anne Holmes, P.E., Supervising Engineer AHM

FM: Marisa Baptiste, Engineer II MB

RE: King County Vashon Island Closed Landfill 2018 Annual Groundwater Data Evaluation Report

The purpose of this letter is to transmit the King County Vashon Island Closed Landfill 2018 Annual Groundwater Data Evaluation Report. This annual report incorporates a summary of the most recent hydrogeologic interpretation as prepared by a licensed hydrogeologist and presented in *Agency Draft* of the Vashon Island Closed Landfill Remedial Investigation Report, October 2018. The potentiometric maps and groundwater velocity calculations that have been included in the report were prepared by a licensed hydrogeologist and have been previously submitted with quarterly reports. This report also includes an executive summary, site specific summary, exceedances table, trend test table, time-concentration plots of parameters of interest, and descriptive statistics summary table.

The 2018 Annual Report has been updated to include environmental data collected through December 2018.

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

Enclosures

cc: Tim O'Connor, Hydrogeologist III, Washington State Department of Ecology
Yolanda Pon, Environmental Health Services Supervisor, Public Health – Seattle & King County
Glynda Steiner, P.E., CCM, Deputy Division Director, Solid Waste Division (SWD), Department of Natural Resources & Parks (DNRP)
Neil Fujii, P.E., Managing Engineering, SWD, DNRP
Anne Holmes, P.E., Supervising Engineer, SWD, DNRP
Jennifer Keune, Environmental Compliance Coordinator, SWD, DNRP

King County
Solid Waste Division
Department of Natural Resources and Parks
King Street Center
201 South Jackson Street, Suite 701
Seattle, WA 98104-3855
206-477-4466
711 TTY Relay
www.kingcounty.gov/solidwaste

April 1, 2019

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

RE: King County Vashon Island Closed Landfill 2018 Annual Groundwater Data Evaluation Report

Dear Mr. O'Connor:

The purpose of this letter is to transmit the King County Vashon Island Closed Landfill 2018 Annual Groundwater Data Evaluation Report. This annual report incorporates a summary of the most recent hydrogeologic interpretation as prepared by a licensed hydrogeologist and presented in *Agency Draft* of the Vashon Island Closed Landfill Remedial Investigation Report, October 2018. The potentiometric maps and groundwater velocity calculations that have been included in the report were prepared by a licensed hydrogeologist and have been previously submitted with quarterly reports. This report also includes an executive summary, site specific summary, exceedances table, trend test table, time-concentration plots of parameters of interest, and descriptive statistics summary table.

The 2018 Annual Report has been updated to include environmental data collected through December 2018.

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

Sincerely,

Marisa Baptiste
Engineer II

Enclosures

cc: Darshan Dhillon, Health and Environmental Investigator, Environmental Health Division, Public Health – Seattle and King County
Alan Noell, Ph.D., P.E., Washington State Department of Ecology
Glynda Steiner, P.E., CCM, Deputy Division Director, Solid Waste Division (SWD), Department of Natural Resources & Parks (DNRP)
Neil Fujii, P.E., Managing Engineering, SWD, DNRP
Anne Holmes, P.E., Supervising Engineer, SWD, DNRP
Jennifer Keune, Environmental Compliance Coordinator, SWD, DNRP

KING COUNTY
VASHON ISLAND CLOSED LANDFILL

2018 ANNUAL GROUNDWATER DATA EVALUATION REPORT

King County
Department of
Natural Resources and Parks
Solid Waste Division

Serving Community | Protecting Environment | Operating Excellence

April 2019

www.kingcounty.gov/solidwaste

CERTIFICATION

KING COUNTY VASHON ISLAND CLOSED LANDFILL
2018 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: Anne Holmes, P.E.	**Title:** Supervising Engineer, Facility Engineering and Science Section	**Date:** 4/1/19
Mailing Address: Solid Waste Division Department of Natural Resources & Parks 201 South Jackson Street, Suite 701 Seattle, WA 98104-3855		**Telephone Number:** 206-477-5223
Signature:		

EXP. 9/21/20

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 _____	Reference (section, subsection)	Included in this report	Location – page # or appendix #
***Quarterly Groundwater Reports**: 173-351-415 (2) plus the referenced section*			
Statistical calculations and summaries		☐	
Descriptive statistics	420, (1)	☐	
Statistical tests	420, (2)	☐	
Notification of statistical increase (if applicable)	420, (4)	☐	
Notification of concentrations above Chapter 173-200 WAC criteria (if any)	430, (4)	☐	
Static water level readings	415, (2)	☐	
Potentiometric surface elevation maps depicting flow direction	415, (2)	☐	
Flow rate – calculated	415, (2)	☐	
Cation-anion balances	430, (5a)	☐	
Explanation of greater than 5% (or 10%) difference if needed	430, (5a)	☐	
Trilinear diagrams	430, (5b)	☐	
Leachate analyses (if sampled and tested)	415, (2)	☐	
Data entered into EIM database (date entered:)	415, (3)	☐	
Complete copy of the lab report with chain of custody record.			
***Annual Groundwater Reports**: 173-351-415 (1)* **YEAR 2018**			
Summary of statistical results and trends	415, (1)	☒	Tables 3-1, 3-2, and 3-3
Summary of groundwater flow rate and direction for the year	415, (1)	☒	Appendix G
Copy of all potentiometric maps for the year	415, (1)	☒	Appendix G
Summary geochemical evaluation	415, (1)	☒	Appendix I
For Quarterly and Annual Reports			
Stamped by a licensed professional	RCW 18.220	☒	

Signature of Report Author

April 1, 2019
Date

Vashon Island Closed Landfill
Landfill

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

KING COUNTY
VASHON ISLAND CLOSED LANDFILL

2018 ANNUAL GROUNDWATER DATA EVALUATION REPORT

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

April 2019

TABLE OF CONTENTS

TABLE OF CONTENTS ..... **I**

LIST OF FIGURES ..... **II**

LIST OF TABLES ..... **III**

LIST OF APPENDICES ..... **IV**

EXECUTIVE SUMMARY ..... **V**

1. PURPOSE **1-1**

2. INTRODUCTION **2-1**

2.1. SITE LOCATION AND REGIONAL SETTING 2-1
2.2. SITE HISTORY 2-2
2.3. PREVIOUS INVESTIGATIONS AND SITE IMPROVEMENTS 2-2
2.4. GEOLOGY AND HYDROGEOLOGY 2-5
2.4.1. Regional Geology *2-5*
2.4.2. Site Geology *2-5*
2.4.3. Regional Hydrogeology *2-6*
2.4.4. Site Hydrogeology *2-7*

3. EVALUATION METHODS **3-1**

3.1. DATA QUALITY 3-1

4. RESULTS **4-1**

4.1. GROUNDWATER ELEVATIONS AND FLOW DIRECTION 4-1
4.1.1. Groundwater in Unit B *4-1*
4.1.2. Groundwater in Channel Cc1 ..... *4-1*
4.1.3. Groundwater in Channel Cc2 ..... *4-2*
4.1.4. Groundwater in Channel Cc3 ..... *4-2*
4.1.5. Groundwater in the Unit D Aquifer *4-3*
4.2. GROUNDWATER QUALITY 4-3
4.2.1. Groundwater in Channel Cc1 ..... *4-5*
4.2.2. Groundwater in Channel Cc2 ..... *4-7*
4.2.3. Groundwater in Channel Cc3 ..... *4-13*
4.2.4. Groundwater in the Unit D Aquifer *4-14*
4.3. WEIR AND SURFACE WATER QUALITY 4-18
4.4. OFFSITE DOMESTIC WELL MONITORING 4-20

5. LANDFILL GAS **5-20**

6. CONCLUSIONS AND RECOMMENDATIONS **6-20**

6.1. CONCLUSIONS 6-20
6.2. RECOMMENDATIONS/PROPOSED ACTIONS 6-21

7. REFERENCES **7-1**

LIST OF FIGURES

Figure 1	Vashon Island Closed Landfill Vicinity Map
Figure 2	Groundwater Monitoring Well Locations
Figure 3	Surface Water Monitoring Well Locations
Figure 4	Private Monitoring Well Locations
Figure 5	Landfill Gas Collection and Monitoring Systems
Figure 6	Regional Geologic Cross Section Location Map. Cross Sections: A-A' and D-D'
Figure 7	Site Cross Section Location Map. Cross Sections: B-B', C-C', and D-D'
Figure 8	Regional Geologic Cross Section A-A'
Figure 9	Geologic Cross Section B-B'
Figure 10	Geologic Cross Section C-C'
Figure 11	Geologic Cross Section D-D'
Figure 12	Water Level Elevations in Unit B Aquifer
Figure 13	Water Level Elevations in Channel Cc1
Figure 14	Water Level Elevations in Channel Cc2
Figure 15	Water Level Elevations in Channel Cc3
Figure 16	Water Level Elevations in Unit D Aquifer

LIST OF TABLES

Table 2-1	Significant Maintenance Activities Summary 2018
Table 2-2	Vashon Island Closed Landfill Groundwater Monitoring Well Completion Details
Table 2-3	Summary of Vashon Island Closed Landfill Site Stratigraphic Units
Table 3-1	Summary of Statistical Analyses for Groundwater Well Samples
Table 3-2	Summary of Trend Results for Groundwater Well Samples Summary of Trend Analysis
Table 3-3	Summary of Trend Analyses for Groundwater Well Samples Groundwater Trends in Individual Wells
Table 3-4	Summary of Statistical Analyses for West Hillside Seep / Weir Samples
Table 4-1	Comparison of Background Conditions and Unit D Aquifer

LIST OF APPENDICES

Appendix A Groundwater Quality Standards

Appendix B Exceedance Reports
Summary of Groundwater Quality Criteria Exceedances
Summary of Groundwater Prediction Limit Exceedances
Summary of Groundwater Volatile Organic Compound Detections Exceedances
Summary of Surface Water Monitoring Location Exceedances vs. Surface Water Quality Standards

Appendix C Time Concentration Plots for Groundwater in Channel Cc1

Appendix D Time Concentration Plots for Groundwater in Channel Cc2

Appendix E Time Concentration Plots for Groundwater in Channel Cc3

Appendix F Time Concentration Plots for Groundwater in Unit D Aquifer

Appendix G Groundwater Velocity Calculations and Potentiometric Maps

Appendix H Groundwater Monitoring Data

Appendix I Ion Balance Summary & Trilinear Diagrams

Appendix J Surface Water Monitoring Data

Appendix K Leachate Monitoring Data

Appendix L Landfill Gas Monitoring Data

Appendix M Inspection Survey Reports

Appendix N Vashon Island Closed Landfill - 2018 Financial Summary

EXECUTIVE SUMMARY

This Report presents the results of statistical analyses on the groundwater monitoring data collected at the Vashon Island Closed Landfill (VLF) from 1986 through December 2018 per WAC 173-351 and King County Solid Waste Code, Chapter 10.04. The Fourth Quarter 2018 data is presented in the following appendices: Appendix B Exceedance Reports, Appendix G Groundwater Velocity Calculations and Potentiometric Maps, Appendix H Groundwater Monitoring Data, Appendix I Ion Balance Summary & Trilinear Diagrams, Appendix J Surface Water Monitoring Data, Appendix K Leachate Monitoring Data, and Appendix L Landfill Gas Monitoring Data.

The Financial Assurance information in this document (included in Appendix N) presents the authorized 2018-2019 budget for the Vashon Island Closed Landfill. The financial information is presented in a format, which responds to the regulatory request for financial assurance and will be updated based on a remedial investigation and feasibility study ongoing for the landfill.

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

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

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

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

In 2014, Channel Cc2 entered voluntary cleanup under the Washington State Model Toxics Control Act (MTCA).

There are two groundwater monitoring wells in Channel Cc3, both of which are considered to be of good quality with little evidence of landfilling impacts.

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

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

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

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

1. PURPOSE

The purpose of this report is to report the annual conditions at Vashon Island Closed Landfill (VLF) in compliance of the regulatory requirements of the WAC 173.351, Criteria for Municipal Solid Waste Landfills.

2. INTRODUCTION

This is the 2018 Annual Groundwater Data Evaluation Report that presents the results of statistical analyses on the groundwater monitoring data collected at the VLF from 1986 through December 2018. This annual report describes the hydrogeologic conditions at the landfill and presents the evaluations on the groundwater quality data collected from upgradient and downgradient monitoring wells and on the water quality from seeps on the hillside to the west of the landfill. The data in this report are presented in compliance with Washington Department of Ecology "Criteria for Municipal Solid Waste Landfills" (WAC 173-351-415), and the Code of the King County Board of Health "King County Solid Waste Regulations" (Title 10, Rules and Regulations No. 8).

To meet the annual reporting requirement of WAC 173-351, this annual report includes a discussion of maintenance activities at the site in 2018 (Table 2-1), surface water data (Appendix J), landfill gas data (Appendix L), and leachate data (Appendix K).

This report also provides a brief description of the partial closure and site improvements that were completed in 1989 and mentions the site investigations conducted at the landfill in 1995 and 1999 and the final closure construction completed in 2002. Groundwater quality trends are discussed in context of these site improvements. This report also includes: a summary of previous site investigations; a description of the location, topography, and regional geology and groundwater hydrology of the landfill; a history of the landfill; evaluation methods; data quality; site hydrogeology; and results and discussion of groundwater flow and chemistry at the landfill. Planned future activities at the site are presented in Section 6. This report has been updated to reflect the updated hydrogeological conceptual model (Aspect, 2018) and to include data, analysis, and evaluation of monitoring wells MW-33, MW-34, MW-35, MW-36, which were installed in March of 2015.

2.1. SITE LOCATION and REGIONAL SETTING

The Vashon Island Closed Landfill (VLF) is located on a 145-acre King County owned parcel in the west central portion of Vashon Island (Figure 1). The landfill property is divided into unequal parts by Westside Highway SW. Most of the property exists in sparsely to unwooded, gently rolling terrain at elevations of 300 to 400 ft. The 37.2-acre area east of the highway is primarily unwooded open space and consists of 10.3 acres of municipal solid waste and 28.7 acres of landfill facilities. The 15.3-acre area west of the highway is steep, undeveloped, forested land sloping towards the Colvos Passage, commonly referred to as the West Hillslope. The VLF property is bounded by Westside Highway Southwest and rural residential land to the northwest, by Southwest 184th Street to the north, by forested land and rural residential land to the east, and by rural residential land to the south (Figure 1).

Vashon Island has a mild climate, tempered by the surrounding Puget Sound. Summers are cool and dry, while winters are moist and mild. Meteorological data collect from the West Judd Creek Rain Gage on Vashon Island by King County (precipitation collected from 2004 – present and air

temperature collected from 2007 – 2014) shows that the average monthly precipitation ranges from 0.5 inches in July to 7.7 inches in November. Total annual precipitation ranges from a minimum of 30.9 inches in 2013 to a maximum of 56.5 inches in 2006. Average daily temperature ranges from 48 °F to 54 °F. The annual maximum temperature ranges from 68 °F – 84 °F and the annual minimum temperature ranges from 19 °F – 32 °F.

2.2. SITE HISTORY

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

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

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

2.3. PREVIOUS INVESTIGATIONS and SITE IMPROVEMENTS

Hydrogeology, water quality, and environmental investigations have been conducted at the VLF since 1983, led by R.W. Beck and Associates and Sweet, Edwards and Associates (1984), Harper-Owes (1986), Harper-Owes, et al. (1988), CH2M Hill (1995, 1996), Berryman & Henigar (1999), Berryman & Henigar et al. (2000), Berryman & Henigar and Udaloy Environmental Services (UES) (2004, 2006a), King County (2011), and Aspect (2012, 2018). In 1983, the first four groundwater monitoring

wells (MW-1, MW-2, MW-3, and MW-4) were installed at the landfill. Piezometers P-1/1A/1B and P-2/2A (Figure 2), previously located in the fill area on the east side, were abandoned in 1988 by overdrilling and then filling the borehole with bentonite in accordance with the requirements of Washington Administrative Code (WAC) 173-160. Wells MW-5 and MW-6 were installed in 1986. These wells were installed in the early to mid-1980s as part of a site assessment completed to determine how to best bring the landfill into compliance with state and local solid waste disposal regulations. Two piezometers, P-3 and P-4 were installed in 1992, and then later renumbered as monitoring wells MW-13 and MW-24. Monitoring well MW-13 is now utilized as a compliance groundwater monitoring well. Monitoring well MW-24 is used to only monitor static groundwater levels.

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

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

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

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

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

Drilling operations in 2003 included installing 3 additional monitoring wells (MW-26, MW-27 and MW-28) and one piezometer (MW-25) to expand the monitoring network. Monitoring well MW-28 has been dry since completion. A revision to the 2000 hydrogeologic report was completed in December 2004 (Berryman & Henigar and UES, 2004) incorporating these new wells into the hydrogeologic interpretation of the site. Table 2-2 provides details on all of the wells on the site.

Maintenance of the environmental control facilities is performed throughout the year. The Operations and Maintenance Plan was produced at the end of 2005, which provided tables listing the specific O&M activities for each system. The new listings were incorporated into the SWD Operations tracking database in 2006. A summary of the maintenance activities completed in 2018 is included as Table 2-1.

In March 2006, three documents covering the environmental evaluation of the landfill site were submitted to Washington Department of Ecology and Public Health-Seattle & King County. (1) "Environmental Evaluation" provided an evaluation of the landfill environmental control systems and their interaction with the hydrogeologic environment (Berryman & Henigar and UES, 2006a); (2) "Potential Effects of Landfill Gas and Leachate on Vashon Landfill Groundwater and Springs", provided a chemistry-based evaluation of the source of volatile organic compounds (VOCs) found in some of the wells present at the time (Berryman & Henigar and UES, 2006b); and (3) "VOC Sampling and Test Results" reported the findings of soil gas sampling performed at the site. Combined, these documents address the requirements of Compliance Task 4 in the Vashon Closed Landfill Permit (Berryman & Henigar and Herrera, 2004).

These reports also provided recommendations for further actions, some of which were completed in 2006. One, the testing of the leachate lagoon liner, was completed in 2007. The results indicated that the liner did not have any leaks.

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

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

In March of 2015, the recommendation to better define the hydrogeology model, wells MW-33, MW-34, MW-35, and MW-36 were installed. Monitoring well MW-33 was the only new well installed. Monitoring well MW-34 replaced monitoring well MW-27. Monitoring well MW-35 replaced monitoring well MW-5D, which was an old multi-completion well. Monitoring well MW-36 replaced monitoring well MW-14, which had a stuck pump above the screen interval. After four years of data collection, there is now sufficient data from these wells for analysis. As of this annual report they will now be included as part of annual and quarterly reporting.

In July 2015, the leachate lagoon was tested for leaks by Beyond Leak Detection, a regulatory requirement and a condition of the County's Solid Waste Handling Permit, and found to have no leaks.

In October of 2018, an Agency Draft of the Vashon Island Closed Landfill Remedial Investigation Report (RI) was distributed to the Washington State Department of Ecology and Public Health-Seattle & King County. The RI began in 2014 and was conducted in accordance with the Washington State Model Toxics Control Act (MTCA; Washington Administrative Code [WAC] Chapter 173-340). Data was gathered and analyzed to provide an understanding of the hydrogeologic site setting, nature and extent of contaminants, their fate and transport, and the receptors that may be impacted by the contaminants. The RI will be used to prepare a Feasibility Study to determine the necessity for additional cleanup actions in compliance with MTCA regulations (WAC 173-340-350 through 173-340-390).

2.4. GEOLOGY AND HYDROGEOLOGY

2.4.1. **Regional Geology**

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

2.4.2. **Site Geology**

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

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

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

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

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

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

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

2.4.3. **Regional Hydrogeology**

Groundwater flow on Vashon-Maury Island (VMI) is largely radial and downward, flowing outward from the island's central uplands towards the surrounding Puget Sound (King County, 2005). Vashon Island hydrogeology has previously been characterized based on island well logs and two primary aquifers were identified as being used as Vashon Island's water supply source: the Principal Aquifer generally located above sea level yielding moderate amounts of water to wells, and the Deep Aquifer at depths of about 100 to 300 ft. below sea level capable of yielding larger quantities of water (Carr, 1983). The 1998 groundwater management plan (GWAC, 1998) defined four hydrostratigraphic zones based on water level data and completion depths from 25 wells. Broadly speaking, Zones 1 and 2 are within the Principal Aquifer and Zones 3 and 4 are within the Deep Aquifer identified in the Carr Report. In both studies, groundwater flow in the

shallower aquifers was to the east and west from a topographic high that extends in an approximate north-south axis along the island, with steeper gradients along the west side. Groundwater modeling completed as a component of the Water Resources Evaluation confirmed this aspect of groundwater flow on the island (King County, 2005). Research for the groundwater modeling found that groundwater use is fairly evenly divided among the shallow advance outwash, upper deep, and lower deep aquifers.

2.4.4. **Site Hydrogeology**

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

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

Groundwater in Channel Cc1 is currently evaluated using monitoring wells MW-3, MW-4, MW-10, and MW-13 (Figures 6-11) and all monitoring wells measure water levels within the Cc1 deposits. Monitoring wells typically producing sufficient water include MW-10, MW-13, and periodically monitoring wells MW-1 and MW-3.

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

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

A steep slope west of the landfill cuts across a water-bearing silt/sand contact. As a result, some 400 to 500 ft. to the west of the landfill, groundwater emerges and enters an unnamed creek before entering Puget Sound at Colvos Passage approximately two-thirds 3 of a mile to the west. A hydrogeologic investigation of the hillslope attempting to locate the outcroppings of the Unit C channels and provide water quality monitoring locations for the channels was completed in 2011; the findings are presented in the Vashon Landfill Western Hillslope Investigation Report.

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

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

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

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

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

3. EVALUATION METHODS

The landfill environmental evaluation was conducted in accordance with the Draft Data Evaluation Supplement to the Environmental Monitoring Sampling and Analysis Plan and Quality Assurance Project Plan for Vashon Island Closed Landfill. The evaluation tools include:

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

The prediction limit exceedances, regulatory standard exceedances, ion balances and trilinear diagrams are prepared for each quarterly report and compiled in this report. Samples from all monitoring wells are compared to the Washington State and Federal groundwater quality standards found in Appendix A. The data evaluated from wells screened within Unit D Aquifer, will be calculated and compared to intrawell prediction limits and wells screened within Channel Cc2 will be calculated and compared to interwell prediction limits from upgradient monitoring well MW-20 (Appendix B). Monitoring wells MW-33, MW-34, MW-35, and MW-36, which were installed in 2015, were not included in previous annual or quarterly reports, but are now included in this report and prediction limit exceedances, regulatory standards exceedances, ion balances, and trilinear diagrams from the 2018 quarterly reports have been updated to include this wells.

The Mann Kendall trends were recalculated in 2018 using the R Project for Statistical Computing package 'Kendall'. This new tool produces more robust results compared with previously used technology. The trend test is evaluated for long term trends, including historical data up to the last eight samples, and for short term trends using the last eight samples. For wells with historical data beyond 50 samples, the most recent 50 samples are used in the long term trend test. Wells with fewer than 20 samples, wells that have not produced sufficient water for eight samples in the last two years, and decommissioned wells are compiled as a long term trend only.

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

3.1. DATA QUALITY

Five analytical labs have performed laboratory services for water samples collected at the Vashon Landfill including Laucks from 1986 to March 1990, AmTest from March 1990 to April 1992, and Analytical Resources (ARI) from April 1992 to May 1995, Laucks again from May 1995 to April 2008 and Pace from April 2008 to March 2009 and the King County Environmental Laboratory

from April 2009 to current. The State Manchester Laboratory accredited all five laboratories for the methods used at the time the samples were analyzed.

Contamination of blanks has important ramifications for data quality. However, some compounds have high blank contamination rates for compounds, such as methylene chloride. Although improvements have been made in reducing the rate of blank contamination in the lab, blank samples that have a longer residence time in the lab still show elevated rates. Since the common lab 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.

There are instances, particularly in the case of arsenic where the limit of detection, because of technological limitations, is above the State or Federal water quality levels. Because these concentrations are not quantifiable, they can be reported only qualitatively, as less than a reporting limit and are qualified accordingly. Another issue involving limits arises when the limits of detection or analytical sensitivity changes over time. Especially noticeable for parameters such as chloride, where more recent samples show more fluctuations or definition on the graphs due to more significant figures (greater sensitivity) being reported. Other factors that may contribute to these changes may be due to dilution, or due to technical or contractual specifications such as technical advancements in instrumentation in the contractual laboratory industry. These changes must be kept in mind while reviewing data evaluation and conclusions and laboratory qualifiers can be found in Appendix B.

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

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

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

4. RESULTS

4.1. GROUNDWATER ELEVATIONS AND FLOW DIRECTION

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

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

In order to utilize the most current information, an elevation datum transition from NGVD29 to NAVD88 was implemented. Water level elevations from 2016 to present were adjusted by approximately an increase in three feet from previous reports. Figures 12 through 16 highlight this modification.

4.1.1. **Groundwater in Unit B**

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

4.1.2. **Groundwater in Channel Cc1**

There are currently four monitoring wells screened in Channel Cc1 deposits: MW-3, MW-4, MW-10, and MW-13. Groundwater is encountered in this zone at elevations of 264 to 280 ft. above mean sea level (MSL).

The saturated thickness of the Channel Cc1 is generally less than 11 ft. (Figure 13). The water levels in monitoring wells MW-3 and MW-4 have declined due to minimal recharge rates and seasonally there is an insufficient volume of water present to collect samples. Monitoring well MW-4 yielded sufficient groundwater for analysis from 1997 to late 2000, and in 2018 yielded sufficient groundwater for four samples. Monitoring well MW-3 yielded sufficient water for two samples in 2018. Monitoring wells MW-10 and MW-13 have yielded sufficient groundwater for continuing analysis since 1993.

Water levels for most of the wells have fallen in elevation since 1991 at which time the practice began of periodically placing temporary HDPE cover over the completed refuse fill area. The final closure of the landfill in 2002 appears to have further reduced surface recharge to this sand zone.

Historically, groundwater levels in the wells in Channel Cc1 have shown a variation from less than one foot to almost five feet with no marked seasonality. Monitoring well MW-4 is screened across a silt contact and the well can act as a sump. The well is not sampled unless the water levels rise above the silt contact. There was sufficient groundwater for two samples in 2007, three samples in 2017 and four samples in 2018. Previously the water levels had not been above the silt contact since November 2000.

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

4.1.3. **Groundwater in Channel Cc2**

Monitoring wells MW-9, MW-2, MW-20, MW-21, MW-33, and MW-35 are completed in Channel Cc2 and are screened at elevations between 220 and 250 ft. MSL.

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

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

The updated hydrogeological conceptual model (Aspect, 2018) was used for the third and fourth quarter potentiometric groundwater surface maps and groundwater velocity calculations found in Appendix G. The following groundwater data is taken from those two memoranda. The perched zone monitored by monitoring wells MW-2, MW-20, MW-21, MW-33, and MW-35 has a hydraulic gradient of between 0.007 ft/ft and 0.042 ft/ft. Its hydraulic conductivity is estimated to be between 1.61 and 19.35 ft/day and the effective porosity is estimated to be 0.2. The estimated horizontal groundwater velocity for 2018 ranged from 0.06 to 4.07 ft/day. The calculated velocities are expected to be accurate only within one order of magnitude due to variability in permeability rates. Quarterly velocity calculations and potentiometric maps are attached in Appendix G.

4.1.4. **Groundwater in Channel Cc3**

Monitoring wells MW-8 and MW-36 are screened within Channel Cc3. Monitoring well MW-36 was installed in April of 2015. Groundwater is encountered at elevations of 210 to 227 ft. MSL (Figure 16). Water levels in MW-8 have averaged 206.92 ft. with the highest elevation at 208.23 ft.

and the lowest at 205.57 ft., therefore the screened interval in MW-8 has intersected the potentiometric surface in all depth-to-water measurements (Figure 15).

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

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

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

There are seven wells screened within the Unit D Aquifer (MW-7, MW-12, MW-19, MW-25, MW-26, MW-29, and MW-34). Monitoring well MW-34 was installed in March of 2015. Groundwater is encountered at elevations of 154 to 195 ft. MSL (Figure 16).

The general flow direction in the Unit D Aquifer is away from MW-7 southwest towards MW-12, northwest towards MW-19, and northeast towards MW-25 (Appendix G). The water fluctuations for the monitoring wells are less than two ft., except for MW-25 which was less than 4 ft. in 2018, and without considerable seasonal trends (Figure 16). This lack of response to the annual cycle of wet and dry seasons can be explained by the landfill being located in an area where there is not significant recharge to the aquifer (Carr,1983); which is in turn attributable to relatively low-permeability surficial deposits (till) and landfill closures. The potentiometric maps shown in Appendix G generally agree with the flow directions reported by Carr (1983).

The updated hydrogeological conceptual model (Aspect, 2018) was used for the third and fourth quarter potentiometric groundwater surface maps and groundwater velocity calculations found in Appendix G. The following groundwater data is taken from those two memoranda. In 2018 the groundwater velocity occurring in the Unit D Aquifer was between 0.35 and 4.33 ft/day, with a hydraulic gradient ranging from 0.016 to 0.034 ft/ft and a hydraulic conductivity estimated between 4.4 and 46.1 ft/day. The estimated velocities are expected to be accurate only within one order of magnitude due to variability in permeability rates (Appendix G).

4.2. GROUNDWATER QUALITY

Results for the groundwater quality beneath the Vashon Landfill were derived from Channels Cc1, Cc2, Cc3, and the Unit D Aquifer. Statistical summaries present both short- and long-term data. Short-term term results obtained from January 2017 to December 2018 are emphasized all statistics and trend information discussed here is for that period unless otherwise indicated. Tables 3-1, 3-2, and 3-3 provide statistics and trends for both this recent period and the previous samples, respectively. All screen intervals are in reference to North American Vertical Datum of 1988 (NAVD 88), unless otherwise indicated. During the recent sampling period, eight samples were

taken from each well. Certain wells have limited data because they have a short monitoring history; are seasonally dry, have low production, or are slow to recover and did not yield adequate data for comprehensive analyses. Only long-term trend tests are available for these wells. For monitoring wells MW-33, MW-34, MW-35, and MW-36, which were installed in 2015, there is only sufficient data for short-term statistical and trend analysis. Apparent trends in individual wells, long- and short-term, are discussed where applicable (Tables 3-2 and 3-3). Hydraulically up-gradient wells are discussed first.

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

It is also important to note that several compounds, in particular acetone, zinc, and methylene chloride, have been frequently detected in blanks and field samples at similar concentrations. In 2018, both total and dissolved zinc were detected in groundwater field blank samples. The likely source of these compounds is laboratory contamination.

In 2018, arsenic was detected and exceeded the Washington State groundwater quality regulatory standard for all monitoring well samples collected. However, United States Geological Survey and Washington State Department of Health have identified arsenic as a common, naturally-occurring element in groundwater throughout western Washington.

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

The summary statistics are presented in Table 3-1. A summary of long- and short-term trend evaluations for individual wells is presented in Tables 3-2 and 3-3. Exceedances of water-quality standards, prediction limit exceedances, time-concentration plots, potentiometric maps, groundwater velocities, and raw analytical data are provided in appendices.

4.2.1. **Groundwater in Channel Cc1**

As described in Section 3.1.1, MW-3, MW-4, MW-10, and MW-13 are the only monitoring wells in the groundwater in Channel Cc1 and water quality samples were taken in the most recent period (January 2017 to December 2018). There was sufficient water to collect three sample from MW-3 and seven samples from MW-4 during this period.

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

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

4.2.1.1. MW-10

Monitoring well MW-10, located in the northwest corner of the property and northwest of the placement of the refuse, was installed with seven other additional groundwater monitoring wells during the summer of 1995. It is screened between 255.04 and 265.04 ft. MSL.

The pH (field) is neutral (median 7.13). Specific conductance (field), median 149.0 µmhos/cm and total dissolved solids (median 107.0 mg/L) are low and stable (Tables 3-1 and 3-2). Sulfate (median 8.8 mg/L), chloride (median 3.28 mg/L) and nitrate (median 0.63 mg/L) are low and stable (Table 3-2 and Appendix C). During the recent period, no conventional parameters exceeded the water-quality standards.

Dissolved iron was not detected in the last eight samples for but total iron was detected once, however, iron is low and stable. Concentrations of common metals, calcium, and magnesium are low and stable. A short-term, statistically-significant increasing trend for total arsenic was seen in samples from monitoring well MW-10 (Table 3-2 and 3-3). Total arsenic exceeded the State Groundwater Quality Criteria in all eight samples.

No volatile organic compounds have been detected in MW-10 since 2001.

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

4.2.1.2. MW-13

Monitoring well MW-13 is screened above the lacustrine silt in sandy soils. It was installed in 1992 and placed on the quarterly monitoring schedule in June 1994. Monitoring well MW-13 is located in the southeast portion of the property and screened between 262.3 and 267.3 ft. MSL.

The pH (field) is neutral (median 7.07). Specific conductance (field) (median 166 µmhos/cm), total dissolved solids (median 121 mg/L), nitrate (median 0.17 mg/L), and sulfate (median 13.8 mg/L) are low and stable. (Table 3-1 and Appendix C)

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

Arsenic exceeds the State Groundwater Quality Criteria of 0.05 µg/L in all eight recent samples (Appendix B). No other samples exceed State or Federal standards. No volatile organic compounds have been detected in this well since 1999. In general, water in this well is of good quality with no indications of potential landfill impact.

4.2.1.3. MW-3 and MW-4

Monitoring wells MW-3 and MW-4 are shallow wells in Cc2. Monitoring well MW-3 is screened between 276.15 and 281.15 ft. MSL. Monitoring well MW-4 is screened between 266.17 and 276.17 ft. MSL. Monitoring well MW-3 had sufficient water to provide two samples and monitoring well MW-4 sufficient water to provide four samples in 2018. Monitoring well MW-4 is monitored quarterly for water levels and will be sampled, if possible. Monitoring well MW-3 shows similar or decreased values compared to previous years when sampled, except for nitrate, which has a long-term increasing trend in both monitoring wells (Tables 3-2 and 3-3). Since there were not eight consecutive samples take in the past two years for monitoring wells MW-3 and MW-4 there are not short-term trends for these wells. Monitoring well MW-3 had two exceedance of water-quality standards for pH and total arsenic. Monitoring well Samples from monitoring well MW-4 exceeded pH three times and total arsenic four times. In 2018, there were two VOC detections for samples in monitoring well MW-3 tetrachloroethene and trichlorofluoromethane. There was one VOC detected for samples in monitoring well MW-4 in 2018, trichlorofluoromethane (Appendix B).

4.2.1.4. Groundwater in Channel Cc1 Summary

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

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

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

4.2.2. **Groundwater in Channel Cc2**

Monitoring wells MW-9, MW-2, MW-20, MW-21, MW-33, and MW-35 monitor the groundwater perched within Channel Cc2. Monitoring wells MW-2, MW-20, MW-21, MW-33, and MW-35 are completed in continuous thin sand that correlates with the elevation and location of one of the seeps (seep 2 or SW-W2) on the west side of the landfill.

The trilinear diagram shows all of the samples to be within the same calcium-magnesium-bicarbonate hydro-chemical facie, as they have been in past samples for these wells. MW-21 and MW-2 continue to be characterized by more dominant bicarbonate-carbonate characteristics. The cation/anion ratio for the wells in this channel was within ten percent (Appendix I) for all of 2018. The reported results are sufficient for characterization.

Interwell prediction limits for the fourth quarter of 2018 are tabulated in Appendix B. The prediction limits in for monitoring wells in Channel Cc2 are compared to well MW-20.

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

4.2.2.1. MW-20

MW-20 is located in the southeast portion of the property. It was installed in October 1998 and is screened between 236.49 and 240.79 ft. MSL in a continuous sand bed within the lacustrine silt.

The field pH results show a neutral pH (median 7.03). Measurements of specific conductance (median 221 μmhos/cm), chloride (median 3.14 mg/L), sulfate (median 16.6 mg/L,) and total dissolved solids (median 144 mg/L) are stable (Tables 3-1, 3-2, and 3-3).

Many of the dissolved metals exhibit short term stability; calcium (median 13.4 mg/L) and magnesium (median 14.2 mg/L). Dissolved arsenic (median 0.002 mg/L and dissolved iron (median 0.3 mg/L) both have increasing short-term trends, while dissolved manganese (median 0.29 mg/L) has a short-term decreasing trend. During the 2018 reporting period, total arsenic, dissolved iron, and dissolved manganese levels exceeded the State Groundwater Quality Criteria in four of four quarterly samples. There was also one exceedance of bis(2-ethylhexyl) phthalate in November of 2018 during the Appendix III sampling event.

In 2018, there were two VOCs detected in monitoring well MW-20, 2-methyl-1-propanol and dichlorodifluoromethane. Monitoring well MW-20 has a long-term increasing trend for dichlorodifluoromethane, but the short-term trend shows dichlorodifluoromethane as decreasing.

The assessment monitoring program for Appendix III parameters detected dichlorodifluoromethane, in 2011, as the single Appendix III parameter not included on the

Appendix I and II lists. This parameter is included in the current monitoring program for VLF. At the request of Ecology, wells MW-2 MW-20, and MW-21 were sampled again in 2012 for Appendix III analytes. With the exception of dichlorodifluoromethane, there continue to be no detections of Appendix III analytes. A demonstration was presented to Ecology in 2014, and based on the findings it was agree that, with the exception of dichlorodifluoromethane, KCSWD would cease sampling for Appendix III analytes for five years dating from 2013, the last year Appendix III analytes. In 2018, Appendix III analytes were sampled for again in the Channel Cc2 monitoring wells. 2-methyl-1-propanol and bis(2-ethylhexyl)phthalate were detected in monitoring well MW-20. These new Appendix III analyte detections may be the result of the LLOQ lab methodology that was implemented in 2017.

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

4.2.2.2. MW-9

MW-9 is located in the northwest portion of the property. It was installed as part of the addition of eight groundwater monitoring wells during the summer of 1995. It is screened between 226.39 and 236.29 ft. MSL in sand and gravel.

The pH conditions in this well are fairly neutral, with a median of 6.98. The specific conductance (median 192 µmhos/cm) is stable. Total dissolved solids (median 131 mg/L), nitrate (median 0.39 mg/L), chloride (median 4.7 mg/L), and sulfate (median 12.5 mg/L) appear to be stable in recent samples (Tables 3-1, 3-2, and 3-3).

Iron levels are low and stable with one detections in the past eight samples. Sodium (median 6.2 mg/L) levels are stable. Total arsenic results exceeds the State groundwater quality criterion of 0.05 µg/L in the eight recent samples.

In 2018, there were no volatile organic compounds detected in MW-9.

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

4.2.2.3. MW-2 and MW-21

Monitoring wells MW-2 and MW-21 are located downgradient and in the southwest portion of the property. Monitoring well MW-2 has been monitored quarterly since September 1986. Monitoring well MW-21 was installed in fall 1998 and has been monitored continuously since then. The screen elevation for monitoring well MW-2 is 232.39 ft. to 237.39 ft. MSL and for monitoring well MW-21 237.06 ft. to 246.46 ft. MSL.

The pH measurements from these wells show conditions close to neutrality. The pH median values for monitoring wells MW-2 and MW-21 are 6.85 and 6.67, respectively, and are stable. In recent sampling in both wells, several indicator parameters and metals were elevated, compared to the up-gradient monitoring well MW-20. Monitoring well MW-2 has the higher concentrations compared with monitoring well MW-20 for total dissolved solids (median 182 mg/L), specific conductance (median 301 μmhos/cm), alkalinity (median 135 mg/L) dissolved calcium (median 19.8 mg/L), dissolved magnesium (median 21.6 mg/L), and dissolved sodium (median 9.2 mg/L). Monitoring well MW-21 has higher concentrations compared to monitoring well MW-20 for specific conductance (median 263 μmhos/cm), total dissolved solids (median 169 mg/L), alkalinity (median 120 mg/L), ammonia (median (0.02 mg/L), nitrate (median 0.12 mg/L), dissolved iron (median 0.4 mg/L), dissolved manganese (median 0.69 mg/L), dissolved calcium (median 18.9 mg/L), dissolved magnesium (median 16.6 mg/L), and dissolved sodium (median 11.5 mg/L) (Tables 3-1, 3-2, and 3-3).

For all four samples taken in 2018 from both monitoring wells MW-2 and MW-21 the secondary State and Federal groundwater quality criteria was exceeded for dissolved manganese. Monitoring well MW-21 exceeded the State and Federal groundwater quality criteria for dissolved iron in all four samples and for pH in one sampled. (Appendix B).

Both monitoring wells MW-21 and MW-2 showed statistically-significant short-term trends for the past eight samples. Monitoring well MW-2 had short-term increasing trends for dissolved manganese, total manganese, and cis-1,2-dichloroethene and decreasing trends for alkalinity, total dissolved solids, total arsenic, and dichlorodifluoromethane. Wells screened within Channel Cc2 continually show a long-term stabilization of groundwater conditions for many of the analytes that are sampled for.

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

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

- *Cis*-1,2 dichloroethene in MW-2 (six out of eight samples, median 0.24 µg/L), and MW-21 (eight out of eight samples, median 0.91 µg/L);
- Vinyl chloride in MW-2 (eight out of eight samples, median 0.7 µg/L), and MW-21 (eight out of eight samples, median 0.06 µg/L);
- Trichlorofluoromethane in MW-2 (eight out of eight samples, median 0.36 µg/L), and MW-21 (eight out of eight samples, median 0.32 µg/L);

- Dichlorodifluoromethane in MW-2 (eight out of eight samples, median 3.5 µg/L), and MW-21 (eight out of eight samples, median 0.91 µg/L).

In 2018, monitoring wells MW-2 and MW-21 exceeded the State Groundwater Quality Criteria for vinyl chloride for all four samples taken (Appendix B).

In 2018, Appendix III analytes were sampled for again in the Channel Cc2 monitoring wells. Bis(2-ethylhexyl) phthalate was detected in monitoring well MW-2 and 2-methyl-1-propanol was detected in monitoring well MW-21.

4.2.2.4. MW-5D, MW-33, and MW-35

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

Monitoring well MW-35 was installed in March of 2015, in order to replace monitoring well MW-5D and monitoring well MW-33 was installed in March of 2015, in order to better define groundwater quality in Channel Cc2. The screen elevation for monitoring well MW-33 is 221.95 ft. to 231.95 ft. MSL and for monitoring well MW-35, 236.98 ft. to 246.98 ft. MSL

The pH measurements for monitoring wells MW-33 and MW-35 are close to neutral with median values of 6.66 and 6.62, respectively. In recent sampling in both wells, several indicator parameters and metals were elevated, compared to the up-gradient monitoring well MW-20. Monitoring well MW-33 has higher concentrations compared with monitoring well MW-20 for the following indicator parameters: specific conductance (median 816 µmhos/cm), total dissolved solids (median 488 mg/L), alkalinity (median 423 mg/L), ammonia (median 0.033 mg/L), and chloride (median 4.55 mg/L) and for the following dissolved metals: arsenic (median 0.038 mg/L), iron (median 7.48 mg/L), manganese (median 1.08 mg/L), calcium (median 70.2 mg/L), magnesium (median 57.5 mg/L), sodium (median 19.1 mg/L), and potassium (median 3.47 mg/L). Monitoring well MW-35 has higher concentrations compared with monitoring well MW-20 for the following indicator parameters: specific conductance (median 705 µmhos/cm), total dissolved solids (median 445 mg/L), alkalinity (median 350 mg/L), ammonia (median

0.069 mg/L), sulfate (median 20.6 mg/L), and chloride (median 4.06 mg/L) and for the following dissolved metals: arsenic (median 0.036 mg/L), iron (median 15.45 mg/L), manganese (median 12.51 mg/L), calcium (median 64.0 mg/L), magnesium (median 43.0 mg/L), sodium (median 16.6 mg/L), and potassium (median 3.35 mg/L) (Tables 3-1, 3-2, and 3-3).

For all four samples taken in 2018 from both monitoring wells MW-33 and MW-35 the primary State and Federal groundwater quality criteria were exceeded for total arsenic and the secondary State and Federal groundwater quality criteria was exceeded for dissolved iron and dissolved manganese (Appendix B). Monitoring wells MW-33 and MW-35 exceed the secondary State and Federal groundwater quality criteria for pH in one sample each.

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

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

- Benzene in MW-33 (eight out of eight samples, median 0.99 µg/L), and MW-35 (eight out of eight samples, median 0.96 µg/L);
- Chloroethane in MW-33 (eight out of eight samples, median 0.41 µg/L)
- Toluene in MW-33 (one out of eight samples, max 0.13 µg/L), and MW-35 (eight out of eight samples, median 0.91 µg/L);
- Trichloroethene in MW-33 (seven out of eight samples, median 0.15 µg/L), and MW-35 (eight out of eight samples, median 1.08 µg/L);
- Vinyl chloride in MW-33 (eight out of eight samples, median 29.5 µg/L), and MW-35 (eight out of eight samples, median 2.3 µg/L);
- *cis*-1,2 dichloroethene in MW-33 (eight out of eight samples, median 26.55 µg/L), and MW-35 (eight out of eight samples, median 5.74 µg/L);
- trans-1,2-dichloroethene in MW-33 (eight out of eight samples, median 0.7 µg/L), and MW-35 (eight out of eight samples, median 0.36 µg/L);
- 1,1-dichloroethane in MW-33 (eight out of eight samples, median 1.42 µg/L), and MW-35 (eight out of eight samples, median 0.16 µg/L);
- 1,2-dichloropropane in MW-33 (eight out of eight samples, median 6.53 µg/L), and MW-35 (eight out of eight samples, median 0.74 µg/L);
- Dichlorodifluoromethane in MW-33 (eight out of eight samples, median 3.76 µg/L), and MW-35 (eight out of eight samples, median 0.29 µg/L).

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

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

4.2.2.5. Groundwater in Channel Cc2 Summary

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

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

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

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

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

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

4.2.3. **Groundwater in Channel Cc3**

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

The trilinear diagram shows all of the samples to be within the same calcium-magnesium-bicarbonate hydro-chemical facie, as they have been in past samples for these wells. The cation/anion ratio for the wells in this channel was within ten percent (Appendix I) for all of 2018. The reported results are sufficient for characterization.

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

4.2.3.1. MW-8

Monitoring well MW-8 is located in the west portion of the property. It was installed as part of the addition of eight groundwater monitoring wells during the summer of 1995. Monitoring well MW-8 is screened between 205.95 and 215.95 ft. MSL and is beneath the lacustrine silt.

Monitoring well MW-8 has nearly neutral pH values (median 6.8) with little variability and no apparent trends. Specific conductance (median 164 µmhos/cm), total dissolved solids (median 120 mg/L), nitrate (median 3.6 mg/L), sulfate (median 7.1 mg/L) and chloride (median 4.4 mg/L), levels exhibit minor variability and with only a decreasing trend in nitrate (Tables 3-1, 3-2, and 3-3).

Dissolved iron levels are low and stable with only no detections in the past eight samples. Other metals detected are barium, copper, manganese, vanadium, and zinc, all near or at the laboratory minimum detectable level. Dissolved magnesium (median 9.3 mg/L), dissolved sodium (median 6.3 mg/L), and dissolved potassium (median 1.1 mg/L) are all low and stable with no statistically-significant trends.

Monitoring well MW-8 exceeded the State groundwater quality criteria for total arsenic in all four sampling events of 2018 and the secondary State groundwater quality criteria for pH during one sampling event (Appendix B).

No volatile organic compounds were detected at MW-8 in 2018.

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

4.2.3.2. MW-36

Monitoring well MW-36 is located in the west portion of the property. It was installed as part of the addition of four groundwater monitoring wells during the spring of 2015. Monitoring well MW-36 is screened between 214.26 and 224.26 ft. MSL.

Monitoring well MW-36 has a pH value (median 7.57) with little variability and no apparent trends. Specific conductance (median 177 µmhos/cm), total dissolved solids (median 130 mg/L), nitrate (median 0.02 mg/L), sulfate (median 12.9 mg/L) and chloride (median 3.1 mg/L), levels exhibit minor variability and with no statistically significant trends. There were no long-term trends analyzed for monitoring well MW-36, because there are fewer than twenty data points (Tables 3-1, 3-2, and 3-3).

Dissolved iron levels are low and stable with only no detections in the past eight samples. Other dissolved metals detected are barium, chromium, copper, manganese, and vanadium, all near or at the laboratory minimum detectable level. Dissolved magnesium (median 9.4 mg/L), dissolved sodium (median 6.2 mg/L), and dissolved potassium (median 2.7 mg/L) are all low and stable with no statistically-significant trends.

Monitoring well MW-36 exceeded the State groundwater quality criteria for total arsenic in all four sampling events of 2018 (Appendix B).

Carbon disulfide was detected in monitoring well MW-36 during one sampling event during 2018 (Appendix B).

General characteristics show this well to be of good quality.

4.2.3.3. Groundwater in Channel Cc3 Summary

Monitoring wells MW-8 and MW-36 both appear to be well of good quality with little evidence of landfilling impacts. Neither well has any increasing short-term trends and the overall water quality in both wells appears to be stable or decreasing.

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

Monitoring wells MW-7, MW-11, MW-12, MW-19, MW-26, MW-29, and MW-34 monitor the groundwater in the Unit D Aquifer.

Construction differences make the determination of groundwater gradients and flow direction difficult in the area monitored by these wells. Average screened depth below the water table in the wells ranges from near zero in monitoring wells MW-11, MW-26 and MW-29 to more than 30 ft. in monitoring wells MW-7, MW-12, and MW-34.

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

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

4.2.4.1. MW-7

Monitoring well MW-7 is located in the southeast portion of the property. Historically, monitoring well MW-7 has been interpreted to represent upgradient conditions. However, the interpretation provided in the 2004 Hydrogeologic Update redefined monitoring well MW-7 as downgradient. In the latest update of the hydrogeological model monitoring well MW-7 was redefined again as being upgradient. This well was installed as part of the addition of eight groundwater monitoring wells during the summer of 1995. The screened elevations for this well are between 144.4 and 154.4 ft. MSL.

The pH conditions in monitoring well MW-7 are slightly alkaline (median 7.5). Specific conductance (median 188 µmhos/cm), nitrate (median 0.01 mg/L), alkalinity (median 78 mg/L), total dissolved solids (median 134 mg/L), chloride (median 3.36 mg/L), and sulfate (median 10.7 mg/L) are stable. Ammonia (median 0.251 mg/L) has a short-term decreasing trend in monitoring well MW-7 (Tables 3-1, 3-2, and 3-3).

Monitoring well MW-7 had seven detections of dissolved iron in the past eight samples and a decreasing trend over that time period. Dissolved manganese (median 0.182 mg/L) displays no significant trends. Dissolved manganese and total arsenic exceeded State groundwater quality standards in all four of the most recent samples. Other metals detected occasionally in this period included vanadium and zinc.

Monitoring well MW-7 exceeded the intrawell prediction limit for total barium in two samples and total magnesium in one sample, in 2018 (Appendix B).

No volatile organic compounds were detected in monitoring well MW-7 in 2018.

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

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

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

Monitoring well MW-25 was installed in 2003 to replace monitoring well MW-11. However, the screen failed during installation and the well cannot be developed. The well has been left in place for use for water level measurements only. Monitoring well MW-29 was subsequently installed in 2003 as the new replacement well for monitoring well MW-11. The screened elevations for monitoring well MW-29 are between 158.22 and 173.02 ft. MSL.

The water pH for monitoring well MW-29 is slightly alkaline (median 7.37). Specific conductance (median 243 µmhos/cm) total dissolved solids (median 155 mg/L), alkalinity (median 103 mg/L), chloride (median 3.6 mg/L), and sulfate (median 15.5 mg/L) are stable (Tables 3-1, 3-2, and 3-3).

Dissolved iron (median 0.82 mg/L) and dissolved manganese (median 0.09 mg/L) are stable. There are short-term increasing trends for total arsenic and total iron for monitoring well MW-29. Total arsenic, dissolved iron, and dissolved manganese exceeded state groundwater quality standards in all 2018 samples (Appendix B). Other metals occasionally detected in this period include chromium, nickel, and zinc.

Monitoring well MW-29 exceeded the intrawell prediction limit for pH in one samples in 2018 (Appendix B).

One volatile organic compound, carbon disulfide, was detected in monitoring well MW-29 in 2018 (Appendix B).

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

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

Monitoring wells MW-12 and MW-19 were both installed in the summer of 1995. Monitoring well MW-12 is located to the south of the property. Monitoring well MW-19 is located to the northwest of the property. The screened elevations for monitoring well MW-12 are between 139.9 and 142.9 ft. MSL. The screened elevations for monitoring well MW-19 are between 132.85 and 142.85 ft. MSL.

Monitoring wells MW-26 and MW-28 were both installed in 2003. Monitoring well MW-26 is located in the northwest corner of the property and the screened elevations are between 144.2 and 158.3 ft. MSL. MW-28 has been dry since installation; its screened elevations are between 162.64 and 177.041 ft. MSL.

Monitoring well MW-34 was installed in March of 2015 to replace monitoring well MW-27 and was drilled to be fully screened in Unit D Aquifer. Monitoring well MW-34 is located on the western side of the property, east of Westside Hwy. The screened elevations for monitoring well MW-34 are between 140.64 ft. and 150.64 ft. MSL.

The pH for the Unit D Aquifer in monitoring wells MW-12, MW-19, and MW-26 are slightly alkaline (medians 7.2, 7.4, and 7.9, respectively) and monitoring well MW-34 is neutral (median 6.9). Monitoring well MW-19 has a short-term decreasing trend for pH. Monitoring well MW-12 has short-term increasing trends for specific conductance (median 165 µmhos/cm) and alkalinity (median 64 mg/L) and a short-term decreasing trend for nitrate (median 0.74 mg/L). Monitoring well has a short-term decreasing trend for specific conductance (median 201 µmhos/cm) (Tables 3-1, 3-2, and 3-3).

All samples taken from monitoring wells MW-12, MW-19, MW-26, and MW-34 exceeded the State groundwater quality standard for total arsenic in 2018. Monitoring wells MW-19 and MW-26 also exceeded the secondary State and Federal groundwater quality standard for dissolved manganese for all samples in 2018. (Appendix B)

Trends for monitoring MW-26 are stable for the past eight samples with no-short term trends. Monitoring well MW-12 has short-term increasing trends for dissolved calcium (median 11.8 mg/L), total calcium (median 11.7 mg/L), and dissolved potassium (median 1.82 mg/L). Monitoring well MW-19 has short-term increasing trends for total arsenic (median 0.0012 mg/L) and dissolved iron (median 0.03 mg/L). Monitoring well MW-34 has a short-term decreasing trend for dissolved manganese (median 0.0002 mg/L). (Tables 3-1, 3-2 and 3-3)

Monitoring well MW-12 exceeded the intrawell prediction limit for pH in two samples, specific conductance in two samples, alkalinity in one sample, total calcium in one sample, and total magnesium in two sample, in 2018. Monitoring well MW-19 exceeded the intrawell prediction limit for total arsenic in one samples in 2018. Monitoring well MW-26 exceeded the intrawell prediction limit for pH in one samples in 2018. Monitoring well MW-34 exceeded the intrawell prediction limit for pH in one samples, total organic carbon in one samples, and total magnesium in two sample, in 2018.

There were no VOCs detected in monitoring wells MW-12, MW-19, MW-26, and MW-34 during 2018.

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

The redox conditions in the north portion of the property (including monitoring wells MW-19, MW-26 and MW-29) are more reducing, determined by lower levels of nitrate, and higher levels of iron, manganese, and ammonia (Table 3-1).

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

4.2.4.4. Groundwater in Unit D Aquifer Summary

Trend analyses for most monitoring wells in this unit show stable concentrations for many of the constituents in the short-term. Exceptions include an increasing trends for total iron in monitoring wells MW-7 and MW-29 and a decreasing trend for dissolved iron in monitoring well MW-19 and increasing trends for dissolved calcium, total calcium, and dissolved potassium in monitoring well MW-12. Conditions present in wells in the Unit D Aquifer do not indicate impacts attributable to landfill activities. The water quality in this unit is good and is believed to represent natural conditions.

4.3. WEIR and SURFACE WATER QUALITY

The weirs are located on the western ravine adjacent to the landfill (Figure 3). The elevations for the weirs are 239.33 ft. for Weir 1; 224.78 ft. for Weir 2; and 195.38 ft. for Weir 3. The weir sampling locations SW-W1, SW-W2 and SW-W3 are located downstream of each weir. The elevations for the sampling locations are 230.59 ft. for SW-W1; 193.57 ft. for SW-W2; and 192.53 ft. for SW-W3 (Figure 3). The sampling stations consist of a v-notch weir.

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

The weirs have been monitored since March 1991. Results for water from the weirs are presented in two periods similar to groundwater. Emphasis is on results obtained from the last eight samples, predominantly between 2017 and 2018. Four samples were collected from each of the three weirs in 2018.

The specific conductance ranges between 180 and 222 µmhos/cm for SW-W1; 515 to 625 µmhos/cm for SW-W2; and 240 to 293 µmhos/cm for SW-W3. Chloride levels range from 5 to 8 mg/L for SW-W1; 17 to 19 mg/L for SW-W2; and 7 to 9 mg/L for SW-W3. In general for specific conductance and chloride, SW-W1 has the lowest levels while SW-W2 displays the highest levels, and SW-W3 is midrange but tends closer to SW-W1. The maximum levels for both constituents have decreased compared to historical values for all three locations and in general the variability has decreased, as shown by decreases in standard deviation for short- and long-term periods at SW-W2 and SW-W3 (Table 3-4).

The medians for total calcium concentrations are 16 mg/L for SW-W1, 51 mg/L for SW-W2, and 22 mg/L for SW-W3. The medians for total magnesium concentrations are 12 mg/L for SW-W1,

41 mg/L for SW-W2, and 18 for SW-W3. The medians for total potassium concentrations are 1.1 mg/L for SW-W1, 3.1 mg/L for SW-W2, and 2.2 mg/L for SW-W3. The medians for sodium concentrations are 7 mg/L for SW-W1, 15 mg/L for SW-W2, and 9 mg/L for SW-W3. As with specific conductance and chloride, SW-W1 and SW-W3 have lower levels for calcium, magnesium, potassium, and sodium, while SW-W2 has the higher levels. The levels of these metals are stable relative to long term values at all three locations. All medians above are equal to or lower than last year's values (Table 3-4).

The only volatile organic compound detected with any frequency in the weirs is vinyl chloride. Vinyl chloride was detected in SW-W1 three times in 2017 and four times in 2018. Vinyl chloride is occasionally detected in SW-W2, but is routinely detected in SW-W3. The median decreased in the recent samples for SW-W3 to 0.040 µg/L. SW-W2 had no vinyl chloride detections in the recent eight samples (Table 3-4).

Most of the exceedances of the Federal and State Surface Water Quality Standards are for metals. Historically the value of these exceedances in evaluating water impacts associated with municipal solid waste landfills is limited since the standards are based on dissolved metals and the weir results are based on total metals. In 2007, field procedures changed allowing samples collected to be field filtered and metals to be analyzed for both total and dissolved constituents. Dissolved metals were then compared to groundwater criteria and total metals were compared to surface water criteria. Because water collected at the weirs is truly surface water, having been exposed to atmospheric conditions, it will no longer be compared to groundwater standards starting in 2011. Ammonia, fecal coliforms, total iron, and dissolved oxygen exceeded the surface water quality standards in 2018 (Appendix B). All other exceedances are very inconsistent.

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

Station SW-E had a slightly alkaline pH with a median of 7.7 and a specific conductivity median of 192 µmhos/cm. The median values for total metals are arsenic is 0.002 mg/L, calcium is 15 mg/L, sodium is 7 mg/L, iron is 0.7 mg/L, magnesium is 13 mg/L, and potassium is 2.0 mg/L. Station SW-E has lower metal values in all metals compared to SW-W1 with the exception of potassium which is only approximately 1 mg/L higher (Table 3-4).

SW-E had no vinyl chloride detections.

4.3.1.1. Weir and Surface Water Summary

Conditions in SW-W1 represent the lowest levels of impact while SW-W2 displays somewhat higher low levels. SW-W3 exhibits a midrange impact on the basis of 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. The water quality is compared to surface water standards. The new down-stream surface water station has water-quality values similar or better than SW-W1.

4.4. OFFSITE DOMESTIC WELL MONITORING

In 2002, Department of Natural Resources and Parks (DNRP) conducted sampling on Vashon-Maury Island in 11 domestic wells located around the landfill. No evidence of contamination originating from the landfill was found. The data was presented in the 2002 Vashon Island Closed Landfill Annual Report. Data are included with the onsite well data in the pdf files.

In 2005, King County Solid Waste Division agreed to monitor 3 of these 11 wells. The first round of these samples was collected in October 2005. One of the three wells is no longer sampled as access is no longer available. Starting in 2010, samples will be collected from both of the off property wells bi-annually. Four samples were collected in 2018 from the two off property wells (DW-85 and DW-PA) (Figure 4). No evidence of contamination originating from the landfill was found. The results from the domestic wells are included in Appendix H.

5. LANDFILL GAS

Landfill gas is monitored by a network of compliance probes installed around the perimeter of the landfill and ambient air stations around the property boundary (Figure 5). The monitoring network comprises of nine ambient air stations, three monitoring wells, and twenty-six gas probes. Probes are monitored monthly. The results can be found in Appendix L. There were no detections in 2018. 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. Conclusions from the landfill gas review indication that gas well GW-9 is efficiently removing methane within a 100 ft. radius of influence (KCSWD, 2017). In 2018, gas wells GW-10 and GW-11 were installed, in order to increase the radius of influence for methane removal beyond GW-9.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. CONCLUSIONS

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

1. The groundwater generally moves westward in the middle channel of the lacustrine silt, now designated Channel Cc2, within Unit C.
2. The flow direction within the Unit D Aquifer is better defined and potentiometric maps show less radial flow after monitoring well MW-27 was decommissioned. The updated hydrogeological conceptual model provided a further definition in the potentiometric maps (Appendix G).
3. The monitoring wells in the Unit D Aquifer showed low sensitivity to hydrologic activity, based on the observation of very small seasonal water level fluctuations, indicating limited groundwater recharge in the area of the landfill.
4. Landfilling impacts have been recognized in Channel Cc2 at monitoring wells MW-2, MW-21, MW-33, and MW-35 including for volatile organic compounds. Detections for many VOCs have declined significantly or are stable in the short term. Leachate is believed to have contributed to past impacts. Recent data, specifically levels of VOCs in MW-2, MW-21, MW-33, and MW-35, suggest possible transport of historic contaminants from landfill gas.
5. Expanded Appendix III analyte testing showed a few new detections, most likely resulting from the lower detection limits introduced in 2017.
6. The landfill closure has been effective in improving the water quality condition of impacted wells, based on reductions in specific conductance, total dissolved solids, chloride, and several VOCs.
7. Results obtained from wells in Unit D Aquifer do not show impacts attributable to landfill activities, but instead reflect the natural variations in water quality that exist around the landfill.

6.2. RECOMMENDATIONS/PROPOSED ACTIONS

1. The existing monitoring network shall continue to be monitored as described in the 2004 Vashon Island Landfill Hydrogeologic Report Update and following protocols from the Vashon Island Landfill Sampling and Analysis Plan.
2. Evaluation of the operating efficiency of the landfill gas collection system and probe network will continue in 2019 to determine if more improvements to the collection and treatment system are needed. Furthermore, we will continue to assess the effect of landfill gas wells GW-9, GW-10, and GW-11 have on groundwater conditions.
3. Monitoring of the groundwater wells will continue for Appendix I and II parameters, with the addition of dichlorodifluoromethane. In 2018, KCSWD performed the first of two samples for Appendix III parameters on monitoring wells in Channel Cc2, MW-2, MW-20, MW-21, MW-33, and MW-35, for a minimum of once per year for two years. The second samples for Appendix III parameters will be sampled in 2019, after which we will re-assess Appendix III analytes.
4. The water-bearing zone in Channel Cc2 shall continue in assessment monitoring in accordance with WAC 173-351-430.
5. Surface water sampling site SW-E will be sampled quarterly for pH (field), specific conductivity (field and laboratory), turbidity (field and laboratory), hardness, total metals, and vinyl chloride.

7. REFERENCES

Aspect Consulting, LLC (Aspect), 2017, Vashon Landfill – Influence Testing Summary Report, D310.1.6.4.2, Seattle, Wa, June 2017.

Aspect Consulting, LLC (Aspect) et al., 2012, Environmental Review, Investigation, and Evaluation Technical Memorandum – Vashon Island Closed Landfill, Agency Draft, prepared for King County Department of Public Works, Solid Waste Division, Aspect Consulting, LLC, Seattle, WA, March 2012.

Aspect Consulting, LLC (Aspect) and Herrera Environmental Consultants, 2018, *Agency Draft* Vashon Island Closed Landfill Remedial Investigation Report, October 2018.

Baedecker, M.J. and W. Back, 1979, *Modern Marine Sediments as a Natural Analog to the Chemically Stressed Environment of a Landfill.* Journal of Hydrology, 43:393-414.

Berryman & Henigar, 1999, Vashon Landfill 1999 Stormwater Improvements Technical Information Report, March 1999.

Berryman & Henigar, CH2Mhill, HWA Geosciences Inc. Udaloy Environmental Services, and HDR Engineering, Inc. December 1999. *Pre-design Engineering report for the Vashon Landfill Closure*, prepared for King County Department of Natural Resources, Solid Waste Division.

Berryman & Henigar, CH2Mhill, HWA Geosciences Inc. Udaloy Environmental Services, and HDR Engineering, Inc. November 2000. *Vashon Island Landfill Hydrogeologic Report*, prepared for King County Department of Natural Resources, Solid Waste Division.

Berryman & Henigar and Herrera Environmental Consultants, 2004, VOC Sampling and Testing Results, July 2004.

Berryman & Henigar and Udaloy Environmental Services (UES). December 2004. *Vashon Island Landfill Hydrogeologic Report Update*, prepared for King County Department of Natural Resources, Solid Waste Division.

Berryman & Henigar and UES, 2006a, Vashon Island Closed Landfill Environmental Evaluation, March 2006.

Berryman & Henigar and UES, 2006b, Vashon Island Closed Landfill: Potential Effects of Landfill Gas and Leachate on Vashon Landfill Groundwater and Springs, February 2006.

Carr/Associates. December 1, 1983. *Vashon/ Maury Island Water resources Study*, prepared for King County Department of Planning and Community Development.

CH2M Hill. March 1995. *Groundwater Monitoring Well Construction Work Plan*, prepared for King County Solid Waste Division.

CH2M Hill. December 1996. *Vashon Island Landfill Monitoring well Construction Report*, prepared for King County Solid Waste Division.

Challa, J.; D. Skoff; F.J. Quirus. 1997. Landfill Gas as Source of VOCs in Ground Water. Practice Periodical of Hazardous, Toxic and Radioactive Waste Management. Vol. 1, No. 2. ASCE

Fisher, S.R., and Potter, K.W., 1989, *Methods for Determining Compliance with Groundwater Quality Regulations at Waste Disposal Facilities, Final Report*, Wisconsin Department of Natural Resources.

Geraghty & Miller, Inc. Environmental Services. 1993. Vashon Groundwater Management Plan, Update Area Characterization and Data Analysis, Project. Public Health-Seattle & King County.

Gibbons, Robert D.1994 *Statistical Methods for Groundwater Monitoring*, John Wiley and Sons, New York.

Golder Associates. 1986. *Geotechnical Memorandum #4, Subtask 1/Task 1B, Geotechnical Data Development Vashon Landfill Leachate Control*.

Harding Lawson Associates. August 8, 1991. *Vashon Landfill Groundwater Quality, Statistical Summary of Data Collection between 1986 and 1991*, prepared for King County Solid Waste Division, Seattle, Washington.

Harding Lawson Associates. June 30, 1993. *Vashon Landfill 1992 Annual Water Quality Report*, prepared for King County Solid Waste Division, Seattle, Washington.

Harper-Owes. 1986. *Vashon Island Leachate Control*, Technical Memorandum prepared for King County Solid Waste Division, Seattle, Washington.

Harper-Owes et al., 1988, Vashon Island Landfill Leachate Control Facilities Construction Record Drawings, May 1988.

Kerfoot, H.B. 1994. *Landfill Gas effects on Groundwater Samples at Municipal Solid Waste Facility*. Journal of Air & Waste Management Association. Vol. 44.

King County, 2005, Vashon-Maury Island Phase I Groundwater Model, A Part of the Vashon-Mary Island Water Resources Evaluation, King County Department of Natural Resources and Parks, Water and Land Resources Division, October 2005.

King County, 2011, Vashon Closed Landfill Western Hillslope Investigation, King County Department of Natural Resources and Parks, Water and Land Resources Division, March 31, 2011.

King County Solid Waste Division. July 9, 1994. *Vashon Island Landfill 1993 Annual Ground water Data Evaluation Report*.

King County Solid Waste Division. December 1995. *Vashon Island Landfill 1994 Annual Groundwater Data Evaluation Report*.

King County Solid Waste Division. November, 1996. *Vashon Island Landfill 1995 Annual Groundwater Data Evaluation Report*.

King County Solid Waste Division. April 2004. *Vashon Island Landfill 2003 Annual Groundwater Data Evaluation Report*.

King County Solid Waste Division. April 2005. *Vashon Island Landfill 2004 Annual Groundwater Data Evaluation Report*.

King County Solid Waste Division. April 2006. *Vashon Island Landfill 2005 Annual Groundwater Data Evaluation Report*.

King County Department of Natural Resources. April 2000. *Vashon Landfill Final Closure, Contract No. C03056C, Special Provisions*, prepared by Berryman & Henigar.

Nyer, E.K., M.E. Duffin. 1997. *The State of the Art of Bioremediation*. GWMR. Spring.

Prosser, R., A. Janechek. 1995. *Landfill Gas and Groundwater Contamination*. Proceedings of the October 1995 American Society of Civil Engineers Convention.

R. W. Beck and Associates, 1983. *King County Landfills Ground Water Monitoring Investigations, Task 11 Report*.

R.W. Beck and Associates/ Sweet, Edwards & Associates. December 1984. *Groundwater Geology/ Quality Investigations for Rural Landfills in King County, Washington*, prepared for King County Solid Waste Division.

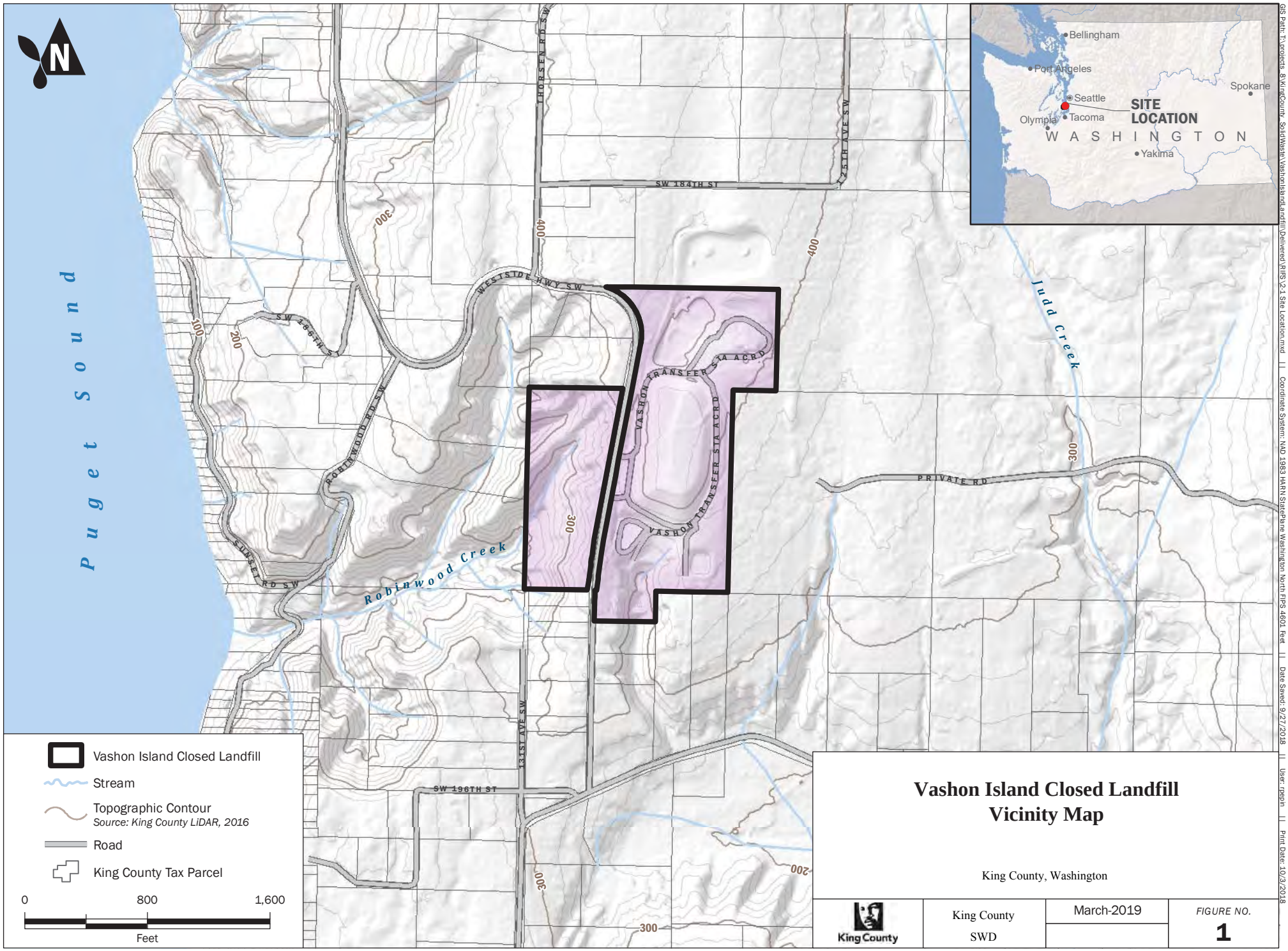
Rekow, K.H., and Chapra, S.C. 1983, *Engineering Approaches for Lake Management, Volume 1, Data Analysis and Empirical Modeling*, Boston, Butterworth, p. 340.

Smayda, T.J. and R.J. Owes. 1991. *Unlined Landfills in the Pacific Northwest: Leachate Composition and Groundwater Impacts, in Proceedings: Nonpoint Source. Pollution: The Unfinished Agenda for the Protection of our Water Quality*, Tacoma, WA.

Stumm, W. and J. J. Morgan. 1981. *Aquatic Chemistry: An introduction Emphasizing Chemical Equilibria in Natural Waters*. John Wiley & Sons.

Washington, J. W. 1996. *Gas Partitioning of Dissolved Volatile Organic Compounds in the Vadose Zone: Principles, Temperature Effects and Literature Review*. Groundwater. Vol. 34, No. 4.

FIGURES and TABLES



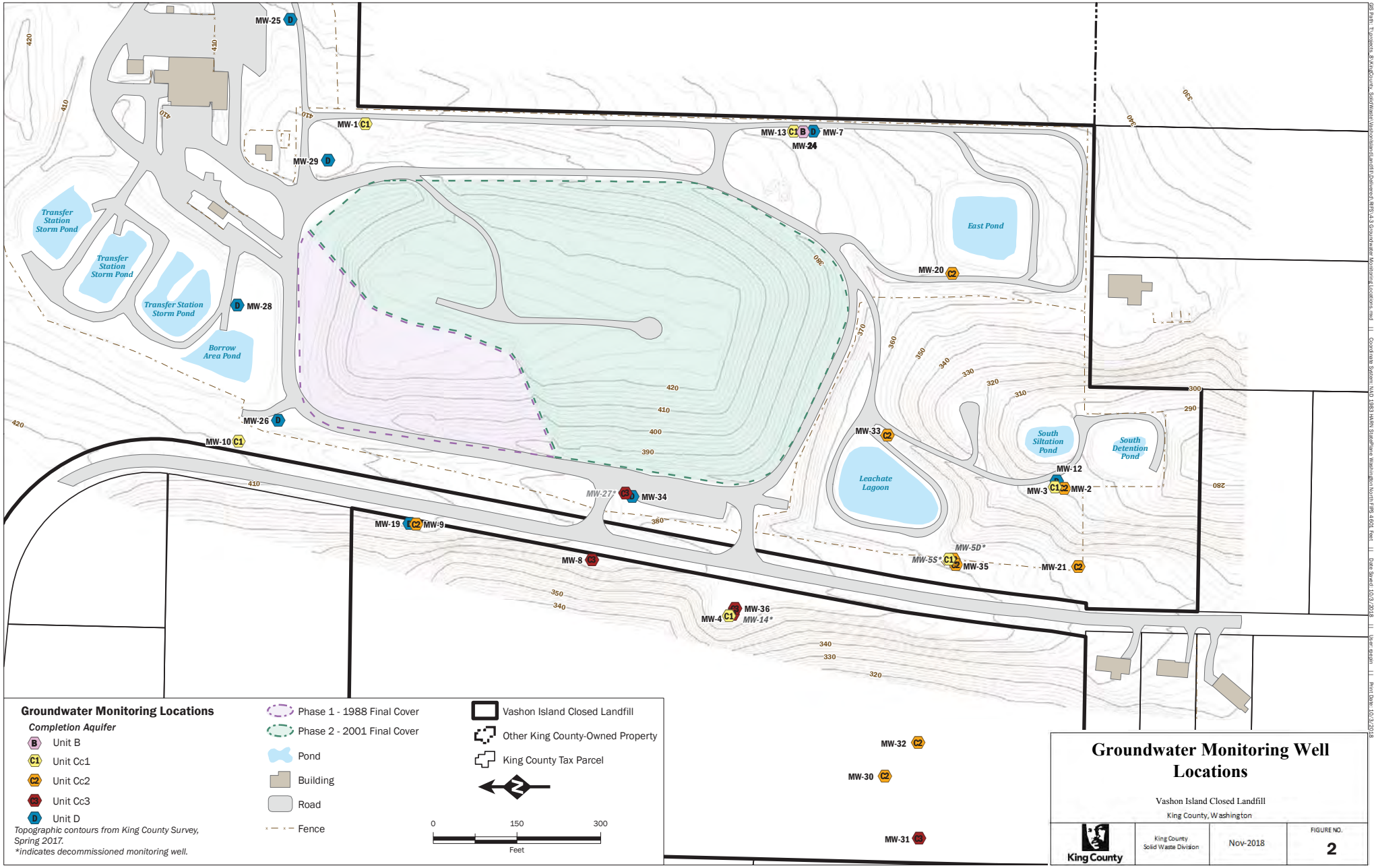
Vashon Island Closed Landfill Vicinity Map

King County, Washington

King County	King County SWD	March-2019	FIGURE NO. 1

GIS Path: T:\projects_8\KingCounty_SolidWaste\VashonIslandLandfill\Delivered\RIFS\2-1 Site Location.mxd || Coordinate System: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet || Date Saved: 9/27/2018 || User: rpepin || Print Date: 10/3/2018

Basemap Layer Credits || Copyright:© 2014 Esri



Groundwater Monitoring Locations

Completion Aquifer

- B Unit B
- C1 Unit Cc1
- C2 Unit Cc2
- C3 Unit Cc3
- D 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

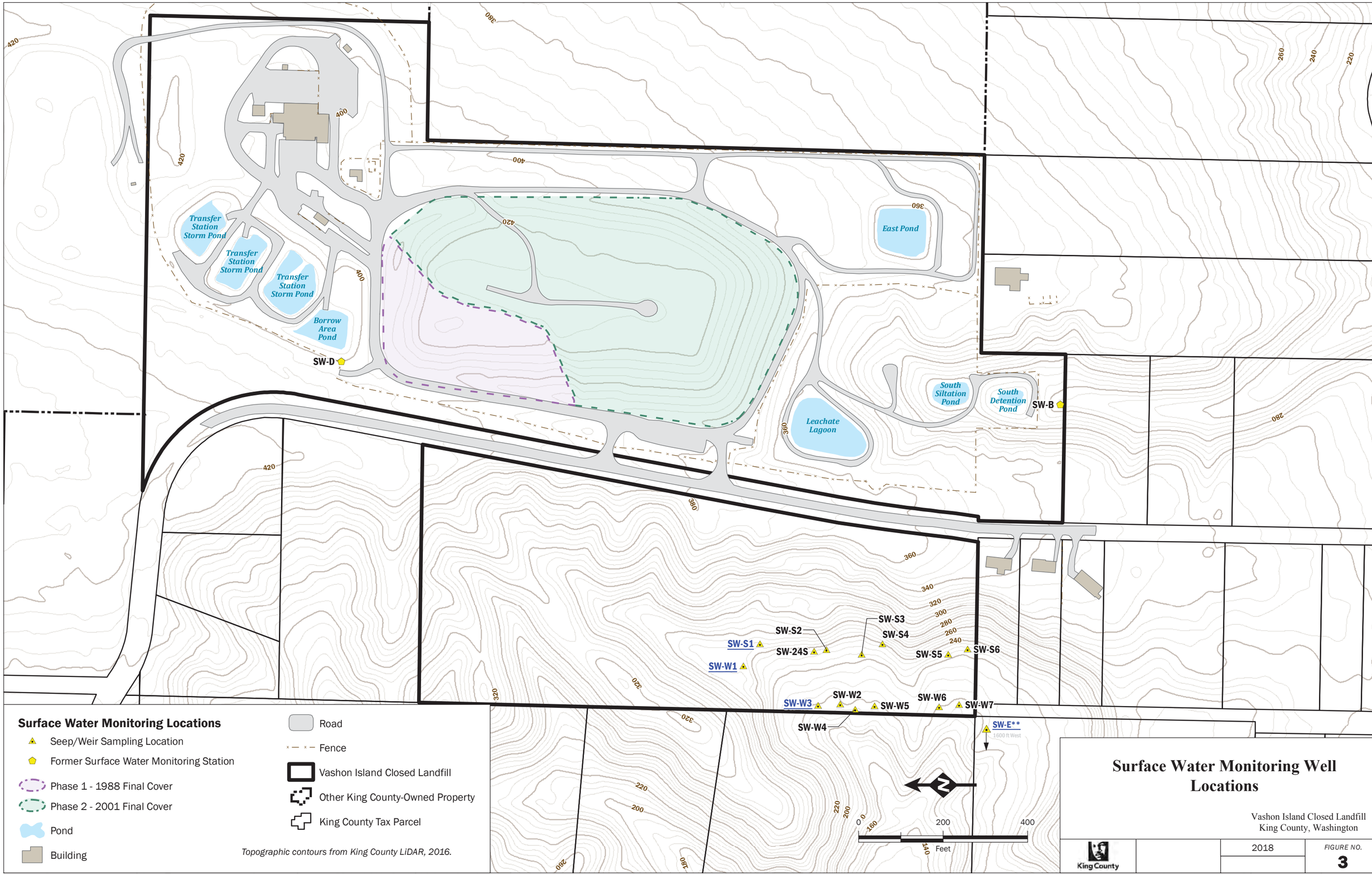
0 150 300
Feet

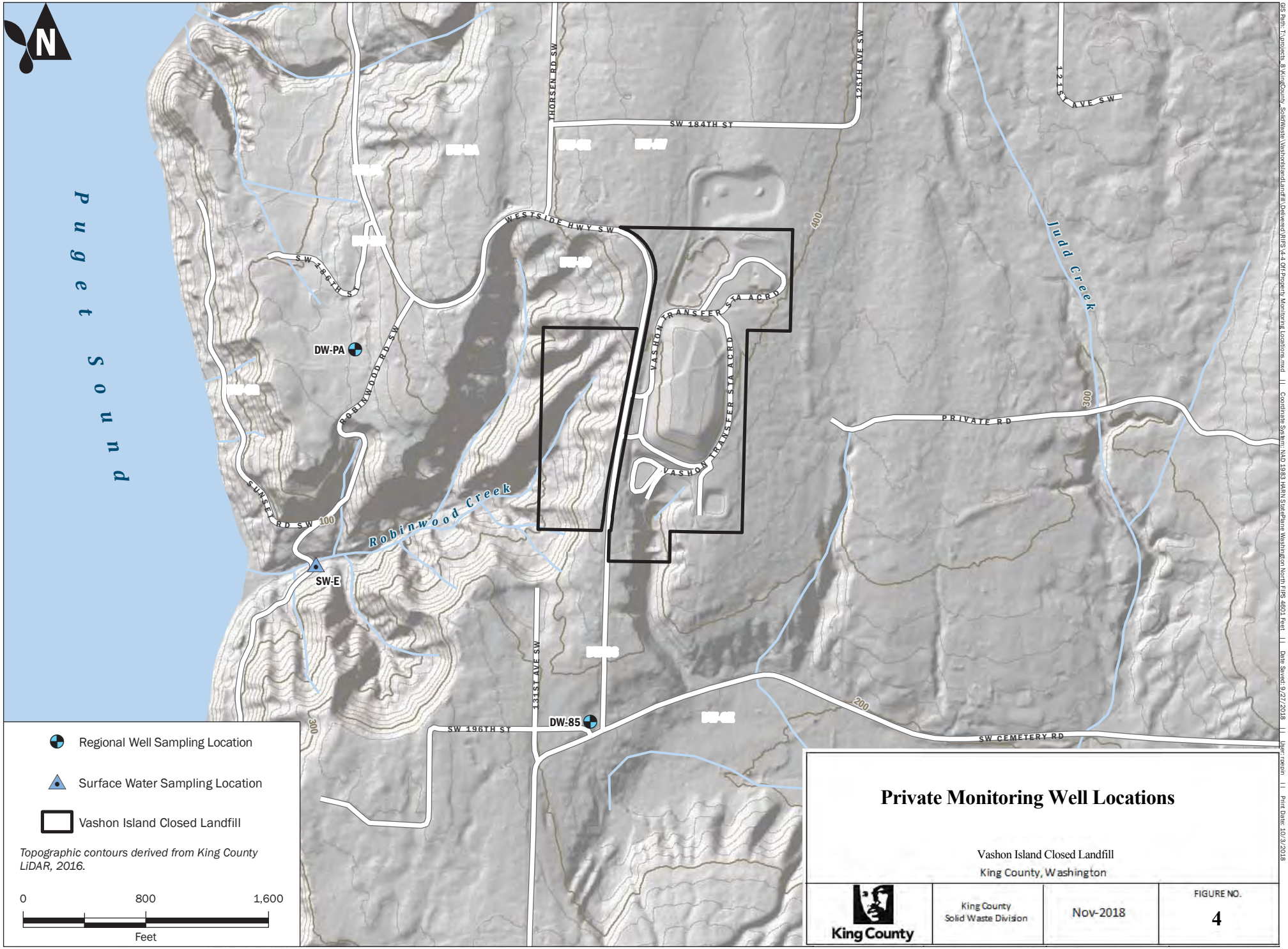
Groundwater Monitoring Well Locations

Vashon Island Closed Landfill
King County, Washington

King County
King County Solid Waste Division
Nov-2018
FIGURE NO. 2

GIS Path: T:\projects_8\KingCounty_SolidWaste\VashonIslandLandfill\Delivered\RFS\4.3 Groundwater Monitoring\Locations.mxd || Coordinate System: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet || Date Saved: 10/3/2018 || User: ppan || Print Date: 10/3/2018


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
SW-D
SW-B
SW-S1
SW-S2
SW-S3
SW-S4
SW-S5
SW-S6
SW-24S
SW-W1
SW-W2
SW-W3
SW-W4
SW-W5
SW-W6
SW-W7
SW-E**
1600 ft West
0 160 200 400
Feet
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.
Surface Water Monitoring Well Locations
Vashon Island Closed Landfill
King County, Washington
King County
2018
FIGURE NO.
3
GIS Path: T:\projects_8\KingCounty_SolidWaste\VashonIslandLandfill\Delivered\RFS\4-5 Surface Water Monitoring Locations.mxd || Coordinate System: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet || Date Saved: 10/3/2018 || User: rpejin || Print Date: 10/3/2018

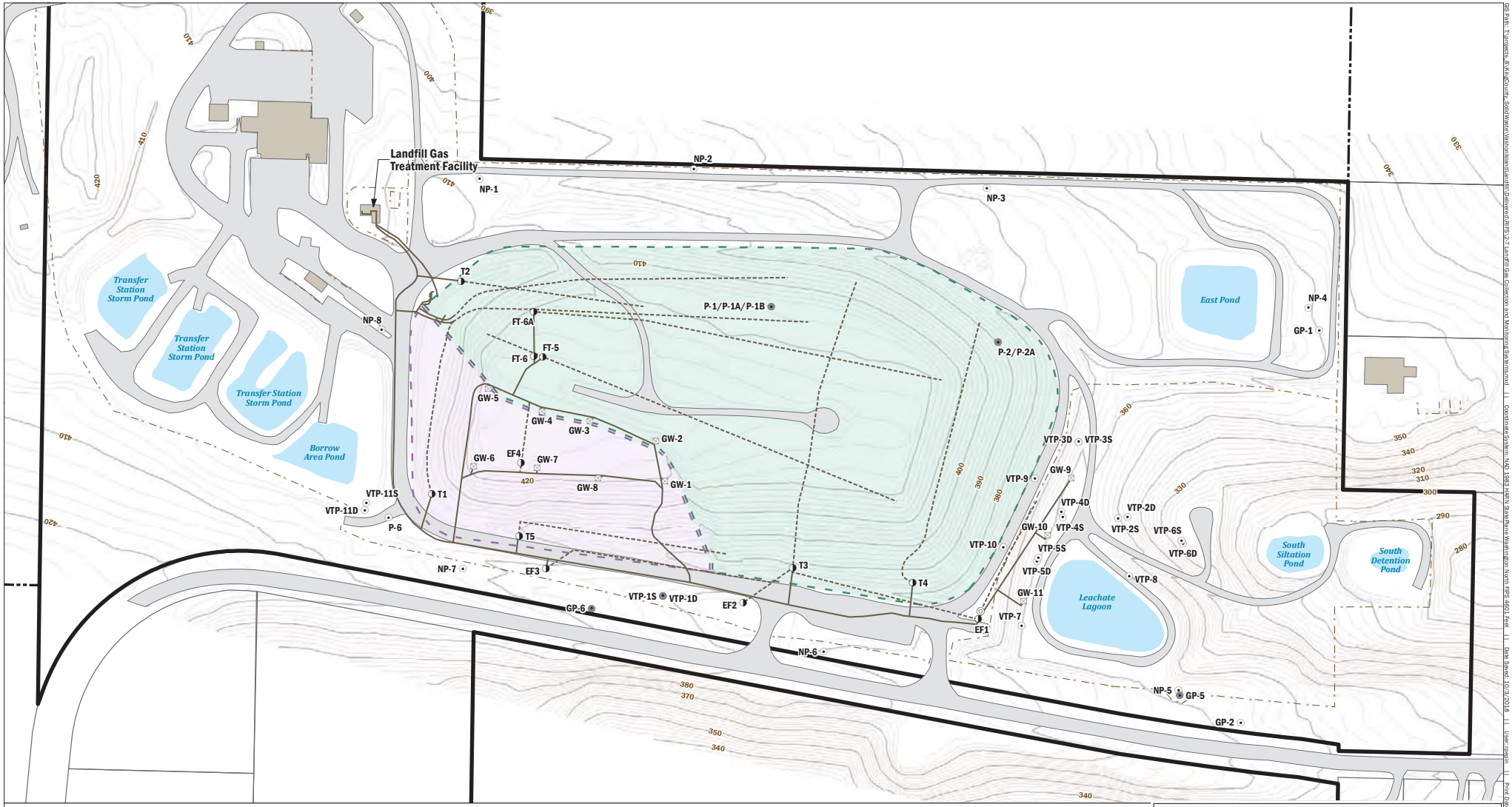


Private Monitoring Well Locations

Vashon Island Closed Landfill
King County, Washington

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

GIS Path: T:\projects_8\KingCounty_SolidWaste\VashonIslandLandfill\Delivered\RIFS\4-4 Off-Property Monitoring Locations.mxd || Coordinate System: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet || Date Saved: 9/27/2018 || User: rpeain || Print Date: 10/3/2018



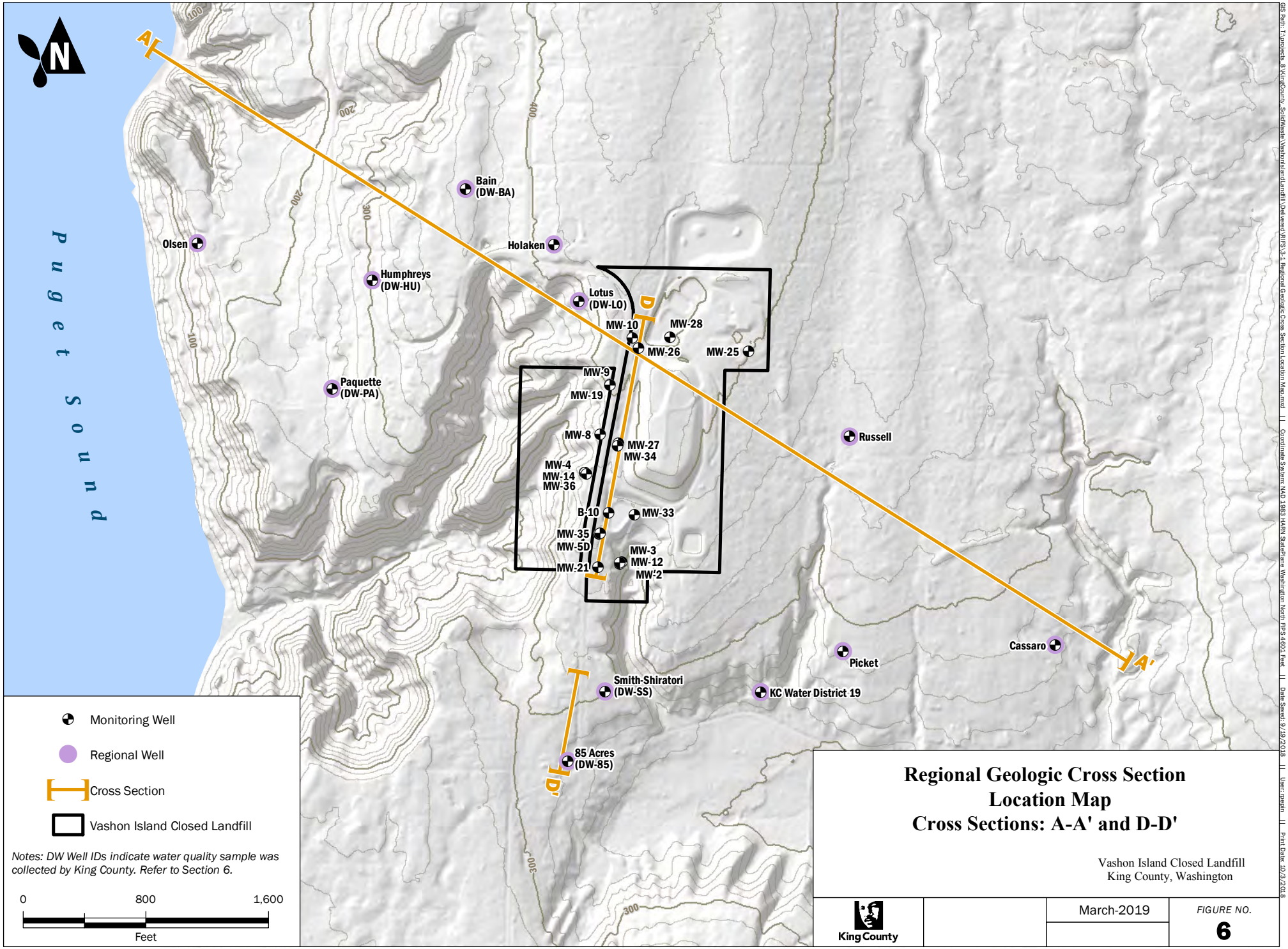
Topographic contours from King County Survey, Spring 2017. Landfill gas system features are approximated from as-built locations, and revised to match survey data where available.

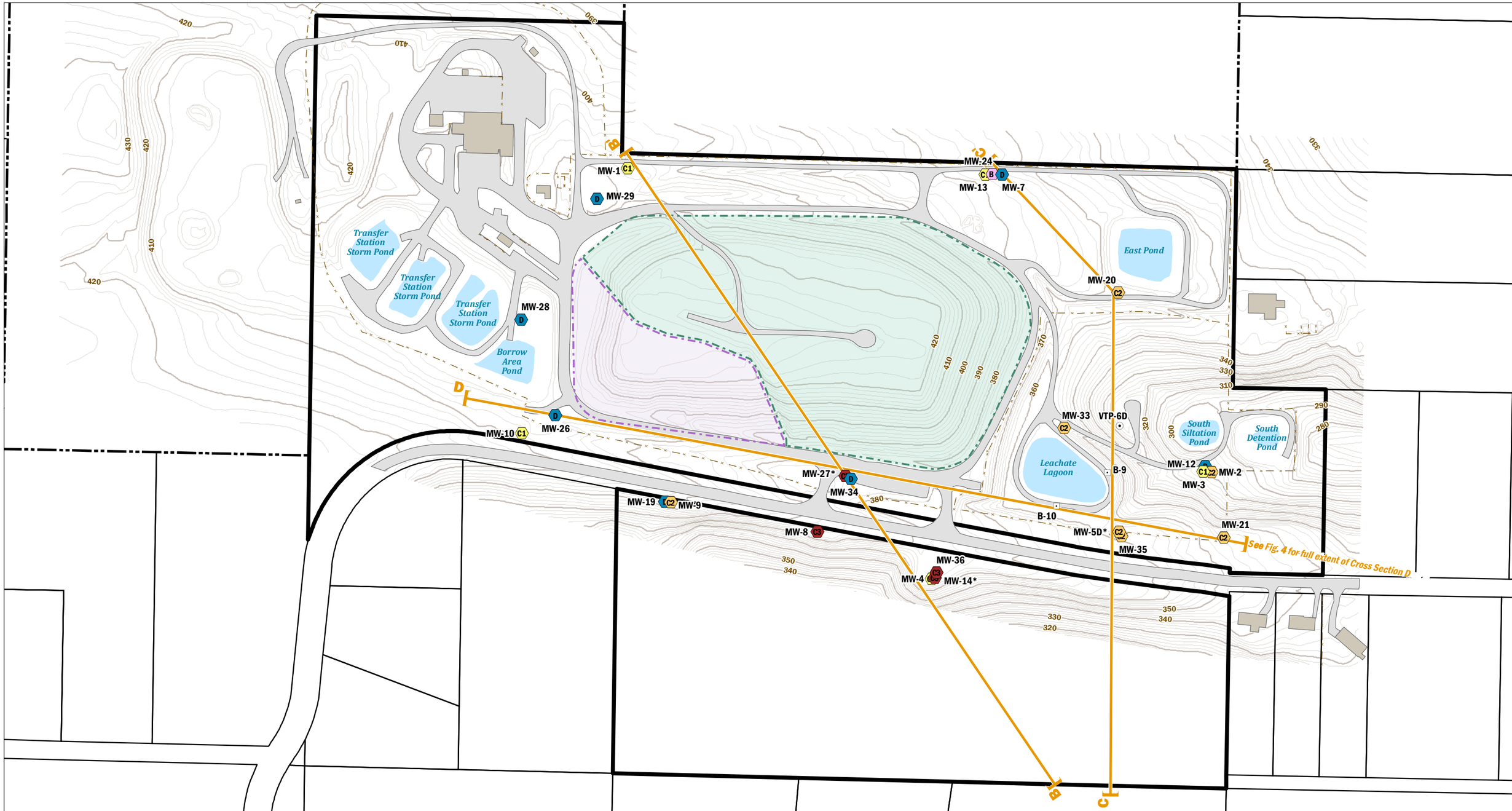
Landfill Gas Collection and Monitoring Systems

Vashon Island Closed Landfill
King County, Washington

King County	King County Solid Waste Division	Nov-2018	FIGURE NO. 5

GIS Path: T:\projects_8\KingCounty_SolidWaste\VashonIslandLandfill\Delivered\RIFS\2-7 Landfill Gas Collection and Monitoring Systems.mxd || Coordinate System: NAD 1983 HARN State Plane Washington North FIPS 4601 Feet || Date Saved: 10/3/2018 || User: jmajin || Print Date: 10/3/2018


N
Puget Sound
A
A'
D
D'
Bain
(DW-BA)
Olsen
Holaken
Humphreys
(DW-HU)
Lotus
(DW-LO)
MW-10
MW-28
MW-26
MW-25
MW-9
MW-19
Paquette
(DW-PA)
MW-8
MW-27
MW-34
MW-4
MW-14
MW-36
B-10
MW-33
MW-35
MW-5D
MW-3
MW-12
MW-2
MW-21
Russell
Cassaro
Picket
Smith-Shiratori
(DW-SS)
KC Water District 19
85 Acres
(DW-85)
100
200
300
400
Monitoring Well
Regional Well
Cross Section
Vashon Island Closed Landfill
Notes: DW Well IDs indicate water quality sample was collected by King County. Refer to Section 6.
0
800
1,600
Feet
Regional Geologic Cross Section
Location Map
Cross Sections: A-A' and D-D'
Vashon Island Closed Landfill
King County, Washington
King County
March-2019
FIGURE NO.
6
GIS Path: T:\projects_8\KingCounty_SolidWaste\VashonIslandLandfill\Delivered\RIFS\3-1 Regional Geologic Cross Section Location Map.mxd || Coordinate System: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet || Date Saved: 9/19/2018 || User: pepin || Print Date: 10/3/2018



Monitoring Well Completion Aquifer

- Unit B
- Unit Cc1
- Unit Cc2
- Unit Cc3
- Unit D

- Boring
- Gas Probe
- Cross Section
- Phase 1 - 1988 Final Cover
- Phase 2 - 2001 Final Cover

- Pond
- Building
- Road
- Fence

- Vashon Island Closed Landfill
- Other King County-Owned Property
- King County Tax Parcel

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

0 200 400
Feet

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

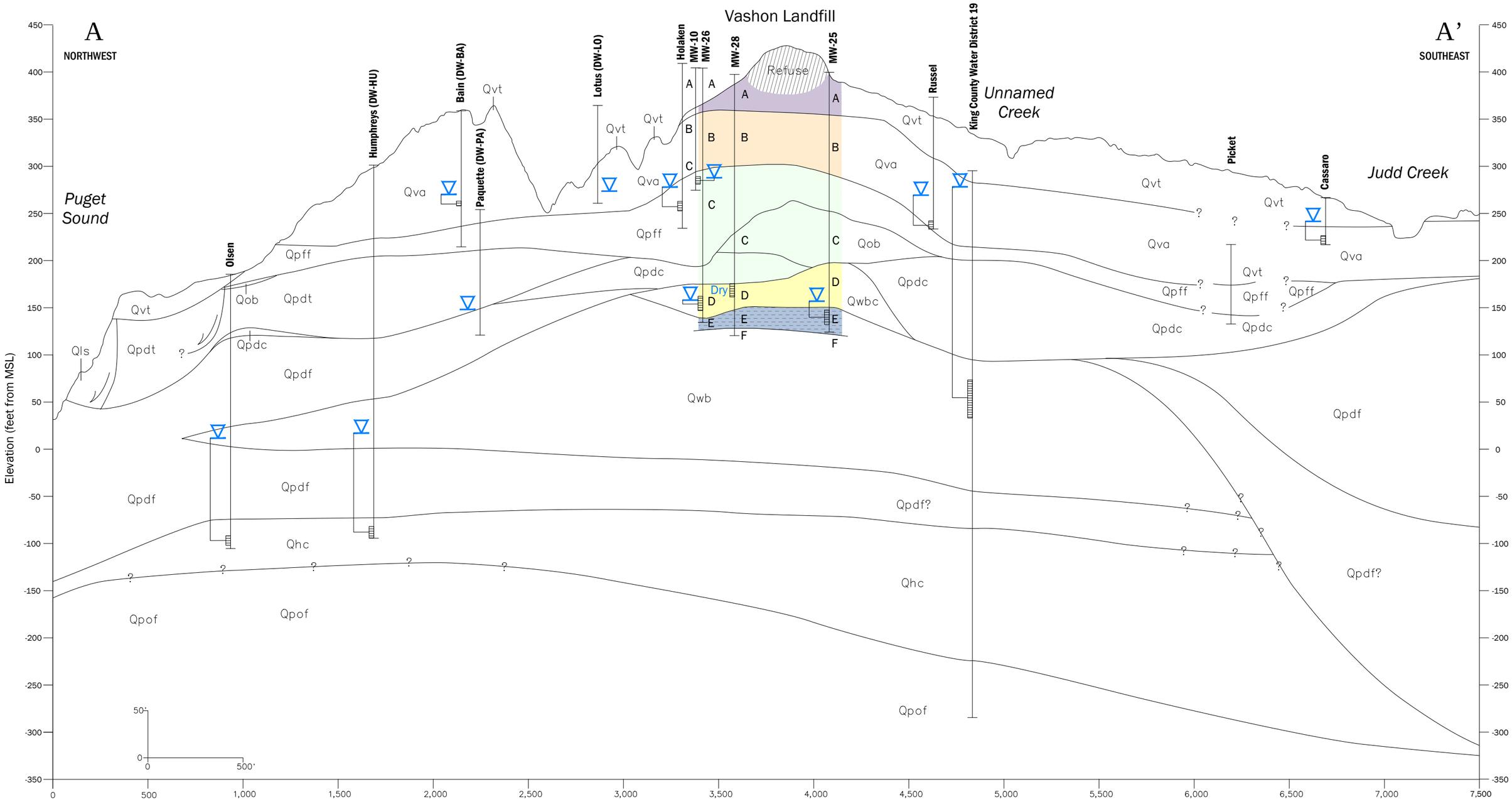
Vashon Island Closed Landfill
King County, Washington

King County

March-2019

FIGURE NO.
7

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



Source: Modified from Troost, 2004.

Geologic Units

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

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

Static Water Level
Screen Interval

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

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

0 500 1000 Feet

Regional Geologic Cross Section A-A'

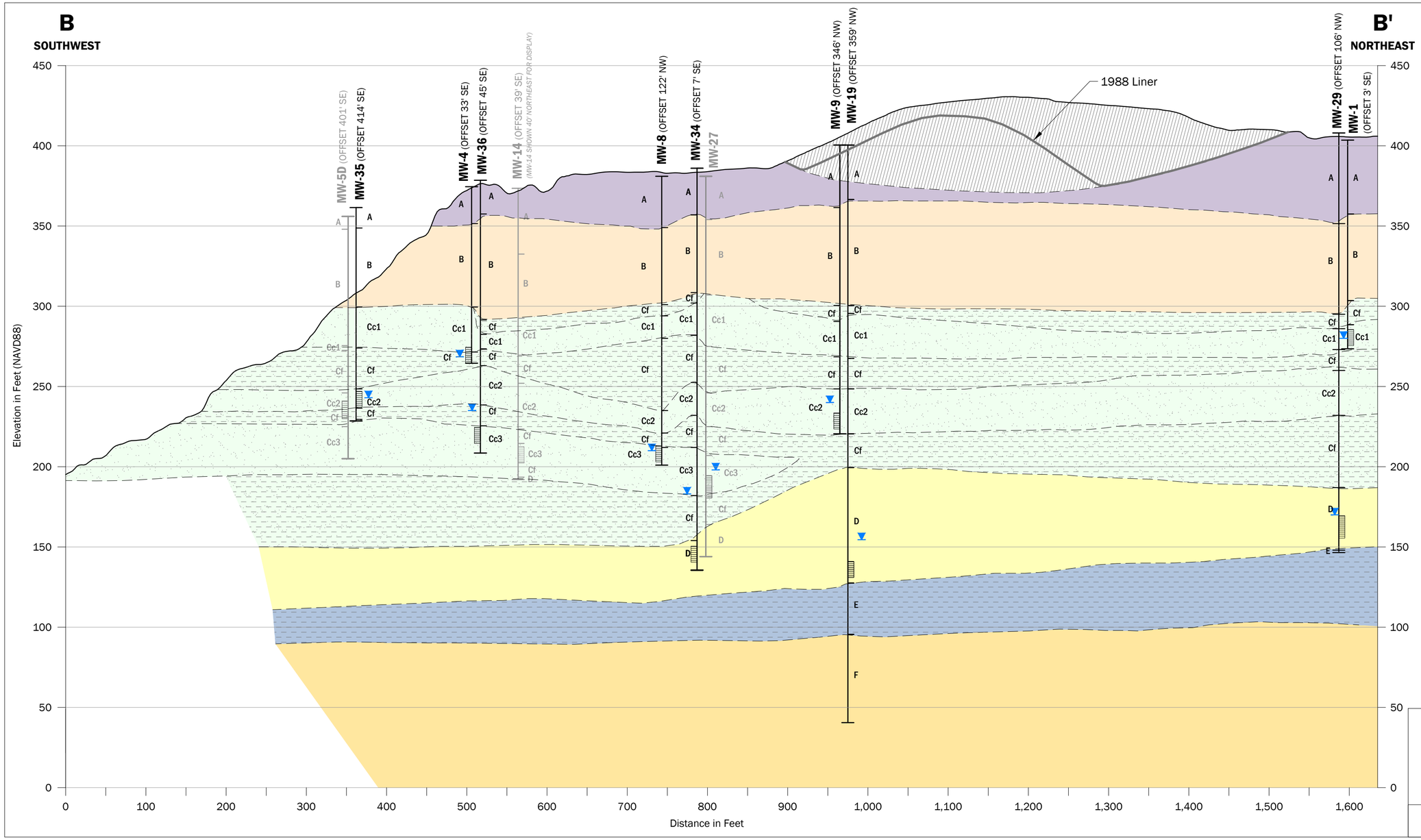
Vashon Island Closed Landfill
King County, Washington

King County

March-2019

FIGURE NO.
8

CAD Path: Q:\King County\090057 Vashon Island Landfill\2018-05 RI-FS Report\090057-AA.dwg Section AA' || Date Saved: Sep 19, 2018 4:31pm || User: scudd



Refuse/Fill

Unit A: Vashon glacial till - fine grained

Unit B: advance outwash sand - coarse grained

Unit C: glacial deposit - variable coarse & fine grained

Coarse Fine

Unit D: fluvial sands and gravels with fine-grained overbank deposits

Unit E: lacustrine silt - fine grained

Unit F: fluvial sands and gravels with fine-grained overbank deposits

Static Water Level

Screen Interval

Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 50'
Vertical Exaggeration 2x

0 100 200 Feet

Notes:
1. Decommissioned wells are depicted in gray.
2. Unit Cc2, Unit Cc3, Unit D, and Unit F are the four principal water-bearing units at the VLF.

Geologic Cross Section B-B'

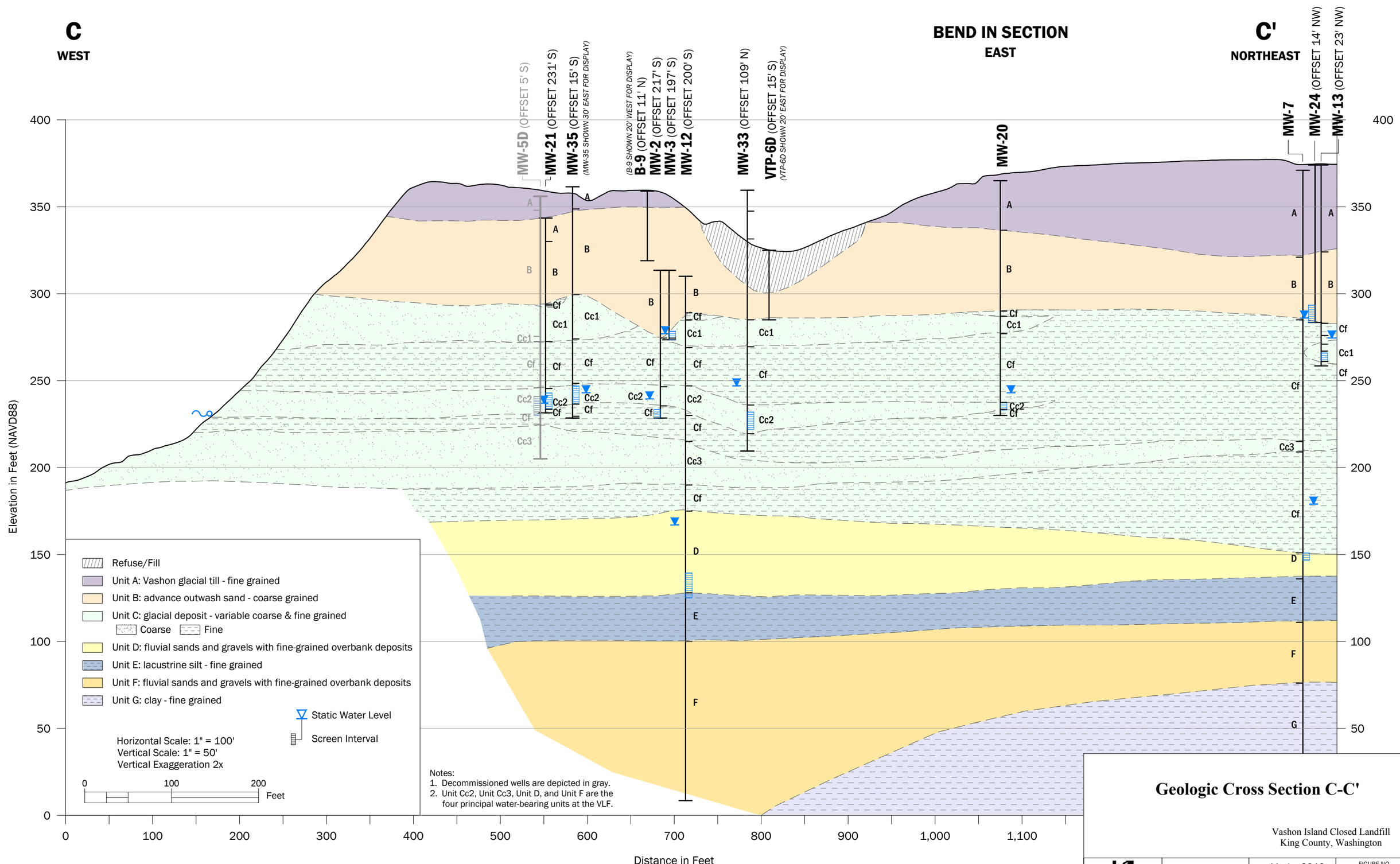
Vashon Island Closed Landfill
King County, Washington

King County

Marhc-2019

FIGURE NO.
9

CAD Path: O:\Kcgi County\090057 Vashon Island Landfill\2018-05 RI-FS Report\090057-BB.dwg 11x22 | | Coordinate System: NAD 1983 State Plane Washington North FIPS 4601 Feet | | Date Saved: Sep 28, 2018 2:20pm | | User: sculd



Geologic Cross Section C-C'

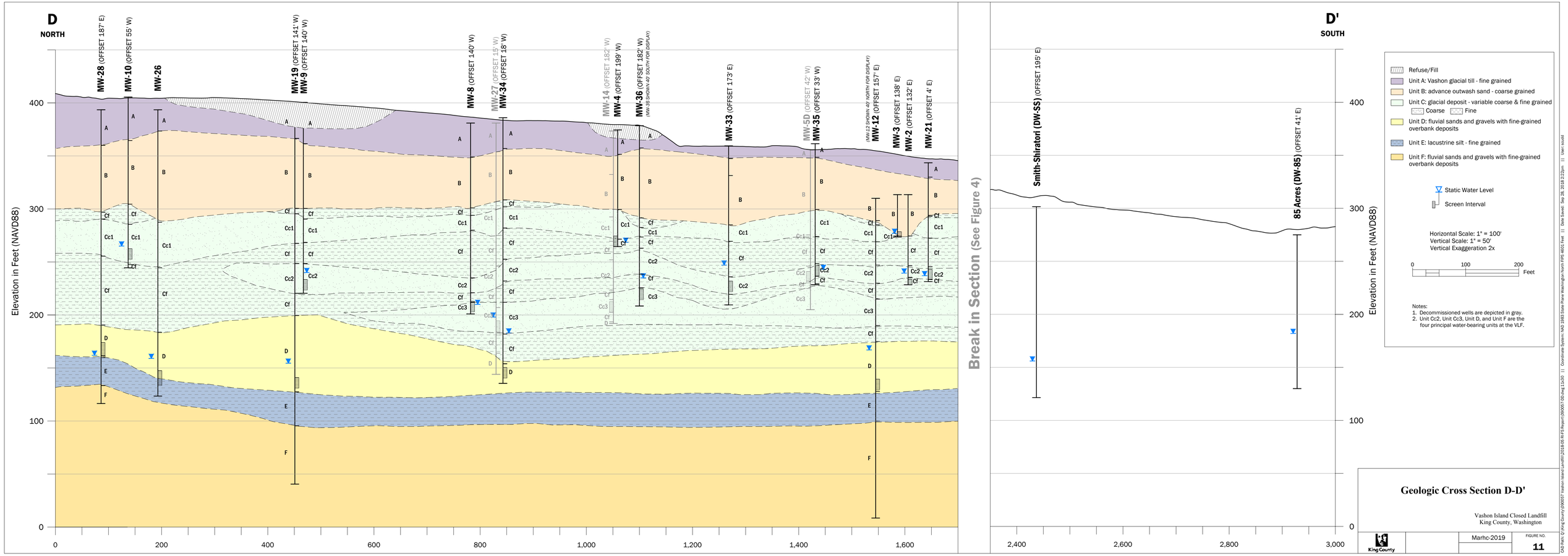
Vashon Island Closed Landfill
King County, Washington

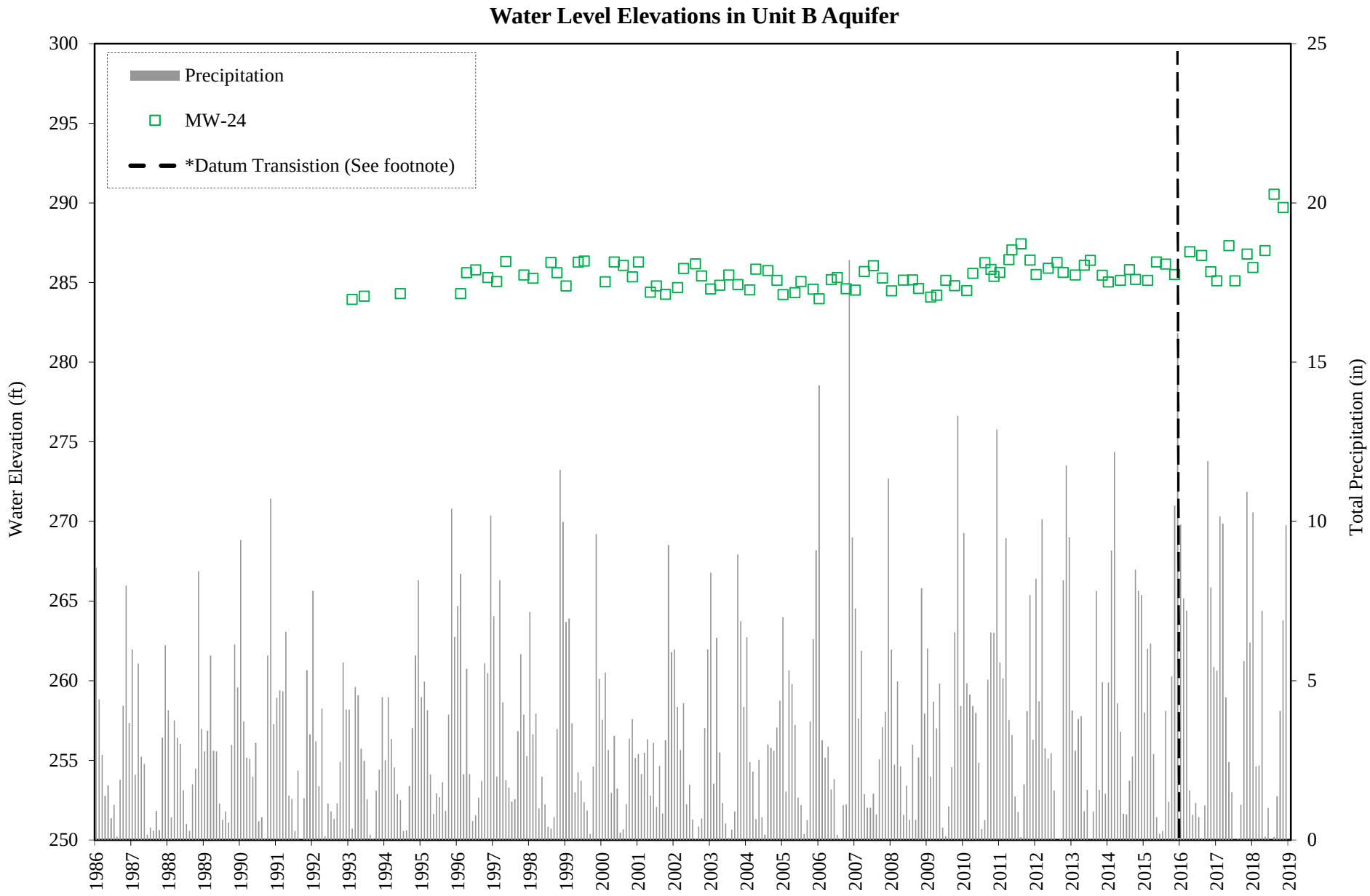
King County

Marhc-2019

FIGURE NO.
10

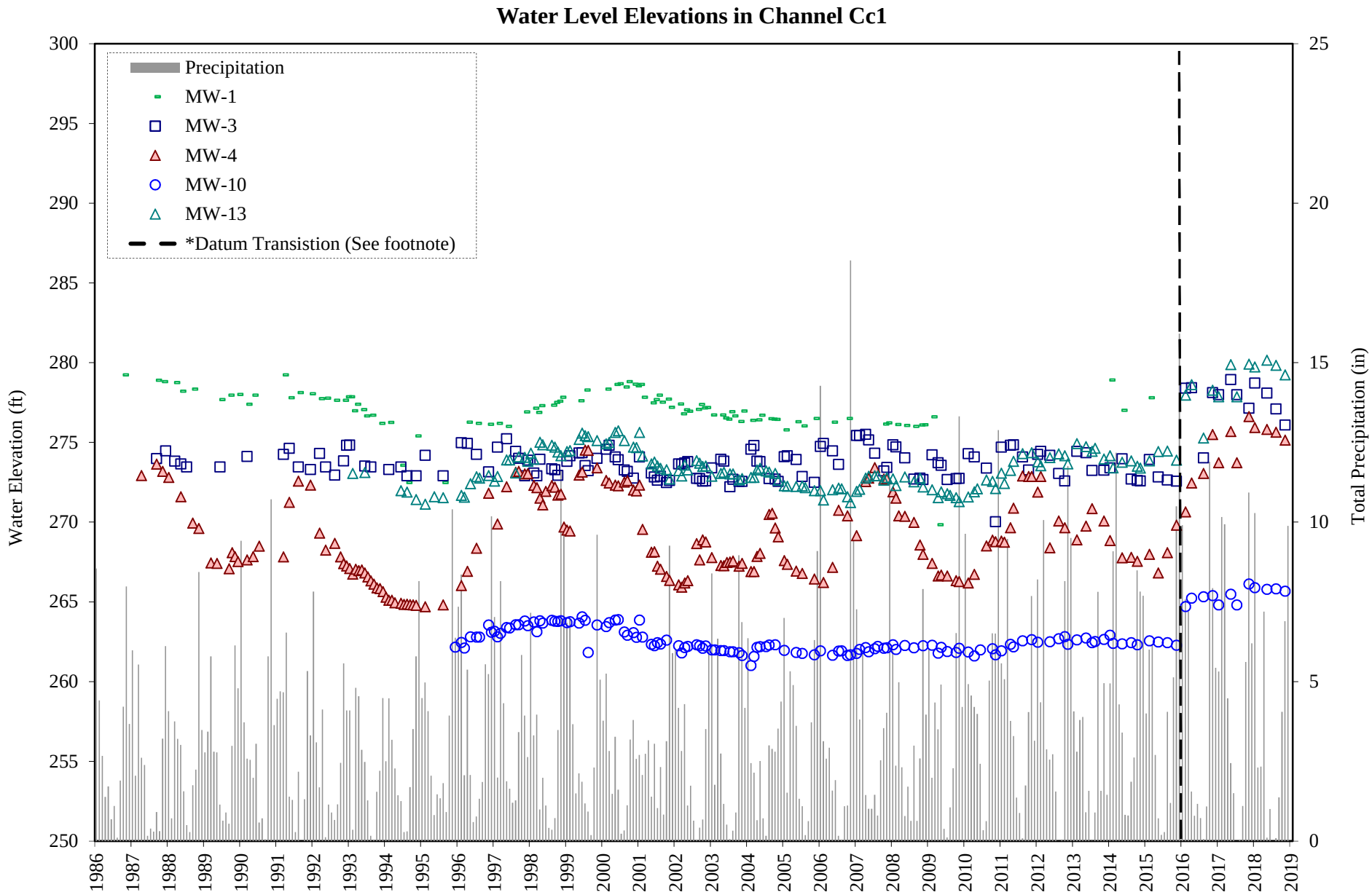
CAD Path: Q:\King County\090057 Vashon Island Landfill\2018-05 RI-FS Report\090057-Cc.dwg 11x17 Landscape || Coordinate System: NAD 1983 State Plane Washington North FIPS 4601 Feet || Date Saved: Sep 28, 2018 2:21pm || User: scudd


D
NORTH
D'
SOUTH
MW-28 (OFFSET 187' E)
MW-10 (OFFSET 55' W)
MW-26
MW-19 (OFFSET 141' W)
MW-9 (OFFSET 140' W)
MW-8 (OFFSET 140' W)
MW-27 (OFFSET 15' W)
MW-34 (OFFSET 18' W)
MW-14 (OFFSET 182' W)
MW-4 (OFFSET 199' W)
MW-36 (OFFSET 182' W)
(MW-36 SHOWN 40' SOUTH FOR DISPLAY)
MW-33 (OFFSET 173' E)
MW-5D (OFFSET 42' W)
MW-35 (OFFSET 33' W)
(MW-12 SHOWN 40' NORTH FOR DISPLAY)
MW-12 (OFFSET 157' E)
MW-3 (OFFSET 138' E)
MW-2 (OFFSET 132' E)
MW-21 (OFFSET 4' E)
Smith-Shiraton (DW-SS) (OFFSET 195' E)
85 Acres (DW-85) (OFFSET 41' E)
Break in Section (See Figure 4)
Elevation in Feet (NAVD88)
Refuse/Fill
Unit A: Vashon glacial till - fine grained
Unit B: advance outwash sand - coarse grained
Unit C: glacial deposit - variable coarse & fine grained
Coarse
Fine
Unit D: fluvial sands and gravels with fine-grained overbank deposits
Unit E: lacustrine silt - fine grained
Unit F: fluvial sands and gravels with fine-grained overbank deposits
Static Water Level
Screen Interval
Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 50'
Vertical Exaggeration 2x
Feet
Notes:
1. Decommissioned wells are depicted in gray.
2. Unit Cc2, Unit Cc3, Unit D, and Unit F are the four principal water-bearing units at the VLF.
Geologic Cross Section D-D'
Vashon Island Closed Landfill
King County, Washington
King County
Marhc-2019
FIGURE NO.
11



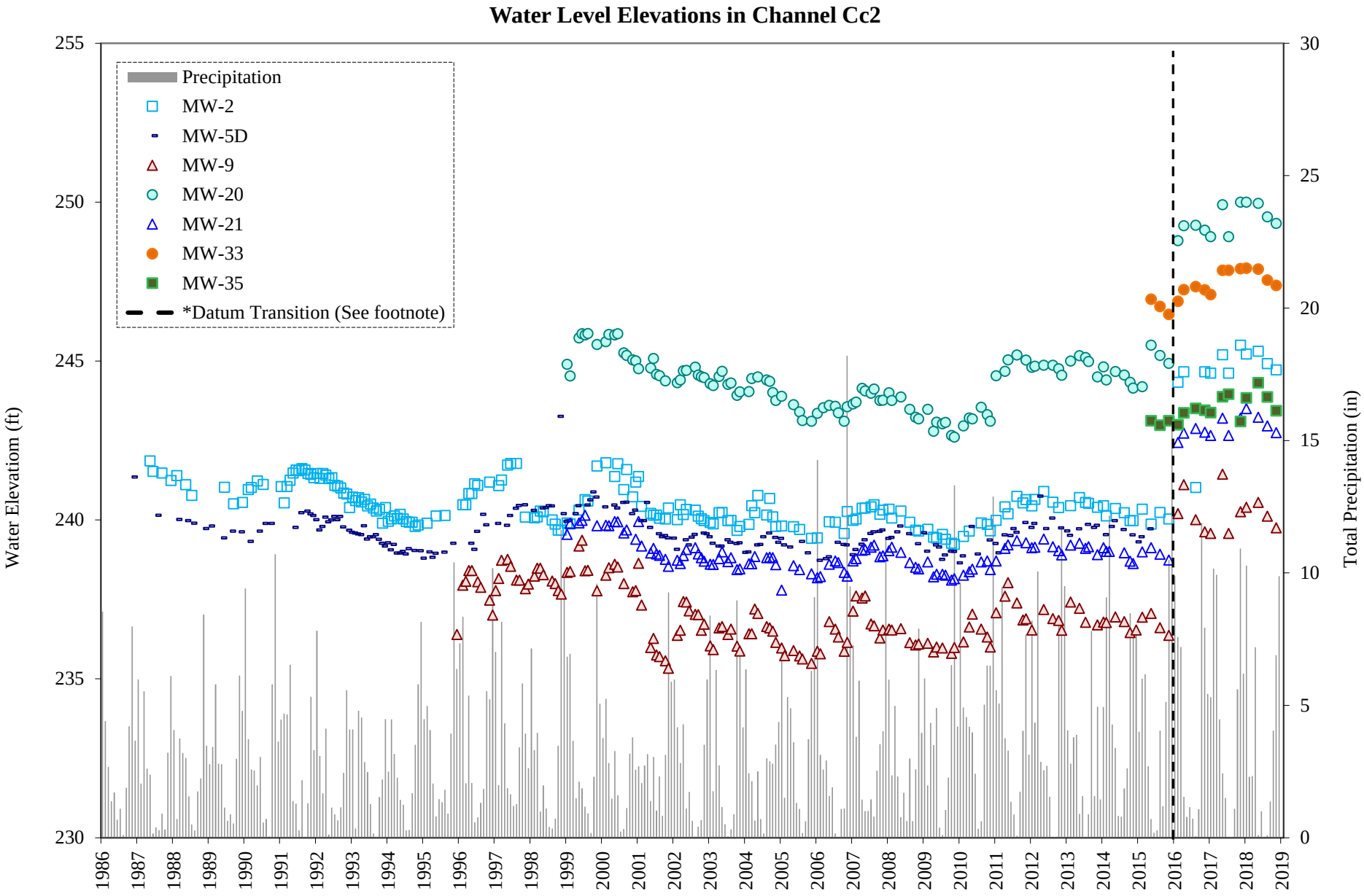
Precipitation Data Source:
Pre 2005: NOAA
Sea-Tac AP Station. Monthly Total Precipitation
Post 2005: KC DNRP. WLRD, Rain Gage, Vashon Landfill
*Datum transition from NGVD29 to NAVD88 beginning in 2016

Figure 12



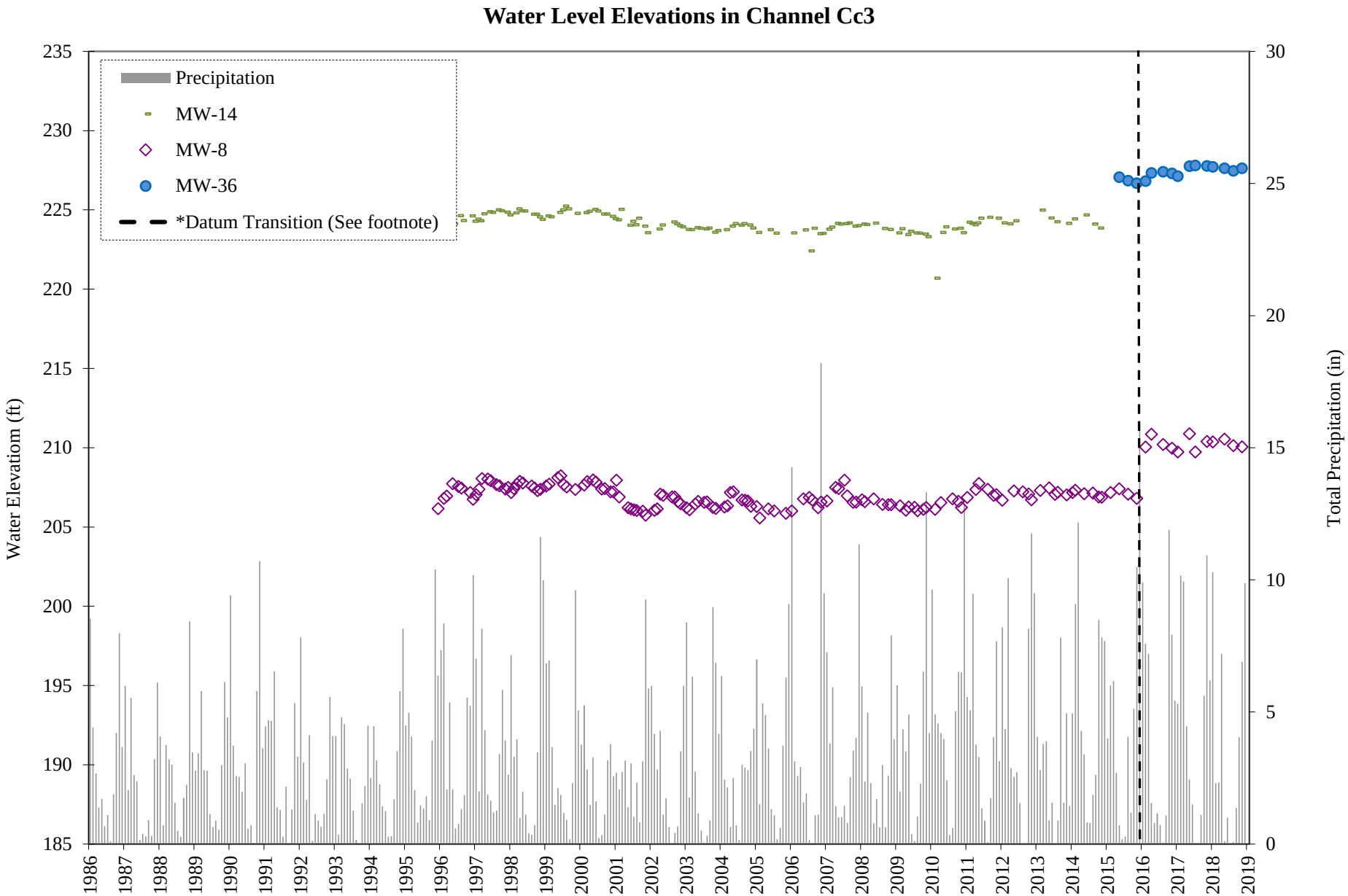
Precipitation Data Source:
Pre 2005: NOAA
Sea-Tac AP Station. Monthly Total Precipitation
Post 2005: KC DNRP. WLRD, Rain Gage, Vashon Landfill
*Datum transition from NGVD29 to NAVD88 beginning in 2016

Figure 13



Precipitation Data Source:
Pre 2005: NOAA
Sea-Tac AP Station. Monthly Total Precipitation
Post 2005: KC DNRP. WLRD, Rain Gage, Vashon Landfill
*Datum transition from NGVD29 to NAVD88 beginning 2016.

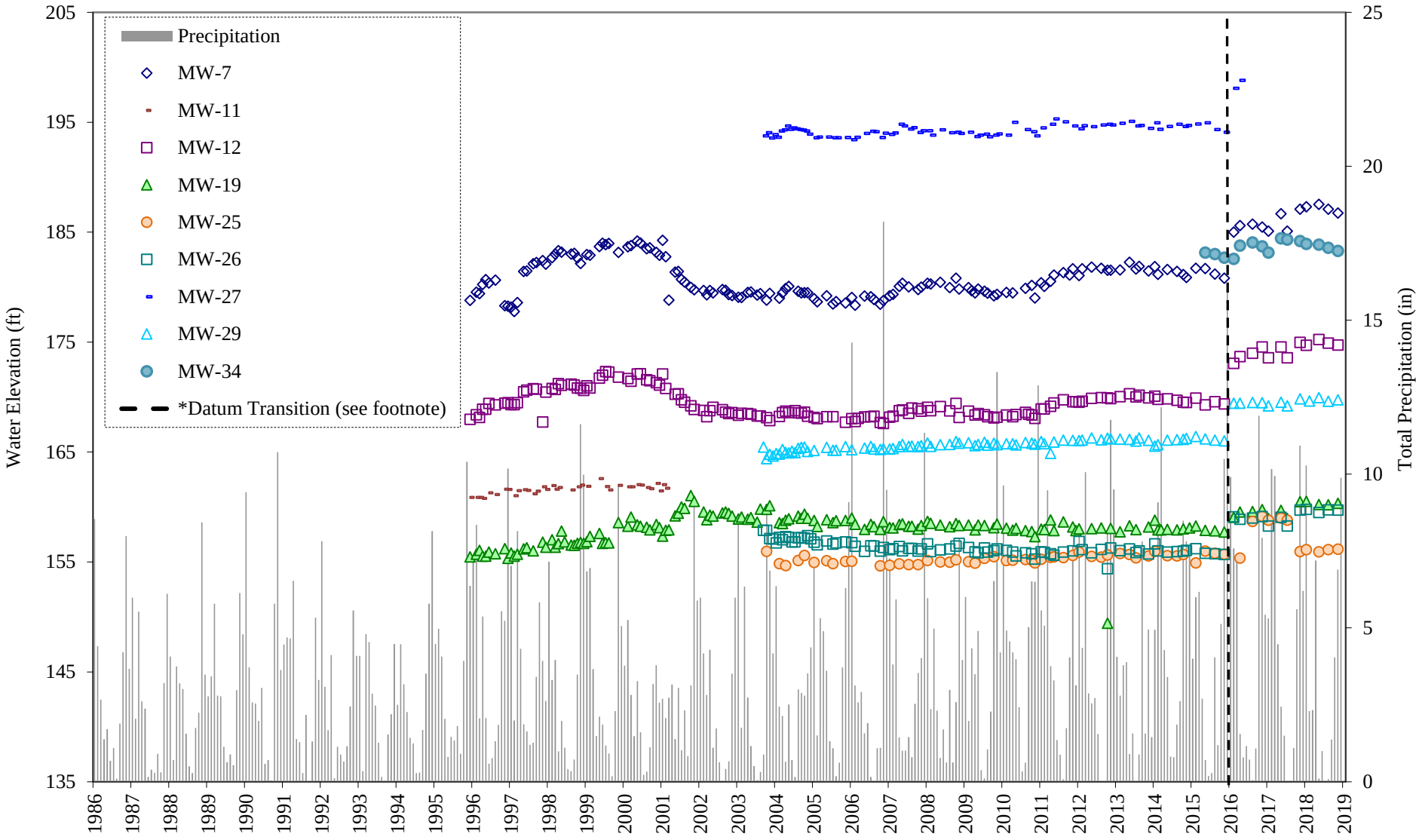
Figure 14



Precipitation Data Source:
Pre 2005: NOAA
Sea-Tac AP Station. Monthly Total Precipitation
Post 2005: KC DNRP. WLRD, Rain Gage, Vashon Landfill
*Datum transition from NGVD29 to NAVD88 beginning 2016.

Figure 15

Water Level Elevations in Unit D Aquifer



Precipitation Data Source:
Pre 2005: NOAA
Sea-Tac AP Station. Monthly Total Precipitation
Post 2005: KC DNRP. WLRD, Rain Gage, Vashon Landfill
*Datum transition from NGVD29 to NAVD88 beginning 2016.

Figure 16

Table 2-1

Significant Maintenance Activities Summary 2018

Vashon Island Closed Landfill

Maintenance Activity	Resolution
Landfill Gas Extraction Well Installation Technical Memorandum	Drilled and installed two vertical landfill gas extraction wells (i.e. GW-10 and GW-11). The wells were incorporated into the active landfill gas collection system.
Resurfaced an Entrance Road to the Transfer Station	Entrance road to Transfer Station had several places where asphalt was cracking and uneven. The road was ground down and resurfaced where needed.
Agency Draft of the Vashon Island Closed Landfill Remedial Investigation Report (RI)	Submitted an Agency Draft of the RI report to Washington Department of Ecology and Public Health-Seattle & King County for the initial review.

Table 2-2

Vashon Island Closed Landfill Groundwater Monitoring Well Completion Details

Well Number	Date Completed	Installed By	Top of PVC Casing Elevation (feet)[a]	Well Casing and Screen	Well Dia. (inches)	Screen slot (inches)	Top of Screen Elevation[b]	Bottom of Screen Elevation[b]	Top of Seal Elevation[b]	Bottom of Seal Elevation[b]	Seal Type	Top of Sand Pack (feet elev.)[b]	Bottom of Sand Pack (feet elev.)[b]	Sand Type	Reference[c]
MW-1[d]	9/8/1983	Sweet- Edwards	407.06	Sch 80 PVC	3	0.010	287.94	277.94	405.94	292.94	Bentonite	292.94	275.94	3/8 minus pea gravel	A
MW-2	9/9/1983	Sweet- Edwards	318.09	Sch 80 PVC	3	0.010	237.39	232.39	316.39	250.39	Bentonite	248.39	231.39	3/8 minus pea gravel	A
MW-3	9/12/1983	Sweet- Edwards	318.12	Sch 80 PVC	3	0.010	281.15	276.15	316.15	284.15	Bentonite	284.15	276.15	3/8 minus pea gravel	A
MW-4	9/14/1983	Sweet- Edwards	377.30	Sch 80 PVC	3	0.010	276.17	266.17	376.17	281.17	Bentonite	281.17	266.17	3/8 minus pea gravel	A
MW-5S[d]	3/6/1986	Golder	360.09	Sch 40 PVCb	2	0.020	285.32	275.32	359.32	356.32	Bentonite	356.32	274.82	#8 Monteray & Gravel	B
MW-5D[d]	3/6/1986	Golder	360.66	Sch 40 PVCb	2	0.020	244.32	233.32	258.82	253.32	Bentonite	257.32	233.32	#8 Monteray & Gravel	B
MW-6S[d]	3/19/1986	Golder	397.7	Sch 40 PVCb	2	0.020	290.88	280.88	395.88	392.88	Bentonite	392.88	279.88	#8 Aqua and Gravel	B
MW-6D[d]	3/19/1986	Golder	397.6	Sch 40 PVCb	2	0.020	245.38	235.38	259.88	253.88	Bentonite	247.88	234.88	#8 Aqua	B
MW-7	4/28/1995	CH2M HILL	376.56	Sch 40 PVC	2	0.010	154.40	144.40	374.40	157.40	Bentonite	157.40	142.40	#20 x 40	C
MW-8	6/30/1995	CH2M HILL	386.13	Sch 40 PVC	2	0.010	215.95	205.95	383.95	216.95	Bentonite	216.95	203.95	#20 x 40	C
MW-9	6/12/1995	CH2M HILL	405.32	Sch 40 PVC	2	0.010	236.39	226.39	403.39	239.39	Bentonite	239.39	223.39	#20 x 40	C
MW-10	7/1/1995	CH2M HILL	410.21	Sch 40 PVC	2	0.010	265.04	255.04	408.04	268.04	Bentonite	268.04	253.04	#20 x 40	C
MW-11[d]	5/15/1995	CH2M HILL	409.85	Sch 40 PVC	2	0.010	165.74	155.74	407.74	167.74	Bentonite	167.74	147.74	#20 x 40	C
MW-12	5/26/1995	CH2M HILL	315.67	Sch 40 PVC	2	0.010	142.90	132.90	313.40	146.40	Bentonite	146.40	127.40	#20 x 40	C
MW-13	4/22/1992	Terra	377.37	Sch 40 PVC	2	0.020	267.30	262.30	375.30	269.30	Bentonite	269.30	259.80	#8	D
MW-14[d]	6/21/1995	CH2M HILL	379.14	Sch 40 PVC	2	0.020	216.08	206.08	377.08	223.08	Bentonite	223.08	205.08	#20 x 40	C
MW-19	6/12/1995	CH2M HILL	405.58	Sch 40 PVC	2	0.020	142.85	132.85	402.35	142.35	Bentonite	142.35	126.35	#20 x 40	C
MW-20	10/21/1998	UES	370.43	Sch 40 PVC	2	0.020	240.79	236.49	368.49	244.09	Bentonite	244.09	234.49	#20 x 40	E
MW-21	10/21/1998	UES	348.95	Sch 40 PVC	2	0.020	246.46	237.06	347.06	252.06	Bentonite	252.06	236.06	#20 x 40	E
MW-24	4/27/1992	Terra	377.53	Sch 40 PVC	2	0.020	294.96	284.96	375.46	298.46	Bentonite	298.46	285.46	#8	D
MW-25	8/11/2003	UES	402.48	Sch 80 PVC	4	0.020	152.04	137.94	400.54	155.54	Bentonite	155.54	133.54	#16 x 30	F
MW-26	8/6/2003	UES	406.58	Sch 80 PVC	4	0.020	158.30	144.20	404.40	162.10	Bentonite	162.10	140.70	#16 x 30	F
MW-27[d]	8/15/2003	UES	386.34	Sch 80 PVC	4	0.020	197.55	183.35	384.05	200.55	Bentonite	200.55	180.55	#16 x 30	F
MW-28	8/29/2003	UES	398.72	Sch 80 PVC	4	0.020	177.04	162.64	396.64	180.14	Bentonite	180.14	160.84	#16 x 30	F
MW-29	8/29/2003	UES	413.79	Sch 80 PVC	4	0.020	173.02	158.22	411.22	175.22	Bentonite	175.22	150.22	#16 x 30	G
MW-33	3/13/2015	Aspect Consulting	359.77	Sch 40 PVC	4	0.020	229.78	219.78	357.07	232.90	Bentonite	232.90	217.82	10 x 20 Colorado Silica	I
MW-34	3/26/2015	Aspect Consulting	385.88	Sch 40 PVC	4	0.020	147.96	137.96	383.26	151.26	Bentonite	151.26	135.76	10 x 20 Colorado Silica	I
MW-35	3/18/2015	Aspect Consulting	361.47	Sch 40 PVC	4	0.020	244.25	233.35	358.75	247.25	Bentonite	247.25	233.55	10 x 20 Colorado Silica	I
MW-36	4/02/2015	Aspect Consulting	378.24	Sch 40 PVC	4	0.020	221.25	211.25	375.25	223.25	Bentonite	223.25	210.25	10 x 20 Colorado Silica	I
P-1S[d]	3/12/1986	Golder	No data	Sch 40 PVC	2	0.020	307.46	297.46	396.46	393.46	Bentonite	393.46	291.46	#8 Aqua and Gravel	B
P-1D[d]	3/12/1986	Golder	No data	Sch 40 PVC	2	0.020	281.96	271.96	291.46	286.46	Bentonite	286.46	271.46	#8 Aqua	B
P-1A[d]	3/25/1986	Golder	No data	Sch 40 PVC	2	0.020	283.48	273.48	357.48	289.48	Bentonite	289.48	272.48	#8 Monteray	B
P-1B[d]	3/29/1986	Golder	No data	Sch 40 PVC	2	0.020	302.54	292.54	383.54	307.54	Bentonite	307.54	292.54	10 x 20 silica	B
P-2[d]	3/19/1986	Golder	No data	Sch 40 PVC	2	0.020	277.19	262.19	287.19	282.19	Bentonite	282.19	260.19	#8 Aqua	B
P-2A[d]	3/24/1986	Golder	No data	Sch 40 PVC	2	0.020	297.06	285.06	352.06	310.06	Bentonite	310.06	283.56	#8 Aqua	B
P-4	2/29/1988	Golder	No data	Sch 80 PVC	1	0.020	378.36	376.36	410.86	380.36	Bentonite	380.36	375.36	#16 Monteray	H

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

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

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

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

Table 3-1
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc1						
Well Location	MW-1 [b]	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Long	Short	Long	Short
pH Field, [Standard Units]							
No. of Analyses	17	28	44	85	8	91	8
No. of Detections	17	28	44	85	8	91	8
Minimum	6.40	5.44	5.94	6.77	6.75	6.72	6.70
Maximum	8.17	6.82	7.97	8.42	7.64	7.96	7.41
Mean	7.21	6.10	6.52	7.39	7.14	7.23	7.03
Standard Deviation	0.429	0.340	0.340	0.284	0.255	0.236	0.223
Median	7.19	6.14	6.44	7.39	7.13	7.22	7.07
Specific Conductance Field, [µmhos/cm]							
No. of Analyses	18	28	44	85	8	90	8
No. of Detections	18	28	44	85	8	90	8
Minimum	155	74	160	100	146	130	160
Maximum	250	200	860	156	159	195	177
Mean	190	113	502	129	150	160	167
Standard Deviation	27.2	27.3	201.7	10.8	4.1	15.1	5.1
Median	185	100	493	130	149	160	166
Total Dissolved Solids, [mg/L]							
No. of Analyses	19	23	41	84	8	91	8
No. of Detections	19	23	41	84	8	91	8
Minimum	77	8	29	46	100	68	115
Maximum	170	90	500	130	117	150	124
Mean	126	67	317	97	107	116	120
Standard Deviation	26.48	16.87	125.89	13.04	4.96	14.75	2.92
Median	123	69	340	98	107	118	121
Alkalinity, [mg/L]							
No. of Analyses	5	21	23	85	8	87	8
No. of Detections	5	21	23	85	8	87	8
Minimum	98	19	40	52	56	30	64
Maximum	120	41	320	70	64	80	68
Mean	110	28	163	56	59	64	66
Standard Deviation	10.5	5.8	109.3	2.7	2.6	7.8	1.5
Median	110	28	180	56	58	64	66
Ammonia-N, [mg/L]							
No. of Analyses	30	28	56	85	8	92	8
No. of Detections	4	9	23	11	3	11	0
Minimum	ND	ND	ND	ND	ND	ND	ND
Maximum	0.130	0.650	0.332	0.060	0.005	0.070	ND
Mean	0.025	0.114	0.050	0.011	0.002	0.010	ID
Standard Deviation	0.023	0.203	0.073	0.011	0.002	0.011	ID
Median	0.025	0.015	0.025	0.005	0.002	0.005	ID
Nitrate-N, [mg/L]							
No. of Analyses	29	28	56	85	8	92	8
No. of Detections	21	28	31	85	8	91	8
Minimum	ND	0.2	ND	0.21	0.574	ND	0.108
Maximum	0.33	5.53	6.30	0.84	0.70	0.28	0.24
Mean	0.16	1.94	1.30	0.39	0.63	0.10	0.17
Standard Deviation	0.09	1.40	1.82	0.10	0.04	0.05	0.04
Median	0.16	1.30	0.10	0.38	0.63	0.08	0.17
Sulfate, [mg/L]							
No. of Analyses	29	28	56	85	8	91	8
No. of Detections	29	28	56	85	8	91	8
Minimum	11.0	5.2	3.7	2.6	8.4	12.9	12.2
Maximum	21.0	19.0	46.0	11.0	9.4	26.8	16.6
Mean	16.9	10.5	17.2	9.6	8.8	18.9	13.9
Standard Deviation	2.08	3.72	9.10	0.93	0.35	2.29	1.32
Median	17.0	10.0	15.0	9.7	8.8	19.0	13.8
Chloride, [mg/L]							
No. of Analyses	29	28	56	85	8	92	8
No. of Detections	29	28	54	84	8	92	8
Minimum	1.30	0.94	ND	ND	3.12	2.50	2.80
Maximum	6.27	11.00	19.00	30.90	3.40	10.60	3.25
Mean	4.27	2.78	8.97	3.40	3.28	3.55	3.05
Standard Deviation	0.87	2.31	4.20	3.04	0.10	1.06	0.13
Median	4.20	2.00	7.92	3.00	3.28	3.10	3.08
Dissolved Arsenic, [mg/L]							
No. of Analyses	30	28	56	85	8	92	8
No. of Detections	25	1	13	84	8	91	8
Minimum	ND	ND	ND	ND	0.001	ND	0.002
Maximum	0.007	0.007	0.006	0.002	0.002	0.003	0.002
Mean	0.005	ID	0.001	0.002	0.002	0.002	0.002
Standard Deviation	1E-03	ID	1E-03	4E-04	5E-05	3E-04	1E-04
Median	0.005	ID	0.001	0.002	0.002	0.002	0.002
Total Arsenic, [mg/L]							
No. of Analyses		6	8	13	8	16	8
No. of Detections		3	7	13	8	16	8
Minimum		ND	ND	0.0015	0.0015	0.0016	0.0016
Maximum		0.0001	0.0006	0.0018	0.0017	0.0022	0.0021
Mean		0.0003	0.0004	0.0016	0.0016	0.0018	0.0018
Standard Deviation		0.0002	0.0001	0.0001	0.0001	0.0002	0.0002
Median		0.0003	0.0004	0.0016	0.0015	0.0018	0.0019

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc1						
Well Location	MW-1 [b]	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Long	Short	Long	Short
Dissolved Iron, [mg/L]							
No. of Analyses	30	28	56	85	8	92	8
No. of Detections	14	19	40	55	0	58	5
Minimum	ND	ND	ND	ND	ND	ND	ND
Maximum	0.32	8.60	0.50	0.30	ND	0.49	0.04
Mean	0.03	1.02	0.08	0.03	ID	0.04	0.02
Standard Deviation	0.06	2.38	0.11	0.05	ID	0.06	0.01
Median	0.02	0.04	0.04	0.02	ID	0.02	0.01
Total Iron, [mg/L]							
No. of Analyses		6	8	13	8	16	8
No. of Detections		6	7	13	3	16	8
Minimum		0.03	ND	0.01	ND	0.01	0.01
Maximum		0.27	0.34	0.04	0.017	2.18	0.05
Mean		0.14	0.08	0.02	0.008	0.24	0.03
Standard Deviation		0.08	0.11	0.008	0.005	0.53	0.014
Median		0.14	0.04	0.015	0.005	0.07	0.030
Dissolved Manganese, [mg/L]							
No. of Analyses	30	28	56	85	8	92	8
No. of Detections	6	21	49	8	1	53	8
Minimum	ND	ND	ND	ND	ND	ND	0.0003
Maximum	0.058	2.700	0.970	0.003	0.0001	0.027	0.014
Mean	0.006	0.348	0.158	0.001	ID	0.002	0.006
Standard Deviation	0.012	0.854	0.215	0.000	ID	0.004	0.005
Median	0.001	0.002	0.068	0.001	ID	0.001	0.004
Total Manganese, [mg/L]							
No. of Analyses		6	8	13	8	16	8
No. of Detections		6	8	5	7	13	8
Minimum		0.002	0.001	ND	ND	ND	0.0005
Maximum		0.019	0.169	0.0019	0.0009	0.0650	0.013
Mean		0.009	0.036	0.0009	0.0003	0.0101	0.005
Standard Deviation		0.007	0.060	0.0005	0.0002	0.0157	0.004
Median		0.006	0.007	0.0005	0.0003	0.0057	0.004
Dissolved Calcium, [mg/L]							
No. of Analyses	10	22	33	85	8	92	8
No. of Detections	10	22	33	85	8	92	8
Minimum	11.0	7.2	11.1	4.3	9.0	6.5	9.0
Maximum	14.0	11.0	73.6	13.0	10.7	11.5	10.7
Mean	12.2	9.0	43.5	8.9	9.8	9.3	10.1
Standard Deviation	1.16	1.05	23.00	1.02	0.48	0.89	0.55
Median	11.7	9.3	45.0	9.0	9.9	9.5	10.3
Total Calcium, [mg/L]							
No. of Analyses		6	8	13	8	16	8
No. of Detections		6	8	13	8	16	8
Minimum		7.1	11.2	8.2	9.3	8.4	9.2
Maximum		9.2	17.2	10.6	11.2	11.5	11.4
Mean		8.4	12.5	9.1	10.1	9.6	10.1
Standard Deviation		0.72	1.95	0.60	0.64	0.86	0.64
Median		8.65	11.85	9.09	10.09	9.55	10.15
Dissolved Magnesium, [mg/L]							
No. of Analyses	10	22	33	85	8	92	8
No. of Detections	10	22	33	85	8	92	8
Minimum	10.7	1.8	8.1	4.2	9.4	7.7	11.0
Maximum	16.0	3.1	56.8	12.0	10.5	14.0	12.9
Mean	12.5	2.4	33.1	8.2	9.8	10.6	11.9
Standard Deviation	1.74	0.27	17.60	0.89	0.38	1.20	0.73
Median	11.8	2.4	36.0	8.2	9.8	10.2	12.1
Total Magnesium, [mg/L]							
No. of Analyses		6	8	13	8	16	8
No. of Detections		6	8	13	8	16	8
Minimum		2.2	8.9	8.0	9.5	9.6	11.2
Maximum		2.8	11.9	9.5	10.9	13.6	13.6
Mean		2.5	9.5	8.8	10.2	11.4	12.0
Standard Deviation		0.20	1.00	0.43	0.51	1.32	0.84
Median		2.5	9.1	8.8	10.1	11.0	11.8
Dissolved Sodium, [mg/L]							
No. of Analyses	10	22	33	85	8	92	8
No. of Detections	10	22	33	85	8	92	8
Minimum	7.3	3.2	5.4	2.3	4.8	4.9	5.7
Maximum	10.0	7.1	24.8	6.4	5.4	14.4	6.7
Mean	8.3	4.9	13.4	4.5	5.1	6.0	6.3
Standard Deviation	0.95	0.98	6.16	0.47	0.22	1.00	0.37
Median	8.0	4.8	13.0	4.5	5.2	5.8	6.4
Total Sodium, [mg/L]							
No. of Analyses		6	8	13	8	16	8
No. of Detections		6	8	13	8	16	8
Minimum		3.1	6.2	4.4	5.0	5.4	5.9
Maximum		7.7	7.5	5.4	5.7	15.8	7.0
Mean		5.4	6.9	4.8	5.3	6.7	6.3
Standard Deviation		1.62	0.37	0.27	0.24	2.48	0.36
Median		5.5	6.9	4.8	5.3	6.1	6.3

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc1						
Well Location	MW-1 [b]	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Long	Short	Long	Short
Dissolved Potassium, [mg/L]							
No. of Analyses	10	22	33	85	8	92	8
No. of Detections	10	22	33	85	8	92	8
Minimum	2.20	1.59	0.88	0.65	1.38	1.10	1.74
Maximum	3.00	4.10	2.70	2.00	1.54	2.24	1.87
Mean	2.51	3.08	1.71	1.35	1.47	1.70	1.79
Standard Deviation	0.25	0.65	0.53	0.15	0.06	0.17	0.05
Median	2.40	3.20	1.70	1.34	1.47	1.70	1.78
Total Potassium, [mg/L]							
No. of Analyses		6	8	13	8	16	8
No. of Detections		6	8	13	8	16	8
Minimum		1.69	0.98	1.28	1.42	1.48	1.66
Maximum		2.80	1.17	1.65	1.59	2.50	1.88
Mean		2.43	1.07	1.48	1.51	1.88	1.79
Standard Deviation		0.41	0.07	0.10	0.06	0.21	0.07
Median		2.56	1.07	1.47	1.51	1.89	1.79
Benzene, [µg/L]							
No. of Analyses	30	28	56	85	8	92	8
No. of Detections	1	0	0	1	0	1	0
Minimum	ND	ND	ND	ND	ND	ND	ND
Maximum	0.32	ND	ND	0.28	ND	0.22	ND
Mean	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID
Chloroethane, [µg/L]							
No. of Analyses	30	28	56	85	8	92	8
No. of Detections	0	0	6	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	1.30	ND	ND	ND	ND
Mean	ID	ID	0.97	ID	ID	ID	ID
Standard Deviation	ID	ID	1.06	ID	ID	ID	ID
Median	ID	ID	0.66	ID	ID	ID	ID
Toluene, [µg/L]							
No. of Analyses	30	28	56	85	8	92	8
No. of Detections	2	0	0	1	0	1	0
Minimum	ND	ND	ND	ND	ND	ND	ND
Maximum	0.54	ND	ND	0.35	ND	0.78	ND
Mean	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID
Trichloroethene, [µg/L]							
No. of Analyses	30	28	56	85	8	92	8
No. of Detections	1	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND
Maximum	1.00	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID
Vinyl Chloride, [µg/L]							
No. of Analyses	30	28	56	85	8	92	8
No. of Detections	0	0	23	1	0	1	0
Minimum	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	19.0	0.02	ND	0.02	ND
Mean	ID	ID	3.2	ID	ID	ID	ID
Standard Deviation	ID	ID	5.0	ID	ID	ID	ID
Median	ID	ID	0.5	ID	ID	ID	ID
Total Xylenes, [µg/L]							
No. of Analyses		7	9	26	8	28	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
cis-1,2-Dichloroethene, [µg/L]							
No. of Analyses	17	25	43	85	8	92	8
No. of Detections	0	0	16	0	0	1	0
Minimum	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	16.00	ND	ND	0.79	ND
Mean	ID	ID	1.11	ID	ID	ID	ID
Standard Deviation	ID	ID	2.54	ID	ID	ID	ID
Median	ID	ID	0.50	ID	ID	ID	ID
trans-1,2-Dichloroethene, [µg/L]							
No. of Analyses	21	27	48	85	8	92	8
No. of Detections	0	0	1	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	0.31	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc1						
Well Location	MW-1 [b]	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Long	Short	Long	Short
1,1 Dichloroethane, [µg/L]							
No. of Analyses	30	28	56	85	8	92	8
No. of Detections	0	0	17	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	1.00	ND	ND	ND	ND
Mean	ID	ID	0.47	ID	ID	ID	ID
Standard Deviation	ID	ID	0.66	ID	ID	ID	ID
Median	ID	ID	0.50	ID	ID	ID	ID
1,2-Dichloropropane, [µg/L]							
No. of Analyses	30	28	56	85	8	92	8
No. of Detections	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID
Trichlorofluoromethane, [µg/L]							
No. of Analyses	10	22	34	85	8	92	8
No. of Detections	0	12	26	1	0	1	0
Minimum	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	0.67	2.10	0.20	ND	1.00	ND
Mean	ID	0.23	0.97	ID	ID	ID	ID
Standard Deviation	ID	0.17	0.96	ID	ID	ID	ID
Median	ID	0.22	0.88	ID	ID	ID	ID
Dichlorodifluoromethane, [µg/L]							
No. of Analyses	5	21	24	85	8	87	8
No. of Detections	0	0	12	0	0	1	0
Minimum	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	4.20	ND	ND	1.50	ND
Mean	ID	ID	1.21	ID	ID	ID	ID
Standard Deviation	ID	ID	1.43	ID	ID	ID	ID
Median	ID	ID	0.85	ID	ID	ID	ID

NOTES:

ID - Insufficient Data (i.e. the number of detections is less than 3)
ND - Not Detected (i.e. at laboratory MDL - Method Detection Limit)

[a] - Wells Decommissioned in 2003 (i.e. MW-11)
[b] - Wells Decommissioned in 2015 (i.e. MW-1; MW-5D; MW-14)
[c] - Wells Decommissioned in 2016 (i.e. MW-27)
[d] - Wells Commissioned in 2015 (i.e. MW-33; MW-34; MW-35; MW-36)

Time Interval:
Long - All data in the period of record exclusive of the eight most recent analyses
Short - Eight most recent analyses in the last two years

- Total metals were not included in the analyte list for this well prior to well decommissioning.

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc2										
Well Location	MW-2		MW-5D [b]	MW-9		MW-20		MW-21		MW-33 [d]	MW-35 [d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Short	Short
pH Field, [Standard Units]											
No. of Analyses	141	8	127	88	8	73	8	73	8	8	8
No. of Detections	141	8	127	88	8	73	8	73	8	8	8
Minimum	6.06	6.54	6.04	6.82	6.55	7.00	6.57	6.56	6.41	6.48	6.46
Maximum	7.75	6.99	8.04	7.98	7.33	8.56	7.26	8.24	6.93	6.80	6.78
Mean	6.87	6.81	6.70	7.37	6.93	7.89	7.00	6.90	6.70	6.66	6.62
Standard Deviation	0.245	0.166	0.282	0.214	0.238	0.362	0.233	0.247	0.171	0.111	0.101
Median	6.90	6.85	6.70	7.40	6.98	7.97	7.03	6.87	6.67	6.66	6.62
Specific Conductance Field, [µmhos/cm]											
No. of Analyses	140	8	126	88	8	74	8	73	8	8	8
No. of Detections	140	8	126	88	8	74	8	73	8	8	8
Minimum	230	285	110	110	181	140	203	200	247	748	649
Maximum	1024	333	1760	210	202	242	233	480	271	845	758
Mean	449	303	739	154	192	173	219	347	261	804	712
Standard Deviation	120.5	14.3	396.5	18.5	6.6	20.3	12.7	68.6	8.7	33.1	35.3
Median	430	301	550	150	192	170	221	345	263	816	705
Total Dissolved Solids, [mg/L]											
No. of Analyses	135	8	127	87	8	72	8	73	8	8	8
No. of Detections	135	8	126	87	8	72	8	73	8	8	8
Minimum	34	173	ND	58	123	50	133	157	160	445	409
Maximum	480	197	900	160	147	160	150	307	181	511	473
Mean	274	183	457	111	132	122	143	233	170	481	446
Standard Deviation	63.75	8.88	204.42	18.02	7.96	17.95	5.84	32.60	6.07	23.01	23.73
Median	260	182	360	110	131	120	144	230	169	488	445
Alkalinity, [mg/L]											
No. of Analyses	88	8	82	87	8	73	8	73	8	8	8
No. of Detections	88	8	82	87	8	73	8	73	8	8	8
Minimum	110	130	4	56	70	59	76	117	116	393	331
Maximum	500	154	720	100	81	95	89	290	125	443	385
Mean	221	138	285	67	75	73	85	198	120	419	357
Standard Deviation	53.6	8.3	115.0	6.2	3.8	5.5	4.1	45.3	3.5	17.6	19.4
Median	225	135	295	66	74	72	87	200	120	423	350
Ammonia-N, [mg/L]											
No. of Analyses	146	8	143	87	8	73	8	73	8	8	8
No. of Detections	18	3	118	11	1	41	8	37	7	8	8
Minimum	ND	ND	ND	ND	ND	ND	0.0136	ND	ND	0.0291	0.0319
Maximum	0.040	0.003	0.430	0.060	0.002	0.100	0.018	0.130	0.023	0.065	0.075
Mean	0.012	0.002	0.068	0.011	ID	0.018	0.015	0.018	0.018	0.037	0.065
Standard Deviation	0.009	0.001	0.067	0.011	ID	0.014	0.002	0.020	0.006	0.012	0.014
Median	0.005	0.002	0.050	0.005	ID	0.015	0.015	0.015	0.020	0.033	0.069
Nitrate-N, [mg/L]											
No. of Analyses	146	8	143	88	8	73	8	73	8	8	8
No. of Detections	72	0	26	87	8	13	1	40	8	1	1
Minimum	ND	ND	ND	ND	0.21	ND	ND	ND	0.08	ND	ND
Maximum	1.25	ND	0.30	1.60	0.82	0.11	0.01	0.56	0.20	0.04	0.02
Mean	0.13	ID	0.04	0.24	0.42	0.02	ID	0.08	0.12	ID	ID
Standard Deviation	0.24	ID	0.06	0.26	0.18	0.02	ID	0.09	0.04	ID	ID
Median	0.05	ID	0.03	0.18	0.39	0.01	ID	0.03	0.12	ID	ID
Sulfate, [mg/L]											
No. of Analyses	146	8	143	87	8	73	8	73	8	8	8
No. of Detections	146	8	111	87	8	73	8	73	8	8	8
Minimum	1.5	13.7	ND	9.0	11.0	14.0	15.4	10.0	11.7	13.9	18.4
Maximum	18.8	17.0	81.8	18.0	14.3	18.0	17.5	19.0	14.0	17.4	22.3
Mean	12.4	15.0	5.5	12.9	12.6	16.0	16.6	14.1	12.7	15.4	20.5
Standard Deviation	2.79	1.05	7.22	1.33	1.00	1.17	0.71	2.82	0.78	1.16	1.22
Median	12.0	14.7	6.0	13.0	12.5	16.0	16.6	14.2	12.5	15.4	20.6
Chloride, [mg/L]											
No. of Analyses	146	8	143	87	8	73	8	73	8	8	8
No. of Detections	143	8	137	87	8	73	8	73	8	8	8
Minimum	ND	2.74	ND	3.00	3.97	3.00	3.04	2.13	2.13	4.20	3.83
Maximum	10.60	3.28	89.00	23.00	5.60	4.30	3.34	15.20	2.39	4.97	4.82
Mean	4.38	2.98	22.25	4.42	4.76	3.64	3.18	4.15	2.22	4.58	4.14
Standard Deviation	1.56	0.16	24.92	2.09	0.53	0.34	0.11	1.89	0.10	0.31	0.32
Median	4.00	2.97	6.00	4.00	4.72	3.62	3.14	4.00	2.16	4.55	4.06
Dissolved Arsenic, [mg/L]											
No. of Analyses	146	8	143	87	8	73	8	73	8	8	8
No. of Detections	85	8	141	86	8	72	8	66	8	8	8
Minimum	ND	0.001	ND	ND	0.002	ND	0.001	ND	0.001	0.033	0.026
Maximum	0.004	0.001	0.320	0.003	0.002	0.005	0.002	0.023	0.002	0.044	0.038
Mean	0.001	0.001	0.103	0.002	0.002	0.002	0.002	0.005	0.001	0.038	0.034
Standard Deviation	6E-04	8E-05	6E-02	4E-04	6E-05	5E-04	2E-04	6E-03	2E-04	3E-03	4E-03
Median	0.001	0.001	0.108	0.002	0.002	0.002	0.002	0.003	0.001	0.038	0.036
Total Arsenic, [mg/L]											
No. of Analyses	16	8	7	15	8	15	8	15	8	8	8
No. of Detections	1	7	7	15	8	15	8	12	8	8	8
Minimum	ND	ND	0.0796	0.0022	0.0022	0.0013	0.0021	ND	0.0026	0.0323	0.0272
Maximum	0.0010	0.0010	0.0919	0.0025	0.0025	0.0028	0.0044	0.0072	0.0087	0.0392	0.0404
Mean	ID	0.0009	0.0864	0.0023	0.0023	0.0016	0.0027	0.0025	0.0047	0.0368	0.0337
Standard Deviation	ID	0.0002	0.0040	0.0001	0.0001	0.0004	0.0007	0.0021	0.0019	0.0022	0.0048
Median	ID	0.0009	0.0861	0.0023	0.0023	0.0016	0.0024	0.0015	0.0042	0.0375	0.0338

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc2										
Well Location	MW-2		MW-5D [b]	MW-9		MW-20		MW-21		MW-33 [d]	MW-35 [d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Short	Short
Dissolved Iron, [mg/L]											
No. of Analyses	146	8	142	87	8	73	8	73	8	8	8
No. of Detections	104	0	141	49	1	52	8	73	8	8	8
Minimum	ND	ND	ND	ND	ND	ND	0.196	0.146	0.256	6.51	13
Maximum	0.89	ND	59.00	0.29	0.04	0.51	0.39	5.20	0.59	7.69	16.40
Mean	0.07	ID	20.80	0.04	ID	0.06	0.30	1.57	0.41	7.34	15.18
Standard Deviation	0.11	ID	12.20	0.05	ID	0.07	0.06	1.28	0.10	0.38	1.36
Median	0.04	ID	17.50	0.02	ID	0.04	0.30	1.40	0.40	7.48	15.45
Total Iron, [mg/L]											
No. of Analyses	16	8	7	15	8	15	8	15	8	8	8
No. of Detections	11	7	7	15	3	14	8	15	8	8	8
Minimum	ND	ND	7.77	0.01	ND	ND	0.59	0.23	0.95	6.44	12.70
Maximum	0.15	0.02	8.79	0.35	0.08	5.12	2.07	2.82	3.28	7.82	18.00
Mean	0.03	0.01	8.28	0.07	0.02	0.49	0.95	0.99	1.77	7.44	15.60
Standard Deviation	0.036	0.006	0.38	0.09	0.03	1.30	0.47	0.77	0.72	0.45	1.70
Median	0.020	0.015	8.30	0.04	0.01	0.04	0.79	0.69	1.75	7.51	15.95
Dissolved Manganese, [mg/L]											
No. of Analyses	146	8	142	87	8	73	8	72	8	8	8
No. of Detections	145	8	141	7	3	73	8	72	8	8	8
Minimum	ND	0.08	ND	ND	ND	0.05	0.22	0.17	0.19	0.88	2.37
Maximum	0.59	0.26	11.50	0.540	0.0001	0.55	0.31	1.60	0.81	1.13	2.56
Mean	0.13	0.14	2.40	0.007	0.0001	0.21	0.28	0.57	0.59	1.04	2.47
Standard Deviation	0.08	0.06	2.54	0.058	0.0002	0.09	0.03	0.33	0.22	0.08	0.08
Median	0.11	0.12	1.50	0.001	0.0001	0.21	0.29	0.48	0.69	1.08	2.51
Total Manganese, [mg/L]											
No. of Analyses	16	8	7	15	8	15	8	15	8	8	8
No. of Detections	16	8	7	9	7	15	8	15	8	8	8
Minimum	0.07	0.08	0.50	ND	ND	0.15	0.22	0.17	0.50	0.90	1.94
Maximum	0.24	0.31	0.61	0.015	0.0028	2.92	0.31	0.95	1.05	1.08	2.75
Mean	0.12	0.15	0.56	0.003	0.0006	0.54	0.29	0.45	0.75	1.01	2.44
Standard Deviation	0.04	0.07	0.04	0.004	0.0009	0.67	0.03	0.25	0.20	0.07	0.23
Median	0.12	0.12	0.56	0.001	0.0003	0.36	0.30	0.36	0.77	1.04	2.45
Dissolved Calcium, [mg/L]											
No. of Analyses	121	8	114	87	8	73	8	73	8	8	8
No. of Detections	121	8	113	87	8	73	8	73	8	8	8
Minimum	4.3	18.5	ND	7.8	11.6	9.1	12.0	17.5	16.3	64.7	52.3
Maximum	47.9	21.0	139.0	15.2	15.8	18.0	14.0	40.0	19.7	74.6	67.0
Mean	32.3	19.7	63.6	11.7	14.3	12.2	13.4	26.3	18.6	70.1	62.7
Standard Deviation	9.39	0.95	35.52	1.37	1.27	1.62	0.70	6.00	1.08	3.32	4.73
Median	32.0	19.8	51.5	12.0	14.6	12.0	13.6	26.0	18.9	70.2	64.0
Total Calcium, [mg/L]											
No. of Analyses	15	8	7	15	8	15	8	15	8	8	8
No. of Detections	15	8	7	15	8	15	8	15	8	8	8
Minimum	19.7	18.4	18.8	8.5	12.0	11.5	12.2	16.8	16.1	64.7	52.8
Maximum	27.1	21.2	23.6	14.6	16.7	14.4	14.6	24.9	20.4	75.0	68.8
Mean	23.9	19.7	21.0	12.4	14.7	13.2	13.7	21.2	18.7	70.6	63.5
Standard Deviation	1.92	1.00	1.81	1.53	1.55	0.92	0.87	2.31	1.25	3.54	4.80
Median	24.30	19.65	20.80	12.70	15.00	13.30	14.05	20.80	18.75	72.35	64.30
Dissolved Magnesium, [mg/L]											
No. of Analyses	121	8	114	87	8	73	8	73	8	8	8
No. of Detections	121	8	113	87	8	73	8	73	8	8	8
Minimum	3.9	20.2	ND	6.6	10.5	7.7	12.7	15.2	15.2	51.9	37.8
Maximum	53.9	23.9	97.1	13.0	12.7	14.0	15.1	43.2	17.9	59.4	49.1
Mean	36.3	21.9	47.5	9.2	11.7	10.1	14.0	26.5	16.7	56.8	42.9
Standard Deviation	10.51	1.24	27.88	1.13	0.77	1.45	0.80	7.63	0.86	2.62	3.74
Median	35.0	21.6	36.3	9.2	12.0	9.9	14.2	24.8	16.6	57.5	43.0
Total Magnesium, [mg/L]											
No. of Analyses	15	8	7	15	8	15	8	15	8	8	8
No. of Detections	15	8	7	15	8	15	8	15	8	8	8
Minimum	19.4	20.6	15.2	8.5	10.3	8.7	12.5	15.8	14.3	49.8	36.5
Maximum	31.8	23.8	17.8	11.9	14.0	14.3	15.7	25.7	18.4	61.1	47.0
Mean	27.6	21.7	16.1	10.5	12.2	11.8	14.3	21.3	16.5	56.7	43.0
Standard Deviation	3.19	1.08	0.99	0.85	1.26	1.88	1.18	3.12	1.34	3.42	3.27
Median	28.6	21.5	15.8	10.8	12.1	11.6	14.8	21.4	16.2	56.5	43.8
Dissolved Sodium, [mg/L]											
No. of Analyses	121	8	115	87	8	73	8	73	8	8	8
No. of Detections	121	8	114	87	8	73	8	73	8	8	8
Minimum	2.2	8.1	ND	4.5	5.5	4.2	6.0	8.4	10.3	16.9	13.8
Maximum	14.0	10.3	25.7	6.2	6.6	8.0	7.0	13.0	12.0	19.8	17.7
Mean	10.4	9.2	16.5	5.2	6.1	6.1	6.5	10.3	11.3	18.8	16.3
Standard Deviation	1.75	0.68	3.94	0.39	0.37	0.80	0.34	0.95	0.65	1.06	1.24
Median	10.0	9.2	16.0	5.2	6.2	6.1	6.6	10.0	11.5	19.1	16.6
Total Sodium, [mg/L]											
No. of Analyses	15	8	7	15	8	15	8	15	8	8	8
No. of Detections	15	8	7	15	8	15	8	15	8	8	8
Minimum	8.2	8.4	12.5	5.2	5.6	4.9	5.8	9.2	9.6	16.5	13.2
Maximum	11.4	10.2	15.0	6.3	6.8	6.7	7.3	11.7	12.2	20.3	17.3
Mean	9.4	9.1	13.9	5.7	6.3	6.0	6.6	10.5	11.2	18.9	16.3
Standard Deviation	0.75	0.62	0.81	0.32	0.46	0.51	0.55	0.76	0.85	1.19	1.35
Median	9.3	9.1	14.0	5.7	6.3	6.0	6.8	10.7	11.3	19.0	16.9

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc2										
Well Location	MW-2		MW-5D [b]	MW-9		MW-20		MW-21		MW-33 [d]	MW-35 [d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Short	Short
Dissolved Potassium, [mg/L]											
No. of Analyses	121	8	115	87	8	73	8	73	8	8	8
No. of Detections	121	8	114	87	8	73	8	73	8	8	8
Minimum	0.59	2.08	ND	1.20	2.00	1.50	2.07	1.80	1.96	3.34	3.19
Maximum	3.70	2.25	5.30	2.41	2.33	2.90	2.28	3.30	2.11	3.65	3.51
Mean	2.53	2.17	3.43	1.91	2.18	2.06	2.14	2.41	2.02	3.47	3.35
Standard Deviation	0.40	0.06	0.97	0.19	0.10	0.22	0.07	0.35	0.06	0.10	0.12
Median	2.50	2.18	3.30	1.90	2.18	2.00	2.13	2.30	2.02	3.47	3.35
Total Potassium, [mg/L]											
No. of Analyses	15	8	7	15	8	15	8	15	8	8	8
No. of Detections	15	8	7	15	8	15	8	15	8	8	8
Minimum	2.27	2.08	2.17	1.92	1.94	1.98	2.12	2.13	2.02	3.47	3.31
Maximum	2.58	2.38	2.49	2.67	2.43	2.48	2.32	2.74	2.17	3.68	3.56
Mean	2.41	2.20	2.31	2.18	2.25	2.23	2.24	2.36	2.08	3.58	3.46
Standard Deviation	0.09	0.12	0.10	0.19	0.16	0.15	0.08	0.19	0.05	0.07	0.10
Median	2.41	2.17	2.30	2.16	2.29	2.21	2.25	2.34	2.07	3.58	3.48
Benzene, [µg/L]											
No. of Analyses	156	8	144	88	8	74	8	74	8	8	8
No. of Detections	0	0	113	0	0	0	0	3	0	8	8
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.93	0.83
Maximum	ND	ND	5.00	ND	ND	ND	ND	0.25	ND	1.22	1.14
Mean	ID	ID	1.10	ID	ID	ID	ID	0.11	ID	1.02	0.95
Standard Deviation	ID	ID	1.12	ID	ID	ID	ID	0.02	ID	0.09	0.10
Median	ID	ID	0.63	ID	ID	ID	ID	0.10	ID	0.99	0.96
Chloroethane, [µg/L]											
No. of Analyses	156	8	144	88	8	74	8	74	8	8	8
No. of Detections	26	0	9	0	0	0	0	0	0	8	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.27	ND
Maximum	1.20	ND	0.90	ND	ND	ND	ND	ND	ND	0.56	ND
Mean	0.65	ID	0.49	ID	ID	ID	ID	ID	ID	0.39	ID
Standard Deviation	0.86	ID	0.77	ID	ID	ID	ID	ID	ID	0.10	ID
Median	0.10	ID	0.10	ID	ID	ID	ID	ID	ID	0.41	ID
Toluene, [µg/L]											
No. of Analyses	156	8	144	88	8	74	8	74	8	8	8
No. of Detections	2	0	48	0	0	1	0	0	0	1	6
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	0.29	ND	2.85	ND	ND	0.22	ND	ND	ND	0.13	0.12
Mean	ID	ID	0.77	ID	ID	ID	ID	ID	ID	ID	0.10
Standard Deviation	ID	ID	0.89	ID	ID	ID	ID	ID	ID	ID	0.02
Median	ID	ID	0.27	ID	ID	ID	ID	ID	ID	ID	0.11
Trichloroethene, [µg/L]											
No. of Analyses	156	8	144	88	8	74	8	74	8	8	8
No. of Detections	0	0	34	0	0	0	0	0	0	7	8
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.00
Maximum	ND	ND	1.80	ND	ND	ND	ND	ND	ND	0.17	1.16
Mean	ID	ID	0.37	ID	ID	ID	ID	ID	ID	0.14	1.09
Standard Deviation	ID	ID	0.43	ID	ID	ID	ID	ID	ID	0.02	0.06
Median	ID	ID	0.10	ID	ID	ID	ID	ID	ID	0.15	1.08
Vinyl Chloride, [µg/L]											
No. of Analyses	156	8	144	88	8	74	8	74	8	8	8
No. of Detections	144	8	127	0	0	1	0	73	8	8	8
Minimum	ND	0.05	ND	ND	ND	ND	ND	ND	0.04	24.3	1.8
Maximum	40.0	0.09	38.0	ND	ND	0.09	ND	1.00	0.09	39.4	4.4
Mean	6.5	0.07	13.5	ID	ID	ID	ID	0.36	0.06	30.7	2.6
Standard Deviation	8.5	0.01	9.1	ID	ID	ID	ID	0.22	0.02	6.0	1.0
Median	0.9	0.07	13.0	ID	ID	ID	ID	0.36	0.06	29.5	2.3
Total Xylenes, [µg/L]											
No. of Analyses	29	8	21	28	8	29	8	30	8	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
cis-1,2-Dichloroethene, [µg/L]											
No. of Analyses	131	8	127	88	8	74	8	74	8	8	8
No. of Detections	34	6	120	0	0	1	0	72	8	8	8
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	0.76	24.10	4.92
Maximum	0.60	0.41	22.00	ND	ND	0.98	ND	8.70	1.00	34.90	11.20
Mean	0.17	0.22	10.37	ID	ID	ID	ID	2.23	0.90	27.29	6.61
Standard Deviation	0.13	0.12	3.90	ID	ID	ID	ID	2.20	0.08	3.44	2.17
Median	0.10	0.24	10.00	ID	ID	ID	ID	1.26	0.91	26.55	5.74
trans-1,2-Dichloroethene, [µg/L]											
No. of Analyses	134	8	130	88	8	74	8	74	8	8	8
No. of Detections	0	0	101	0	0	0	0	9	7	8	8
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.63	0.32
Maximum	ND	ND	0.88	ND	ND	ND	ND	0.41	0.13	0.91	0.40
Mean	ID	ID	0.40	ID	ID	ID	ID	0.13	0.12	0.72	0.36
Standard Deviation	ID	ID	0.19	ID	ID	ID	ID	0.08	0.01	0.09	0.03
Median	ID	ID	0.37	ID	ID	ID	ID	0.10	0.12	0.70	0.36

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc2										
Well Location	MW-2		MW-5D [b]	MW-9		MW-20		MW-21		MW-33 [d]	MW-35 [d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Short	Short
1,1 Dichloroethane, [µg/L]											
No. of Analyses	156	8	144	88	8	74	8	74	8	8	8
No. of Detections	8	0	77	0	0	0	0	0	0	8	8
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.29	0.12
Maximum	0.28	ND	1.15	ND	ND	ND	ND	ND	ND	1.70	0.36
Mean	0.20	ID	0.43	ID	ID	ID	ID	ID	ID	1.43	0.19
Standard Deviation	0.17	ID	0.32	ID	ID	ID	ID	ID	ID	0.13	0.08
Median	0.10	ID	0.47	ID	ID	ID	ID	ID	ID	1.42	0.16
1,2-Dichloropropane, [µg/L]											
No. of Analyses	156	8	144	88	8	74	8	74	8	8	8
No. of Detections	0	0	69	0	0	0	0	0	0	8	8
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.26	0.58
Maximum	ND	ND	2.80	ND	ND	ND	ND	ND	ND	8.18	1.26
Mean	ID	ID	0.51	ID	ID	ID	ID	ID	ID	6.76	0.80
Standard Deviation	ID	ID	0.53	ID	ID	ID	ID	ID	ID	0.64	0.21
Median	ID	ID	0.39	ID	ID	ID	ID	ID	ID	6.53	0.74
Trichlorofluoromethane, [µg/L]											
No. of Analyses	121	8	115	88	8	74	8	74	8	8	8
No. of Detections	117	8	21	0	0	1	0	70	8	0	0
Minimum	ND	0.22	ND	ND	ND	ND	ND	ND	0.26	ND	ND
Maximum	23.00	1.20	1.50	ND	ND	0.61	ND	9.00	0.52	ND	ND
Mean	6.88	0.46	0.21	ID	ID	ID	ID	2.37	0.36	ID	ID
Standard Deviation	5.46	0.32	0.26	ID	ID	ID	ID	2.33	0.10	ID	ID
Median	4.40	0.36	0.10	ID	ID	ID	ID	1.39	0.32	ID	ID
Dichlorodifluoromethane, [µg/L]											
No. of Analyses	87	8	81	88	8	74	8	73	8	8	8
No. of Detections	85	8	80	0	0	9	8	71	8	8	8
Minimum	ND	2.10	ND	ND	ND	ND	0.33	ND	0.75	3.21	0.23
Maximum	30.00	6.82	8.00	ND	ND	1.86	1.08	20.00	1.94	7.10	0.65
Mean	11.17	3.81	3.47	ID	ID	0.19	0.55	5.32	1.10	4.53	0.36
Standard Deviation	6.42	1.60	1.99	ID	ID	0.31	0.23	3.79	0.43	1.58	0.17
Median	9.45	3.50	3.50	ID	ID	0.10	0.48	4.20	0.91	3.76	0.29

NOTES:

ID - Insufficient Data (i.e. the number of detections is less than 3)
ND - Not Detected (i.e. at laboratory MDL - Method Detection Limit)

[a] - Wells Decommissioned in 2003 (i.e. MW-11)
[b] - Wells Decommissioned in 2015 (i.e. MW-1; MW-5D; MW-14)
[c] - Wells Decommissioned in 2016 (i.e. MW-27)
[d] - Wells Commissioned in 2015 (i.e. MW-33; MW-34; MW-35; MW-36)

Time Interval:
Long - All data in the period of record exclusive of the eight most recent analyses
Short - Eight most recent analyses in the last two years

- Total metals were not included in the analyte list for this well prior to well decommissioning.

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc3				
Well Location	MW-8		MW-14 [b]	MW-27 [c]	MW-36 [d]
Time Interval	Long	Short	Long	Long	Short
pH Field, [Standard Units]					
No. of Analyses	86	8	68	56	8
No. of Detections	86	8	68	56	8
Minimum	6.23	5.97	6.71	6.46	6.51
Maximum	7.95	7.06	8.47	7.24	7.76
Mean	6.86	6.69	7.70	6.85	7.45
Standard Deviation	0.322	0.339	0.301	0.161	0.418
Median	6.81	6.80	7.77	6.88	7.57
Specific Conductance Field, [µmhos/cm]					
No. of Analyses	86	8	68	56	8
No. of Detections	86	8	68	56	8
Minimum	130	158	140	140	171
Maximum	650	171	190	199	178
Mean	170	164	159	172	176
Standard Deviation	54.5	4.4	10.8	13.4	2.3
Median	165	164	160	170	177
Total Dissolved Solids, [mg/L]					
No. of Analyses	86	8	68	56	8
No. of Detections	86	8	68	56	8
Minimum	54	117	71	57	123
Maximum	150	135	150	146	132
Mean	116	123	116	120	129
Standard Deviation	16.07	6.40	15.59	17.25	2.77
Median	120	120	120	123	130
Alkalinity, [mg/L]					
No. of Analyses	86	8	68	56	8
No. of Detections	86	8	68	56	8
Minimum	47	49	54	57	68
Maximum	78	55	84	78	70
Mean	60	52	72	67	69
Standard Deviation	5.7	1.7	3.9	4.2	0.8
Median	60	51	72	68	70
Ammonia-N, [mg/L]					
No. of Analyses	86	8	68	56	8
No. of Detections	8	1	11	7	1
Minimum	ND	ND	ND	ND	ND
Maximum	0.430	0.004	0.250	0.460	0.004
Mean	0.016	ID	0.016	0.021	ID
Standard Deviation	0.048	ID	0.032	0.063	ID
Median	0.005	ID	0.005	0.005	ID
Nitrate-N, [mg/L]					
No. of Analyses	86	8	68	56	8
No. of Detections	85	8	10	55	8
Minimum	ND	3.16	ND	ND	0.02
Maximum	8.10	4.39	0.06	10.30	0.03
Mean	3.91	3.73	0.01	3.08	0.02
Standard Deviation	0.938	0.461	0.011	1.557	0.002
Median	3.80	3.63	0.01	2.86	0.02
Sulfate, [mg/L]					
No. of Analyses	86	8	68	56	8
No. of Detections	86	8	68	56	8
Minimum	6.7	6.8	9.0	7.8	12.3
Maximum	11.0	7.5	13.0	11.0	13.4
Mean	8.6	7.1	11.3	9.4	12.9
Standard Deviation	0.77	0.24	1.03	0.91	0.38
Median	8.6	7.1	11.0	9.4	12.9
Chloride, [mg/L]					
No. of Analyses	86	8	68	56	8
No. of Detections	86	8	68	56	8
Minimum	3.00	4.25	2.77	4.00	2.89
Maximum	6.23	4.78	4.00	6.10	3.21
Mean	4.38	4.42	3.11	4.87	3.08
Standard Deviation	0.49	0.19	0.25	0.50	0.10
Median	4.25	4.35	3.00	5.00	3.08
Dissolved Arsenic, [mg/L]					
No. of Analyses	86	8	68	56	8
No. of Detections	1	7	68	2	8
Minimum	ND	ND	0.002	ND	0.002
Maximum	0.002	0.000	0.004	0.001	0.002
Mean	ID	0.000	0.003	ID	0.002
Standard Deviation	ID	1E-05	3E-04	ID	9E-05
Median	ID	0.0005	0.003	ID	0.002
Total Arsenic, [mg/L]					
No. of Analyses	14	8		13	8
No. of Detections	0	7		0	8
Minimum	ND	ND		ND	0.0017
Maximum	ND	0.0005		ND	0.0019
Mean	ID	0.0005		ID	0.0017
Standard Deviation	ID	0.00001		ID	0.0001
Median	ID	0.0005		ID	0.0017

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc3				
Well Location	MW-8		MW-14 [b]	MW-27 [c]	MW-36 [d]
Time Interval	Long	Short	Long	Long	Short
Dissolved Iron, [mg/L]					
No. of Analyses	86	8	68	56	8
No. of Detections	52	0	53	27	0
Minimum	ND	ND	ND	ND	ND
Maximum	0.17	ND	0.23	0.30	ND
Mean	0.03	ID	0.04	0.03	ID
Standard Deviation	0.03	ID	0.05	0.05	ID
Median	0.02	ID	0.03	0.01	ID
Total Iron, [mg/L]					
No. of Analyses	14	8		13	8
No. of Detections	7	1		3	2
Minimum	ND	ND		ND	ND
Maximum	0.07	0.02		0.02	0.33
Mean	0.02	ID		0.01	ID
Standard Deviation	0.022	ID		0.004	ID
Median	0.009	ID		0.005	ID
Dissolved Manganese, [mg/L]					
No. of Analyses	86	8	68	56	8
No. of Detections	4	0	68	1	8
Minimum	ND	ND	0.012	ND	0.0012
Maximum	0.0029	ND	0.061	0.0018	0.0022
Mean	0.0006	ID	0.049	ID	0.0015
Standard Deviation	0.0004	ID	0.008	ID	0.0003
Median	0.0005	ID	0.051	ID	0.0015
Total Manganese, [mg/L]					
No. of Analyses	14	8		13	8
No. of Detections	2	1		0	8
Minimum	ND	ND		ND	0.003
Maximum	0.0013	0.0022		ND	0.243
Mean	ID	ID		ID	0.035
Standard Deviation	ID	ID		ID	0.084
Median	ID	ID		ID	0.005
Dissolved Calcium, [mg/L]					
No. of Analyses	86	8	68	56	8
No. of Detections	86	8	68	56	8
Minimum	9.7	10.3	9.1	10.1	11.9
Maximum	15.9	11.8	18.0	17.0	14.5
Mean	12.0	11.4	12.4	12.7	13.6
Standard Deviation	1.21	0.48	1.47	1.18	0.85
Median	12.0	11.5	12.0	12.7	13.8
Total Calcium, [mg/L]					
No. of Analyses	14	8		13	8
No. of Detections	14	8		13	8
Minimum	9.5	10.2		11.1	11.5
Maximum	12.5	12.1		13.8	14.9
Mean	11.2	11.6		12.6	13.8
Standard Deviation	0.74	0.63		0.77	1.04
Median	11.25	11.85		12.50	13.80
Dissolved Magnesium, [mg/L]					
No. of Analyses	86	8	68	56	8
No. of Detections	86	8	68	56	8
Minimum	7.1	8.8	6.8	8.5	8.6
Maximum	11.9	9.5	12.0	13.0	10.0
Mean	9.3	9.2	8.6	10.4	9.4
Standard Deviation	0.80	0.23	0.89	0.97	0.50
Median	9.2	9.3	8.6	10.0	9.4
Total Magnesium, [mg/L]					
No. of Analyses	14	8		13	8
No. of Detections	14	8		13	8
Minimum	8.3	8.4		8.6	7.8
Maximum	10.0	9.8		11.7	10.3
Mean	9.0	9.3		10.5	9.5
Standard Deviation	0.46	0.44		0.78	0.76
Median	9.0	9.4		10.5	9.6
Dissolved Sodium, [mg/L]					
No. of Analyses	86	8	68	56	8
No. of Detections	86	8	68	56	8
Minimum	4.5	5.8	4.9	5.2	5.7
Maximum	7.3	6.7	7.3	7.6	6.9
Mean	6.1	6.3	5.7	6.2	6.3
Standard Deviation	0.48	0.28	0.48	0.54	0.41
Median	6.1	6.3	5.6	6.1	6.2
Total Sodium, [mg/L]					
No. of Analyses	14	8		13	8
No. of Detections	14	8		13	8
Minimum	5.6	5.8		5.3	5.2
Maximum	6.5	6.6		6.9	6.7
Mean	6.1	6.4		6.3	6.3
Standard Deviation	0.24	0.28		0.44	0.50
Median	6.2	6.5		6.3	6.5

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc3				
Well Location	MW-8		MW-14 [b]	MW-27 [c]	MW-36 [d]
Time Interval	Long	Short	Long	Long	Short
Dissolved Potassium, [mg/L]					
No. of Analyses	86	8	68	56	8
No. of Detections	86	8	68	56	8
Minimum	0.90	1.05	2.00	0.99	2.34
Maximum	1.50	1.14	3.40	1.50	2.82
Mean	1.09	1.09	2.43	1.28	2.64
Standard Deviation	0.11	0.03	0.22	0.11	0.14
Median	1.10	1.09	2.40	1.30	2.68
Total Potassium, [mg/L]					
No. of Analyses	14	8		13	8
No. of Detections	14	8		13	8
Minimum	1.02	1.04		1.07	2.64
Maximum	1.29	1.15		1.48	2.85
Mean	1.16	1.11		1.34	2.73
Standard Deviation	0.07	0.03		0.12	0.08
Median	1.14	1.11		1.38	2.73
Benzene, [µg/L]					
No. of Analyses	85	8	69	56	8
No. of Detections	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID
Chloroethane, [µg/L]					
No. of Analyses	85	8	69	56	8
No. of Detections	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID
Toluene, [µg/L]					
No. of Analyses	85	8	69	56	8
No. of Detections	1	0	0	0	0
Minimum	ND	ND	ND	ND	ND
Maximum	0.33	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID
Trichloroethene, [µg/L]					
No. of Analyses	85	8	69	56	8
No. of Detections	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID
Vinyl Chloride, [µg/L]					
No. of Analyses	85	8	69	56	8
No. of Detections	0	0	1	0	0
Minimum	ND	ND	ND	ND	ND
Maximum	ND	ND	0.04	ND	ND
Mean	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID
Total Xylenes, [µg/L]					
No. of Analyses	26	8	9	26	8
No. of Detections	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID
cis-1,2-Dichloroethene, [µg/L]					
No. of Analyses	85	8	69	56	8
No. of Detections	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID
trans-1,2-Dichloroethene, [µg/L]					
No. of Analyses	85	8	69	56	8
No. of Detections	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc3				
Well Location	MW-8		MW-14 [b]	MW-27 [c]	MW-36 [d]
Time Interval	Long	Short	Long	Long	Short
1,1 Dichloroethane, [µg/L]					
No. of Analyses	85	8	69	56	8
No. of Detections	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID
1,2-Dichloropropane, [µg/L]					
No. of Analyses	85	8	69	56	8
No. of Detections	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID
Standard Deviation	ID	ID	ID	ID	ID
Median	ID	ID	ID	ID	ID
Trichlorofluoromethane, [µg/L]					
No. of Analyses	85	8	69	56	8
No. of Detections	20	0	0	1	0
Minimum	ND	ND	ND	ND	ND
Maximum	0.56	ND	ND	0.21	ND
Mean	0.16	ID	ID	ID	ID
Standard Deviation	0.12	ID	ID	ID	ID
Median	0.10	ID	ID	ID	ID
Dichlorodifluoromethane, [µg/L]					
No. of Analyses	85	8	69	56	8
No. of Detections	11	0	0	2	0
Minimum	ND	ND	ND	ND	ND
Maximum	0.64	ND	ND	0.29	ND
Mean	0.14	ID	ID	ID	ID
Standard Deviation	0.11	ID	ID	ID	ID
Median	0.10	ID	ID	ID	ID

NOTES:

ID - Insufficient Data (i.e. the number of detections is less than 3)
ND - Not Detected (i.e. at laboratory MDL - Method Detection Limit)

[a] - Wells Decommissioned in 2003 (i.e. MW-11)
b - Wells Decommissioned in 2015 (i.e. MW-1; MW-5D; MW-14)
[c] - Wells Decommissioned in 2016 (i.e. MW-27)
d - Wells Commissioned in 2015 (i.e. MW-33; MW-34; MW-35; MW-36)

Time Interval:
Long - All data in the period of record exclusive of the eight most recent analyses
Short - Eight most recent analyses in the last two years

- Total metals were not included in the analyte list for this well prior to well decommissioning.

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Unit D Aquifer											
Well Location	MW-7		MW-11 [A]	MW-12		MW-19		MW-26		MW-29		MW-34 [D]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Long	Short	Short
pH Field, [Standard Units]												
No. of Analyses	86	8	24	86	8	87	8	58	8	62	8	8
No. of Detections	86	8	24	86	8	87	8	58	8	62	8	8
Minimum	6.76	7.13	6.87	6.80	6.59	6.84	7.04	7.44	7.34	7.02	6.65	6.64
Maximum	8.38	7.72	8.37	8.37	7.47	8.54	7.62	9.20	8.22	7.80	7.48	7.10
Mean	7.71	7.45	7.54	7.49	7.10	7.66	7.38	8.14	7.87	7.54	7.28	6.94
Standard Deviation	0.299	0.203	0.341	0.250	0.290	0.250	0.182	0.257	0.297	0.159	0.273	0.139
Median	7.79	7.46	7.57	7.49	7.15	7.66	7.40	8.15	7.90	7.58	7.37	6.94
Specific Conductance Field, [µmhos/cm]												
No. of Analyses	86	8	24	85	8	87	8	58	8	62	8	8
No. of Detections	86	8	24	85	8	87	8	58	8	62	8	8
Minimum	100	184	153	115	155	100	205	136	184	165	236	197
Maximum	194	189	220	185	171	230	227	200	191	265	248	202
Mean	158	187	180	139	164	193	218	169	188	214	243	201
Standard Deviation	14.6	1.8	14.1	11.7	4.7	23.9	6.4	13.0	2.5	20.4	3.9	1.7
Median	160	188	180	135	165	195	220	170	189	210	243	201
Total Dissolved Solids, [mg/L]												
No. of Analyses	86	8	24	86	8	87	8	58	8	58	8	8
No. of Detections	86	8	24	86	8	87	8	58	8	58	8	8
Minimum	63	131	36	53	109	80	141	90	135	90	148	133
Maximum	160	136	130	150	119	170	149	450	172	170	160	147
Mean	115	133	113	100	116	133	144	134	144	144	155	138
Standard Deviation	15.50	1.77	18.84	15.41	3.15	20.22	2.72	46.07	11.93	15.05	4.03	5.07
Median	120	134	120	100	117	130	144	130	141	147	155	138
Alkalinity, [mg/L]												
No. of Analyses	86	8	24	86	8	87	8	58	8	58	8	8
No. of Detections	86	8	24	86	8	87	8	58	8	58	8	8
Minimum	58	77	74	30	60	64	85	67	74	88	100	67
Maximum	100	79	100	66	65	110	88	86	78	140	103	71
Mean	73	78	82	57	63	84	87	74	75	99	102	69
Standard Deviation	5.1	0.7	5.2	4.3	1.6	12.7	1.1	3.6	1.1	7.7	1.1	1.0
Median	73	78	83	58	64	82	87	75	75	100	103	70
Ammonia-N, [mg/L]												
No. of Analyses	86	8	24	85	8	87	8	58	8	58	8	8
No. of Detections	86	8	20	7	0	72	8	58	8	3	6	1
Minimum	0.073	0.219	ND	ND	ND	ND	0.0284	0.03	0.179	ND	ND	ND
Maximum	0.320	0.277	0.120	0.060	ND	0.200	0.039	0.300	0.275	0.030	0.004	0.059
Mean	0.202	0.253	0.027	0.009	ID	0.047	0.032	0.219	0.242	0.010	0.003	ID
Standard Deviation	0.051	0.021	0.026	0.008	ID	0.035	0.003	0.046	0.030	0.007	0.001	ID
Median	0.200	0.251	0.020	0.005	ID	0.037	0.032	0.225	0.248	0.005	0.003	ID
Nitrate-N, [mg/L]												
No. of Analyses	86	8	24	86	8	87	8	58	8	58	8	8
No. of Detections	33	5	6	86	8	34	0	25	3	1	0	8
Minimum	ND	ND	ND	0.55	0.70	ND	ND	ND	ND	ND	ND	2.01
Maximum	0.34	0.02	0.02	1.90	0.79	0.81	ND	0.23	0.02	0.08	ND	2.57
Mean	0.02	0.01	0.01	0.74	0.74	0.03	ID	0.03	0.01	ID	ID	2.39
Standard Deviation	0.040	0.005	0.004	0.150	0.028	0.087	ID	0.032	0.004	ID	ID	0.177
Median	0.02	0.01	0.01	0.74	0.74	0.01	ID	0.03	0.01	ID	ID	2.45
Sulfate, [mg/L]												
No. of Analyses	86	8	24	86	8	87	8	58	8	58	8	8
No. of Detections	86	8	24	86	8	87	8	58	8	58	8	8
Minimum	8.7	10.1	13.0	9.0	9.8	12.0	15.5	11.0	12.7	15.0	14.9	12.0
Maximum	14.0	11.4	17.0	12.0	11.4	24.0	17.5	14.2	14.1	18.0	16.2	13.2
Mean	10.4	10.7	14.6	10.2	10.6	19.0	16.6	13.0	13.3	16.6	15.5	12.7
Standard Deviation	0.66	0.36	0.93	0.52	0.43	2.05	0.66	0.68	0.51	0.86	0.52	0.39
Median	10.3	10.7	14.5	10.0	10.6	19.0	16.5	13.0	13.3	16.6	15.5	12.9
Chloride, [mg/L]												
No. of Analyses	86	8	24	86	8	87	8	58	8	58	8	8
No. of Detections	86	8	24	86	8	87	8	58	8	58	8	8
Minimum	2.70	3.15	3.00	2.60	2.88	3.70	4.27	3.00	3.54	3.39	3.40	4.75
Maximum	5.00	3.48	6.00	5.00	3.30	37.60	4.82	9.11	3.93	5.60	3.78	5.20
Mean	3.19	3.35	3.63	3.08	3.13	5.57	4.57	3.97	3.73	3.93	3.58	5.01
Standard Deviation	0.34	0.10	0.69	0.37	0.12	3.53	0.18	0.86	0.13	0.32	0.12	0.13
Median	3.00	3.36	3.80	3.00	3.16	5.00	4.57	3.87	3.75	3.99	3.56	5.03
Dissolved Arsenic, [mg/L]												
No. of Analyses	86	8	24	86	8	87	8	58	8	58	8	8
No. of Detections	86	8	24	86	8	87	8	58	8	58	8	8
Minimum	0.002	0.005	0.003	0.002	0.002	0.001	0.001	0.002	0.003	0.004	0.004	0.001
Maximum	0.022	0.005	0.007	0.006	0.002	0.027	0.001	0.003	0.003	0.008	0.004	0.001
Mean	0.007	0.005	0.005	0.002	0.002	0.004	0.001	0.003	0.003	0.005	0.004	0.001
Standard Deviation	3E-03	7E-05	1E-03	4E-04	3E-05	4E-03	2E-05	4E-04	8E-05	7E-04	1E-04	5E-05
Median	0.006	0.005	0.005	0.002	0.002	0.002	0.001	0.003	0.003	0.005	0.004	0.001
Total Arsenic, [mg/L]												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	15	8		14	8	15	8	15	8	15	8	8
Minimum	0.0048	0.0046		0.0019	0.0019	0.0012	0.0011	0.0029	0.0034	0.0039	0.0035	0.0012
Maximum	0.0059	0.0052		0.0023	0.0021	0.0019	0.0021	0.0108	0.0057	0.0131	0.0100	0.0014
Mean	0.0052	0.0050		0.0021	0.0020	0.0015	0.0013	0.0043	0.0045	0.0066	0.0054	0.0013
Standard Deviation	0.0003	0.0002		0.0001	0.0001	0.0002	0.0003	0.0022	0.0007	0.0028	0.0021	3.91E-05
Median	0.0051	0.0050		0.0020	0.0020	0.0014	0.0012	0.0032	0.0046	0.0061	0.0046	0.0013

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Unit D Aquifer											
Well Location	MW-7		MW-11 [A]	MW-12		MW-19		MW-26		MW-29		MW-34 [D]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Long	Short	Short
Dissolved Iron, [mg/L]												
No. of Analyses	86	8	24	86	8	87	8	58	8	58	8	8
No. of Detections	60	7	24	51	0	85	8	58	8	58	8	0
Minimum	ND	ND	0.13	ND	ND	ND	0.0259	0.033	0.0601	0.29	0.69	ND
Maximum	0.22	0.02	4.00	0.42	ND	0.19	0.10	0.23	0.13	0.98	0.84	ND
Mean	0.04	0.01	0.35	0.04	ID	0.06	0.04	0.10	0.09	0.67	0.79	ID
Standard Deviation	0.04	0.00	0.78	0.06	ID	0.04	0.02	0.04	0.03	0.12	0.06	ID
Median	0.04	0.02	0.20	0.02	ID	0.05	0.03	0.10	0.08	0.71	0.82	ID
Total Iron, [mg/L]												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	14	8		8	6	15	8	15	8	15	8	5
Minimum	ND	0.02		ND	ND	0.06	0.09	0.14	1.28	0.73	0.75	ND
Maximum	0.06	0.06		0.94	0.03	0.72	1.09	10.50	3.56	4.24	3.81	0.05
Mean	0.02	0.03		0.12	0.02	0.26	0.28	2.47	2.37	1.78	1.54	0.02
Standard Deviation	0.014	0.013		0.251	0.008	0.21	0.33	3.83	0.81	1.07	0.99	0.016
Median	0.020	0.025		0.015	0.014	0.21	0.17	0.27	2.47	1.62	1.11	0.015
Dissolved Manganese, [mg/L]												
No. of Analyses	86	8	24	86	8	86	8	58	8	58	8	8
No. of Detections	84	8	24	3	1	85	8	58	8	58	8	7
Minimum	ND	0.1510	0.0770	ND	ND	ND	0.43	0.04	0.06	0.07	0.09	ND
Maximum	0.26	0.19	0.13	0.140	0.0001	1.35	0.51	0.08	0.07	0.12	0.10	0.0002
Mean	0.14	0.17	0.10	0.002	ID	0.43	0.49	0.06	0.07	0.09	0.09	0.0002
Standard Deviation	0.03	0.01	0.01	0.015	ID	0.20	0.03	0.01	0.003	0.01	0.00	0.0001
Median	0.14	0.17	0.09	0.001	ID	0.47	0.49	0.06	0.07	0.09	0.09	0.0002
Total Manganese, [mg/L]												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	15	8		4	7	15	8	15	8	15	8	8
Minimum	0.15	0.16		ND	ND	0.44	0.50	0.05	0.07	0.09	0.08	0.0003
Maximum	0.26	0.29		0.0151	0.0005	0.72	0.59	0.20	0.10	0.21	0.13	0.0014
Mean	0.18	0.20		0.0021	0.0003	0.54	0.53	0.09	0.09	0.11	0.10	0.0006
Standard Deviation	0.03	0.04		0.0039	0.0002	0.08	0.03	0.05	0.01	0.04	0.01	0.0004
Median	0.18	0.18		0.0005	0.0003	0.52	0.52	0.07	0.09	0.10	0.10	0.0006
Dissolved Calcium, [mg/L]												
No. of Analyses	86	8	24	86	8	87	8	58	8	58	8	8
No. of Detections	86	8	24	86	8	87	8	58	8	58	8	8
Minimum	9.2	13.4	12.0	7.7	9.7	9.2	13.2	11.2	14.7	13.6	17.5	11.9
Maximum	18.0	16.2	18.0	13.0	12.2	19.6	15.7	18.3	18.0	23.0	21.2	14.4
Mean	13.0	15.3	15.8	9.8	11.5	14.1	15.1	15.6	17.2	18.3	20.2	13.7
Standard Deviation	1.53	1.00	1.53	1.06	0.81	2.00	0.82	1.23	1.04	1.38	1.18	0.80
Median	13.0	15.6	16.0	9.8	11.8	14.0	15.4	15.7	17.5	18.2	20.4	14.0
Total Calcium, [mg/L]												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	15	8		14	8	15	8	15	8	15	8	8
Minimum	12.2	13.7		8.0	9.7	13.5	14.1	14.9	15.6	17.7	17.6	12.3
Maximum	15.6	16.8		11.4	12.8	16.8	16.1	18.4	19.1	21.2	22.2	14.9
Mean	14.1	15.7		10.1	11.6	14.8	15.4	16.6	17.9	19.3	20.6	13.8
Standard Deviation	0.87	0.90		0.76	0.92	0.97	0.59	1.22	1.05	0.93	1.45	0.76
Median	14.20	15.75		10.10	11.70	14.50	15.45	16.50	18.15	19.30	20.75	13.90
Dissolved Magnesium, [mg/L]												
No. of Analyses	86	8	24	86	8	87	8	58	8	58	8	8
No. of Detections	86	8	24	86	8	87	8	58	8	58	8	8
Minimum	6.3	8.8	8.4	6.2	8.5	8.4	13.2	5.4	6.9	10.0	13.4	11.2
Maximum	11.0	10.3	11.0	9.5	10.0	17.1	14.5	7.9	7.9	16.2	15.4	13.0
Mean	8.1	9.6	9.9	7.7	9.5	12.6	14.1	6.6	7.5	12.9	14.5	12.4
Standard Deviation	0.74	0.57	0.62	0.77	0.50	1.95	0.51	0.55	0.31	1.29	0.66	0.60
Median	8.2	9.7	9.9	7.8	9.6	12.0	14.2	6.6	7.5	13.0	14.5	12.4
Total Magnesium, [mg/L]												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	15	8		14	8	15	8	15	8	15	8	8
Minimum	7.8	8.9		7.9	8.0	12.2	13.8	6.1	7.1	11.9	13.1	11.0
Maximum	9.9	11.1		9.6	10.7	16.0	15.0	9.6	8.3	15.9	15.6	13.4
Mean	8.6	10.0		8.6	9.6	14.2	14.4	7.3	7.7	13.9	14.7	12.4
Standard Deviation	0.61	0.68		0.56	0.82	1.24	0.46	0.95	0.37	0.97	0.84	0.71
Median	8.6	9.9		8.6	9.6	14.2	14.6	7.1	7.8	14.0	14.8	12.5
Dissolved Sodium, [mg/L]												
No. of Analyses	86	8	24	86	8	87	8	58	8	58	8	8
No. of Detections	86	8	24	86	8	87	8	58	8	58	8	8
Minimum	4.8	5.4	4.9	4.3	5.5	4.8	6.3	6.5	7.4	5.1	5.9	6.2
Maximum	7.5	6.6	7.0	10.0	6.4	7.5	7.3	9.5	9.0	7.6	7.1	7.3
Mean	5.9	6.1	5.9	5.4	6.1	6.3	6.9	8.0	8.4	6.1	6.6	6.8
Standard Deviation	0.55	0.43	0.52	0.95	0.29	0.56	0.34	0.78	0.54	0.51	0.43	0.35
Median	5.8	6.2	5.9	5.3	6.1	6.3	6.9	8.0	8.6	6.0	6.6	6.8
Total Sodium, [mg/L]												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	15	8		14	8	15	8	15	8	15	8	8
Minimum	5.4	5.8		5.0	5.7	6.1	6.5	7.1	7.6	5.3	6.2	5.9
Maximum	6.6	6.8		6.7	6.7	8.0	7.2	10.1	9.1	6.9	7.1	7.3
Mean	5.8	6.3		5.6	6.2	6.8	7.0	8.6	8.6	6.3	6.8	6.8
Standard Deviation	0.44	0.35		0.43	0.36	0.56	0.25	0.96	0.54	0.42	0.33	0.44
Median	5.7	6.2		5.6	6.1	6.8	7.1	8.6	8.7	6.5	6.8	6.8

Table 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Unit D Aquifer											
Well Location	MW-7		MW-11 [A]	MW-12		MW-19		MW-26		MW-29		MW-34 [D]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Long	Short	Short
Dissolved Potassium, [mg/L]												
No. of Analyses	86	8	24	86	8	87	8	58	8	58	8	8
No. of Detections	86	8	24	86	8	87	8	58	8	58	8	8
Minimum	1.60	2.35	1.70	1.40	1.66	1.70	2.33	2.10	2.80	1.55	2.02	1.39
Maximum	3.60	2.82	2.60	2.30	1.92	3.30	2.54	3.30	3.11	2.50	2.34	1.62
Mean	2.53	2.67	2.08	1.72	1.82	2.41	2.42	2.84	2.96	2.04	2.20	1.52
Standard Deviation	0.28	0.15	0.21	0.18	0.08	0.25	0.06	0.23	0.09	0.18	0.10	0.06
Median	2.50	2.71	2.10	1.73	1.82	2.43	2.43	2.90	2.96	2.05	2.20	1.53
Total Potassium, [mg/L]												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	15	8		14	8	15	8	15	8	15	8	8
Minimum	2.12	2.59		1.67	1.69	2.36	2.29	2.76	2.82	2.02	2.07	1.50
Maximum	2.95	2.87		2.08	1.94	2.86	2.55	3.37	3.23	2.36	2.30	1.63
Mean	2.63	2.75		1.80	1.86	2.52	2.46	3.08	3.06	2.18	2.21	1.58
Standard Deviation	0.18	0.10		0.12	0.09	0.14	0.08	0.20	0.12	0.12	0.09	0.04
Median	2.62	2.77		1.77	1.87	2.48	2.45	3.06	3.07	2.15	2.23	1.58
Benzene, [µg/L]												
No. of Analyses	86	8	24	87	8	87	8	58	8	58	8	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, [µg/L]												
No. of Analyses	86	8	24	87	8	87	8	58	8	58	8	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
Toluene, [µg/L]												
No. of Analyses	86	8	24	87	8	87	8	58	8	58	8	8
No. of Detections	0	0	1	0	0	1	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	0.21	ND	ND	0.95	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, [µg/L]												
No. of Analyses	86	8	24	87	8	87	8	58	8	58	8	8
No. of Detections	0	0	0	1	0	1	0	0	0	0	0	0
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND	ND	0.35	ND	0.28	ND	ND	ND	ND	ND	ND
Mean	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	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, [µg/L]												
No. of Analyses	86	8	24	87	8	87	8	58	8	58	8	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
Total Xylenes, [µg/L]												
No. of Analyses	28	8		27	8	28	8	28	8	28	8	8
No. of Detections	0	0		0	0	0	0	0	0	0	0	0
Minimum	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean	ID	ID		ID	ID	ID	ID	ID	ID	ID	ID	ID
Standard Deviation	ID	ID		ID	ID	ID	ID	ID	ID	ID	ID	ID
Median	ID	ID		ID	ID	ID	ID	ID	ID	ID	ID	ID
cis-1,2-Dichloroethene, [µg/L]												
No. of Analyses	86	8	24	87	8	87	8	58	8	58	8	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
trans-1,2-Dichloroethene, [µg/L]												
No. of Analyses	86	8	24	87	8	87	8	58	8	58	8	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 3-1 (*continued*)
Summary of Statistical Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Unit D Aquifer											
Well Location	MW-7		MW-11 [A]	MW-12		MW-19		MW-26		MW-29		MW-34 [D]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Long	Short	Short
1,1 Dichloroethane, [µg/L]												
No. of Analyses	86	8	24	87	8	87	8	58	8	58	8	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, [µg/L]												
No. of Analyses	86	8	24	87	8	87	8	58	8	58	8	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
Trichlorofluoromethane, [µg/L]												
No. of Analyses	86	8	24	87	8	87	8	58	8	58	8	8
No. of Detections	0	0	1	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	0.66	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, [µg/L]												
No. of Analyses	86	8	24	87	8	87	8	58	8	58	8	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

NOTES:

ID - Insufficient Data (i.e. the number of detections is less than 3)
ND - Not Detected (i.e. at laboratory MDL - Method Detection Limit)

[a] - Wells Decommissioned in 2003 (i.e. MW-11)
[b] - Wells Decommissioned in 2015 (i.e. MW-1; MW-5D; MW-14)
[c] - Wells Decommissioned in 2016 (i.e. MW-27)
[d] - Wells Commissioned in 2015 (i.e. MW-33; MW-34; MW-35; MW-36)

Time Interval:
Long - All data in the period of record exclusive of the eight most recent analyses
Short - Eight most recent analyses in the last two years

- Total metals were not included in the analyte list for this well prior to well decommissioning.

Table 3-2
Summary of Trend Results for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

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

NOTES:

D = decreasing trend
I = increasing trend
-- = no noticeable trend

[a] Decommissioned in 2003
[b] Decommissioned in 2015
[c] Decommissioned in 2016
[d] Commissioned in 2015

Time Interval:

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.

Total metals were not included in the analyte list for this well prior to well decommissioning.

Table 3-2 (*continued*)
Summary of Trend Results for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc2										
Well Location	MW-2		MW-5D[b]	MW-9		MW-20		MW-21		MW-33[d]	MW-35[d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Short	Short
pH field, Standard Units	--	--	--	D	--	D	--	I	--	--	--
Specific Conductance field, micromhos/cm	D	--	D	--	--	I	--	D	--	D	D
Alkalinity, mg/L	D	D	D	I	--	I	--	D	--	D	D
Ammonia-N, mg/L	D	--	D	D	--	--	D	D	--	--	--
Chloride, mg/L	--	--	D	I	--	D	--	D	--	D	--
Nitrate-N, mg/L	I	--	D	I	--	D	--	I	--	--	--
Sulfate, mg/L	I	--	I	--	--	I	--	I	--	--	--
Total Dissolved Solids	D	D	D	I	--	I	--	D	--	D	D
Dissolved Arsenic, mg/L	--	D	D	--	--	D	I	D	--	--	--
Total Arsenic, mg/L	--	--	--	--	--	I	--	I	--	--	I
Dissolved Calcium, mg/L	D	--	D	--	--	--	--	D	--	--	--
Total Calcium, mg/L	D	--	--	--	--	--	--	--	--	--	--
Dissolved Iron, mg/L	D	--	D	D	--	D	I	D	--	D	I
Total Iron, mg/L	--	--	--	I	--	I	--	I	--	--	I
Dissolved Magnesium, mg/L	D	--	D	I	--	I	--	D	--	--	--
Total Magnesium, mg/L	D	--	--	--	--	I	--	--	I	--	--
Dissolved Manganese, mg/L	--	I	D	--	--	I	D	D	--	D	--
Total Manganese, mg/L	--	I	--	--	--	--	--	I	--	--	--
Dissolved Potassium, mg/L	D	--	D	I	--	--	--	D	--	--	--
Total Potassium, mg/L	--	--	--	--	--	--	--	--	--	--	--
Dissolved Sodium, mg/L	D	--	D	I	--	D	--	--	--	--	--
Total Sodium, mg/L	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane, ug/L	--	--	D	--	--	--	--	--	--	--	--
1,2-Dichloropropane, ug/L	--	--	D	--	--	--	--	--	--	--	--
Benzene, ug/L	--	--	D	--	--	--	--	--	--	--	--
cis 1,2-Dichloroethene, ug/L	I	I	D	--	--	--	--	--	D	--	--
Chloroethane, ug/L	--	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane, ug/L	D	D	D	--	--	I	D	D	--	--	--
Trichloroethene, ug/L	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane, ug/L	D	--	D	--	--	--	--	D	--	--	--
Toluene, ug/L	--	--	--	--	--	--	--	--	--	--	I
trans 1,2-Dichloroethene, ug/L	--	--	--	--	--	--	--	--	--	D	I
Vinyl chloride, ug/L	D	--	D	--	--	--	--	D	--	--	D

NOTES:

D = decreasing trend
I = increasing trend
-- = no noticeable trend

[a] Decommissioned in 2003
[b] Decommissioned in 2015
[c] Decommissioned in 2016
[d] Commissioned in 2015

Time Interval:

Short — Short - Eight most recent analyses in the last two years.
Long — Long - Historical data up to the last eight samples, but no greater than 50 samples.

Total metals were not included in the analyte list for this well prior to well decommissioning.

Table 3-2 (*continued*)
Summary of Trend Results for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc3				
Well Location	MW-8		MW-14[b]	MW-27[c]	MW-36[d]
Time Interval	Long	Short	Long	Long	Short
pH field, Standard Units	--	--	--	--	--
Specific Conductance field, micromhos/cm	D	--	I	--	--
Alkalinity, mg/L	D	--	--	--	--
Ammonia-N, mg/L	D	--	--	D	--
Chloride, mg/L	I	--	--	I	--
Nitrate-N, mg/L	D	D	--	D	--
Sulfate, mg/L	D	--	I	--	--
Total Dissolved Solids	--	--	I	I	--
Dissolved Arsenic, mg/L	--	--	--	--	--
Total Arsenic, mg/L	--	--		--	--
Dissolved Calcium, mg/L	D	--	--	D	--
Total Calcium, mg/L	I	--		--	--
Dissolved Iron, mg/L	D	--	--	D	--
Total Iron, mg/L	--	--		--	--
Dissolved Magnesium, mg/L	D	--	I	--	--
Total Magnesium, mg/L	--	--		--	--
Dissolved Manganese, mg/L	--	--	--	--	--
Total Manganese, mg/L	--	--		--	--
Dissolved Potassium, mg/L	--	--	I	--	--
Total Potassium, mg/L	--	--		--	--
Dissolved Sodium, mg/L	--	--	--	--	--
Total Sodium, mg/L	--	--		--	--
1,1-Dichloroethane, ug/L	--	--	--	--	--
1,2-Dichloropropane, ug/L	--	--	--	--	--
Benzene, ug/L	--	--	--	--	--
cis 1,2-Dichloroethene, ug/L	--	--	--	--	--
Chloroethane, ug/L	--	--	--	--	--
Dichlorodifluoromethane, ug/L	--	--	--	--	--
Trichloroethene, ug/L	--	--	--	--	--
Trichlorofluoromethane, ug/L	--	--	--	--	--
Toluene, ug/L	--	--	--	--	--
trans 1,2-Dichloroethene, ug/L	--	--	--	--	--
Vinyl chloride, ug/L	--	--	--	--	--

NOTES:

D	= decreasing trend
I	= increasing trend
--	= no noticeable trend
[a]	Decommissioned in 2003
[b]	Decommissioned in 2015
[c]	Decommissioned in 2016
[d]	Commissioned in 2015

Time Interval:

Short	Short - Eight most recent analyses in the last two years.
Long	Long - Historical data up to the last eight samples, but no greater than 50 samples.
	Total metals were not included in the analyte list for this well prior to well decommissioning.

Table 3-2 (*continued*)
Summary of Trend Results for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Unit D Aquifer											
Well Location	MW-7		MW-11[a]	MW-12		MW-19		MW-26		MW-29		MW-34[d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Long	Short	Short
pH field, Standard Units	--	--	--	--	--	D	D	D	--	D	--	--
Specific Conductance field, micromhos/cm	--	--	--	I	I	I	--	--	--	--	--	D
Alkalinity, mg/L	I	--	--	I	I	--	--	I	--	I	--	--
Ammonia-N, mg/L	I	D	D	D	--	--	--	I	--	D	--	--
Chloride, mg/L	I	--	--	I	--	--	--	--	--	D	--	--
Nitrate-N, mg/L	D	--	--	D	D	D	--	--	--	D	--	--
Sulfate, mg/L	I	--	--	I	--	D	--	I	--	--	--	--
Total Dissolved Solids	I	--	I	I	--	I	--	I	--	I	--	--
Dissolved Arsenic, mg/L	D	--	I	--	--	D	--	I	--	D	--	--
Total Arsenic, mg/L	D	--		I	--	--	I	I	--	--	I	--
Dissolved Calcium, mg/L	--	--	--	--	I	--	--	--	--	--	--	--
Total Calcium, mg/L	--	--		--	I	--	--	--	--	--	--	--
Dissolved Iron, mg/L	D	D	--	D	--	D	I	--	--	--	--	--
Total Iron, mg/L	I	I		I	--	--	--	I	--	--	I	--
Dissolved Magnesium, mg/L	--	--	--	I	--	--	--	--	--	I	--	--
Total Magnesium, mg/L	--	--		--	--	--	--	--	--	--	--	--
Dissolved Manganese, mg/L	--	--	D	--	--	--	--	D	--	D	--	D
Total Manganese, mg/L	--	--		--	--	--	--	--	--	--	--	--
Dissolved Potassium, mg/L	--	--	D	I	I	I	--	I	--	I	--	--
Total Potassium, mg/L	I	--		--	--	--	--	--	--	--	--	--
Dissolved Sodium, mg/L	--	--	--	I	--	--	--	--	--	--	--	--
Total Sodium, mg/L	--	--		--	--	--	--	D	--	--	--	--
1,1-Dichloroethane, ug/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane, ug/L	--	--	--	--	--	--	--	--	--	--	--	--
Benzene, ug/L	--	--	--	--	--	--	--	--	--	--	--	--
cis 1,2-Dichloroethene, ug/L	--	--	--	--	--	--	--	--	--	--	--	--
Chloroethane, ug/L	--	--	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane, ug/L	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene, ug/L	--	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane, ug/L	--	--	--	--	--	--	--	--	--	--	--	--
Toluene, ug/L	--	--	--	--	--	--	--	--	--	--	--	--
trans 1,2-Dichloroethene, ug/L	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl chloride, ug/L	--	--	--	--	--	--	--	--	--	--	--	--

NOTES:

D = decreasing trend
I = increasing trend
-- = no noticeable trend

[a] Decommissioned in 2003
[b] Decommissioned in 2015
[c] Decommissioned in 2016
[d] Commissioned in 2015

Time Interval:

Short — Short - Eight most recent analyses in the last two years.
Long — Long - Historical data up to the last eight samples, but no greater than 50 samples.

Total metals were not included in the analyte list for this well prior to well decommissioning.

Table 3-3
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

		Channel Cc1						
Well Location		MW-1[b]	MW-3	MW-4	MW-10		MW-13	
Time Interval		Long	Long	Long	Long	Short	Long	Short
pH field, Standard Units								
	No. of Analyses	5	21	24	50	8	50	8
	No. of Detections	5	21	24	50	8	50	8
	Trend	--	D	--	D	--	--	--
	S-value	0	-105	-55	-353	-6	32	-2
	Probability	1	0.00168	0.18029	0.0032	0.53619	0.79523	0.90154
	Significant	NO	YES	NO	YES	NO	NO	NO
Specific Conductance field, micromhos/cm								
	No. of Analyses	5	21	24	50	8	50	8
	No. of Detections	5	21	24	50	8	50	8
	Trend	--	--	D	--	--	--	--
	S-value	-1	-22	-182	176	-10	-30	-10
	Probability	1	0.52243	7.1E-06	0.13409	0.26551	0.80664	0.26551
	Significant	NO	NO	YES	NO	NO	NO	NO
Alkalinity, mg/L								
	No. of Analyses	5	21	23	50	8	50	8
	No. of Detections	5	21	23	50	8	50	8
	Trend	--	D	D	--	--	--	--
	S-value	-1	-124	-205	112	-7	223	-7
	Probability	1	0.00019	7E-08	0.35135	0.45443	0.06302	0.45443
	Significant	NO	YES	YES	NO	NO	NO	NO
Ammonia-N, mg/L								
	No. of Analyses	30	27	50	50	8	50	8
	No. of Detections	4	9	23	7	3	3	0
	Trend	D	D	D	D	--	D	--
	S-value	-183	-203	-455	-524	-2	-650	-7
	Probability	0.00014	1.4E-05	0.00012	1.4E-06	0.89432	2.4E-10	--
	Significant	YES	YES	YES	YES	NO	YES	--
Chloride, mg/L								
	No. of Analyses	29	28	50	50	8	50	8
	No. of Detections	29	28	48	49	8	50	8
	Trend	--	D	--	I	--	--	--
	S-value	95	-245	62	455	-4	-148	0
	Probability	0.07286	1.2E-06	0.60856	0.00013	0.71052	0.21762	1
	Significant	NO	YES	NO	YES	NO	NO	NO
Nitrate-N, mg/L								
	No. of Analyses	29	28	50	50	8	50	8
	No. of Detections	21	28	30	50	8	49	8
	Trend	--	I	I	I	--	D	I
	S-value	-8	171	571	762	-8	-258	20
	Probability	0.89489	0.00076	1.6E-06	1.8E-10	0.38648	0.03154	0.01874
	Significant	NO	YES	YES	YES	NO	YES	YES
Sulfate, mg/L								
	No. of Analyses	29	28	50	50	8	50	8
	No. of Detections	29	28	50	50	8	50	8
	Trend	--	D	--	D	--	D	--
	S-value	-57	-232	91	-514	2	-719	-12
	Probability	0.28361	4.7E-06	0.45129	1.5E-05	0.90154	1.5E-09	0.17355
	Significant	NO	YES	NO	YES	NO	YES	NO
Total Dissolved Solids								
	No. of Analyses	19	23	41	50	8	50	8
	No. of Detections	19	23	41	50	8	50	8
	Trend	--	--	D	I	--	--	--
	S-value	3	-64	-515	323	-5	67	-14
	Probability	0.94399	0.09579	7.6E-09	0.00701	0.61799	0.58003	0.09511
	Significant	NO	NO	YES	YES	NO	NO	NO
Dissolved Arsenic, mg/L								
	No. of Analyses	30	28	50	50	8	50	8
	No. of Detections	25	1	13	50	8	50	8
	Trend	--	D	D	--	--	--	--
	S-value	38	-179	-566	-162	15	221	11
	Probability	0.47517	8.6E-06	1.6E-07	0.17688	0.0809	0.06516	0.21249
	Significant	NO	YES	YES	NO	NO	NO	NO
Total Arsenic, mg/L								
	No. of Analyses		6	8	13	8	16	8
	No. of Detections		3	7	13	8	16	8
	Trend		D	--	--	I	--	I
	S-value		-12	-12	-27	17	42	18
	Probability		0.02677	0.17355	0.11202	0.04606	0.06364	0.03267
	Significant		YES	NO	NO	YES	NO	YES

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc1						
Well Location	MW-1[b]	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Long	Short	Long	Short
Dissolved Calcium, mg/L							
No. of Analyses	10	22	33	50	8	50	8
No. of Detections	10	22	33	50	8	50	8
Trend	I	D	D	--	--	--	--
S-value	25	-93	-389	-56	0	-5	1
Probability	0.03046	0.00929	1.8E-09	0.6453	1	0.97327	1
Significant	YES	YES	YES	NO	NO	NO	NO
Total Calcium, mg/L							
No. of Analyses		6	8	13	8	16	8
No. of Detections		6	8	13	8	16	8
Trend		--	--	--	--	--	--
S-value		-11	2	13	2	-34	7
Probability		0.06029	0.9	0.46327	0.90154	0.13735	0.45443
Significant		NO	NO	NO	NO	NO	NO
Dissolved Iron, mg/L							
No. of Analyses	30	28	50	50	8	50	8
No. of Detections	14	19	35	22	0	26	5
Trend	--	D	--	D	--	D	--
S-value	-96	-214	-193	-597	0	-249	-9
Probability	0.08434	2.3E-05	0.10714	3.7E-08	--	0.02873	0.30832
Significant	NO	YES	NO	YES	--	YES	NO
Total Iron, mg/L							
No. of Analyses		6	8	13	8	16	8
No. of Detections		6	7	13	3	16	8
Trend		--	--	I	--	D	--
S-value		-1	-4	35	-2	-48	-6
Probability		1	0.71052	0.03604	0.88602	0.03434	0.53619
Significant		NO	NO	YES	NO	YES	NO
Dissolved Magnesium, mg/L							
No. of Analyses	10	22	33	50	8	50	8
No. of Detections	10	22	33	50	8	50	8
Trend	I	--	D	--	--	--	--
S-value	28	5	-379	226	8	215	2
Probability	0.01532	0.90986	4.7E-09	0.05971	0.38648	0.07174	0.90154
Significant	YES	NO	YES	NO	NO	NO	NO
Total Magnesium, mg/L							
No. of Analyses		6	8	13	8	16	8
No. of Detections		6	8	13	8	16	8
Trend		--	--	--	--	D	--
S-value		-6	-7	-7	1	-48	1
Probability		0.33889	0.45443	0.71244	1	0.03398	1
Significant		NO	NO	NO	NO	YES	NO
Dissolved Manganese, mg/L							
No. of Analyses	30	28	50	50	8	50	8
No. of Detections	6	21	43	7	1	17	8
Trend	D	D	--	--	--	--	--
S-value	-134	-249	-160	-76	-1	158	-8
Probability	0.01383	7.6E-07	0.18321	0.29651	1	0.12527	0.38648
Significant	YES	YES	NO	NO	--	NO	NO
Total Manganese, mg/L							
No. of Analyses		6	8	13	8	16	8
No. of Detections		6	8	5	7	13	8
Trend		--	--	--	--	--	--
S-value		5	-8	-26	-8	-41	-10
Probability		0.45237	0.38648	0.07956	0.38648	0.07066	0.26551
Significant		NO	NO	NO	NO	NO	NO
Dissolved Potassium, mg/L							
No. of Analyses	10	22	33	50	8	50	8
No. of Detections	10	22	33	50	8	50	8
Trend	--	D	D	I	--	I	--
S-value	20	-165	-396	271	16	374	0
Probability	0.07857	3.6E-06	7.6E-10	0.02316	0.06349	0.00166	1
Significant	NO	YES	YES	YES	NO	YES	NO
Total Potassium, mg/L							
No. of Analyses		6	8	13	8	16	8
No. of Detections		6	8	13	8	16	8
Trend		--	--	--	--	--	--
S-value		-9	-6	11	10	-37	15
Probability		0.13285	0.53619	0.54105	0.26551	0.104	0.0809
Significant		NO	NO	NO	NO	NO	NO

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc1						
Well Location	MW-1[b]	MW-3	MW-4	MW-10		MW-13	
Time Interval	Long	Long	Long	Long	Short	Long	Short
Dissolved Sodium, mg/L							
No. of Analyses	10	22	33	50	8	50	8
No. of Detections	10	22	33	50	8	50	8
Trend	--	--	D	--	--	--	--
S-value	18	16	-375	179	13	137	6
Probability	0.12685	0.6722	6.3E-09	0.13613	0.13463	0.25494	0.53619
Significant	NO	NO	YES	NO	NO	NO	NO
Total Sodium, mg/L							
No. of Analyses		6	8	13	8	16	8
No. of Detections		6	8	13	8	16	8
Trend		--	--	--	--	D	--
S-value		-9	-3	-11	7	-66	8
Probability		0.13285	0.80309	0.54105	0.45443	0.00336	0.38648
Significant		NO	NO	NO	NO	YES	NO
1,1-Dichloroethane, ug/L							
No. of Analyses	30	28	50	50	8	50	8
No. of Detections	0	0	17	0	0	0	0
Trend	--	--	D	--	--	--	--
S-value	-200	-189	-557	0	-7	0	-7
Probability	--	--	2E-06	--	--	--	--
Significant	--	--	YES	--	--	--	--
1,2-Dichloropropane, ug/L							
No. of Analyses	30	28	50	50	8	50	8
No. of Detections	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--
S-value	-200	-189	-707	0	-7	0	-7
Probability	--	--	--	--	--	--	--
Significant	--	--	--	--	--	--	--
Benzene, ug/L							
No. of Analyses	30	28	50	50	8	50	8
No. of Detections	1	0	0	0	0	0	0
Trend	D	--	--	--	--	--	--
S-value	-203	-189	-707	0	-7	0	-7
Probability	1E-05	--	--	--	--	--	--
Significant	YES	--	--	--	--	--	--
cis 1,2-Dichloroethene, ug/L							
No. of Analyses	17	25	43	50	8	50	8
No. of Detections	0	0	16	0	0	0	0
Trend	--	--	--	--	--	--	--
S-value	-70	-123	-38	0	-7	0	-7
Probability	--	--	0.69396	--	--	--	--
Significant	--	--	NO	--	--	--	--
Chloroethane, ug/L							
No. of Analyses	30	28	50	50	8	50	8
No. of Detections	0	0	6	0	0	0	0
Trend	--	--	D	--	--	--	--
S-value	-77	-178	-692	0	-7	0	-7
Probability	--	--	1.7E-09	--	--	--	--
Significant	--	--	YES	--	--	--	--
Dichlorodifluoromethane, ug/L							
No. of Analyses	5	21	24	50	8	50	8
No. of Detections	0	0	12	0	0	0	0
Trend	--	--	D	--	--	--	--
S-value	0	-54	-191	0	-7	0	-7
Probability	--	--	1.7E-06	--	--	--	--
Significant	--	--	YES	--	--	--	--
Trichloroethene, ug/L							
No. of Analyses	30	28	50	50	8	50	8
No. of Detections	1	0	0	0	0	0	0
Trend	D	--	--	--	--	--	--
S-value	-215	-189	-707	0	-7	0	-7
Probability	5E-06	--	--	--	--	--	--
Significant	YES	--	--	--	--	--	--

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

		Channel Cc1						
Well Location		MW-1[b]	MW-3	MW-4	MW-10		MW-13	
Time Interval		Long	Long	Long	Long	Short	Long	Short
Trichlorofluoromethane, ug/L								
	No. of Analyses	10	22	34	50	8	50	8
	No. of Detections	0	12	26	0	0	0	0
	Trend	--	--	D	--	--	--	--
	S-value	0	1	-239	0	-7	0	-7
	Probability	--	1	0.00041	--	--	--	--
	Significant	--	NO	YES	--	--	--	--
Toluene, ug/L								
	No. of Analyses	30	28	50	50	8	50	8
	No. of Detections	2	0	0	0	0	0	0
	Trend	--	--	--	--	--	--	--
	S-value	-88	-184	-643	0	-7	0	-7
	Probability	0.10132	--	--	--	--	--	--
	Significant	NO	--	--	--	--	--	--
trans 1,2-Dichloroethene, ug/L								
	No. of Analyses	21	27	48	50	8	50	8
	No. of Detections	0	0	1	0	0	0	0
	Trend	--	--	D	--	--	--	--
	S-value	-110	-167	-622	0	-7	0	-7
	Probability	--	--	1.2E-09	--	--	--	--
	Significant	--	--	YES	--	--	--	--
Vinyl chloride, ug/L								
	No. of Analyses	30	28	50	50	8	50	8
	No. of Detections	0	0	20	0	0	1	0
	Trend	--	--	D	--	--	--	--
	S-value	-134	-202	-637	0	-7	-21	-7
	Probability	--	--	7.8E-08	--	--	0.48834	--
	Significant	--	--	YES	--	--	NO	--

NOTES:

D	= decreasing trend
I	= increasing trend
--	= no noticeable trend
a	Decommissioned in 2003
b	Decommissioned in 2015
c	Decommissioned in 2016
d	Commissioned in 2015

Time Interval:

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.
	Total metals were not included in the analyte list for this well prior to well decommissioning.

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc2										
Well Location	MW-2		MW-5D[b]	MW-9		MW-20		MW-21		MW-33[d]	MW-35[d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Short	Short
pH field, Standard Units											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	50	8	50	8	50	8	8	8
Trend	--	--	--	D	--	D	--	I	--	--	--
S-value	105	-7	-129	-447	-11	-593	-16	359	-10	-9	-9
Probability	0.38389	0.45443	0.28376	0.00019	0.21249	7.3E-07	0.06349	0.00271	0.26551	0.31857	0.31857
Significant	NO	NO	NO	YES	NO	YES	NO	YES	NO	NO	NO
Specific Conductance field, micromhos/cm											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	50	8	50	8	50	8	8	8
Trend	D	--	D	--	--	I	--	D	--	D	D
S-value	-690	-12	-804	211	-4	333	-10	-605	-8	-22	-22
Probability	8E-09	0.17355	1.8E-11	0.07597	0.71052	0.00498	0.26551	4.2E-07	0.38648	0.00937	0.00937
Significant	YES	NO	YES	NO	NO	YES	NO	YES	NO	YES	YES
Alkalinity, mg/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	50	8	50	8	50	8	8	8
Trend	D	D	D	I	--	I	--	D	--	D	D
S-value	-870	-22	-962	273	0	268	-10	-716	-9	-24	-19
Probability	3.03E-13	0.00937	7.91E-16	0.0228	1	0.02527	0.26551	2.2E-09	0.31093	0.00443	0.02482
Significant	YES	YES	YES	YES	NO	YES	NO	YES	NO	YES	YES
Ammonia-N, mg/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	3	3	45	3	1	31	8	20	7	8	8
Trend	D	--	D	D	--	--	D	D	--	--	--
S-value	-534	-4	-305	-648	-5	198	-20	-304	-4	-14	-16
Probability	4.3E-07	0.69024	0.01095	4.9E-10	0.5108	0.09344	0.01874	0.00971	0.71052	0.10776	0.06349
Significant	YES	NO	YES	YES	--	NO	YES	YES	NO	NO	NO
Chloride, mg/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	50	8	50	8	50	8	8	8
Trend	--	--	D	I	--	D	--	D	--	D	--
S-value	136	-3	-351	420	-4	-589	-9	-540	5	-18	-12
Probability	0.25803	0.80309	0.00332	0.00045	0.71052	8.5E-07	0.31857	6.4E-06	0.61049	0.03545	0.17355
Significant	NO	NO	YES	YES	NO	YES	NO	YES	NO	YES	NO
Nitrate-N, mg/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	45	0	14	49	8	9	1	36	8	1	1
Trend	I	--	D	I	--	D	--	I	--	--	--
S-value	299	0	-523	316	-6	-425	-5	469	0	5	3
Probability	0.01264	--	4.1E-06	0.00841	0.53619	0.0001	0.38273	7.4E-05	1	0.5108	0.74231
Significant	YES	--	YES	YES	NO	YES	--	YES	NO	--	--
Sulfate, mg/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	50	8	50	8	50	8	8	8
Trend	I	--	I	--	--	I	--	I	--	--	--
S-value	912	-14	649	99	-3	401	-7	836	-12	15	6
Probability	2.29E-14	0.10236	5.7E-08	0.40834	0.80309	0.00073	0.45443	2.5E-12	0.1669	0.0809	0.53619
Significant	YES	NO	YES	NO	NO	YES	NO	YES	NO	NO	NO
Total Dissolved Solids											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	50	8	50	8	50	8	8	8
Trend	D	D	D	I	--	I	--	D	--	D	D
S-value	-498	-20	-819	413	-3	711	-14	-590	-11	-22	-19
Probability	3.1E-05	0.01874	7E-12	0.00056	0.80002	2.7E-09	0.10776	8.1E-07	0.21249	0.00937	0.02482
Significant	YES	YES	YES	YES	NO	YES	NO	YES	NO	YES	YES
Dissolved Arsenic, mg/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	23	8	50	50	8	50	8	43	8	8	8
Trend	--	D	D	--	--	D	I	D	--	--	--
S-value	-14	-20	-270	18	-5	-343	22	-488	11	-10	16
Probability	0.90639	0.01874	0.02303	0.88672	0.61799	0.00417	0.00937	4.5E-05	0.21249	0.26551	0.06349
Significant	NO	YES	YES	NO	NO	YES	YES	YES	NO	NO	NO
Total Arsenic, mg/L											
No. of Analyses	16	8	7	15	8	15	8	15	8	8	8
No. of Detections	1	7	7	15	8	15	8	12	8	8	8
Trend	--	--	--	--	--	I	--	I	--	--	I
S-value	-1	-8	11	34	11	51	11	42	4	6	22
Probability	1	0.38648	0.13313	0.09922	0.21249	0.01335	0.21249	0.04154	0.71052	0.53619	0.00937
Significant	NO	NO	NO	NO	NO	YES	NO	YES	NO	NO	YES

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc2										
Well Location	MW-2		MW-5D[b]	MW-9		MW-20		MW-21		MW-33[d]	MW-35[d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Short	Short
Dissolved Calcium, mg/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	50	8	50	8	50	8	8	8
Trend	D	--	D	--	--	--	--	D	--	--	--
S-value	-796	-1	-898	66	-2	147	5	-727	7	-8	4
Probability	2.8E-11	1	6.10E-14	0.58355	0.90154	0.2199	0.61799	1.2E-09	0.45443	0.38648	0.71052
Significant	YES	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO
Total Calcium, mg/L											
No. of Analyses	15	8	7	15	8	15	8	15	8	8	8
No. of Detections	15	8	7	15	8	15	8	15	8	8	8
Trend	D	--	--	--	--	--	--	--	--	--	--
S-value	-54	-4	-1	31	2	24	6	-35	12	-2	10
Probability	0.00848	0.71052	1	0.13668	0.90154	0.25328	0.53619	0.09166	0.17355	0.90154	0.26551
Significant	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Dissolved Iron, mg/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	19	0	50	19	1	29	8	50	8	8	8
Trend	D	--	D	D	--	D	I	D	--	D	I
S-value	-580	0	-813	-595	-1	-231	18	-657	-4	-21	20
Probability	2.6E-08	--	1E-11	1.1E-08	1	0.04644	0.03545	4E-08	0.71052	0.01265	0.01696
Significant	YES	--	YES	YES	--	YES	YES	YES	NO	YES	YES
Total Iron, mg/L											
No. of Analyses	16	8	7	15	8	15	8	15	8	8	8
No. of Detections	11	7	7	15	3	14	8	15	8	8	8
Trend	--	--	--	I	--	I	--	I	--	--	I
S-value	18	-12	5	45	-14	51	6	75	2	-13	23
Probability	0.43522	0.17355	0.54801	0.02945	0.06239	0.01312	0.53619	0.00025	0.90154	0.13463	0.00609
Significant	NO	NO	NO	YES	NO	YES	NO	YES	NO	NO	YES
Dissolved Magnesium, mg/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	50	8	50	8	50	8	8	8
Trend	D	--	D	I	--	I	--	D	--	--	--
S-value	-736	-14	-799	409	1	336	3	-645	8	-6	-10
Probability	7.6E-10	0.10776	2.4E-11	0.00064	1	0.00505	0.80309	7.1E-08	0.37908	0.53619	0.26551
Significant	YES	NO	YES	YES	NO	YES	NO	YES	NO	NO	NO
Total Magnesium, mg/L											
No. of Analyses	15	8	7	15	8	15	8	15	8	8	8
No. of Detections	15	8	7	15	8	15	8	15	8	8	8
Trend	D	--	--	--	--	I	--	--	I	--	--
S-value	-63	-14	-3	9	2	65	9	-25	17	8	-4
Probability	0.0021	0.10776	0.76389	0.69146	0.9	0.00154	0.31857	0.23495	0.04606	0.38648	0.71052
Significant	YES	NO	NO	NO	NO	YES	NO	NO	YES	NO	NO
Dissolved Manganese, mg/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	49	8	50	5	3	50	8	50	8	8	8
Trend	--	I	D	--	--	I	D	D	--	D	--
S-value	18	24	-823	-100	-14	588	-24	-383	-10	-20	-2
Probability	0.88677	0.00443	5.5E-12	0.11016	0.08418	9.1E-07	0.00443	0.00139	0.26551	0.01874	0.90154
Significant	NO	YES	YES	NO	NO	YES	YES	YES	NO	YES	NO
Total Manganese, mg/L											
No. of Analyses	16	8	7	15	8	15	8	15	8	8	8
No. of Detections	16	8	7	9	7	15	8	15	8	8	8
Trend	--	I	--	--	--	--	--	I	--	--	--
S-value	-27	22	-9	32	-16	7	-10	51	-6	-3	10
Probability	0.24129	0.00937	0.22956	0.11177	0.06349	0.76653	0.26551	0.01335	0.53619	0.80309	0.26551
Significant	NO	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO
Dissolved Potassium, mg/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	50	8	50	8	50	8	8	8
Trend	D	--	D	I	--	--	--	D	--	--	--
S-value	-539	2	-675	382	6	97	5	-505	9	7	0
Probability	6.5E-06	0.9	1.6E-08	0.00141	0.53619	0.42122	0.61799	2.5E-05	0.31093	0.45443	1
Significant	YES	NO	YES	YES	NO	NO	NO	YES	NO	NO	NO
Total Potassium, mg/L											
No. of Analyses	15	8	7	15	8	15	8	15	8	8	8
No. of Detections	15	8	7	15	8	15	8	15	8	8	8
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	-9	10	5	33	2	29	7	-10	5	8	0
Probability	0.69074	0.26551	0.54801	0.11329	0.90154	0.16586	0.45443	0.65565	0.61799	0.38648	1
Significant	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc2										
Well Location	MW-2		MW-5D[b]	MW-9		MW-20		MW-21		MW-33[d]	MW-35[d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Short	Short
Dissolved Sodium, mg/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	50	8	50	50	8	50	8	50	8	8	8
Trend	D	--	D	**I**	--	D	--	--	--	--	--
S-value	-548	10	-258	264	4	-281	6	-125	7	3	-6
Probability	4.7E-06	0.26551	0.03099	0.02769	0.71052	0.01915	0.53619	0.29682	0.45443	0.80309	0.53619
Significant	YES	NO	YES	YES	NO	YES	NO	NO	NO	NO	NO
Total Sodium, mg/L											
No. of Analyses	15	8	7	15	8	15	8	15	8	8	8
No. of Detections	15	8	7	15	8	15	8	15	8	8	8
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	-38	10	-11	10	6	34	10	21	6	12	-3
Probability	0.06676	0.26551	0.13313	0.65565	0.53619	0.10203	0.26551	0.32111	0.52982	0.17355	0.80309
Significant	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1,1-Dichloroethane, ug/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	2	0	21	0	0	0	0	0	0	8	8
Trend	--	--	D	--	--	--	--	--	--	--	--
S-value	-79	-7	-470	0	-7	0	-7	0	-7	-9	-11
Probability	0.05358	--	1.1E-05	--	--	--	--	--	--	0.31857	0.21249
Significant	NO	--	YES	--	--	--	--	--	--	NO	NO
1,2-Dichloropropane, ug/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	0	0	15	0	0	0	0	0	0	8	8
Trend	--	--	D	--	--	--	--	--	--	--	--
S-value	0	-7	-275	0	-7	0	-7	0	-7	-16	-12
Probability	--	--	0.00456	--	--	--	--	--	--	0.06349	0.17355
Significant	--	--	YES	--	--	--	--	--	--	NO	NO
Benzene, ug/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	0	0	50	0	0	0	0	0	0	8	8
Trend	--	--	D	--	--	--	--	--	--	--	--
S-value	0	-7	-565	0	-7	0	-7	0	-7	-12	-10
Probability	--	--	2.4E-06	--	--	--	--	--	--	0.17355	0.26551
Significant	--	--	YES	--	--	--	--	--	--	NO	NO
cis 1,2-Dichloroethene, ug/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	3	6	50	0	0	1	0	48	8	8	8
Trend	**I**	**I**	D	--	--	--	--	--	D	--	--
S-value	120	18	-646	0	-7	45	-7	-173	-18	-10	-12
Probability	0.01515	0.03545	5.2E-08	--	--	0.12738	--	0.15005	0.03545	0.26551	0.17355
Significant	YES	YES	YES	--	--	NO	--	NO	YES	NO	NO
Chloroethane, ug/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	8	0
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	0	-7	0	0	-7	0	-7	0	-7	-6	-7
Probability	--	--	--	--	--	--	--	--	--	0.53619	--
Significant	--	--	--	--	--	--	--	--	--	NO	--
Dichlorodifluoromethane, ug/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	48	8	50	0	0	7	8	48	8	8	8
Trend	D	D	D	--	--	**I**	D	D	--	--	--
S-value	-368	-20	-687	0	-7	304	-22	-601	-6	-8	-11
Probability	0.00156	0.01874	3.3E-09	--	--	2.5E-05	0.00937	2.3E-07	0.53619	0.38648	0.21249
Significant	YES	YES	YES	--	--	YES	YES	YES	NO	NO	NO
Trichloroethene, ug/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	0	0	3	0	0	0	0	0	0	7	8
Trend	--	--	--	--	--	--	--	--	--	--	--
S-value	0	-7	21	0	-7	0	-7	0	-7	-5	14
Probability	--	--	0.68307	--	--	--	--	--	--	0.61799	0.10236
Significant	--	--	NO	--	--	--	--	--	--	NO	NO

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc2										
Well Location	MW-2		MW-5D[b]	MW-9		MW-20		MW-21		MW-33[d]	MW-35[d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Short	Short
Trichlorofluoromethane, ug/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	49	8	15	0	0	1	0	47	8	0	0
Trend	D	--	D	--	--	--	--	D	--	--	--
S-value	-533	-14	-324	0	-7	45	-7	-572	-8	-7	-7
Probability	8.6E-06	0.10776	0.00083	--	--	0.12738	--	1.8E-06	0.38648	--	--
Significant	YES	NO	YES	--	--	NO	--	YES	NO	--	--
Toluene, ug/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	0	0	0	0	0	1	0	0	0	1	6
Trend	--	--	--	--	--	--	--	--	--	--	I
S-value	0	-7	0	0	-7	-9	-7	0	-7	1	18
Probability	--	--	--	--	--	0.78164	--	--	--	1	0.03267
Significant	--	--	--	--	--	NO	--	--	--	--	YES
trans 1,2-Dichloroethene, ug/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	0	0	44	0	0	0	0	0	7	8	8
Trend	--	--	--	--	--	--	--	--	--	D	I
S-value	0	-7	92	0	-7	0	-7	0	-8	-18	18
Probability	--	--	0.44518	--	--	--	--	--	0.3688	0.03545	0.03545
Significant	--	--	NO	--	--	--	--	--	NO	YES	YES
Vinyl chloride, ug/L											
No. of Analyses	50	8	50	50	8	50	8	50	8	8	8
No. of Detections	49	8	50	0	0	1	0	49	8	8	8
Trend	D	--	D	--	--	--	--	D	--	--	D
S-value	-792	-10	-928	0	-7	45	-7	-837	-16	-16	-18
Probability	3.6E-11	0.26551	8.27E-15	--	--	0.12738	--	2.7E-12	0.06349	0.06349	0.03545
Significant	YES	NO	YES	--	--	NO	--	YES	NO	NO	YES

NOTES:

D = decreasing trend
I = increasing trend
-- = no noticeable trend

[a] Decommissioned in 2003
[b] Decommissioned in 2015
[c] Decommissioned in 2016
[d] Commissioned in 2015

Time Interval:
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.

Total metals were not included in the analyte list for this well prior to well decommissioning.

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

		Channel Cc3				
Well Location		MW-8		MW-14[b]	MW-27[c]	MW-36[d]
Time Interval		Long	Short	Long	Long	Short
pH field, Standard Units						
	No. of Analyses	50	8	50	50	8
	No. of Detections	50	8	50	50	8
	Trend	--	--	--	--	--
	S-value	-214	-3	116	-172	0
	Probability	0.07455	0.80309	0.33577	0.15224	1
	Significant	NO	NO	NO	NO	NO
Specific Conductance field, micromhos/cm						
	No. of Analyses	50	8	50	50	8
	No. of Detections	50	8	50	50	8
	Trend	D	--	I	--	--
	S-value	-307	-12	285	-112	-6
	Probability	0.00998	0.17355	0.01472	0.34856	0.53619
	Significant	YES	NO	YES	NO	NO
Alkalinity, mg/L						
	No. of Analyses	50	8	50	50	8
	No. of Detections	50	8	50	50	8
	Trend	D	--	--	--	--
	S-value	-506	2	163	-186	-1
	Probability	2.4E-05	0.90154	0.1711	0.12139	1
	Significant	YES	NO	NO	NO	NO
Ammonia-N, mg/L						
	No. of Analyses	50	8	50	50	8
	No. of Detections	3	1	7	5	1
	Trend	D	--	--	D	--
	S-value	-594	-1	-55	-631	-5
	Probability	1.2E-08	1	0.62051	2.3E-09	0.5108
	Significant	YES	--	NO	YES	--
Chloride, mg/L						
	No. of Analyses	50	8	50	50	8
	No. of Detections	50	8	50	50	8
	Trend	I	--	--	I	--
	S-value	436	-11	69	454	-12
	Probability	0.00027	0.21249	0.55114	0.00015	0.17355
	Significant	YES	NO	NO	YES	NO
Nitrate-N, mg/L						
	No. of Analyses	50	8	50	50	8
	No. of Detections	49	8	6	49	8
	Trend	D	D	--	D	--
	S-value	-255	-21	4	-307	-8
	Probability	0.03358	0.01265	0.97792	0.01045	0.37908
	Significant	YES	YES	NO	YES	NO
Sulfate, mg/L						
	No. of Analyses	50	8	50	50	8
	No. of Detections	50	8	50	50	8
	Trend	D	--	I	--	--
	S-value	-506	12	566	46	-7
	Probability	2.3E-05	0.17355	8.5E-07	0.70614	0.44483
	Significant	YES	NO	YES	NO	NO
Total Dissolved Solids						
	No. of Analyses	50	8	50	50	8
	No. of Detections	50	8	50	50	8
	Trend	--	--	I	I	--
	S-value	198	-11	272	443	-3
	Probability	0.09849	0.21249	0.02205	0.00021	0.80002
	Significant	NO	NO	YES	YES	NO
Dissolved Arsenic, mg/L						
	No. of Analyses	50	8	50	50	8
	No. of Detections	1	7	50	2	8
	Trend	--	--	--	--	--
	S-value	-3	8	-215	-54	11
	Probability	0.96053	0.38648	0.06364	0.27938	0.21249
	Significant	NO	NO	NO	NO	NO
Total Arsenic, mg/L						
	No. of Analyses	14	8		13	8
	No. of Detections	0	7		0	8
	Trend	--	--		--	--
	S-value	0	10		0	-3
	Probability	--	0.26551		--	0.79897
	Significant	--	NO		--	NO

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc3				
Well Location	MW-8		MW-14[b]	MW-27[c]	MW-36[d]
Time Interval	Long	Short	Long	Long	Short
Dissolved Calcium, mg/L					
No. of Analyses	50	8	50	50	8
No. of Detections	50	8	50	50	8
Trend	D	--	--	D	--
S-value	-556	8	141	-249	12
Probability	2.9E-06	0.37908	0.23563	0.03648	0.1669
Significant	YES	NO	NO	YES	NO
Total Calcium, mg/L					
No. of Analyses	14	8		13	8
No. of Detections	14	8		13	8
Trend	**I**	--		--	--
S-value	39	3		8	8
Probability	0.03617	0.80309		0.66817	0.38648
Significant	YES	NO		NO	NO
Dissolved Iron, mg/L					
No. of Analyses	50	8	50	50	8
No. of Detections	20	0	38	21	0
Trend	D	--	--	D	--
S-value	-530	0	-83	-569	0
Probability	7.7E-07	--	0.49013	1.6E-07	--
Significant	YES	--	NO	YES	--
Total Iron, mg/L					
No. of Analyses	14	8		13	8
No. of Detections	7	1		3	2
Trend	--	--		--	--
S-value	4	-7		-15	-5
Probability	0.85952	0.19043		0.2428	0.5108
Significant	NO	--		NO	--
Dissolved Magnesium, mg/L					
No. of Analyses	50	8	50	50	8
No. of Detections	50	8	50	50	8
Trend	D	--	**I**	--	--
S-value	-245	12	383	-22	11
Probability	0.04108	0.17355	0.00138	0.86034	0.21249
Significant	YES	NO	YES	NO	NO
Total Magnesium, mg/L					
No. of Analyses	14	8		13	8
No. of Detections	14	8		13	8
Trend	--	--		--	--
S-value	-8	6		11	14
Probability	0.70113	0.53619		0.53953	0.10776
Significant	NO	NO		NO	NO
Dissolved Manganese, mg/L					
No. of Analyses	50	8	50	50	8
No. of Detections	3	0	50	1	8
Trend	--	--	--	--	--
S-value	-86	-7	-118	1	-13
Probability	0.12909	--	0.3266	1	0.13463
Significant	NO	--	NO	NO	NO
Total Manganese, mg/L					
No. of Analyses	14	8		13	8
No. of Detections	2	1		0	8
Trend	--	--		--	--
S-value	9	-7		0	-4
Probability	0.46706	0.19043		--	0.71052
Significant	NO	--		--	NO
Dissolved Potassium, mg/L					
No. of Analyses	50	8	50	50	8
No. of Detections	50	8	50	50	8
Trend	--	--	**I**	--	--
S-value	91	15	251	182	3
Probability	0.44907	0.0809	0.03379	0.12849	0.80309
Significant	NO	NO	YES	NO	NO
Total Potassium, mg/L					
No. of Analyses	14	8		13	8
No. of Detections	14	8		13	8
Trend	--	--		--	--
S-value	35	11		18	5
Probability	0.05852	0.18015		0.29967	0.61799
Significant	NO	NO		NO	NO

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Channel Cc3				
Well Location	MW-8		MW-14[b]	MW-27[c]	MW-36[d]
Time Interval	Long	Short	Long	Long	Short
Dissolved Sodium, mg/L					
No. of Analyses	50	8	50	50	8
No. of Detections	50	8	50	50	8
Trend	--	--	--	--	--
S-value	-14	14	157	29	14
Probability	0.91329	0.10776	0.19035	0.81472	0.10776
Significant	NO	NO	NO	NO	NO
Total Sodium, mg/L					
No. of Analyses	14	8		13	8
No. of Detections	14	8		13	8
Trend	--	--		--	--
S-value	-21	4		2	14
Probability	0.27356	0.71052		0.95135	0.10776
Significant	NO	NO		NO	NO
1,1-Dichloroethane, ug/L					
No. of Analyses	50	8	50	50	8
No. of Detections	0	0	0	0	0
Trend	--	--	--	--	--
S-value	0	-7	0	0	-7
Probability	--	--	--	--	--
Significant	--	--	--	--	--
1,2-Dichloropropane, ug/L					
No. of Analyses	50	8	50	50	8
No. of Detections	0	0	0	0	0
Trend	--	--	--	--	--
S-value	0	-7	0	0	-7
Probability	--	--	--	--	--
Significant	--	--	--	--	--
Benzene, ug/L					
No. of Analyses	50	8	50	50	8
No. of Detections	0	0	0	0	0
Trend	--	--	--	--	--
S-value	0	-7	0	0	-7
Probability	--	--	--	--	--
Significant	--	--	--	--	--
cis 1,2-Dichloroethene, ug/L					
No. of Analyses	50	8	50	50	8
No. of Detections	0	0	0	0	0
Trend	--	--	--	--	--
S-value	0	-7	0	0	-7
Probability	--	--	--	--	--
Significant	--	--	--	--	--
Chloroethane, ug/L					
No. of Analyses	50	8	50	50	8
No. of Detections	0	0	0	0	0
Trend	--	--	--	--	--
S-value	0	-7	0	0	-7
Probability	--	--	--	--	--
Significant	--	--	--	--	--
Dichlorodifluoromethane, ug/L					
No. of Analyses	50	8	50	50	8
No. of Detections	0	0	0	1	0
Trend	--	--	--	--	--
S-value	0	-7	0	-49	-7
Probability	--	--	--	0.09629	--
Significant	--	--	--	NO	--
Trichloroethene, ug/L					
No. of Analyses	50	8	50	50	8
No. of Detections	0	0	0	0	0
Trend	--	--	--	--	--
S-value	0	-7	0	0	-7
Probability	--	--	--	--	--
Significant	--	--	--	--	--

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

		Channel Cc3				
Well Location		MW-8		MW-14[b]	MW-27[c]	MW-36[d]
Time Interval		Long	Short	Long	Long	Short
Trichlorofluoromethane, ug/L						
	No. of Analyses	50	8	50	50	8
	No. of Detections	0	0	0	1	0
	Trend	--	--	--	--	--
	S-value	0	-7	0	-49	-7
	Probability	--	--	--	0.09629	--
	Significant	--	--	--	NO	--
Toluene, ug/L						
	No. of Analyses	50	8	50	50	8
	No. of Detections	1	0	0	0	0
	Trend	--	--	--	--	--
	S-value	-5	-7	0	0	-7
	Probability	0.88977	--	--	--	--
	Significant	NO	--	--	--	--
trans 1,2-Dichloroethene, ug/L						
	No. of Analyses	50	8	50	50	8
	No. of Detections	0	0	0	0	0
	Trend	--	--	--	--	--
	S-value	0	-7	0	0	-7
	Probability	--	--	--	--	--
	Significant	--	--	--	--	--
Vinyl chloride, ug/L						
	No. of Analyses	50	8	50	50	8
	No. of Detections	0	0	1	0	0
	Trend	--	--	--	--	--
	S-value	0	-7	21	0	-7
	Probability	--	--	0.48834	--	--
	Significant	--	--	NO	--	--

NOTES:

D	= decreasing trend
I	= increasing trend
--	= no noticeable trend
[a]	Decommissioned in 2003
[b]	Decommissioned in 2015
[c]	Decommissioned in 2016
[d]	Commissioned in 2015

Time Interval:

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.
	Total metals were not included in the analyte list for this well prior to well decommissioning.

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Unit D Aquifer											
Well Location	MW-7		MW-11[a]	MW-12		MW-19		MW-26		MW-29		MW-34[d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Long	Short	Short
pH field, Standard Units												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	24	50	8	50	8	50	8	50	8	8
Trend	--	--	--	--	--	D	D	D	--	D	--	--
S-value	-216	-16	-29	-232	-12	-392	-20	-388	-8	-270	-4	-10
Probability	0.07167	0.06349	0.48686	0.05305	0.17355	0.00106	0.01874	0.0012	0.38648	0.02429	0.71052	0.26551
Significant	NO	NO	NO	NO	NO	YES	YES	YES	NO	YES	NO	NO
Specific Conductance field, micromhos/cm												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	24	50	8	50	8	50	8	50	8	8
Trend	--	--	--	I	I	I	--	--	--	--	--	D
S-value	11	-4	-32	312	20	278	-8	49	1	205	-4	-18
Probability	0.93191	0.71052	0.43767	0.00808	0.01874	0.01963	0.38648	0.68437	1	0.08528	0.71052	0.03545
Significant	NO	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO	YES
Alkalinity, mg/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	24	50	8	50	8	50	8	50	8	8
Trend	I	--	--	I	I	--	--	I	--	I	--	--
S-value	372	-4	22	619	21	178	-10	343	8	559	-1	-9
Probability	0.00188	0.7062	0.59928	2.3E-07	0.01265	0.13814	0.26551	0.00417	0.38648	2.6E-06	1	0.31857
Significant	YES	NO	NO	YES	YES	NO	NO	YES	NO	YES	NO	NO
Ammonia-N, mg/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	20	3	0	37	8	50	8	2	6	1
Trend	I	D	D	D	--	--	--	I	--	D	--	--
S-value	629	-21	-152	-480	-7	93	-2	266	-10	-656	-7	-7
Probability	1.5E-07	0.01265	0.00012	4.4E-06	--	0.43943	0.90154	0.02637	0.26551	1.8E-10	0.45443	0.19043
Significant	YES	YES	YES	YES	--	NO	NO	YES	NO	YES	NO	--
Chloride, mg/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	24	50	8	50	8	50	8	50	8	8
Trend	I	--	--	I	--	--	--	--	--	D	--	--
S-value	358	1	46	317	5	-177	10	-46	6	-343	4	-6
Probability	0.00278	1	0.22362	0.00778	0.61799	0.14055	0.26551	0.706	0.53619	0.00417	0.71052	0.53619
Significant	YES	NO	NO	YES	NO	NO	NO	NO	NO	YES	NO	NO
Nitrate-N, mg/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	14	5	6	50	8	17	0	25	3	1	0	8
Trend	D	--	--	D	D	D	--	--	--	D	--	--
S-value	-582	12	-49	-299	-19	-554	0	-196	0	-571	0	-4
Probability	2.7E-07	0.15787	0.1119	0.01263	0.02482	1.5E-06	--	0.09075	1	1.5E-08	--	0.71052
Significant	YES	NO	NO	YES	YES	YES	--	NO	NO	YES	--	NO
Sulfate, mg/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	24	50	8	50	8	50	8	50	8	8
Trend	I	--	--	I	--	D	--	I	--	--	--	--
S-value	349	0	-65	549	2	-556	10	253	0	-16	5	-3
Probability	0.00335	1	0.08789	3.8E-06	0.89784	2.8E-06	0.26551	0.03283	1	0.89959	0.61799	0.80309
Significant	YES	NO	NO	YES	NO	YES	NO	YES	NO	NO	NO	NO
Total Dissolved Solids												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	24	50	8	50	8	50	8	50	8	8
Trend	I	--	I	I	--	I	--	I	--	I	--	--
S-value	496	-7	99	469	1	316	-2	391	-16	539	-1	1
Probability	3.3E-05	0.44728	0.01039	8.8E-05	1	0.00828	0.89553	0.00108	0.05945	6.3E-06	1	1
Significant	YES	NO	YES	YES	NO	YES	NO	YES	NO	YES	NO	NO
Dissolved Arsenic, mg/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	24	50	8	50	8	50	8	50	8	8
Trend	D	--	I	--	--	D	--	I	--	D	--	--
S-value	-640	-9	167	75	-4	-981	12	317	7	-608	9	6
Probability	8.9E-08	0.31857	8.5E-06	0.53509	0.7062	2.35E-16	0.1669	0.00814	0.45443	3.8E-07	0.31857	0.52982
Significant	YES	NO	YES	NO	NO	YES	NO	YES	NO	YES	NO	NO
Total Arsenic, mg/L												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	15	8		14	8	15	8	15	8	15	8	8
Trend	D	--		I	--	--	I	I	--	--	I	--
S-value	-48	10		58	10	-19	22	48	16	-35	24	14
Probability	0.01987	0.26551		0.00178	0.24789	0.37305	0.00937	0.01947	0.06349	0.09246	0.00443	0.10236
Significant	YES	NO		YES	NO	NO	YES	YES	NO	NO	YES	NO

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Unit D Aquifer											
Well Location	MW-7		MW-11[a]	MW-12		MW-19		MW-26		MW-29		MW-34[d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Long	Short	Short
Dissolved Calcium, mg/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	24	50	8	50	8	50	8	50	8	8
Trend	--	--	--	--	I	--	--	--	--	--	--	--
S-value	51	15	-37	172	21	115	8	-89	10	108	11	7
Probability	0.67452	0.0809	0.35597	0.15227	0.01265	0.33872	0.38648	0.45991	0.25809	0.36706	0.21249	0.45443
Significant	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO
Total Calcium, mg/L												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	15	8		14	8	15	8	15	8	15	8	8
Trend	--	--		--	I	--	--	--	--	--	--	--
S-value	23	5		19	17	-38	-4	-1	6	7	1	3
Probability	0.2751	0.61799		0.32297	0.04606	0.06676	0.71052	1	0.52982	0.76522	1	0.80309
Significant	NO	NO		NO	YES	NO	NO	NO	NO	NO	NO	NO
Dissolved Iron, mg/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	24	7	24	19	0	49	8	50	8	50	8	0
Trend	D	D	--	D	--	D	I	--	--	--	--	--
S-value	-531	-27	10	-520	0	-394	18	-67	2	215	13	0
Probability	1.6E-06	0.00119	0.82194	8.9E-07	--	0.00101	0.03545	0.5807	0.90154	0.07333	0.13463	--
Significant	YES	YES	NO	YES	--	YES	YES	NO	NO	NO	NO	--
Total Iron, mg/L												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	14	8		8	6	15	8	15	8	15	8	5
Trend	I	I		I	--	--	--	I	--	--	I	--
S-value	43	22		48	-11	32	16	53	14	-31	24	-9
Probability	0.0372	0.00937		0.00715	0.21249	0.12454	0.06349	0.01007	0.10776	0.13765	0.00443	0.30832
Significant	YES	YES		YES	NO	NO	NO	YES	NO	NO	YES	NO
Dissolved Magnesium, mg/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	24	50	8	50	8	50	8	50	8	8
Trend	--	--	--	I	--	--	--	--	--	I	--	--
S-value	166	5	43	388	4	214	3	203	6	336	8	4
Probability	0.16722	0.61799	0.28787	0.00119	0.71052	0.07403	0.79897	0.09096	0.53619	0.00487	0.38648	0.7062
Significant	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES	NO	NO
Total Magnesium, mg/L												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	15	8		14	8	15	8	15	8	15	8	8
Trend	--	--		--	--	--	--	--	--	--	--	--
S-value	5	14		-10	16	-25	3	13	8	4	10	8
Probability	0.84309	0.10776		0.6217	0.06349	0.23381	0.80309	0.55262	0.38648	0.88155	0.26551	0.38648
Significant	NO	NO		NO	NO	NO	NO	NO	NO	NO	NO	NO
Dissolved Manganese, mg/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	49	8	24	2	1	49	8	50	8	50	8	7
Trend	--	--	D	--	--	--	--	D	--	D	--	D
S-value	-57	-10	-99	34	-11	-69	4	-276	15	-268	12	-22
Probability	0.63872	0.26551	0.01432	0.50062	0.10018	0.56875	0.71052	0.02133	0.0809	0.02544	0.17355	0.00937
Significant	NO	NO	YES	NO	--	NO	NO	YES	NO	YES	NO	YES
Total Manganese, mg/L												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	15	8		4	7	15	8	15	8	15	8	8
Trend	--	--		--	--	--	--	--	--	--	--	--
S-value	-21	16		18	-16	-1	15	39	16	-8	8	-14
Probability	0.32111	0.06349		0.23925	0.06349	1	0.0809	0.06004	0.06349	0.72872	0.38648	0.10776
Significant	NO	NO		NO	NO	NO	NO	NO	NO	NO	NO	NO
Dissolved Potassium, mg/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	24	50	8	50	8	50	8	50	8	8
Trend	--	--	D	I	I	I	--	I	--	I	--	--
S-value	191	4	-130	319	21	242	10	285	8	364	14	8
Probability	0.11139	0.71052	0.00092	0.00766	0.01265	0.0433	0.26551	0.01735	0.37908	0.00233	0.10776	0.37908
Significant	NO	NO	YES	YES	YES	YES	NO	YES	NO	YES	NO	NO
Total Potassium, mg/L												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	15	8		14	8	15	8	15	8	15	8	8
Trend	I	--		--	--	--	--	--	--	--	--	--
S-value	52	9		24	15	-25	1	2	1	28	3	10
Probability	0.01104	0.31857		0.2073	0.0809	0.23381	1	0.96048	1	0.18096	0.80309	0.26551
Significant	YES	NO		NO	NO	NO	NO	NO	NO	NO	NO	NO

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Unit D Aquifer											
Well Location	MW-7		MW-11[a]	MW-12		MW-19		MW-26		MW-29		MW-34[d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Long	Short	Short
Dissolved Sodium, mg/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	50	8	24	50	8	50	8	50	8	50	8	8
Trend	--	--	--	I	--	--	--	--	--	--	--	--
S-value	-80	8	-75	355	6	129	4	146	14	175	8	4
Probability	0.50851	0.38648	0.0649	0.00305	0.53619	0.28409	0.71052	0.22497	0.10776	0.14535	0.38648	0.71052
Significant	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO
Total Sodium, mg/L												
No. of Analyses	15	8		14	8	15	8	15	8	15	8	8
No. of Detections	15	8		14	8	15	8	15	8	15	8	8
Trend	--	--		--	--	--	--	D	--	--	--	--
S-value	-21	12		19	16	-11	6	-59	12	-1	12	12
Probability	0.3223	0.17355		0.32442	0.06349	0.62069	0.53619	0.0041	0.17355	1	0.1669	0.17355
Significant	NO	NO		NO	NO	NO	NO	YES	NO	NO	NO	NO
1,1-Dichloroethane, ug/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	-7	0	0	-7	0	-7	0	-7	0	-7	-7
Probability	--	--	--	--	--	--	--	--	--	--	--	--
Significant	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane, ug/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	-7	0	0	-7	0	-7	0	-7	0	-7	-7
Probability	--	--	--	--	--	--	--	--	--	--	--	--
Significant	--	--	--	--	--	--	--	--	--	--	--	--
Benzene, ug/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	-7	0	0	-7	0	-7	0	-7	0	-7	-7
Probability	--	--	--	--	--	--	--	--	--	--	--	--
Significant	--	--	--	--	--	--	--	--	--	--	--	--
cis 1,2-Dichloroethene, ug/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	-7	0	0	-7	0	-7	0	-7	0	-7	-7
Probability	--	--	--	--	--	--	--	--	--	--	--	--
Significant	--	--	--	--	--	--	--	--	--	--	--	--
Chloroethane, ug/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	-7	0	0	-7	0	-7	0	-7	0	-7	-7
Probability	--	--	--	--	--	--	--	--	--	--	--	--
Significant	--	--	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane, ug/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	-7	0	0	-7	0	-7	0	-7	0	-7	-7
Probability	--	--	--	--	--	--	--	--	--	--	--	--
Significant	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene, ug/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	-7	0	0	-7	0	-7	0	-7	0	-7	-7
Probability	--	--	--	--	--	--	--	--	--	--	--	--
Significant	--	--	--	--	--	--	--	--	--	--	--	--

Table 3-3 (*continued*)
Summary of Trend Analyses for Groundwater Well Samples
Vashon Island Closed Landfill
1986 through 2018

	Unit D Aquifer											
Well Location	MW-7		MW-11[a]	MW-12		MW-19		MW-26		MW-29		MW-34[d]
Time Interval	Long	Short	Long	Long	Short	Long	Short	Long	Short	Long	Short	Short
Trichlorofluoromethane, ug/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	1	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	-7	-19	0	-7	0	-7	0	-7	0	-7	-7
Probability	--	--	0.19354	--	--	--	--	--	--	--	--	--
Significant	--	--	NO	--	--	--	--	--	--	--	--	--
Toluene, ug/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	1	0	0	1	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	-7	-9	0	-7	1	-7	0	-7	0	-7	-7
Probability	--	--	0.56336	--	--	1	--	--	--	--	--	--
Significant	--	--	NO	--	--	NO	--	--	--	--	--	--
trans 1,2-Dichloroethene, ug/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	-7	0	0	-7	0	-7	0	-7	0	-7	-7
Probability	--	--	--	--	--	--	--	--	--	--	--	--
Significant	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl chloride, ug/L												
No. of Analyses	50	8	24	50	8	50	8	50	8	50	8	8
No. of Detections	0	0	0	0	0	0	0	0	0	0	0	0
Trend	--	--	--	--	--	--	--	--	--	--	--	--
S-value	0	-7	0	0	-8	-19	-7	0	-7	0	-7	-10
Probability	--	--	--	--	--	--	--	--	--	--	--	--
Significant	--	--	--	--	--	--	--	--	--	--	--	--

NOTES:

D	= decreasing trend
I	= increasing trend
--	= no noticeable trend
[a]	Decommissioned in 2003
[b]	Decommissioned in 2015
[c]	Decommissioned in 2016
[d]	Commissioned in 2015

Time Interval:

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.
	Total metals were not included in the analyte list for this well prior to well decommissioning.

Table 3-4
Summary of Statistical Analyses for West Hillside Seep / Weir Samples
Vashon Island Closed Landfill
1991 through 2018

	West Hillside Seep / Weir							
Monitoring 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	69	8	101	8	100	8	17	8
No. of Detections	69	8	101	8	100	8	17	8
Minimum	6.5	7.2	6.9	6.9	6.3	7.3	6.4	6.8
Maximum	8.8	7.6	8.9	8.3	10.7	7.9	10.2	8.1
Mean	7.6	7.4	8.0	7.7	7.8	7.6	7.7	7.5
Standard Deviation	0.5	0.2	0.4	0.5	0.6	0.2	0.8	0.4
Median	7.6	7.5	8.1	7.6	7.9	7.7	7.6	7.7
Specific Conductance field, [µmhos/cm]								
No. of Analyses	70	8	102	8	102	8	16	8
No. of Detections	70	8	102	8	102	8	16	8
Minimum	70	180	325	515	190	240	110	150
Maximum	860	222	1200	625	1034	293	370	221
Mean	324.5	197.5	754.8	574.1	457.4	270.3	188.1	188.2
Standard Deviation	168.3	13.8	181.9	42.0	166.5	19.3	57.4	29.0
Median	244	197	725	582	425	272	180	192
Chemical Oxygen Demand, [mg/L]								
No. of Analyses	69	8	101	8	100	8		
No. of Detections	62	8	99	8	86	8		
Minimum	ND	11.0	ND	14.0	ND	9.8		
Maximum	100.0	41.7	130.0	19.0	160.0	17.0		
Mean	19.60	20.21	21.41	16.13	17.82	13.85		
Standard Deviation	17.13	9.83	18.54	1.89	20.73	2.28		
Median	14.0	17.0	16.0	16.0	14.0	14.0		
Alkalinity, [mg/L]								
No. of Analyses	41	8	60	8	59	8		
No. of Detections	41	8	60	8	59	8		
Minimum	69	66	222	261	87	111		
Maximum	150	90	530	317	290	131		
Mean	92.3	75.7	400.7	290.0	178.5	118.4		
Standard Deviation	18.4	7.3	66.6	18.3	51.9	8.4		
Median	90	74	400	291	170	115		
Ammonia-N, [mg/L]								
No. of Analyses	69	8	102	8	101	8		
No. of Detections	40	8	39	7	27	7		
Minimum	ND	0.012	ND	ND	ND	ND		
Maximum	0.14	0.03	45	0.01	0.20	0.01		
Mean	0.025	0.017	0.457	0.006	0.016	0.008		
Standard Deviation	0.028	0.006	4.454	0.002	0.025	0.003		
Median	0.02	0.01	0.01	0.01	0.01	0.01		
Nitrate-N, [mg/L]								
No. of Analyses	69	8	102	8	101	8		
No. of Detections	61	8	73	8	93	8		
Minimum	ND	0.642	ND	0.122	ND	0.254		
Maximum	4.26	2.73	9.00	0.43	1.40	0.77		
Mean	1.528	1.653	0.231	0.277	0.349	0.502		
Standard Deviation	1.121	0.745	0.887	0.104	0.278	0.187		
Median	1.45	1.77	0.11	0.28	0.29	0.53		
Sulfate, [mg/L]								
No. of Analyses	69	8	102	8	101	8		
No. of Detections	68	8	102	8	101	8		
Minimum	ND	8	5	12	6	10		
Maximum	36	9	30	14	109	12		
Mean	11.7	8.1	8.6	12.9	12.2	11.0		
Standard Deviation	5.1	0.4	3.4	0.4	9.9	0.8		
Median	11	8	8	13	11	11		
Chloride, [mg/L]								
No. of Analyses	69	8	100	8	100	8		
No. of Detections	69	8	98	8	98	8		
Minimum	3	5	ND	17	ND	7		
Maximum	15	8	79	19	48	9		
Mean	5.9	6.6	31.8	18.1	12.2	8.2		
Standard Deviation	1.9	0.9	11.3	0.9	6.1	0.6		
Median	5	6	32	18	10	8		

Table 3-4 (*continued*)
Summary of Statistical Analyses for West Hillside Seep / Weir Samples
Vashon Island Closed Landfill
1991 through 2018

	West Hillside Seep / Weir							
Monitoring Location	**SW-W1**		**SW-W2**		**SW-W3**		**SW-E**	
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short
Dissolved Arsenic, [mg/L]								
No. of Analyses	37	8	39	8	39	8	16	8
No. of Detections	34	8	37	8	39	8	16	8
Minimum	ND	0.001	ND	0.001	0.002	0.002	0.001	0.001
Maximum	0.009	0.004	0.016	0.002	0.004	0.004	0.002	0.002
Mean	0.0026	0.0025	0.0018	0.0014	0.0027	0.0032	0.0018	0.0018
Standard Deviation	0.0020	0.0010	0.0024	0.0002	0.0005	0.0005	0.0003	0.0004
Median	0.002	0.002	0.001	0.001	0.003	0.003	0.002	0.002
Total Arsenic, [mg/L]								
No. of Analyses	70	8	101	8	100	8	16	8
No. of Detections	70	8	101	8	99	8	16	8
Minimum	0.002	0.003	0.002	0.002	ND	0.004	0.002	0.001
Maximum	0.083	0.007	0.017	0.003	0.052	0.005	0.003	0.011
Mean	0.0118	0.0044	0.0047	0.0026	0.0060	0.0043	0.0022	0.0031
Standard Deviation	0.0121	0.0013	0.0029	0.0007	0.0063	0.0007	0.0004	0.0030
Median	0.008	0.004	0.004	0.003	0.005	0.004	0.002	0.002
Dissolved Iron, [mg/L]								
No. of Analyses	37	8	39	8	39	8	16	8
No. of Detections	36	8	39	8	39	8	16	8
Minimum	ND	0.1	0.012	0.019	0.018	0.044	0.033	0.040
Maximum	1.4	0.4	9.0	0.0	0.2	0.1	0.2	0.2
Mean	0.29	0.20	0.32	0.03	0.08	0.06	0.07	0.09
Standard Deviation	0.32	0.11	1.43	0.01	0.05	0.03	0.04	0.06
Median	0.18	0.18	0.03	0.03	0.05	0.05	0.05	0.07
Total Iron, [mg/L]								
No. of Analyses	70	8	101	8	100	8	16	8
No. of Detections	70	8	101	8	100	8	16	8
Minimum	0.7	0.7	0.4	0.5	0.5	0.6	0.2	0.3
Maximum	76.0	4.2	27.9	3.1	37.5	2.9	5.4	14.9
Mean	8.45	2.00	4.50	1.62	3.60	1.05	1.08	2.37
Standard Deviation	11.02	1.27	4.93	0.93	5.50	0.76	1.37	5.06
Median	4.7	1.5	2.9	1.8	1.9	0.8	0.6	0.7
Dissolved Manganese, [mg/L]								
No. of Analyses	37	8	39	8	39	8	16	8
No. of Detections	37	8	39	8	39	8	16	8
Minimum	0.01	0.12	0.02	0.04	0.11	0.29	0.01	0.01
Maximum	3.18	0.44	2.40	0.10	0.51	0.51	0.01	0.02
Mean	0.420	0.242	0.135	0.062	0.284	0.386	0.011	0.012
Standard Deviation	0.562	0.097	0.378	0.026	0.090	0.079	0.002	0.004
Median	0.28	0.24	0.06	0.05	0.27	0.36	0.01	0.01
Total Manganese, [mg/L]								
No. of Analyses	70	8	100	8	99	8	16	8
No. of Detections	70	8	100	8	99	8	16	8
Minimum	0.33	0.33	0.26	0.13	0.25	0.44	0.03	0.02
Maximum	18.00	1.43	17.90	0.45	8.56	0.76	0.18	1.14
Mean	2.572	0.724	2.107	0.318	1.227	0.568	0.075	0.188
Standard Deviation	2.913	0.368	2.572	0.125	1.510	0.125	0.039	0.385
Median	1.48	0.55	1.02	0.37	0.79	0.52	0.07	0.05
Dissolved Calcium, [mg/L]								
No. of Analyses	37	8	39	8	39	8	16	8
No. of Detections	37	8	39	8	39	8	16	8
Minimum	12	12	35	42	17	18	8	9
Maximum	18	18	74	55	33	24	17	17
Mean	15.4	15.4	58.2	49.9	24.2	21.6	13.3	14.2
Standard Deviation	1.6	1.7	7.9	3.9	3.7	2.0	2.9	2.2
Median	15	15	58	50	24	22	14	14
Total Calcium, [mg/L]								
No. of Analyses	65	8	95	8	94	8	16	8
No. of Detections	65	8	95	8	94	8	16	8
Minimum	13	12	27	48	17	18	9	9
Maximum	85	18	127	55	93	25	18	19
Mean	30.6	15.8	75.8	51.0	42.6	22.0	14.1	15.0
Standard Deviation	20.6	1.7	20.4	2.9	19.1	2.0	2.8	2.8
Median	19	16	72	51	38	22	15	15

Table 3-4 (*continued*)
Summary of Statistical Analyses for West Hillside Seep / Weir Samples
Vashon Island Closed Landfill
1991 through 2018

	West Hillside Seep / Weir							
Monitoring Location	**SW-W1**		**SW-W2**		**SW-W3**		**SW-E**	
Time Interval	Long	Short	Long	Short	Long	Short	Long	Short
Dissolved Magnesium, [mg/L]								
No. of Analyses	37	8	39	8	39	8	16	8
No. of Detections	37	8	39	8	39	8	16	8
Minimum	10	11	29	37	12	16	6	9
Maximum	16	14	64	47	26	20	16	15
Mean	12.8	11.9	49.8	41.9	19.8	18.0	11.9	12.7
Standard Deviation	1.3	1.0	7.3	3.1	3.1	1.4	2.9	2.0
Median	13	12	49	42	20	18	12	12
Total Magnesium, [mg/L]								
No. of Analyses	65	8	95	8	95	8	16	8
No. of Detections	65	8	95	8	95	8	16	8
Minimum	11	10	20	37	15	15	7	9
Maximum	55	14	104	47	89	20	15	16
Mean	19.9	11.8	64.4	41.6	33.4	17.9	12.4	13.2
Standard Deviation	10.3	1.1	18.3	2.9	14.6	1.5	2.5	2.1
Median	15	12	60	41	31	18	14	13
Dissolved Sodium, [mg/L]								
No. of Analyses	37	8	39	8	39	8	16	8
No. of Detections	37	8	39	8	39	8	16	8
Minimum	5	6	10	12	6	7	4	5
Maximum	8	8	19	17	11	9	8	7
Mean	6.8	6.9	15.2	15.1	8.7	8.5	6.3	6.6
Standard Deviation	0.6	0.7	1.8	1.3	0.9	0.6	0.8	0.8
Median	7	7	15	15	9	9	6	7
Total Sodium, [mg/L]								
No. of Analyses	65	8	96	8	94	8	16	8
No. of Detections	65	8	96	8	94	8	16	8
Minimum	6	5	8	13	7	7	5	5
Maximum	17	8	25	17	18	9	7	7
Mean	8.9	6.9	16.1	15.1	11.3	8.4	6.5	6.6
Standard Deviation	3.1	0.8	2.5	1.2	2.9	0.7	0.8	0.7
Median	7	7	16	15	10	9	7	7
Dissolved Potassium, [mg/L]								
No. of Analyses	37	8	39	8	39	8	16	8
No. of Detections	36	8	39	8	38	8	16	8
Minimum	ND	0.8	1.2	2.7	ND	1.8	1.7	1.7
Maximum	1.5	1.3	4.1	3.3	2.8	2.4	2.3	2.8
Mean	1.08	1.07	3.20	3.02	2.11	2.08	2.00	1.99
Standard Deviation	0.23	0.15	0.45	0.20	0.42	0.17	0.15	0.33
Median	1.1	1.1	3.2	3.1	2.2	2.1	2.0	1.9
Total Potassium, [mg/L]								
No. of Analyses	65	8	96	8	95	8	16	8
No. of Detections	65	8	96	8	95	8	16	8
Minimum	0.8	0.9	1.8	3.0	1.7	1.9	1.7	1.8
Maximum	2.8	1.4	5.6	3.5	17.0	2.4	2.2	3.4
Mean	1.38	1.11	3.47	3.13	2.68	2.18	1.94	2.12
Standard Deviation	0.42	0.15	0.55	0.18	1.57	0.16	0.13	0.52
Median	1.2	1.1	3.4	3.1	2.4	2.2	2.0	2.0
Vinyl Chloride, [µg/L]								
No. of Analyses	67	8	99	8	98	8	16	8
No. of Detections	8	7	1	0	71	8	0	0
Minimum	ND	ND	ND	ND	ND	0.033	ND	ND
Maximum	1.00	0.03	1.00	ND	1.00	0.06	ND	ND
Mean	0.06	0.0202	ID	ID	0.08	0.04	ID	ID
Standard Deviation	0.21	0.01	ID	ID	0.17	0.01	ID	ID
Median	0.010	0.021	ID	ID	0.044	0.04	ID	ID

NOTES:

ID - Insufficient Data (i.e. the number of detections is less than 3)
ND - Not Detected (i.e. at laboratory MDL - Method Detection Limit)

Time Interval:
Long - All data in the period of record exclusive of the eight most recent analyses
Short - Eight most recent analyses in the last two years

- These analytes were not included in the analyte list for this well due to N/A

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

Constituent	Area Background Range*	Unit D Aquifer Jan. 2017 - Dec. 2018
General Indicators		
pH	6.5 to 8.3	6.6 to 9.2
Conductivity (µmhos/cm)	80 to 545	100 to 248
Chloride	1.6 to 14	2.7 to 37.6
Sulfate	<0.50 to 41	8.7 to 24.0
Nitrate	<0.2 to 5.8	<0.01 to 2.57
Metals[a]		
Arsenic	<0.001 to 0.017	0.0011 to 0.0108
Iron	0.04 to 10	<0.005 to 10.5
Manganese	0.005 to 0.960	<0.001 to 0.72
Sodium	5.0 to 62	7.6 to 10.1

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

[a] = Total metals concentrations are reported for area background values.

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

Appendix A

Groundwater Quality Standards

Water Quality Standards

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

Water Quality Standards

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

Water Quality Standards

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

NOTES: pCi/L=picocuries per liter
mg/L=milligrams per liter
mf/L=million fibers per liter
p=Listed as a Primary Standard
--'=no standard established
i=listed individually as groundwater criteria
c=Listed as a carcinogen in the Ground Water Criteria
MCL=Maximum Contaminant Level
*=Criteria shall be the most stringent concentration of the Federal MCLG, MCL; or State MCL
MCLG= Maximum Contaminant Level Goal
**=treatment technique in lieu of an MCL
***= A Drinking Water Advisory, not an enforceable standard.
Ground Water Quality Criteria=Water Quality Standards for Ground Waters of the State of Washington

Compiled by KCSWD 1/12/94. Revised 10/5/09

Appendix B

Exceedance Reports

Summary of Groundwater Quality Criteria Exceedances

Summary of Groundwater Prediction Limit Exceedances

Summary of Groundwater Volatile Organic Compound Detections Exceedances

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

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 B-1
Channel Cc1: Summary of Groundwater Quality Criteria Exceedances

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Parameter	Units	Site ID	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded Numerical Limit
pH (Field)	(Std. pH Units)	MW-3	1/30/2018	5.44	F2; SGW2	< 6.5, or > 8.5
		MW-3	5/21/2018	5.75	F2; SGW2	< 6.5, or > 8.5
		MW-4	2/5/2018	5.94	F2; SGW2	< 6.5, or > 8.5
		MW-4	8/13/2018	6.09	F2; SGW2	< 6.5, or > 8.5
		MW-4	11/29/2018	6.32	F2; SGW2	< 6.5, or > 8.5
Arsenic[1]	(mg/L)	MW-3	1/30/2018	0.000117	SGW1	0.00005
		MW-3	5/21/2018	0.0000669	SGW1	0.00005
		MW-4	2/5/2018	0.000344	SGW1	0.00005
		MW-4	5/23/2018	0.000376	SGW1	0.00005
		MW-4	8/13/2018	0.00036	SGW1	0.00005
		MW-4	11/29/2018	0.00033	SGW1	0.00005
		MW-10	1/29/2018	0.0016	SGW1	0.00005
		MW-10	5/22/2018	0.00165	SGW1	0.00005
		MW-10	8/10/2018	0.00168	SGW1	0.00005
		MW-10	11/9/2018	0.00153	SGW1	0.00005
		MW-13	1/31/2018	0.00196	SGW1	0.00005
		MW-13	5/21/2018	0.0018	SGW1	0.00005
		MW-13	8/10/2018	0.00205	SGW1	0.00005
		MW-13	11/28/2018	0.00199	SGW1	0.00005

F2 = Secondary Federal Drinking Water Quality Standard
SGW1 = State of Washington Primary Ground Water Quality Standard
SGW2 = State of Washington Secondary Ground Water Quality Standard
See Analytical Data Qualifier Page for Data Qualifier Information (page B-1, Appendix B)
[1] Total Metals
[2] Dissolved Metals

Table B-2
Channel Cc2: Summary of Groundwater Quality Criteria Exceedances

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Parameter	Units	Site ID	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded Numerical Limit
pH (Field)	(Std. pH Units)	MW-21	8/15/2018	6.41	F2; SGW2	< 6.5, or > 8.5
		MW-33	5/22/2018	6.48	F2; SGW2	< 6.5, or > 8.5
		MW-35	8/15/2018	6.46	F2; SGW2	< 6.5, or > 8.5
Specific Conductance (Field)	(µmhos/cm)	MW-33	1/30/2018	821	SGW2	700
		MW-33	5/22/2018	783.4	SGW2	700
		MW-33	8/15/2018	748	SGW2	700
		MW-33	11/27/2018	772.9	SGW2	700
		MW-35	5/21/2018	704	SGW2	700
Arsenic[1]	(mg/L)	MW-2	1/30/2018	0.000975	SGW1	0.00005
		MW-2	5/21/2018	0.000809	SGW1	0.00005
		MW-2	8/17/2018	0.000899	SGW1	0.00005
		MW-2	11/28/2018	0.000898	SGW1	0.00005
		MW-9	1/29/2018	0.00245	SGW1	0.00005
		MW-9	5/22/2018	0.00233	SGW1	0.00005
		MW-9	8/10/2018	0.00234	SGW1	0.00005
		MW-9	11/29/2018	0.00236	SGW1	0.00005
		MW-20	1/31/2018	0.00226	SGW1	0.00005
		MW-20	5/22/2018	0.0044	SGW1	0.00005
		MW-20	8/15/2018	0.00283	SGW1	0.00005
		MW-20	11/28/2018	0.00259	SGW1	0.00005
		MW-21	2/5/2018	0.00577	SGW1	0.00005
		MW-21	5/21/2018	0.00873	SGW1	0.00005
		MW-21	8/15/2018	0.00326	SGW1	0.00005
		MW-21	11/27/2018	0.00484	SGW1	0.00005
		MW-33	1/30/2018	0.0373	F1; SGW1	0.01, 0.00005
		MW-33	5/22/2018	0.0383	F1; SGW1	0.01, 0.00005
		MW-33	8/15/2018	0.0392	F1; SGW1	0.01, 0.00005
		MW-33	11/27/2018	0.0323	F1; SGW1	0.01, 0.00005
		MW-35	1/31/2018	0.0371	F1; SGW1	0.01, 0.00005
		MW-35	5/21/2018	0.0381	F1; SGW1	0.01, 0.00005
		MW-35	8/15/2018	0.0404	F1; SGW1	0.01, 0.00005
		MW-35	11/27/2018	0.035	F1; SGW1	0.01, 0.00005

Table B-2 (*continued*)
Channel Cc2: Summary of Groundwater Quality Criteria Exceedances

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Parameter	Units	Site ID	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded Numerical Limit
Iron[2]	(mg/L)	MW-20	1/31/2018	0.341	F2; SGW2	0.3; 0.3
		MW-20	5/22/2018	0.386	F2; SGW2	0.3; 0.3
		MW-20	8/15/2018	0.334	F2; SGW2	0.3; 0.3
		MW-20	11/28/2018	0.309	F2; SGW2	0.3; 0.3
		MW-21	2/5/2018	0.445	F2; SGW2	0.3; 0.3
		MW-21	5/21/2018	0.425	F2; SGW2	0.3; 0.3
		MW-21	8/15/2018	0.375	F2; SGW2	0.3; 0.3
		MW-21	11/27/2018	0.348	F2; SGW2	0.3; 0.3
		MW-33	1/30/2018	7.66	F2; SGW2	0.3; 0.3
		MW-33	5/22/2018	7.24	F2; SGW2	0.3; 0.3
		MW-33	8/15/2018	7.15	F2; SGW2	0.3; 0.3
		MW-33	11/27/2018	6.51	F2; SGW2	0.3; 0.3
		MW-35	1/31/2018	16.2	F2; SGW2	0.3; 0.3
		MW-35	5/21/2018	16.4	F2; SGW2	0.3; 0.3
		MW-35	8/15/2018	16.4	F2; SGW2	0.3; 0.3
		MW-35	11/27/2018	15.6	F2; SGW2	0.3; 0.3
Manganese[2]	(mg/L)	MW-2	1/30/2018	0.133	F2; SGW2	0.05; 0.05
		MW-2	5/21/2018	0.259	F2; SGW2	0.05; 0.05
		MW-2	8/17/2018	0.158	F2; SGW2	0.05; 0.05
		MW-2	11/28/2018	0.173	F2; SGW2	0.05; 0.05
		MW-20	1/31/2018	0.289	F2; SGW2	0.05; 0.05
		MW-20	5/22/2018	0.286	F2; SGW2	0.05; 0.05
		MW-20	8/15/2018	0.25	F2; SGW2	0.05; 0.05
		MW-20	11/28/2018	0.215	F2; SGW2	0.05; 0.05
		MW-21	2/5/2018	0.676	F2; SGW2	0.05; 0.05
		MW-21	5/21/2018	0.734	F2; SGW2	0.05; 0.05
		MW-21	8/15/2018	0.52	F2; SGW2	0.05; 0.05
		MW-21	11/27/2018	0.377	F2; SGW2	0.05; 0.05
		MW-33	1/30/2018	1.1	F2; SGW2	0.05; 0.05
		MW-33	5/22/2018	1.03	F2; SGW2	0.05; 0.05
		MW-33	8/15/2018	0.978	F2; SGW2	0.05; 0.05
		MW-33	11/27/2018	0.877	F2; SGW2	0.05; 0.05
		MW-35	1/31/2018	2.53	F2; SGW2	0.05; 0.05
		MW-35	5/21/2018	2.52	F2; SGW2	0.05; 0.05
		MW-35	8/15/2018	2.51	F2; SGW2	0.05; 0.05
		MW-35	11/27/2018	2.37	F2; SGW2	0.05; 0.05
1,1-Dichloroethane	(µg/L)	MW-33	1/30/2018	1.47	SGW1	1.0
		MW-33	5/22/2018	1.29	SGW1	1.0
		MW-33	8/15/2018	1.29	SGW1	1.0
		MW-33	11/27/2018	1.42	SGW1	1.0
1,2-Dichloropropane	(µg/L)	MW-33	1/30/2018	6.95	F1; SGW1	5.0; 0.6
		MW-33	5/22/2018	6.32	F1; SGW1	5.0; 0.6
		MW-33	8/15/2018	6.26	F1; SGW1	5.0; 0.6
		MW-33	11/27/2018	6.34	F1; SGW1	5.0; 0.6
		MW-35	1/31/2018	0.71	SGW1	0.6
		MW-35	8/15/2018	0.626	SGW1	0.6
		MW-35	11/27/2018	0.838	SGW1	0.6
Benzene	(µg/L)	MW-33	1/30/2018	1.06	SGW1	1.0
Bis(2-Chloroethyl)Ether	(µg/L)	MW-33	11/27/2018	3.16	SGW1	0.07
		MW-35	11/27/2018	1.28	SGW1	0.07
Bis(2-Ethylhexyl)Phthalate	(µg/L)	MW-20	11/28/2018	10.7 D	F1; SGW1	6.0; 6.0
Vinyl Chloride	(µg/L)	MW-2	1/30/2018	0.0595	SGW1	0.02
		MW-2	5/21/2018	0.0932	SGW1	0.02
		MW-2	8/17/2018	0.0567	SGW1	0.02
		MW-2	11/28/2018	0.0544	SGW1	0.02
		MW-21	2/5/2018	0.0456	SGW1	0.02
		MW-21	5/21/2018	0.0434	SGW1	0.02
		MW-21	8/15/2018	0.0415	SGW1	0.02
		MW-21	11/27/2018	0.0632	SGW1	0.02
		MW-33	1/30/2018	26.1	F1; SGW1	2.0; 0.02
		MW-33	5/22/2018	24.9	F1; SGW1	2.0; 0.02
		MW-33	8/15/2018	24.3	F1; SGW1	2.0; 0.02
		MW-33	11/27/2018	29	F1; SGW1	2.0; 0.02
		MW-35	1/31/2018	2	F1; SGW1	2.0; 0.02
		MW-35	5/21/2018	1.81	SGW1	0.02
		MW-35	8/15/2018	1.78	SGW1	0.02
		MW-35	11/27/2018	2.5	F1; SGW1	2.0; 0.02

F1 = Primary Federal Drinking Water Quality Standard
F2 = Secondary Federal Drinking Water Quality Standard
SGW1 = State of Washington Primary Ground Water Quality Standard
SGW2 = State of Washington Secondary Ground Water Quality Standard
See Analytical Data Qualifier Page for Data Qualifier Information (page B-1, Appendix B)
[1] Total Metals
[2] Dissolved Metals

Table B-3
Channel Cc3: Summary of Groundwater Quality Criteria Exceedances

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Parameter	Units	Site ID	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded Numerical Limit
pH (Field)	(Std. pH Units)	MW-8	8/10/2018	5.97	F2; SGW2	< 6.5, or > 8.5
Arsenic[1]	(mg/L)	MW-8	1/30/2018	0.000482	SGW1	0.00005
		MW-8	5/22/2018	0.000495	SGW1	0.00005
		MW-8	8/10/2018	0.000502	SGW1	0.00005
		MW-8	11/9/2018	0.000484	SGW1	0.00005
		MW-36	1/31/2018	0.00192	SGW1	0.00005
		MW-36	5/23/2018	0.0017	SGW1	0.00005
		MW-36	8/13/2018	0.00175	SGW1	0.00005
		MW-36	11/29/2018	0.00165	SGW1	0.00005

Table B-4
Unit D Aquifer: Summary of Groundwater Quality Criteria Exceedances

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Parameter	Units	Site ID	Sample Date	Sample Value	Standard(s) Exceeded	Standard(s) Exceeded Numerical Limit
Arsenic[1]	(mg/L)	MW-7	1/31/2018	0.00519	SGW1	0.00005
		MW-7	5/21/2018	0.00511	SGW1	0.00005
		MW-7	8/13/2018	0.0052	SGW1	0.00005
		MW-7	11/28/2018	0.00495	SGW1	0.00005
		MW-12	1/30/2018	0.00213	SGW1	0.00005
		MW-12	5/21/2018	0.00213	SGW1	0.00005
		MW-12	8/13/2018	0.00213	SGW1	0.00005
		MW-12	11/28/2018	0.002	SGW1	0.00005
		MW-19	1/29/2018	0.00115	SGW1	0.00005
		MW-19	5/22/2018	0.00127	SGW1	0.00005
		MW-19	8/14/2018	0.00135	SGW1	0.00005
		MW-19	11/29/2018	0.00211	SGW1	0.00005
		MW-26	1/30/2018	0.00504	SGW1	0.00005
		MW-26	5/23/2018	0.0043	SGW1	0.00005
		MW-26	8/14/2018	0.00467	SGW1	0.00005
		MW-26	11/29/2018	0.00569	SGW1	0.00005
		MW-29	2/5/2018	0.00467	SGW1	0.00005
		MW-29	5/23/2018	0.00592	SGW1	0.00005
		MW-29	8/14/2018	0.00998	SGW1	0.00005
		MW-29	11/29/2018	0.00632	SGW1	0.00005
		MW-34	1/31/2018	0.00134	SGW1	0.00005
		MW-34	5/23/2018	0.00136	SGW1	0.00005
		MW-34	8/14/2018	0.00134	SGW1	0.00005
		MW-34	11/28/2018	0.00132	SGW1	0.00005
Iron[2]	(mg/L)	MW-29	2/5/2018	0.808	F2; SGW2	0.3; 0.3
		MW-29	5/23/2018	0.823	F2; SGW2	0.3; 0.3
		MW-29	8/14/2018	0.839	F2; SGW2	0.3; 0.3
		MW-29	11/29/2018	0.823	F2; SGW2	0.3; 0.3
Manganese[2]	(mg/L)	MW-7	1/31/2018	0.18	F2; SGW2	0.05; 0.05
		MW-7	5/21/2018	0.175	F2; SGW2	0.05; 0.05
		MW-7	8/13/2018	0.166	F2; SGW2	0.05; 0.05
		MW-7	11/28/2018	0.151	F2; SGW2	0.05; 0.05
		MW-19	1/29/2018	0.506	F2; SGW2	0.05; 0.05
		MW-19	5/22/2018	0.501	F2; SGW2	0.05; 0.05
		MW-19	8/14/2018	0.485	F2; SGW2	0.05; 0.05
		MW-19	11/29/2018	0.497	F2; SGW2	0.05; 0.05
		MW-26	1/30/2018	0.0676	F2; SGW2	0.05; 0.05
		MW-26	5/23/2018	0.069	F2; SGW2	0.05; 0.05
		MW-26	8/14/2018	0.068	F2; SGW2	0.05; 0.05
		MW-26	11/29/2018	0.0679	F2; SGW2	0.05; 0.05
		MW-29	2/5/2018	0.0963	F2; SGW2	0.05; 0.05
		MW-29	5/23/2018	0.1	F2; SGW2	0.05; 0.05
		MW-29	8/14/2018	0.0989	F2; SGW2	0.05; 0.05
		MW-29	11/29/2018	0.0889	F2; SGW2	0.05; 0.05

F2 = Secondary Federal Drinking Water Quality Standard
SGW1 = State of Washington Primary Ground Water Quality Standard
SGW2 = State of Washington Secondary Ground Water Quality Standard
See Analytical Data Qualifier Page for Data Qualifier Information (page B-1, Appendix B)
[1] Total Metals
[2] Dissolved Metals

Table B-5

Channel Cc2: Summary of Groundwater Prediction Limit Exceedances

Interwell

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Parameter	Units	Well ID	Sample Date	Sample Value	Prediction Limit (PL) Value
pH (Field)	(Std. Units)	MW-2	1/30/2018	6.85	6.95 (Lower PL)
		MW-2	5/21/2018	6.54	
		MW-2	11/28/2018	6.6	
		MW-9	5/22/2018	6.55	
		MW-9	8/10/2018	6.76	
		MW-20	1/31/2018	6.92	
		MW-20	8/15/2018	6.57	
		MW-20	11/28/2018	6.82	
		MW-21	2/5/2018	6.59	
		MW-21	5/21/2018	6.68	
		MW-21	8/15/2018	6.41	
		MW-21	11/27/2018	6.81	
		MW-33	1/30/2018	6.72	
		MW-33	5/22/2018	6.48	
		MW-33	8/15/2018	6.6	
		MW-33	11/27/2018	6.6	
		MW-35	1/31/2018	6.62	
		MW-35	5/22/2018	6.51	
		MW-35	8/15/2018	6.46	
		MW-35	11/27/2018	6.64	
Specific Conductance (Field)	(µmhos/cm)	MW-2	1/30/2018	295.1	242.1
		MW-2	5/21/2018	305.3	
		MW-2	8/17/2018	284.5	
		MW-2	11/28/2018	301.4	
		MW-21	2/5/2018	257	
		MW-21	5/21/2018	261.7	
		MW-21	8/15/2018	252.1	
		MW-21	11/27/2018	268.1	
		MW-33	1/30/2018	821	
		MW-33	5/22/2018	783.4	
		MW-33	8/15/2018	748	
		MW-33	11/27/2018	772.9	
		MW-35	1/31/2018	696.9	
		MW-35	5/21/2018	704	
		MW-35	8/15/2018	693	
		MW-35	11/27/2018	649.1	
Alkalinity, Total (as CaCO3)	(mg/L)	MW-2	1/30/2018	132	94.9
		MW-2	5/21/2018	139	
		MW-2	8/17/2018	131	
		MW-2	11/28/2018	130	
		MW-21	2/5/2018	116	
		MW-21	5/21/2018	119	
		MW-21	8/15/2018	116	
		MW-21	11/27/2018	125	
		MW-33	1/30/2018	421	
		MW-33	5/22/2018	400	
		MW-33	8/15/2018	393	
		MW-33	11/27/2018	405	
		MW-35	1/31/2018	347	
		MW-35	5/21/2018	345	
		MW-35	8/15/2018	347	
		MW-35	11/27/2018	331	
Ammonia	(mg/L)	MW-33	1/30/2018	0.0323	0.0322
		MW-33	8/15/2018	0.07	
		MW-35	1/31/2018	0.067	
		MW-35	5/21/2018	0.0702	
		MW-35	11/27/2018	0.0666	

Table B-5 (continued)

Channel Cc2: Summary of Groundwater Prediction Limit Exceedances

Interwell

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Parameter	Units	Well ID	Sample Date	Sample Value	Prediction Limit (PL) Value
Chloride	(mg/L)	MW-9	1/29/2018	4.68	4.09
		MW-9	5/22/2018	4.83	
		MW-9	8/10/2018	4.75	
		MW-9	11/29/2018	4.75	
		MW-33	1/30/2018	4.22	
		MW-33	5/22/2018	4.61	
		MW-33	8/15/2018	4.2	
		MW-33	11/27/2018	4.37	
		MW-35	11/27/2018	4.32	
Nitrate-Nitrogen (NO3 as N)	(mg/L)	MW -9	1/29/2018	0.382	0.039
		MW-9	5/22/2018	0.329	
		MW-9	8/10/2018	0.432	
		MW-9	11/29/2018	0.344	
		MW-21	2/5/2018	0.0924	
		MW-21	5/21/2018	0.116	
		MW-21	8/15/2018	0.094	
		MW-21	11/27/2018	0.203	
		MW-33	1/30/2018	0.0426	
Sulfate	(mg/L)	MW-33	5/22/2018	19.6	18
		MW-35	1/31/2018	21.6	
		MW-35	8/15/2018	20.5	
		MW-35	11/27/2018	21	
Total Dissolved Solids	(mg/L)	MW-2	1/30/2018	180	158
		MW-2	5/21/2018	184	
		MW-2	8/17/2018	176	
		MW-2	11/28/2018	173	
		MW-21	2/5/2018	169	
		MW-21	5/21/2018	166	
		MW-21	8/15/2018	160	
		MW-21	11/27/2018	174	
		MW-33	1/30/2018	486	
		MW-33	5/22/2018	471	
		MW-33	8/15/2018	445	
		MW-33	11/27/2018	453	
		MW-35	1/31/2018	445	
		MW-35	5/22/2018	436	
		MW-35	8/15/2018	420	
		MW-35	11/27/2018	409	
Total Organic Carbon	(mg/L)	MW-33	5/22/2018	4.35	2.33
		MW-35	1/31/2018	4.23	
		MW-35	8/15/2018	4.49	
		MW-35	11/27/2018	3.84	
Total Solids	(mg/L)	MW-33	1/30/2018	509	286
		MW-33	5/22/2018	500	
		MW-33	8/15/2018	470	
		MW-33	11/27/2018	463	
		MW-35	1/31/2018	478	
		MW-35	5/22/2018	481	
		MW-35	8/15/2018	453	
		MW-35	11/27/2018	443	
Total Suspended Solids	(mg/L)	MW-33	8/15/2018	12	9.7
		MW-33	11/27/2018	13.2	
		MW-35	1/31/2018	10	
		MW-35	5/22/2018	34.6	
		MW-35	8/15/2018	30.2	
		MW-35	11/27/2018	51.6	

Table B-5 (continued)

Channel Cc2: Summary of Groundwater Prediction Limit Exceedances

Interwell

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Parameter	Units	Well ID	Sample Date	Sample Value	Prediction Limit (PL) Value
Arsenic[1]	(mg/L)	MW-20	5/22/2018	0.0044	0.0028
		MW-20	8/15/2018	0.00283	
		MW-21	2/5/2018	0.00577	
		MW-21	5/21/2018	0.0087	
		MW-21	8/15/2018	0.00326	
		MW-21	11/27/2018	0.00484	
		MW-33	1/30/2018	0.0373	
		MW-33	5/22/2018	0.0383	
		MW-33	8/15/2018	0.0392	
		MW-33	11/27/2018	0.0323	
		MW-35	1/31/2018	0.0373	
		MW-35	5/22/2018	0.0381	
		MW-35	8/15/2018	0.0402	
		MW-35	11/27/2018	0.035	
Calcium[1]	(mg/L)	MW-2	1/30/2018	19.8	15.6
		MW-2	5/21/2018	21.2	
		MW-2	8/17/2018	19.6	
		MW-2	11/28/2018	18.8	
		MW-9	1/29/2018	15.7	
		MW-9	8/10/2018	16.1	
		MW-21	2/5/2018	18.8	
		MW-21	5/21/2018	18.7	
		MW-21	8/15/2018	19.4	
		MW-21	11/27/2018	19.5	
		MW-33	1/30/2018	72.4	
		MW-33	5/22/2018	68.1	
		MW-33	8/15/2018	72.7	
		MW-33	11/27/2018	67.0	
		MW-35	1/31/2018	64.5	
		MW-35	5/22/2018	64.4	
		MW-35	8/15/2018	68.8	
		MW-35	11/27/2018	62.0	
Iron[2]	(mg/L)	MW-33	1/30/2018	7.7	0.51
		MW-33	5/22/2018	7.2	
		MW-33	8/15/2018	7.2	
		MW-33	11/27/2018	6.5	
		MW-35	1/31/2018	12.2	
		MW-35	5/22/2018	16.4	
		MW-35	8/15/2018	16.4	
		MW-35	11/27/2018	15.6	
Magnesium[1]	(mg/L)	MW-2	1/30/2018	22.0	17.1
		MW-2	5/21/2018	21.3	
		MW-2	8/17/2018	20.8	
		MW-2	11/28/2018	20.9	
		MW-21	11/27/2018	18.4	
		MW-33	1/30/2018	59.7	
		MW-33	5/22/2018	56.3	
		MW-33	8/15/2018	61.1	
		MW-33	11/27/2018	55.8	
		MW-35	1/31/2018	43.7	
		MW-35	5/22/2018	43.4	
		MW-35	8/15/2018	45	
		MW-35	11/27/2018	40.0	
Manganese[2]	(mg/L)	MW-21	2/5/2018	0.676	0.548
		MW-21	5/21/2018	0.734	
		MW-33	1/30/2018	1.1	
		MW-33	5/22/2018	1.03	
		MW-33	8/15/2018	0.98	
		MW-33	11/27/2018	55.8	
		MW-35	1/31/2018	2.53	
		MW-35	5/22/2018	2.52	
		MW-35	8/15/2018	2.51	
		MW-35	11/27/2018	40	

Table B-5 (continued)

Channel Cc2: Summary of Groundwater Prediction Limit Exceedances

Interwell

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Parameter	Units	Well ID	Sample Date	Sample Value	Prediction Limit (PL) Value
Potassium[1]	(mg/L)	MW-33	1/30/2018	3.68	2.57
		MW-33	5/22/2018	3.59	
		MW-33	8/15/2018	3.64	
		MW-33	11/27/2018	3.54	
		MW-35	1/31/2018	3.49	
		MW-35	5/22/2018	3.55	
		MW-35	8/15/2018	3.46	
		MW-35	11/27/2018	3.31	
Sodium[1]	(mg/L)	MW-2	1/30/2018	9.56	7.39
		MW-2	5/21/2018	10.2	
		MW-2	8/17/2018	9.35	
		MW-2	11/28/2018	9.1	
		MW-21	2/5/2018	11.7	
		MW-21	5/21/2018	11.7	
		MW-21	8/15/2018	12.2	
		MW-21	11/27/2018	10.6	
		MW-33	1/30/2018	19.7	
		MW-33	5/22/2018	19.9	
		MW-33	8/15/2018	20.3	
		MW-33	11/27/2018	18.2	
		MW-35	1/31/2018	17	
		MW-35	5/22/2018	16.8	
		MW-35	8/15/2018	17	
		MW-35	11/27/2018	16.1	
Vinyl Chloride	(µg/L)	MW-2	5/21/2018	0.093	0.09
		MW-33	1/30/2018	26.1	
		MW-33	5/22/2018	24.9	
		MW-33	8/15/2018	24.3	
		MW-33	11/27/2018	29	
		MW-35	1/31/2018	2	
		MW-35	5/22/2018	1.81	
		MW-35	8/15/2018	1.78	
		MW-35	11/27/2018	2.5	

[1] Total Metals
[2] Dissolved Metals

Table B-6

Unit D Aquifer: Summary of Groundwater Prediction Limit Exceedances

Intrawell

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Parameter	Units	Well ID	Sample Date	Sample Value	Prediction Limit (PL) Value
pH (Field)	(Std. Units)	MW-12	5/21/2018	6.82	6.98 (Lower PL)
		MW-12	8/13/2018	6.59	
		MW-26	8/14/2018	7.34	7.44 (Lower PL)
		MW-29	8/14/2018	6.7	7.13 (Lower PL)
		MW-34	8/14/2018	6.6	6.7
Specific Conductance (Field)	(µmhos/cm)	MW-12	5/21/2018	168.6	167.2
		MW-12	11/28/2018	170.8	
Alkalinity, Total (as CaCO3)	(mg/L)	MW-12	11/28/2018	65.3	65.27
Total Organic Carbon	(mg/L)	MW-34	5/23/2018	168.6	167.20
Arsenic[1]	(mg/L)	MW-19	11/29/2018	0.00211	0.00207
Barium[1]	mg/L	MW-7	5/21/2018	0.0154	0.0152
		MW-7	11/28/2018	0.0156	
Calcium [1]	(mg/L)	MW-12	8/13/2018	12.8	12.2
Magnesium[1]	(mg/L)	MW-7	8/13/2018	11.10	10.7
		MW-12	1/29/2018	10.2	10.17
		MW-12	8/13/2018	10.70	
		MW-34	8/14/2018	13.40	13.20

[1] Total Metals

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

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Compound	Units	Site ID	Date	Sample Value
Tetrachloroethene	(µg/L)	MW-3	1/30/2018	0.13 JT
		MW-3	5/21/2018	0.13 JT
Trichlorofluoromethane	(µg/L)	MW-3	1/30/2018	0.226
		MW-3	5/21/2018	0.258
		MW-4	5/23/2018	0.11 JT
		MW-4	8/13/2018	0.11 JT

Table B-8
Channel Cc2: Summary of Groundwater Volatile Organic Compound Detections

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Compound	Units	Site ID	Date	Sample Value
1,1-Dichloroethane	(µg/L)	MW-33	1/30/2018	1.47
		MW-33	5/22/2018	1.29
		MW-33	8/15/2018	1.29
		MW-33	11/27/2018	1.42
		MW-35	1/31/2018	0.16 JT
		MW-35	5/21/2018	0.12 JT
		MW-35	8/15/2018	0.126 JT
		MW-35	11/27/2018	0.193 JT
1,1-Dichloroethene	(µg/L)	MW-33	1/30/2018	0.17 JT
		MW-33	5/22/2018	0.15 JT
		MW-33	8/15/2018	0.14 JT
		MW-33	11/27/2018	0.166 JT
1,2-Dichloroethane	(µg/L)	MW-33	1/30/2018	0.13 JT
		MW-33	5/22/2018	0.12 JT
		MW-33	8/15/2018	0.114 JT
		MW-33	11/27/2018	0.118 JT
1,2-Dichloropropane	(µg/L)	MW-33	1/30/2018	6.95
		MW-33	5/22/2018	6.32
		MW-33	8/15/2018	6.26
		MW-33	11/27/2018	6.34
		MW-35	1/31/2018	0.71
		MW-35	5/21/2018	0.581
		MW-35	8/15/2018	0.626
		MW-35	11/27/2018	0.838
2-Methyl-1-Propanol	(µg/L)	MW-20	11/28/2018	9.14 JT
		MW-21	11/27/2018	29.8 J
Acetone	(µg/L)	MW-2	5/21/2018	3 JT
Benzene	(µg/L)	MW-33	1/30/2018	1.06
		MW-33	5/22/2018	0.944
		MW-33	8/15/2018	0.934
		MW-33	11/27/2018	0.954
		MW-35	1/31/2018	0.981
		MW-35	5/21/2018	0.83
		MW-35	8/15/2018	0.866
		MW-35	11/27/2018	0.975
Carbon Disulfide	(µg/L)	MW-35	1/31/2018	0.1 JT
Chloroethane	(µg/L)	MW-33	1/30/2018	0.434
		MW-33	5/22/2018	0.267
		MW-33	8/15/2018	0.278
		MW-33	11/27/2018	0.455
Chloromethane	(µg/L)	MW-21	11/27/2018	0.302 JT

Table B-8 (continued)
Channel Cc2: Summary of Groundwater Volatile Organic Compound Detections

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Compound	Units	Site ID	Date	Sample Value
cis-1,2-Dichloroethene	(µg/L)	MW-2	1/30/2018	0.293
		MW-2	5/21/2018	0.413
		MW-2	8/17/2018	0.313
		MW-2	11/28/2018	0.265
		MW-21	2/5/2018	0.968
		MW-21	5/21/2018	0.879
		MW-21	8/15/2018	0.839
		MW-21	11/27/2018	0.763
		MW-33	1/30/2018	28.2
		MW-33	5/22/2018	25.1
		MW-33	8/15/2018	24.1
		MW-33	11/27/2018	27.9
		MW-35	1/31/2018	5.91
		MW-35	5/21/2018	4.92
		MW-35	8/15/2018	5.04
		MW-35	11/27/2018	6.38
Dichlorodifluoromethane	(µg/L)	MW-2	1/30/2018	3.01
		MW-2	5/21/2018	2.1
		MW-2	8/17/2018	2.54
		MW-2	11/28/2018	2.66
		MW-20	1/31/2018	0.488
		MW-20	5/22/2018	0.476
		MW-20	8/15/2018	0.423
		MW-20	11/28/2018	0.326
		MW-21	2/5/2018	0.82
		MW-21	5/21/2018	0.829
		MW-21	8/15/2018	0.788
		MW-21	11/27/2018	1.16
		MW-33	1/30/2018	3.85
		MW-33	5/22/2018	3.44
		MW-33	8/15/2018	3.21
		MW-33	11/27/2018	4.84
		MW-35	1/31/2018	0.285
		MW-35	5/21/2018	0.225
		MW-35	8/15/2018	0.229
		MW-35	11/27/2018	0.349
o-Xylene	(µg/L)	MW-35	1/31/2018	0.14 JT
		MW-35	5/21/2018	0.13 JT
		MW-35	8/15/2018	0.125 JT
		MW-35	11/27/2018	0.114 JT
Toluene	(µg/L)	MW-33	11/27/2018	0.125 JT
		MW-35	1/31/2018	0.12 JT
		MW-35	5/21/2018	0.11 JT
		MW-35	8/15/2018	0.114 JT
		MW-35	11/27/2018	0.117 JT
trans-1,2-Dichloroethene	(µg/L)	MW-21	2/5/2018	0.13 JT
		MW-21	5/21/2018	0.12 JT
		MW-21	8/15/2018	0.117 JT
		MW-21	11/27/2018	0.104 JT
		MW-33	1/30/2018	0.724
		MW-33	5/22/2018	0.639
		MW-33	8/15/2018	0.632
		MW-33	11/27/2018	0.697
		MW-35	1/31/2018	0.383
		MW-35	5/21/2018	0.348
		MW-35	8/15/2018	0.37
		MW-35	11/27/2018	0.401
Tricholoroethene	(µg/L)	MW-33	1/30/2018	0.16 JT
		MW-33	5/22/2018	0.14 JT
		MW-33	8/15/2018	0.137 JT
		MW-33	11/27/2018	0.131 JT
		MW-35	1/31/2018	1.16
		MW-35	5/21/2018	1.04
		MW-35	8/15/2018	1.12
		MW-35	11/27/2018	1.16

Table B-8 (continued)
Channel Cc2: Summary of Groundwater Volatile Organic Compound Detections

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Compound	Units	Site ID	Date	Sample Value
Trichlorofluoromethane	(µg/L)	MW-2	1/30/2018	0.375
		MW-2	5/21/2018	0.221
		MW-2	8/17/2018	0.249
		MW-2	11/28/2018	0.373
		MW-21	2/5/2018	0.331
		MW-21	5/21/2018	0.27
		MW-21	8/15/2018	0.261
		MW-21	11/27/2018	0.518
Vinyl Chloride	(µg/L)	MW-2	1/30/2018	0.0595
		MW-2	5/21/2018	0.0932
		MW-2	8/17/2018	0.0567
		MW-2	11/28/2018	0.0544
		MW-21	2/5/2018	0.0456
		MW-21	5/21/2018	0.0434
		MW-21	8/15/2018	0.0415
		MW-21	11/27/2018	0.0632
		MW-33	1/30/2018	26.1
		MW-33	5/22/2018	24.9
		MW-33	8/15/2018	24.3
		MW-33	11/27/2018	29
		MW-35	1/31/2018	2
		MW-35	5/21/2018	1.81
		MW-35	8/15/2018	1.78
		MW-35	11/27/2018	2.5

Table B-9
Channel Cc3: Summary of Groundwater Volatile Organic Compound Detections

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Compound	Units	Site ID	Date	Sample Value
Carbon Disulfide	(µg/L)	MW-36	8/13/2018	0.102 JT

Table B-10
Unit D Aquifer: Summary of Groundwater Volatile Organic Compound Detections

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Compound	Units	Site ID	Date	Sample Value
Carbon Disulfide	(µg/L)	MW-29	2/5/2018	0.13 JT

Table B-11
Summary of Trip, Field, and Method Blanks Volatile Organic Compound Detections

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Summary of Trip Blank Volatile Organic Compound Detections				
Compound	Units	Sample ID	Date	Sample Value
No detections in Trip Blanks				
Summary of Field Blank Volatile Organic Compound Detections				
2-Butanone	(µg/L)	WV9-180522F	5/22/2018	71
		WV2-180817F	8/17/2018	45
2-Hexanone	(µg/L)	WV2-180817F	8/17/2018	0.524 JT
Acetone	(µg/L)	WV9-180522F	5/22/2018	5.44
		WV2-180817F	8/17/2018	43.1
Carbon Disulfide	(µg/L)	WV9-180522F	5/22/2018	0.13 JT
		WV2-180817F	8/17/2018	0.345
Toluene	(µg/L)	WVPA180130F	1/30/2019	0.1 JT
		WV9-180522F	5/22/2018	0.274
Summary of Method Blank Volatile Organic Compound Detections				
Compound	Units	Workgroup ID	Date	Sample Value
Isobutyl alcohol	(µg/L)	WG161338-1	12/6/2018	9.59

Table B-12

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

West Hillslope Seeps & Site Surface Water Discharge

Vashon Island Closed Landfill
January 1, 2018 - December 31, 2018

Compound	Units	Site ID	Sample Date	Sample Value	Reg. Limit	Standard(s) Exceeded
Ammonia	(mg/L)	SW-W1	03/26/18	0.0119	0.0034; 0.0041	SSWC; FC
		SW-W1	6/25/2018	0.0277	0.0073; 0.0088	SSWC; FC
		SW-W1	9/17/2018	0.0243	0.0078; 0.0095	SSWC; FC
		SW-W1	12/12/2018	0.0118	0.0115	SSWC
		SW-W3	6/25/2018	0.274	0.0070; 0.0085	SSWC; FC
		SW-W3	9/17/2018	0.0094	0.0082	SSWC
Coliforms, Fecal	(cfu/100mL)	SW-W1	6/25/2018	120	100	SSWC
		SW-W2	6/25/2018	140		
Iron[1]	(mg/L)	SW-W1	03/26/18	2.81	1	FC
		SW-W1	6/25/2018	1.2		
		SW-W2	03/26/18	2.2		
		SW-W2	6/25/2018	1.77		
		SW-W3	6/25/2018	1.26		
		SW-W1	12/12/2018	4.19		
Dissolved Oxygen	(mg/L)	SW-W1	9/17/2018	7.49	8.00 (min)	SSWC

FC Federal Chronic Surface Water Criteria

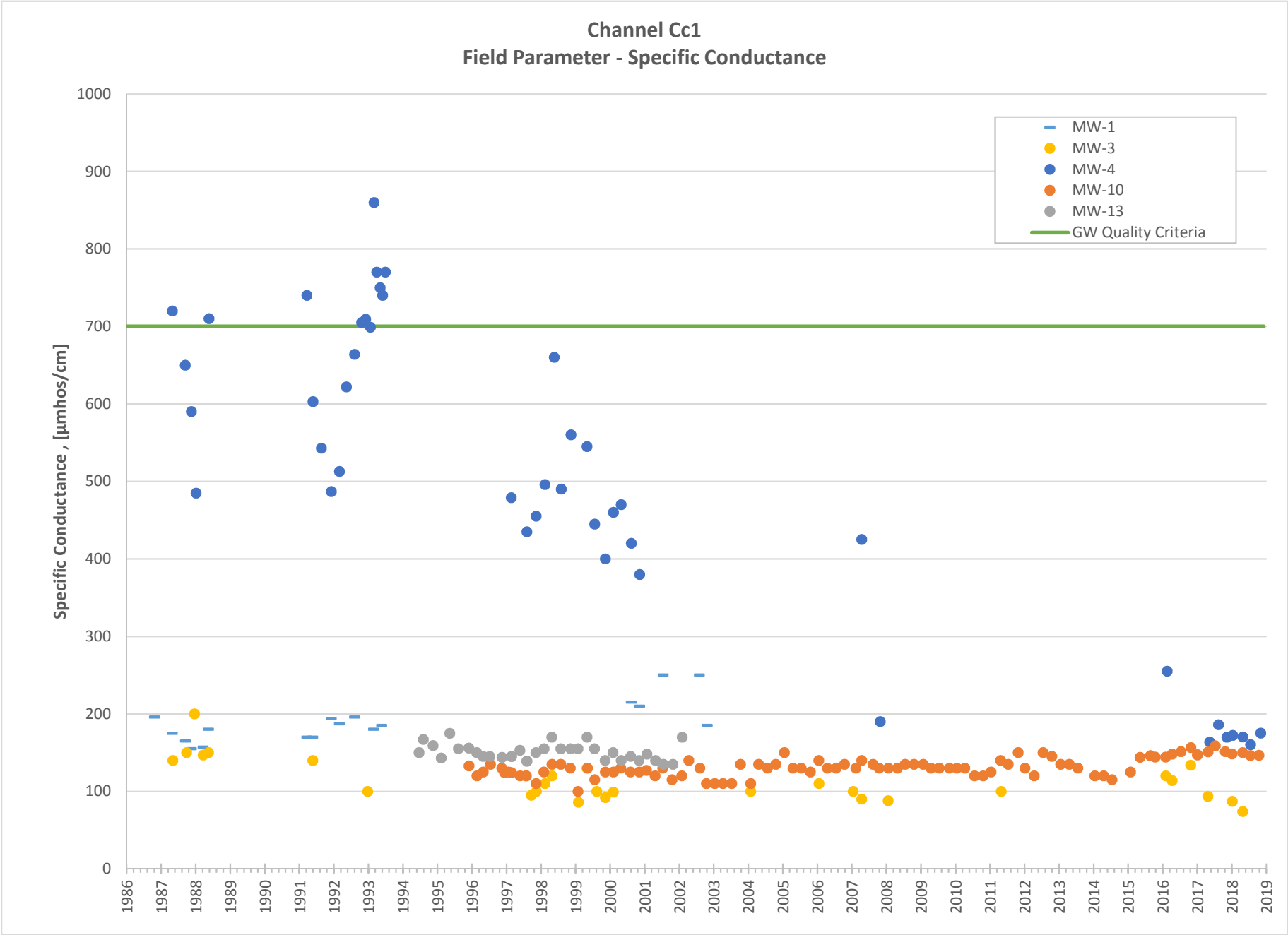
SSWC State Surface Water Chronic Criteria

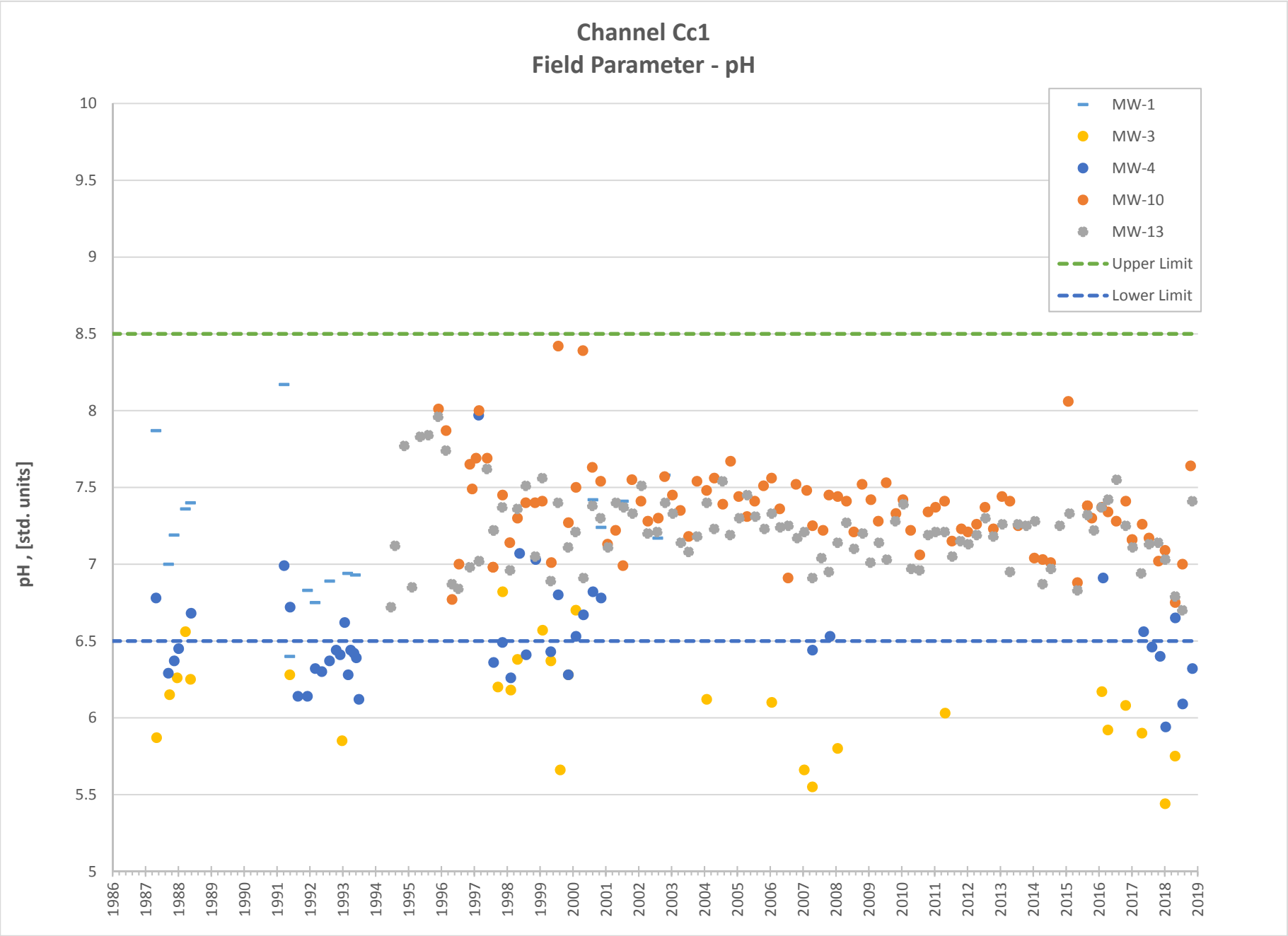
[1] Total Metal

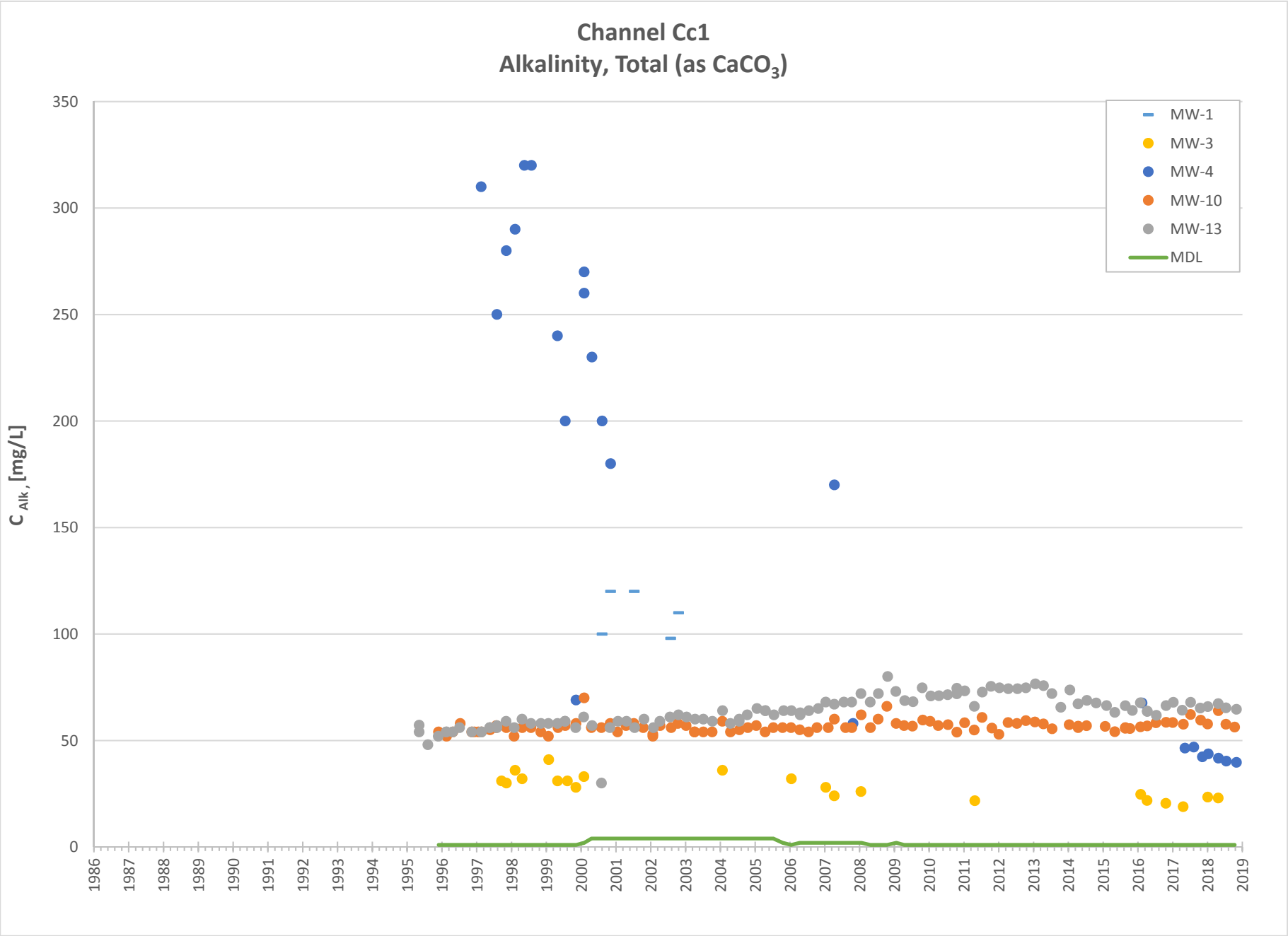
See Data Qualifiers Section for Qualifier Information (page B-1, Appendix B)

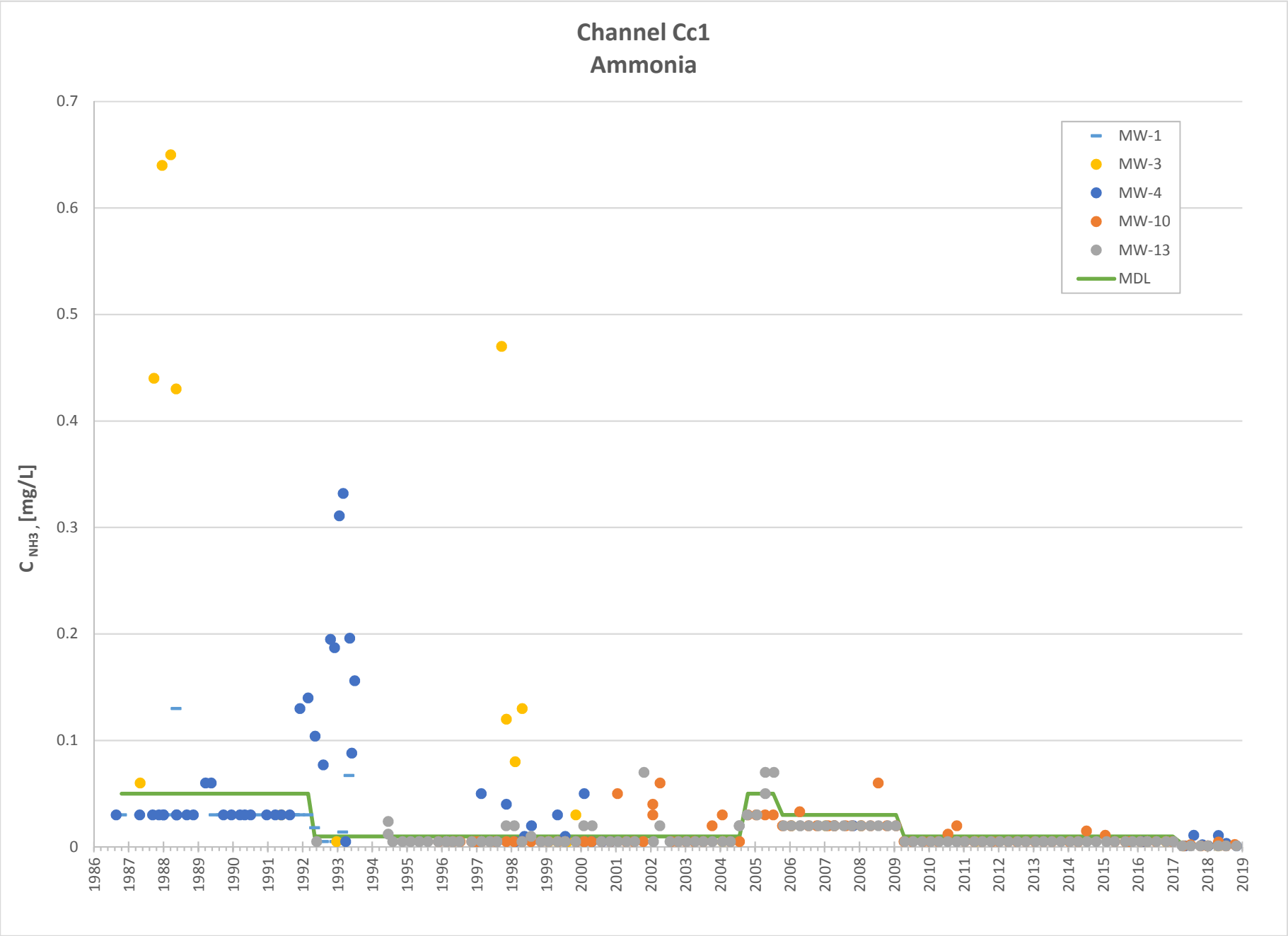
Appendix C

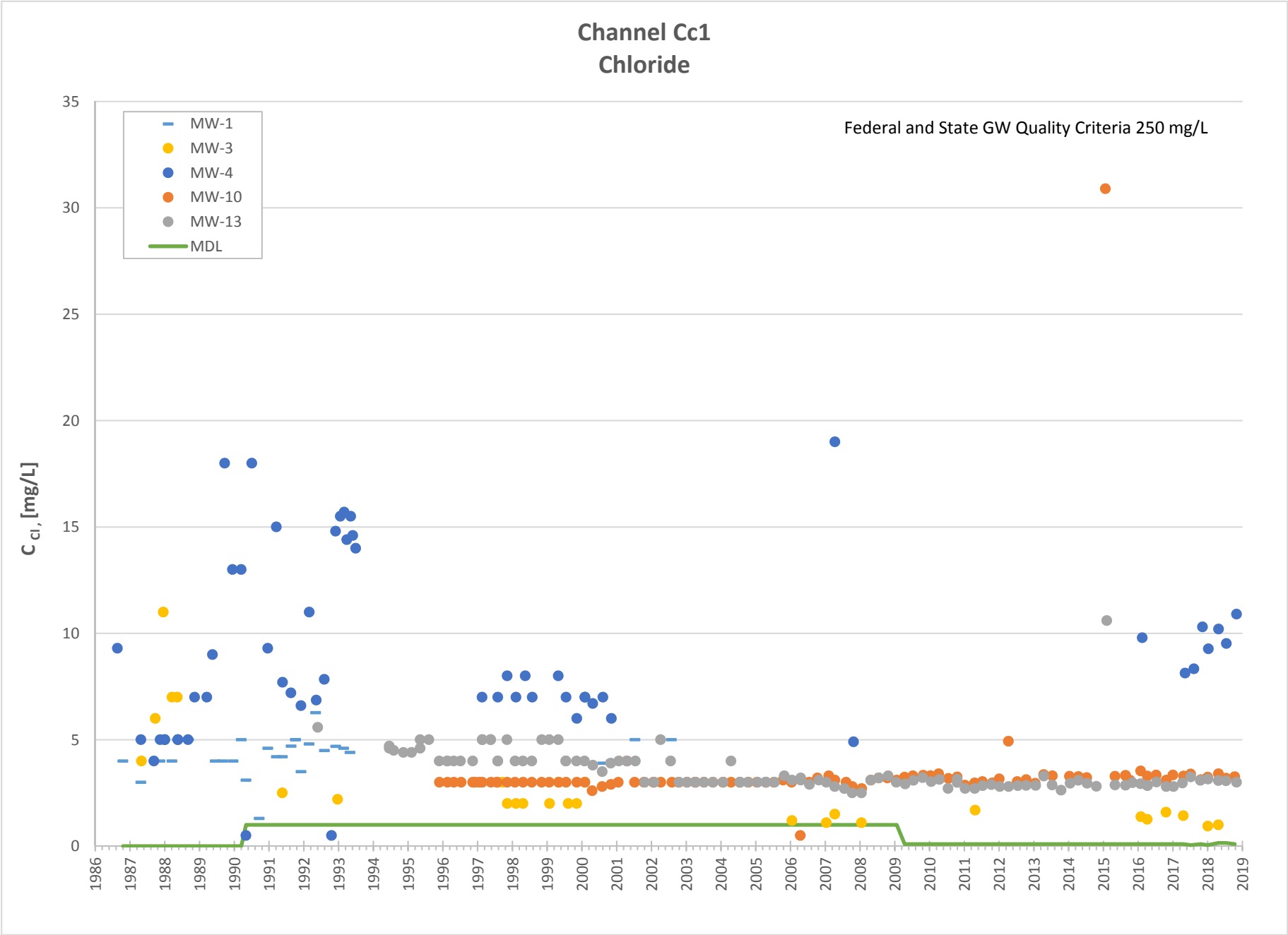
Time Concentration Plots for
Groundwater in Channel Cc1

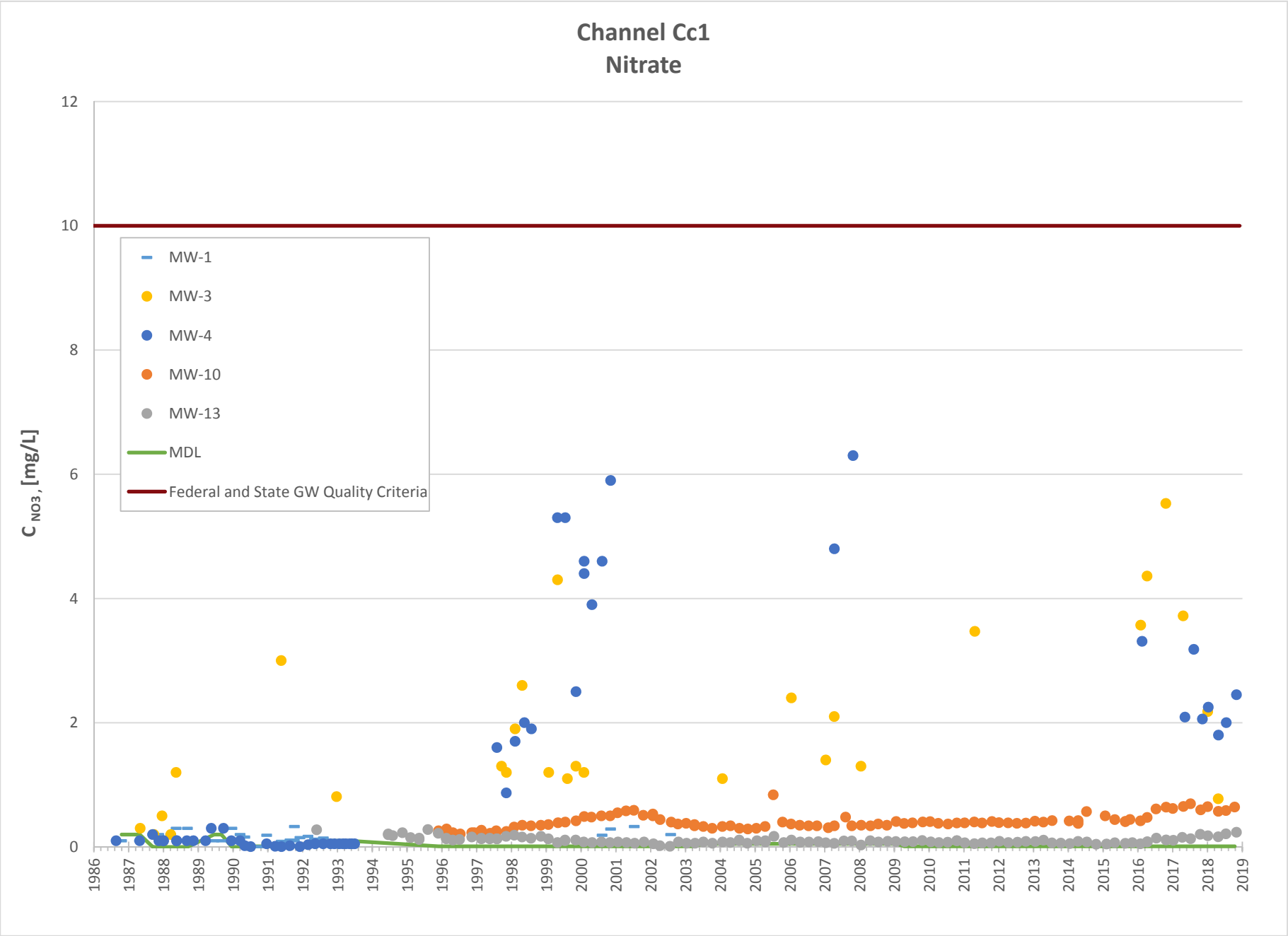

Channel Cc1
Field Parameter - Specific Conductance
Specific Conductance , [µmhos/cm]
1000
900
800
700
600
500
400
300
200
100
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
GW Quality Criteria

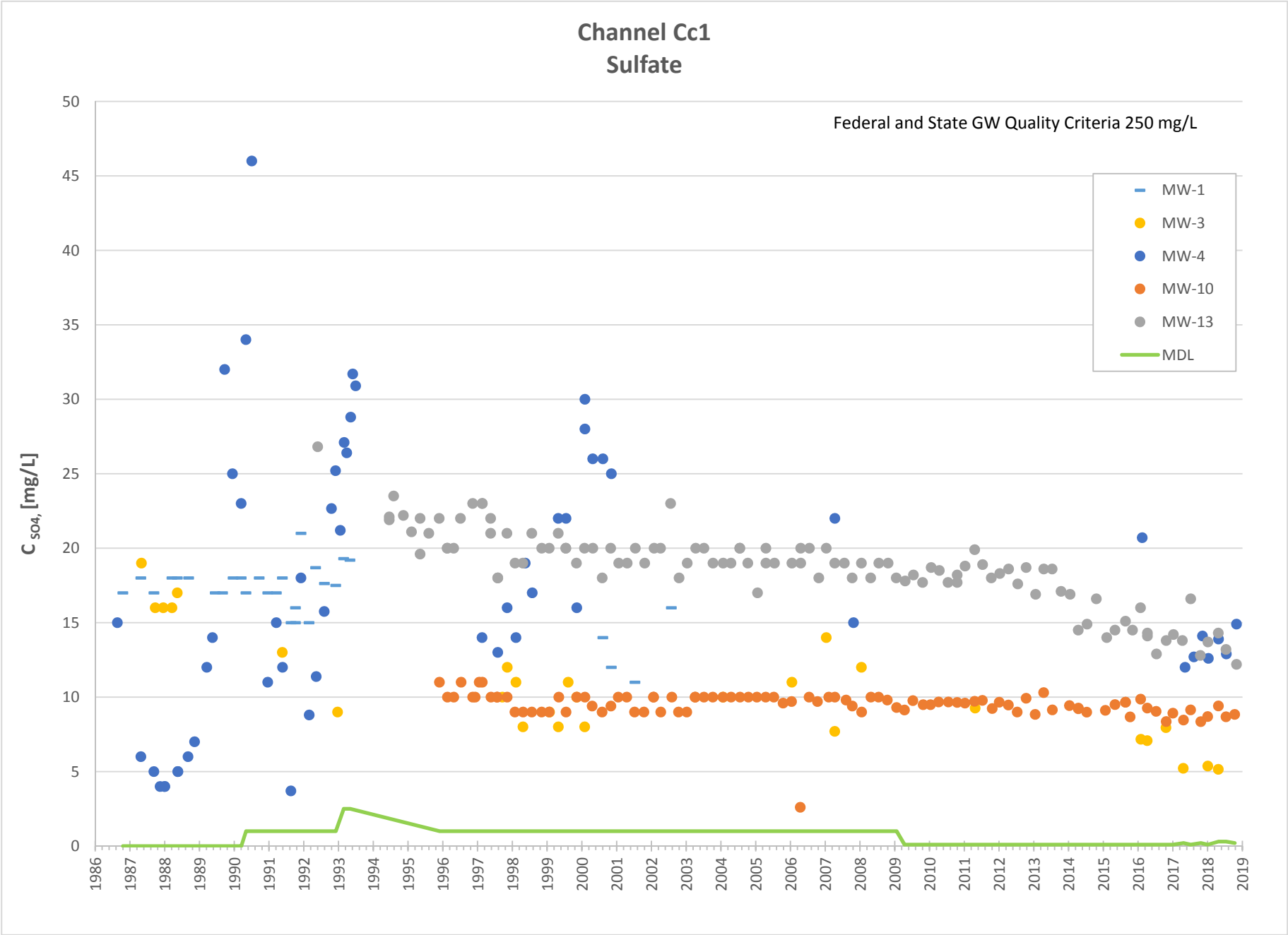

Channel Cc1
Field Parameter - pH
pH , [std. units]
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
Upper Limit
Lower Limit

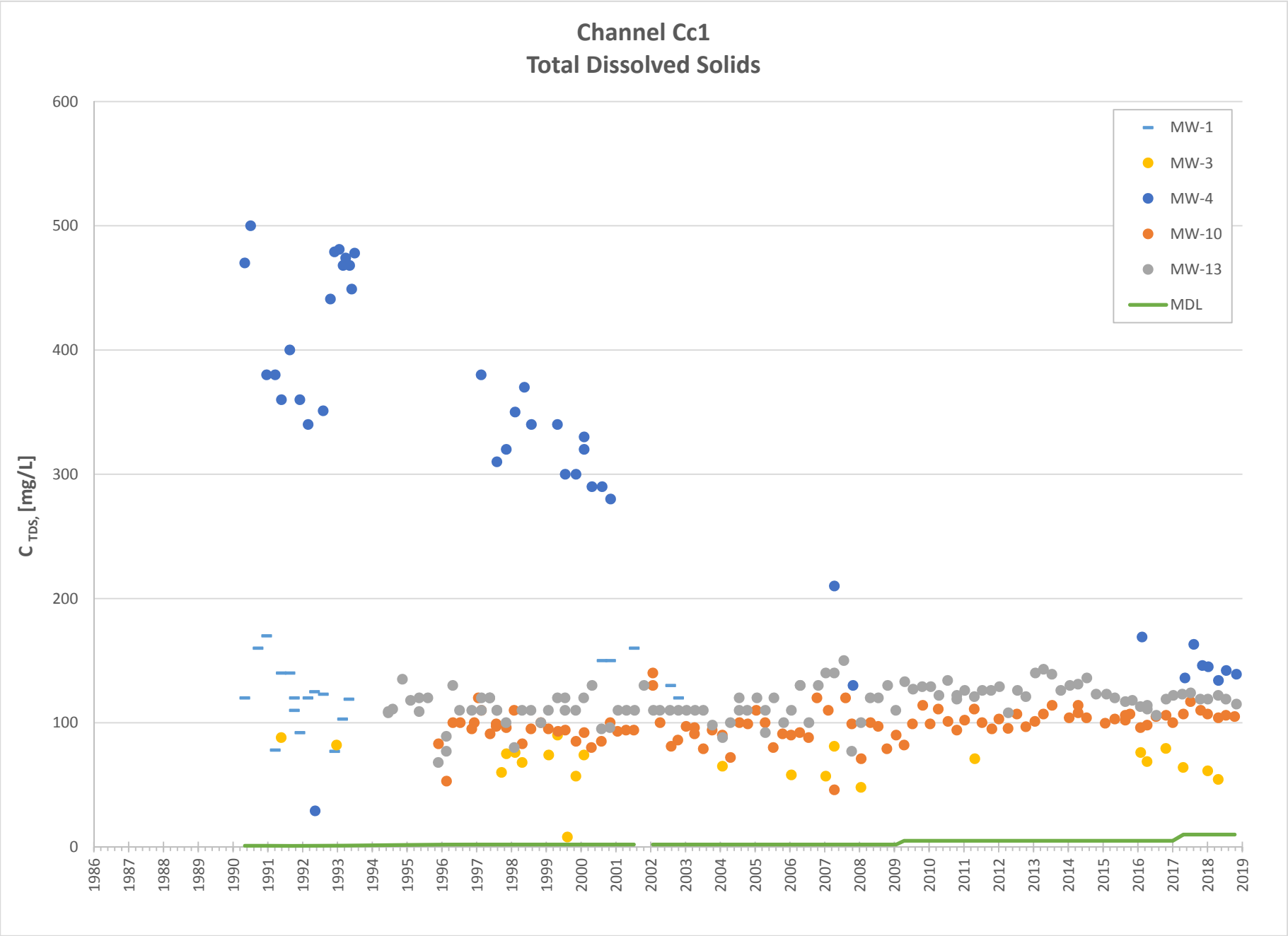

Channel Cc1
Alkalinity, Total (as $CaCO_3$)
C_{Alk}, [mg/L]
350
300
250
200
150
100
50
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
MDL

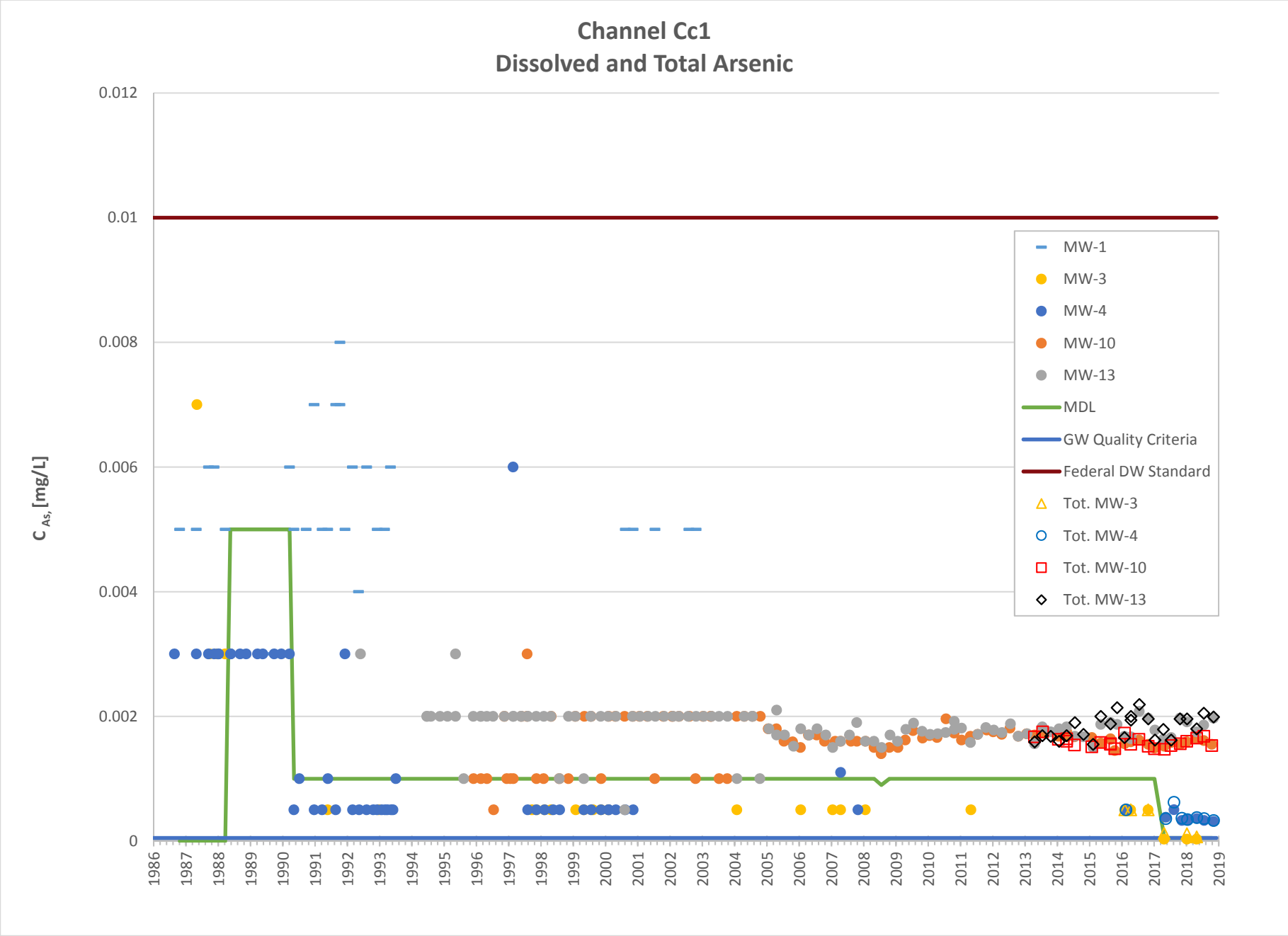

Channel Cc1
Ammonia
C NH3 , [mg/L]
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
MDL

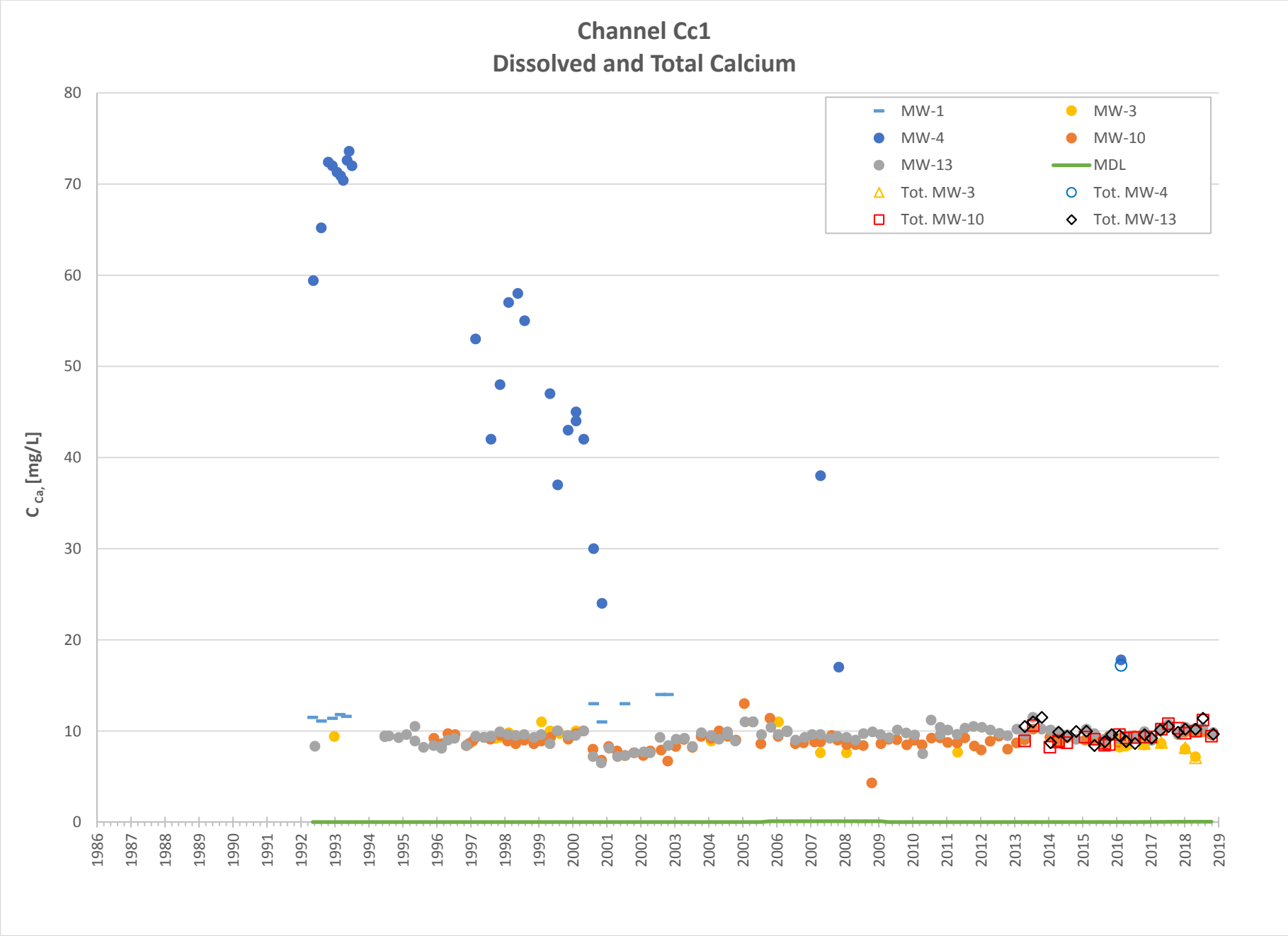

Channel Cc1
Chloride
MW-1
MW-3
MW-4
MW-10
MW-13
MDL
Federal and State GW Quality Criteria 250 mg/L
C Cl, [mg/L]
35
30
25
20
15
10
5
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

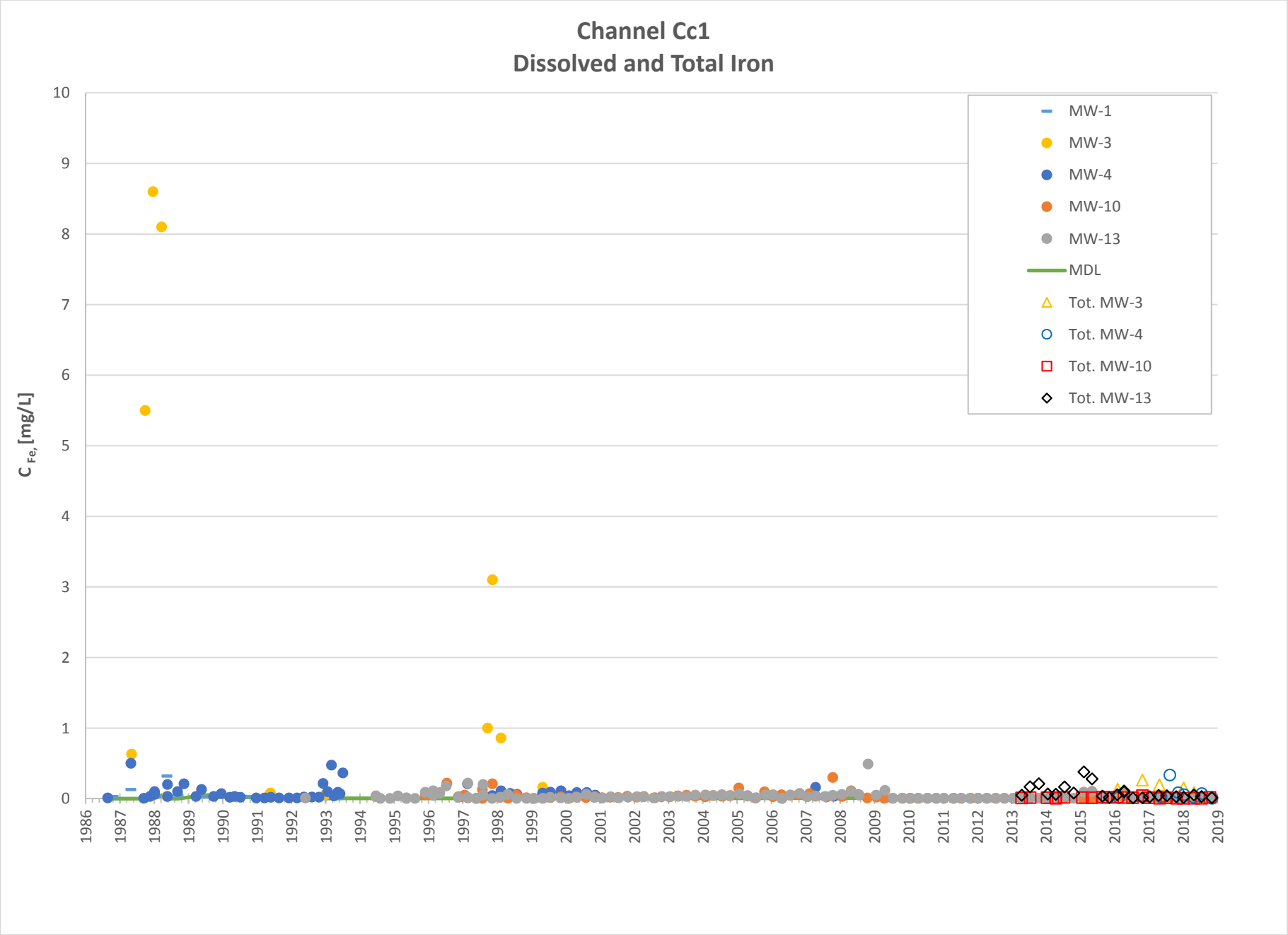

Channel Cc1
Nitrate
12
10
8
6
4
2
0
C NO3, [mg/L]
MW-1
MW-3
MW-4
MW-10
MW-13
MDL
Federal and State GW Quality Criteria
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

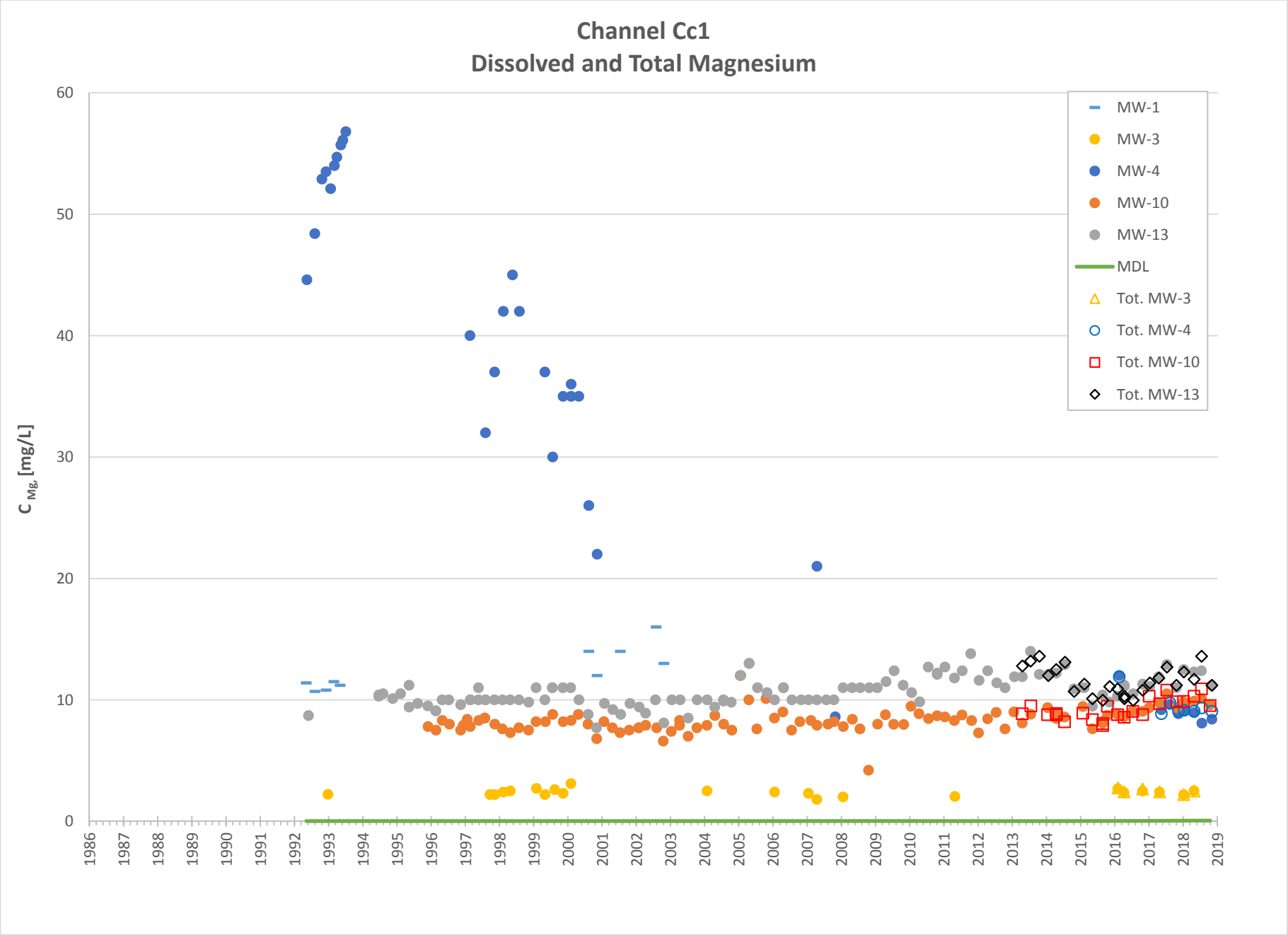

Channel Cc1
Sulfate
Federal and State GW Quality Criteria 250 mg/L
MW-1
MW-3
MW-4
MW-10
MW-13
MDL
C SO4, [mg/L]
0
5
10
15
20
25
30
35
40
45
50
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

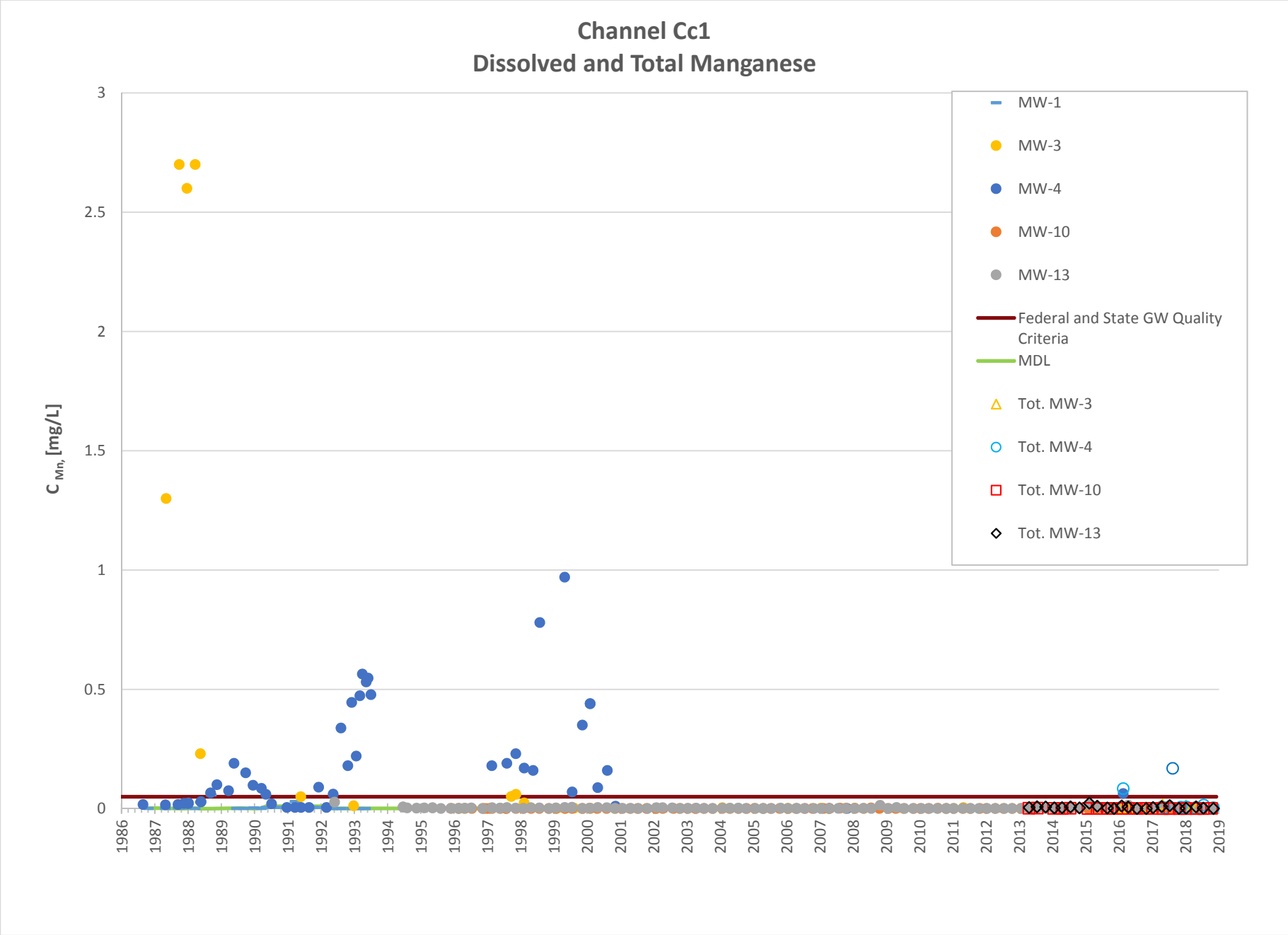

Channel Cc1
Total Dissolved Solids
C TDS, [mg/L]
600
500
400
300
200
100
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
MDL

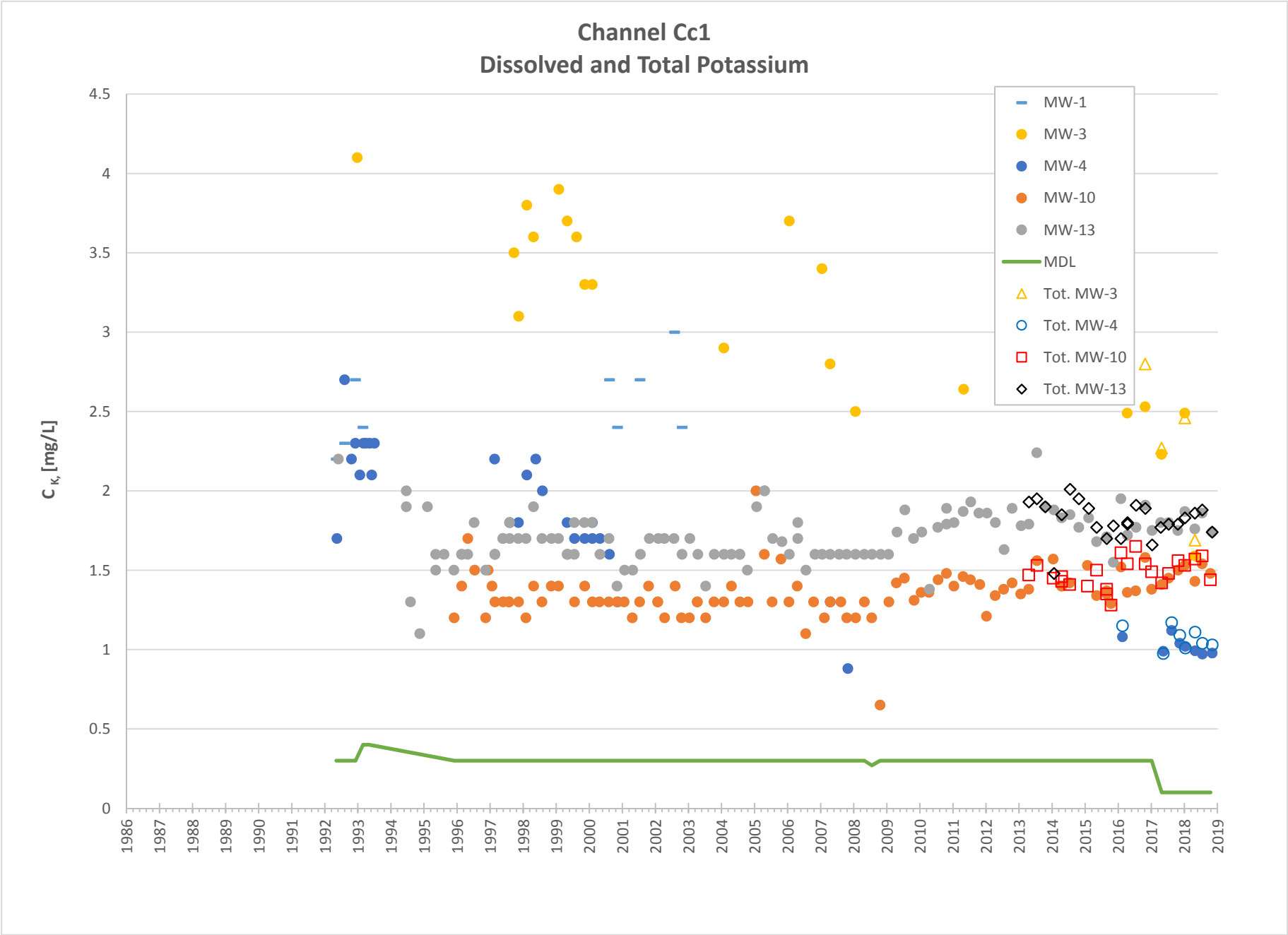

Channel Cc1
Dissolved and Total Arsenic
C As, [mg/L]
0.012
0.01
0.008
0.006
0.004
0.002
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
MDL
GW Quality Criteria
Federal DW Standard
Tot. MW-3
Tot. MW-4
Tot. MW-10
Tot. MW-13

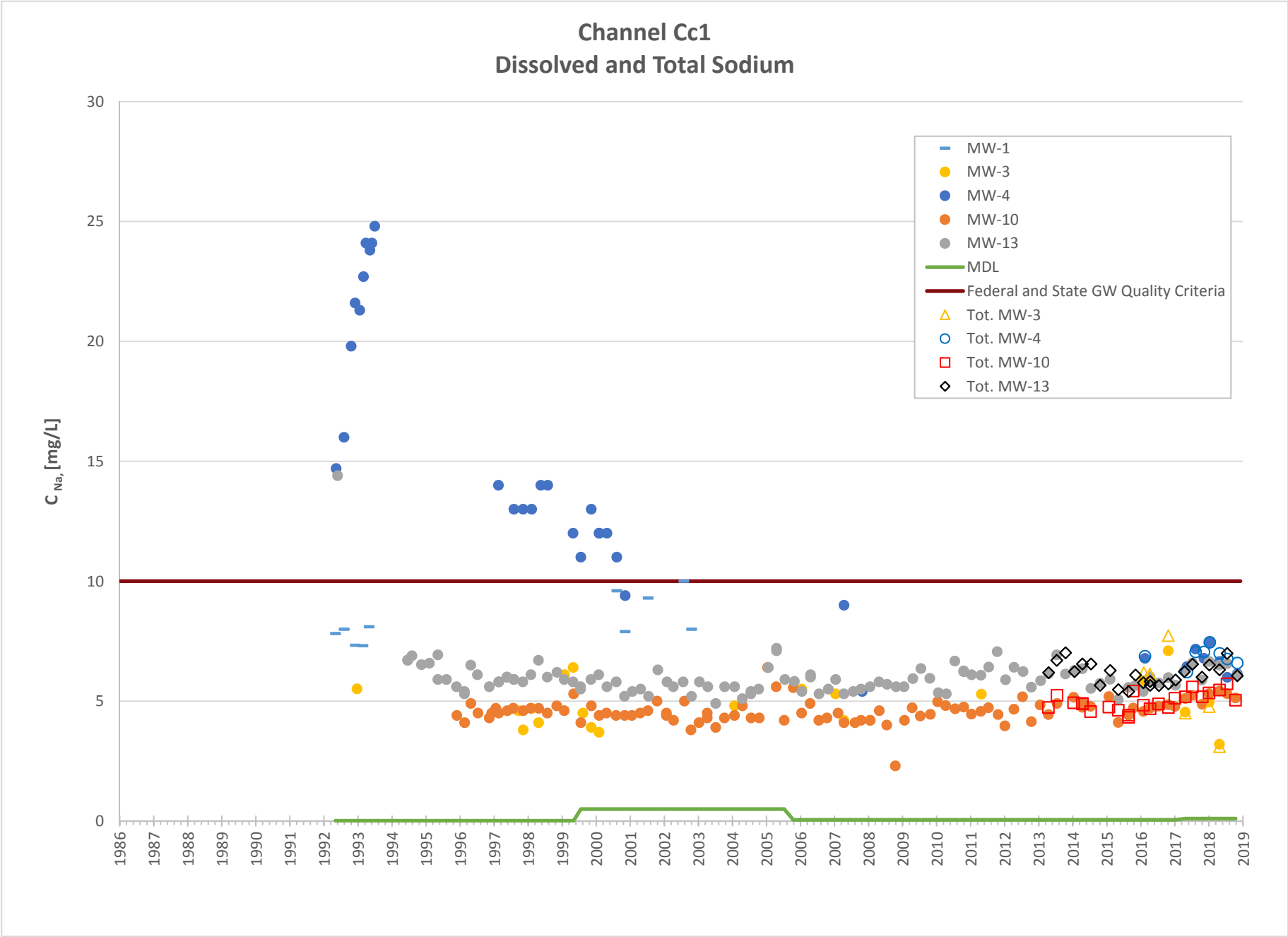

Channel Cc1
Dissolved and Total Calcium
C Ca, [mg/L]
80
70
60
50
40
30
20
10
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
MDL
Tot. MW-3
Tot. MW-4
Tot. MW-10
Tot. MW-13

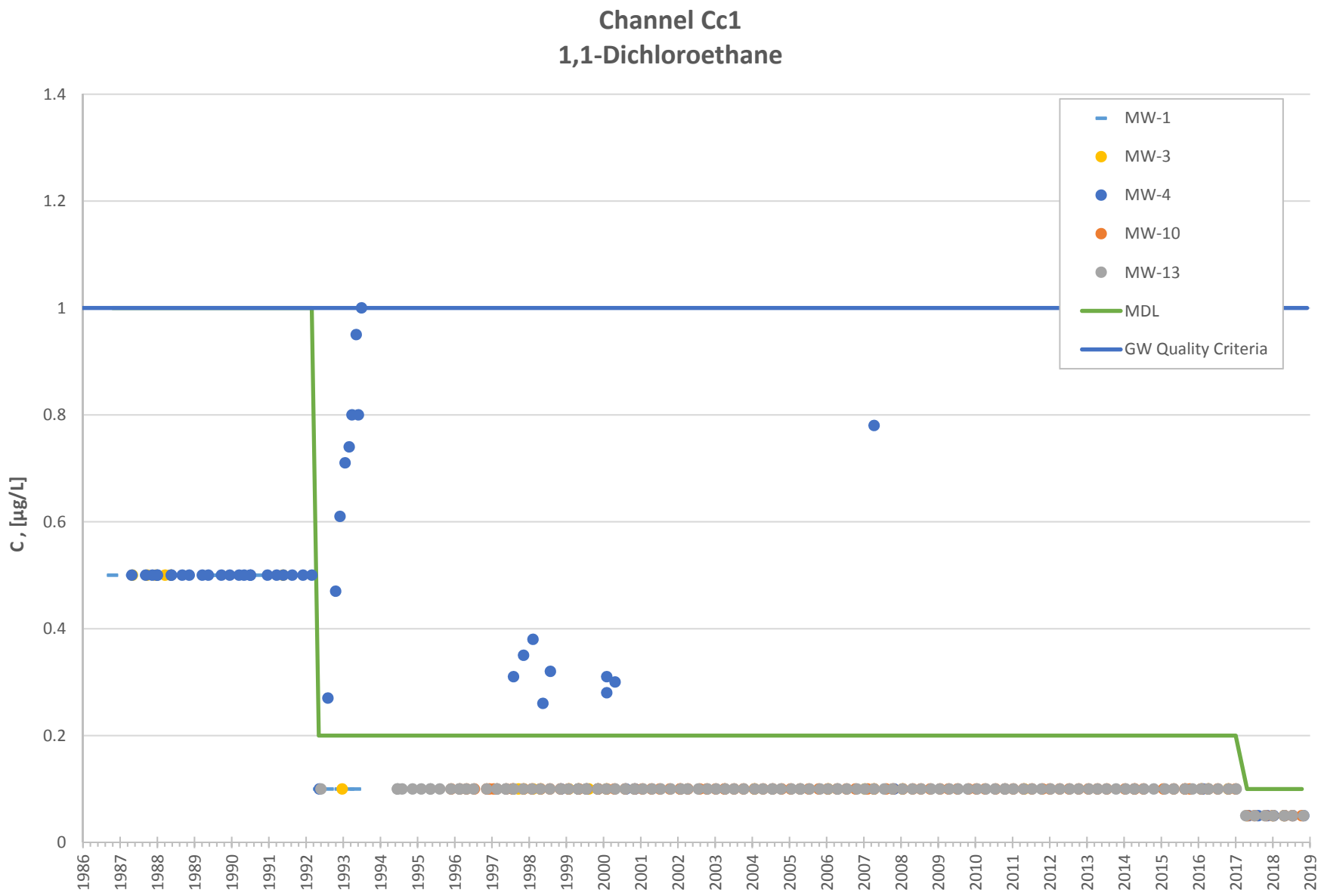

Channel Cc1
Dissolved and Total Iron
C Fe, [mg/L]
10
9
8
7
6
5
4
3
2
1
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
MDL
Tot. MW-3
Tot. MW-4
Tot. MW-10
Tot. MW-13


Channel Cc1
Dissolved and Total Magnesium
C Mg, [mg/L]
60
50
40
30
20
10
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
MDL
Tot. MW-3
Tot. MW-4
Tot. MW-10
Tot. MW-13

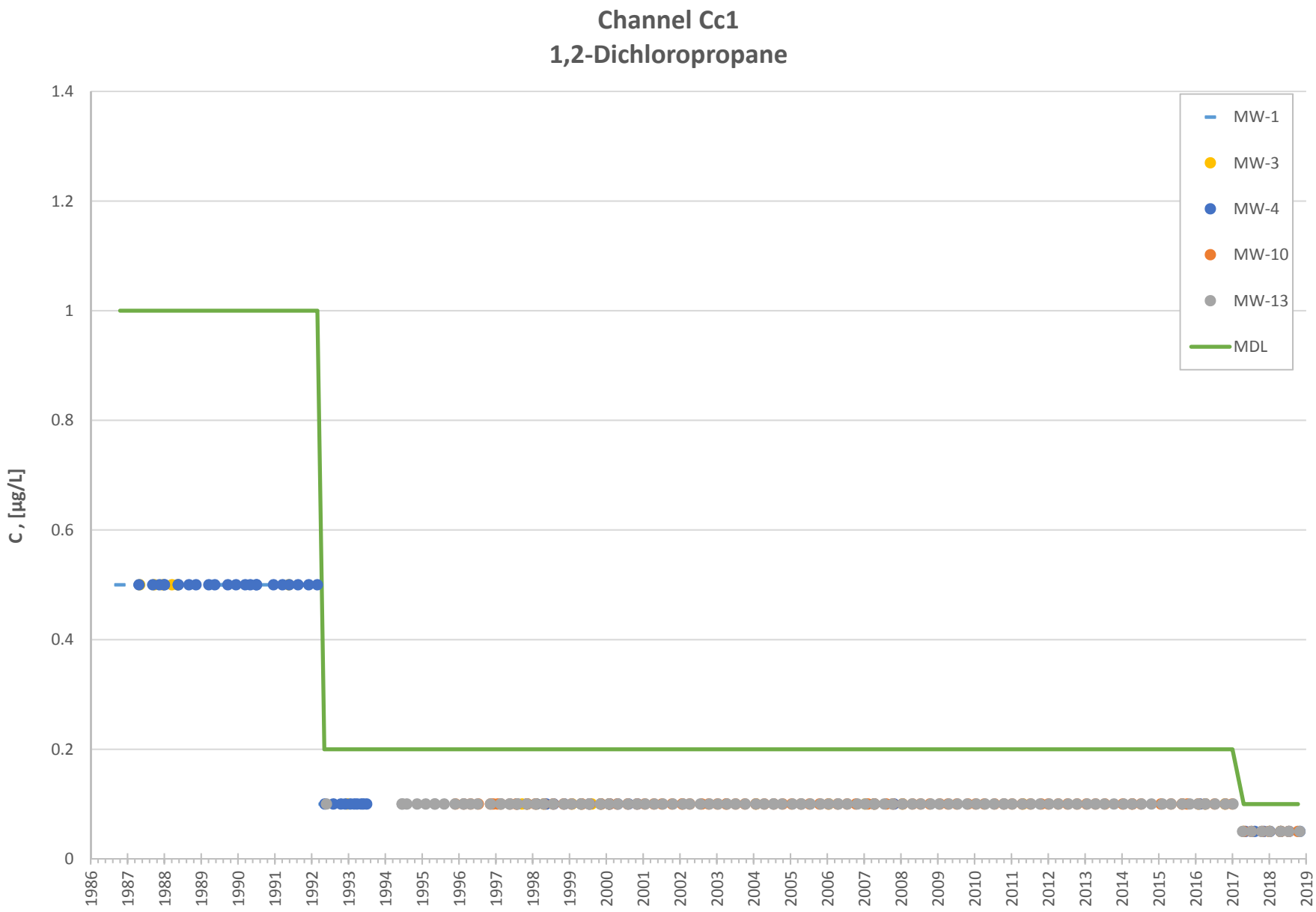

Channel Cc1
Dissolved and Total Manganese
C Mn, [mg/L]
3
2.5
2
1.5
1
0.5
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
Federal and State GW Quality Criteria
MDL
Tot. MW-3
Tot. MW-4
Tot. MW-10
Tot. MW-13


Channel Cc1
Dissolved and Total Potassium
C K, [mg/L]
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
MDL
Tot. MW-3
Tot. MW-4
Tot. MW-10
Tot. MW-13

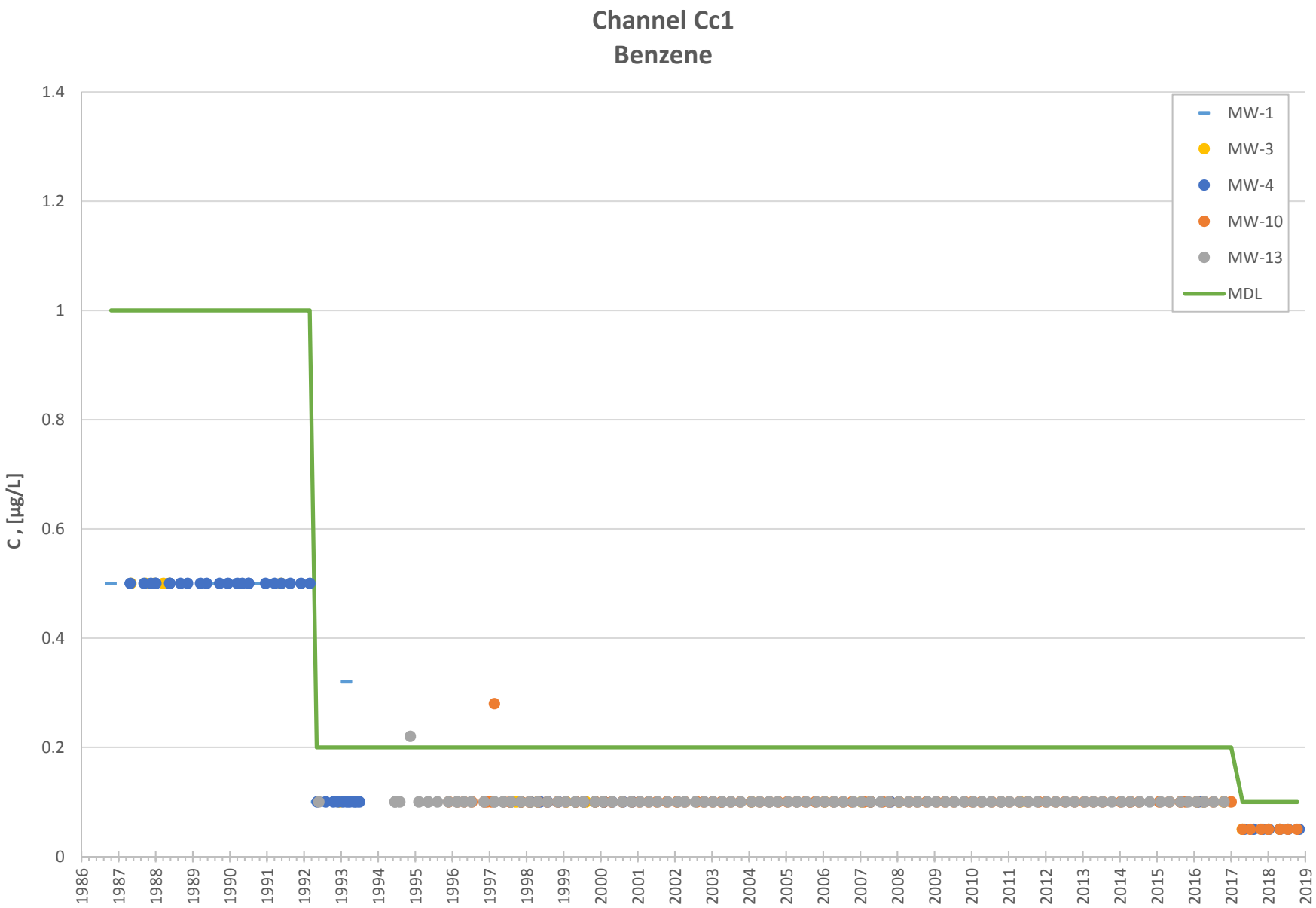

Channel Cc1
Dissolved and Total Sodium
C Na, [mg/L]
30
25
20
15
10
5
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
MDL
Federal and State GW Quality Criteria
Tot. MW-3
Tot. MW-4
Tot. MW-10
Tot. MW-13



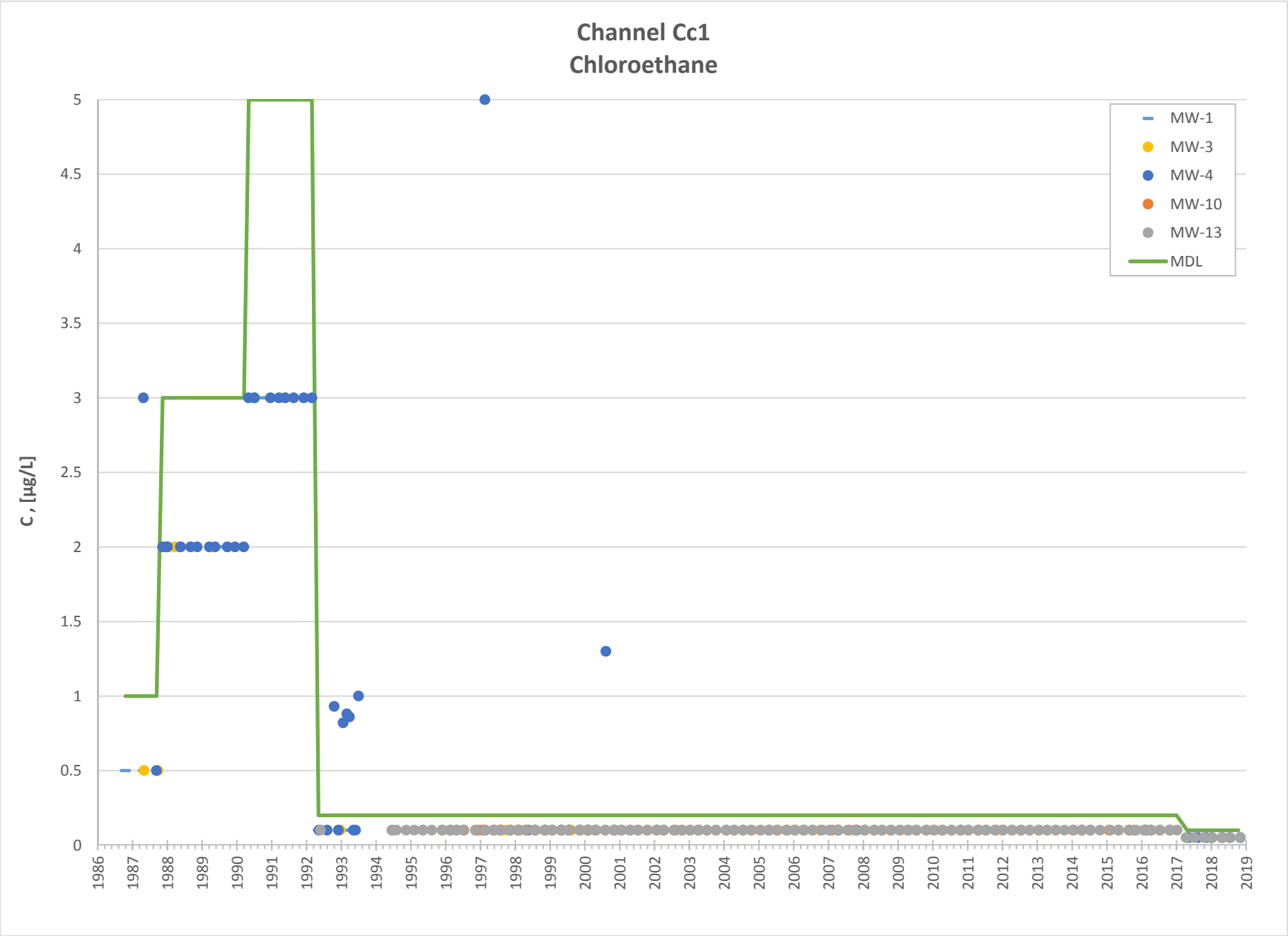
Note: Data point MW-4 on 2/28/1997 = 5 µg/L

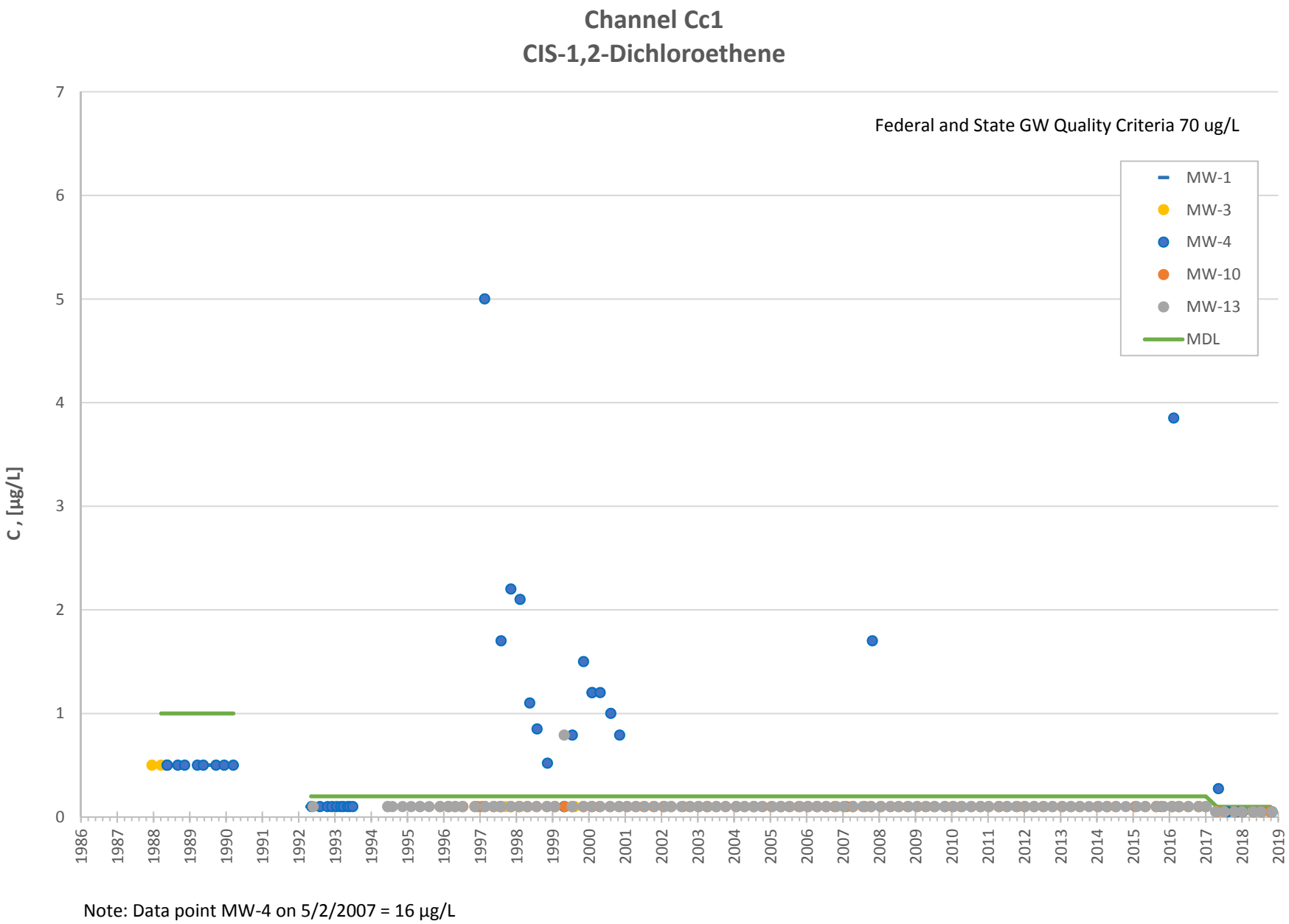


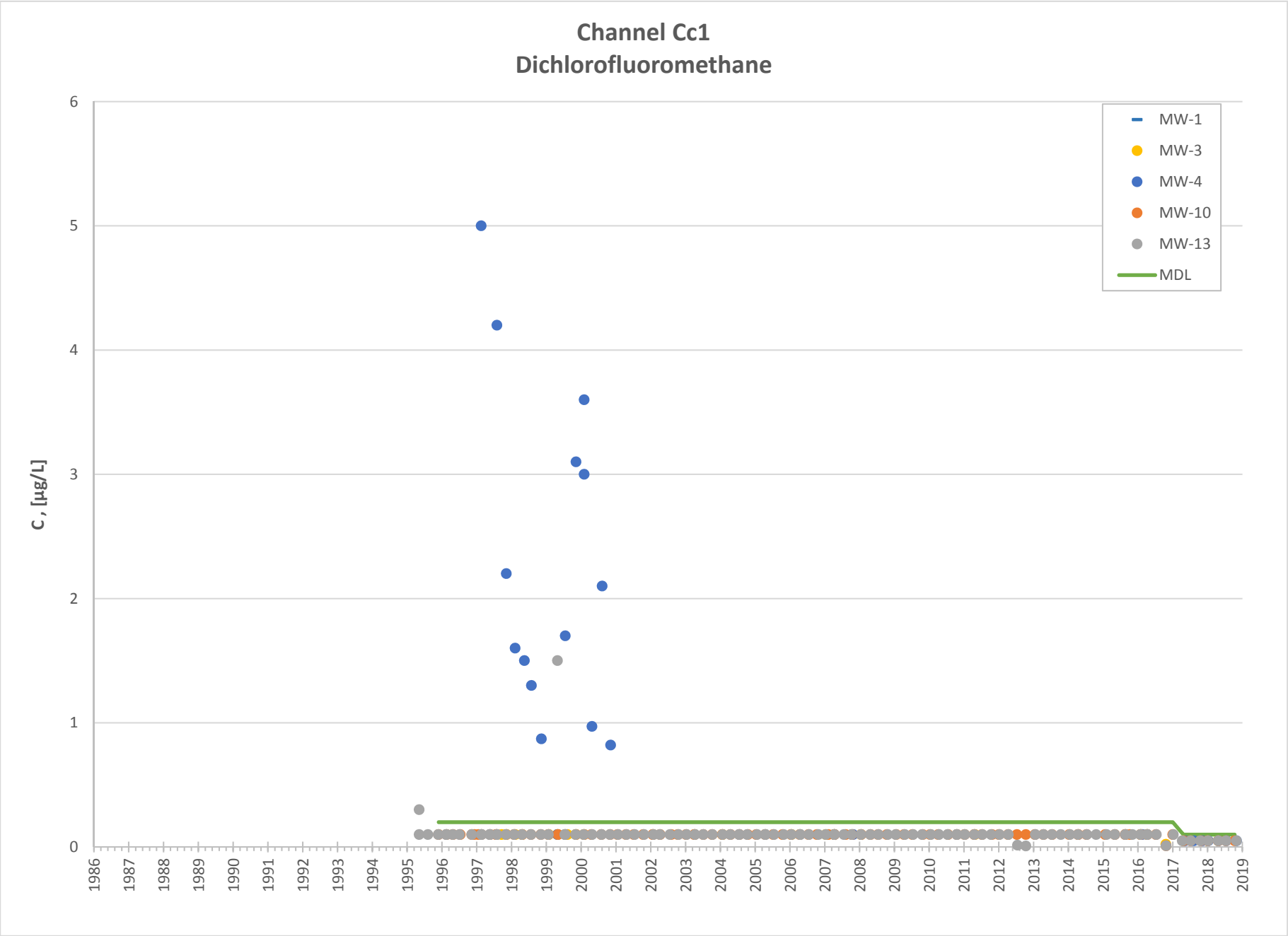
Note: Data point MW-4 on 2/28/1997 = 5 µg/L

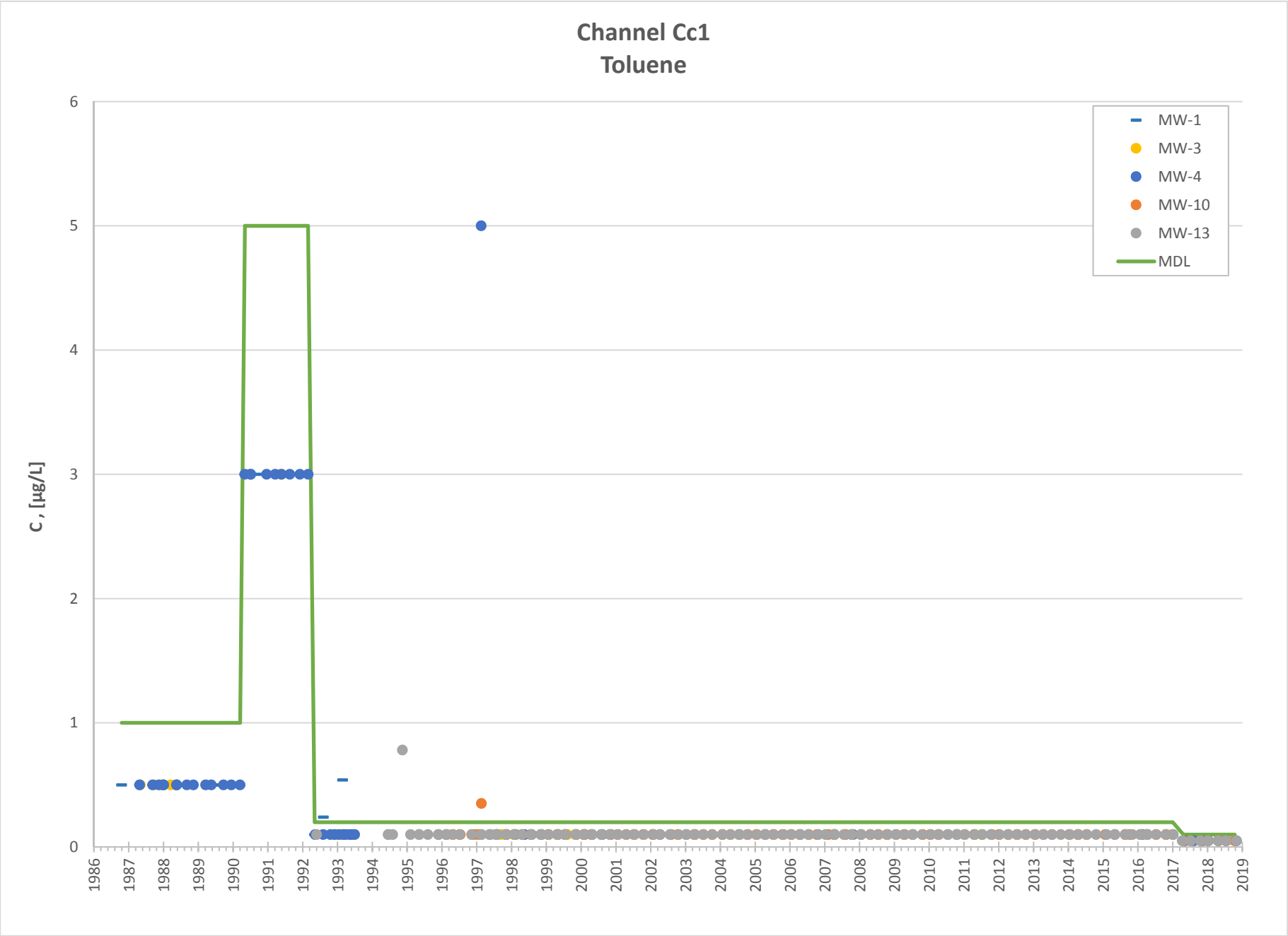


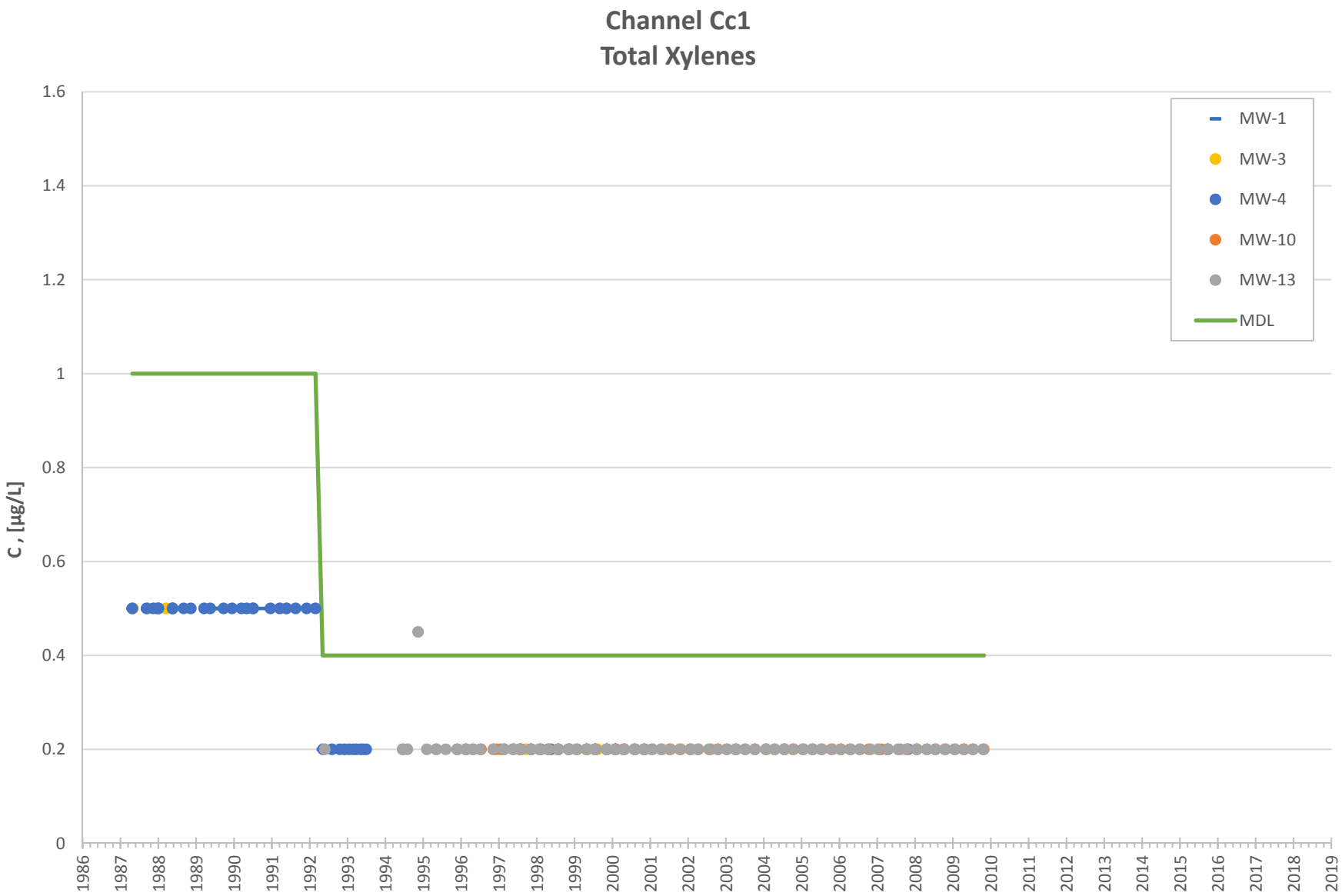
Note: Data point MW-4 on 2/28/1997 = 5 µg/L


Channel Cc1
Chloroethane
C , [µg/L]
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
MDL


Channel Cc1
CIS-1,2-Dichloroethene
Federal and State GW Quality Criteria 70 ug/L
MW-1
MW-3
MW-4
MW-10
MW-13
MDL
C , [µg/L]
0
1
2
3
4
5
6
7
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Note: Data point MW-4 on 5/2/2007 = 16 µg/L

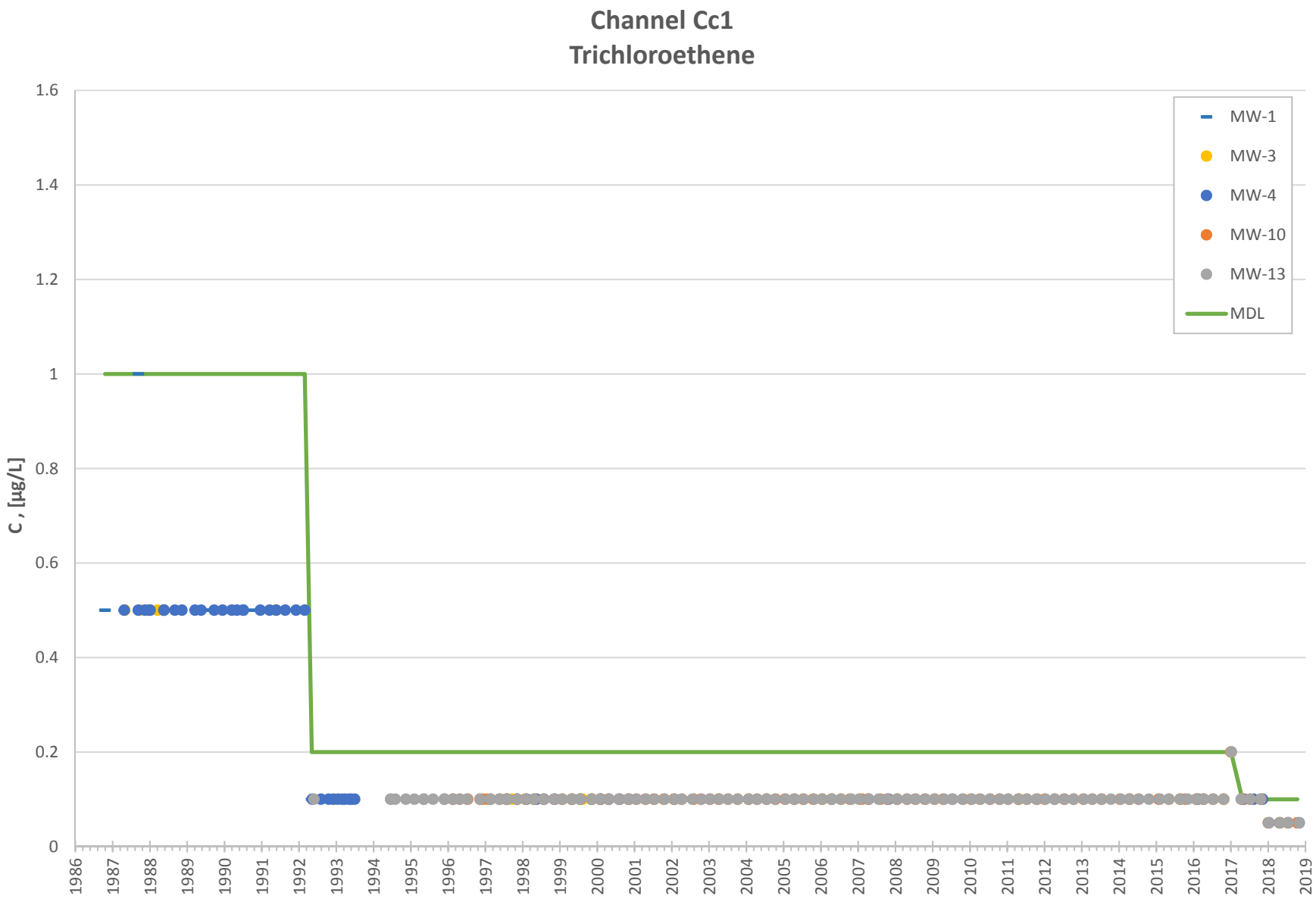

Channel Cc1
Dichlorofluoromethane
C , [µg/L]
0
1
2
3
4
5
6
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
MDL


Channel Cc1
Toluene
C , [µg/L]
0
1
2
3
4
5
6
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
MDL

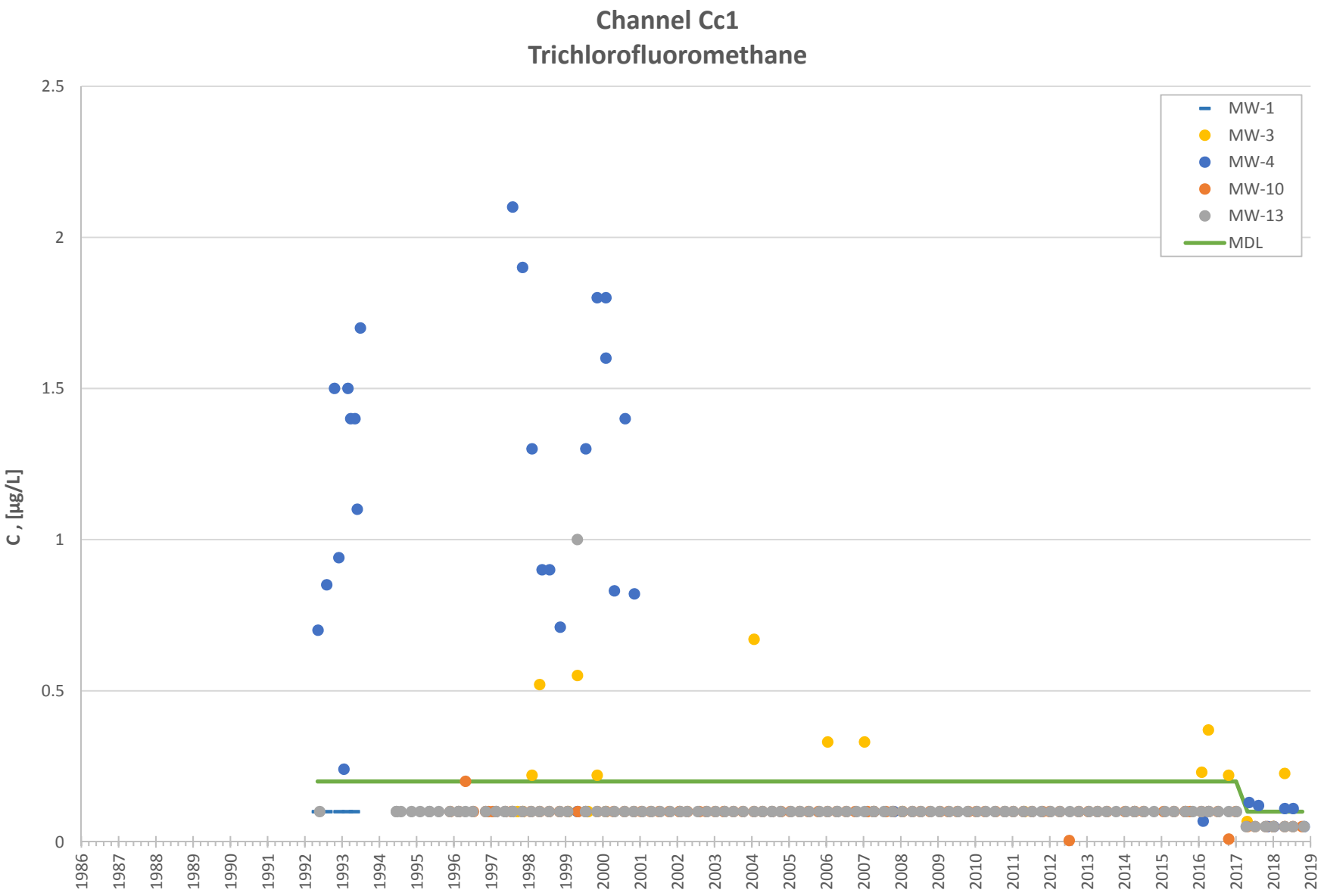


Note: Data point MW-4 on 2/28/1997 = 10 µg/L

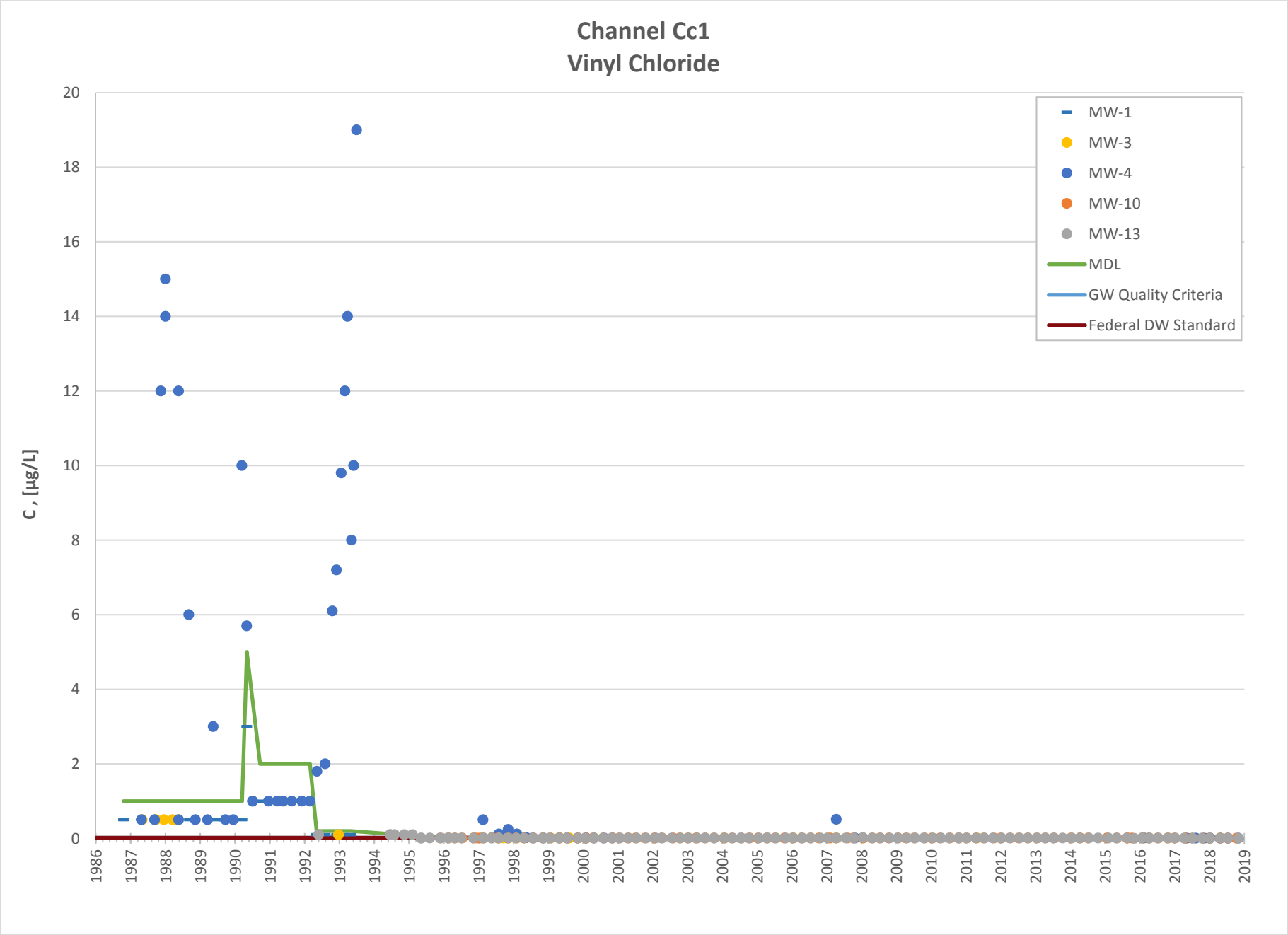
Note: Data point MW-4 on 2/28/1997 = 5 µg/L



Note: Data point MW-4 on 2/28/1997 = 5 µg/L

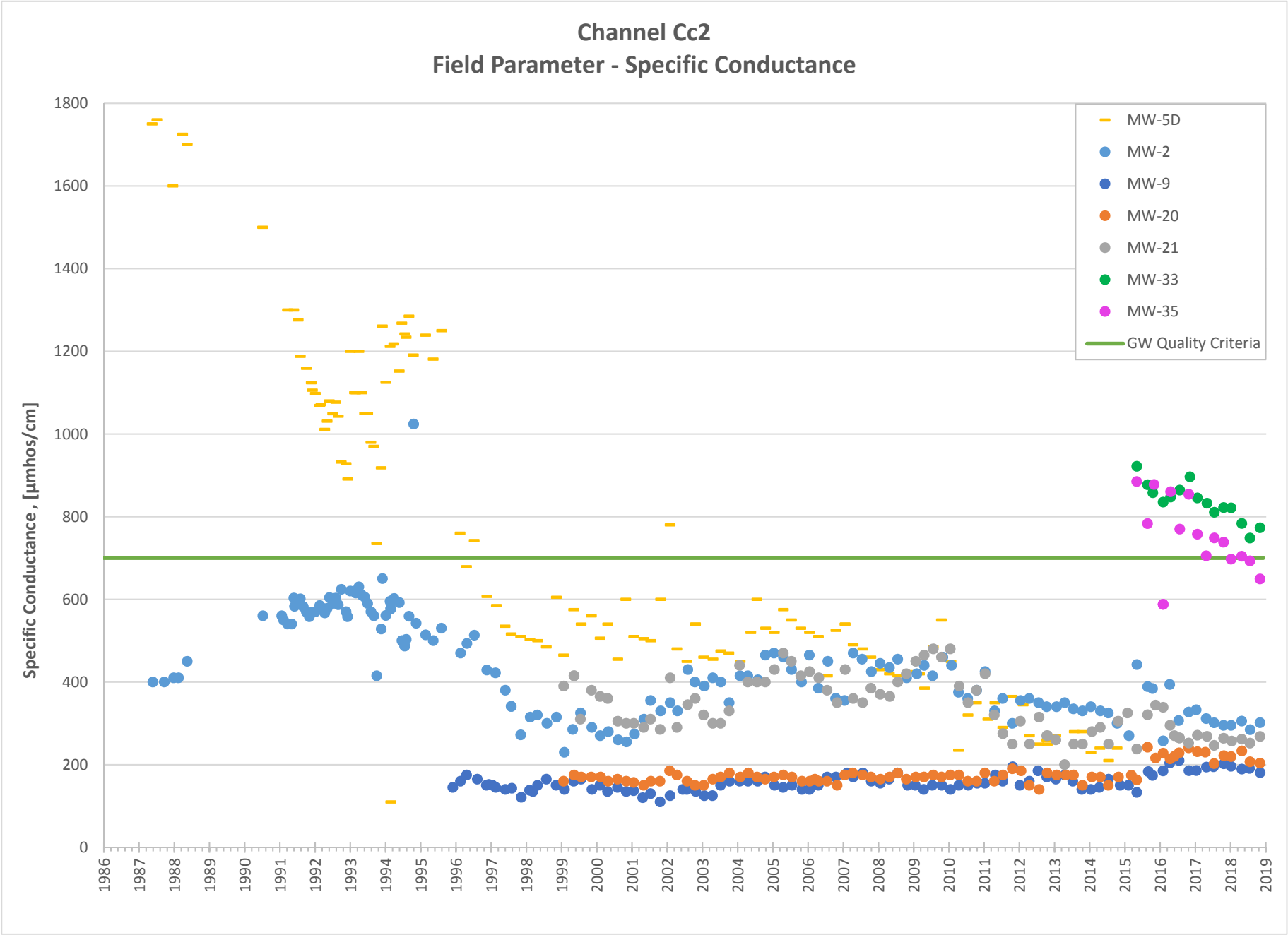


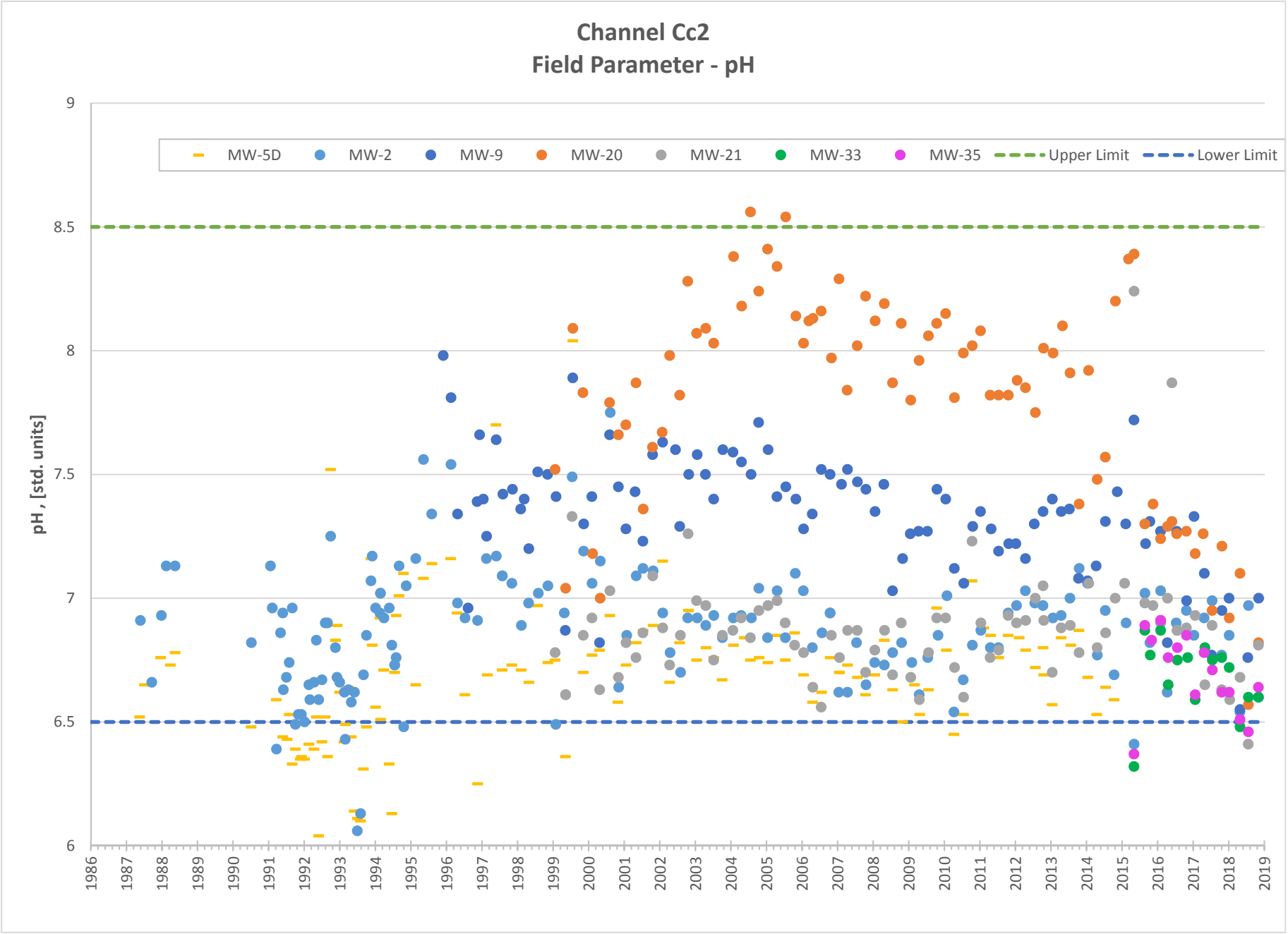
Note: Data point MW-4 on 2/28/1997 = 5 µg/L

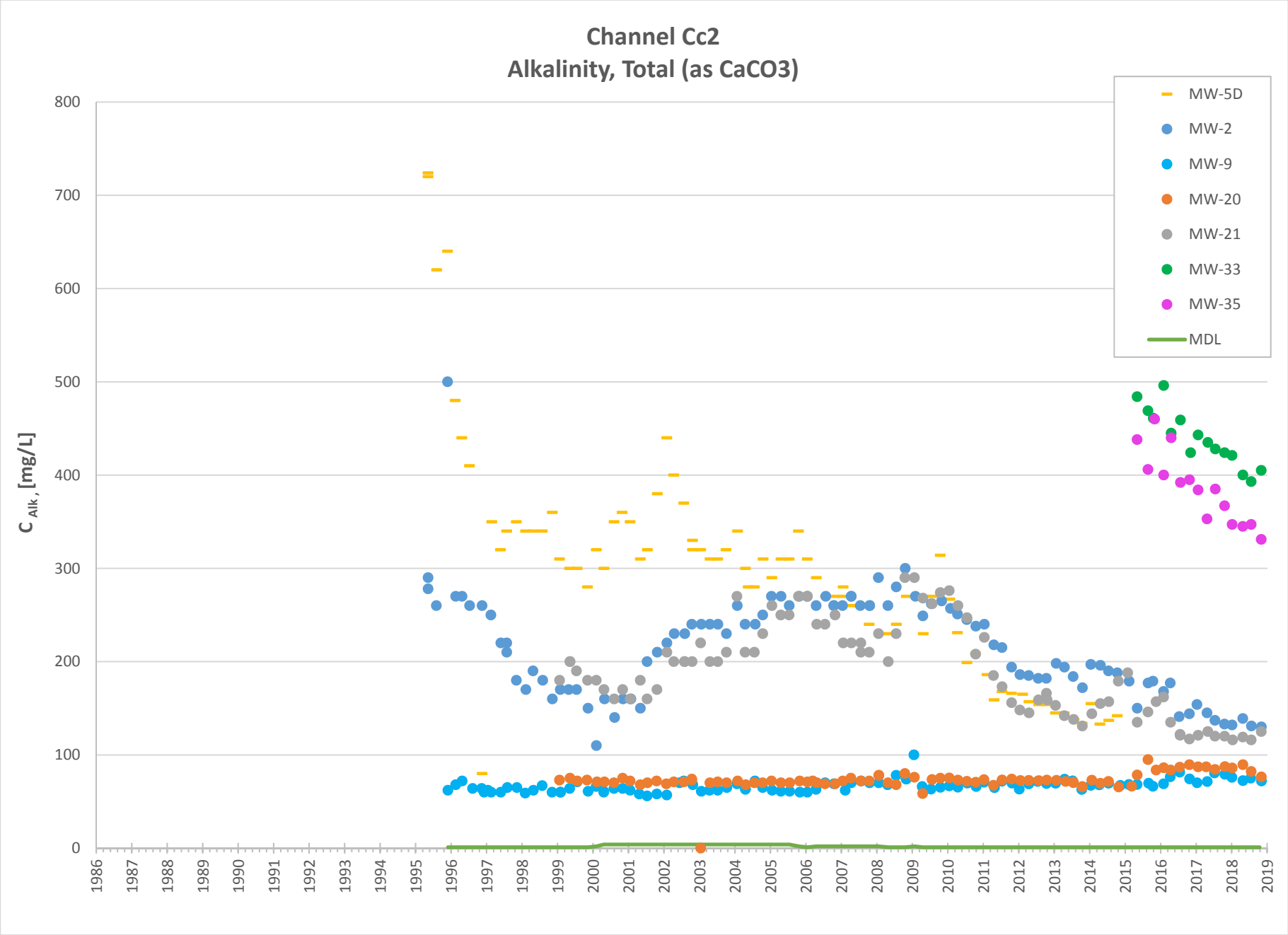

Channel Cc1
Vinyl Chloride
C , [µg/L]
20
18
16
14
12
10
8
6
4
2
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-1
MW-3
MW-4
MW-10
MW-13
MDL
GW Quality Criteria
Federal DW Standard

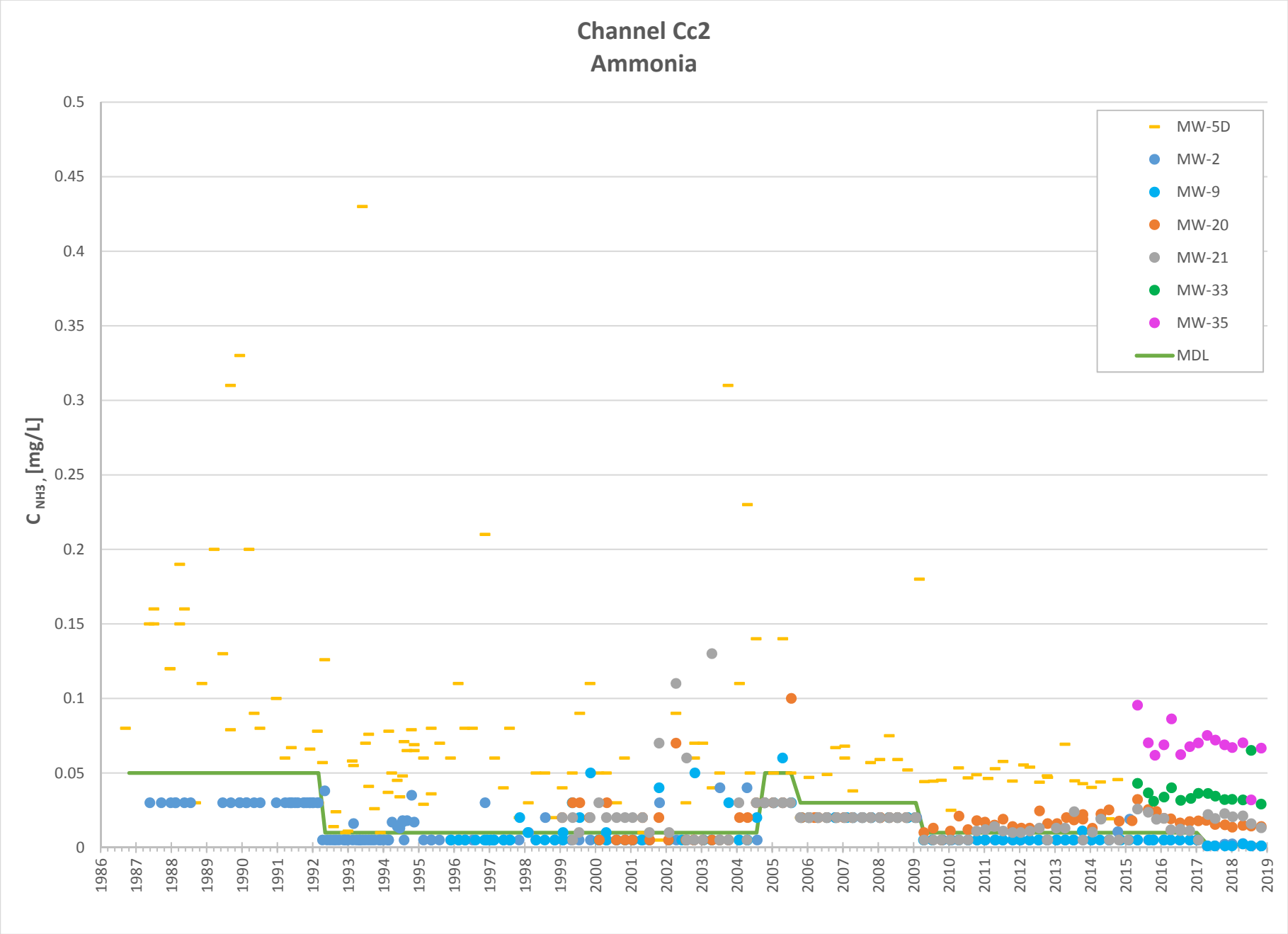
Appendix D

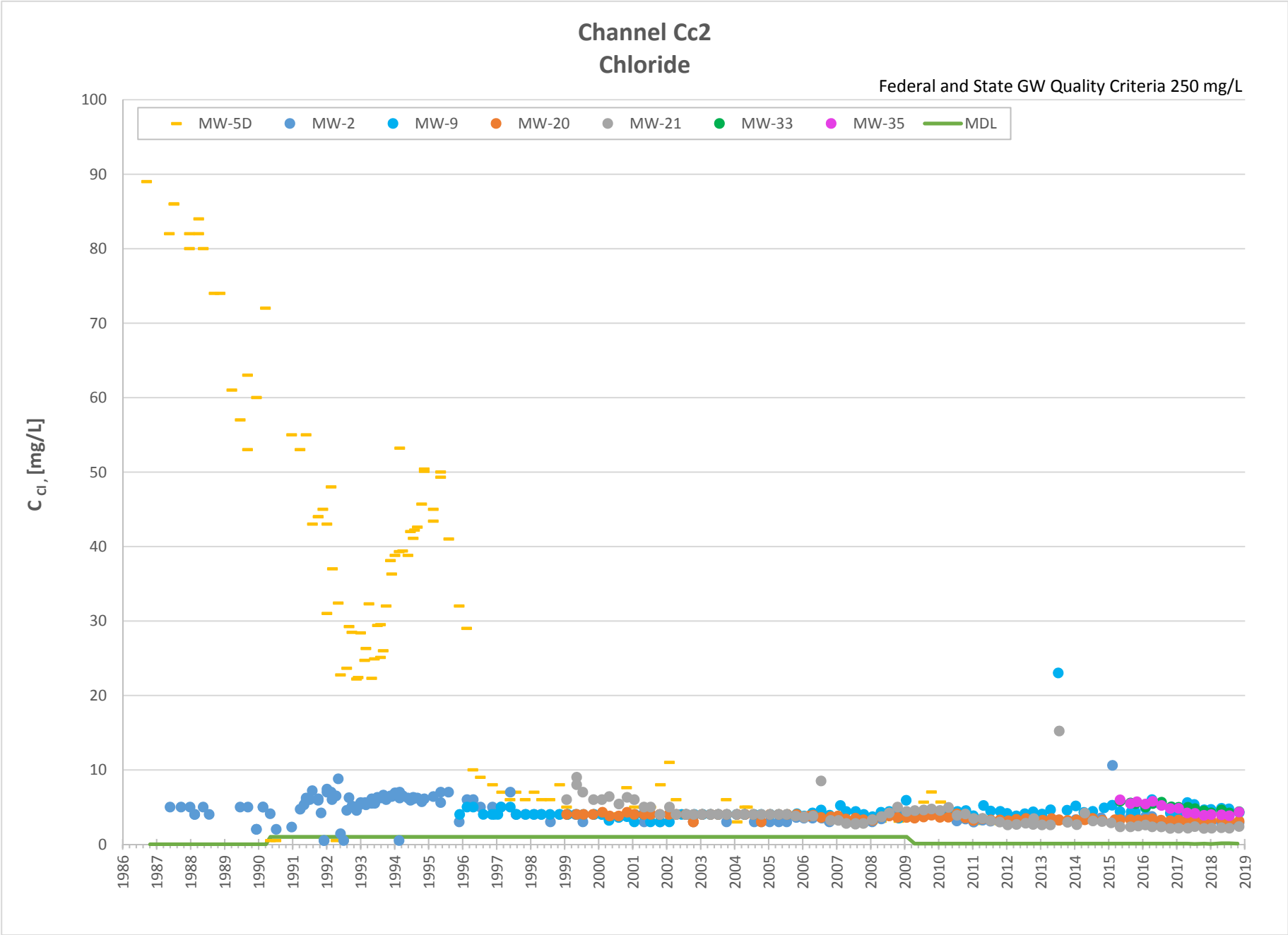
Time Concentration Plots for
Groundwater in Channel Cc2

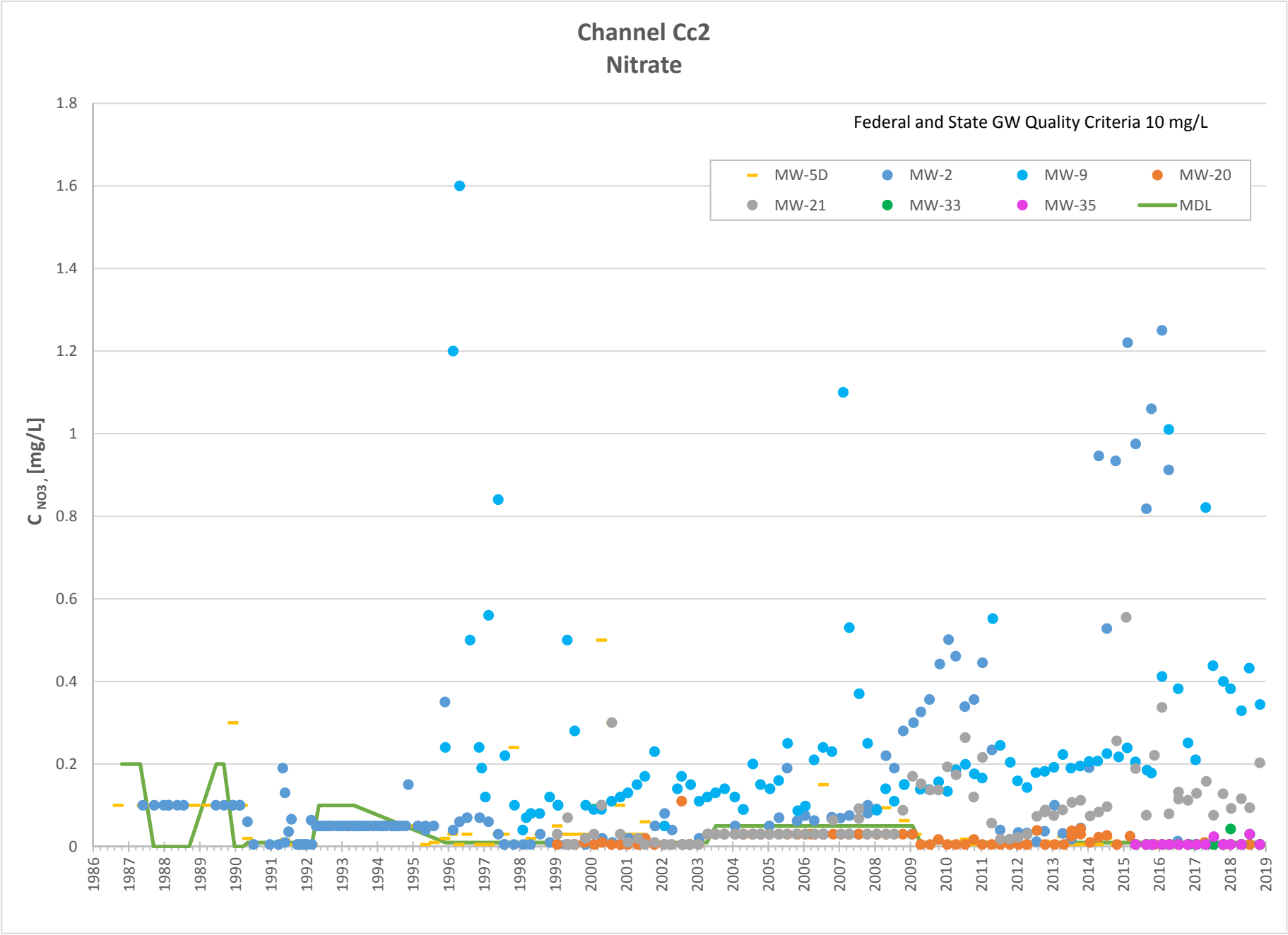

Channel Cc2
Field Parameter - Specific Conductance
Specific Conductance , [µmhos/cm]
1800
1600
1400
1200
1000
800
600
400
200
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
GW Quality Criteria

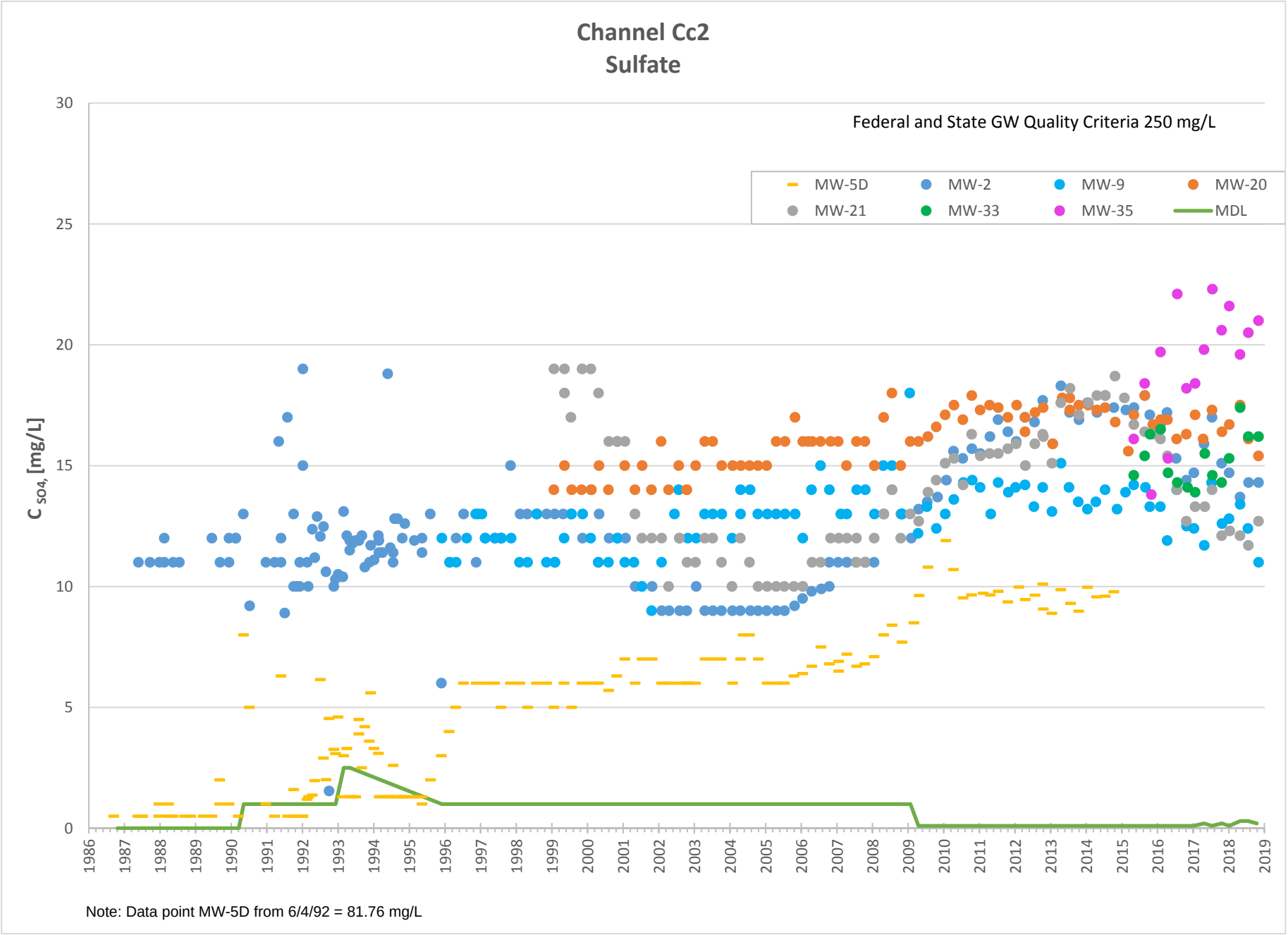

Channel Cc2
Field Parameter - pH
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
Upper Limit
Lower Limit
pH , [std. units]
9
8.5
8
7.5
7
6.5
6
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

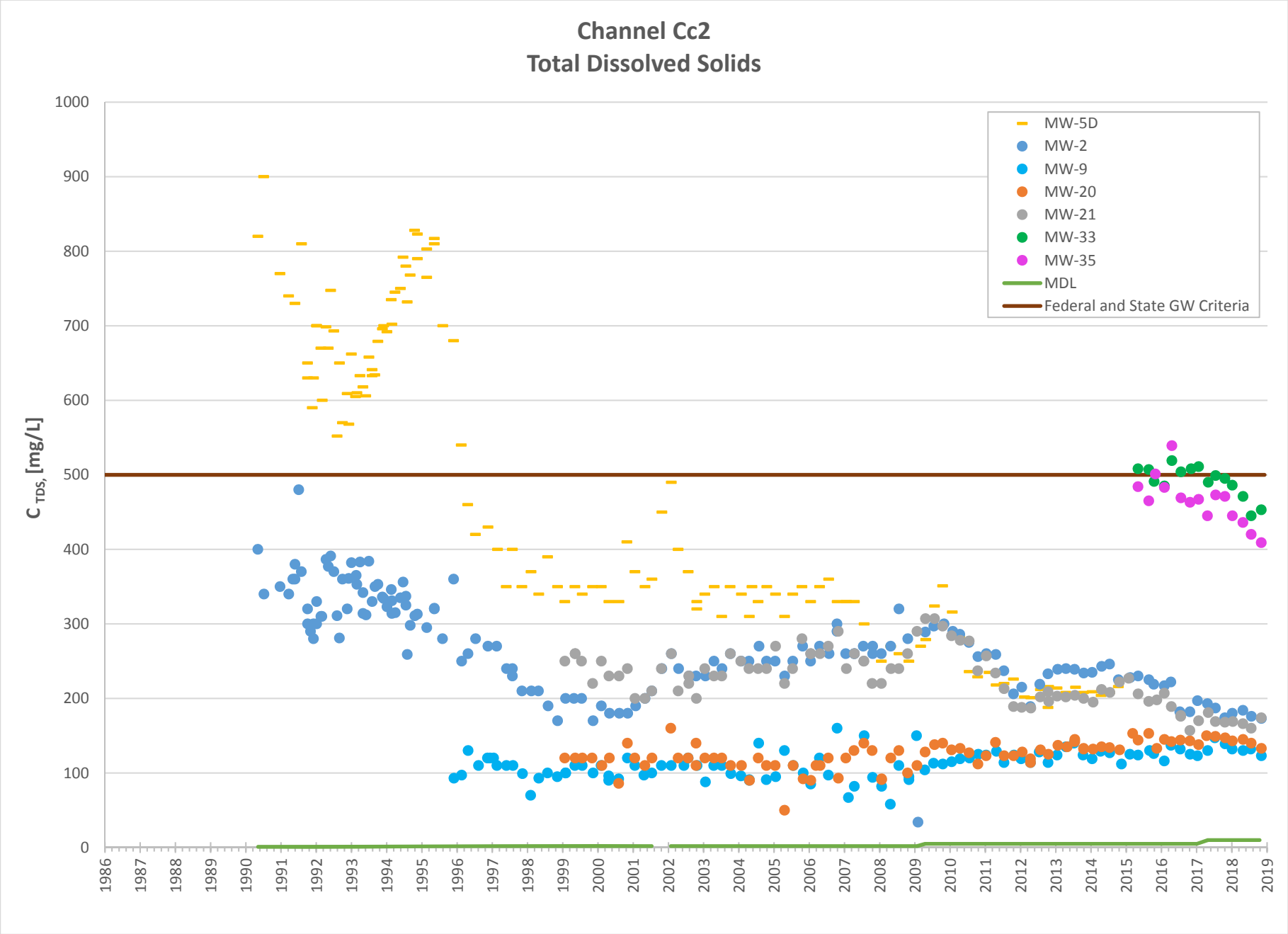

Channel Cc2
Alkalinity, Total (as CaCO3)
C Alk , [mg/L]
800
700
600
500
400
300
200
100
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL

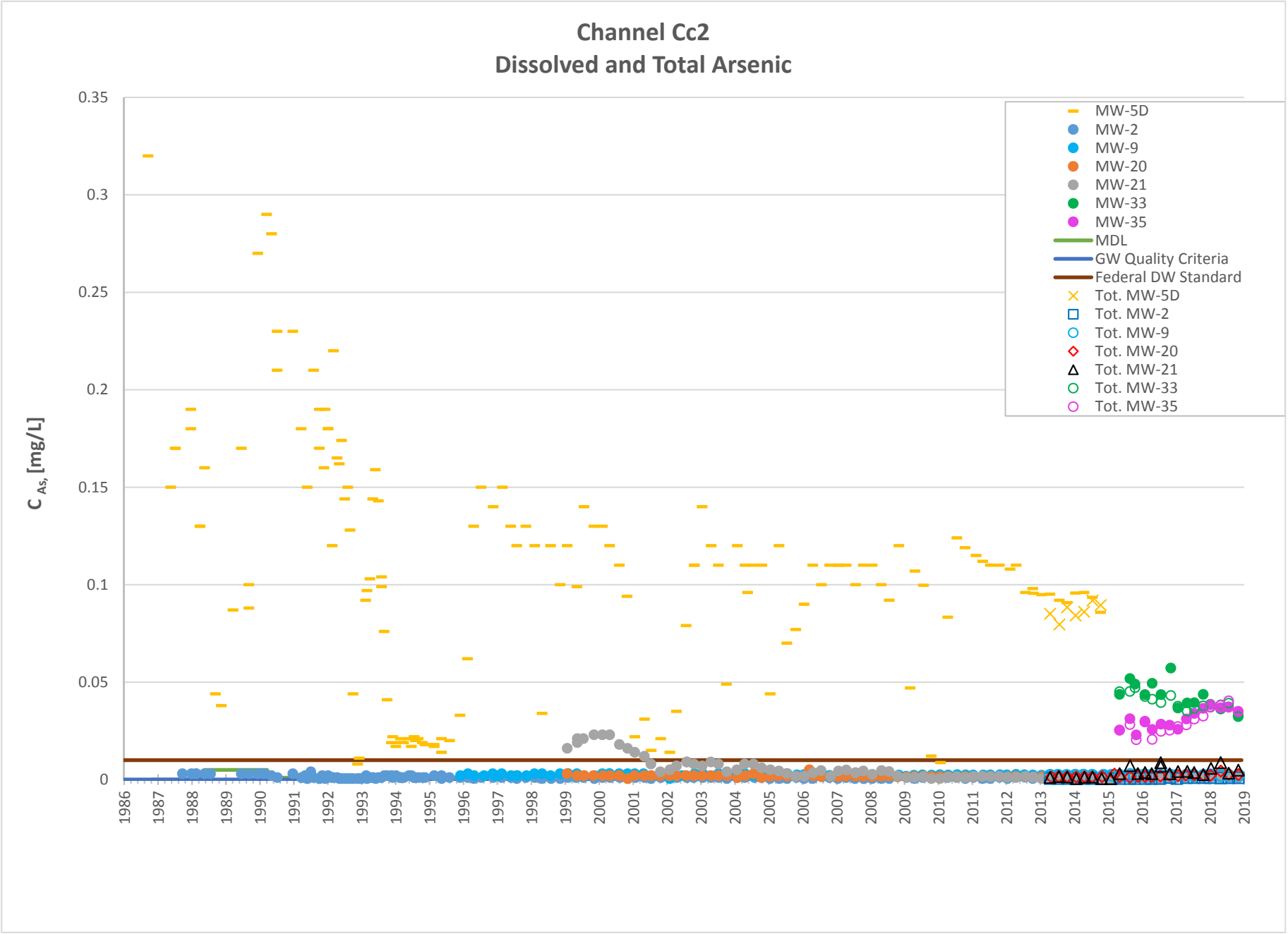

Channel Cc2
Ammonia
C_{NH3}, [mg/L]
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL

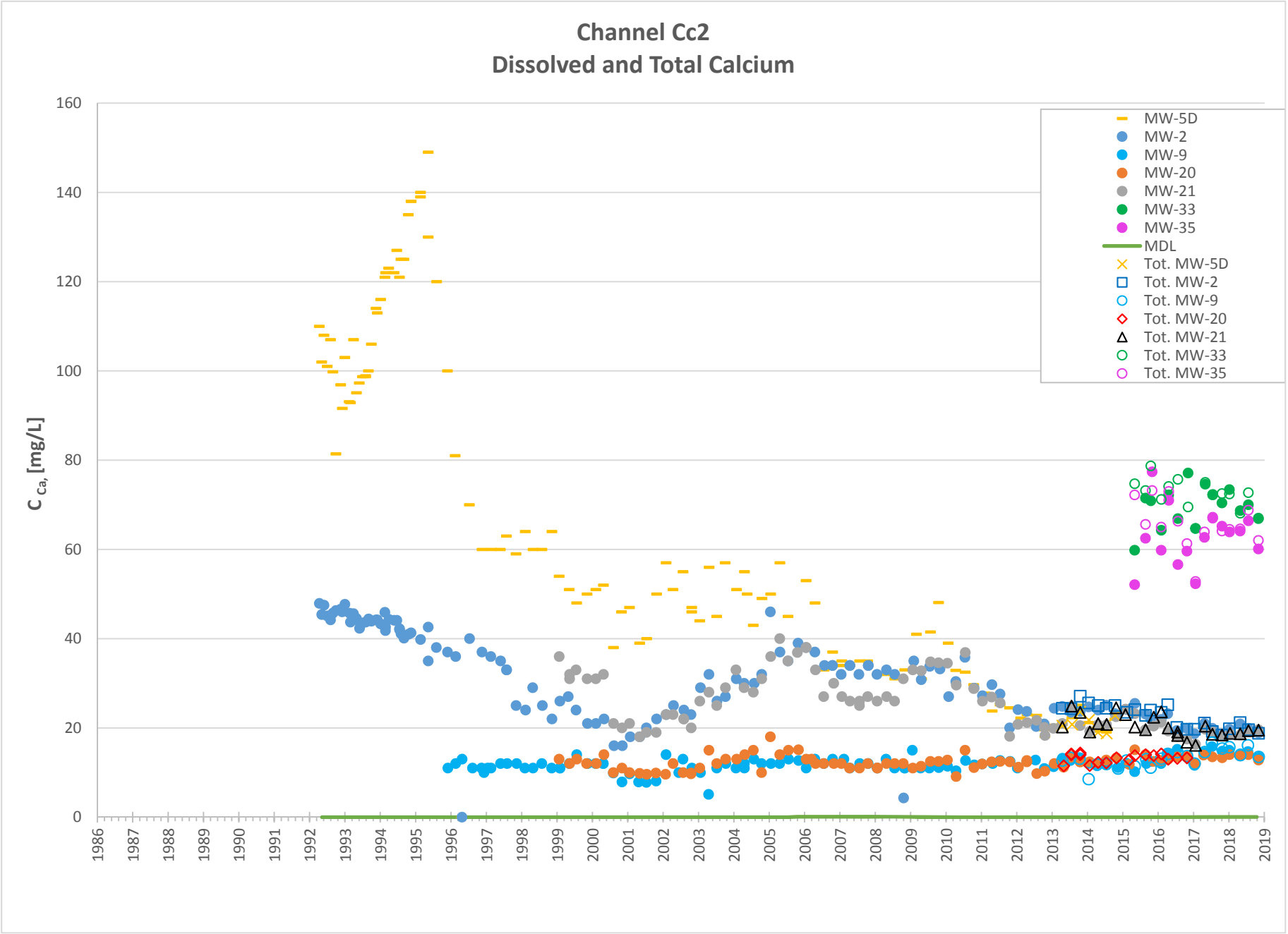

Channel Cc2
Chloride
Federal and State GW Quality Criteria 250 mg/L
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
C Cl, [mg/L]
100
90
80
70
60
50
40
30
20
10
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

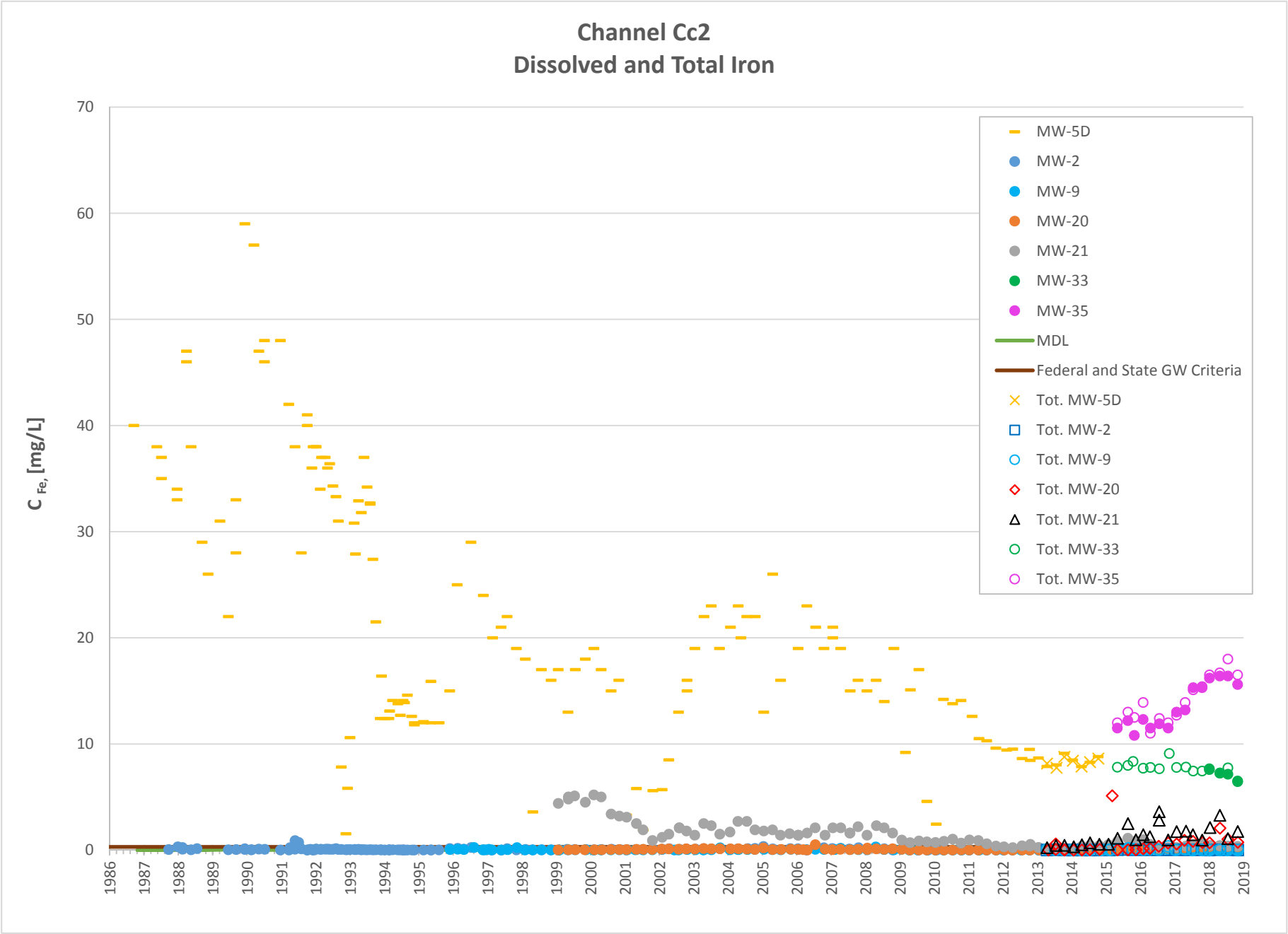

Channel Cc2
Nitrate
Federal and State GW Quality Criteria 10 mg/L
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
C NO3 , [mg/L]
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

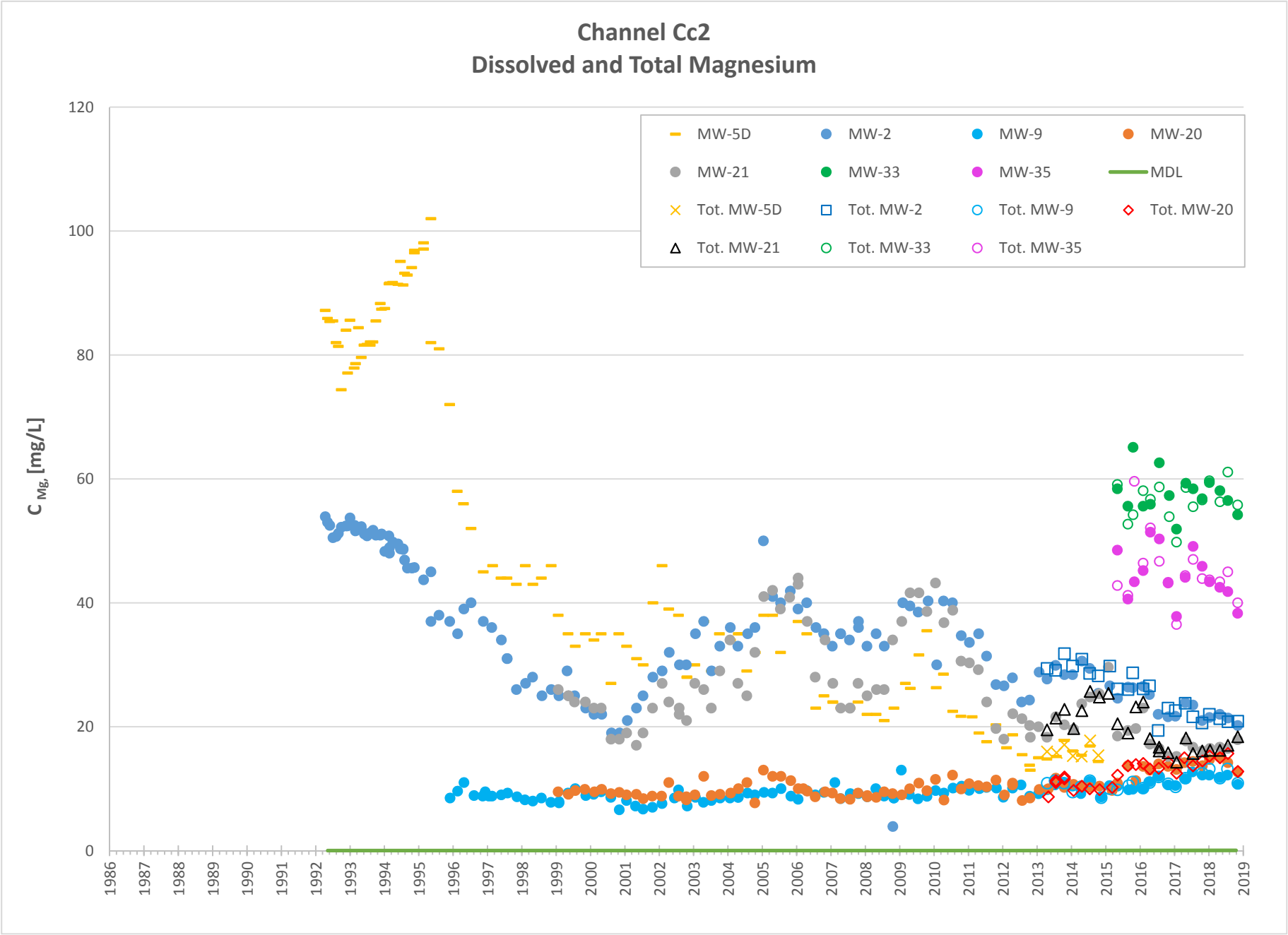

Channel Cc2
Sulfate
Federal and State GW Quality Criteria 250 mg/L
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
C SO4, [mg/L]
30
25
20
15
10
5
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Note: Data point MW-5D from 6/4/92 = 81.76 mg/L

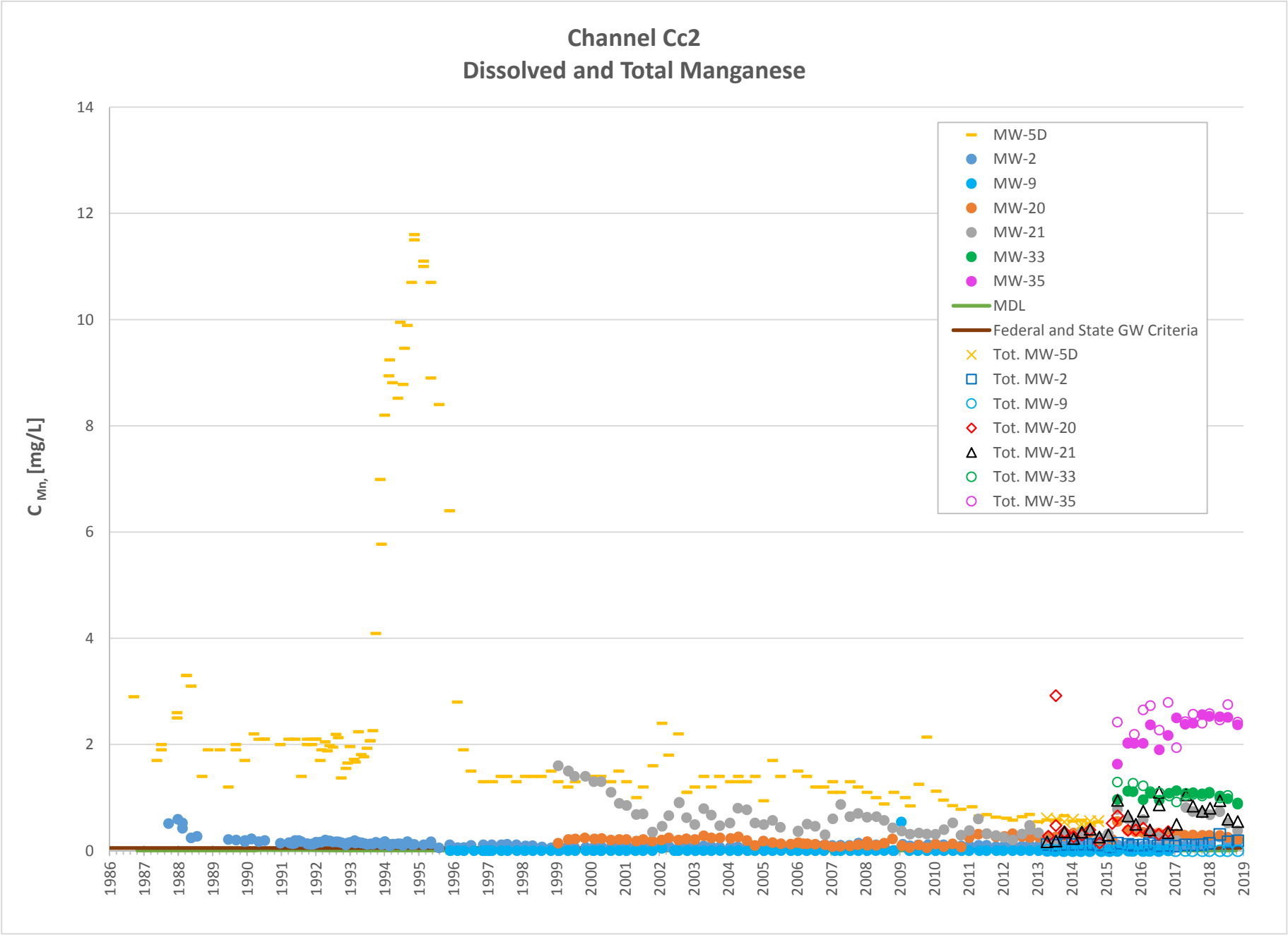

Channel Cc2
Total Dissolved Solids
C TDS, [mg/L]
1000
900
800
700
600
500
400
300
200
100
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
Federal and State GW Criteria

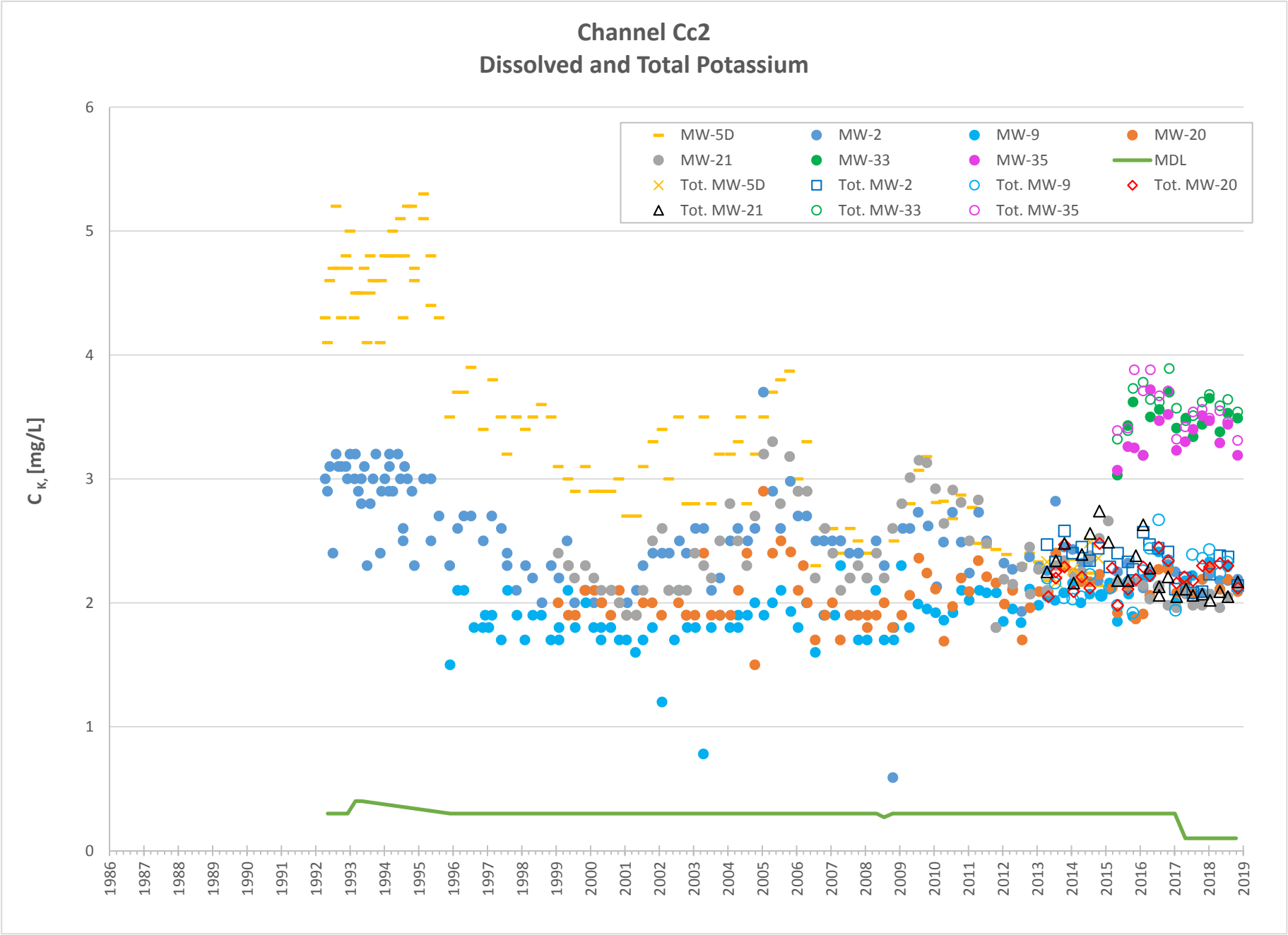

Channel Cc2
Dissolved and Total Arsenic
C As, [mg/L]
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
GW Quality Criteria
Federal DW Standard
Tot. MW-5D
Tot. MW-2
Tot. MW-9
Tot. MW-20
Tot. MW-21
Tot. MW-33
Tot. MW-35

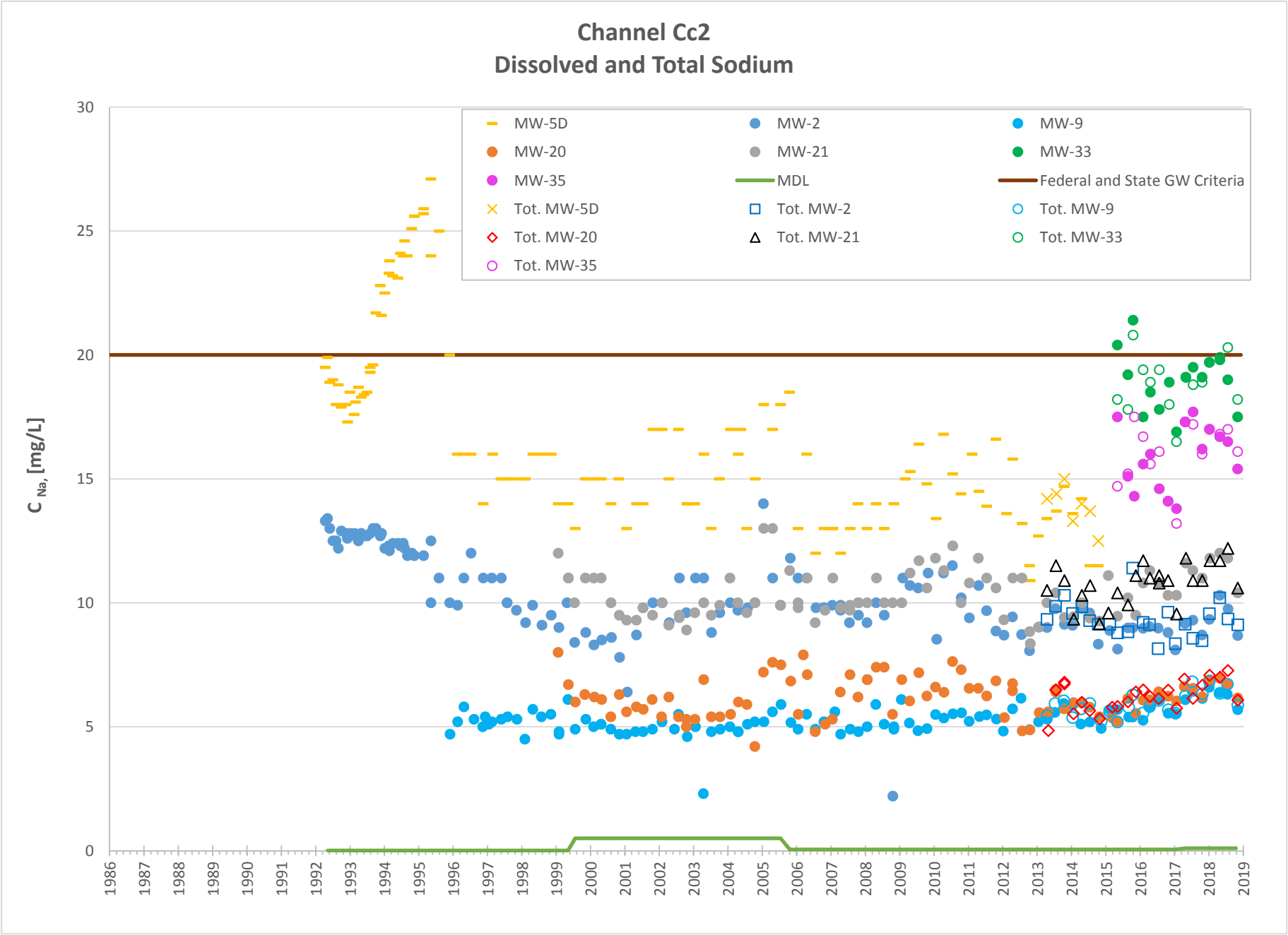

Channel Cc2
Dissolved and Total Calcium
C Ca, [mg/L]
160
140
120
100
80
60
40
20
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
Tot. MW-5D
Tot. MW-2
Tot. MW-9
Tot. MW-20
Tot. MW-21
Tot. MW-33
Tot. MW-35

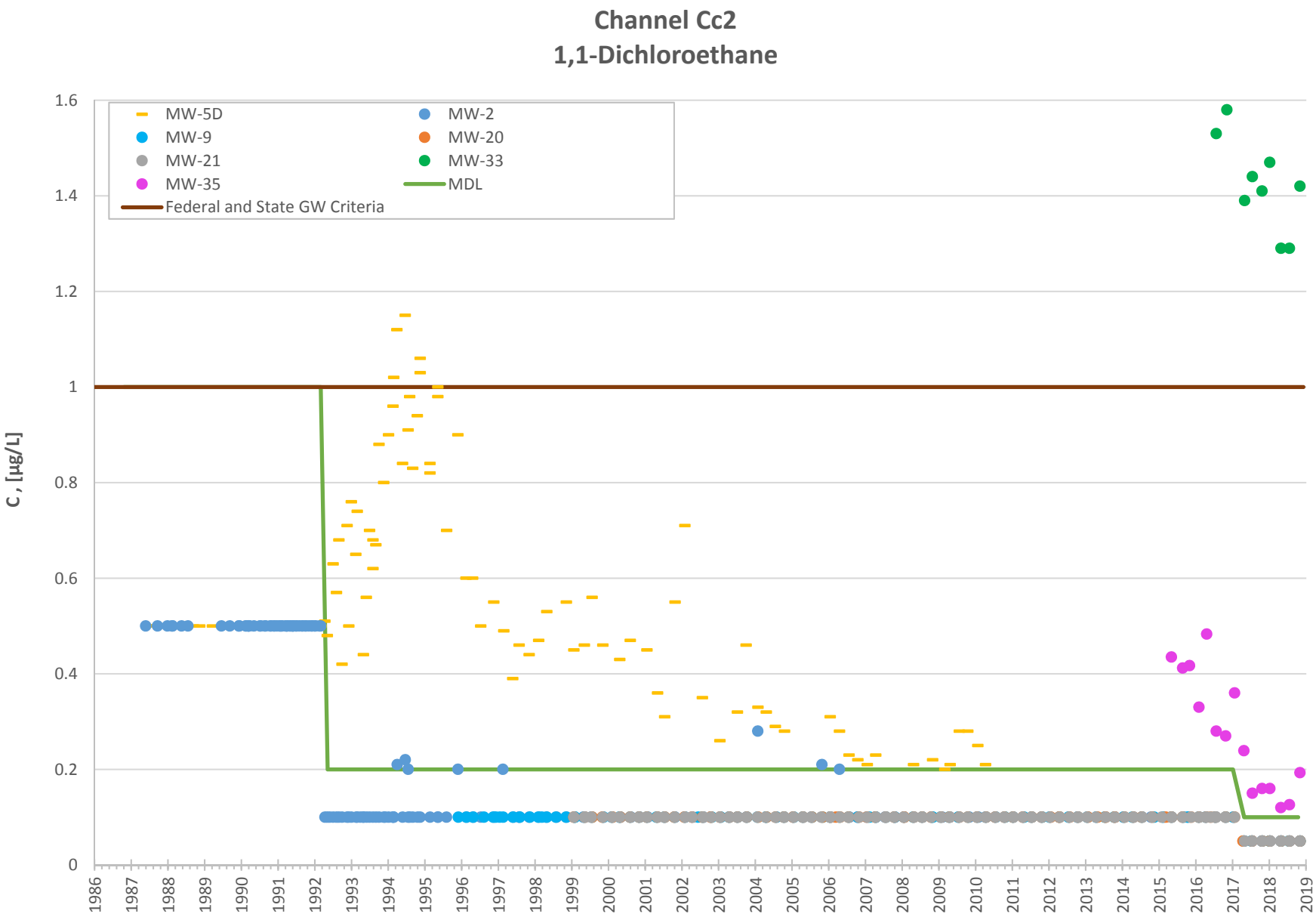

Channel Cc2
Dissolved and Total Iron
C Fe, [mg/L]
70
60
50
40
30
20
10
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
Federal and State GW Criteria
Tot. MW-5D
Tot. MW-2
Tot. MW-9
Tot. MW-20
Tot. MW-21
Tot. MW-33
Tot. MW-35


Channel Cc2
Dissolved and Total Magnesium
C Mg, [mg/L]
120
100
80
60
40
20
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
Tot. MW-5D
Tot. MW-2
Tot. MW-9
Tot. MW-20
Tot. MW-21
Tot. MW-33
Tot. MW-35

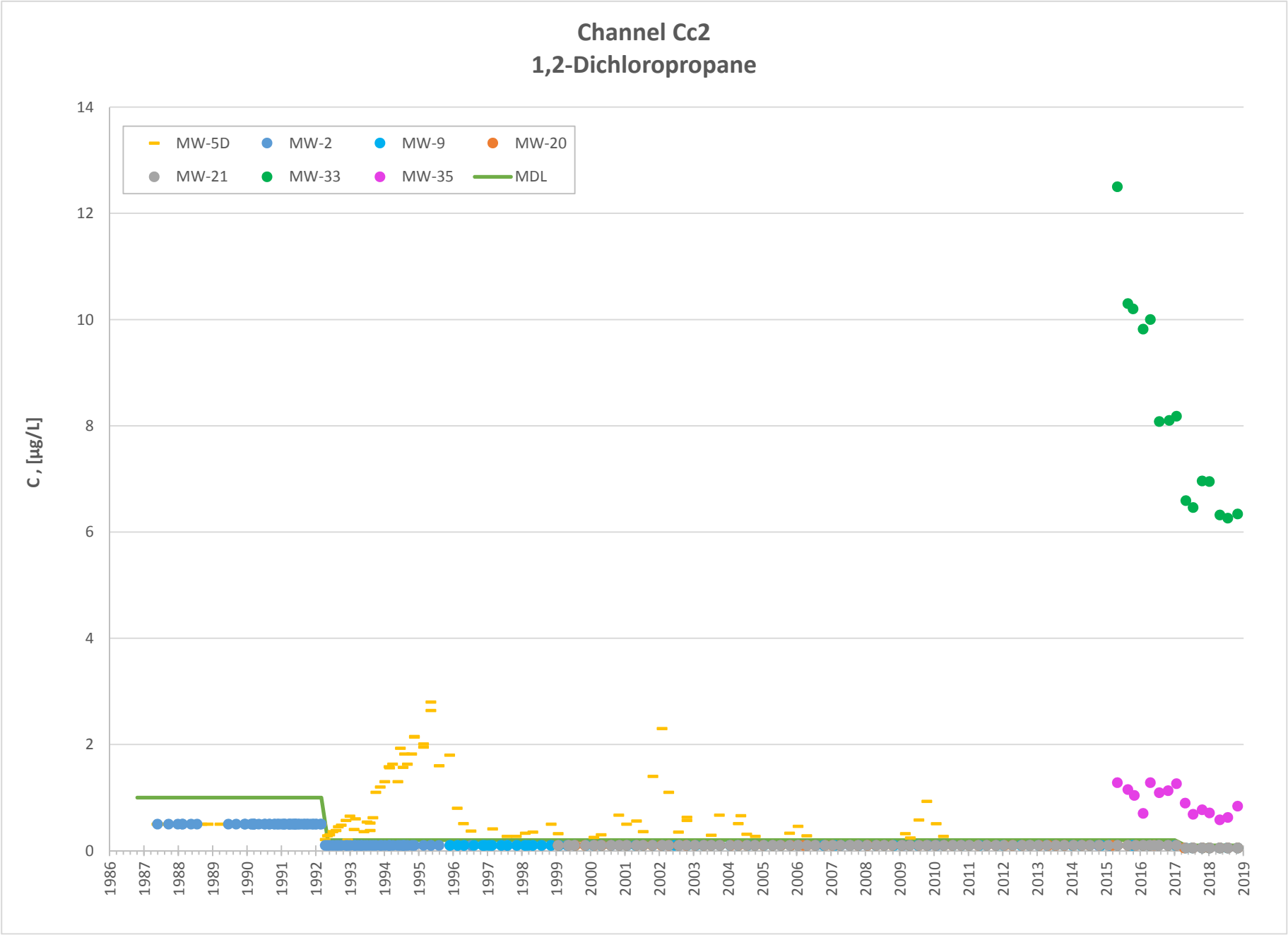

Channel Cc2
Dissolved and Total Manganese
C Mn, [mg/L]
14
12
10
8
6
4
2
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
Federal and State GW Criteria
Tot. MW-5D
Tot. MW-2
Tot. MW-9
Tot. MW-20
Tot. MW-21
Tot. MW-33
Tot. MW-35

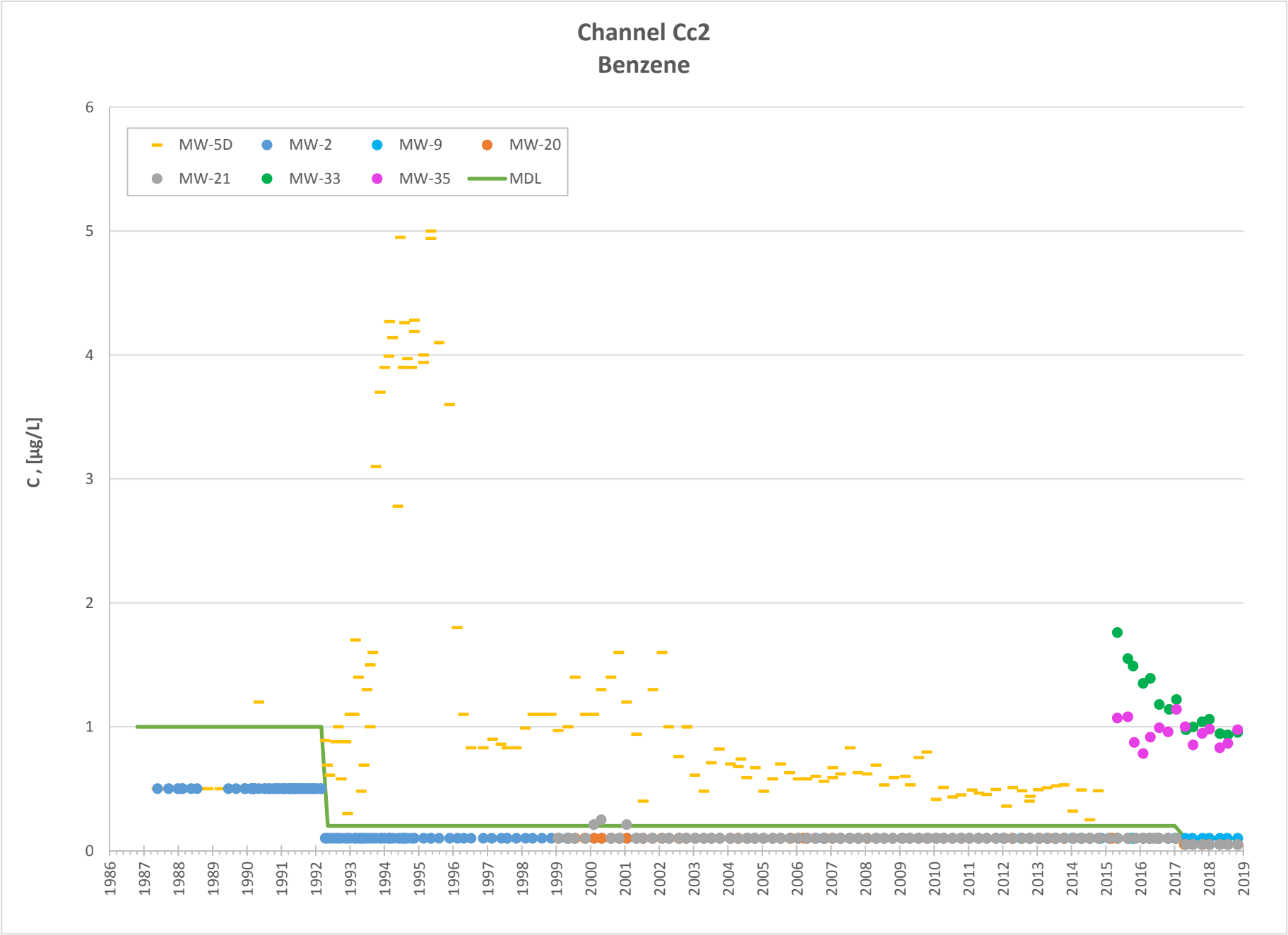

Channel Cc2
Dissolved and Total Potassium
C K, [mg/L]
0
1
2
3
4
5
6
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
Tot. MW-5D
Tot. MW-2
Tot. MW-9
Tot. MW-20
Tot. MW-21
Tot. MW-33
Tot. MW-35

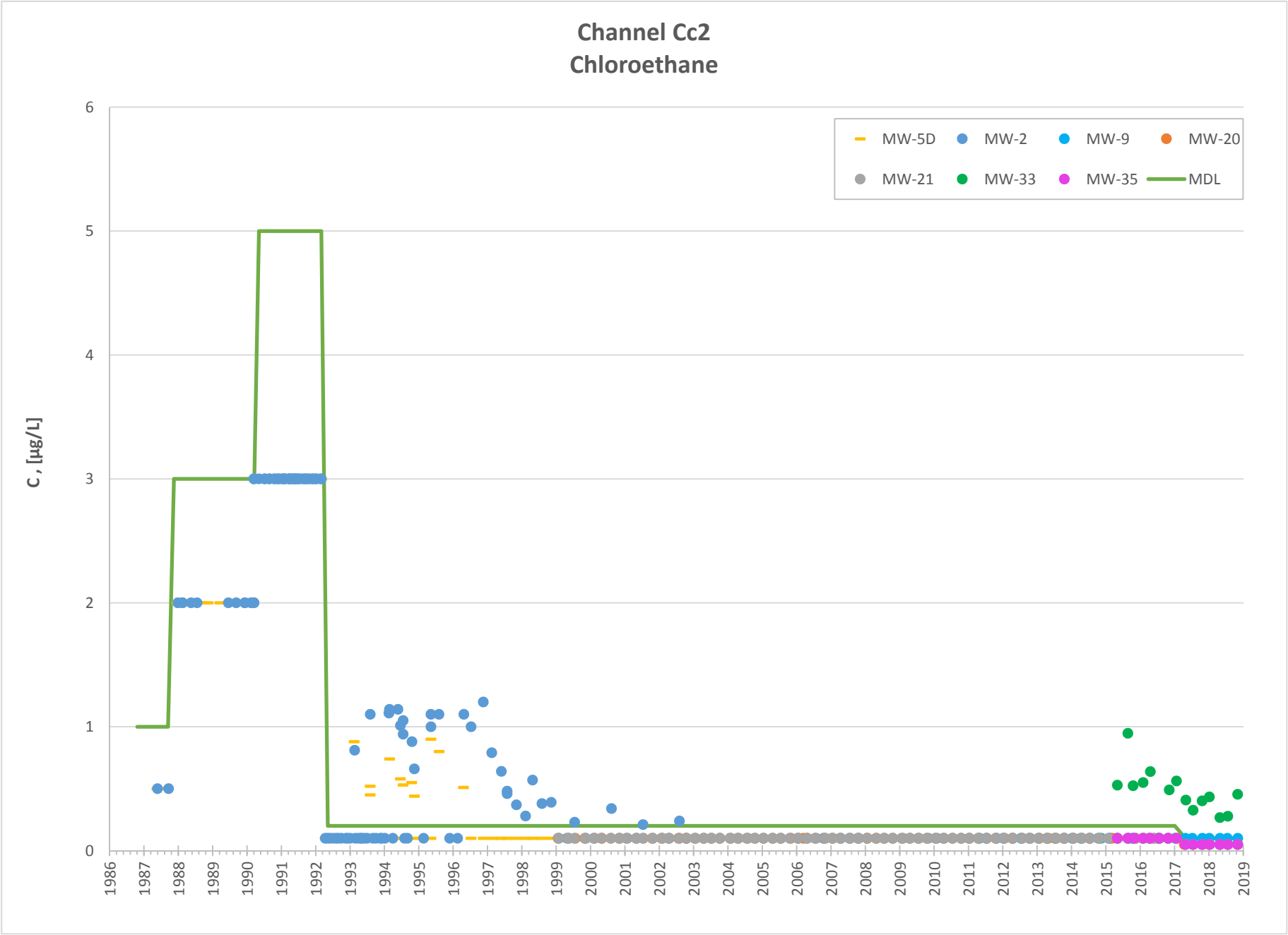

Channel Cc2
Dissolved and Total Sodium
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
Federal and State GW Criteria
Tot. MW-5D
Tot. MW-2
Tot. MW-9
Tot. MW-20
Tot. MW-21
Tot. MW-33
Tot. MW-35
C Na, [mg/L]
0
5
10
15
20
25
30
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

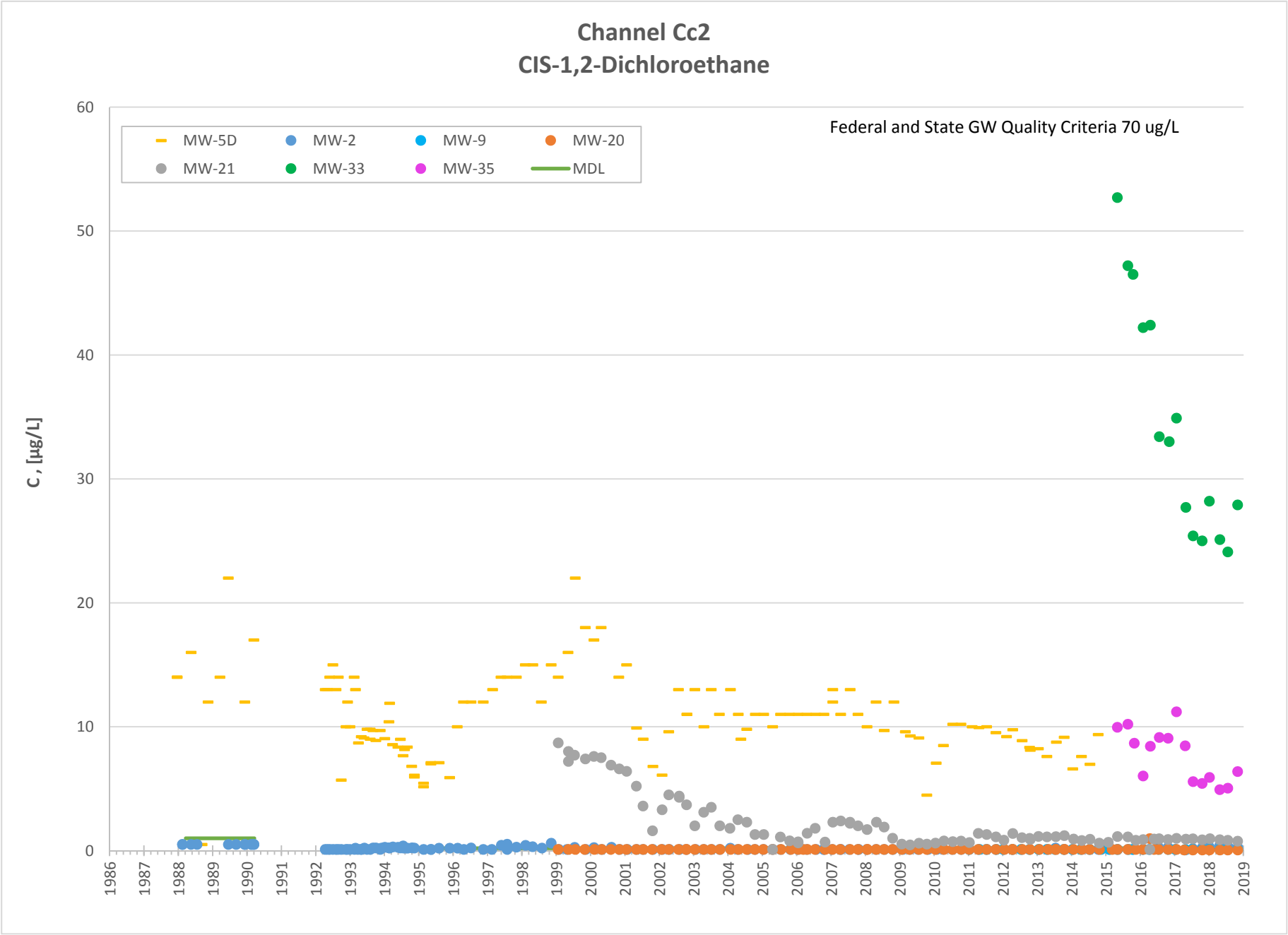


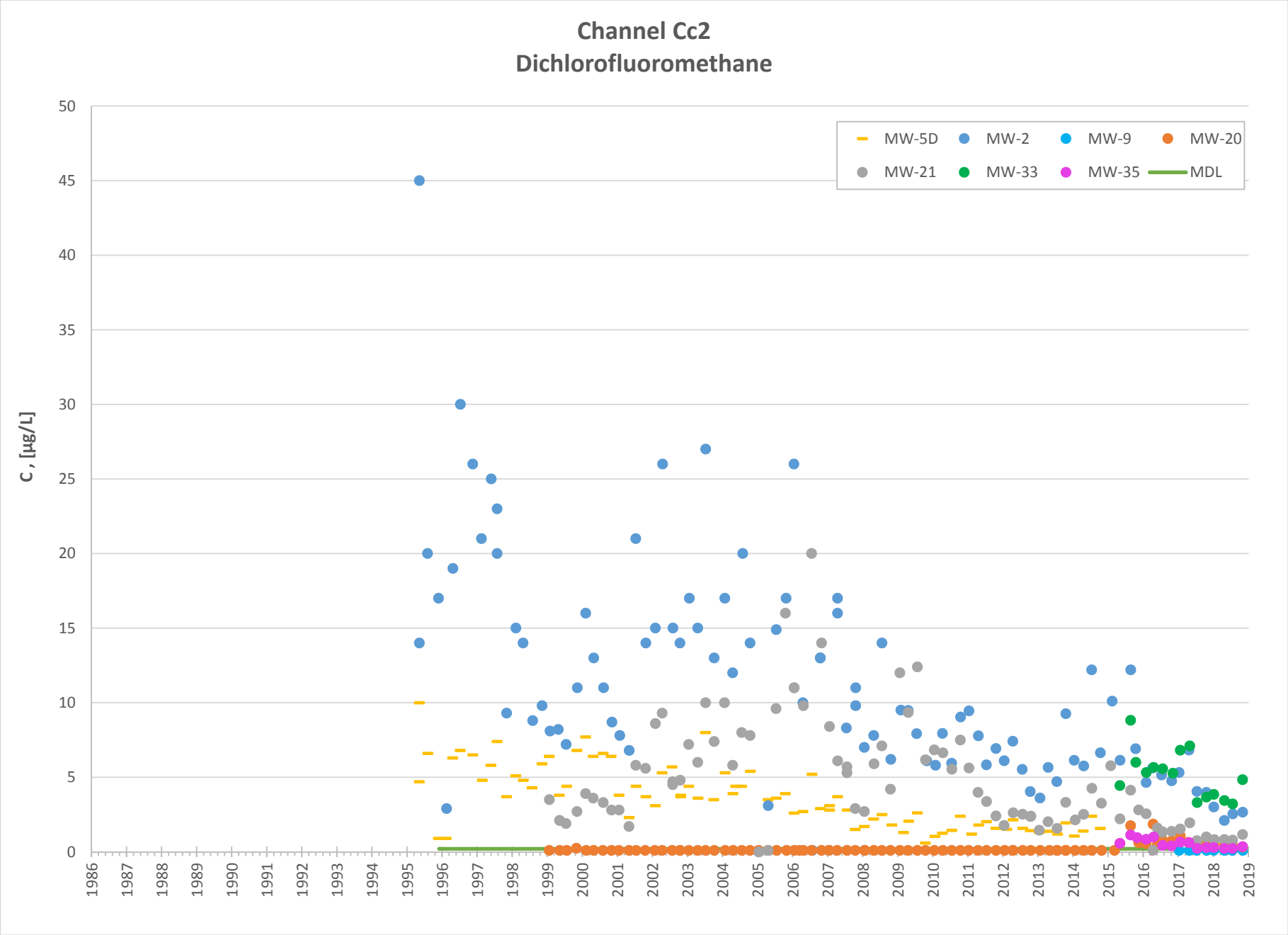
Note: Data point MW-5D from 5/20/87 = 2.5 ug/L

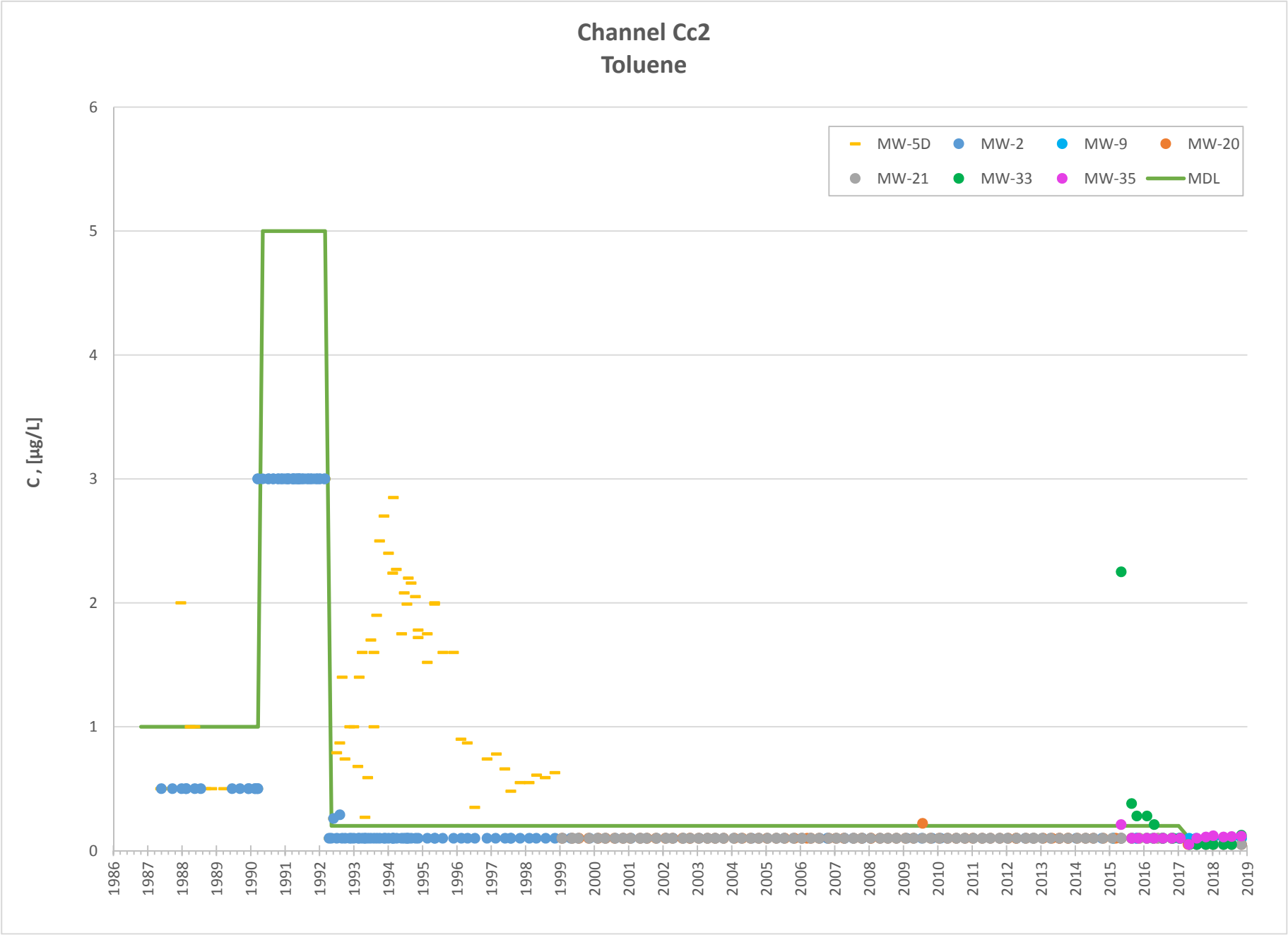

Channel Cc2
1,2-Dichloropropane
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
C , [µg/L]
0
2
4
6
8
10
12
14
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

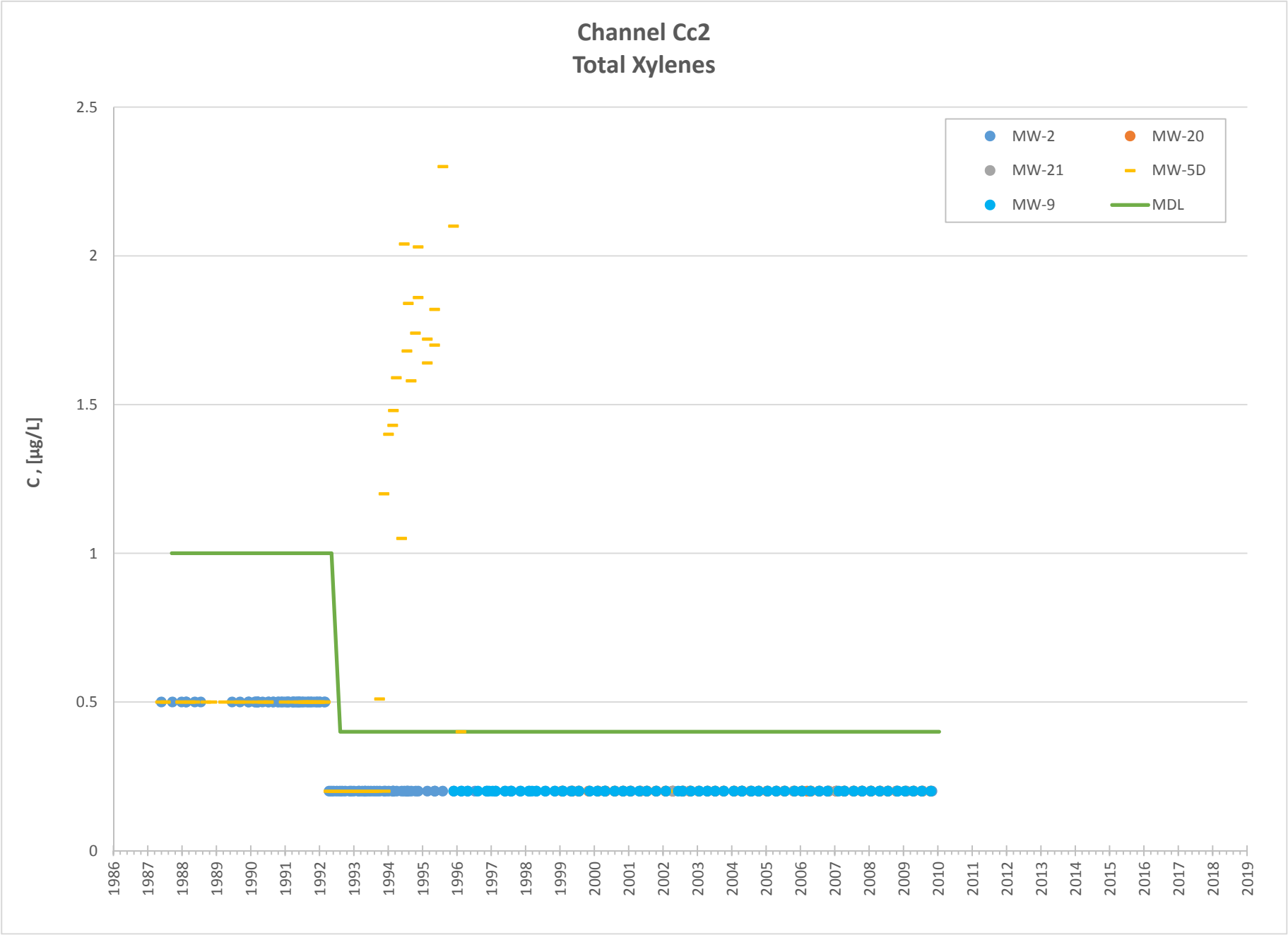

Channel Cc2
Benzene
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
C , [µg/L]
0
1
2
3
4
5
6
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

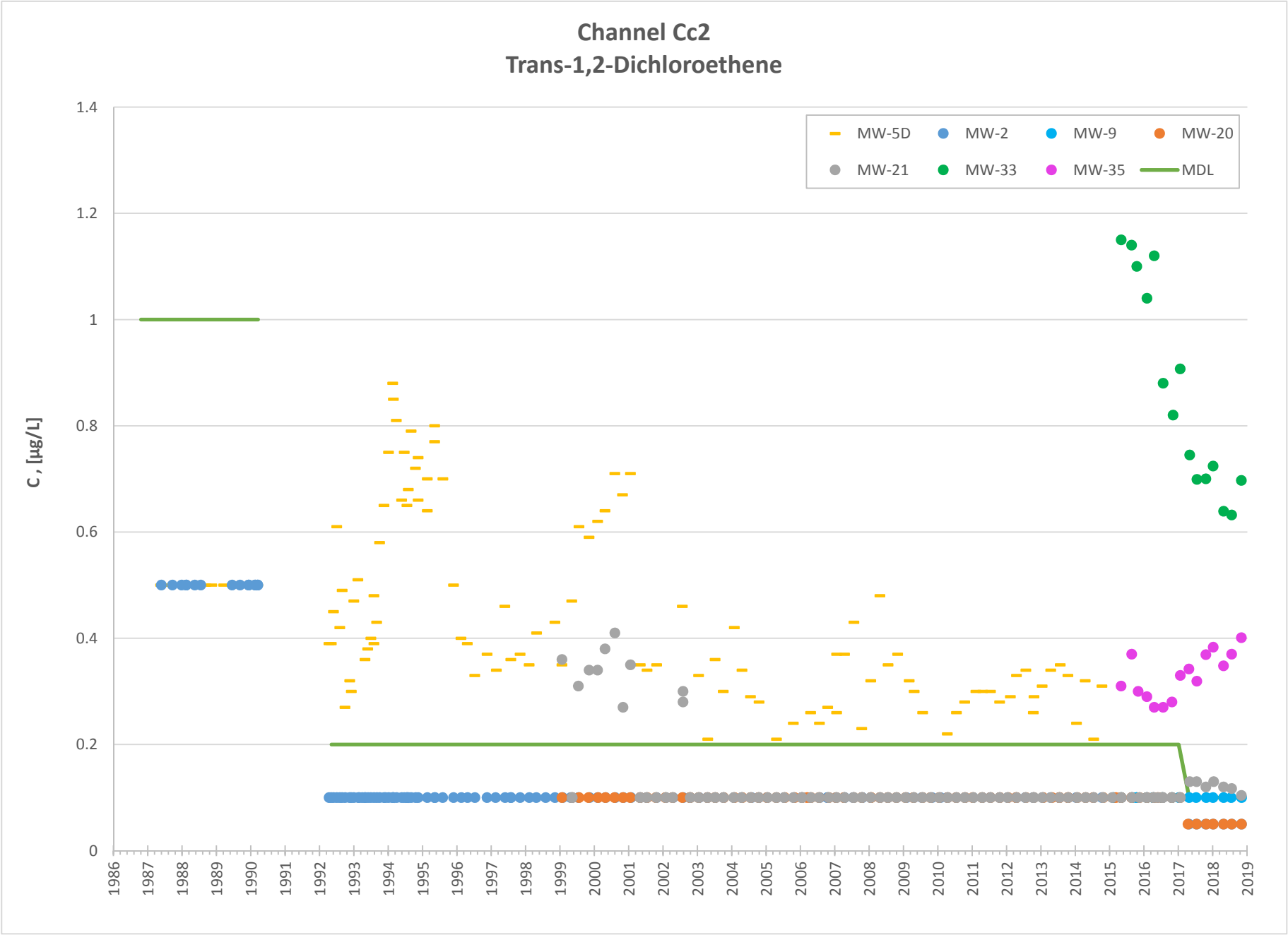

Channel Cc2
Chloroethane
C , [µg/L]
0
1
2
3
4
5
6
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL

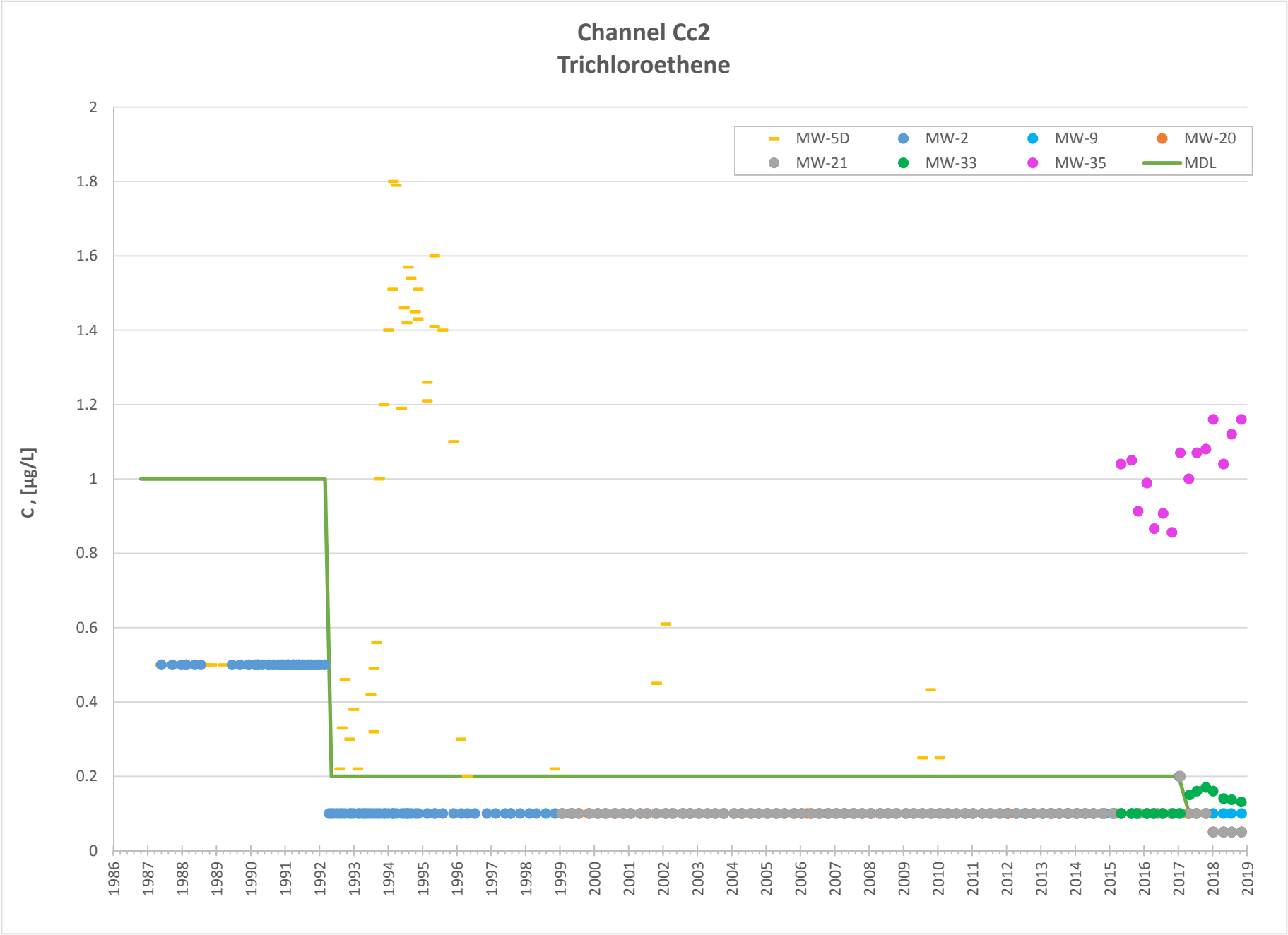

Channel Cc2
CIS-1,2-Dichloroethane
Federal and State GW Quality Criteria 70 ug/L
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
C , [ug/L]
60
50
40
30
20
10
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

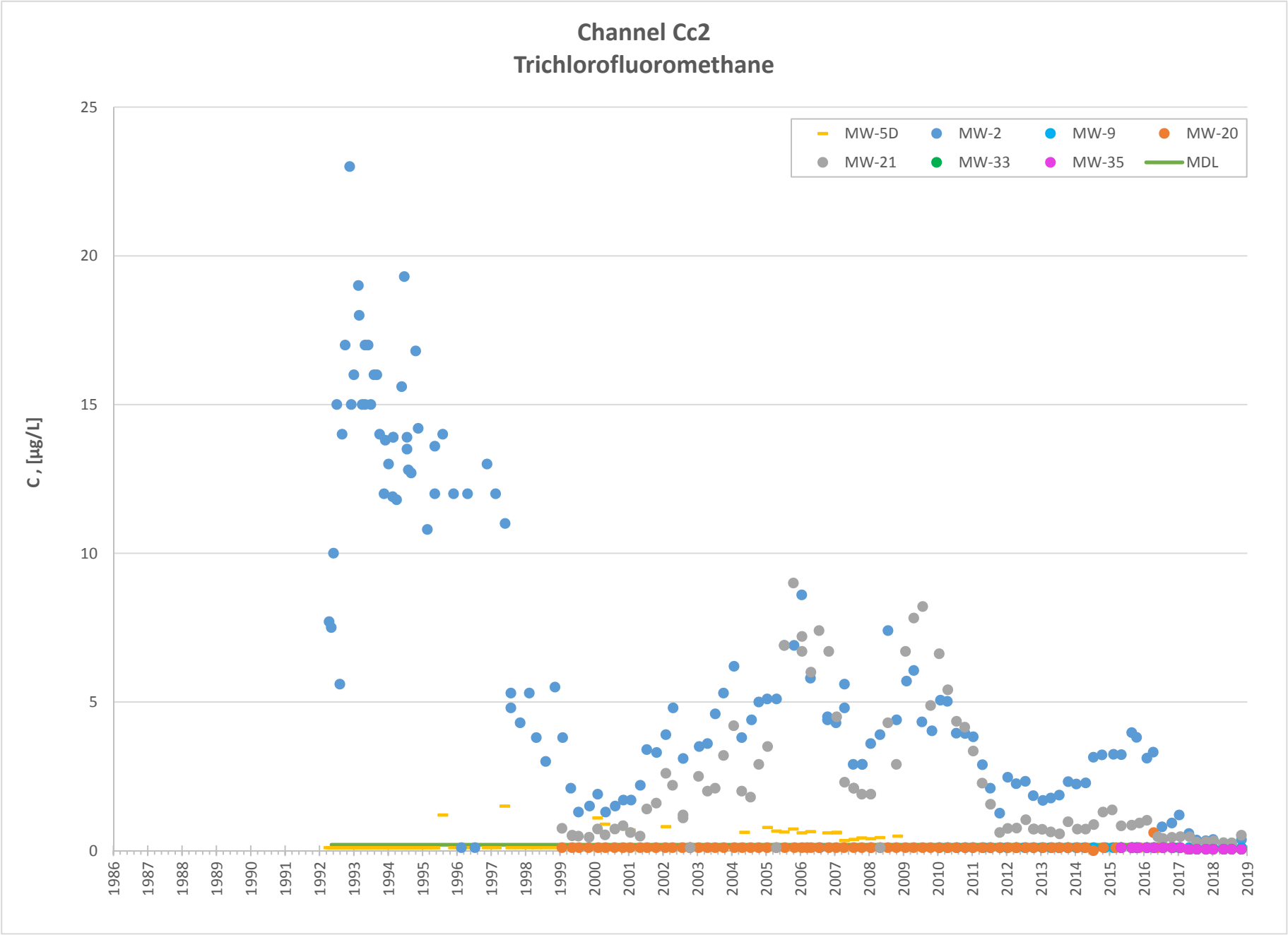

Channel Cc2
Dichlorofluoromethane
C , [µg/L]
50
45
40
35
30
25
20
15
10
5
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL

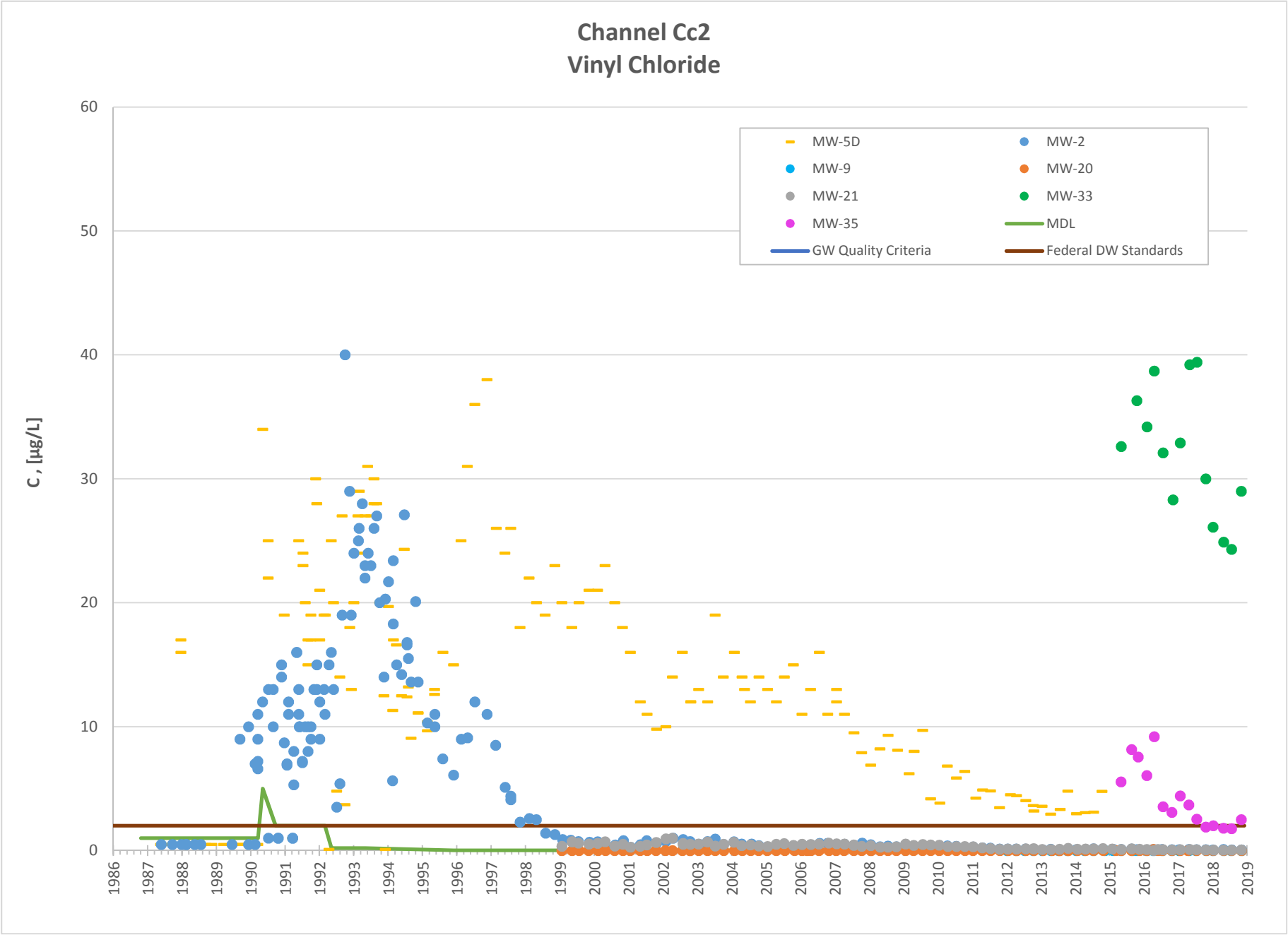

Channel Cc2
Toluene
C , [µg/L]
0
1
2
3
4
5
6
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL


Channel Cc2
Total Xylenes
C , [µg/L]
2.5
2
1.5
1
0.5
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-2
MW-20
MW-21
MW-5D
MW-9
MDL


Channel Cc2
Trans-1,2-Dichloroethene
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
C , [µg/L]
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

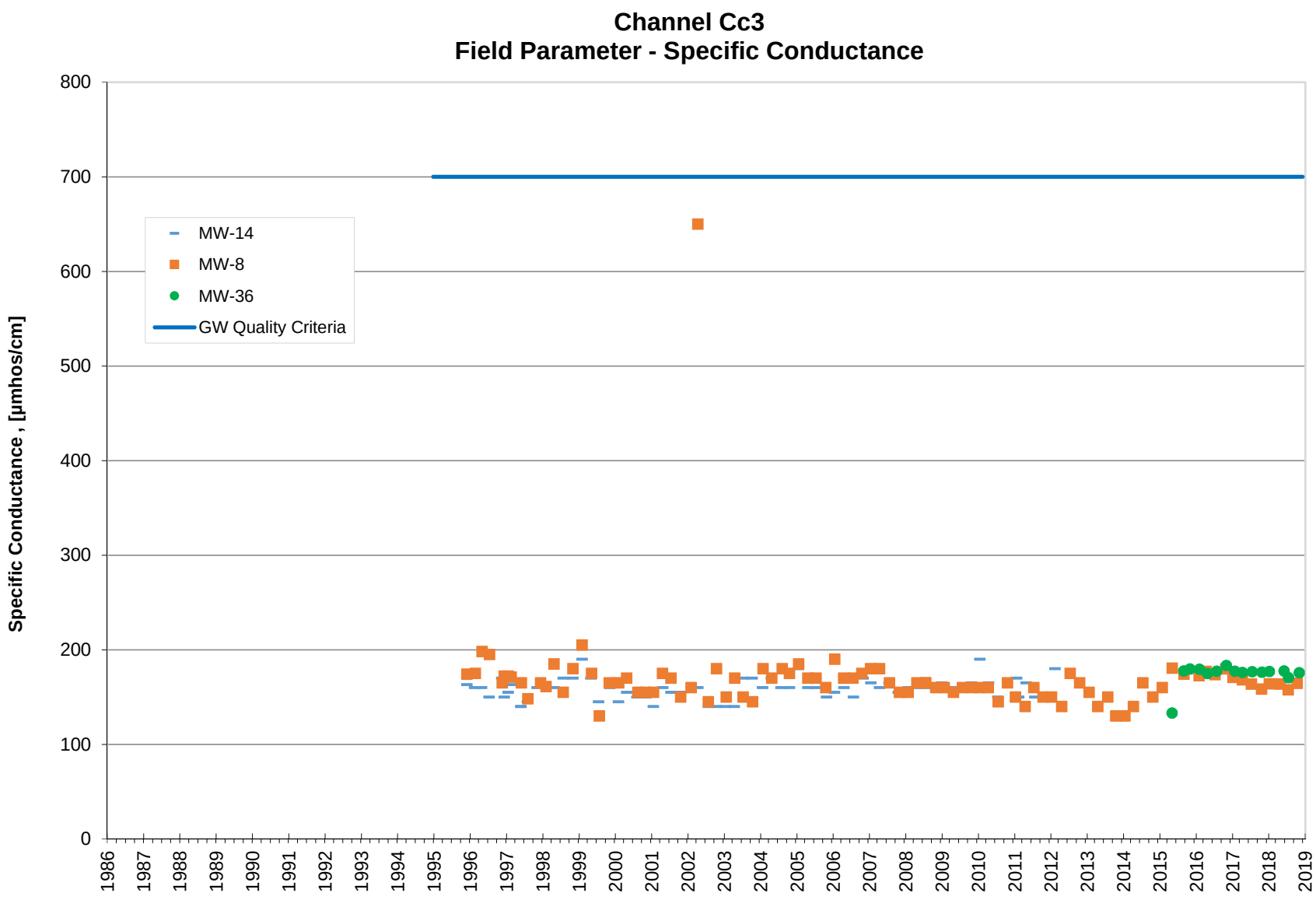

Channel Cc2
Trichloroethene
C , [µg/L]
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

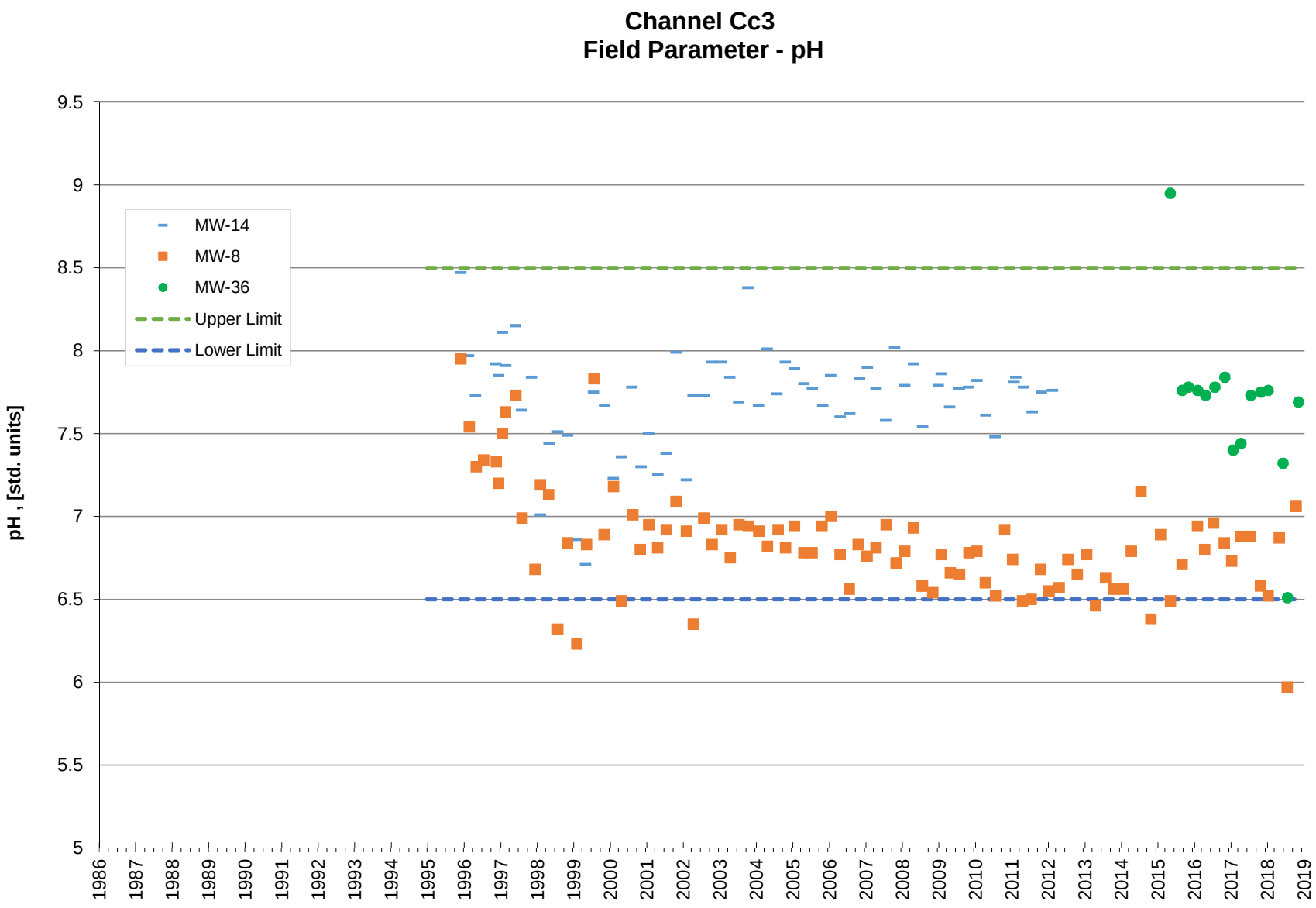

Channel Cc2
Trichlorofluoromethane
C , [µg/L]
25
20
15
10
5
0
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

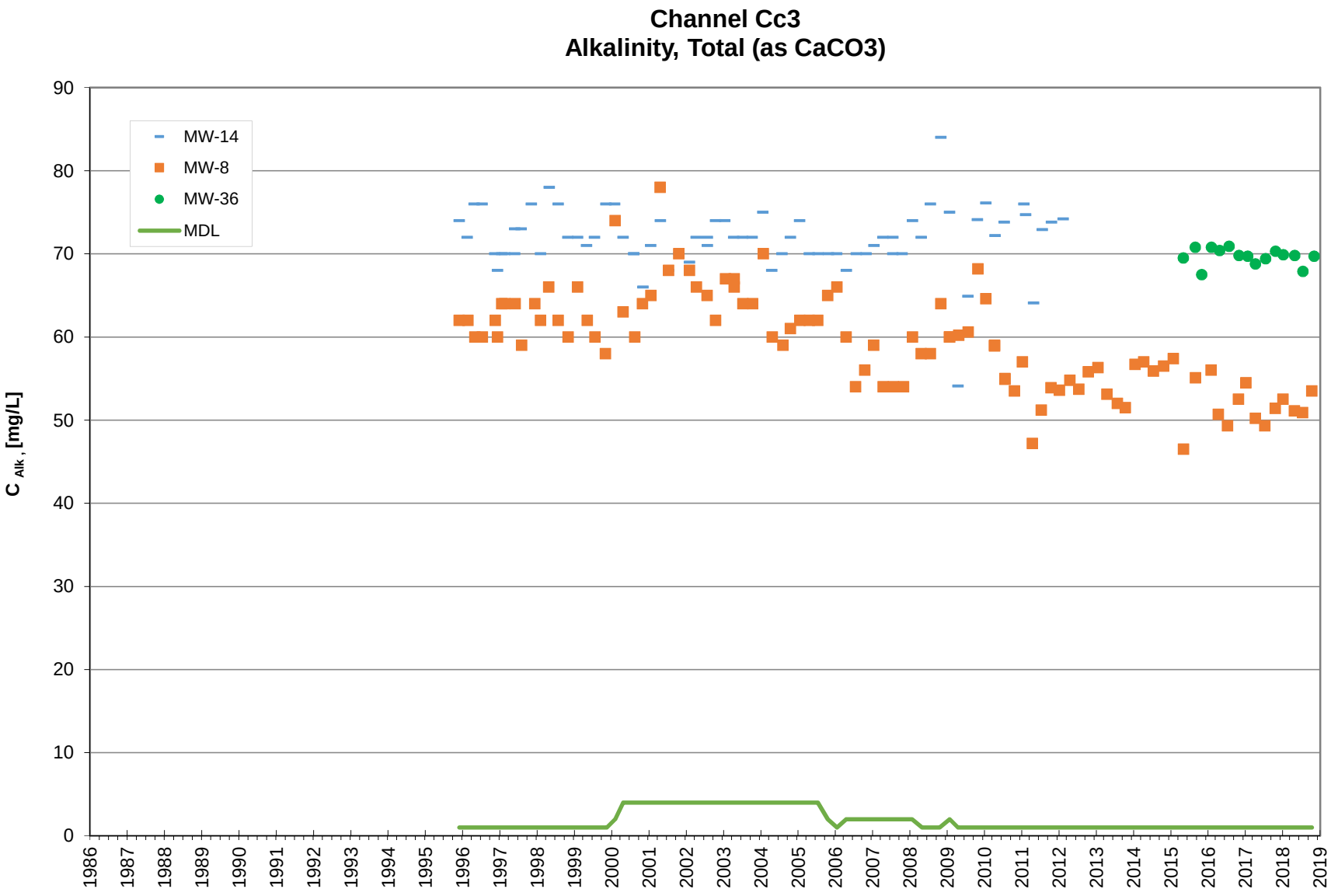

Channel Cc2
Vinyl Chloride
C , [µg/L]
60
50
40
30
20
10
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-5D
MW-2
MW-9
MW-20
MW-21
MW-33
MW-35
MDL
GW Quality Criteria
Federal DW Standards

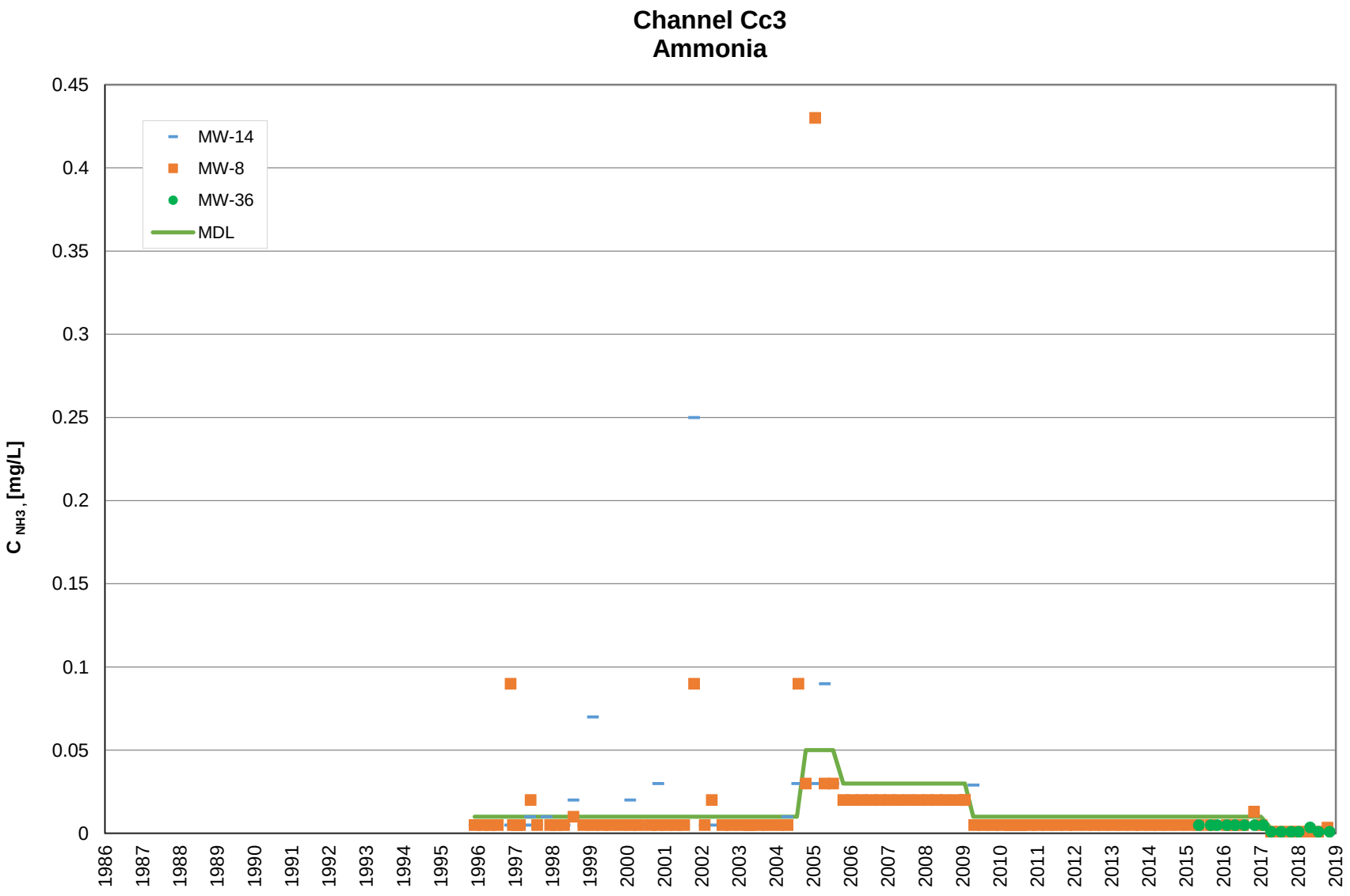
Appendix E

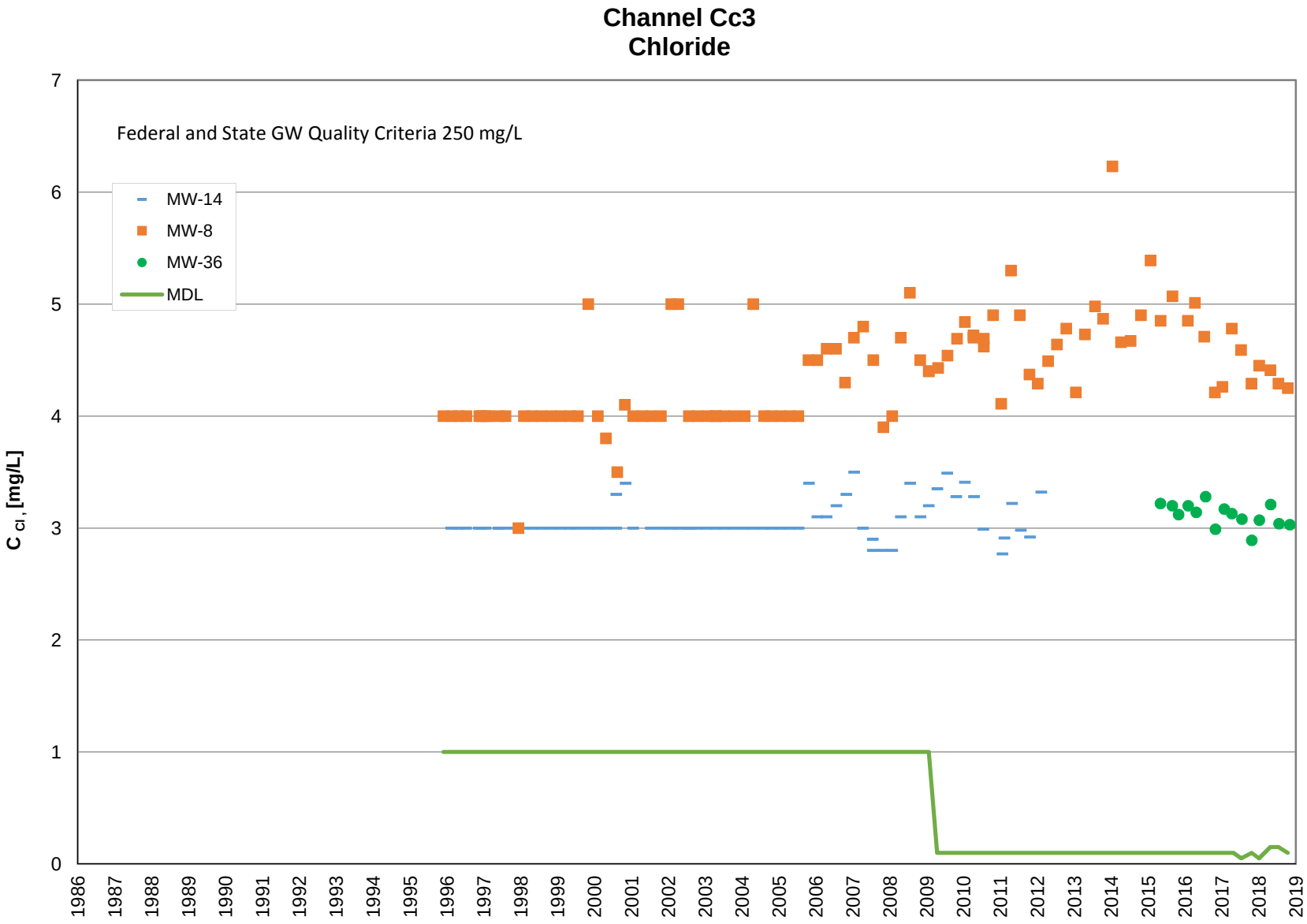
Time Concentration Plots for
Groundwater in Channel Cc3

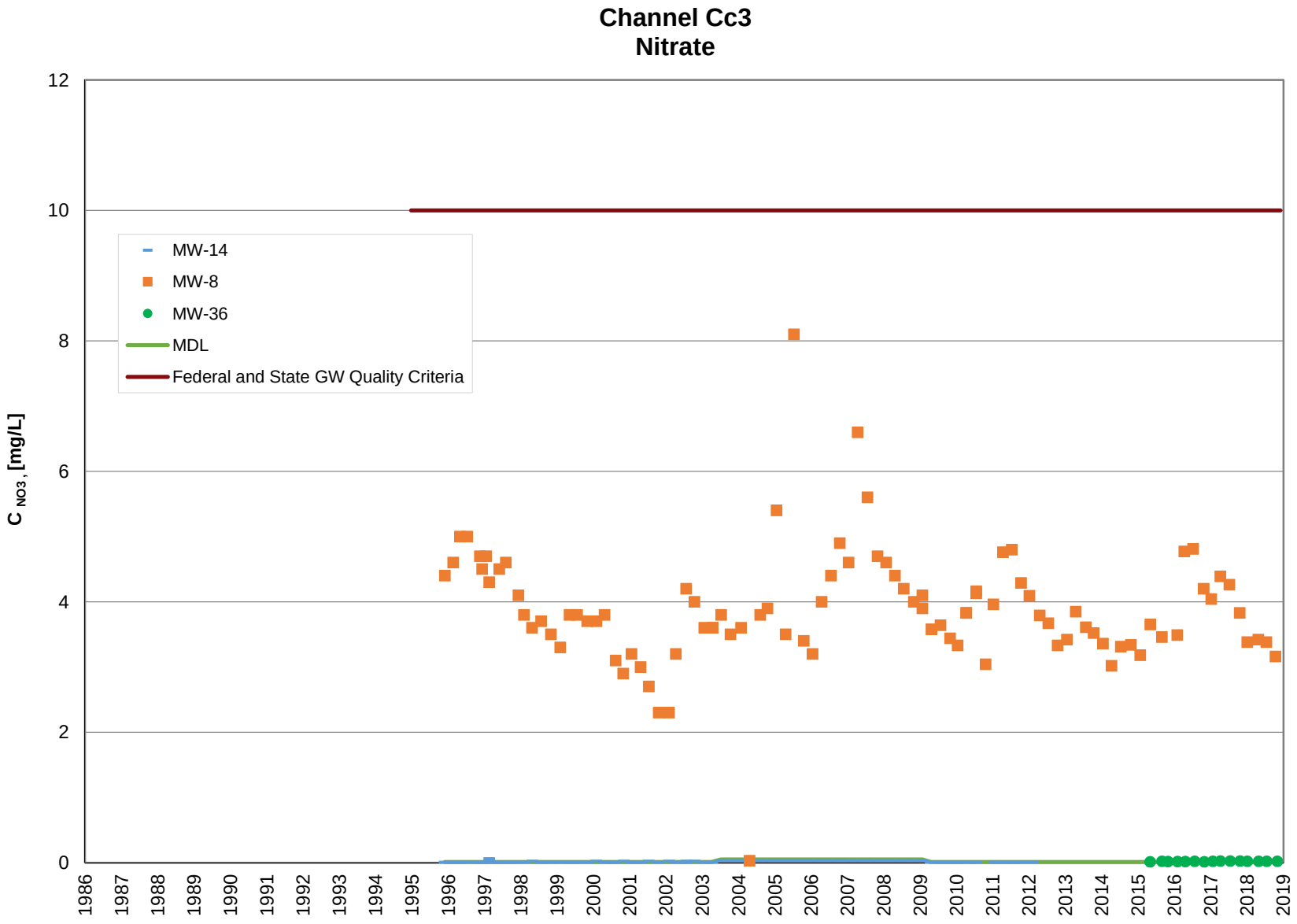

Channel Cc3
Field Parameter - Specific Conductance
Specific Conductance , [µmhos/cm]
800
700
600
500
400
300
200
100
0
MW-14
MW-8
MW-36
GW Quality Criteria
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

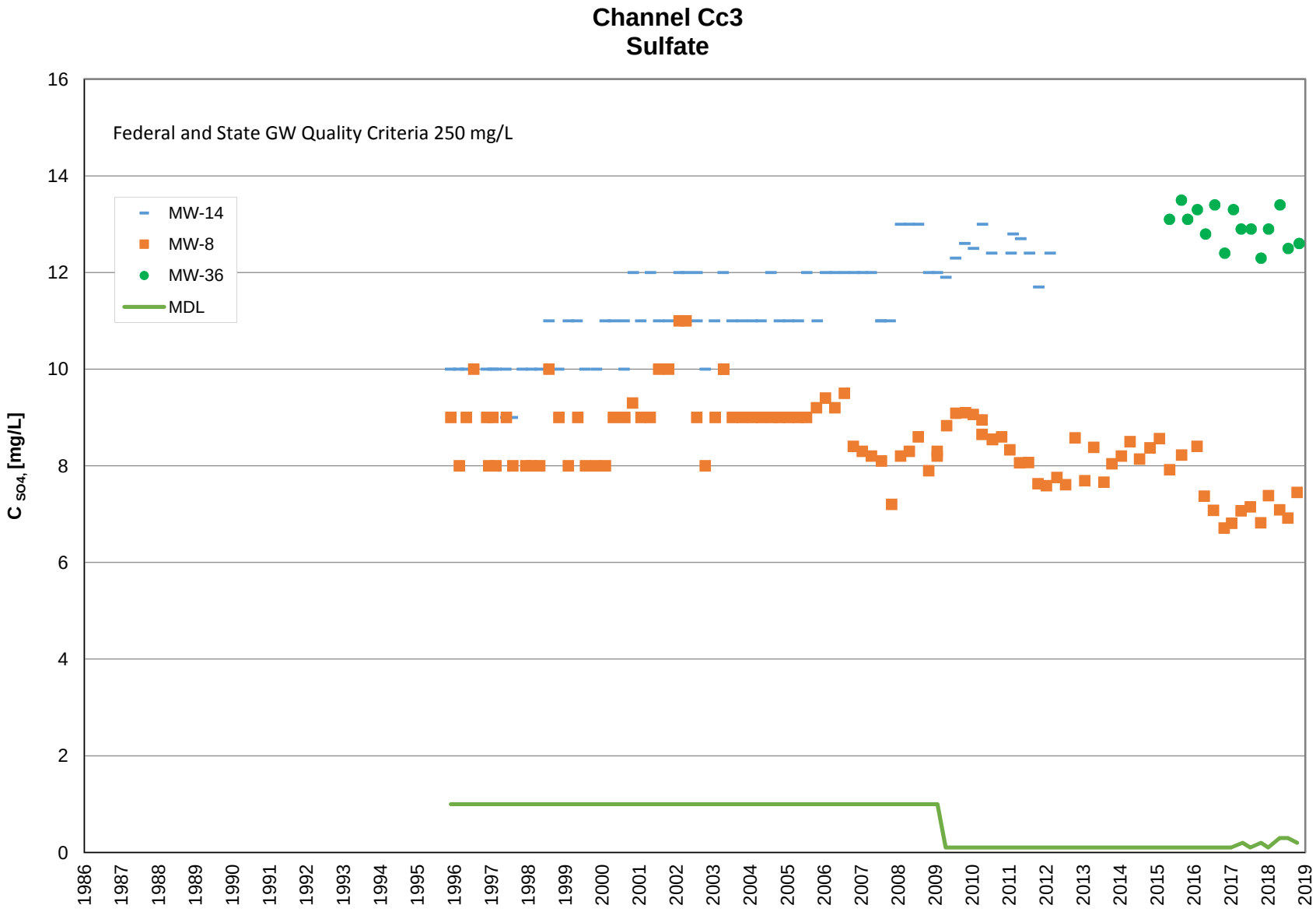

Channel Cc3
Field Parameter - pH
pH , [std. units]
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
MW-14
MW-8
MW-36
Upper Limit
Lower Limit
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

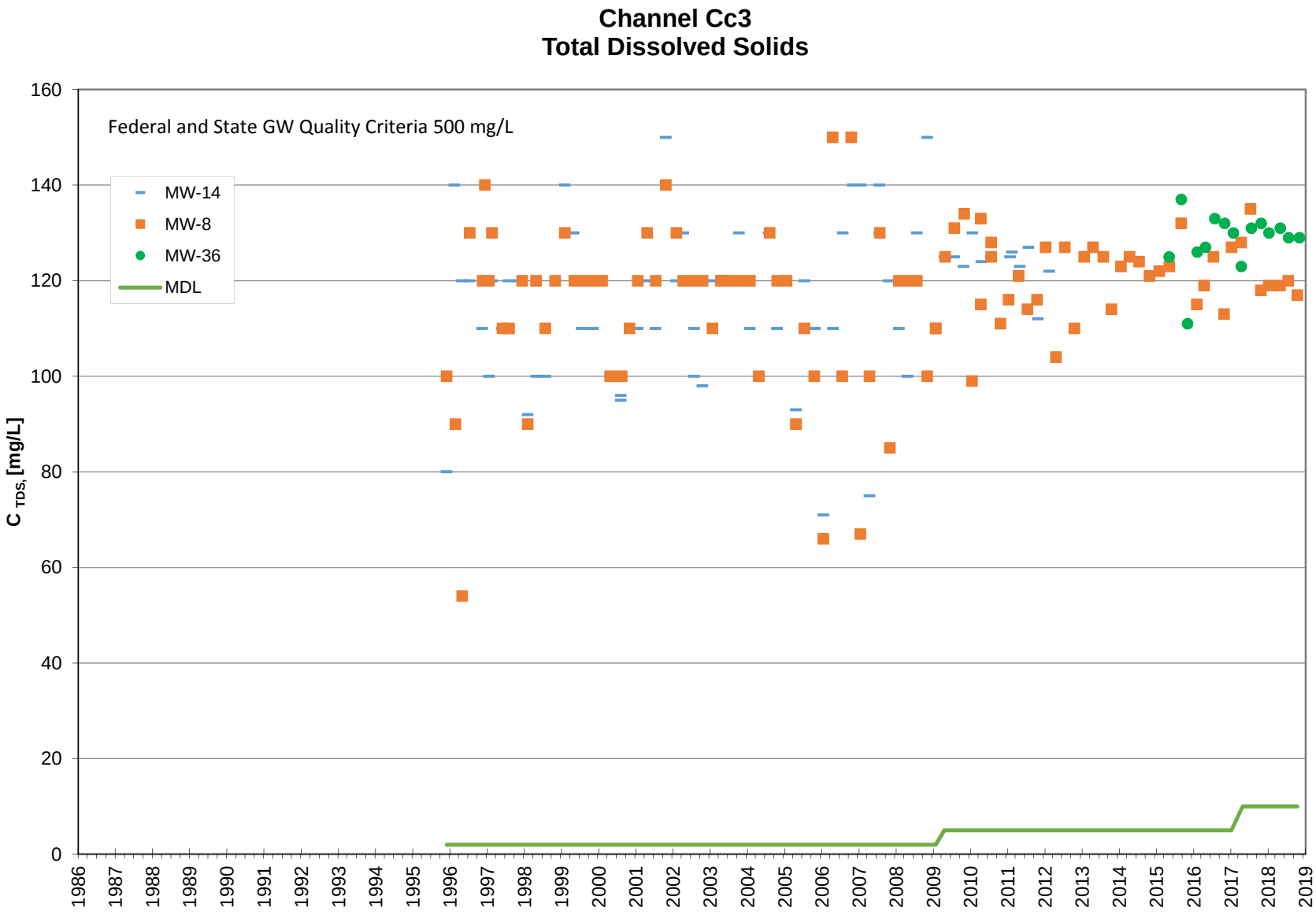

Channel Cc3
Alkalinity, Total (as CaCO3)
MW-14
MW-8
MW-36
MDL
C Alk, [mg/L]
0
10
20
30
40
50
60
70
80
90
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

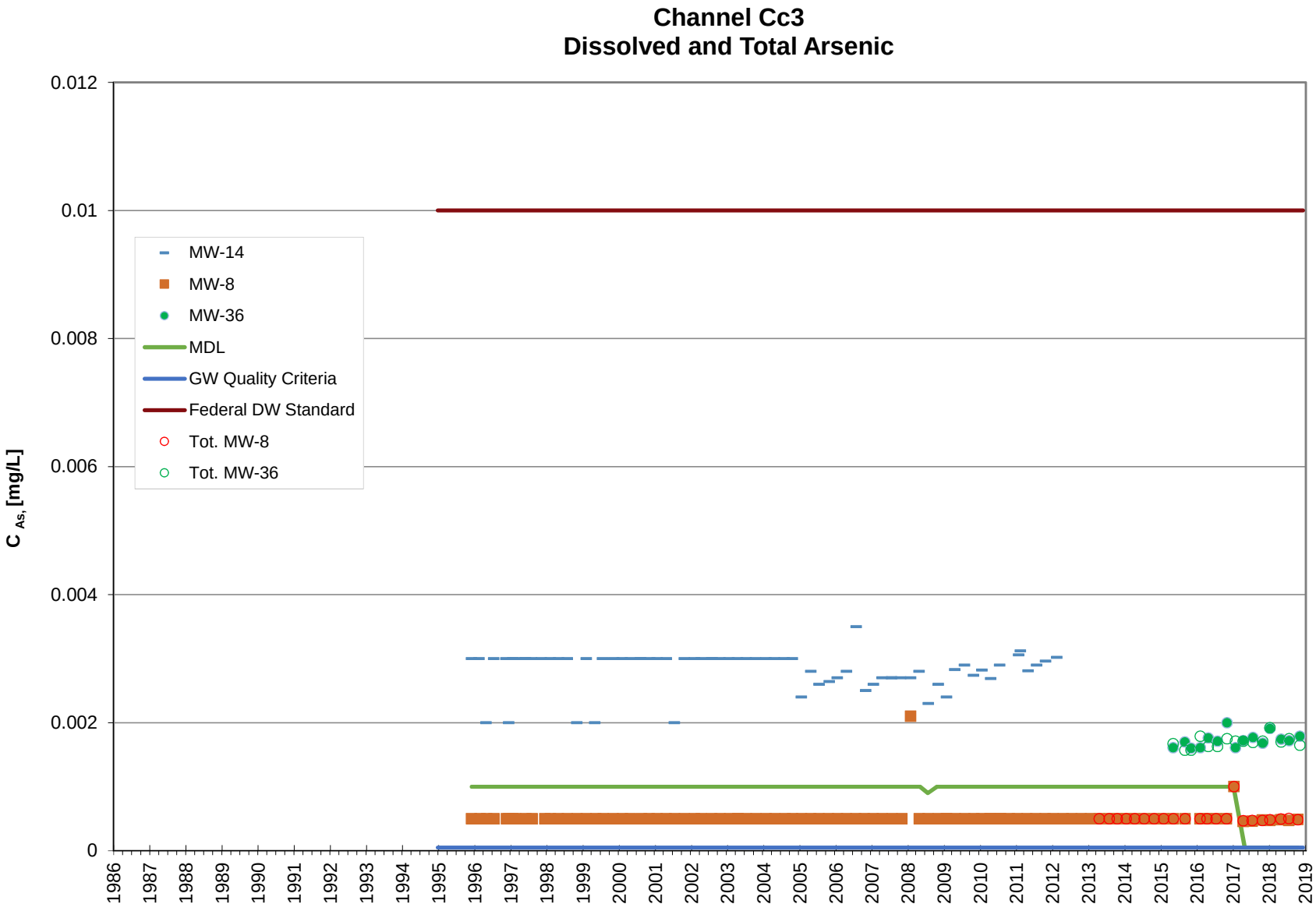

Channel Cc3
Ammonia
MW-14
MW-8
MW-36
MDL
C NH3, [mg/L]
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

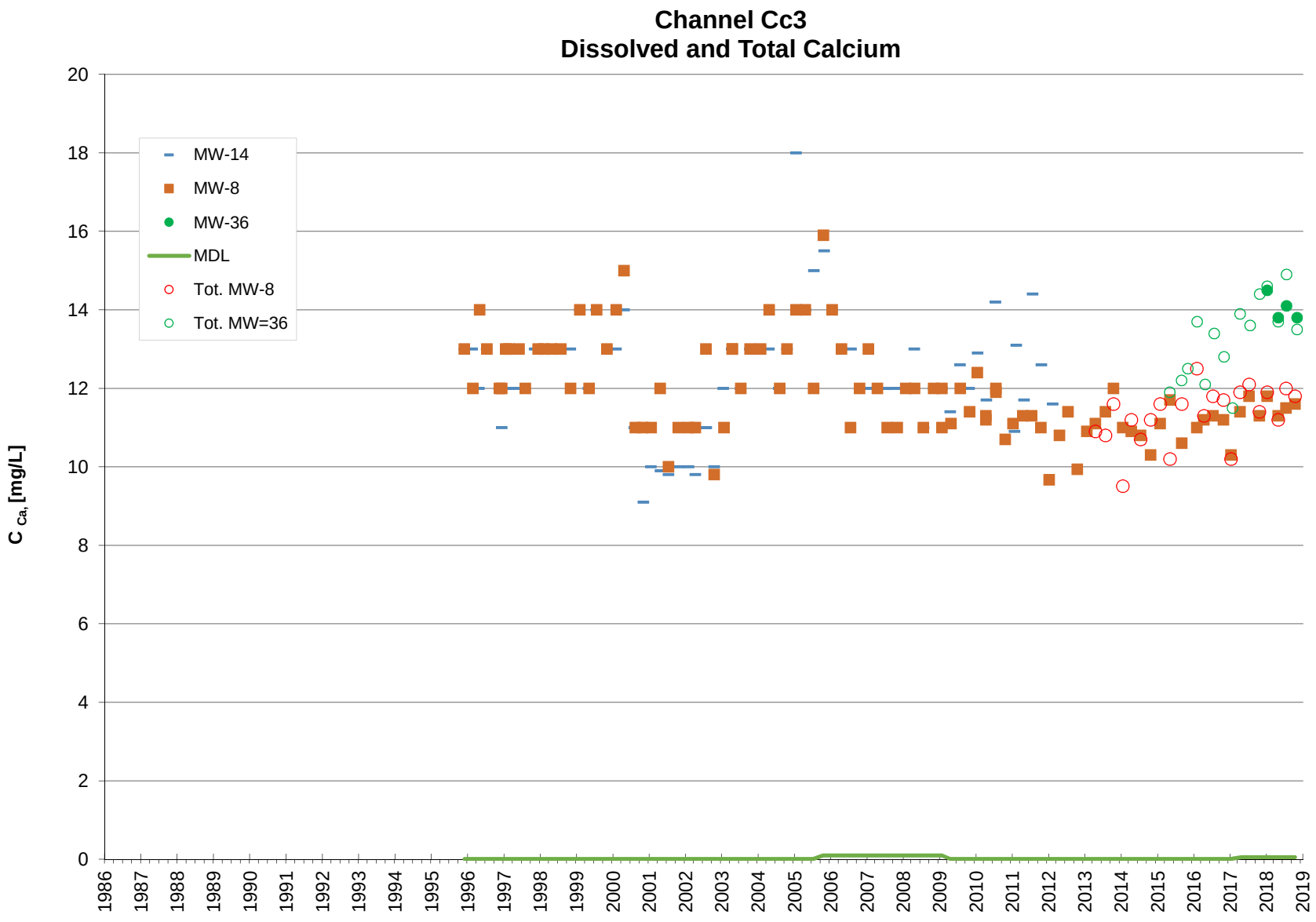

Channel Cc3
Chloride
Federal and State GW Quality Criteria 250 mg/L
MW-14
MW-8
MW-36
MDL
C Cl, [mg/L]
0
1
2
3
4
5
6
7
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

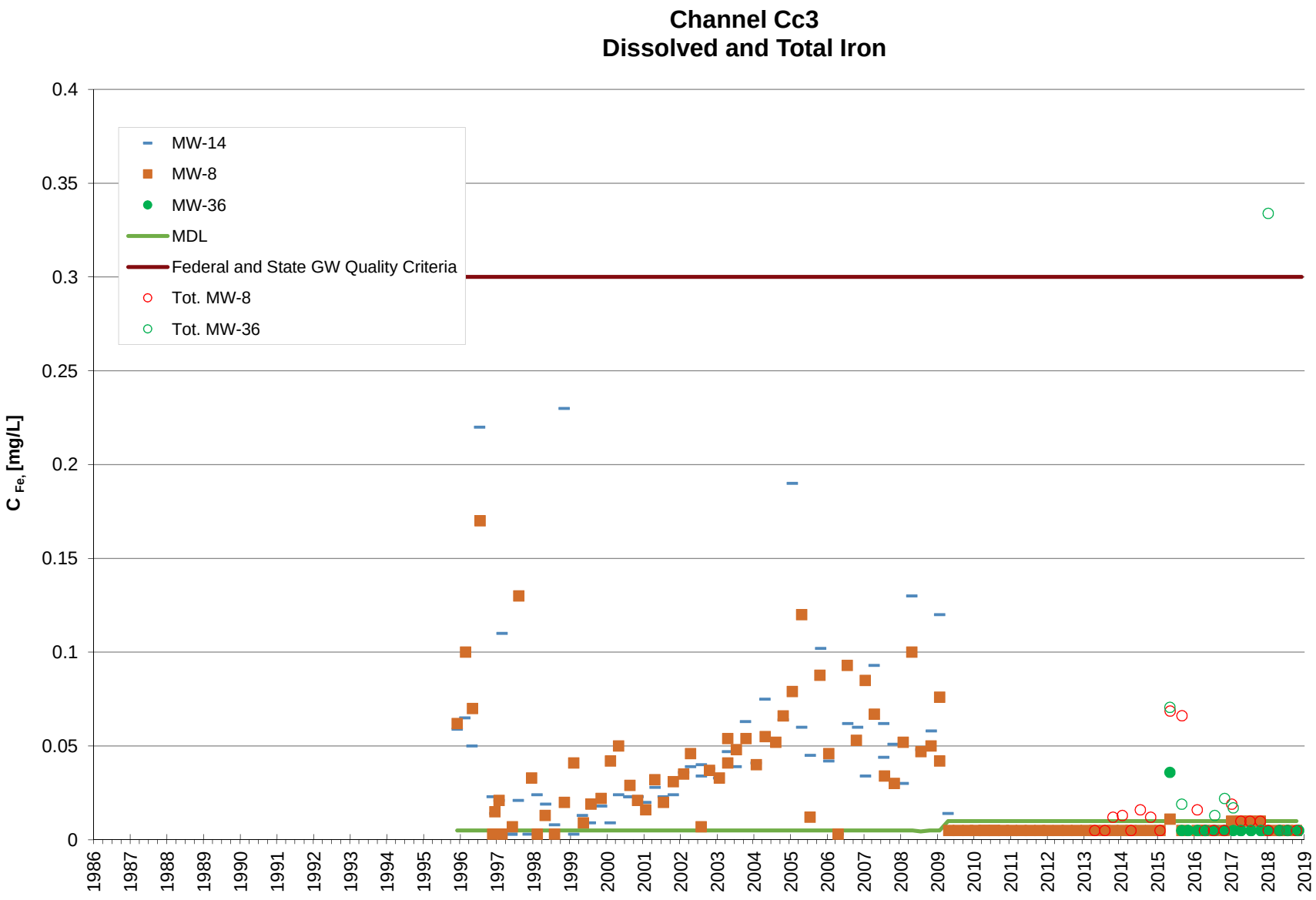

Channel Cc3
Nitrate
12
10
8
6
4
2
0
C NO3, [mg/L]
MW-14
MW-8
MW-36
MDL
Federal and State GW Quality Criteria
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

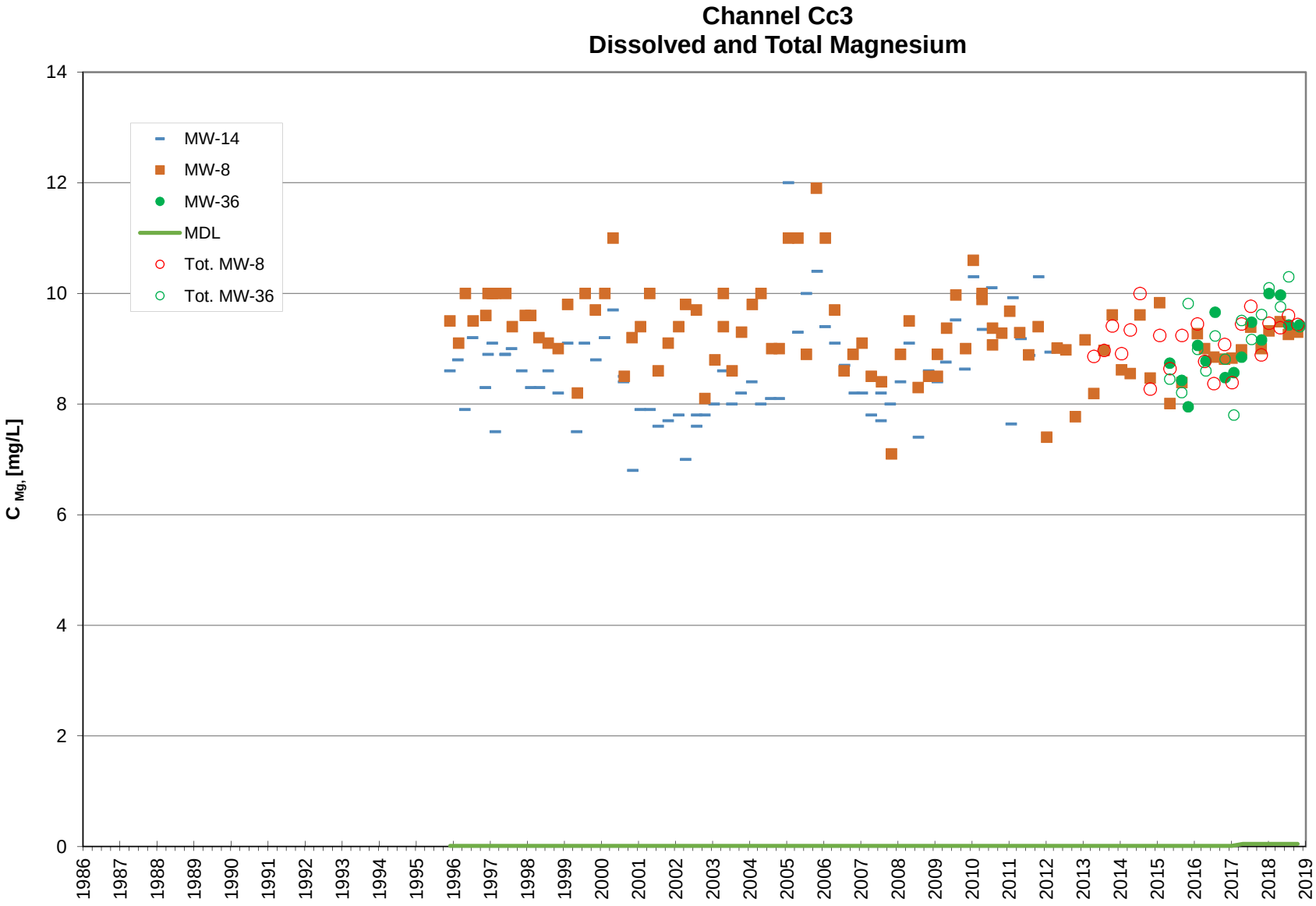

Channel Cc3
Sulfate
Federal and State GW Quality Criteria 250 mg/L
MW-14
MW-8
MW-36
MDL
C SO4, [mg/L]
0
2
4
6
8
10
12
14
16
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

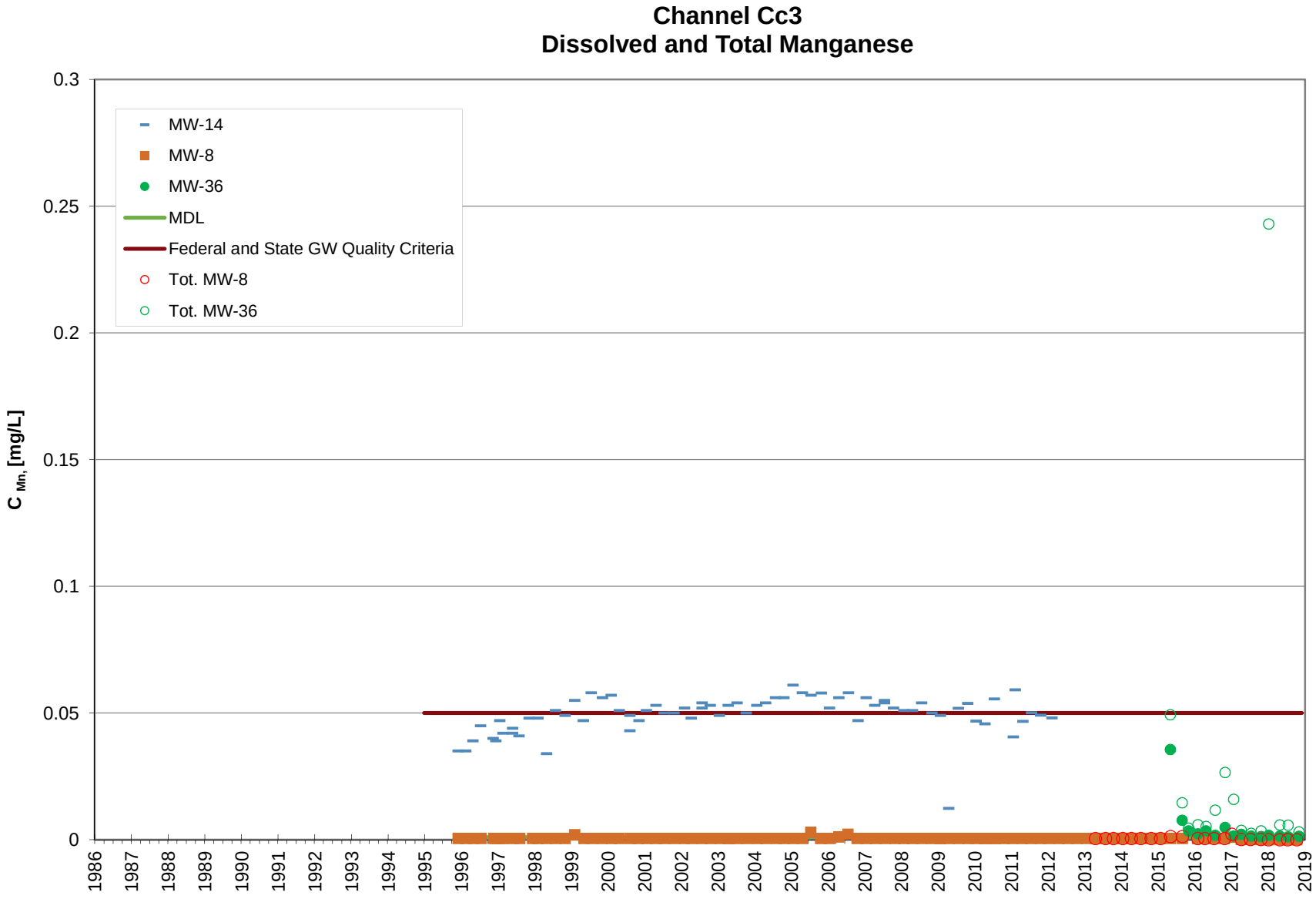

Channel Cc3
Total Dissolved Solids
Federal and State GW Quality Criteria 500 mg/L
MW-14
MW-8
MW-36
MDL
C TDS, [mg/L]
0
20
40
60
80
100
120
140
160
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

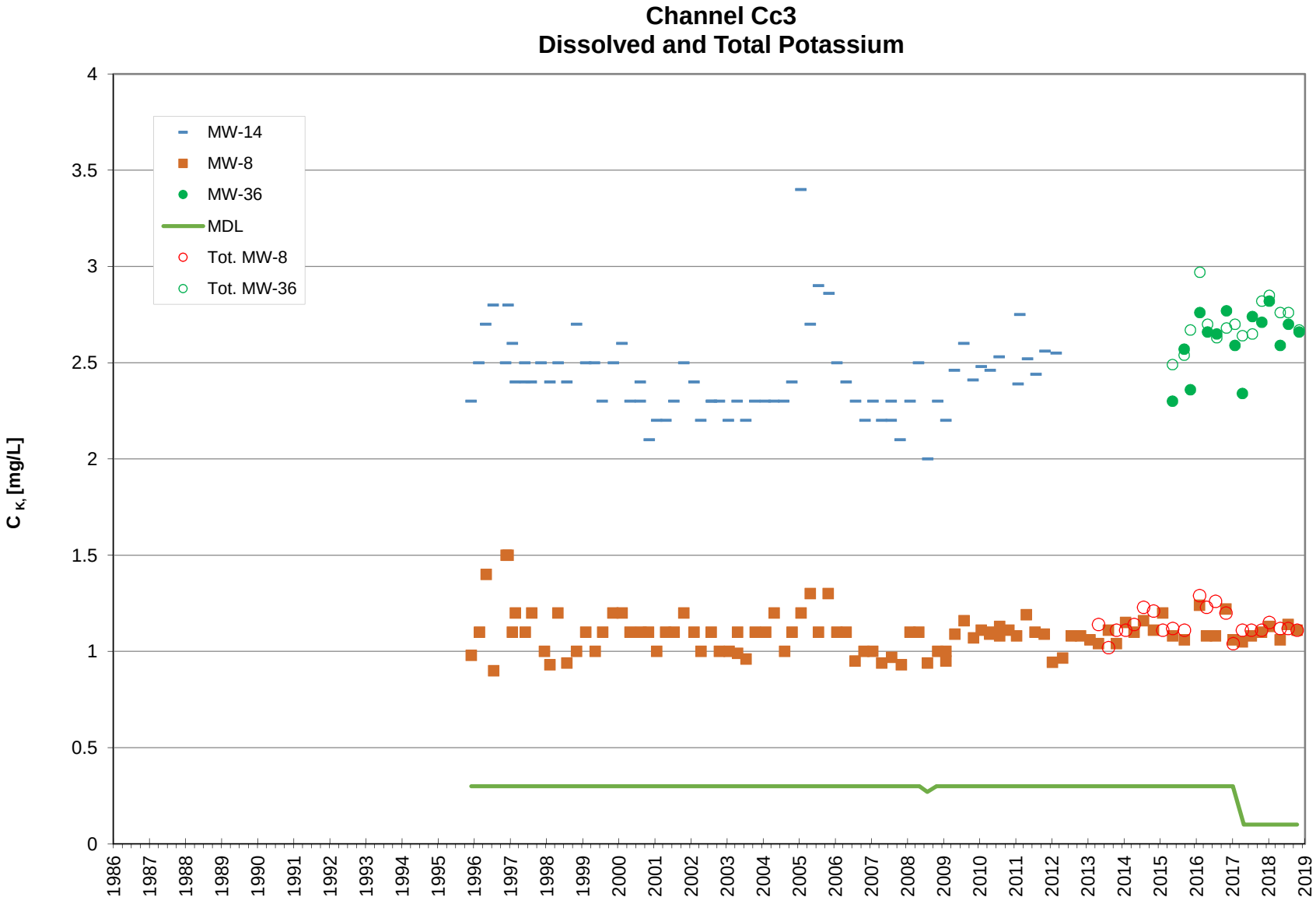

Channel Cc3
Dissolved and Total Arsenic
C As, [mg/L]
0.012
0.01
0.008
0.006
0.004
0.002
0
MW-14
MW-8
MW-36
MDL
GW Quality Criteria
Federal DW Standard
Tot. MW-8
Tot. MW-36
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

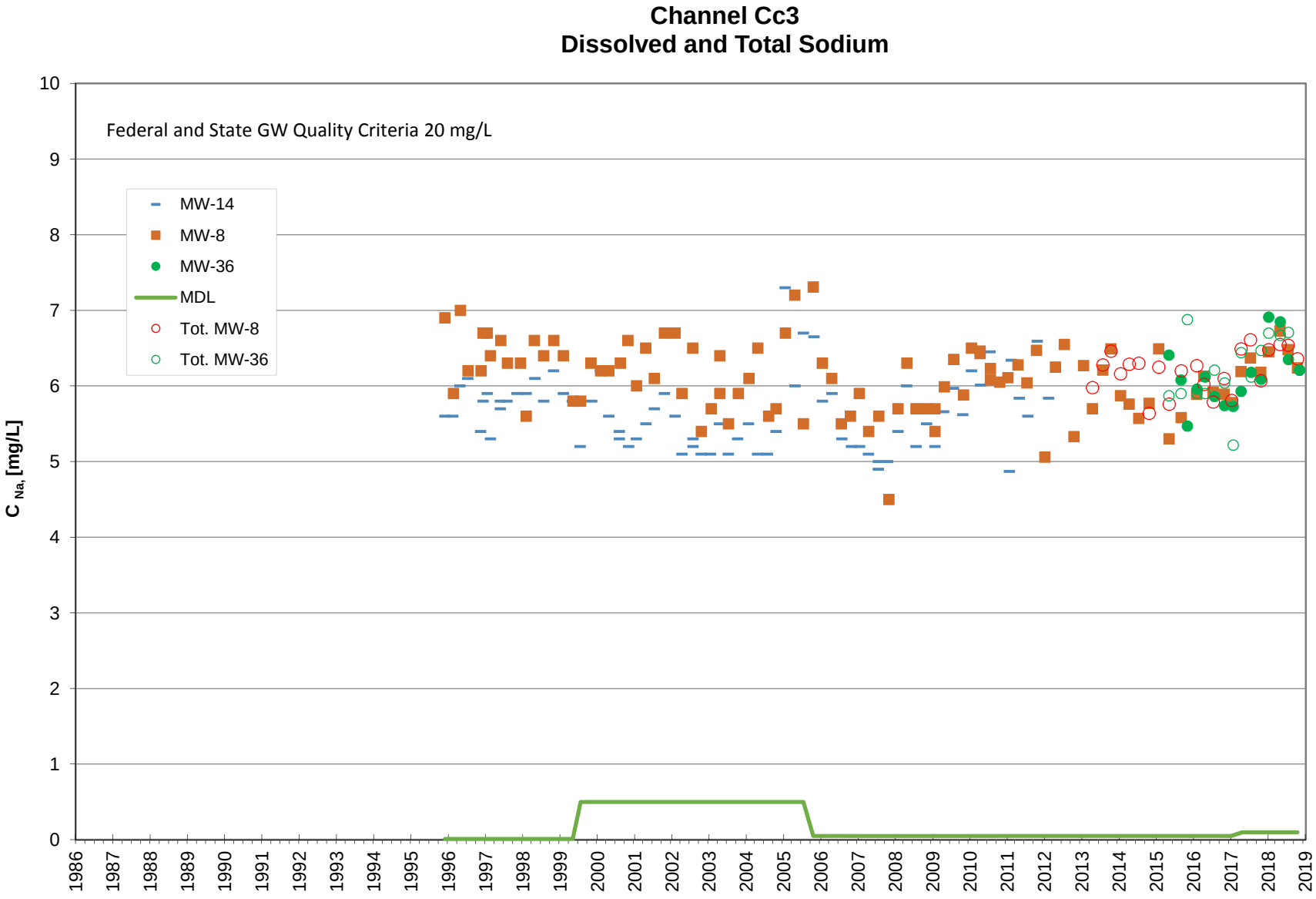

Channel Cc3
Dissolved and Total Calcium
C Ca, [mg/L]
MW-14
MW-8
MW-36
MDL
Tot. MW-8
Tot. MW=36
0
2
4
6
8
10
12
14
16
18
20
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

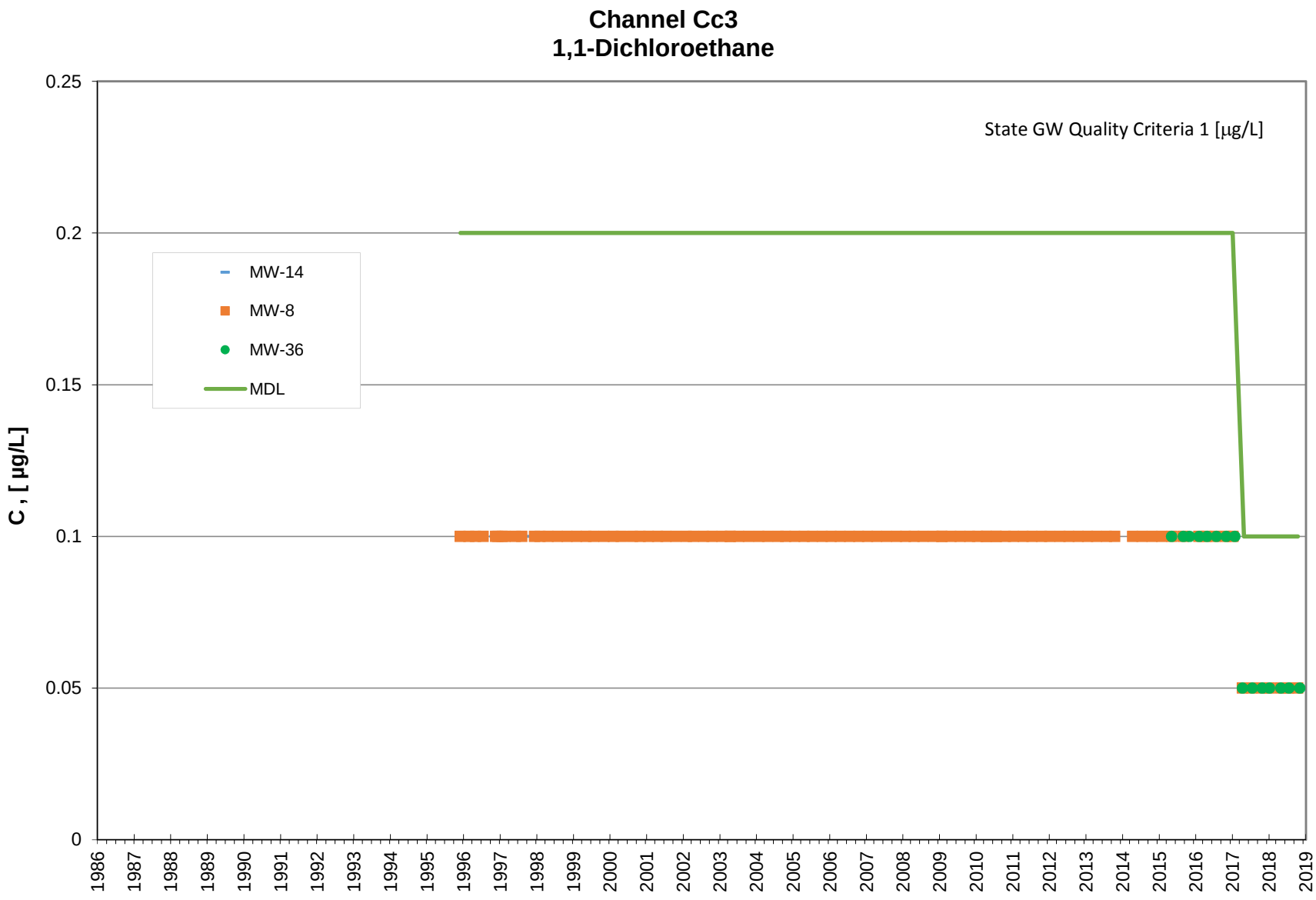

Channel Cc3
Dissolved and Total Iron
MW-14
MW-8
MW-36
MDL
Federal and State GW Quality Criteria
Tot. MW-8
Tot. MW-36
C Fe, [mg/L]
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

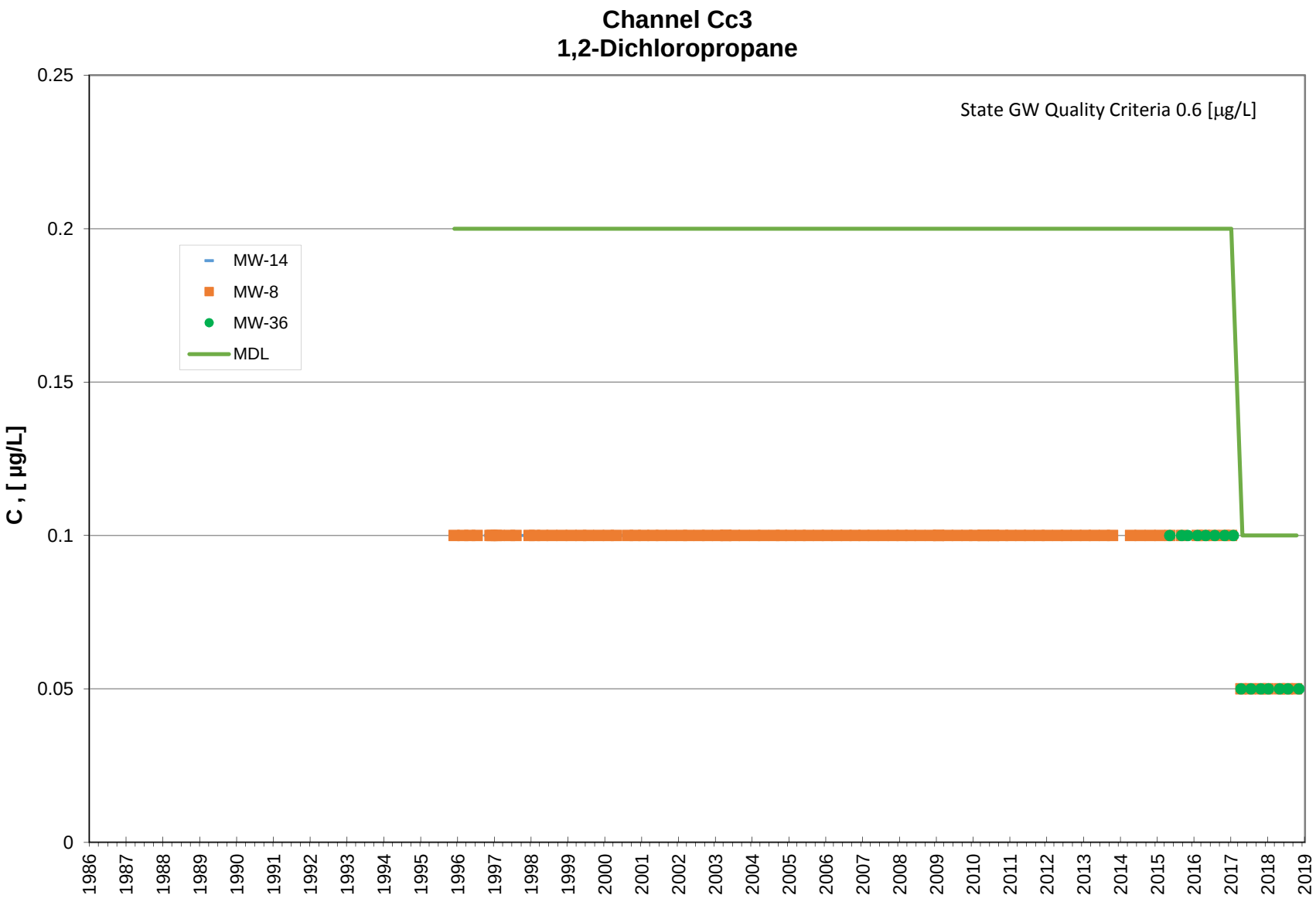

Channel Cc3
Dissolved and Total Magnesium
MW-14
MW-8
MW-36
MDL
Tot. MW-8
Tot. MW-36
C Mg, [mg/L]
0
2
4
6
8
10
12
14
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

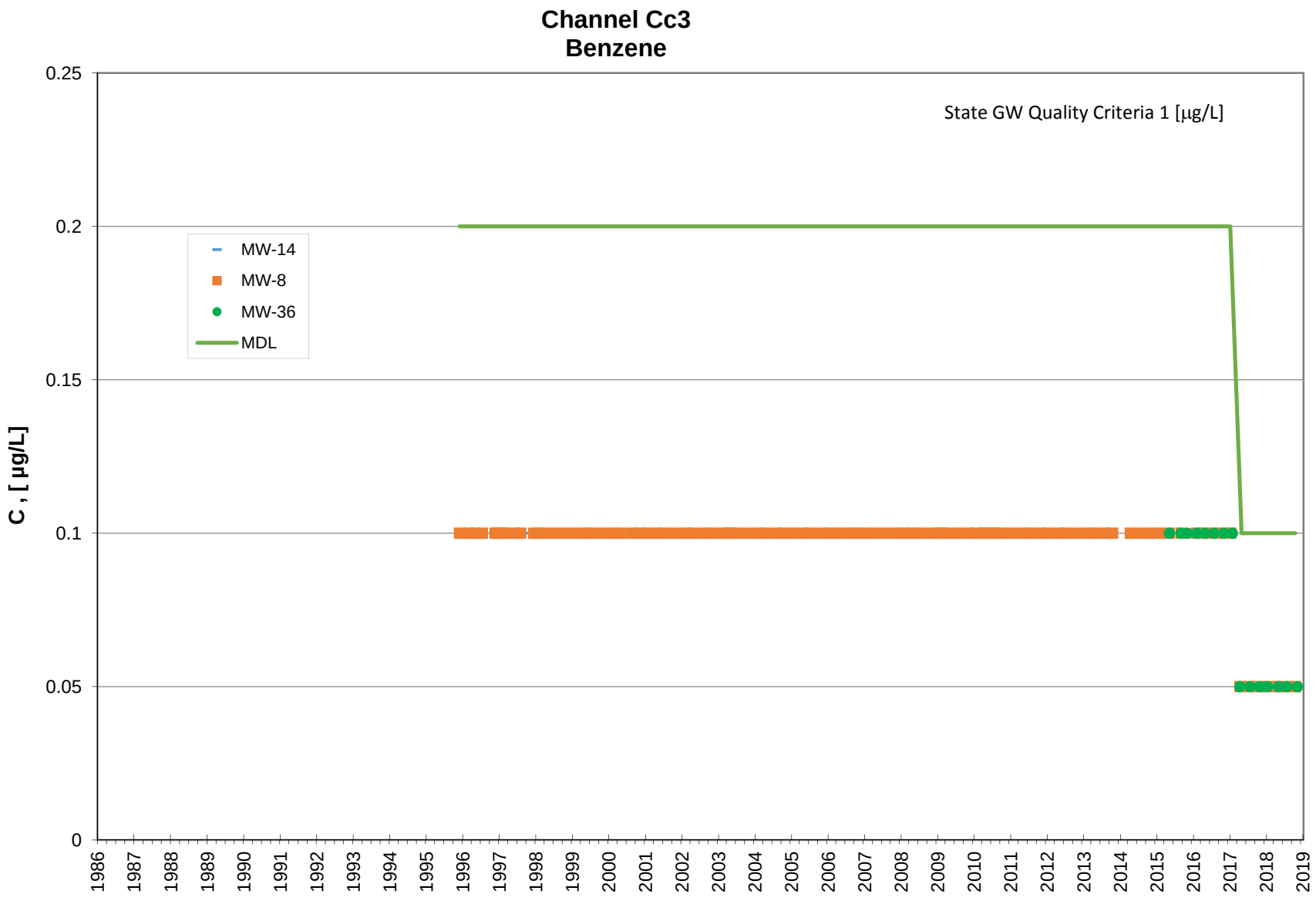

Channel Cc3
Dissolved and Total Manganese
MW-14
MW-8
MW-36
MDL
Federal and State GW Quality Criteria
Tot. MW-8
Tot. MW-36
C Mn, [mg/L]
0.3
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

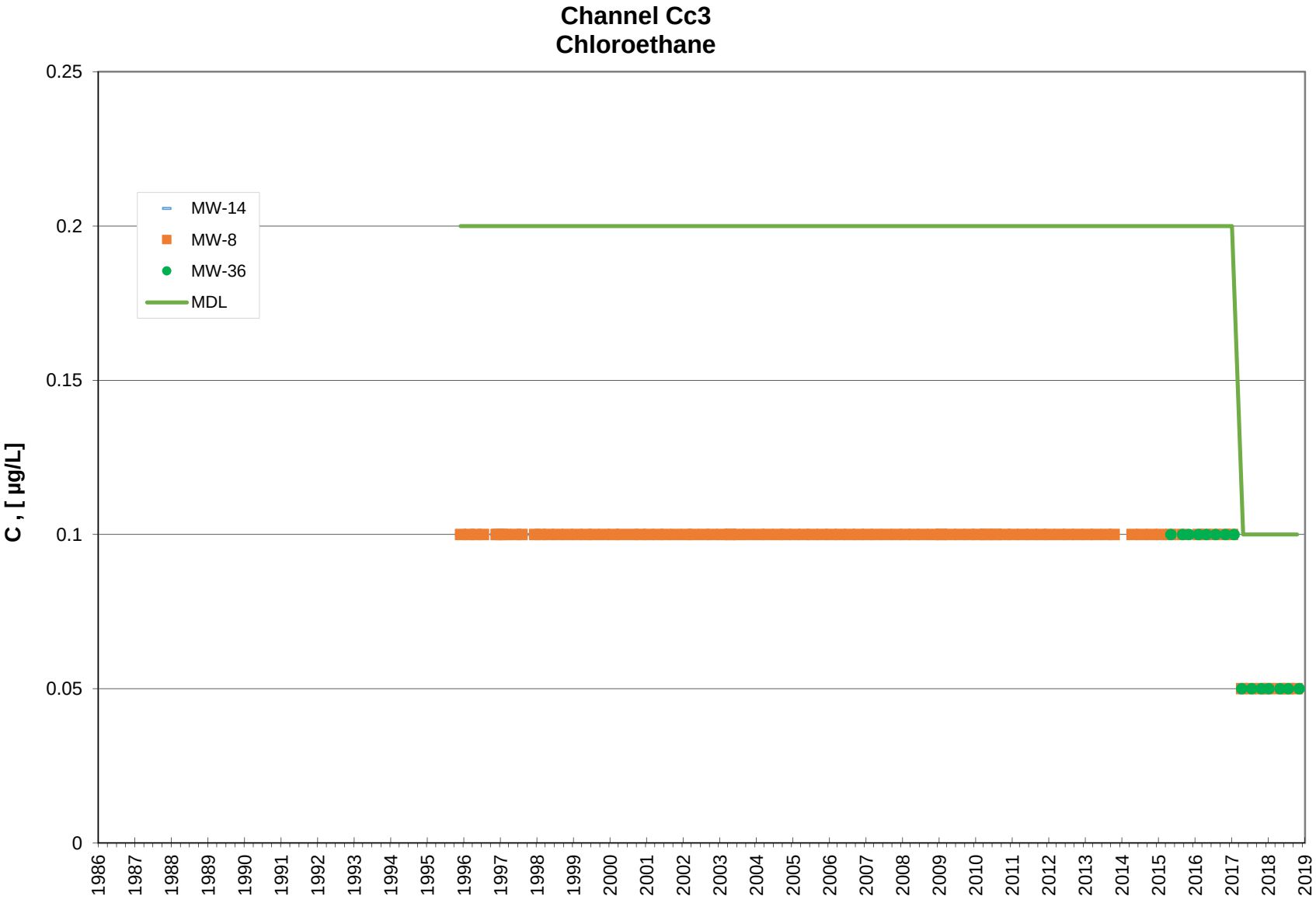

Channel Cc3
Dissolved and Total Potassium
MW-14
MW-8
MW-36
MDL
Tot. MW-8
Tot. MW-36
C K, [mg/L]
0
0.5
1
1.5
2
2.5
3
3.5
4
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

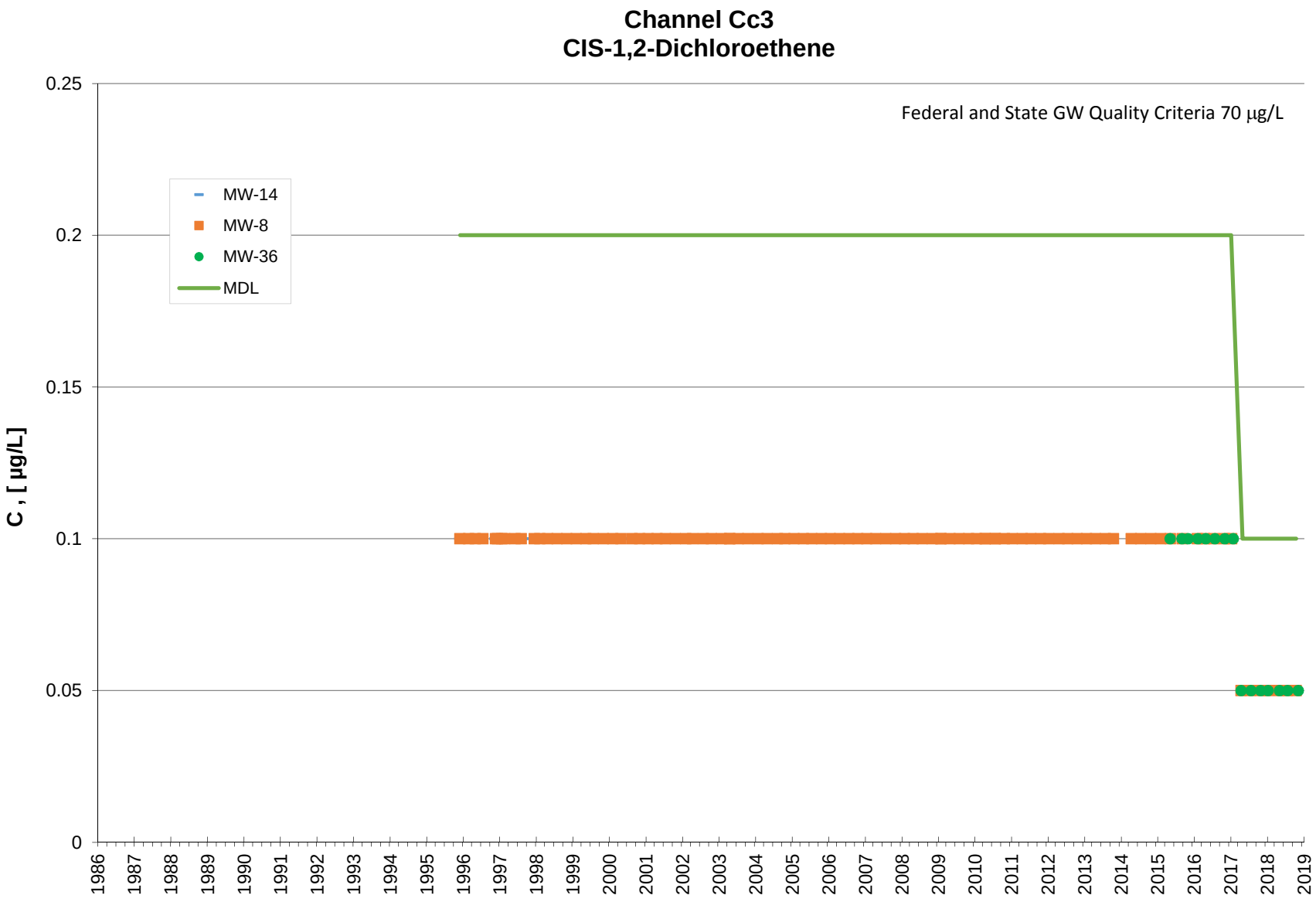

Channel Cc3
Dissolved and Total Sodium
Federal and State GW Quality Criteria 20 mg/L
MW-14
MW-8
MW-36
MDL
Tot. MW-8
Tot. MW-36
C Na, [mg/L]
0
1
2
3
4
5
6
7
8
9
10
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

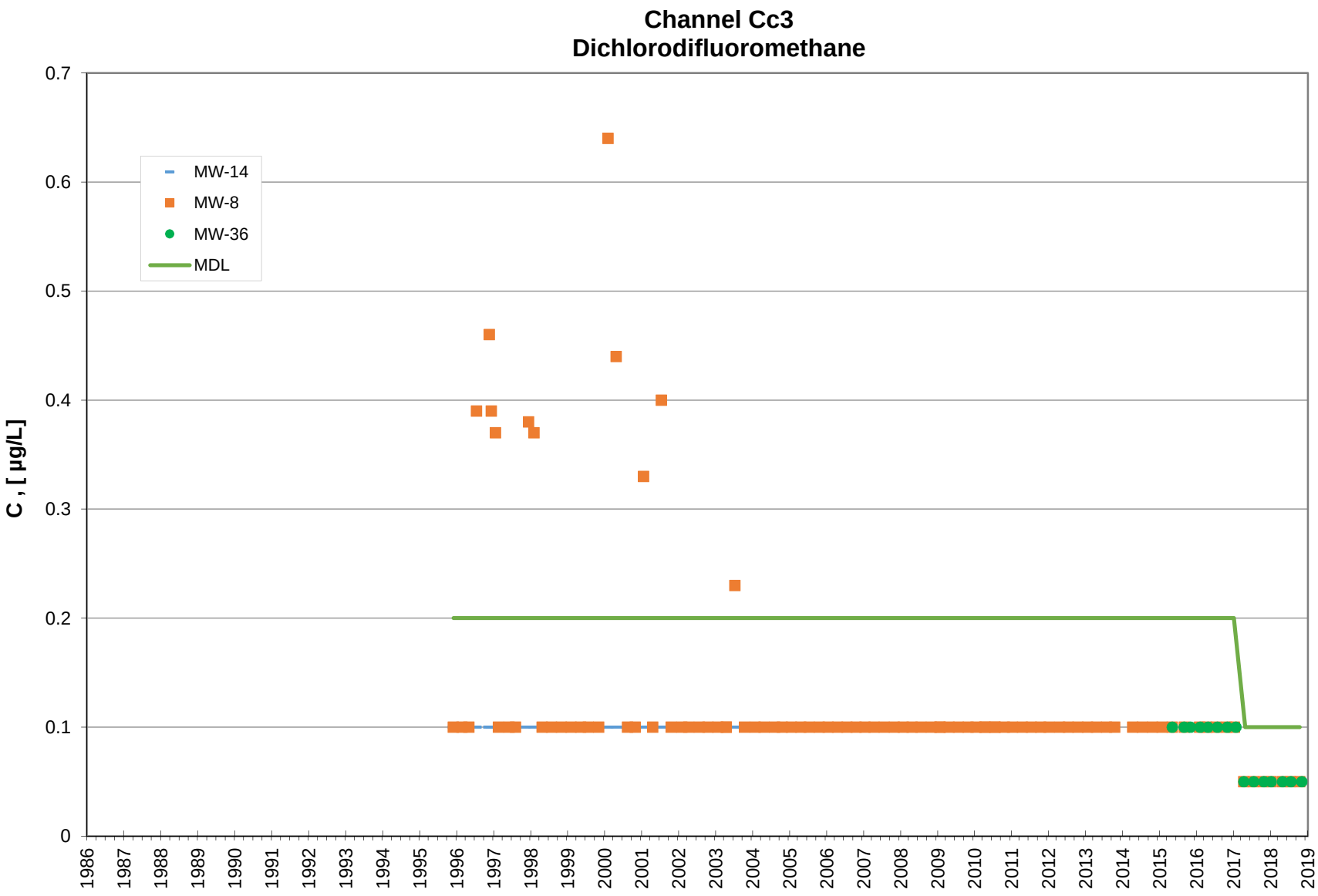

Channel Cc3
1,1-Dichloroethane
State GW Quality Criteria 1 [µg/L]
MW-14
MW-8
MW-36
MDL
C , [µg/L]
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

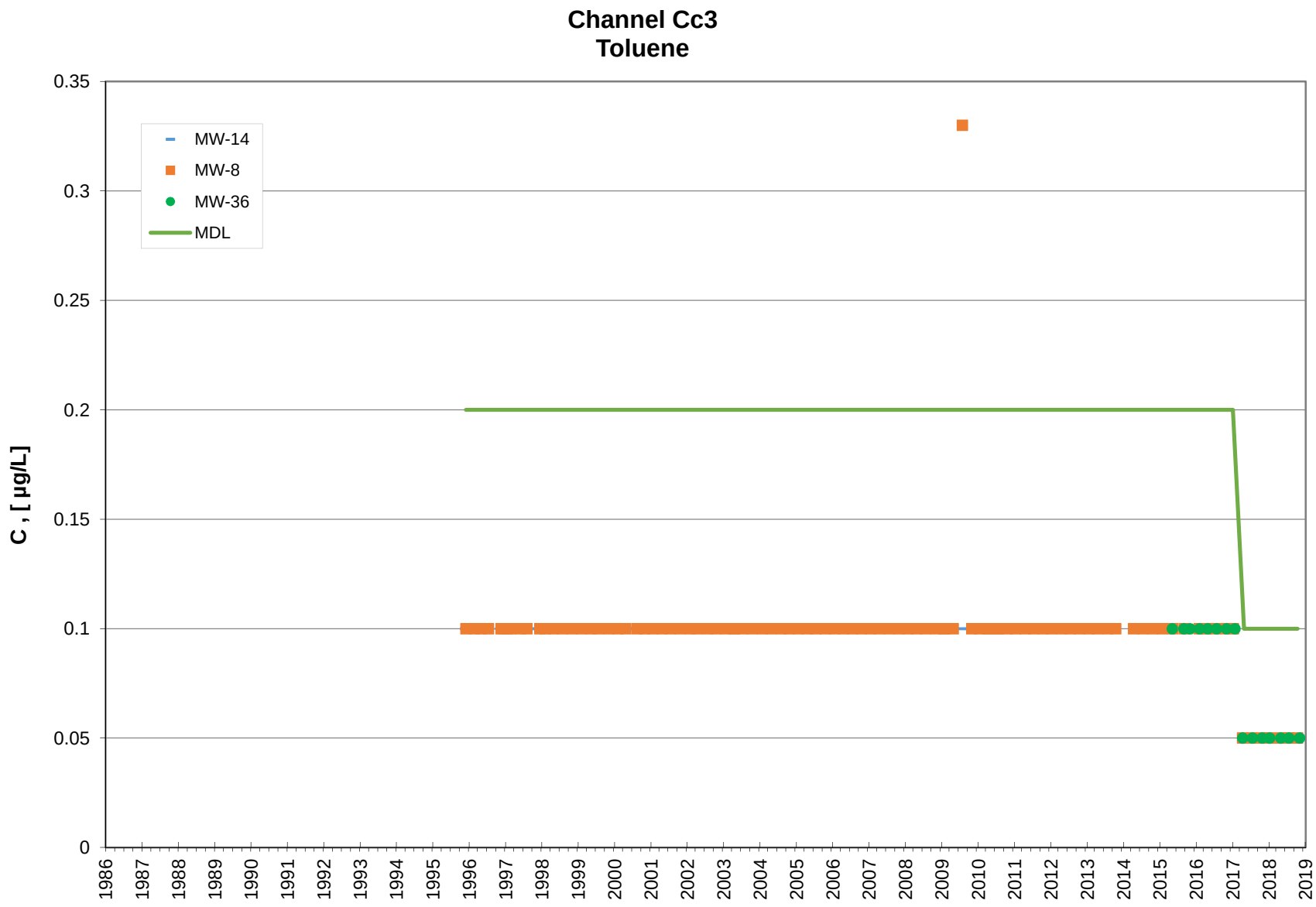

Channel Cc3
1,2-Dichloropropane
State GW Quality Criteria 0.6 [µg/L]
MW-14
MW-8
MW-36
MDL
C , [µg/L]
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

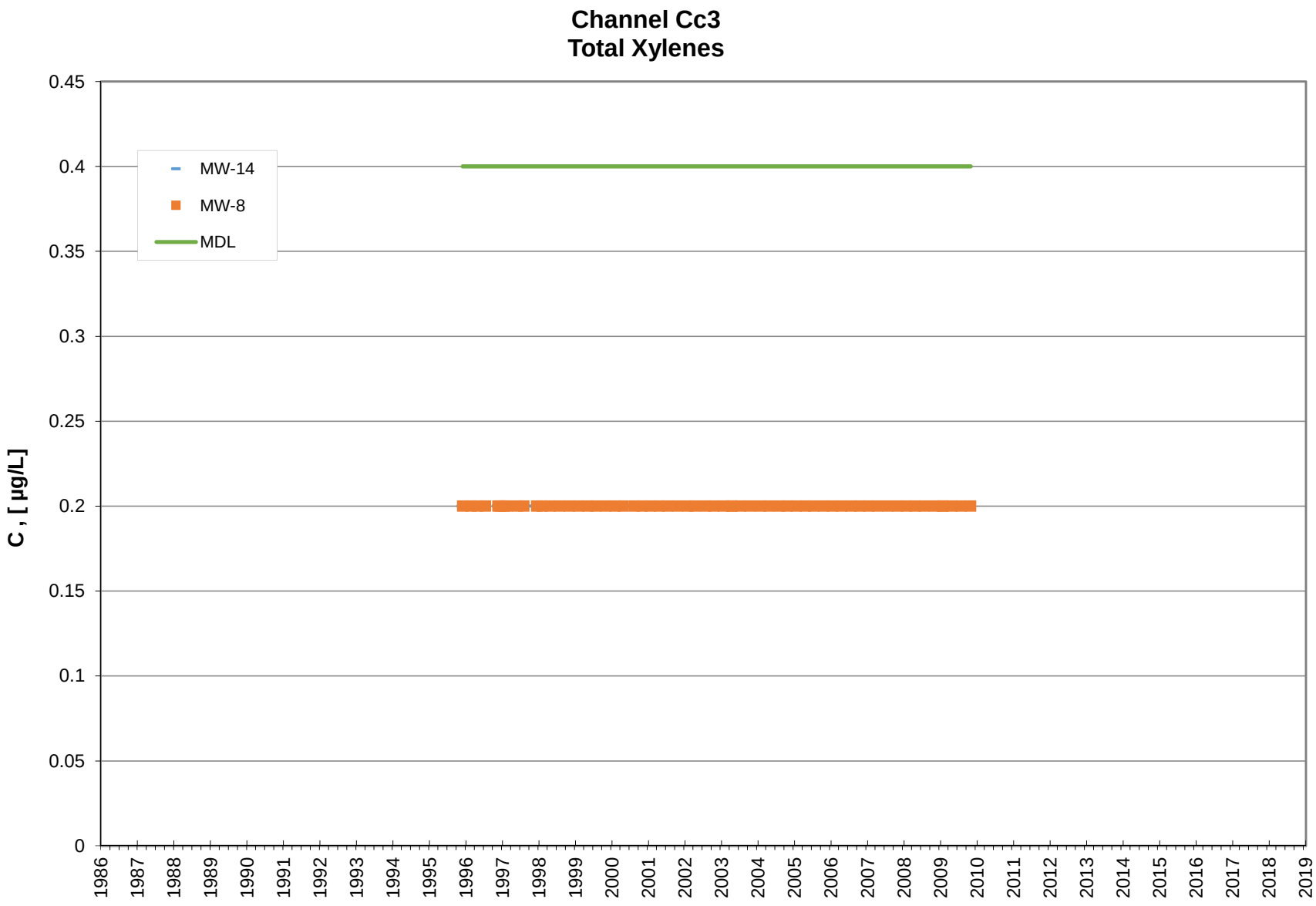

Channel Cc3
Benzene
State GW Quality Criteria 1 [µg/L]
MW-14
MW-8
MW-36
MDL
C , [µg/L]
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

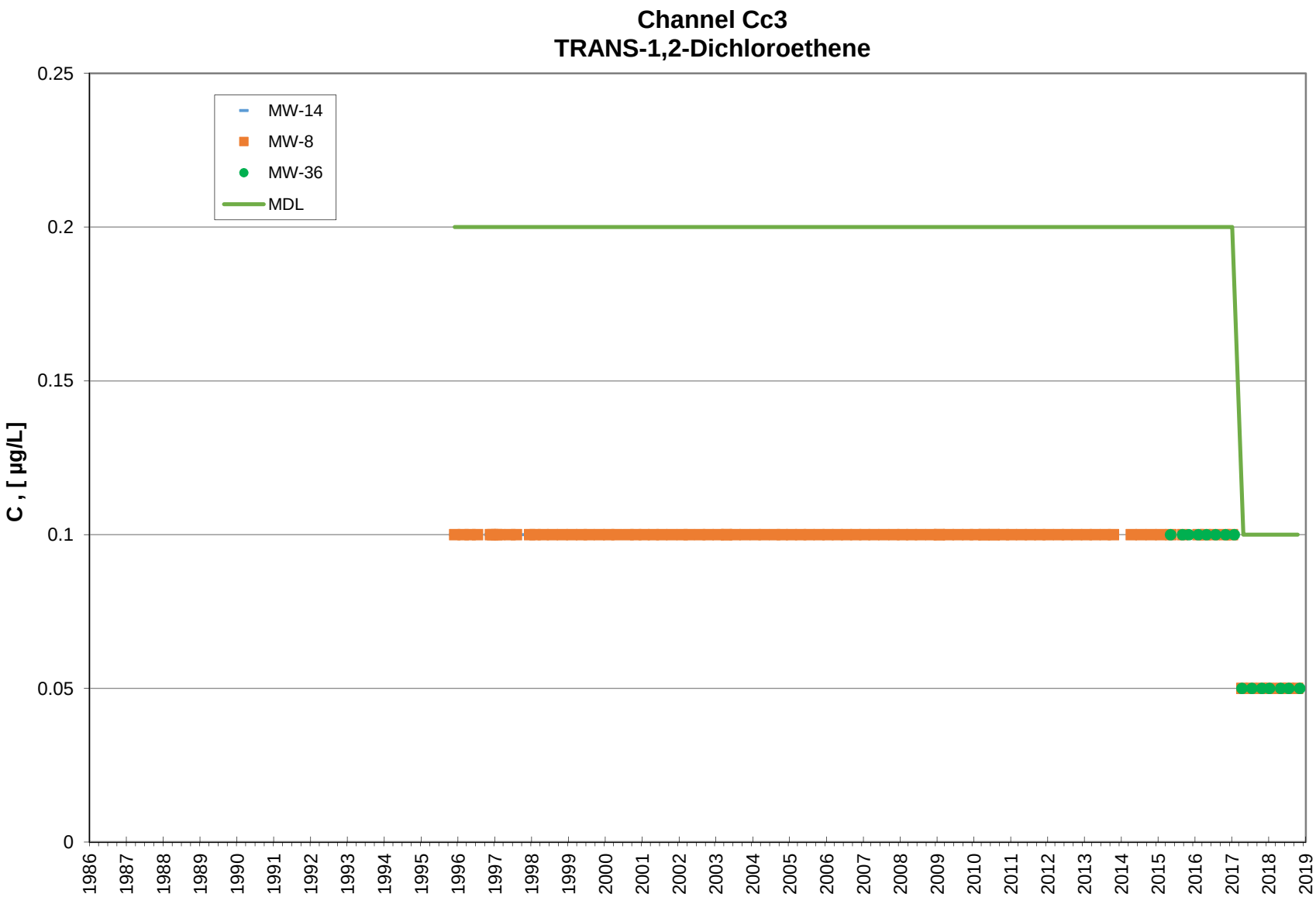

Channel Cc3
Chloroethane
C , [µg/L]
0.25
0.2
0.15
0.1
0.05
0
MW-14
MW-8
MW-36
MDL
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

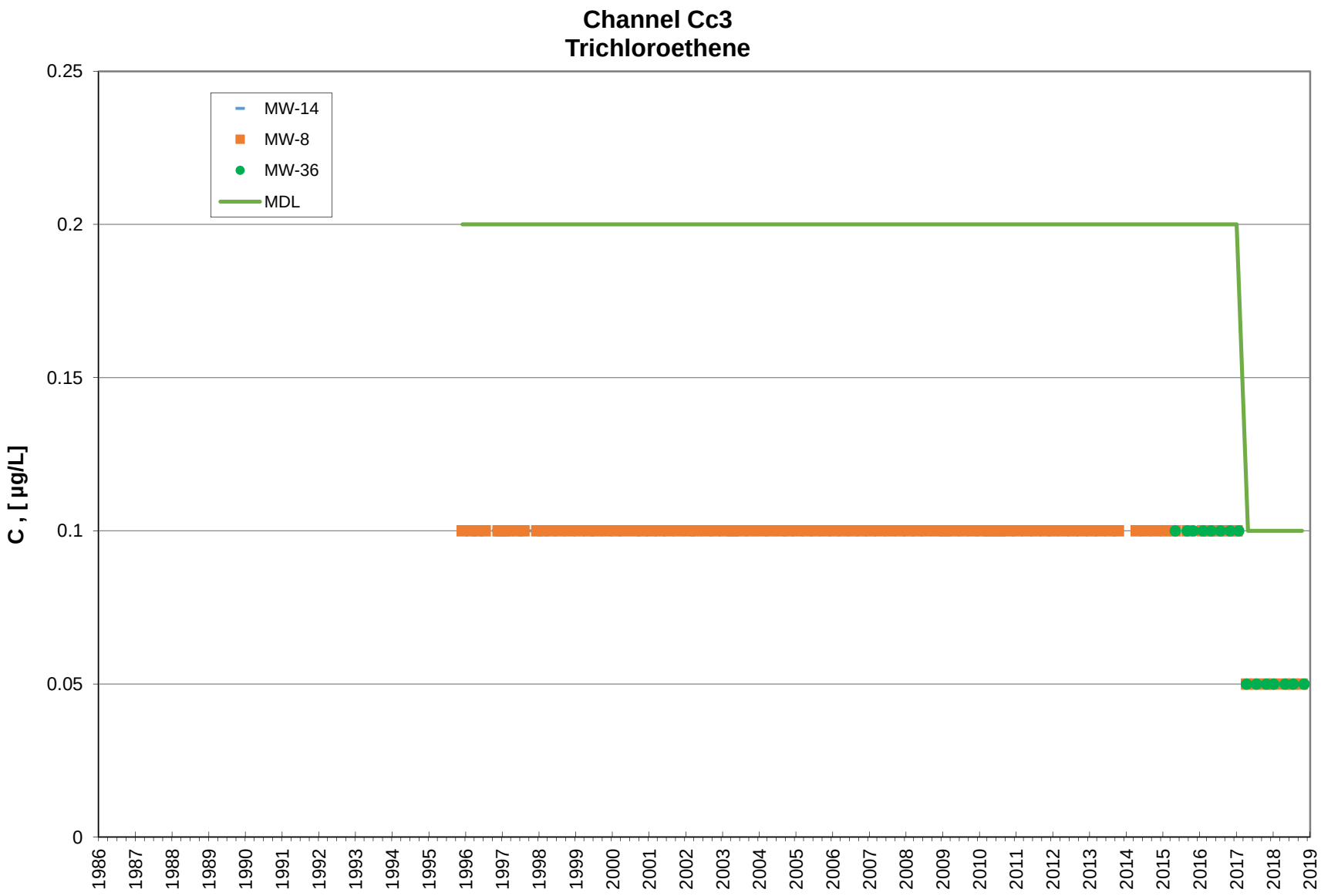

Channel Cc3
CIS-1,2-Dichloroethene
Federal and State GW Quality Criteria 70 µg/L
MW-14
MW-8
MW-36
MDL
C , [µg/L]
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

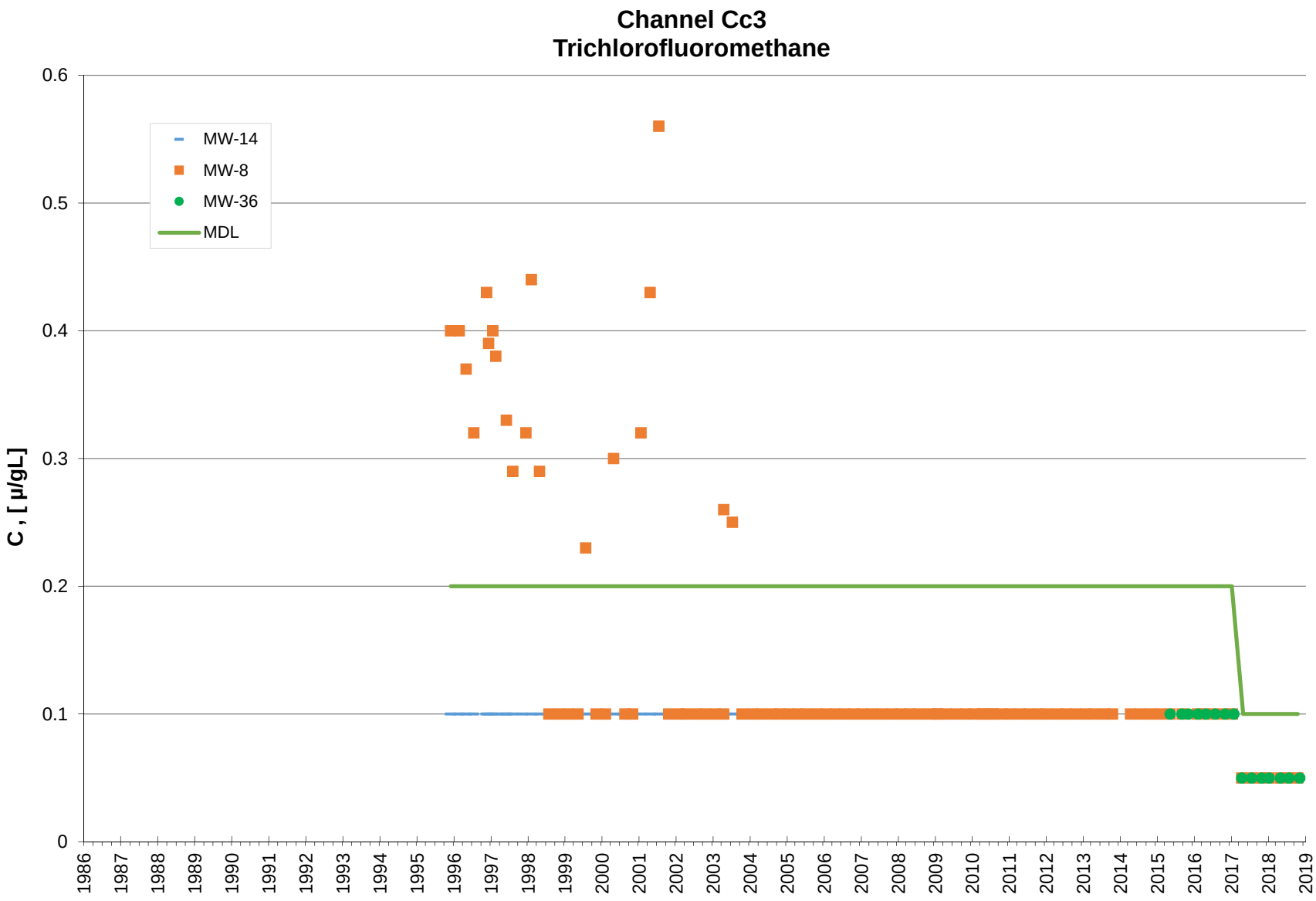

Channel Cc3
Dichlorodifluoromethane
C , [µg/L]
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
MW-14
MW-8
MW-36
MDL
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

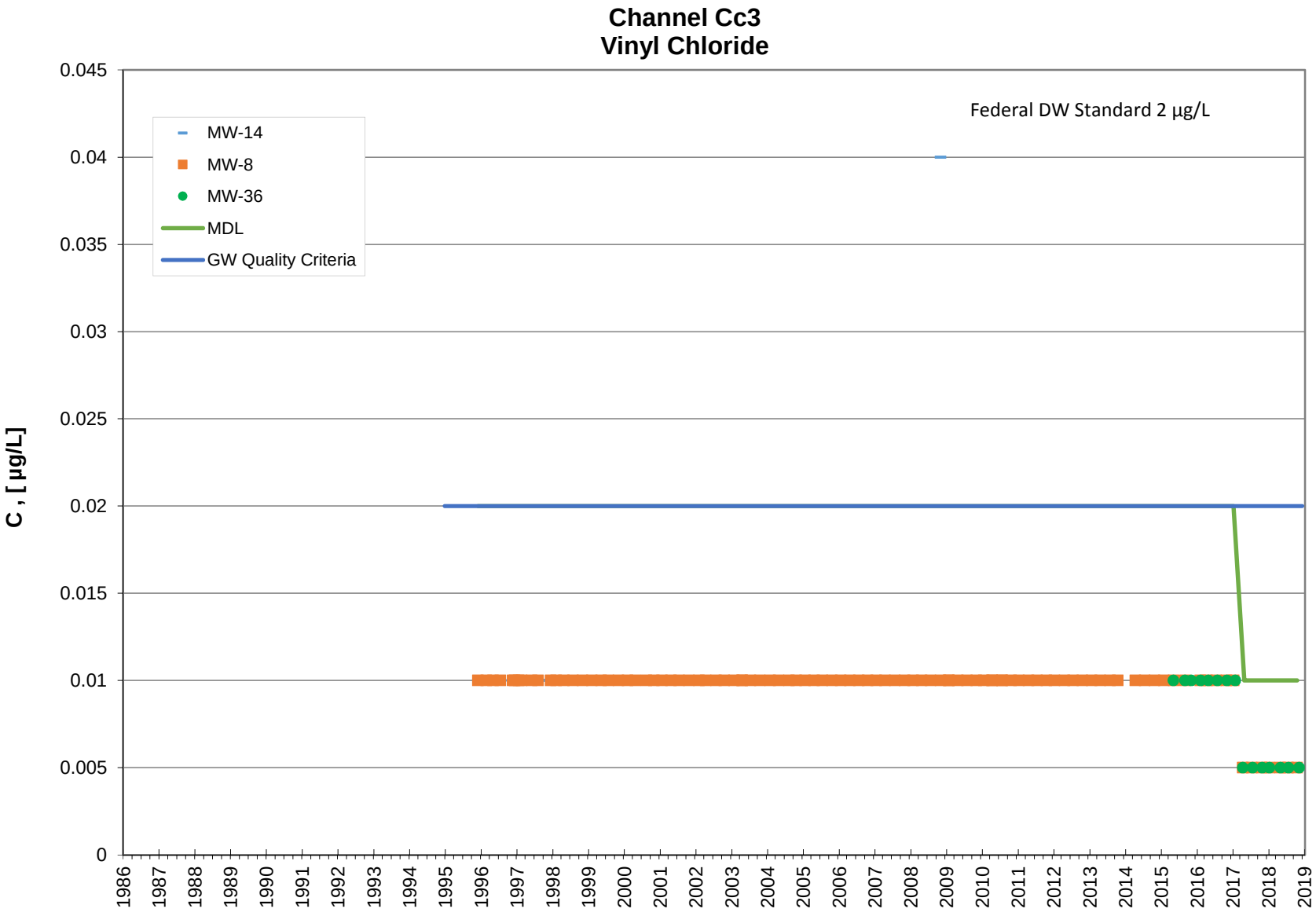

Channel Cc3
Toluene
MW-14
MW-8
MW-36
MDL
C , [µg/L]
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Channel Cc3
Total Xylenes
C , [µg/L]
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
MW-14
MW-8
MDL
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Channel Cc3
TRANS-1,2-Dichloroethene
MW-14
MW-8
MW-36
MDL
C , [µg/L]
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

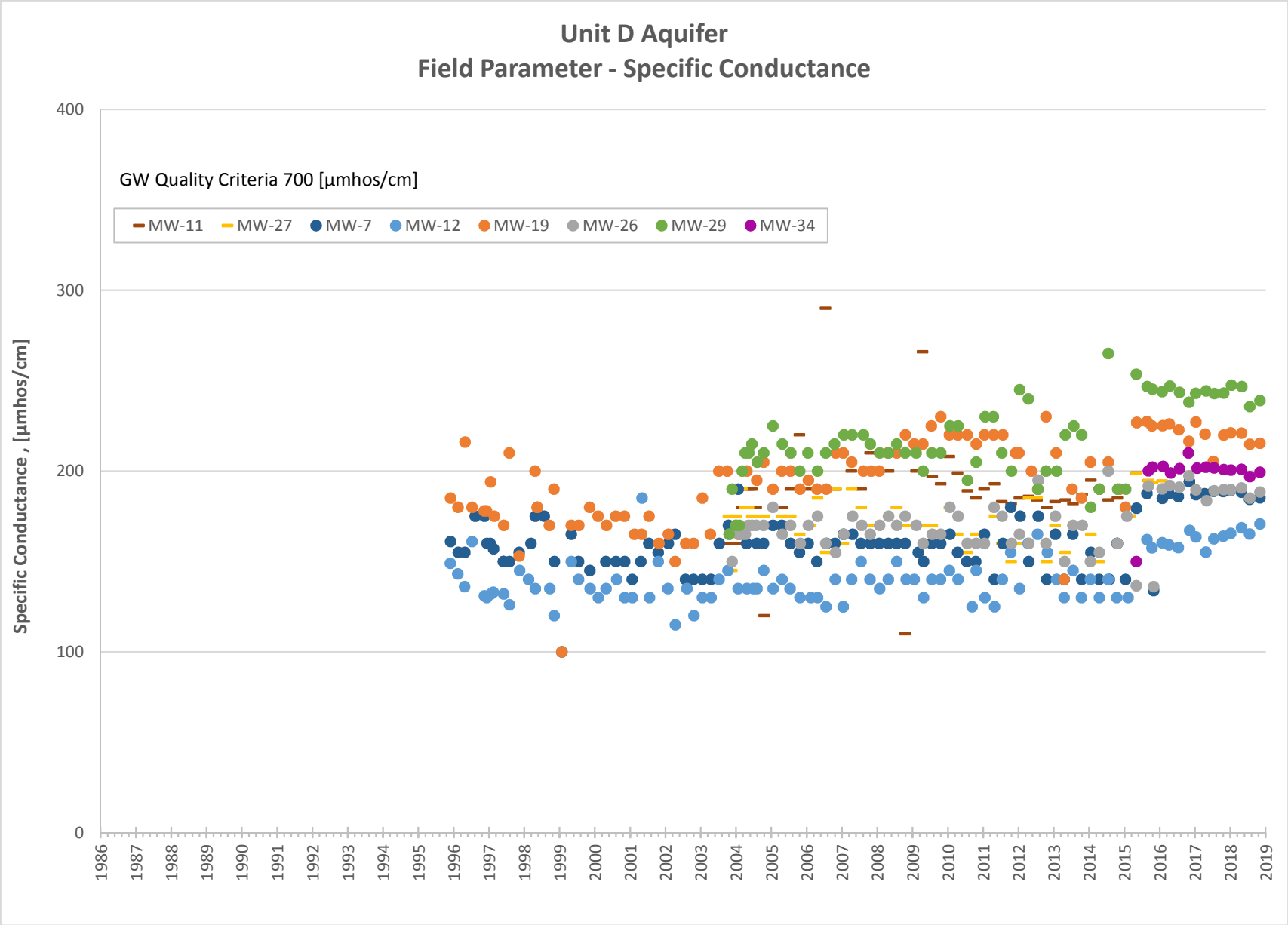

Channel Cc3
Trichloroethene
MW-14
MW-8
MW-36
MDL
C , [µg/L]
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

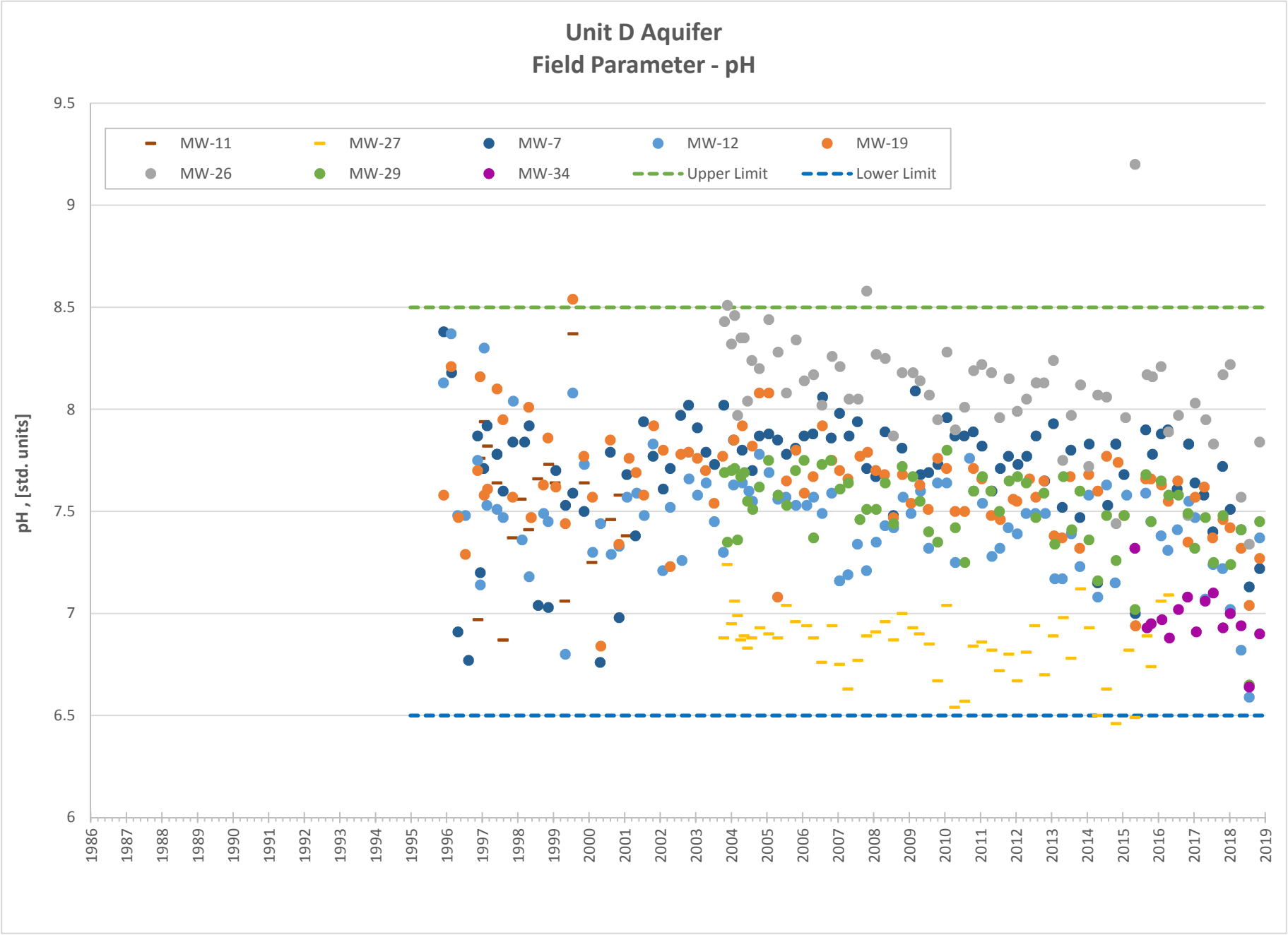

Channel Cc3
Trichlorofluoromethane
MW-14
MW-8
MW-36
MDL
C , [µ/gL]
0.6
0.5
0.4
0.3
0.2
0.1
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

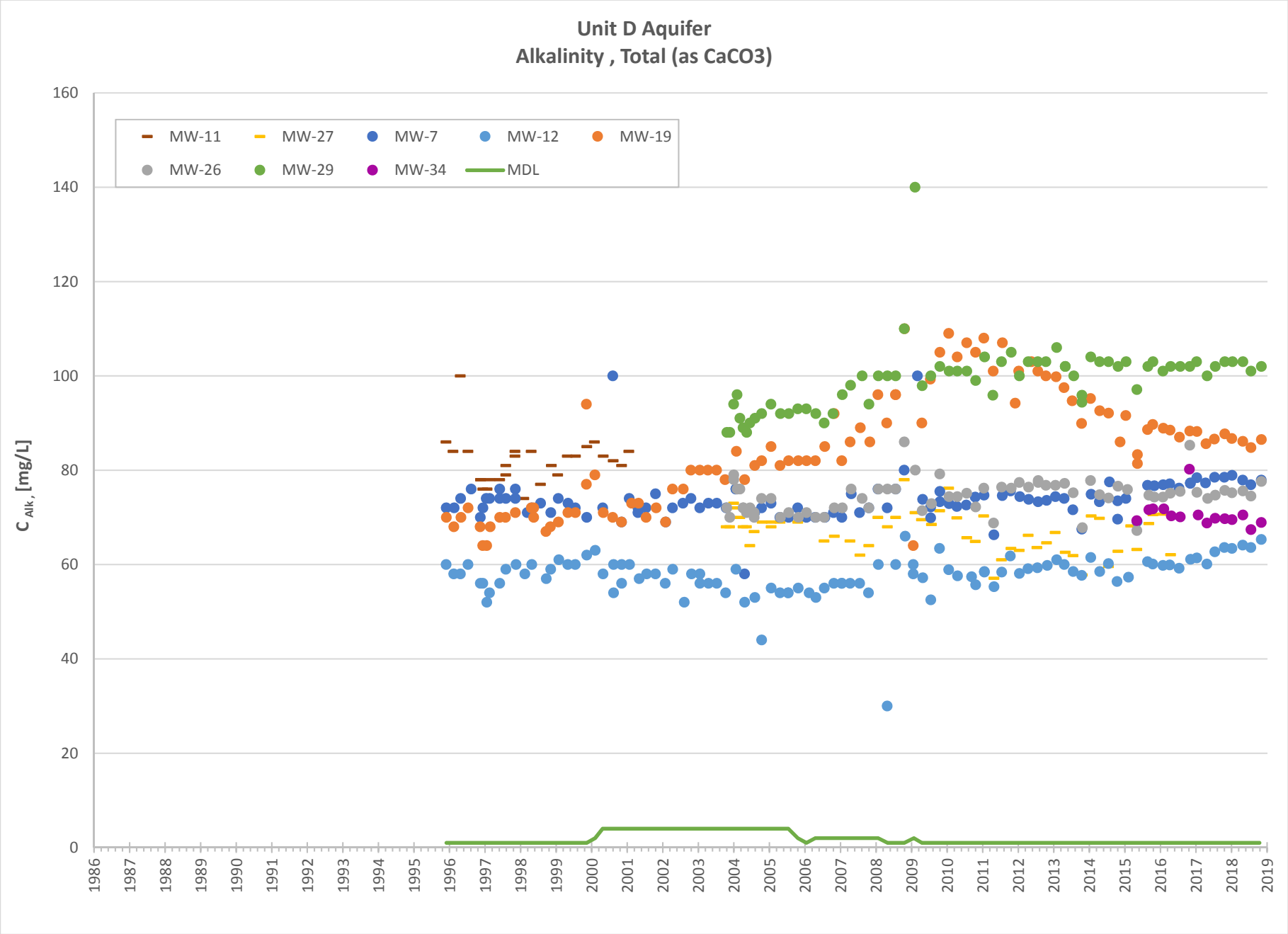

Channel Cc3
Vinyl Chloride
Federal DW Standard 2 µg/L
MW-14
MW-8
MW-36
MDL
GW Quality Criteria
C , [µg/L]
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

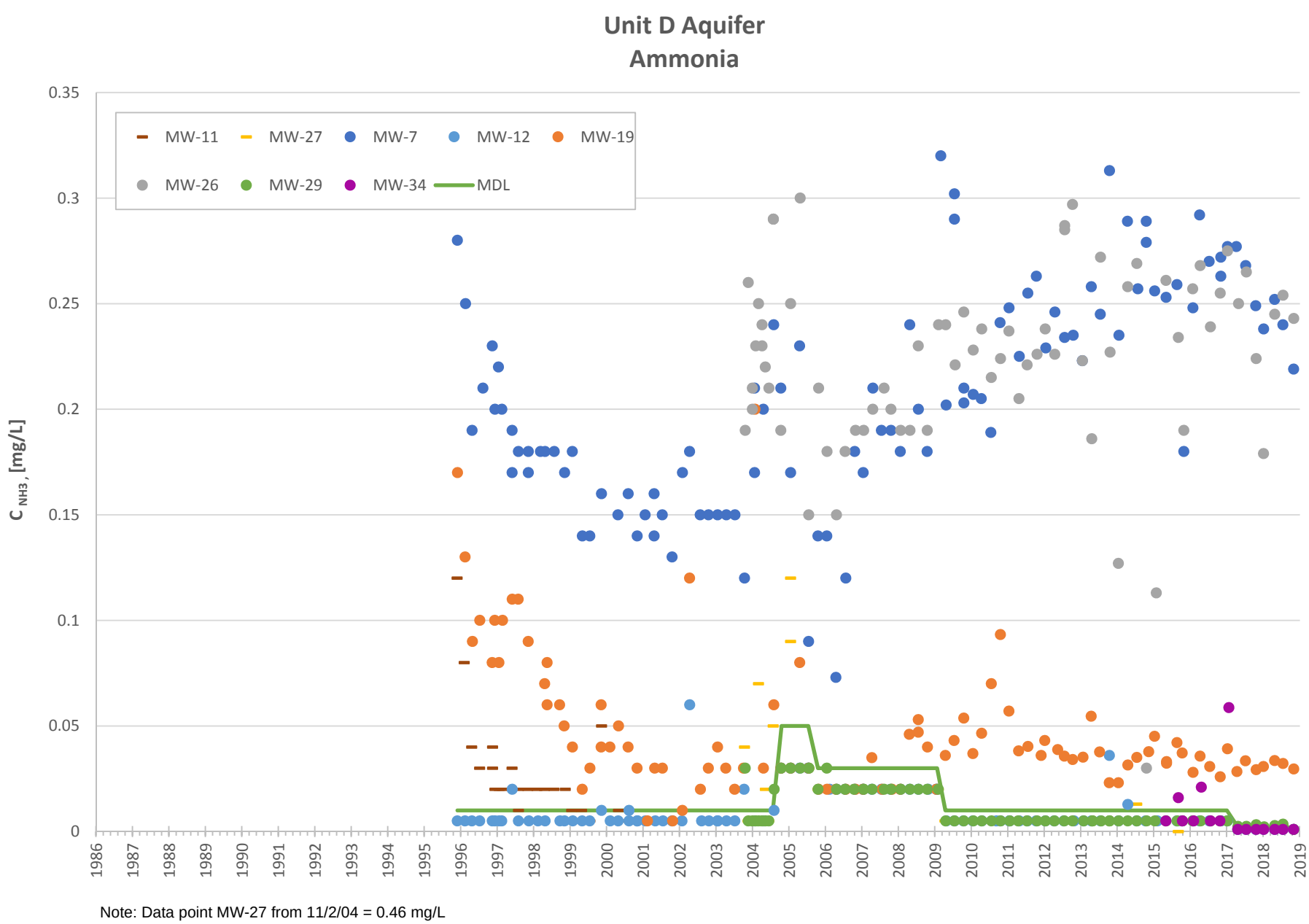
Appendix F

Time Concentration Plots for
Groundwater in Unit D Aquifer

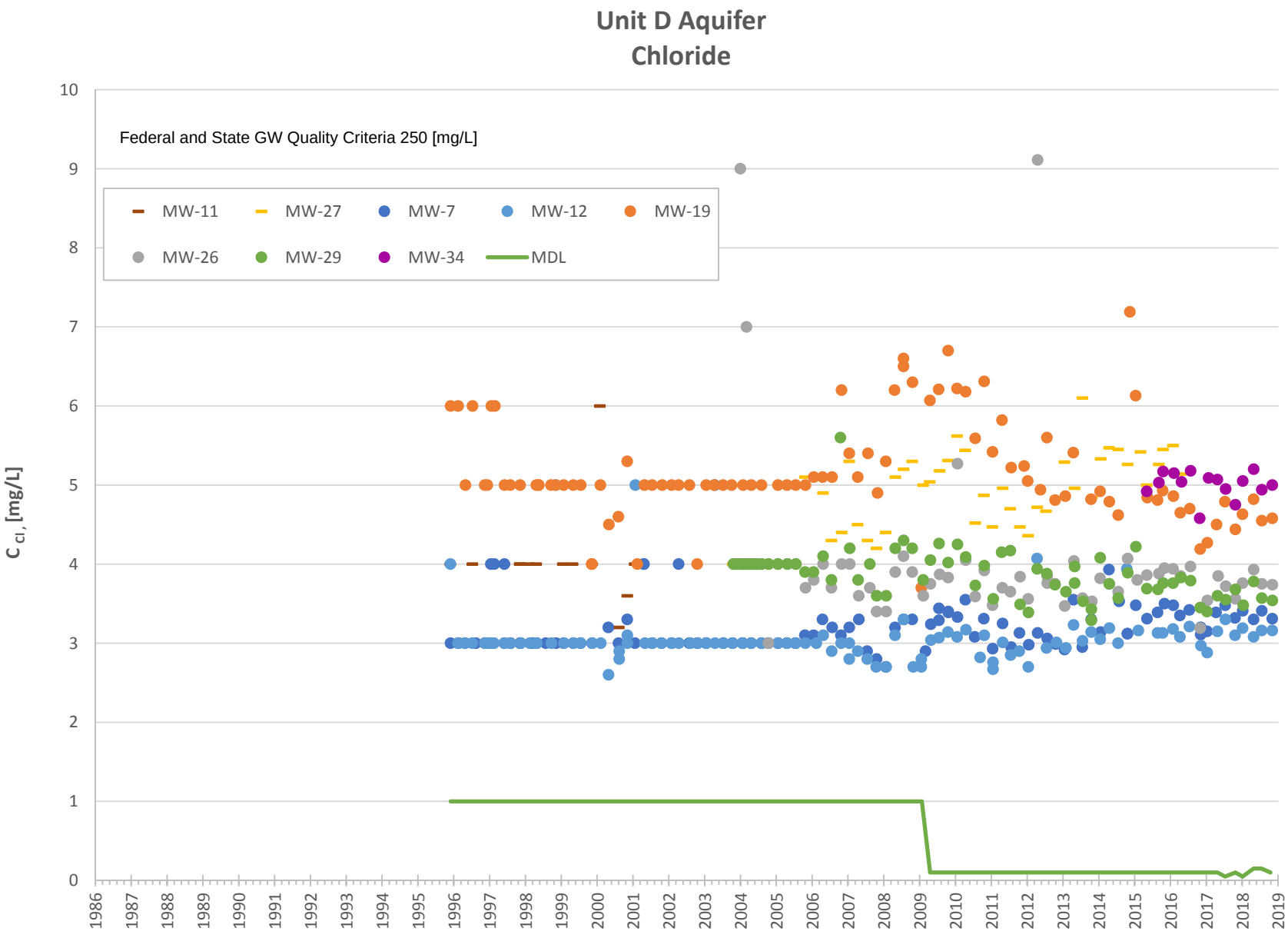

Unit D Aquifer
Field Parameter - Specific Conductance
GW Quality Criteria 700 [µmhos/cm]
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
Specific Conductance , [µmhos/cm]
400
300
200
100
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Unit D Aquifer
Field Parameter - pH
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
Upper Limit
Lower Limit
pH , [std. units]
9.5
9
8.5
8
7.5
7
6.5
6
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

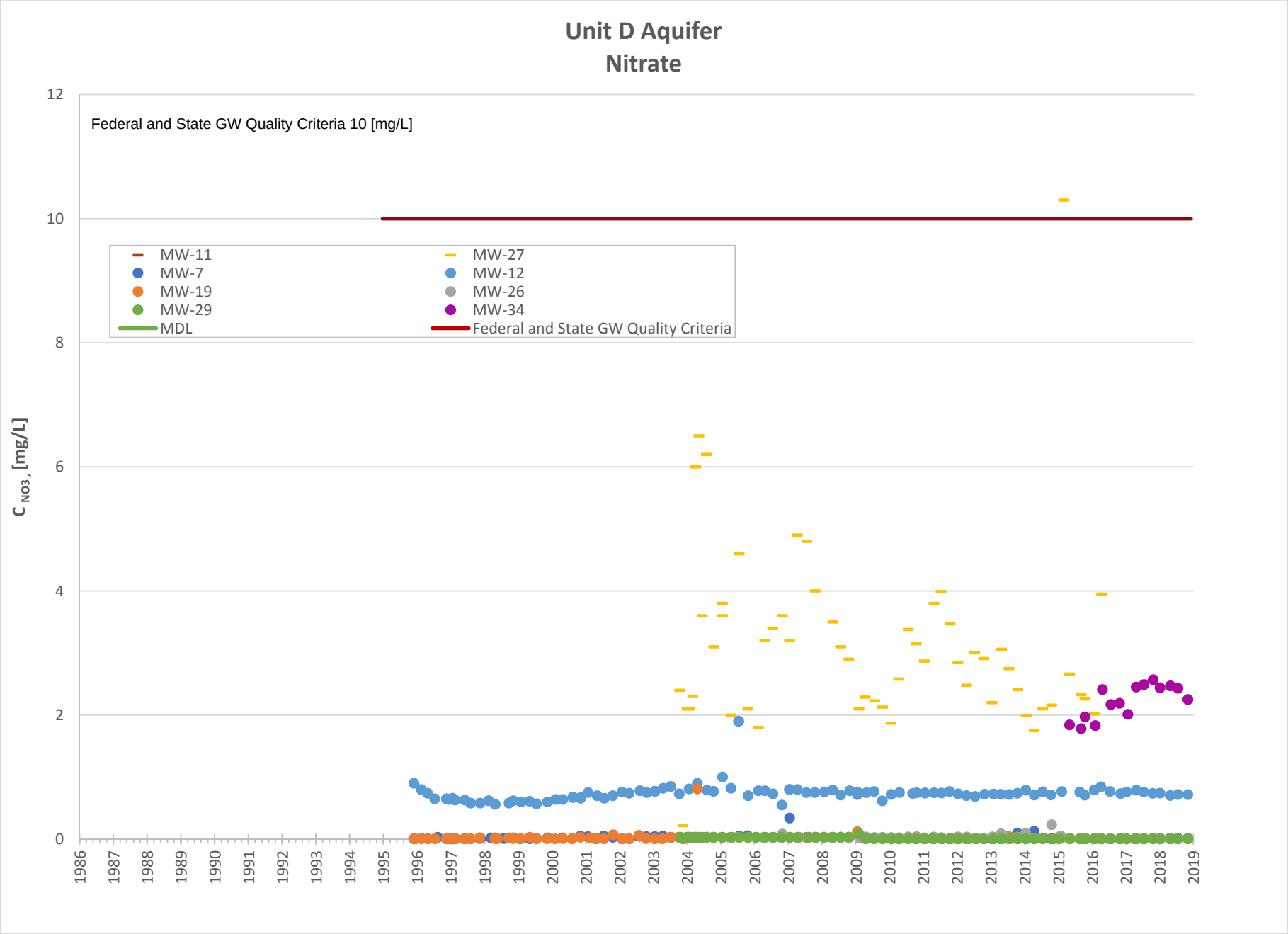

Unit D Aquifer
Alkalinity , Total (as CaCO3)
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
C Alk , [mg/L]
0
20
40
60
80
100
120
140
160
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

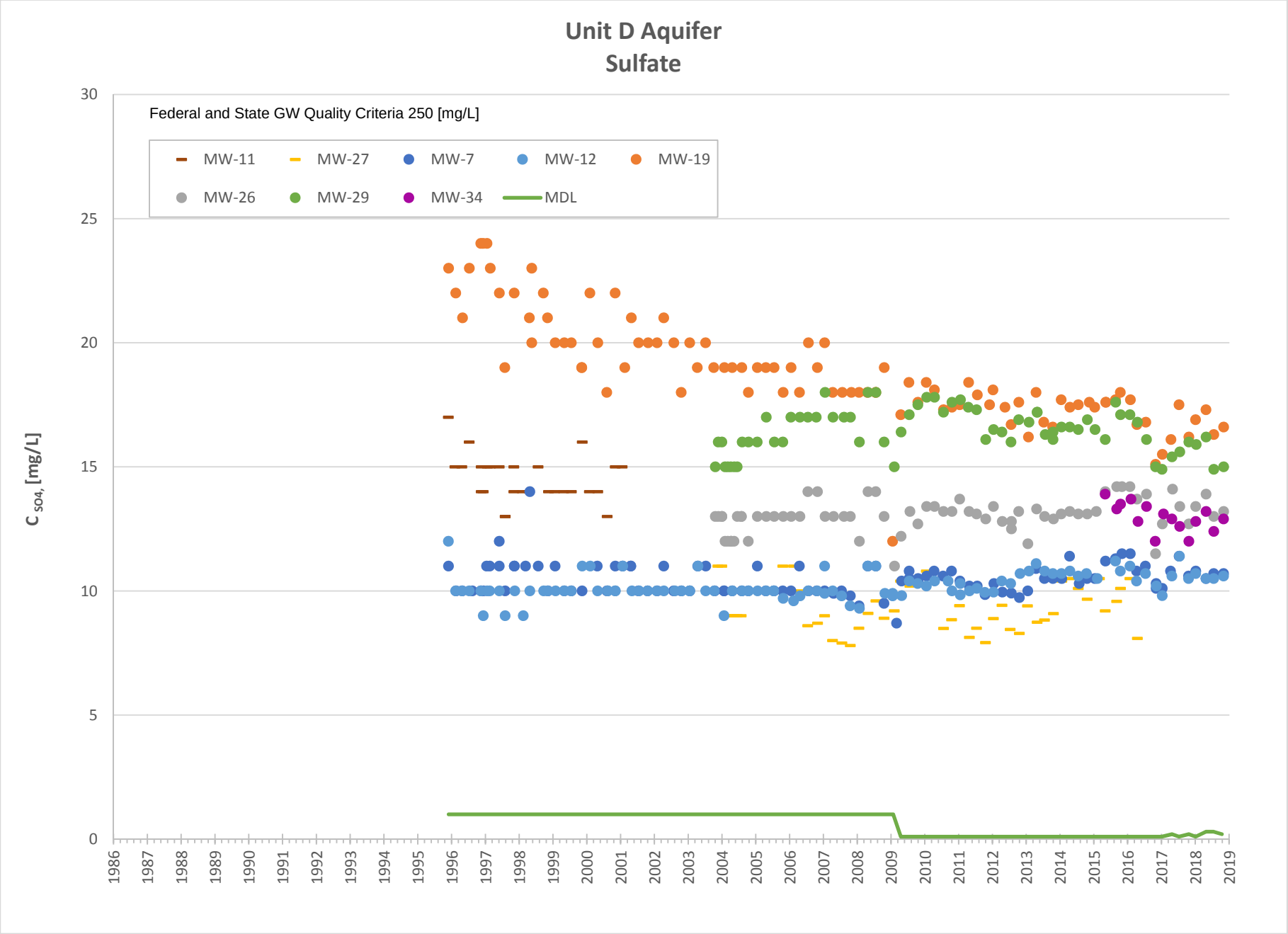


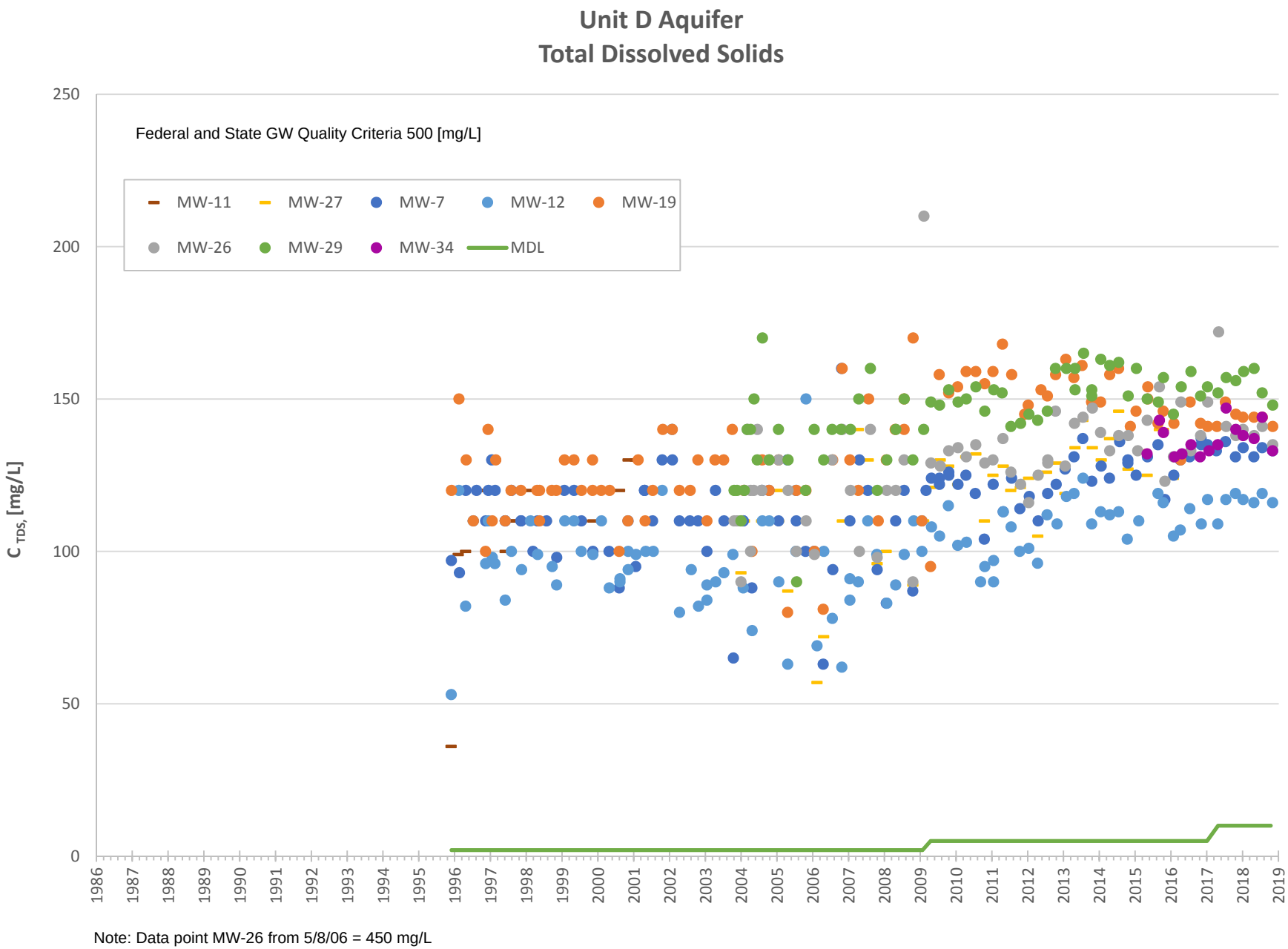
Note: Data point MW-27 from 11/2/04 = 0.46 mg/L



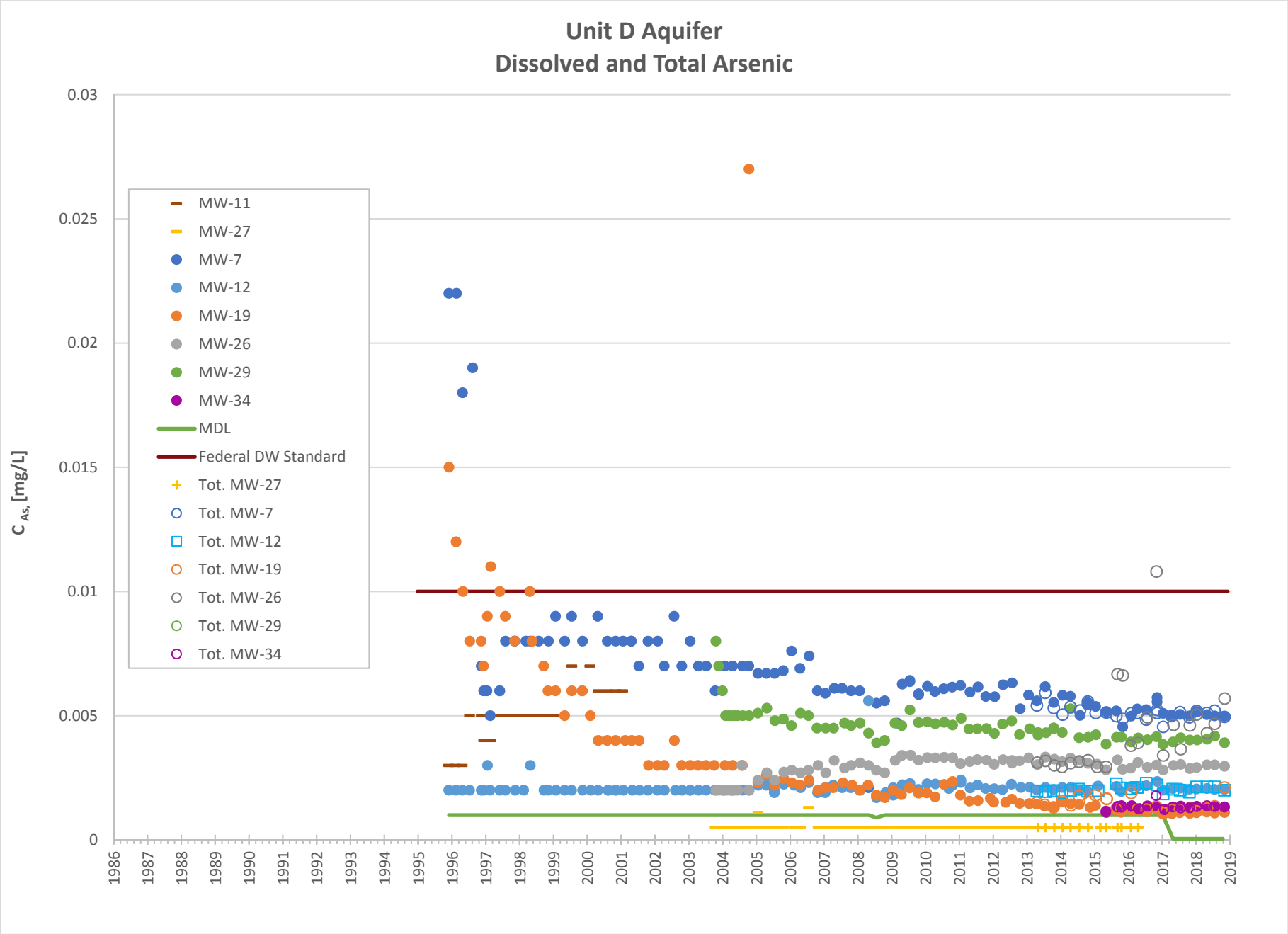
Note: Data point MW-19 from 7/30/13 = 37.6 mg/L

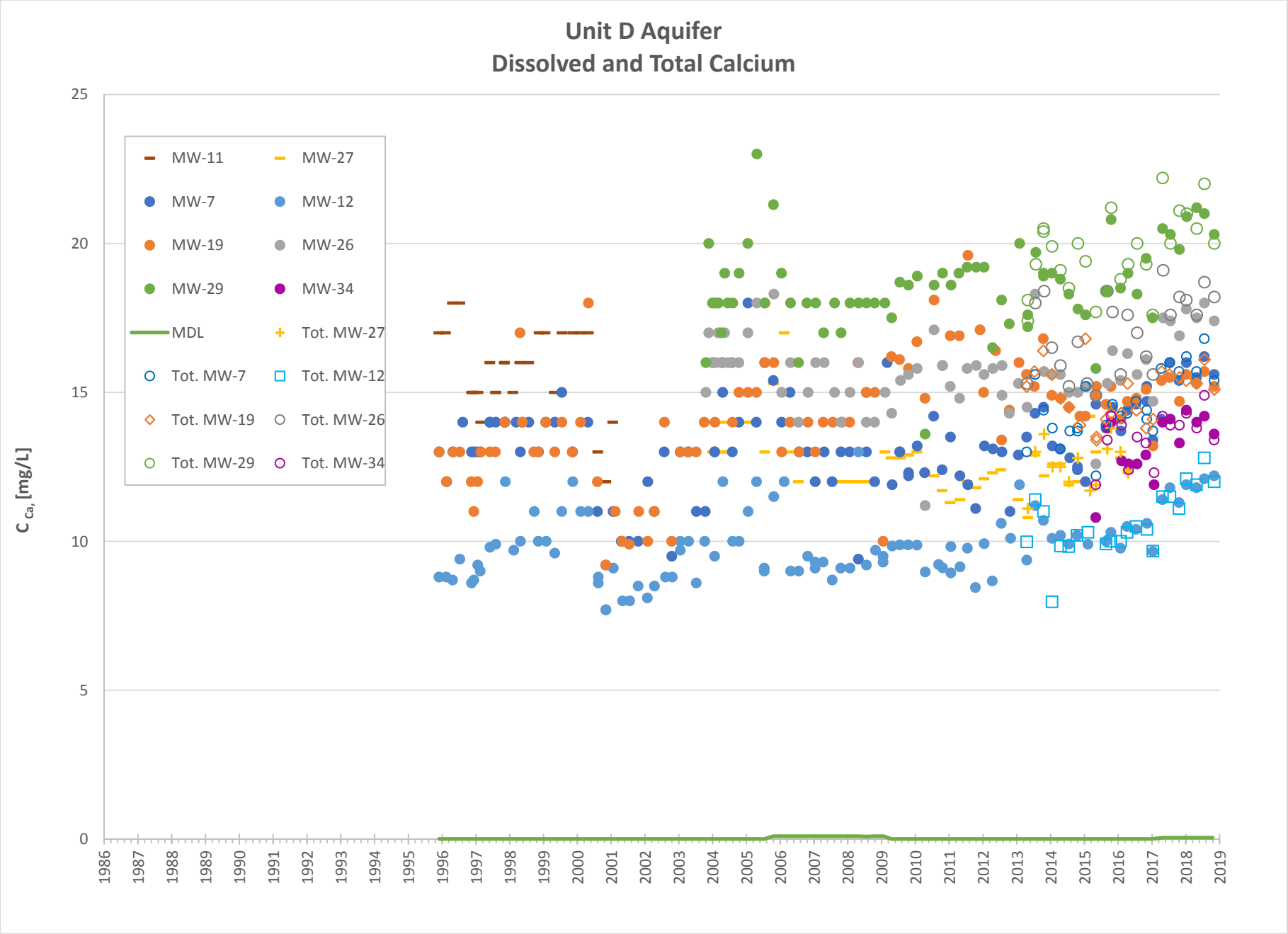

Unit D Aquifer
Nitrate
Federal and State GW Quality Criteria 10 [mg/L]
MW-11
MW-7
MW-19
MW-29
MDL
MW-27
MW-12
MW-26
MW-34
Federal and State GW Quality Criteria
C NO3 , [mg/L]
0
2
4
6
8
10
12
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

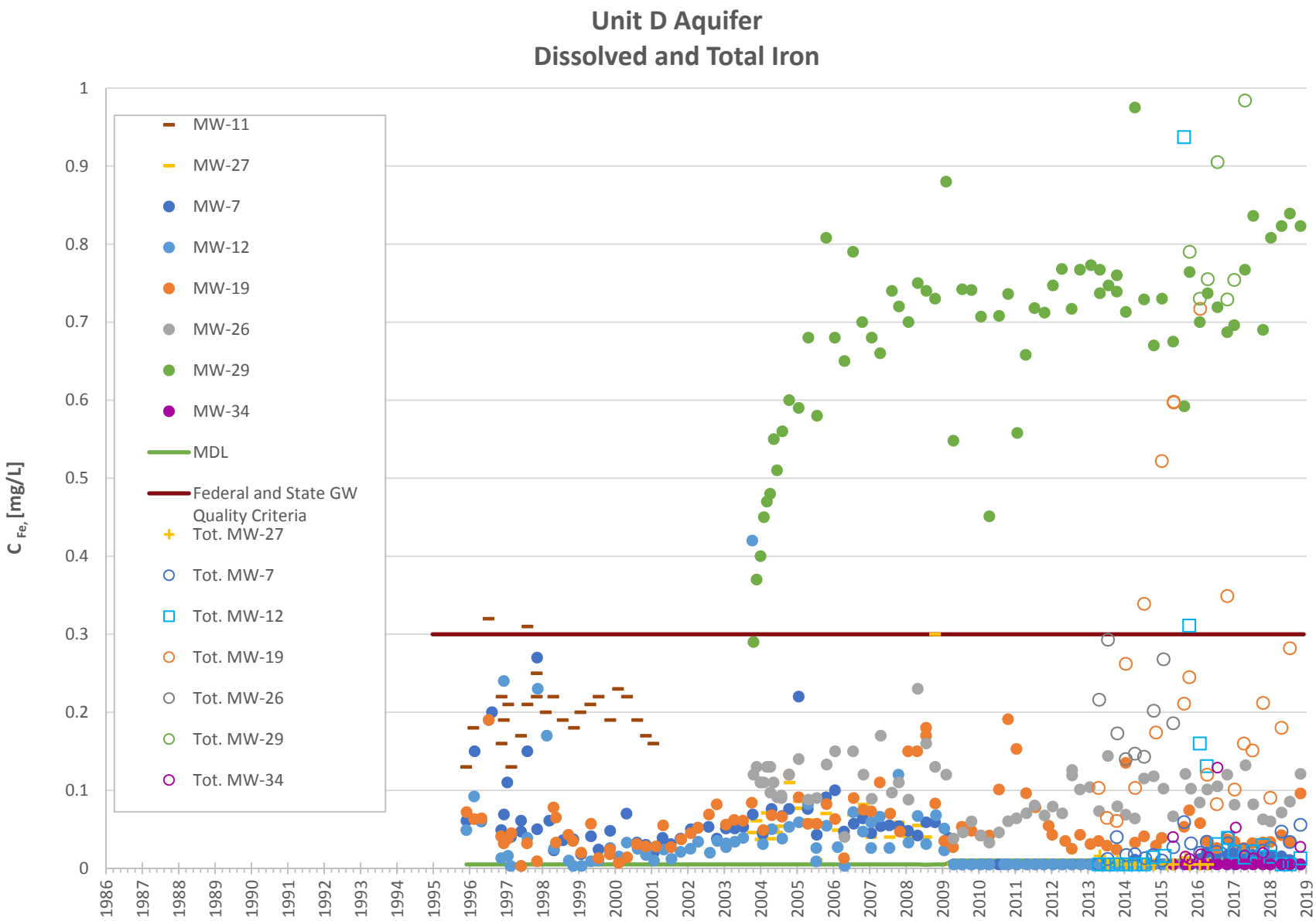

Unit D Aquifer
Sulfate
Federal and State GW Quality Criteria 250 [mg/L]
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
C SO4, [mg/L]
30
25
20
15
10
5
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019



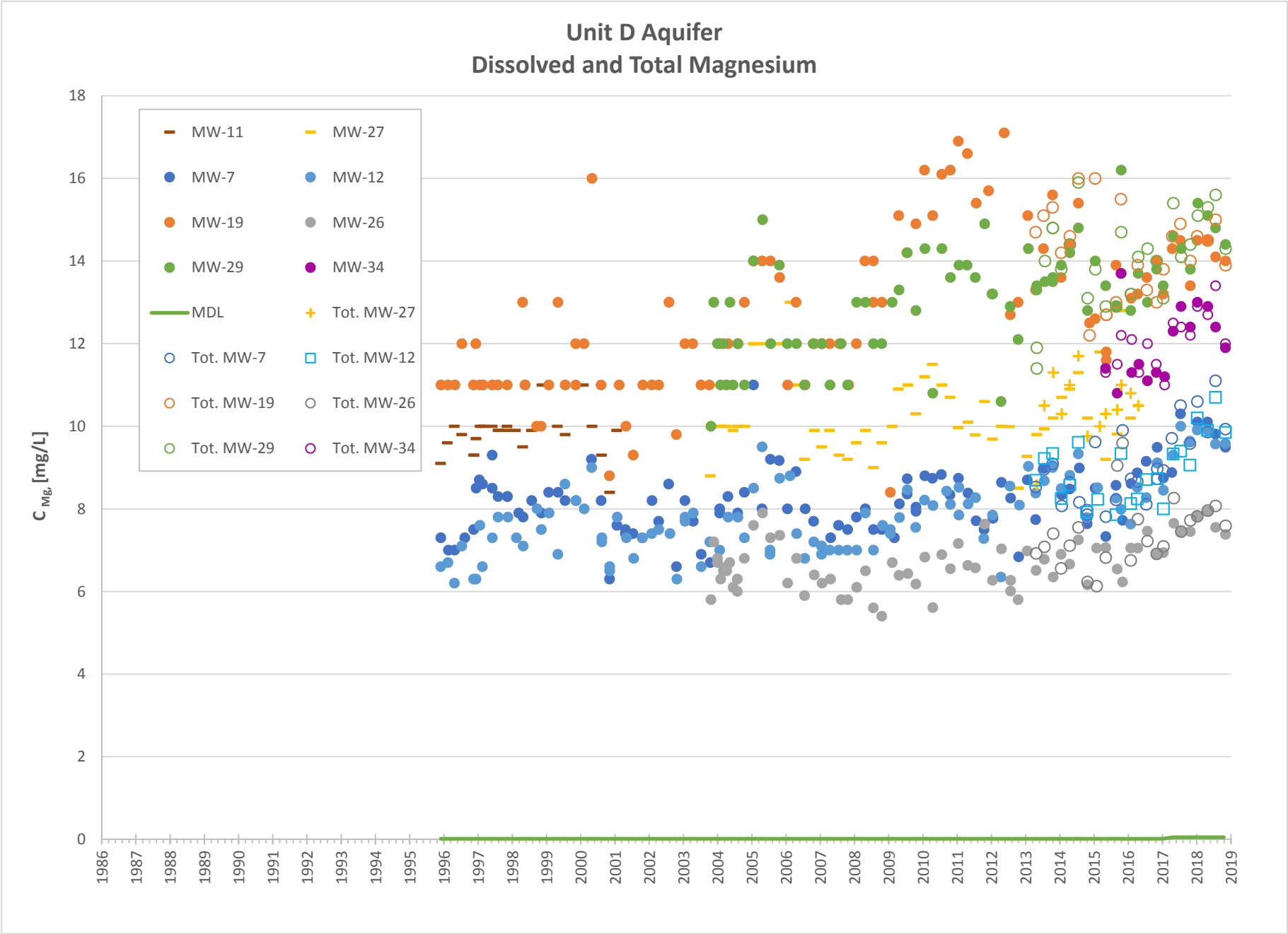
Note: Data point MW-26 from 5/8/06 = 450 mg/L

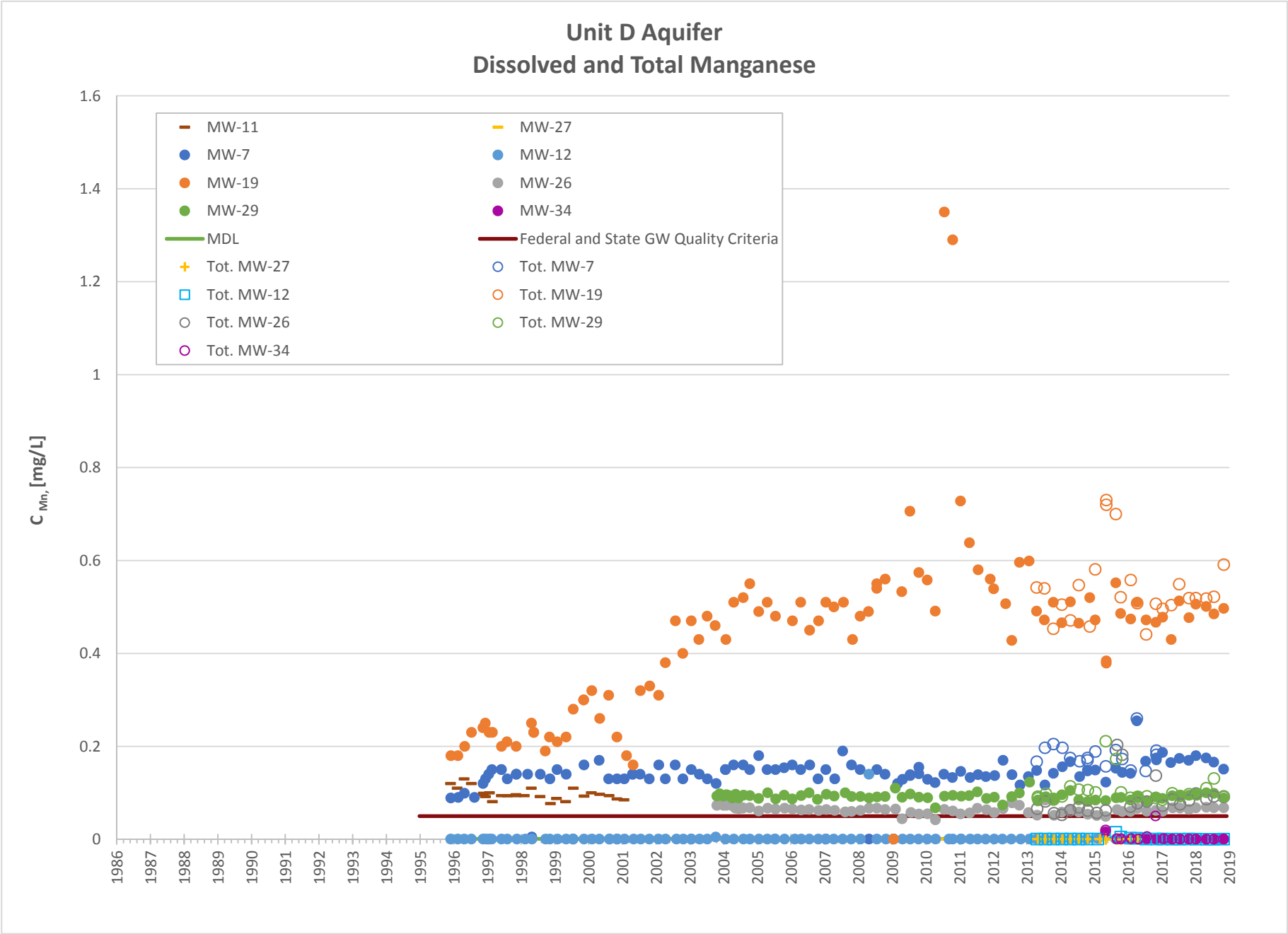

Unit D Aquifer
Dissolved and Total Arsenic
C As, [mg/L]
0.03
0.025
0.02
0.015
0.01
0.005
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
Federal DW Standard
Tot. MW-27
Tot. MW-7
Tot. MW-12
Tot. MW-19
Tot. MW-26
Tot. MW-29
Tot. MW-34

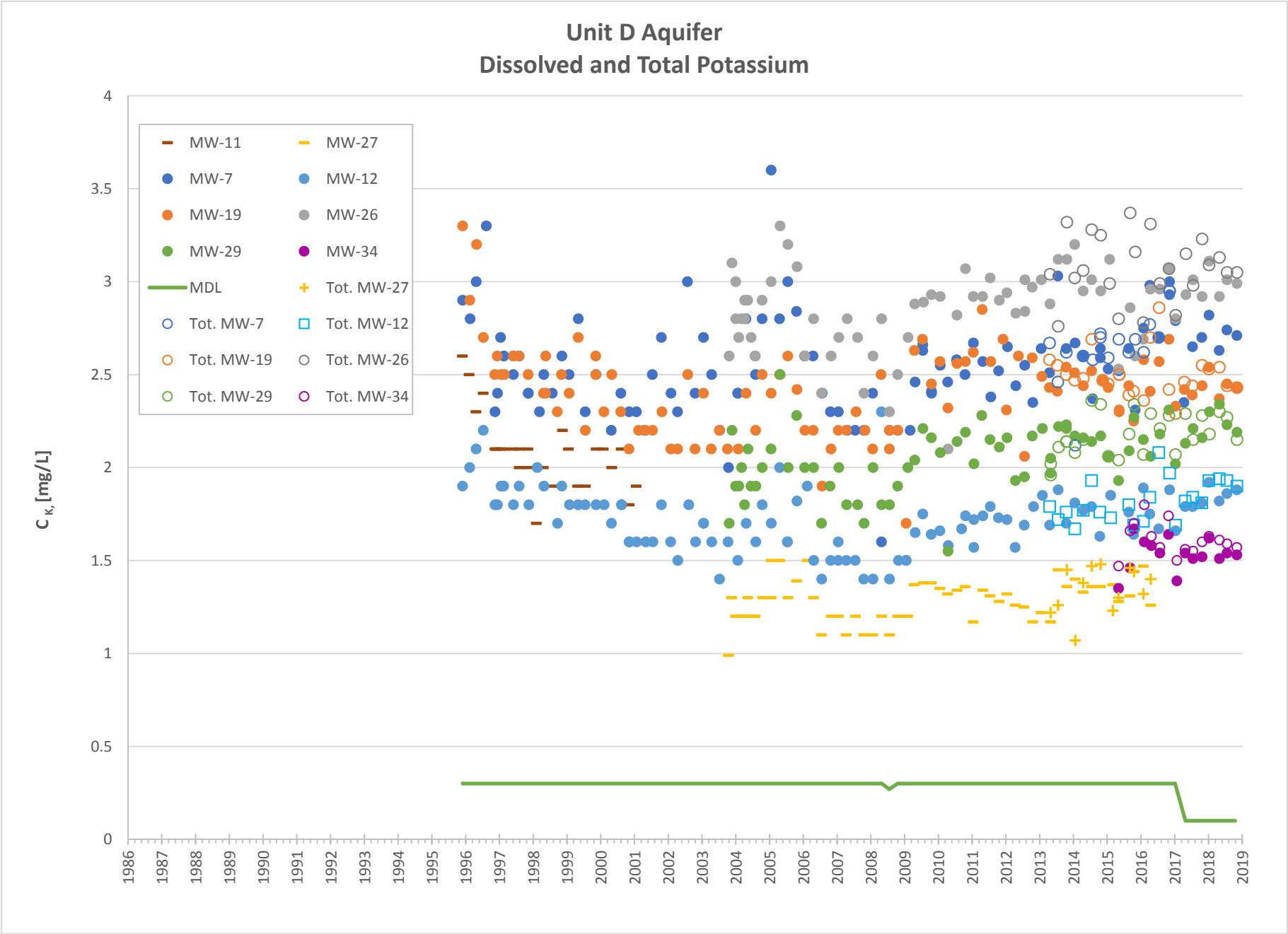

Unit D Aquifer
Dissolved and Total Calcium
C Ca, [mg/L]
25
20
15
10
5
0
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
Tot. MW-27
Tot. MW-7
Tot. MW-12
Tot. MW-19
Tot. MW-26
Tot. MW-29
Tot. MW-34
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

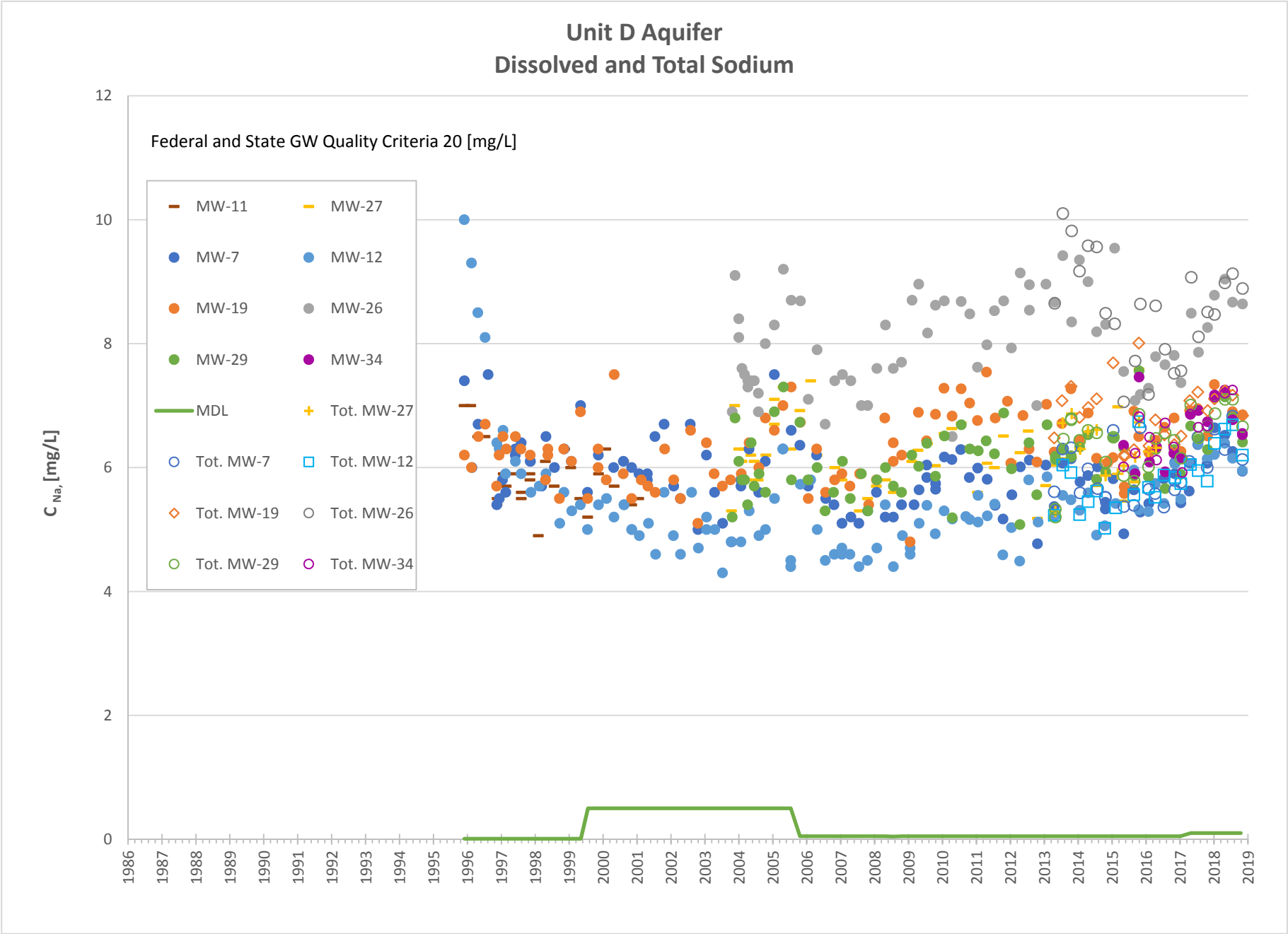


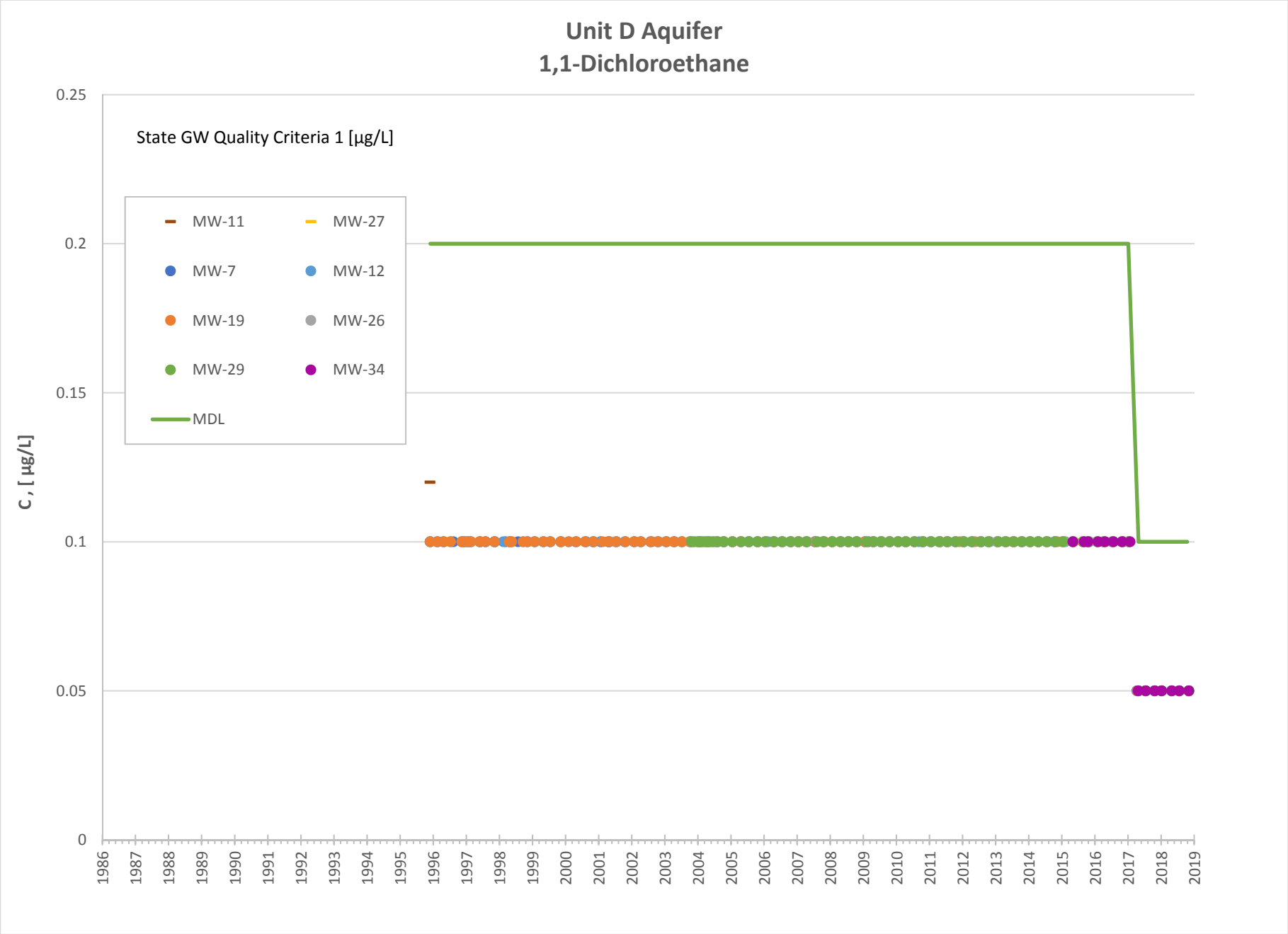
Note: Data point MW-11 from 4/30/96 = 4 mg/L

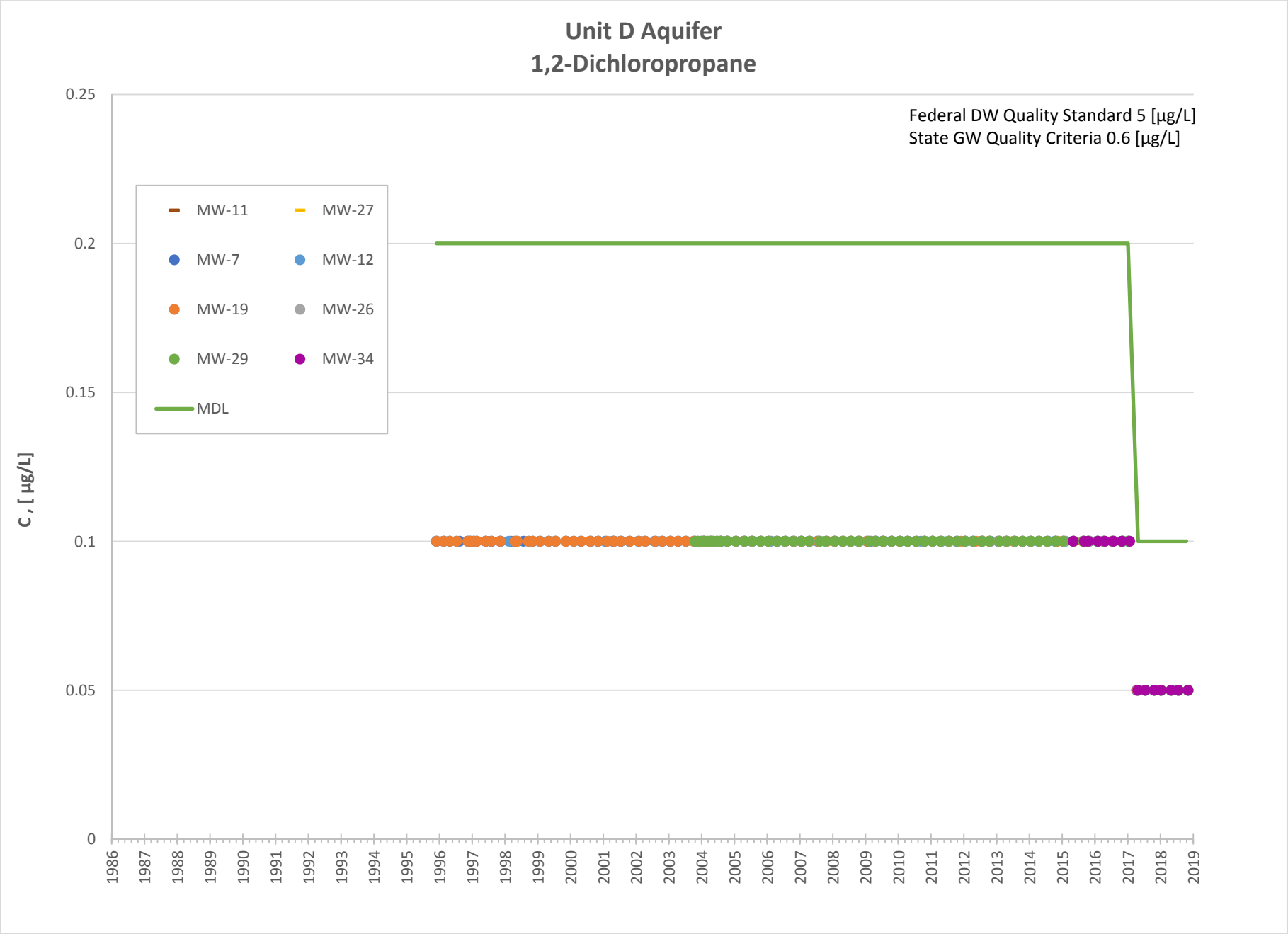

Unit D Aquifer
Dissolved and Total Magnesium
C Mg, [mg/L]
0
2
4
6
8
10
12
14
16
18
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
Tot. MW-27
Tot. MW-7
Tot. MW-12
Tot. MW-19
Tot. MW-26
Tot. MW-29
Tot. MW-34

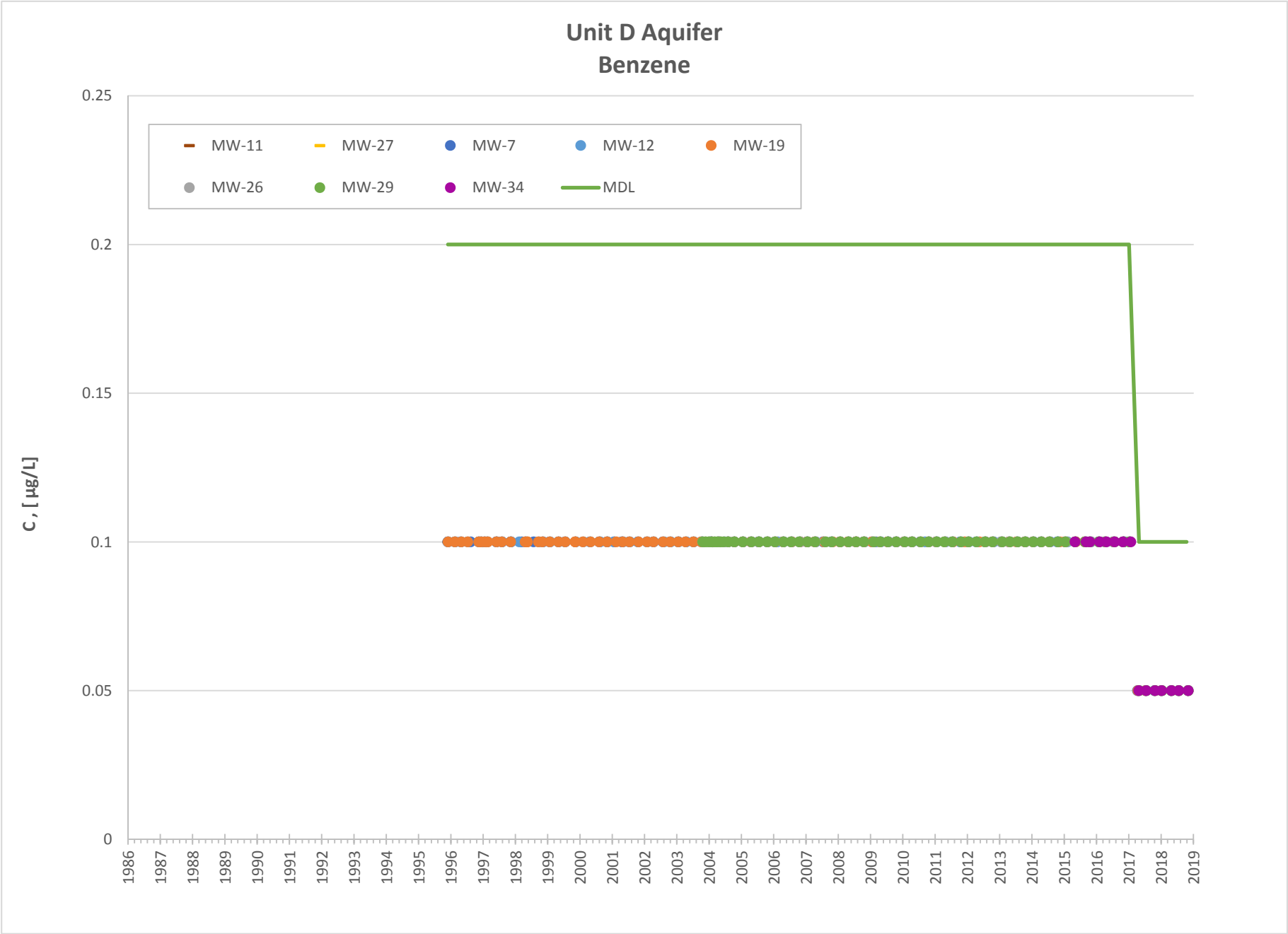

Unit D Aquifer
Dissolved and Total Manganese
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
Federal and State GW Quality Criteria
Tot. MW-27
Tot. MW-7
Tot. MW-12
Tot. MW-19
Tot. MW-26
Tot. MW-29
Tot. MW-34
C Mn, [mg/L]
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

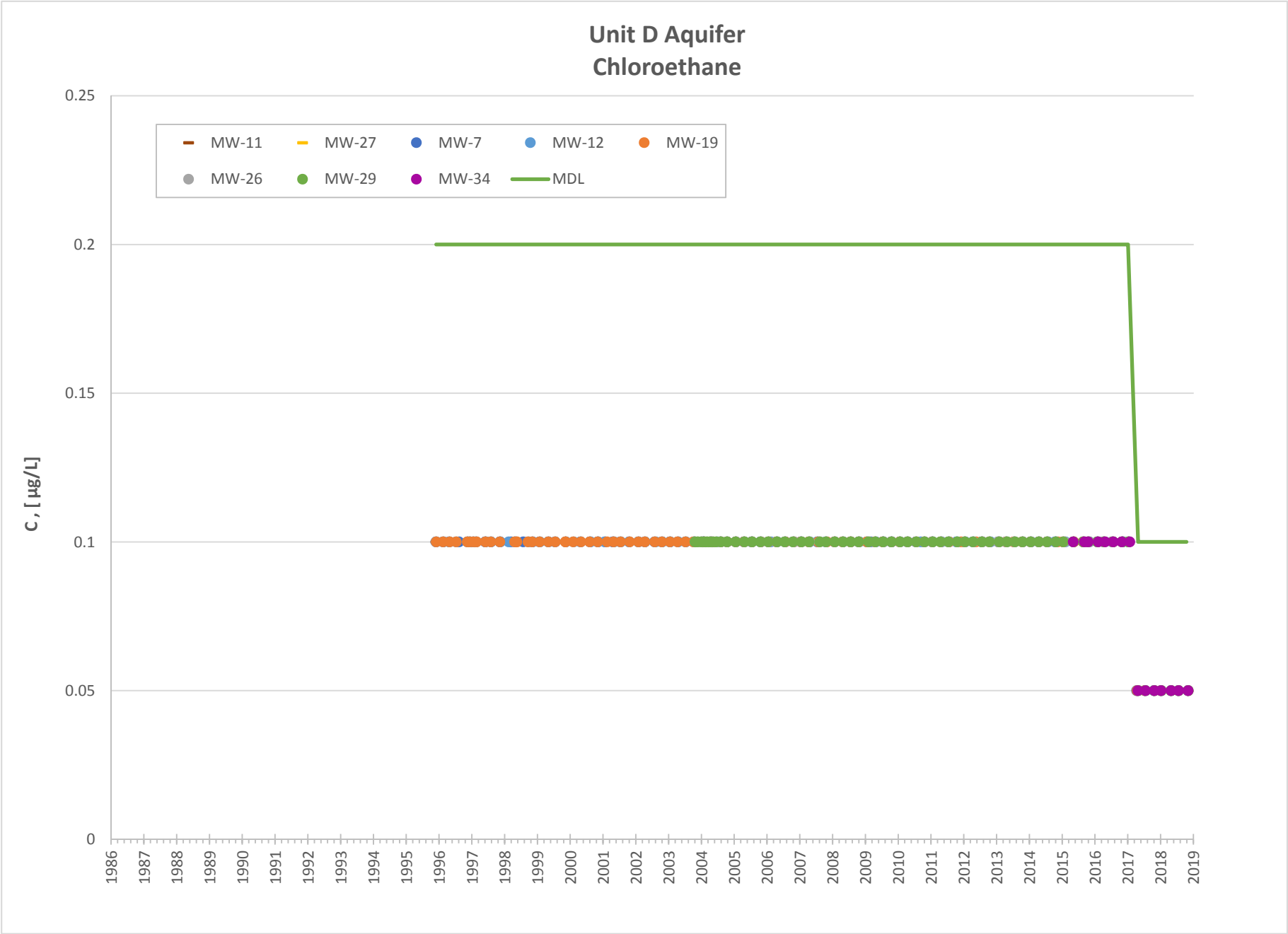

Unit D Aquifer
Dissolved and Total Potassium
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
Tot. MW-27
Tot. MW-7
Tot. MW-12
Tot. MW-19
Tot. MW-26
Tot. MW-29
Tot. MW-34
C K, [mg/L]
0
0.5
1
1.5
2
2.5
3
3.5
4
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

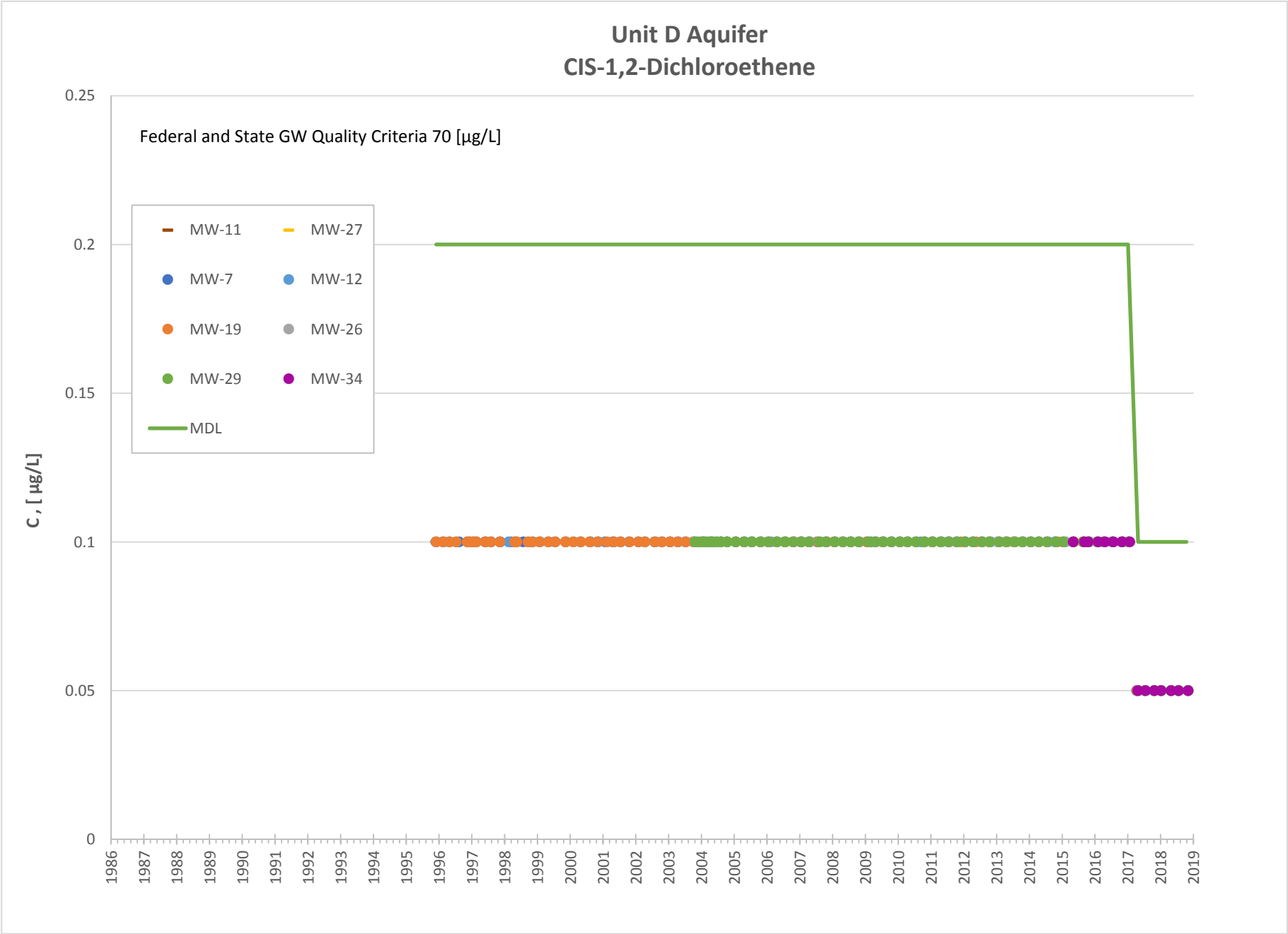

Unit D Aquifer
Dissolved and Total Sodium
Federal and State GW Quality Criteria 20 [mg/L]
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
Tot. MW-27
Tot. MW-7
Tot. MW-12
Tot. MW-19
Tot. MW-26
Tot. MW-29
Tot. MW-34
C Na, [mg/L]
0
2
4
6
8
10
12
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

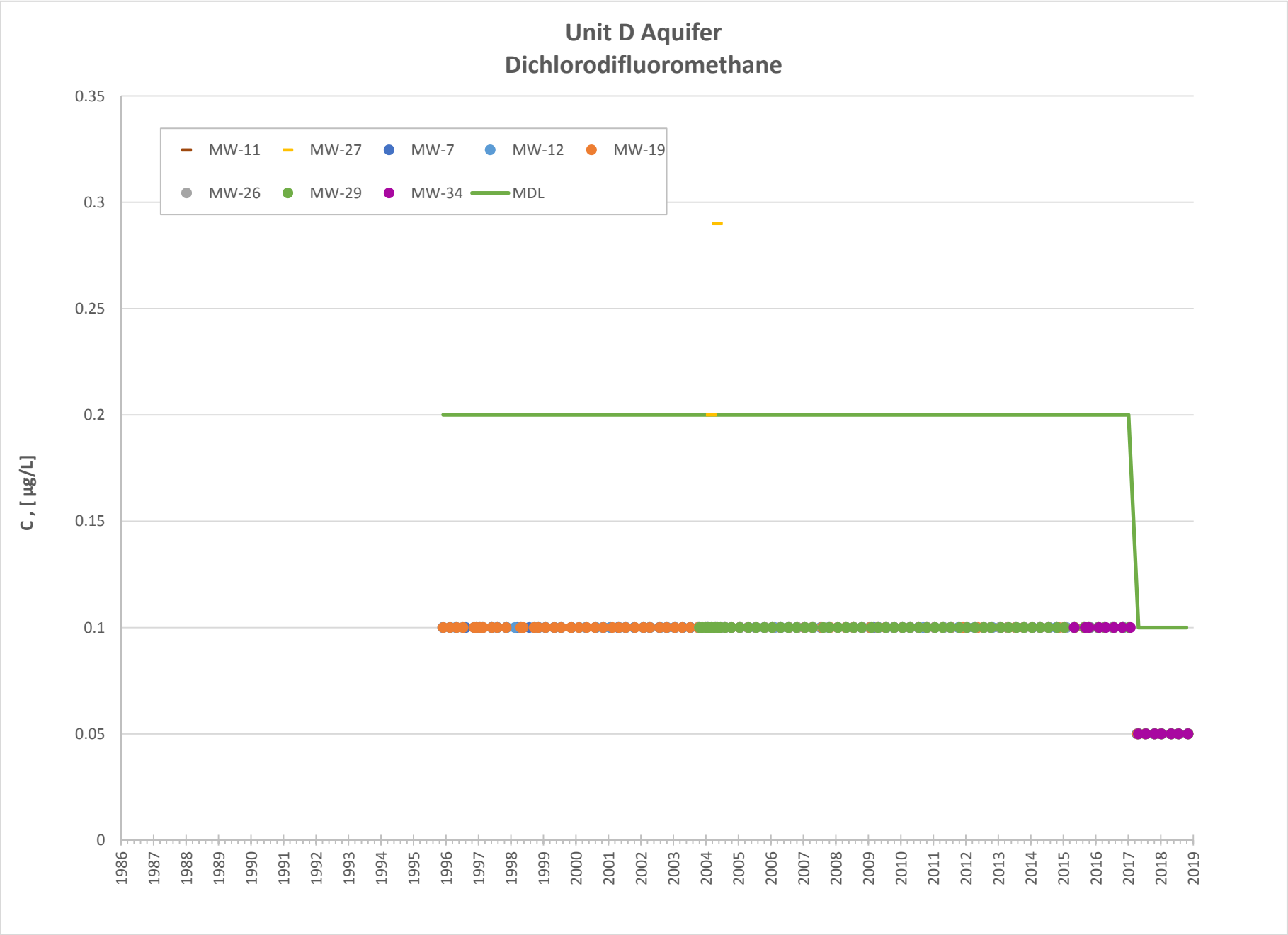

Unit D Aquifer
1,1-Dichloroethane
State GW Quality Criteria 1 [µg/L]
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
C , [µg/L]
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

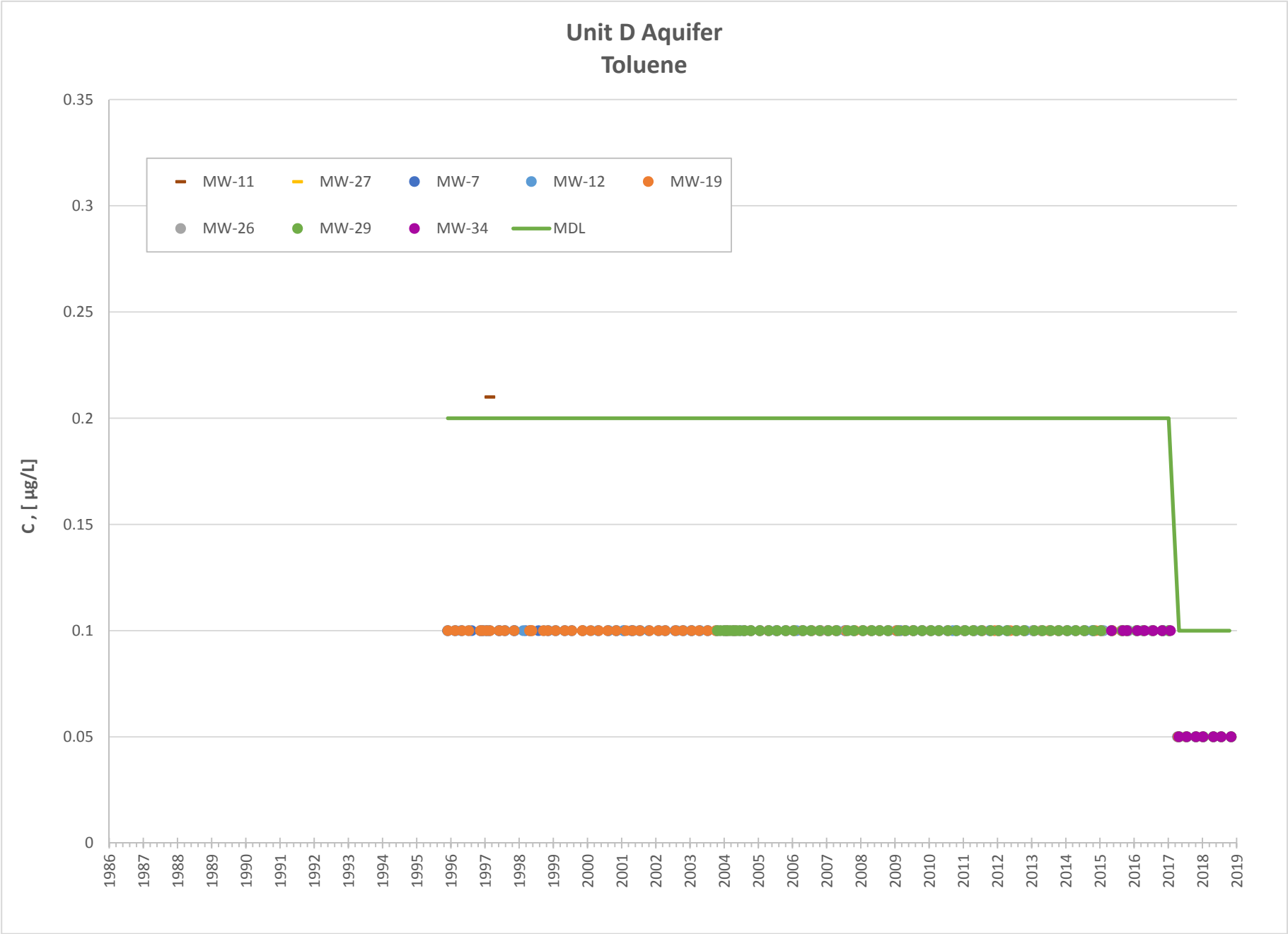

Unit D Aquifer
1,2-Dichloropropane
Federal DW Quality Standard 5 [µg/L]
State GW Quality Criteria 0.6 [µg/L]
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
C , [µg/L]
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

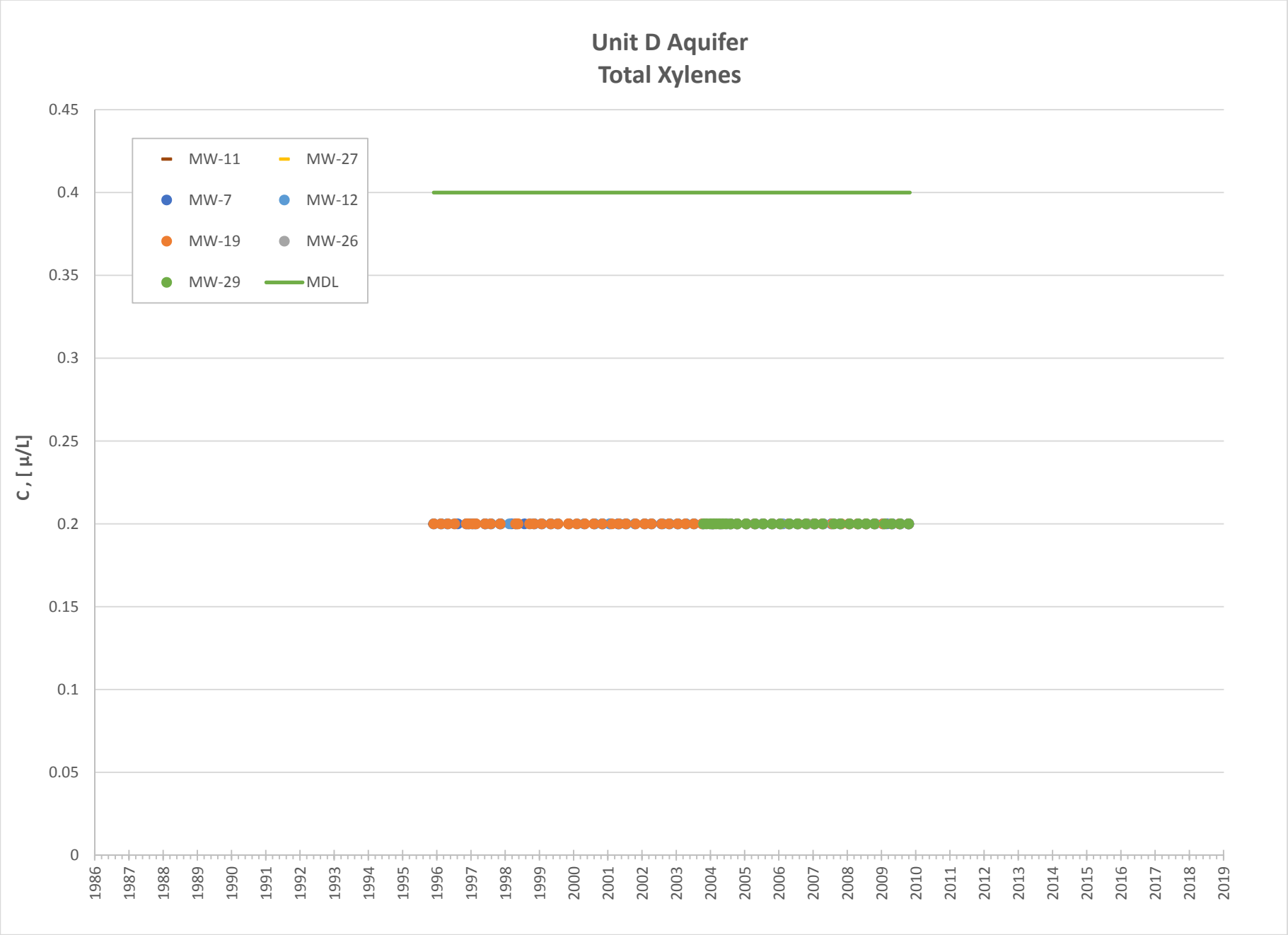

Unit D Aquifer
Benzene
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
C , [µg/L]
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

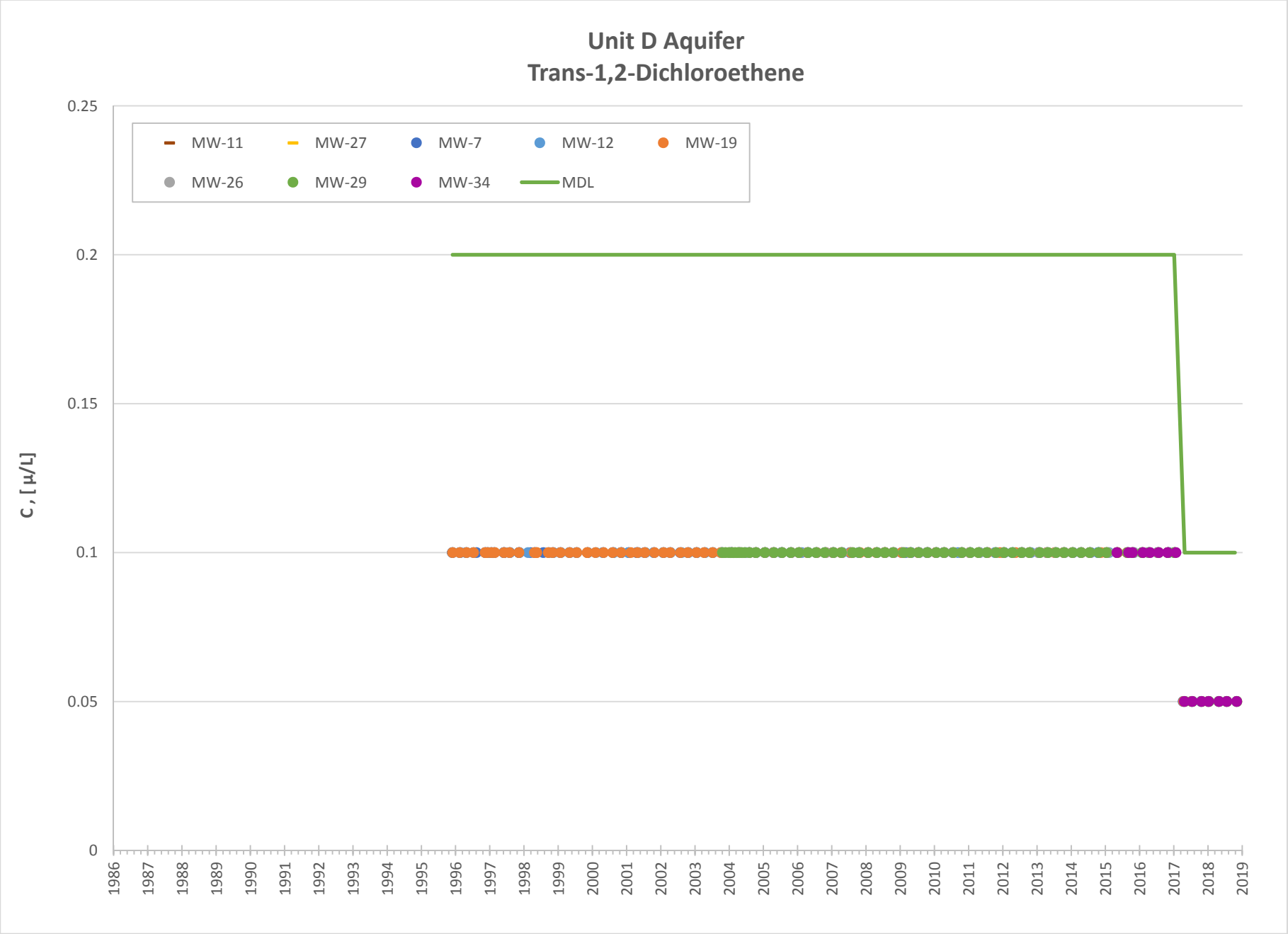

Unit D Aquifer
Chloroethane
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
C , [µg/L]
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

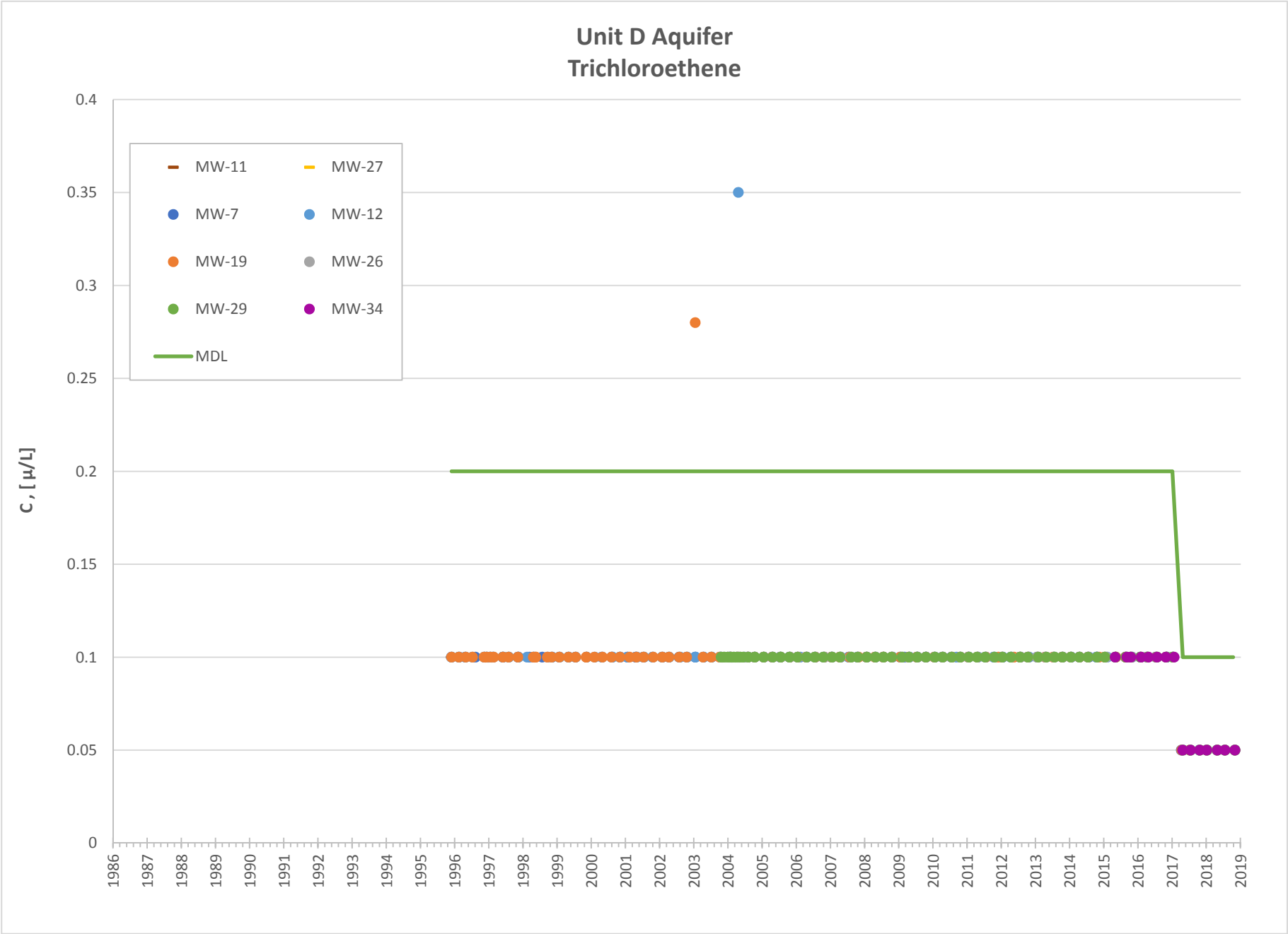

Unit D Aquifer
CIS-1,2-Dichloroethene
Federal and State GW Quality Criteria 70 [µg/L]
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
C , [µg/L]
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

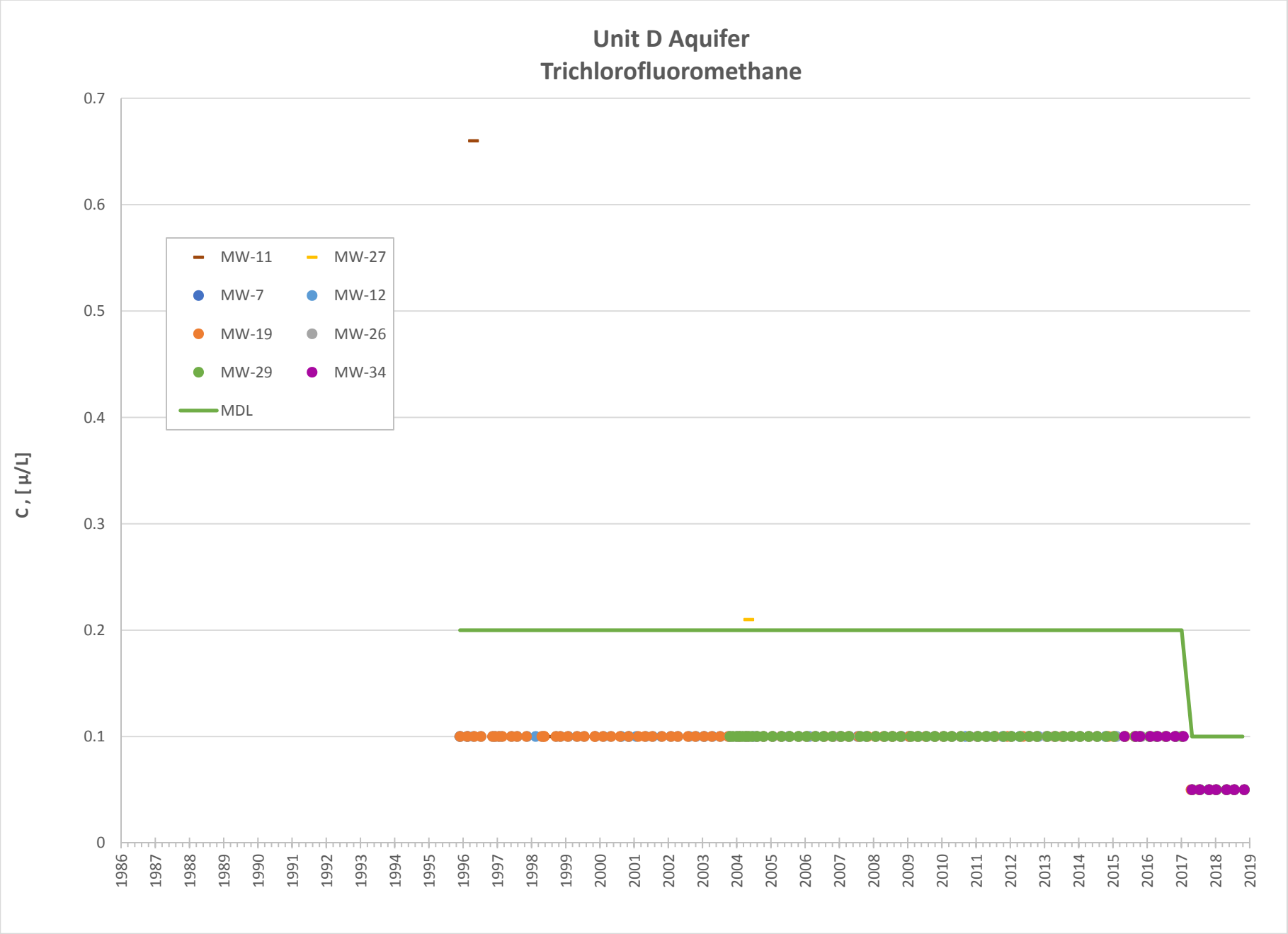

Unit D Aquifer
Dichlorodifluoromethane
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
C , [µg/L]
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

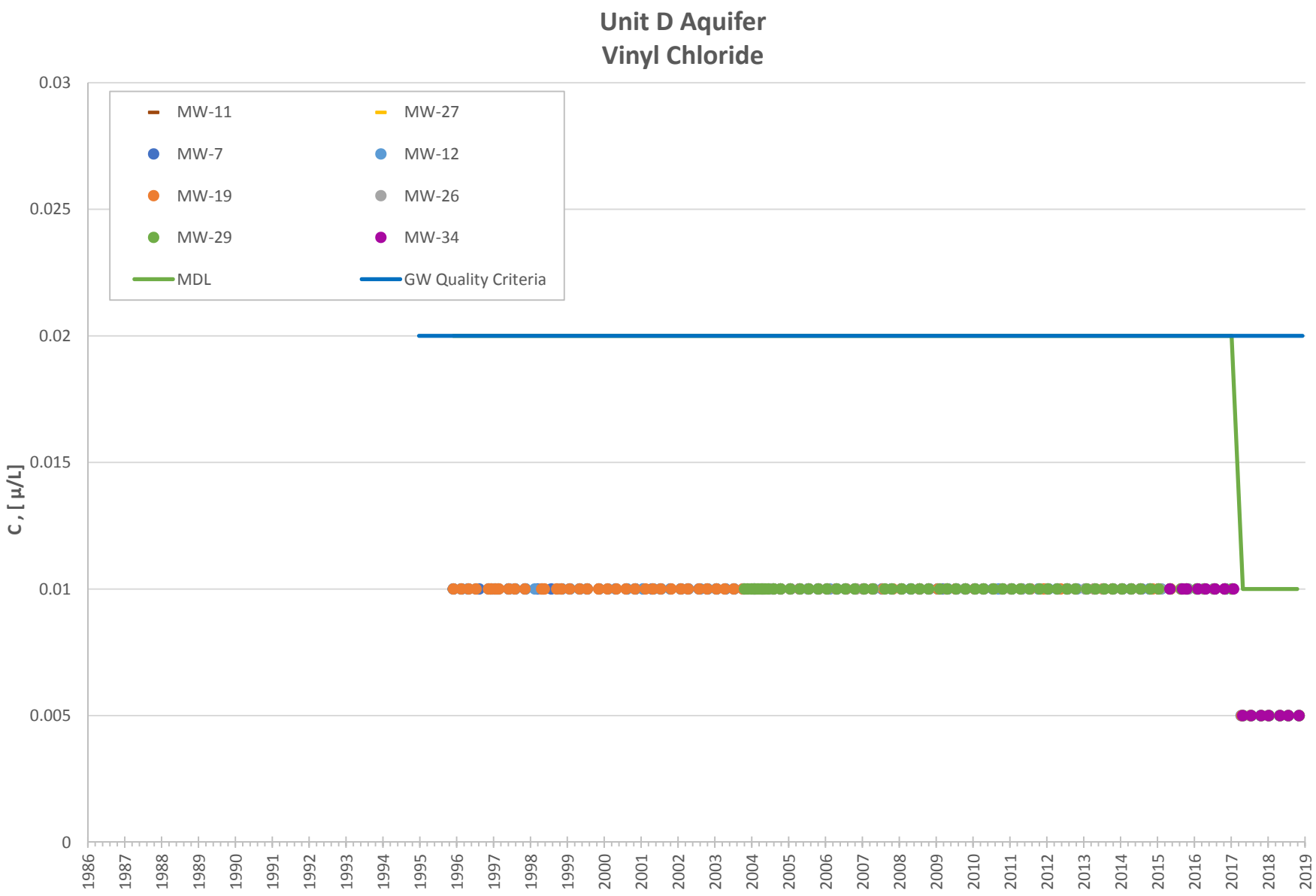

Unit D Aquifer
Toluene
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
C , [µg/L]
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Unit D Aquifer
Total Xylenes
C , [µ/L]
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MDL
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Unit D Aquifer
Trans-1,2-Dichloroethene
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
C , [µ/L]
0.25
0.2
0.15
0.1
0.05
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Unit D Aquifer
Trichloroethene
C , [µ/L]
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Unit D Aquifer
Trichlorofluoromethane
C , [µ/L]
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
MW-11
MW-27
MW-7
MW-12
MW-19
MW-26
MW-29
MW-34
MDL
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019



Note: Data point MW-19 on 5/7/2008 = 0.1 µg/L

Appendix G

Groundwater Velocity Calculations and
Potentiometric Maps

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

Memorandum

June 6, 2018

TO: Dan Swope, Engineer III, Engineering Services Section, Solid Waste Division, Department of Natural Resources and Parks (DNRP)

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

RE: Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations
First Quarter 2018 Results
Vashon Island Landfill, King County, Washington
Project No. 1126980 – Task 25.106

King County Water and Land Resources Division (KCWLR Division) submits this memorandum report on groundwater conditions during the first quarter of 2018 for the middle channel deposit in the Cc2 perched zone and the Unit D aquifer beneath the Vashon Island Landfill (landfill), in accordance with the *Proposal for Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations* (KCWLR Division, 2017). King County Solid Waste Division (KCSWD) personnel measured groundwater elevations at the landfill on January 25, 2018. These measurements were received by KCWLR Division on May 24, 2018 and were used to:

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

This report includes data from newly installed wells (MW-33, MW-34, MW-35, and MW-36) and their related designation to the hydrostratigraphic units underlying the landfill. The new designations are presented in Table 1 and discussed in *Potentiometric Groundwater Surface Mapping and Groundwater Velocity Calculation, 3rd Quarter Data Collected July 31, 2017, Vashon Island Landfill, King County, Washington; Project No. 090057-310.3* (Aspect Consulting, 2017).

Groundwater Elevation Data

KCSWD measured groundwater levels at 21 monitoring wells during the first quarter of 2018. These wells were completed in the Cc2 perched zone, Unit D aquifer, and in other zones as referred to in *Potentiometric Groundwater Surface Mapping and Groundwater Velocity Calculation, 3rd Quarter Data Collected July 31, 2017, Vashon Island Landfill, King County, Washington; Project No. 090057-310.3* (Aspect Consulting, 2017) and *Vashon Island Landfill Hydrogeologic Report Update.* (B&H/UES, 2004).

Table 1 lists spring and groundwater well identifications, locations, details, measured depth to groundwater levels and calculated groundwater elevations for wells in the Cc2 perched zone, Unit D aquifer, and other water bearing zones.

Cc2 Perched Zone

Three separate perching zones are identified in the *Vashon Island Landfill Hydrogeologic Report Update* (B&H/UES, 2004) within the upper lacustrine silt deposits identified as Unit C. Only the southern portion of the of the Cc2 middle channel deposit perched zone was identified as laterally extensive. Groundwater in this perched zone is measured by wells MW-2, MW-9, MW-20, MW-21, MW-33, and MW-35. While the current elevations of the springs were not measured, the spring locations where the Cc2 perched zone outcrops along the west hillslope are included in the figures. For more information regarding the west slope spring and geologic conditions, see the *Vashon Island Landfill Hillslope Report for Scope of Work #1* (KCSWD, 2006).

Well MW-33 a measured water levels at about 15 feet above the top of the screen and may be influenced by vertical gradients or confining conditions in the perched zone.

According to *Potentiometric Groundwater Surface Mapping and Groundwater Velocity Calculation: 3rd Quarter Data Collected July 31, 2017* (Aspect 2017), Well MW-9 is assumed not to be in hydraulic communication with the other wells in this zone. Based on this, MW-9 was not used to determine either potentiometric surface or groundwater velocity for this monitoring event.

Figure 1 shows well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Cc2 perched zone for the January 25, 2018 measurement event.

Unit D Aquifer

Groundwater in the Unit D aquifer is measured by wells MW-7, MW-12, MW-19, MW-25, MW-26, MW-27, MW-28, MW-29, and MW-34 (B&H/UES, 2004).

The water level in monitoring well MW-28 was measured at about the screen bottom and is interpreted as “dry.” MW-28 has historically been dry and was not used to determine either potentiometric surface or groundwater velocity for this monitoring event.

Wells MW-7, MW-12, MW-19 and MW-34 measured water levels were at least 17 feet above the top of the screen and may be influenced by vertical gradients or confining conditions in the Unit D aquifer.

Figure 2 shows well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Unit D aquifer for the January 25, 2018 measurement event.

Direction of Groundwater Flow

Groundwater elevations from measurements made on January 25, 2018, indicate that groundwater in the Cc2 perched zone generally flowed towards the southwest (Figure 1). Groundwater elevations from measurements made on January 25, 2018, indicate that groundwater in the Unit D aquifer flows to the north-northwest, north-northeast, and to the southwest away from a “ridge” of higher groundwater elevations trending generally west-northwest/east-southeast across the southern end of the landfill (Figure 2).

Figures 1 and 2 show groundwater elevations, potentiometric surface contours and interpreted groundwater flow directions for the springs and wells in the Cc2 perched zone, and the wells in the Unit D aquifer, respectively, based on the January 25, 2018 measurements.

Groundwater Parameters

Horizontal groundwater velocity was calculated using the following formula:

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

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

Horizontal groundwater velocity was calculated southern Cc2 perched zone and for the Unit D aquifer directly beneath the landfill. The hydraulic conductivity and effective porosity values were based on the ranges referred to in the *Potentiometric Groundwater Surface Mapping and Groundwater Velocity Calculation – Vashon Island Landfill* (Aspect, 2010). Table 2 presents a summary of the groundwater parameters used to calculate groundwater velocities from first quarter 2018 data.

The hydraulic gradient was determined from the potentiometric surface maps (Figures 1 and 2). The average hydraulic gradient was approximately 0.012 ft/ft within the Cc2 perched zone and 0.026 ft/ft in the Unit D aquifer. Note that the gradients used in the Cc2 perched zone are only in the areas under the landfill.

On January 25, 2018, the average horizontal groundwater velocity within the Cc2 perched zone was 0.002 feet per day (ft/d), and the average groundwater velocity in the Unit D aquifer was 0.92 ft/d.

References

Aspect Consulting. 2017. *Potentiometric Groundwater Surface Mapping and Groundwater Velocity Calculation, 3rd Quarter Data Collected July 31, 2017, Vashon Island Landfill, King County, Washington; Project No. 090057-310.3.0.* October 27.

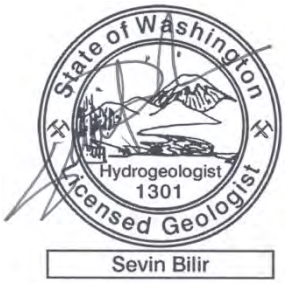
Berryman & Henigar in association with Udaloy Environmental Services (B&H/UES). 2004. *Vashon Island Landfill Hydrogeologic Report Update*. December.

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

King County Water and Land Resources Division (KCWLR Division). 2017. *Proposal for Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations*.

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

Sincerely,



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

Enclosures:

Table 1: Groundwater Elevations – First Quarter 2018

Table 2: Groundwater Parameters – First Quarter 2018

Figure 1: Groundwater Potentiometric Surface Map – First Quarter 2018 – Cc2 Perched Zone

Figure 2: Groundwater Potentiometric Surface Map – First Quarter 2018 – Unit D Aquifer

Table 1: Groundwater Elevations – First Quarter 2018

Vashon Island Landfill
King County, Washington

Completed in Unit:	Spring / Well Identification	Easting	Northing	Top of Casing Elevation (feet MSL)	Top of Screen Elevation (feet)	Bottom of Screen Elevation (feet)	January 25, 2018	
							Measured Depth to Water (feet)	Groundwater Elevations (feet MSL)
Cc1	MW-3	1227789.507	162374.0517	318.12	281.15	276.15	39.40	278.72
	MW-4	1227559.402	162957.8726	377.30	276.17	266.17	101.37	275.93
	MW-10	1227868.254	163837.4075	410.21	265.04	255.04	144.32	265.89
	MW-13	1228427.508	162842.228	377.37	267.30	262.30	97.65	279.72
	MW-24	1228427.78	162831.38	373.93	294.96	284.96	88.00	285.93
CC2 Perched Zone	18s*	1227270.527	162552.8362	NA	NA	NA	NA	NS
	19s*	1227258.475	162350.9209	NA	NA	NA	NA	NS
	24s*	1227262.207	162692.4735	NA	NA	NA	NA	NS
	34s*	1227245.998	162398.8069	NA	NA	NA	NA	NS
	MW-2	1227788.192	162365.5107	318.09	237.39	232.39	72.87	245.22
	MW-9	1227723.361	163526.7593	405.32	236.39	226.39	164.92	240.40
	MW-20	1228173.098	162566.14	370.43	240.79	236.49	120.43	250.00
	MW-21	1227647.721	162339.8555	348.95	246.46	237.06	105.45	243.50
	MW-33	1227883.225	162681.958	359.24	231.95	221.95	111.32	247.92
	MW-35	1227651.14	162559.4538	361.48	246.98	236.98	117.64	243.84
Cc3	MW-8	1227664.843	163216.8853	386.13	215.95	205.95	175.76	210.37
	MW-36	1227572.628	162951.3298	378.26	224.26	214.26	150.55	227.71
D	MW-7	1228427.426	162810.969	376.56	154.40	144.40	189.25	187.31
	MW-12	1227800.607	162374.9914	315.67	142.90	132.90	140.95	174.72
	MW-19	1227724.722	163534.7053	405.58	142.85	132.85	245.07	160.51
	MW-25	1228627.795	163748.581	399.22	152.04	137.94	243.10	156.12
	MW-26	1227909.96	163770.324	406.58	158.30	144.20	246.80	159.78
	MW-28	1228115.845	163843.491	398.72	177.04	162.64	DRY	DRY
	MW-29**	1228375.178	163680.916	413.79	173.02	158.22	244.14	169.65
	MW-34	1227773.787	163135.4694	385.94	150.64	140.64	202.00	183.94

Notes:

Water level measurements made by KCSWD personnel.
Northing & Easting coordinates are Washington North State Plane Coordinates in WGS84
Elevations reported in feet above Mean Sea Level based on the NAVD 88.
*Location dependent on groundwater elevation.
**Attempted 1/25/18, NM due to access issue in well. Measured 2/5/18 at sampling event.

NA Not applicable
NS Spring not surveyed
DRY No water detected or water depth measured below base of screen.

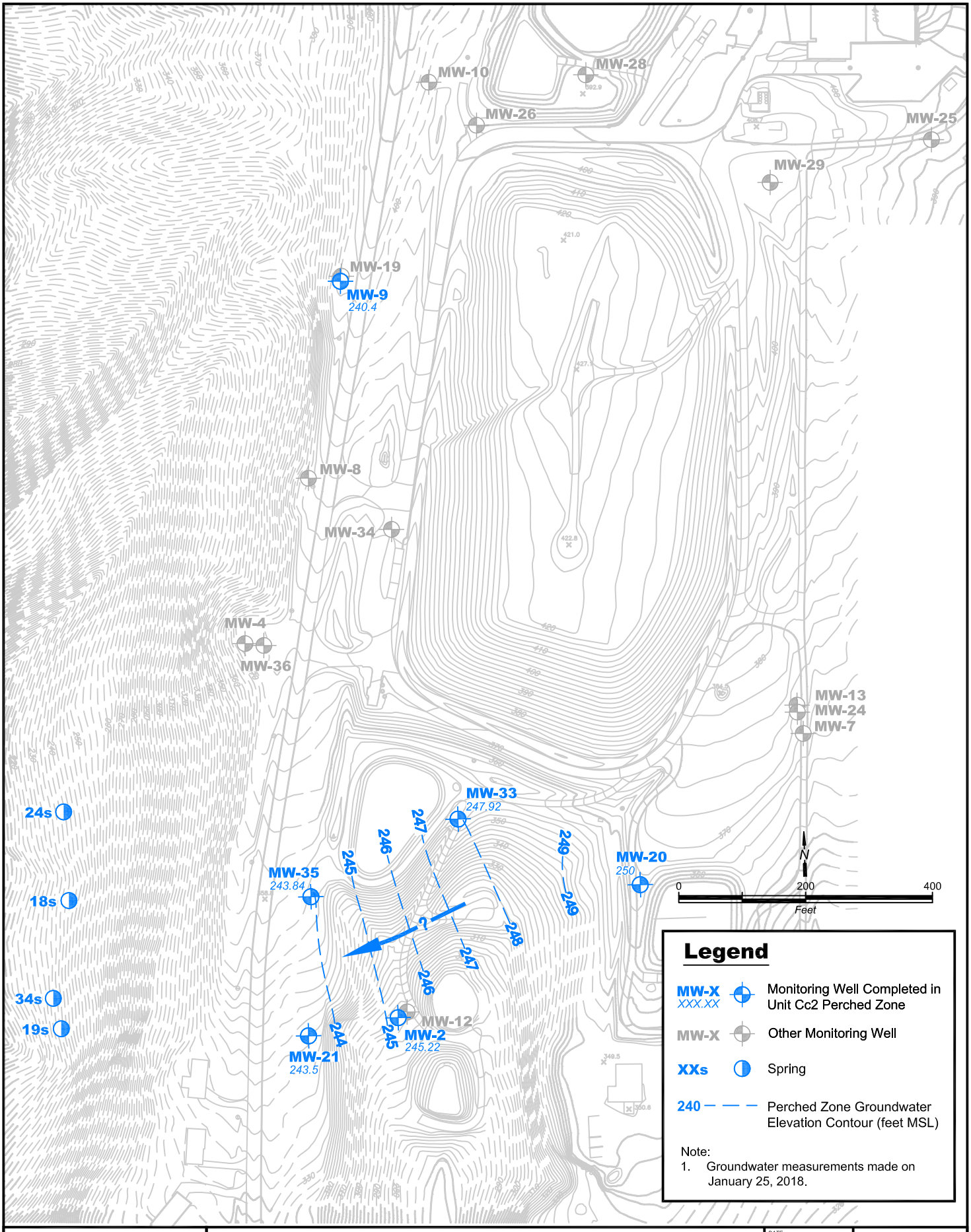
Table 2: Groundwater Parameters – First Quarter 2018

Vashon Island Landfill
King County, Washington

Water Bearing Zone Beneath Landfill	Horizontal Hydraulic Conductivity (*K*)			Horizontal Hydraulic Gradient (DH/DL)	Effective Porosity (n_{eff})	Horizontal Groundwater Velocity (*v*)	General Groundwater Flow Direction
	Range	(cm/s)	(ft/d)	(ft/ft)		(ft/d)	
Cc2 Perched Zone	Low	1.90E-06	0.01	0.012	30%	0.0004	Southwest
	High	1.60E-04	0.45	0.012	20%	0.028	
	Average	1.70E-05	0.05	0.012	25%	0.002	
D	Low	1.00E-03	3	0.026	30%	0.26	Southwest and north-northwest, north-northeast from a ridge
	High	1.00E-02	28	0.026	20%	3.58	
	Average	3.20E-03	9	0.026	25%	0.92	

Notes

1. Horizontal hydraulic conductivity values and effective porosity values from *Vashon Island Landfill Monitoring Well Construction Report, December 1996, King County Solid Waste Division.*
2. Average hydraulic conductivity values are the geometric mean of the high and low values.
3. Horizontal hydraulic gradients based on average of gradients measured at several points from the maps shown on Figures 1 and 2.
4. Effective porosity values were adopted from *Potentiometric Surface Maps and* Ground Water Velocity Estimates: *4th Quarter Ground Water Data Collected October 14, 2003 - Vashon Island Landfill, King County, Washington, January 6, 2004, HWA Geosciences, Inc.*
5. Cc2 Perched Zone gradient calculations did not incorporate hillslope or MW-9 locations.



King County

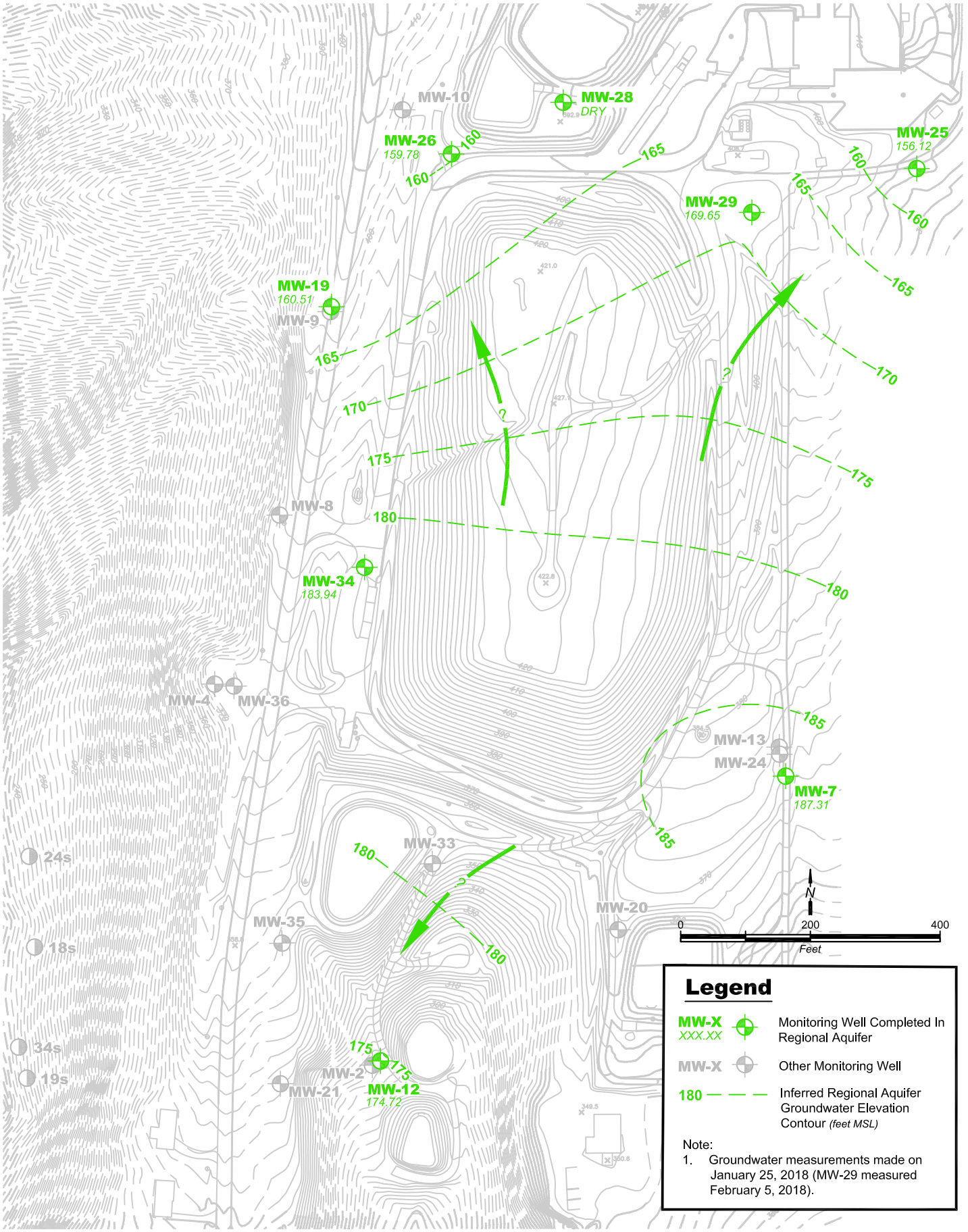
Groundwater Potentiometric Surface Map
First Quarter 2018 - Cc2 Perched Zone

Vashon Island Landfill

King County, Washington

DATE: June 2018	PROJECT NO. 1033601
DESIGNED BY: SB	
DRAWN BY: KK	FIGURE NO. 1
REVISED BY: SB	

Vashon_1Q2018_Cc2Perched.dwg



King County

Groundwater Potentiometric Surface Map
First Quarter 2018 - Unit D Aquifer
Vashon Island Landfill
King County, Washington

DATE: June 2018	PROJECT NO. 1033601
DESIGNED BY: SB	
DRAWN BY: KK	FIGURE NO. 2
REVISED BY: SB	

Vashon_1Q2018_UnitD.dwg

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

Memorandum

July 20, 2018

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

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

RE: Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations
Second Quarter 2018 Results
Vashon Island Landfill, King County, Washington
Project No. 1126980 – Task 25.106

King County Water and Land Resources Division (KCWLR Division) submits this memorandum report on groundwater conditions during the second quarter of 2018 for the middle channel deposit in the Cc2 perched zone and the Unit D aquifer beneath the Vashon Island Landfill (landfill), in accordance with the *Proposal for Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations* (KCWLR Division, 2017). King County Solid Waste Division (KCSWD) personnel measured groundwater elevations at the landfill on May 18, 2018. These measurements were received by KCWLR Division on June 25, 2018 and were used to:

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

This report includes data from newly installed wells (MW-33, MW-34, MW-35, and MW-36) and their related designation to the hydrostratigraphic units underlying the landfill. The new designations are presented in Table 1 and discussed in *Potentiometric Groundwater Surface Mapping and Groundwater Velocity Calculation, 3rd Quarter Data Collected July 31, 2017, Vashon Island Landfill, King County, Washington; Project No. 090057-310.3* (Aspect Consulting, 2017).

Groundwater Elevation Data

KCSWD measured groundwater levels at 21 monitoring wells during the second quarter of 2018. These wells were completed in the Cc2 perched zone, Unit D aquifer, and in other zones as referred to in *Potentiometric Groundwater Surface Mapping and Groundwater Velocity Calculation, 3rd Quarter Data Collected July 31, 2017, Vashon Island Landfill, King County, Washington; Project No. 090057-310.3* (Aspect Consulting, 2017) and *Vashon Island Landfill Hydrogeologic Report Update.* (B&H/UES, 2004).

Table 1 lists spring and groundwater well identifications, locations, details, measured depth to groundwater levels and calculated groundwater elevations for wells in the Cc2 perched zone, Unit D aquifer, and other water bearing zones.

Cc2 Perched Zone

Three separate perching zones are identified in the *Vashon Island Landfill Hydrogeologic Report Update* (B&H/UES, 2004) within the upper lacustrine silt deposits identified as Unit C. Only the southern portion of the of the Cc2 middle channel deposit perched zone was identified as laterally extensive. Groundwater in this perched zone is measured by wells MW-2, MW-9, MW-20, MW-21, MW-33, and MW-35. While the current elevations of the springs were not measured, the spring locations where the Cc2 perched zone outcrops along the west hillslope are included in the figures. For more information regarding the west slope spring and geologic conditions, see the *Vashon Island Landfill Hillslope Report for Scope of Work #1* (KCSWD, 2006).

Well MW-33 a measured water levels at about 15 feet above the top of the screen and may be influenced by vertical gradients or confining conditions in the perched zone.

According to *Potentiometric Groundwater Surface Mapping and Groundwater Velocity Calculation: 3rd Quarter Data Collected July 31, 2017* (Aspect 2017), Well MW-9 is assumed not to be in hydraulic communication with the other wells in this zone. Based on this, MW-9 was not used to determine either potentiometric surface or groundwater velocity for this monitoring event.

Figure 1 shows well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Cc2 perched zone for the May 18, 2018 measurement event.

Unit D Aquifer

Groundwater in the Unit D aquifer is measured by wells MW-7, MW-12, MW-19, MW-25, MW-26, MW-27, MW-28, MW-29, and MW-34 (B&H/UES, 2004).

The water level in monitoring well MW-28 is interpreted as “dry” as the water level recorded was incorrectly measured or reported. MW-28 has historically been dry and the data was not used to determine either potentiometric surface or groundwater velocity for this monitoring event.

Wells MW-7, MW-12, MW-19 and MW-34 measured water levels were at least 17 feet above the top of the screen and may be influenced by vertical gradients or confining conditions in the Unit D aquifer.

Figure 2 shows well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Unit D aquifer for the May 18, 2018 measurement event.

Direction of Groundwater Flow

Groundwater elevations from measurements made on May 18, 2018, indicate that groundwater in the Cc2 perched zone generally flowed towards the southwest (Figure 1). Groundwater elevations from measurements made on May 18, 2018, indicate that groundwater in the Unit D aquifer flows to the north-northwest, north-northeast, and to the southwest away from a “ridge” of higher groundwater elevations trending generally west-northwest/east-southeast across the southern end of the landfill (Figure 2).

Figures 1 and 2 show groundwater elevations, potentiometric surface contours and interpreted groundwater flow directions for the springs and wells in the Cc2 perched zone, and the wells in the Unit D aquifer, respectively, based on the May 18, 2018 measurements.

Groundwater Parameters

Horizontal groundwater velocity was calculated using the following formula:

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

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

Horizontal groundwater velocity was calculated southern Cc2 perched zone and for the Unit D aquifer directly beneath the landfill. The hydraulic conductivity and effective porosity values were based on the ranges referred to in the *Potentiometric Groundwater Surface Mapping and Groundwater Velocity Calculation – Vashon Island Landfill* (Aspect, 2010). Table 2 presents a summary of the groundwater parameters used to calculate groundwater velocities from second quarter 2018 data.

The hydraulic gradient was determined from the potentiometric surface maps (Figures 1 and 2). The average hydraulic gradient was approximately 0.011 ft/ft within the Cc2 perched zone and 0.019 ft/ft in the Unit D aquifer. Note that the gradients used in the Cc2 perched zone are only in the areas under the landfill.

On May 18, 2018, the average horizontal groundwater velocity within the Cc2 perched zone was 0.002 feet per day (ft/d), and the average groundwater velocity in the Unit D aquifer was 0.67 ft/d.

References

Aspect Consulting. 2017. *Potentiometric Groundwater Surface Mapping and Groundwater Velocity Calculation, 3rd Quarter Data Collected July 31, 2017, Vashon Island Landfill, King County, Washington; Project No. 090057-310.3.0.* October 27.

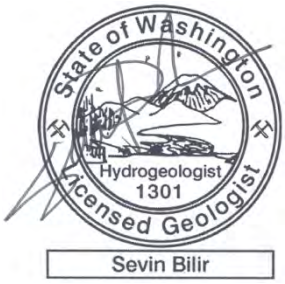
Berryman & Henigar in association with Udaloy Environmental Services (B&H/UES). 2004. *Vashon Island Landfill Hydrogeologic Report Update*. December.

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

King County Water and Land Resources Division (KCWLR Division). 2017. *Proposal for Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations*.

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

Sincerely,



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

Enclosures:

- Table 1: Groundwater Elevations – Second Quarter 2018
- Table 2: Groundwater Parameters – Second Quarter 2018
- Figure 1: Groundwater Potentiometric Surface Map – Second Quarter 2018 – Cc2 Perched Zone
- Figure 2: Groundwater Potentiometric Surface Map – Second Quarter 2018 – Unit D Aquifer

Table 1: Groundwater Elevations – Second Quarter 2018

Vashon Island Landfill
King County, Washington

Completed in Unit:	Spring / Well Identification	Easting	Northing	Top of Casing Elevation (feet MSL)	Top of Screen Elevation (feet)	Bottom of Screen Elevation (feet)	May 18, 2018	
							Measured Depth to Water (feet)	Groundwater Elevations (feet MSL)
Cc1	MW-3	1227789.507	162374.0517	318.12	281.15	276.15	40.03	278.09
	MW-4	1227559.402	162957.8726	377.30	276.17	266.17	101.49	275.81
	MW-10	1227868.254	163837.4075	410.21	265.04	255.04	144.43	265.78
	MW-13	1228427.508	162842.228	377.37	267.30	262.30	97.23	280.14
	MW-24	1228427.78	162831.38	373.93	294.96	284.96	86.93	287.00
CC2 Perched Zone	18s*	1227270.527	162552.8362	NA	NA	NA	NA	NS
	19s*	1227258.475	162350.9209	NA	NA	NA	NA	NS
	24s*	1227262.207	162692.4735	NA	NA	NA	NA	NS
	34s*	1227245.998	162398.8069	NA	NA	NA	NA	NS
	MW-2	1227788.192	162365.5107	318.09	237.39	232.39	72.78	245.31
	MW-9	1227723.361	163526.7593	405.32	236.39	226.39	164.77	240.55
	MW-20	1228173.098	162566.14	370.43	240.79	236.49	120.47	249.96
	MW-21	1227647.721	162339.8555	348.95	246.46	237.06	105.72	243.23
	MW-33	1227883.225	162681.958	359.24	231.95	221.95	111.35	247.89
	MW-35	1227651.14	162559.4538	361.48	246.98	236.98	117.16	244.32
Cc3	MW-8	1227664.843	163216.8853	386.13	215.95	205.95	175.59	210.54
	MW-36	1227572.628	162951.3298	378.26	224.26	214.26	150.63	227.63
D	MW-7	1228427.426	162810.969	376.56	154.40	144.40	189.02	187.54
	MW-12	1227800.607	162374.9914	315.67	142.90	132.90	140.44	175.23
	MW-19	1227724.722	163534.7053	405.58	142.85	132.85	245.36	160.22
	MW-25	1228627.795	163748.581	399.22	152.04	137.94	243.29	155.93
	MW-26	1227909.96	163770.324	406.58	158.30	144.20	247.08	159.50
	MW-28	1228115.845	163843.491	398.72	177.04	162.64	**DRY	**DRY
	MW-29	1228375.178	163680.916	413.79	173.02	158.22	243.84	169.95
	MW-34	1227773.787	163135.4694	385.94	150.64	140.64	202.07	183.87

Notes:

Water level measurements made by KCSWD personnel.
Northing & Easting coordinates are Washington North State Plane Coordinates in WGS84
Elevations reported in feet above Mean Sea Level based on the NAVD 88.
*Location dependent on groundwater elevation.

NA Not applicable
NS Spring not surveyed
**Depth to water (229.29') was incorrectly measured or recorded. Likely dry.

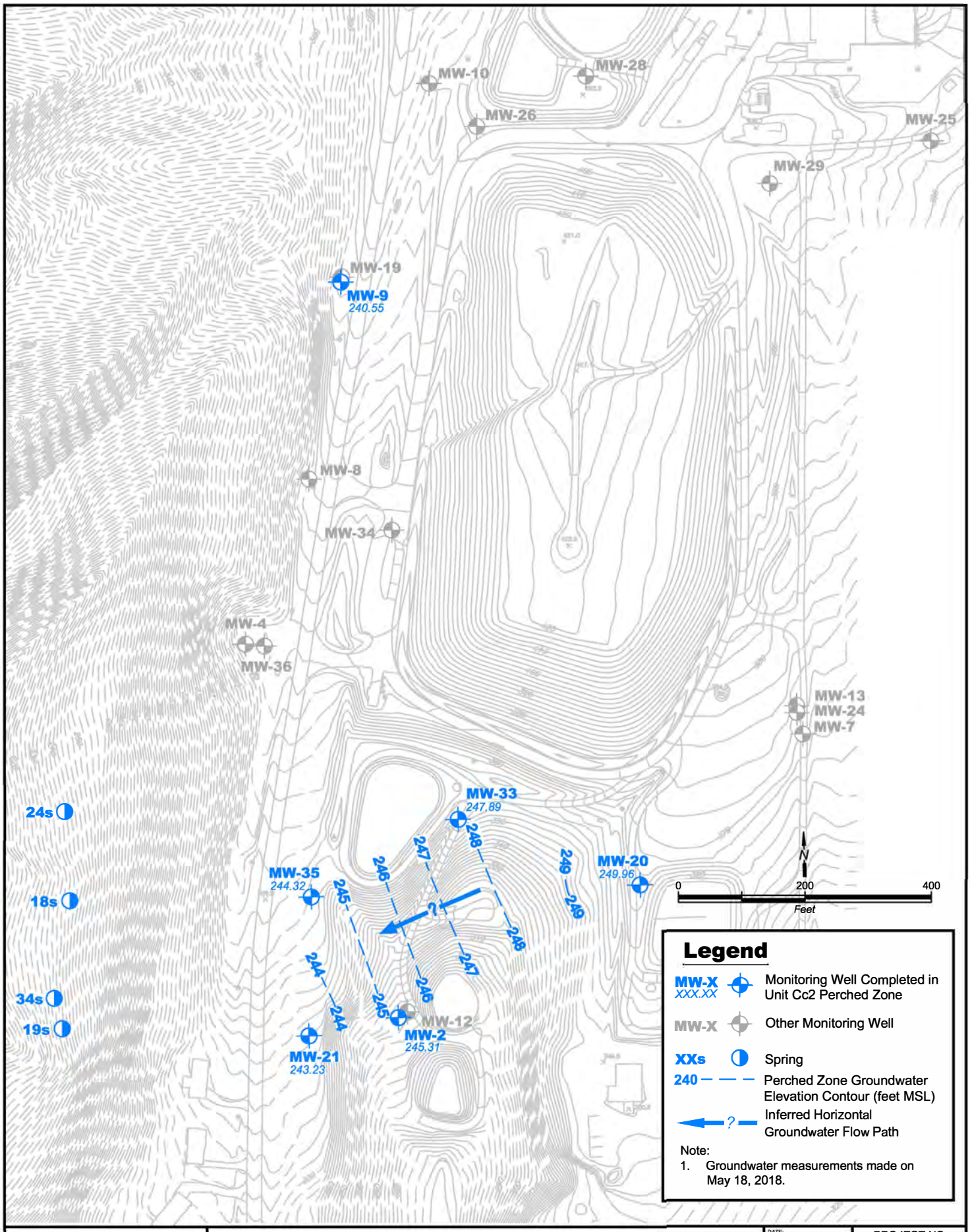
Table 2: Groundwater Parameters – Second Quarter 2018

Vashon Island Landfill
King County, Washington

Water Bearing Zone Beneath Landfill	Horizontal Hydraulic Conductivity (*K*)			Horizontal Hydraulic Gradient (DH/DL)	Effective Porosity (n_{eff})	Horizontal Groundwater Velocity (*v*)	General Groundwater Flow Direction
	Range	(cm/s)	(ft/d)	(ft/ft)		(ft/d)	
Cc2 Perched Zone	Low	1.90E-06	0.01	0.011	30%	0.0004	Southwest
	High	1.60E-04	0.45	0.011	20%	0.026	
	Average	1.70E-05	0.05	0.011	25%	0.002	
D	Low	1.00E-03	3	0.019	30%	0.19	Southwest and north-northwest, north-northeast from a ridge
	High	1.00E-02	28	0.019	20%	2.62	
	Average	3.20E-03	9	0.019	25%	0.67	

Notes

1. Horizontal hydraulic conductivity values and effective porosity values from *Vashon Island Landfill Monitoring Well Construction Report, December 1996, King County Solid Waste Division.*
2. Average hydraulic conductivity values are the geometric mean of the high and low values.
3. Horizontal hydraulic gradients based on average of gradients measured at several points from the maps shown on Figures 1 and 2.
4. Effective porosity values were adopted from *Potentiometric Surface Maps and* Ground Water Velocity Estimates: *4th Quarter Ground Water Data Collected October 14, 2003 - Vashon Island Landfill, King County, Washington, January 6, 2004, HWA Geosciences, Inc.*
5. Cc2 Perched Zone gradient calculations did not incorporate hillslope or MW-9 locations.



King County

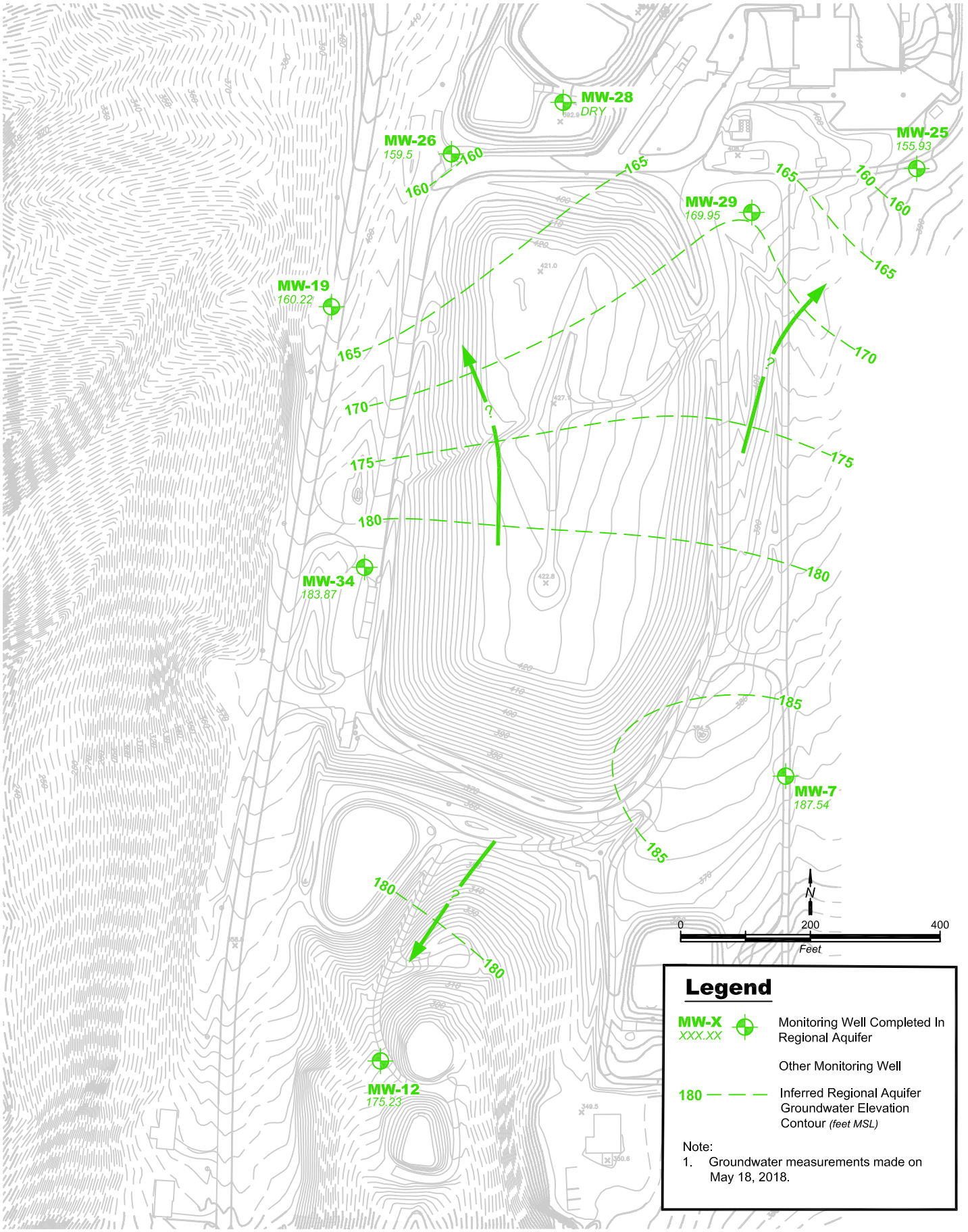
Groundwater Potentiometric Surface Map
Second Quarter 2018 - Cc2 Perched Zone

Vashon Island Landfill

King County, Washington

DATE: July 2018	PROJECT NO. 1033601
DESIGNED BY: SB	
DRAWN BY: KK	FIGURE NO. 1
REVISED BY: SB	

VI_2Q2018_Cc2Perched.dwg



King County

Groundwater Potentiometric Surface Map
Second Quarter 2018 - Unit D Aquifer

Vashon Island Landfill

King County, Washington

DATE: July 2018	PROJECT NO. 1033601
DESIGNED BY: SB	
DRAWN BY: KK	FIGURE NO. 2
REVISED BY: SB	

VI_2Q2018_UnitD.dwg

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

Memorandum

March 25, 2019

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

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

RE: Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations
Third Quarter 2018 Results
Vashon Island Closed Landfill, King County, Washington
Project No. 1033601 – Task 29.14.137.45

King County Water and Land Resources Division (KCWLR Division) submits this memorandum report on groundwater conditions during the third quarter of 2018 for the middle channel deposit in the Cc2 perched zone and the Unit D aquifer beneath the Vashon Island Closed Landfill (Landfill), in accordance with the *Proposal for Potentiometric Groundwater Surface Maps and Groundwater Velocity Calculations* (KCWLR Division, 2018).

An agency draft of the recent remedial investigation report (Aspect, 2018) provided additional understanding of the hydrogeology that has been incorporated into this memorandum. King County Solid Waste Division (KCSWD) personnel measured groundwater elevations at the Landfill on August 7, 2018. These measurements were received by KCWLR Division on August 29—November 6, 2018 and were used to:

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

Groundwater Elevation Data

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

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

Unit C - Cc2 Perched Zone

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

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

West hillslope springs 18S and 24S were monitored during a previous short term investigation and are no longer monitored. Figure A-1 shows spring and monitoring well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Cc2 perched zone for the August 7, 2018 measurement event.

Unit D Aquifer

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

Monitoring wells MW-7 and MW-34 also had measured water levels at least 17 feet above the top of the screen. These two wells have typically higher groundwater elevations which create a groundwater divide beneath the southern portion of the landfill aligned generally westerly (Aspect, 2018).

Monitoring well MW-28 was reported as and historically has been reported as “dry.” MW-28 screen was installed at the contact between Unit D and unit below (Unit E) and requires a two foot rise in surrounding groundwater levels to reach the screen bottom. Data from MW-28 was not used to determine the potentiometric surface for this monitoring event.

Figure A-2 shows monitoring well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Unit D aquifer for the August 7, 2018 measurement event.

Direction of Groundwater Flow

Figures A-1 and A-2 show groundwater elevations, potentiometric surface contours and interpreted groundwater flow directions for the monitoring wells in the Cc2 perched zone, and the monitoring wells in the Unit D aquifer, respectively, based on the August 7, 2018 measurements.

Groundwater elevations from measurements made on August 7, 2018, indicate that groundwater in the Cc2 perched zone generally flowed towards the west (Figure A-1). Inclusion of 2006 elevations of groundwater springs 18S and 24S (located on the west hillslope) indicate flow generally to the west than to the southwest as had previously been indicated in previous reports exclusive of groundwater elevation data on the west hillslope.

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

Groundwater Parameters

Horizontal groundwater velocity was calculated using the following formula:

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

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

Horizontal groundwater velocity was calculated for the southern Cc2 perched zone and for the Unit D aquifer. The hydraulic conductivity and effective porosity values were based on the new ranges referred to in the *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill, Volume 1* (Aspect, 2018). Table A-2 presents a summary of the groundwater parameters used to calculate groundwater velocities from third quarter 2018 data.

The hydraulic gradient was determined from the potentiometric surface maps (Figures A-1 and A-2). The average hydraulic gradient in the Cc2 perched zone was approximately 0.024 feet/feet (ft/ft) property wide and 0.014 ft/ft in the south slope area. The average hydraulic gradient in the Unit D aquifer was approximately 0.034 and 0.019 ft/ft in the northerly and southerly direction, respectively.

On August 7, 2018, the average horizontal groundwater velocity in the Cc2 perched zone was approximately 1.0 feet per day (ft/d) property wide and 0.40 ft/d in the south slope area. The average horizontal groundwater velocity in the Unit D aquifer was approximately 1.73 and 0.96 ft/d in the northerly and southerly direction, respectively.

References

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

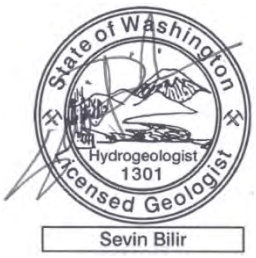
King County Water and Land Resources Division (KCWLR Division). 2006. *Vashon Island Closed Landfill Hillslope Report for Scope of Work #1*.

KCWLR Division. 2011. Vashon Closed Landfill Western Hillslope Investigation. March 31.

KCWLR Division. 2018. Proposal for Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations. King County Landfills (Cedar Falls, Cedar Hills, Enumclaw, Hobart, and Vashon Island). Unpublished. May 14.

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

Sincerely,



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

Enclosures:

Table A-1:	Groundwater Elevations – Third Quarter 2018
Table A-2:	Groundwater Parameters – Third Quarter 2018
Figure A-1:	Groundwater Potentiometric Surface Map – Third Quarter 2018 – Cc2 Perched Zone
Figure A-2:	Groundwater Potentiometric Surface Map – Third Quarter 2018 – Unit D Aquifer

Table A-1: Groundwater Elevations – Third Quarter 2018

Vashon Island Closed Landfill
King County, Washington

							August 7, 2018	
	Spring / Well Identification	**Easting**	**Northing**	**Top of Casing Elevation (feet MSL)**	**Top of Screen Elevation (feet)**	**Bottom of Screen Elevation (feet)**	**Measured Depth to Water (feet)**	**Groundwater Elevations (feet MSL)**
Cc2 Perched Zone	18S*	1227270.5272*	162552.8362*	NA	NA	NA	NA	227.94*
	24S*	1227262.207*	162692.4735*	NA	NA	NA	NA	227.24*
	MW-2	1227788.192	162365.5107	318.09	237.39	232.39	73.17	244.92
	MW-9	1227723.361	163526.7593	405.32	236.39	226.39	165.20	240.12
	MW-20	1228173.098	162566.14	370.43	240.79	236.49	120.89	249.54
	MW-21	1227647.721	162339.8555	348.95	246.46	237.06	105.99	242.96
	MW-33	1227883.225	162681.958	359.24	231.95	221.95	111.69	247.55
	MW-35	1227651.14	162559.4538	361.48	246.98	236.98	117.61	243.87
Unit D Aquifer	MW-7	1228427.426	162810.969	376.56	154.40	144.40	189.47	187.09
	MW-12	1227800.607	162374.9914	315.67	142.90	132.90	140.75	174.92
	MW-19	1227724.722	163534.7053	405.58	142.85	132.85	245.38	160.20
	MW-25	1228627.795	163748.581	399.22	152.04	137.94	243.11	156.11
	MW-26	1227909.96	163770.324	406.58	158.30	144.20	246.84	159.74
	MW-28**	1228115.845	163843.491	398.72	177.04	162.64	DRY	DRY
	MW-29	1228375.178	163680.916	413.79	173.02	158.22	244.16	169.63
	MW-34	1227773.787	163135.4694	385.94	150.64	140.64	202.37	183.57

Notes:

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

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

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

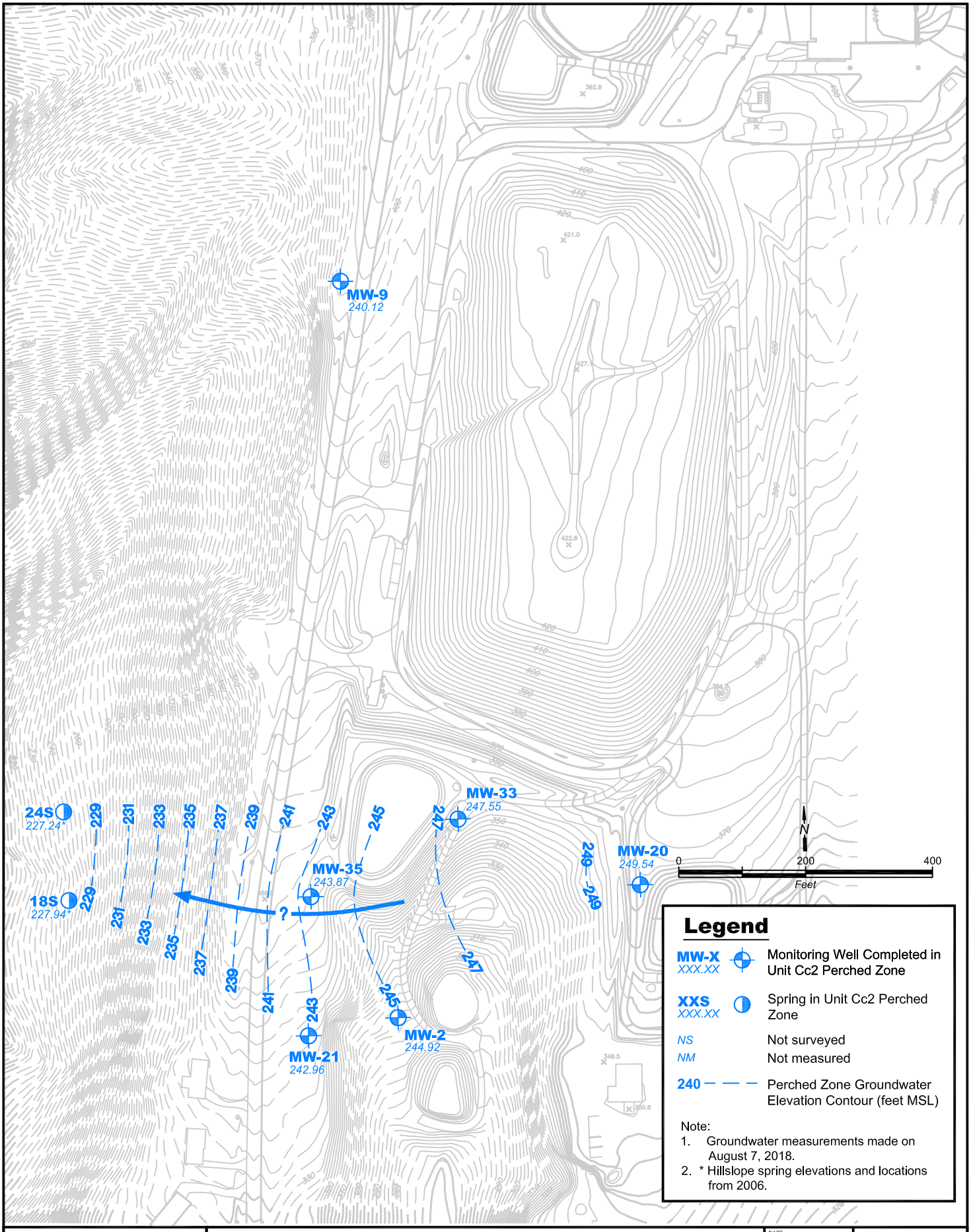
Table A-2: Groundwater Parameters – Third Quarter 2018

Vashon Island Closed Landfill
King County, Washington

Water Bearing Zone Beneath Landfill	Horizontal Hydraulic Conductivity (K)[3]			Horizontal Hydraulic Gradient (DH/DL)	Effective Porosity (n_{eff})	Horizontal Groundwater Velocity (v)	General Groundwater Flow Direction
	Range	(cm/s)	(ft/d)	(ft/ft)		(ft/d)	
Unit Cc2 - Property Wide[4]	Low	5.7E-04	1.61	0.007	20%	0.06	West
	High	1.6E-02	46.08	0.042	20%	9.60	
	Average[6]	2.9E-03	8.21	0.024	20%	1.00	
Unit Cc2 - South Slope Area[5]	Low	5.7E-04	1.61	0.007	20%	0.06	WSW to W
	High	6.8E-03	19.35	0.020	20%	1.94	
	Average[6]	2.1E-03	5.81	0.014	20%	0.40	
Unit D - Northerly flow direction	Low	1.5E-03	4.4	0.034	20%	0.74	North - with some to the NE and NW away from ridge
	High	1.6E-02	46.1		20%	7.84	
	Average	3.6E-03	10.2		20%	1.73	
Unit D - Southerly flow direction	Low	1.5E-03	4.4	0.019	20%	0.41	Southwest - away from ridge
	High	1.6E-02	46.1		20%	4.33	
	Average	3.6E-03	10.2		20%	0.96	

Notes

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

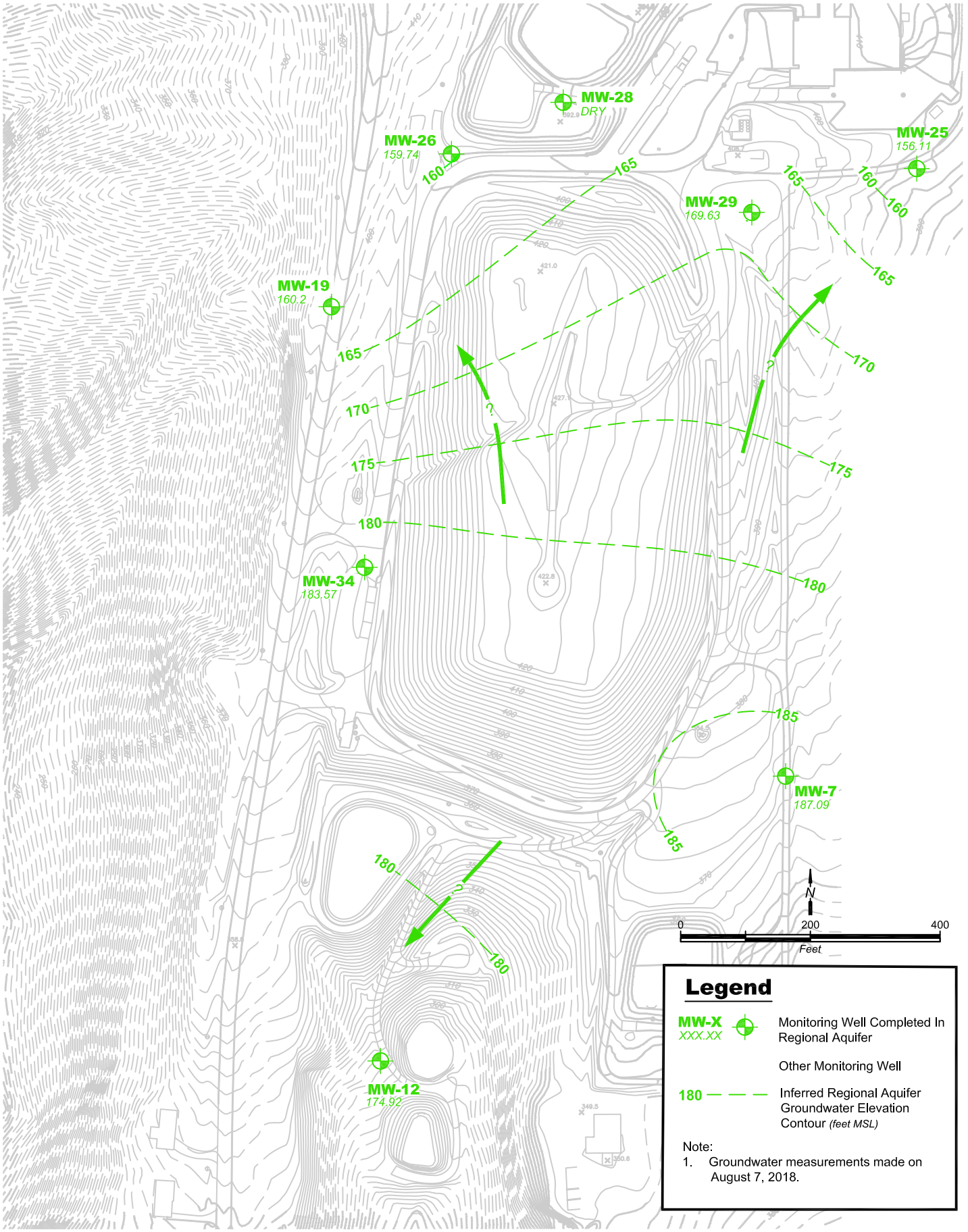


King County

Groundwater Potentiometric Surface Map
Third Quarter 2018 - Cc2 Perched Zone
Vashon Island Closed Landfill
King County, Washington

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

VI_3Q2018_Cc2Perched.dwg



King County

Groundwater Potentiometric Surface Map
Third Quarter 2018 - Unit D Aquifer
Vashon Island Closed Landfill
King County, Washington

DATE: December 2018	PROJECT NO. 1033601
DESIGNED BY: SB	
DRAWN BY: KK	FIGURE NO. A-2
REVISED BY: SB	

VI_3Q2018_UnitD.dwg

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

Memorandum

March 6, 2019

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

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

RE: Potentiometric Groundwater Surface Maps & Groundwater Velocity Calculations
Fourth Quarter 2018 Results
Vashon Island Closed Landfill, King County, Washington
Project No. 1126980 – Task 25.106

King County Water and Land Resources Division (KCWLR Division) submits this memorandum report on groundwater conditions during the fourth quarter of 2018 for the middle channel deposit in the Cc2 perched zone and the Unit D aquifer beneath the Vashon Island Closed Landfill (Landfill), in accordance with the *Proposal for Potentiometric Groundwater Surface Maps and Groundwater Velocity Calculations* (KCWLR Division, 2019).

An agency draft of the recent remedial investigation report (Aspect, 2018) provided additional understanding of the hydrogeology that has been incorporated into this memorandum. King County Solid Waste Division (KCSWD) personnel measured groundwater elevations at the Landfill on November 2, 2018. These measurements were received by KCWLR Division on December 27, 2018 and were used to:

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

Groundwater Elevation Data

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

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

Unit C – Cc2 Perched Zone

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

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

West hillslope springs 18S and 24S were monitored during a previous short term investigation (KCWLR Division, 2006) and are no longer monitored. Figure A-1 shows spring and monitoring well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Cc2 perched zone for the November 2, 2018 measurement event.

Unit D Aquifer

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

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

Figure A-2 shows monitoring well locations, groundwater elevations, groundwater potentiometric surface contours, and interpreted groundwater flow directions in the Unit D aquifer for the November 2, 2018 measurement event.

Direction of Groundwater Flow

Figures A-1 and A-2 show groundwater elevations, potentiometric surface contours and interpreted groundwater flow directions for the monitoring wells in the Cc2 perched zone, and the monitoring wells in the Unit D aquifer, respectively, based on the November 2, 2018 measurements.

Groundwater elevations from measurements made on November 2, 2018, indicate that groundwater in the Cc2 perched zone generally flowed towards the west (Figure A-1). Previously surveyed ground surface elevations of springs 18S and 24S (located on the west hillslope) are included in this report to add to gap of information to the west of the landfill, as indicated in previous reports (Aspect. 2018).

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

Groundwater Parameters

Horizontal groundwater velocity was calculated using the following formula:

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

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

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

The hydraulic gradient was determined from the potentiometric surface maps (Figures A-1 and A-2). The average hydraulic gradient in the Cc2 perched zone was approximately 0.025 feet/feet (ft/ft). The average hydraulic gradient in the Unit D aquifer was approximately 0.031 and 0.016 ft/ft in the northerly and southerly direction, respectively.

On November 2, 2018, the average horizontal groundwater velocity in the Cc2 perched zone was approximately 1.03 feet per day (ft/d) property wide and 0.73 ft/d in the south slope area. The average horizontal groundwater velocity in the Unit D aquifer was approximately 1.60 and 0.81 ft/d in the northerly and southerly direction, respectively.

References

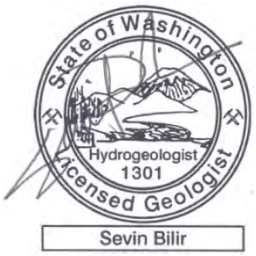
Aspect. 2018. *Remedial Investigation Report, Phase 1 – Vashon Island Closed Landfill*, *Volume 1* (Contract Number E00102E08; Task No. 310.3 – D310.3.2).October 9. AGENCY DRAFT.

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

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

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

Sincerely,



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

Enclosures:

Table A-1:	Groundwater Elevations – Fourth Quarter 2018
Table A-2:	Groundwater Parameters – Fourth Quarter 2018
Figure A-1:	Groundwater Potentiometric Surface Map – Fourth Quarter 2018 – Cc2 Perched Zone
Figure A-2:	Groundwater Potentiometric Surface Map – Fourth Quarter 2018 – Unit D Aquifer

Table A-1: Groundwater Elevations – Fourth Quarter 2018

Vashon Island Closed Landfill
King County, Washington

							November 2, 2018	
	Spring / Well Identification	Easting	Northing	Top of Casing Elevation (feet MSL)	Top of Screen Elevation (feet)	Bottom of Screen Elevation (feet)	Measured Depth to Water (feet)	Groundwater Elevations (feet MSL)
Cc2 Perched Zone	18S*	1227270.5272*	162552.8362*	NA	NA	NA	NA	227.94*
	24S*	1227262.207*	162692.4735*	NA	NA	NA	NA	227.24*
	MW-2	1227788.192	162365.5107	318.09	237.39	232.39	73.37	244.72
	MW-9	1227723.361	163526.7593	405.32	236.39	226.39	165.57	239.75
	MW-20	1228173.098	162566.14	370.43	240.79	236.49	121.10	249.33
	MW-21	1227647.721	162339.8555	348.95	246.46	237.06	106.20	242.75
	MW-33	1227883.225	162681.958	359.24	231.95	221.95	111.86	247.38
	MW-35	1227651.14	162559.4538	361.48	246.98	236.98	118.04	243.44
Unit D Aquifer	MW-7	1228427.426	162810.969	376.56	154.40	144.40	189.81	186.75
	MW-12	1227800.607	162374.9914	315.67	142.90	132.90	140.94	174.73
	MW-19	1227724.722	163534.7053	405.58	142.85	132.85	245.24	160.34
	MW-25	1228627.795	163748.581	399.22	152.04	137.94	243.06	156.16
	MW-26	1227909.96	163770.324	406.58	158.30	144.20	246.87	159.71
	MW-28**	1228115.845	163843.491	398.72	177.04	162.64	DRY	DRY
	MW-29	1228375.178	163680.916	413.79	173.02	158.22	244.03	169.76
	MW-34	1227773.787	163135.4694	385.94	150.64	140.64	202.65	183.29

Notes

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

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

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

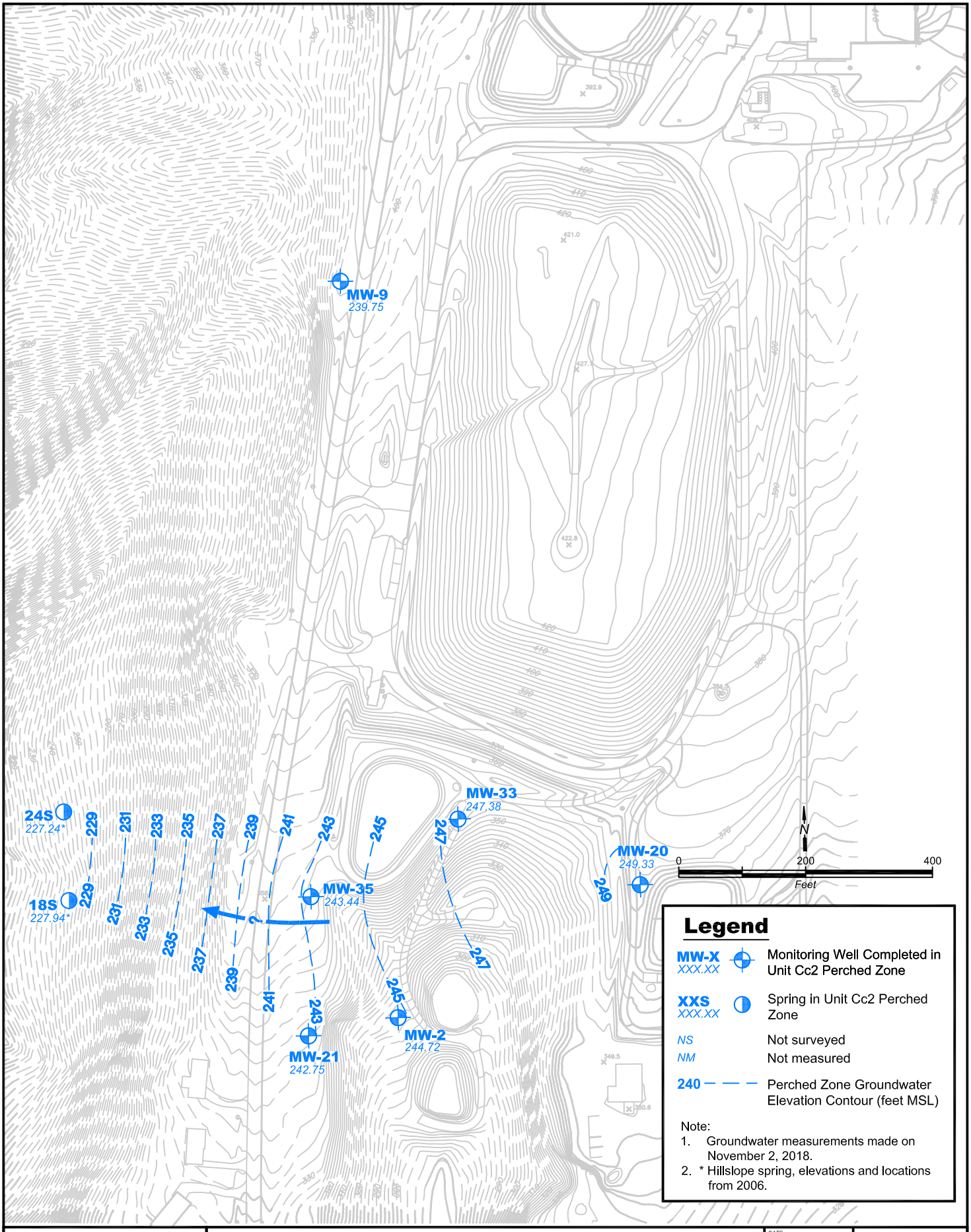
Table A-2: Groundwater Parameters – Fourth Quarter 2018

Vashon Island Closed Landfill
King County, Washington

Water Bearing Zone Beneath Landfill	Horizontal Hydraulic Conductivity (K)[3]			Horizontal Hydraulic Gradient (DH/DL)	Effective Porosity (n_{eff})	Horizontal Groundwater Velocity (v)	General Groundwater Flow Direction
	Range	(cm/s)	(ft/d)	(ft/ft)		(ft/d)	
Unit Cc2 - Property Wide[4]	Low	5.7E-04	1.61	0.008	20%	0.07	West
	High	1.6E-02	46.08	0.042	20%	9.69	
	Average[6]	2.9E-03	8.21	0.025	20%	1.03	
Unit Cc2 - South Slope Area[5]	Low	5.7E-04	1.61	0.008	20%	0.07	West
	High	6.8E-03	19.35	0.042	20%	4.07	
	Average[6]	2.1E-03	5.81	0.025	20%	0.73	
Unit D - Northerly flow direction	Low	1.5E-03	4.4	0.031	20%	0.68	North - with some to the NE and NW away from ridge
	High	1.6E-02	46.1	0.031	20%	7.2	
	Average	3.6E-03	10.2	0.031	20%	1.60	
Unit D - Southerly flow direction	Low	1.5E-03	4.4	0.016	20%	0.35	Southwest - away from ridge
	High	1.6E-02	46.1	0.016	20%	3.68	
	Average	3.6E-03	10.2	0.016	20%	0.81	

Notes

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

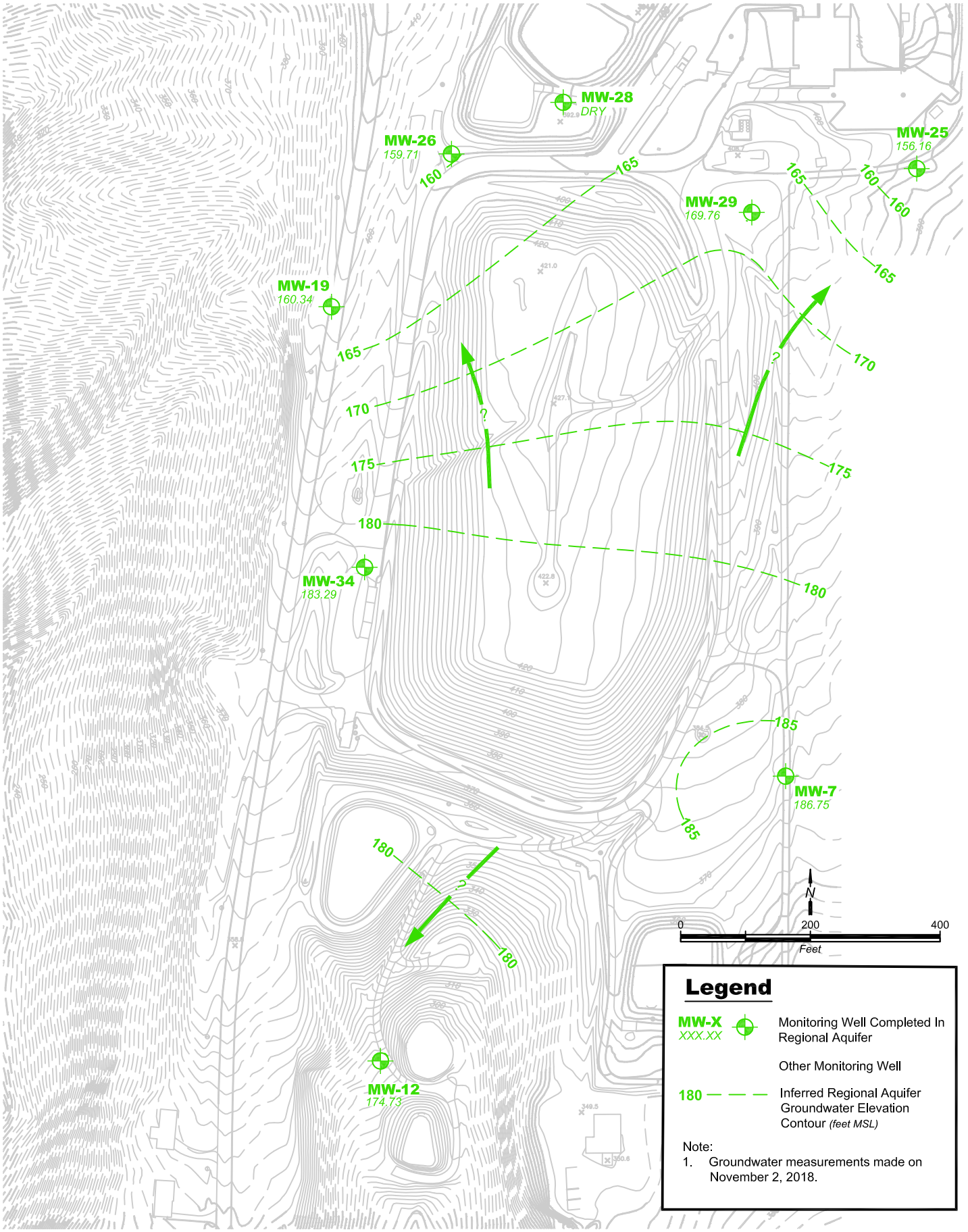


King County

Groundwater Potentiometric Surface Map
Fourth Quarter 2018 - Cc2 Perched Zone
Vashon Island Closed Landfill
King County, Washington

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

VI_4Q2018_Cc2Perched.dwg



King County

Groundwater Potentiometric Surface Map
Fourth Quarter 2018 - Unit D Aquifer
Vashon Island Closed Landfill
King County, Washington

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

VI_4Q2018_UnitD.dwg

Appendix H

Groundwater Monitoring Data

King County Solid Waste Division
Environmental Monitoring Data
Data Collected from January 1, 2018 - December 31, 2018
Vashon Island Closed Landfill --- Groundwater Water Levels
Contact Person: Sendy Jimenez (206) 477-5224

Table H-1

Groundwater - Static Water Levels

Static Water Levels		Top of PVC Casing Elevation	Depth to Groundwater	Groundwater Elevation
Well #	Measurement Date	(feet)	(feet)	(feet above MSL)
Unit B				
MW-24	1/25/2018	377.53	88.00	289.53
MW-24	5/18/2018	377.53	86.93	290.60
MW-24	8/7/2018	377.53	87.00	290.53
MW-24	11/2/2018	377.53	87.82	289.71
Channel Cc1				
MW-3	1/25/2018	318.12	39.40	278.72
MW-3	5/18/2018	318.12	40.03	278.09
MW-3	8/7/2018	318.12	41.03	277.09
MW-3	11/2/2018	318.12	Dry	Dry
MW-4	1/25/2018	377.30	101.37	275.93
MW-4	5/18/2018	377.30	101.49	275.81
MW-4	8/7/2018	377.30	101.67	275.63
MW-4	11/2/2018	377.30	102.17	275.13
MW-10	1/25/2018	410.21	144.32	265.89
MW-10	5/18/2018	410.21	144.43	265.78
MW-10	8/7/2018	410.21	144.40	265.81
MW-10	11/2/2018	410.21	144.55	265.66
MW-13	1/25/2018	377.37	97.65	279.72
MW-13	5/18/2018	377.37	97.23	280.14
MW-13	8/7/2018	377.37	97.55	279.82
MW-13	11/2/2018	377.37	98.14	279.23
Channel Cc2				
MW-2	1/25/2018	318.09	72.87	245.22
MW-2	5/18/2018	318.09	72.78	245.31
MW-2	8/7/2018	318.09	73.17	244.92
MW-2	11/2/2018	318.09	73.37	244.72
MW-9	1/25/2018	405.32	164.92	240.40
MW-9	5/18/2018	405.32	164.77	240.55
MW-9	8/7/2018	405.32	165.20	240.12
MW-9	11/2/2018	405.32	165.57	239.75
MW-20	1/25/2018	370.43	120.43	250.00
MW-20	5/18/2018	370.43	120.47	249.96
MW-20	8/7/2018	370.43	120.89	249.54
MW-20	11/2/2018	370.43	121.10	249.33
MW-21	1/25/2018	348.95	105.45	243.50
MW-21	5/18/2018	348.95	105.72	243.23
MW-21	8/7/2018	348.95	105.99	242.96
MW-21	11/2/2018	348.95	106.20	242.75
MW-33	1/25/2018	359.24	111.32	247.92
MW-33	5/18/2018	359.24	111.35	247.89
MW-33	8/7/2018	359.24	111.69	247.55
MW-33	11/2/2018	359.24	111.86	247.38
MW-35	1/25/2018	361.48	117.64	243.84
MW-35	5/18/2018	361.48	117.16	244.32
MW-35	8/7/2018	361.48	117.61	243.87
MW-35	11/2/2018	361.48	118.04	243.44

Table H-1 (*continued*)

Groundwater - Static Water Levels

Static Water Levels		Top of PVC Casing Elevation	Depth to Groundwater	Groundwater Elevation
Well #	Measurement Date	(feet)	(feet)	(feet above MSL)
Channel Cc3				
MW-8	1/25/2018	386.13	175.76	210.37
MW-8	5/18/2018	386.13	175.59	210.54
MW-8	8/7/2018	386.13	176.00	210.13
MW-8	11/2/2018	386.13	176.07	210.06
MW-36	1/25/2018	378.26	150.55	227.71
MW-36	5/18/2018	378.26	150.63	227.63
MW-36	8/7/2018	378.26	150.80	227.46
MW-36	11/2/2018	378.26	150.63	227.63
Unit D				
MW-7	1/25/2018	376.56	189.25	187.31
MW-7	5/18/2018	376.56	189.02	187.54
MW-7	8/7/2018	376.56	189.47	187.09
MW-7	11/2/2018	376.56	189.81	186.75
MW-12	1/25/2018	315.67	140.95	174.72
MW-12	5/18/2018	315.67	140.44	175.23
MW-12	8/7/2018	315.67	140.75	174.92
MW-12	11/2/2018	315.67	140.94	174.73
MW-19	1/25/2018	405.58	245.07	160.51
MW-19	5/18/2018	405.58	245.36	160.22
MW-19	8/7/2018	405.58	245.38	160.20
MW-19	11/2/2018	405.58	245.24	160.34
MW-25	1/25/2018	399.22	243.10	156.12
MW-25	5/18/2018	399.22	243.29	155.93
MW-25	8/7/2018	399.22	243.11	156.11
MW-25	11/2/2018	399.22	243.06	156.16
MW-26	1/25/2018	406.58	246.80	159.78
MW-26	5/18/2018	406.58	247.08	159.50
MW-26	8/7/2018	406.58	246.84	159.74
MW-26	11/2/2018	406.58	246.87	159.71
MW-28	1/25/2018	398.72	Dry	Dry
MW-28	5/18/2018	398.72	Dry	Dry
MW-28	8/7/2018	398.72	Dry	Dry
MW-28	11/2/2018	398.72	Dry	Dry
MW-29	1/25/2018	413.79	Not Measured	Not Measured
MW-29	5/18/2018	413.79	243.84	169.95
MW-29	8/7/2018	413.79	244.16	169.63
MW-29	11/2/2018	413.79	244.03	169.76
MW-34	1/25/2018	385.94	202.00	183.94
MW-34	5/18/2018	385.94	202.07	183.87
MW-34	8/7/2018	385.94	202.37	183.57
MW-34	11/2/2018	385.94	202.65	183.29

Table H-2

Groundwater - Sampling Water Levels

Sampling Water Levels		Top of PVC Casing Elevation	Depth to Groundwater	Groundwater Elevation
Well #	Measurement Date	(feet)	(feet)	(feet above MSL)
Channel Cc1				
MW-3	1/30/2018	318.12	39.13	278.99
MW-3	5/21/2018	318.12	40.12	278.00
MW-3	8/13/2018	318.12	41.23	276.89
MW-3	11/28/2018	318.12	41.61	276.51
MW-4	2/5/2018	377.30	101.44	275.86
MW-4	5/23/2018	377.30	101.50	275.80
MW-4	8/13/2018	377.30	101.70	275.60
MW-4	11/29/2018	377.30	102.41	274.89
MW-10	1/29/2018	410.21	145.35	264.86
MW-10	5/22/2018	410.21	144.35	265.86
MW-10	8/10/2018	410.21	145.48	264.73
MW-10	11/9/2018	410.21	144.55	265.66
MW-13	1/31/2018	377.37	98.05	279.32
MW-13	5/21/2018	377.37	97.20	280.17
MW-13	8/10/2018	377.37	97.50	279.87
MW-13	11/28/2018	377.37	98.38	278.99
Channel Cc2				
MW-2	1/30/2018	318.09	73.01	245.08
MW-2	5/21/2018	318.09	72.88	245.21
MW-2	8/17/2018	318.09	73.31	244.78
MW-2	11/28/2018	318.09	73.45	244.64
MW-9	1/29/2018	405.32	164.93	240.39
MW-9	5/22/2018	405.32	164.82	240.50
MW-9	8/10/2018	405.32	165.30	240.02
MW-9	11/29/2018	405.32	165.48	239.84
MW-20	1/31/2018	370.43	120.70	249.73
MW-20	5/22/2018	370.43	120.42	250.01
MW-20	8/15/2018	370.43	120.84	249.59
MW-20	11/28/2018	370.43	121.18	249.25
MW-21	2/5/2018	345.66	105.80	239.86
MW-21	5/21/2018	345.66	105.77	239.89
MW-21	8/15/2018	345.66	106.00	239.66
MW-21	11/27/2018	345.66	106.27	239.39
MW-33	1/30/2018	359.24	111.53	247.71
MW-33	5/22/2018	359.24	111.27	247.97
MW-33	8/15/2018	359.24	111.70	247.54
MW-33	11/27/2018	359.24	111.81	247.43
MW-35	1/31/2018	361.48	117.67	243.81
MW-35	5/21/2018	361.48	117.62	243.86
MW-35	8/15/2018	361.48	117.90	243.58
MW-35	11/27/2018	361.48	118.13	243.35

Table H-2 (*continued*)

Groundwater - Sampling Water Levels

Sampling Water Levels		Top of PVC Casing Elevation	Depth to Groundwater	Groundwater Elevation
Well #	Measurement Date	(feet)	(feet)	(feet above MSL)
Channel Cc3				
MW-8	1/30/2018	386.13	175.90	210.23
MW-8	5/22/2018	386.13	175.58	210.35
MW-8	8/10/2018	386.13	175.96	210.17
MW-8	11/9/2018	386.13	176.04	210.09
MW-36	1/31/2018	378.28	150.69	227.59
MW-36	5/23/2018	378.26	150.52	227.74
MW-36	8/13/2018	378.28	150.89	277.39
MW-36	11/29/2018	378.26	150.93	227.33
Unit D				
MW-7	1/31/2018	376.56	189.70	186.86
MW-7	5/21/2018	376.56	189.23	187.33
MW-7	8/13/2018	376.56	189.58	186.98
MW-7	11/28/2018	376.56	189.92	186.64
MW-12	1/30/2018	315.67	140.87	174.80
MW-12	5/21/2018	315.67	140.42	175.25
MW-12	8/13/2018	315.67	140.77	174.90
MW-12	11/28/2018	315.67	141.16	174.51
MW-19	1/29/2018	405.58	245.32	160.26
MW-19	5/22/2018	405.58	245.21	160.37
MW-19	8/14/2018	405.58	245.11	160.47
MW-19	11/29/2018	405.58	244.94	160.64
MW-26	1/30/2018	406.58	247.15	159.43
MW-26	5/23/2018	406.58	246.80	159.78
MW-26	8/14/2018	406.58	246.98	159.60
MW-26	11/29/2018	406.58	246.62	159.96
MW-29	2/5/2018	413.79	244.14	169.65
MW-29	5/23/2018	413.79	243.94	169.85
MW-29	8/14/2018	413.79	244.10	169.69
MW-29	11/29/2018	413.79	243.96	169.83
MW-34	1/31/2018	385.94	202.30	183.64
MW-34	5/23/2018	385.94	201.79	184.15
MW-34	8/14/2018	385.94	202.26	183.68
MW-34	11/28/2018	385.94	202.70	183.24

Table H-3
Groundwater - Field Parameters

Groundwater - Field Parameters			Specific Conductance (Field)	Dissolved Oxygen (DO) (Field)	Oxidation-Reduction Potential (ORP) (Field)	pH (Field)	Purge Volume	Temperature (Field)	Turbidity (Field)
Well #	Sample Date	Sample ID	(µmhos/cm)	(mg/L)	(mV)	(Std. Units)	(gal)	(^{o} C)	(NTU)
Channel Cc1									
MW-3	1/30/2018	WV3-180130-	87.1	9.80	286.40	5.44	2.75	9.77	3.36
MW-3	5/21/2018	WV3-180521-	74.0	8.30	234.40	5.75	1.20	10.38	1.53
**MW-3	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--
MW-4	2/5/2018	WV4-180205-	172.3	10.41	220.50	5.94	0.28	10.30	0.63
MW-4	5/23/2018	WV4-180523-	170.1	10.49	236.30	6.65	0.26	11.24	1.33
MW-4	8/13/2018	WV4-180813-	160.2	10.31	372.90	6.09	0.75	11.65	0.74
MW-4	11/29/2018	WV4-181129-	175.2	10.44	285.40	6.32	0.60	10.68	0.25
MW-10	1/29/2018	WV10180129-	148.4	6.12	233.90	7.09	1.50	10.19	0.68
MW-10	5/22/2018	WV10180522-	150.2	5.62	376.90	6.75	2.00	10.43	0.33
MW-10	8/10/2018	WV10180810-	146.3	5.77	400.20	7.00	2.80	11.01	0.31
MW-10	11/9/2018	WV10181109-	146.5	6.10	334.20	7.64	2.20	10.09	0.68
MW-13	1/31/2018	WV13180131-	166.8	7.33	191.00	7.03	2.00	10.23	0.44
MW-13	5/21/2018	WV13180521-	167.2	7.54	292.00	6.79	1.80	10.56	0.77
MW-13	8/10/2018	WV13180810-	165.2	7.43	178.00	6.70	2.20	10.95	0.41
MW-13	11/28/2018	WV13181128-	160.1	8.70	338.60	7.41	1.75	10.61	1.13
Channel Cc2									
MW-2	1/30/2018	WV2-180130-	295.1	0.72	255.60	6.85	2.25	9.65	0.35
MW-2	5/21/2018	WV2-180521-	305.3	1.18	198.00	6.54	1.00	9.99	3.71
MW-2	8/17/2018	WV2-180817-	284.5	0.66	284.20	6.97	3.00	10.02	0.43
MW-2	11/28/2018	WV2-181128-	301.4	0.90	267.10	6.60	1.80	9.75	1.04
MW-9	1/29/2018	WV9-180129-	196.1	8.81	221.60	7.00	2.25	10.01	0.96
MW-9	5/22/2018	WV9-180522-	189.2	9.18	230.40	6.55	4.60	10.08	0.53
MW-9	8/10/2018	WV9-180810-	190.8	9.22	417.10	6.76	2.80	10.65	0.26
MW-9	11/29/2018	WV9-181129-	180.7	8.59	416.30	7.00	3.00	10.08	0.45
MW-20	1/31/2018	WV20180131-	219.5	1.27	-34.80	6.92	2.50	10.18	2.94
MW-20	5/22/2018	WV20180522-	233.2	1.67	2.40	7.10	1.50	11.75	9.49
MW-20	8/15/2018	WV20180815-	206.9	1.53	114.70	6.57	2.50	12.69	4.53
MW-20	11/28/2018	WV20181128-	203.6	1.09	157.40	6.82		10.91	3.13
MW-21	2/5/2018	WV21180205-	257.0	0.67	28.00	6.59	3.50	9.72	4.85
MW-21	5/21/2018	WV21180521-	261.7	0.83	45.10	6.68	3.00	10.03	13.10
MW-21	8/15/2018	WV21180815-	252.1	1.23	61.80	6.41	3.00	10.24	3.96
MW-21	11/27/2018	WV21181127-	268.1	1.87	293.80	6.81	4.25	9.96	8.07
MW-33	1/30/2018	WV33180130-	821.0	0.54	-72.50	6.72	3.25	11.97	0.36
MW-33	5/22/2018	WV33180522-	783.4	0.57	-50.20	6.48	3.50	12.39	0.81
MW-33	8/15/2018	WV33180815-	748.0	0.60	-46.50	6.60	3.25	12.84	0.40
MW-33	11/27/2018	WV33181127-	772.9	0.63	-8.20	6.60		12.16	0.83
MW-35	1/31/2018	WV35180131-	696.9	0.47	-72.60	6.62	3.00	10.20	1.88
MW-35	5/21/2018	WV35180521-	704.0	0.37	-61.90	6.51	4.00	10.66	3.05
MW-35	8/15/2018	WV35180815-	693.0	0.40	-77.70	6.46	2.80	10.98	3.81
MW-35	11/27/2018	WV35181127-	649.1	0.42	-68.60	6.64		10.59	8.89
Channel Cc3									
MW-8	1/30/2018	WV8-180130-	163.9	10.14	272.90	6.52	2.00	10.26	0.28
MW-8	5/22/2018	WV8-180522-	163.5	10.26	203.80	6.87	1.50	11.68	0.34
MW-8	8/10/2018	WV8-180810-	157.6	10.25	423.10	5.97	3.00	10.68	0.20
MW-8	11/9/2018	WV8-181109-	164.4	10.19	356.30	7.06	2.00	10.36	0.21
MW-36	1/31/2018	WV36180131-	176.9	3.02	73.50	7.76	3.00	11.36	4.65
MW-36	6/28/2018	WV36180523-	177.6	3.34	244.00	7.32	3.00	11.73	0.87
MW-36	8/13/2018	WV36180813-	170.5	3.31	409.50	6.51	2.50	11.92	0.26
MW-36	11/29/2018	WV36181129-	175.8	3.12	274.20	7.69	2.70	11.47	0.22

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

Groundwater - Field Parameters			Specific Conductance (Field)	Dissolved Oxygen (DO) (Field)	Oxidation-Reduction Potential (ORP) (Field)	pH (Field)	Purge Volume	Temperature (Field)	Turbidity (Field)
Well #	Sample Date	Sample ID	(µmhos/cm)	(mg/L)	(mV)	(Std. Units)	(gal)	(^{o} C)	(NTU)
Unit D									
MW-7	1/31/2018	WV7-180131-	189.4	0.97	3.50	7.51	4.60	10.06	0.37
MW-7	5/21/2018	WV7-180521-	188.2	1.50	54.00	7.41	2.90	10.65	0.60
MW-7	8/13/2018	WV7-180813-	184.4	1.44	163.60	7.13	2.50	11.31	0.36
MW-7	11/28/2018	WV7-181128-	185.2	1.41	330.10	7.22	3.20	10.43	1.09
MW-12	1/30/2018	WV12180130-	165.5	5.04	272.30	7.02	2.00	9.32	0.65
MW-12	5/21/2018	WV12180521-	168.6	5.09	233.30	6.82	1.50	9.89	0.68
MW-12	8/13/2018	WV12180813-	165.2	4.92	226.70	6.59	1.50	10.15	0.35
MW-12	11/28/2018	WV12181128-	170.8	4.96	255.90	7.37	2.00	9.58	0.52
MW-19	1/29/2018	WV19180129-	221.1	0.59	-2.30	7.42	5.00	9.80	1.23
MW-19	5/22/2018	WV19180522-	221.0	1.20	164.40	7.32	2.80	10.24	0.71
MW-19	8/14/2018	WV19180814-	214.9	1.44	141.90	7.04	2.80	11.01	2.73
MW-19	11/29/2018	WV19181129-	215.4	1.26	402.40	7.27	3.00	9.93	11.30
MW-26	1/30/2018	WV26180130-	189.6	0.78	-54.10	8.22	6.00	10.10	5.54
MW-26	5/23/2018	WV26180523-	190.7	0.83	-26.80	7.57	5.00	10.55	8.73
MW-26	5/23/2018	WV26180523D	190.7	0.83	-26.80	7.57	5.00	10.55	8.73
MW-26	8/14/2018	WV26180814-	185.0	0.94	39.30	7.34	4.00	11.02	6.09
MW-26	8/14/2018	WV26180814D	185.0	0.94	39.30	7.34	4.00	11.02	6.09
MW-26	11/29/2018	WV26181129-	188.4	0.96	155.20	7.84		10.32	12.70
MW-29	2/5/2018	WV29180205-	247.6	0.82	-98.60	7.24	4.50	10.30	5.04
MW-29	5/23/2018	WV29180523-	246.8	1.02	-98.50	7.41	4.00	11.70	6.95
MW-29	8/14/2018	WV29180814-	235.7	1.14	26.20	6.65	4.00	11.25	31.70
MW-29	11/29/2018	WV29181129-	239.0	0.71	-14.20	7.45	5.75	10.45	7.38
MW-34	1/31/2018	WV34180131-	200.5	6.56	265.90	7.00	2.00	11.55	0.35
MW-34	5/23/2018	WV34180523-	201.0	6.15	264.70	6.94	3.25	12.52	0.37
MW-34	8/14/2018	WV34180814-	196.9	6.98	203.20	6.64		14.27	0.22
MW-34	11/28/2018	WV34181128-	199.4	6.21	257.50	6.90	3.30	12.00	0.31
MW-34	11/28/2018	WV34181128D	199.4	6.21	257.50	6.90	3.30	12.00	0.31
Field Blank									
FIELD BLANK	1/30/2018	WVPA180130F	1.8	-	-	6.71	-	-	15.90
FIELD BLANK	5/22/2018	WV9-180522F	1.8	-	-	7.51	-	-	14.30
FIELD BLANK	8/17/2018	WV2-180817F	3.3	-	-	7.74	-	-	16.30
Offsite Private Wells									
DW-85	1/30/2018	WV85180130-	151.1	0.35	-151.80	8.01	123.00	9.93	0.56
DW-85	8/17/2018	WV85180817-	147.5	0.31	141.90	7.75	150.00	11.92	0.25
DW-PA	1/30/2018	WVPA180130-	188.2	8.98	171.40	7.16	75.00	9.00	0.72
DW-PA	8/17/2018	WVPA180817-	182.6	9.21	394.70	6.72	135.00	11.35	0.38

Table H-4
Groundwater - Conventionals

Groundwater - Conventionals			Alkalinity, Total (as $CACO_3$)	Ammonia as N	Chloride	Nitrate	Specific Conductance (Lab)	Sulfate	Total Dissolved Solids	Total Organic Carbon	Total Solids	Total Suspended Solids
Well #	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µmhos/cm)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Channel Cc1												
MW-3	1/30/2018	WV3-180130-	23.40	0.002 U	0.94	2.18	89.50	5.37	61.30	0.5 U	66.50	2.00
MW-3	5/21/2018	WV3-180521-	23.00	0.002 U	1.00	0.78	76.60	5.15	54.30	1.02	57.70	0.5 U
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/5/2018	WV4-180205-	43.70	0.002 U	9.27	2.25	172.00	12.60	145.00	0.51 T	145.00	0.5 U
MW-4	5/23/2018	WV4-180523-	41.70	0.01	10.20	1.80	165.00	13.90	134.00	1.21	140.00	0.5 U
MW-4	8/13/2018	WV4-180813-	40.30	0.0034 T	9.52	2.00	165.00	12.90	142.00	1.04	147.00	0.99 T
MW-4	11/29/2018	WV4-181129-	39.70	0.002 U	10.90	2.45	169.00	14.90	139.00	0.59 T	139.00	0.5 U
MW-10	1/29/2018	WV10180129-	57.70	0.002 U	3.24	0.65	151.00	8.69	107.00	0.5 U	110.00	0.5 U
MW-10	5/22/2018	WV10180522-	64.00	0.0046 T	3.40	0.57	154.00	9.41	104.00	0.6 T	114.00	0.5 U
MW-10	8/10/2018	WV10180810-	57.60	0.002 U	3.19	0.59	152.00	8.68	106.00	0.5 U	109.00	0.5 U
MW-10	11/9/2018	WV10181109-	56.3 S	0.0022 ST	3.26 S	0.642 S	144 S	8.84 S	105 S	0.5 SU	109 S	0.5 ST
MW-13	1/31/2018	WV13180131-	65.90	0.002 U	3.15	0.18	173.00	13.70	119.00	0.5 U	125.00	0.71 T
MW-13	5/21/2018	WV13180521-	67.30	0.002 U	3.08	0.16	180.00	14.30	122.00	0.5 U	131.00	1.80
MW-13	8/10/2018	WV13180810-	65.30	0.002 U	3.07	0.21	174.00	13.20	119.00	0.56 T	124.00	1.21
MW-13	11/28/2018	WV13181128-	64.60	0.002 U	3.00	0.24	162.00	12.20	115.00	0.5 U	120.00	0.5 T
Channel Cc2												
MW-2	1/30/2018	WV2-180130-	132.00	0.0024 T	3.04	0.01 U	294.00	14.70	180.00	0.5 U	188.00	0.5 T
MW-2	5/21/2018	WV2-180521-	139.00	0.0026 T	2.89	0.01 U	305.00	13.70	184.00	0.7 T	197.00	1.70
MW-2	8/17/2018	WV2-180817-	131.00	0.002 U	2.91	0.01 U	294.00	14.30	176.00	0.76 T	179.00	0.5 U
MW-2	11/28/2018	WV2-181128-	130.00	0.002 U	2.91	0.01 U	281.00	14.30	173.00	0.5 U	177.00	1.10
MW-9	1/29/2018	WV9-180129-	75.90	0.002 U	4.68	0.38	198.00	12.80	132.00	0.5 U	139.00	0.5 U
MW-9	5/22/2018	WV9-180522-	72.30	0.0023 T	4.83	0.33	189.00	13.40	130.00	0.66 T	137.00	0.5 U
MW-9	8/10/2018	WV9-180810-	75.00	0.002 U	4.75	0.43	199.00	12.40	132.00	0.5 U	138.00	0.5 U
MW-9	11/29/2018	WV9-181129-	72.00	0.002 U	4.25	0.34	180.00	11.00	123.00	0.5 U	128.00	0.5 U
MW-20	1/31/2018	WV20180131-	85.90	0.01	3.13	0.01 U	215.00	16.70	143.00	0.5 U	153.00	2.20
MW-20	5/22/2018	WV20180522-	89.40	0.01	3.33	0.01 U	221.00	17.50	145.00	0.78 T	161.00	6.90
MW-20	8/15/2018	WV20180815-	82.20	0.01	3.11	0.01 U	210.00	16.10	140.00	0.51 T	146.00	3.11
MW-20	11/28/2018	WV20181128-	76.30	0.01	3.11	0.01 U	190.00	15.40	133.00	0.5 U	137.00	1.80
MW-21	2/5/2018	WV21180205-	116.00	0.02	2.16	0.09	259.00	12.30	169.00	0.76 T	178.00	2.60
MW-21	5/21/2018	WV21180521-	119.00	0.02	2.21	0.12	263.00	12.10	166.00	1.08	188.00	9.60
MW-21	8/15/2018	WV21180815-	116.00	0.02	2.15	0.09	259.00	11.70	160.00	0.99 T	170.00	1.75
MW-21	11/27/2018	WV21181127-	125.00	0.01	2.39	0.20	268.00	12.70	174.00	0.69 T	178.00	3.50
MW-33	1/30/2018	WV33180130-	421.00	0.03	4.22	0.04	800.00	15.30	486.00	1.96	509.00	5.00
MW-33	5/22/2018	WV33180522-	400.00	0.03	4.61	0.01 U	771.00	17.40	471.00	2.05	500.00	9.00
MW-33	8/15/2018	WV33180815-	393.00	0.07	4.20	0.05 U	763.00	16.20	445.00	2.00	470.00	12.00
MW-33	11/27/2018	WV33181127-	405.00	0.03	4.37	0.01 U	749.00	16.20	453.00	1.54	463.00	13.20
MW-35	1/31/2018	WV35180131-	347.00	0.07	3.98	0.01 U	671.00	21.60	445.00	4.23	478.00	10.00
MW-35	5/21/2018	WV35180521-	345.00	0.07	3.94	0.01 U	667.00	19.60	436.00	4.35	481.00	34.60
MW-35	8/15/2018	WV35180815-	347.00	0.03	3.83	0.05 U	676.00	20.50	420.00	4.49	453.00	30.20
MW-35	11/27/2018	WV35181127-	331.00	0.07	4.32	0.01 U	619.00	21.00	409.00	3.84	443.00	51.60
Channel Cc3												
MW-8	1/30/2018	WV8-180130-	52.50	0.002 U	4.45	3.38	167.00	7.38	119.00	0.5 U	125.00	0.5 U
MW-8	5/22/2018	WV8-180522-	51.10	0.002 U	4.41	3.42	164.00	7.09	119.00	0.8 T	128.00	0.5 U
MW-8	8/10/2018	WV8-180810-	50.90	0.002 U	4.29	3.38	164.00	6.92	120.00	0.82 T	124.00	0.5 U
MW-8	11/9/2018	WV8-181109-	53.5 S	0.0035 ST	4.25 S	3.16 S	161 S	7.45 S	117 S	0.5 SU	122 S	1 SU
MW-36	1/31/2018	WV36180131-	69.90	0.002 U	3.07	0.021 T	179.00	12.90	130.00	0.5 U	148.00	15.80
MW-36	5/23/2018	WV36180523-	69.80	0.0036 T	3.21	0.023 T	178.00	13.40	131.00	0.5 U	136.00	0.5 U
MW-36	8/13/2018	WV36180813-	67.90	0.002 U	3.04	0.022 T	176.00	12.50	129.00	0.63 T	134.00	1 U
MW-36	11/29/2018	WV36181129-	69.70	0.002 U	3.03	0.02 T	171.00	12.60	129.00	0.5 U	129.00	0.5 U

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

Groundwater - Conventionals			Alkalinity, Total (as $CACO_3$)	Ammonia as N	Chloride	Nitrate	Specific Conductance (Lab)	Sulfate	Total Dissolved Solids	Total Organic Carbon	Total Solids	Total Suspended Solids
Well #	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(µmhos/cm)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Unit D												
MW-7	1/31/2018	WV7-180131-	78.90	0.24	3.41	0.01 U	191.00	10.80	134.00	0.5 U	137.00	0.5 U
MW-7	5/21/2018	WV7-180521-	77.90	0.25	3.30	0.017 T	189.00	10.50	131.00	0.5 U	141.00	0.5 T
MW-7	8/13/2018	WV7-180813-	76.90	0.24	3.41	0.016 T	191.00	10.70	134.00	0.54 T	139.00	0.5 U
MW-7	11/28/2018	WV7-181128-	77.90	0.22	3.31	0.014 T	183.00	10.70	133.00	0.5 U	134.00	0.5 T
MW-12	1/30/2018	WV12180130-	63.40	0.002 U	3.19	0.74	168.00	10.70	117.00	0.5 U	121.00	0.5 T
MW-12	5/21/2018	WV12180521-	64.10	0.002 U	3.08	0.70	168.00	10.50	116.00	0.5 U	126.00	0.5 U
MW-12	8/13/2018	WV12180813-	63.60	0.002 U	3.16	0.72	170.00	10.50	119.00	0.5 U	125.00	0.5 U
MW-12	11/28/2018	WV12181128-	65.30	0.002 U	3.16	0.72	165.00	10.60	116.00	0.5 U	121.00	0.5 U
MW-19	1/29/2018	WV19180129-	86.70	0.03	4.63	0.01 U	223.00	16.90	144.00	0.5 U	149.00	0.5 U
MW-19	5/22/2018	WV19180522-	86.10	0.03	4.82	0.01 U	221.00	17.30	144.00	0.65 T	154.00	0.9 T
MW-19	8/14/2018	WV19180814-	84.80	0.03	4.55	0.01 U	221.00	16.30	144.00	0.59 T	151.00	1.36
MW-19	11/29/2018	WV19181129-	86.50	0.03	4.58	0.01 U	215.00	16.60	141.00	0.5 U	146.00	1.40
MW-26	1/30/2018	WV26180130-	75.20	0.18	3.76	0.016 T	192.00	13.40	140.00	0.5 U	163.00	25.20
MW-26	5/23/2018	WV26180523-	75.60	0.25	3.93	0.01 U	192.00	13.90	138.00	0.91 T	175.00	50.30
MW-26	5/23/2018	WV26180523D	75.30	0.24	3.92	0.01 U	192.00	13.80	137.00	0.82 T	176.00	46.40
MW-26	8/14/2018	WV26180814-	74.50	0.25	3.75	0.01 U	192.00	13.00	141.00	0.53 T	178.00	27.60
MW-26	8/14/2018	WV26180814D	74.30	0.26	3.71	0.01 U	191.00	12.90	139.00	0.62 T	176.00	28.50
MW-26	11/29/2018	WV26181129-	77.60	0.24	3.74	0.01 U	187.00	13.20	135.00	0.56 T	156.00	32.80
MW-29	2/5/2018	WV29180205-	103.00	0.0022 T	3.48	0.01 U	247.00	15.90	159.00	0.5 U	169.00	3.00
MW-29	5/23/2018	WV29180523-	103.00	0.0028 T	3.78	0.01 U	245.00	16.20	160.00	0.5 U	166.00	5.60
MW-29	8/14/2018	WV29180814-	101.00	0.0035 T	3.57	0.01 U	243.00	14.90	152.00	0.5 U	174.00	18.40
MW-29	11/29/2018	WV29181129-	102.00	0.002 U	3.54	0.01 U	235.00	15.00	148.00	0.5 U	157.00	5.20
MW-34	1/31/2018	WV34180131-	69.50	0.002 U	5.05	2.44	204.00	12.80	138.00	0.5 U	145.00	0.5 U
MW-34	5/23/2018	WV34180523-	70.50	0.002 U	5.20	2.47	205.00	13.20	137.00	0.8 T	144.00	0.5 U
MW-34	8/14/2018	WV34180814-	67.40	0.002 U	4.94	2.43	201.00	12.40	144.00	0.5 U	147.00	0.5 U
MW-34	11/28/2018	WV34181128-	68.90	0.002 U	5.00	2.25	195.00	12.90	133.00	0.5 U	139.00	0.5 U
MW-34	11/28/2018	WV34181128D	68.30	0.002 U	4.94	2.24	195.00	12.70	134.00	0.5 U	138.00	0.5 U
Field Blank												
FIELD BLANK	1/30/2018	WVPA180130F	1 U	0.002 U	0.05 U	0.01 U	1.5 T	0.1 U	10 U	0.5 U	10 U	0.5 U
FIELD BLANK	5/22/2018	WV9-180522F	1 U	0.002 U	0.05 U	0.01 U	1.5 T	0.1 U	10 U	0.63 T	10 U	0.5 U
FIELD BLANK	8/17/2018	WV2-180817F	1 U	0.002 U	0.05 U	0.01 U	2.5 T	0.1 U	10 U	0.58 T	10 U	0.5 U
Offsite Private Wells												
DW-85	1/30/2018	WV85180130-	68.90	0.27	2.72	0.01 U	153.00	2.32	105.00	0.5 U	108.00	0.5 U
DW-85	8/17/2018	WV85180817-	68.60	0.27	2.67	0.01 U	154.00	2.33	105.00	0.67 T	107.00	0.5 U
DW-PA	1/30/2018	WVPA180130-	67.80	0.002 U	5.87	1.21	191.00	12.10	127.00	0.5 U	133.00	0.5 U
DW-PA	8/17/2018	WVPA180817-	67.70	0.002 U	5.63	1.31	191.00	10.70	123.00	0.59 T	131.00	0.5 U

** MW-3 water level was below pump - no sample collected.

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

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	Antimony, Dissolved (mg/L)	Antimony, Total (mg/L)	Arsenic, Dissolved (mg/L)	Arsenic, Total (mg/L)	Barium, Dissolved (mg/L)	Barium, Total (mg/L)	Beryllium, Dissolved (mg/L)	Beryllium, Total (mg/L)	Cadmium, Dissolved (mg/L)	Cadmium, Total (mg/L)
Channel Cc1												
MW-3	1/30/2018	WV3-180130-	0.0003 U	0.0003 U	5E-05 U	0.000117	0.0294	0.0312	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-3	5/21/2018	WV3-180521-	0.0003 U	0.0003 U	5E-05 U	0.0000669	0.0222	0.0252	0.0001 U	0.0001 U	5E-05 U	5E-05 U
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/5/2018	WV4-180205-	0.0003 U	0.0003 U	0.000343	0.000344	0.00422	0.0046	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-4	5/23/2018	WV4-180523-	0.0003 U	0.0003 U	0.000358	0.000376	0.00402	0.00449	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-4	8/13/2018	WV4-180813-	0.0003 U	0.0003 U	0.000329	0.00036	0.00417	0.00488	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-4	11/29/2018	WV4-181129-	0.0003 U	0.0003 U	0.000313	0.00033	0.00416	0.00461	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-10	1/29/2018	WV10180129-	0.0003 U	0.0003 U	0.00159	0.0016	0.00338	0.00345	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-10	5/22/2018	WV10180522-	0.0003 U	0.0003 U	0.00164	0.00165	0.00334	0.0037	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-10	8/10/2018	WV10180810-	0.0003 U	0.0003 U	0.00161	0.00168	0.00357	0.00364	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-10	11/9/2018	WV10181109-	0.0003 U	0.0003 U	0.00155	0.00153	0.00333	0.00343	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-13	1/31/2018	WV13180131-	0.0003 U	0.0003 U	0.00191	0.00196	0.00401	0.00386	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-13	5/21/2018	WV13180521-	0.0003 U	0.0003 U	0.00175	0.0018	0.00389	0.00435	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-13	8/10/2018	WV13180810-	0.0003 U	0.0003 U	0.00186	0.00205	0.0041	0.00426	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-13	11/28/2018	WV13181128-	0.0003 U	0.0003 U	0.00197	0.00199	0.00362	0.00394	0.0001 U	0.0001 U	5E-05 U	5E-05 U
Channel Cc2												
MW-2	1/30/2018	WV2-180130-	0.0003 U	0.0003 U	0.000959	0.000975	0.0069	0.0069	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-2	5/21/2018	WV2-180521-	0.0003 U	0.0003 U	0.000811	0.000809	0.00693	0.0079	0.0001 U	0.0001 U	0.0000777	0.0000857
MW-2	8/17/2018	WV2-180817-	0.0003 U	0.0003 U	0.000925	0.000899	0.00681	0.00744	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-2	11/28/2018	WV2-181128-	0.0003 U	0.0003 U	0.000901	0.000898	0.00671	0.00691	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-9	1/29/2018	WV9-180129-	0.0003 U	0.0003 U	0.00229	0.00245	0.00411	0.00381	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-9	5/22/2018	WV9-180522-	0.0003 U	0.0003 U	0.00234	0.00233	0.0037	0.00397	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-9	8/10/2018	WV9-180810-	0.0003 U	0.0003 U	0.00226	0.00234	0.00416	0.0043	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-9	11/29/2018	WV9-181129-	0.0003 U	0.0003 U	0.0022	0.00236	0.00347	0.00357	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-20	1/31/2018	WV20180131-	0.0003 U	0.0003 U	0.00173	0.00226	0.00697	0.00751	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-20	5/22/2018	WV20180522-	0.0003 U	0.0003 U	0.00167	0.0044	0.00675	0.00925	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-20	8/15/2018	WV20180815-	0.0003 U	0.0003 U	0.00184	0.00283	0.0069	0.0079	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-20	11/28/2018	WV20181128-	0.0003 U	0.0003 U	0.00197	0.00259	0.00575	0.00691	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-21	2/5/2018	WV21180205-	0.0003 U	0.0003 U	0.00141	0.00577	0.00756	0.00993	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-21	5/21/2018	WV21180521-	0.0003 U	0.0003 U	0.00139	0.00873	0.00742	0.0117	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-21	8/15/2018	WV21180815-	0.0003 U	0.0003 U	0.00156	0.00326	0.00773	0.00871	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-21	11/27/2018	WV21181127-	0.0003 U	0.0003 U	0.00154	0.00484	0.00645	0.00875	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-33	1/30/2018	WV33180130-	0.0003 U	0.0003 U	0.0386	0.0373	0.0289	0.0285	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-33	5/22/2018	WV33180522-	0.0003 U	0.0003 U	0.0362	0.0383	0.0258	0.0289	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-33	8/15/2018	WV33180815-	0.0003 U	0.0003 U	0.0373	0.0392	0.028	0.0285	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-33	11/27/2018	WV33181127-	0.0003 U	0.0003 U	0.0327	0.0323	0.0257	0.0282	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-35	1/31/2018	WV35180131-	0.0003 U	0.0003 U	0.0384	0.0371	0.0251	0.0258	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-35	5/21/2018	WV35180521-	0.0003 U	0.0003 U	0.0368	0.0381	0.0241	0.028	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-35	8/15/2018	WV35180815-	0.0003 U	0.0003 U	0.0371	0.0404	0.0249	0.0266	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-35	11/27/2018	WV35181127-	0.0003 U	0.0003 U	0.0348	0.035	0.0217	0.0275	0.0001 U	0.0001 U	5E-05 U	5E-05 U
Channel Cc3												
MW-8	1/30/2018	WV8-180130-	0.0003 U	0.0003 U	0.000473	0.000482	0.00367	0.00347	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-8	5/22/2018	WV8-180522-	0.0003 U	0.0003 U	0.000483	0.000495	0.00342	0.00366	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-8	8/10/2018	WV8-180810-	0.0003 U	0.0003 U	0.000474	0.000502	0.00362	0.00358	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-8	11/9/2018	WV8-181109-	0.0003 U	0.0003 U	0.000487	0.000484	0.00363	0.00349	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-36	1/31/2018	WV36180131-	0.0003 U	0.0003 U	0.00191	0.00192	0.00773	0.012	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-36	5/23/2018	WV36180523-	0.0003 U	0.0003 U	0.00174	0.0017	0.00696	0.00798	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-36	8/13/2018	WV36180813-	0.0003 U	0.0003 U	0.00172	0.00175	0.0076	0.00777	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-36	11/29/2018	WV36181129-	0.0003 U	0.0003 U	0.00179	0.00165	0.0069	0.00763	0.0001 U	0.0001 U	5E-05 U	5E-05 U
Unit D												
MW-7	1/31/2018	WV7-180131-	0.0003 U	0.0003 U	0.00517	0.00519	0.0138	0.014	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-7	5/21/2018	WV7-180521-	0.0003 U	0.0003 U	0.00504	0.00511	0.0133	0.0154	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-7	8/13/2018	WV7-180813-	0.0003 U	0.0003 U	0.00499	0.0052	0.0132	0.0142	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-7	11/28/2018	WV7-181128-	0.0003 U	0.0003 U	0.00497	0.00495	0.0129	0.0156	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-12	1/30/2018	WV12180130-	0.0003 U	0.0003 U	0.00205	0.00213	0.00498	0.00492	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-12	5/21/2018	WV12180521-	0.0003 U	0.0003 U	0.00207	0.00213	0.00472	0.00525	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-12	8/13/2018	WV12180813-	0.0003 U	0.0003 U	0.00203	0.00213	0.00495	0.00519	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-12	11/28/2018	WV12181128-	0.0003 U	0.0003 U	0.00203	0.002	0.00465	0.00503	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-19	1/29/2018	WV19180129-	0.0003 U	0.0003 U	0.00109	0.00115	0.0168	0.0164	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-19	5/22/2018	WV19180522-	0.0003 U	0.0003 U	0.00112	0.00127	0.0159	0.0178	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-19	8/14/2018	WV19180814-	0.0003 U	0.0003 U	0.00108	0.00135	0.0159	0.017	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-19	11/29/2018	WV19181129-	0.0003 U	0.0003 U	0.0011	0.00211	0.0153	0.0197	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-26	1/30/2018	WV26180130-	0.0003 U	0.0003 U	0.00291	0.00504	0.00908	0.0173	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-26	5/23/2018	WV26180523-	0.0003 U	0.0003 U	0.00302	0.0043	0.00849	0.0152	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-26	5/23/2018	WV26180523D	0.0003 U	0.0003 U	0.00305	0.0042	0.00851	0.0153	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-26	8/14/2018	WV26180814-	0.0003 U	0.0003 U	0.00302	0.00467	0.00903	0.0164	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-26	8/14/2018	WV26180814D	0.0003 U	0.0003 U	0.0031	0.0045	0.00922	0.0154	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-26	11/29/2018	WV26181129-	0.0003 U	0.0003 U	0.00296	0.00569	0.00826	0.0172	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-29	2/5/2018	WV29180205-	0.0003 U	0.0003 U	0.00402	0.00467	0.0106	0.0105	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-29	5/23/2018	WV29180523-	0.0003 U	0.0003 U	0.00405	0.00592	0.0109	0.0127	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-29	8/14/2018	WV29180814-	0.0003 U	0.0003 U	0.00418	0.00998	0.0107	0.0148	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-29	11/29/2018	WV29181129-	0.0003 U	0.0003 U	0.00391	0.00632	0.00982	0.0115	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-34	1/31/2018	WV34180131-	0.0003 U	0.0003 U	0.00135	0.00134	0.00455	0.00466	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-34	5/23/2018	WV34180523-	0.0003 U	0.0003 U	0.00138	0.00136	0.00419	0.00472	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-34	8/14/2018	WV34180814-	0.0003 U	0.0003 U	0.00132	0.00134	0.00453	0.005	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-34	11/28/2018	WV34181128-	0.0003 U	0.0003 U	0.00133	0.00132	0.00384	0.00432	0.0001 U	0.0001 U	5E-05 U	5E-05 U
MW-34	11/28/2018	WV34181128D	0.0003 U	0.0003 U	0.00134	0.00133	0.00387	0.00441	0.0001 U	0.0001 U	5E-05 U	5E-05 U
Field Blank												
FIELD BLANK	1/30/2018	WVPA180130F	0.0003 U	0.0003 U	5E-05 U	5E-05 U	0.0005 U	0.0005 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U
FIELD BLANK	5/22/2018	WV9-180522F	0.0003 U	0.0003 U	5E-05 U	5E-05 U	0.0005 U	0.0005 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U
FIELD BLANK	8/17/2018	WV2-180817F	0.0003 U	0.0003 U	5E-05 U	5E-05 U	0.0005 U	0.0005 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U
Offsite Private Wells												
DW-85	1/30/2018	WV85180130-	0.0003 U	0.0003 U	0.000433	0.000425	0.0101	0.01	0.0001 U	0.0001 U	5E-05 U	5E-05 U
DW-85	8/17/2018	WV85180817-	0.0003 U	0.0003 U	0.000424	0.00044	0.01	0.0107	0.0001 U	0.0001 U	5E-05 U	5E-05 U
DW-PA	1/30/2018	WVPA180130-	0.0003 U	0.0003 U	0.00124	0.00128	0.00401	0.00412	0.0001 U	0.0001 U	5E-05 U	5E-05 U
DW-PA	8/17/2018	WVPA180817-	0.0003 U	0.0003 U	0.00153	0.00152	0.00425	0.00428	0.0001 U	0.0001 U	5E-05 U	5E-05 U

** MW-3 water level was below pump - no sample collected.

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

Groundwater - Metals (Dissolved & Total)			Calcium, Dissolved	Calcium, Total	Chromium, Dissolved	Chromium, Total	Cobalt, Dissolved	Cobalt, Total	Copper, Dissolved	Copper, Total	Iron, Dissolved	Iron, Total	Lead, Dissolved	Lead, Total
Well #	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)	(mg/L)
Channel Cc1														
MW-3	1/30/2018	WV3-180130-	8.02	8.16	0.000342	0.00051	5E-05 U	0.0000928	0.0002 U	0.000379	0.01 U	0.152	0.0001 U	0.000264
MW-3	5/21/2018	WV3-180521-	7.17	7.07	0.0002 U	0.000294	5E-05 U	0.0000511	0.0002 U	0.00036	0.01 U	0.0879	0.0001 U	0.0001 U
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/5/2018	WV4-180205-	11.5	11.7	0.0038	0.00419	5E-05 U	5E-05 U	0.0002 U	0.000261	0.01 U	0.0554	0.0001 U	0.000151
MW-4	5/23/2018	WV4-180523-	11.1	11.2	0.00384	0.00421	5E-05 U	5E-05 U	0.0002 U	0.000364	0.01 U	0.0187	0.0001 U	0.0001 U
MW-4	8/13/2018	WV4-180813-	12.1	12.5	0.00396	0.00402	5E-05 U	0.000054	0.0002 U	0.000273	0.01 U	0.0724	0.0001 U	0.000123
MW-4	11/29/2018	WV4-181129-	12.4	12.5	0.0036	0.00385	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-10	1/29/2018	WV10180129-	9.87	9.76	0.00339	0.00342	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-10	5/22/2018	WV10180522-	9.88	9.98	0.00309	0.00332	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-10	8/10/2018	WV10180810-	9.92	11.2	0.00325	0.00325	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 DU	0.01 U	0.0001 U	0.0001 U
MW-10	11/9/2018	WV10181109-	9.58	9.43	0.00331	0.00329	5E-05 U	5E-05 U	0.000252	0.000202	0.01 U	0.0171	0.0001 U	0.0001 U
MW-13	1/31/2018	WV13180131-	10.4	10.2	0.0026	0.00272	5E-05 U	5E-05 U	0.000209	0.000247	0.01 U	0.0179	0.0001 U	0.0001 U
MW-13	5/21/2018	WV13180521-	10.3	10.2	0.00252	0.00306	5E-05 U	5E-05 U	0.000218	0.000549	0.0304	0.0527	0.0001 U	0.0001 U
MW-13	8/10/2018	WV13180810-	10.3	11.4	0.00306	0.00347	5E-05 U	5E-05 U	0.0002 U	0.000247	0.0101 D	0.03	0.0001 U	0.0001 U
MW-13	11/28/2018	WV13181128-	9.83	9.65	0.00281	0.00322	5E-05 U	5E-05 U	0.000207	0.000258	0.01 U	0.0138	0.0001 U	0.0001 U
Channel Cc2														
MW-2	1/30/2018	WV2-180130-	19.7	19.8	0.0002 U	0.0002 U	0.0000718	0.0000727	0.000233	0.000214	0.01 U	0.0102	0.0001 U	0.0001 U
MW-2	5/21/2018	WV2-180521-	20.9	21.2	0.0002 U	0.000244	5E-05 U	0.0000753	0.00027	0.000321	0.01 U	0.0241	0.0001 U	0.0001 U
MW-2	8/17/2018	WV2-180817-	19.9	19.6	0.0002 U	0.000208	0.0000752	0.0000868	0.0002 U	0.000227	0.01 U	0.0145	0.0001 U	0.0001 U
MW-2	11/28/2018	WV2-181128-	18.9	18.8	0.0002 U	0.0002 U	0.0000683	0.0000773	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-9	1/29/2018	WV9-180129-	15	15.7	0.004	0.00426	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-9	5/22/2018	WV9-180522-	14.2	13.9	0.00401	0.00429	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-9	8/10/2018	WV9-180810-	14.7	16.1	0.00422	0.00432	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 DU	0.01 U	0.0001 U	0.0001 U
MW-9	11/29/2018	WV9-181129-	13.4	13.5	0.00382	0.00406	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-20	1/31/2018	WV20180131-	14	14.2	0.0002 U	0.0002 U	0.0000699	0.0000765	0.0002 U	0.0002 U	0.341	0.69	0.0001 U	0.0001 U
MW-20	5/22/2018	WV20180522-	13.7	14.1	0.0002 U	0.0002 U	0.0000696	0.0000857	0.0002 U	0.0002 U	0.386	2.07	0.0001 U	0.0001 U
MW-20	8/15/2018	WV20180815-	14	14.6	0.0002 U	0.0002 U	0.0000588	0.0000741	0.0002 U	0.0002 U	0.334	1.03	0.0001 U	0.0001 U
MW-20	11/28/2018	WV20181128-	12.8	12.6	0.0002 U	0.0002 U	0.0000505	0.0000517	0.0002 U	0.0002 U	0.309	0.745	0.0001 U	0.0001 U
MW-21	2/5/2018	WV21180205-	18.6	18.8	0.0002 U	0.0002 U	0.000204	0.000314	0.0002 U	0.000294	0.445	2.13	0.0001 U	0.0001 U
MW-21	5/21/2018	WV21180521-	18.4	18.7	0.0002 U	0.0002 U	0.000223	0.00039	0.000275	0.000449	0.425	3.28	0.0001 U	0.0001 U
MW-21	8/15/2018	WV21180815-	19.1	19.4	0.0002 U	0.0002 U	0.000168	0.000214	0.000216	0.000208	0.375	1.08	0.0001 U	0.0001 U
MW-21	11/27/2018	WV21181127-	19.6	19.5	0.0002 U	0.0002 U	0.000185	0.000272	0.0002 U	0.0002 U	0.348	1.75	0.0001 U	0.0001 U
MW-33	1/30/2018	WV33180130-	73.4	72.4	0.0002 U	0.0002 U	0.00152	0.00157	0.0002 U	0.0002 U	7.66	7.58	0.0001 U	0.0001 U
MW-33	5/22/2018	WV33180522-	68.7	68.1	0.0002 U	0.0002 U	0.00151	0.00155	0.0002 U	0.0002 U	7.24	7.26	0.0001 U	0.0001 U
MW-33	8/15/2018	WV33180815-	70	72.7	0.0002 U	0.0002 U	0.00148	0.00159	0.0002 U	0.0002 U	7.15	7.74	0.0001 U	0.0001 U
MW-33	11/27/2018	WV33181127-	66.9	67	0.0002 U	0.0002 U	0.00122	0.00123	0.0002 U	0.0002 U	6.51	6.44	0.0001 U	0.0001 U
MW-35	1/31/2018	WV35180131-	63.9	64.5	0.0002 U	0.00057	0.00194	0.00206	0.0002 U	0.000856	16.2	16.5	0.0001 U	0.0001 U
MW-35	5/21/2018	WV35180521-	64.1	64.6	0.0002 U	0.00102	0.00199	0.00217	0.0002 U	0.000498	16.4	16.7	0.0001 U	0.000118
MW-35	8/15/2018	WV35180815-	66.4	68.8	0.0002 U	0.000635	0.00191	0.00217	0.0002 U	0.0002 U	16.4	18	0.0001 U	0.0001 U
MW-35	11/27/2018	WV35181127-	60.1	62	0.0002 U	0.00151	0.00204	0.0023	0.0002 U	0.000739	15.6	16.5	0.0001 U	0.000164
Channel Cc3														
MW-8	1/30/2018	WV8-180130-	11.8	11.9	0.00185	0.00189	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-8	5/22/2018	WV8-180522-	11.3	11.2	0.00184	0.00192	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-8	8/10/2018	WV8-180810-	11.5	12	0.00193	0.0019	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 DU	0.01 U	0.0001 U	0.0001 U
MW-8	11/9/2018	WV8-181109-	11.6	11.8	0.00198	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
MW-36	1/31/2018	WV36180131-	14.5	14.6	0.00048	0.00108	5E-05 U	0.0025	0.0002 U	0.000856	0.01 U	0.334	0.0001 U	0.000202
MW-36	5/23/2018	WV36180523-	13.8	13.7	0.000578	0.000608	5E-05 U	0.0000568	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-36	8/13/2018	WV36180813-	14.1	14.9	0.000564	0.00054	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-36	11/29/2018	WV36181129-	13.8	13.5	0.000489	0.000589	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
Unit D														
MW-7	1/31/2018	WV7-180131-	16	16.2	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.000221	0.0157	0.026	0.0001 U	0.0001 U
MW-7	5/21/2018	WV7-180521-	15.5	15.7	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0153	0.047	0.0001 U	0.0001 U
MW-7	8/13/2018	WV7-180813-	16.2	16.8	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0105	0.0337	0.0001 U	0.0001 U
MW-7	11/28/2018	WV7-181128-	15.6	15.4	0.0002 U	0.0002 U	5E-05 U	0.0000631	0.0002 U	0.0002 U	0.01 U	0.0558	0.0001 U	0.0001 U
MW-12	1/30/2018	WV12180130-	11.9	12.1	0.00354	0.00371	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.0149	0.0001 U	0.0001 U
MW-12	5/21/2018	WV12180521-	11.8	11.9	0.0037	0.00387	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-12	8/13/2018	WV12180813-	12.1	12.8	0.00368	0.00378	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-12	11/28/2018	WV12181128-	12.2	12	0.00362	0.00374	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.0128	0.0001 U	0.0001 U
MW-19	1/29/2018	WV19180129-	15.6	15.4	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0338	0.0903	0.0001 U	0.0001 U
MW-19	5/22/2018	WV19180522-	15.3	15.3	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0424	0.18	0.0001 U	0.0001 U
MW-19	8/14/2018	WV19180814-	15.7	16.1	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0341	0.282	0.0001 U	0.0001 U
MW-19	11/29/2018	WV19181129-	15.2	15.1	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0959	1.09	0.0001 U	0.0001 U
MW-26	1/30/2018	WV26180130-	17.8	18.1	0.0002 U	0.000395	5E-05 U	0.000129	0.0002 U	0.000406	0.0601	3.26	0.0001 U	0.000148
MW-26	5/23/2018	WV26180523-	17.5	17.6	0.0002 U	0.000736	5E-05 U	0.00022	0.0002 U	0.000648	0.0715	2.03	0.0001 U	0.000189
MW-26	5/23/2018	WV26180523D	17.9	17.2	0.0002 U	0.000647	5E-05 U	0.000267	0.0002 U	0.000758	0.0726	2	0.0001 U	0.0002
MW-26	8/14/2018	WV26180814-	18	18.7	0.0002 U	0.00108	5E-05 U	0.000271	0.0002 U	0.000859	0.0854	2.55	0.0001 U	0.000245
MW-26	8/14/2018	WV26180814D	18.2	18.7	0.0002 U	0.000732	5E-05 U	0.000304	0.0002 U	0.000655	0.084	2.29	0.0001 U	0.000193
MW-26	11/29/2018	WV26181129-	17.4	18.2	0.0002 U	0.000524	5E-05 U	0.000133	0.0002 U	0.000453	0.121	3.56	0.0001 U	0.00013
MW-29	2/5/2018	WV29180205-	20.9	21	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.808	1.19	0.0001 U	0.0001 U
MW-29	5/23/2018	WV29180523-	21.2	20.5	0.0002 U	0.000208	5E-05 U	0.0000508	0.0002 U	0.000288	0.823	1.72	0.0001 U	0.0001 U
MW-29	8/14/2018	WV29180814-	21	22	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.839	3.81	0.0001 U	0.0001 U
MW-29	11/29/2018	WV29181129-	20.3	20	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.823	1.82	0.0001 U	0.0001 U
MW-34	1/31/2018	WV34180131-	14.4	14.3	0.00105	0.00109	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-34	5/23/2018	WV34180523-	14	13.8	0.00105	0.00116	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-34	8/14/2018	WV34180814-	14.2	14.9	0.00106	0.00109	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
MW-34	11/28/2018	WV34181128-	13.6	13.4	0.000986	0.00316	5E-05 U	5E-05 U	0.0002 U	0.000238	0.01 U	0.0276	0.0001 U	0.0001 U
MW-34	11/28/2018	WV34181128D	13.7	13.6	0.000979	0.00111	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.0113	0.0001 U	0.0001 U
Field Blank														
FIELD BLANK	1/30/2018	WVPA180130F	0.05 U	0.05 U	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
FIELD BLANK	5/22/2018	WV9-180522F	0.05 U	0.05 U	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
FIELD BLANK	8/17/2018	WV2-180817F	0.05 U	0.05 U	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.01 U	0.01 U	0.0001 U	0.0001 U
Offsite Private Wells														
DW-85	1/30/2018	WV85180130-	14.4	14.5	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.0002 U	0.0693	0.0713	0.0001 U	0.0001 U
DW-85	8/17/2018	WV85180817-	14.9	14.7	0.0002 U	0.0002 U	5E-05 U	5E-05 U	0.0002 U	0.000399	0.0642	0.0701	0.0001 U	0.0001 U
DW-PA	1/30/2018	WVPA180130-	13.7	13.5	0.00134	0.00138	5E-05 U	5E-05 U	0.0079	0.0211	0.01 U	0.0214	0.00116	0.000914
DW-PA	8/17/2018	WVPA180817-	13.9	13.4	0.00209	0.00202	5E-05 U	5E-05 U	0.00319	0.00709	0.01 U	0.01 U	0.000262	0.000397

** MW-3 water level was below pump - no sample collected.

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

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	Magnesium, Dissolved (mg/L)	Magnesium, Total (mg/L)	Manganese, Dissolved (mg/L)	Manganese, Total (mg/L)	Mercury, Dissolved (mg/L)	Mercury, Total (mg/L)	Nickel, Dissolved (mg/L)	Nickel, Total (mg/L)	Potassium, Dissolved (mg/L)	Potassium, Total (mg/L)
Channel Cc1												
MW-3	1/30/2018	WV3-180130-	2.18	2.2	0.000293	0.016	5E-05 U	5E-05 U	0.000213	0.000461	2.49	2.46
MW-3	5/21/2018	WV3-180521-	2.51	2.49	0.000584	0.00418	5E-05 U	5E-05 U	0.000384	0.000572	1.59	1.69
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/5/2018	WV4-180205-	9.12	9.14	0.000118	0.00703	5E-05 U	5E-05 U	0.0011	0.00159	1.02	1.01
MW-4	5/23/2018	WV4-180523-	8.95	9.07	0.000245	0.00138	5E-05 U	5E-05 U	0.00108	0.0013	0.992	1.11
MW-4	8/13/2018	WV4-180813-	8.08	9.34	0.00027	0.0153	5E-05 U	5E-05 U	0.000864	0.00207	0.971	1.04
MW-4	11/29/2018	WV4-181129-	8.41	9.06	0.000189	0.0039	5E-05 U	5E-05 U	0.000526	0.000696	0.978	1.03
MW-10	1/29/2018	WV10180129-	9.83	9.87	0.0001 U	0.000226	5E-05 U	5E-05 U	0.000195	0.000256	1.53	1.53
MW-10	5/22/2018	WV10180522-	9.89	10.3	0.0001 U	0.000258	5E-05 U	5E-05 U	0.000213	0.000249	1.43	1.57
MW-10	8/10/2018	WV10180810-	10.1	10.9	0.0001 U	0.000143	5E-05 U	5E-05 U	0.000224	0.000279	1.54	1.59
MW-10	11/9/2018	WV10181109-	9.6	9.52	0.000109	0.000868	5E-05 U	5E-05 U	0.00022	0.000245	1.48	1.44
MW-13	1/31/2018	WV13180131-	12.5	12.3	0.00201	0.00192	5E-05 U	5E-05 U	0.00102	0.00111	1.87	1.83
MW-13	5/21/2018	WV13180521-	12.3	11.7	0.0097	0.00765	5E-05 U	5E-05 U	0.00116	0.00129	1.76	1.86
MW-13	8/10/2018	WV13180810-	12.4	13.6	0.00274	0.00253	5E-05 U	5E-05 U	0.0011	0.00128	1.86	1.88
MW-13	11/28/2018	WV13181128-	11.2	11.2	0.00055	0.000483	5E-05 U	5E-05 U	0.00098	0.00106	1.74	1.74
Channel Cc2												
MW-2	1/30/2018	WV2-180130-	21.5	22	0.133	0.137	5E-05 U	5E-05 U	0.00448	0.0048	2.23	2.23
MW-2	5/21/2018	WV2-180521-	22	21.3	0.259	0.306	5E-05 U	5E-05 U	0.00626	0.00672	2.18	2.38
MW-2	8/17/2018	WV2-180817-	21.4	20.8	0.158	0.168	5E-05 U	5E-05 U	0.00484	0.00491	2.18	2.37
MW-2	11/28/2018	WV2-181128-	20.2	20.9	0.173	0.187	5E-05 U	5E-05 U	0.00452	0.00475	2.19	2.14
MW-9	1/29/2018	WV9-180129-	12.2	13.2	0.0001 U	0.000214	5E-05 U	5E-05 U	0.000141	0.000229	2.33	2.43
MW-9	5/22/2018	WV9-180522-	11.8	11.7	0.0001 U	0.000278	5E-05 U	5E-05 U	0.000185	0.000208	2.11	2.24
MW-9	8/10/2018	WV9-180810-	12.2	13.2	0.00012	0.000224	5E-05 U	5E-05 U	0.000152	0.00016	2.29	2.33
MW-9	11/29/2018	WV9-181129-	10.7	10.9	0.0001 U	0.000217	5E-05 U	5E-05 U	0.00016	0.000272	2.13	2.12
MW-20	1/31/2018	WV20180131-	14.7	15.3	0.289	0.298	5E-05 U	5E-05 U	0.000371	0.000504	2.28	2.29
MW-20	5/22/2018	WV20180522-	15.1	15	0.286	0.3	5E-05 U	5E-05 U	0.000431	0.00053	2.11	2.32
MW-20	8/15/2018	WV20180815-	14.2	15.7	0.25	0.282	5E-05 U	5E-05 U	0.000376	0.000493	2.19	2.3
MW-20	11/28/2018	WV20181128-	12.7	12.8	0.215	0.223	5E-05 U	5E-05 U	0.000278	0.000333	2.09	2.12
MW-21	2/5/2018	WV21180205-	16.5	16.2	0.676	0.8	5E-05 U	5E-05 U	0.00378	0.00424	2.07	2.02
MW-21	5/21/2018	WV21180521-	16.7	16.2	0.734	0.941	5E-05 U	5E-05 U	0.00368	0.0042	1.96	2.09
MW-21	8/15/2018	WV21180815-	16.5	17	0.52	0.593	5E-05 U	5E-05 U	0.00342	0.00374	2.05	2.05
MW-21	11/27/2018	WV21181127-	17.9	18.4	0.377	0.548	5E-05 U	5E-05 U	0.00111	0.0015	2.11	2.17
MW-33	1/30/2018	WV33180130-	59.4	59.7	1.1	1.08	5E-05 U	5E-05 U	0.00617	0.00636	3.65	3.68
MW-33	5/22/2018	WV33180522-	58.1	56.3	1.03	0.994	5E-05 U	5E-05 U	0.00614	0.00654	3.38	3.59
MW-33	8/15/2018	WV33180815-	56.5	61.1	0.978	1.04	5E-05 U	5E-05 U	0.00623	0.0069	3.53	3.64
MW-33	11/27/2018	WV33181127-	54.2	55.8	0.877	0.897	5E-05 U	5E-05 U	0.00565	0.00598	3.49	3.54
MW-35	1/31/2018	WV35180131-	43.4	43.7	2.53	2.58	5E-05 U	5E-05 U	0.00404	0.00466	3.47	3.49
MW-35	5/21/2018	WV35180521-	42.5	43.4	2.52	2.46	5E-05 U	5E-05 U	0.00426	0.00515	3.29	3.55
MW-35	8/15/2018	WV35180815-	41.8	45	2.51	2.75	5E-05 U	5E-05 U	0.00438	0.00503	3.44	3.46
MW-35	11/27/2018	WV35181127-	38.3	40	2.37	2.42	5E-05 U	5E-05 U	0.00397	0.0055	3.19	3.31
Channel Cc3												
MW-8	1/30/2018	WV8-180130-	9.32	9.46	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.000515	0.00059	1.13	1.15
MW-8	5/22/2018	WV8-180522-	9.49	9.38	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.000577	0.000743	1.06	1.12
MW-8	8/10/2018	WV8-180810-	9.26	9.6	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.000593	0.000627	1.14	1.12
MW-8	11/9/2018	WV8-181109-	9.3	9.44	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.000557	0.000556	1.11	1.11
MW-36	1/31/2018	WV36180131-	10	10.1	0.0018	0.243	5E-05 U	5E-05 U	0.0001 U	0.00192	2.82	2.85
MW-36	5/23/2018	WV36180523-	9.97	9.76	0.00146	0.0059	5E-05 U	5E-05 U	0.000106	0.000131	2.59	2.76
MW-36	8/13/2018	WV36180813-	9.43	10.3	0.00117	0.00575	5E-05 U	5E-05 U	0.0001 U	0.000154	2.7	2.76
MW-36	11/29/2018	WV36181129-	9.43	9.4	0.00134	0.00309	5E-05 U	5E-05 U	0.0001 U	0.0001 U	2.66	2.67
Unit D												
MW-7	1/31/2018	WV7-180131-	10.1	10.6	0.18	0.186	5E-05 U	5E-05 U	0.000167	0.000233	2.82	2.87
MW-7	5/21/2018	WV7-180521-	10.1	9.86	0.175	0.237	5E-05 U	5E-05 U	0.000185	0.000226	2.63	2.82
MW-7	8/13/2018	WV7-180813-	9.81	11.1	0.166	0.181	5E-05 U	5E-05 U	0.000126	0.000163	2.74	2.81
MW-7	11/28/2018	WV7-181128-	9.49	9.93	0.151	0.289	5E-05 U	5E-05 U	0.000115	0.00017	2.71	2.71
MW-12	1/30/2018	WV12180130-	9.91	10.2	0.0001 U	0.000312	5E-05 U	5E-05 U	0.000174	0.000255	1.92	1.93
MW-12	5/21/2018	WV12180521-	9.9	9.9	0.0001 U	0.000114	5E-05 U	5E-05 U	0.000226	0.000219	1.82	1.94
MW-12	8/13/2018	WV12180813-	9.57	10.7	0.0001 U	0.000146	5E-05 U	5E-05 U	0.000189	0.000218	1.86	1.93
MW-12	11/28/2018	WV12181128-	9.58	9.85	0.0001 U	0.000234	5E-05 U	5E-05 U	0.000181	0.000242	1.88	1.9
MW-19	1/29/2018	WV19180129-	14.5	14.6	0.506	0.519	5E-05 U	5E-05 U	0.000117	0.000238	2.54	2.53
MW-19	5/22/2018	WV19180522-	14.5	14.5	0.501	0.518	5E-05 U	5E-05 U	0.000152	0.00015	2.37	2.54
MW-19	8/14/2018	WV19180814-	14.1	15	0.485	0.522	5E-05 U	5E-05 U	0.0001 U	0.000101	2.45	2.44
MW-19	11/29/2018	WV19181129-	14	13.9	0.497	0.591	5E-05 U	5E-05 U	0.000111	0.000116	2.43	2.43
MW-26	1/30/2018	WV26180130-	7.83	7.82	0.0676	0.0986	5E-05 U	5E-05 U	0.0001 U	0.000567	3.11	3.09
MW-26	5/23/2018	WV26180523-	7.94	7.96	0.069	0.0864	5E-05 U	5E-05 U	0.000146	0.000887	2.92	3.13
MW-26	5/23/2018	WV26180523D	8.18	7.76	0.0705	0.0848	5E-05 U	5E-05 U	0.00016	0.000981	2.97	3.05
MW-26	8/14/2018	WV26180814-	7.55	8.07	0.068	0.0923	5E-05 U	5E-05 U	0.000138	0.00138	3.01	3.05
MW-26	8/14/2018	WV26180814D	7.58	8.22	0.0688	0.0897	5E-05 U	5E-05 U	0.000185	0.0011	3.03	3.12
MW-26	11/29/2018	WV26181129-	7.38	7.59	0.0679	0.0914	5E-05 U	5E-05 U	0.000127	0.000573	2.99	3.05
MW-29	2/5/2018	WV29180205-	15.4	15.1	0.0963	0.0967	5E-05 U	5E-05 U	0.0001 U	0.000126	2.3	2.18
MW-29	5/23/2018	WV29180523-	15.1	15.3	0.1	0.11	5E-05 U	5E-05 U	0.0001 U	0.00033	2.34	2.3
MW-29	8/14/2018	WV29180814-	14.8	15.6	0.0989	0.131	5E-05 U	5E-05 U	0.000121	0.000285	2.23	2.27
MW-29	11/29/2018	WV29181129-	14.4	14.3	0.0889	0.0925	5E-05 U	5E-05 U	0.0001 U	0.000157	2.19	2.15
MW-34	1/31/2018	WV34180131-	13	12.9	0.000141	0.00046	5E-05 U	5E-05 U	0.00115	0.00124	1.62	1.63
MW-34	5/23/2018	WV34180523-	12.9	12.7	0.000162	0.000262	5E-05 U	5E-05 U	0.00124	0.0013	1.51	1.61
MW-34	8/14/2018	WV34180814-	12.4	13.4	0.00015	0.000253	5E-05 U	5E-05 U	0.0012	0.0014	1.54	1.59
MW-34	11/28/2018	WV34181128-	11.9	12	0.00014	0.000666	5E-05 U	5E-05 U	0.00119	0.00143	1.53	1.57
MW-34	11/28/2018	WV34181128D	11.8	12.3	0.000171	0.000438	5E-05 U	5E-05 U	0.00127	0.00134	1.54	1.55
Field Blank												
FIELD BLANK	1/30/2018	WVPA180130F	0.05 U	0.05 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.0001 U	0.0001 U	0.1 U	0.5 U
FIELD BLANK	5/22/2018	WV9-180522F	0.05 U	0.05 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.0001 U	0.0001 U	0.1 U	0.5 U
FIELD BLANK	8/17/2018	WV2-180817F	0.05 U	0.05 U	0.0001 U	0.0001 U	5E-05 U	5E-05 U	0.0001 U	0.0001 U	0.1 U	0.1 U
Offsite Private Wells												
DW-85	1/30/2018	WV85180130-	6.56	6.57	0.0553	0.0545	5E-05 U	5E-05 U	0.0001 U	0.0001 U	2.64	2.58
DW-85	8/17/2018	WV85180817-	6.6	6.78	0.0556	0.0544	5E-05 U	5E-05 U	0.0001 U	0.0001 U	2.6	2.75
DW-PA	1/30/2018	WVPA180130-	11.8	11.8	0.00107	0.00113	5E-05 U	5E-05 U	0.000496	0.000585	1.63	1.6
DW-PA	8/17/2018	WVPA180817-	11.6	11.5	0.00016	0.000129	5E-05 U	5E-05 U	0.000553	0.000522	1.6	1.65

** MW-3 water level was below pump - no sample collected.

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

Groundwater - Metals (Dissolved & Total) Well #	Sample Date	Sample ID	Selenium, Dissolved (mg/L)	Selenium, Total (mg/L)	Silver, Dissolved (mg/L)	Silver, Total (mg/L)	Sodium, Dissolved (mg/L)	Sodium, Total (mg/L)	Thallium, Dissolved (mg/L)	Thallium, Total (mg/L)	Vanadium, Dissolved (mg/L)	Vanadium, Total (mg/L)	Zinc [1], Dissolved (mg/L)	Zinc [1], Total (mg/L)
Channel Cc1														
MW-3	1/30/2018	WV3-180130-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	4.96	4.77	0.0001 U	0.0001 U	0.000077	0.00041	0.0005 U	0.000637
MW-3	5/21/2018	WV3-180521-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	3.2	3.1	0.0001 U	0.0001 U	0.0000962	0.000213 D	0.0005 U	0.000655 D
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/5/2018	WV4-180205-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.44	7.45	0.0001 U	0.0001 U	0.00221	0.00235	0.0005 U	0.0005 U
MW-4	5/23/2018	WV4-180523-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.65	6.99	0.0001 U	0.0001 U	0.0024	0.00255 D	0.0012	0.00149 D
MW-4	8/13/2018	WV4-180813-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	5.99	6.76	0.0001 U	0.0001 U	0.00235 D	0.0026	0.0005 U	0.00321
MW-4	11/29/2018	WV4-181129-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.14	6.59	0.0001 U	0.0001 U	0.00218	0.00237 D	0.0005 U	0.0005 U
MW-10	1/29/2018	WV10180129-	0.0005 U	0.0005 U	4E-05 U	0.0000539	5.31	5.34	0.0001 U	0.0001 U	0.00438	0.0043	0.0005 U	0.0005 U
MW-10	5/22/2018	WV10180522-	0.0005 U	0.0005 U	0.0000613	0.0000751	5.42	5.46	0.0001 U	0.0001 U	0.0045	0.00459 D	0.0005 U	0.000577 D
MW-10	8/10/2018	WV10180810-	0.0005 U	0.0005 U	0.0000759	0.0000881	5.31	5.72	0.0001 U	0.0001 U	0.00447 D	0.0048	0.0005 U	0.0005 U
MW-10	11/9/2018	WV10181109-	0.0005 U	0.0005 U	0.0000484	0.0000739	5.13	5.04	0.0001 U	0.0001 U	0.00437	0.00435	0.000651	0.000977
MW-13	1/31/2018	WV13180131-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.65	6.51	0.0001 U	0.0001 U	0.00597	0.00606	0.0005 U	0.0005 U
MW-13	5/21/2018	WV13180521-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.5	6.31	0.0001 U	0.0001 U	0.00528	0.00568 D	0.0005 U	0.0005 DU
MW-13	8/10/2018	WV13180810-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.56	6.99	0.0001 U	0.0001 U	0.00583 D	0.00662	0.0005 U	0.0005 U
MW-13	11/28/2018	WV13181128-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.08	6.06	0.0001 U	0.0001 U	0.00618	0.00653 D	0.0005 U	0.0005 U
Channel Cc2														
MW-2	1/30/2018	WV2-180130-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	9.33	9.56	0.0001 U	0.0001 U	0.00366	0.00357	0.000813	0.000708
MW-2	5/21/2018	WV2-180521-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	10.3	10.2	0.0001 U	0.0001 U	0.00263	0.00263 D	0.00149	0.00123 D
MW-2	8/17/2018	WV2-180817-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	9.75	9.35	0.0001 U	0.0001 U	0.00358 D	0.00333	0.000714	0.000837
MW-2	11/28/2018	WV2-181128-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	8.68	9.11	0.0001 U	0.0001 U	0.00359	0.00352 D	0.000741	0.000571
MW-9	1/29/2018	WV9-180129-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.59	6.84	0.0001 U	0.0001 U	0.00486	0.00513	0.0005 U	0.0005 U
MW-9	5/22/2018	WV9-180522-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.38	6.35	0.0001 U	0.0001 U	0.00495	0.00507 D	0.000724	0.0005 DU
MW-9	8/10/2018	WV9-180810-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.31	6.72	0.0001 U	0.0001 U	0.00486 D	0.00508	0.0005 U	0.0005 U
MW-9	11/29/2018	WV9-181129-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	5.69	5.87	0.0001 U	0.0001 U	0.00483	0.00501	0.000695	0.0005 U
MW-20	1/31/2018	WV20180131-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.89	7.08	0.0001 U	0.0001 U	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U
MW-20	5/22/2018	WV20180522-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.95	7	0.0001 U	0.0001 U	0.000121	0.000225 D	0.0005 U	0.0005 DU
MW-20	8/15/2018	WV20180815-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.69	7.27	0.0001 U	0.0001 U	0.000191 D	0.000195	0.0005 U	0.0005 U
MW-20	11/28/2018	WV20181128-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.16	6.08	0.0001 U	0.0001 U	0.000134	0.000158 DJ	0.0005 U	0.0005 U
MW-21	2/5/2018	WV21180205-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	11.8	11.7	0.0001 U	0.0001 U	0.000447	0.000926	0.000821	0.00114
MW-21	5/21/2018	WV21180521-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	12	11.7	0.0001 U	0.0001 U	0.000497	0.00124 D	0.00114	0.00165 D
MW-21	8/15/2018	WV21180815-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	11.8	12.2	0.0001 U	0.0001 U	0.000555 D	0.000713	0.000742	0.000714
MW-21	11/27/2018	WV21181127-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	10.4	10.6	0.0001 U	0.0001 U	0.000435	0.000883 D	0.0005 U	0.000051
MW-33	1/30/2018	WV33180130-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	19.7	19.7	0.0001 U	0.0001 U	0.000744	0.000712	0.0005 U	0.0005 U
MW-33	5/22/2018	WV33180522-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	19.8	19.9	0.0001 U	0.0001 U	0.000725	0.000857 D	0.0005 U	0.0005 DU
MW-33	8/15/2018	WV33180815-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	19	20.3	0.0001 U	0.0001 U	0.00076 D	0.000771	0.000789	0.0005 U
MW-33	11/27/2018	WV33181127-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	17.5	18.2	0.0001 U	0.0001 U	0.00068	0.000824 D	0.000857 J	0.0005 U
MW-35	1/31/2018	WV35180131-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	17	17	0.0001 U	0.0001 U	0.000336	0.000546	0.000706	0.00307
MW-35	5/21/2018	WV35180521-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	16.7	16.8	0.0001 U	0.0001 U	0.000356	0.000803 D	0.0007	0.00527 D
MW-35	8/15/2018	WV35180815-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	16.5	17	0.0001 U	0.0001 U	0.000456 D	0.000485	0.00142	0.00173
MW-35	11/27/2018	WV35181127-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	15.4	16.1	0.0001 U	0.0001 U	0.000296	0.000882 D	0.000705	0.00485
Channel Cc3														
MW-8	1/30/2018	WV8-180130-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.45	6.48	0.0001 U	0.0001 U	0.0024	0.0024	0.0005 U	0.0005 U
MW-8	5/22/2018	WV8-180522-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.73	6.55	0.0001 U	0.0001 U	0.00249	0.00254 D	0.0005 U	0.0005 DU
MW-8	8/10/2018	WV8-180810-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.48	6.54	0.0001 U	0.0001 U	0.00253 D	0.00257	0.0005 U	0.0005 U
MW-8	11/9/2018	WV8-181109-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.24	6.36	0.0001 U	0.0001 U	0.00246	0.00249	0.0005 U	0.0005 U
MW-36	1/31/2018	WV36180131-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.91	6.7	0.0001 U	0.0001 U	0.00163	0.00234	0.0005 U	0.00363
MW-36	5/23/2018	WV36180523-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.85	6.67	0.0001 U	0.0001 U	0.00187	0.00195 D	0.0005 U	0.0005 DU
MW-36	8/13/2018	WV36180813-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.35	6.71	0.0001 U	0.0001 U	0.00188 D	0.00202	0.0005 U	0.0005 U
MW-36	11/29/2018	WV36181129-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.21	6.21	0.0001 U	0.0001 U	0.0018	0.00194 D	0.0005 U	0.0005 U
Unit D														
MW-7	1/31/2018	WV7-180131-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.64	6.62	0.0001 U	0.0001 U	0.0000919	0.0000976	0.000564	0.000776
MW-7	5/21/2018	WV7-180521-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.52	6.29	0.0001 U	0.0001 U	0.000164	0.00023 D	0.0005 U	0.000746 D
MW-7	8/13/2018	WV7-180813-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.26	6.83	0.0001 U	0.0001 U	0.000189 D	0.00018	0.000706	0.00059
MW-7	11/28/2018	WV7-181128-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	5.94	6.13	0.0001 U	0.0001 U	0.000138	0.000299 D	0.000625	0.00106
MW-12	1/30/2018	WV12180130-	0.0005 U	0.0005 U	4E-05 U	0.000042	6.21	6.39	0.0001 U	0.0001 U	0.00521	0.0053	0.0005 U	0.0005 U
MW-12	5/21/2018	WV12180521-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.39	6.62	0.0001 U	0.0001 U	0.00533	0.00539 D	0.0005 U	0.0005 DU
MW-12	8/13/2018	WV12180813-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.15	6.69	0.0001 U	0.0001 U	0.00536 D	0.0055	0.000514	0.0005 U
MW-12	11/28/2018	WV12181128-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	5.95	6.2	0.0001 U	0.0001 U	0.00526	0.00535 D	0.0005 U	0.000916
MW-19	1/29/2018	WV19180129-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.34	7.11	0.0001 U	0.0001 U	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U
MW-19	5/22/2018	WV19180522-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.17	7.24	0.0001 U	0.0001 U	0.000109	0.00016 D	0.0005 U	0.000717 D
MW-19	8/14/2018	WV19180814-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.9	7.17	0.0001 U	0.0001 U	9.57E-05 D	0.0000786	0.000679	0.0005 U
MW-19	11/29/2018	WV19181129-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.85	6.84	0.0001 U	0.0001 U	7.5E-05 U	0.000111	0.0005 U	0.000533
MW-26	1/30/2018	WV26180130-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	8.78	8.47	0.0001 U	0.0001 U	7.5E-05 U	0.00038	0.000657	0.0128
MW-26	5/23/2018	WV26180523-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	9.04	8.98	0.0001 U	0.0001 U	0.000112	0.000825 D	0.000504	0.0254 D
MW-26	5/23/2018	WV26180523D	0.0005 U	0.0005 U	4E-05 U	4E-05 U	9.13	8.71	0.0001 U	0.0001 U	0.00012	0.000852 D	0.000681	0.0254 D
MW-26	8/14/2018	WV26180814-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	8.67	9.13	0.0001 U	0.0001 U	0.000149 D	0.000946	0.000621	0.0395
MW-26	8/14/2018	WV26180814D	0.0005 U	0.0005 U	4E-05 U	4E-05 U	8.52	9.09	0.0001 U	0.0001 U	0.000183 D	0.000862	0.000948	0.0316
MW-26	11/29/2018	WV26181129-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	8.64	8.89	0.0001 U	0.0001 U	0.00011	0.000453	0.000643	0.0153
MW-29	2/5/2018	WV29180205-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.13	6.87	0.0001 U	0.0001 U	7.5E-05 U	7.5E-05 U	0.00305	0.0005 U
MW-29	5/23/2018	WV29180523-	0.0005 U	0.0005 U	4E-05 DU	4E-05 U	7.14	7.1	0.0001 U	0.0001 U	0.000124	0.000397 D	0.0005 U	0.00124 D
MW-29	8/14/2018	WV29180814-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.81	7.1	0.0001 U	0.0001 U	0.000129 D	0.000322	0.000993	0.0011
MW-29	11/29/2018	WV29181129-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.41	6.66	0.0001 U	0.0001 U	7.5E-05 U	0.000112	0.0005 U	0.0005 U
MW-34	1/31/2018	WV34180131-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.17	7.14	0.0001 U	0.0001 U	0.00277	0.00274	0.000559	0.000504
MW-34	5/23/2018	WV34180523-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.25	7.2	0.0001 U	0.0001 U	0.0029	0.00289 D	0.00217	0.00101 D
MW-34	8/14/2018	WV34180814-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.77	7.25	0.0001 U	0.0001 U	0.00273 D	0.00292	0.00122	0.000913
MW-34	11/28/2018	WV34181128-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.55	6.53	0.0001 U	0.0001 U	0.00269	0.00276 D	0.000599	0.000515
MW-34	11/28/2018	WV34181128D	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.48	6.61	0.0001 U	0.0001 U	0.00277	0.00293 D	0.000687	0.000551
Field Blank														
FIELD BLANK	1/30/2018	WVPA180130F	0.0005 U	0.0005 U	4E-05 U	4E-05 U	0.1 U	0.1 U	0.0001 U	0.0001 U	7.5E-05 U	7.5E-05 U	0.0005 U	0.0005 U
FIELD BLANK	5/22/2018	WV9-180522F	0.0005 U	0.0005 U	4E-05 U	4E-05 U	0.1 U	0.1 U	0.0001 U	0.0001 U	7.70E-05	0.000139 D	0.000963	0.00508 D
FIELD BLANK	8/17/2018	WV2-180817F	0.0005 U	0.0005 U	4E-05 U	4E-05 U	0.1 U	0.1 U	0.0001 U	0.0001 U	0.000125 D	7.5E-05 U	0.0005 U	0.000736
Offsite Private Wells														
DW-85	1/30/2018	WV85180130-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.18	5.99	0.0001 U	0.0001 U	7.5E-05 U	0.0000806	0.00134	0.000911
DW-85	8/17/2018	WV85180817-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.1	6.19	0.0001 U	0.0001 U	0.000136 D	0.000174	0.000616	0.00123
DW-PA	1/30/2018	WVPA180130-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.97	6.97	0.0001 U	0.0001 U	0.00282	0.00277	0.00709	0.00532
DW-PA	8/17/2018	WVPA180817-	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.8	6.77	0.0001 U	0.0001 U	0.00343 D	0.00344	0.00138	0.00125

** MW-3 water level was below pump - no sample collected.

[1] Note: Dissolved zinc concentration is greater than the total zinc for MW-19. This could be the result of two factors, one being that the metal aliquots are collected back to back and the second being that there is always uncertainty when the detected value is close to the detection limit.

Table H-6

Groundwater - Volatile Organic Compounds

Groundwater - VOAs			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	1/30/2018	WV3-180130-	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	5/21/2018	WV3-180521-	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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/5/2018	WV4-180205-	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-4	5/23/2018	WV4-180523-	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-4	8/13/2018	WV4-180813-	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-4	11/29/2018	WV4-181129-	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	1/29/2018	WV10180129-	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	5/22/2018	WV10180522-	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	8/10/2018	WV10180810-	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	11/9/2018	WV10181109-	0.25 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	2.5 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	1 SU	0.5 SU	2.5 SU
MW-13	1/31/2018	WV13180131-	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	5/21/2018	WV13180521-	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	8/10/2018	WV13180810-	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	11/28/2018	WV13181128-	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	1/30/2018	WV2-180130-	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	5/21/2018	WV2-180521-	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	8/17/2018	WV2-180817-	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	11/28/2018	WV2-181128-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	2.5 U
MW-9	1/29/2018	WV9-180129-	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	5/22/2018	WV9-180522-	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	8/10/2018	WV9-180810-	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	11/29/2018	WV9-181129-	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	1/31/2018	WV20180131-	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	5/22/2018	WV20180522-	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	8/15/2018	WV20180815-	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	11/28/2018	WV20181128-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	2.5 U
MW-21	2/5/2018	WV21180205-	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	5/21/2018	WV21180521-	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	8/15/2018	WV21180815-	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	11/27/2018	WV21181127-	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	2.5 U
MW-33	1/30/2018	WV33180130-	0.25 U	0.1 U	0.1 U	0.1 U	1.47	0.17 JT	0.1 U	2.5 U	0.1 U	0.1 U	0.13 JT	6.95	0.1 U	1 U	0.5 U	2.5 U
MW-33	5/22/2018	WV33180522-	0.25 U	0.1 U	0.1 U	0.1 U	1.29	0.15 JT	0.1 U	2.5 U	0.1 U	0.1 U	0.12 JT	6.32	0.1 U	1 U	0.5 U	2.5 U
MW-33	8/15/2018	WV33180815-	0.25 U	0.1 U	0.1 U	0.1 U	1.29	0.14 JT	0.1 U	2.5 U	0.1 U	0.1 U	0.114 JT	6.26	0.1 U	1 U	0.5 U	2.5 U
MW-33	11/27/2018	WV33181127-	0.25 U	0.1 U	0.1 U	0.1 U	1.42	0.166 JT	0.1 U	2.5 U	0.1 U	0.1 U	0.118 JT	6.34	0.1 U	0.25 U	0.5 U	2.5 U
MW-35	1/31/2018	WV35180131-	0.25 U	0.1 U	0.1 U	0.1 U	0.16 JT	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.71	0.1 U	1 U	0.5 U	2.5 U
MW-35	5/21/2018	WV35180521-	0.25 U	0.1 U	0.1 U	0.1 U	0.12 JT	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.581	0.1 U	1 U	0.5 U	2.5 U
MW-35	8/15/2018	WV35180815-	0.25 U	0.1 U	0.1 U	0.1 U	0.126 JT	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.626	0.1 U	1 U	0.5 U	2.5 U
MW-35	11/27/2018	WV35181127-	0.25 U	0.1 U	0.1 U	0.1 U	0.193 JT	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.838	0.1 U	0.25 U	0.5 U	2.5 U

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

Groundwater - VOAs			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	1/30/2018	WV8-180130-	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	5/22/2018	WV8-180522-	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	8/10/2018	WV8-180810-	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	11/9/2018	WV8-181109-	0.25 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	2.5 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	1 SU	0.5 SU	2.5 SU
MW-36	1/31/2018	WV36180131-	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	5/23/2018	WV36180523-	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	8/13/2018	WV36180813-	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	11/29/2018	WV36181129-	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																		
MW-7	1/31/2018	WV7-180131-	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	5/21/2018	WV7-180521-	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	8/13/2018	WV7-180813-	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	11/28/2018	WV7-181128-	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	1/30/2018	WV12180130-	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	5/21/2018	WV12180521-	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	8/13/2018	WV12180813-	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	11/28/2018	WV12181128-	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	1/29/2018	WV19180129-	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	5/22/2018	WV19180522-	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	8/14/2018	WV19180814-	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	11/29/2018	WV19181129-	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	1/30/2018	WV26180130-	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	5/23/2018	WV26180523-	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	5/23/2018	WV26180523D	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	8/14/2018	WV26180814-	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	8/14/2018	WV26180814D	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	11/29/2018	WV26181129-	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	2/5/2018	WV29180205-	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	5/23/2018	WV29180523-	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	8/14/2018	WV29180814-	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	11/29/2018	WV29181129-	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	1/31/2018	WV34180131-	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	5/23/2018	WV34180523-	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	8/14/2018	WV34180814-	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	11/28/2018	WV34181128-	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	11/28/2018	WV34181128D	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																		
FIELD BLANK	1/30/2018	WVPA180130F	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	5/22/2018	WV9-180522F	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	71	0.5 U	2.5 U
FIELD BLANK	8/17/2018	WV2-180817F	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	45	0.524 JT	2.5 U
Offsite Private Wells																		
DW-85	1/30/2018	WV85180130-	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	8/17/2018	WV85180817-	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	1/30/2018	WVPA180130-	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	8/17/2018	WVPA180817-	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 water level was below pump - no sample collected.

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

Groundwater - VOAs			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	1/30/2018	WV3-180130-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-3	5/21/2018	WV3-180521-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/5/2018	WV4-180205-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-4	5/23/2018	WV4-180523-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-4	8/13/2018	WV4-180813-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-4	11/29/2018	WV4-181129-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-10	1/29/2018	WV10180129-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-10	5/22/2018	WV10180522-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-10	8/10/2018	WV10180810-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-10	11/9/2018	WV10181109-	2.5 SU	0.035 SU	0.1 SU	0.1 SU	0.25 SU	0.5 SU	0.1 SU	0.1 SU	0.25 SU	0.1 SU	0.5 SU	0.1 SU	0.1 SU	0.25 SU	0.1 SU	0.25 SU
MW-13	1/31/2018	WV13180131-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-13	5/21/2018	WV13180521-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-13	8/10/2018	WV13180810-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-13	11/28/2018	WV13181128-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	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	1/30/2018	WV2-180130-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.293	0.25 U
MW-2	5/21/2018	WV2-180521-	3 JT	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.413	0.25 U
MW-2	8/17/2018	WV2-180817-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.313	0.25 U
MW-2	11/28/2018	WV2-181128-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.265	0.25 U
MW-9	1/29/2018	WV9-180129-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-9	5/22/2018	WV9-180522-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-9	8/10/2018	WV9-180810-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-9	11/29/2018	WV9-181129-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-20	1/31/2018	WV20180131-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-20	5/22/2018	WV20180522-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-20	8/15/2018	WV20180815-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-20	11/28/2018	WV20181128-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-21	2/5/2018	WV21180205-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.968	0.25 U
MW-21	5/21/2018	WV21180521-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.879	0.25 U
MW-21	8/15/2018	WV21180815-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.839	0.25 U
MW-21	11/27/2018	WV21181127-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.302 JT	0.763	0.25 U
MW-33	1/30/2018	WV33180130-	2.5 U	0.035 U	1.06	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.434	0.1 U	0.25 U	28.2	0.25 U
MW-33	5/22/2018	WV33180522-	2.5 U	0.035 U	0.944	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.267	0.1 U	0.25 U	25.1	0.25 U
MW-33	8/15/2018	WV33180815-	2.5 U	0.035 U	0.934	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.278	0.1 U	0.25 U	24.1	0.25 U
MW-33	11/27/2018	WV33181127-	2.5 U	0.035 U	0.954	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.455	0.1 U	0.25 U	27.9	0.25 U
MW-35	1/31/2018	WV35180131-	2.5 U	0.035 U	0.981	0.1 U	0.25 U	0.5 U	0.1 U	0.1 JT	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	5.91	0.25 U
MW-35	5/21/2018	WV35180521-	2.5 U	0.035 U	0.83	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	4.92	0.25 U
MW-35	8/15/2018	WV35180815-	2.5 U	0.035 U	0.866	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	5.04	0.25 U
MW-35	11/27/2018	WV35181127-	2.5 U	0.035 U	0.975	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	6.38	0.25 U

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

Groundwater - VOAs			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	1/30/2018	WV8-180130-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-8	5/22/2018	WV8-180522-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-8	8/10/2018	WV8-180810-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-8	11/9/2018	WV8-181109-	2.5 SU	0.035 SU	0.1 SU	0.1 SU	0.25 SU	0.5 SU	0.1 SU	0.1 SU	0.25 SU	0.1 SU	0.5 SU	0.1 SU	0.1 SU	0.25 SU	0.1 SU	0.25 SU
MW-36	1/31/2018	WV36180131-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-36	5/23/2018	WV36180523-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-36	8/13/2018	WV36180813-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.102 JT	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	11/29/2018	WV36181129-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
Unit D																		
MW-7	1/31/2018	WV7-180131-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-7	5/21/2018	WV7-180521-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-7	8/13/2018	WV7-180813-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-7	11/28/2018	WV7-181128-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-12	1/30/2018	WV12180130-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-12	5/21/2018	WV12180521-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-12	8/13/2018	WV12180813-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-12	11/28/2018	WV12181128-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-19	1/29/2018	WV19180129-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-19	5/22/2018	WV19180522-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-19	8/14/2018	WV19180814-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-19	11/29/2018	WV19181129-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-26	1/30/2018	WV26180130-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-26	5/23/2018	WV26180523-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-26	5/23/2018	WV26180523D	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-26	8/14/2018	WV26180814-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-26	8/14/2018	WV26180814D	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-26	11/29/2018	WV26181129-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-29	2/5/2018	WV29180205-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.13 JT	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	5/23/2018	WV29180523-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-29	8/14/2018	WV29180814-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-29	11/29/2018	WV29181129-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-34	1/31/2018	WV34180131-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-34	5/23/2018	WV34180523-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-34	8/14/2018	WV34180814-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-34	11/28/2018	WV34181128-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
MW-34	11/28/2018	WV34181128D	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
Field Blank																		
FIELD BLANK	1/30/2018	WVPA180130F	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
FIELD BLANK	5/22/2018	WV9-180522F	5.44	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.13 JT	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	8/17/2018	WV2-180817F	43.1	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.345	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
Offsite Private Wells																		
DW-85	1/30/2018	WV85180130-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
DW-85	8/17/2018	WV85180817-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
DW-PA	1/30/2018	WVPA180130-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U
DW-PA	8/17/2018	WVPA180817-	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U

** MW-3 water level was below pump - no sample collected.

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

Groundwater - VOAs			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	1/30/2018	WV3-180130-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.13 JT	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.226	0.1 U	0.01 U
MW-3	5/21/2018	WV3-180521-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.13 JT	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.258	0.1 U	0.01 U
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
**MW-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	2/5/2018	WV4-180205-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-4	5/23/2018	WV4-180523-	0.1 U	0.1 U	0.1 U	0.1 U	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	0.11 JT	0.1 U	0.01 U
MW-4	8/13/2018	WV4-180813-	0.1 U	0.1 U	0.1 U	0.1 U	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	0.11 JT	0.1 U	0.01 U
MW-4	11/29/2018	WV4-181129-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-10	1/29/2018	WV10180129-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-10	5/22/2018	WV10180522-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-10	8/10/2018	WV10180810-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-10	11/9/2018	WV10181109-	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	2.5 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.5 SU	5 SU	0.1 SU	0.1 SU	0.1 SU	0.01 SU
MW-13	1/31/2018	WV13180131-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-13	5/21/2018	WV13180521-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-13	8/10/2018	WV13180810-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-13	11/28/2018	WV13181128-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
Channel Cc2																			
MW-2	1/30/2018	WV2-180130-	0.1 U	3.01	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.375	0.1 U	0.0595
MW-2	5/21/2018	WV2-180521-	0.1 U	2.1	0.1 U	0.1 U	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	0.221	0.1 U	0.0932
MW-2	8/17/2018	WV2-180817-	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	5 U	0.1 U	0.249	0.1 U	0.0567
MW-2	11/28/2018	WV2-181128-	0.1 U	2.66	0.1 U	0.1 U	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	0.373	0.1 U	0.0544
MW-9	1/29/2018	WV9-180129-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-9	5/22/2018	WV9-180522-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-9	8/10/2018	WV9-180810-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-9	11/29/2018	WV9-181129-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-20	1/31/2018	WV20180131-	0.1 U	0.488	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-20	5/22/2018	WV20180522-	0.1 U	0.476	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-20	8/15/2018	WV20180815-	0.1 U	0.423	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-20	11/28/2018	WV20181128-	0.1 U	0.326	0.1 U	0.1 U	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 U
MW-21	2/5/2018	WV21180205-	0.1 U	0.82	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.13 JT	0.5 U	5 U	0.1 U	0.331	0.1 U	0.0456
MW-21	5/21/2018	WV21180521-	0.1 U	0.829	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.12 JT	0.5 U	5 U	0.1 U	0.27	0.1 U	0.0434
MW-21	8/15/2018	WV21180815-	0.1 U	0.788	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.117 JT	0.5 U	5 U	0.1 U	0.261	0.1 U	0.0415
MW-21	11/27/2018	WV21181127-	0.1 U	1.16	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.104 JT	0.5 U	0.5 U	0.1 U	0.518	0.1 U	0.0632
MW-33	1/30/2018	WV33180130-	0.1 U	3.85	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.724	0.5 U	5 U	0.16 JT	0.1 U	0.1 U	26.1
MW-33	5/22/2018	WV33180522-	0.1 U	3.44	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.639	0.5 U	5 U	0.14 JT	0.1 U	0.1 U	24.9
MW-33	8/15/2018	WV33180815-	0.1 U	3.21	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.632	0.5 U	5 U	0.137 JT	0.1 U	0.1 U	24.3
MW-33	11/27/2018	WV33181127-	0.1 U	4.84	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.125 JT	0.697	0.5 U	0.5 U	0.131 JT	0.1 U	0.1 U	29
MW-35	1/31/2018	WV35180131-	0.1 U	0.285	0.1 U	0.1 U	0.1 U	2.5 U	0.14 JT	0.1 U	0.1 U	0.12 JT	0.383	0.5 U	5 U	1.16	0.1 U	0.1 U	2
MW-35	5/21/2018	WV35180521-	0.1 U	0.225	0.1 U	0.1 U	0.1 U	2.5 U	0.13 JT	0.1 U	0.1 U	0.11 JT	0.348	0.5 U	5 U	1.04	0.1 U	0.1 U	1.81
MW-35	8/15/2018	WV35180815-	0.1 U	0.229	0.1 U	0.1 U	0.1 U	2.5 U	0.125 JT	0.1 U	0.1 U	0.114 JT	0.37	0.5 U	5 U	1.12	0.1 U	0.1 U	1.78
MW-35	11/27/2018	WV35181127-	0.1 U	0.349	0.1 U	0.1 U	0.1 U	2.5 U	0.114 JT	0.1 U	0.1 U	0.117 JT	0.401	0.5 U	0.5 U	1.16	0.1 U	0.1 U	2.5

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

Groundwater - VOAs			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	1/30/2018	WV8-180130-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-8	5/22/2018	WV8-180522-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-8	8/10/2018	WV8-180810-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-8	11/9/2018	WV8-181109-	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	2.5 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.5 SU	5 SU	0.1 SU	0.1 SU	0.1 SU	0.01 SU
MW-36	1/31/2018	WV36180131-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-36	5/23/2018	WV36180523-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-36	8/13/2018	WV36180813-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-36	11/29/2018	WV36181129-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
Unit D																			
MW-7	1/31/2018	WV7-180131-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-7	5/21/2018	WV7-180521-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-7	8/13/2018	WV7-180813-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-7	11/28/2018	WV7-181128-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-12	1/30/2018	WV12180130-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-12	5/21/2018	WV12180521-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-12	8/13/2018	WV12180813-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-12	11/28/2018	WV12181128-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-19	1/29/2018	WV19180129-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-19	5/22/2018	WV19180522-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-19	8/14/2018	WV19180814-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-19	11/29/2018	WV19181129-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-26	1/30/2018	WV26180130-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-26	5/23/2018	WV26180523-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-26	5/23/2018	WV26180523D	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-26	8/14/2018	WV26180814-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-26	8/14/2018	WV26180814D	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-26	11/29/2018	WV26181129-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-29	2/5/2018	WV29180205-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-29	5/23/2018	WV29180523-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-29	8/14/2018	WV29180814-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-29	11/29/2018	WV29181129-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-34	1/31/2018	WV34180131-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-34	5/23/2018	WV34180523-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-34	8/14/2018	WV34180814-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-34	11/28/2018	WV34181128-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
MW-34	11/28/2018	WV34181128D	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
Field Blank																			
FIELD BLANK	1/30/2018	WVPA180130F	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 JT	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
FIELD BLANK	5/22/2018	WV9-180522F	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.274	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
FIELD BLANK	8/17/2018	WV2-180817F	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
Offsite Private Wells																			
DW-85	1/30/2018	WV85180130-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
DW-85	8/17/2018	WV85180817-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
DW-PA	1/30/2018	WVPA180130-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
DW-PA	8/17/2018	WVPA180817-	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U

** MW-3 water level was below pump - no sample collected.

Table H-7

Groundwater - VOA Trip Blanks

Groundwater VTRPs			1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichloropropane	1,2-Dibromo-3-Chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene
		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
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)
VOA TRIP BLANK	1/20/2018	VTRP180131X	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
VOA TRIP BLANK	1/25/2018	VTRP180129Y	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
VOA TRIP BLANK	1/25/2018	VTRP180130Y	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
VOA TRIP BLANK	1/27/2018	VTRP180130X	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
VOA TRIP BLANK	1/30/2018	VTRP180131Y	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
VOA TRIP BLANK	1/31/2018	VTRP180205Y	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
VOA TRIP BLANK	5/18/2018	VTRP180521X	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
VOA TRIP BLANK	5/18/2018	VTRP180521Y	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
VOA TRIP BLANK	5/21/2018	VTRP180522X	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
VOA TRIP BLANK	5/21/2018	VTRP180522Y	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
VOA TRIP BLANK	5/22/2018	VTRP180523X	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
VOA TRIP BLANK	5/22/2018	VTRP180523Y	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
VOA TRIP BLANK	8/8/2018	VTRP180810X	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
VOA TRIP BLANK	8/8/2018	VTRP180810Y	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
VOA TRIP BLANK	8/10/2018	VTRP180813X	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
VOA TRIP BLANK	8/10/2018	VTRP180813Y	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
VOA TRIP BLANK	8/13/2018	VTRP180814X	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
VOA TRIP BLANK	8/13/2018	VTRP180814Y	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
VOA TRIP BLANK	8/14/2018	VTRP180815X	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
VOA TRIP BLANK	8/14/2018	VTRP180815Y	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
VOA TRIP BLANK	8/16/2018	VTRP180817X	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
VOA TRIP BLANK	11/1/2018	VTRP181109Y	0.25 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	2.5 SU	0.1 SU	0.1 SU
VOA TRIP BLANK	11/26/2018	VTRP181127X	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
VOA TRIP BLANK	11/27/2018	VTRP181128X	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
VOA TRIP BLANK	11/27/2018	VTRP181128X2	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
VOA TRIP BLANK	11/27/2018	VTRP181128Y	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
VOA TRIP BLANK	11/27/2018	VTRP181128Y2	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
VOA TRIP BLANK	11/28/2018	VTRP181129X	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
VOA TRIP BLANK	11/28/2018	VTRP181129Y	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

Groundwater VTRPs			1,2-Dichloroethane	1,2-Dichloropropane	1,4-Dichlorobenzene	2-Butanone	2-Hexanone	4-Methyl-2-Pentanone	Acetone	Acrylonitrile	Benzene	Bromochloromethane
		CAS #	107-06-2	78-87-5	106-46-7	78-93-3	591-78-6	108-10-1	67-64-1	107-13-1	71-43-2	74-97-5
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)
VOA TRIP BLANK	1/20/2018	VTRP180131X	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	1/25/2018	VTRP180129Y	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	1/25/2018	VTRP180130Y	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	1/27/2018	VTRP180130X	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	1/30/2018	VTRP180131Y	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	1/31/2018	VTRP180205Y	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	5/18/2018	VTRP180521X	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	5/18/2018	VTRP180521Y	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	5/21/2018	VTRP180522X	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	5/21/2018	VTRP180522Y	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	5/22/2018	VTRP180523X	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	5/22/2018	VTRP180523Y	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	8/8/2018	VTRP180810X	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	8/8/2018	VTRP180810Y	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	8/10/2018	VTRP180813X	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	8/10/2018	VTRP180813Y	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	8/13/2018	VTRP180814X	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	8/13/2018	VTRP180814Y	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	8/14/2018	VTRP180815X	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	8/14/2018	VTRP180815Y	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	8/16/2018	VTRP180817X	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	11/1/2018	VTRP181109Y	0.1 SU	0.1 SU	0.1 SU	1 SU	0.5 SU	2.5 SU	2.5 SU	0.035 SU	0.1 SU	0.1 SU
VOA TRIP BLANK	11/26/2018	VTRP181127X	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	11/27/2018	VTRP181128X	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	11/27/2018	VTRP181128X2	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	11/27/2018	VTRP181128Y	0.1 U	0.1 U	0.1 U	0.25 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	11/27/2018	VTRP181128Y2	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	11/28/2018	VTRP181129X	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U
VOA TRIP BLANK	11/28/2018	VTRP181129Y	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U	0.1 U	0.1 U

Table H-7 (*continued*)

Groundwater - VOA Trip Blanks

Groundwater VTRPs			Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane
		CAS #	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
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)
VOA TRIP BLANK	1/20/2018	VTRP180131X	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
VOA TRIP BLANK	1/25/2018	VTRP180129Y	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
VOA TRIP BLANK	1/25/2018	VTRP180130Y	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
VOA TRIP BLANK	1/27/2018	VTRP180130X	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
VOA TRIP BLANK	1/30/2018	VTRP180131Y	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
VOA TRIP BLANK	1/31/2018	VTRP180205Y	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
VOA TRIP BLANK	5/18/2018	VTRP180521X	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
VOA TRIP BLANK	5/18/2018	VTRP180521Y	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
VOA TRIP BLANK	5/21/2018	VTRP180522X	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
VOA TRIP BLANK	5/21/2018	VTRP180522Y	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
VOA TRIP BLANK	5/22/2018	VTRP180523X	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
VOA TRIP BLANK	5/22/2018	VTRP180523Y	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
VOA TRIP BLANK	8/8/2018	VTRP180810X	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
VOA TRIP BLANK	8/8/2018	VTRP180810Y	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
VOA TRIP BLANK	8/10/2018	VTRP180813X	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
VOA TRIP BLANK	8/10/2018	VTRP180813Y	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
VOA TRIP BLANK	8/13/2018	VTRP180814X	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
VOA TRIP BLANK	8/13/2018	VTRP180814Y	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
VOA TRIP BLANK	8/14/2018	VTRP180815X	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
VOA TRIP BLANK	8/14/2018	VTRP180815Y	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
VOA TRIP BLANK	8/16/2018	VTRP180817X	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
VOA TRIP BLANK	11/1/2018	VTRP181109Y	0.25 SU	0.5 SU	0.1 SU	0.1 SU	0.25 SU	0.1 SU	0.5 SU	0.1 SU	0.1 SU	0.25 SU
VOA TRIP BLANK	11/26/2018	VTRP181127X	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
VOA TRIP BLANK	11/27/2018	VTRP181128X	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
VOA TRIP BLANK	11/27/2018	VTRP181128X2	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
VOA TRIP BLANK	11/27/2018	VTRP181128Y	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
VOA TRIP BLANK	11/27/2018	VTRP181128Y2	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
VOA TRIP BLANK	11/28/2018	VTRP181129X	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
VOA TRIP BLANK	11/28/2018	VTRP181129Y	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

Groundwater VTRPs			Cis-1-2-Dichloroethene	Cis-1,3-Dichloropropene	Dibromomethane	Dichlorodifluoromethane	Ethylbenzene	M & P Xylene	Methyl Iodide	Methylene Chloride	O-Xylene	Styrene
		CAS #	156-59-2	10061-01-5	74-95-3	75-71-8	100-41-4	MPX	74-88-4	75-09-2	95-47-6	100-42-5
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)
VOA TRIP BLANK	1/20/2018	VTRP180131X	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	1/25/2018	VTRP180129Y	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	1/25/2018	VTRP180130Y	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	1/27/2018	VTRP180130X	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	1/30/2018	VTRP180131Y	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	1/31/2018	VTRP180205Y	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	5/18/2018	VTRP180521X	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	5/18/2018	VTRP180521Y	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	5/21/2018	VTRP180522X	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	5/21/2018	VTRP180522Y	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	5/22/2018	VTRP180523X	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	5/22/2018	VTRP180523Y	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	8/8/2018	VTRP180810X	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	8/8/2018	VTRP180810Y	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	8/10/2018	VTRP180813X	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	8/10/2018	VTRP180813Y	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	8/13/2018	VTRP180814X	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	8/13/2018	VTRP180814Y	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	8/14/2018	VTRP180815X	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	8/14/2018	VTRP180815Y	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	8/16/2018	VTRP180817X	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	11/1/2018	VTRP181109Y	0.1 SU	0.25 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	0.1 SU	2.5 SU	0.1 SU	0.1 SU
VOA TRIP BLANK	11/26/2018	VTRP181127X	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	11/27/2018	VTRP181128X	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	11/27/2018	VTRP181128X2	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	11/27/2018	VTRP181128Y	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	11/27/2018	VTRP181128Y2	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	11/28/2018	VTRP181129X	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U
VOA TRIP BLANK	11/28/2018	VTRP181129Y	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.5 U	0.1 U	0.1 U

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

Groundwater VTRPs			Tetrachloroethene	Toluene	Trans-1-2-Dichloroethene	Trans-1-3-Dichloropropene	Trans-1-4-Dichloro-2-Butene	Trichloroethene	Trichlorofluoromethane	Vinyl Acetate	Vinyl Chloride
		CAS #	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)
VOA TRIP BLANK	1/20/2018	VTRP180131X	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	1/25/2018	VTRP180129Y	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	1/25/2018	VTRP180130Y	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	1/27/2018	VTRP180130X	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	1/30/2018	VTRP180131Y	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	1/31/2018	VTRP180205Y	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	5/18/2018	VTRP180521X	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	5/18/2018	VTRP180521Y	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	5/21/2018	VTRP180522X	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	5/21/2018	VTRP180522Y	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	5/22/2018	VTRP180523X	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	5/22/2018	VTRP180523Y	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/8/2018	VTRP180810X	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/8/2018	VTRP180810Y	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/10/2018	VTRP180813X	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/10/2018	VTRP180813Y	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/13/2018	VTRP180814X	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/13/2018	VTRP180814Y	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/14/2018	VTRP180815X	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/14/2018	VTRP180815Y	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	8/16/2018	VTRP180817X	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	11/1/2018	VTRP181109Y	0.1 SU	0.1 SU	0.1 SU	0.5 SU	5 SU	0.1 SU	0.1 SU	0.1 SU	0.01 SU
VOA TRIP BLANK	11/26/2018	VTRP181127X	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	11/27/2018	VTRP181128X	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	11/27/2018	VTRP181128X2	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	11/27/2018	VTRP181128Y	0.1 U	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	11/27/2018	VTRP181128Y2	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	11/28/2018	VTRP181129X	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	11/28/2018	VTRP181129Y	0.1 U	0.1 U	0.1 U	0.5 U	5 U	0.1 U	0.1 U	0.1 U	0.01 U

Table H-8

Groundwater - Appendix III Analytes

Groundwater - Metals (Dissolved & Total)

Groundwater - Metals (Dissolved & Total)			TIN Dissolved	TIN Total
Well #	Sample Date	Sample ID	(mg/L)	(mg/L)
			Channel Cc2	
MW-2	11/28/2018	WV2-181128-	0.0005 U	0.0005 U
MW-20	11/28/2018	WV20181128-	0.0005 U	0.0005 U
MW-21	11/27/2018	WV21181127-	0.0005 U	0.0005 U
MW-33	11/27/2018	WV33181127-	0.0005 U	0.0005 U
MW-35	11/27/2018	WV35181127-	0.0005 U	0.0005 U

Groundwater - Volatile Organic Compounds

Groundwater - VOAs			1,1-Dichloropropene	1,3-Dichlorobenzene	1,3-Dichloropropane	2,2-Dichloropropane	2-Methyl-1-Propanol	3-Chloropropene	Acetonitrile	Acrolein	Chloroprene	Methyl Methacrylate	Methylacrylonitrile	Propionitrile
	CAS #		563-58-6	541-73-1	142-28-9	594-20-7	78-83-1	107-05-1	75-05-8	107-02-8	126-99-8	80-62-6	126-98-7	107-12-0
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)
			Channel Cc2											
MW-2	11/28/2018	WV2-181128-	0.1 U	0.1 U	0.1 U	0.1 U	5 U	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U
MW-20	11/28/2018	WV20181128-	0.1 U	0.1 U	0.1 U	0.1 U	9.14 JT	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U
MW-21	11/27/2018	WV21181127-	0.1 U	0.1 U	0.1 U	0.1 U	29.8 J	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U
MW-33	11/27/2018	WV33181127-	0.1 U	0.1 U	0.1 U	0.1 U	5 U	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U
MW-35	11/27/2018	WV35181127-	0.1 U	0.1 U	0.1 U	0.1 U	5 U	0.1 U	5 U	2.5 U	0.1 U	0.25 U	0.1 U	0.5 U

Groundwater - Semi-Volatile Organic Compounds

Groundwater - SemiVOAs			1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,2-Diphenylhydrazine	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2,2-Oxybis (1-Chloropropane)	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol
	CAS #		120-82-1	95-50-1	122-66-7	541-73-1	106-46-7	108-60-1	95-95-4	88-06-2	120-83-2	105-67-9	51-28-5
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)
			Channel Cc2										
MW-2	11/28/2018	WV2-181128-	0.49 U	0.1 U	0.196 U	0.1 U	0.1 U	0.49 U	0.98 U	0.98 U	0.49 U	1.96 U	9.8 U
MW-20	11/28/2018	WV20181128-	0.49 U	0.1 U	0.196 U	0.1 U	0.1 U	0.49 U	0.98 U	0.98 U	0.49 U	1.96 U	9.8 U
MW-21	11/27/2018	WV21181127-	0.49 U	0.1 U	0.196 U	0.1 U	0.1 U	0.49 U	0.98 U	0.98 U	0.49 U	1.96 U	9.8 U
MW-33	11/27/2018	WV33181127-	0.481 U	0.1 U	0.192 U	0.1 U	0.1 U	0.481 U	0.962 U	0.962 U	0.481 U	1.92 U	9.62 U
MW-35	11/27/2018	WV35181127-	0.476 U	0.1 U	0.19 U	0.1 U	0.1 U	0.476 U	0.952 U	0.952 U	0.476 U	1.9 U	9.52 U

Groundwater - SemiVOAs			2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Nitroaniline	2-Nitrophenol	3,3-Dichlorobenzidine	3-Nitroaniline	4,6-Dinitro-2-Methylphenol
	CAS #		121-14-2	606-20-2	91-58-7	95-57-8	91-57-6	95-48-7	88-74-4	88-75-5	91-94-1	99-09-2	534-52-1
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)
			Channel Cc2										
MW-2	11/28/2018	WV2-181128-	0.98 U	0.98 U	0.49 U	0.49 U	0.0238 U	0.49 U	0.98 U	0.196 U	0.196 U	0.98 U	0.98 U
MW-20	11/28/2018	WV20181128-	0.98 U	0.98 U	0.49 U	0.49 U	0.0248 U	0.49 U	0.98 U	0.196 U	0.196 U	0.98 U	0.98 U
MW-21	11/27/2018	WV21181127-	0.98 U	0.98 U	0.49 U	0.49 U	0.0248 U	0.49 U	0.98 U	0.196 U	0.196 U	0.98 U	0.98 U
MW-33	11/27/2018	WV33181127-	0.962 U	0.962 U	0.481 U	0.481 U	0.0243 U	0.481 U	0.962 U	0.192 U	0.192 U	0.962 U	0.962 U
MW-35	11/27/2018	WV35181127-	0.952 U	0.952 U	0.476 U	0.476 U	0.024 U	0.476 U	0.952 U	0.19 U	0.19 U	0.952 U	0.952 U

Groundwater - SemiVOAs			4-Bromophenyl Phenyl Ether	4-Chloro-3-Methylphenol	4-Chlorophenyl Phenyl Ether	4-Nitroaniline	4-Nitrophenol	Acenaphthylene	Acenapthalene	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(G,H,I)Perylene
	CAS #		101-55-3	59-50-7	7005-72-3	100-01-6	100-02-7	208-96-8	83-32-9	120-12-7	56-55-3	50-32-8	191-24-2
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)
			Channel Cc2										
MW-2	11/28/2018	WV2-181128-	0.49 U	0.49 U	0.49 U	4.9 U	4.9 U	0.0238 U	0.0238 U	0.0476 U	0.0476 U	0.0476 U	0.0476 U
MW-20	11/28/2018	WV20181128-	0.49 U	0.49 U	0.49 U	4.9 U	4.9 U	0.0248 U	0.0248 U	0.0495 U	0.0495 U	0.0495 U	0.0495 U
MW-21	11/27/2018	WV21181127-	0.49 U	0.49 U	0.49 U	4.9 U	4.9 U	0.0248 U	0.0248 U	0.0495 U	0.0495 U	0.0495 U	0.0495 U
MW-33	11/27/2018	WV33181127-	0.481 U	0.481 U	0.481 U	4.81 U	4.81 U	0.0243 U	0.0243 U	0.0485 U	0.0485 U	0.0485 U	0.0485 U
MW-35	11/27/2018	WV35181127-	0.476 U	0.476 U	0.476 U	4.76 U	4.76 U	0.024 U	0.024 U	0.0481 U	0.0481 U	0.0481 U	0.0481 U

Groundwater - SemiVOAs			Benzoic Acid	Benzyl Alcohol	Bis(2-Chloroethoxy)Methane	Bis(2-Chloroethyl)Ether	Bis(2-Ethylhexyl)Phthalate	Butylbenzylphthalate	Chrysene	Dibenzo(A,H)Anthracene	Dibenzofuran	Diethylphthalate	Dimethylphthalate
	CAS #		65-85-0	100-51-6	111-91-1	111-44-4	117-81-7	85-68-7	218-01-9	53-70-3	132-64-9	84-66-2	131-11-3
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)
			Channel Cc2										
MW-2	11/28/2018	WV2-181128-	9.8 U	4.9 U	0.49 U	0.49 U	2.19	0.952 U	0.0476 U	0.0476 U	0.49 U	0.952 U	0.952 U
MW-20	11/28/2018	WV20181128-	9.8 U	4.9 U	0.49 U	0.49 U	10.7 D	0.99 U	0.0495 U	0.0495 U	0.49 U	0.99 U	0.99 U
MW-21	11/27/2018	WV21181127-	9.8 U	4.9 U	0.49 U	0.49 U	0.99 U	0.99 U	0.0495 U	0.0495 U	0.49 U	0.99 U	0.99 U
MW-33	11/27/2018	WV33181127-	9.62 U	4.81 U	0.481 U	3.16	0.971 U	0.971 U	0.0485 U	0.0485 U	0.481 U	0.971 U	0.971 U
MW-35	11/27/2018	WV35181127-	9.52 U	4.76 U	0.476 U	1.28	0.962 U	0.962 U	0.0481 U	0.0481 U	0.476 U	0.962 U	0.962 U

Groundwater - SemiVOAs			Di-N-Butylphthalate	Di-N-Octyl Phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(1,2,3-C,D)Pyrene	Isophorone	Naphthalene
	CAS #		84-74-2	117-84-0	206-44-0	86-73-7	118-74-1	87-68-3	77-47-4	67-72-1	193-39-5	78-59-1	91-20-3
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)
			Channel Cc2										
MW-2	11/28/2018	WV2-181128-	0.952 U	0.952 U	0.0476 U	0.0476 U	0.196 U	1.96 U	4.9 U	4.9 U	0.0476 U	0.49 U	0.0238 U
MW-20	11/28/2018	WV20181128-	0.99 U	0.99 U	0.0495 U	0.0495 U	0.196 U	1.96 U	4.9 U	4.9 U	0.0495 U	0.49 U	0.0248 U
MW-21	11/27/2018	WV21181127-	0.99 U	0.99 U	0.0495 U	0.0495 U	0.196 U	1.96 U	4.9 U	4.9 U	0.0495 U	0.49 U	0.0248 U
MW-33	11/27/2018	WV33181127-	0.971 U	0.971 U	0.0485 U	0.0485 U	0.192 U	1.92 U	4.81 U	4.81 U	0.0485 U	0.481 U	0.0243 U
MW-35	11/27/2018	WV35181127-	0.962 U	0.962 U	0.0481 U	0.0481 U	0.19 U	1.9 U	4.76 U	4.76 U	0.0481 U	0.476 U	0.024 U

Groundwater - SemiVOAs			Nitrobenzene	N-Nitrosodimethylamine	N-Nitrosodiphenylamine	N-Nitrosodipropylamine	P-Chloroaniline	Pentachlorophenol	Phenanthrene	Phenol	Pyrene
	CAS #		98-95-3	62-75-9	86-30-6	621-64-7	106-47-8	87-86-5	85-01-8	108-95-2	129-00-0
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
			Channel Cc2								
MW-2	11/28/2018	WV2-181128-	0.49 U	0.49 U	0.49 U	0.49 U	0.98 U	1.96 U	0.0476 U	0.49 U	0.0476 U
MW-20	11/28/2018	WV20181128-	0.49 U	0.49 U	0.49 U	0.49 U	0.98 U	1.96 U	0.0495 U	0.49 U	0.0495 U
MW-21	11/27/2018	WV21181127-	0.49 U	0.49 U	0.49 U	0.49 U	0.98 U	1.96 U	0.0495 U	0.49 U	0.0495 U
MW-33	11/27/2018	WV33181127-	0.481 U	0.481 U	0.481 U	0.481 U	0.962 U	1.92 U	0.0485 U	0.481 U	0.0485 U
MW-35	11/27/2018	WV35181127-	0.476 U	0.476 U	0.476 U	0.476 U	0.952 U	1.9 U	0.0481 U	0.476 U	0.0481 U

Groundwater - VOA Trip Blanks

Groundwater VTRPs			1,1-Dichloropropene	1,3-Dichlorobenzene	1,3-Dichloropropane	2,2-Dichloropropane	2-Methyl-1-Propanol	3-Chloropropene	Acetonitrile	Acrolein	Chloroprene	Ethyl Methacrylate	Methyl Methacrylate	Methylacrylonitrile	Propionitrile
	CAS #		563-58-6	541-73-1	142-28-9	594-20-7	78-83-1	107-05-1	75-05-8	107-02-8	126-99-8	97-63-2	80-62-6	126-98-7	107-12-0
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)
VOA TRIP BLANK	11/26/2018	VTRP181127X	0.1 U	0.1 U	0.1 U	0.1 U	5 U	0.1 U	5 U	2.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U
VOA TRIP BLANK	11/27/2018	VTRP181128X	0.1 U	0.1 U	0.1 U	0.1 U	5 U	0.1 U	5 U	2.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U
VOA TRIP BLANK	11/27/2018	VTRP181128Y	0.1 U	0.1 U	0.1 U	0.1 U	5 U	0.1 U	5 U	2.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.5 U

Table H-8 (*continued*)

Groundwater - Appendix III Analytes

Groundwater - Pesticides, Herbicides, & PCB's

Groundwater - Pesticides, Herbicides, & PCB's			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
		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
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)
			Channel Cc2										
MW-2	11/28/2018	WV2-181128-	0.025 U	0.025 U	0.05 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00625 U	0.00625 U
MW-20	11/28/2018	WV20181128-	0.025 U	0.025 U	0.05 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00641 U	0.00641 U
MW-21	11/27/2018	WV21181127-	0.025 U	0.025 U	0.05 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00625 U	0.00625 U
MW-33	11/27/2018	WV33181127-	0.025 U	0.0367	0.05 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00641 U	0.00641 U
MW-35	11/27/2018	WV35181127-	0.0263 U	0.0423	0.0526 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00625 U	0.00625 U

Groundwater - Pesticides, Herbicides, & PCB's			Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Beta BHC	Delta BHC	Dieldrin	Dinoseb	Endosulfan I	Endosulfan II
		CAS #	11141-16-5	53469-21-9	12672-29-6	11097-69-1	11096-82-5	319-85-7	319-86-8	60-57-1	88-85-7	959-98-8	33213-65-9
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)
			Channel Cc2										
MW-2	11/28/2018	WV2-181128-	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.005 U	0.005 U	0.005 U	0.025 U	0.005 U	0.005 U
MW-20	11/28/2018	WV20181128-	0.00641 U	0.00641 U	0.00641 U	0.00641 U	0.00641 U	0.005 U	0.005 U	0.005 U	0.025 U	0.005 U	0.005 U
MW-21	11/27/2018	WV21181127-	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.005 U	0.005 U	0.005 U	0.025 U	0.005 U	0.005 U
MW-33	11/27/2018	WV33181127-	0.00641 U	0.00641 U	0.00641 U	0.00641 U	0.00641 U	0.005 U	0.005 U	0.005 U	0.025 U	0.005 U	0.005 U
MW-35	11/27/2018	WV35181127-	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.00625 U	0.005 U	0.005 U	0.005 U	0.0263 U	0.005 U	0.005 U

Groundwater - Pesticides, Herbicides, & PCB's			Endosulfan Sulfate	Endrin	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	Isodrin	Lindane (Gamma BHC)	Methoxychlor	Total Aroclors	Toxaphene	Trans-Chlordane
		CAS #	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)
			Channel Cc2										
MW-2	11/28/2018	WV2-181128-	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.025 U	0.00625 U	0.5 U	0.005 U
MW-20	11/28/2018	WV20181128-	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.025 U	0.00641 U	0.5 U	0.005 U
MW-21	11/27/2018	WV21181127-	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.025 U	0.00625 U	0.5 U	0.005 U
MW-33	11/27/2018	WV33181127-	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.025 U	0.00641 U	0.5 U	0.005 U
MW-35	11/27/2018	WV35181127-	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.025 U	0.00625 U	0.5 U	0.005 U

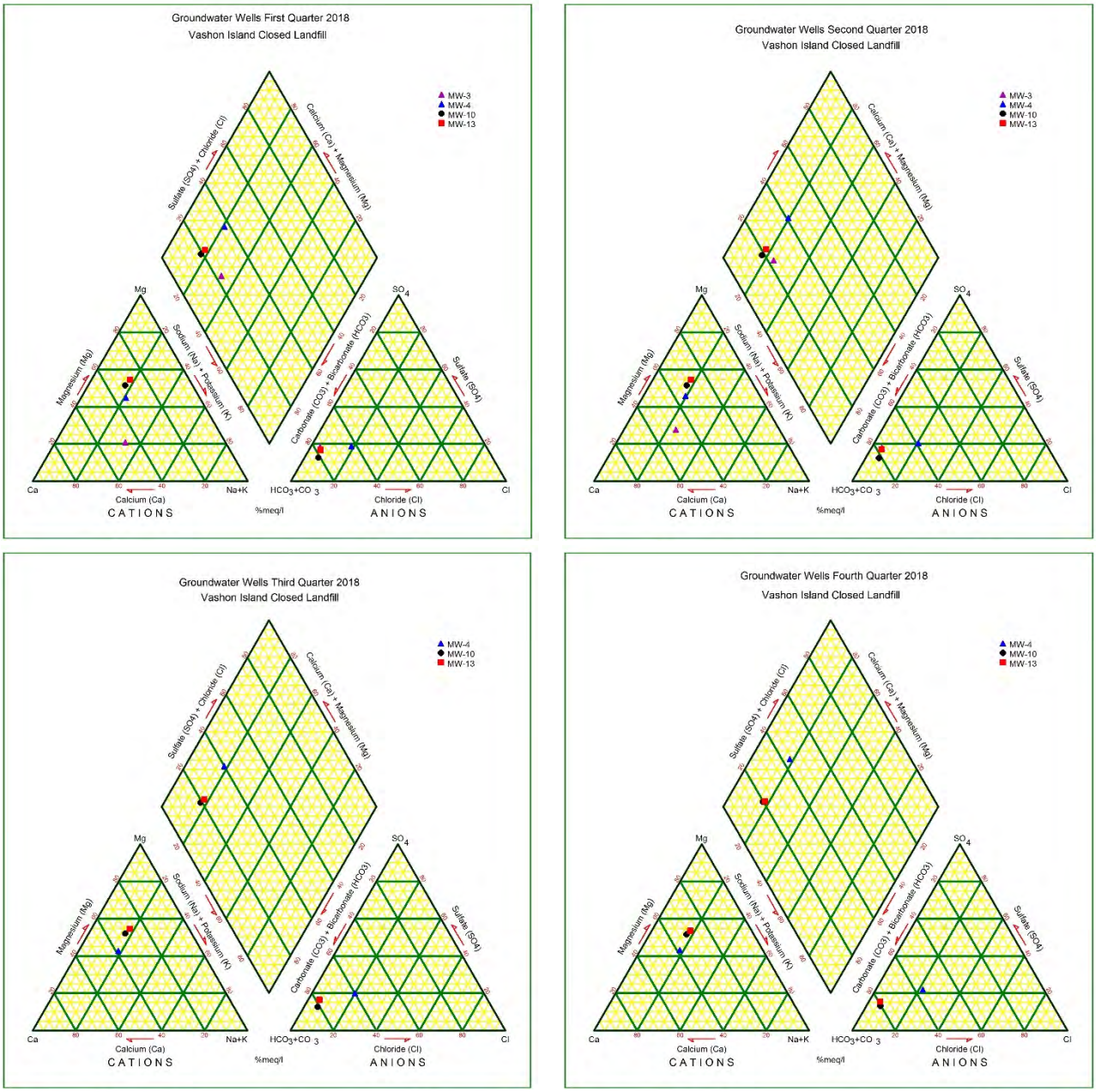


Figure I-1. Channel Cc1 Trilinear Diagrams

NOTE: Third and Fourth Quarters, 2018: water level at MW-3 well was below the pump - no samples were collected.

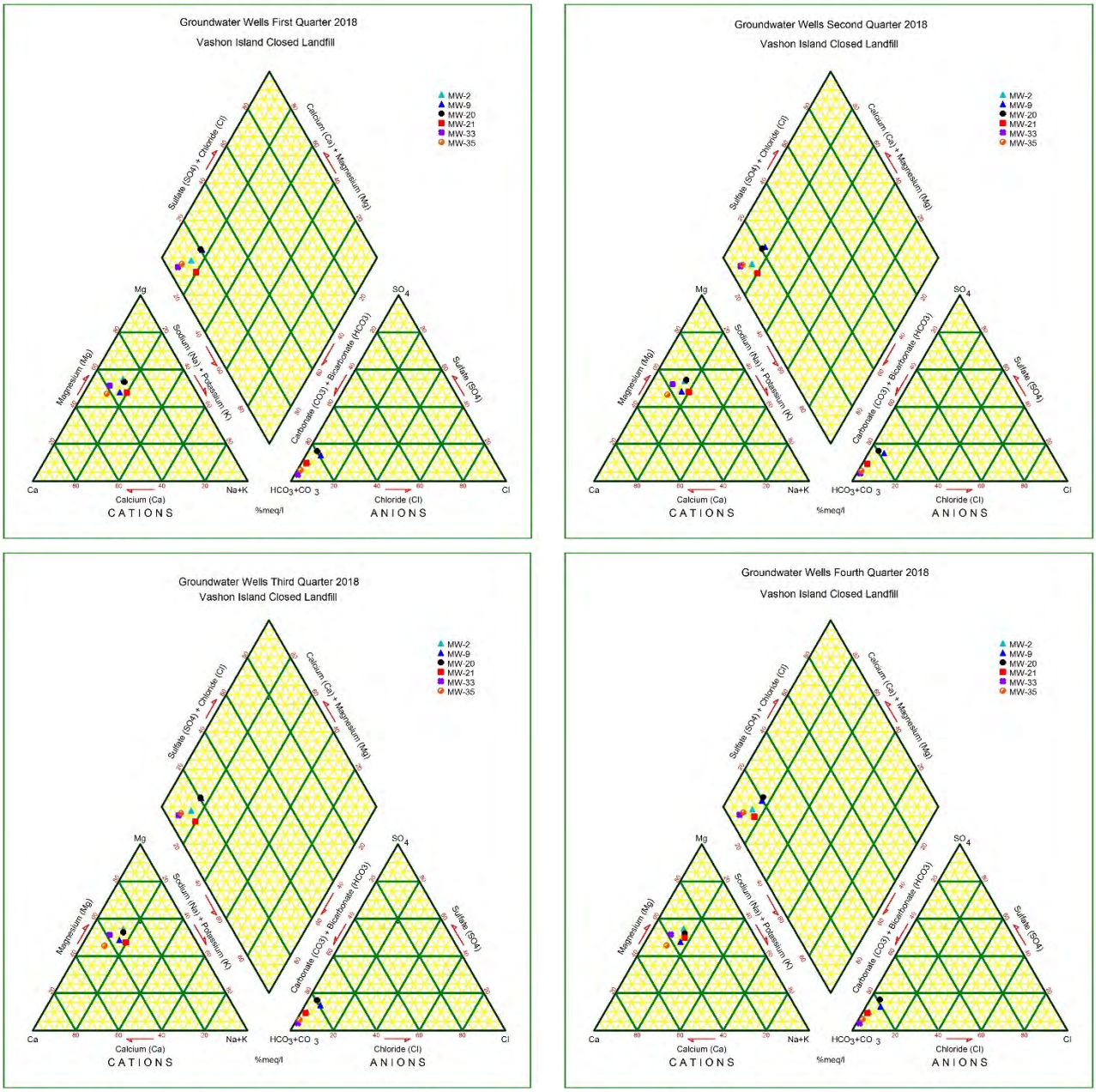


Figure I-2. Channel Cc2 Trilinear Diagrams

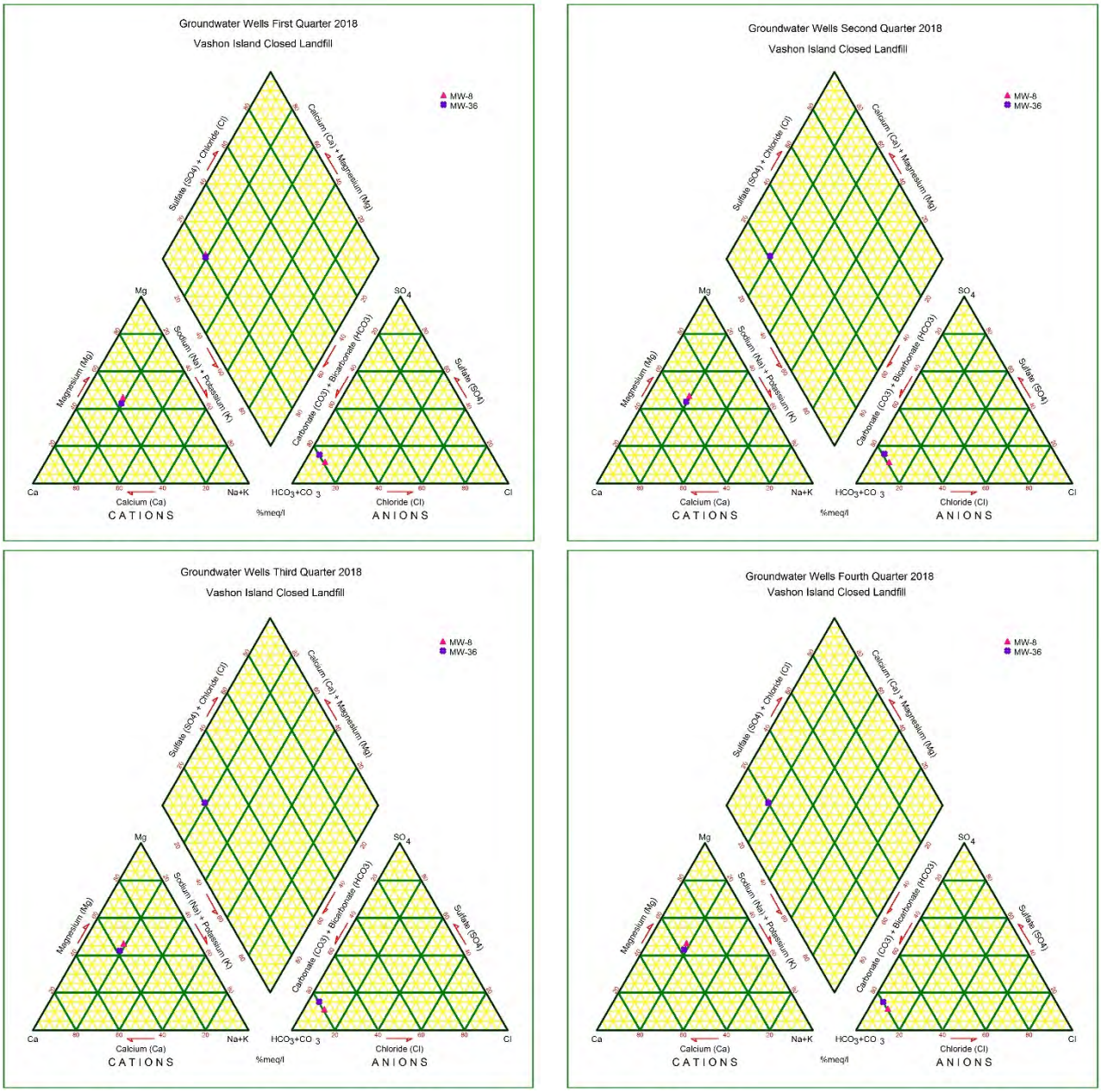


Figure I-3. Channel Cc3 Trilinear Diagrams

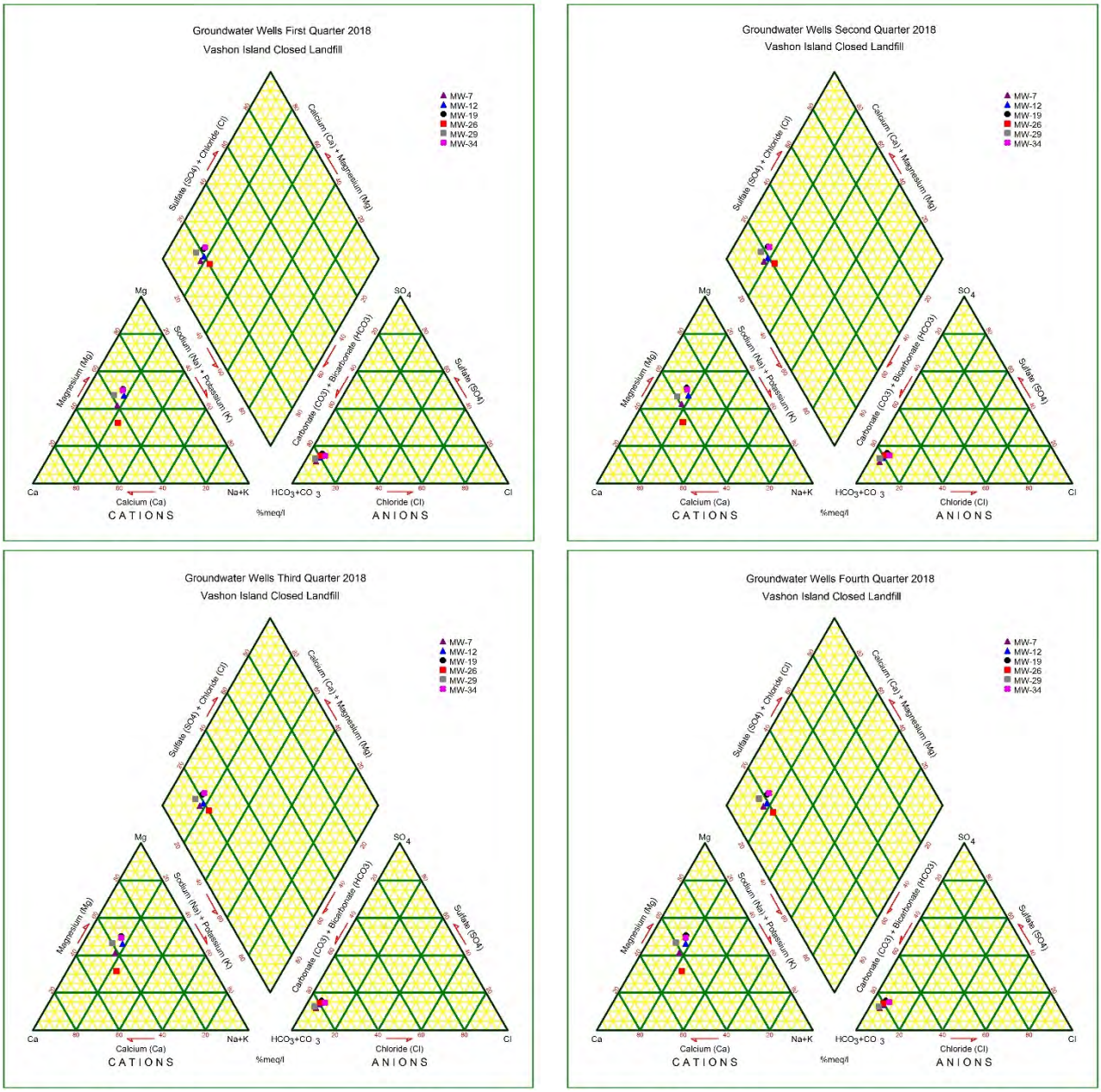


Figure I-4. Unit D Aquifer Trilinear Diagrams

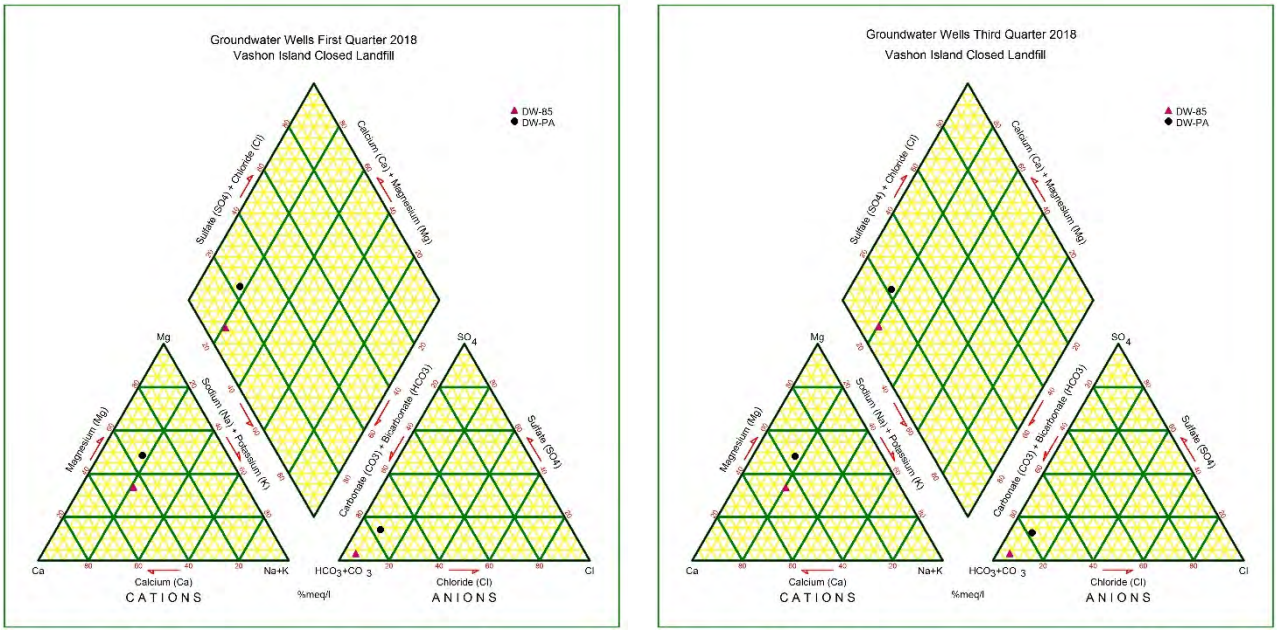


Figure I-5. Private Wells Trilinear Diagrams

Appendix J

Surface Water Monitoring Data

Table J-1

Surface Water - Field Parameters

Surface Water - Field Parameters			Specific Conductance (Field)	Dissolved Oxygen (DO) (Field)	Oxidation-Reduction Potential (ORP) (Field)	pH (Field)	Temperature (Field)	Turbidity (Field)
Site ID	Sample Date	Sample ID	(std. Units)	(mg/L)	(mV)	(µmhos/cm)	(°C)	(NTU)
SW-E	3/26/2018	SVE-180326D	213.3	12.44	201.8	7.06	6.97	10.8
SW-E	3/26/2018	SVE-180326Q	213.3	12.44	201.8	7.06	6.97	10.8
SW-E	6/25/2018	SVE-180625Q	217.3	10.88	145.5	7.71	11.87	7.39
SW-E	9/17/2018	SVE-180917D	221.3	11.12	295.5	7.46	11.46	4.54
SW-E	9/17/2018	SVE-180917Q	221.3	11.12	295.5	7.46	11.46	4.54
SW-E	12/26/2018	SVE-181226Q	187.5	12.22	373.1	8.14	7.26	9.6
SW-W1	3/26/2018	SVW1180326Q	197.1	11.19	4.6	7.29	7.457	19.6
SW-W1	6/25/2018	SVW1180625Q	208.7	9.35	30.4	7.24	12.89	11
SW-W1	9/17/2018	SVW1180917Q	221.9	7.49	136.2	7.24	12.28	5.95
SW-W1	12/12/2018	SVW1181212Q	197.2	10.66	207.7	7.6	7.558	20.4
SW-W2	3/26/2018	SVW2180326Q	590.7	11.98	185.3	7.53	7.087	12.1
SW-W2	6/25/2018	SVW2180625Q	606.6	10.09	311	7.56	12.66	10.5
SW-W2	9/17/2018	SVW2180917Q	625.1	10.68	367.7	7.45	11.76	2.75
SW-W2	12/12/2018	SVW2181212Q	517.5	11.73	330.4	7.71	7.182	5.92
SW-W3	3/26/2018	SVW3180326Q	275.1	11.48	66.6	7.64	8.27	8.93
SW-W3	6/25/2018	SVW3180625Q	292.6	10.18	137.6	7.3	11.96	10.9
SW-W3	9/17/2018	SVW3180917Q	291.5	10.62	248.6	7.33	11.65	7.53
SW-W3	12/12/2018	SVW3181212Q	260.1	11.22	325	7.83	8.632	6.82

King County Solid Waste Division
Environmental Monitoring Data
Data Collected from January 1, 2018 - December 31, 2018
Vashon Island Closed Landfill --- Surface Water Analysis Data
Contact Person: Sendy Jimenez (206) 477-5224

Table J-2

Surface Water - Conventionals

Surface Water - Conventionals			Alkalinity, Total (as $CaCO_3$)	Ammonia as N	Biological Oxygen Demand - 5 Day	Chemical Oxygen Demand	Chloride	Coliforms, Fecal	Coliforms, Total
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(CFU/100 mL)	(CFU/100 mL)
SW-E	3/26/2018	SVE-180326D	--	--	--	--	--	--	--
SW-E	3/26/2018	SVE-180326Q	--	--	--	--	--	--	--
SW-E	6/25/2018	SVE-180625Q	--	--	--	--	--	--	--
SW-E	9/17/2018	SVE-180917D	--	--	--	--	--	--	--
SW-E	9/17/2018	SVE-180917Q	--	--	--	--	--	--	--
SW-E	12/26/2018	SVE-181226Q	--	--	--	--	--	--	--
SW-W1	3/26/2018	SVW1180326Q	71	0.0119	2 U	21.8	6.27	1	300
SW-W1	6/25/2018	SVW1180625Q	80.9	0.0277	2 U	15 T	7.44	120	250
SW-W1	9/17/2018	SVW1180917Q	89.7	0.0243	2 U	11 T	7.16	5	560
SW-W1	12/12/2018	SVW1181212Q	76.3	0.0118	2.34	41.7	7.79	3	450
SW-W2	3/26/2018	SVW2180326Q	279	0.0052 T	2 U	18 T	17.6	10	14
SW-W2	6/25/2018	SVW2180625Q	299	0.0096 T	2 U	15 T	18.5	140	500
SW-W2	9/17/2018	SVW2180917Q	308	0.0077 T	2 U	14 T	19.4	5	260
SW-W2	12/12/2018	SVW2181212Q	261	0.0032 T	2 U	14 T	18.7	4	140 C
SW-W3	3/26/2018	SVW3180326Q	113	0.0076 T	2 U	14 T	7.93	1	40
SW-W3	6/25/2018	SVW3180625Q	128	0.0134	2 U	17 T	8.76	26	200
SW-W3	9/17/2018	SVW3180917Q	131	0.0094 T	2 U	16 T	8.73	6	500
SW-W3	12/12/2018	SVW3181212Q	111	0.0062 T	2 U	15 T	8.97	17	180

Surface Water - Conventionals			Cyanide	Fluoride	Hardness	Nitrate	Nitrate + Nitrite as N	Phosphorous, Soluble Reactive	Phosphorus, Total as P	Specific Conductance
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	µmhos/cm
SW-E	3/26/2018	SVE-180326D	--	--	94.1	--	--	--	--	208
SW-E	3/26/2018	SVE-180326Q	--	--	90.2	--	--	--	--	208
SW-E	6/25/2018	SVE-180625Q	--	--	97.1	--	--	--	--	219
SW-E	9/17/2018	SVE-180917D	--	--	104	--	--	--	--	222
SW-E	9/17/2018	SVE-180917Q	--	--	104	--	--	--	--	221
SW-E	12/26/2018	SVE-181226Q	--	--	86.9	--	--	--	--	184
SW-W1	3/26/2018	SVW1180326Q	0.002 U	0.02 U	82.8	1.73	1.73	0.0261	0.097	192
SW-W1	6/25/2018	SVW1180625Q	0.002 U	0.02 U	91.1	1.17	1.17	0.0498	0.0978	208
SW-W1	9/17/2018	SVW1180917Q	0.002 U	0.02 U	103	0.642	0.642	0.0609	0.116	220
SW-W1	12/12/2018	SVW1181212Q	0.002 U	0.02 U	91.7	0.769	0.769	0.0399	0.356	188
SW-W2	3/26/2018	SVW2180326Q	0.002 U	0.02 U	291	0.275	0.275	0.0111	0.0613	575
SW-W2	6/25/2018	SVW2180625Q	0.002 U	0.02 U	304	0.195	0.196	0.0181	0.0613	608
SW-W2	9/17/2018	SVW2180917Q	0.002 U	0.02 U	330	0.122	0.122	0.0179	0.0429	620
SW-W2	12/12/2018	SVW2181212Q	0.002 U	0.02 U	286	0.188	0.188	0.0149	0.0363	516
SW-W3	3/26/2018	SVW3180326Q	0.002 U	0.02 U	122	0.557	0.557	0.0514	0.0436	268
SW-W3	6/25/2018	SVW3180625Q	0.002 U	0.1 U	136	0.347	0.347	0.0718	0.161	300
SW-W3	9/17/2018	SVW3180917Q	0.002 U	0.02 U	145	0.254	0.254	0.0645	0.2	302
SW-W3	12/12/2018	SVW3181212Q	0.002 U	0.025 T	125	0.318	0.318	0.0572	0.14	250

Table J-2 *(continued)*

Surface Water - Conventionals

Surface Water - Conventionals			Sulfate	Total Dissolved Solids	Total Kjeldahl Nitrogen	Total Organic Carbon	Total Solids	Total Suspended Solids	Turbidity
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(NTU)
SW-E	3/26/2018	SVE-180326D	--	--	--	--	--	--	10.2
SW-E	3/26/2018	SVE-180326Q	--	--	--	--	--	--	21.6
SW-E	6/25/2018	SVE-180625Q	--	--	--	--	--	--	12.9
SW-E	9/17/2018	SVE-180917D	--	--	--	--	--	--	6.11
SW-E	9/17/2018	SVE-180917Q	--	--	--	--	--	--	5.85
SW-E	12/26/2018	SVE-181226Q	--	--	--	--	--	--	7.98
SW-W1	3/26/2018	SVW1180326Q	7.93	141	0.556	8.3	180	41.9	18.7
SW-W1	6/25/2018	SVW1180625Q	8.82	158	0.252	4.93	187	13.1	8.02
SW-W1	9/17/2018	SVW1180917Q	8.43	155	0.222	4.4	167	7.88	5.34
SW-W1	12/12/2018	SVW1181212Q	8.44	145	0.868	13.1	209	90	39.4
SW-W2	3/26/2018	SVW2180326Q	13	354	0.416	7.51	403	36.9	20.6
SW-W2	6/25/2018	SVW2180625Q	12.6	384	0.3	6.16	435	43	16.6
SW-W2	9/17/2018	SVW2180917Q	13.3	383	0.283	4.74	409	15.3	5.98
SW-W2	12/12/2018	SVW2181212Q	13.5	343	0.476	6.64	354	5.4	3.05
SW-W3	3/26/2018	SVW3180326Q	11.2	183	0.289	6.13	214	24.3	10.3
SW-W3	6/25/2018	SVW3180625Q	11.9	205	0.227	5.63	251	34	13.4
SW-W3	9/17/2018	SVW3180917Q	11.6	202	0.297	4.78	455	218	16.4
SW-W3	12/12/2018	SVW3181212Q	10.9	180	0.287	6.26	201	14	6.14

King County Solid Waste Division
Environmental Monitoring Data
Data Collected from January 1, 2018 - December 31, 2018
Vashon Island Closed Landfill --- Surface Water Analysis Data
Contact Person: Sendy Jimenez (206) 477-5224

Table J-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
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SW-E	3/26/2018	SVE-180326D	0.0133	0.292	0.0003 U	0.0003 U	0.0017	0.00203	0.00551	0.00762
SW-E	3/26/2018	SVE-180326Q	0.0127	0.306	0.0003 U	0.0003 U	0.00171	0.00195	0.0054	0.00788
SW-E	6/25/2018	SVE-180625Q	0.0114	0.433	0.0003 U	0.0003 U	0.00217	0.00252	0.00574	0.00909
SW-E	9/17/2018	SVE-180917D	0.00922	0.167	0.0003 U	0.0003 U	0.00202	0.0023	0.00482	0.0069
SW-E	9/17/2018	SVE-180917Q	0.0094	0.162	0.0003 U	0.0003 U	0.00199	0.0023	0.00494	0.00679
SW-E	12/26/2018	SVE-181226Q	0.0237	0.352	0.0003 U	0.0003 U	0.00165	0.00196	0.00545	0.0082
SW-W1	3/26/2018	SVW1180326Q	0.00372	0.343	0.0003 U	0.0003 U	0.00178	0.0046	0.000848	0.00848
SW-W1	6/25/2018	SVW1180625Q	0.00264	0.124	0.0003 U	0.0003 U	0.00348	0.00435	0.0011	0.00343
SW-W1	9/17/2018	SVW1180917Q	0.005 U	0.0367	0.0003 U	0.0003 U	0.00425	0.00489	0.00124	0.00191
SW-W1	12/12/2018	SVW1181212Q	0.005 U	0.471	0.0003 U	0.0003 U	0.00252	0.00705	0.00071	0.0105
SW-W2	3/26/2018	SVW2180326Q	0.00214	0.159	0.0003 U	0.0003 U	0.00135	0.00306	0.00395	0.00887
SW-W2	6/25/2018	SVW2180625Q	0.002 U	0.126	0.0003 U	0.0003 U	0.00146	0.00294	0.00393	0.00822
SW-W2	9/17/2018	SVW2180917Q	0.005 U	0.035	0.0003 U	0.0003 U	0.0015	0.002	0.00419	0.00608
SW-W2	12/12/2018	SVW2181212Q	0.005 U	0.0426	0.0003 U	0.0003 U	0.00117	0.00151	0.00335	0.00466
SW-W3	3/26/2018	SVW3180326Q	0.00536	0.147	0.0003 U	0.0003 U	0.00296	0.00379	0.00396	0.00649
SW-W3	6/25/2018	SVW3180625Q	0.0031	0.274	0.0003 U	0.0003 U	0.00367	0.00542	0.00513	0.00959
SW-W3	9/17/2018	SVW3180917Q	0.005 U	0.108	0.0003 U	0.0003 U	0.0038	0.00471	0.00519	0.00741
SW-W3	12/12/2018	SVW3181212Q	0.0142	0.105	0.0003 U	0.0003 U	0.00315	0.0038	0.00412	0.00581

Surface Water - Metals (Dissolved & Total)			Beryllium, Dissolved	Beryllium, Total	Cadmium, Dissolved	Cadmium, Total	Calcium, Dissolved	Calcium, Total	Chromium, Dissolved	Chromium, Total
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SW-E	3/26/2018	SVE-180326D	0.0001 U	0.0001 U	5E-05 U	5E-05 U	15	15.1	0.00124	0.00236
SW-E	3/26/2018	SVE-180326Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	15.1	14.5	0.00122	0.00231
SW-E	6/25/2018	SVE-180625Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	16.6	16.1	0.00128	0.00272
SW-E	9/17/2018	SVE-180917D	0.0001 U	0.0001 U	5E-05 U	5E-05 U	16.4	16.8	0.00131	0.0019
SW-E	9/17/2018	SVE-180917Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	16.5	16.8	0.00124	0.0019
SW-E	12/26/2018	SVE-181226Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.1	14.4	0.00119	0.00213
SW-W1	3/26/2018	SVW1180326Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	14.8	14.9	0.000478	0.00225
SW-W1	6/25/2018	SVW1180625Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	17.4	16.6	0.000361	0.00104
SW-W1	9/17/2018	SVW1180917Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	17.6	18.2	0.000283	0.000502
SW-W1	12/12/2018	SVW1181212Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	16.1	16.8	0.000384	0.00263
SW-W2	3/26/2018	SVW2180326Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	49.5	49.1	0.000232	0.000742
SW-W2	6/25/2018	SVW2180625Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	51.5	52.4	0.0002 U	0.000569
SW-W2	9/17/2018	SVW2180917Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	54.5	54.9	0.0002 U	0.000322
SW-W2	12/12/2018	SVW2181212Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	49.4	48.7	0.000299	0.000417
SW-W3	3/26/2018	SVW3180326Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	21.8	20.6	0.000312	0.00084
SW-W3	6/25/2018	SVW3180625Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	23.7	23.8	0.000274	0.00109
SW-W3	9/17/2018	SVW3180917Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	24.1	24.5	0.000229	0.000576
SW-W3	12/12/2018	SVW3181212Q	0.0001 U	0.0001 U	5E-05 U	5E-05 U	21.4	21.4	0.000425	0.00071

Table J-3 *(continued)*

Surface Water - Metals (Dissolved & Total)

Surface Water - Metals (Dissolved & Total)			Cobalt, Dissolved	Cobalt, Total	Copper, Dissolved	Copper, Total	Iron, Dissolved	Iron, Total	Lead, Dissolved	Lead, Total
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SW-E	3/26/2018	SVE-180326D	5E-05 U	0.000229	0.00038	0.00105	0.0406	0.571	0.0001 U	0.000479
SW-E	3/26/2018	SVE-180326Q	5E-05 U	0.000246	0.000397	0.00107	0.0404	0.586	0.0001 U	0.000512
SW-E	6/25/2018	SVE-180625Q	5E-05 U	0.00031	0.000345	0.00109	0.0548	0.759	0.0001 U	0.000579
SW-E	9/17/2018	SVE-180917D	5E-05 U	0.000144	0.000329	0.000622	0.0535	0.372	0.0001 U	0.000251
SW-E	9/17/2018	SVE-180917Q	5E-05 U	0.000135	0.000361	0.000587	0.0517	0.344	0.0001 U	0.000226
SW-E	12/26/2018	SVE-181226Q	5E-05 U	0.000251	0.000592	0.0011	0.0788	0.598	0.0001 U	0.00045
SW-W1	3/26/2018	SVW1180326Q	6.65E-05	0.00121	0.000369	0.00224	0.109	2.81	0.0001 U	0.0017
SW-W1	6/25/2018	SVW1180625Q	9.44E-05	0.000439	0.000268	0.000781	0.258	1.2	0.0001 U	0.000509
SW-W1	9/17/2018	SVW1180917Q	7.42E-05	0.00017	0.000299	0.000381	0.386	0.853	0.0001 U	0.000147
SW-W1	12/12/2018	SVW1181212Q	7.23E-05	0.00144	0.000373	0.00206	0.179	4.19	0.0001 U	0.00177
SW-W2	3/26/2018	SVW2180326Q	5E-05 U	0.00026	0.000255	0.000802	0.0194	2.2	0.0001 U	0.000449
SW-W2	6/25/2018	SVW2180625Q	5E-05 U	0.000205	0.000212	0.000666	0.024	1.77	0.0001 U	0.000329
SW-W2	9/17/2018	SVW2180917Q	5E-05 U	9.6E-05	0.0002 U	0.000354	0.0388	0.651	0.0001 U	0.000115
SW-W2	12/12/2018	SVW2181212Q	5E-05 U	9.05E-05	0.000308	0.000422	0.0406	0.501	0.0001 U	0.0001 U
SW-W3	3/26/2018	SVW3180326Q	8.56E-05	0.000278	0.000317	0.000813	0.0567	0.869	0.0001 U	0.000537
SW-W3	6/25/2018	SVW3180625Q	0.000105	0.000437	0.000237	0.000981	0.0453	1.26	0.0001 U	0.00204
SW-W3	9/17/2018	SVW3180917Q	0.000102	0.000217	0.000218 J	0.000497	0.0469	0.637	0.0001 U	0.000257
SW-W3	12/12/2018	SVW3181212Q	9.57E-05	0.000191	0.000561	0.000793	0.13	0.581	0.0001 U	0.000314

Surface Water - Metals (Dissolved & Total)			Magnesium, Dissolved	Magnesium, Total	Manganese, Dissolved	Manganese, Total	Mercury, Total	Nickel, Dissolved	Nickel, Total	Potassium, Dissolved
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SW-E	3/26/2018	SVE-180326D	13.8	13.7	0.00845	0.0642	0	0.000641	0.00162	1.96
SW-E	3/26/2018	SVE-180326Q	13.9	13.1	0.00844	0.067	0	0.000672	0.00166	1.95
SW-E	6/25/2018	SVE-180625Q	14.9	13.8	0.0115	0.0934	0	0.000623	0.00198	1.9
SW-E	9/17/2018	SVE-180917D	14.8	15	0.0125	0.0499	0	0.000666	0.00111	1.88
SW-E	9/17/2018	SVE-180917Q	14.8	15.1	0.0129	0.0456	0	0.000677	0.00106	1.9
SW-E	12/26/2018	SVE-181226Q	12.4	12.4	0.00836	0.0483	0	0.000807	0.00175	1.96
SW-W1	3/26/2018	SVW1180326Q	11.5	11.1	0.232	1.07	5E-05 U	0.000722	0.00546	1.03
SW-W1	6/25/2018	SVW1180625Q	13.1	12	0.282	0.517	5E-05 U	0.000686	0.00238	1.09
SW-W1	9/17/2018	SVW1180917Q	13.6	13.9	0.442	0.514	5E-05 U	0.00069	0.00114	1.2
SW-W1	12/12/2018	SVW1181212Q	12.2	12.1	0.266	1.43	5E-05 U	0.000843	0.00661	1.33
SW-W2	3/26/2018	SVW2180326Q	42.3	41	0.0508	0.402	5E-05 U	0.00188	0.00271	3.1
SW-W2	6/25/2018	SVW2180625Q	43.3	42	0.0499	0.384	5E-05 U	0.00189	0.0026	2.76
SW-W2	9/17/2018	SVW2180917Q	47	46.8	0.103	0.219	5E-05 U	0.00197	0.00229	3.13
SW-W2	12/12/2018	SVW2181212Q	40.6	40	0.036	0.126	5E-05 U	0.00189	0.00206	3.3
SW-W3	3/26/2018	SVW3180326Q	18.2	17.2	0.335	0.499	5E-05 U	0.000928	0.00179	2.07
SW-W3	6/25/2018	SVW3180625Q	19.9	18.7	0.491 D	0.763	5E-05 U	0.00103	0.00253	2.11
SW-W3	9/17/2018	SVW3180917Q	20	20.4	0.514 D	0.635	5E-05 U	0.00103	0.00151	2.19
SW-W3	12/12/2018	SVW3181212Q	17.7	17.5	0.369	0.465	5E-05 U	0.00118	0.00161	2.35

Table J-3 *(continued)*

Surface Water - Metals (Dissolved & Total)

Surface Water - Metals (Dissolved & Total)			Potassium, Total	Selenium, Dissolved	Selenium, Total	Silver, Dissolved	Silver, Total	Sodium, Dissolved	Sodium, Total	Thallium, Dissolved
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SW-E	3/26/2018	SVE-180326D	1.94	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	7.17	7	0.0001 U
SW-E	3/26/2018	SVE-180326Q	1.87	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	7.18	6.74	0.0001 U
SW-E	6/25/2018	SVE-180625Q	1.99	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.45	6.9	0.0001 U
SW-E	9/17/2018	SVE-180917D	2.07	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.39	7.49	0.0001 U
SW-E	9/17/2018	SVE-180917Q	2.08	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.35	7.42	0.0001 U
SW-E	12/26/2018	SVE-181226Q	1.99	0.0005 U	0.0005 U	4E-05 U	4E-05 U	6.65	6.55	0.0001 U
SW-W1	3/26/2018	SVW1180326Q	1	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	7.22	6.97	0.0001 U
SW-W1	6/25/2018	SVW1180625Q	1.12	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.76	7.25	0.0001 U
SW-W1	9/17/2018	SVW1180917Q	1.31	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.66	7.97	0.0001 U
SW-W1	12/12/2018	SVW1181212Q	1.36	0.0005 U	0.0005 U	4E-05 U	4E-05 U	7.07	7	0.0001 U
SW-W2	3/26/2018	SVW2180326Q	3.05	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	15.6	15.3	0.0001 U
SW-W2	6/25/2018	SVW2180625Q	2.97	0.0005 U	0.0005 U	4E-05 U	4E-05 U	15.5	15.1	0.0001 U
SW-W2	9/17/2018	SVW2180917Q	3.48	0.0005 U	0.0005 U	4E-05 U	4E-05 U	16.7	17	0.0001 U
SW-W2	12/12/2018	SVW2181212Q	3.31	0.0005 U	0.0005 U	4E-05 U	4E-05 U	15.1	14.8	0.0001 U
SW-W3	3/26/2018	SVW3180326Q	1.94	0.0005 U	0.0005 U	4E-05 U	4E-05 DU	9	8.51	0.0001 U
SW-W3	6/25/2018	SVW3180625Q	2.26	0.0005 U	0.0005 U	4E-05 U	4E-05 U	8.91	8.61	0.0001 U
SW-W3	9/17/2018	SVW3180917Q	2.36	0.0005 U	0.0005 U	4E-05 U	4E-05 U	9.17	9.35	0.0001 U
SW-W3	12/12/2018	SVW3181212Q	2.41	0.0005 U	0.0005 U	4E-05 U	4E-05 U	8.43	8.22	0.0001 U

Surface Water - Metals (Dissolved & Total)			Thallium, Total	Tin, Dissolved	Tin, Total	Vanadium, Dissolved	Vanadium, Total	Zinc, Dissolved	Zinc, Total
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SW-E	3/26/2018	SVE-180326D	0.0001 U	0.0005 U	0.0005 U	0.00262	0.00383	0.000673	0.00187
SW-E	3/26/2018	SVE-180326Q	0.0001 U	0.0005 U	0.0005 U	0.00264	0.00371	0.000734	0.00184
SW-E	6/25/2018	SVE-180625Q	0.0001 U	0.0005 U	0.0005 U	0.00312 D	0.00451	0.00228	0.00171
SW-E	9/17/2018	SVE-180917D	0.0001 U	0.0005 U	0.0005 U	0.0028	0.00348	0.00131	0.000817
SW-E	9/17/2018	SVE-180917Q	0.0001 U	0.0005 U	0.0005 U	0.00279	0.00346	0.00227	0.000783
SW-E	12/26/2018	SVE-181226Q	0.0001 U	0.0005 U	0.0005 U	0.00248	0.0036	0.000666	0.00149
SW-W1	3/26/2018	SVW1180326Q	0.0001 U	0.0005 U	0.0005 U	0.000372	0.0029	0.000617	0.0031
SW-W1	6/25/2018	SVW1180625Q	0.0001 U	0.0005 U	0.0005 U	0.000498 D	0.00135	0.00199	0.00137
SW-W1	9/17/2018	SVW1180917Q	0.0001 U	0.0005 U	0.0005 U	0.000441	0.000749	0.000871	0.000523
SW-W1	12/12/2018	SVW1181212Q	0.0001 U	0.0005 U	0.0005 U	0.000481	0.00334	0.000558	0.00405
SW-W2	3/26/2018	SVW2180326Q	0.0001 U	0.0005 U	0.0005 U	0.0005	0.00128	0.000509	0.00106
SW-W2	6/25/2018	SVW2180625Q	0.0001 U	0.0005 U	0.0005 U	0.000404 D	0.000922	0.00155	0.00108
SW-W2	9/17/2018	SVW2180917Q	0.0001 U	0.0005 U	0.0005 U	0.000358	0.000538	0.00101	0.000558
SW-W2	12/12/2018	SVW2181212Q	0.0001 U	0.0005 U	0.0005 U	0.000506	0.000644	0.0005 U	0.000576
SW-W3	3/26/2018	SVW3180326Q	0.0001 U	0.0005 U	0.0005 U	0.000716	0.00147	0.000584	0.00121
SW-W3	6/25/2018	SVW3180625Q	0.0001 U	0.0005 U	0.0005 U	0.000684 D	0.0019	0.000891	0.00182
SW-W3	9/17/2018	SVW3180917Q	0.0001 U	0.0005 U	0.0005 U	0.00061	0.00111	0.000864	0.000689 J
SW-W3	12/12/2018	SVW3181212Q	0.0001 U	0.0005 U	0.0005 U	0.00101	0.00145	0.000568	0.000786 J

Table J-4

Surface Water - Volatile Organic Compounds

Surface Water - VOAs			1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichloropropane	1,2-Dibromo-3-Chloropropane	1,2-Dibromoethane
		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
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
SW-E	3/26/2018	SVE-180326D	--	--	--	--	--	--	--	--	--
SW-E	3/26/2018	SVE-180326Q	--	--	--	--	--	--	--	--	--
SW-E	6/25/2018	SVE-180625Q	--	--	--	--	--	--	--	--	--
SW-E	9/17/2018	SVE-180917D	--	--	--	--	--	--	--	--	--
SW-E	9/17/2018	SVE-180917Q	--	--	--	--	--	--	--	--	--
SW-E	12/26/2018	SVE-181226Q	--	--	--	--	--	--	--	--	--
SW-W1	3/26/2018	SVW1180326Q	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
SW-W1	6/25/2018	SVW1180625Q	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
SW-W1	9/17/2018	SVW1180917Q	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
SW-W1	12/12/2018	SVW1181212Q	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
SW-W2	3/26/2018	SVW2180326Q	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
SW-W2	6/25/2018	SVW2180625Q	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
SW-W2	9/17/2018	SVW2180917Q	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
SW-W2	12/12/2018	SVW2181212Q	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
SW-W3	3/26/2018	SVW3180326Q	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
SW-W3	6/25/2018	SVW3180625Q	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
SW-W3	9/17/2018	SVW3180917Q	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
SW-W3	12/12/2018	SVW3181212Q	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
VOA TRIP BLANK	3/23/2018	VTRP180326X	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	3/23/2018	VTRP180326X2	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
VOA TRIP BLANK	6/22/2018	VTRP180625X2	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
VOA TRIP BLANK	9/14/2018	VTRP180917X2	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	9/17/2018	VTRP180917X	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
VOA TRIP BLANK	12/11/2018	VTRP181212X	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
VOA TRIP BLANK	12/24/2018	VTRP181226X	--	--	--	--	--	--	--	--	--

Surface Water - VOAs			1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,4-Dichlorobenzene	2-Butanone	2-Hexanone	4-Methyl-2-Pentanone	Acetone	Acrylonitrile
		CAS #	95-50-1	107-06-2	78-87-5	106-46-7	78-93-3	591-78-6	108-10-1	67-64-1	107-13-1
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
SW-E	3/26/2018	SVE-180326D	--	--	--	--	--	--	--	--	--
SW-E	3/26/2018	SVE-180326Q	--	--	--	--	--	--	--	--	--
SW-E	6/25/2018	SVE-180625Q	--	--	--	--	--	--	--	--	--
SW-E	9/17/2018	SVE-180917D	--	--	--	--	--	--	--	--	--
SW-E	9/17/2018	SVE-180917Q	--	--	--	--	--	--	--	--	--
SW-E	12/26/2018	SVE-181226Q	--	--	--	--	--	--	--	--	--
SW-W1	3/26/2018	SVW1180326Q	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
SW-W1	6/25/2018	SVW1180625Q	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
SW-W1	9/17/2018	SVW1180917Q	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
SW-W1	12/12/2018	SVW1181212Q	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
SW-W2	3/26/2018	SVW2180326Q	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
SW-W2	6/25/2018	SVW2180625Q	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
SW-W2	9/17/2018	SVW2180917Q	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
SW-W2	12/12/2018	SVW2181212Q	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
SW-W3	3/26/2018	SVW3180326Q	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
SW-W3	6/25/2018	SVW3180625Q	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
SW-W3	9/17/2018	SVW3180917Q	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
SW-W3	12/12/2018	SVW3181212Q	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
VOA TRIP BLANK	3/23/2018	VTRP180326X	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	3/23/2018	VTRP180326X2	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
VOA TRIP BLANK	6/22/2018	VTRP180625X2	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
VOA TRIP BLANK	9/14/2018	VTRP180917X2	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	9/17/2018	VTRP180917X	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
VOA TRIP BLANK	12/11/2018	VTRP181212X	0.1 U	0.1 U	0.1 U	0.1 U	1 U	0.5 U	2.5 U	2.5 U	0.035 U
VOA TRIP BLANK	12/24/2018	VTRP181226X	--	--	--	--	--	--	--	--	--

Table J-4 *(continued)*

Surface Water - Volatile Organic Compounds

Surface Water - VOAs			Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chlorodibromomethane
		CAS #	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
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
SW-E	3/26/2018	SVE-180326D	--	--	--	--	--	--	--	--	--
SW-E	3/26/2018	SVE-180326Q	--	--	--	--	--	--	--	--	--
SW-E	6/25/2018	SVE-180625Q	--	--	--	--	--	--	--	--	--
SW-E	9/17/2018	SVE-180917D	--	--	--	--	--	--	--	--	--
SW-E	9/17/2018	SVE-180917Q	--	--	--	--	--	--	--	--	--
SW-E	12/26/2018	SVE-181226Q	--	--	--	--	--	--	--	--	--
SW-W1	3/26/2018	SVW1180326Q	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
SW-W1	6/25/2018	SVW1180625Q	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
SW-W1	9/17/2018	SVW1180917Q	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
SW-W1	12/12/2018	SVW1181212Q	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
SW-W2	3/26/2018	SVW2180326Q	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
SW-W2	6/25/2018	SVW2180625Q	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
SW-W2	9/17/2018	SVW2180917Q	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
SW-W2	12/12/2018	SVW2181212Q	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
SW-W3	3/26/2018	SVW3180326Q	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
SW-W3	6/25/2018	SVW3180625Q	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
SW-W3	9/17/2018	SVW3180917Q	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
SW-W3	12/12/2018	SVW3181212Q	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
VOA TRIP BLANK	3/23/2018	VTRP180326X	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	3/23/2018	VTRP180326X2	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
VOA TRIP BLANK	6/22/2018	VTRP180625X2	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
VOA TRIP BLANK	9/14/2018	VTRP180917X2	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	9/17/2018	VTRP180917X	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
VOA TRIP BLANK	12/11/2018	VTRP181212X	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
VOA TRIP BLANK	12/24/2018	VTRP181226X	--	--	--	--	--	--	--	--	--

Surface Water - VOAs			Chloroethane	Chloroform	Chloromethane	Cis-1-2-Dichloroethene	Cis-1,3-Dichloropropene	Dibromomethane	Dichlorodifluoromethane	Ethylbenzene	M & P Xylene
		CAS #	75-00-3	67-66-3	74-87-3	156-59-2	10061-01-5	74-95-3	75-71-8	100-41-4	MPX
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
SW-E	3/26/2018	SVE-180326D	--	--	--	--	--	--	--	--	--
SW-E	3/26/2018	SVE-180326Q	--	--	--	--	--	--	--	--	--
SW-E	6/25/2018	SVE-180625Q	--	--	--	--	--	--	--	--	--
SW-E	9/17/2018	SVE-180917D	--	--	--	--	--	--	--	--	--
SW-E	9/17/2018	SVE-180917Q	--	--	--	--	--	--	--	--	--
SW-E	12/26/2018	SVE-181226Q	--	--	--	--	--	--	--	--	--
SW-W1	3/26/2018	SVW1180326Q	0.1 U	0.1 U	0.25 GU	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
SW-W1	6/25/2018	SVW1180625Q	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
SW-W1	9/17/2018	SVW1180917Q	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
SW-W1	12/12/2018	SVW1181212Q	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
SW-W2	3/26/2018	SVW2180326Q	0.1 U	0.1 U	0.25 GU	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
SW-W2	6/25/2018	SVW2180625Q	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
SW-W2	9/17/2018	SVW2180917Q	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
SW-W2	12/12/2018	SVW2181212Q	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
SW-W3	3/26/2018	SVW3180326Q	0.1 U	0.1 U	0.25 GU	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
SW-W3	6/25/2018	SVW3180625Q	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
SW-W3	9/17/2018	SVW3180917Q	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
SW-W3	12/12/2018	SVW3181212Q	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
VOA TRIP BLANK	3/23/2018	VTRP180326X	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	3/23/2018	VTRP180326X2	0.1 U	0.1 U	0.25 GU	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
VOA TRIP BLANK	6/22/2018	VTRP180625X2	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
VOA TRIP BLANK	9/14/2018	VTRP180917X2	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	9/17/2018	VTRP180917X	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
VOA TRIP BLANK	12/11/2018	VTRP181212X	0.1 U	0.1 U	0.25 U	0.1 U	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U
VOA TRIP BLANK	12/24/2018	VTRP181226X	--	--	--	--	--	--	--	--	--

Table J-4 *(continued)*

Surface Water - Volatile Organic Compounds

Surface Water - VOAs			Methyl Iodide	Methylene Chloride	O-Xylene	Styrene	Tetrachloroethene	Toluene	Trans-1-2-Dichloroethene	Trans-1-3-Dichloropropene	Trans-1-4-Dichloro-2-Butene
		CAS #	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
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
SW-E	3/26/2018	SVE-180326D	--	--	--	--	--	--	--	--	--
SW-E	3/26/2018	SVE-180326Q	--	--	--	--	--	--	--	--	--
SW-E	6/25/2018	SVE-180625Q	--	--	--	--	--	--	--	--	--
SW-E	9/17/2018	SVE-180917D	--	--	--	--	--	--	--	--	--
SW-E	9/17/2018	SVE-180917Q	--	--	--	--	--	--	--	--	--
SW-E	12/26/2018	SVE-181226Q	--	--	--	--	--	--	--	--	--
SW-W1	3/26/2018	SVW1180326Q	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
SW-W1	6/25/2018	SVW1180625Q	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
SW-W1	9/17/2018	SVW1180917Q	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
SW-W1	12/12/2018	SVW1181212Q	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
SW-W2	3/26/2018	SVW2180326Q	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
SW-W2	6/25/2018	SVW2180625Q	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
SW-W2	9/17/2018	SVW2180917Q	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
SW-W2	12/12/2018	SVW2181212Q	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
SW-W3	3/26/2018	SVW3180326Q	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
SW-W3	6/25/2018	SVW3180625Q	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
SW-W3	9/17/2018	SVW3180917Q	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
SW-W3	12/12/2018	SVW3181212Q	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
VOA TRIP BLANK	3/23/2018	VTRP180326X	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	3/23/2018	VTRP180326X2	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
VOA TRIP BLANK	6/22/2018	VTRP180625X2	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
VOA TRIP BLANK	9/14/2018	VTRP180917X2	--	--	--	--	--	--	--	--	--
VOA TRIP BLANK	9/17/2018	VTRP180917X	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
VOA TRIP BLANK	12/11/2018	VTRP181212X	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
VOA TRIP BLANK	12/24/2018	VTRP181226X	--	--	--	--	--	--	--	--	--

Surface Water - VOAs			Trichloroethene	Trichlorofluoromethane	Vinyl Acetate	Vinyl Chloride
		CAS #	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)
SW-E	3/26/2018	SVE-180326D	--	--	--	0.01 U
SW-E	3/26/2018	SVE-180326Q	--	--	--	0.01 U
SW-E	6/25/2018	SVE-180625Q	--	--	--	0.01 U
SW-E	9/17/2018	SVE-180917D	--	--	--	0.01 U
SW-E	9/17/2018	SVE-180917Q	--	--	--	0.01 U
SW-E	12/26/2018	SVE-181226Q	--	--	--	0.01 U
SW-W1	3/26/2018	SVW1180326Q	0.1 U	0.1 U	0.1 U	0.012 JT
SW-W1	6/25/2018	SVW1180625Q	0.1 U	0.1 U	0.1 U	0.019 JT
SW-W1	9/17/2018	SVW1180917Q	0.1 U	0.1 U	0.1 U	0.022
SW-W1	12/12/2018	SVW1181212Q	0.1 U	0.1 U	0.1 U	0.0221
SW-W2	3/26/2018	SVW2180326Q	0.1 U	0.1 U	0.1 U	0.01 U
SW-W2	6/25/2018	SVW2180625Q	0.1 U	0.1 U	0.1 U	0.01 U
SW-W2	9/17/2018	SVW2180917Q	0.1 U	0.1 U	0.1 U	0.01 U
SW-W2	12/12/2018	SVW2181212Q	0.1 U	0.1 U	0.1 U	0.01 U
SW-W3	3/26/2018	SVW3180326Q	0.1 U	0.1 U	0.1 U	0.038
SW-W3	6/25/2018	SVW3180625Q	0.1 U	0.1 U	0.1 U	0.0348
SW-W3	9/17/2018	SVW3180917Q	0.1 U	0.1 U	0.1 U	0.0331
SW-W3	12/12/2018	SVW3181212Q	0.1 U	0.1 U	0.1 U	0.0417
VOA TRIP BLANK	3/23/2018	VTRP180326X	--	--	--	0.01 U
VOA TRIP BLANK	3/23/2018	VTRP180326X2	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	6/22/2018	VTRP180625X2	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	9/14/2018	VTRP180917X2	--	--	--	0.01 U
VOA TRIP BLANK	9/17/2018	VTRP180917X	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	12/11/2018	VTRP181212X	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	12/24/2018	VTRP181226X	--	--	--	0.01 U

Table J-5

Surface Water - Pesticides & Herbicides

Surface Water - Pesticides & Herbicides			2,4,5-T	2,4,5-TP Silvex	2,4-D	Dinoseb
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)
SW-W1	03/26/18	SVW1180326Q	0.025 U	0.025 U	0.05 U	0.025 U
SW-W1	06/25/18	SVW1180625Q	0.025 U	0.025 U	0.05 U	0.025 U
SW-W1	09/17/18	SVW1180917Q	0.025 U	0.025 U	0.05 U	0.025 U
SW-W1	12/12/18	SVW1181212Q	0.0255 U	0.0255 U	0.051 U	0.0255 U
SW-W2	03/26/18	SVW2180326Q	0.025 U	0.0266	0.05 U	0.025 U
SW-W2	06/25/18	SVW2180625Q	0.025 U	0.025 U	0.05 U	0.025 U
SW-W2	09/17/18	SVW2180917Q	0.025 U	0.0271	0.05 U	0.025 U
SW-W2	12/12/18	SVW2181212Q	0.025 U	0.025 U	0.05 U	0.025 U
SW-W3	03/26/18	SVW3180326Q	0.025 U	0.025 U	0.05 U	0.025 U
SW-W3	6/25/2018	SVW3180625Q	0.025 U	0.025 U	0.05 U	0.025 U
SW-W3	9/17/2018	SVW3180917Q	0.025 U	0.025 U	0.05 U	0.025 U
SW-W3	12/12/2018	SVW3181212Q	0.0253 U	0.0253 U	0.0505 U	0.0253 U

Surface Water - Pesticides & Herbicides			Endrin	Lindane (Gamma BHC)	Methoxychlor	Toxaphene
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)
SW-W1	3/26/2018	SVW1180326Q	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W1	6/25/2018	SVW1180625Q	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W1	9/17/2018	SVW1180917Q	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W1	12/12/2018	SVW1181212Q	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W2	3/26/2018	SVW2180326Q	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W2	6/25/2018	SVW2180625Q	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W2	9/17/2018	SVW2180917Q	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W2	12/12/2018	SVW2181212Q	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W3	3/26/2018	SVW3180326Q	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W3	6/25/2018	SVW3180625Q	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W3	9/17/2018	SVW3180917Q	0.0125 U	0.0125 U	0.0625 U	1.25 U
SW-W3	12/12/2018	SVW3181212Q	0.0125 U	0.0125 U	0.0625 U	1.25 U

Appendix K

Leachate Monitoring Data

Table K-1

Leachate - Field Parameters

Leachate - Field Parameters			Specific Conductance (Field)	pH (Field)	Temperature (Field)
Site ID	Sample Date	Sample ID	(µmhos/cm)	(Std. pH Units)	(° C)
LS-B	3/26/2018	LVB-180326Q	2400	7.12	10.2
LS-B	6/20/2018	LVB-180625Q	3000	7.85	15.5
LS-B	9/19/2018	LVB-180919Q	3300	7.64	13.7
LS-B	12/12/2018	LVB-181212Q	1250	6.74	16.2
LS-LVT	03/29/18	LVT-180329P	225	7.02	9.8
LS-LVT	43265.625	LVT-180614P	250	7.83	19
LS-LVT	09/27/18	LVT-180927P	295	7.91	16.9
LS-LVT	12/26/18	LVT-181226P	290	6.44	6.3
LS-PS1	03/26/18	LVP-180326Q	170	7.68	7.8
LS-PS1	06/25/18	LVP-180625Q	200	7.57	16.7
LS-PS1	09/19/18	LVP-180919Q	275	7.7	17.7
LS-PS1	12/12/18	LVP-181212D	330	6.93	16.5
LS-PS1	12/12/18	LVP-181212Q	330	6.93	16.5

Table K-2

Leachate - Conventionals

Leachate - Conventionals			Alkalinity, Total (as $CaCO_3$)	Ammonia as N	Biological Oxygen Demand - 5 Day	Chemical Oxygen Demand	Chloride
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
LS-B	03/26/18	LVB-180326Q	147	0.0028 T	2 U	39.9	448
LS-B	06/25/18	LVB-180625Q	181	0.0076 T	2 U	48.9	560
LS-B	09/19/18	LVB-180919Q	191	0.003 T	2 U	48.9	571
LS-B	12/12/18	LVB-181212Q	94.2	0.0066 T	2 U	17 T	173
LS-PS1	03/26/18	LVP-180326Q	61.4	0.0734	2 U	11 T	8.82
LS-PS1	06/25/18	LVP-180625Q	52.5	0.164	3.16	24.6	14.3
LS-PS1	09/19/18	LVP-180919Q	56.2	0.207	2 U	19 T	18.9
LS-PS1	12/12/18	LVP-181212D	90.6	0.0039 T	8.58	28.6	30.3
LS-PS1	12/12/18	LVP-181212Q	90.6	0.0082 T	7.85	28.4	30.1
LS-LVT	03/29/18	LVT-180329P	--	--	--	--	--
LS-LVT	6/14/2018	LVT-180614P	--	--	--	--	--
LS-LVT	9/27/2018	LVT-180927P	--	--	--	--	--
LS-LVT	12/26/2018	LVT-181226P	--	--	--	--	--

Leachate - Conventionals			Coliforms, Fecal	Coliforms, Total	Cyanide	Fluoride	Nitrate + Nitrite as N
Site ID	Sample Date	Sample ID	(CFU/100 mL)	(CFU/100 mL)	(mg/L)	(mg/L)	(mg/L)
LS-B	3/26/2018	LVB-180326Q	1 U	9	0.008 U	0.2 U	54.3
LS-B	6/25/2018	LVB-180625Q	1 U	1	0.008 SU	0.14 T	104
LS-B	9/19/2018	LVB-180919Q	1 U	90 CU	0.008 U	0.2 U	104
LS-B	12/12/2018	LVB-181212Q	1 U	170	0.008 U	0.1 U	31.8
LS-PS1	3/26/2018	LVP-180326Q	1 U	180	0.008 U	0.039 T	0.523
LS-PS1	6/25/2018	LVP-180625Q	1 U	5000	0.008 U	0.0481	0.2 T
LS-PS1	9/19/2018	LVP-180919Q	2	1000	0.008 U	0.046	0.351
LS-PS1	12/12/2018	LVP-181212D	330	6400	0.008 U	0.0497	0.779
LS-PS1	12/12/2018	LVP-181212Q	310	9000	0.008 U	0.0496	0.792
LS-LVT	3/29/2018	LVT-180329P	--	--	--	--	--
LS-LVT	6/14/2018	LVT-180614P	--	--	--	--	--
LS-LVT	9/27/2018	LVT-180927P	--	--	--	--	--
LS-LVT	12/26/2018	LVT-181226P	--	--	--	--	--

Table K-2 *(continued)*

Leachate - Conventionals

Leachate - Conventionals			Phosphorous, Soluble Reactive	Phosphorus, Total as P	Specific Conductance	Sulfate	Sulfide, Total	Total Fats, Oil, & Grease
Site ID	Sample Date	Sample ID	(mg/L)	(mg/l)	(µohms/cm)	(mg/L)	(mg/L)	(mg/L)
LS-B	3/26/2018	LVB-180326Q	0.0278	0.1 U	3740	759	0.05 U	5.9 B
LS-B	6/25/2018	LVB-180625Q	0.0394	1 U	4180	1000	0.01 U	3.5 BT
LS-B	9/19/2018	LVB-180919Q	0.0311	1 U	4260	938	0.01 U	2.2 BT
LS-B	12/12/2018	LVB-181212Q	0.021	1 U	1400	264	0.019 T	1.4 GU
LS-PS1	3/26/2018	LVP-180326Q	0.0215	0.1 U	208	16.9	0.1 U	4.8 BT
LS-PS1	6/25/2018	LVP-180625Q	0.0293	1 U	230	29.5	0.01 U	3.4 BT
LS-PS1	9/19/2018	LVP-180919Q	0.029	1 U	277	37.1	0.01 U	2.8 BGT
LS-PS1	12/12/2018	LVP-181212D	0.00893	1 U	336	36.1	0.021 T	2.1 T
LS-PS1	12/12/2018	LVP-181212Q	0.00854	1 U	337	36	0.013 T	1.6 GT
LS-LVT	3/29/2018	LVT-180329P	--	--	--	--	--	5.9 BT
LS-LVT	6/14/2018	LVT-180614P	--	--	--	--	--	3.4 BT
LS-LVT	9/27/2018	LVT-180927P	--	--	--	--	--	5.7 BT
LS-LVT	12/26/2018	LVT-181226P	--	--	--	--	--	1.8 U

Leachate - Conventionals			Total Kjeldahl Nitrogen	Total Organic Carbon	Total Suspended Solids	Total Volatile Solids	Volatile Suspended Solids
Site ID	Sample Date	Sample ID	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
LS-B	3/26/2018	LVB-180326Q	1.08	15.2	1 T	887	1 T
LS-B	6/25/2018	LVB-180625Q	1.91	19.8	0.5 U	994	0.5 U
LS-B	9/19/2018	LVB-180919Q	2.08	18.9	1.98	1030	1.31
LS-B	12/12/2018	LVB-181212Q	0.7	8.24	0.5 U	328	0.5 U
LS-PS1	3/26/2018	LVP-180326Q	0.456	3.53	0.9 T	34.9	0.9 T
LS-PS1	6/25/2018	LVP-180625Q	0.821	9.56	1.3 JT	48.3	2.7 J
LS-PS1	9/19/2018	LVP-180919Q	0.966	8.26	4.9	66	3.24
LS-PS1	12/12/2018	LVP-181212D	1.49	10.5	19	89.6	13
LS-PS1	12/12/2018	LVP-181212Q	1.47	10.6	23	81.7	15
LS-LVT	3/29/2018	LVT-180329P	--	--	--	--	--
LS-LVT	6/14/2018	LVT-180614P	--	--	--	--	--
LS-LVT	9/27/2018	LVT-180927P	--	--	--	--	--
LS-LVT	12/26/2018	LVT-181226P	--	--	--	--	--

Table K-3

Leachate - Metals (Total)

Leachate - Metals Site ID	Sample Date	Sample ID	Aluminum, Total (mg/L)	Antimony, Total (mg/L)	Arsenic, Total (mg/L)	Barium, Total (mg/L)	Beryllium, Total (mg/L)	Cadmium, Total (mg/L)
LS-B	3/26/2018	LVB-180326Q	0.0143	0.000619	0.0023	0.0624	0.0001 U	7.17E-05
LS-B	6/25/2018	LVB-180625Q	0.02 U	0.003 U	0.0026	0.0673	0.001 U	0.0005 U
LS-B	9/19/2018	LVB-180919Q	0.05 U	0.003 U	0.0030	0.0725	0.001 U	0.0005 U
LS-B	12/12/2018	LVB-181212Q	0.05 U	0.003 U	0.0017	0.0202	0.001 U	0.0005 U
LS-PS1	3/26/2018	LVP-180326Q	0.12	0.0003 U	0.0007	0.0251	0.0001 U	5E-05 U
LS-PS1	6/25/2018	LVP-180625Q	0.0562	0.003 U	0.0022	0.0217	0.001 U	0.0005 U
LS-PS1	9/19/2018	LVP-180919Q	0.15	0.003 U	0.0027	0.0435	0.001 U	0.0005 U
LS-PS1	12/12/2018	LVP-181212D	0.257	0.003 U	0.0016	0.0345	0.001 U	0.0005 U
LS-PS1	12/12/2018	LVP-181212Q	0.249	0.003 U	0.0015	0.0345	0.001 U	0.0005 U
LS-LVT	3/29/2018	LVT-180329P	--	--	0.0013	--	--	5E-05 U
LS-LVT	6/14/2018	LVT-180614P	--	--	0.0033	--	--	0.0005 U
LS-LVT	9/27/2018	LVT-180927P	--	--	0.0032	--	--	0.0005 U
LS-LVT	12/26/2018	LVT-181226P	--	--	0.0013	--	--	0.0005 U

Leachate - Metals Site ID	Sample Date	Sample ID	Calcium, Total (mg/L)	Chromium, Total (mg/L)	Cobalt, Total (mg/L)	Copper, Total (mg/L)	Iron, Total (mg/L)	Lead, Total (mg/L)
LS-B	3/26/2018	LVB-180326Q	235 D	0.000861	0.00274	0.00432	0.0327	0.0001 U
LS-B	6/25/2018	LVB-180625Q	296	0.002 U	0.00365	0.00403	0.1 U	0.001 U
LS-B	9/19/2018	LVB-180919Q	305	0.002 U	0.00364	0.00522	0.1 U	0.001 U
LS-B	12/12/2018	LVB-181212Q	94.4	0.002 U	0.00119	0.00439	0.1 U	0.001 U
LS-PS1	3/26/2018	LVP-180326Q	22.8	0.000286	0.000204	0.00267	0.196	0.000106
LS-PS1	6/25/2018	LVP-180625Q	22.7	0.002 U	0.0005 U	0.0027	0.274	0.001 U
LS-PS1	9/19/2018	LVP-180919Q	24.7	0.002 U	0.0005 U	0.002 U	0.992	0.001 U
LS-PS1	12/12/2018	LVP-181212D	33.4	0.002 U	0.0005 U	0.00434	0.64	0.00108
LS-PS1	12/12/2018	LVP-181212Q	33.9	0.002 U	0.0005 U	0.00434	0.637	0.00111
LS-LVT	3/29/2018	LVT-180329P	--	0.000533	--	0.00337	--	0.00046
LS-LVT	6/14/2018	LVT-180614P	--	0.00506	--	0.0114 D	--	0.00607
LS-LVT	9/27/2018	LVT-180927P	--	0.002 U	--	0.00353	--	0.0011
LS-LVT	12/26/2018	LVT-181226P	--	0.002 U	--	0.00417	--	0.001 U

Leachate - Metals Site ID	Sample Date	Sample ID	Magnesium, Total (mg/L)	Manganese, Total (mg/L)	Mercury, Total (mg/L)	Nickel, Total (mg/L)	Potassium, Total (mg/L)	Selenium, Total (mg/L)
LS-B	3/26/2018	LVB-180326Q	149 D	0.00291	0.0001 U	0.0578	40.6	0.000629
LS-B	6/25/2018	LVB-180625Q	178	0.00249	0.0001 U	0.0796	47.4	0.005 U
LS-B	9/19/2018	LVB-180919Q	192	0.00187	0.0001 U	0.0827	50.7	0.005 U
LS-B	12/12/2018	LVB-181212Q	58.3	0.00429	0.0001 U	0.0227	17.2	0.005 U
LS-PS1	3/26/2018	LVP-180326Q	5.38	0.128	0.0001 U	0.0029	2.22	0.0005 U
LS-PS1	6/25/2018	LVP-180625Q	6.4	0.0959	0.0001 U	0.00418	5 U	0.005 U
LS-PS1	9/19/2018	LVP-180919Q	8.96	0.452	0.0001 U	0.00536	3.53	0.005 U
LS-PS1	12/12/2018	LVP-181212D	11.2	0.273	0.0001 U	0.00649	4.24	0.005 U
LS-PS1	12/12/2018	LVP-181212Q	11.2	0.281	0.0001 U	0.00647	4.24	0.005 U
LS-LVT	3/29/2018	LVT-180329P	--	--	--	0.00396	--	--
LS-LVT	6/14/2018	LVT-180614P	--	--	--	0.00762	--	--
LS-LVT	9/27/2018	LVT-180927P	--	--	--	0.00608	--	--
LS-LVT	12/26/2018	LVT-181226P	--	--	--	0.00596	--	--

Leachate - Metals Site ID	Sample Date	Sample ID	Silver, Total (mg/L)	Sodium, Total (mg/L)	Thallium, Total (mg/L)	Tin, Total (mg/L)	Vanadium, Total (mg/L)	Zinc, Total (mg/L)
LS-B	3/26/2018	LVB-180326Q	4E-05 DU	303 D	0.0001 U	0.0005 U	0.000868	0.0147
LS-B	6/25/2018	LVB-180625Q	0.0004 U	358	0.001 U	0.005 U	0.00113 D	0.0708
LS-B	9/19/2018	LVB-180919Q	0.0004 U	392	0.001 U	0.005 U	0.00122	0.0177
LS-B	12/12/2018	LVB-181212Q	0.0004 U	116	0.001 U	0.005 U	0.000909	0.012
LS-PS1	3/26/2018	LVP-180326Q	4E-05 DU	8.25	0.0001 U	0.0005 U	0.000504	0.0124
LS-PS1	6/25/2018	LVP-180625Q	0.0004 U	10.8	0.001 U	0.005 U	0.00075 DU	0.0166
LS-PS1	9/19/2018	LVP-180919Q	0.0004 U	15.8	0.001 U	0.005 U	0.00098	0.0104
LS-PS1	12/12/2018	LVP-181212D	0.0004 U	19.6	0.001 U	0.005 U	0.000899	0.0159
LS-PS1	12/12/2018	LVP-181212Q	0.0004 U	19.6	0.001 U	0.005 U	0.000938	0.0136 J
LS-LVT	3/29/2018	LVT-180329P	4E-05 DU	--	--	--	--	0.0104
LS-LVT	6/14/2018	LVT-180614P	0.0004 U	--	--	--	--	0.102
LS-LVT	9/27/2018	LVT-180927P	0.0004 U	--	--	--	--	0.0171
LS-LVT	12/26/2018	LVT-181226P	0.0004 U	--	--	--	--	0.0126

Table K-4

Leachate - Volatile Organic Compounds

Leachate - VOAs			1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,1-Dichloropropene	1,2,3-Trichloropropane
		CAS #	630-20-6	71-55-6	79-34-5	79-00-5	75-34-3	75-35-4	563-58-6	96-18-4
Well #	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/26/2018	LVB-180326Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-B	6/25/2018	LVB-180625Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-B	9/19/2018	LVB-180919Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-B	12/12/2018	LVB-181212Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-PS1	3/26/2018	LVP-180326Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-PS1	6/25/2018	LVP-180625Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-PS1	9/19/2018	LVP-180919Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-PS1	12/12/2018	LVP-181212D	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-PS1	12/12/2018	LVP-181212Q	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
VOA TRIP BLANK	3/23/2018	VTRP180326Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
VOA TRIP BLANK	6/22/2018	VTRP180625X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
VOA TRIP BLANK	6/22/2018	VTRP180625Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
VOA TRIP BLANK	9/14/2018	VTRP180919X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
VOA TRIP BLANK	12/11/2018	VTRP181212X2	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

Leachate - VOAs			1,2-Dibromo-3-Chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,3-Dichloropropane	1,4-Dichlorobenzene
		CAS #	96-12-8	106-93-4	95-50-1	107-06-2	78-87-5	541-73-1	142-28-9	106-46-7
Well #	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/26/2018	LVB-180326Q	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-B	6/25/2018	LVB-180625Q	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-B	9/19/2018	LVB-180919Q	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-B	12/12/2018	LVB-181212Q	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-PS1	3/26/2018	LVP-180326Q	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-PS1	6/25/2018	LVP-180625Q	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-PS1	9/19/2018	LVP-180919Q	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-PS1	12/12/2018	LVP-181212D	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
LS-PS1	12/12/2018	LVP-181212Q	25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
VOA TRIP BLANK	3/23/2018	VTRP180326Y	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
VOA TRIP BLANK	6/22/2018	VTRP180625X	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
VOA TRIP BLANK	6/22/2018	VTRP180625Y	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
VOA TRIP BLANK	9/14/2018	VTRP180919X	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
VOA TRIP BLANK	12/11/2018	VTRP181212X2	2.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

Leachate - VOAs			2,2-Dichloropropane	2-Butanone	2-Hexanone	2-Methyl-1-Propanol	3-Chloropropene	4-Methyl-2-Pentanone	Acetone	Acetonitrile
		CAS #	594-20-7	78-93-3	591-78-6	78-83-1	107-05-1	108-10-1	67-64-1	75-05-8
Well #	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/26/2018	LVB-180326Q	1 U	2.5 U	5 U	50 U	1 U	25 U	25 U	50 U
LS-B	6/25/2018	LVB-180625Q	1 U	2.5 U	5 U	50 U	1 U	25 U	25 U	50 U
LS-B	9/19/2018	LVB-180919Q	1 U	2.5 U	5 U	50 U	1 U	25 U	25 U	50 U
LS-B	12/12/2018	LVB-181212Q	1 U	2.5 U	5 U	50 U	1 U	25 U	25 U	50 U
LS-PS1	3/26/2018	LVP-180326Q	1 U	2.5 U	5 U	50 U	1 U	25 U	25 U	50 U
LS-PS1	6/25/2018	LVP-180625Q	1 U	2.5 U	5 U	50 GU	1 U	25 U	25 U	50 U
LS-PS1	9/19/2018	LVP-180919Q	1 U	2.5 U	5 U	50 U	1 U	25 U	25 U	50 U
LS-PS1	12/12/2018	LVP-181212D	1 U	2.5 U	5 U	50 GU	1 U	25 U	25 U	50 U
LS-PS1	12/12/2018	LVP-181212Q	1 U	2.5 U	5 U	50 U	1 U	25 U	25 U	50 U
VOA TRIP BLANK	3/23/2018	VTRP180326Y	0.1 U	0.25 U	0.5 U	5 U	0.1 U	2.5 U	2.5 U	5 U
VOA TRIP BLANK	6/22/2018	VTRP180625X	0.1 U	0.25 U	0.5 U	5 U	0.1 U	2.5 U	2.5 U	5 U
VOA TRIP BLANK	6/22/2018	VTRP180625Y	0.1 U	0.25 U	0.5 U	5 U	0.1 U	2.5 U	2.5 U	5 U
VOA TRIP BLANK	9/14/2018	VTRP180919X	0.1 U	0.25 U	0.5 U	5 U	0.1 U	2.5 U	2.5 U	5 U
VOA TRIP BLANK	12/11/2018	VTRP181212X2	0.1 U	0.25 U	0.5 U	5 U	0.1 U	2.5 U	2.5 U	5 U

Table K-4 *(continued)*

Leachate - Volatile Organic Compounds

Leachate - VOAs			Acrolein	Acrylonitrile	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide
		CAS #	107-02-8	107-13-1	71-43-2	74-97-5	75-27-4	75-25-2	74-83-9	75-15-0
Well #	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/26/2018	LVB-180326Q	25 U	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U
LS-B	6/25/2018	LVB-180625Q	25 U	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U
LS-B	9/19/2018	LVB-180919Q	25 U	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U
LS-B	12/12/2018	LVB-181212Q	25 U	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U
LS-PS1	3/26/2018	LVP-180326Q	25 U	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U
LS-PS1	6/25/2018	LVP-180625Q	25 U	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U
LS-PS1	9/19/2018	LVP-180919Q	25 U	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U
LS-PS1	12/12/2018	LVP-181212D	25 U	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U
LS-PS1	12/12/2018	LVP-181212Q	25 U	0.35 U	1 U	1 U	2.5 U	5 U	1 U	1 U
VOA TRIP BLANK	3/23/2018	VTRP180326Y	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U
VOA TRIP BLANK	6/22/2018	VTRP180625X	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U
VOA TRIP BLANK	6/22/2018	VTRP180625Y	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U
VOA TRIP BLANK	9/14/2018	VTRP180919X	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U
VOA TRIP BLANK	12/11/2018	VTRP181212X2	2.5 U	0.035 U	0.1 U	0.1 U	0.25 U	0.5 U	0.1 U	0.1 U

Leachate - VOAs			Carbon Tetrachloride	Chlorobenzene	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	Chloroprene	Cis-1-2-Dichloroethene
		CAS #	56-23-5	108-90-7	124-48-1	75-00-3	67-66-3	74-87-3	126-99-8	156-59-2
Well #	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/26/2018	LVB-180326Q	2.5 U	1 U	5 U	1 U	1 U	2.5 GU	1 U	1 U
LS-B	6/25/2018	LVB-180625Q	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U
LS-B	9/19/2018	LVB-180919Q	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U
LS-B	12/12/2018	LVB-181212Q	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U
LS-PS1	3/26/2018	LVP-180326Q	2.5 U	1 U	5 U	1 U	1 U	2.5 GU	1 U	1 U
LS-PS1	6/25/2018	LVP-180625Q	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U
LS-PS1	9/19/2018	LVP-180919Q	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U
LS-PS1	12/12/2018	LVP-181212D	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U
LS-PS1	12/12/2018	LVP-181212Q	2.5 U	1 U	5 U	1 U	1 U	2.5 U	1 U	1 U
VOA TRIP BLANK	3/23/2018	VTRP180326Y	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 GU	0.1 U	0.1 U
VOA TRIP BLANK	6/22/2018	VTRP180625X	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U
VOA TRIP BLANK	6/22/2018	VTRP180625Y	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U
VOA TRIP BLANK	9/14/2018	VTRP180919X	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U
VOA TRIP BLANK	12/11/2018	VTRP181212X2	0.25 U	0.1 U	0.5 U	0.1 U	0.1 U	0.25 U	0.1 U	0.1 U

Leachate - VOAs			Cis-1,3-Dichloropropene	Dibromomethane	Dichlorodifluoromethane	Ethylbenzene	M & P Xylene	Methyl Iodide	Methyl Methacrylate	Methylacrylonitrile
		CAS #	10061-01-5	74-95-3	75-71-8	100-41-4	MPX	74-88-4	80-62-6	126-98-7
Well #	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/26/2018	LVB-180326Q	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U
LS-B	6/25/2018	LVB-180625Q	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U
LS-B	9/19/2018	LVB-180919Q	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U
LS-B	12/12/2018	LVB-181212Q	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U
LS-PS1	3/26/2018	LVP-180326Q	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U
LS-PS1	6/25/2018	LVP-180625Q	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U
LS-PS1	9/19/2018	LVP-180919Q	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U
LS-PS1	12/12/2018	LVP-181212D	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U
LS-PS1	12/12/2018	LVP-181212Q	2.5 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U
VOA TRIP BLANK	3/23/2018	VTRP180326Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U
VOA TRIP BLANK	6/22/2018	VTRP180625X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U
VOA TRIP BLANK	6/22/2018	VTRP180625Y	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U
VOA TRIP BLANK	9/14/2018	VTRP180919X	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U
VOA TRIP BLANK	12/11/2018	VTRP181212X2	0.25 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.25 U	0.1 U

Table K-4 *(continued)*

Leachate - Volatile Organic Compounds

Leachate - VOAs			Methylene Chloride	O-Xylene	Propionitrile	Styrene	Tetrachloroethene	Toluene	Trans-1-2-Dichloroethene	Trans-1-3-Dichloropropene
		CAS #	75-09-2	95-47-6	107-12-0	100-42-5	127-18-4	108-88-3	156-60-5	10061-02-6
Well #	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/26/2018	LVB-180326Q	25 U	1 U	5 U	1 U	1 U	1 U	1 U	5 U
LS-B	6/25/2018	LVB-180625Q	25 U	1 U	5 U	1 U	1 U	1 U	1 U	5 U
LS-B	9/19/2018	LVB-180919Q	25 U	1 U	5 U	1 U	1 U	1 U	1 U	5 U
LS-B	12/12/2018	LVB-181212Q	25 U	1 U	5 U	1 U	1 U	1 U	1 U	5 U
LS-PS1	3/26/2018	LVP-180326Q	25 U	1 U	5 U	1 U	1 U	1 U	1 U	5 U
LS-PS1	6/25/2018	LVP-180625Q	25 U	1 U	5 U	1 U	1 U	1 U	1 U	5 U
LS-PS1	9/19/2018	LVP-180919Q	25 U	1 U	5 U	1 U	1 U	1 U	1 U	5 U
LS-PS1	12/12/2018	LVP-181212D	25 U	1 U	5 U	1 U	1 U	1 U	1 U	5 U
LS-PS1	12/12/2018	LVP-181212Q	25 U	1 U	5 U	1 U	1 U	1 U	1 U	5 U
VOA TRIP BLANK	3/23/2018	VTRP180326Y	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	6/22/2018	VTRP180625X	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	6/22/2018	VTRP180625Y	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	9/14/2018	VTRP180919X	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	12/11/2018	VTRP181212X2	2.5 U	0.1 U	0.5 U	0.1 U	0.1 U	0.1 U	0.1 U	0.5 U

Leachate - VOAs			Trans-1-4-Dichloro-2-Butene	Trichloroethene	Trichlorofluoromethane	Vinyl Acetate	Vinyl Chloride
		CAS #	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)
LS-B	3/26/2018	LVB-180326Q	5 U	1 U	1 U	1 U	0.1 U
LS-B	6/25/2018	LVB-180625Q	5 U	1 U	1 U	1 U	0.1 U
LS-B	9/19/2018	LVB-180919Q	5 U	1 U	1 U	1 U	0.1 U
LS-B	12/12/2018	LVB-181212Q	5 U	1 U	1 U	1 U	0.1 U
LS-PS1	3/26/2018	LVP-180326Q	5 U	1 U	1 U	1 U	0.1 U
LS-PS1	6/25/2018	LVP-180625Q	5 U	1 U	1 U	1 U	0.1 U
LS-PS1	9/19/2018	LVP-180919Q	5 U	1 U	1 U	1 U	0.1 U
LS-PS1	12/12/2018	LVP-181212D	5 U	1 U	1 U	1 U	0.1 U
LS-PS1	12/12/2018	LVP-181212Q	5 U	1 U	1 U	1 U	0.1 U
VOA TRIP BLANK	3/23/2018	VTRP180326Y	0.5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	6/22/2018	VTRP180625X	0.5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	6/22/2018	VTRP180625Y	0.5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	9/14/2018	VTRP180919X	0.5 U	0.1 U	0.1 U	0.1 U	0.01 U
VOA TRIP BLANK	12/11/2018	VTRP181212X2	0.5 U	0.1 U	0.1 U	0.1 U	0.01 U

Table K-5

Leachate - Pesticides, Herbicides, & PCBs

Leachate - Pesticides, Herbicides, & PCBs			2,4,5-T	2,4,5-TP Silvex	2,4-D	4,4'DDD	4,4'DDE	4,4'DDT	Aldrin
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	03/26/18	LVB-180326Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-B	06/25/18	LVB-180625Q	0.25 GU	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-B	09/19/18	LVB-180919Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-B	12/12/18	LVB-181212Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-PS1	03/26/18	LVP-180326Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-PS1	06/25/18	LVP-180625Q	0.25 GU	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-PS1	09/19/18	LVP-180919Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-PS1	12/12/2018	LVP-181212D	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-PS1	12/12/2018	LVP-181212Q	0.25 U	0.25 U	0.5 U	0.01 U	0.01 U	0.01 U	0.01 U

Leachate - Pesticides, Herbicides, & PCBs			Alpha BHC	Alpha Chlordane	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/26/2018	LVB-180326Q	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
LS-B	6/25/2018	LVB-180625Q	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
LS-B	9/19/2018	LVB-180919Q	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
LS-B	12/12/2018	LVB-181212Q	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
LS-PS1	3/26/2018	LVP-180326Q	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
LS-PS1	6/25/2018	LVP-180625Q	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
LS-PS1	9/19/2018	LVP-180919Q	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
LS-PS1	12/12/2018	LVP-181212D	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
LS-PS1	12/12/2018	LVP-181212Q	0.01 U	0.01 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U

Leachate - Pesticides, Herbicides, & PCBs			Aroclor 1254	Aroclor 1260	Beta BHC	Delta BHC	Dieldrin	Dinoseb	Endosulfan I
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/26/2018	LVB-180326Q	0.025 U	0.025 U	0.01 U	0.01 U	0.01 U	0.25 U	0.01 U
LS-B	6/25/2018	LVB-180625Q	0.025 U	0.025 U	0.01 U	0.01 U	0.01 U	0.25 U	0.01 U
LS-B	9/19/2018	LVB-180919Q	0.025 U	0.025 U	0.01 U	0.01 U	0.01 U	0.25 U	0.01 U
LS-B	12/12/2018	LVB-181212Q	0.025 U	0.025 U	0.01 U	0.01 U	0.01 U	0.25 U	0.01 U
LS-PS1	3/26/2018	LVP-180326Q	0.025 U	0.025 U	0.01 U	0.01 U	0.01 U	0.25 U	0.01 U
LS-PS1	6/25/2018	LVP-180625Q	0.025 U	0.025 U	0.01 U	0.01 U	0.01 U	0.25 U	0.01 U
LS-PS1	9/19/2018	LVP-180919Q	0.025 U	0.025 U	0.01 U	0.01 U	0.01 U	0.25 U	0.01 U
LS-PS1	12/12/2018	LVP-181212D	0.025 U	0.025 U	0.01 U	0.01 U	0.01 U	0.25 U	0.01 U
LS-PS1	12/12/2018	LVP-181212Q	0.025 U	0.025 U	0.01 U	0.01 U	0.01 U	0.25 U	0.01 U

Table K-5 *(continued)*

Leachate - Pesticides, Herbicides, & PCBs

Leachate - Pesticides, Herbicides, & PCBs			Endosulfan II	Endosulfan Sulfate	Endrin	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	Isodrin
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/26/2018	LVB-180326Q	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-B	6/25/2018	LVB-180625Q	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-B	9/19/2018	LVB-180919Q	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-B	12/12/2018	LVB-181212Q	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-PS1	3/26/2018	LVP-180326Q	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-PS1	6/25/2018	LVP-180625Q	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-PS1	9/19/2018	LVP-180919Q	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-PS1	12/12/2018	LVP-181212D	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
LS-PS1	12/12/2018	LVP-181212Q	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U

Leachate - Pesticides, Herbicides, & PCBs			Lindane (Gamma BHC)	Methoxychlor	Total Aroclors	Toxaphene	trans-Chlordane
Site ID	Sample Date	Sample ID	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
LS-B	3/26/2018	LVB-180326Q	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-B	6/25/2018	LVB-180625Q	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-B	9/19/2018	LVB-180919Q	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-B	12/12/2018	LVB-181212Q	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-PS1	3/26/2018	LVP-180326Q	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-PS1	6/25/2018	LVP-180625Q	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-PS1	9/19/2018	LVP-180919Q	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-PS1	12/12/2018	LVP-181212D	0.01 U	0.05 U	0.025 U	1 U	0.01 U
LS-PS1	12/12/2018	LVP-181212Q	0.01 U	0.05 U	0.025 U	1 U	0.01 U

Appendix L

Landfill Gas Monitoring Data

Table L-1
Landfill Gas Monitoring Data

Environmental Monitoring Data for First Quarter, 2018

Data Collected: January, 2018
Vashon Island Closed Landfill

Sample ID	Sample Date / Time	CH_4		CO_2	O_2	Relative Pressure	Map Location (see Fig. 5)
		%Vol	%LEL	%Vol	%Vol	in. H2O	
GP-001	1/9/18 11:34	0	0	3.4	17.7	0.25	GP-1
GP-002	1/9/18 12:07	0	0	2.2	18.2	-0.13	GP-2
GP-01D	1/9/18 11:07	0	0	0.5	17.4	2.67	NP-1
GP-01I	1/9/18 11:06	0	0	0.5	17.4	1.93	
GP-01S	1/9/18 11:05	0	0	1	19.9	-0.09	
GP-02D	1/9/18 11:12	0	0	0.7	18.7	2.06	NP-2
GP-02I	1/9/18 11:11	0	0	0.5	18.7	1.74	
GP-02S	1/9/18 11:10	0	0	0.5	20.3	-0.01	
GP-03D	1/9/18 11:18	0	0	1.8	18	1.02	NP-3
GP-03I	1/9/18 11:17	0	0	1.9	18.8	1.28	
GP-03S	1/9/18 11:16	0	0	0.5	20.5	-0.04	
GP-04D	1/9/18 11:33	0	0	0.8	19.6	0.85	NP-4
GP-04I	1/9/18 11:31	0	0	1.1	19.9	0.34	
GP-04S	1/9/18 11:30	0	0	3	18.3	2.78	
GP-05D	1/9/18 11:46	0	0	2.3	18.7	-0.44	NP-5
GP-05I	1/9/18 11:44	0	0	1.6	19.6	-0.19	
GP-05S	1/9/18 11:43	0	0	0.5	20.7	-0.14	
GP-06D	1/9/18 12:02	0	0	0.3	20.9	-0.22	NP-6
GP-06I	1/9/18 12:01	0	0	1.7	19.9	-0.24	
GP-06S	1/9/18 12:00	0	0	2.5	18.6	-0.06	
GP-07D	1/9/18 12:13	0	0	2.9	17.1	0.85	NP-7
GP-07I	1/9/18 12:11	0	0	1	20.1	0.41	
GP-07S	1/9/18 12:10	0	0	1	18.9	0.93	
GP-08D	1/9/18 10:58	0	0	0.4	19.5	2.63	NP-8
GP-08I	1/9/18 10:57	0	0	2.4	15.6	2.45	
GP-08S	1/9/18 10:56	0	0	5.2	4.5	0.03	

Table L-1 (*continued*)
Landfill Gas Monitoring Data

Environmental Monitoring Data for First Quarter, 2018

Data Collected: February, 2018
Vashon Island Closed Landfill

Sample ID	Sample Date / Time	CH_4		CO_2	O_2	Relative Pressure	Map Location (see Fig. 5)
		%Vol	%LEL	%Vol	%Vol	in. H2O	
GP-001	2/6/2018 13:57	0.0	0	0.1	21.0	-0.9	GP-1
GP-002	2/6/2018 14:39	0.0	0	2.1	18.7	-0.01	GP-2
GP-01D	2/6/2018 14:27	0.0	0	0.1	21.0	-2.39	NP-1
GP-01I	2/6/2018 14:25	0.0	0	0.1	21.0	-0.88	
GP-01S	2/6/2018 14:24	0.0	0	0.1	21.0	-0.03	
GP-02D	2/6/2018 14:21	0.0	0	0.1	21.0	-2.42	NP-2
GP-02I	2/6/2018 14:19	0.0	0	0.1	21.0	-2.31	
GP-02S	2/6/2018 14:18	0.0	0	0.1	21.0	-0.04	
GP-03D	2/6/2018 14:14	0.0	0	2.2	17.6	-2.11	NP-3
GP-03I	2/6/2018 14:13	0.0	0	0.7	20.4	-2.08	
GP-03S	2/6/2018 14:12	0.0	0	0.1	21.0	-0.01	
GP-04D	2/6/2018 14:03	0.0	0	0.1	21.0	-1.65	NP-4
GP-04I	2/6/2018 14:01	0.0	0	0.2	21.0	-1.08	
GP-04S	2/6/2018 14:00	0.0	0	3.0	17.6	3.89	
GP-05D	2/6/2018 13:33	0.0	0	2.5	18.8	-0.17	NP-5
GP-05I	2/6/2018 13:32	0.0	0	1.2	20.4	-0.18	
GP-05S	2/6/2018 13:31	0.0	0	0.2	21.0	-0.07	
GP-06D	2/6/2018 14:46	0.0	0	0.1	21.0	-0.87	NP-6
GP-06I	2/6/2018 14:45	0.0	0	0.1	21.0	-0.58	
GP-06S	2/6/2018 14:43	0.0	0	1.0	20.5	-0.01	
GP-07D	2/6/2018 14:52	0.0	0	1.5	19.3	-0.05	NP-7
GP-07I	2/6/2018 14:51	0.0	0	0.1	21.0	-1.83	
GP-07S	2/6/2018 14:49	0.0	0	0.1	21.0	-1.59	
GP-08D	2/6/2018 14:35	0.0	0	0.1	21.0	-2.25	NP-8
GP-08I	2/6/2018 14:33	0.0	0	0.5	20.5	-2.21	
GP-08S	2/6/2018 14:32	0.0	0	1.1	16.1	0.83	

Table L-1 (*continued*)
Landfill Gas Monitoring Data

Environmental Monitoring Data for First Quarter, 2018

Data Collected: March, 2018
Vashon Island Closed Landfill

Sample ID	Sample Date / Time	CH_4		CO_2	O_2	Relative Pressure	Map Location (see Fig. 5)
		%Vol	%LEL	%Vol	%Vol	in. H2O	
GP-001	3/21/2018 11:43	0.0	0	3.1	17.8	1.04	GP-1
GP-002	3/21/2018 12:33	0.0	0	1.9	18.2	0.4	GP-2
GP-01D	3/21/2018 11:05	0.0	0	0.4	17.3	3.09	NP-1
GP-01I	3/21/2018 11:03	0.0	0	0.5	19.2	1.16	
GP-01S	3/21/2018 11:02	0.0	0	0.2	20.2	-0.01	
GP-02D	3/21/2018 11:21	0.0	0	0.6	18.4	2.78	NP-2
GP-02I	3/21/2018 11:20	0.0	0	0.4	18.3	2.63	
GP-02S	3/21/2018 11:18	0.0	0	0.2	19.7	-0.02	
GP-03D	3/21/2018 11:32	0.0	0	1.4	18.2	2.32	NP-3
GP-03I	3/21/2018 11:30	0.0	0	1.3	18.8	2.25	
GP-03S	3/21/2018 11:29	0.0	0	1.1	18.9	0.09	
GP-04D	3/21/2018 11:41	0.0	0	0.6	19.8	2.39	NP-4
GP-04I	3/21/2018 11:40	0.0	0	0.4	20.2	1.58	
GP-04S	3/21/2018 11:38	0.0	0	2.8	17.7	1.24	
GP-05D	3/21/2018 11:50	0.0	0	1.9	19.1	0.44	NP-5
GP-05I	3/21/2018 11:48	0.0	0	1.3	19.6	0.21	
GP-05S	3/21/2018 11:47	0.0	0	3.2	17.2	0.03	
GP-06D	3/21/2018 12:30	0.0	0	0.2	20.6	1.13	NP-6
GP-06I	3/21/2018 12:28	0.0	0	0.3	20.2	0.24	
GP-06S	3/21/2018 12:27	0.0	0	2.5	17.1	0.02	
GP-07D	3/21/2018 12:41	0.0	0	1.1	19	0.04	NP-7
GP-07I	3/21/2018 12:39	0.0	0.00	0.10	20.90	1.34	
GP-07S	3/21/2018 12:38	0.0	0	0.2	20.4	2.03	
GP-08D	3/21/2018 10:47	0.0	0	0.3	19.7	2.97	NP-8
GP-08I	3/21/2018 10:45	0.0	0	3.2	14.4	2.75	
GP-08S	3/21/2018 10:44	0.0	0	5.8	4.3	0.07	

Table L-2

Landfill Gas Monitoring Data

Environmental Monitoring Data for Second Quarter, 2018

Data Collected: April, 2018
Vashon Island Closed Landfill

Sample ID	Sample Date / Time	CH_4		CO_2	O_2	Relative Pressure	Map Location
		%Vol	%LEL	%Vol	%Vol	in. H2O	(see Fig. 5)
GP-001	4/25/18 11:34	0	0	1.6	18.7	-0.11	GP-1
GP-002	4/25/18 12:11	0	0	1.8	17.8	0	GP-2
GP-01D	4/25/18 9:58	0	0	0.2	18.6	0.48	NP-1
GP-01I	4/25/18 9:57	0	0	0.3	20.1	0.2	
GP-01S	4/25/18 9:56	0	0	0.4	20.2	0	
GP-02D	4/25/18 11:00	0	0	0.5	18.5	0.08	NP-2
GP-02I	4/25/18 10:58	0	0	0.4	18.2	0.15	
GP-02S	4/25/18 10:57	0	0	0.1	20.7	0	
GP-03D	4/25/18 11:07	0	0	1.7	17.7	-0.15	NP-3
GP-03I	4/25/18 11:06	0	0	1.4	18.5	-0.27	
GP-03S	4/25/18 11:05	0	0	0.7	19.7	0	
GP-04D	4/25/18 11:32	0	0	0.2	20.3	-0.17	NP-4
GP-04I	4/25/18 11:31	0	0	0.2	20.2	-0.23	
GP-04S	4/25/18 11:29	0	0	2.7	16.5	4.53	
GP-05D	4/25/18 11:48	0	0	1.9	18.6	-0.28	NP-5
GP-05I	4/25/18 11:46	0	0	1.1	19.6	-0.15	
GP-05S	4/25/18 11:45	0	0	0.1	20.8	-0.08	
GP-06D	4/25/18 12:08	0	0	0.1	20.6	-0.26	NP-6
GP-06I	4/25/18 12:07	0	0	0.1	20.6	-0.16	
GP-06S	4/25/18 12:05	0	0	2.6	16.2	0	
GP-07D	4/25/18 12:24	0	0	1.7	16.2	-0.06	NP-7
GP-07I	4/25/18 12:23	0	0	0	20.7	-0.27	
GP-07S	4/25/18 12:22	0	0	0	20.7	0	
GP-08D	4/25/18 9:49	0	0	0.3	19.3	0.58	NP-8
GP-08I	4/25/18 9:48	0	0	1.9	16.7	0.21	
GP-08S	4/25/18 9:47	0	0	0.4	19.9	-1.1	

Table L-2 (*continued*)

Landfill Gas Monitoring Data

Environmental Monitoring Data for Second Quarter, 2018

Data Collected: May, 2018
Vashon Island Closed Landfill

Sample ID	Sample Date / Time	CH_4		CO_2	O_2	Relative Pressure	Map Location (see Fig. 5)
		%Vol	%LEL	%Vol	%Vol	in. H2O	
GP-001	5/8/2018 11:48	0	0	0.1	21	1.18	GP-1
GP-002	5/8/2018 12:45	0	0	1.8	18.4	0.39	GP-2
GP-01D	5/8/2018 12:13	0	0	0	21	1.67	
GP-01I	5/8/2018 12:12	0	0	0	21	0.96	NP-1
GP-01S	5/8/2018 12:11	0	0	0.4	20.5	1.63	
GP-02D	5/8/2018 12:08	0	0	0.1	21	1.54	
GP-02I	5/8/2018 12:07	0	0	0.1	21	1.52	NP-2
GP-02S	5/8/2018 12:06	0	0	0.1	21	0.04	
GP-03D	5/8/2018 11:59	0	0	1.6	18.1	1.44	
GP-03I	5/8/2018 11:58	0	0	1.5	18.6	1.39	NP-3
GP-03S	5/8/2018 11:57	0	0	0.7	19.6	0.07	
GP-04D	5/8/2018 11:53	0	0	0.3	20.3	1.85	
GP-04I	5/8/2018 11:52	0	0	0.4	20.4	1.23	NP-4
GP-04S	5/8/2018 11:51	0	0	1.2	19.4	0.94	
GP-05D	5/8/2018 11:22	0	0	1.9	18.8	0.73	
GP-05I	5/8/2018 11:20	0	0	1.3	19.6	0.32	NP-5
GP-05S	5/8/2018 11:19	0	0	3.4	16.3	0.02	
GP-06D	5/8/2018 12:31	0	0	0.1	21	1.19	
GP-06I	5/8/2018 12:30	0	0	0.1	21	0.27	NP-6
GP-06S	5/8/2018 12:28	0	0	2.4	16.8	0.07	
GP-07D	5/8/2018 12:23	0	0	1.1	17.8	0.19	
GP-07I	5/8/2018 12:22	0	0	0	21	0.87	NP-7
GP-07S	5/8/2018 12:21	0	0	0	21	1.36	
GP-08D	5/8/2018 11:14	0	0	0.6	14.8	1.49	
GP-08I	5/8/2018 11:13	0	0	2.4	16.5	1.16	NP-8
GP-08S	5/8/2018 11:12	0	0	0.1	21	0	

Table L-2 (*continued*)
Landfill Gas Monitoring Data

Environmental Monitoring Data for Second Quarter, 2018

Data Collected: June, 2018

Vashon Island Closed Landfill

Sample ID	Sample Date / Time	CH_4		CO_2	O_2	Relative Pressure	Map Location (see Fig. 5)
		%Vol	%LEL	%Vol	%Vol	in. H2O	
GP-001	6/28/2018 12:56	0.00	0.00	0	20.40	-0.08	GP-1
GP-002	6/28/2018 13:20	0.00	0.00	1.7	17.70	0.04	GP-2
GP-01D	6/28/2018 13:11	0.00	0.00	0	20.50	-0.52	NP-1
GP-01I	6/28/2018 13:09	0.00	0.00	0	20.50	-0.27	
GP-01S	6/28/2018 13:08	0.00	0.00	0.5	19.30	-0.03	
GP-02D	6/28/2018 12:21	0.00	0.00	0.1	20.80	-0.66	NP-2
GP-02I	6/28/2018 12:19	0.00	0.00	0.1	20.70	-0.67	
GP-02S	6/28/2018 12:18	0.00	0.00	0.1	20.60	-0.39	
GP-03D	6/28/2018 13:03	0.00	0.00	1.7	17.80	-0.62	NP-3
GP-03I	6/28/2018 13:01	0.00	0.00	1.6	18.00	-0.58	
GP-03S	6/28/2018 13:00	0.00	0.00	1.1	18.70	0.04	
GP-04D	6/28/2018 12:54	0.00	0.00	0.7	18.80	-0.53	NP-4
GP-04I	6/28/2018 12:53	0.00	0.00	0.3	19.90	-0.33	
GP-04S	6/28/2018 12:52	0.00	0.00	1.8	18.30	-0.1	
GP-05D	6/28/2018 12:29	0.00	0.00	1.9	18.40	-0.23	NP-5
GP-05I	6/28/2018 12:28	0.00	0.00	1.3	19.50	-0.1	
GP-05S	6/28/2018 12:26	0.00	0.00	0.3	20.40	0	
GP-06D	6/28/2018 13:18	0.00	0.00	0.1	20.40	-0.3	NP-6
GP-06I	6/28/2018 13:16	0.00	0.00	0.1	20.40	-0.07	
GP-06S	6/28/2018 13:15	0.00	0.00	2.9	16.80	0.04	
GP-07D	6/28/2018 13:27	0.00	0.00	1.3	17.50	0.15	NP-7
GP-07I	6/28/2018 13:25	0.00	0.00	0	20.60	-0.5	
GP-07S	6/28/2018 13:24	0.00	0.00	0	20.60	-0.4	
GP-08D	6/28/2018 12:12	0.00	0.00	0.1	21.00	-0.59	NP-8
GP-08I	6/28/2018 12:11	0.00	0.00	0.1	21.00	-0.62	
GP-08S	6/28/2018 12:10	0.00	0.00	0.1	21.00	-0.06	

Table L-3
Landfill Gas Monitoring Data

Environmental Monitoring Data for Third Quarter, 2018

Data Collected: July, 2018

Vashon Island Closed Landfill

Sample ID	Sample Date / Time	CH4		CO2	Vol O2	Relative Pressure	Map Location (see Fig. 5)
		%Vol	%LEL	%Vol	%Vol	in. H2O	
GP-001	7/17/18 11:44	0.0	0.0	0.1	20.7	-0.35	GP-1
GP-002	7/17/18 12:22	0.0	0.0	1.5	19.3	0.06	GP-2
GP-01D	7/17/18 11:21	0.0	0.0	0.1	20.9	-0.73	NP-1
GP-01I	7/17/18 11:20	0.0	0.0	0.1	20.8	-0.45	
GP-01S	7/17/18 11:18	0.0	0.0	0.8	19.6	-0.03	
GP-02D	7/17/18 11:26	0.0	0.0	0.1	20.8	-0.67	NP-2
GP-02I	7/17/18 11:25	0.0	0.0	0.1	20.7	-0.75	
GP-02S	7/17/18 11:24	0.0	0.0	0.6	20.2	0.01	
GP-03D	7/17/18 11:33	0.0	0.0	1.5	18.1	-0.81	NP-3
GP-03I	7/17/18 11:32	0.0	0.0	1.6	18.5	-0.79	
GP-03S	7/17/18 11:31	0.0	0.0	1	19.4	0	
GP-04D	7/17/18 11:43	0.0	0.0	0.8	18.9	-0.69	NP-4
GP-04I	7/17/18 11:41	0.0	0.0	0.5	20	-0.44	
GP-04S	7/17/18 11:40	0.0	0.0	1.8	19	-0.04	
GP-05D	7/17/18 11:50	0.0	0.0	1.5	19.4	-0.03	NP-5
GP-05I	7/17/18 11:49	0.0	0.0	1.2	20	-0.13	
GP-05S	7/17/18 11:48	0.0	0.0	0.1	21	0.03	
GP-06D	7/17/18 12:18	0.0	0.0	0.1	21	-0.17	NP-6
GP-06I	7/17/18 12:17	0.0	0.0	0.1	21	-0.01	
GP-06S	7/17/18 12:16	0.0	0.0	2.8	18.8	0.04	
GP-07D	7/17/18 12:33	0.0	0.0	1.2	19.5	0.27	NP-7
GP-07I	7/17/18 12:32	0.0	0.0	0	21	-0.44	
GP-07S	7/17/18 12:31	0.0	0.0	0	21	-0.37	
GP-08D	7/17/18 11:14	0.0	0.0	0.1	21	-0.56	NP-8
GP-08I	7/17/18 11:12	0.0	0.0	0.1	21	-0.61	
GP-08S	7/17/18 11:12	0.0	0.0	0.1	20.9	-0.03	

Table L-3 (*continued*)
Landfill Gas Monitoring Data

Environmental Monitoring Data for Third Quarter, 2018

Data Collected: August, 2018
Vashon Island Closed Landfill

Sample ID	Sample Date / Time	CH4		CO2	Vol O2	Relative Pressure	Map Location (see Fig. 5)
		%Vol	%LEL	%Vol	%Vol	in. H2O	
GP-001	8/10/2018 11:50	0.0	0.0	0.1	20.3	-0.51	GP-1
GP-002	8/10/2018 12:30	0.0	0.0	1.5	17.9	0	GP-2
GP-01D	8/10/2018 12:20	0.0	0.0	0	20.5	-0.57	NP-1
GP-01I	8/10/2018 12:19	0.0	0.0	0	20.4	-0.21	
GP-01S	8/10/2018 12:18	0.0	0.0	0.9	18.4	-0.06	
GP-02D	8/10/2018 11:03	0.0	0.0	0.1	20.3	-0.62	NP-2
GP-02I	8/10/2018 11:01	0.0	0.0	0.1	20.2	-0.64	
GP-02S	8/10/2018 11:00	0.0	0.0	0.7	19.1	0.02	
GP-03D	8/10/2018 12:12	0.0	0.0	1.6	17.9	-0.77	NP-3
GP-03I	8/10/2018 12:11	0.0	0.0	1.6	17.9	-0.78	
GP-03S	8/10/2018 12:10	0.0	0.0	1.1	18.9	-0.08	
GP-04D	8/10/2018 11:55	0.0	0.0	0.6	18.9	-0.72	NP-4
GP-04I	8/10/2018 11:54	0.0	0.0	0.6	19.6	-0.49	
GP-04S	8/10/2018 11:52	0.0	0.0	2	18.6	-0.22	
GP-05D	8/10/2018 11:34	0.0	0.0	1.8	18.4	-0.35	NP-5
GP-05I	8/10/2018 11:32	0.0	0.0	1.3	19.3	-0.14	
GP-05S	8/10/2018 11:31	0.0	0.0	0.3	20.3	0.05	
GP-06D	8/10/2018 12:27	0.0	0.0	0.1	20.3	-0.46	NP-6
GP-06I	8/10/2018 12:25	0.0	0.0	0.1	20.3	-0.14	
GP-06S	8/10/2018 12:24	0.0	0.0	3	17.5	0	
GP-07D	8/10/2018 12:35	0.0	0.0	1.3	17.7	0	NP-7
GP-07I	8/10/2018 12:34	0.0	0.0	0	20.3	-0.52	
GP-07S	8/10/2018 12:33	0.0	0.0	0	20.3	-0.42	
GP-08D	8/10/2018 10:56	0.0	0.0	0.1	20	-0.47	NP-8
GP-08I	8/10/2018 10:55	0.0	0.0	0.1	20.1	-0.47	
GP-08S	8/10/2018 10:53	0.0	0.0	0.1	20	-0.05	

Table L-3 (*continued*)
Landfill Gas Monitoring Data

Environmental Monitoring Data for Third Quarter, 2018

Data Collected: September, 2018

Vashon Island Closed Landfill

Sample ID	Sample Date / Time	CH4		CO2	Vol O2	Relative Pressure	Map Location (see Fig. 5)
		%Vol	%LEL	%Vol	%Vol	in. H2O	
GP-001	9/11/2018 11:00	0.0	0.0	0.1	21.00	-0.07	GP-1
GP-002	9/11/2018 10:48	0.0	0.0	1.7	18.50	0.06	GP-2
GP-01D	9/11/2018 11:23	0.0	0.0	0.1	21.00	0.26	NP-1
GP-01I	9/11/2018 11:22	0.0	0.0	0.2	20.50	0.19	
GP-01S	9/11/2018 11:21	0.0	0.0	1.2	18.70	0.14	
GP-02D	9/11/2018 10:55	0.0	0.0	0.1	21.00	0.01	NP-2
GP-02I	9/11/2018 10:54	0.0	0.0	0.1	21.00	0	
GP-02S	9/11/2018 10:53	0.0	0.0	0.6	20.40	0.01	
GP-03D	9/11/2018 11:14	0.0	0.0	1.8	19.00	-0.02	NP-3
GP-03I	9/11/2018 11:11	0.0	0.0	1.8	18.50	-0.06	
GP-03S	9/11/2018 11:10	0.0	0.0	1.3	19.80	0.03	
GP-04D	9/11/2018 11:05	0.0	0.0	1	18.90	0.01	NP-4
GP-04I	9/11/2018 11:03	0.0	0.0	0.6	20.40	-0.05	
GP-04S	9/11/2018 11:02	0.0	0.0	2.1	19.50	0.01	
GP-05D	9/11/2018 11:30	0.0	0.0	1.8	18.90	0.09	NP-5
GP-05I	9/11/2018 11:29	0.0	0.0	1.4	19.70	0.06	
GP-05S	9/11/2018 11:28	0.0	0.0	1.1	20.10	0.05	
GP-06D	9/11/2018 10:46	0.0	0.0	0.2	21.00	0.02	NP-6
GP-06I	9/11/2018 10:45	0.0	0.0	0.3	21.00	0.02	
GP-06S	9/11/2018 10:43	0.0	0.0	3.6	18.40	0.04	
GP-07D	9/11/2018 10:40	0.0	0.0	1.7	18.90	0.03	NP-7
GP-07I	9/11/2018 10:39	0.0	0.0	0.1	21.00	-0.1	
GP-07S	9/11/2018 10:38	0.0	0.0	0.1	21.00	0.01	
GP-08D	9/11/2018 10:29	0.0	0.0	0.7	14.10	0.1	NP-8
GP-08I	9/11/2018 10:28	0.0	0.0	2.3	16.60	-0.03	
GP-08S	9/11/2018 10:26	0.0	0.0	0.3	20.90	-0.03	

Table L-4
Landfill Gas Monitoring Data

Environmental Monitoring Data for Forth Quarter, 2018

Data Collected: October, 2018

Vashon Island Closed Landfill

Sample ID	Sample Date / Time	CH_4		CO_2	O_2	Relative Pressure	Map Location (see Fig. 5)
		%Vol	%LEL	%Vol	%Vol	in. H2O	
GP-001	10/10/2018 12:41	0.0	0.0	0.1	21	-0.13	GP-1
GP-002	10/10/2018 13:14	0.0	0.0	1.6	18.5	0.02	GP-2
GP-01D	10/10/2018 12:18		0.0	0.1	21	-1.07	NP-1
GP-01I	10/10/2018 12:16	0.0	0.0	0.1	20.9	-0.92	
GP-01S	10/10/2018 12:15	0.0	0.0	1	19	-0.03	
GP-02D	10/10/2018 12:23	0.0	0.0	0.1	21	-1.02	NP-2
GP-02I	10/10/2018 12:22	0.0	0.0	0.1	21	-1.01	
GP-02S	10/10/2018 12:21	0.0	0.0	0.3	20.7	-0.01	
GP-03D	10/10/2018 12:29	0.0	0.0	1.4	19.3	-0.97	NP-3
GP-03I	10/10/2018 12:28	0.0	0.0	1.6	19	-0.96	
GP-03S	10/10/2018 12:26	0.0	0.0	0.8	20.2	-0.02	
GP-04D	10/10/2018 12:39	0.0	0.0	1	19	-0.77	NP-4
GP-04I	10/10/2018 12:38	0.0	0.0	0.3	21	-0.49	
GP-04S	10/10/2018 12:37	0.0	0.0	1.4	20.1	-0.09	
GP-05D	10/10/2018 12:53	0.0	0.0	1.5	19.3	-0.02	NP-5
GP-05I	10/10/2018 12:52	0.0	0.0	1	20.2	0	
GP-05S	10/10/2018 12:51	0.0	0.0	0.2	21	0.01	
GP-06D	10/10/2018 13:20	0.0	0.0	0.1	21	-0.13	NP-6
GP-06I	10/10/2018 13:19	0.0	0.0	0.1	21	0	
GP-06S	10/10/2018 13:18	0.0	0.0	2.7	19	0.04	
GP-07D	10/10/2018 13:27	0.0	0.0	1.3	19.6	0.04	NP-7
GP-07I	10/10/2018 13:26	0.0	0.0	0.1	21	-0.52	
GP-07S	10/10/2018 13:25	0.0	0.0	0.1	21	-0.4	
GP-08D	10/10/2018 12:10	0.0	0.0	0.1	21	-0.71	NP-8
GP-08I	10/10/2018 12:09	0.0	0.0	0.1	21	-0.78	
GP-08S	10/10/2018 12:08	0.0	0.0	0.1	21	0.03	

Table L-4 (*continued*)
Landfill Gas Monitoring Data

Environmental Monitoring Data for Forth Quarter, 2018

Data Collected: November, 2018
Vashon Island Closed Landfill

Sample ID	Sample Date / Time	CH4		CO2	Vol O2	Relative Pressure	Map Location (see Fig. 5)
		%Vol	%LEL	%Vol	%Vol	in. H2O	
GP-001	11/6/2018 11:56	0.0	0.0	0.1	20.6	-0.81	GP-1
GP-002	11/6/2018 12:41	0.0	0.0	1.7	17.9	0.17	GP-2
GP-01D	11/6/2018 11:34	0.0	0.0	0.1	20.2	-2.26	NP-1
GP-01I	11/6/2018 11:33	0.0	0.0	0.1	20.1	-2	
GP-01S	11/6/2018 11:32	0.0	0.0	1.1	18.3	0.02	
GP-02D	11/6/2018 11:39	0.0	0.0	0.1	20.2	-2.2	NP-2
GP-02I	11/6/2018 11:38	0.0	0.0	0.1	20.2	-2.15	
GP-02S	11/6/2018 11:37	0.0	0.0	0.5	19.7	0.03	
GP-03D	11/6/2018 11:45	0.0	0.0	1.2	18.9	-2	NP-3
GP-03I	11/6/2018 11:44	0.0	0.0	1.5	18.8	-1.94	
GP-03S	11/6/2018 11:43	0.0	0.0	0.8	19.5	-0.02	
GP-04D	11/6/2018 11:54	0.0	0.0	0.3	20.2	-1.59	NP-4
GP-04I	11/6/2018 11:53	0.0	0.0	0.2	20.3	-1	
GP-04S	11/6/2018 11:52	0.0	0.0	1.3	19.5	-0.4	
GP-05D	11/6/2018 12:02	0.0	0.0	1.7	18.7	-0.36	NP-5
GP-05I	11/6/2018 12:01	0.0	0.0	1	19.7	-0.04	
GP-05S	11/6/2018 12:00	0.0	0.0	0.2	20.4	0.04	
GP-06D	11/6/2018 12:38	0.0	0.0	0.1	20.3	-0.64	NP-6
GP-06I	11/6/2018 12:37	0.0	0.0	0.1	20.2	-0.02	
GP-06S	11/6/2018 12:36	0.0	0.0	2.7	18.3	0.15	
GP-07D	11/6/2018 12:47	0.0	0.0	1.2	19.2	0.15	NP-7
GP-07I	11/6/2018 12:46	0.0	0.0	0.1	20.4	-1.04	
GP-07S	11/6/2018 12:44	0.0	0.0	0.1	20.3	-1.02	
GP-08D	11/6/2018 11:20	0.0	0.0	0.1	20.3	-2.04	NP-8
GP-08I	11/6/2018 11:18	0.0	0.0	0.1	20.3	-2.09	
GP-08S	11/6/2018 11:17	0.0	0.0	0.1	20.4	-0.16	

Table L-4 (*continued*)
Landfill Gas Monitoring Data

Environmental Monitoring Data for Forth Quarter, 2018

Data Collected: December, 2018

Vashon Island Closed Landfill

Sample ID	Sample Date / Time	CH4		CO2	Vol O2	Relative Pressure	Map Location (see Fig. 5)
		%Vol	%LEL	%Vol	%Vol	in. H2O	
GP-001	12/21/2018 12:24	0.0	0.0	0.1	20.60	-1.59	GP-1
GP-002	12/21/2018 13:14	0.0	0.0	1.9	18.30	-0.11	GP-2
GP-01D	12/21/2018 12:55	0.0	0.0	0.1	20.70	-3.94	NP-1
GP-01I	12/21/2018 12:54	0.0	0.0	0.1	20.70	-3.54	
GP-01S	12/21/2018 12:52	0.0	0.0	2.1	17.50	1.11	
GP-02D	12/21/2018 12:49	0.0	0.0	0.1	20.70	-3.9	NP-2
GP-02I	12/21/2018 12:47	0.0	0.0	0.1	20.70	-3.95	
GP-02S	12/21/2018 12:46	0.0	0.0	1.5	18.80	0.87	
GP-03D	12/21/2018 12:42	0.0	0.0	1.2	19.10	-3.6	NP-3
GP-03I	12/21/2018 12:41	0.0	0.0	1.4	19.50	-3.59	
GP-03S	12/21/2018 12:39	0.0	0.0	0.6	20.00	-1.05	
GP-04D	12/21/2018 12:31	0.0	0.0	0.2	20.50	-2.84	NP-4
GP-04I	12/21/2018 12:29	0.0	0.0	0.2	20.60	-1.87	
GP-04S	12/21/2018 12:28	0.0	0.0	1	19.80	-1.24	
GP-05D	12/21/2018 12:02	0.0	0.0	2	18.80	-0.69	NP-5
GP-05I	12/21/2018 12:00	0.0	0.0	1.1	19.80	-0.43	
GP-05S	12/21/2018 11:58	0.0	0.0	0.2	20.60	-0.21	
GP-06D	12/21/2018 13:11	0.0	0.0	0.1	20.70	-1.59	NP-6
GP-06I	12/21/2018 13:09	0.0	0.0	0.2	20.60	-0.98	
GP-06S	12/21/2018 13:08	0.0	0.0	2.8	17.90	-0.18	
GP-07D	12/21/2018 13:21	0.0	0.0	1.2	19.50	-0.16	NP-7
GP-07I	12/21/2018 13:20	0.0	0.0	0.1	20.70	-2.64	
GP-07S	12/21/2018 13:18	0.0	0.0	0.1	20.60	-2.47	
GP-08D	12/21/2018 13:04	0.0	0.0	0.6	14.10	-3.66	NP-8
GP-08I	12/21/2018 13:03	0.0	0.0	0.9	18.40	-3.59	
GP-08S	12/21/2018 13:01	0.0	0.0	0.4	20.30	-0.08	

Appendix M

Inspection Survey Reports

SOLID WASTE INSPECTION REPORT

Public Health
Seattle & King County

PUBLIC HEALTH - SEATTLE & KING COUNTY Downtown Office 401 - 5th Ave., Ste 1100 Seattle, WA 98104 206-263-9566	**PURPOSE OF VISIT:** Routine Inspection/Field Review of a Closed Landfill - Permitted establishment (PE=1002)
ESTABLISHMENT INFORMATION: **VASHON LANDFILL** VASHON LANDFILL 18900 SW WESTSIDE HWY SW VASHON ISLAND, WA 98070 206-296-4385 **Program Record:** PR0015723	**INSPECTION INFORMATION:** **Date of Inspection:** Monday, July 9, 2018 **Time In:** 1:15 pm **Time Out:** 1:55 pm **Inspector:** Darshan Dhillon **Result: COMPLETE**

VIOLATIONS OBSERVED (if any)

OVERALL INSPECTION COMMENTS:

ACTIONS AND RECOMMENDATIONS:

1.0 Aeration blowers located in the leachate ponds were not operating at the time of inspection. I observed observed the blowers for 20 minutes to see if they turned on. They did not turn on. Please ensure that aeration blowers are working properly by July 20, 2018

1.1 Overgrown black berries, weeds and grass on the landfill cover needs to be kept under control.

Observations:

2.0 New gas probes have been installed as part of ongoing remediation actions.

2.1 New groundwater monitoring wells were installed as part of ongoing remediation action plan.

2.2 All monitoring wells were secured with padlocks.

2.3 Storm water pond was found to be almost dry.

2.4 Access to the landfill has been controlled with a perimeter fence which was kept in good repair.

Dan Swope
Engineer II

Darshan S. Dhillon
H&EI III

PIC Phone #: 206-477-4623 **Email:** Dan.swope@kingcounty.gov

INSPECTION CHECKLIST

The following items are evaluated during inspections.
Violations cited as out of compliance during this inspection are highlighted below.
Out=out of compliance

OUT

Abandoned Landfill Sites BOH 10.09.040

- ☐ 0888-Abandoned landfills maintained so as to not create a risk to the public health.

Closer Landfill Leachate Managment for surface impoundment WAC-173-350-330

- ☐ 0754-Records kept of weekly inspections and liner inspections at least every 5 years
- ☐ 0763-Liners, embankments, tank piping and secondary containment maintained and logs kept
- ☐ 0766-Surface impoundments not equipped with a leak detection layer must meet WAC 173-350-500
- ☐ 0767-Surface impoundments w/a leak detection layer are subject to WAC 173-350-040 (5),173-350-330(b)

Closure Performance Standard WAC-173-304-407 (3)

- ☐ 0870-Closure must be performed in a manner to minimize maintenance
- ☐ 0871-Closure must be performed to control and prevent threats to human health and the environment
- ☐ 0872-Facility must be prepared for post-closure period

Closure Plan and Amendments WAC-173-304-407 (4)

- ☐ 0873-Facility must provide a closure plan amendments as directed by JHD
- ☐ 0874-Facility must be closed in accordance with the approved closure plan amendments

Closure Procedure WAC 173-304-407 (4)

- ☐ 0875-Closure plan sheets signed by WS PE showing as-built changes in final constn per closure plan

Closure Requirements WAC-173-351-500

- ☐ 0856-Final cover installed to minimize, infiltration and erosion per design
- ☐ 0857-Closure plan followed for areas of the MSWLF unit within 30 days of final receipt of wa-stes
- ☐ 0858-For closed areas, closure activities must be completed within 180 days

Financial Assurance Criteria WAC-173-351-600

- ☐ 0864-Financial assurance for post closure care per WAC 173-351-600 (3)

Landfill requirements for landfill closed under WAC 173-304-460

- ☐ 0882-Must prevent groundwater contamination per WAC 173-304-100
- ☐ 0883-Operation shall not result in explosive gas generation in facility structures
- ☐ 0884-Operation shall not result in explosive gas generated by the landfill at property boundary
- ☐ 0885-Landfill shall not cause violation of ambient air quality standard at property boundary
- ☐ 0886-Landfill shall not cause water quality violations

Methane Monitoring BOH 10.09.050

- ☐ 0889-Methane monitoring must be conducted per BOH 10.09.050
- ☐ 0890-Structures within 1,000 ft of landfill must be protected from potential methane migration

Performance Standards

- ☐ 0290-Must not pose a threat to human health or environment
- ☐ 0291-Protects from ground water contamination
- ☐ 0292-The facility must conform to the approved local comprehensive solid waste management plan
- ☐ 0293-Complies with RCW 70.94 Emission or ambient air quality standards
- ☐ 0294-Complies with all other local/state/federal laws and regulations

Permit Requirements

- ☐ 0891-Permit Required for Landfills operating under WAC 173-351

Post Closure care WAC-173-351-500

OUT

- ☐ 0859-For closed areas post closure care must be conducted per post-closure plan and WAC
- ☐ 0860-Final cover for closed areas must be maintained (vegetation, settlement, erosion,# run on/off)
- ☐ 0861-Leachate collection systems maintained and operated per post-closure plan and WAC 173-351-300
- ☐ 0862-Gas monitoring systems maintained and operated per post-closure plan and WAC 173-351-200

Post Closure Performance Standards WAC 173-304-407 (6)

- ☐ 0876-Post-closure activities must provide maintenance & monitoring of air/land/ water for stability

Post Closure Plan WAC 173-304-407 (7)

- ☐ 0877-Facility must keep and abide by approved plan of post closure
- ☐ 0878-Facility must provide an approved financial assurance instrument for all post closure costs
- ☐ 0879-Post-closure activities must be completed per the closure plan and schedule
- ☐ 0880-Owner/operator must implement post closure activities w/ a valid post closure plan and any requ

Post Closure Procedure WAC 173-304-407 (8)

- ☐ 0881-WA PE certification must be to the JHD of why post-closure activities are no longer necessary

Requirements sf Landfills BOH 10.09: for landfills closed under WAC 173-351/304&pre WAC173-.04

- ☐ 0887-Necessary maintenance, site inspections, and reporting provided for closed landfills

Appendix N

Vashon Island Closed Landfill –
2018 Financial Summary

King County Solid Waste Division
Vashon Island Closed Landfill - 2018 Financial Summary

King County Vashon Closed Landfill – Closed 2001 WAC 173-351

The minimum 30 year post closure required funding period is currently planned through 2031. Financial Assurance is derived from three sources: the established post-closure fund [WAC 173-351-600 (5) (a) (i), the recurring two-year operational and capital improvement program funds WAC 173-351-600 (5) (a) (ii)and the high security bonding options [WAC 173-351-600 (5) (a) (iii)] described in the April 18, 2014 letter from V. Okereke KCSWD to B. Lasby SKCDPH.

Landfill Systems being maintained during post-closure:
Geomembrane cover
Landfill gas collection with carbon treatment
Leachate/Wastewater control and management
Groundwater, surface water, leachate and landfill gas monitoring

Completion of the following projects will provide necessary information to reevaluate the current post-closure assumptions and financial assurance plans:
Enhancements to landfill gas control and treatment
Modifications to leachate and wastewater management
Groundwater monitoring of natural attenuation and landfill gas control improvements
Determination of remaining post-closure period

King County Solid Waste Division
Vashon Island Closed Landfill - 2016-2018 Financial Summary

Account Description	2017/2018	2019 Forecast	2020 Forecast
PCM Budget: Routine Maintenance, Operations, Compliance Reporting, Public Response (Excludes Capitol Improvement Project)			
LABOR	$376,277	$113,705	$117,017
MISC OPERATING SUPPLIES	$354	$177	$177
SMALL TOOLS NON CAP NON CO	$23,350	$11,675	$11,675
UTILITIES SURFACE WATER UTILITY	$24	$12	$12
DISPOSAL	$33,048	$16,249	$16,723
LICENSES FEES PERMITS	$16,858	$8,285	$8,527
LABORATORY ANALYSIS	$174,448	$87,224	$87,224
PCM BUDGET SUBTOTAL	$624,359	$237,327	$241,354

Capitol Improvement Program Budget: Environmental Investigation, Engineering Control Systems Modifications, Groundwater Montirong Network Evaluation and Modifications

CIP BUDGET SUBTOTAL	$979,000