



Tennessee Valley Authority
Gallatin Fossil Plant
Non-Registered Site # 83-1324

GROUNDWATER ASSESSMENT MONITORING REPORT JULY 2015

Prepared by
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Chattanooga, Tennessee
September 24, 2015

DOCUMENT CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information.

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Gallatin Fossil Plant Manager

TABLE OF CONTENTS

	Page
DOCUMENT CERTIFICATION.....	i
TABLE OF CONTENTS.....	ii
ABBREVIATIONS AND ACRONYMS.....	iii
INTRODUCTION	1
GROUNDWATER SAMPLING	1
ANALYTICAL RESULTS	1
EVALUATION OF ASSESSMENT MONITORING DATA.....	2
GROUNDWATER CONDITIONS	4
CONCLUSIONS.....	5

APPENDICES

- A. Field Data Sheets
- B. Laboratory Analytical Reports and Sample Custody Records
- C. Time-Series Graphs of Sample Constituent Data
- D. Historical Groundwater Level Data for Wells GAF-19/19R, GAF-20 and GAF-21

LIST OF TABLES

- 1. July 29, 2015 Groundwater Assessment Monitoring Results..... 3
- 2. July 29, 2015 Groundwater Level Measurements..... 4

LIST OF FIGURES

- 1. Groundwater Potentiometric Surface on September 15, 2011 6

ACRONYMS AND ABBREVIATIONS

EPA	Environmental Protection Agency
GAF	Gallatin Fossil Plant
GWPS	Groundwater Protection Standards
MCL	Maximum Contaminant Level
MSL	Mean Sea Level
NRS	Non-Registered Site
RL	Reporting Limit
RSL	Regional Screening Level (EPA Region 3)
TAN	Test America Nashville
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority

INTRODUCTION

This report presents results of the July 2015 quarterly *Groundwater Assessment Monitoring* event for Non-Registered Site (NRS) # 83-1324 at the Gallatin Fossil Plant (GAF). Sample collection, laboratory analysis, and evaluation of sample constituent data were performed in accordance with Rule 0400-11-01-.04 (7) and the facility *Groundwater Monitoring Program Plan* approved by TDEC on October 14, 2009. Water samples from July 2015 were analyzed by ESC Lab Sciences of Mount Juliet, Tennessee.

GROUNDWATER SAMPLING

Groundwater samples were collected July 29, 2015, by D. Mihalek and M. Stone of AECOM from background well GAF-22 and from downgradient compliance wells GAF-19R, GAF-20, GAF-26 and GAF-27. All wells were purged and sampled using low flow methods and a centrifugal (submersible) pump. Standing water in the wells was first evacuated using a submersible pump, after which the wells were allowed to recover before collecting water samples. Field duplicate samples were collected from GAF-27, and an equipment rinsate blank was collected after sampling NRL wells. Field parameters (i.e., temperature, specific conductance, pH, dissolved oxygen, oxidation-reduction potential and turbidity) were monitored during well purging using a flow-through cell and calibrated instruments. Each well was considered properly evacuated when field parameters remained stable after purging or after two hours. Field data sheets completed during well sampling are included in Appendix A. Sample containers were sealed, necessary data were recorded on a chain-of-custody form, and samples were placed in iced coolers for transport. April 2015 samples were delivered to ESC on July 28th and 29th. Copies of all sample custody records are provided in Appendix B.

ANALYTICAL RESULTS

Groundwater samples were analyzed for inorganic constituents in accordance with 0400-11-01-.04 (7) Appendix I. As indicated in our first *Groundwater Assessment Monitoring* report (dated May 19, 2009), laboratory analysis of the April 2009 groundwater samples for the complete 0400-11-01-.04 (7) Appendix II parameter list indicated no detections of any Appendix II organic constituents. Furthermore, no inorganic constituents beyond those listed in Appendix I (0400-11-01-.04 (7)) were detected. Therefore, subsequent groundwater assessment monitoring and quarterly baseline monitoring events have been limited to those inorganic constituents detected in the April 2009 event, pursuant to 0400-11-01-.04 (7)(6)(iii)(II).

TDEC suspended requirements to monitor and report cobalt data from NRS # 83-1324 on 11/21/2011 (personal communication A.D. Spear to R.L. Hooper). Naturally-occurring cobalt, associated with concretionary mineral deposits found in alluvial sediments in the NRS # 83-1324 vicinity, was shown to be the likely source of elevated cobalt concentrations in groundwater (12/19/2001 letter from G.G. Park to A. Majors of TDEC). TDEC subsequently approved the alternate source demonstration for naturally occurring cobalt in a letter dated February 10, 2003.

All analytical testing was conducted within recommended sample holding times. The July 2015 sampling equipment blank for all wells show all nondetects. Appendix C presents July 2015 laboratory reports for ESC containing complete analytical results for all water samples. The laboratory report includes analytical results, methods, detection limits, and data qualifiers for each sample analysis.

EVALUATION OF ASSESSMENT MONITORING DATA

Groundwater Protection Standards (GWPS) are used in evaluating compliance monitoring data are based on constituent Maximum Contaminant Levels (MCLs) listed in Appendix III of Rule 0400-11-01-.04 (7), where available. Table 1 presents a summary of the July 2015 groundwater monitoring results. Included at the bottom of the table are field turbidity measurements which serve as qualitative indicators of possible sampling bias associated with analyses of total (non-filtered) samples. Dissolved samples were collected at the wells GAF-19R, GAF-22, GAF-26, and GAF-27 which exhibited a turbidity higher than 5 ntu. GWPS exceedances are indicated for beryllium, cadmium and nickel only at well GAF-19R. These constituents have been observed at this level in this well in the past.

Time-series graphs of groundwater monitoring data for GAF-19R (and its predecessor GAF-19), GAF-20, GAF-22, GAF-26, and GAF-27 are presented in Appendix D. Note that open circle symbols on graphs denote measurements below analytical reporting limits; these measurements are displayed at the constituent reporting limit. Beryllium, cadmium, and nickel concentrations at GAF-19R and GAF-19 have been elevated since monitoring began in November 2000. The data suggests a potential downward or stabilizing trend in beryllium concentrations since 2009

TABLE 1. July 29, 2015 Groundwater Assessment Monitoring Results

Constituent	Units	GAF-19R	GAF-20	GAF-22	GAF-26	GAF-27 ^b	GWPS ^a
Antimony, total	ug/L	<2	<2	<2	<2	<2	6
Arsenic, total	ug/L	3.73	<2	<2	3.37	<2	10
Barium, total	ug/L	24.7	21	22.9	52.8	48.75	2,000
Beryllium, total	ug/L	11	<2	<2	<2	<2	4
Cadmium, total	ug/L	11.1	<1	<1	<1	<1	5
Chromium, total	ug/L	45.3	4.16	25.3	6.76	3.275	100
Cobalt, total	ug/L	466	138	<2	14.5	<2	--
Copper, total	ug/L	32.8	<5	6.21	8.62	<5	N/A
Fluoride, total	mg/L	0.508	0.104	0.178	0.315	0.2255	4
Lead, total	ug/L	4.69	<2	<2	4.27	<2	15
Mercury, total	ug/L	0.256	<0.2	<0.2	<0.2	<0.2	2
Nickel, total	ug/L	252	27.5	17.4	22.1	<2	100
Selenium, total	ug/L	5.97	<2	<2	<2	<2	50
Silver, total	ug/L	<2	<2	<2	<2	<2	100
Thallium, total	ug/L	<2	<2	<2	<2	<2	2
Vanadium, total	ug/L	15.7	<5	<5	9.5	<5	N/A
Zinc, total	ug/L	727	36.9	<25	46.8	<25	N/A
Turbidity, field	NTU	44.9	7.9	55.4	13.8	11.4	--

Constituent concentrations highlighted in red exceed GWPS.

^a WPS based on applicable TDEC MCLs listed in Appendix III of Rule 0400-11-01-.04(7), where available; N/A indicates TDEC MCLs not available

^b Constituent concentration values are averages of field duplicate samples.

timeframe. Cadmium and nickel present no consistent trend upward or downward for the period of record. The July 2015 concentrations of beryllium, cadmium, and nickel at GAF-19R are within the historical ranges of the given constituent data for this well. As noted in previous monitoring reports, the historically elevated levels of metals at GAF-19R are associated with unusually low pH, i.e., median pH is 3.8 at this well. In comparison, median pH values for compliance well GAF-20 and background well GAF-22 are 5.7 and 7.1, respectively.

Suspended solids in groundwater samples often consist of particles of geologic material containing naturally-occurring metals, some of which may be the same as Appendix I inorganic constituents. Regional soils are known to contain naturally-occurring arsenic, and could potentially be a source for other metals. Interference from colloidal particles in the samples could explain erratic historical data.

GROUNDWATER CONDITIONS

Hydrogeologic data for facility monitoring wells indicate that shallow groundwater movement beneath the NRS # 83-1324 vicinity occurs in Quaternary age alluvial deposits and underlying Carters and Lebanon (limestone-shale) formations of Ordovician age. Monitoring wells GAF-19R, GAF-20 and GAF-22, completed in the alluvium, range from approximately 49 to 52 feet in depth. Depths of bedrock wells GAF-26 and GAF-27 installed in 2012 are 103 and 87 feet, respectively. Groundwater levels measured in these monitoring wells in July prior to sampling are presented in Table 2.

TABLE 2. July 2015 Groundwater Level Measurements

Well	Top of Casing Elevation (ft)	Depth to Water (ft)	Water Elevation (ft)	Bottom Depth (ft)
GAF-19R	478.67	28.78	449.89	54.39
GAF-20	475.59	24.96	450.63	53.51
GAF-22	472.87	26.82	446.05	51.49
GAF-26	479.53	22.46	457.07	105.93
GAF-27	476.77	20.47	456.3	90.50

No hydraulically upgradient wells exist to allow for creation of a potentiometric map for this event. In lieu of event-based hydrologic information, a historical shallow groundwater potentiometric surface for the NRS site is presented showing water level contours throughout the NRS on

September 15, 2011 (Figure 1), representing the most complete potentiometric map of shallow groundwater available for the facility. The potentiometric contouring is generally consistent with maps presented in previous reports, though the addition of groundwater level points measured within the ash might indicate a slightly higher phreatic surface than historically observed in the alluvium unit due to differences in hydraulic characteristics of the media. Horizontal hydraulic gradients and groundwater seepage velocity presented here utilize mean groundwater levels measured at facility monitoring wells between May 2000 and January 2013 (see Appendix E for groundwater level data). The average horizontal hydraulic gradient (J_h) in the NRS site vicinity based on Figure 1 is approximately 0.0172. The direction of the horizontal gradient is southwesterly toward the Cumberland River. The highest measured hydraulic conductivity of alluvial deposits in the NRS site vicinity is $2.2\text{E-}7$ cm/s ($6.2\text{E-}04$ ft/d). This measurement represents an estimate of vertical hydraulic conductivity (K_v) since it was determined from laboratory permeameter testing of an undisturbed soil core. The horizontal component of hydraulic conductivity (K_h) is conservatively estimated to be approximately ten times K_v or approximately $2.2\text{E-}6$ cm/s ($6.2\text{E-}3$ ft/d). An effective soil porosity (θ) of 0.2 is assumed in estimating the horizontal seepage velocity (v) through the soil zone. Applying Darcy's Law (i.e., $v = K_h * J_h / \theta$), the average horizontal seepage velocity between NRS # 83-1324 and the river of approximately 0.2 ft/yr is conservatively estimated. Groundwater in this upper most aquifer flows under TVA property and discharges to the Cumberland River without traversing private property. The possibility of impact to any private water well is extremely remote

CONCLUSIONS

Groundwater assessment monitoring results for the July 29, 2015 event indicate GWPS exceptions for beryllium, cadmium, and nickel at well GAF-19R, which is consistent with past observations. Historical data indicate a potential downward or stabilizing trend for beryllium, while cadmium and nickel appear to be consistent with recent historical readings. TVA also plans to mitigate groundwater impacts by reducing infiltration through maintenance activities in the NRS footprint as needed. Fill material will be placed and graded for maintenance of flat areas and areas in need of additional cover. The material will be used for minor regrading and shaping in order to promote positive surface runoff and reduce infiltration. Grading will focus on the areas where erosion or ponding occurs. The graded areas will be sloped to drain and covered with two feet of cover soil and vegetated.

The next sampling event is planned for October 2015.

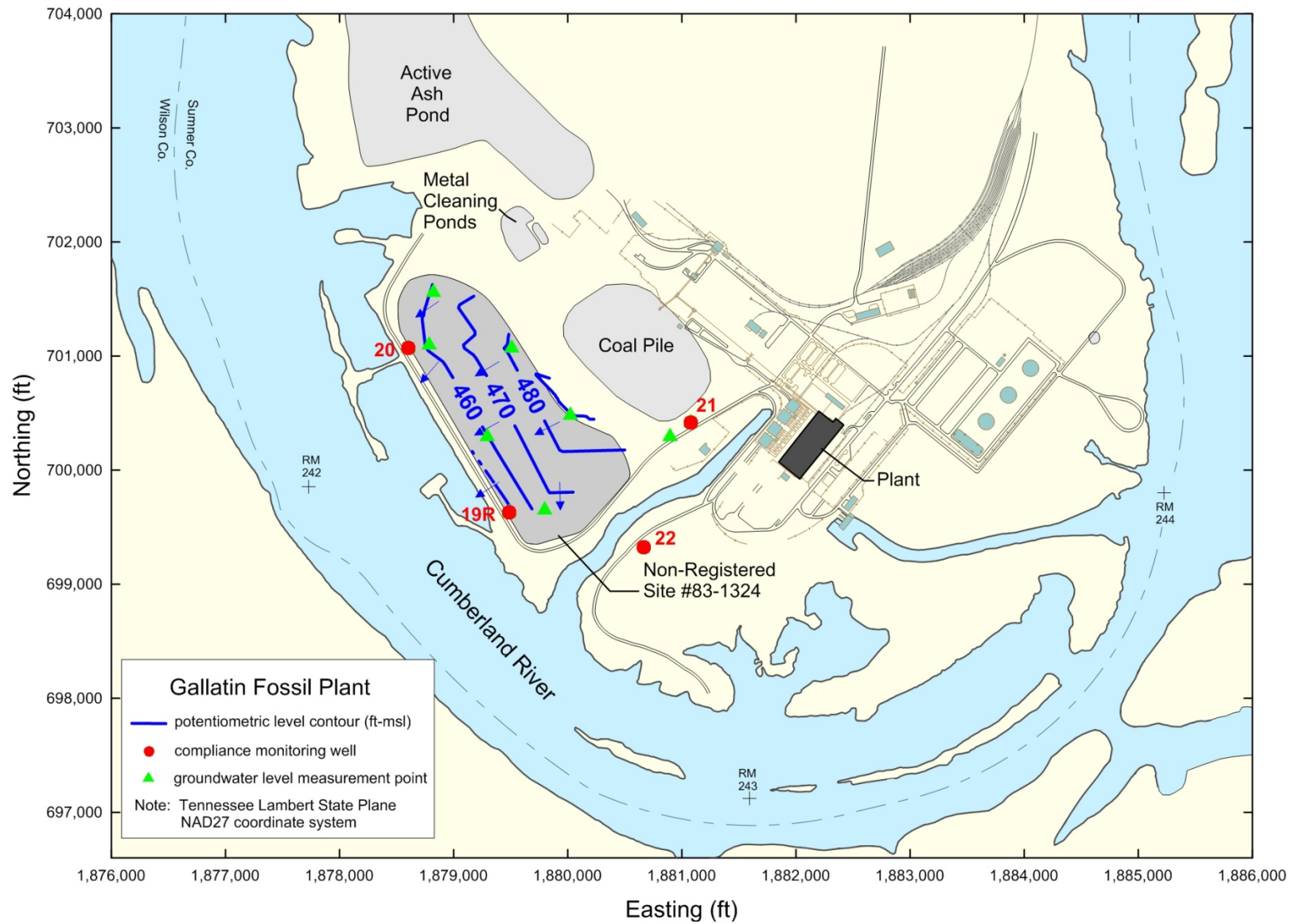


FIGURE 1. Groundwater Potentiometric Surface on September 15, 2011

APPENDIX A
FIELD DATA SHEETS

Preliminary Groundwater Data Field Worksheet

Sheet 1 of 1

Project/Site TVA GAF NRS		Well Number GAF-19R 84068		Purge Date	Year 2015	Month 07	Day 29
Depth to Water (m) 4195	Bottom of Well (m) 4194	Well Diameter (mm) 51	4188	Survey Leader MIHALEK		Field Crew STONE	
☒ Depth of Screen		☐ Open Bore Hole		Sample Label GAF-19R		☐ Unfiltered ☐ Filtered ☒ Both Filter Type and Size: 0.45 micron	
40 m To 50 Ft		4191 m To 4190 m		Volume Factor = 1.063		Well Volume = 4.17 gal	
Bottom of Well = 4194 m		Depth to Water = 128.78 m		Target Purge Volume = 12.52 gal		Actual Purge Volume = 2.2 gal	

Purge Pump:	☐ Bladder	☒ Centrifugal	☐ Peristaltic	☐ Dedicated	Other (list):					
Sample Pump:	☐ Bladder	☒ Centrifugal	☐ Peristaltic	☐ Dedicated	Other (list):					
Notes and WQ Observations	Time ET <u>CT</u>	Pump Rate (L/min)	Depth to Water (m)	Pump Depth (m) <u>PT</u>	Temp °C	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)	Turbidity (NTU)
Begin Purge →	1010	0.25	29.71	45	19.62	3.35	10.23	2477	360.0	115
0.35-gal	1015	0.25	29.60	45	20.95	3.59	1.83	2522	323.7	57.6
0.5-gal	1020	0.20	29.57	45	21.39	3.55	1.35	2553	330.3	70.9
0.8-gal	1025	0.20	29.56	45	21.54	3.54	1.35	2567	330.6	68.5
1.0-gal	1030	0.20	29.56	45	21.66	3.52	1.29	2588	335.0	63.3
1.1-gal	1035	0.20	29.55	45	21.92	3.51	1.38	2622	336.2	57.8
1.2-gal	1040	0.20	29.56	45	21.71	3.52	1.23	2625	331.3	45.4
1.5-gal	1045	0.20	29.55	45	22.23	3.53	1.47	2667	331.1	44.3
1.8-gal	1050	0.20	29.55	45	22.29	3.54	1.34	2680	331.8	43.3
2.0-gal	1055	0.20	29.55	45	22.30	3.54	1.50	2689	330.6	44.8
2.2-gal	1100	0.20	29.55	45	22.37	3.54	1.27	2702	330.9	44.9
Post Sample	1112	-	29.60	-	25.11	3.60	1.31	2846	331.2	48.3

Remarks: Post sample readings collected from YSI cupReviewed By: [Signature]
Survey LeaderDate: 7/29/15

Project Leader

Date

Sample Collector MIHALEK/STONE			
Sample Date		Time	
Year 2015	Month 07	Day 29	ET 1105
Pump Duration: 50 min		min 72004	
"999" = 2 days			

Sample Readings							
1100	0.20	4192	10	400	300	94	90
Analysis Time ET (CT)	Pump Rate (L/min)	Pump Depth (m)	Temp °C	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)
45	0.20	45	170.1	150.1	360.1	120.1	SM 2580B
							EPA 180.1

Additional Sample Data									
Analyst:						Well Diameter (mm)		Vol. Factor (L/m)	
Date Analyzed		415	431	436	437	12.7	(0.5 in)	0.127	
Year 2015	Month 07	Phenol Alkalinity mg/L (EPA 310.1)	Total Alk. mg/L (EPA 310.1)	Mineral Acidity mg/L (EPA 305.1)	CO ₂ Acidity mg/L (EPA 305.1)	51	(2 in)	2.027	
Turbidity 1350		Time:	Time:	Time:	Time:	76	(3 in)	4.560	
☐ Clear		Initial:	Initial:	Initial:	Initial:	102	(4 in)	8.107	
☐ Slightly Turbid		Bottles Required	☐ Ferrous	☐ Mineral	☐ Phenol	127	(5 in)	12.668	
☐ Turbid		☐ BOD	☐ TOC	☐ Metals	☐ Dis. Mineral	153	(6 in)	18.228	
☐ Highly Turbid		☐ COD	☐ TIC	☐ Dis. Metals	☐ Nutrient	Others (list):			
Color									
Odor:									

Preliminary Groundwater Data Field Worksheet

Sheet 1 of 1

Project: <u>TVA GAF NRS</u>	Well Number: <u>GAF-20</u> 34068	Purge Date: <u>2015</u>	Year: <u>07</u>	Month: <u>29</u>	Day: <u>29</u>
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Depth to Water (ft) <u>24.96</u> 4195	Bottom of Well (ft) <u>53.51</u> 4194	Well Diameter (mm) <u>51</u> 4188	Survey Leader: <u>MIHALEK</u>	Field Crew: <u>STONE</u>
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☒ Depth of Screen	☐ Open Bore Hole	Sample Label: <u>GAF-20</u>	Filter Type and Size: ☐ Unfiltered ☐ Filtered ☒ Both <u>0.45 micron</u>
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Bottom of Well: <u>53.51</u> ft	Depth to Water: <u>24.96</u> ft	Volume Factor: <u>0.163</u> L/m	Well Volume: <u>4.65</u> gal	Target Purge Volume: <u>13.96</u> gal	Actual Purge Volume: <u>3.09</u> gal 4186
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Purge Pump: ☐ Bladder ☒ Centrifugal ☐ Peristaltic	Other (list):
Sample Pump: ☐ Bladder ☒ Centrifugal ☐ Peristaltic	Other (list):

Notes and WQ Observations	Time ET (CT)	Pump Rate (L/min)	Depth to Water (m)	Pump Depth (m) <u>FT</u>	Temp (°C)	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(*) ORP (mV)	Turbidity (NTU)
Begin Purge →	<u>1150</u>	<u>0.35</u>	<u>25.78</u>	<u>46</u>	<u>21.70</u>	<u>5.84</u>	<u>4.12</u>	<u>1454</u>	<u>34.1</u>	<u>17.3</u>
<u>0.7 gal</u>	<u>1155</u>	<u>0.30</u>	<u>25.85</u>	<u>46</u>	<u>19.13</u>	<u>6.10</u>	<u>1.42</u>	<u>1424</u>	<u>18.2</u>	<u>31.0</u>
<u>1-gal</u>	<u>1200</u>	<u>0.30</u>	<u>25.77</u>	<u>46</u>	<u>19.51</u>	<u>6.11</u>	<u>1.61</u>	<u>1452</u>	<u>14.8</u>	<u>12.9</u>
<u>1.3-gal</u>	<u>1205</u>	<u>0.30</u>	<u>25.78</u>	<u>46</u>	<u>19.67</u>	<u>6.09</u>	<u>0.99</u>	<u>1478</u>	<u>13.7</u>	<u>10.48</u>
<u>1.8-gal</u>	<u>1210</u>	<u>0.30</u>	<u>25.78</u>	<u>46</u>	<u>19.88</u>	<u>6.08</u>	<u>1.13</u>	<u>1494</u>	<u>12.5</u>	<u>9.72</u>
<u>2.0-gal</u>	<u>1215</u>	<u>0.30</u>	<u>26.79</u>	<u>46</u>	<u>19.85</u>	<u>6.06</u>	<u>0.95</u>	<u>1507</u>	<u>11.8</u>	<u>8.29</u>
<u>2.3-gal</u>	<u>1220</u>	<u>0.30</u>	<u>25.79</u>	<u>46</u>	<u>19.85</u>	<u>6.04</u>	<u>0.91</u>	<u>1513</u>	<u>11.2</u>	<u>7.41</u>
<u>2.6-gal</u>	<u>1225</u>	<u>0.30</u>	<u>25.79</u>	<u>46</u>	<u>20.00</u>	<u>6.03</u>	<u>0.89</u>	<u>1522</u>	<u>10.9</u>	<u>7.50</u>
<u>3.0-gal</u>	<u>1230</u>	<u>0.30</u>	<u>25.79</u>	<u>46</u>	<u>20.05</u>	<u>6.03</u>	<u>0.65</u>	<u>1524</u>	<u>9.9</u>	<u>7.90</u>
Post Sample	<u>1242</u>	-	<u>25.83</u>	-	<u>26.16</u>	<u>6.08</u>	<u>1.27</u>	<u>1745</u>	<u>3.7</u>	<u>7.61</u>

Remarks: POST SAMPLE READINGS TAKEN FROM YSI CUP

117.20 Hz

Reviewed By: [Signature]

Survey Leader

Date: 7/29/15

Project Leader

Date

Sample Collector: <u>MIHALEK/STONE</u>
Sample Date: <u>2015</u> <u>07</u> <u>29</u> Time: <u>1235</u> ET (CT)
Pump Duration: <u>40</u> min 72004
*999 = 2 days

Sample Readings							
<u>1230</u>	<u>0.30</u>	<u>46</u>	<u>20.05</u>	<u>6.03</u>	<u>0.65</u>	<u>1524</u>	<u>9.9</u> <u>7.90</u>
4192	4193	4192	10	400	300	94	90
Analysis Time ET (CT)	Pump Rate (L/min)	Pump Depth (m) <u>FT</u>	Temp (°C) EPA 170.1	pH (s.u.) EPA 150.1	DO (mg/L) EPA 360.1	COND (umhos/cm) EPA 120.1	(*) ORP (mV) SM 2580B

Additional Sample Data

Analyst:	415	431	436	437	Well Diameter (mm)	Vol. Factor (L/m)
Date Analyzed: Year <u>2015</u> Month <u>07</u> Day <u>29</u>	Phenol Alkalinity (mg/L) (EPA 310.1)	Total Alk. (mg/L) (EPA 310.1)	Mineral Acidity (mg/L) (EPA 305.1)	CO ₂ Acidity (mg/L) (EPA 305.1)	12.7 (0.5 in)	0.127
Turbidity 1350 ☐ Clear ☐ Slightly Turbid ☐ Turbid ☐ Highly Turbid	Time: Initial	Time: Initial	Time: Initial	Time: Initial	51 (2 in)	2.027
Color	Bottles Required ☐ BOD ☐ TOC ☐ Ferrous ☐ Metals ☐ Dis. Metals	☐ Mineral ☐ Dis. Mineral ☐ Nutrient	☐ Phenol ☐ Filt TIC ☐ TSS/TDS	Others (list):	76 (3 in)	4.560
Odor:	☐ COD ☐ TIC	☐ Dis. Metals	☐ Nutrient	☐ TSS/TDS	102 (4 in)	8.107
					127 (5 in)	12.668
					153 (6 in)	18.228

Preliminary Groundwater Data Field Worksheet

Sheet 1 of 1

Project/Site TVA GAF NRS	Well Number GAF-22 84068	Purge Date 2015	Year 07	Month 29	Day
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Depth to Water (m) 26.82 4195	Bottom of Well (m) 51.49 4194	Well Diameter (mm) 51 4188	Survey Leader M. HALEK	Field Crew STONE
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☒ Depth of Screen	☐ Open Bore Hole	Sample Label GAF-22	☐ Unfiltered ☐ Filtered ☒ Both Filter Type and Size 0.45 micron
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Bottom of Well	Depth to Water	x	Volume Factor	=	Well Volume	Target Purge Volume	Actual Purge Volume
51.49	26.82	1.063	1.063	1.063	4.02 gal	12.06 gal	3.0 4186

Purge Pump: ☐ Bladder ☒ Centrifugal ☐ Peristaltic	Other (list):
Sample Pump: ☐ Bladder ☒ Centrifugal ☐ Peristaltic	Other (list):

Notes and WQ Observations	Time ET (CT)	Pump Rate (L/min)	Depth to Water (m)	Pump Depth (m) Ft	Temp °C	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)	Turbidity (NTU)
Begin Purge →	0800	0.10	27.88	40	18.09	6.66	3.31	304	30.8	OR
0.3 gal	0805	0.13	28.44	40	18.82	7.03	1.77	304	23.9	911
0.9 gal	0810	0.10	29.13	40	19.64	7.19	1.76	308	24.9	801
1.0 gal	0815	0.15	29.45	40	20.51	7.25	1.84	312	27.1	100
1.1 gal	0820	0.15	29.83	40	20.70	7.29	1.94	312	31.1	102
1.2 gal	0825	0.13	30.33	40	20.38	7.29	2.04	306	36.8	103.2
1.5 gal	0830	0.15	30.84	40	20.34	7.30	2.18	306	39.3	73.0
1.7 gal	0835	0.15	30.98	40	21.16	7.30	2.10	310	40.9	72.8
2.0 gal	0840	0.10	31.29	40	21.93	7.31	2.09	316	42.5	66.9
2.1 gal	0845	0.10	31.64	40	22.63	7.33	2.19	322	43.7	48.6
2.2 gal	0850	0.10	31.88	40	22.30	7.31	2.60	320	45.5	50.2
2.4 gal	0900	0.10	32.00	40	22.32	7.30	2.58	320	47.6	54.3
2.5 gal	0905	0.10	32.11	40	22.22	7.30	2.55	323	47.1	57.2
2.7 gal	0910	0.10	32.19	40	22.30	7.32	2.59	324	47.7	58.3
3.0 gal	0915	0.10	32.22	40	22.38	7.34	2.54	325	47.5	55.4

Remarks: **KEVIN LATHAM ONSITE FOR DETERGENT S @ 0900 MISSED READING**
POST SAMPLE READINGS TAKEN FROM XSI CUP

Reviewed By: [Signature]	Date: 7/29/15	Project Leader	Date
---------------------------------	----------------------	----------------	------

Sample Collector: M. HALEK/S. NRS
Sample Date: 0920
Year: 2015 Month: 07 Day: 29 ET: (CT)
Pump Duration: 70 min
72004
"999" = 2 days

Sample Readings							
0915	0.10	40	22.38	7.34	2.54	325	47.5 55.4
4192	10	400	300	94	90		
Pump Depth (m) Ft	Temp °C EPA 170.1	pH (s.u.) EPA 150.1	DO (mg/L) EPA 360.1	COND (umhos/cm) EPA 120.1	(+/-) ORP (mV) SM 2580B	Turbidity (NTU) EPA 180.1	

Additional Sample Data							
Analyst:					Well Diameter (mm)	Vol. Factor (L/m)	
Date Analyzed	415	431	436	437	12.7 (0.5 in)	0.127	
Year Month Day	Phenol Alkalinity mg/L (EPA 310.1)	Total Alk. mg/L (EPA 310.1)	Mineral Acidity mg/L (EPA 305.1)	CO ₂ Acidity mg/L (EPA 305.1)	51 (2 in)	2.027	
Turbidity 1350 ☐ Clear ☐ Slightly Turbid ☐ Turbid ☐ Highly Turbid	Time: Initial:	Time: Initial:	Time: Initial:	Time: Initial:	76 (3 in)	4.560	
Color	Bottles Required ☐ BOD ☐ TOC ☐ COD ☐ TIC	☐ Ferrous ☐ Metals ☐ Dis. Metals	☐ Mineral ☐ Dis. Mineral ☐ Nutrient	☐ Phenol ☐ Filt. TIC ☐ TSS/TDS	102 (4 in)	8.107	
Odor:	Others (list):				127 (5 in)	12.668	
					153 (6 in)	18.228	

Preliminary Groundwater Data Field Worksheet

Sheet 1 of 1

Project Site TVA GAF NES	Well Number GAF-26 84068	Purge Date	Year 2015	Month 07	Day 29
------------------------------------	------------------------------------	------------	---------------------	--------------------	------------------

Depth to Water (m) 22.46 4195	Bottom of Well (m) 105.93 4194	Well Diameter (mm) 51 4188	Survey Leader MIHALEK	Field Crew STONE
☒ Depth of Screen 77 4191 To 87 4190 ☐ Open Bore Hole			Sample Label GAF-26	☐ Unfiltered ☐ Filtered ☒ Both Filter Type and Size: 0.45 micron
Bottom of Well 105.93 4194 - Depth to Water 22.46 4195 x Volume Factor 0.163 4186 = Well Volume 13.60 4186 gal		Target Purge Volume 40.81 4186 gal Actual Purge Volume 3.2 4186 gal		

Purge Pump: ☐ Bladder ☒ Centrifugal ☐ Peristaltic ☐ Dedicated Other (list):
 Sample Pump: ☐ Bladder ☒ Centrifugal ☐ Peristaltic ☐ Dedicated Other (list):

Notes and WQ Observations	Time ET (CT)	Pump Rate (L/min)	Depth to Water (m)	Pump Depth (m)	Temp (°C)	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)	Turbidity (NTU)
Begin Purge →	1450	0.6	23.36	82	20.31	8.07	2.74	1035	-127.8	6.48
1.0-gal	1455	0.6	23.38	82	17.91	7.85	0.53	1009	-205.5	10.96
1.2-gal	1500	0.5	23.28	82	18.63	7.87	0.37	1025	-216.1	11.20
2.0-gal	1505	0.5	23.30	82	18.57	7.87	0.27	1023	-218.8	11.20
2.5-gal	1510	0.5	23.30	82	18.51	7.88	0.22	1022	-221.9	13.10
2.7-gal	1515	0.5	23.30	82	18.62	7.88	0.17	1025	-226.8	13.90
2.9-gal	1520	0.5	23.30	82	18.47	7.88	0.18	1023	-228.5	13.70
3.2-gal	1525	0.5	23.30	82	18.61	7.88	0.18	1023	-230.7	13.81
Post Sample	1538	-	23.60	-	20.80	7.65	1.54	1081	-97.9	13.87

Remarks: **Post Sample readings taken from YSI cup.**

Reviewed By: **[Signature]**
 Survey Leader

7/29/15
 Date

Project Leader

Date

Sample Collector MIHALEK/STONE			
Sample Date		Time	
Year 2015	Month 07	Day 29	ET (CT) 1530
Pump Duration: 35 min		72004	
*999 = 2 days			

Sample Readings									
1525	0.5	82	18.61	7.88	0.18	1023	-230.7	(3.81)	
Analysis Time ET (CT)	Pump Rate (L/min)	Pump Depth (m)	Temp (°C)	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)	Turbidity (NTU)	
		82	170.1	150.1	360.1	EPA 120.1	SM 2580B	EPA 180.1	

Additional Sample Data									
Analyst:							Well Diameter (mm)	Vol. Factor (L/m)	
Date Analyzed			415	431	436	437	127 (0.5 in)	0.127	
Year	Month	Day	Phenol Alkalinity mg/L (EPA 310.1)	Total Alk mg/L (EPA 310.1)	Mineral Acidity mg/L (EPA 305.1)	CO ₂ Acidity mg/L (EPA 305.1)	51 (2 in)	2.027	
Turbidity 1350 ☐ Clear ☐ Slightly Turbid ☐ Turbid ☐ Highly Turbid			Time:	Time:	Time:	Time:	76 (3 in)	4.560	
			Initial:	Initial:	Initial:	Initial:	102 (4 in)	8.107	
			127 (5 in)	12.668					
Color: ☐ BOD ☐ TOC ☐ Ferrous ☐ Mineral ☐ Phenol Odor: ☐ COD ☐ TIC ☐ Dis. Metals ☐ Nutrient ☐ TSS/TDS			Others (list):						

Preliminary Groundwater Data Field Worksheet

Sheet 1 of 1

Project Site TVA GAF NRS	Well Number GAF-27 84068	Purge Date	Year 2015	Month 07	Day 29
-----------------------------	-----------------------------	------------	--------------	-------------	-----------

Depth to Water (m) 20.47 4195	Bottom of Well (m) 90.50 4194	Well Diameter (mm) 4188	Survey Leader M. HAUER	Field Crew STONE
-------------------------------	-------------------------------	-------------------------	---------------------------	---------------------

☒ Depth of Screen	☐ Open Bore Hole	Sample Label GAF-27	☐ Unfiltered ☐ Filtered ☒ Both
---	---	------------------------	--

Bottom of Well	Depth to Water	x	Volume Factor	=	Well Volume	Target Purge Volume	Actual Purge Volume
90.50 m	20.47 m	x	10.163	=	11.41 gal	34.24 gal	31.9 gal

Purge Pump:	☐ Bladder	☒ Centrifugal	☐ Peristaltic	☐ Dedicated	Other (list):
Sample Pump:	☐ Bladder	☒ Centrifugal	☐ Peristaltic	☐ Dedicated	Other (list):

Notes and WQ Observations	Time ET (CT)	Pump Rate (L/min)	Depth to Water (m)	Pump Depth (m)	Temp °C	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)	Turbidity (NTU)
Begin Purge →	1300	0.25	21.43	82	17.72	6.81	2.41	1347	88.0	9.38
0.5 gal	1305	0.35	24.50	82	20.41	6.92	0.37	1406	-9.4	44.8
0.6 gal	1310	0.20	24.63	82	20.28	6.91	0.37	1400	-13.9	47.3
0.8 gal	1315	0.25	25.50	82	20.28	6.95	0.38	1398	-12.6	44.5
1.3 gal	1320	0.25	27.30	82	21.47	6.93	0.31	1459	-24.2	56.1
1.5 gal	1325	0.20	27.50	82	19.99	6.93	0.30	1400	-24.1	56.2
1.8 gal	1330	0.20	27.88	82	21.46	6.94	0.31	1440	-24.9	32.4
2.1 gal	1335	0.25	28.18	82	23.27	6.94	0.30	1493	-25.6	21.0
2.3 gal	1340	0.15	28.54	82	21.99	6.94	0.30	1454	-25.4	14.9
2.5 gal	1345	0.20	29.02	82	21.15	6.94	0.31	1435	-26.7	12.67
2.7 gal	1350	0.20	29.66	82	21.74	6.94	0.31	1440	-28.7	11.76
2.9 gal	1355	0.20	29.99	82	22.09	6.94	0.31	1455	-29.2	11.35
3.1 gal	1400	0.20	30.12	82	22.75	6.95	0.31	1473	-30.4	11.39

Remarks: SEE BELOW

Reviewed By: DEJANOS 7/29/15

Survey Leader

Date

Project Leader

Date

Sample Collector M. HAUER	Sample Date	Time
Year 2015	Month 07	Day 29
Pump Duration: 60 min	ET (CT)	72004

"999" = 2 days

Sample Readings							
1400	0.20	4192	10	400	300	94	90
Analysis Time ET (CT)	Pump Rate (L/min)	Pump Depth (m)	Temp °C EPA 170.1	pH (s.u.) EPA 150.1	DO (mg/L) EPA 360.1	COND (umhos/cm) EPA 120.1	(+/-) ORP (mV) SM 2580B
							Turbidity (NTU) EPA 180.1

Additional Sample Data							
Analyst:	415	431	436	437	Well Diameter (mm)	Vol. Factor (L/m)	
Date Analyzed	Phenol Alkalinity (mg/L) (EPA 310.1)	Total Alk. (mg/L) (EPA 310.1)	Mineral Acidity (mg/L) (EPA 305.1)	CO ₂ Acidity (mg/L) (EPA 305.1)	51 (2 in)	2.027	
Year Month Day	Time:	Time:	Time:	Time:	76 (3 in)	4.560	
Turbidity 1350	Initial:	Initial:	Initial:	Initial:	102 (4 in)	8.107	
☐ Clear	Bottles Required	☐ Ferrous	☐ Mineral	☐ Phenol	127 (5 in)	12.668	
☐ Slightly Turbid	☐ BOD	☐ TOC	☐ Metals	☐ Dis. Mineral	153 (6 in)	18.228	
☐ Turbid	☐ COD	☐ TIC	☐ Dis. Metals	☐ Nutrient			
☐ Highly Turbid							
Color							
Odor:							

COLLECTED BY TVA 30066A [2-2008]

POST READINGS TAKEN FROM YSI CUP

POST READINGS 1413 Temp: 22.00 pH-7.11

BOTTLE PRES. INADVERTENTLY SPILLED ON THIS PAGE

DO-0.87 Cond-1472 ORP-29.8 NTU-11.47

Instrument Standardization

Field Standardization of Instruments

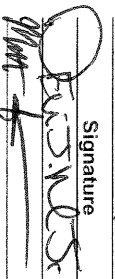
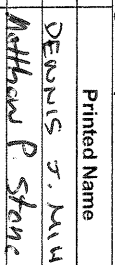
Survey 7/29/15

Standardized By Date/Time-Begin & End Elevation (m) Air Temp (°C) Barometric Pressure (BP'mmHg)		As Found <u>JM</u> <u>7/2/15 @</u> <u>NA</u> <u>NA</u> <u>NA</u>		Check Final <u>DJM</u> <u>7/29/15 @ 0708</u> <u>73°F</u>	
Instrument(s) Type <u>YSI</u> Model <u>556MPS</u>		TVA Tag Number(s) or SN <u>13B1C0011</u>		Calibration Date <u>7/29/15</u> Calibration Due Date <u>7/31/15</u>	
Field Measurements		Instrument Readings			Remarks & Additional Information
		As Found	Adjusted To	Check Final	
Temp. (°C)	Instrument				* Annual Ice Pt Ck Date
	* Hand Thermometer				
	ID #				
Dissolved Oxygen (mg/l)	Water Temp/Oxy Sol.	/		/	
	Instrument (D.O)				
	Instrument (% Sat.)				
Conductivity (umhos/cm) <u>µS/cm</u> <u>mS/cm</u>	Instrument	<u>4.49</u>	<u>4.46</u>	<u>4.49</u>	Date Expires <u>4/2016</u>
	Low Range	Conc of STD = <u>4.49</u>			Lot # <u>C3530642</u>
	Instrument	<u>4.49</u>	<u>4.46</u>	<u>4.49</u>	Date Expires
	High Range	<u>4</u>	Conc of STD = <u>4.49</u>		
pH (std units) % slope of probe	Buffers Temp	/	/	/	Date Expires
	Instrument @ 7.0	<u>7.00</u>	<u>7.03</u>	<u>7.00</u>	<u>01/2016</u>
	Instrument @ 10.0				<u>C470239</u>
	Instrument @ 4.0	<u>4.00</u>	<u>4.16</u>	<u>4.00</u>	<u>4/2016</u>
☐ ORP ☐ Sulfide	Instrument				Date Std Prepared
	STD Temp/Conc.	/		/	
	Instrument				Date Std Prepared
	STD Temp/Conc.	/		/	
Turbidity	Instrument	<u>1.00</u>	<u>1.10</u>	<u>1.00</u>	Date Expires
	Low Range	Conc of STD = <u>1.00</u>			Lot #
	Instrument	<u>10.00</u>	<u>9.99</u>	<u>10.00</u>	Date Expires
	High Range	Conc of STD = <u>10.00</u>			Lot #
Depth (m)	Instrument (0.0)				
Comments <u>Lot DATES & Nbs For NTU NOT PROVIDED</u>					
					Reviewed By: <u>DJM</u>

LAMITE
2020we
SN: 1601

**Generation Construction
[Projects and Civil Construction / Coal Combustion Products]
PRE-JOB BRIEF (PJB)**

Pre-job Briefing Participants

Signature	Printed Name
	DENNIS J. MILWACKER
	Matthew P. Stone

Are there recommended changes to the work that could have improved the safety or efficiency of the work, i.e., PPE, work environment, tools, materials, equipment, etc.?

Yes ☐ No ☒

Were there any unexpected aspects or occurrences including accidents, injuries or near-miss incidents?

Yes ☐ No ☒

Was the task accomplished with expected results?

Yes ☒ No ☐

Is any enhancement to plant documentation warranted, i.e., were procedures/step text complete and accurate, any print or schematic discrepancies, etc.?

Yes ☐ No ☒

Was planning and scheduling optimized to reduce the potential for human error?

Yes ☒ No ☐

Was preparation adequate?

Yes ☒ No ☐

Were lessons learned that change the way the job should be performed, recorded, passed on to others, and entered into Maximo as appropriate?

Yes ☐ No ☐

Were Lessons Learned entered into the FG&D Lessons Learned website?

Yes ☐ No ☐

If a JSA was used in the pre-job briefing, did it adequately cover all of the hazards and control measures?

Yes ☐ No ☐

If a JSA was not used in the pre-job briefing, did the checklist cover all of the hazards and control measures?

Yes ☒ No ☐

Was there any change in work scope requiring re-briefing of workers?

Yes ☐ No ☒

If a JSA was not used in the pre-job briefing should a JSA be developed for this job?

Yes ☐ No ☐

Was training for the job appropriate and effective?

Yes ☒ No ☐

Was work area cleanup/housekeeping adequate?

Yes ☒ No ☐

Did all involved with the work understand their individual responsibilities?

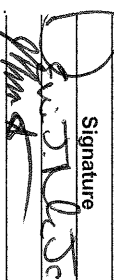
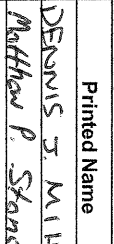
Yes ☒ No ☐

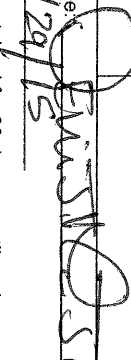
Is additional follow up required from this Post-job Review?

Yes ☐ No ☒

If YES, then the Foreman/Supervisor/Lead Performer is responsible to provide this feedback to the responsible group for action.

Post-job Review Participants

Signature	Printed Name
	DENNIS J. MILWACKER, Jr.
	Matthew P. Stone

Foreman/Supv/Employee: 
Date of Review: 7/29/15
Note: This form must be retained for 30 days or until work order/package is closed.

Hazard Identification & Mitigation (TVA 20287 (5-2009))

Location: TVA GAF NDS
Employee / Task Manager 7/29/15
MIA AUSE

Date: ~~BRANDON~~ 7/29/15

Description of Work Being Performed:

GROUNDWATER MONITORING

- Requires workers to take time before starting a job to inspect the environment to detect conditions unanticipated by work planning and pre-job briefing and confirm those that were.
- Focuses attention on the surroundings and critical steps before focusing on the task.

- At the beginning of any task that involves plant equipment.
- It should be considered before starting similar segments of a large activity that occurs at different locations.
- If work involves actions at multiple plant locations then the two-minute rule should be applied at each location.

- Identify any hazards that exist at the job site utilizing the list of potential safety hazards shown on this card as a guide:
- Mitigate all hazards prior to beginning work.

If a hazard cannot be mitigated through simple means, contact your foreman.

Hazard Identification		Hazard Mitigation
(Identify and circle all potential hazards at the worksite)		(Document the mitigation steps for each identified hazard)
Ergonomic Factors	Awkward, unstable footing, twisting, climbing, fatigue, lifting heavy bulky objects, repetitive motion, bending, kneeling, squatting, stooping pushing/pulling work restrictions	✓
Work Space	Restricted space, congested area, confined space, overhead obstructions, pinch points, suitable access	
Tools	Hand tools, power tools, machine tools, guards	
Environment	Dust, noise, lighting, heat/cold, humidity, asbestos, weather conditions, x-rays, arsenic lead	HEAT / HUMIDITY
Material Handling	Heavy, bulky, unsecured or controlled load, sharp edges or objects, solids, liquids, gases, flammables	AWARENESS
Work Surfaces	Slippery, incline, grating, unstable, fall potential, hot surfaces, sharp edges, loose items on work surface	AWARENESS
Equipment	Unguarded machines/tools, authorized/certified personnel, opening/closing doors, heavy equipment operation, hazardous design/layouts, GFCI	
Scaffolds/ Ladders	Permits, inspection, falling objects, working above other employees, training, if fall protection needed? Homes, lanyard, secure/hold	N/A
Projectiles	Falling objects, unguarded machine operations, tools, explosives, flammables, stored energy, grinding operations	
Housekeeping	Does housekeeping in work area pose hazards? Tripping, slipping, falling, bumping, fire hazards, blocked exits	TRASH IN DISCONNECTED CONTAINERS
Confined Spaces	Permits, clearance – locked/tagout, energy sources, rotating equipment, monitoring – oxygen, flammables, toxic substances, training	
Energized Pressurized Systems	Hold orders, operating valves, noise, projectiles, liquids/steam, exposure to chemicals, heat/cold, lock-out/tagouts, training	
Personal Protective Equipment	Hard hat, safety glasses and side shields, gloves, hearing protection, flame resistant clothing, footwear, coveralls	N/A ✓
Toxic/ Hazardous Substances	Personal protective equipment, material handling, unsecured materials, MSDS needed, toxins, carcinogens, lead, asbestos	✓
Welding Or Cutting	Oxygen acetylene regulator settings, bottles/cylinders secured, blinds, burning permits, fire extinguisher, fire watch	WELDING CLOVES
Vehicle Usage	Driver tired, worked over on shift, etc., seat and lap belts, condition of vehicle tires, lights, wipers, fluids, weather, road and traffic conditions, following distance of other drivers	

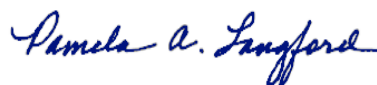
APPENDIX B

**LABORATORY ANALYTICAL REPORTS
AND SAMPLE CUSTODY RECORDS**

TVA-Environmental Affairs

Sample Delivery Group: L779585
Samples Received: 07/29/2015
Project Number: GAF-20
Description: GAF Groundwater
Site: TVA GAF NRS
Report To: Maggie Gilliland
400 W. Summit Hill Mailstop TVA WT 9D-K
Knoxville, TN 37902

Entire Report Reviewed By:



Pam Langford

Pam Langford

Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



¹Cp: Cover Page	1
²Tc: Table of Contents	2
³Ss: Sample Summary	3
⁴Cn: Case Narrative	6
⁵Sr: Sample Results	7
GAF-19R L779585-01	7
GAF-20 L779585-02	9
GAF-22 L779585-03	11
GAF-26 L779585-04	13
GAF-27 L779585-05	15
GAF-DUP-1 L779585-06	17
GAF-EQB-1 L779585-07	19
GAF-EQB-2 L779585-08	20
FIELD BLANK L779585-09	21
⁶Qc: Quality Control Summary	22
Gravimetric Analysis by Method 2540 C-2011	22
Gravimetric Analysis by Method 2540 D-2011	23
Wet Chemistry by Method 2310 B-2011	24
Wet Chemistry by Method 2320 B-2011	25
Wet Chemistry by Method 9056MOD	26
Mercury by Method 7470A	30
Metals (ICP) by Method 6010B	32
Metals (ICPMS) by Method 6020	33
⁷Gl: Glossary of Terms	37
⁸Al: Accreditations & Locations	38
⁹Sc: Chain of Custody	39



SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



GAF-19R L779585-01 GW

Collected by
Dennis Mihalek

Collected date/time
07/29/15 11:05

Received date/time
07/29/15 16:56

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Gravimetric Analysis by Method 2540 D-2011	WG806006	1	07/31/15 02:11	08/01/15 06:31	JM
Mercury by Method 7470A	WG806124	1	07/31/15 09:06	07/31/15 13:29	CHM
Mercury by Method 7470A	WG806144	1	07/31/15 11:22	08/03/15 08:35	CHM
Metals (ICPMS) by Method 6020	WG806055	1	08/01/15 10:38	08/04/15 04:36	LAT
Metals (ICPMS) by Method 6020	WG806145	1	08/03/15 12:02	08/04/15 14:56	LAT
Wet Chemistry by Method 2310 B-2011	WG806696	1	08/05/15 14:30	08/05/15 14:30	KBC
Wet Chemistry by Method 2320 B-2011	WG806993	1	08/06/15 10:09	08/06/15 10:09	MCG
Wet Chemistry by Method 9056MOD	WG805883	1	07/30/15 21:14	07/30/15 21:14	NJM

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

GAF-20 L779585-02 GW

Collected by
Dennis Mihalek

Collected date/time
07/29/15 12:35

Received date/time
07/29/15 16:56

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Gravimetric Analysis by Method 2540 D-2011	WG806006	1	07/31/15 02:11	08/01/15 06:30	JM
Mercury by Method 7470A	WG806124	1	07/31/15 09:06	07/31/15 13:31	CHM
Mercury by Method 7470A	WG806144	1	07/31/15 11:22	08/03/15 08:42	CHM
Metals (ICPMS) by Method 6020	WG806055	1	08/01/15 10:38	08/04/15 04:38	LAT
Metals (ICPMS) by Method 6020	WG806145	1	08/03/15 12:02	08/04/15 14:26	LAT
Wet Chemistry by Method 2310 B-2011	WG806696	1	08/05/15 14:30	08/05/15 14:30	KBC
Wet Chemistry by Method 2320 B-2011	WG806993	1	08/06/15 10:09	08/06/15 10:09	MCG
Wet Chemistry by Method 9056MOD	WG805883	1	07/30/15 21:28	07/30/15 21:28	NJM

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

GAF-22 L779585-03 GW

Collected by
Dennis Mihalek

Collected date/time
07/29/15 09:20

Received date/time
07/29/15 16:56

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Gravimetric Analysis by Method 2540 D-2011	WG806006	1	07/31/15 02:11	08/01/15 06:30	JM
Mercury by Method 7470A	WG806124	1	07/31/15 09:06	07/31/15 13:34	CHM
Mercury by Method 7470A	WG806144	1	07/31/15 11:22	08/03/15 08:44	CHM
Metals (ICPMS) by Method 6020	WG806055	1	08/01/15 10:38	08/04/15 04:41	LAT
Metals (ICPMS) by Method 6020	WG806145	1	08/03/15 12:02	08/04/15 14:59	LAT
Wet Chemistry by Method 2310 B-2011	WG806696	1	08/05/15 14:30	08/05/15 14:30	KBC
Wet Chemistry by Method 2320 B-2011	WG806993	1	08/06/15 10:09	08/06/15 10:09	MCG
Wet Chemistry by Method 9056MOD	WG805883	1	07/30/15 21:42	07/30/15 21:42	NJM

GAF-26 L779585-04 GW

Collected by
Dennis Mihalek

Collected date/time
07/29/15 15:30

Received date/time
07/29/15 16:56

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Gravimetric Analysis by Method 2540 D-2011	WG806006	1	07/31/15 02:11	08/01/15 06:32	JM
Mercury by Method 7470A	WG806124	1	07/31/15 09:06	07/31/15 13:40	CHM
Mercury by Method 7470A	WG806144	1	07/31/15 11:22	08/03/15 08:46	CHM
Metals (ICPMS) by Method 6020	WG806055	1	08/01/15 10:38	08/04/15 04:43	LAT
Metals (ICPMS) by Method 6020	WG806145	1	08/03/15 12:02	08/04/15 15:01	LAT
Wet Chemistry by Method 2310 B-2011	WG806696	1	08/05/15 14:30	08/05/15 14:30	KBC
Wet Chemistry by Method 2320 B-2011	WG806993	1	08/06/15 10:09	08/06/15 10:09	MCG
Wet Chemistry by Method 9056MOD	WG805883	1	07/30/15 21:56	07/30/15 21:56	NJM



GAF-27 L779585-05 GW

Collected by
Dennis MihalekCollected date/time
07/29/15 14:05Received date/time
07/29/15 16:56

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Gravimetric Analysis by Method 2540 D-2011	WG806006	1	07/31/15 02:11	08/01/15 06:37	JM
Mercury by Method 7470A	WG806124	1	07/31/15 09:06	07/31/15 13:42	CHM
Mercury by Method 7470A	WG806144	1	07/31/15 11:22	08/03/15 08:48	CHM
Metals (ICPMS) by Method 6020	WG806055	1	08/01/15 10:38	08/04/15 04:50	LAT
Metals (ICPMS) by Method 6020	WG806145	1	08/03/15 12:02	08/04/15 15:04	LAT
Wet Chemistry by Method 2310 B-2011	WG806696	1	08/05/15 14:30	08/05/15 14:30	KBC
Wet Chemistry by Method 2320 B-2011	WG806993	1	08/06/15 10:09	08/06/15 10:09	MCG
Wet Chemistry by Method 9056MOD	WG805883	1	07/30/15 22:09	07/30/15 22:09	NJM

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

GAF-DUP-1 L779585-06 GW

Collected by
Dennis MihalekCollected date/time
07/29/15 14:05Received date/time
07/29/15 16:56

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Gravimetric Analysis by Method 2540 D-2011	WG806006	1	07/31/15 02:11	08/01/15 06:38	JM
Mercury by Method 7470A	WG806124	1	07/31/15 09:06	07/31/15 13:45	CHM
Mercury by Method 7470A	WG806144	1	07/31/15 11:22	08/03/15 08:50	CHM
Metals (ICPMS) by Method 6020	WG806055	1	08/01/15 10:38	08/04/15 04:52	LAT
Metals (ICPMS) by Method 6020	WG806145	1	08/03/15 12:02	08/04/15 15:06	LAT
Wet Chemistry by Method 2310 B-2011	WG806696	1	08/05/15 14:30	08/05/15 14:30	KBC
Wet Chemistry by Method 2320 B-2011	WG806993	1	08/06/15 10:09	08/06/15 10:09	MCG
Wet Chemistry by Method 9056MOD	WG806849	1	08/04/15 17:07	08/04/15 17:07	DJD

GAF-EQB-1 L779585-07 GW

Collected by
Dennis MihalekCollected date/time
07/29/15 07:27Received date/time
07/29/15 16:56

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Gravimetric Analysis by Method 2540 D-2011	WG806006	1	07/31/15 02:11	08/01/15 06:40	JM
Mercury by Method 7470A	WG806144	1	07/31/15 11:22	08/03/15 08:53	CHM
Metals (ICPMS) by Method 6020	WG806055	1	08/01/15 10:38	08/04/15 04:54	LAT
Wet Chemistry by Method 2310 B-2011	WG806696	1	08/05/15 14:30	08/05/15 14:30	KBC
Wet Chemistry by Method 2320 B-2011	WG806993	1	08/06/15 10:09	08/06/15 10:09	MCG
Wet Chemistry by Method 9056MOD	WG805954	1	07/31/15 14:56	07/31/15 14:56	DJD

GAF-EQB-2 L779585-08 GW

Collected by
Dennis MihalekCollected date/time
07/29/15 16:08Received date/time
07/29/15 16:56

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Gravimetric Analysis by Method 2540 D-2011	WG806006	1	07/31/15 02:11	08/01/15 06:41	JM
Mercury by Method 7470A	WG806144	1	07/31/15 11:22	08/03/15 08:59	CHM
Metals (ICPMS) by Method 6020	WG806055	1	08/01/15 10:38	08/04/15 04:57	LAT
Wet Chemistry by Method 2310 B-2011	WG806696	1	08/05/15 14:30	08/05/15 14:30	KBC
Wet Chemistry by Method 2320 B-2011	WG806993	1	08/06/15 10:09	08/06/15 10:09	MCG
Wet Chemistry by Method 9056MOD	WG806849	1	08/04/15 18:19	08/04/15 18:19	DJD

FIELD BLANK L779585-09 GW

Collected by
Dennis MihalekCollected date/time
07/29/15 07:35Received date/time
07/29/15 16:56

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Gravimetric Analysis by Method 2540 C-2011	WG806291	1	08/04/15 09:14	08/05/15 13:21	JG
Gravimetric Analysis by Method 2540 D-2011	WG806006	1	07/31/15 02:11	08/01/15 06:43	JM
Mercury by Method 7470A	WG806144	1	07/31/15 11:22	08/03/15 09:01	CHM



FIELD BLANK L779585-09 GW

Collected by
Dennis MihalekCollected date/time
07/29/15 07:35Received date/time
07/29/15 16:56

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Metals (ICP) by Method 6010B	WG805919	1	07/30/15 10:59	07/30/15 20:28	ST
Metals (ICPMS) by Method 6020	WG806055	1	08/01/15 10:38	08/04/15 04:59	LAT
Wet Chemistry by Method 9056MOD	WG806849	1	08/04/15 17:21	08/04/15 17:21	DJD

¹Cp²Tc³Ss⁴Cn⁵Sr⁶Qc⁷Gl⁸Al⁹Sc



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the

Pam Langford

Pam Langford
Technical Service Representative

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Gravimetric Analysis by Method 2540 D-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Suspended Solids	83.0		2.50	1	08/01/2015 06:31	WG806006

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Acidity	820		10.0	1	08/05/2015 14:30	WG806696

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	08/06/2015 10:09	WG806993

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Fluoride	0.508		0.100	1	07/30/2015 21:14	WG805883

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	0.000256		0.000200	1	08/03/2015 08:35	WG806144
Mercury,Dissolved	ND		0.000200	1	07/31/2015 13:29	WG806124

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/04/2015 04:36	WG806055
Antimony,Dissolved	ND		0.00200	1	08/04/2015 14:56	WG806145
Arsenic	0.00373		0.00200	1	08/04/2015 04:36	WG806055
Arsenic,Dissolved	0.00225		0.00200	1	08/04/2015 14:56	WG806145
Barium	0.0247		0.00500	1	08/04/2015 04:36	WG806055
Barium,Dissolved	0.0134		0.00500	1	08/04/2015 14:56	WG806145
Beryllium	0.0110		0.00200	1	08/04/2015 04:36	WG806055
Beryllium,Dissolved	0.0119		0.00200	1	08/04/2015 14:56	WG806145
Cadmium	0.0111		0.00100	1	08/04/2015 04:36	WG806055
Cadmium,Dissolved	0.0104		0.00100	1	08/04/2015 14:56	WG806145
Chromium	0.0453		0.00200	1	08/04/2015 04:36	WG806055
Chromium,Dissolved	0.0302		0.00200	1	08/04/2015 14:56	WG806145
Copper	0.0328		0.00500	1	08/04/2015 04:36	WG806055
Copper,Dissolved	0.0387		0.00500	1	08/04/2015 14:56	WG806145
Cobalt	0.466		0.00200	1	08/04/2015 04:36	WG806055
Cobalt,Dissolved	0.472		0.00200	1	08/04/2015 14:56	WG806145
Lead	0.00469		0.00200	1	08/04/2015 04:36	WG806055
Lead,Dissolved	0.00440		0.00200	1	08/04/2015 14:56	WG806145
Nickel	0.252		0.00200	1	08/04/2015 04:36	WG806055
Nickel,Dissolved	0.246		0.00200	1	08/04/2015 14:56	WG806145
Selenium	0.00597		0.00200	1	08/04/2015 04:36	WG806055
Selenium,Dissolved	0.00534		0.00200	1	08/04/2015 14:56	WG806145
Silver	ND		0.00200	1	08/04/2015 04:36	WG806055
Silver,Dissolved	ND		0.00200	1	08/04/2015 14:56	WG806145
Thallium	ND		0.00200	1	08/04/2015 04:36	WG806055
Thallium,Dissolved	ND		0.00200	1	08/04/2015 14:56	WG806145
Vanadium	0.0157		0.00500	1	08/04/2015 04:36	WG806055



Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Vanadium,Dissolved	0.0121		0.00500	1	08/04/2015 14:56	WG806145
Zinc	0.727		0.0250	1	08/04/2015 04:36	WG806055
Zinc,Dissolved	0.755		0.0250	1	08/04/2015 14:56	WG806145

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Gravimetric Analysis by Method 2540 D-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Suspended Solids	27.1		2.50	1	08/01/2015 06:30	WG806006

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Acidity	50.0		10.0	1	08/05/2015 14:30	WG806696

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	51.8		20.0	1	08/06/2015 10:09	WG806993

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Fluoride	0.104		0.100	1	07/30/2015 21:28	WG805883

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	08/03/2015 08:42	WG806144
Mercury,Dissolved	ND		0.000200	1	07/31/2015 13:31	WG806124

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/04/2015 04:38	WG806055
Antimony,Dissolved	ND		0.00200	1	08/04/2015 14:26	WG806145
Arsenic	ND		0.00200	1	08/04/2015 04:38	WG806055
Arsenic,Dissolved	ND		0.00200	1	08/04/2015 14:26	WG806145
Barium	0.0210		0.00500	1	08/04/2015 04:38	WG806055
Barium,Dissolved	0.0189		0.00500	1	08/04/2015 14:26	WG806145
Beryllium	ND		0.00200	1	08/04/2015 04:38	WG806055
Beryllium,Dissolved	ND		0.00200	1	08/04/2015 14:26	WG806145
Cadmium	ND		0.00100	1	08/04/2015 04:38	WG806055
Cadmium,Dissolved	ND		0.00100	1	08/04/2015 14:26	WG806145
Chromium	0.00416		0.00200	1	08/04/2015 04:38	WG806055
Chromium,Dissolved	ND		0.00200	1	08/04/2015 14:26	WG806145
Copper	ND		0.00500	1	08/04/2015 04:38	WG806055
Copper,Dissolved	ND		0.00500	1	08/04/2015 14:26	WG806145
Cobalt	0.138		0.00200	1	08/04/2015 04:38	WG806055
Cobalt,Dissolved	0.136		0.00200	1	08/04/2015 14:26	WG806145
Lead	ND		0.00200	1	08/04/2015 04:38	WG806055
Lead,Dissolved	ND		0.00200	1	08/04/2015 14:26	WG806145
Nickel	0.0275		0.00200	1	08/04/2015 04:38	WG806055
Nickel,Dissolved	0.0256		0.00200	1	08/04/2015 14:26	WG806145
Selenium	ND		0.00200	1	08/04/2015 04:38	WG806055
Selenium,Dissolved	ND		0.00200	1	08/04/2015 14:26	WG806145
Silver	ND		0.00200	1	08/04/2015 04:38	WG806055
Silver,Dissolved	ND		0.00200	1	08/04/2015 14:26	WG806145
Thallium	ND		0.00200	1	08/04/2015 04:38	WG806055
Thallium,Dissolved	ND		0.00200	1	08/04/2015 14:26	WG806145
Vanadium	ND		0.00500	1	08/04/2015 04:38	WG806055



Metals (ICPMS) by Method 6020

Analyte	Result mg/l	<u>Qualifier</u>	RDL mg/l	Dilution	Analysis date / time	<u>Batch</u>
Vanadium,Dissolved	ND		0.00500	1	08/04/2015 14:26	WG806145
Zinc	0.0369		0.0250	1	08/04/2015 04:38	WG806055
Zinc,Dissolved	0.0375		0.0250	1	08/04/2015 14:26	WG806145

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Gravimetric Analysis by Method 2540 D-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Suspended Solids	25.5		2.50	1	08/01/2015 06:30	WG806006

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Acidity	ND		10.0	1	08/05/2015 14:30	WG806696

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	174		20.0	1	08/06/2015 10:09	WG806993

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Fluoride	0.178		0.100	1	07/30/2015 21:42	WG805883

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	08/03/2015 08:44	WG806144
Mercury,Dissolved	ND		0.000200	1	07/31/2015 13:34	WG806124

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/04/2015 04:41	WG806055
Antimony,Dissolved	ND		0.00200	1	08/04/2015 14:59	WG806145
Arsenic	ND		0.00200	1	08/04/2015 04:41	WG806055
Arsenic,Dissolved	ND		0.00200	1	08/04/2015 14:59	WG806145
Barium	0.0229		0.00500	1	08/04/2015 04:41	WG806055
Barium,Dissolved	0.0151		0.00500	1	08/04/2015 14:59	WG806145
Beryllium	ND		0.00200	1	08/04/2015 04:41	WG806055
Beryllium,Dissolved	ND		0.00200	1	08/04/2015 14:59	WG806145
Cadmium	ND		0.00100	1	08/04/2015 04:41	WG806055
Cadmium,Dissolved	ND		0.00100	1	08/04/2015 14:59	WG806145
Chromium	0.0253		0.00200	1	08/04/2015 04:41	WG806055
Chromium,Dissolved	ND		0.00200	1	08/04/2015 14:59	WG806145
Copper	0.00621		0.00500	1	08/04/2015 04:41	WG806055
Copper,Dissolved	ND		0.00500	1	08/04/2015 14:59	WG806145
Cobalt	ND		0.00200	1	08/04/2015 04:41	WG806055
Cobalt,Dissolved	ND		0.00200	1	08/04/2015 14:59	WG806145
Lead	ND		0.00200	1	08/04/2015 04:41	WG806055
Lead,Dissolved	ND		0.00200	1	08/04/2015 14:59	WG806145
Nickel	0.0174		0.00200	1	08/04/2015 04:41	WG806055
Nickel,Dissolved	0.0147		0.00200	1	08/04/2015 14:59	WG806145
Selenium	ND		0.00200	1	08/04/2015 04:41	WG806055
Selenium,Dissolved	ND		0.00200	1	08/04/2015 14:59	WG806145
Silver	ND		0.00200	1	08/04/2015 04:41	WG806055
Silver,Dissolved	ND		0.00200	1	08/04/2015 14:59	WG806145
Thallium	ND		0.00200	1	08/04/2015 04:41	WG806055
Thallium,Dissolved	ND		0.00200	1	08/04/2015 14:59	WG806145
Vanadium	ND		0.00500	1	08/04/2015 04:41	WG806055



Metals (ICPMS) by Method 6020

Analyte	Result mg/l	<u>Qualifier</u>	RDL mg/l	Dilution	Analysis date / time	<u>Batch</u>
Vanadium,Dissolved	ND		0.00500	1	08/04/2015 14:59	WG806145
Zinc	ND		0.0250	1	08/04/2015 04:41	WG806055
Zinc,Dissolved	ND		0.0250	1	08/04/2015 14:59	WG806145

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Gravimetric Analysis by Method 2540 D-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Suspended Solids	758		2.50	1	08/01/2015 06:32	WG806006

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2310 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acidity	26.0		10.0	1	08/05/2015 14:30	WG806696

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	35.6		20.0	1	08/06/2015 10:09	WG806993

Wet Chemistry by Method 9056MOD

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Fluoride	0.315		0.100	1	07/30/2015 21:56	WG805883

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	08/03/2015 08:46	WG806144
Mercury,Dissolved	ND		0.000200	1	07/31/2015 13:40	WG806124

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	08/04/2015 04:43	WG806055
Antimony,Dissolved	ND		0.00200	1	08/04/2015 15:01	WG806145
Arsenic	0.00337		0.00200	1	08/04/2015 04:43	WG806055
Arsenic,Dissolved	ND		0.00200	1	08/04/2015 15:01	WG806145
Barium	0.0528		0.00500	1	08/04/2015 04:43	WG806055
Barium,Dissolved	0.0275		0.00500	1	08/04/2015 15:01	WG806145
Beryllium	ND		0.00200	1	08/04/2015 04:43	WG806055
Beryllium,Dissolved	ND		0.00200	1	08/04/2015 15:01	WG806145
Cadmium	ND		0.00100	1	08/04/2015 04:43	WG806055
Cadmium,Dissolved	ND		0.00100	1	08/04/2015 15:01	WG806145
Chromium	0.00676		0.00200	1	08/04/2015 04:43	WG806055
Chromium,Dissolved	ND		0.00200	1	08/04/2015 15:01	WG806145
Copper	0.00862		0.00500	1	08/04/2015 04:43	WG806055
Copper,Dissolved	ND		0.00500	1	08/04/2015 15:01	WG806145
Cobalt	0.0145		0.00200	1	08/04/2015 04:43	WG806055
Cobalt,Dissolved	0.00579		0.00200	1	08/04/2015 15:01	WG806145
Lead	0.00427		0.00200	1	08/04/2015 04:43	WG806055
Lead,Dissolved	ND		0.00200	1	08/04/2015 15:01	WG806145
Nickel	0.0221		0.00200	1	08/04/2015 04:43	WG806055
Nickel,Dissolved	0.00789		0.00200	1	08/04/2015 15:01	WG806145
Selenium	ND		0.00200	1	08/04/2015 04:43	WG806055
Selenium,Dissolved	ND		0.00200	1	08/04/2015 15:01	WG806145
Silver	ND		0.00200	1	08/04/2015 04:43	WG806055
Silver,Dissolved	ND		0.00200	1	08/04/2015 15:01	WG806145
Thallium	ND		0.00200	1	08/04/2015 04:43	WG806055
Thallium,Dissolved	ND		0.00200	1	08/04/2015 15:01	WG806145
Vanadium	0.00950		0.00500	1	08/04/2015 04:43	WG806055



Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Vanadium,Dissolved	ND		0.00500	1	08/04/2015 15:01	WG806145
Zinc	0.0468		0.0250	1	08/04/2015 04:43	WG806055
Zinc,Dissolved	ND		0.0250	1	08/04/2015 15:01	WG806145

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Gravimetric Analysis by Method 2540 D-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Suspended Solids	6.20		2.50	1	08/01/2015 06:37	WG806006

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Acidity	ND		10.0	1	08/05/2015 14:30	WG806696

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	171		20.0	1	08/06/2015 10:09	WG806993

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Fluoride	0.217		0.100	1	07/30/2015 22:09	WG805883

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	08/03/2015 08:48	WG806144
Mercury,Dissolved	ND		0.000200	1	07/31/2015 13:42	WG806124

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/04/2015 04:50	WG806055
Antimony,Dissolved	ND		0.00200	1	08/04/2015 15:04	WG806145
Arsenic	ND		0.00200	1	08/04/2015 04:50	WG806055
Arsenic,Dissolved	ND		0.00200	1	08/04/2015 15:04	WG806145
Barium	0.0484		0.00500	1	08/04/2015 04:50	WG806055
Barium,Dissolved	0.0384		0.00500	1	08/04/2015 15:04	WG806145
Beryllium	ND		0.00200	1	08/04/2015 04:50	WG806055
Beryllium,Dissolved	ND		0.00200	1	08/04/2015 15:04	WG806145
Cadmium	ND		0.00100	1	08/04/2015 04:50	WG806055
Cadmium,Dissolved	ND		0.00100	1	08/04/2015 15:04	WG806145
Chromium	0.00336		0.00200	1	08/04/2015 04:50	WG806055
Chromium,Dissolved	ND		0.00200	1	08/04/2015 15:04	WG806145
Copper	ND		0.00500	1	08/04/2015 04:50	WG806055
Copper,Dissolved	ND		0.00500	1	08/04/2015 15:04	WG806145
Cobalt	ND		0.00200	1	08/04/2015 04:50	WG806055
Cobalt,Dissolved	ND		0.00200	1	08/04/2015 15:04	WG806145
Lead	ND		0.00200	1	08/04/2015 04:50	WG806055
Lead,Dissolved	ND		0.00200	1	08/04/2015 15:04	WG806145
Nickel	ND		0.00200	1	08/04/2015 04:50	WG806055
Nickel,Dissolved	ND		0.00200	1	08/04/2015 15:04	WG806145
Selenium	ND		0.00200	1	08/04/2015 04:50	WG806055
Selenium,Dissolved	ND		0.00200	1	08/04/2015 15:04	WG806145
Silver	ND		0.00200	1	08/04/2015 04:50	WG806055
Silver,Dissolved	ND		0.00200	1	08/04/2015 15:04	WG806145
Thallium	ND		0.00200	1	08/04/2015 04:50	WG806055
Thallium,Dissolved	ND		0.00200	1	08/04/2015 15:04	WG806145
Vanadium	ND		0.00500	1	08/04/2015 04:50	WG806055



Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Vanadium,Dissolved	ND		0.00500	1	08/04/2015 15:04	WG806145
Zinc	ND		0.0250	1	08/04/2015 04:50	WG806055
Zinc,Dissolved	ND		0.0250	1	08/04/2015 15:04	WG806145

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Gravimetric Analysis by Method 2540 D-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Suspended Solids	5.00		2.50	1	08/01/2015 06:38	WG806006

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Acidity	ND		10.0	1	08/05/2015 14:30	WG806696

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	172		20.0	1	08/06/2015 10:09	WG806993

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Fluoride	0.234		0.100	1	08/04/2015 17:07	WG806849

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	08/03/2015 08:50	WG806144
Mercury,Dissolved	ND		0.000200	1	07/31/2015 13:45	WG806124

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/04/2015 04:52	WG806055
Antimony,Dissolved	ND		0.00200	1	08/04/2015 15:06	WG806145
Arsenic	ND		0.00200	1	08/04/2015 04:52	WG806055
Arsenic,Dissolved	ND		0.00200	1	08/04/2015 15:06	WG806145
Barium	0.0491		0.00500	1	08/04/2015 04:52	WG806055
Barium,Dissolved	0.0380		0.00500	1	08/04/2015 15:06	WG806145
Beryllium	ND		0.00200	1	08/04/2015 04:52	WG806055
Beryllium,Dissolved	ND		0.00200	1	08/04/2015 15:06	WG806145
Cadmium	ND		0.00100	1	08/04/2015 04:52	WG806055
Cadmium,Dissolved	ND		0.00100	1	08/04/2015 15:06	WG806145
Chromium	0.00319		0.00200	1	08/04/2015 04:52	WG806055
Chromium,Dissolved	ND		0.00200	1	08/04/2015 15:06	WG806145
Copper	ND		0.00500	1	08/04/2015 04:52	WG806055
Copper,Dissolved	ND		0.00500	1	08/04/2015 15:06	WG806145
Cobalt	ND		0.00200	1	08/04/2015 04:52	WG806055
Cobalt,Dissolved	ND		0.00200	1	08/04/2015 15:06	WG806145
Lead	ND		0.00200	1	08/04/2015 04:52	WG806055
Lead,Dissolved	ND		0.00200	1	08/04/2015 15:06	WG806145
Nickel	ND		0.00200	1	08/04/2015 04:52	WG806055
Nickel,Dissolved	ND		0.00200	1	08/04/2015 15:06	WG806145
Selenium	ND		0.00200	1	08/04/2015 04:52	WG806055
Selenium,Dissolved	ND		0.00200	1	08/04/2015 15:06	WG806145
Silver	ND		0.00200	1	08/04/2015 04:52	WG806055
Silver,Dissolved	ND		0.00200	1	08/04/2015 15:06	WG806145
Thallium	ND		0.00200	1	08/04/2015 04:52	WG806055
Thallium,Dissolved	ND		0.00200	1	08/04/2015 15:06	WG806145
Vanadium	ND		0.00500	1	08/04/2015 04:52	WG806055



Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Vanadium,Dissolved	ND		0.00500	1	08/04/2015 15:06	WG806145
Zinc	ND		0.0250	1	08/04/2015 04:52	WG806055
Zinc,Dissolved	ND		0.0250	1	08/04/2015 15:06	WG806145

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc



Gravimetric Analysis by Method 2540 D-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Suspended Solids	5.50		2.50	1	08/01/2015 06:40	WG806006

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Acidity	84.0		10.0	1	08/05/2015 14:30	WG806696

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	08/06/2015 10:09	WG806993

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Fluoride	ND		0.100	1	07/31/2015 14:56	WG805954

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	08/03/2015 08:53	WG806144

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/04/2015 04:54	WG806055
Arsenic	ND		0.00200	1	08/04/2015 04:54	WG806055
Barium	ND		0.00500	1	08/04/2015 04:54	WG806055
Beryllium	ND		0.00200	1	08/04/2015 04:54	WG806055
Cadmium	ND		0.00100	1	08/04/2015 04:54	WG806055
Chromium	ND		0.00200	1	08/04/2015 04:54	WG806055
Copper	ND		0.00500	1	08/04/2015 04:54	WG806055
Cobalt	ND		0.00200	1	08/04/2015 04:54	WG806055
Lead	ND		0.00200	1	08/04/2015 04:54	WG806055
Nickel	ND		0.00200	1	08/04/2015 04:54	WG806055
Selenium	ND		0.00200	1	08/04/2015 04:54	WG806055
Silver	ND		0.00200	1	08/04/2015 04:54	WG806055
Thallium	ND		0.00200	1	08/04/2015 04:54	WG806055
Vanadium	ND		0.00500	1	08/04/2015 04:54	WG806055
Zinc	ND		0.0250	1	08/04/2015 04:54	WG806055



Gravimetric Analysis by Method 2540 D-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Suspended Solids	5.90		2.50	1	08/01/2015 06:41	WG806006

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Acidity	70.0		10.0	1	08/05/2015 14:30	WG806696

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	08/06/2015 10:09	WG806993

Wet Chemistry by Method 9056MOD

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Fluoride	ND		0.100	1	08/04/2015 18:19	WG806849

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	08/03/2015 08:59	WG806144

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Antimony	ND		0.00200	1	08/04/2015 04:57	WG806055
Arsenic	ND		0.00200	1	08/04/2015 04:57	WG806055
Barium	ND		0.00500	1	08/04/2015 04:57	WG806055
Beryllium	ND		0.00200	1	08/04/2015 04:57	WG806055
Cadmium	ND		0.00100	1	08/04/2015 04:57	WG806055
Chromium	ND		0.00200	1	08/04/2015 04:57	WG806055
Copper	ND		0.00500	1	08/04/2015 04:57	WG806055
Cobalt	ND		0.00200	1	08/04/2015 04:57	WG806055
Lead	ND		0.00200	1	08/04/2015 04:57	WG806055
Nickel	ND		0.00200	1	08/04/2015 04:57	WG806055
Selenium	ND		0.00200	1	08/04/2015 04:57	WG806055
Silver	ND		0.00200	1	08/04/2015 04:57	WG806055
Thallium	ND		0.00200	1	08/04/2015 04:57	WG806055
Vanadium	ND		0.00500	1	08/04/2015 04:57	WG806055
Zinc	ND		0.0250	1	08/04/2015 04:57	WG806055



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	ND		10.0	1	08/05/2015 13:21	WG806291

1 Cp

2 Tc

Gravimetric Analysis by Method 2540 D-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Suspended Solids	5.60		2.50	1	08/01/2015 06:43	WG806006

3 Ss

4 Cn

Wet Chemistry by Method 9056MOD

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	ND		1.00	1	08/04/2015 17:21	WG806849
Fluoride	ND		0.100	1	08/04/2015 17:21	WG806849
Sulfate	ND		5.00	1	08/04/2015 17:21	WG806849

5 Sr

6 Qc

7 Gl

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	08/03/2015 09:01	WG806144

8 Al

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	07/30/2015 20:28	WG805919
Calcium	ND		1.00	1	07/30/2015 20:28	WG805919
Lithium	ND		0.0150	1	07/30/2015 20:28	WG805919

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	ND		0.00200	1	08/04/2015 04:59	WG806055
Arsenic	ND		0.00200	1	08/04/2015 04:59	WG806055
Barium	ND		0.00500	1	08/04/2015 04:59	WG806055
Beryllium	ND		0.00200	1	08/04/2015 04:59	WG806055
Cadmium	ND		0.00100	1	08/04/2015 04:59	WG806055
Chromium	ND		0.00200	1	08/04/2015 04:59	WG806055
Copper	ND		0.00500	1	08/04/2015 04:59	WG806055
Cobalt	ND		0.00200	1	08/04/2015 04:59	WG806055
Lead	ND		0.00200	1	08/04/2015 04:59	WG806055
Molybdenum	ND		0.00500	1	08/04/2015 04:59	WG806055
Nickel	ND		0.00200	1	08/04/2015 04:59	WG806055
Selenium	ND		0.00200	1	08/04/2015 04:59	WG806055
Silver	ND		0.00200	1	08/04/2015 04:59	WG806055
Thallium	ND		0.00200	1	08/04/2015 04:59	WG806055
Vanadium	ND		0.00500	1	08/04/2015 04:59	WG806055
Zinc	ND		0.0250	1	08/04/2015 04:59	WG806055

Method Blank (MB)

(MB) 08/05/15 13:15

Analyte	MB Result	MB Qualifier	MB RDL
	mg/l		mg/l
Dissolved Solids	ND		10.0

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

L779291-01 Original Sample (OS) • Duplicate (DUP)

(OS) 08/05/15 13:09 • (DUP) 08/05/15 13:10

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	761	749	1	1.59		5

⁷ Gl

⁸ Al

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 08/05/15 13:08 • (LCSD) 08/05/15 13:09

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Dissolved Solids	8800	8680	8740	98.6	99.3	85.0-115			0.689	5

⁹ Sc



Method Blank (MB)

(MB) 08/01/15 06:25

	MB Result	MB Qualifier	MB RDL
Analyte	mg/l		mg/l
Suspended Solids	ND		2.50

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L779585-01 Original Sample (OS) • Duplicate (DUP)

(OS) 08/01/15 06:31 • (DUP) 08/01/15 06:29

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Suspended Solids	83.0	80.0	1	3.68		5

L779588-01 Original Sample (OS) • Duplicate (DUP)

(OS) 08/01/15 06:30 • (DUP) 08/01/15 06:29

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Suspended Solids	288	272	1	5.71	J3	5

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 08/01/15 06:26 • (LCSD) 08/01/15 06:28

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Suspended Solids	773	808	780	105	101	85.0-115			3.53	5



Method Blank (MB)

(MB) 08/05/15 14:30

Analyte	MB Result	MB Qualifier	MB RDL
	mg/l		mg/l
Acidity	ND		10.0

L779585-08 Original Sample (OS) • Duplicate (DUP)

(OS) 08/05/15 14:30 • (DUP) 08/05/15 14:30

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Acidity	70	70	1	0.00		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 08/05/15 14:30 • (LCSD) 08/05/15 14:30

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Acidity	20.0	20.0	20.0	100	100	85.0-115			0.000	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) 08/06/15 10:09

	MB Result	MB Qualifier	MB RDL
Analyte	mg/l		mg/l
Alkalinity	ND		20.0

L779643-02 Original Sample (OS) • Duplicate (DUP)

(OS) 08/06/15 10:09 • (DUP) 08/06/15 10:09

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Alkalinity	2000	1900	10	3.0		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 08/06/15 10:09 • (LCSD) 08/06/15 10:09

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Alkalinity	100	106	106	106	106	85.0-115			0.000	20

L779643-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 08/06/15 10:09 • (MS) 08/06/15 10:09 • (MSD) 08/06/15 10:09

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Alkalinity	100	748	1700	1740	95.0	99.0	10	80.0-120			0.000	20

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) 07/30/15 11:24

	MB Result	MB Qualifier	MB RDL
Analyte	mg/l		mg/l
Fluoride	ND		0.100

L779291-10 Original Sample (OS) • Duplicate (DUP)

(OS) 07/30/15 18:41 • (DUP) 07/30/15 18:55

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Fluoride	ND	0.000	1	0		20

L779585-05 Original Sample (OS) • Duplicate (DUP)

(OS) 07/30/15 22:09 • (DUP) 07/30/15 22:23

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Fluoride	0.217	0.214	1	2		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 07/30/15 11:38 • (LCSD) 07/30/15 11:52

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Fluoride	8.00	7.91	7.92	99	99	90-110			0	20

L779291-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 07/30/15 19:36 • (MS) 07/30/15 19:50 • (MSD) 07/30/15 20:04

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Fluoride	5.00	ND	5.09	5.12	102	102	1	80-120			1	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) 07/31/15 08:28

	MB Result	MB Qualifier	MB RDL
Analyte	mg/l		mg/l
Fluoride	ND		0.100

L779585-07 Original Sample (OS) • Duplicate (DUP)

(OS) 07/31/15 14:56 • (DUP) 07/31/15 15:11

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Fluoride	ND	0.000	1	0		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 07/31/15 08:44 • (LCSD) 07/31/15 08:59

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Fluoride	8.00	7.82	7.82	98	98	90-110			0	20

L779638-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 07/31/15 23:44 • (MS) 08/01/15 00:00 • (MSD) 08/01/15 00:15

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Fluoride	5.00	0.0532	4.56	4.81	90	95	1	80-120			5	20

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Method Blank (MB)

(MB) 08/04/15 12:20

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Chloride	ND		1.00
Fluoride	ND		0.100
Sulfate	ND		5.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L780399-01 Original Sample (OS) • Duplicate (DUP)

(OS) 08/04/15 13:47 • (DUP) 08/04/15 14:01

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	4.88	4.87	1	0		20
Fluoride	0.490	0.482	1	2		20
Sulfate	6.34	6.36	1	0		20

L779585-08 Original Sample (OS) • Duplicate (DUP)

(OS) 08/04/15 18:19 • (DUP) 08/04/15 18:33

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	0.116	0.108	1	0		20
Fluoride	ND	0.000	1	0		20
Sulfate	0.00330	-0.00210	1	0		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 08/04/15 12:35 • (LCSD) 08/04/15 12:49

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	39.7	40.0	99	100	90-110			1	20
Fluoride	8.00	8.14	8.12	102	102	90-110			0	20
Sulfate	40.0	40.8	40.8	102	102	90-110			0	20

L780400-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 08/04/15 14:16 • (MS) 08/04/15 14:30 • (MSD) 08/04/15 14:44

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
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[L779585-06,08,09](#)

Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%	%
Chloride	50.0	2.32	54.5	53.2	104	102	1	80-120	2 20
Fluoride	5.00	0.0512	5.28	5.29	105	105	1	80-120	0 20
Sulfate	50.0	0.323	51.0	51.9	101	103	1	80-120	2 20

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) 07/31/15 12:56

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Mercury,Dissolved	ND		0.000200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 07/31/15 12:58 • (LCSD) 07/31/15 14:23

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	0.00297	0.00243	99	81	80-120			20	20

L778726-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 07/31/15 13:03 • (MS) 07/31/15 13:05 • (MSD) 07/31/15 13:07

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	ND	0.00287	0.00289	96	96	1	75-125			1	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) 08/03/15 08:24

Analyte	MB Result mg/l	<u>MB Qualifier</u>	MB RDL mg/l
Mercury	ND		0.000200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 08/03/15 08:26 • (LCSD) 08/03/15 08:33

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Mercury	0.00300	0.00289	0.00258	96	86	80-120			11	20

L779585-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 08/03/15 08:35 • (MS) 08/03/15 08:37 • (MSD) 08/03/15 08:39

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Mercury	0.00300	0.000256	0.00323	0.00319	99	98	1	75-125			1	20



Method Blank (MB)

(MB) 07/30/15 20:13

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Boron	ND		0.200
Calcium	ND		1.00
Lithium	ND		0.0150

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 07/30/15 20:22 • (LCSD) 07/30/15 20:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron	1.00	1.08	1.08	108	108	80-120			0	20
Calcium	10.0	10.4	10.3	104	103	80-120			0	20
Lithium	1.00	1.06	1.05	106	105	80-120			1	20

L779585-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 07/30/15 20:28 • (MS) 07/30/15 20:34 • (MSD) 07/30/15 20:37

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Boron	1.00	0.0454	1.09	1.08	105	103	1	75-125			1	20
Calcium	10.0	0.00792	10.3	10.3	103	103	1	75-125			1	20
Lithium	1.00	0.00275	1.05	1.06	104	106	1	75-125			2	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) 08/04/15 04:01

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Antimony	ND		0.00200
Arsenic	ND		0.00200
Barium	ND		0.00500
Beryllium	ND		0.00200
Cadmium	ND		0.00100
Chromium	ND		0.00200
Copper	ND		0.00500
Cobalt	ND		0.00200
Lead	ND		0.00200
Molybdenum	ND		0.00500
Nickel	ND		0.00200
Selenium	ND		0.00200
Silver	ND		0.00200
Thallium	ND		0.00200
Vanadium	ND		0.00500
Zinc	ND		0.0250

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 08/04/15 04:03 • (LCSD) 08/04/15 04:06

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	0.0508	0.0516	102	103	80-120			2	20
Arsenic	0.0500	0.0517	0.0502	103	100	80-120			3	20
Barium	0.0500	0.0480	0.0484	96	97	80-120			1	20
Beryllium	0.0500	0.0502	0.0507	100	101	80-120			1	20
Cadmium	0.0500	0.0531	0.0531	106	106	80-120			0	20
Chromium	0.0500	0.0512	0.0517	102	103	80-120			1	20
Copper	0.0500	0.0536	0.0542	107	108	80-120			1	20
Cobalt	0.0500	0.0518	0.0523	104	105	80-120			1	20
Lead	0.0500	0.0484	0.0484	97	97	80-120			0	20
Molybdenum	0.0500	0.0487	0.0492	97	98	80-120			1	20
Nickel	0.0500	0.0520	0.0530	104	106	80-120			2	20
Selenium	0.0500	0.0496	0.0502	99	100	80-120			1	20
Silver	0.0500	0.0535	0.0541	107	108	80-120			1	20
Thallium	0.0500	0.0483	0.0481	97	96	80-120			0	20



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 08/04/15 04:03 • (LCSD) 08/04/15 04:06

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Vanadium	0.0500	0.0506	0.0512	101	102	80-120			1	20
Zinc	0.0500	0.0518	0.0501	104	100	80-120			3	20

L779680-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 08/04/15 04:08 • (MS) 08/04/15 04:12 • (MSD) 08/04/15 04:15

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Antimony	0.0500	0.000759	0.0520	0.0524	103	103	1	75-125			1	20
Arsenic	0.0500	0.0118	0.0627	0.0650	102	106	1	75-125			3	20
Barium	0.0500	0.0592	0.107	0.105	95	91	1	75-125			2	20
Beryllium	0.0500	0.0000494	0.0494	0.0492	99	98	1	75-125			0	20
Cadmium	0.0500	0.0000352	0.0511	0.0536	102	107	1	75-125			5	20
Chromium	0.0500	0.0214	0.0672	0.0678	92	93	1	75-125			1	20
Copper	0.0500	0.0785	0.123	0.125	88	94	1	75-125			2	20
Cobalt	0.0500	0.0000978	0.0474	0.0478	95	95	1	75-125			1	20
Lead	0.0500	0.00386	0.0521	0.0516	96	95	1	75-125			1	20
Molybdenum	0.0500	0.0397	0.0886	0.0893	98	99	1	75-125			1	20
Nickel	0.0500	0.0142	0.0609	0.0619	93	96	1	75-125			2	20
Selenium	0.0500	0.00113	0.0503	0.0512	98	100	1	75-125			2	20
Silver	0.0500	0.0000839	0.0529	0.0528	106	105	1	75-125			0	20
Thallium	0.0500	0.0000667	0.0474	0.0469	95	94	1	75-125			1	20
Vanadium	0.0500	0.0402	0.0861	0.0863	92	92	1	75-125			0	20
Zinc	0.0500	0.0746	0.119	0.119	90	89	1	75-125			0	20

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc



Method Blank (MB)

(MB) 08/04/15 14:19

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Antimony,Dissolved	ND		0.00200
Arsenic,Dissolved	ND		0.00200
Barium,Dissolved	ND		0.00500
Beryllium,Dissolved	ND		0.00200
Cadmium,Dissolved	ND		0.00100
Chromium,Dissolved	ND		0.00200
Copper,Dissolved	ND		0.00500
Cobalt,Dissolved	ND		0.00200
Lead,Dissolved	ND		0.00200
Nickel,Dissolved	ND		0.00200
Selenium,Dissolved	ND		0.00200
Silver,Dissolved	ND		0.00200
Thallium,Dissolved	ND		0.00200
Vanadium,Dissolved	ND		0.00500
Zinc,Dissolved	ND		0.0250

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 08/04/15 14:22 • (LCSD) 08/04/15 14:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony,Dissolved	0.0500	0.0517	0.0502	103	100	80-120			3	20
Arsenic,Dissolved	0.0500	0.0486	0.0491	97	98	80-120			1	20
Barium,Dissolved	0.0500	0.0482	0.0480	96	96	80-120			0	20
Beryllium,Dissolved	0.0500	0.0562	0.0538	112	108	80-120			4	20
Cadmium,Dissolved	0.0500	0.0498	0.0509	100	102	80-120			2	20
Chromium,Dissolved	0.0500	0.0507	0.0485	101	97	80-120			4	20
Copper,Dissolved	0.0500	0.0541	0.0512	108	102	80-120			5	20
Cobalt,Dissolved	0.0500	0.0512	0.0506	102	101	80-120			1	20
Lead,Dissolved	0.0500	0.0501	0.0484	100	97	80-120			3	20
Nickel,Dissolved	0.0500	0.0513	0.0503	103	101	80-120			2	20
Selenium,Dissolved	0.0500	0.0513	0.0503	103	101	80-120			2	20
Silver,Dissolved	0.0500	0.0538	0.0527	108	105	80-120			2	20
Thallium,Dissolved	0.0500	0.0492	0.0472	98	94	80-120			4	20
Vanadium,Dissolved	0.0500	0.0500	0.0477	100	95	80-120			5	20
Zinc,Dissolved	0.0500	0.0504	0.0503	101	101	80-120			0	20



L779585-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 08/04/15 14:26 • (MS) 08/04/15 14:31 • (MSD) 08/04/15 14:33

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony,Dissolved	0.0500	0.000286	0.0517	0.0504	103	100	1	75-125			2	20
Arsenic,Dissolved	0.0500	0.000893	0.0518	0.0493	102	97	1	75-125			5	20
Barium,Dissolved	0.0500	0.0189	0.0680	0.0678	98	98	1	75-125			0	20
Beryllium,Dissolved	0.0500	0.0000997	0.0556	0.0548	111	109	1	75-125			1	20
Cadmium,Dissolved	0.0500	0.0000893	0.0520	0.0495	104	99	1	75-125			5	20
Chromium,Dissolved	0.0500	0.000328	0.0482	0.0466	96	93	1	75-125			3	20
Copper,Dissolved	0.0500	0.00173	0.0515	0.0494	100	95	1	75-125			4	20
Cobalt,Dissolved	0.0500	0.136	0.186	0.183	100	95	1	75-125			1	20
Lead,Dissolved	0.0500	0.000115	0.0490	0.0484	98	97	1	75-125			1	20
Nickel,Dissolved	0.0500	0.0256	0.0748	0.0721	98	93	1	75-125			4	20
Selenium,Dissolved	0.0500	0.000252	0.0529	0.0508	105	101	1	75-125			4	20
Silver,Dissolved	0.0500	0.0000952	0.0523	0.0512	104	102	1	75-125			2	20
Thallium,Dissolved	0.0500	0.000107	0.0484	0.0472	97	94	1	75-125			3	20
Vanadium,Dissolved	0.0500	0.000124	0.0479	0.0461	96	92	1	75-125			4	20
Zinc,Dissolved	0.0500	0.0375	0.0850	0.0828	95	91	1	75-125			3	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

Qualifier	Description
J3	The associated batch QC was outside the established quality control range for precision.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

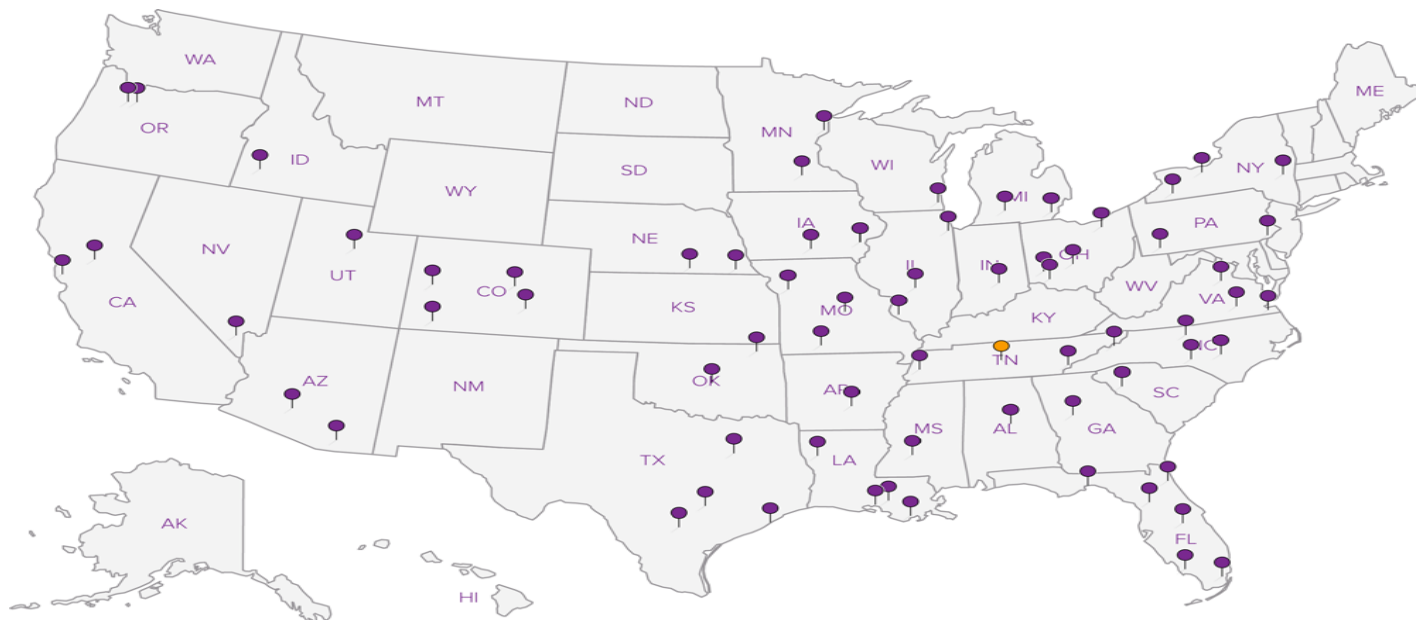
¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
Canada	1461.01	DOD	1461.01
EPA–Crypto	TN00003	USDA	S-67674

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



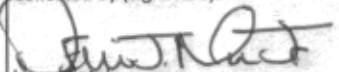
TVA-Environmental Affairs

400 W. Summit Hill Mailstop TVA WT 9D-K
Knoxville, TN 37902Report to:
Maggie GillilandProject
Description: GAF GroundwaterPhone: 865-632-6941
Fax:

Collected by (print):

DENNIS MIHALEK

Collected by (signature):


Immediately
Packed on Ice N ☐ Y ☒

Billing Information:

TVA Accounts Payable
1101 Market St. Mailstop: LP-5D-C
Chattanooga, TN 37402Email To: dennis.mihalet@tva.com
EDMSVK@tva.gov; mdwilliams@tva.gov; npagano@tva.govCity/State
Collected: GALLATIN, TNLab Project #
TVAENVAFF-GAF GRDWAT

P.O. #

60407651

Date Results Needed
STANDARDEmail? ☐ No ☒ Yes
FAX? ☐ No ☐ YesNo.
of
Cntrs

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs
GAF-19R	G	GW	-	7/29/15	1105	5
GAF-20	G	GW	-	7/29/15	1235	5
GAF-22	G	GW	-	7/29/15	0920	5
GAF-26	G	GW	-	7/29/15	1530	5
GAF-27	G	GW	-	7/29/15	1405	5
GAF-DUP-1	G	GW	-	7/29/15	1405	5
GAF-EQB-1	G	GW	-	7/29/15	0727	4
GAF-EQB-2	G	GW	-	7/29/15	1608	4
		GW				4

* Matrix: SS - Soil GW - Groundwater WW - Waste Water DW - Drinking Water OT - Other

Remarks: DI TVA = Deionized H₂O (TVA Supplied)
ALL DISSOLVED SAMPLES WERE FIELD FILTERED
SEE ATTACHED E-MAIL NOTES

Relinquished by: (Signature)

DENNIS MIHALET

Date:

7/29/15

Time:

1620

Received by: (Signature)



Relinquished by: (Signature)



Date:

7/29/15

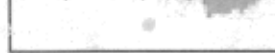
Time:

1656

Received by: (Signature)



Relinquished by: (Signature)



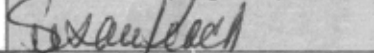
Date:

7/29/15

Time:

1656

Received for lab by: (Signature)



Analysis / Container / Preservative

ACIDITY, ALKALINITY 500mlHDPE-NoPres

FLOURIDE 250mlHDPE-NoPres

METALS 500mlHDPE-HNO3

TSS 1L-HDPE NoPres

DISSOLVED METALS

Chain of Custody Page 1 of 2



YOUR LAB OF CHOICE

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L # L7794585

Table # A000

Acctnum: TVAENVAFF

Template: T104168

Prelogin: P517733

TSR: 633 - Pam Langford

PB: 7.20.11 L

Shipped Via: FedEx Ground

Rem./Contaminant Sample # (lab only)

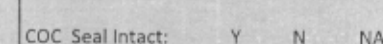
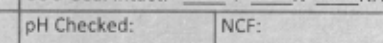
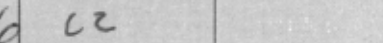
pH _____ Temp _____
Flow _____ Other _____

Hold #

Condition: (lab use only)

COC Seal Intact: ☐ Y ☐ N ☐ NA

pH Checked: _____ NCF: _____

Mihalek, Dennis

1779585

From:

Sent:

To:

Subject:

Bock, Adeline

Friday, July 24, 2015 12:45 PM

Mihalek, Dennis; Stone, Matt

FW: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

Importance:

High

Hi Dennis and Matt,

Below is the latest and greatest version of the TVA Gallatin NRL and NRS GW Sampling event. Per our conference call, if possible, please print out a few copies and add them in addition to the COC when submitting samples to the lab. It's a long email chain, but as many labs have told us, the more information the better.

Thank you,

Adeline Bock

Environmental Chemist, Geosciences Department

adeline.bock@aecom.com

AECOM

1600 Perimeter Park Drive, Suite 400; Morrisville, NC 27560

T: 919-461-1340; F: 919-461-1415

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From: Bock, Adeline

Sent: Friday, July 24, 2015 1:36 PM

To: 'Pam Langford'

Cc: Lancaster, Nicole; Hempel, Stephanie; Keys, Vernon; Mihalek, Dennis; Stone, Matt; Kiker, Joey; Perry, Elizabeth; 'mkgilliland@tva.gov'; Pagano, Nicole

Subject: RE: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

Importance: High

Pam,

The decision has been made to add two field blanks (one for each site) at TVA Gallatin for all parameters. Please have the extra bottles ready for pick up on Monday. Our field staff will pick them up as they drop off samples at the end of the day. Please advise as to how our field staff can identify where the cooler with the extra bottles will be located.

NRS Site

Metals, Total (Table 1) by SW-846 6010C/7470A

Chloride, Fluoride, and Sulfate by SW-846 9056A

Total Suspended Solids (TSS) by Standard Method 2540D

Alkalinity

Acidity

NRL Site

Metals, Total (Table 2) by SW-6010C/7470A

1779585

Chloride, Fluoride, and Sulfate by SW-846 9056A
Radium 226 and 228
Total Dissolved Solids (TDS) by Standard Method 2540C
TSS by Standard Method 2540D
Alkalinity
Acidity

Additionally, in the attached, lab-provided pre-labeled COC, the matrix for well GAF-NRL-015 is listed as drinking water. Please confirm that this is a typo as previous sampling events have this site listed as GW and our PM did not indicate any change in matrix.

Please let me know if you have questions or comments. Thank you Pam,

Adeline Bock
Environmental Chemist, Geosciences Department
adeline.bock@aecom.com

AECOM
1600 Perimeter Park Drive, Suite 400; Morrisville, NC 27560
T: 919-461-1340; F: 919-461-1415

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From: Mihalek, Dennis
Sent: Tuesday, July 21, 2015 5:05 PM
To: Pam Langford; Morrisville NC Project Chemist Mailbox
Cc: Hempel, Stephanie; Keys, Vernon; Stone, Matt; Perry, Elizabeth; mggilliland@tva.gov; Pagano, Nicole; Kiker, Joey; Bock, Adeline
Subject: RE: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

Great. Thank you.

Yes. We received extra 500 mL bottles, marked for preservation with HNO3 with a "Dissolved Metals" label on them. Thank you for providing those.

Dennis Mihalek

From: Pam Langford [<mailto:plangford@esclabsciences.com>]
Sent: Tuesday, July 21, 2015 3:57 PM
To: Mihalek, Dennis
Subject: RE: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

Yes, that should be the container for the total metals analysis. Can you identify the extra containers that were to be sent for possible dissolved metals analysis?

Pamela A. Langford
Lab Documentation Chemist
ESC Lab Sciences
12065 Lebanon Road
Mt. Juliet, TN 37122
Direct: 615-773-9687
plangford@esclabsciences.com

L779585

From: Mihalek, Dennis [mailto:dennis.mihalek@aecom.com]

Sent: Tuesday, July 21, 2015 2:24 PM

To: Pam Langford; Morrisville NC Project Chemist Mailbox

Cc: Hempel, Stephanie; Keys, Vernon; Stone, Matt; Perry, Elizabeth; mggilliland@tva.gov; Pagano, Nicole; Kiker, Joey; Bock, Adeline

Subject: RE: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

Pam,

I received the coolers today for this project. Thank you.

Each sample set has a 500 ml bottle preserved with HNO3 labeled for the analysis of "Silver by ICPMS, Arsenic by ICPMS, Barium by ICPMS, Beryllium by ICPMS,". Is that bottle the bottle to be used for total metals?

Just making sure,

Dennis Mihalek

From: Pam Langford [mailto:plangford@esclabsciences.com]

Sent: Friday, July 17, 2015 2:58 PM

To: Morrisville NC Project Chemist Mailbox

Cc: Hempel, Stephanie; Keys, Vernon; Stone, Matt; Perry, Elizabeth; mggilliland@tva.gov; Pagano, Nicole; Kiker, Joey; Mihalek, Dennis; Bock, Adeline

Subject: RE: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

We supply a 500ml HDPE – HNO3 (nitric acid) container for metals. This container holds sufficient volume for all metals methods (Hg by 7470, Metals by ICP 6010 and Metals by ICP/MS 6020).

As the filtration will occur in the field with this sampling event, the containers for total or dissolved metals are the same; the filtered sample will be added to the container supplied for dissolved metals

Please let me know if you have additional questions.

Have a great weekend!

Pamela A. Langford
Lab Documentation Chemist
ESC Lab Sciences
12065 Lebanon Road
Mt. Juliet, TN 37122
Direct: 615-773-9687
plangford@esclabsciences.com

From: Lancaster, Nicole [mailto:nicole.lancaster@aecom.com] **On Behalf Of** Morrisville NC Project Chemist Mailbox

Sent: Friday, July 17, 2015 11:56 AM

To: Pam Langford

Cc: Hempel, Stephanie; Morrisville NC Project Chemist Mailbox; Keys, Vernon; Stone, Matt; Perry, Elizabeth; mggilliland@tva.gov; Pagano, Nicole; Kiker, Joey; Mihalek, Dennis; Bock, Adeline

Subject: RE: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

L-779585

Pam,

The decision has been made to add alkalinity and acidity to our parameters. Will you please add eighteen (18) bottles for both of these parameters to the sample kits? Also, will you please clarify the bottles for metals. What bottles do you provide for total and dissolved metals? Are there also separate bottles for total and dissolved mercury? Please let me know.

Thanks.

Nicole Lancaster

From: Mihalek, Dennis
Sent: Friday, July 17, 2015 10:28 AM
To: Pam Langford; Bock, Adeline
Cc: Hempel, Stephanie; Morrisville NC Project Chemist Mailbox; Keys, Vernon; Stone, Matt; Perry, Elizabeth; mggilliland@tva.gov; Pagano, Nicole; Kiker, Joey
Subject: RE: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

Excellent. This helps a great deal. Thank you Pam and have a good day.

Dennis Mihalek

From: Pam Langford [<mailto:plangford@esclabsciences.com>]
Sent: Friday, July 17, 2015 9:27 AM
To: Mihalek, Dennis; Bock, Adeline
Cc: Hempel, Stephanie; Morrisville NC Project Chemist Mailbox; Keys, Vernon; Stone, Matt; Perry, Elizabeth; mggilliland@tva.gov; Pagano, Nicole; Kiker, Joey
Subject: RE: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

Got it.....Will make sure the containers are labeled as dissolved metals and that the preservative is included in our shipment.

Thanks, Dennis!

Pamela A. Langford
Lab Documentation Chemist
ESC Lab Sciences
12065 Lebanon Road
Mt. Juliet, TN 37122
Direct: 615-773-9687
plangford@esclabsciences.com

From: Mihalek, Dennis [<mailto:dennis.mihalek@aeocom.com>]
Sent: Friday, July 17, 2015 9:04 AM
To: Pam Langford; Bock, Adeline
Cc: Hempel, Stephanie; Morrisville NC Project Chemist Mailbox; Keys, Vernon; Stone, Matt; Perry, Elizabeth; mggilliland@tva.gov; Pagano, Nicole; Kiker, Joey
Subject: RE: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

Pam,

L779585

Understood. All we really need is for the bottles to indicate the analysis is for "dissolved metals". Sample information is not needed. Yes, we would be filtering in the field.

Dennis Mihalek

From: Pam Langford [<mailto:plangford@esclabsciences.com>]
Sent: Friday, July 17, 2015 8:48 AM
To: Mihalek, Dennis; Bock, Adeline
Cc: Hempel, Stephanie; Morrisville NC Project Chemist Mailbox; Keys, Vernon; Stone, Matt; Perry, Elizabeth; mggilliland@tva.gov; Pagano, Nicole; Kiker, Joey
Subject: RE: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

They will have labels which indicate they are metals containers but no sample information will be indicated -- are you planning to filter in the field? (This will let me know whether you will need the nitric preserved container)

Thanks, Dennis!

Pamela A. Langford
Lab Documentation Chemist
ESC Lab Sciences
12065 Lebanon Road
Mt. Juliet, TN 37122
Direct: 615-773-9687
plangford@esclabsciences.com

From: Mihalek, Dennis [<mailto:dennis.mihalek@aecom.com>]
Sent: Friday, July 17, 2015 8:45 AM
To: Pam Langford; Bock, Adeline
Cc: Hempel, Stephanie; Morrisville NC Project Chemist Mailbox; Keys, Vernon; Stone, Matt; Perry, Elizabeth; mggilliland@tva.gov; Pagano, Nicole; Kiker, Joey
Subject: RE: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

Pam,

One more thing. Can you have those dissolved bottles pre-labeled as such so there is no confusion?

Thank You,

Dennis

From: Pam Langford [<mailto:plangford@esclabsciences.com>]
Sent: Friday, July 17, 2015 8:35 AM
To: Mihalek, Dennis; Bock, Adeline
Cc: Hempel, Stephanie; Morrisville NC Project Chemist Mailbox; Keys, Vernon; Stone, Matt; Perry, Elizabeth; mggilliland@tva.gov; Pagano, Nicole; Kiker, Joey
Subject: RE: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

Dennis,

L 779585

I will include sufficient containers to perform dissolved metals analysis on all samples, but this will not be indicated on the chain of custody sent (to ensure that dissolved metals are not analyzed for the low turbidity samples. The bottle order is essentially a prelog for the sample set). You will need to indicate on the COC if dissolved metals are required for particular sample.

Please let me know if you have additional questions regarding this email.
Thanks for your email!

Pamela A. Langford
Lab Documentation Chemist
ESC Lab Sciences
12065 Lebanon Road
Mt. Juliet, TN 37122
Direct: 615-773-9687
plangford@esclabsciences.com

From: Mihalek, Dennis [<mailto:dennis.mihalek@aecom.com>]

Sent: Thursday, July 16, 2015 2:44 PM

To: Bock, Adeline; Pam Langford

Cc: Hempel, Stephanie; Morrisville NC Project Chemist Mailbox; Keys, Vernon; Stone, Matt; Perry, Elizabeth; mggilliland@tva.gov; Pagano, Nicole; Kiker, Joey

Subject: RE: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

It is highly anticipated that dissolved metals samples will be collected. Please ensure bottles for dissolved metals are provided and labeled as such.

"All samples will be collected for totals analysis. If turbidity is greater than 5 NTU, a filtered sample will also be collected. AECOM field staff will coordinate with the laboratory if additional supplies are required."

Good Day,

Dennis J. Mihalek, Jr., P.G.

Senior Staff Geologist

D 1-615-224-2109 C 1-615-939-1362

dennis.mihalek@aecom.com

AECOM

1000 Corporate Centre Drive, Franklin, Tennessee 37067

T 1-615-771-2480 F 1-615-771-2459

www.aecom.com

[Twitter](#) | [Facebook](#) | [Instagram](#) | [Google+](#)

Connect with me on LinkedIn. [linkedin.com/in/dennismihalek](https://www.linkedin.com/in/dennismihalek)

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From: Bock, Adeline

Sent: Thursday, July 16, 2015 9:06 AM

To: plangford@esclabsciences.com

Cc: Hempel, Stephanie; Morrisville NC Project Chemist Mailbox; Mihalek, Dennis; Keys, Vernon; Stone, Matt; Perry,

Elizabeth; mgilliland@tva.gov; Pagano, Nicole; Kiker, Joey
Subject: TVA Gallatin NRL and NRS GW Sampling Event - Sample Kit Request

Pam,

Between July 27 and 30, 2015, AECOM anticipates the collection of up to twelve (12) groundwater samples, two (2) field duplicate samples, and two (2) equipment blank samples at two sites located in Gallatin, TN for the following parameters:

NRS Site

Metals, Total (Table 1) by SW-846 6010C/7470A
Chloride, Fluoride, and Sulfate by SW-846 9056A
Total Suspended Solids (TSS) by Standard Method 2540D

NRL Site

Metals, Total (Table 2) by SW-6010C/7470A
Chloride, Fluoride, and Sulfate by SW-846 9056A
Radium 226 and 228
Total Dissolved Solids (TDS) by Standard Method 2540C
TSS by Standard Method 2540D

The following sampling supplies, at a minimum, are to be provided to the attention of Dennis Mihalek at the AECOM Franklin Tennessee office by 10 AM on Wednesday, July 22, 2015: Please pre-label and sort the supplies by site.

Delivery Address:

Dennis Mihalek
AECOM
1000 Corporate Centre Drive, Suite 250
Franklin, Tennessee 37067

- 32 250ml plastic bottle, pre-preserved with nitric acid, for the determination of metals
- 16 250ml plastic bottle, unpreserved, for the determination of chloride, fluoride, and sulfate
- 16 1-Liter plastic bottles, unpreserved, for TSS and/or TDS
- 9 bottles of sufficient size for Radium 226 and 228
- 6 Liters of analyte-free water for the collection of equipment blanks for all analyses
- Ample supply of custody chains
- Cooler(s), labeled with laboratory name and return shipment address
- Bottle Labels
- Integrity Seals
- Coordination with laboratory courier for pickup of samples at TVA sites.

All samples will be collected for totals analysis. If turbidity is greater than 5 NTU, a filtered sample will also be collected. AECOM field staff will coordinate with the laboratory if additional supplies are required.

Regulatory: Maximum Contamination Level (MCL), TDEC Regulatory Limits (DSWM Rule 0400-11-01-.04), and CCR Rule

TAT: Standard (14 calendar days)

Target Analyte and Detection Limit Requirements: The required target analyte lists are presented in the attached file. Sample concentrations that are below the practical quantitation limit (PQL), but above the method detection limit (MDL), are to be reported and J-flagged (estimated). Sample detection/quantitation limits are to be adjusted for sample preparation activities and percent moisture. The laboratory must achieve sample quantitation limits less than or equal to the appropriate regulatory limit (e.g., MCL, TDEC, CCR Rule). Alternatively, they must state in the case narrative that the sample quantitation limits are the lowest that can be achieved using U.S. EPA-approved methods

Report Format (Electronic, pdf and Microsoft Excel spreadsheet):

L 779505

Please note full CLP documentation packages are not required. Sample and quality control (QC) results for analytical measurements are to be reported in a consistent, standardized, tabular format. The laboratory must be able to report, with each analytical measurement result, the laboratory's method-specific reporting limits adjusted for sample-specific preparation activities. The laboratory report should contain the following information:

1. Laboratory Report. Sample and quality control (QC) results for analytical measurements are to be reported in a consistent, standardized, tabular format. The laboratory must be able to report, with each analytical measurement result, the laboratory's method-specific reporting limits adjusted for sample-specific preparation activities. The laboratory report should contain the following:
 - Laboratory Certification Number
 - Facility name & address
 - Date of report preparation
 - Chain-of-Custody record with associated air bill
 - Sample Receipt Form, indicating condition of samples upon receipt and temperature
 - Case Narrative (A signed statement from the laboratory indicating that the samples were received in good condition, at the required temperature and that analysis of the samples complied with all procedures outlined in USEPA methodology, unless otherwise specified. Any deviation from the methods, additional sample preparation, sample dilution and unrectified analytical problems, should be justified in a narrative with the laboratory report.)
 - Sample identification (lab and field),
 - Date of sample collection and receipt
 - Summary of Analytical Results, including:
 - Sample identification and the corresponding laboratory identification
 - Sample matrix
 - Dates of and methods of analysis, preparation and/or extraction
 - Weight or volume of sample used for analysis/extraction/digestion
 - Dilution or concentration factor for the samples
 - Percentage of moisture in the soil samples (if applicable)
 - Definitions of any data qualifiers
 - Method detection limit and Reporting Limit (Practical Quantitation Limit⁽¹⁾), adjusted for sample preparation activities
 - Analytical results
 - Units of measure
 - Summary of QA/QC Results, including:
 - Laboratory blank results (method and calibration, as appropriate)
 - Surrogate recoveries and control limits, if applicable
 - Laboratory Control Sample (LCS) results with percent recoveries and control limits for all target analytes
 - Matrix spike/matrix spike duplicate results, recoveries, RPD, and control limits for all target analytes (if performed on a project sample and as applicable)
 - Laboratory duplicate results, %RPD, and control limits for all target analytes (if performed on a project sample and as applicable)
1. For each QC measurement, the theoretical value, the quality objective, and the calculated error (in terms of the quality objective for the measurement) must be maintained in a permanent record. It must be clear from the QC data report that the correct QC measurements have been made for the method employed and what the outcome was. Relevant QC measurement data must be reported with the results for each sample
2. Microsoft Excel spreadsheet that presents a summary of sample results in a cross tabular format compared to the appropriate standard/screening level (e.g., MCL, TDEC, and CCR, etc.).
3. TVA EDD for import into MANAGES

Please let me know if you have any questions or comments. Thank you.

Adeline Bock
Environmental Chemist, Geosciences Department
adeline.rock@aecom.com

AECOM

L 779585

1600 Perimeter Park Drive, Suite 400; Morrisville, NC 27560
T: 919-461-1340; F: 919-461-1415

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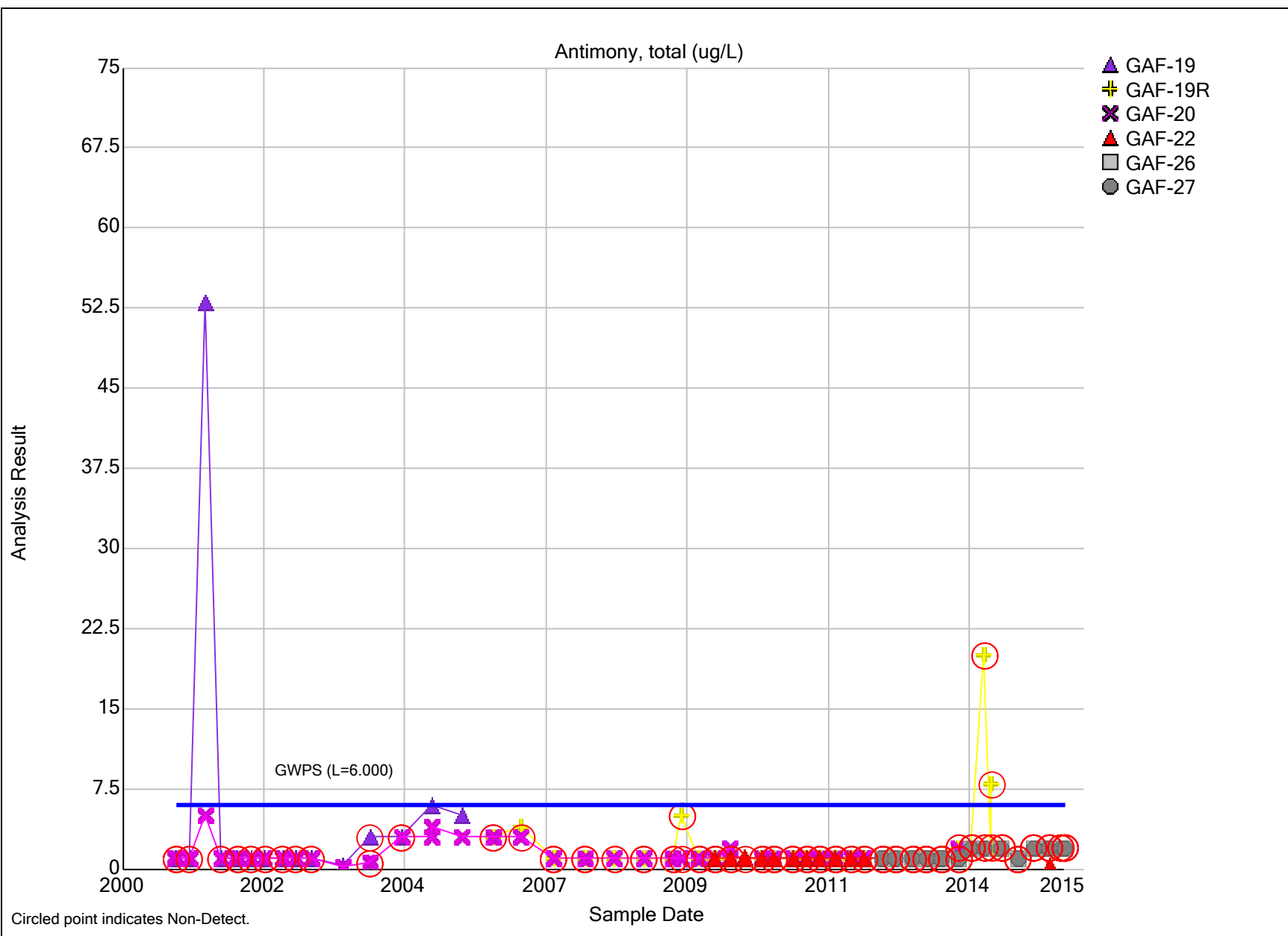
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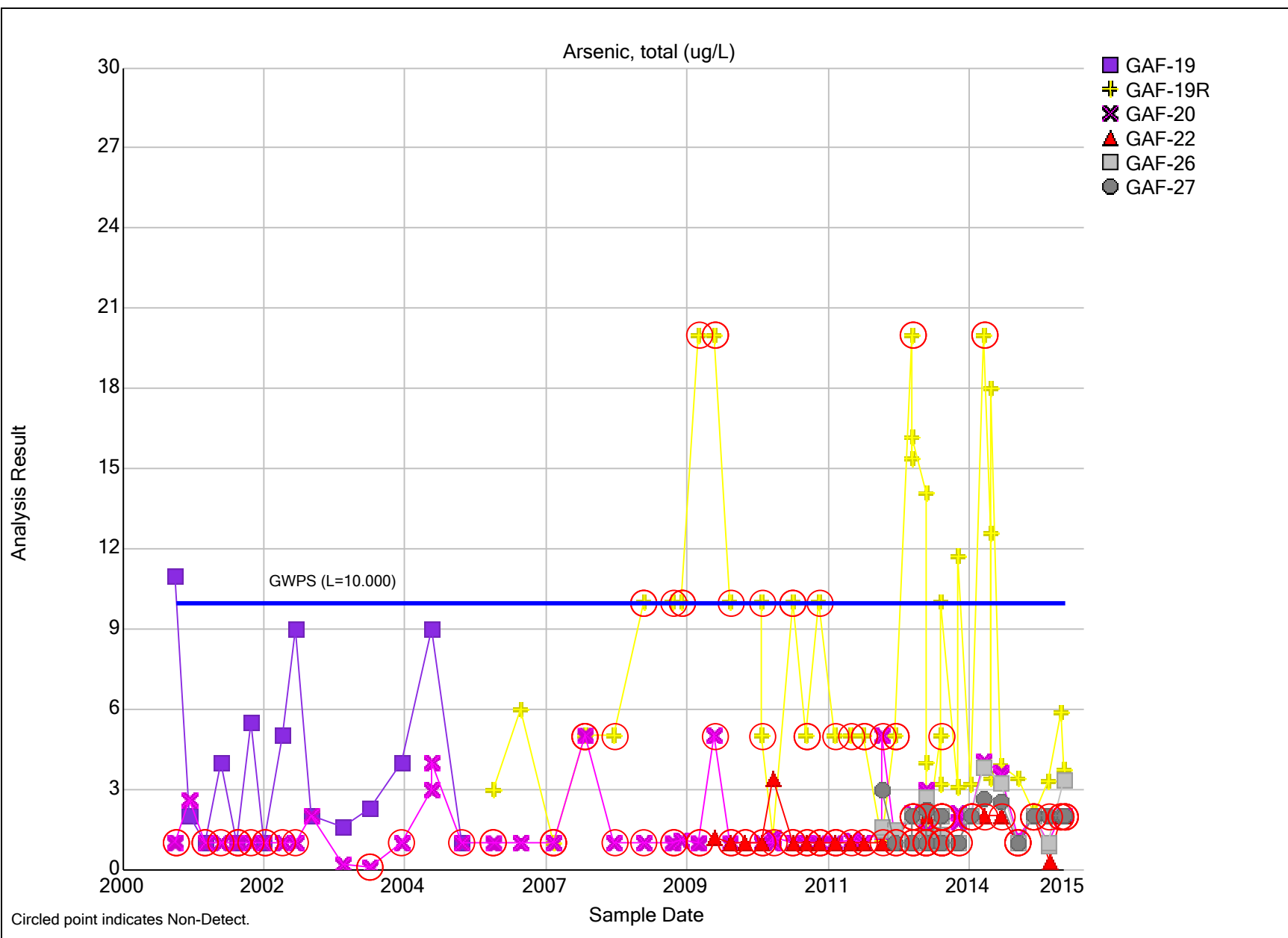
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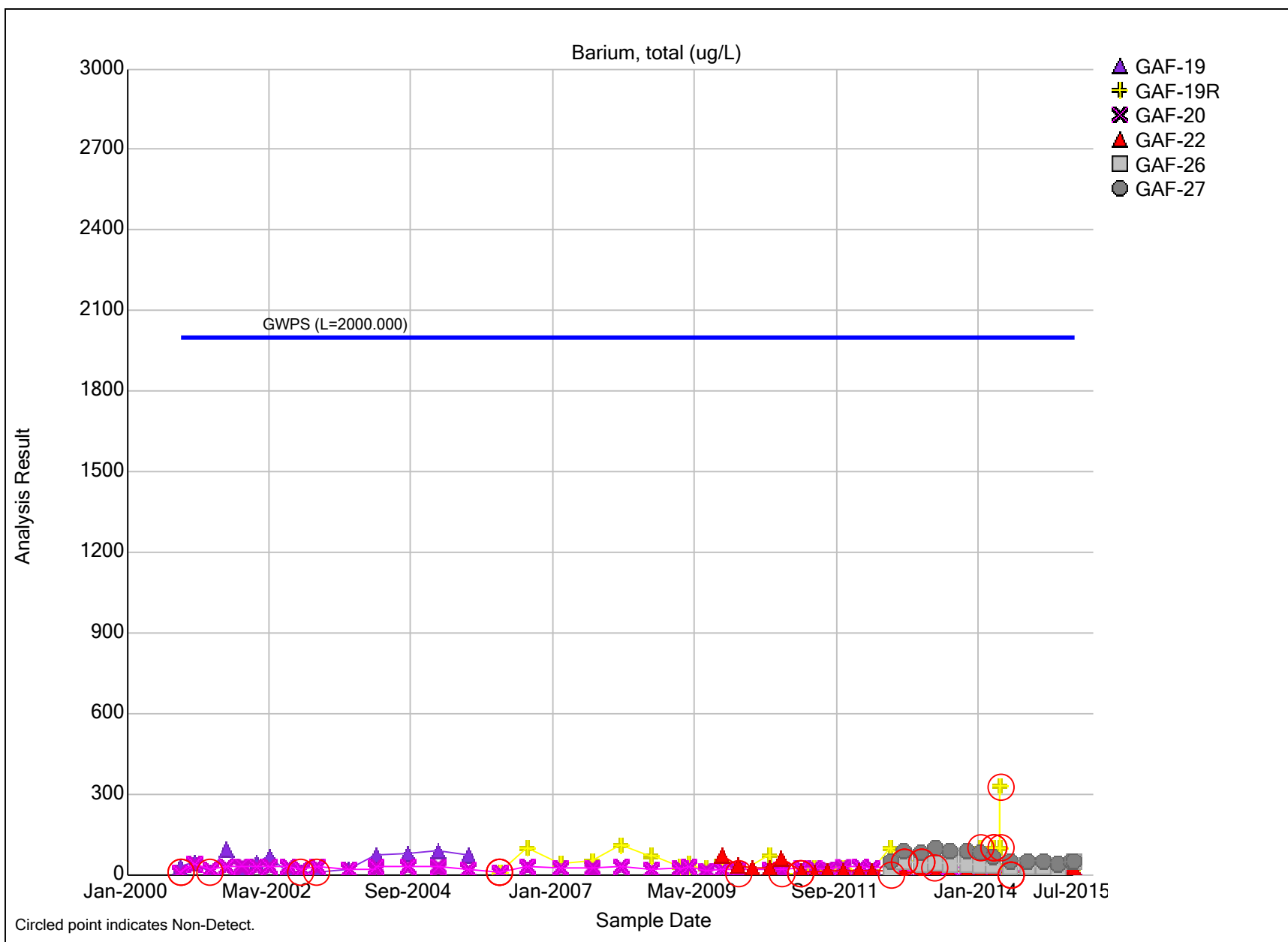
Notice: This communication and any attached files may contain privileged or other confidential information. If you have received this in error, please contact the sender immediately via reply email and immediately delete the message and any attachments without copying or disclosing the contents. Thank you.

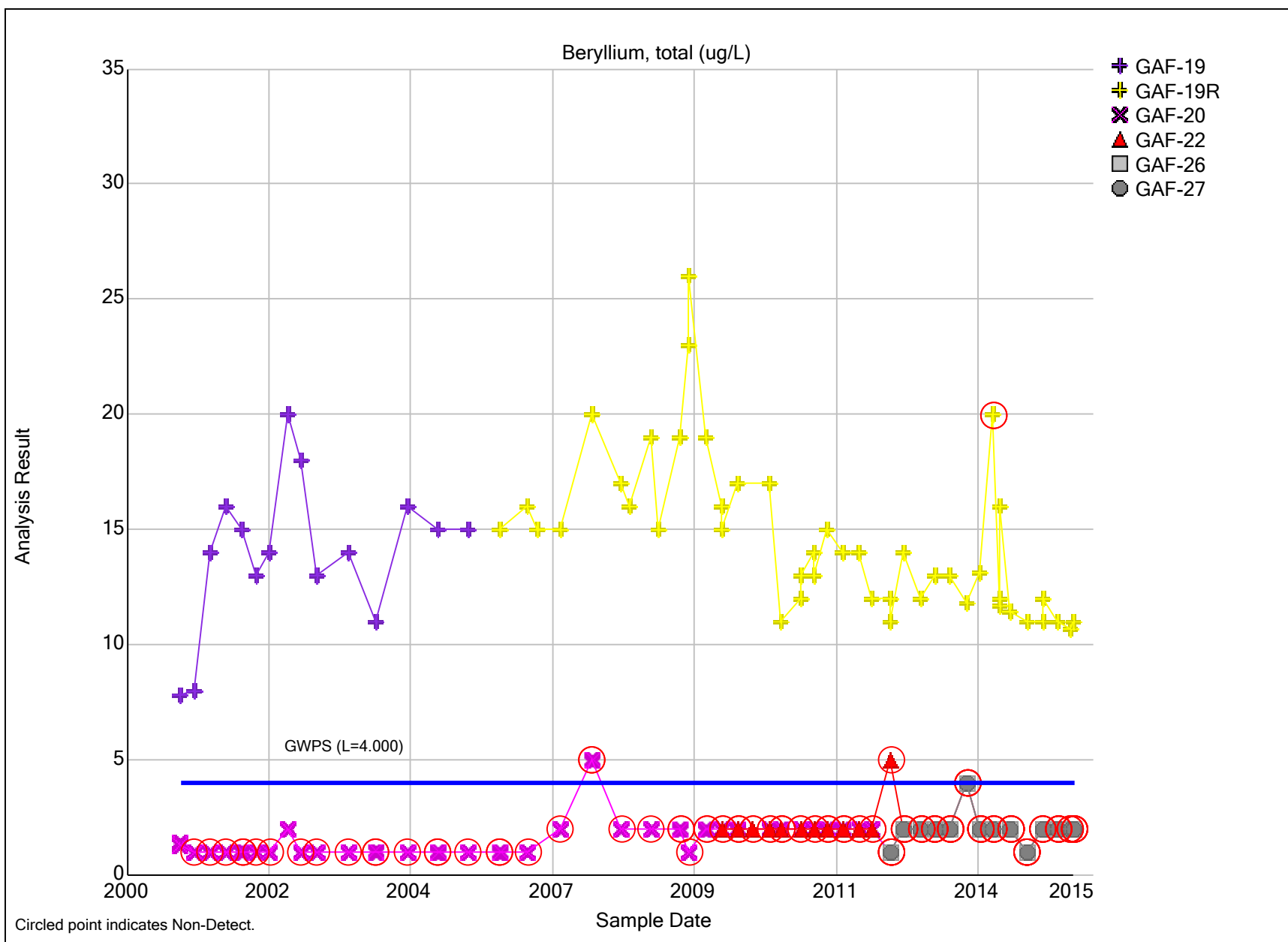
APPENDIX C

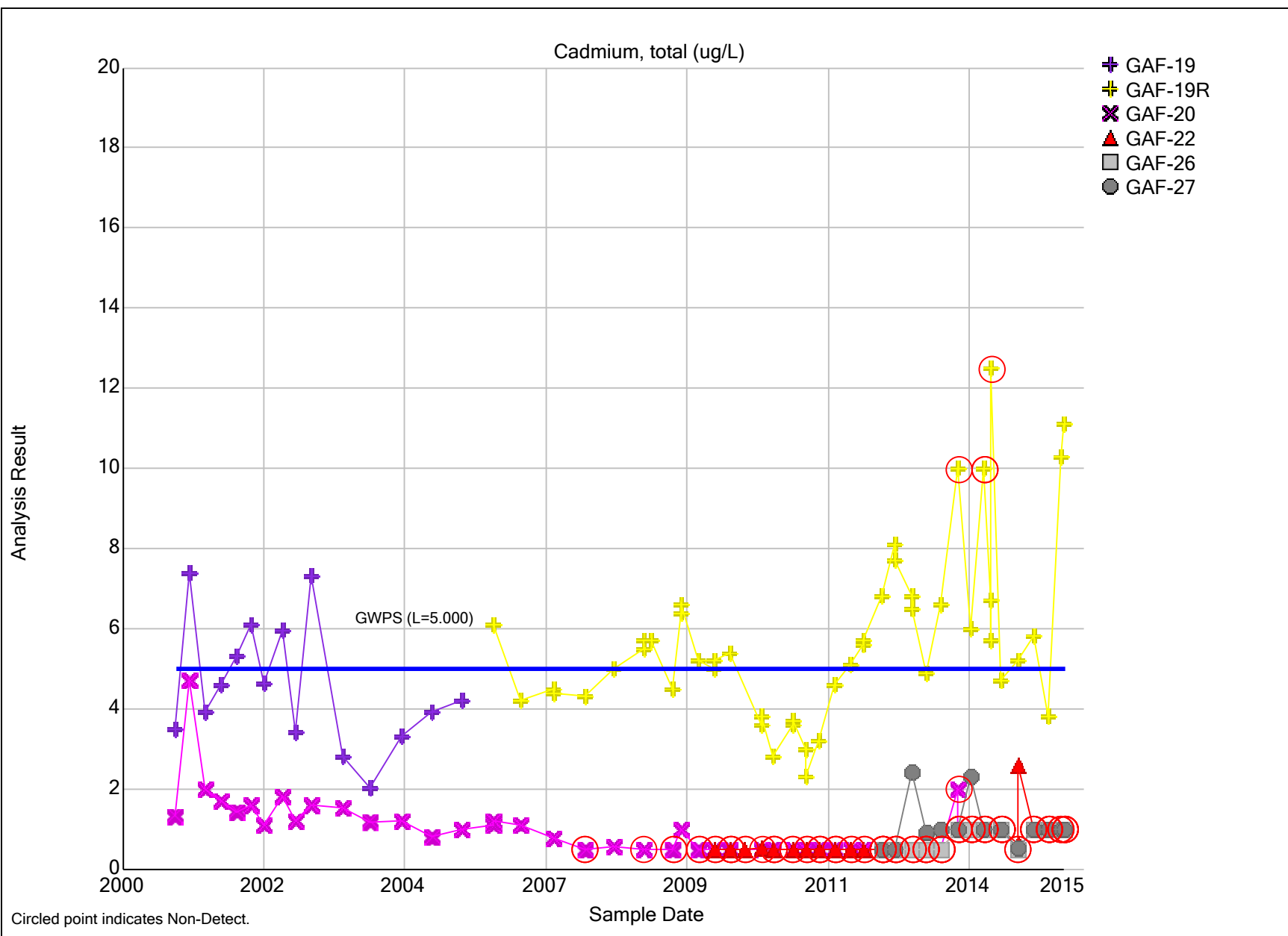
TIME-SERIES GRAPHS OF SAMPLE CONSTITUENT DATA

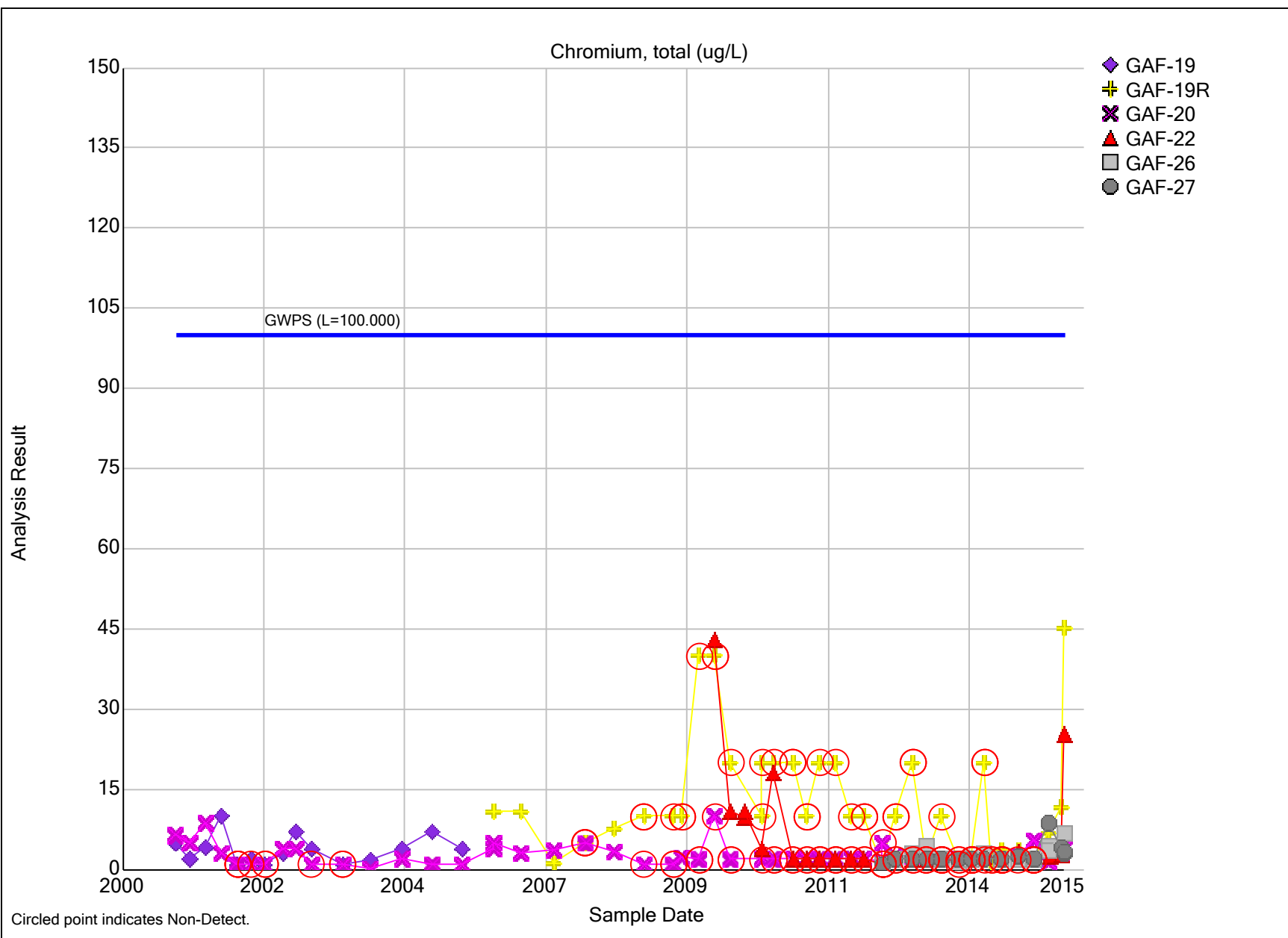


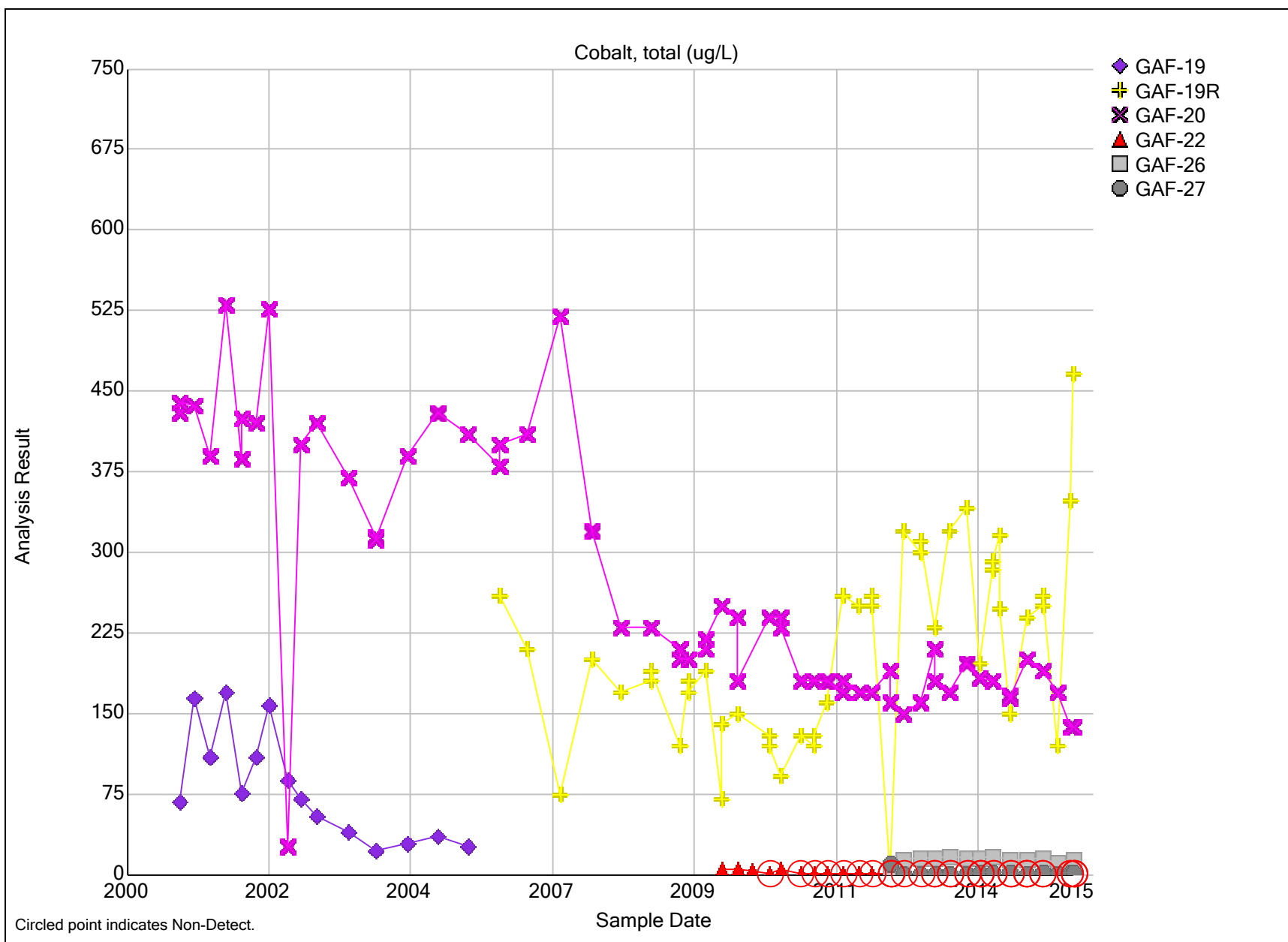


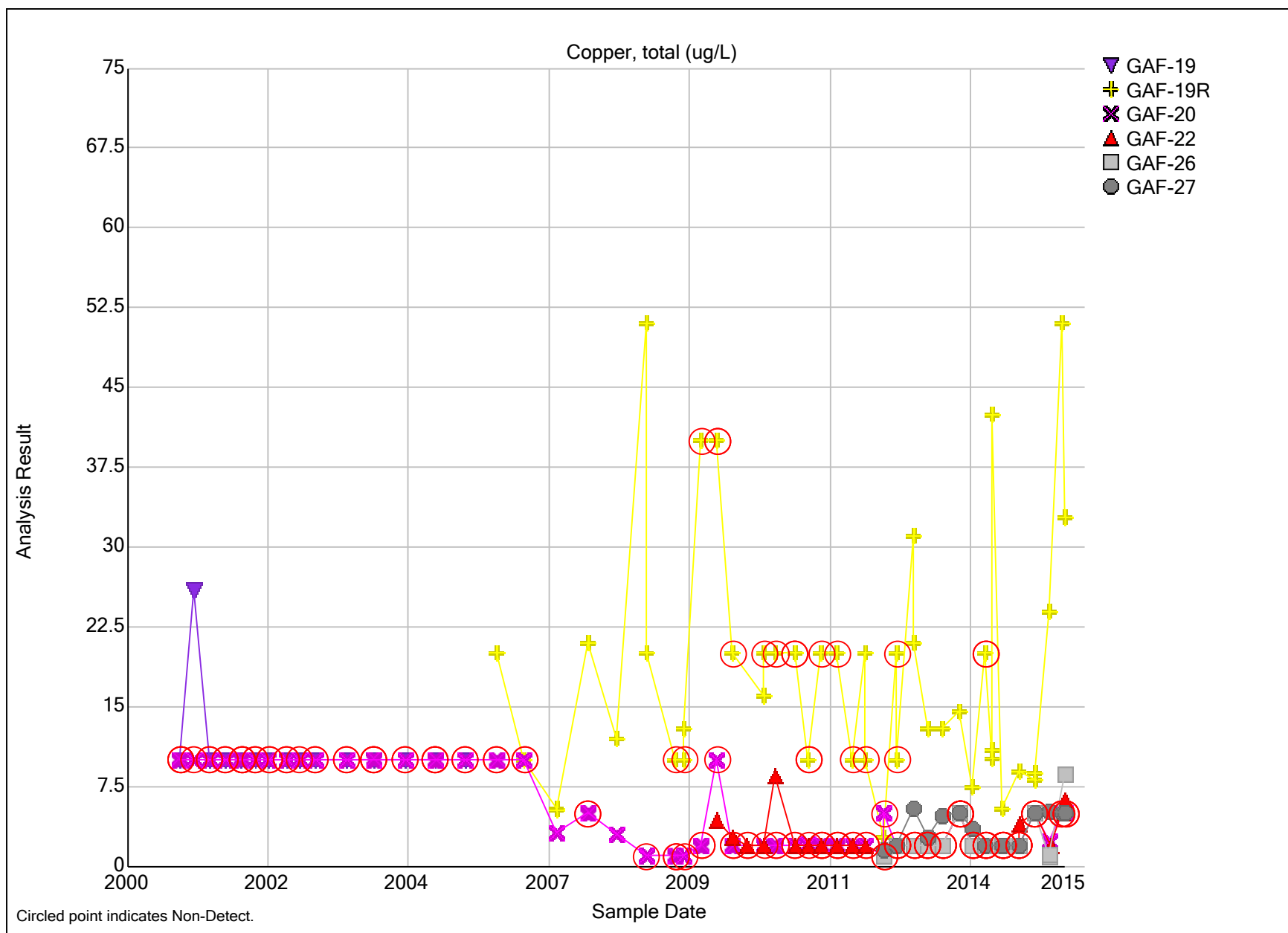


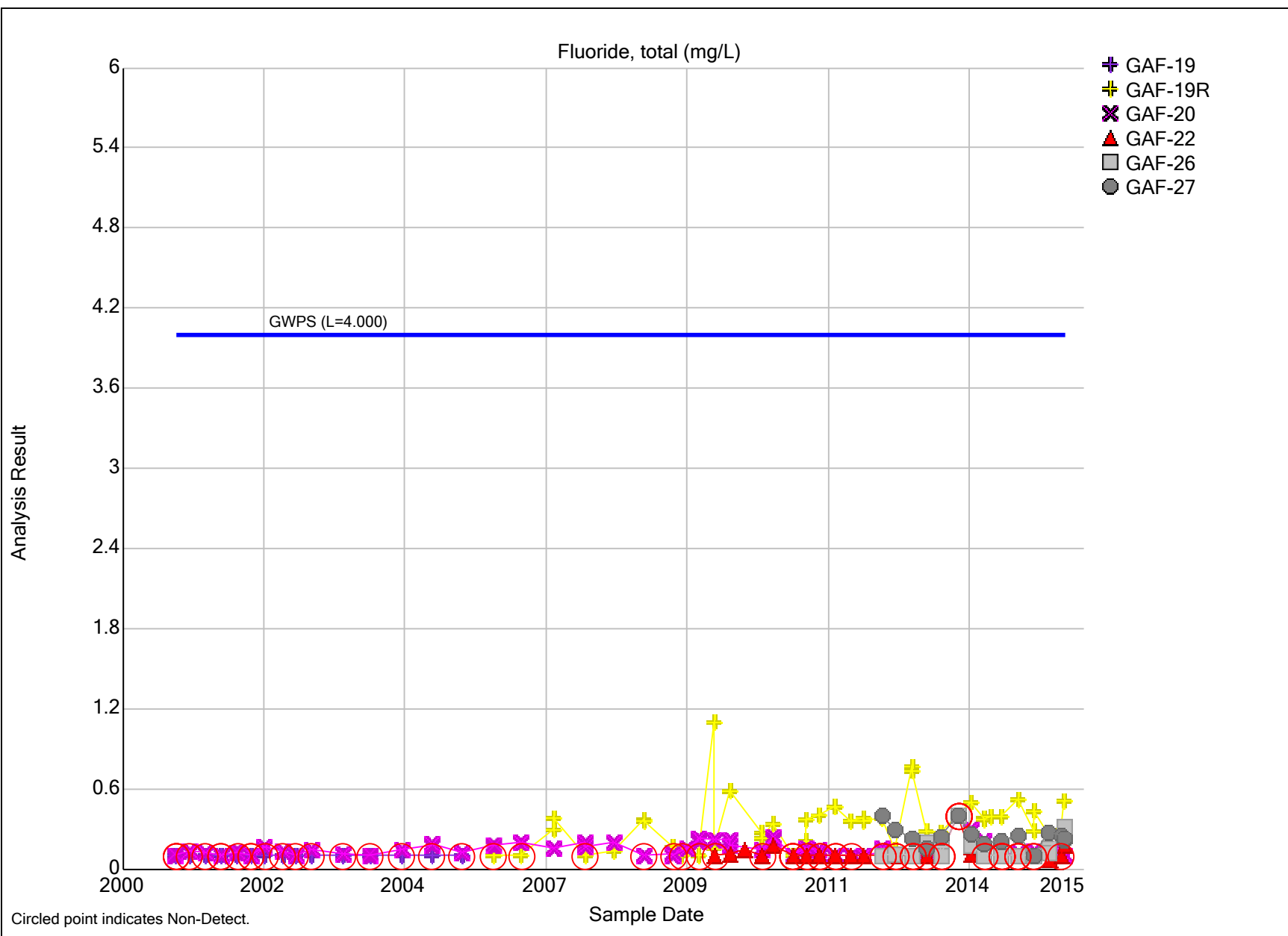


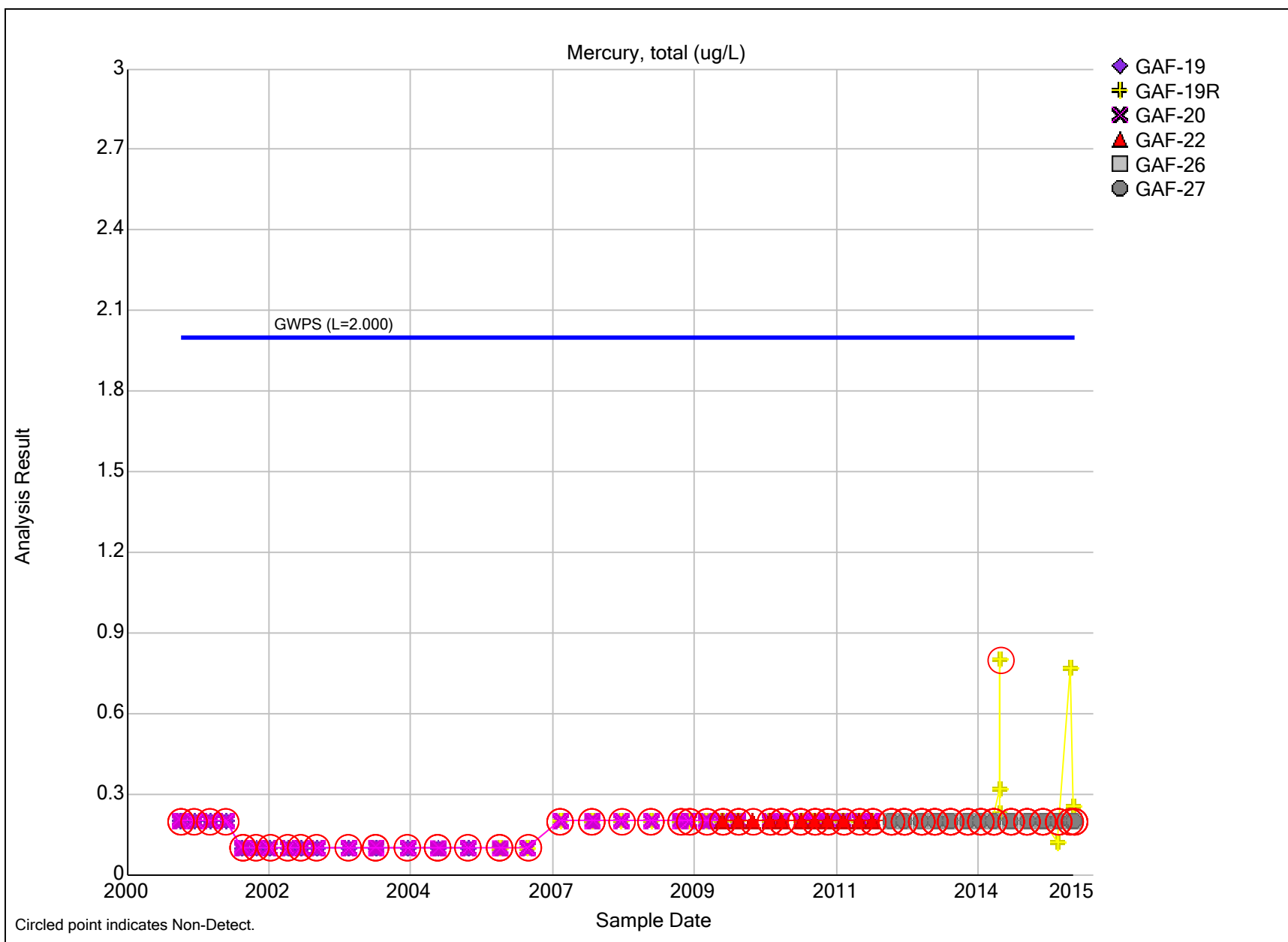


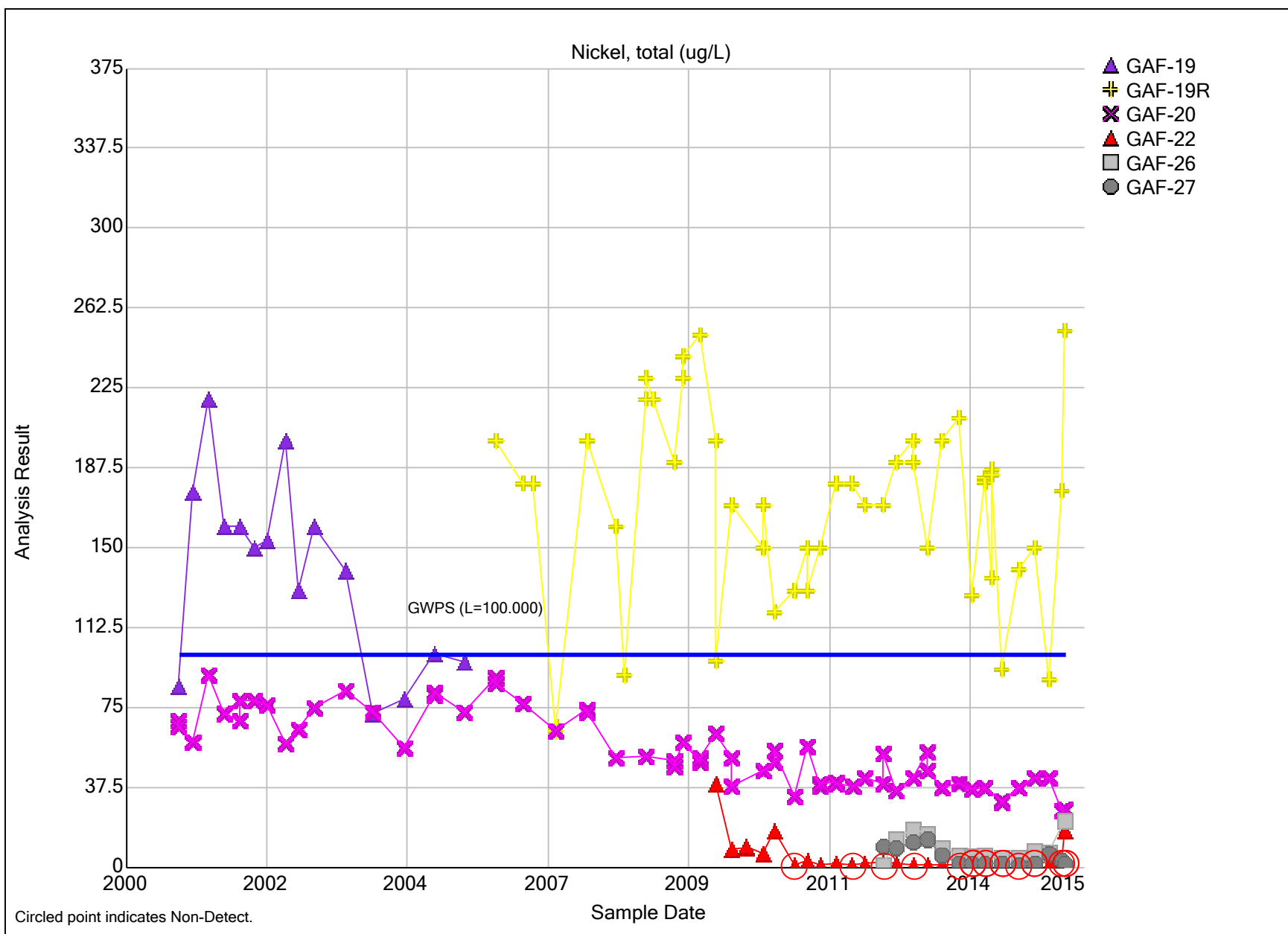


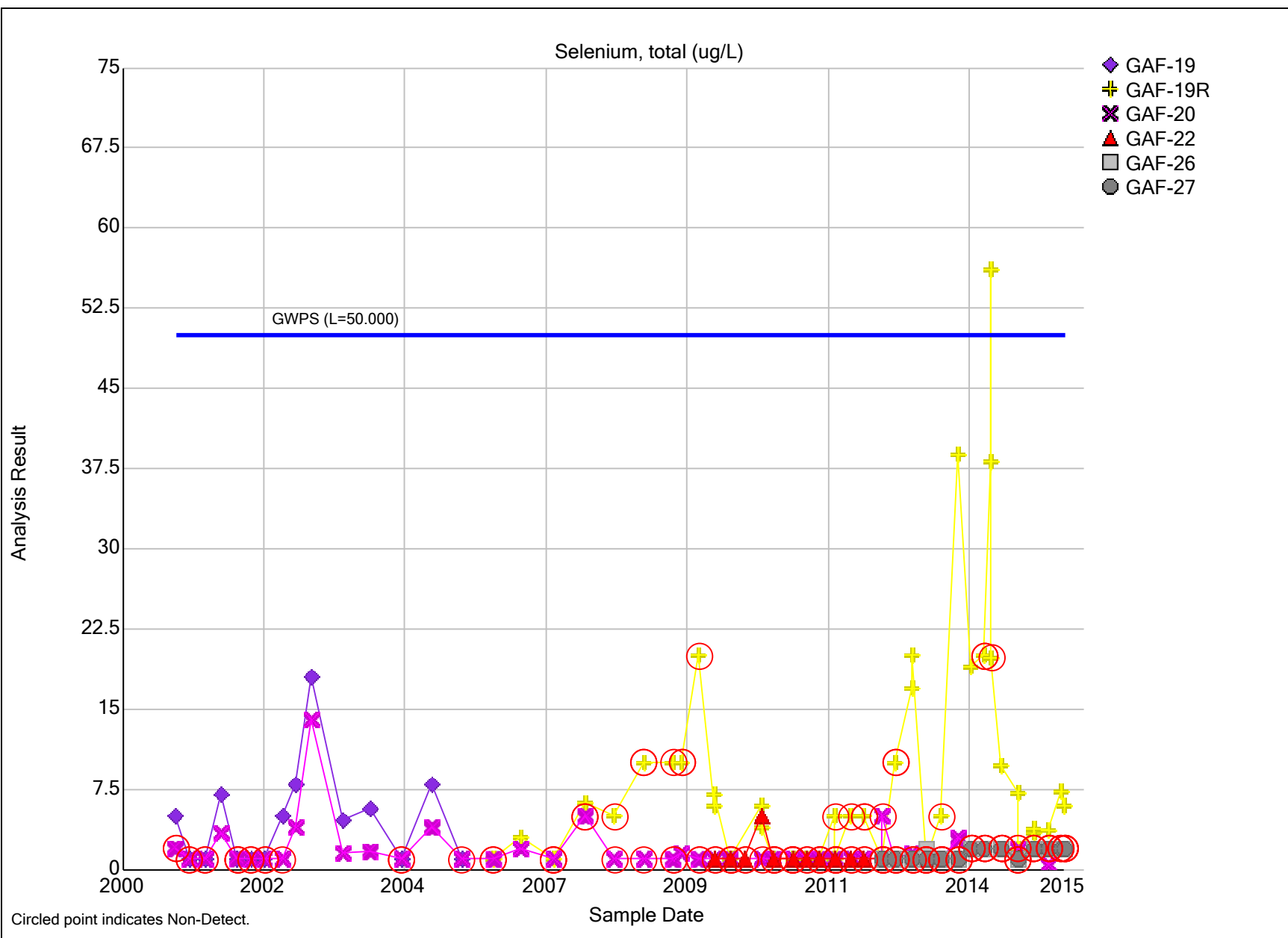


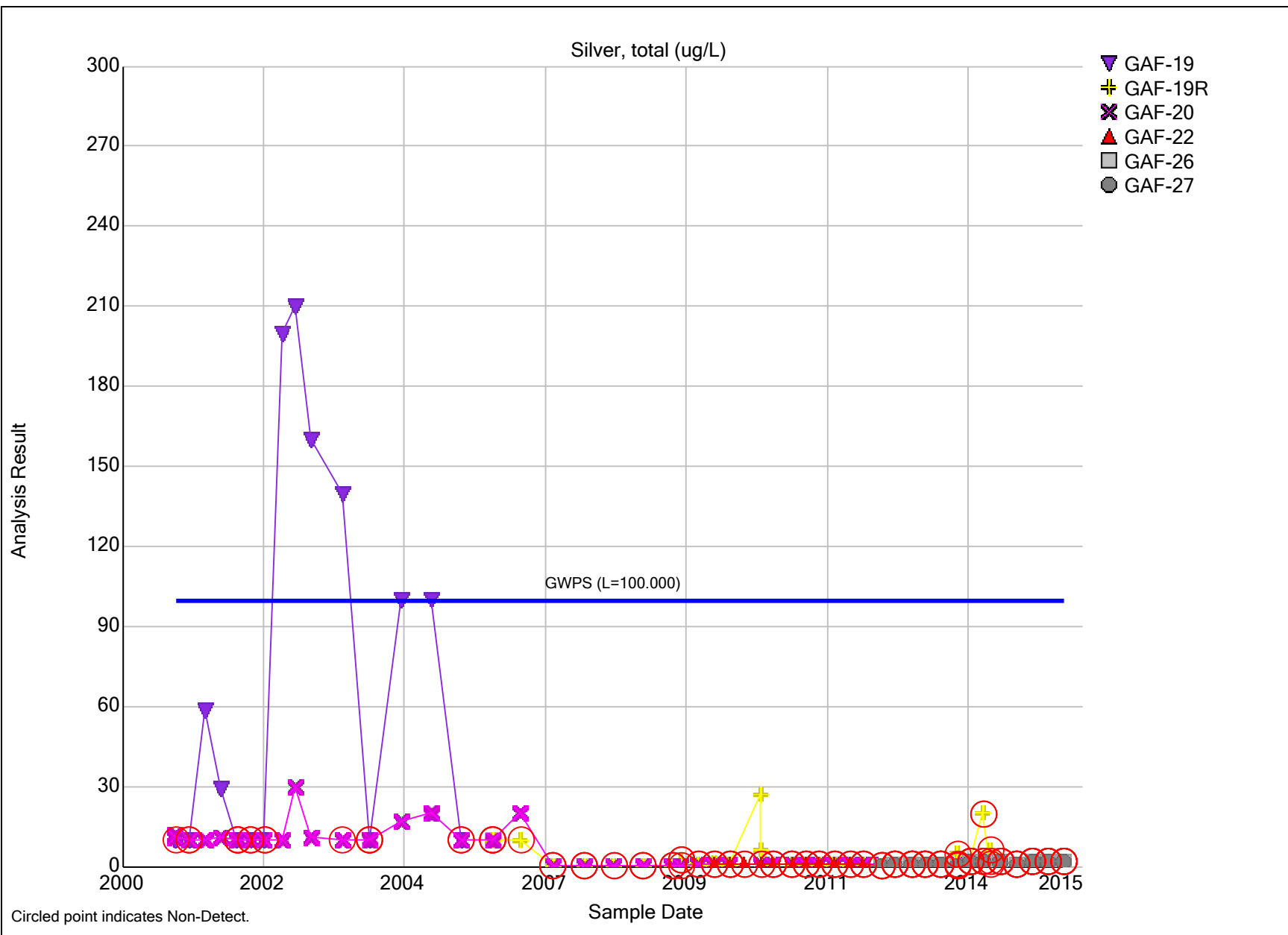


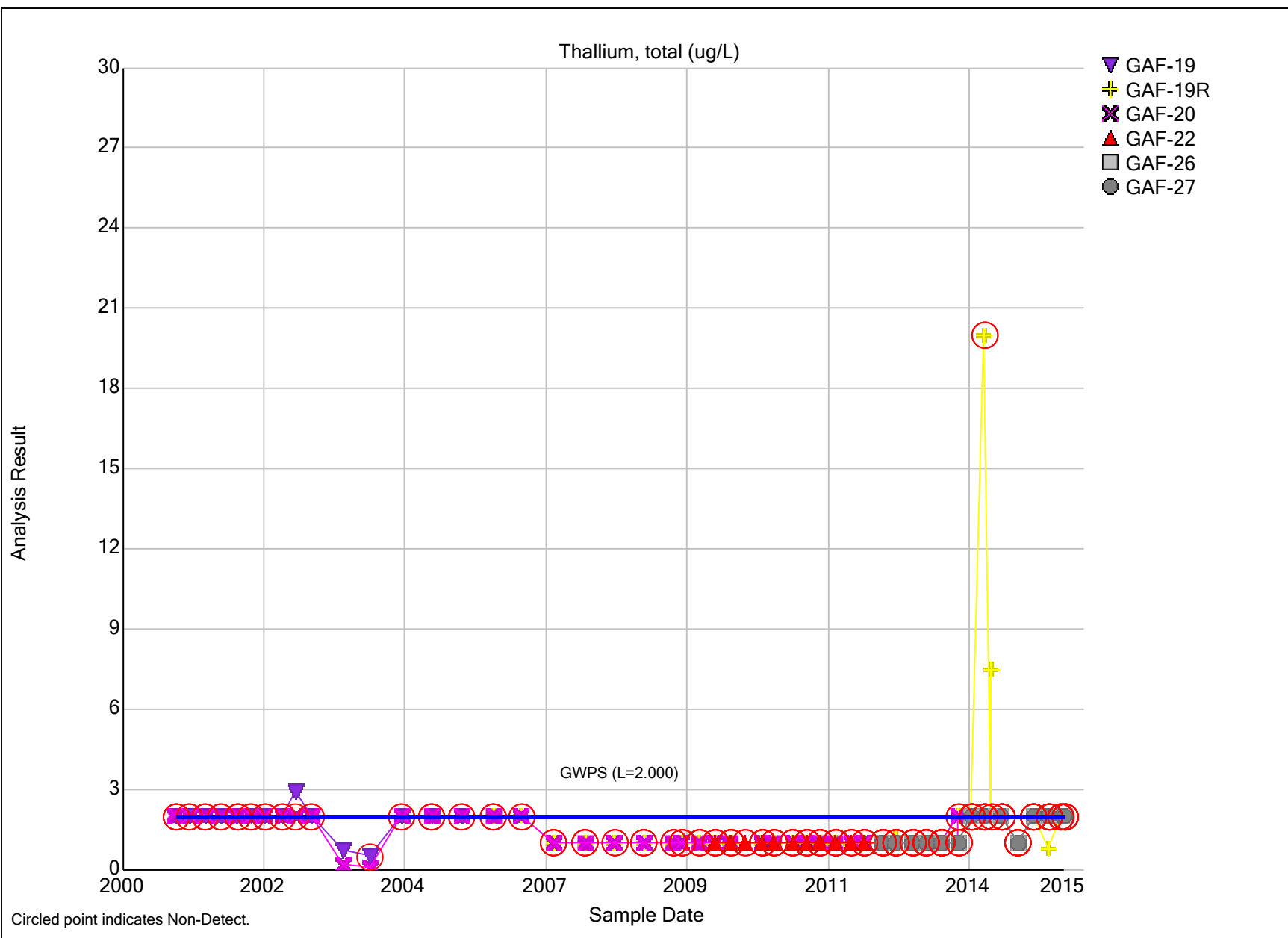


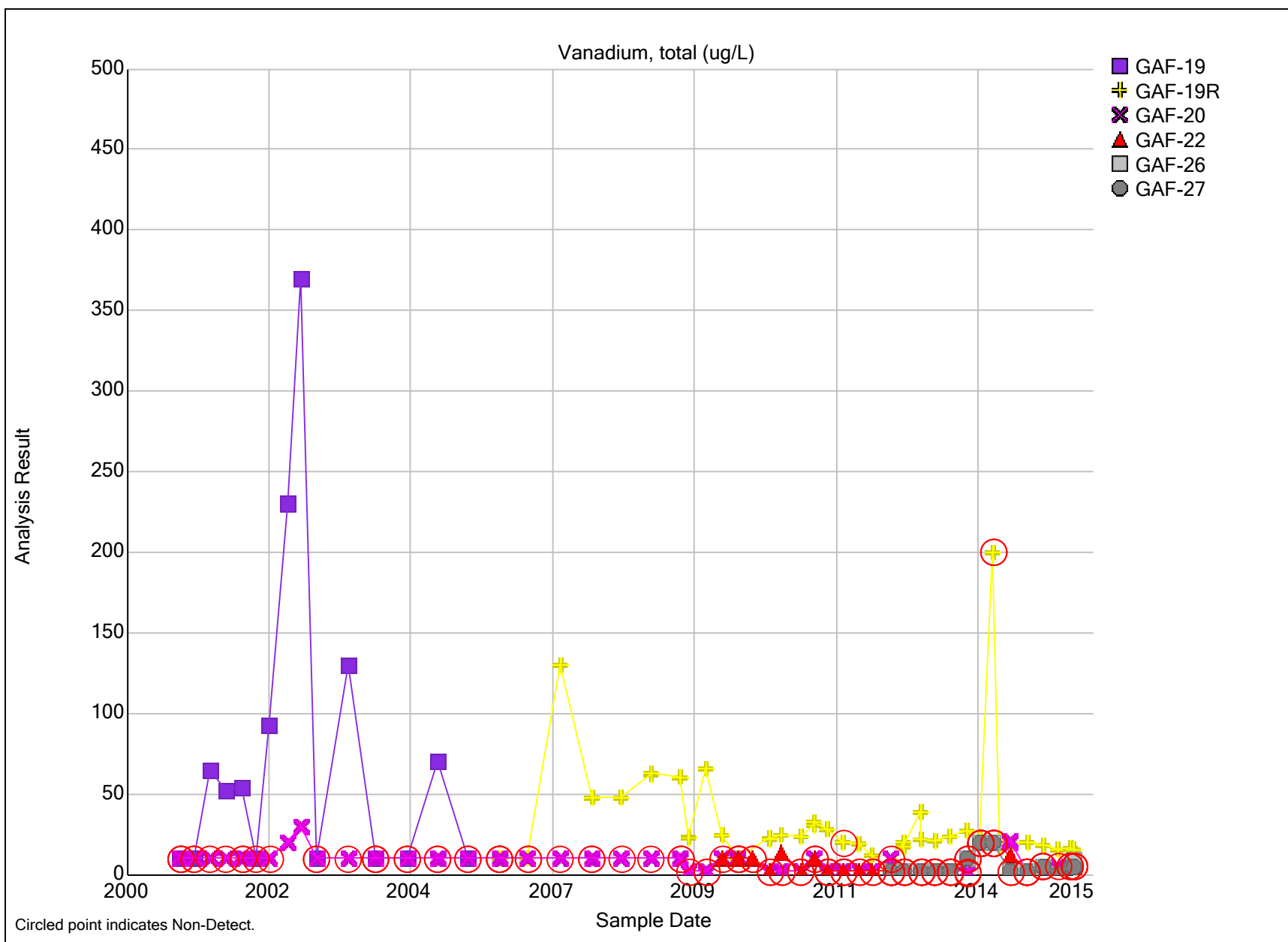


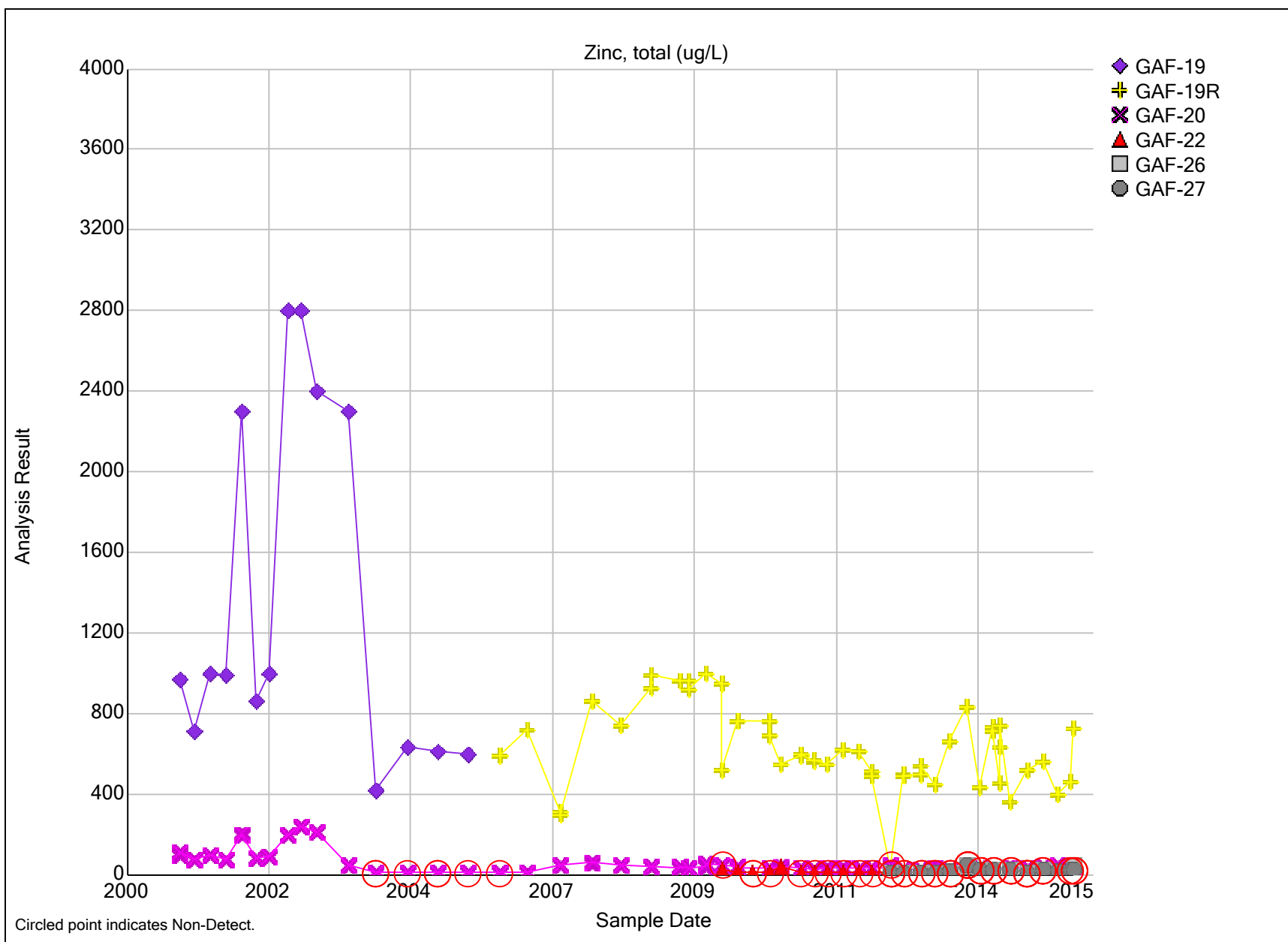


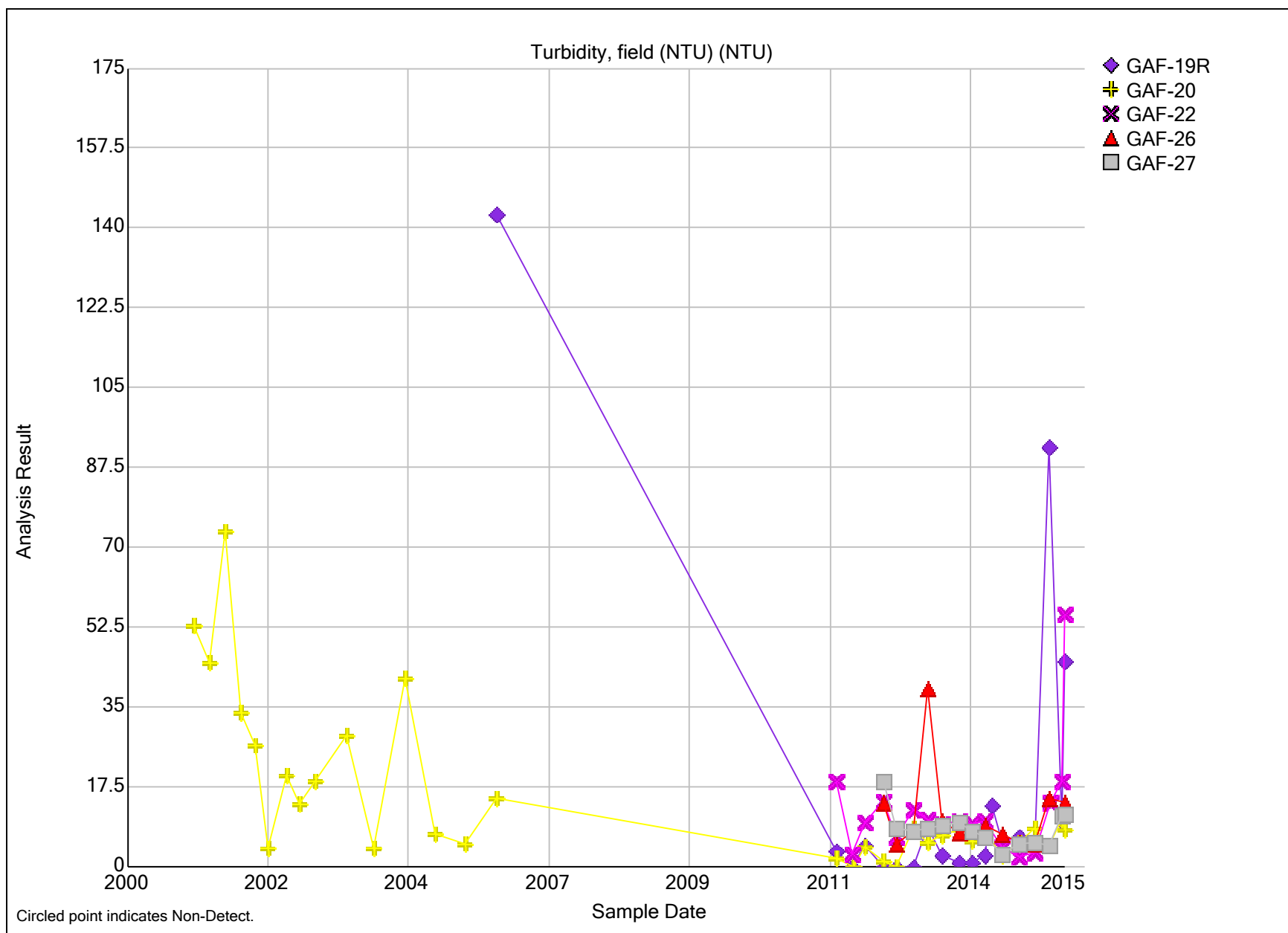


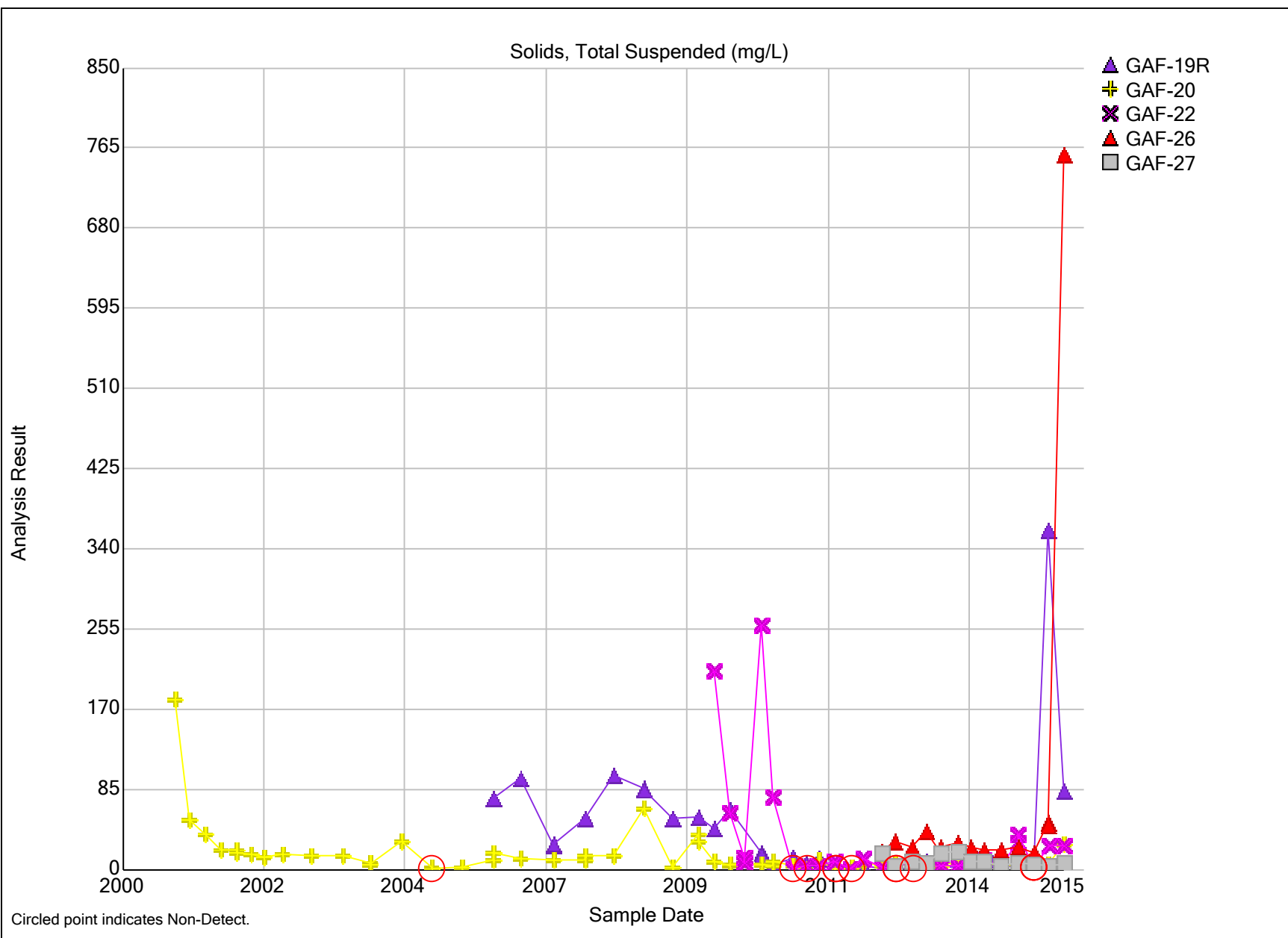












APPENDIX D

HISTORICAL GROUNDWATER LEVEL DATA FOR WELLS GAF-19/19R, GAF-20 AND GAF-21

Sample Date	GAF-19/19R (feet MSL)	GAF-21 (feet MSL)	GAF-21 (feet MSL)
05/09/2001	449.01	450.79	478.38
08/15/2001	447.47	449.74	474.97
11/20/2001	447.37	449.31	473.69
02/12/2002	450.23	452.07	481.99
05/07/2002	451.84	451.87	482.35
08/20/2002	448.10	449.57	475.92
11/06/2002	448.72	451.54	478.94
02/12/2003	449.74	452.26	480.90
08/19/2003	449.90	451.31	479.82
02/03/2004	450.98	451.93	482.02
08/11/2004	449.60	450.59	478.15
02/09/2005	454.79	452.36	482.41
08/10/2005	449.31	449.60	476.67
02/15/2006	449.34	451.84	481.66
08/01/2006	448.16	449.80	476.70
02/15/2007	447.21	451.70	481.49
08/22/2007	448.92	448.85	477.66
02/19/2008	447.41	451.64	482.81
08/12/2008	448.46	449.57	478.87
02/05/2009	451.15	451.48	482.51
04/01/2009	448.19	446.39	482.58
07/14/2009	447.51	451.31	480.41
10/14/2009	448.82	451.87	482.77
01/20/2010	449.67	451.97	481.89
07/27/2010	449.87	450.23	479.72
10/05/2010	450.85	446.69	479.49
02/01/2011	451.44	451.61	481.40
04/22/2011	449.70	451.64	483.07
07/11/2011	449.15	450.85	480.77
10/12/2011	450.33	450.46	479.92
01/18/2012	452.20	451.74	481.76
04/04/2012	450.16	451.34	481.20
07/24/2012	448.95	450.88	480.22
10/10/2012	450.69	453.71	479.69
01/23/2013	451.21	451.15	482.25
Mean value =	449.61	450.85	480.14