Parametrix

ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

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June 6, 2012
PMX No. 555-3747-003 (06/02)

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

Re: March 2012 Groundwater Sampling Event, Newcastle Demolition Landfill

Dear Rick:

INTRODUCTION

This report summarizes the groundwater monitoring data collected in March 2012 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 properly 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 (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 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 further 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, semivolatile organic compounds, and metals (except for arsenic) be discontinued. These parameters are not required by Chapter 173-304 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 2012 SAMPLING EVENT

Samples were collected on March 27 and 28, 2012, 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-2D). The 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 (calcium and magnesium), dissolved arsenic, dissolved iron, dissolved manganese, dissolved zinc, chemical oxygen demand (COD), total organic carbon (TOC), and total dissolved solids (TDS).

GROUNDWATER SAMPLING RESULTS

The analytical results for the 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. The QA review indicated acceptable accuracy and precision and no qualifiers were necessary.

Data Analysis

Data analysis consisted of comparing groundwater data (wells and surface water station SW-6) to established state groundwater quality criteria (GWQSs; 173-200 WAC) and state maximum contaminant levels for drinking water (MCLs; 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 at concentrations above secondary GWQSs and/or MCLs (established based on aesthetic characteristics such as taste, appearance, and/or staining):

- Specific conductivity in samples from wells MW-1 (upgradient), MW-2, MW-3, and surface water station SW-6;
- Total dissolved solids in samples from well MW-1 (upgradient), and surface water station SW-6;
- Dissolved iron in samples from wells MW-1 (upgradient), 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-2, MW-3, MW-5, and surface water stations SW-6 and SW-7 exceeded the carcinogenic GWQS but not 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 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). 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 concentrations 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, COD, 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 concentrations are an exception, and have shown a slight increase since 2007. Because this is a low-yield well, continuing development over several years is likely to occur, resulting in improving water quality.
- At SW-6, the dissolved manganese concentrations have steadily decreased since 1994.

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 2012 (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 and dissolved iron, statistically significant decreasing trend in dissolved manganese, upgradient from the landfill;
- MW-2: statistically significant increasing trends in ammonia, dissolved calcium, chloride, hardness, dissolved iron, dissolved manganese, specific conductivity, and TOC;
- MW-3: statistically significant increasing trends in ammonia, dissolved iron, specific conductivity, and TOC; statistically significant decreasing trends in chloride and dissolved manganese; and
- MW-5: statistically significant decreasing trends in dissolved calcium, COD, hardness, and sulfate.

GROUNDWATER LEVEL MONITORING RESULTS

Groundwater levels were measured at all four monitoring wells prior to sampling. The measurements are presented in Table 3 with calculated water elevations.

DISCUSSION AND CONCLUSIONS

Analysis of the March 2012 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 (specific conductivity, TDS, dissolved iron, and dissolved manganese) occurred in the upgradient well and in downgradient wells and surface water stations. Dissolved arsenic concentrations exceeded the carcinogenic GWQS in all wells (including the upgradient well) and surface water stations, but were all below the MCL. Statistically 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 2012 data for wells MW-2 and MW-3 indicate continuing lower concentrations for parameters that were elevated following the golf course construction period. In well MW-2 lower concentrations continued to be observed for dissolved iron, dissolved manganese, and TOC, although specific conductivity and concentrations of chloride and hardness have been higher in the past few years. In well MW-3, lower specific conductivity and concentrations of ammonia, chloride, COD, hardness (and dissolved calcium), dissolved iron, dissolved manganese, and TOC continued to be observed.

Please contact me at (425) 458-6320 or lgilbert@parametrix.com if you have questions regarding this report.

Sincerely,

PARAMETRIX

Lisa A. Gilbert, LHG
Project Hydrogeologist

cc: Bill Lasby, Public Health– Seattle & King County (two copies)

Jing Liu, 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.

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

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

TABLES

Table 1. Newcastle Groundwater and Surface Water Data

Parameter	Units	MW-1 3/27/2012	MW-2 3/28/2012	MW-2D 3/28/2012	MW-3 3/28/2012	MW-5 3/28/2012	SW-6 3/27/2012	SW-7 3/27/2012
Temperature	°C	10.03	10.44	- -	10.66	12.04	11.95	7.93
pH	standard	7.25	7.29	- -	7.52	6.55	7.59	8.38
Specific Conductivity	uS/cm	840	778	- -	772	617	891	338
Ammonia	mg-N/L	0.067	0.556	0.544	0.312	0.053	0.167	0.041
Chemical Oxygen Demand	mg/L	5 U	5 U	5.71	5 U	5 U	5 U	5 U
Chloride	mg/L	3.8	16.1	15.9	8.4	5	6.4	7.1
Dissolved Hardness	mg/L CaCO3	470	320	320	88	320	340	130
Nitrate	mg-N/L	0.038	0.058	0.047	0.067	0.2 U	0.082	1.1
Nitrate + Nitrite	mg-N/L	0.038	0.058	0.047	0.067	0.2 U	0.082	1.1
Nitrite	mg-N/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sulfate	mg/L	181	22.7	22.5	37.6	79.7	127	49.2
Total Dissolved Solids	mg/L	611	469	460	498	365	565	214
Total Organic Carbon	mg/L	2.06	3.59	3.26	4.29	2.05	2.13	2.69
Arsenic, Dissolved	mg/L	0.0006	0.0003	0.0003	0.0024	0.0149	0.0047	0.0008
Calcium, Dissolved	mg/L	122	77.8	78	18.5	74.4	67.3	28.7
Iron, Dissolved	mg/L	0.68	0.65	0.66	0.66	5.24	1.59	0.16
Magnesium, Dissolved	mg/L	39.6	30.4	30.5	10.3	31.7	41.3	13.4
Manganese, Dissolved	mg/L	0.06	0.111	0.113	0.019	0.791	0.281	0.05
Zinc, Dissolved	mg/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U

Table 2. Results of Mann-Kendall Tests for Trend, Newcastle Demolition Landfill, March 2012

Well ID	Analyte	n	S	Variance	Z	Trend
MW-1	Ammonia-N	52	197	16036.3	1.55	No Trend
	Calcium, Dissolved	49	-108	13430.0	-0.92	No Trend
	Chloride	**52**	**459**	**15967.7**	**3.62**	**Positive**
	COD	52	71	6927.0	0.84	No Trend
	Hardness	51	-116	15098.7	-0.94	No Trend
	Iron, Dissolved	**52**	**451**	**16037.0**	**3.55**	**Positive**
	Manganese, Dissolved	**52**	**-320**	**16038.7**	**-2.52**	**Negative**
	Specific Conductivity	51	-42	15157.3	-0.33	No Trend
	Sulfate	52	-100	16031.3	-0.78	No Trend
	TOC	52	152	14000.0	1.28	No Trend
MW-2	**Ammonia-N**	**46**	**242**	**11152.0**	**2.28**	**Positive**
	Calcium, Dissolved	**41**	**425**	**7925.7**	**4.76**	**Positive**
	Chloride	**46**	**660**	**11127.3**	**6.25**	**Positive**
	COD	46	105	10985.0	0.99	No Trend
	Hardness	**43**	**411**	**9076.3**	**4.30**	**Positive**
	Iron, Dissolved	**46**	**500**	**11147.3**	**4.71**	**Positive**
	Manganese, Dissolved	**45**	**249**	**10445.0**	**2.43**	**Positive**
	Specific Conductivity	**43**	**349**	**9130.3**	**3.64**	**Positive**
	Sulfate	45	25	10442.3	0.23	No Trend
	TOC	**46**	**340**	**11145.3**	**3.21**	**Positive**
MW-3	**Ammonia-N**	**32**	**152**	**3800.7**	**2.45**	**Positive**
	Calcium, Dissolved	29	-23	2841.0	-0.41	No Trend
	Chloride	**33**	**-168**	**4161.3**	**-2.59**	**Negative**
	COD	**33**	**112**	**3999.3**	**1.76**	**No Trend**
	Hardness	30	-63	3129.7	-1.11	No Trend
	Iron, Dissolved	**33**	**157**	**4162.3**	**2.42**	**Positive**
	Manganese, Dissolved	**32**	**-208**	**3796.0**	**-3.36**	**Negative**
	Specific Conductivity	**33**	**213**	**4164.3**	**3.29**	**Positive**
	Sulfate	33	21	4162.3	0.31	No Trend
	TOC	**33**	**190**	**4161.3**	**2.93**	**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.

Trends significant at a confidence level of 97.5% are shown in bold type.

Table 2. Results of Mann-Kendall Tests for Trend, Newcastle Demolition Landfill, March 2012 (continued)

Well ID	Analyte	n	S	Variance	Z	Trend
MW-5	Ammonia-N	14	-15	333.7	-0.77	No Trend
	Calcium, Dissolved	**14**	**-67**	**333.7**	**-3.61**	**Negative**
	Chloride	14	-4	332.7	-0.16	No Trend
	COD	**14**	**-53**	**325.0**	**-2.88**	**Negative**
	Hardness	**14**	**-70**	**328.0**	**3.81**	**Negative**
	Iron, Dissolved	14	5	333.7	0.22	No Trend
	Manganese, Dissolved	14	26	332.7	1.37	No Trend
	Specific Conductivity	14	-28	332.7	-1.48	No Trend
	Sulfate	**14**	**-70**	**332.7**	**-3.78**	**Negative**
	TOC	14	-6	332.7	-0.27	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.

Trends significant at a confidence level of 97.5% are shown in bold type.

Table 3. Groundwater Elevations for Newcastle Landfill, March 2012

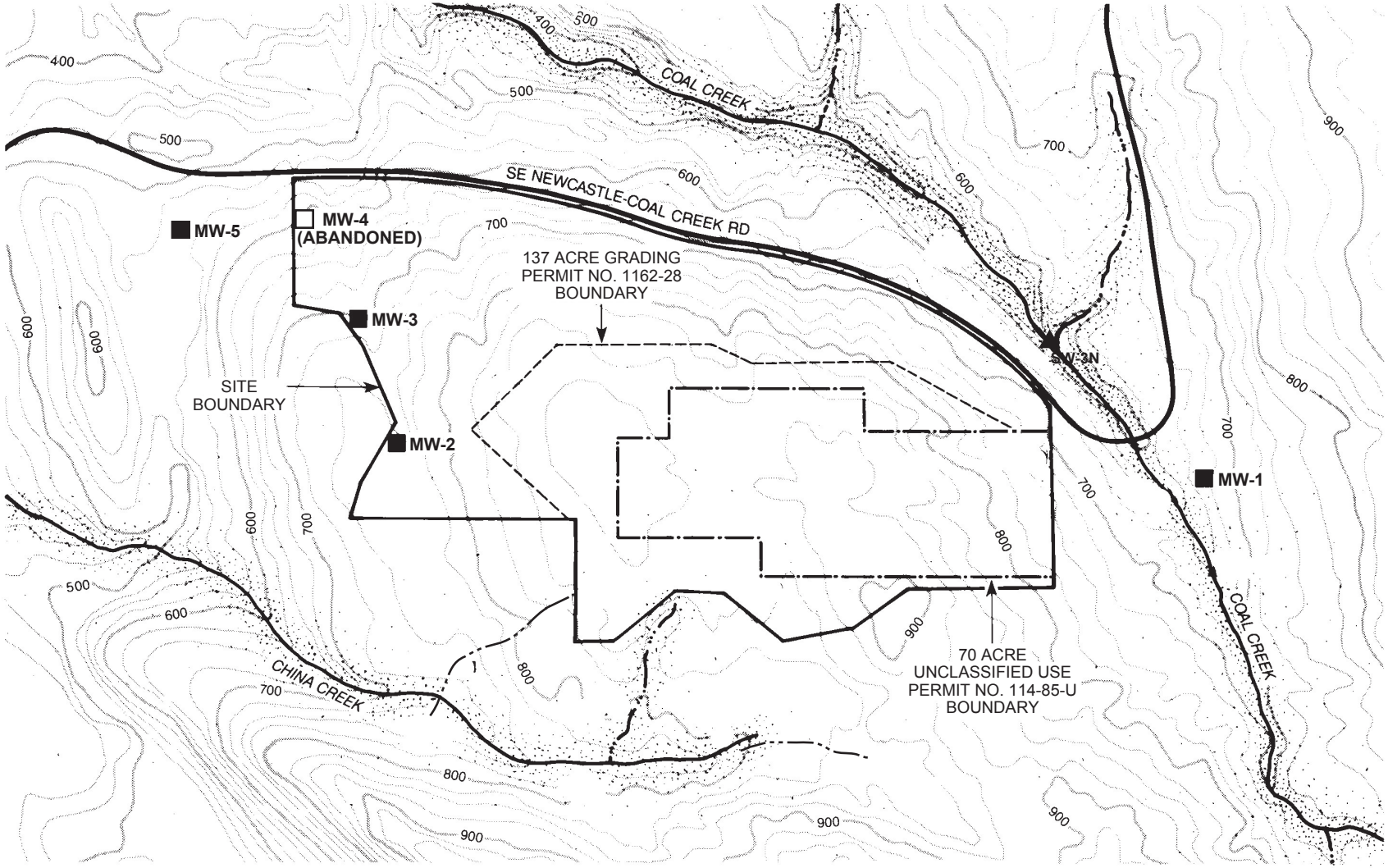
Well	Date	Reference Elevation[1]	Depth to Groundwater[2]	Groundwater Elevation[1]
MW-1	3/27/2012	649	52.20	596
MW-2	3/28/2012	753	25.01	728
MW-3	3/28/2012	716	149.20	566
MW-5	3/28/2012	542	59.20	483

Notes:

[1] Reference Elevation and Groundwater Elevation approximate

[2] Depth to groundwater measured from well seal

FIGURES



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

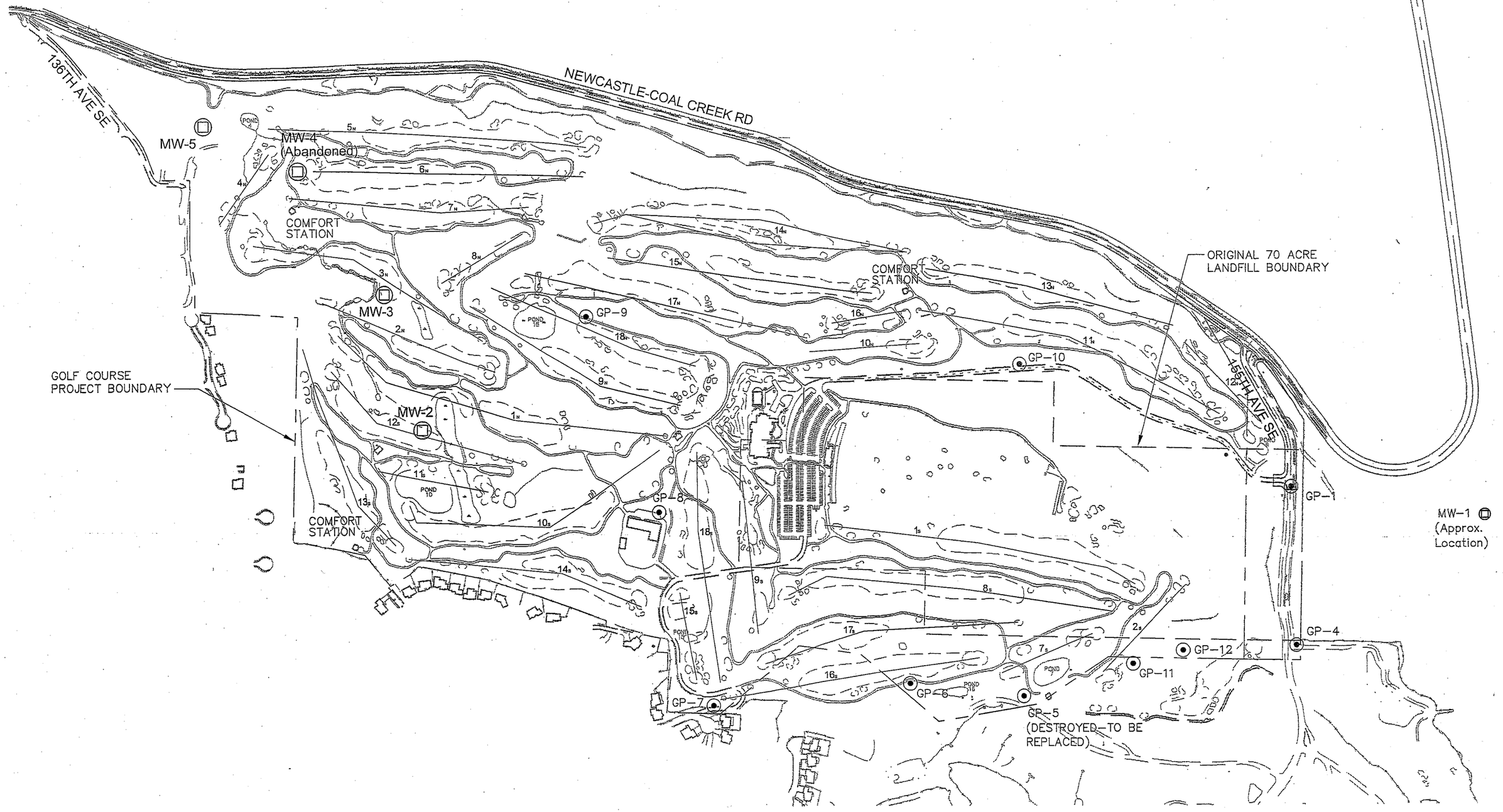
N

0 1,000

SCALE IN FEET

MW-1 Groundwater Monitoring Well

Figure 1
Groundwater Monitoring Locations in Site Vicinity
Newcastle Demolition Landfill



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

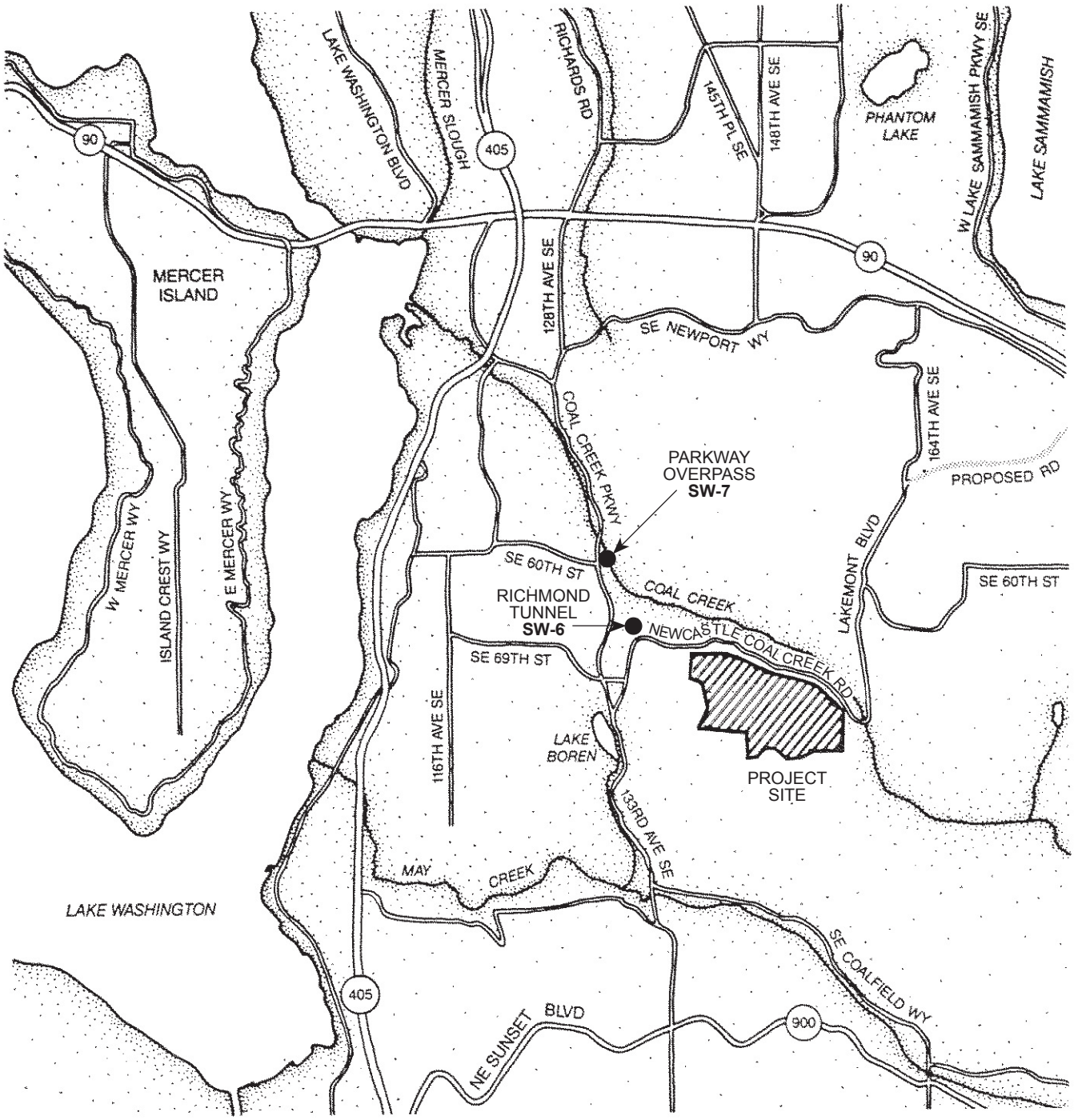
0 250 500
SCALE IN FEET

N

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



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

N

0 1

SCALE IN MILES

● Surface Water Monitoring Site

Figure 3
Off-site Monitoring Locations
Newcastle Demolition Landfill

APPENDIX A

LABORATORY REPORT AND CHAIN-OF-CUSTODY FORMS

Analytical Resources, Incorporated
Analytical Chemists and Consultants

10 April 2012

Lisa Gilbert
Parametrix, Inc.
411 108th Avenue NE
Bellevue, WA 98004-5571

RE: Project No. Newcastle LF, 555-3747-003
ARI Job No: UO16

Dear Lisa:

Please find enclosed the original Chain-of-Custody documentation and the final reports for the samples from the project referenced above. Analytical Resources, Inc. (ARI) accepted three water samples in good condition on March 27, 2012. The samples were analyzed for dissolved metals, hardness and conventional parameters as requested.

No analytical complications were noted.

As always, a copy of this report and all raw data will remain on file at ARI. If you have questions, or require further information, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark D. Harris
Project Manager
206/695-6210
<markh@arilabs.com>

Enclosures

cc: File UO16

MDH/bc

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 4016	Turn-around Requested:	Page: 1 of 1	
ARI Client Company: Parametrix, Inc.	Phone: (425) 458-6200	Date: 3/27/12	Ice Present? Y
Client Contact: Lisa Gilbert	(425) 458-6320	No. of Coolers: 1	Cooler Temps: 5.8
Client Project Name: Newcastle Landfill			
Client Project #: 555-3747-003	Samplers: JTB		

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

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: (*) Dissolved Metals	TDS	Cl, SO4	NO3/NO2	TOC, COD, NH3				Notes/Comments
MW-1	3/27/12	1425	water	3	X	X	X	X					(*) Dissolved
SW-6	3/27/12	1107	"	3	X	X	X	X					Metals - Field
SW-7	3/27/12	1011	"	3	X	X	X	X					Filtered

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name: H. Jesse Bennett	Printed Name: A. Volgardsen	Printed Name:	Printed Name:
	Company: Parametrix, Inc.	Company: ARI	Company:	Company:
	Date & Time: 3/27/12 1530	Date & Time: 3/27/12 1530	Date & Time:	Date & Time:

JTB/gb 3/27/12

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Parametrix
Project Name: Newaste Landfill
COC No(s): (NA)
Delivered by: Fed-Ex UPS Courier Hand Delivered Other:
Assigned ARI Job No: U016
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): 5.8
If cooler temperature is out of compliance fill out form 00070F
Temp Gun ID#: 90941619

Cooler Accepted by: AV Date: 3/27/12 Time: 1530

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:

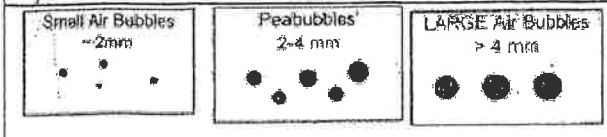
Samples Logged by: AV Date: 3/27/12 Time: 1610

*** 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"
Peabubbles → "pb"
Large → "lg"
Headspace → "hs"

U016:00003

PRESERVATION VERIFICATION 03/27/12
Page 1 of 1

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **UO16**

Inquiry Number: NONE
Analysis Requested: 03/27/12
Contact: Gilbert, Lisa
Client: Parametrix, Inc.
Logged by: AV
Sample Set Used: Yes-481
Validatable Package: No
Deliverables:

PC: Mark
VTSR: 03/27/12

Project #: 555-3747-003
Project: Newcastle Landfill
Sample Site:
SDG No:
Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	AK102 <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
12-5302 **UO16A**	MW-1			pass	pass		DIS pass					pass				Y						
12-5303 **UO16B**	SW-6			pass	pass		DIS pass					pass				Y						
12-5304 **UO16C**	SW-7			pass	pass		DIS pass					pass				Y						

Checked By AV Date 3/27/12

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: U016
Client: Parametrix, Inc.
Project Event: 555-3747-003
Project Name: Newcastle Landfill

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	MW-1	U016A	12-5302	Water	03/27/12 14:25	03/27/12 15:30
2.	SW-6	U016B	12-5303	Water	03/27/12 11:07	03/27/12 15:30
3.	SW-7	U016C	12-5304	Water	03/27/12 10:11	03/27/12 15:30

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-003, Newcastle Landfill

ARI Job No: UO16

Parameter: Total Dissolved Solids-EPA 160.1

Matrix: Water

Holding Time: 7 Days

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-1	UO16A	03/27/12	03/27/12	N/A	03/30/12
SW-6	UO16B	03/27/12	03/27/12	N/A	03/30/12
SW-7	UO16C	03/27/12	03/27/12	N/A	03/30/12
Method Blank	MB033012	N/A	N/A	N/A	03/30/12
Lab Control	LCS033012	N/A	N/A	N/A	03/30/12
MW-1	UO16ADP	03/27/12	03/27/12	N/A	03/30/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-003, Newcastle Landfill

ARI Job No: UO16

Parameter: Chloride-EPA 325.2

Matrix: Water

Holding Time: 28 Days

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-1	UO16A	03/27/12	03/27/12	N/A	04/03/12
SW-6	UO16B	03/27/12	03/27/12	N/A	04/03/12
SW-7	UO16C	03/27/12	03/27/12	N/A	04/03/12
Method Blank	MB040312	N/A	N/A	N/A	04/03/12
Standard Ref.	SRM040312	N/A	N/A	N/A	04/03/12
MW-1	UO16ADP	03/27/12	03/27/12	N/A	04/03/12
MW-1	UO16AMS	03/27/12	03/27/12	N/A	04/03/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-003, Newcastle Landfill

ARI Job No: UO16

Parameter: N-Ammonia-EPA 350.1M

Matrix: Water

Holding Time: 28 Days

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-1	UO16A	03/27/12	03/27/12	N/A	03/29/12
SW-6	UO16B	03/27/12	03/27/12	N/A	03/29/12
SW-7	UO16C	03/27/12	03/27/12	N/A	03/29/12
Method Blank	MB032912	N/A	N/A	N/A	03/29/12
Standard Ref.	SRM032912	N/A	N/A	N/A	03/29/12
MW-1	UO16ADP	03/27/12	03/27/12	N/A	03/29/12
MW-1	UO16AMS	03/27/12	03/27/12	N/A	03/29/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-003, Newcastle Landfill

ARI Job No: UO16

Parameter: N-Nitrate-Calculated

Matrix: Water

Holding Time: 48 Hours

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-1	UO16A	03/27/12	03/27/12	N/A	03/28/12
SW-6	UO16B	03/27/12	03/27/12	N/A	03/28/12
SW-7	UO16C	03/27/12	03/27/12	N/A	03/28/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-003, Newcastle Landfill

ARI Job No: UO16

Parameter: N-Nitrite-EPA 353.2

Matrix: Water

Holding Time: 48 Hours

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-1	UO16A	03/27/12	03/27/12	N/A	03/28/12
SW-6	UO16B	03/27/12	03/27/12	N/A	03/28/12
SW-7	UO16C	03/27/12	03/27/12	N/A	03/28/12
Method Blank	MB032812	N/A	N/A	N/A	03/28/12
Standard Ref.	SRM032812	N/A	N/A	N/A	03/28/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-003, Newcastle Landfill

ARI Job No: UO16

Parameter: Nitrate + Nitrite-EPA 353.2

Matrix: Water

Holding Time: 48 Hours (unpreserved)
28 Days (preserved)

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-1	UO16A	03/27/12	03/27/12	N/A	03/28/12
SW-6	UO16B	03/27/12	03/27/12	N/A	03/28/12
SW-7	UO16C	03/27/12	03/27/12	N/A	03/28/12
Method Blank	MB032812	N/A	N/A	N/A	03/28/12
Standard Ref.	SRM032812	N/A	N/A	N/A	03/28/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-003, Newcastle Landfill

ARI Job No: UO16

Parameter: Sulfate-EPA 375.2

Matrix: Water

Holding Time: 28 Days

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-1	UO16A	03/27/12	03/27/12	N/A	03/28/12
SW-6	UO16B	03/27/12	03/27/12	N/A	03/28/12
SW-7	UO16C	03/27/12	03/27/12	N/A	03/28/12
Method Blank	MB032812	N/A	N/A	N/A	03/28/12
Standard Ref.	SRM032812	N/A	N/A	N/A	03/28/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-003, Newcastle Landfill

ARI Job No: UO16

Parameter: Chemical Oxygen Demand-EPA 410.4

Matrix: Water

Holding Time: 28 Days

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-1	UO16A	03/27/12	03/27/12	N/A	04/02/12
SW-6	UO16B	03/27/12	03/27/12	N/A	04/02/12
SW-7	UO16C	03/27/12	03/27/12	N/A	04/02/12
Method Blank	MB040212	N/A	N/A	N/A	04/02/12
Standard Ref.	SRM040212	N/A	N/A	N/A	04/02/12
MW-1	UO16ADP	03/27/12	03/27/12	N/A	04/02/12
MW-1	UO16AMS	03/27/12	03/27/12	N/A	04/02/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-003, Newcastle Landfill

ARI Job No: UO16

Parameter: Total Organic Carbon-EPA 415.1

Matrix: Water

Holding Time: 28 Days

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-1	UO16A	03/27/12	03/27/12	N/A	03/27/12
SW-6	UO16B	03/27/12	03/27/12	N/A	03/27/12
SW-7	UO16C	03/27/12	03/27/12	N/A	03/27/12
Method Blank	MB032712	N/A	N/A	N/A	03/27/12
Standard Ref.	SRM032712	N/A	N/A	N/A	03/27/12
MW-1	UO16ADP	03/27/12	03/27/12	N/A	03/27/12
MW-1	UO16AMS	03/27/12	03/27/12	N/A	03/27/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-003, Newcastle Landfill

ARI Job No: UO16

Parameter: ICP Dissolved Metals-6010B

Matrix: Water

Holding Time: 6 Months

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-1	UO16A	03/27/12	03/27/12	03/28/12	04/03/12
SW-6	UO16B	03/27/12	03/27/12	03/28/12	04/03/12
SW-7	UO16C	03/27/12	03/27/12	03/28/12	04/03/12
Method Blank	MB032812	N/A	N/A	03/28/12	04/03/12
Lab Control	LCS032812	N/A	N/A	03/28/12	04/03/12
MW-1	UO16ADP	03/27/12	03/27/12	03/28/12	04/03/12
MW-1	UO16AMS	03/27/12	03/27/12	03/28/12	04/03/12

METHOD BLANK RESULTS-CONVENTIONALS
UO16-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-003
Date Sampled: NA
Date Received: NA

Analyte	Method	Date	Units	Blank	ID
Total Dissolved Solids	EPA 160.1	03/30/12	mg/L	< 5.0 U	
Chloride	EPA 325.2	04/03/12	mg/L	< 1.0 U	FB
N-Ammonia	EPA 350.1M	03/29/12	mg-N/L	< 0.010 U	FB
N-Nitrite	EPA 353.2	03/28/12	mg-N/L	< 0.010 U	FB
Nitrate + Nitrite	EPA 353.2	03/28/12	mg-N/L	< 0.010 U	FB
Sulfate	EPA 375.2	03/28/12	mg/L	< 2.0 U	FB
Chemical Oxygen Demand	EPA 410.4	04/02/12	mg/L	< 5.00 U	
Total Organic Carbon	EPA 415.1	03/27/12	mg/L	< 1.50 U	

FB Filtration Blank

SAMPLE RESULTS-CONVENTIONALS
UO16-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-003
Date Sampled: 03/27/12
Date Received: 03/27/12

Client ID: MW-1
ARI ID: 12-5302 UO16A

Analyte	Date Batch	Method	Units	RL	Sample
Total Dissolved Solids	03/30/12 033012#1	EPA 160.1	mg/L	10.0	611
Chloride	04/03/12 040312#1	EPA 325.2	mg/L	1.0	3.8
N-Ammonia	03/29/12 032912#1	EPA 350.1M	mg-N/L	0.010	0.067
N-Nitrate	03/28/12	Calculated	mg-N/L	0.010	0.038
N-Nitrite	03/28/12 032812#1	EPA 353.2	mg-N/L	0.010	< 0.010 U
Nitrate + Nitrite	03/28/12 032812#1	EPA 353.2	mg-N/L	0.010	0.038
Sulfate	03/28/12 032812#1	EPA 375.2	mg/L	40.0	181
Chemical Oxygen Demand	04/02/12 040212#1	EPA 410.4	mg/L	5.00	< 5.00 U
Total Organic Carbon	03/27/12 032712#1	EPA 415.1	mg/L	1.50	2.06

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
UO16-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-003
Date Sampled: 03/27/12
Date Received: 03/27/12

Client ID: SW-6
ARI ID: 12-5303 UO16B

Analyte	Date Batch	Method	Units	RL	Sample
Total Dissolved Solids	03/30/12 033012#1	EPA 160.1	mg/L	10.0	565
Chloride	04/03/12 040312#1	EPA 325.2	mg/L	1.0	6.4
N-Ammonia	03/29/12 032912#1	EPA 350.1M	mg-N/L	0.010	0.167
N-Nitrate	03/28/12	Calculated	mg-N/L	0.010	0.082
N-Nitrite	03/28/12 032812#1	EPA 353.2	mg-N/L	0.010	< 0.010 U
Nitrate + Nitrite	03/28/12 032812#1	EPA 353.2	mg-N/L	0.010	0.082
Sulfate	03/28/12 032812#1	EPA 375.2	mg/L	40.0	127
Chemical Oxygen Demand	04/02/12 040212#1	EPA 410.4	mg/L	5.00	< 5.00 U
Total Organic Carbon	03/27/12 032712#1	EPA 415.1	mg/L	1.50	2.13

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
UO16-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-003
Date Sampled: 03/27/12
Date Received: 03/27/12

Client ID: SW-7
ARI ID: 12-5304 UO16C

Analyte	Date Batch	Method	Units	RL	Sample
Total Dissolved Solids	03/30/12 033012#1	EPA 160.1	mg/L	5.0	214
Chloride	04/03/12 040312#1	EPA 325.2	mg/L	1.0	7.1
N-Ammonia	03/29/12 032912#1	EPA 350.1M	mg-N/L	0.010	0.041
N-Nitrate	03/28/12	Calculated	mg-N/L	0.020	1.10
N-Nitrite	03/28/12 032812#1	EPA 353.2	mg-N/L	0.010	< 0.010 U
Nitrate + Nitrite	03/28/12 032812#1	EPA 353.2	mg-N/L	0.020	1.10
Sulfate	03/28/12 032812#1	EPA 375.2	mg/L	10.0	49.2
Chemical Oxygen Demand	04/02/12 040212#1	EPA 410.4	mg/L	5.00	< 5.00 U
Total Organic Carbon	03/27/12 032712#1	EPA 415.1	mg/L	1.50	2.69

RL Analytical reporting limit
U Undetected at reported detection limit

MS/MSD RESULTS-CONVENTIONALS
UO16-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-003
Date Sampled: 03/27/12
Date Received: 03/27/12

Analyte	Method	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: UO16A Client ID: MW-1							
Chloride	EPA 325.2	04/03/12	mg/L	3.8	9.5	5.0	114.0%
N-Ammonia	EPA 350.1M	03/29/12	mg-N/L	0.067	0.575	0.500	101.6%
Chemical Oxygen Demand	EPA 410.4	04/02/12	mg/L	< 5.00	105	100	105.0%
Total Organic Carbon	EPA 415.1	03/27/12	mg/L	2.06	21.0	20.0	94.7%

REPLICATE RESULTS-CONVENTIONALS
UO16-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-003
Date Sampled: 03/27/12
Date Received: 03/27/12

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: UO16A Client ID: MW-1						
Total Dissolved Solids	EPA 160.1	03/30/12	mg/L	611	602	1.5%
Chloride	EPA 325.2	04/03/12	mg/L	3.8	4.0	5.1%
N-Ammonia	EPA 350.1M	03/29/12	mg-N/L	0.067	0.066	1.5%
Chemical Oxygen Demand	EPA 410.4	04/02/12	mg/L	< 5.00	< 5.00	NA
Total Organic Carbon	EPA 415.1	03/27/12	mg/L	2.06	1.79	14.0%

LAB CONTROL RESULTS-CONVENTIONALS
U016-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-003
Date Sampled: NA
Date Received: NA

Analyte/Method	QC ID	Date	Units	LCS	Spike Added	Recovery
Total Dissolved Solids EPA 160.1	ICVL	03/30/12	mg/L	440	500	88.0%

STANDARD REFERENCE RESULTS-CONVENTIONALS
UO16-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-003
Date Sampled: NA
Date Received: NA

Analyte/SRM ID	Method	Date	Units	SRM	True Value	Recovery
Chloride ERA #411010	EPA 325.2	04/03/12	mg/L	5.1	5.0	102.0%
N-Ammonia ERA #15125	EPA 350.1M	03/29/12	mg-N/L	0.538	0.500	107.6%
N-Nitrite ERA #23034	EPA 353.2	03/28/12	mg-N/L	0.516	0.500	103.2%
Nitrate + Nitrite ERA #20034	EPA 353.2	03/28/12	mg-N/L	0.525	0.500	105.0%
Sulfate ERA #37065	EPA 375.2	03/28/12	mg/L	25.6	25.0	102.4%
Chemical Oxygen Demand Thermo Orion #I01	EPA 410.4	04/02/12	mg/L	84.8	90.0	94.2%
Total Organic Carbon ERA 0523-11-05	EPA 415.1	03/27/12	mg/L	21.0	20.0	105.0%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
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Sample ID: MW-1
SAMPLE

Lab Sample ID: UO16A
LIMS ID: 12-5302
Matrix: Water
Data Release Authorized:
Reported: 04/04/12

QC Report No: UO16-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-003
Date Sampled: 03/27/12
Date Received: 03/27/12

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	03/28/12	200.8	04/03/12	**7440-38-2**	**Arsenic**	0.2	**0.6**	
6010B	03/28/12	6010B	04/03/12	**7440-70-2**	**Calcium**	50	**122,000**	
6010B	03/28/12	6010B	04/03/12	**7439-89-6**	**Iron**	50	**680**	
6010B	03/28/12	6010B	04/03/12	**7439-95-4**	**Magnesium**	50	**39,600**	
6010B	03/28/12	6010B	04/03/12	**7439-96-5**	**Manganese**	1	**60**	
6010B	03/28/12	6010B	04/03/12	7440-66-6	Zinc	10	10	U

Calculated Dissolved Hardness (mg-CaCO3/L): 470

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: SW-6
SAMPLE

Lab Sample ID: UO16B
LIMS ID: 12-5303
Matrix: Water
Data Release Authorized:
Reported: 04/04/12

QC Report No: UO16-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-003
Date Sampled: 03/27/12
Date Received: 03/27/12

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	03/28/12	200.8	04/03/12	**7440-38-2**	**Arsenic**	0.2	**4.7**	
6010B	03/28/12	6010B	04/03/12	**7440-70-2**	**Calcium**	50	**67,300**	
6010B	03/28/12	6010B	04/03/12	**7439-89-6**	**Iron**	50	**1,590**	
6010B	03/28/12	6010B	04/03/12	**7439-95-4**	**Magnesium**	50	**41,300**	
6010B	03/28/12	6010B	04/03/12	**7439-96-5**	**Manganese**	1	**281**	
6010B	03/28/12	6010B	04/03/12	7440-66-6	Zinc	10	10	U

Calculated Dissolved Hardness (mg-CaCO3/L): 340

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: SW-7
SAMPLE

Lab Sample ID: UO16C
LIMS ID: 12-5304
Matrix: Water
Data Release Authorized:
Reported: 04/04/12

QC Report No: UO16-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-003
Date Sampled: 03/27/12
Date Received: 03/27/12

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	03/28/12	200.8	04/03/12	**7440-38-2**	**Arsenic**	0.2	**0.8**	
6010B	03/28/12	6010B	04/03/12	**7440-70-2**	**Calcium**	50	**28,700**	
6010B	03/28/12	6010B	04/03/12	**7439-89-6**	**Iron**	50	**160**	
6010B	03/28/12	6010B	04/03/12	**7439-95-4**	**Magnesium**	50	**13,400**	
6010B	03/28/12	6010B	04/03/12	**7439-96-5**	**Manganese**	1	**50**	
6010B	03/28/12	6010B	04/03/12	7440-66-6	Zinc	10	10	U

Calculated Dissolved Hardness (mg-CaCO3/L): 130

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: MW-1
MATRIX SPIKE

Lab Sample ID: UO16A
LIMS ID: 12-5302
Matrix: Water
Data Release Authorized:
Reported: 04/04/12

QC Report No: UO16-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-003
Date Sampled: 03/27/12
Date Received: 03/27/12

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	200.8	0.620	29.3	25.0	115%	
Calcium	6010B	122,000	132,000	10,000	100%	H
Iron	6010B	678	2,700	2,000	101%	
Magnesium	6010B	39,600	47,800	10,000	82.0%	
Manganese	6010B	60.0	521	500	92.2%	
Zinc	6010B	10.0 U	501	500	100%	

Reported in µg/L

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked

Percent Recovery Limits: 75-125%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: MW-1
DUPLICATE

Lab Sample ID: UO16A
LIMS ID: 12-5302
Matrix: Water
Data Release Authorized:
Reported: 04/04/12

QC Report No: UO16-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-003
Date Sampled: 03/27/12
Date Received: 03/27/12

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	200.8	0.6	0.6	0.0%	+/- 0.2	L
Calcium	6010B	122,000	122,000	0.0%	+/- 20%	
Iron	6010B	680	680	0.0%	+/- 20%	
Magnesium	6010B	39,600	39,300	0.8%	+/- 20%	
Manganese	6010B	60	60	0.0%	+/- 20%	
Zinc	6010B	10 U	10 U	0.0%	+/- 10	L

Reported in µg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: UO16LCS
LIMS ID: 12-5303
Matrix: Water
Data Release Authorized:
Reported: 04/04/12

QC Report No: UO16-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-003
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	200.8	28.5	25.0	114%	
Calcium	6010B	10200	10000	102%	
Iron	6010B	2010	2000	100%	
Magnesium	6010B	10500	10000	105%	
Manganese	6010B	479	500	95.8%	
Zinc	6010B	510	500	102%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: UO16MB
LIMS ID: 12-5303
Matrix: Water
Data Release Authorized:
Reported: 04/04/12

QC Report No: UO16-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-003
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	03/28/12	200.8	04/03/12	7440-38-2	Arsenic	0.2	0.2	U
6010B	03/28/12	6010B	04/03/12	7440-70-2	Calcium	50	50	U
6010B	03/28/12	6010B	04/03/12	7439-89-6	Iron	50	50	U
6010B	03/28/12	6010B	04/03/12	7439-95-4	Magnesium	50	50	U
6010B	03/28/12	6010B	04/03/12	7439-96-5	Manganese	1	1	U
6010B	03/28/12	6010B	04/03/12	7440-66-6	Zinc	10	10	U

U-Analyte undetected at given RL
RL-Reporting Limit

Analytical Resources, Incorporated
Analytical Chemists and Consultants

10 April 2012

Lisa Gilbert
Parametrix, Inc.
411 108th Avenue NE
Bellevue, WA 98004-5571

RE: Project No. Newcastle LF, 555-3747-
ARI Job No: UO28

Dear Lisa:

Please find enclosed the original Chain-of-Custody documentation and the final reports for the samples from the project referenced above. Analytical Resources, Inc. (ARI) accepted four water samples in good condition on March 28, 2012. The samples were analyzed for dissolved metals, hardness and conventional parameters as requested.

No analytical complications were noted.

As always, a copy of this report and all raw data will remain on file at ARI. If you have questions, or require further information, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark D. Harris
Project Manager
206/695-6210
<markh@arilabs.com>

Enclosures

cc: File UO28

MDH/bc

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 4028	Turn-around Requested:	Page: 1 of 1	
ARI Client Company: PARAMETRIX, INC.	Phone: (425) 458-6200	Date: 3/28/12	Ice Present? Y
Client Contact: Lisa Gilbert (425) 458-6320		No. of Coolers: 1	Cooler Temps: 4.4
Client Project Name: Newcastle Landfill			
Client Project #: 555-3747-	Samplers: Jesse Bennett		

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

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: TDS	Cl, SO_4, NO_2, NO_3	Dissolved (*) Metals	TOC, COD, NH_3					Notes/Comments
MW-3	3/28/12	1000	Water	3	X	X	X	X					(*) Dissolved
MW-2	"	1200	"	3	X	X	X	X					Metals - field
MW-5	"	1330	"	3	X	X	X	X					filtered
MW-2D	"	1200	"	3	X	X	X	X					

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name: H. Jesse Bennett	Printed Name: Bob Congleton	Printed Name:	Printed Name:
	Company: Parametrix, Inc.	Company: ARI	Company:	Company:
	Date & Time: 3/28/12 1538	Date & Time: 3/28/12 1538	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: PMX

Project Name: NEWCASTLE LANDFILL

COC No(s): _____ (NA)

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

Assigned ARI Job No: U028

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): 4.4

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

Temp Gun ID#: _____

Cooler Accepted by: Bob Craig Date: 3/28/12 Time: 1538

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: _____

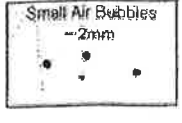
Samples Logged by: AV Date: 3/28/12 Time: 1700

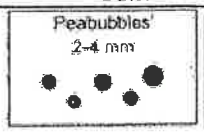
*** Notify Project Manager of discrepancies or concerns ***

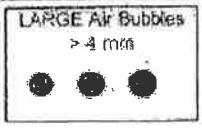
Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:







Small → "sm"
Peabubbles → "pb"
Large → "lg"
Headspace → "hs"

U028 : 00003

PRESERVATION VERIFICATION 03/28/12
Page 1 of 1

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **UO28**

Inquiry Number: NONE
Analysis Requested: 03/29/12
Contact: Gilbert, Lisa
Client: Parametrix, Inc.
Logged by: AV
Sample Set Used: Yes-481
Validatable Package: No
Deliverables:

PC: Mark
VTSR: 03/28/12

Project #: 555-3747-
Project: Newcastle Landfill
Sample Site:
SDG No:
Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	AK102 <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
12-5399 **UO28A**	MW-3			pass	pass		DIS pass					pass				Y						
12-5400 **UO28B**	MW-2			pass	pass		DIS pass					pass				Y						
12-5401 **UO28C**	MW-5			pass	pass		DIS pass					pass				Y						
12-5402 **UO28D**	MW-2D			pass	pass		DIS pass					pass				Y						

Checked By AV Date 3/28/12

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: UO28
Client: Parametrix, Inc.
Project Event: 555-3747-
Project Name: Newcastle Landfill

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	MW-3	UO28A	12-5399	Water	03/28/12 10:00	03/28/12 15:38
2.	MW-2	UO28B	12-5400	Water	03/28/12 12:00	03/28/12 15:38
3.	MW-5	UO28C	12-5401	Water	03/28/12 13:30	03/28/12 15:38
4.	MW-2D	UO28D	12-5402	Water	03/28/12 12:00	03/28/12 15:38

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-, Newcastle Landfill

ARI Job No: UO28

Parameter: Total Dissolved Solids-EPA 160.1

Matrix: Water

Holding Time: 7 Days

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-3	UO28A	03/28/12	03/28/12	N/A	03/30/12
MW-2	UO28B	03/28/12	03/28/12	N/A	03/30/12
MW-5	UO28C	03/28/12	03/28/12	N/A	03/30/12
MW-2D	UO28D	03/28/12	03/28/12	N/A	03/30/12
Method Blank	MB033012	N/A	N/A	N/A	03/30/12
Lab Control	LCS033012	N/A	N/A	N/A	03/30/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-, Newcastle Landfill

ARI Job No: UO28

Parameter: Chloride-EPA 325.2

Matrix: Water

Holding Time: 28 Days

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-3	UO28A	03/28/12	03/28/12	N/A	04/03/12
MW-2	UO28B	03/28/12	03/28/12	N/A	04/03/12
MW-5	UO28C	03/28/12	03/28/12	N/A	04/03/12
MW-2D	UO28D	03/28/12	03/28/12	N/A	04/03/12
Method Blank	MB040312	N/A	N/A	N/A	04/03/12
Standard Ref.	SRM040312	N/A	N/A	N/A	04/03/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-, Newcastle Landfill

ARI Job No: UO28

Parameter: N-Ammonia-EPA 350.1M

Matrix: Water

Holding Time: 28 Days

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-3	UO28A	03/28/12	03/28/12	N/A	03/29/12
MW-2	UO28B	03/28/12	03/28/12	N/A	03/29/12
MW-5	UO28C	03/28/12	03/28/12	N/A	03/29/12
MW-2D	UO28D	03/28/12	03/28/12	N/A	03/29/12
Method Blank	MB032912	N/A	N/A	N/A	03/29/12
Standard Ref.	SRM032912	N/A	N/A	N/A	03/29/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-, Newcastle Landfill

ARI Job No: UO28

Parameter: N-Nitrate-Calculated

Matrix: Water

Holding Time: 48 Hours

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-3	UO28A	03/28/12	03/28/12	N/A	03/29/12
MW-2	UO28B	03/28/12	03/28/12	N/A	03/29/12
MW-5	UO28C	03/28/12	03/28/12	N/A	03/29/12
MW-2D	UO28D	03/28/12	03/28/12	N/A	03/29/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-, Newcastle Landfill

ARI Job No: UO28

Parameter: N-Nitrite-EPA 353.2

Matrix: Water

Holding Time: 48 Hours

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-3	UO28A	03/28/12	03/28/12	N/A	03/29/12
MW-2	UO28B	03/28/12	03/28/12	N/A	03/29/12
MW-5	UO28C	03/28/12	03/28/12	N/A	03/29/12
MW-2D	UO28D	03/28/12	03/28/12	N/A	03/29/12
Method Blank	MB032912	N/A	N/A	N/A	03/29/12
Standard Ref.	SRM032912	N/A	N/A	N/A	03/29/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-, Newcastle Landfill

ARI Job No: UO28

Parameter: Nitrate + Nitrite-EPA 353.2

Matrix: Water

Holding Time: 48 Hours (unpreserved)
28 Days (preserved)

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-3	UO28A	03/28/12	03/28/12	N/A	03/29/12
MW-2	UO28B	03/28/12	03/28/12	N/A	03/29/12
MW-5	UO28C	03/28/12	03/28/12	N/A	03/29/12
MW-2D	UO28D	03/28/12	03/28/12	N/A	03/29/12
Method Blank	MB032912	N/A	N/A	N/A	03/29/12
Standard Ref.	SRM032912	N/A	N/A	N/A	03/29/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-, Newcastle Landfill

ARI Job No: UO28

Parameter: Sulfate-EPA 375.2

Matrix: Water

Holding Time: 28 Days

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-3	UO28A	03/28/12	03/28/12	N/A	04/09/12
MW-2	UO28B	03/28/12	03/28/12	N/A	04/09/12
MW-5	UO28C	03/28/12	03/28/12	N/A	04/09/12
MW-2D	UO28D	03/28/12	03/28/12	N/A	04/09/12
Method Blank	MB040912	N/A	N/A	N/A	04/09/12
Standard Ref.	SRM040912	N/A	N/A	N/A	04/09/12
MW-3	UO28ADP	03/28/12	03/28/12	N/A	04/09/12
MW-3	UO28AMS	03/28/12	03/28/12	N/A	04/09/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-, Newcastle Landfill

ARI Job No: UO28

Parameter: Chemical Oxygen Demand-EPA 410.4

Matrix: Water

Holding Time: 28 Days

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-3	UO28A	03/28/12	03/28/12	N/A	04/02/12
MW-2	UO28B	03/28/12	03/28/12	N/A	04/02/12
MW-5	UO28C	03/28/12	03/28/12	N/A	04/02/12
MW-2D	UO28D	03/28/12	03/28/12	N/A	04/02/12
Method Blank	MB040212	N/A	N/A	N/A	04/02/12
Standard Ref.	SRM040212	N/A	N/A	N/A	04/02/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-, Newcastle Landfill

ARI Job No: U028

Parameter: Total Organic Carbon-EPA 415.1

Matrix: Water

Holding Time: 28 Days

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-3	U028A	03/28/12	03/28/12	N/A	03/29/12
MW-2	U028B	03/28/12	03/28/12	N/A	03/29/12
MW-5	U028C	03/28/12	03/28/12	N/A	03/29/12
MW-2D	U028D	03/28/12	03/28/12	N/A	03/29/12
Method Blank	MB032912	N/A	N/A	N/A	03/29/12
Standard Ref.	SRM032912	N/A	N/A	N/A	03/29/12
MW-3	U028ADP	03/28/12	03/28/12	N/A	03/29/12
MW-3	U028AMS	03/28/12	03/28/12	N/A	03/29/12

ANALYTICAL RESOURCES INCORPORATED

Client Project ID: 555-3747-, Newcastle Landfill

ARI Job No: UO28

Parameter: ICP Dissolved Metals-6010B

Matrix: Water

Holding Time: 6 Months

Date Reported: 04/10/12

Client Sample ID	ARI Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-3	UO28A	03/28/12	03/28/12	03/30/12	04/04/12
MW-2	UO28B	03/28/12	03/28/12	03/30/12	04/04/12
MW-5	UO28C	03/28/12	03/28/12	03/30/12	04/04/12
MW-2D	UO28D	03/28/12	03/28/12	03/30/12	04/04/12
Method Blank	MB033012	N/A	N/A	03/30/12	04/04/12
Lab Control	LCS033012	N/A	N/A	03/30/12	04/04/12
MW-3	UO28ADP	03/28/12	03/28/12	03/30/12	04/04/12
MW-3	UO28AMS	03/28/12	03/28/12	03/30/12	04/04/12

METHOD BLANK RESULTS-CONVENTIONALS
UO28-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-
Date Sampled: NA
Date Received: NA

Analyte	Method	Date	Units	Blank	ID
Total Dissolved Solids	EPA 160.1	03/30/12	mg/L	< 5.0 U	
Chloride	EPA 325.2	04/03/12	mg/L	< 1.0 U	FB
N-Ammonia	EPA 350.1M	03/29/12	mg-N/L	< 0.010 U	FB
N-Nitrite	EPA 353.2	03/29/12	mg-N/L	< 0.010 U	FB
Nitrate + Nitrite	EPA 353.2	03/29/12	mg-N/L	< 0.010 U	FB
Sulfate	EPA 375.2	04/09/12	mg/L	< 2.0 U	FB
Chemical Oxygen Demand	EPA 410.4	04/02/12	mg/L	< 5.00 U	
Total Organic Carbon	EPA 415.1	03/29/12	mg/L	< 1.50 U	

FB Filtration Blank

SAMPLE RESULTS-CONVENTIONALS
UO28-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-
Date Sampled: 03/28/12
Date Received: 03/28/12

Client ID: MW-3
ARI ID: 12-5399 UO28A

Analyte	Date Batch	Method	Units	RL	Sample
Total Dissolved Solids	03/30/12 033012#1	EPA 160.1	mg/L	10.0	498
Chloride	04/03/12 040312#1	EPA 325.2	mg/L	1.0	8.4
N-Ammonia	03/29/12 032912#1	EPA 350.1M	mg-N/L	0.010	0.312
N-Nitrate	03/29/12	Calculated	mg-N/L	0.010	0.067
N-Nitrite	03/29/12 032912#1	EPA 353.2	mg-N/L	0.010	< 0.010 U
Nitrate + Nitrite	03/29/12 032912#1	EPA 353.2	mg-N/L	0.010	0.067
Sulfate	04/09/12 040912#1	EPA 375.2	mg/L	2.0	37.6
Chemical Oxygen Demand	04/02/12 040212#1	EPA 410.4	mg/L	5.00	< 5.00 U
Total Organic Carbon	03/29/12 032912#1	EPA 415.1	mg/L	1.50	4.29

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
UO28-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-
Date Sampled: 03/28/12
Date Received: 03/28/12

Client ID: MW-2
ARI ID: 12-5400 UO28B

Analyte	Date Batch	Method	Units	RL	Sample
Total Dissolved Solids	03/30/12 033012#1	EPA 160.1	mg/L	10.0	469
Chloride	04/03/12 040312#1	EPA 325.2	mg/L	2.0	16.1
N-Ammonia	03/29/12 032912#1	EPA 350.1M	mg-N/L	0.010	0.556
N-Nitrate	03/29/12	Calculated	mg-N/L	0.010	0.058
N-Nitrite	03/29/12 032912#1	EPA 353.2	mg-N/L	0.010	< 0.010 U
Nitrate + Nitrite	03/29/12 032912#1	EPA 353.2	mg-N/L	0.010	0.058
Sulfate	04/09/12 040912#1	EPA 375.2	mg/L	2.0	22.7
Chemical Oxygen Demand	04/02/12 040212#1	EPA 410.4	mg/L	5.00	< 5.00 U
Total Organic Carbon	03/29/12 032912#1	EPA 415.1	mg/L	1.50	3.59

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
UO28-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-
Date Sampled: 03/28/12
Date Received: 03/28/12

Client ID: MW-5
ARI ID: 12-5401 UO28C

Analyte	Date Batch	Method	Units	RL	Sample
Total Dissolved Solids	03/30/12 033012#1	EPA 160.1	mg/L	10.0	365
Chloride	04/03/12 040312#1	EPA 325.2	mg/L	1.0	5.0
N-Ammonia	03/29/12 032912#1	EPA 350.1M	mg-N/L	0.010	0.053
N-Nitrate	03/29/12	Calculated	mg-N/L	0.200	< 0.200 U
N-Nitrite	03/29/12 032912#1	EPA 353.2	mg-N/L	0.010	< 0.010 U
Nitrate + Nitrite	03/29/12 032912#1	EPA 353.2	mg-N/L	0.200	< 0.200 U
Sulfate	04/09/12 040912#1	EPA 375.2	mg/L	10.0	79.7
Chemical Oxygen Demand	04/02/12 040212#1	EPA 410.4	mg/L	5.00	< 5.00 U
Total Organic Carbon	03/29/12 032912#1	EPA 415.1	mg/L	1.50	2.05

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
UO28-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-
Date Sampled: 03/28/12
Date Received: 03/28/12

Client ID: MW-2D
ARI ID: 12-5402 UO28D

Analyte	Date Batch	Method	Units	RL	Sample
Total Dissolved Solids	03/30/12 033012#1	EPA 160.1	mg/L	10.0	460
Chloride	04/03/12 040312#1	EPA 325.2	mg/L	2.0	15.9
N-Ammonia	03/29/12 032912#1	EPA 350.1M	mg-N/L	0.010	0.544
N-Nitrate	03/29/12	Calculated	mg-N/L	0.010	0.047
N-Nitrite	03/29/12 032912#1	EPA 353.2	mg-N/L	0.010	< 0.010 U
Nitrate + Nitrite	03/29/12 032912#1	EPA 353.2	mg-N/L	0.010	0.047
Sulfate	04/09/12 040912#1	EPA 375.2	mg/L	2.0	22.5
Chemical Oxygen Demand	04/02/12 040212#1	EPA 410.4	mg/L	5.00	5.71
Total Organic Carbon	03/29/12 032912#1	EPA 415.1	mg/L	1.50	3.26

RL Analytical reporting limit
U Undetected at reported detection limit

MS/MSD RESULTS-CONVENTIONALS
U028-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-
Date Sampled: 03/28/12
Date Received: 03/28/12

Analyte	Method	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: U028A Client ID: MW-3							
Sulfate	EPA 375.2	04/09/12	mg/L	37.6	149	100	111.4%
Total Organic Carbon	EPA 415.1	03/29/12	mg/L	4.29	22.4	20.0	90.6%

REPLICATE RESULTS-CONVENTIONALS
UO28-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-
Date Sampled: 03/28/12
Date Received: 03/28/12

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: UO28A Client ID: MW-3						
Sulfate	EPA 375.2	04/09/12	mg/L	37.6	37.0	1.6%
Total Organic Carbon	EPA 415.1	03/29/12	mg/L	4.29	4.11	4.3%

LAB CONTROL RESULTS-CONVENTIONALS
UO28-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-
Date Sampled: NA
Date Received: NA

Analyte/Method	QC ID	Date	Units	LCS	Spike Added	Recovery
Total Dissolved Solids EPA 160.1	ICVL	03/30/12	mg/L	440	500	88.0%

STANDARD REFERENCE RESULTS-CONVENTIONALS
UO28-Parametrix, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 04/10/12

Project: Newcastle Landfill
Event: 555-3747-
Date Sampled: NA
Date Received: NA

Analyte/SRM ID	Method	Date	Units	SRM	True Value	Recovery
Chloride ERA #411010	EPA 325.2	04/03/12	mg/L	5.1	5.0	102.0%
N-Ammonia ERA #15125	EPA 350.1M	03/29/12	mg-N/L	0.538	0.500	107.6%
N-Nitrite ERA #23034	EPA 353.2	03/29/12	mg-N/L	0.518	0.500	103.6%
Nitrate + Nitrite ERA #20034	EPA 353.2	03/29/12	mg-N/L	0.522	0.500	104.4%
Sulfate ERA #37065	EPA 375.2	04/09/12	mg/L	27.0	25.0	108.0%
Chemical Oxygen Demand Thermo Orion #I01	EPA 410.4	04/02/12	mg/L	84.8	90.0	94.2%
Total Organic Carbon ERA 0523-11-05	EPA 415.1	03/29/12	mg/L	20.5	20.0	102.5%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: MW-3
SAMPLE

Lab Sample ID: UO28A
LIMS ID: 12-5399
Matrix: Water
Data Release Authorized:
Reported: 04/06/12

QC Report No: UO28-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-
Date Sampled: 03/28/12
Date Received: 03/28/12

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	03/30/12	200.8	04/05/12	**7440-38-2**	**Arsenic**	0.2	**2.4**	
6010B	03/30/12	6010B	04/04/12	**7440-70-2**	**Calcium**	50	**18,500**	
6010B	03/30/12	6010B	04/04/12	**7439-89-6**	**Iron**	50	**660**	
6010B	03/30/12	6010B	04/04/12	**7439-95-4**	**Magnesium**	50	**10,300**	
6010B	03/30/12	6010B	04/04/12	**7439-96-5**	**Manganese**	1	**19**	
6010B	03/30/12	6010B	04/04/12	7440-66-6	Zinc	10	10	U

Calculated Dissolved Hardness (mg-CaCO3/L): 88

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: MW-2
SAMPLE

Lab Sample ID: UO28B
LIMS ID: 12-5400
Matrix: Water
Data Release Authorized:
Reported: 04/06/12

QC Report No: UO28-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-
Date Sampled: 03/28/12
Date Received: 03/28/12

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	03/30/12	200.8	04/03/12	**7440-38-2**	**Arsenic**	0.2	**0.3**	
6010B	03/30/12	6010B	04/04/12	**7440-70-2**	**Calcium**	50	**77,800**	
6010B	03/30/12	6010B	04/04/12	**7439-89-6**	**Iron**	50	**650**	
6010B	03/30/12	6010B	04/04/12	**7439-95-4**	**Magnesium**	50	**30,400**	
6010B	03/30/12	6010B	04/04/12	**7439-96-5**	**Manganese**	1	**111**	
6010B	03/30/12	6010B	04/04/12	7440-66-6	Zinc	10	10	U

Calculated Dissolved Hardness (mg-CaCO3/L): 320

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: MW-5
SAMPLE

Lab Sample ID: UO28C
LIMS ID: 12-5401
Matrix: Water
Data Release Authorized:
Reported: 04/06/12

QC Report No: UO28-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-
Date Sampled: 03/28/12
Date Received: 03/28/12

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	03/30/12	200.8	04/03/12	**7440-38-2**	**Arsenic**	0.2	**14.9**	
6010B	03/30/12	6010B	04/04/12	**7440-70-2**	**Calcium**	50	**74,400**	
6010B	03/30/12	6010B	04/04/12	**7439-89-6**	**Iron**	50	**5,240**	
6010B	03/30/12	6010B	04/04/12	**7439-95-4**	**Magnesium**	50	**31,700**	
6010B	03/30/12	6010B	04/04/12	**7439-96-5**	**Manganese**	1	**791**	
6010B	03/30/12	6010B	04/04/12	7440-66-6	Zinc	10	10	U

Calculated Dissolved Hardness (mg-CaCO3/L): 320

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: MW-2D
SAMPLE

Lab Sample ID: UO28D
LIMS ID: 12-5402
Matrix: Water
Data Release Authorized:
Reported: 04/06/12

QC Report No: UO28-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-
Date Sampled: 03/28/12
Date Received: 03/28/12

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	03/30/12	200.8	04/03/12	**7440-38-2**	**Arsenic**	0.2	**0.3**	
6010B	03/30/12	6010B	04/04/12	**7440-70-2**	**Calcium**	50	**78,000**	
6010B	03/30/12	6010B	04/04/12	**7439-89-6**	**Iron**	50	**660**	
6010B	03/30/12	6010B	04/04/12	**7439-95-4**	**Magnesium**	50	**30,500**	
6010B	03/30/12	6010B	04/04/12	**7439-96-5**	**Manganese**	1	**113**	
6010B	03/30/12	6010B	04/04/12	7440-66-6	Zinc	10	10	U

Calculated Dissolved Hardness (mg-CaCO3/L): 320

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: MW-3
MATRIX SPIKE

Lab Sample ID: UO28A
LIMS ID: 12-5399
Matrix: Water
Data Release Authorized:
Reported: 04/06/12

QC Report No: UO28-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-
Date Sampled: 03/28/12
Date Received: 03/28/12

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	200.8	2.43	29.4	25.0	108%	
Calcium	6010B	18,500	29,000	10,000	105%	
Iron	6010B	661	2,660	2,000	100%	
Magnesium	6010B	10,300	19,800	10,000	95.0%	
Manganese	6010B	18.6	533	500	103%	
Zinc	6010B	10.0 U	521	500	104%	

Reported in µg/L

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked

Percent Recovery Limits: 75-125%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: MW-3
DUPLICATE

Lab Sample ID: UO28A
LIMS ID: 12-5399
Matrix: Water
Data Release Authorized:
Reported: 04/06/12

QC Report No: UO28-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-
Date Sampled: 03/28/12
Date Received: 03/28/12

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	200.8	2.4	2.6	8.0%	+/- 20%	
Calcium	6010B	18,500	18,500	0.0%	+/- 20%	
Iron	6010B	660	660	0.0%	+/- 20%	
Magnesium	6010B	10,300	10,300	0.0%	+/- 20%	
Manganese	6010B	19	19	0.0%	+/- 20%	
Zinc	6010B	10 U	10 U	0.0%	+/- 10	L

Reported in µg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: UO28LCS
LIMS ID: 12-5400
Matrix: Water
Data Release Authorized:
Reported: 04/06/12

QC Report No: UO28-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	200.8	26.6	25.0	106%	
Calcium	6010B	10400	10000	104%	
Iron	6010B	2050	2000	102%	
Magnesium	6010B	10600	10000	106%	
Manganese	6010B	519	500	104%	
Zinc	6010B	520	500	104%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: UO28MB
LIMS ID: 12-5400
Matrix: Water
Data Release Authorized:
Reported: 04/06/12

QC Report No: UO28-Parametrix, Inc.
Project: Newcastle Landfill
555-3747-
Date Sampled: NA
Date Received: NA

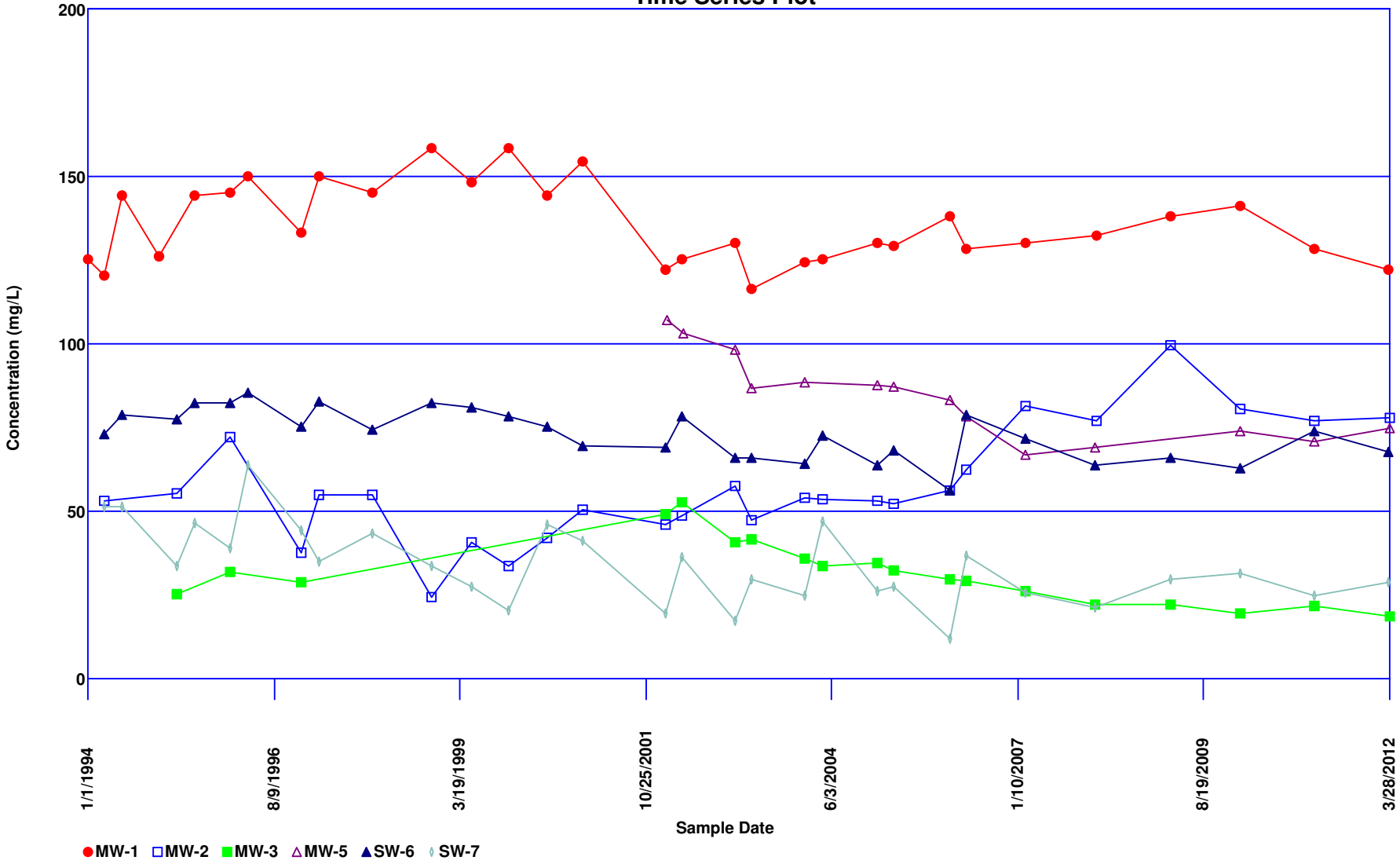
Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	03/30/12	200.8	04/05/12	7440-38-2	Arsenic	0.2	0.2	U
6010B	03/30/12	6010B	04/04/12	7440-70-2	Calcium	50	50	U
6010B	03/30/12	6010B	04/04/12	7439-89-6	Iron	50	50	U
6010B	03/30/12	6010B	04/04/12	7439-95-4	Magnesium	50	50	U
6010B	03/30/12	6010B	04/04/12	7439-96-5	Manganese	1	1	U
6010B	03/30/12	6010B	04/04/12	7440-66-6	Zinc	10	10	U

U-Analyte undetected at given RL
RL-Reporting Limit

APPENDIX B

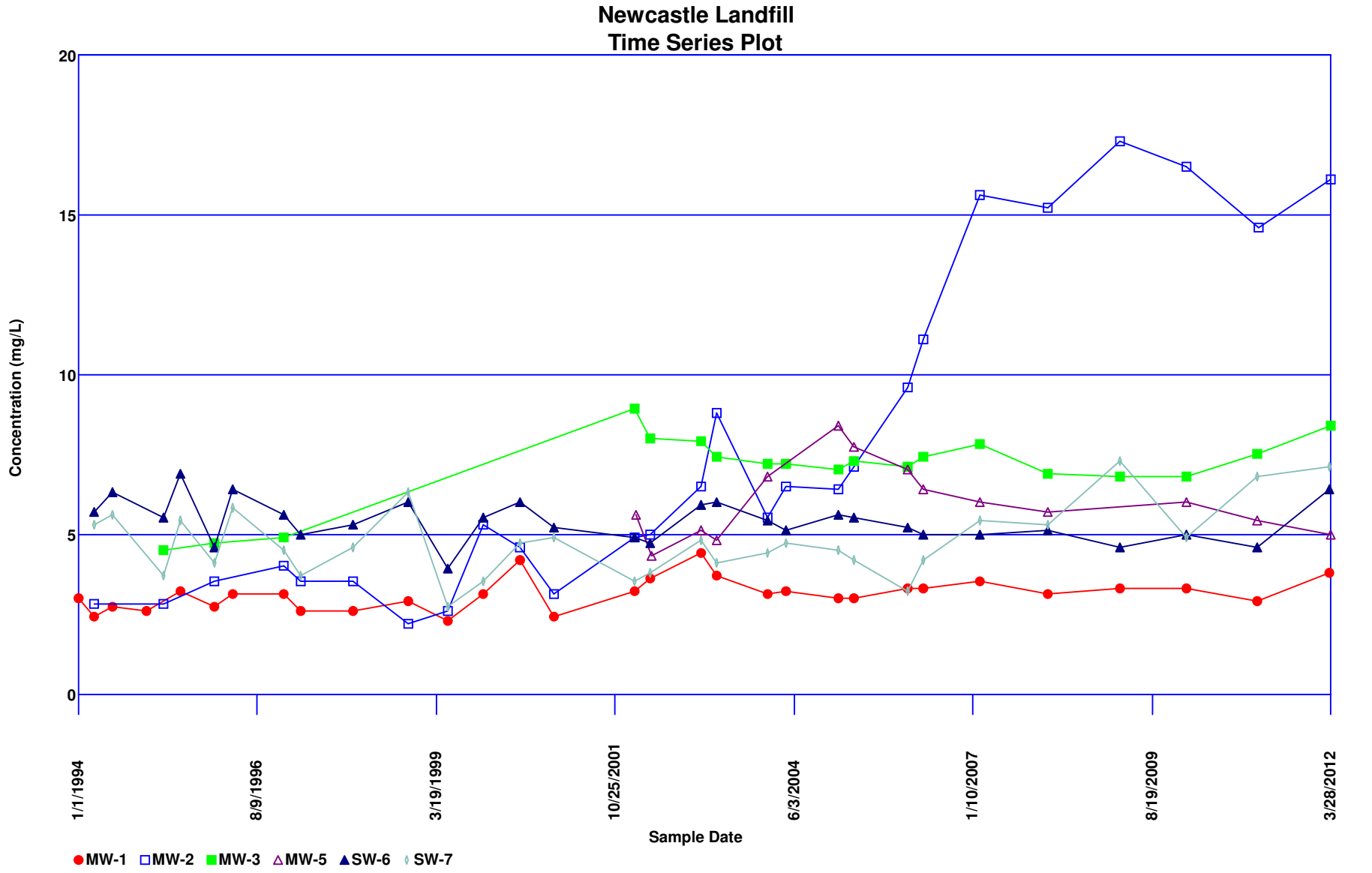
TIME-SERIES PLOTS

Newcastle Landfill
Time Series Plot



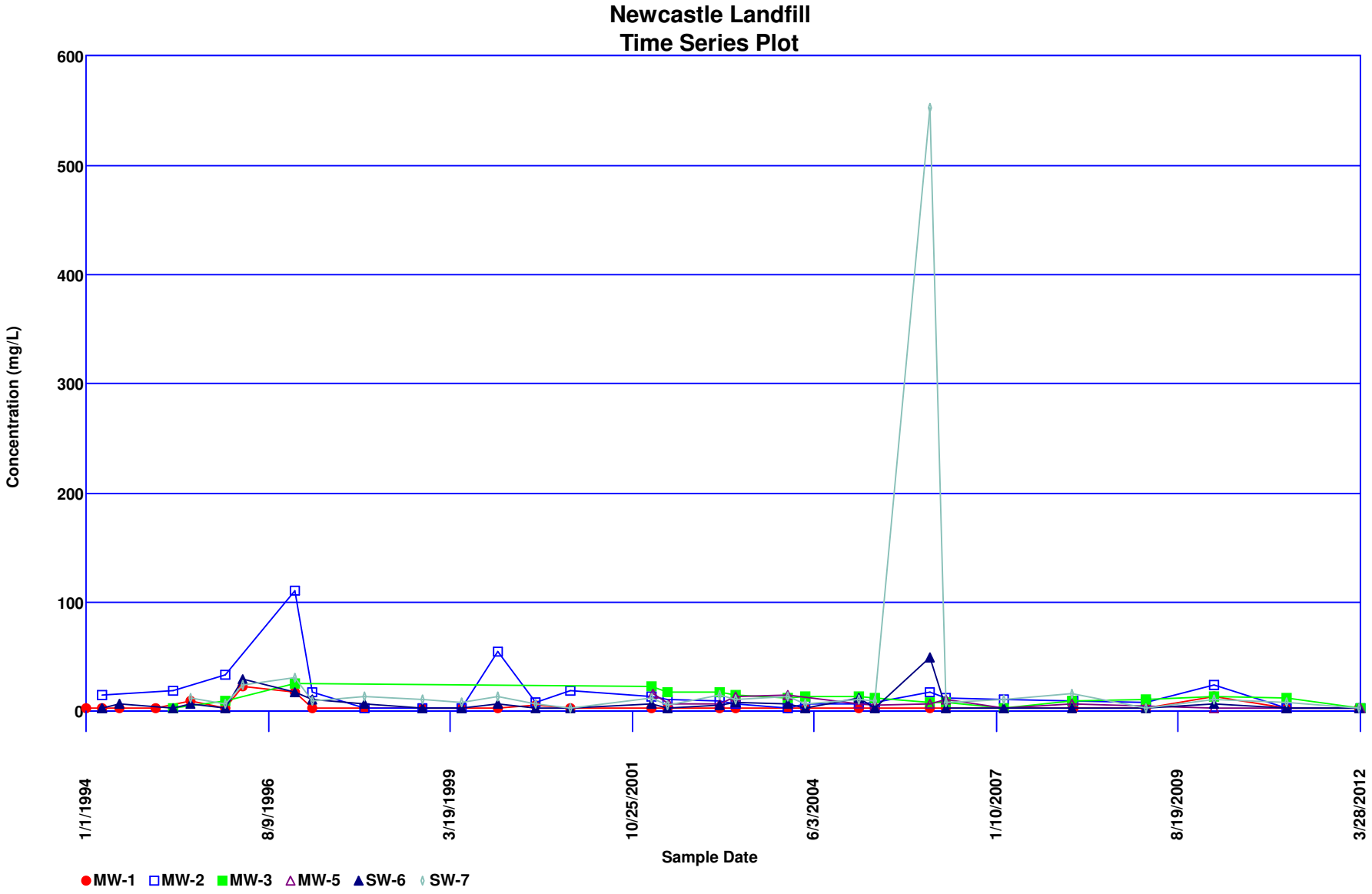
Calcium, Dissolved

Non-Detects Replaced with 1/2 DL



Chloride

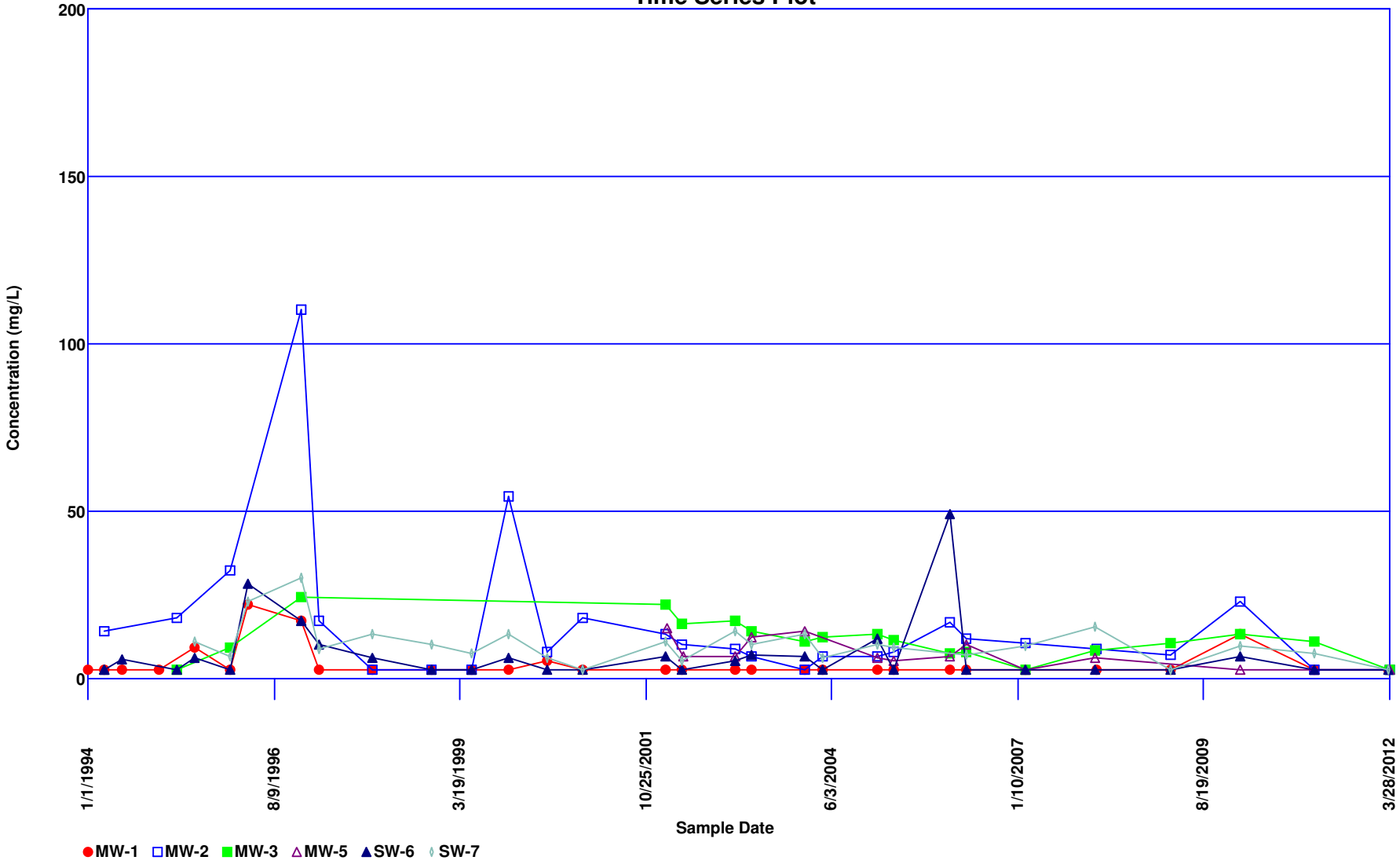
Non-Detects Replaced with 1/2 DL



COD

Non-Detects Replaced with 1/2 DL

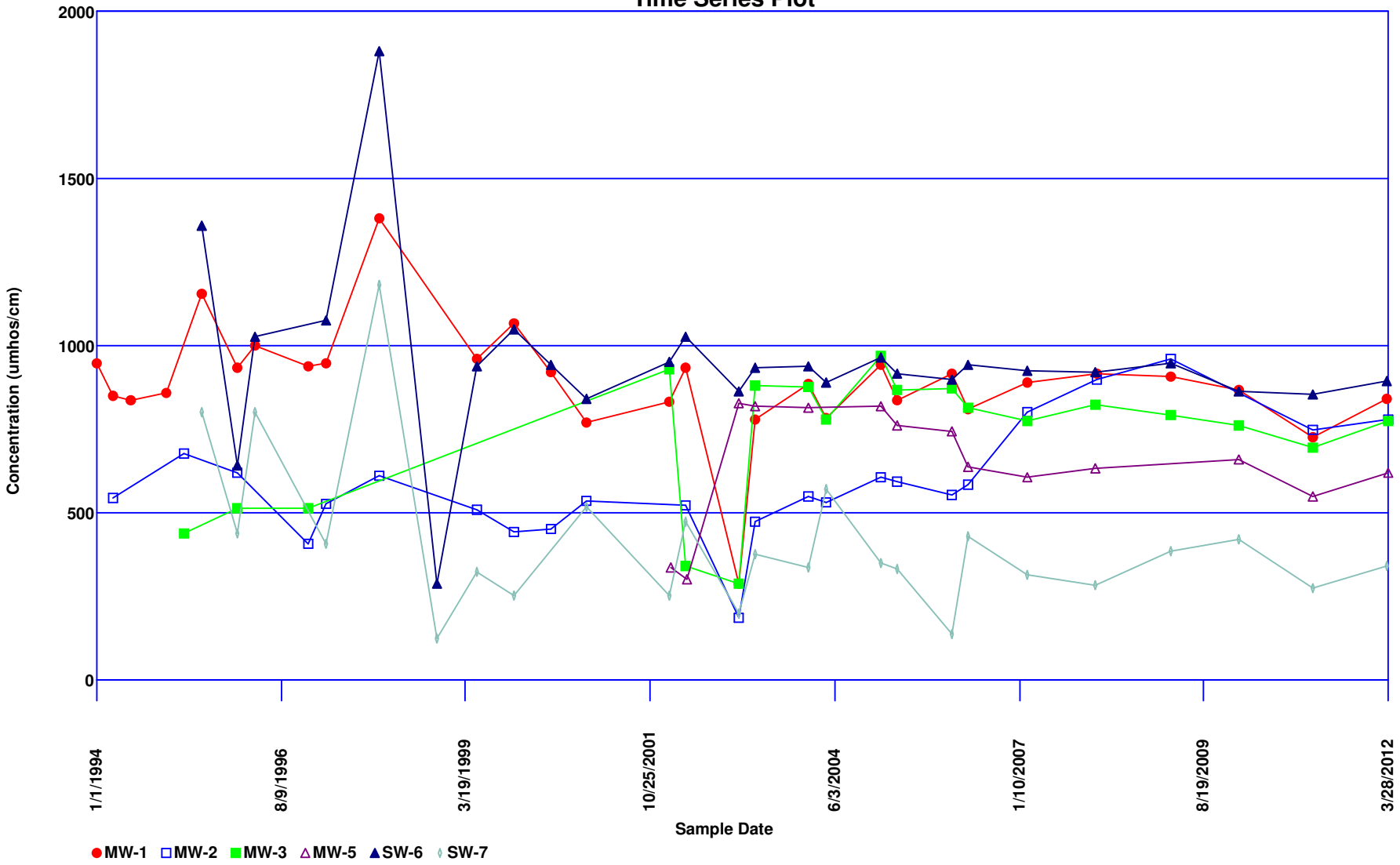
Newcastle Landfill
Time Series Plot



COD

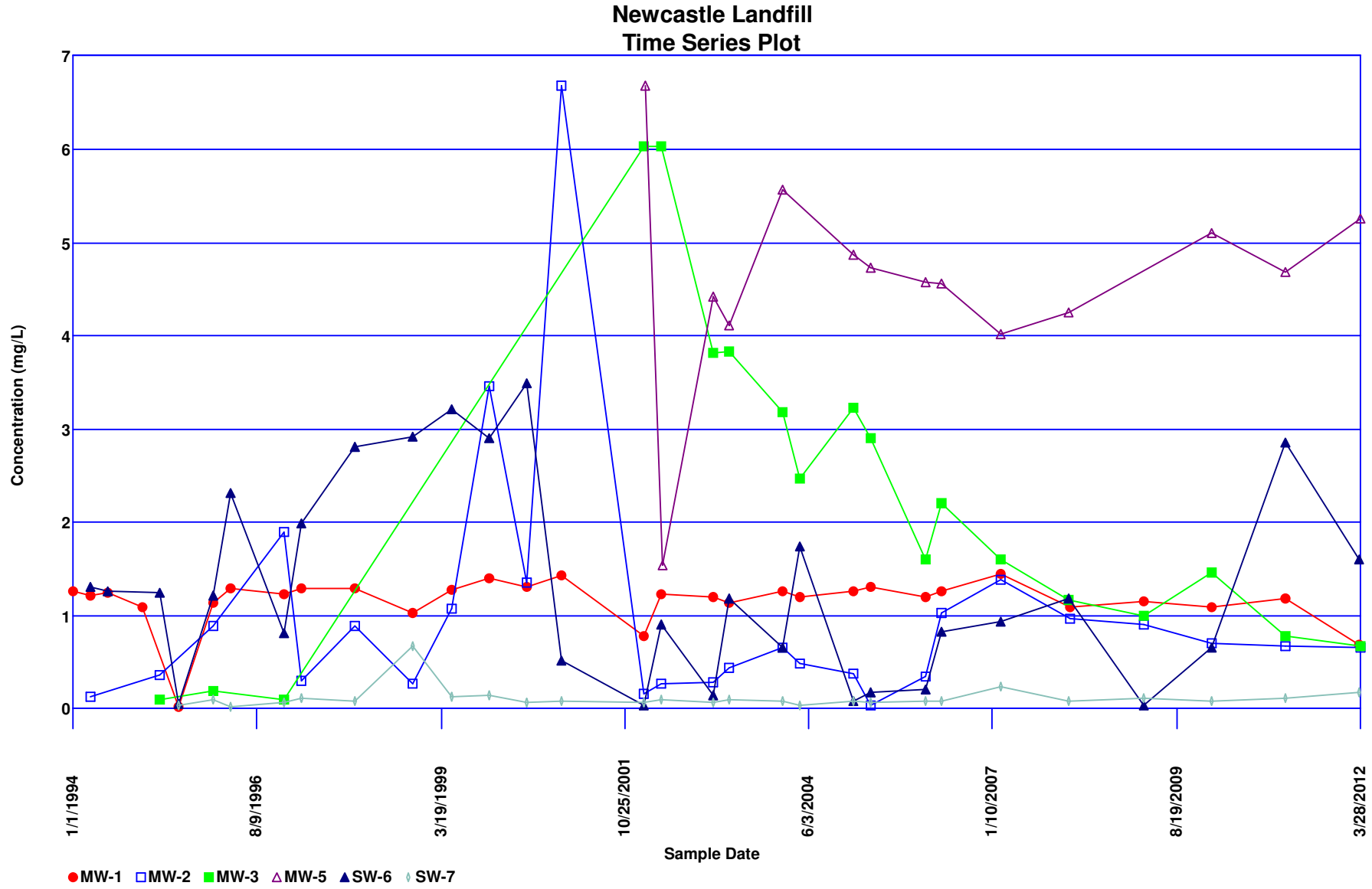
Non-Detects Replaced with 1/2 DL

Newcastle Landfill
Time Series Plot



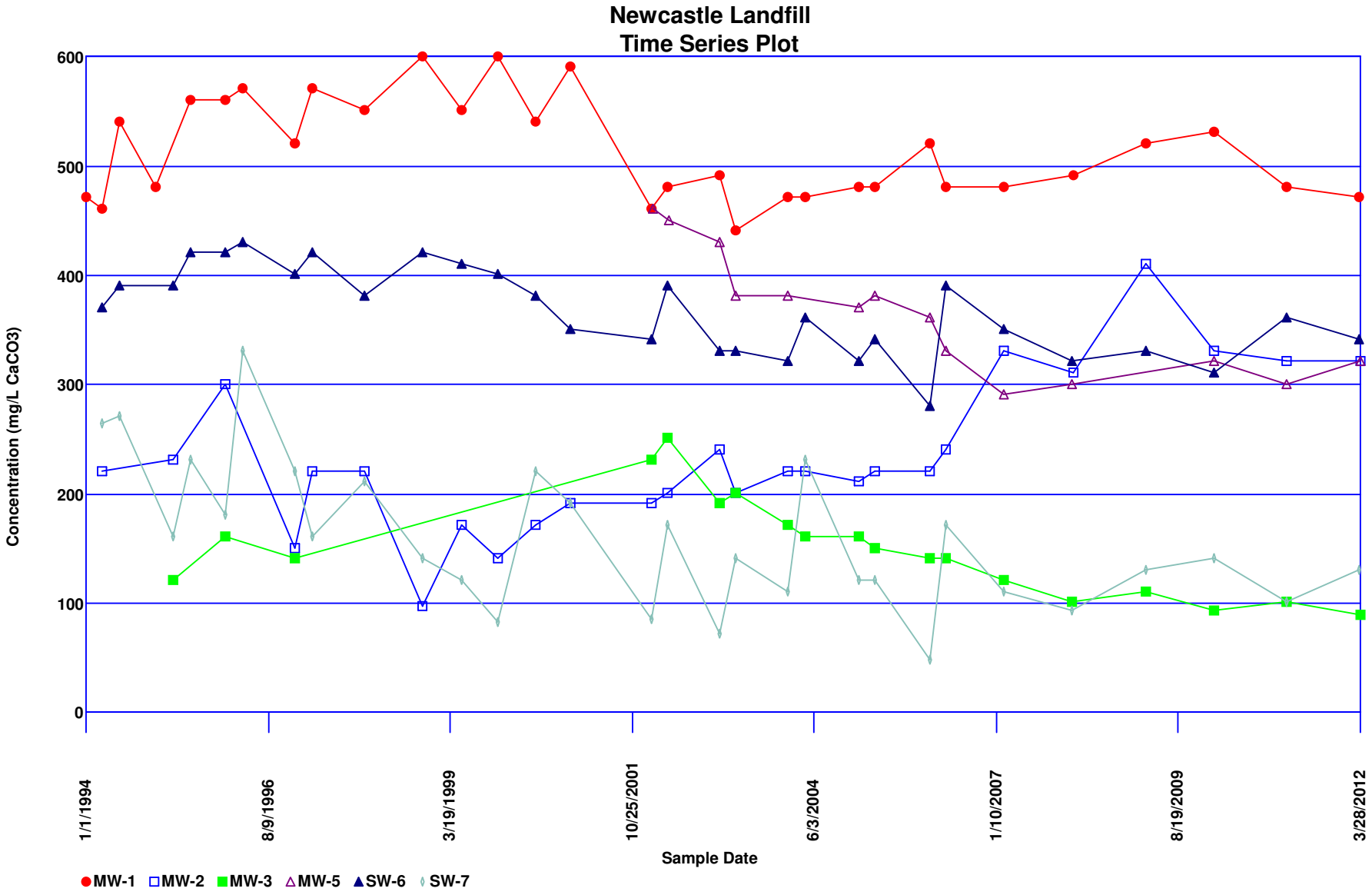
Specific Conductivity

Non-Detects Replaced with 1/2 DL



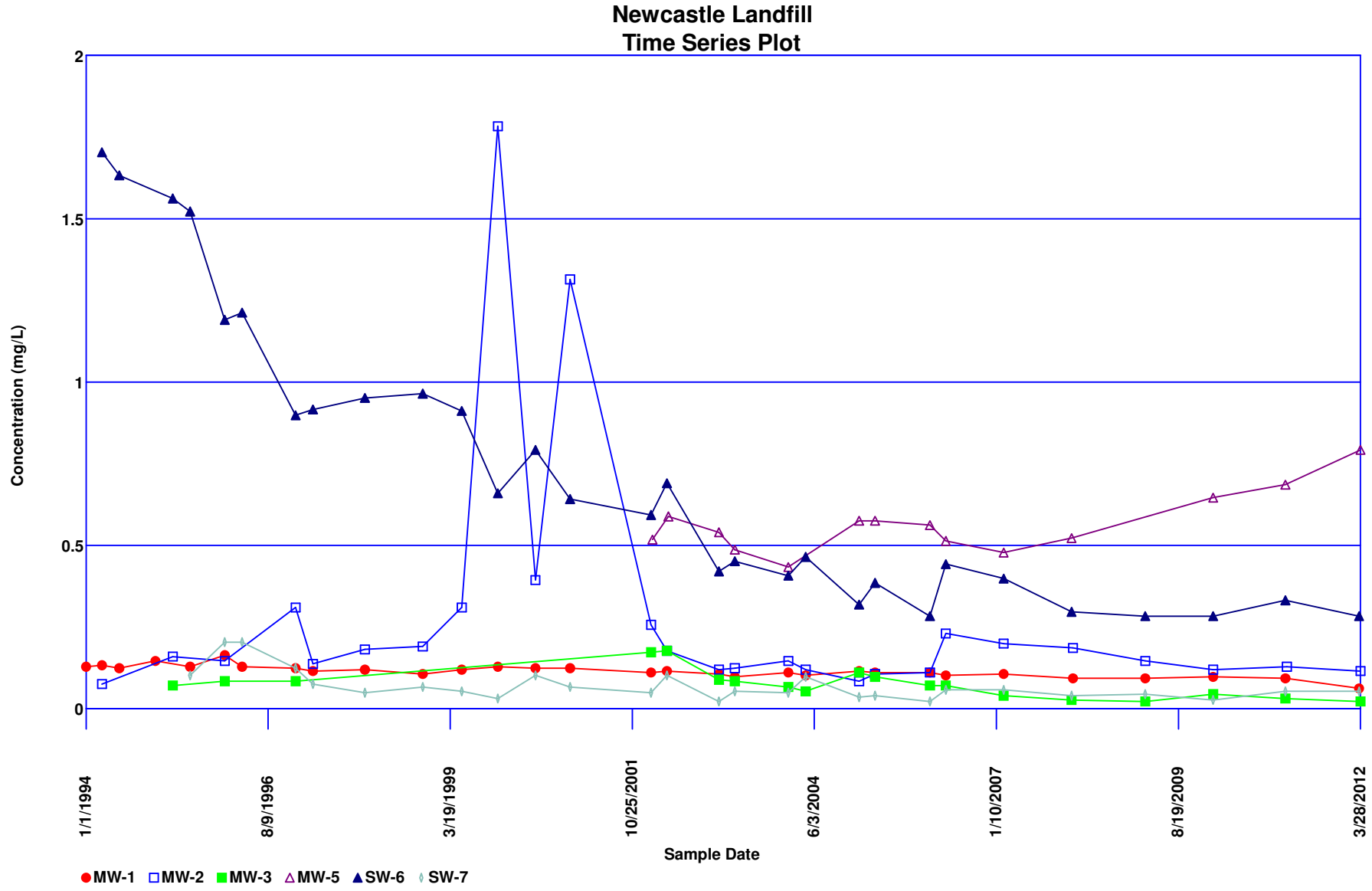
Iron, Dissolved

Non-Detects Replaced with 1/2 DL



Hardness

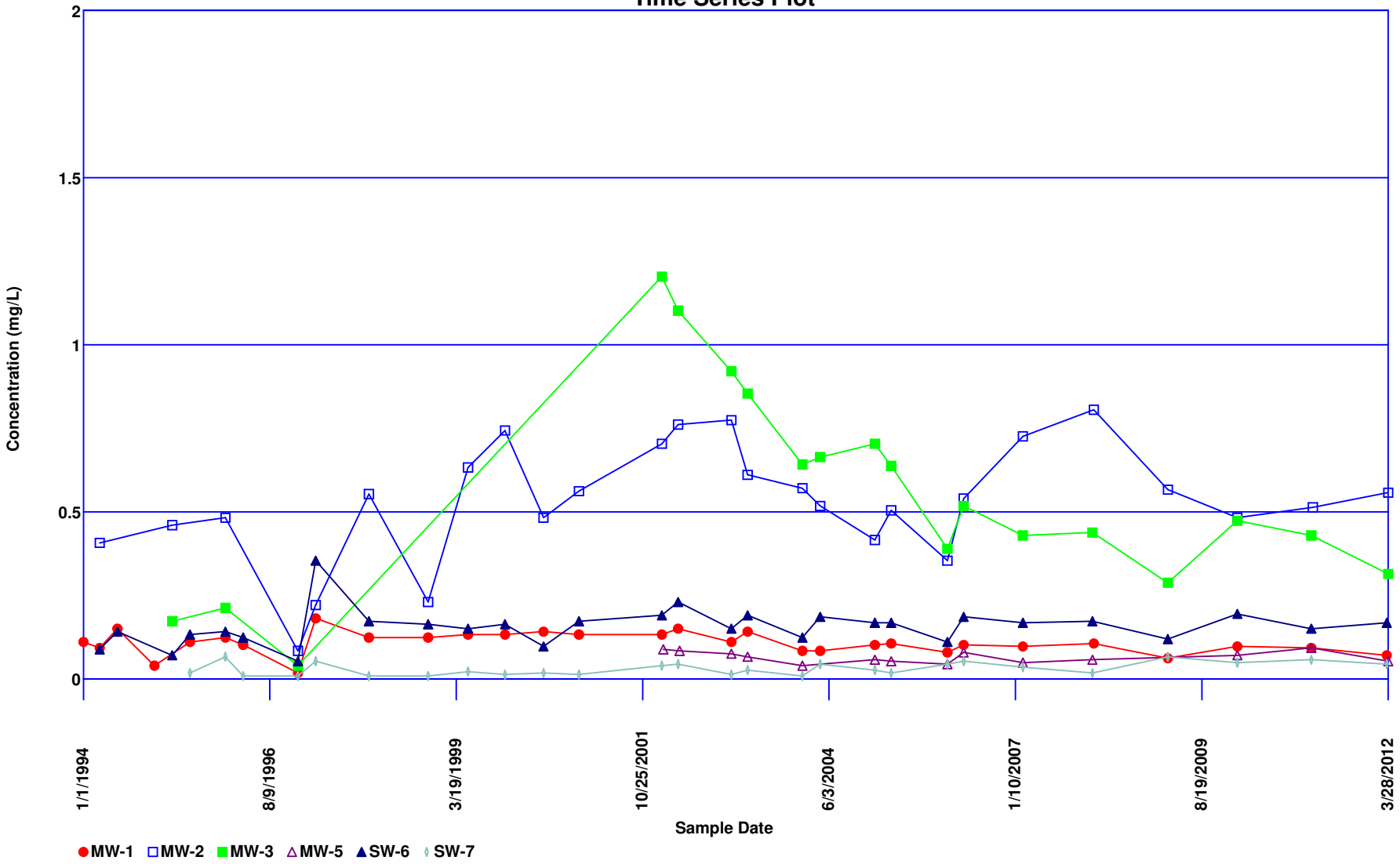
Non-Detects Replaced with 1/2 DL



Manganese, Dissolved

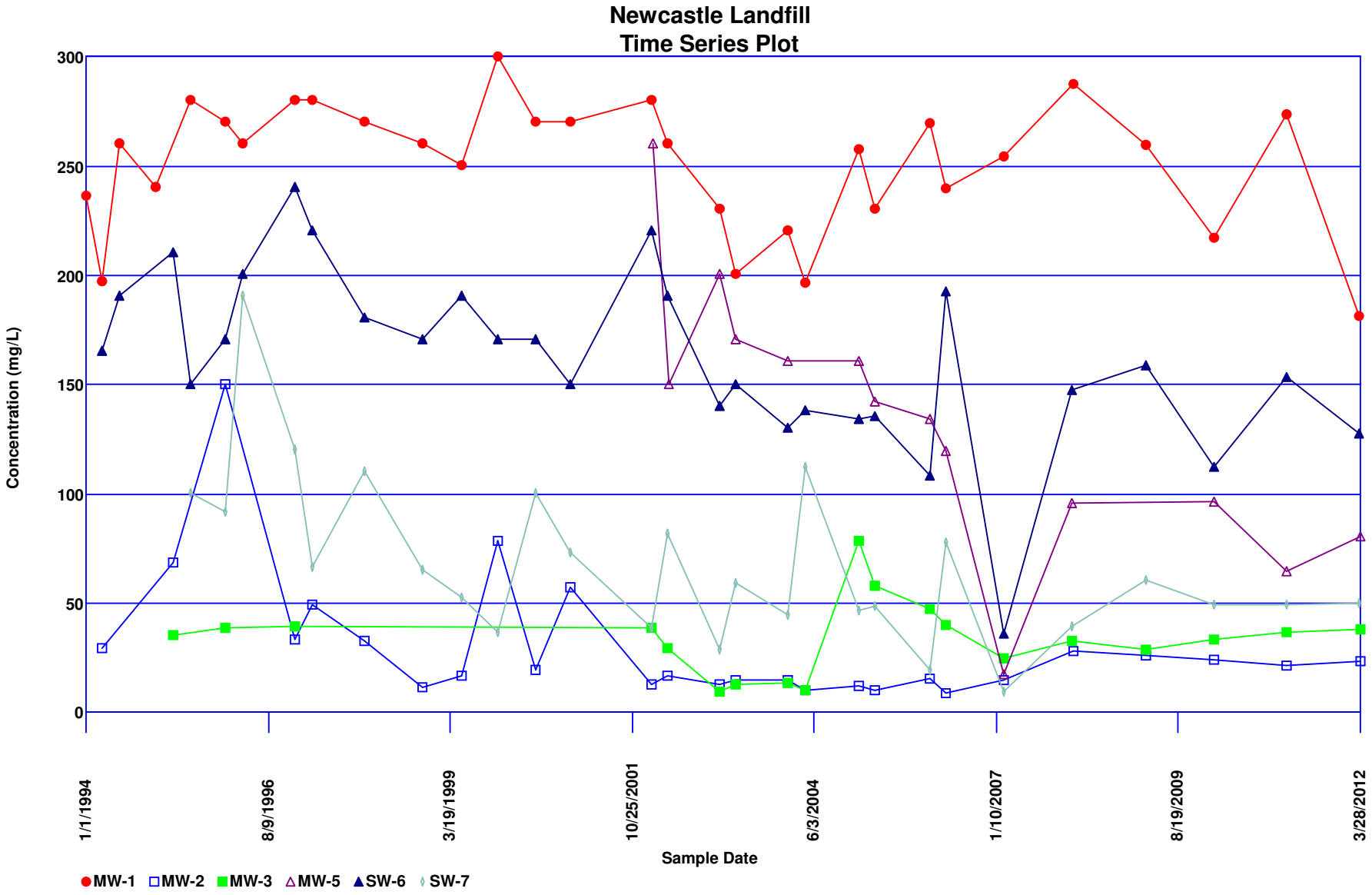
Non-Detects Replaced with 1/2 DL

Newcastle Landfill
Time Series Plot



Ammonia-N

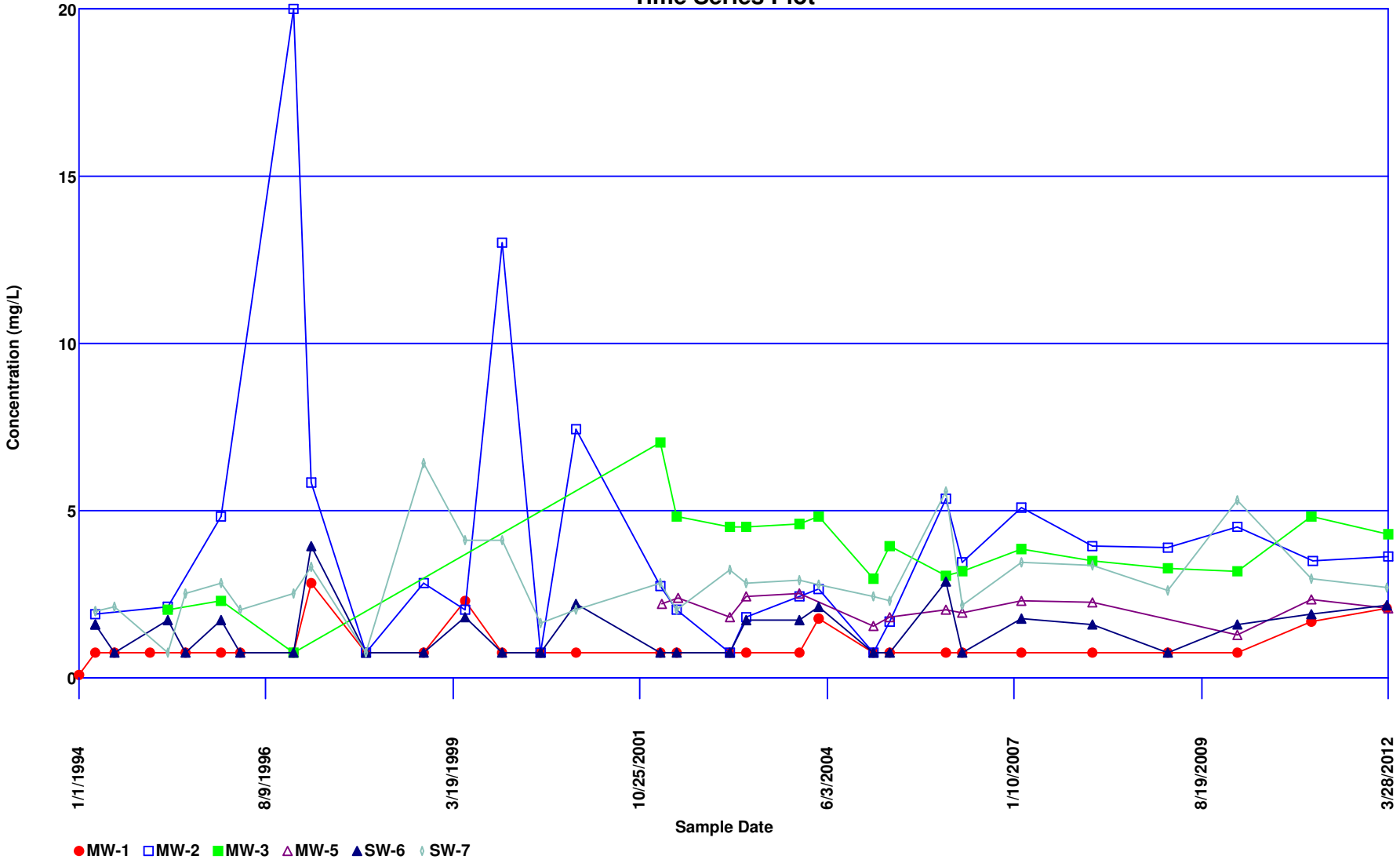
Non-Detects Replaced with 1/2 DL



Sulfate

Non-Detects Replaced with 1/2 DL

Newcastle Landfill
Time Series Plot



TOC

Non-Detects Replaced with 1/2 DL