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April 27, 2017
Parametrix No. 553-1625-014

Mr. Richard H. Morck, P.E.
Landmarc Technologies, Inc.
14816 439th Place SE
North Bend, WA 98045-9248

Re: March 2017 Groundwater Sampling Event, Newcastle Demolition Landfill

Dear Mr. Morck:

INTRODUCTION

This report summarizes the groundwater monitoring data collected in March 2017 at the Newcastle Demolition Landfill. Sample collection and data analyses were conducted in accordance with the Newcastle Demolition Landfill Post-Closure Plan (Parametrix 1998).

The landfill was formerly owned and operated by Coal Creek Development Corporation, and accepted demolition and inert waste until 1992. It was formally closed in June 1993 and has since been developed as a golf course by Newcastle Golf LLC.

The Newcastle Demolition Landfill is located in an area historically mined for coal (Parametrix 1991). The underlying geology of the site consists of a thick sequence of inclined interbedded coal, sandstone, and shale beds of the Eocene Renton Formation. The site is underlain by a complex network of coal mine workings that appear to control much of the groundwater flow beneath the site. Southwesterly regional groundwater flow is substantially intercepted by the mine workings that drain to the west and discharge directly or indirectly into the Richmond Tunnel that flows into Coal Creek. The monitoring wells are installed within bedrock between the workings, and the observed water levels are at elevations expected for groundwater influenced by the draining of the mine workings by the Richmond Tunnel.

MONITORING PROGRAM HISTORY

The downgradient monitoring wells on the golf course (MW-2, MW-3, and MW-4) were disturbed during golf course construction beginning in 1996. Some interim repairs were made during the golf course construction to allow groundwater monitoring to continue, although final completion of the well monuments did not occur until February 2000. At that time the wells were redeveloped, and were thought to be suitable for detecting potential impacts to groundwater quality from the former landfill. However, during the golf course construction period there may have been some impacts to groundwater quality in the monitoring wells due to surface water or soil intrusion. The history of activity associated with the wells during golf course construction was summarized in the November 1999 report (Parametrix 2000).

Damage to well MW-4 indicated by high turbidity was first noted in December 2000. Attempts to redevelop the well in February 2001 were unsuccessful. Well MW-4 was decommissioned and replaced in August 2001 with new monitoring well MW-5. MW-5 is located approximately 500 ft northwest of MW-4 (see Figures 1 and 2). The installation of well MW-5 was documented in a letter from Parametrix to Landmarc Technologies (Parametrix 2001).

From 1996 through 2000, a variable groundwater monitoring schedule was established by the Seattle-King County Department of Public Health (Coal Creek Development Corporation 1996). However, the downgradient wells, particularly well MW-3, were frequently dry during much of the year. During the September 2001 sampling event, all the wells were dry except for upgradient well MW-1. Therefore, no samples were collected, and an alternative sampling schedule was proposed to the Health Department (now known as Public Health – Seattle & King County). The proposed sampling schedule consisted of sampling in January and April when water volumes were expected to be adequate for sampling, and measuring depth to groundwater during the fall when groundwater levels were expected to be at their lowest point.

The current groundwater monitoring program for the closed Newcastle Demolition Landfill consists of sampling four groundwater monitoring wells (MW-1, MW-2, MW-3, and MW-5) and two off-site surface water stations (SW-6 and SW-7). Well MW-1 is upgradient of the landfill, and the other wells and stations are downgradient or downstream of the landfill. Surface water station SW-6, located at the Richmond Tunnel mine discharge, is thought to be representative of groundwater intercepted by a network of mine workings beneath the site that discharges into Coal Creek. Surface water station SW-7 is located farther downstream along Coal Creek. The monitoring well locations are shown on Figures 1 and 2, and the surface water station locations are shown on Figure 3. The locations of the downgradient wells with respect to landfill and golf course features are shown on Figure 2.

In September 2006, recommendations were submitted by Landmarc Technologies, Inc. to Public Health for reducing the monitoring frequency and parameters at the Newcastle Demolition Landfill (Parametrix 2006). It was recommended that the frequency of groundwater monitoring be reduced to annual, and analyses for volatile organic compounds, semi-volatile organic compounds, and metals (except for arsenic) be discontinued. These parameters are not required by Chapter 173-304 Washington Administrative Code (WAC), and the historical data since landfill closure have not indicated any detections of these parameters associated with impacts from the landfill. Reduction in monitoring frequency and parameters based on consistent lack of contamination from the landfill is in accordance with the language of the Post-Closure Monitoring Plan. These recommendations were implemented beginning with the February 2007 event.

MARCH 2017 SAMPLING EVENT

Samples were collected on March 21, 2017, by Parametrix personnel. Samples were collected from wells MW-1 and MW-2 using dedicated Hydrostar pumps, and from wells MW-3 and MW-5 using dedicated electrical submersible pumps. Samples were collected using low-flow purging methods. Samples to be analyzed for dissolved metals were field-filtered through 0.45-micron filters. A duplicate sample was collected at monitoring well MW-2 (designated MW-6).

Samples were delivered directly to Analytical Resources, Inc. (ARI) in Seattle, Washington, for analysis. Samples were measured for field parameters (pH, specific conductivity, and temperature), and analyzed for chloride, nitrite, nitrate, ammonia, sulfate, hardness (dissolved calcium and magnesium), dissolved arsenic, dissolved iron, dissolved manganese, dissolved zinc, chemical oxygen demand (COD), total organic carbon (TOC), and total dissolved solids (TDS). Additional field parameters measured included Dissolved oxygen (DO) and oxygen reduction potential (redox).

SAMPLING RESULTS

The analytical results for the monitoring wells and surface water stations are summarized in Table 1. The laboratory report and chain-of-custody forms are presented in Appendix A.

Data Validation

Parametrix conducted a quality assurance (QA) review of the laboratory data, including holding times, field duplicate results, and blank results. The laboratory QA internal standard data were also reviewed, including matrix spikes, matrix spike duplicates, surrogate recoveries, and laboratory control samples. No data required qualification, except for nitrate and dissolved arsenic in well MW-2 and duplicate MW-6. These data were qualified "J" due to variability between the samples. The variability can likely be attributed to heterogeneity between the sample aliquots.

Data Analysis

Data analysis consisted of comparing groundwater data (from monitoring wells and surface water station SW-6) to established state groundwater quality standards (GWQSs; 173-200 WAC) and state maximum contaminant levels (MCLs) for drinking water (246-290 WAC), preparing time-series plots, and conducting Mann-Kendall trend analyses for selected analytes.

Comparison of Data to Groundwater Quality Standards

The following constituents were present in groundwater at concentrations above secondary GWQSs and/or MCLs (established based on aesthetic characteristics such as taste, appearance, and/or staining):

- Total dissolved solids in samples from well MW-1 (upgradient), and surface water station SW-6;
- Dissolved iron in samples from wells MW-2, MW-3, MW-5, and surface water station SW-6;
- Dissolved manganese in samples from wells MW-1 (upgradient), MW-2, MW-5, and surface water station SW-6.

Dissolved arsenic concentrations in samples from wells MW-1 (upgradient), MW-3, and surface water stations SW-6 and SW-7 exceeded the carcinogenic GWQS but not the MCL. The dissolved arsenic concentration in well MW-5 slightly exceeded the MCL.

The presence of constituents above their GWQS and/or MCL upgradient from the landfill at MW-1 indicates that the aesthetic characteristics of groundwater in the landfill vicinity are a natural artifact of the local geochemistry.

Time-Series Plots

Groundwater and surface water time-series plots were prepared for dissolved arsenic, ammonia, dissolved calcium, chloride, chemical oxygen demand (COD), hardness, dissolved iron, dissolved manganese, specific conductivity, sulfate, and total organic carbon (TOC). These constituents were selected for statistical analyses to include parameters that were elevated in leachate with respect to groundwater (Pacific Groundwater Group 1994a). Dissolved arsenic has been added because it was a constituent of interest discussed in Ecology's Periodic Review (Ecology 2013). These plots are presented in Appendix B and show data collected since 1994. Based on the time-series plots, the following observations can be made:

- Sulfate and hardness (and dissolved calcium) concentrations continued to be highest in upgradient well MW-1.
- In MW-2, concentrations of dissolved iron, dissolved manganese, and TOC continued to be lower than the relatively high concentrations measured between 1999 and 2000. Specific conductivity and concentrations of chloride and hardness (and dissolved calcium) have increased during the past few years.

- In MW-3, concentrations of most parameters have remained stable or decreased over the last few years. Specific conductivity, and concentrations of ammonia, chloride, hardness (and dissolved calcium), dissolved iron, dissolved manganese, and TOC continued to be lower compared to the relatively high values observed during 2002.
- In MW-5, stable or decreasing trends in most parameters have been observed in the last few years. Dissolved manganese and dissolved iron concentrations, however, have showed slight increases. Because this is a low-yield well, continuing development over several years is likely to occur, resulting in improving water quality.
- At SW-6, concentrations of hardness, sulfate, and dissolved manganese have decreased since over the history of monitoring.

Mann-Kendall Tests

The Mann-Kendall test for trends (Gilbert 1987, Gibbons 1994) was used to evaluate the Newcastle Demolition Landfill groundwater data (Pacific Groundwater Group 1994a,b,c). Trends in each well were evaluated separately because the upgradient well continues to show higher concentrations of some constituents than the downgradient wells. The trend analyses used all data collected between April 1988 and March 2017 (except for specific conductivity results for the second 1998 semi-annual monitoring event, which are suspected to be erroneously low due to an error in calibrating the meter). All non-detected values were given a value equal to the reporting limit (Gilbert 1987, Gibbons 1994).

The results of the trend analyses are summarized in Table 2. The Mann-Kendall tests indicate the following:

- MW-1: statistically significant increasing trends in chloride, COD, dissolved iron, and TOC; statistically significant decreasing trends in dissolved arsenic and dissolved manganese, upgradient from the landfill;
- MW-2: statistically significant increasing trends in ammonia, dissolved calcium, chloride, hardness, dissolved iron, specific conductivity, and TOC; a statistically significant decreasing trend in dissolved arsenic;
- MW-3: statistically significant increasing trends in COD, specific conductivity, and TOC; statistically significant decreasing trends in dissolved calcium, chloride, hardness, and dissolved manganese; and
- MW-5: a statistically significant increasing trend in dissolved iron and dissolved manganese; statistically significant decreasing trends in dissolved calcium, chloride, hardness, specific conductivity, and sulfate.

GROUNDWATER LEVEL MONITORING RESULTS

Groundwater levels were measured at three of the four monitoring wells prior to sampling. Depth to water could not be measured at MW-1 due to wellhead constraints. The measurements are presented in Table 3 with calculated water elevations.

DISCUSSION AND CONCLUSIONS

Analysis of the March 2017 groundwater data from the Newcastle Demolition Landfill indicates the following:

- The differences in groundwater chemistry between monitoring wells suggest that the observed water chemistry is influenced by local geochemical conditions, and therefore do not clearly demonstrate landfill impacts. Concentrations exceeding secondary GWQSs or MCLs (TDS, sulfate, dissolved iron, and

dissolved manganese) occurred in the upgradient well and in downgradient wells and the surface water station. Dissolved arsenic concentrations exceeded the carcinogenic GWQS in all wells (including the upgradient well) and the surface water stations. All arsenic concentrations were below the MCL except for well MW-5. Statistically significant increasing trends in indicator parameters were also observed in both upgradient and downgradient wells.

- Some of the variations in concentrations may be related to changed geochemical conditions associated with golf course development activities. The March 2017 data for wells MW-2 and MW-3 indicate continuing lower concentrations for parameters that were elevated following the golf course construction period during 1996 through 2000, including dissolved iron, manganese, and TOC.

Please contact me at (206) 394-3667 or lgilbert@parametrix.com if you have questions regarding this report.

Sincerely,

Parametrix

Lisa A. Gilbert, LHG
Project Hydrogeologist

cc: Darshan S. Dhillon, Public Health – Seattle & King County
Eugene Freeman, Cleanup Program, NWRO, Washington State Department of Ecology
David South, Cleanup Program, NWRO, Washington State Department of Ecology

REFERENCES

Coal Creek Development Corporation. 1996. Letter to Parametrix. February 2, 1996.

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

Gilbert, R.O. 1987. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold. New York

Pacific Groundwater Group. 1994a. Statistical Review, Newcastle Landfill. Prepared for Coal Creek Development Corporation. February 10, 1994.

Pacific Groundwater Group. 1994b. Statistical Review, Newcastle Landfill, First Quarter 1994. Prepared for Coal Creek Development Corporation. April 25, 1994.

Pacific Groundwater Group. 1994c. Statistical Review, Newcastle Landfill, Second Quarter 1994. Prepared for Coal Creek Development Corporation. December 14, 1994.

Parametrix, Inc. 1991. Newcastle Landfill Closure Plan. Prepared for Coal Creek Development Corporation. May 1991.

Parametrix, Inc. 1998. Newcastle Demolition Landfill Post-Closure Plan. Prepared for Preston, Gates & Ellis. October 1998.

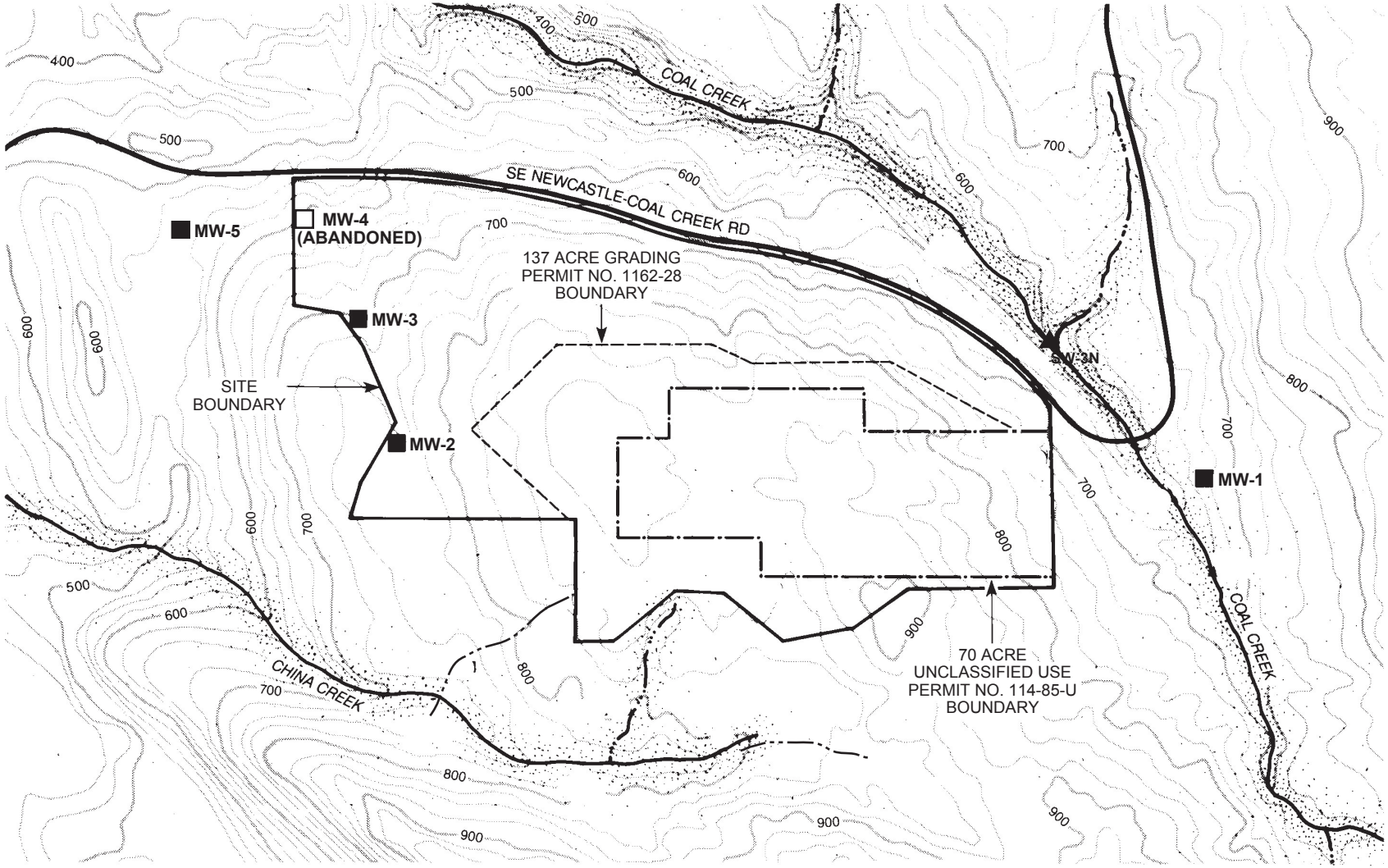
Parametrix, Inc. 2000. Second 1999 Semi-annual Groundwater Sampling Event, Newcastle Demolition Landfill. Prepared for Landmarc Technologies, Inc. May 25, 2000.

Parametrix, Inc. 2001. Newcastle Landfill Well and Gas Probe Activities. Draft letter prepared for Landmarc Technologies, Inc. October 23, 2001.

Parametrix, Inc. 2006. Recommendations for Reduction in Groundwater Monitoring, Newcastle Demolition Landfill. Prepared for Landmarc Technologies, Inc. September 7, 2006.

Washington State Department of Ecology (Ecology). 2013. Periodic Review, Newcastle Coal Creek Landfill Facility Site ID Number 2044. Northwest Region Office, Toxics Cleanup Program, February 2013.

Figures



Parametrix 555-3747-001/01(01) 5/09 (B)

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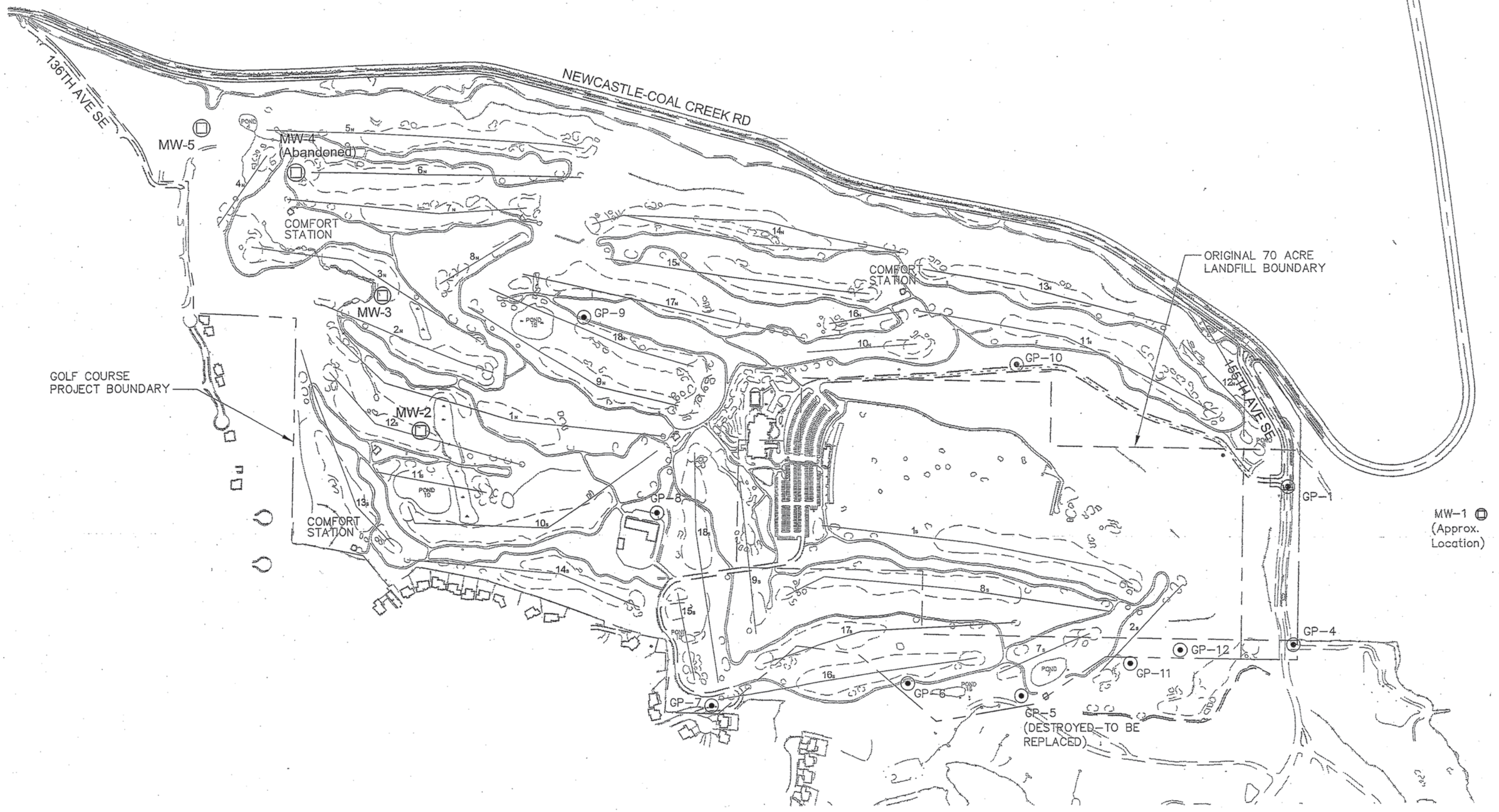
SCALE IN FEET

MW-1 Groundwater Monitoring Well

Figure 1
Groundwater Monitoring Locations in Site Vicinity
Newcastle Demolition Landfill

Parametrix, Inc.



FILE: K3747001P01T01-F02
DATE: 04/10/03

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SCALE IN FEET

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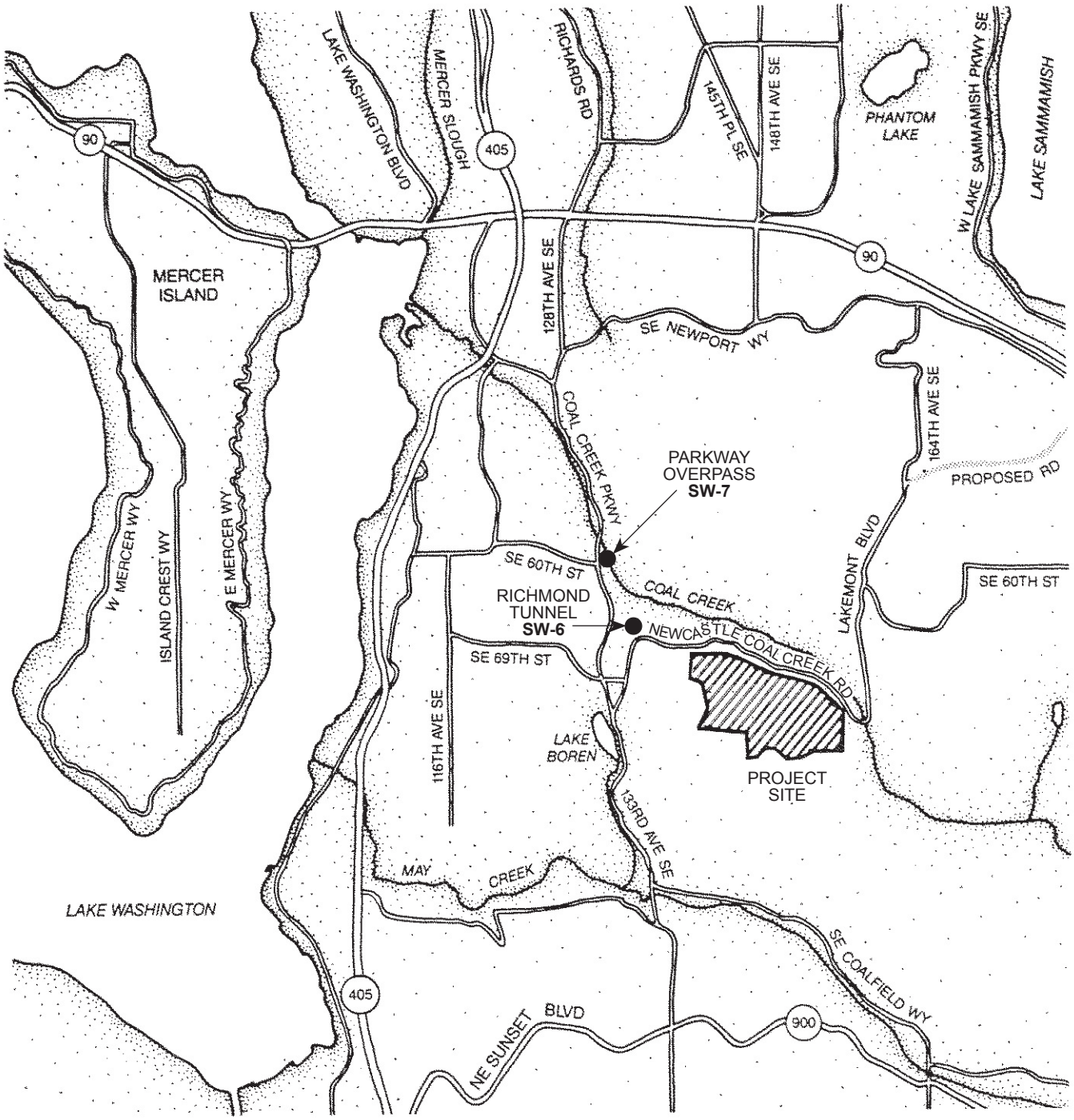
LEGEND

- MW-2 — Groundwater Monitoring Well (Field Located 10/22/01)
- GP-1 — Gas Probe Location (Field Located 10/22/01)
- COMFORT STATION — Comfort Station (Restroom)
- Pond and "Creek" System
- Storm Drainage Control Facility
- Golf Cart Path
- 14s — Golf Course Fairway Alignment and Number

Figure 2
Groundwater Monitoring Well Locations and Golf Course Features, Newcastle Demolition Landfill Area



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SCALE IN MILES

● Surface Water Monitoring Site

Figure 3
Off-site Monitoring Locations
Newcastle Demolition Landfill

Tables

Table 1. Newcastle Groundwater and Surface Water Data

				Groundwater					Surface Water	
Parameter	**Units**	**GWQS**	**MCL**	**MW-1 3/21/2017**	**MW-2 3/21/2017**	**MW-6 (MW-2 Dup) 3/21/2017**	**MW-3 3/21/2017**	**MW-5 3/21/2017**	**SW-6 3/21/2017**	**SW-7 3/21/2017**
Field Data										
Temperature	°C			9.06	10.54	- -	11.00	11.14	11.93	9.07
pH	standard	6.5-8.5 **		7.18	7.43	- -	7.03	6.67	7.12	8.14
Specific Conductivity	uS/cm		700 **	628	557	- -	142	435	683	172
DO	mg/L			1.24	0.26	- -	2.30	0.88	9.90	11.55
Redox	mV			50.4	-129.6	- -	-62.1	-54.8	-55.2	-10.9
Conventionals										
Total Dissolved Solids	mg/L	500 **	500 **	**607**	431	447	130	358	**575**	152
Chloride	mg/L	250 **	250 **	3.14	14.6	14.4	1.33	3.23	5.55	6.25
Ammonia	mg-N/L			0.070	0.523	0.518	0.061	0.047	0.187	0.040 U
Nitrate	mg-N/L	10 *	10 *	0.15	0.0211 J	0.0475 J	0.0535	0.100	0.123	1.12
Nitrate + Nitrite	mg-N/L			0.150	0.021 J	0.048 J	0.054	0.050 U	0.123	1.12
Nitrite	mg-N/L		1 *	0.010 U	0.010 U	0.010 U	0.010 U	0.050 U	0.010 U	0.010 U
Sulfate	mg/L	250 **	250 **	223	14.1	14.6	19.8	75.9	187	36.9
Chemical Oxygen Demand	mg/L			10.0 U	10.4	10.0 U	34.9	10.0 U	10.0 U	10.0 U
Total Organic Carbon	mg/L			0.95	3.92	3.92	9.11	1.65	1.67	3.32
Dissolved Hardness	mg/L			531	284	300	50.2	307	380	82
Dissolved Metals										
Arsenic	mg/L	0.00005 ***	0.01 *	**0.00026**	0.0002 UJ	**0.0005** J	**0.00363**	**0.0151**	**0.00496**	**0.00075**
Calcium	mg/L			141	69.7	72.5	14.3	71.2	74.4	19.1
Iron	mg/L	0.3 **	0.3 **	0.297	**0.574**	**0.615**	**0.616**	**6.03**	**2.89**	0.0980
Magnesium	mg/L			43.6	26.6	29.0	3.49	31.3	47.3	8.33
Manganese	mg/L	0.05 **	0.05 **	**0.121**	**0.105**	**0.113**	0.0457	**0.666**	**0.266**	0.0342
Zinc	mg/L	5 **	5 **	0.0200 U	0.0100 U	0.0100 U	0.159	0.0100 U	0.0100 U	0.0100 U

Notes:

GWQS = Water Quality Standards for Ground Waters of the State of Washington (173-200 WAC)
MCL = Maximum Contaminant Level, Washington State Drinking Water Regulations (Chapter 246-290 WAC)
* = Primary contaminant criteria
** = Secondary contaminant criteria
*** = Carcinogenic contaminant criteria
= Exceeds GWQS or MCL
U = Compound undetected at the specified reporting limit
J = Estimated concentration

Table 2. Results of Mann-Kendall Tests for Trend, Newcastle Demolition Landfill, March 2017

Well ID	Analyte	n	S	Variance	Z	Trend
MW-1	Ammonia-N	57	220	21078.7	1.51	No Trend
	Arsenic	**19**	**-116**	**786.0**	**-4.10**	**Negative**
	Calcium, Dissolved	54	-37	17927.0	-0.27	No Trend
	Chloride	**57**	**475**	**20990.3**	**3.27**	**Positive**
	COD	**57**	**267**	**10635.0**	**2.58**	**Positive**
	Hardness	56	-50	19950.0	-0.35	No Trend
	Iron, Dissolved	**57**	**361**	**21080.3**	**2.48**	**Positive**
	Manganese, Dissolved	**57**	**-340**	**21077.3**	**-2.34**	**Negative**
	Specific Conductivity	56	-25	20019.0	-0.17	No Trend
	Sulfate	57	-34	21072.7	-0.23	No Trend
	TOC	**57**	**455**	**18797.7**	**3.31**	**Positive**
MW-2	**Ammonia-N**	**51**	**314**	**15155.3**	**2.54**	**Positive**
	Arsenic	**19**	**-115**	**721.0**	**-4.25**	**Negative**
	Calcium, Dissolved	**46**	**558**	**11154.0**	**5.27**	**Positive**
	Chloride	**51**	**838**	**15128.7**	**6.80**	**Positive**
	COD	51	185	14977.7	1.50	No Trend
	Hardness	**48**	**554**	**12600.0**	**4.93**	**Positive**
	Iron, Dissolved	**51**	**604**	**15150.7**	**4.90**	**Positive**
	Manganese, Dissolved[1]	50	212	14282.0	1.77	Positive
	Specific Conductivity	**48**	**502**	**12658.7**	**4.45**	**Positive**
	Sulfate	50	-77	14283.0	-0.64	No Trend
	TOC	**51**	**468**	**15148.7**	**3.79**	**Positive**
MW-3	Ammonia-N[1]	37	138	5844.0	1.79	Positive
	Arsenic	17	9	583.7	0.33	No Trend
	Calcium, Dissolved	**34**	**-175**	**4548.3**	**-2.58**	**Negative**
	Chloride	**38**	**-271**	**6318.3**	**-3.40**	**Negative**
	COD	**38**	**182**	**6157.3**	**2.31**	**Positive**
	Hardness	**35**	**-220**	**4945.3**	**-3.11**	**Negative**
	Iron, Dissolved[1]	38	150	6324.0	1.87	Positive
	Manganese, Dissolved	**37**	**-358**	**5839.3**	**-4.67**	**Negative**
	Specific Conductivity	**38**	**206**	**6326.0**	**2.58**	**Positive**
	Sulfate	38	-39	6323.0	-0.48	No Trend
	TOC	**38**	**278**	**6322.0**	**3.48**	**Positive**

n = Sample size

S = Mann-Kendall test statistic. Positive number implies an increasing trend; negative number implies a decreasing trend.

Z = Approximate normal test statistic; calculated based on S and the estimated variance when the sample size is greater than 10.

The comparison level (critical value of Z) at 1.0 - (α/ 2) = (0.05 / 2) = 97.5% confidence level = 1.97737 for a two-tailed Mann-Kendall test.

If the absolute value of the calculated Z statistic (|Z|) > 1.97737, a significant trend is present in the data. There is no trend in the data when |Z| < 1.97737.

[1] When run as a one-tailed test, there is a trend (i.e., |Z| > 1.65463). The comparison level (critical value of Z) at 1.0 - (α) = (0.05) = 95% confidence level = 1.65463.

Trends significant at a confidence level of 97.5% are shown in **BOLD BLACK FONT.**

Table 2. Results of Mann-Kendall Tests for Trend, Newcastle Demolition Landfill, March 2017 (continued)

Well ID	Analyte	n	S	Variance	Z	Trend
MW-5	Ammonia-N	19	-23	815.0	-0.77	No Trend
	Arsenic[1]	13	-32	268.7	-1.89	Negative
	Calcium, Dissolved	**19**	**-109**	**817.0**	**-3.78**	**Negative**
	Chloride	**19**	**-76**	**816.0**	**-2.63**	**Negative**
	COD	19	-27	791.7	-0.92	No Trend
	Hardness	**19**	**-113**	**805.0**	**-3.95**	**Negative**
	Iron, Dissolved	**19**	**71**	**817.0**	**2.45**	**Positive**
	Manganese, Dissolved	**19**	**78**	**816.0**	**2.70**	**Positive**
	Specific Conductivity	**19**	**-66**	**816.0**	**-2.28**	**Negative**
	Sulfate	**19**	**-124**	**816.0**	**-4.31**	**Negative**
	TOC	19	-16	816.0	-0.53	No Trend

n = Sample size

S = Mann-Kendall test statistic. Positive number implies an increasing trend; negative number implies a decreasing trend.

Z = Approximate normal test statistic; calculated based on S and the estimated variance when the sample size is greater than 10.

The comparison level (critical value of Z) at 1.0 - (α/ 2) = (0.05 / 2) = 97.5% confidence level = 1.97737 for a two-tailed Mann-Kendall test.

If the absolute value of the calculated Z statistic (|Z|) > 1.97737, a significant trend is present in the data. There is no trend in the data when |Z| < 1.97737.

[1] When run as a one-tailed test, there is a trend (i.e., |Z| > 1.65463). The comparison level (critical value of Z) at 1.0 - (α) = (0.05) = 95% confidence level = 1.65463.

Trends significant at a confidence level of 97.5% are shown in **BOLD BLACK FONT.**

Table 3. Groundwater Elevations for Newcastle Landfill, March 2017

Well	Date	Reference Elevation[1]	Depth to Groundwater[2]	Groundwater Elevation[1]
MW-1	3/21/2017	649	NM	NM
MW-2	3/21/2017	753	24.17	729
MW-3	3/21/2017	716	142.02	574
MW-5	3/21/2017	542	54.15	488

Notes:

[1] Reference Elevation and Groundwater Elevation approximate

[2] Depth to groundwater measured from well seal

NM = Not Measured

Appendix A

Laboratory Report and Chain-of-Custody Forms

Analytical Resources, Incorporated
Analytical Chemists and Consultants

19 April 2017

Lisa Gilbert
Parametrix, Inc.
719 2nd Avenue, Suite 200
Seattle, WA 98104

RE: Newcastle LF GW Monitoring

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

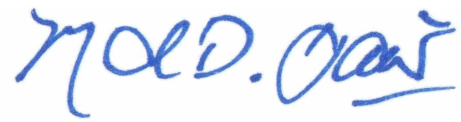
Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
17C0319	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the reqirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.



Mark Harris, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006

PJLA Testing
Accreditation # 66169

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 17C0319	Turn-around Requested: NORMAL
ARI Client Company: PARAMETRIX	Phone:
Client Contact: LISA GILBERT	
Client Project Name: NEWCASTLE LF	
Client Project #: 553162501 4-02-02	Samplers: ARONEY / TPARRY

Page: 1 of 1	
Date: 3/21/17	Ice Present?
No. of Coolers:	Cooler Temps:

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)
www.arilabs.com

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: Cl, SO4, NO2/NO3 IDS	Ammonia COD, TOC	Diss. Fe, Mn, As Zn, Hardness						Notes/Comments
MW-1	3/21/17	1025	WATER	3	X	X	X						FF
MW-2		1205		3	X	X	X						FF
MW-3		1305		3	X	X	X						FF
MW-5		1434		3	X	X	X						FF
MW-6		1215		3	X	X	X						FF
SW-6		1525		3	X	X	X						FF
SW-7		1600		3	X	X	X*						Missing NO_2 Container - Unpreserved, unfiltered volume provided

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name: Adam Romey	Printed Name: Paul Mark	Printed Name:	Printed Name:
	Company: Parametrix	Company: ARI	Company:	Company:
	Date & Time: 3/21/17 1650	Date & Time: 3/21/2017 1650	Date & Time:	Date & Time:

WORK ORDER

17C0319

Client: Parametrix, Inc. **Project Manager:** Mark Harris

Project: Newcastle LF GW Monitoring **Project Number:** 553-1625-002

Analysis groups included in this work order

Hardness, Calculated Diss (6010C)

Met Diss 6010C - Mg Met Diss 6010C - Ca

Nitrate-N Calc EPA 353.2

Nitrite-N, EPA 353.2 Nitrate + Nitrite-N, EPA 35

Preservation Confirmation

Container ID	Container Type	pH	
17C0319-01 A	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
17C0319-01 B	Large OJ, 1000 mL		
17C0319-02 A	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
17C0319-02 B	Large OJ, 1000 mL		
17C0319-03 A	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
17C0319-03 B	Large OJ, 1000 mL		
17C0319-04 A	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
17C0319-04 B	Large OJ, 1000 mL		
17C0319-05 A	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
17C0319-05 B	Large OJ, 1000 mL		
17C0319-06 A	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
17C0319-06 B	Large OJ, 1000 mL		
17C0319-07 A	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
17C0319-07 B	Large OJ, 1000 mL		
17C0319-08 A	HDPE NM, 500 mL, 1:1 HNO3 (FF)	<2	P
17C0319-09 A	HDPE NM, 500 mL, 1:1 HNO3 (FF)		
17C0319-10 A	HDPE NM, 500 mL, 1:1 HNO3 (FF)		
17C0319-11 A	HDPE NM, 500 mL, 1:1 HNO3 (FF)		
17C0319-12 A	HDPE NM, 500 mL, 1:1 HNO3 (FF)		
17C0319-13 A	HDPE NM, 500 mL, 1:1 HNO3 (FF)		
17C0319-14 A	Miscellaneous Container		

P = pass

PM
Preservation Confirmed By

3/21/2017
Date

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Parametrix

COC No(s): _____ NA

Assigned ARI Job No: 170319

Project Name: _____

Delivered by: Fed-Ex UPS Courier (Hand Delivered) Other: _____

Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	(NO)
Were custody papers included with the cooler?	(YES)	NO
Were custody papers properly filled out (ink, signed, etc.)	(YES)	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 1.8

Time: _____

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D005276

Cooler Accepted by: PM Date: 3/21/2017 Time: 16:50

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	(NO)
What kind of packing material was used? ... (Bubble Wrap) (Wet Ice) Gel Packs Baggies Foam Block Paper Other: _____			
Was sufficient ice used (if appropriate)?	NA	(YES)	NO
Were all bottles sealed in individual plastic bags?		YES	(NO)
Did all bottles arrive in good condition (unbroken)?		(YES)	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		_____

Was Sample Split by ARI : NA YES Date/Time: _____ Equipment: _____ Split by: _____

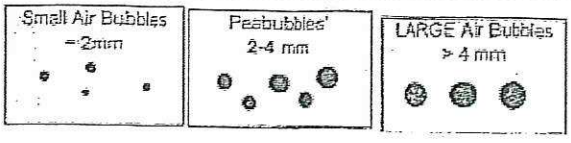
Samples Logged by: _____ Date: _____ Time: _____

*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:



Small → "sm" (< 2 mm)
Peabubbles → "pb" (2 to < 4 mm)
Large → "lg" (4 to < 6 mm)
Headspace → "hs" (> 6 mm)

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1	17C0319-01	Water	21-Mar-2017 10:25	21-Mar-2017 16:50
MW-2	17C0319-02	Water	21-Mar-2017 12:05	21-Mar-2017 16:50
MW-3	17C0319-03	Water	21-Mar-2017 13:05	21-Mar-2017 16:50
MW-5	17C0319-04	Water	21-Mar-2017 14:34	21-Mar-2017 16:50
MW-6	17C0319-05	Water	21-Mar-2017 12:15	21-Mar-2017 16:50
SW-6	17C0319-06	Water	21-Mar-2017 15:25	21-Mar-2017 16:50
SW-7	17C0319-07	Water	21-Mar-2017 16:00	21-Mar-2017 16:50
MW-1	17C0319-08	Water	21-Mar-2017 10:25	21-Mar-2017 16:50
MW-2	17C0319-09	Water	21-Mar-2017 12:05	21-Mar-2017 16:50
MW-3	17C0319-10	Water	21-Mar-2017 13:05	21-Mar-2017 16:50
MW-5	17C0319-11	Water	21-Mar-2017 14:34	21-Mar-2017 16:50
MW-6	17C0319-12	Water	21-Mar-2017 12:15	21-Mar-2017 16:50
SW-6	17C0319-13	Water	21-Mar-2017 15:25	21-Mar-2017 16:50
SW-7	17C0319-14	Water	21-Mar-2017 16:00	21-Mar-2017 16:50

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

Case Narrative

Client: Parametrix, Inc.
Project: Newcastle LF GW Monitoring
Workorder: 17C0319

Sample receipt

7 samples were received 21-Mar-2017 16:50 under ARI work order 17C0319. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Dissolved Metals/Hardness - EPA Methods 200.8/6010C

These samples were digested and analyzed within the recommended holding times.

All initial and continuing calibrations were within method requirements.

No target elements were detected in the method blanks above the LOQs.

The percent recoveries for all elements were within acceptable QC limits for the LCSs.

Wet Chemistry

These samples were prepared and analyzed within the recommended holding times.

All initial and continuing calibrations were within method requirements.

No target compounds were detected in the method blanks above the LOQs.

The percent recoveries for all compounds were within acceptable QC limits for the LCSs.

Matrix spikes (MSs) were prepared and analyzed for sulfate, nitrate+nitrite and chloride in conjunction with sample 'MW-1'. The percent recoveries for all compounds were within acceptable QC limits for the MSs.

Matrix duplicates (MDs) were prepared and analyzed for sulfate, nitrate+nitrite and chloride in conjunction with sample 'MW-1'. The RPDs for all compounds were within acceptable QC limits for the MDs.

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-1

17C0319-01 (Water)
Sampled: 03/21/2017 10:25

Wet Chemistry

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0564 — Sample Size: 100 mL
Prepared: 03/22/2017 11:02 — Final Volume: 200 mL

Analytical Method: EPA 160.1 — Instrument: BAL2 — Analyzed: 03/22/2017 11:02

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10.0	**607**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0635 — Sample Size: 10 mL
Prepared: 03/24/2017 10:44 — Final Volume: 10 mL

Analytical Method: EPA 325.2 — Instrument: LACHAT2 — Analyzed: 03/24/2017 17:56

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	1.00	**3.14**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0844 — Sample Size: 10 mL
Prepared: 03/31/2017 12:46 — Final Volume: 10 mL

Analytical Method: EPA 350.1 M — Instrument: LACHAT2 — Analyzed: 03/31/2017 16:33

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.040	**0.070**	mg-N/L	

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/23/2017 08:21 — Final Volume: 1

Analytical Method: EPA 353.2 — Instrument: [CALC] — Analyzed: 03/23/2017 08:45

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.0200	**0.15**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0592 — Sample Size: 5 mL
Prepared: 03/23/2017 08:21 — Final Volume: 5 mL

Analytical Method: EPA 353.2 — Instrument: LACHAT2 — Analyzed: 03/23/2017 08:45

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-1

17C0319-01 (Water)

Sampled: 03/21/2017 10:25

Wet Chemistry

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.010	**0.150**	mg/L	

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.010	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0566 Sample Size: 5 mL
Prepared: 03/22/2017 11:03 Final Volume: 5 mL

Analytical Method: EPA 375.2 Instrument: LACHAT2 Analyzed: 03/24/2017 10:26

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	10	20.0	**223**	mg/L	D

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0641 Sample Size: 2 mL
Prepared: 03/24/2017 12:58 Final Volume: 2 mL

Analytical Method: EPA 410.4 Instrument: UV1800-1 Analyzed: 03/27/2017 15:39

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
COD		1	10.0	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0581 Sample Size: 20 mL
Prepared: 03/22/2017 16:43 Final Volume: 20 mL

Analytical Method: SM 5310 B-00 Instrument: TOC-LCSH Analyzed: 03/22/2017 18:20

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	**0.95**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-2

17C0319-02 (Water)

Sampled: 03/21/2017 12:05

Wet Chemistry

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0564 Sample Size: 100 mL
Prepared: 03/22/2017 11:02 Final Volume: 200 mL

Analytical Method: EPA 160.1 Instrument: BAL2 Analyzed: 03/22/2017 11:02

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10.0	**431**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0844 Sample Size: 10 mL
Prepared: 03/31/2017 12:46 Final Volume: 10 mL

Analytical Method: EPA 350.1 M Instrument: LACHAT2 Analyzed: 03/31/2017 16:35

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.040	**0.523**	mg-N/L	

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/23/2017 08:21 Final Volume: 1

Analytical Method: EPA 353.2 Instrument: [CALC] Analyzed: 03/23/2017 08:50

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.0200	**0.0211**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0592 Sample Size: 5 mL
Prepared: 03/23/2017 08:21 Final Volume: 5 mL

Analytical Method: EPA 353.2 Instrument: LACHAT2 Analyzed: 03/23/2017 08:50

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.010	**0.021**	mg/L	

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.010	ND	mg/L	U

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-2

17C0319-02 (Water)

Sampled: 03/21/2017 12:05

Wet Chemistry

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0566 Sample Size: 5 mL
Prepared: 03/22/2017 11:03 Final Volume: 5 mL

Analytical Method: EPA 375.2 Instrument: LACHAT2 Analyzed: 03/24/2017 10:30

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	2.00	**14.1**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0641 Sample Size: 2 mL
Prepared: 03/24/2017 12:58 Final Volume: 2 mL

Analytical Method: EPA 410.4 Instrument: UV1800-1 Analyzed: 03/27/2017 15:39

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
COD		1	10.0	**10.4**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0581 Sample Size: 20 mL
Prepared: 03/22/2017 16:43 Final Volume: 20 mL

Analytical Method: SM 5310 B-00 Instrument: TOC-LCSH Analyzed: 03/22/2017 18:20

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	**3.92**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-2

17C0319-02RE1 (Water)
Sampled: 03/21/2017 12:05

Wet Chemistry

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0635 Sample Size: 10 mL
Prepared: 03/24/2017 10:44 Final Volume: 10 mL

Analytical Method: EPA 325.2 Instrument: LACHAT2 Analyzed: 03/24/2017 18:15

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	2	2.00	**14.6**	mg/L	D

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-3

17C0319-03 (Water)
Sampled: 03/21/2017 13:05

Wet Chemistry

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0564 — Sample Size: 200 mL
Prepared: 03/22/2017 11:02 — Final Volume: 200 mL

Analytical Method: EPA 160.1 — Instrument: BAL2 — Analyzed: 03/22/2017 11:02

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5.0	**130**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0635 — Sample Size: 10 mL
Prepared: 03/24/2017 10:44 — Final Volume: 10 mL

Analytical Method: EPA 325.2 — Instrument: LACHAT2 — Analyzed: 03/24/2017 18:01

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	1.00	**1.33**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0844 — Sample Size: 10 mL
Prepared: 03/31/2017 12:46 — Final Volume: 10 mL

Analytical Method: EPA 350.1 M — Instrument: LACHAT2 — Analyzed: 03/31/2017 16:36

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.040	**0.061**	mg-N/L	

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/23/2017 08:21 — Final Volume: 1

Analytical Method: EPA 353.2 — Instrument: [CALC] — Analyzed: 03/23/2017 09:01

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.0200	**0.0535**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0592 — Sample Size: 5 mL
Prepared: 03/23/2017 08:21 — Final Volume: 5 mL

Analytical Method: EPA 353.2 — Instrument: LACHAT2 — Analyzed: 03/23/2017 09:01

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-3

17C0319-03 (Water)
Sampled: 03/21/2017 13:05

Wet Chemistry

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.010	**0.054**	mg/L	

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.010	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0566 Sample Size: 5 mL
Prepared: 03/22/2017 11:03 Final Volume: 5 mL

Analytical Method: EPA 375.2 Instrument: LACHAT2 Analyzed: 03/24/2017 10:31

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	2.00	**19.8**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0641 Sample Size: 2 mL
Prepared: 03/24/2017 12:58 Final Volume: 2 mL

Analytical Method: EPA 410.4 Instrument: UV1800-1 Analyzed: 03/27/2017 15:39

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
COD		1	10.0	**34.9**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0581 Sample Size: 20 mL
Prepared: 03/22/2017 16:43 Final Volume: 20 mL

Analytical Method: SM 5310 B-00 Instrument: TOC-LCSH Analyzed: 03/22/2017 18:20

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	**9.11**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-5

17C0319-04 (Water)
Sampled: 03/21/2017 14:34

Wet Chemistry

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0564 — Sample Size: 100 mL
Prepared: 03/22/2017 11:02 — Final Volume: 200 mL

Analytical Method: EPA 160.1 — Instrument: BAL2 — Analyzed: 03/22/2017 11:02

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10.0	**358**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0635 — Sample Size: 10 mL
Prepared: 03/24/2017 10:44 — Final Volume: 10 mL

Analytical Method: EPA 325.2 — Instrument: LACHAT2 — Analyzed: 03/24/2017 18:02

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	1.00	**3.23**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0844 — Sample Size: 10 mL
Prepared: 03/31/2017 12:46 — Final Volume: 10 mL

Analytical Method: EPA 350.1 M — Instrument: LACHAT2 — Analyzed: 03/31/2017 16:44

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.040	**0.047**	mg-N/L	

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/23/2017 08:21 — Final Volume: 1

Analytical Method: EPA 353.2 — Instrument: [CALC] — Analyzed: 03/23/2017 10:00

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	5	0.100	ND	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0566 — Sample Size: 5 mL
Prepared: 03/22/2017 11:03 — Final Volume: 5 mL

Analytical Method: EPA 375.2 — Instrument: LACHAT2 — Analyzed: 03/24/2017 10:38

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-5

17C0319-04 (Water)
Sampled: 03/21/2017 14:34

Wet Chemistry

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	4	8.00	**75.9**	mg/L	D

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0641 Sample Size: 2 mL
Prepared: 03/24/2017 12:58 Final Volume: 2 mL

Analytical Method: EPA 410.4 Instrument: UV1800-1 Analyzed: 03/27/2017 15:40

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
COD		1	10.0	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0581 Sample Size: 20 mL
Prepared: 03/22/2017 16:43 Final Volume: 20 mL

Analytical Method: SM 5310 B-00 Instrument: TOC-LCSH Analyzed: 03/22/2017 18:20

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	**1.65**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-5

17C0319-04RE1 (Water)
Sampled: 03/21/2017 14:34

Wet Chemistry

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0592 Sample Size: 5 mL
Prepared: 03/23/2017 08:21 Final Volume: 5 mL

Analytical Method: EPA 353.2 Instrument: LACHAT2 Analyzed: 03/23/2017 10:00

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		5	0.050	ND	mg/L	U

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	5	0.050	ND	mg/L	U

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-6

17C0319-05 (Water)

Sampled: 03/21/2017 12:15

Wet Chemistry

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0564 — Sample Size: 100 mL
Prepared: 03/22/2017 11:02 — Final Volume: 200 mL

Analytical Method: EPA 160.1 — Instrument: BAL2 — Analyzed: 03/22/2017 11:02

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10.0	**447**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0635 — Sample Size: 10 mL
Prepared: 03/24/2017 10:44 — Final Volume: 10 mL

Analytical Method: EPA 325.2 — Instrument: LACHAT2 — Analyzed: 03/24/2017 18:03

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	1.00	**14.1**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0844 — Sample Size: 10 mL
Prepared: 03/31/2017 12:46 — Final Volume: 10 mL

Analytical Method: EPA 350.1 M — Instrument: LACHAT2 — Analyzed: 03/31/2017 16:45

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.040	**0.518**	mg-N/L	

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/23/2017 08:21 — Final Volume: 1

Analytical Method: EPA 353.2 — Instrument: [CALC] — Analyzed: 03/23/2017 09:04

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.0200	**0.0475**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0592 — Sample Size: 5 mL
Prepared: 03/23/2017 08:21 — Final Volume: 5 mL

Analytical Method: EPA 353.2 — Instrument: LACHAT2 — Analyzed: 03/23/2017 09:04

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-6

17C0319-05 (Water)

Sampled: 03/21/2017 12:15

Wet Chemistry

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.010	**0.048**	mg/L	

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.010	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0566 Sample Size: 5 mL
Prepared: 03/22/2017 11:03 Final Volume: 5 mL

Analytical Method: EPA 375.2 Instrument: LACHAT2 Analyzed: 03/24/2017 10:39

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	2.00	**14.6**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0641 Sample Size: 2 mL
Prepared: 03/24/2017 12:58 Final Volume: 2 mL

Analytical Method: EPA 410.4 Instrument: UV1800-1 Analyzed: 03/27/2017 15:40

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
COD		1	10.0	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0581 Sample Size: 20 mL
Prepared: 03/22/2017 16:43 Final Volume: 20 mL

Analytical Method: SM 5310 B-00 Instrument: TOC-LCSH Analyzed: 03/22/2017 18:20

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	**3.92**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-6

17C0319-05RE1 (Water)
Sampled: 03/21/2017 12:15

Wet Chemistry

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0635 Sample Size: 10 mL
Prepared: 03/24/2017 10:44 Final Volume: 10 mL

Analytical Method: EPA 325.2 Instrument: LACHAT2 Analyzed: 03/24/2017 18:16

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	2	2.00	**14.4**	mg/L	D

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

SW-6

17C0319-06 (Water)
Sampled: 03/21/2017 15:25

Wet Chemistry

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0564 — Sample Size: 100 mL
Prepared: 03/22/2017 11:02 — Final Volume: 200 mL

Analytical Method: EPA 160.1 — Instrument: BAL2 — Analyzed: 03/22/2017 11:02

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10.0	**575**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0635 — Sample Size: 10 mL
Prepared: 03/24/2017 10:44 — Final Volume: 10 mL

Analytical Method: EPA 325.2 — Instrument: LACHAT2 — Analyzed: 03/24/2017 18:07

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	1.00	**5.55**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0844 — Sample Size: 10 mL
Prepared: 03/31/2017 12:46 — Final Volume: 10 mL

Analytical Method: EPA 350.1 M — Instrument: LACHAT2 — Analyzed: 03/31/2017 16:46

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.040	**0.187**	mg-N/L	

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/23/2017 08:21 — Final Volume: 1

Analytical Method: EPA 353.2 — Instrument: [CALC] — Analyzed: 03/23/2017 09:05

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.0200	**0.123**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0592 — Sample Size: 5 mL
Prepared: 03/23/2017 08:21 — Final Volume: 5 mL

Analytical Method: EPA 353.2 — Instrument: LACHAT2 — Analyzed: 03/23/2017 09:05

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

SW-6

17C0319-06 (Water)
Sampled: 03/21/2017 15:25

Wet Chemistry

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.010	**0.123**	mg/L	

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.010	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0566 Sample Size: 5 mL
Prepared: 03/22/2017 11:03 Final Volume: 5 mL

Analytical Method: EPA 375.2 Instrument: LACHAT2 Analyzed: 03/24/2017 10:40

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	10	20.0	**187**	mg/L	D

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0641 Sample Size: 2 mL
Prepared: 03/24/2017 12:58 Final Volume: 2 mL

Analytical Method: EPA 410.4 Instrument: UV1800-1 Analyzed: 03/27/2017 15:40

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
COD		1	10.0	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0581 Sample Size: 20 mL
Prepared: 03/22/2017 16:43 Final Volume: 20 mL

Analytical Method: SM 5310 B-00 Instrument: TOC-LCSH Analyzed: 03/22/2017 18:20

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	**1.67**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

SW-7

17C0319-07 (Water)
Sampled: 03/21/2017 16:00

Wet Chemistry

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0564 — Sample Size: 200 mL
Prepared: 03/22/2017 11:02 — Final Volume: 200 mL

Analytical Method: EPA 160.1 — Instrument: BAL2 — Analyzed: 03/22/2017 11:02

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5.0	**152**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0635 — Sample Size: 10 mL
Prepared: 03/24/2017 10:44 — Final Volume: 10 mL

Analytical Method: EPA 325.2 — Instrument: LACHAT2 — Analyzed: 03/24/2017 18:08

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	1.00	**6.25**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0844 — Sample Size: 10 mL
Prepared: 03/31/2017 12:46 — Final Volume: 10 mL

Analytical Method: EPA 350.1 M — Instrument: LACHAT2 — Analyzed: 03/31/2017 16:48

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.040	ND	mg-N/L	U

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/23/2017 08:21 — Final Volume: 1

Analytical Method: EPA 353.2 — Instrument: [CALC] — Analyzed: 03/23/2017 09:32

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	2	0.0300	**1.12**	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0592 — Sample Size: 5 mL
Prepared: 03/23/2017 08:21 — Final Volume: 5 mL

Analytical Method: EPA 353.2 — Instrument: LACHAT2 — Analyzed: 03/23/2017 09:06

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

SW-7

17C0319-07 (Water)

Sampled: 03/21/2017 16:00

Wet Chemistry

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.010	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0566 — Sample Size: 5 mL
Prepared: 03/22/2017 11:03 — Final Volume: 5 mL

Analytical Method: EPA 375.2 — Instrument: LACHAT2 — Analyzed: 03/24/2017 10:42

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	2	4.00	**36.9**	mg/L	D

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0641 — Sample Size: 2 mL
Prepared: 03/24/2017 12:58 — Final Volume: 2 mL

Analytical Method: EPA 410.4 — Instrument: UV1800-1 — Analyzed: 03/27/2017 15:40

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
COD		1	10.0	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0581 — Sample Size: 20 mL
Prepared: 03/22/2017 16:43 — Final Volume: 20 mL

Analytical Method: SM 5310 B-00 — Instrument: TOC-LCSH — Analyzed: 03/22/2017 18:20

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	**3.32**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

SW-7

17C0319-07RE1 (Water)
Sampled: 03/21/2017 16:00

Wet Chemistry

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFC0592 Sample Size: 5 mL
Prepared: 03/23/2017 08:21 Final Volume: 5 mL

Analytical Method: EPA 353.2 Instrument: LACHAT2 Analyzed: 03/23/2017 09:32

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		2	0.020	**1.12**	mg/L	D

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-1

17C0319-08 (Water)

Sampled: 03/21/2017 10:25

Metals and Metallic Compounds (dissolved)

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFC0585 Sample Size: 25 mL
Prepared: 03/23/2017 06:38 Final Volume: 25 mL

Analytical Method: EPA 200.8 UCT-KED Instrument: ICPMS2 Analyzed: 03/27/2017 17:22

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Arsenic, Dissolved	7440-38-2	1	0.200	**0.259**	ug/L	

Sample Preparation: Preparation Method: WMN (No Prep)
Preparation Batch: BFC0548 Sample Size: 50 mL
Prepared: 03/22/2017 08:26 Final Volume: 50 mL

Analytical Method: EPA 6010C Instrument: ICP2 Analyzed: 03/31/2017 15:06

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium, Dissolved	7440-70-2	2	0.100	**141**	mg/L	D
Iron, Dissolved	7439-89-6	2	0.100	**0.297**	mg/L	D
Magnesium, Dissolved	7439-95-4	2	0.100	**43.6**	mg/L	D
Manganese, Dissolved	7439-96-5	2	0.0020	**0.121**	mg/L	D
Zinc, Dissolved	7440-66-6	2	0.0200	ND	mg/L	U

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-1

17C0319-08 (Water)

Sampled: 03/21/2017 10:25

Calculation

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/22/2017 08:26 Final Volume: 1

Analytical Method: SM 2340 B-97 Instrument: [CALC] Analyzed: 03/31/2017 15:06

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness, Dissolved		2	0.662	**531**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-2

17C0319-09 (Water)
Sampled: 03/21/2017 12:05

Metals and Metallic Compounds (dissolved)

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFC0585 Sample Size: 25 mL
Prepared: 03/23/2017 06:38 Final Volume: 25 mL

Analytical Method: EPA 200.8 UCT-KED Instrument: ICPMS2 Analyzed: 03/24/2017 22:11

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Arsenic, Dissolved	7440-38-2	1	0.200	ND	ug/L	U

Sample Preparation: Preparation Method: WMN (No Prep)
Preparation Batch: BFC0548 Sample Size: 50 mL
Prepared: 03/22/2017 08:26 Final Volume: 50 mL

Analytical Method: EPA 6010C Instrument: ICP2 Analyzed: 03/31/2017 12:21

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium, Dissolved	7440-70-2	1	0.0500	**69.7**	mg/L	
Iron, Dissolved	7439-89-6	1	0.0500	**0.574**	mg/L	
Magnesium, Dissolved	7439-95-4	1	0.0500	**26.6**	mg/L	
Manganese, Dissolved	7439-96-5	1	0.0010	**0.105**	mg/L	
Zinc, Dissolved	7440-66-6	1	0.0100	ND	mg/L	U

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-2

17C0319-09 (Water)

Sampled: 03/21/2017 12:05

Calculation

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/22/2017 08:26 Final Volume: 1

Analytical Method: SM 2340 B-97 Instrument: [CALC] Analyzed: 03/31/2017 12:21

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness, Dissolved		1	0.331	**284**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-3

17C0319-10 (Water)

Sampled: 03/21/2017 13:05

Metals and Metallic Compounds (dissolved)

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFC0585 Sample Size: 25 mL
Prepared: 03/23/2017 06:38 Final Volume: 25 mL

Analytical Method: EPA 200.8 UCT-KED Instrument: ICPMS2 Analyzed: 03/24/2017 22:16

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Arsenic, Dissolved	7440-38-2	1	0.200	**3.63**	ug/L	

Sample Preparation: Preparation Method: WMN (No Prep)
Preparation Batch: BFC0548 Sample Size: 50 mL
Prepared: 03/22/2017 08:26 Final Volume: 50 mL

Analytical Method: EPA 6010C Instrument: ICP2 Analyzed: 03/31/2017 15:13

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium, Dissolved	7440-70-2	5	0.250	**14.3**	mg/L	D
Iron, Dissolved	7439-89-6	5	0.250	**0.616**	mg/L	D
Magnesium, Dissolved	7439-95-4	5	0.250	**3.49**	mg/L	D
Manganese, Dissolved	7439-96-5	5	0.0050	**0.0457**	mg/L	D
Zinc, Dissolved	7440-66-6	5	0.0500	**0.159**	mg/L	D

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-3

17C0319-10 (Water)

Sampled: 03/21/2017 13:05

Calculation

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/22/2017 08:26 Final Volume: 1

Analytical Method: SM 2340 B-97 Instrument: [CALC] Analyzed: 03/31/2017 15:13

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness, Dissolved		5	1.65	**50.2**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-5

17C0319-11 (Water)
Sampled: 03/21/2017 14:34

Metals and Metallic Compounds (dissolved)

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFC0585 Sample Size: 25 mL
Prepared: 03/23/2017 06:38 Final Volume: 25 mL

Analytical Method: EPA 200.8 UCT-KED Instrument: ICPMS2 Analyzed: 03/24/2017 22:21

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Arsenic, Dissolved	7440-38-2	1	0.200	**15.1**	ug/L	

Sample Preparation: Preparation Method: WMN (No Prep)
Preparation Batch: BFC0548 Sample Size: 50 mL
Prepared: 03/22/2017 08:26 Final Volume: 50 mL

Analytical Method: EPA 6010C Instrument: ICP2 Analyzed: 03/31/2017 13:17

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium, Dissolved	7440-70-2	1	0.0500	**71.2**	mg/L	
Iron, Dissolved	7439-89-6	1	0.0500	**6.03**	mg/L	
Magnesium, Dissolved	7439-95-4	1	0.0500	**31.3**	mg/L	
Manganese, Dissolved	7439-96-5	1	0.0010	**0.666**	mg/L	
Zinc, Dissolved	7440-66-6	1	0.0100	ND	mg/L	U

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-5

17C0319-11 (Water)

Sampled: 03/21/2017 14:34

Calculation

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/22/2017 08:26 Final Volume: 1

Analytical Method: SM 2340 B-97 Instrument: [CALC] Analyzed: 03/31/2017 13:17

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness, Dissolved		1	0.331	**307**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-6

17C0319-12 (Water)

Sampled: 03/21/2017 12:15

Metals and Metallic Compounds (dissolved)

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFC0585 Sample Size: 25 mL
Prepared: 03/23/2017 06:38 Final Volume: 25 mL

Analytical Method: EPA 200.8 UCT-KED Instrument: ICPMS2 Analyzed: 03/24/2017 22:26

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Arsenic, Dissolved	7440-38-2	1	0.200	**0.495**	ug/L	

Sample Preparation: Preparation Method: WMN (No Prep)
Preparation Batch: BFC0548 Sample Size: 50 mL
Prepared: 03/22/2017 08:26 Final Volume: 50 mL

Analytical Method: EPA 6010C Instrument: ICP2 Analyzed: 03/30/2017 16:18

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium, Dissolved	7440-70-2	1	0.0500	**72.5**	mg/L	
Iron, Dissolved	7439-89-6	1	0.0500	**0.615**	mg/L	
Magnesium, Dissolved	7439-95-4	1	0.0500	**29.0**	mg/L	
Manganese, Dissolved	7439-96-5	1	0.0010	**0.113**	mg/L	
Zinc, Dissolved	7440-66-6	1	0.0100	ND	mg/L	U

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

MW-6

17C0319-12 (Water)

Sampled: 03/21/2017 12:15

Calculation

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/22/2017 08:26 Final Volume: 1

Analytical Method: SM 2340 B-97 Instrument: [CALC] Analyzed: 03/30/2017 16:18

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness, Dissolved		1	0.331	**300**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

SW-6

17C0319-13 (Water)

Sampled: 03/21/2017 15:25

Metals and Metallic Compounds (dissolved)

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFC0585 Sample Size: 25 mL
Prepared: 03/23/2017 06:38 Final Volume: 25 mL

Analytical Method: EPA 200.8 UCT-KED Instrument: ICPMS2 Analyzed: 03/24/2017 22:30

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Arsenic, Dissolved	7440-38-2	1	0.200	**4.96**	ug/L	

Sample Preparation: Preparation Method: WMN (No Prep)
Preparation Batch: BFC0548 Sample Size: 50 mL
Prepared: 03/22/2017 08:26 Final Volume: 50 mL

Analytical Method: EPA 6010C Instrument: ICP2 Analyzed: 03/31/2017 13:21

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium, Dissolved	7440-70-2	1	0.0500	**74.4**	mg/L	
Iron, Dissolved	7439-89-6	1	0.0500	**2.89**	mg/L	
Magnesium, Dissolved	7439-95-4	1	0.0500	**47.3**	mg/L	
Manganese, Dissolved	7439-96-5	1	0.0010	**0.266**	mg/L	
Zinc, Dissolved	7440-66-6	1	0.0100	ND	mg/L	U

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

SW-6

17C0319-13 (Water)

Sampled: 03/21/2017 15:25

Calculation

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/22/2017 08:26 Final Volume: 1

Analytical Method: SM 2340 B-97 Instrument: [CALC] Analyzed: 03/31/2017 13:21

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness, Dissolved		1	0.331	**380**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

SW-7

17C0319-14 (Water)
Sampled: 03/21/2017 16:00

Metals and Metallic Compounds (dissolved)

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFC0585 Sample Size: 25 mL
Prepared: 03/23/2017 06:38 Final Volume: 25 mL

Analytical Method: EPA 200.8 UCT-KED Instrument: ICPMS2 Analyzed: 03/24/2017 22:35

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Arsenic, Dissolved	7440-38-2	1	0.200	**0.746**	ug/L	

Sample Preparation: Preparation Method: WMN (No Prep)
Preparation Batch: BFC0548 Sample Size: 50 mL
Prepared: 03/22/2017 08:26 Final Volume: 50 mL

Analytical Method: EPA 6010C Instrument: ICP2 Analyzed: 03/30/2017 16:26

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium, Dissolved	7440-70-2	1	0.0500	**19.1**	mg/L	
Iron, Dissolved	7439-89-6	1	0.0500	**0.0980**	mg/L	
Magnesium, Dissolved	7439-95-4	1	0.0500	**8.33**	mg/L	
Manganese, Dissolved	7439-96-5	1	0.0010	**0.0342**	mg/L	
Zinc, Dissolved	7440-66-6	1	0.0100	ND	mg/L	U

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

SW-7

17C0319-14 (Water)
Sampled: 03/21/2017 16:00

Calculation

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 03/22/2017 08:26 Final Volume: 1

Analytical Method: SM 2340 B-97 Instrument: [CALC] Analyzed: 03/30/2017 16:26

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness, Dissolved		1	0.331	**82**	mg/L	

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BFC0548 - WMN (No Prep)

Instrument: ICP2

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0548-BLK2)			Prepared: 21-Mar-2017 Analyzed: 31-Mar-2017 12:00							
Calcium	ND	0.0500	mg/L							U
Iron	ND	0.0500	mg/L							U
Magnesium	ND	0.0500	mg/L							U
Manganese	ND	0.0010	mg/L							U
Zinc	ND	0.0100	mg/L							U
LCS (BFC0548-BS1)			Prepared: 21-Mar-2017 Analyzed: 30-Mar-2017 15:49							
Calcium	10.3		mg/L	10.0		103 %	80-120			
Iron	2.04		mg/L	2.00		102 %	80-120			
Magnesium	10.9		mg/L	10.0		109 %	80-120			
Manganese	0.505		mg/L	0.500		101 %	80-120			
Zinc	0.511		mg/L	0.500		102 %	80-120			

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BFC0585 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0585-BLK1)				Prepared: 23-Mar-2017 Analyzed: 24-Mar-2017 18:55							
Arsenic	75a	ND	0.200	ug/L							U
LCS (BFC0585-BS1)				Prepared: 23-Mar-2017 Analyzed: 24-Mar-2017 19:21							
Arsenic	75a	24.9	0.200	ug/L	25.0		99.6 %	80-120			

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

Wet Chemistry - Quality Control

Batch BFC0564 - No Prep Wet Chem

Instrument: BAL2

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0564-BLK1)				Prepared: 22-Mar-2017 Analyzed: 22-Mar-2017 11:02						
Dissolved Solids	ND	5.0	mg/L							U
LCS (BFC0564-BS1)				Prepared: 22-Mar-2017 Analyzed: 22-Mar-2017 11:02						
Dissolved Solids	470	10.0	mg/L	500		94.0 %	90-110			

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

Wet Chemistry - Quality Control

Batch BFC0566 - No Prep Wet Chem

Instrument: LACHAT2

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0566-BLK1)			Prepared: 22-Mar-2017 Analyzed: 24-Mar-2017 10:24							
Sulfate	ND	2.00	mg/L							U
LCS (BFC0566-BS1)			Prepared: 22-Mar-2017 Analyzed: 24-Mar-2017 10:25							
Sulfate	16.3	2.00	mg/L	15.0		108 %	90-110			
Duplicate (BFC0566-DUP1)	**Source: 17C0319-01**		Prepared: 22-Mar-2017 Analyzed: 24-Mar-2017 10:27							
Sulfate	221	20.0	mg/L		223			0.70	20	D
Matrix Spike (BFC0566-MS1)	**Source: 17C0319-01**		Prepared: 22-Mar-2017 Analyzed: 24-Mar-2017 10:29							
Sulfate	310	20.0	mg/L	100	223	87.7 %	75-125			E, D

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

Wet Chemistry - Quality Control

Batch BFC0581 - No Prep Wet Chem

Instrument: TOC-LCSH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0581-BLK1)			Prepared: 22-Mar-2017 Analyzed: 22-Mar-2017 18:20							
Total Organic Carbon	ND	0.50	mg/L							U
LCS (BFC0581-BS1)			Prepared: 22-Mar-2017 Analyzed: 22-Mar-2017 18:20							
Total Organic Carbon	21.5	0.50	mg/L	20.0		107 %	90-110			

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

Wet Chemistry - Quality Control

Batch BFC0592 - No Prep Wet Chem

Instrument: LACHAT2

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0592-BLK1)			Prepared: 23-Mar-2017 Analyzed: 23-Mar-2017 08:42							
Nitrate + Nitrite as N	ND	0.010	mg/L							U
Nitrite-N	ND	0.010	mg/L							U
LCS (BFC0592-BS1)			Prepared: 23-Mar-2017 Analyzed: 23-Mar-2017 08:43							
Nitrate + Nitrite as N	0.502	0.010	mg/L	0.500		100 %	90-110			
LCS (BFC0592-BS2)			Prepared: 23-Mar-2017 Analyzed: 23-Mar-2017 08:44							
Nitrite-N	0.499	0.010	mg/L	0.500		99.8 %	75-125			
Duplicate (BFC0592-DUP1)	**Source: 17C0319-01**		Prepared: 23-Mar-2017 Analyzed: 23-Mar-2017 08:46							
Nitrate + Nitrite as N	0.152	0.010	mg/L		0.150			1.06	20	
Nitrite-N	ND	0.010	mg/L		ND					U
Matrix Spike (BFC0592-MS1)	**Source: 17C0319-01**		Prepared: 23-Mar-2017 Analyzed: 23-Mar-2017 08:47							
Nitrate + Nitrite as N	0.656	0.010	mg/L	0.500	0.150	101 %	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike (BFC0592-MS2)	**Source: 17C0319-01**		Prepared: 23-Mar-2017 Analyzed: 23-Mar-2017 08:49							
Nitrite-N	0.508	0.010	mg/L	0.500	ND	102 %	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

Wet Chemistry - Quality Control

Batch BFC0635 - No Prep Wet Chem

Instrument: LACHAT2

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0635-BLK1)			Prepared: 24-Mar-2017 Analyzed: 24-Mar-2017 17:54							
Chloride	ND	1.00	mg/L							U
LCS (BFC0635-BS1)			Prepared: 24-Mar-2017 Analyzed: 24-Mar-2017 17:55							
Chloride	4.98	1.00	mg/L	5.00		99.7 %	90-110			
Duplicate (BFC0635-DUP1)	**Source: 17C0319-01**		Prepared: 24-Mar-2017 Analyzed: 24-Mar-2017 17:57							
Chloride	3.07	1.00	mg/L		3.14			2.26	20	
Matrix Spike (BFC0635-MS1)	**Source: 17C0319-01**		Prepared: 24-Mar-2017 Analyzed: 24-Mar-2017 17:59							
Chloride	8.30	1.00	mg/L	5.00	3.14	103 %	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
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Wet Chemistry - Quality Control

Batch BFC0641 - No Prep Wet Chem

Instrument: UV1800-1

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0641-BLK1)			Prepared: 24-Mar-2017 Analyzed: 27-Mar-2017 15:33							
COD	ND	10.0	mg/L							U
DL (BFC0641-BLK2)			Prepared: 24-Mar-2017 Analyzed: 27-Mar-2017 15:38							
COD	ND	10.0	mg/L							U
Blank (BFC0641-BLK4)			Prepared: 24-Mar-2017 Analyzed: 27-Mar-2017 15:53							
COD	ND	10.0	mg/L							U
LCS (BFC0641-BS1)			Prepared: 24-Mar-2017 Analyzed: 27-Mar-2017 15:34							
COD	103	10.0	mg/L	100		103 %	90-110			
DL (BFC0641-BS2)			Prepared: 24-Mar-2017 Analyzed: 27-Mar-2017 15:39							
COD	103	10.0	mg/L	100		103 %	90-110			
LCS (BFC0641-BS3)			Prepared: 24-Mar-2017 Analyzed: 27-Mar-2017 15:42							
COD	103	10.0	mg/L	100		103 %	90-110			
LCS (BFC0641-BS4)			Prepared: 24-Mar-2017 Analyzed: 27-Mar-2017 15:54							
COD	103	10.0	mg/L	100		103 %	90-110			

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

Wet Chemistry - Quality Control

Batch BFC0844 - No Prep Wet Chem

Instrument: LACHAT2

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0844-BLK1)			Prepared: 31-Mar-2017 Analyzed: 31-Mar-2017 16:06							
Ammonia-N	ND	0.040	mg-N/L							U
LCS (BFC0844-BS1)			Prepared: 31-Mar-2017 Analyzed: 31-Mar-2017 16:08							
Ammonia-N	0.507	0.040	mg-N/L	0.500		101 %	90-110			

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
719 2nd Avenue, Suite 200	Project Number: 553-1625-014-02-02	**Reported:**
Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

Certified Analyses included in this Report

Analyte	Certifications
EPA 200.8 UCT-KED in Water	
Arsenic-75a	NELAP,WADOE,WA-DW,DoD-ELAP
EPA 353.2 in Water	
Nitrate + Nitrite as N	NELAP,DoD-ELAP,WADOE
Nitrite-N	WADOE,NELAP,DoD-ELAP
EPA 375.2 in Water	
Sulfate	WADOE,NELAP
EPA 410.4 in Water	
COD	DoD-ELAP,NELAP,WADOE
EPA 6010C in Water	
Calcium	WADOE,NELAP
Iron	WADOE,NELAP
Magnesium	WADOE,NELAP
Manganese	WADOE,NELAP
Zinc	WADOE,NELAP
SM 5310 B-00 in Water	
Total Organic Carbon	WA-DW,WADOE,NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/06/2017
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	03/30/2017
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2017
WADOE	WA Dept of Ecology	C558	06/30/2017
WA-DW	Ecology - Drinking Water	C558	06/30/2017

Parametrix, Inc.	Project: Newcastle LF GW Monitoring	
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Seattle, WA 98104	Project Manager: Lisa Gilbert	19-Apr-2017 13:35

Notes and Definitions

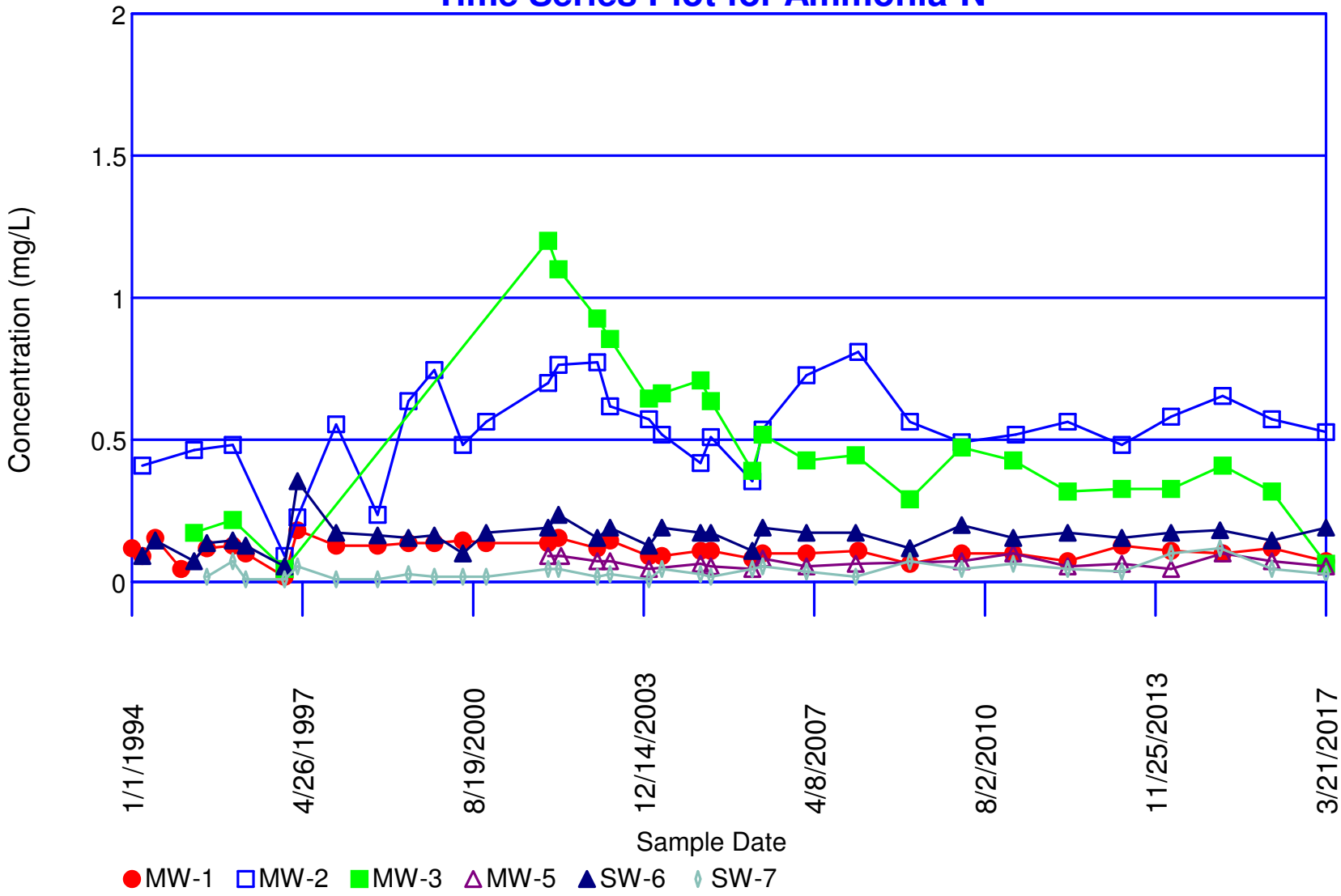
B	This analyte was detected in the method blank.
D	The reported value is from a dilution
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL)
J	Estimated concentration value detected below the reporting limit.
U	This analyte is not detected above the applicable reporting or detection limit.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

Appendix B

Time-Series Plots

Newcastle Landfill

Time Series Plot for Ammonia-N

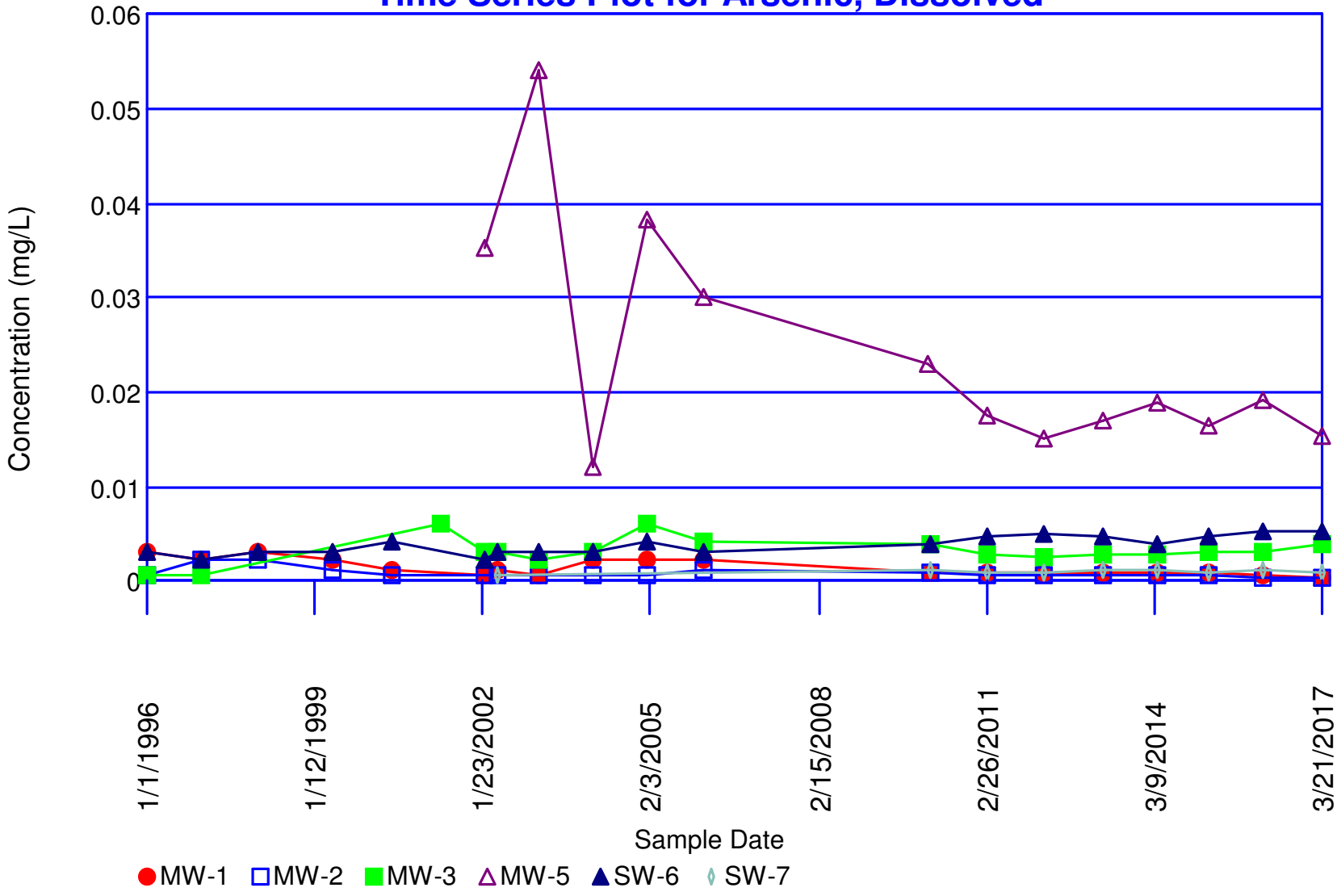


Ammonia-N

Non-Detects Replaced with 1/2 DL

Newcastle Landfill

Time Series Plot for Arsenic, Dissolved

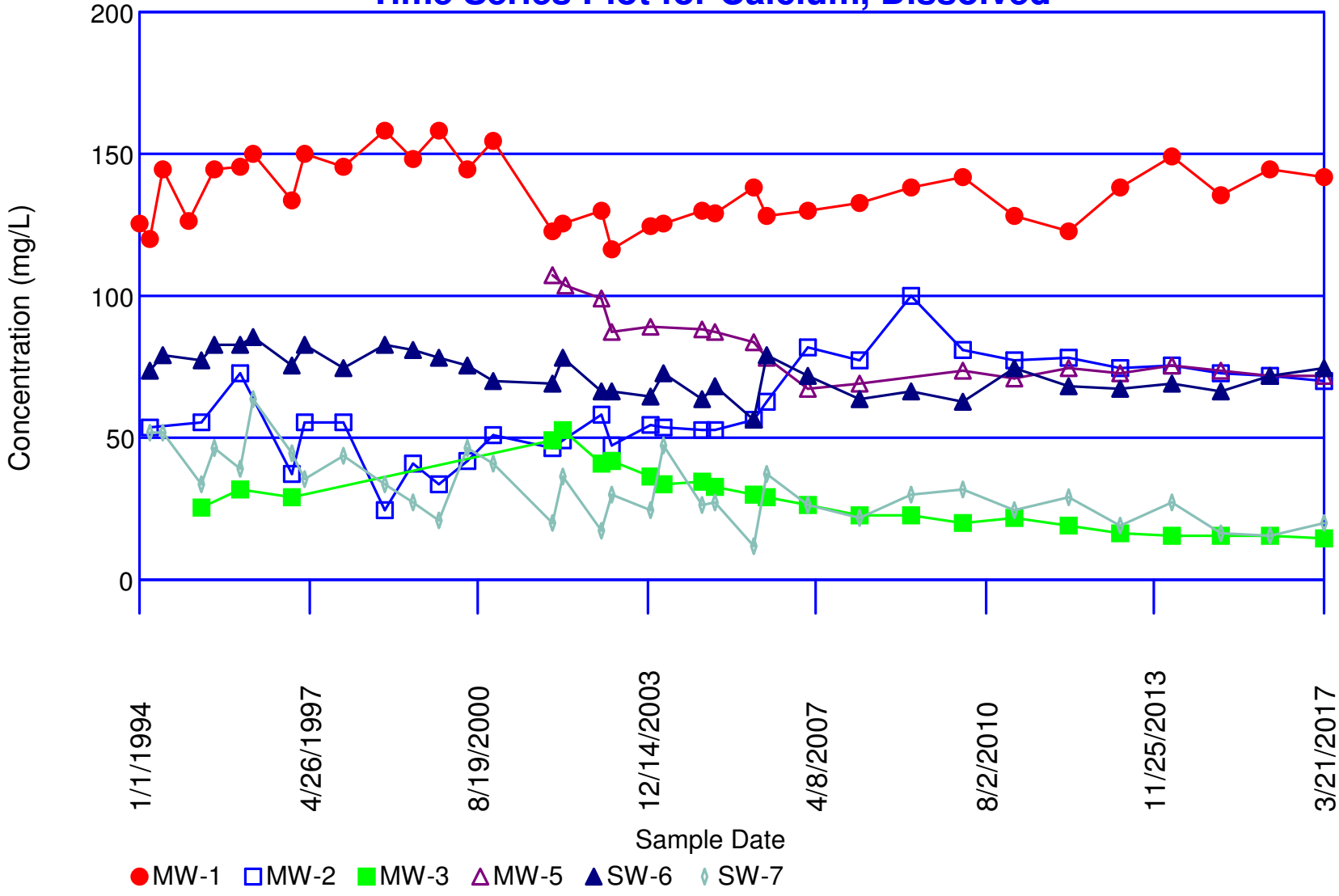


Arsenic, Dissolved

Non-Detects Replaced with 1/2 DL

Newcastle Landfill

Time Series Plot for Calcium, Dissolved

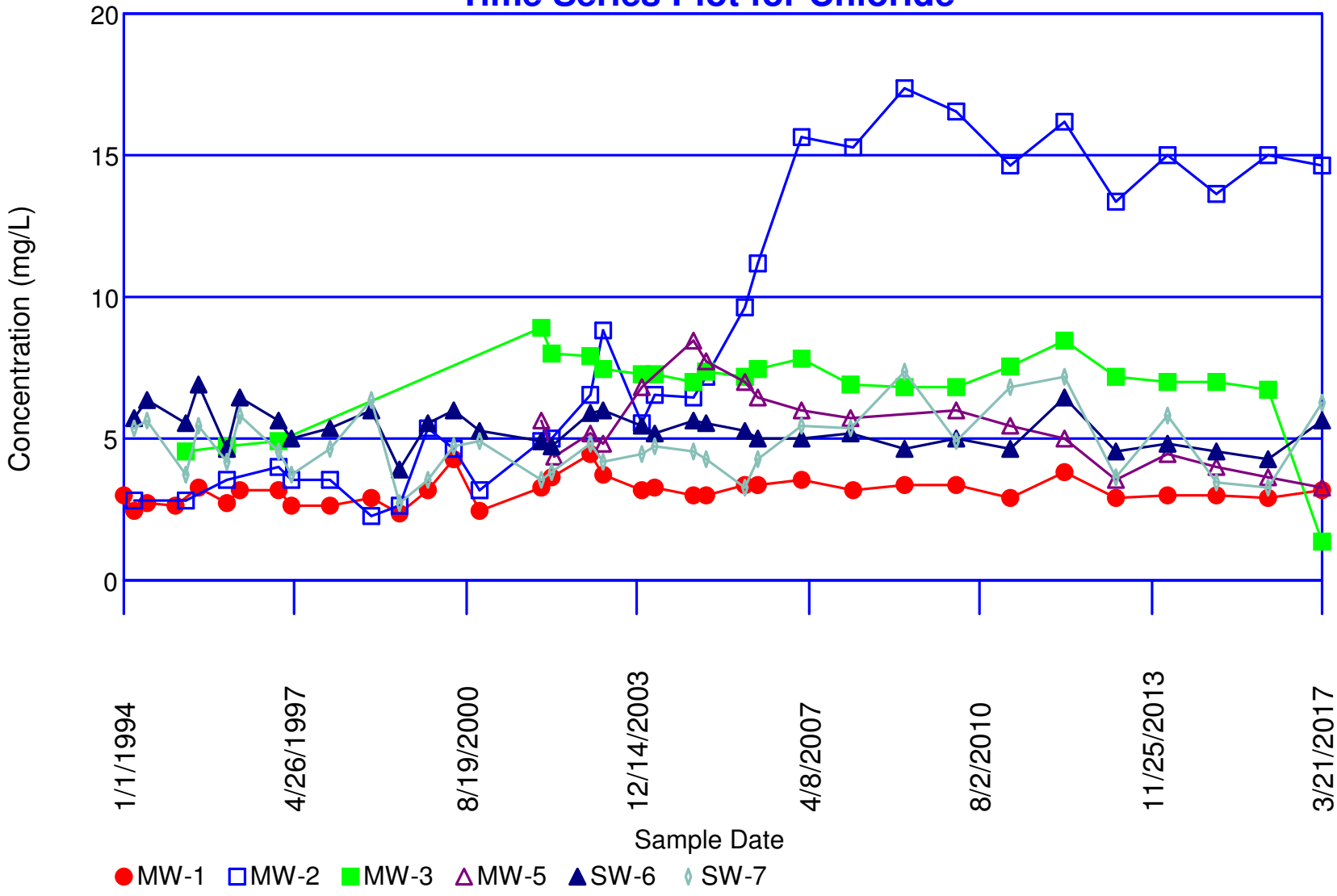


Calcium, Dissolved

Non-Detects Replaced with 1/2 DL

Newcastle Landfill

Time Series Plot for Chloride

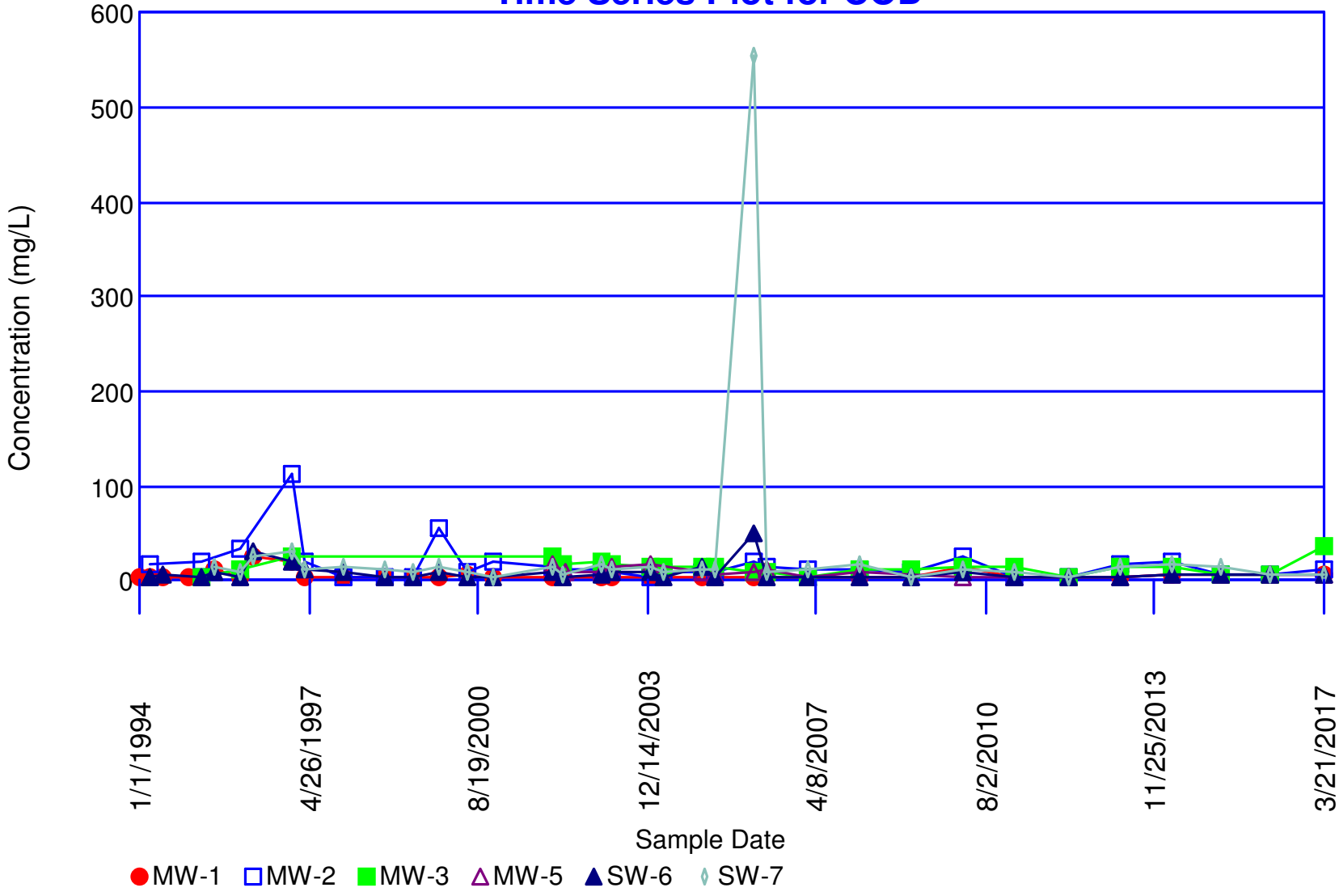


Chloride

Non-Detects Replaced with 1/2 DL

Newcastle Landfill

Time Series Plot for COD

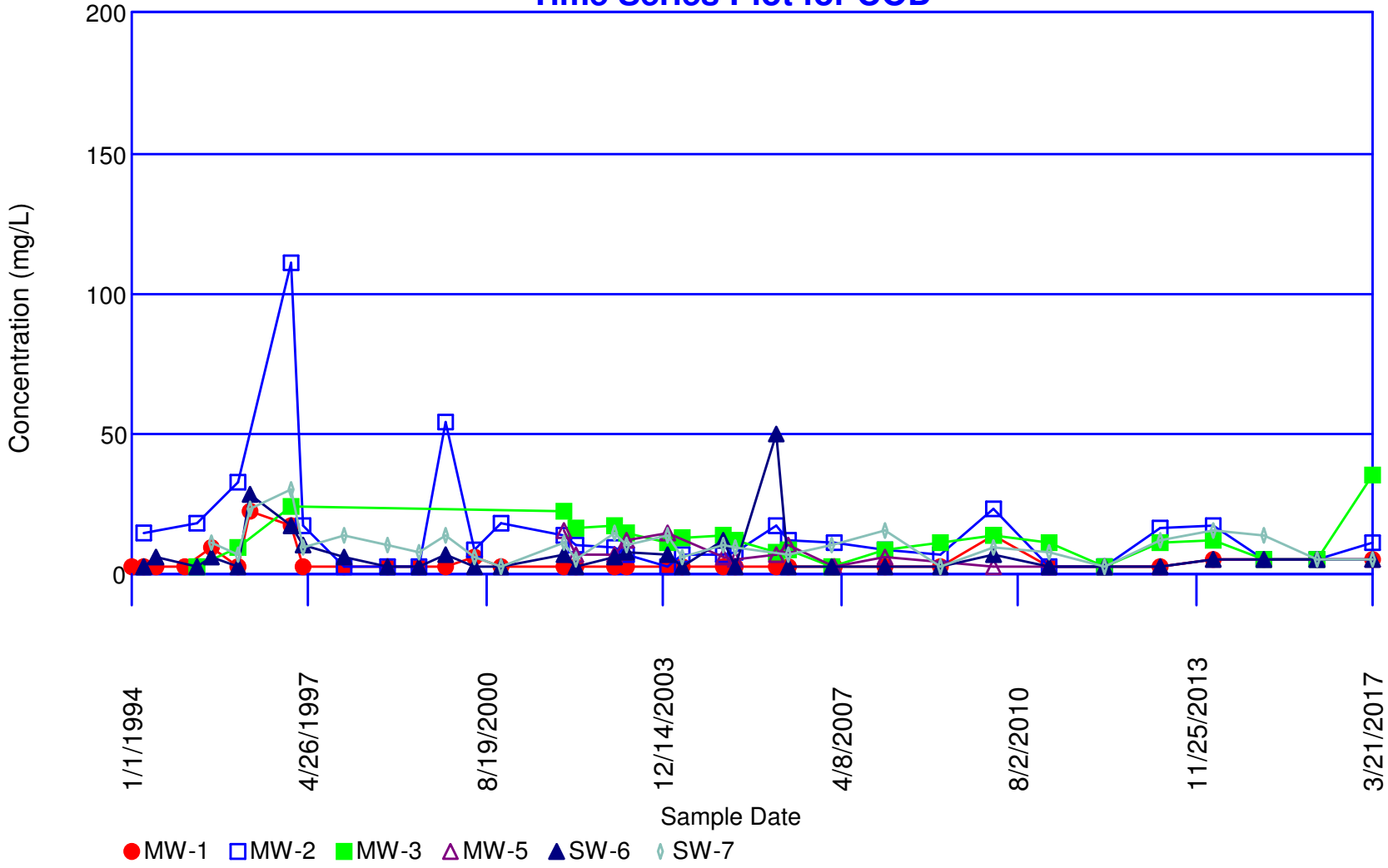


COD

Non-Detects Replaced with 1/2 DL

Newcastle Landfill

Time Series Plot for COD

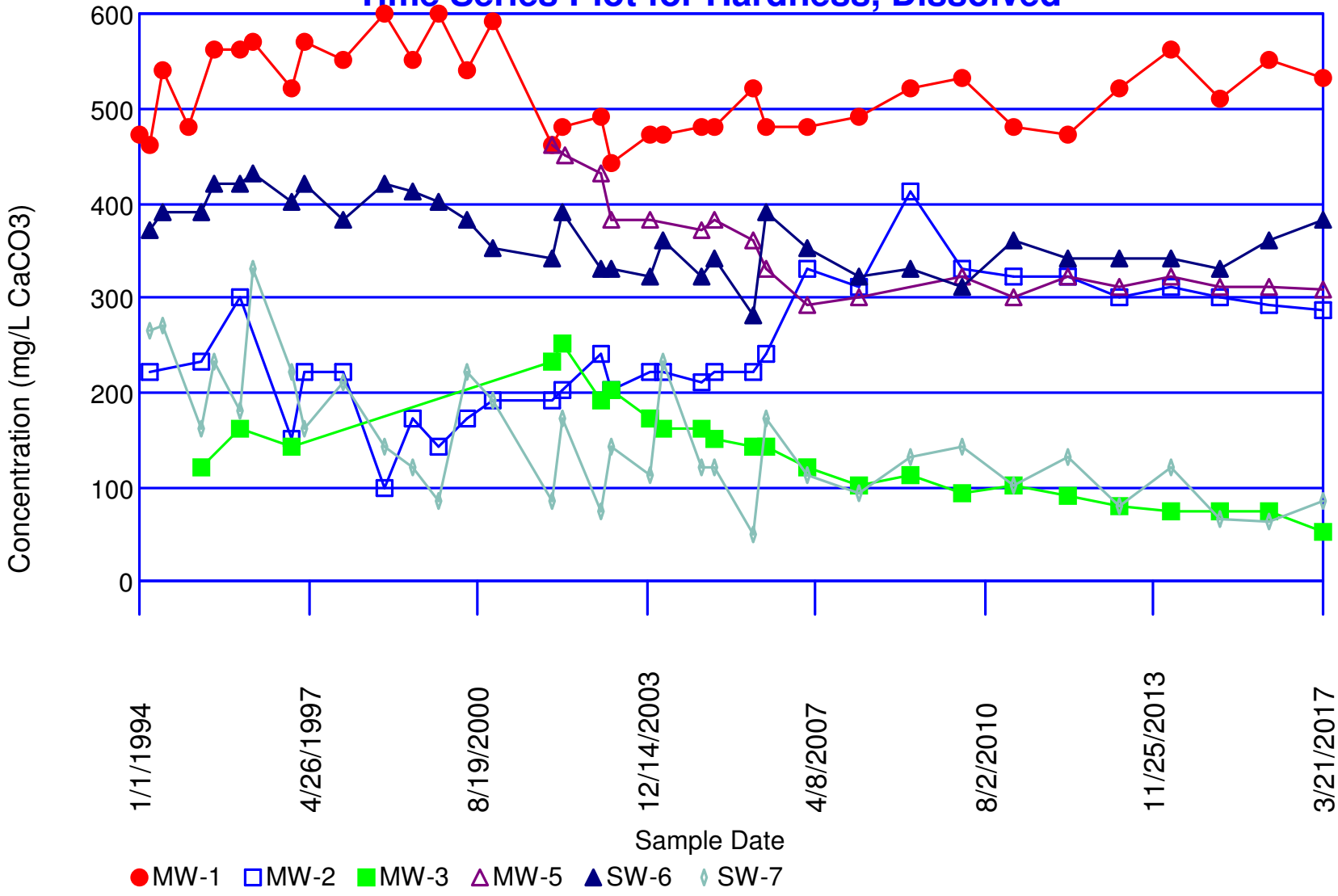


COD

Non-Detects Replaced with 1/2 DL

Newcastle Landfill

Time Series Plot for Hardness, Dissolved

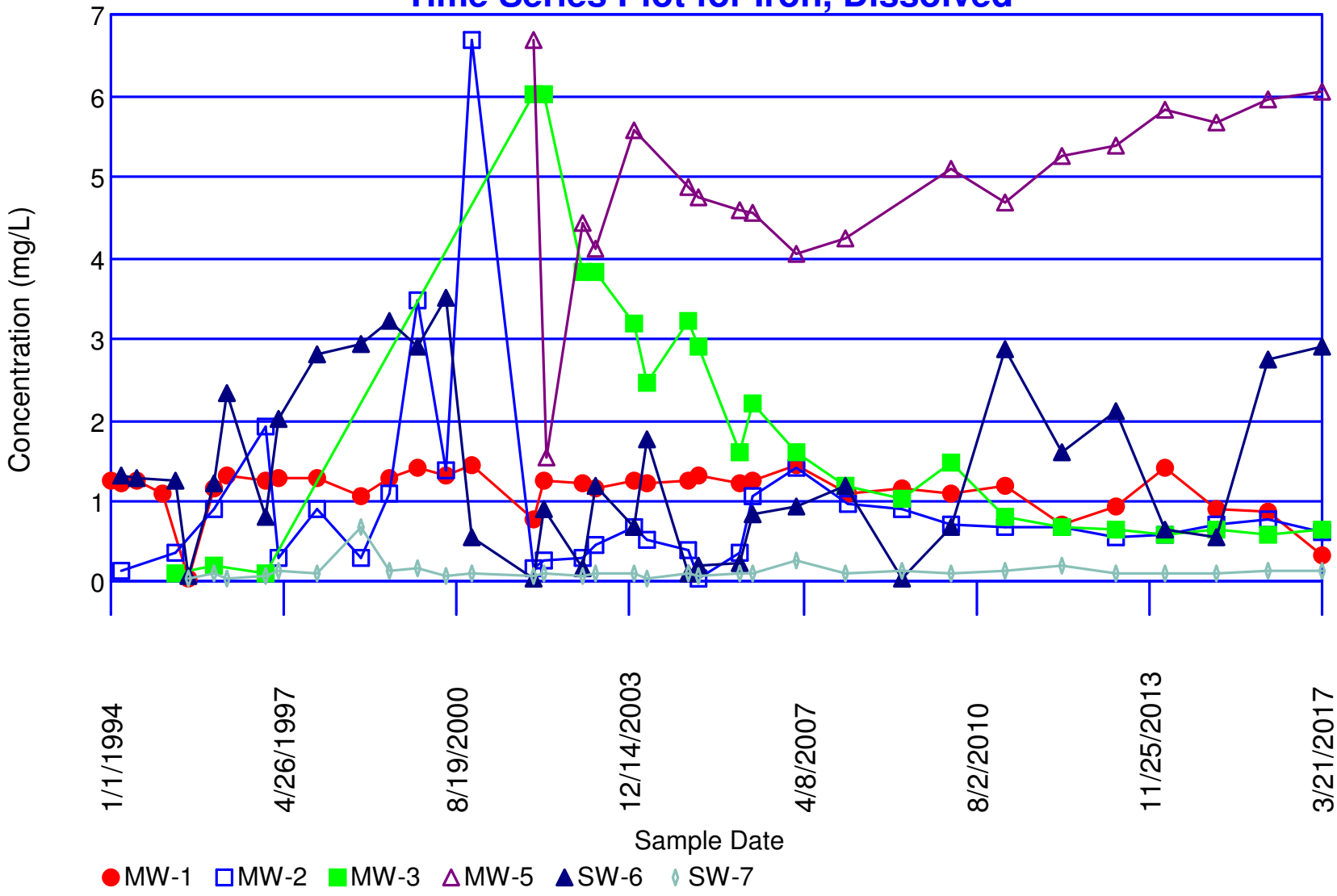


Hardness, Dissolved

Non-Detects Replaced with 1/2 DL

Newcastle Landfill

Time Series Plot for Iron, Dissolved

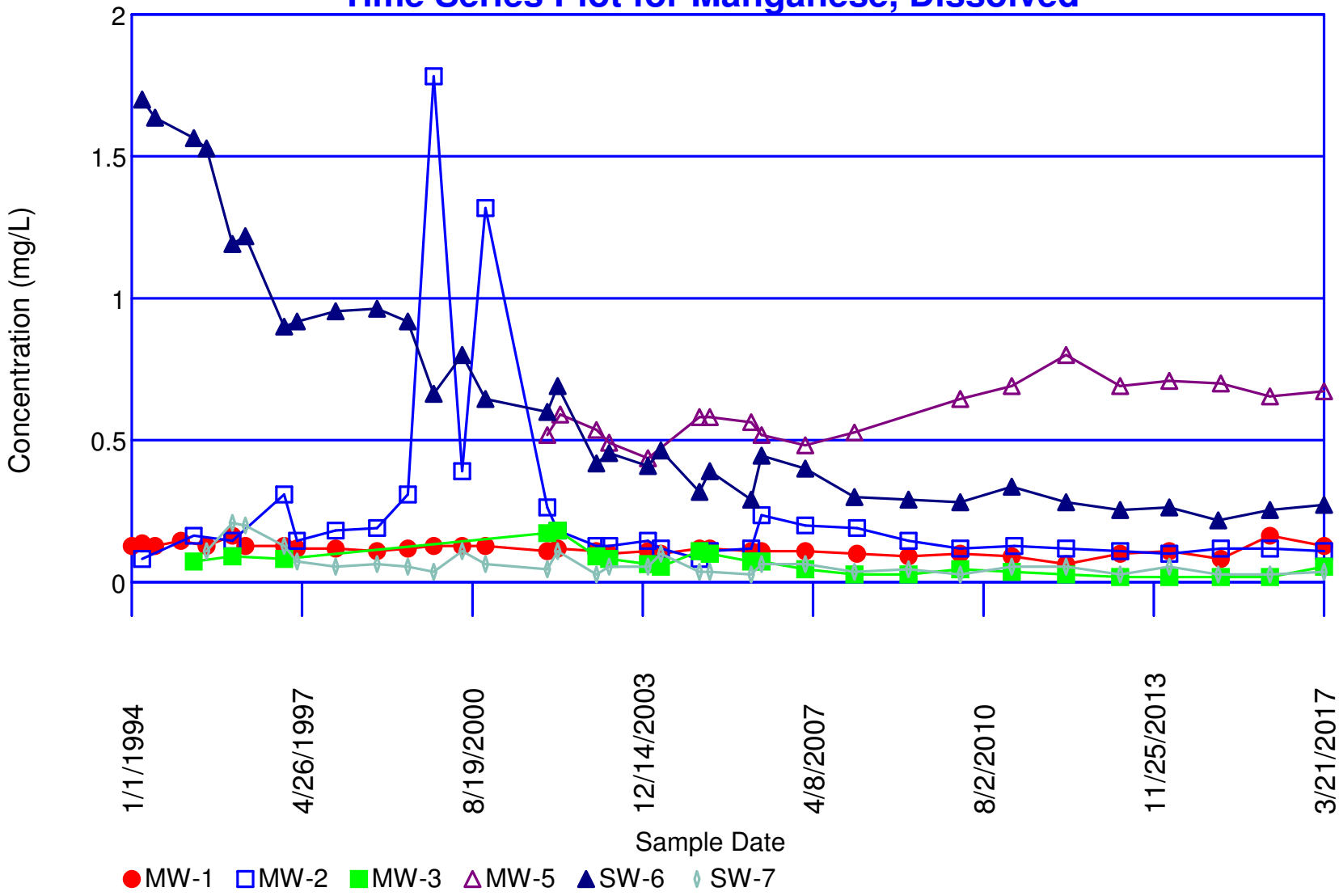


Iron, Dissolved

Non-Detects Replaced with 1/2 DL

Newcastle Landfill

Time Series Plot for Manganese, Dissolved

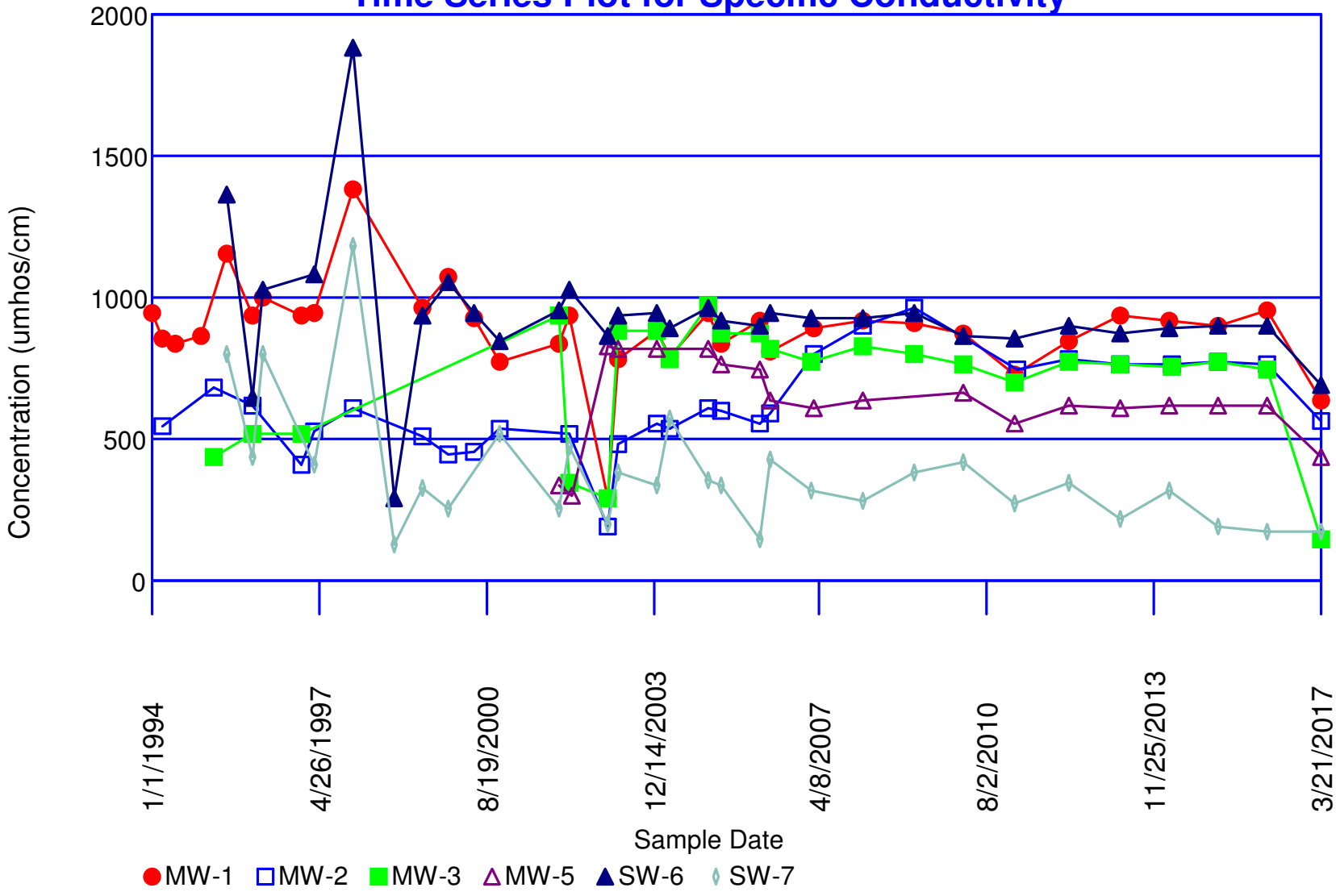


Manganese, Dissolved

Non-Detects Replaced with 1/2 DL

Newcastle Landfill

Time Series Plot for Specific Conductivity

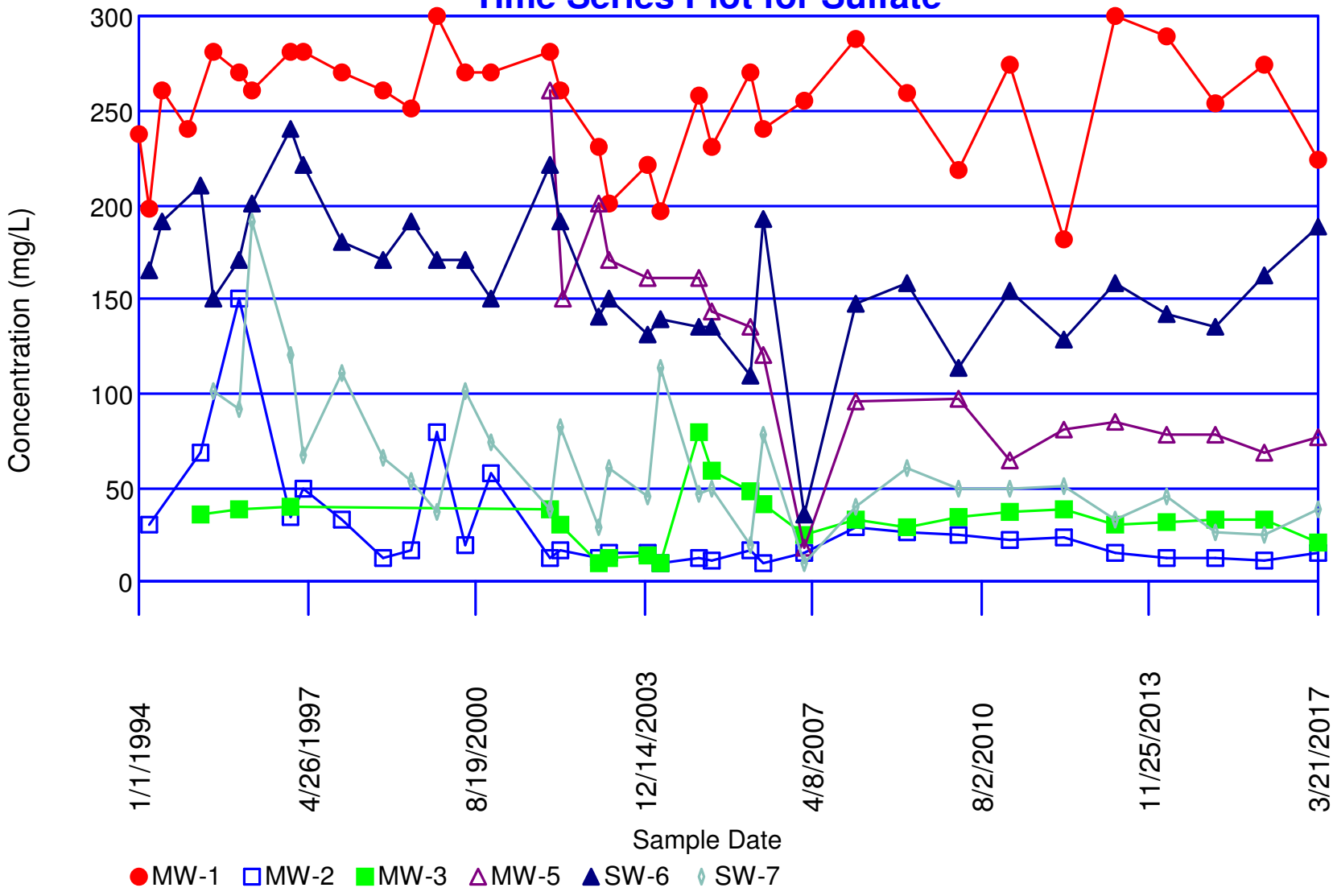


Specific Conductivity

Non-Detects Replaced with 1/2 DL

Newcastle Landfill

Time Series Plot for Sulfate

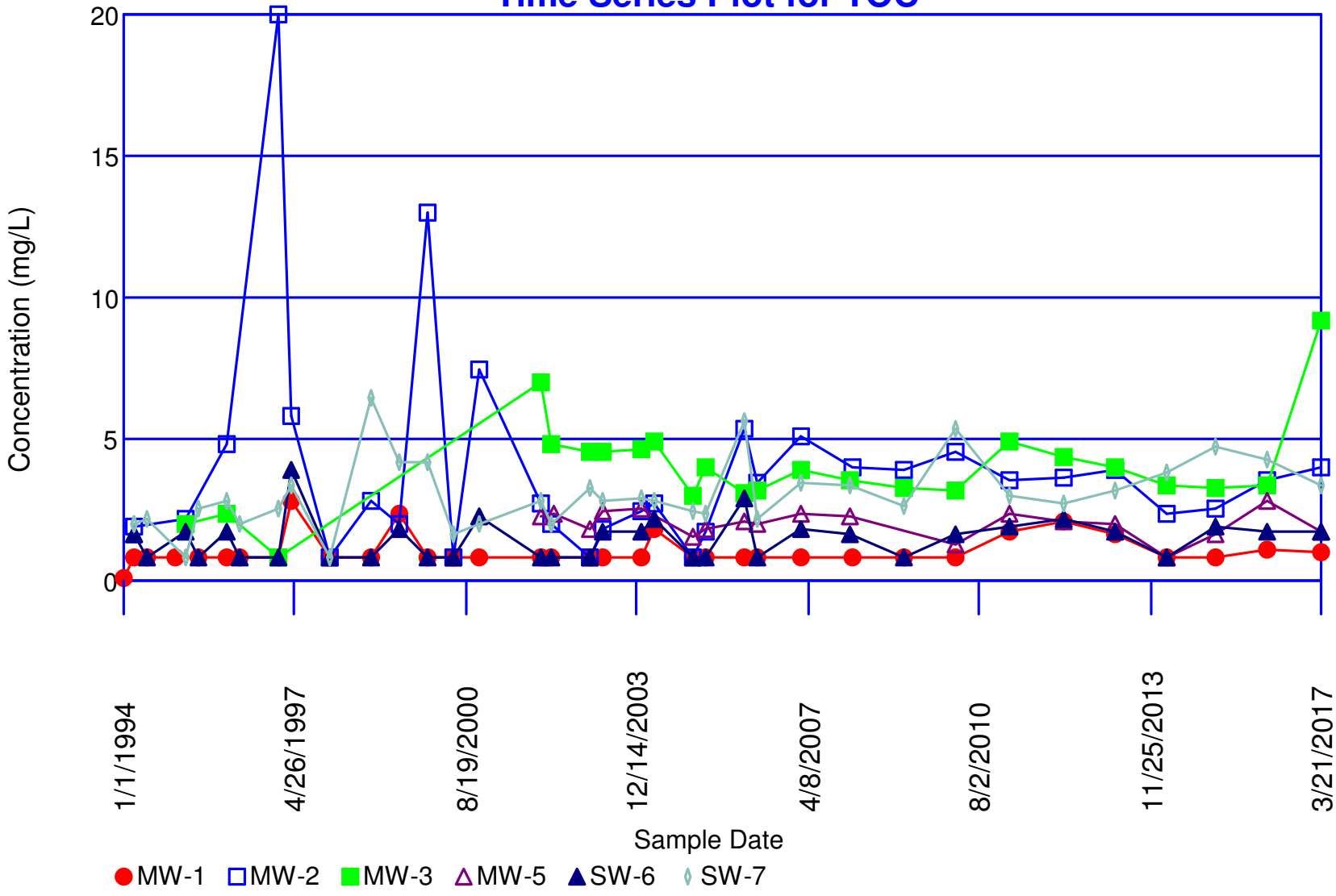


Sulfate

Non-Detects Replaced with 1/2 DL

Newcastle Landfill

Time Series Plot for TOC



TOC

Non-Detects Replaced with 1/2 DL