



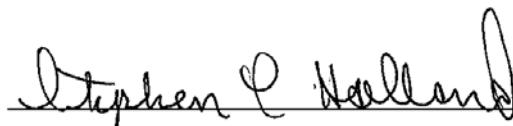
Tennessee Valley Authority
Johnsonville Fossil Plant
South Rail Loop Ash Disposal Area
Non-Registered Site # 43-1232

**GROUNDWATER MONITORING REPORT
SEPTEMBER 2015**

Prepared by
Jeff Norman
Nashville, Tennessee
November 2015

DOCUMENT CERTIFICATION

I certify 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. As specified in T.C.A. § 39-16-702(a)(4), this declaration is made under penalty of perjury.



Stephen L. Holland, Acting Plant Manager
Johnsonville Fossil Plant
November 20, 2015

TABLE OF CONTENTS

| | Page |
|------------------------------|-------------------------------------|
| DOCUMENT CERTIFICATION | Error! Bookmark not defined. |
| TABLE OF CONTENTS | ii |
| INTRODUCTION | 3 |
| GROUNDWATER SAMPLING..... | 3 |
| ANALYTICAL RESULTS..... | 4 |
| STATISTICAL EVALUATION..... | 4 |
| GROUNDWATER CONDITIONS..... | 8 |
| CONCLUSIONS..... | 8 |
| REFERENCES | 9 |

LIST OF TABLES

| | |
|--|---|
| Table 1. September 23, 2015 Groundwater Monitoring Results | 5 |
| Table 2. September 22, 2015 Groundwater Level Measurements | 8 |

LIST OF FIGURES

| | |
|---|----|
| Figure 1. Groundwater Potentiometric Surface on September 22, 2015..... | 10 |
|---|----|

APPENDICES

- A. Field Data Sheets
- B. Sample Custody Record and Laboratory Report
- C. Outlier Screening and Outliers
- D. Detailed Statistical Analysis Output
- E. Time-Series Graphs for Monitoring Parameters

INTRODUCTION

This report contains semiannual post-closure monitoring results for groundwater samples collected September 23, 2015 from the three designated compliance monitoring wells associated with the closed South Rail Loop (SRL) Ash Disposal Area at Johnsonville Fossil Plant (JOF). The former dredge cell was not permitted during operations, and is designated by the Tennessee Department of Environment and Conservation (TDEC) as Non-Registered Site (NRS) 43-1232. The SRL was fully capped with some sections having a synthetic geomembrane and others with compacted soil. TDEC verification of final closure was dated June 29, 2005. Water samples were analyzed by ESC Lab Sciences (ESC). Sample collection was performed by TVA staff in accordance with TDEC Rule 0400-11-01-.04 and the approved facility closure/post-closure plan.

Wells B6R and B8R were installed in December 2012 and adopted as replacement wells for B6 and B8, respectively, by a May 24, 2013 letter from TDEC Division of Solid Waste Management. Wells B6 and B8 are screened within the Chattanooga Shale, and likely influenced by trace metals that naturally occur within the formation. The influence of the Chattanooga Shale obscures the ability to accurately assess groundwater quality immediately downgradient of the non-registered site. New wells B6R and B8R were installed and screened in the overlying Ft. Payne Formation and terrace deposits, the same formation as upgradient well B9. Wells B5, B6, and B8 will be properly closed and the well closure report submitted to TDEC.

As initiated with the September 2011 Groundwater Monitoring Report, TVA has applied an interwell-based prediction interval method for statistical analysis of groundwater monitoring detection data. A narrative description of the statistical methodology, including the outlier screening approach for background monitoring data, is presented in the *Statistical Evaluation* section of this report.

GROUNDWATER SAMPLING

Sampling of downgradient monitoring wells B6R, B8R, and upgradient well B9 was performed by Monte W. Starks (TVA). A submersible, non-dedicated bladder pump was used to purge and collect unfiltered samples from wells B6R and B8R, whereas B9 was purged and sampled with a dedicated bladder pump. Field parameters (e.g., temperature, specific conductance, pH, dissolved oxygen, oxidation-reduction potential, and turbidity) were monitored during well purging using a flow-through cell and calibrated instruments. A minimum of three well volumes were

purged from each well prior to sample collection after which stability of the field parameters was used to determine the appropriate time for sample collection. Field QC duplicate samples were collected from well B9, and an equipment rinsate blank was obtained between sampling of wells B8R and B6R. Field data sheets are provided in Appendix A. Immediately following collection, samples were transferred to new sample bottles provided by the laboratory with appropriate preservatives (where applicable). The samples were then sealed and labeled, data was recorded on a custody form, and samples were placed in an iced cooler for transport. Samples were received by ESC on September 24, 2015. A copy of the chain of custody record is presented in Appendix B.

ANALYTICAL RESULTS

Groundwater samples were analyzed for the 17 required inorganic constituents specified in Appendix I of TDEC Rule 0400-11-01. Table 1 presents a summary of the laboratory results for the monitoring well samples. Results indicate that none of the constituent concentrations observed in any of the samples exceed maximum contaminant levels (MCLs), therefore meeting drinking water standards for the parameters analyzed. All analytical testing was conducted within recommended sample holding times. The laboratory report presented in Appendix B includes analytical methods, detection limits, and data qualifiers (when applicable).

STATISTICAL EVALUATION

Prediction interval methods applied on an interwell basis were used for statistical evaluation of the September 2015 groundwater detection monitoring data. In general, one-sided upper prediction limits (UPLs) derived from n background measurements and having a $(1-\alpha)$ probability of including at least one of two future measurements at compliance wells are computed for each constituent using the methodology of Gibbons (1994, pp. 8-76), where α is the Type 1 (false-positive) error level. Future sample constituent measurements from compliance wells associated with each geologic formation are compared to background prediction limits derived from available monitoring data for the same geologic formation. If any new measurements exceed the background UPL, one independent resample is collected from each monitoring well having a statistical exception. Resamples are analyzed only for the exceeded constituents. If the resample also exceeds the UPL, the exceedance would be deemed statistically significant; otherwise, the original UPL exceedance would be considered insignificant.

Table 1. September 23, 2015 Groundwater Monitoring Results

| Constituent | Units | B6R | B8R | B9 | B9-DUP | Background UPL ^a | TDEC MCL |
|-------------|-------|--------------|--------------|------------|------------|-----------------------------|----------|
| | | downgradient | downgradient | background | background | | |
| Antimony | µg/L | <2 | <2 | <2 | <2 | 3.0 | 6 |
| Arsenic | µg/L | <2 | <2 | <2 | <2 | 2.0 | 10 |
| Barium | µg/L | 17.4 | 30.1 | 5.74 | 6.5 | 65.209 | 2,000 |
| Beryllium | µg/L | <2 | <2 | <2 | <2 | 2.0 | 4 |
| Cadmium | µg/L | <1 | <1 | <1 | <1 | 1.0 | 5 |
| Chromium | µg/L | <2 | <2 | <2 | <2 | 4.0 | 100 |
| Cobalt | µg/L | <2 | <2 | <2 | <2 | 10.0 | -- |
| Copper | µg/L | <5 | <5 | <5 | <5 | 10.0 | -- |
| Fluoride | mg/L | <0.1 | <0.1 | <0.1 | <0.1 | 0.40 | 4 |
| Lead | µg/L | <2 | <2 | <2 | <2 | 2.0 | 15 |
| Mercury | µg/L | <0.2 | <0.2 | <0.2 | <0.2 | 0.2 | 2 |
| Nickel | µg/L | 9.4 | 9.99 | <2 | <2 | 2.5 | 100 |
| Selenium | µg/L | <2 | <2 | <2 | <2 | 2.00 | 50 |
| Silver | µg/L | <2 | <2 | <2 | <2 | 10.0 | 100 |
| Thallium | µg/L | <2 | <2 | <2 | <2 | 2.0 | 2 |
| Vanadium | µg/L | <5 | <5 | <5 | <5 | 10.0 | -- |
| Zinc | µg/L | <25 | <25 | <25 | <25 | 25.0 | -- |
| Turbidity | NTU | 4.7 | 3.7 | 4.4 | -- | -- | -- |

a - UPLs based on B9 data between 3/7/2000 and 9/23/2015 after outlier removal.

Bold values exceed background UPLs.

Implementation of the prediction interval analysis is performed using the MANAGES groundwater data management and analysis software (EPRI, 2014). The appropriate form of the prediction interval method, i.e., either parametric or nonparametric, is selected for each constituent based on background data normality and the percentage of nondetectable values. Background constituent data which are either normally or log-normally distributed (based on Shapiro-Wilk testing at the 95% confidence level) are evaluated with parametric prediction intervals. Otherwise, the non-parametric form of the prediction interval is applied.

The parametric and nonparametric forms of prediction intervals used in the analysis comply with performance standards specified in 0400-11-01-04(7)(a)4(vi). A site-wide Type 1 error rate of 0.05 is maintained in application of the parametric prediction interval method. The corresponding individual sample constituent confidence levels ($1-\alpha$) for comparisons are computed and reported by MANAGES based on the number of compliance locations, constituents, and verification resamples using the methodology presented in the American Society for Testing and Materials (ASTM) D6312-98 (ASTM, 2005). For nonparametric prediction interval testing, the confidence level is based on the number of background sample data and the number of resamples.

Appendix C presents a summary of background monitoring data for upgradient well B9 collected between March 2000 and September 2015. Outliers in background data that were identified and removed prior to constituent UPL estimation for the September 2015 monitoring data evaluation are indicated in the summary table. Outliers are generally defined as constituent concentration data that do not conform to the range and distribution of other measurements. The purpose is to remove abnormally high constituent concentration data that could produce a high (non-conservative) bias in background UPL estimates. Potential causes of abnormal data include analytical errors and chemical interferences, reporting errors, and sampling bias. Of particular concern, is potential bias in metals analyses caused by the presence of suspended solids in unfiltered groundwater samples. Suspended solids often consist of particles of geologic material containing naturally-occurring metals, some of which may be the same as Appendix I inorganic constituents. Consequently, the measured total suspended solids (TSS) content of water samples is one factor considered in screening data outliers.

Another screening guide is comparison of sample data to the extreme outlier limit concentration for each constituent dataset, where the extreme outlier limit is defined as the concentration equal the 75th data percentile plus 3 times the interquartile range (IQR). EPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Unified Guidance* (EPA 2009, pp. 12-5 to 12-7) indicates that box plot outlier limits can provide a useful method for screening of outliers for non-normally distributed datasets. The method is particularly relevant to B9 background data since data are non-normally distributed due to a high percentage of non-detects. The TSS and box plot outlier limit screening guides cannot be rigidly applied, but must be considered together and in conjunction with other factors. For example, TSS is not an appropriate screening tool for all detection monitoring constituents, since not all constituents are metals (e.g., fluoride) and some

metals may not be present in local geologic media. Allowances are also made in applying box plot outlier limits for constituent datasets in which constituent detection limits are variable (e.g., antimony, beryllium, etc.).

Statistical testing results of the September 2015 groundwater monitoring data are summarized in Table 1. Computed background UPLs, their confidence limits, and other details pertaining to statistical analysis of constituent data are provided in Appendix D. Results indicate UPL exceedances for nickel at compliance wells B6R and B8R. Nickel has a declining trend for both wells, as shown on the time-series graph in Appendix E. The results for nickel are consistent with the September 2014 concentrations for wells B6R and B8R, and are generally consistent with historical results for these two constituents. Nickel values at 9.4 micrograms per liter (ug/L) (B6R) and 9.99 ug/L (B8R) are well below the MCL of 100 ug/L. Historical monitoring indicates the likelihood that confirmatory resampling of compliance wells, as allowed by the prediction interval method, would confirm the observed UPL exceedances. Therefore, no confirmatory resampling was conducted. Generally, a downward trend has existed for nickel in both wells, since they were installed in 2012. This may be an indication that the nickel may be associated with the well installation. As the well has settled, so have the nickel levels. As mentioned previously, no MCL exceedance occurred for any of the Appendix I inorganics constituents in any of the well samples, therefore meeting drinking water standards for these parameters.

Time-series graphs of groundwater monitoring data recorded since 2000 are presented in Appendix E. No increasing concentration trends are observed for any of the Appendix I inorganic constituents. Antimony, arsenic, barium, beryllium, cadmium, chromium, copper, fluoride, lead, nickel, selenium, silver, thallium and zinc have never had an MCL exceedance, therefore meeting drinking water standards for these parameters. Several parameters have never been detected since the original wells were installed in late 1990s and early 2000. Vanadium, while having no MCL, has been primarily non-detect since they began testing the older wells and new wells. Mercury was last detected at a level slightly over the MCL in Well B8 in 2007. Since that time and since the well was replaced, there have been no MCL exceedances, therefore the detection of this parameter may have been associated with the Chattanooga Shale, or possibly a lab error. Cobalt was identified in Well B8, but not identified in either replacement wells. Based on the above-mentioned observations, TVA respectfully requests that TDEC join TVA in a formal discussion to explore the reduction in the number of parameters being monitored.

GROUNDWATER CONDITIONS

Groundwater levels measured on March 17, 2015 prior to sample collection are given in Table 2. The groundwater potentiometric surface derived from these measurements is presented on Figure 1. Groundwater generally flows westward across the disposal site with an average hydraulic gradient of approximately 0.006 ft/ft.

Table 2. September 23, 2015 Groundwater Level Measurements

| Monitoring Well | Reference Point Elevation (feet) | Depth to Water (feet) | Water Elevation (feet) | Well Bottom Depth (feet) |
|-----------------|----------------------------------|-----------------------|------------------------|--------------------------|
| B6R | 396.2 | 18.08 | 378.12 | 21.06 |
| B8R | 391.9 | 12.47 | 379.43 | 16.83 |
| B9 | 424.64 | 30.77 | 393.86 | -- |

*** Well bottom inaccessible due to dedicated pump.*

The South Rail Loop NRS is immediately underlain by approximately 7 to 48 ft. of alluvial terrace deposits representing the uppermost geologic formation, followed in turn by the Chattanooga Shale and the Camden Chert. The hydraulic conductivity of the terrace deposits averages approximately 3×10^{-5} cm/sec (or 0.085 ft/day), and the effective porosity is estimated to be approximately 30%. Using these hydraulic data and the current groundwater gradient given above, the local horizontal groundwater seepage velocity in the uppermost aquifer at the time of sampling is estimated from Darcy's Law to be approximately 1.8×10^{-3} ft/day.

CONCLUSIONS

The September 2015 groundwater sample results indicated no MCL exceedances for any Appendix I inorganics constituents in any of the well samples. With no MCL exceedances, the groundwater meets drinking water standards for these parameters analyzed.

Statistical evaluation of the September 2015 groundwater detection monitoring data indicated UPL exceedances for nickel in samples at downgradient compliance wells B6R and B8R. Nickel levels at 9.4 ug/L and 9.99 ug/L, respectively, are well below the MCL of 100 ug/L. Historical monitoring indicates the likelihood that confirmatory resampling of compliance wells, as allowed by the prediction interval method, would confirm both of the observed UPL exceedances.

Therefore, no confirmatory resampling is proposed. While nickel has been detected in previous sampling events, the results show a downward trend since the installation of the wells, suggesting the nickel may be associated with disturbance of the water column during installation.

Based on the observations detailed in this report, TVA respectfully requests that TDEC join TVA in a formal discussion to explore the reduction in the number of parameters being monitored.

The next sampling of the South Rail Loop NRS is planned for March 2016.

REFERENCES

- ASTM, 1998, Standard Guide for Developing Appropriate Statistical Approaches for Groundwater Detection Monitoring Programs, ASTM D 6312-98.
- EPA, 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Unified Guidance, EPA-530/R 09-007.
- EPRI, 2014. "MANAGES (version 4.0), Groundwater Data Management and Evaluation Software", EPRI product # 1012581, Palo Alto, CA.
- Gibbons, R.D., 1994. Statistical Methods for Groundwater Monitoring, John Wiley & Sons, Inc.

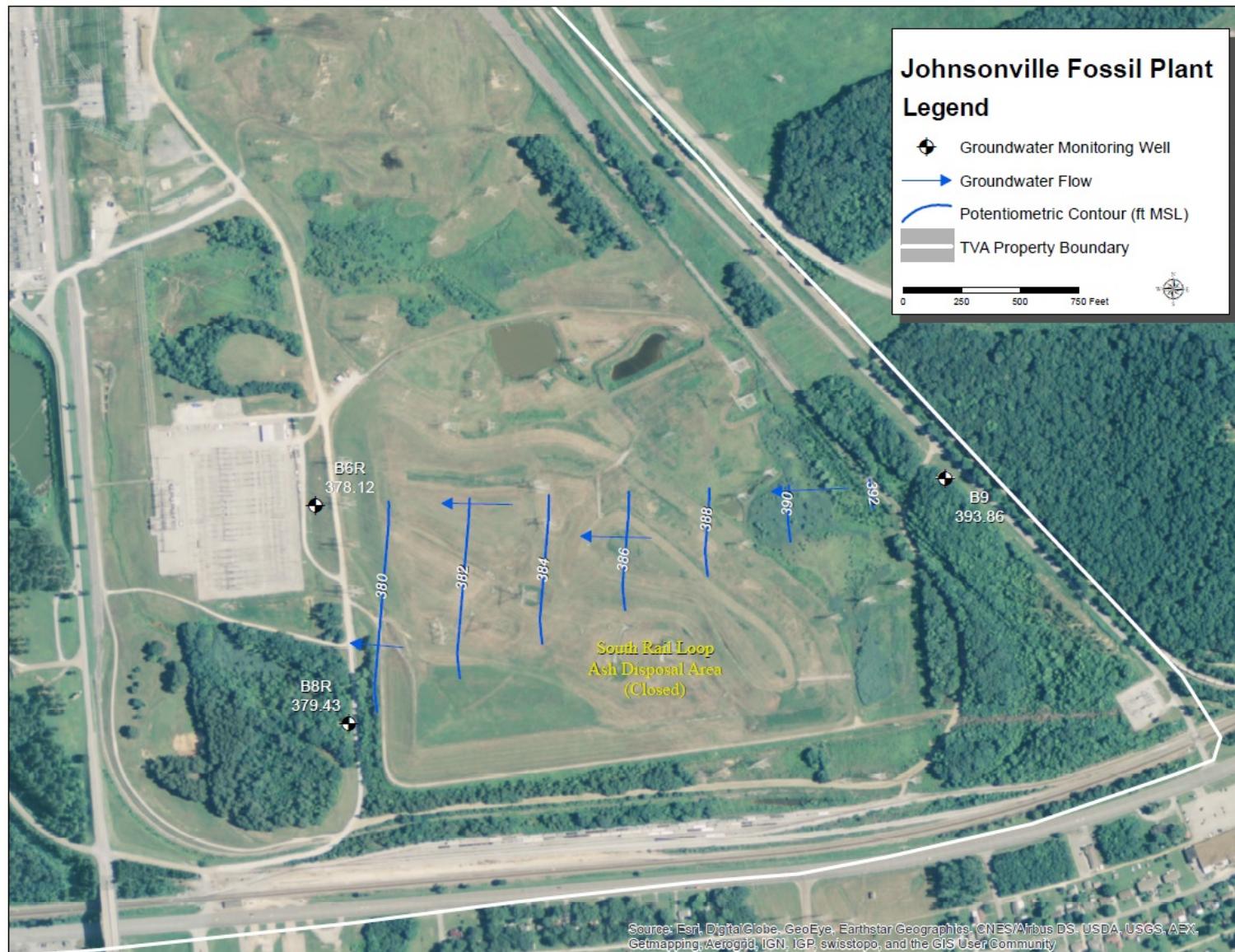


Figure 1. Groundwater Potentiometric Surface on September 22, 2015

Appendix A

Field Sampling Sheets

Preliminary Groundwater Data Field Worksheet

Sheet / of 1

| | | | | | | | | | | | | | |
|--|---------------------------------|--|------------------------------------|--------------------------------------|-----------------------------------|---|-----------------------------------|-------------------|-----------------|-----------------|-----------------|--------------|--|
| Project/Site JOHNSONVILLE | | | Well Number B6R | 84068 | Purge Date 15 | Year 09 | Month Day 23 | | | | | | |
| Depth to Water (m) 5.52 4195 | Bottom of Well (m) 6.42 4194 | Well Diameter (mm) 51 4188 | Survey Leader M. STARKS | | Field Crew J. EUBANKS | | | | | | | | |
| <input type="checkbox"/> Depth of Screen | | <input type="checkbox"/> Open Bore Hole | | Sample Label JOF-B6R-0915 | | <input checked="" type="checkbox"/> Unfiltered <input type="checkbox"/> Filtered <input type="checkbox"/> Both Filter Type and Size: | | | | | | | |
| [Bottom of Well - Depth to Water] x Volume Factor = | | (m) | To | (m) | Well Volume 1.82 (L) | Target Purge Volume 5.47 (L) | Actual Purge Volume 7.0 (L) | | | | | | |
| [(6.42)m - (5.52)m] x (2.027)L/m = | | | | | | | | | | | | | |
| Purge Pump: <input checked="" type="checkbox"/> Bladder <input type="checkbox"/> Centrifugal <input type="checkbox"/> Peristaltic <input type="checkbox"/> Dedicated | | | Other (list): | | | | | | | | | | |
| Sample Pump: <input checked="" type="checkbox"/> Bladder <input type="checkbox"/> Centrifugal <input type="checkbox"/> Peristaltic <input type="checkbox"/> 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 → | | 0740 | | 5.52 | 6.0 | 15.8 | 4.7 | 3.4 | 655 | 403 | 18.5 | | |
| PUMPED 1L | | 0745 | 0.2 | | | 17.9 | 4.9 | 2.0 | 662 | 393 | 54.5 | | |
| 1.5L | | 0750 | 0.3 | | | 18.1 | 5.1 | 1.8 | 662 | 391 | 32.8 | | |
| 1.5L | | 0755 | 0.3 | 5.56 | | 18.5 | 5.2 | 1.8 | 664 | 400 | 16.6 | | |
| 1.5L | | 0800 | 0.3 | | | 18.7 | 5.2 | 1.8 | 667 | 409 | 10.4 | | |
| 1.5L | | 0805 | 0.3 | 5.57 | | 18.9 | 5.2 | 1.8 | 664 | 415 | 4.7 | | |
| Remarks: <u>EQ BLANK BEFORE (SPLENDOR 0715)</u> | | | | | | | | | | | | | |
| Reviewed By: <u>Matt W. Seaton</u> | | Survey Leader | | Date 9-25-15 | | Becky Seaton | | Project Leader | | | | 9/28/15 | |
| Sample Collector: MWS | | Sample Readings | | | | | | | | | | Date 9/28/15 | |
| Sample Date Time | | 0805 | 0.3 | 6.0 | 18.9 | 5.2 | 1.8 | 664 | 415 | 4.7 | Turbidity (NTU) | | |
| Year | Month | Day | 4193 | 4192 | 10 | 400 | 300 | 94 | 90 | | EPA 180.1 | | |
| Pump Duration: 25 min | | ET CT | Analysis Time | Pump Rate (L/min) | Temp °C | pH (s.u.) | DO (mg/L) | COND (umhos/cm) | (+/-) ORP (mV) | Turbidity (NTU) | | | |
| Duration: 72004 | | | ET CT | EPA 170.1 | EPA 150.1 | EPA 360.1 | EPA 120.1 | SM 2580B | EPA 180.1 | EPA 180.1 | | | |
| Additional Sample Data | | | | | | | | | | | | | |
| Analyst: JLE | | | 10 | | 102 | 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 | | | | |
| 15 | 09 | 23 | Time: Initial: 1405 | Time: Initial: JLE | Time: Initial: JLE | Time: Initial: JLE | 76 | (3 in) | 4.560 | | | | |
| Turbidity 1350 | | <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly Turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Highly Turbid | Initial: JLE | Initial: JLE | Initial: JLE | Initial: JLE | 102 | (4 in) | 8.107 | | | | |
| Color: CLEAR | | Bottles Required | <input type="checkbox"/> BOD | <input type="checkbox"/> TOC | <input type="checkbox"/> Ferrous | <input type="checkbox"/> Mineral | <input type="checkbox"/> Phenol | Others (list): | | | | | |
| Odor: None | | | <input type="checkbox"/> COD | <input type="checkbox"/> TIC | <input type="checkbox"/> Metals | <input type="checkbox"/> Dis. Mineral | <input type="checkbox"/> Filt TIC | | | | | | |
| | | | | <input type="checkbox"/> Dis. Metals | <input type="checkbox"/> Nutrient | <input type="checkbox"/> TSS/TDS | | | | | | | |

Preliminary Groundwater Data Field Worksheet

Sheet 1 of 1

Project/Site JOHNSONVILLE Well Number B 000 Sheet 1 of 1
Purge 0 Year 15 Month 05 Day 01

| | | | | |
|----------------------------|----------------------------|--------------------------|----------------------------|--------------------------|
| Depth to Water (m) 3.80 | Bottom of Well (m) 5.13 | Well Diameter (mm) 51 | Survey Leader M. STARKS | Field Crew J. FURBLES |
|----------------------------|----------------------------|--------------------------|----------------------------|--------------------------|

| <input type="checkbox"/> Depth of Screen | <input type="checkbox"/> Open Bore Hole | <input type="checkbox"/> Cylinders | <input type="checkbox"/> Samples |
|--|---|------------------------------------|----------------------------------|
| (m) 4191 | To 4190 | (m) | Sample Label JOF-B8R-0915 |

| [Bottom of Well | - | Depth to Water] | x | Volume Factor | = | Well Volume | Target Purge Volume | Actual Purge Volume |
|-----------------|-------------------------------------|-----------------|--------------------------|---------------|--------------------------|-------------|--------------------------|---------------------|
| (5.13)m | - | (3.80)m] | x | (2,027)L/m | = | 2.69 (L) | 8.08 (L) | 12.0 (L) |
| Purge Pump: | <input checked="" type="checkbox"/> | Bladder | <input type="checkbox"/> | Centrifugal | <input type="checkbox"/> | Peristaltic | <input type="checkbox"/> | Pneumatic |

Remarks: Pump SETTING 23 psi - 7.0 / 7.0

Reviewed By: Mark W. Sturt 9-25-15
Survey Leader Date

Becky Seaton
Project Leader

| | | |
|--------------------------------|-------------|----------------|
| Sample Collector: JLE | | |
| Sample Date | | Time |
| Year 15 | Month 09 | Day 22 |
| | | 15/10 ET CT |
| Pump min Duration: 30 72004 | | |
| "999" = 2 days | | |

| Date | Project Leader | Date | | | | | |
|---------------------------|-------------------------|------|----------------------|----------------------------|------------------------------|------------------------------|---------------------------------|
| Sample Readings | | | | | | | |
| 15/10 | 0.4 | | 4.5 | 23.5 | 4.7 | 1.8 | 286 |
| | 4193 | | 4192 | 10 | 400 | 300 | 94 |
| 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: | | | 8 | | 132 | Well Diameter (mm) | Vol. Factor (L/m) | |
| Date Analyzed | | 415 | 431 | 436 | 437 | 12.7 (0.5 in) | 0.127 | |
| Year 15 | Month 09 | Day 22 | 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 | | <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly Turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Highly Turbid | Time: Initial: | Time: Initial: JLE | Time: Initial: JLE | Time: Initial: JLE | 76 (3 in) | 4.560 |
| | | | | | | 102 (4 in) | 8.107 | |
| | | | | | | 127 (5 in) | 12.668 | |
| | | | | | | 153 (6 in) | 18.228 | |
| Bottles Required <input type="checkbox"/> BOD <input type="checkbox"/> COD <input type="checkbox"/> TOC <input type="checkbox"/> TIC | | | | <input type="checkbox"/> Ferrous <input type="checkbox"/> Metals <input type="checkbox"/> Dis. Metals | <input type="checkbox"/> Mineral <input type="checkbox"/> Dis. Mineral <input type="checkbox"/> Nutrient | <input type="checkbox"/> Phenol <input type="checkbox"/> Filt TIC <input type="checkbox"/> TSS/TDS | Others (list): | |
| Color: CLEAR Odor: None | | | | | | | | |

Preliminary Groundwater Data Field Worksheet

Sheet 1 of 1

| | | | | | | | | | | |
|---|--|---|--------------------------------------|---------------------------------------|--|--|-----------------------------------|-------------------------------|-------------------|-----------------|
| Project/Site JOHNSONVILLE | | | | Well Number B9 | 84068 | Purge Date 15 | Year 09 | Month 22 | Day | |
| Depth to Water (m) 9.38 4195 | Bottom of Well (m) 15.24 4194 | Well Diameter (mm) 51 4188 | Survey Leader M. STARKS | | | Field Crew | | | | |
| <input type="checkbox"/> Depth of Screen | | <input type="checkbox"/> Open Bore Hole | | | | | | | | |
| (m) 4191 | To | (m) 4190 | Sample Label JOF-B9-0915 | | | <input checked="" type="checkbox"/> Unfiltered | <input type="checkbox"/> Filtered | <input type="checkbox"/> Both | | |
| [Bottom of Well - Depth to Water] | | x Volume Factor | = | Well Volume | | Target Purge Volume | | Actual Purge Volume | | |
| [(15.24)m - (9.38)m] x (2,027)L/m = | | | | 11.87 (L) | | 35.63 (L) | | 48.0 (L) | | |
| Purge Pump: <input type="checkbox"/> Bladder <input type="checkbox"/> Centrifugal <input type="checkbox"/> Peristaltic <input checked="" type="checkbox"/> Dedicated | | Other (list): | | | | | | | | |
| Sample Pump: <input type="checkbox"/> Bladder <input type="checkbox"/> Centrifugal <input type="checkbox"/> Peristaltic <input checked="" type="checkbox"/> 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 → | 0725 | | 9.38 | 9.38 | 13.7 | 5.1 | 8.0 | 63 | 364 | 0.0 |
| Pumped 6L | 0730 | 1.2 | | 11.0 | 15.0 | 5.9 | 7.2 | 67 | 318 | 6.0 |
| 6L | 0735 | 1.2 | | | 15.3 | 5.9 | 7.0 | 68 | 321 | 59.1 |
| 6L | 0740 | 1.2 | | | 15.3 | 5.9 | 6.9 | 67 | 330 | 50.6 |
| 6L | 0745 | 1.2 | 9.63 | | 15.4 | 5.9 | 6.8 | 65 | 331 | 17.5 |
| 6L | 0750 | 1.2 | | | 15.4 | 5.9 | 6.8 | 63 | 335 | 11.9 |
| 6L | 0755 | 1.2 | | | 15.4 | 5.8 | 6.7 | 62 | 342 | 9.7 |
| 6L | 0800 | 1.2 | | | 15.5 | 5.8 | 6.7 | 62 | 340 | 5.9 |
| 6L | 0805 | 1.2 | 9.65 | | 15.6 | 5.8 | 6.7 | 61 | 347 | 4.4 |
| Remarks: Pump installed at 12.82 m RAISED TO 11.0 m | | | | | | Collect Dup | | | | |
| Reviewed By: M. STARKS | Date 9-25-15 | | | Becky Seaton | | | Date 9/28/15 | | | |
| Survey Leader | Date | | | Project Leader | | | Date | | | |
| Sample Collector: MWS | Sample Readings | | | | | | | | | |
| Sample Date Time | 0805 1.0 | 4193 | 11.0 | 15.6 | 5.8 | 6.7 | 61 | 347 | 4.4 | |
| Year Month Day | 15 09 22 | ET CT | 4192 | 10 | 400 | 300 | 94 | 90 | | |
| Pump Duration: | 40 | min | Pump Depth (m) | Temp °C | pH (s.u.) | DO (mg/L) | COND (umhos/cm) | (+/-) ORP (mV) | Turbidity (NTU) | |
| | 72004 | | EPA 170.1 | EPA 150.1 | EPA 360.1 | EPA 120.1 | SM 2580B | EPA 180.1 | | |
| Additional Sample Data | | | | | | | | | | |
| Analyst: JLB | | 24 | 24 | | 437 | 60 | 60 | Well Diameter (mm) | Vol. Factor (L/m) | |
| Date Analyzed | 415 | 431 | 436 | | 437 | 12.7 | (0.5 in) | 0.127 | | |
| Year Month Day | 415 | 431 | 436 | | 437 | 51 | (2 in) | 2.027 | | |
| Turbidity 1350 | <input type="checkbox"/> Clear | 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) | 76 | (3 in) | 4.560 | | |
| | <input type="checkbox"/> Slightly Turbid | | | | | 102 | (4 in) | 8.107 | | |
| | <input type="checkbox"/> Turbid | | | | | 127 | (5 in) | 12.668 | | |
| | <input type="checkbox"/> Highly Turbid | | | | | 153 | (6 in) | 18.228 | | |
| Color: CLEAR | Bottles Required | <input type="checkbox"/> Ferrous | <input type="checkbox"/> Mineral | <input type="checkbox"/> Phenol | Others (list): | | | | | |
| Odor: None | <input type="checkbox"/> BOD | <input type="checkbox"/> TOC | <input type="checkbox"/> Metals | <input type="checkbox"/> Dis. Mineral | <input type="checkbox"/> Filt TIC | | | | | |
| | <input type="checkbox"/> COD | <input type="checkbox"/> TIC | <input type="checkbox"/> Dis. Metals | <input type="checkbox"/> Nutrient | <input type="checkbox"/> TSS/TDS | | | | | |

Appendix B

Laboratory Analytical Report

with Chain-of-Custody

Documentation

October 05, 2015

TVA-Environmental Affairs

Sample Delivery Group: L790477
Samples Received: 09/24/2015
Project Number: JOF-B8R
Description: JOF GW WELL

Report To: Ronda Hooper
400 W. Summit Hill Mailstop TVA WT 9D-K
Knoxville, TN 37902

Entire Report Reviewed By:



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.



| | | |
|---|-----------|-----------------|
| ¹ Cp: Cover Page | 1 | ¹ Cp |
| ² Tc: Table of Contents | 2 | ² Tc |
| ³ Ss: Sample Summary | 3 | ³ Ss |
| ⁴ Cn: Case Narrative | 5 | ⁴ Cn |
| ⁵ Sr: Sample Results | 6 | ⁵ Sr |
| JOF-B6R-0915 L790477-01 | 6 | |
| JOF-B8R-0915 L790477-02 | 7 | |
| JOF-B9-0915 DUP L790477-03 | 8 | |
| JOF-B9-0915 L790477-04 | 9 | |
| JOF-B10-0915 L790477-05 | 10 | |
| JOF-B11-0915 L790477-06 | 11 | |
| JOF-B12-0915 L790477-07 | 12 | |
| JOF-B13-0915 L790477-08 | 13 | |
| JOF-DRFEQ-0915 L790477-09 | 14 | |
| JOF-SRLEQ-0915 L790477-10 | 15 | |
| JOF-B12-0915-DUP L790477-11 | 16 | |
| ⁶ Qc: Quality Control Summary | 17 | ⁶ Qc |
| Gravimetric Analysis by Method 2540 D-2011 | 17 | |
| Wet Chemistry by Method 9056MOD | 20 | |
| Mercury by Method 7470A | 22 | |
| Metals (ICPMS) by Method 6020 | 23 | |
| ⁷ Gl: Glossary of Terms | 25 | ⁷ Gl |
| ⁸ Al: Accreditations & Locations | 26 | ⁸ Al |
| ⁹ Sc: Chain of Custody | 27 | ⁹ Sc |

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

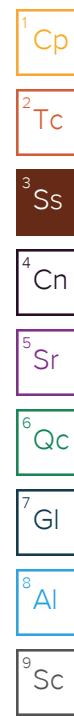


| | | | Collected by Monte W. Starks | Collected date/time 09/23/15 08:05 | Received date/time 09/24/15 09:00 |
|--|----------|----------|---------------------------------|---------------------------------------|--------------------------------------|
| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analysis Analyst |
| Gravimetric Analysis by Method 2540 D-2011 | WG817922 | 1 | 09/28/15 10:10 | 09/30/15 01:26 | MF |
| Mercury by Method 7470A | WG817535 | 1 | 09/25/15 09:00 | 09/25/15 17:30 | TRB |
| Metals (ICPMS) by Method 6020 | WG818559 | 1 | 09/30/15 19:23 | 10/02/15 11:05 | LAT |
| Wet Chemistry by Method 9056MOD | WG818435 | 1 | 10/01/15 21:46 | 10/01/15 21:46 | NJM |
| JOF-B8R-0915 L790477-02 GW | | | Collected by Monte W. Starks | Collected date/time 09/22/15 15:10 | Received date/time 09/24/15 09:00 |
| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analysis Analyst |
| Gravimetric Analysis by Method 2540 D-2011 | WG817633 | 1 | 09/25/15 16:43 | 09/26/15 17:29 | MF |
| Mercury by Method 7470A | WG817535 | 1 | 09/25/15 09:00 | 09/25/15 17:32 | TRB |
| Metals (ICPMS) by Method 6020 | WG818559 | 1 | 09/30/15 19:23 | 10/02/15 11:15 | LAT |
| Wet Chemistry by Method 9056MOD | WG818435 | 1 | 10/01/15 22:00 | 10/01/15 22:00 | NJM |
| JOF-B9-0915 DUP L790477-03 GW | | | Collected by Monte W. Starks | Collected date/time 09/22/15 08:05 | Received date/time 09/24/15 09:00 |
| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analysis Analyst |
| Gravimetric Analysis by Method 2540 D-2011 | WG817633 | 1 | 09/25/15 16:43 | 09/26/15 17:37 | MF |
| Mercury by Method 7470A | WG817535 | 1 | 09/25/15 09:00 | 09/25/15 17:34 | TRB |
| Metals (ICPMS) by Method 6020 | WG818559 | 1 | 09/30/15 19:23 | 10/02/15 11:17 | LAT |
| Wet Chemistry by Method 9056MOD | WG818435 | 1 | 10/01/15 22:14 | 10/01/15 22:14 | NJM |
| JOF-B9-0915 L790477-04 GW | | | Collected by Monte W. Starks | Collected date/time 09/22/15 08:05 | Received date/time 09/24/15 09:00 |
| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analysis Analyst |
| Gravimetric Analysis by Method 2540 D-2011 | WG817633 | 1 | 09/25/15 16:43 | 09/26/15 17:36 | MF |
| Mercury by Method 7470A | WG817535 | 1 | 09/25/15 09:00 | 09/25/15 17:41 | TRB |
| Metals (ICPMS) by Method 6020 | WG818559 | 1 | 09/30/15 19:23 | 10/02/15 11:20 | LAT |
| Wet Chemistry by Method 9056MOD | WG818435 | 1 | 10/01/15 22:28 | 10/01/15 22:28 | NJM |
| JOF-B10-0915 L790477-05 GW | | | Collected by Monte W. Starks | Collected date/time 09/22/15 10:10 | Received date/time 09/24/15 09:00 |
| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analysis Analyst |
| Gravimetric Analysis by Method 2540 D-2011 | WG817633 | 1 | 09/25/15 16:43 | 09/26/15 17:31 | MF |
| Mercury by Method 7470A | WG817535 | 1 | 09/25/15 09:00 | 09/25/15 17:43 | TRB |
| Metals (ICPMS) by Method 6020 | WG818559 | 1 | 09/30/15 19:23 | 10/02/15 11:31 | LAT |
| Wet Chemistry by Method 9056MOD | WG818435 | 1 | 10/01/15 23:10 | 10/01/15 23:10 | NJM |
| JOF-B11-0915 L790477-06 GW | | | Collected by Monte W. Starks | Collected date/time 09/22/15 14:05 | Received date/time 09/24/15 09:00 |
| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analysis Analyst |
| Gravimetric Analysis by Method 2540 D-2011 | WG817633 | 1 | 09/25/15 16:43 | 09/26/15 17:36 | MF |
| Mercury by Method 7470A | WG817535 | 1 | 09/25/15 09:00 | 09/25/15 17:45 | TRB |
| Metals (ICPMS) by Method 6020 | WG818559 | 1 | 09/30/15 19:23 | 10/02/15 11:33 | LAT |
| Wet Chemistry by Method 9056MOD | WG818435 | 1 | 10/01/15 23:24 | 10/01/15 23:24 | NJM |





| JOF-B12-0915 L790477-07 GW | | Collected by Monte W. Starks | Collected date/time 09/22/15 13:15 | Received date/time 09/24/15 09:00 | |
|--|----------|---------------------------------|---------------------------------------|--------------------------------------|------------------|
| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analysis Analyst |
| Gravimetric Analysis by Method 2540 D-2011 | WG817633 | 1 | 09/25/15 16:43 | 09/26/15 17:35 | MF |
| Mercury by Method 7470A | WG817535 | 1 | 09/25/15 09:00 | 09/25/15 17:47 | TRB |
| Metals (ICPMS) by Method 6020 | WG818559 | 1 | 09/30/15 19:23 | 10/02/15 11:35 | LAT |
| Wet Chemistry by Method 9056MOD | WG818435 | 1 | 10/01/15 23:51 | 10/01/15 23:51 | NJM |
| JOF-B13-0915 L790477-08 GW | | Collected by Monte W. Starks | Collected date/time 09/22/15 12:10 | Received date/time 09/24/15 09:00 | |
| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analysis Analyst |
| Gravimetric Analysis by Method 2540 D-2011 | WG817633 | 1 | 09/25/15 16:43 | 09/26/15 17:32 | MF |
| Mercury by Method 7470A | WG817535 | 1 | 09/25/15 09:00 | 09/25/15 17:50 | TRB |
| Metals (ICPMS) by Method 6020 | WG818559 | 1 | 09/30/15 19:23 | 10/02/15 11:38 | LAT |
| Wet Chemistry by Method 9056MOD | WG818435 | 1 | 10/02/15 00:33 | 10/02/15 00:33 | NJM |
| JOF-DRFEQ-0915 L790477-09 GW | | Collected by Monte W. Starks | Collected date/time 09/22/15 12:35 | Received date/time 09/24/15 09:00 | |
| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analysis Analyst |
| Gravimetric Analysis by Method 2540 D-2011 | WG817633 | 1 | 09/25/15 16:43 | 09/26/15 17:26 | MF |
| Mercury by Method 7470A | WG817535 | 1 | 09/25/15 09:00 | 09/25/15 17:52 | TRB |
| Metals (ICPMS) by Method 6020 | WG818559 | 1 | 09/30/15 19:23 | 10/02/15 11:40 | LAT |
| Wet Chemistry by Method 9056MOD | WG818435 | 1 | 10/02/15 00:47 | 10/02/15 00:47 | NJM |
| JOF-SRLEQ-0915 L790477-10 GW | | Collected by Monte W. Starks | Collected date/time 09/23/15 07:15 | Received date/time 09/24/15 09:00 | |
| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analysis Analyst |
| Gravimetric Analysis by Method 2540 D-2011 | WG817922 | 1 | 09/28/15 10:10 | 09/30/15 01:24 | MF |
| Mercury by Method 7470A | WG817535 | 1 | 09/25/15 09:00 | 09/25/15 17:54 | TRB |
| Metals (ICPMS) by Method 6020 | WG818559 | 1 | 09/30/15 19:23 | 10/02/15 11:43 | LAT |
| Wet Chemistry by Method 9056MOD | WG818435 | 1 | 10/02/15 01:01 | 10/02/15 01:01 | NJM |
| JOF-B12-0915-DUP L790477-11 GW | | Collected by Monte W. Starks | Collected date/time 09/22/15 13:15 | Received date/time 09/24/15 09:00 | |
| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analysis Analyst |
| Gravimetric Analysis by Method 2540 D-2011 | WG817444 | 1 | 09/25/15 10:19 | 09/28/15 00:40 | MF |
| Mercury by Method 7470A | WG817535 | 1 | 09/25/15 09:00 | 09/25/15 17:56 | TRB |
| Metals (ICPMS) by Method 6020 | WG818559 | 1 | 09/30/15 19:23 | 10/02/15 11:45 | LAT |
| Wet Chemistry by Method 9056MOD | WG818435 | 1 | 10/02/15 01:15 | 10/02/15 01:15 | NJM |





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 RDL (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 data.

Pam Langford
Technical Service Representative

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Sr
- ⁶ Qc
- ⁷ GI
- ⁸ AI
- ⁹ Sc



Gravimetric Analysis by Method 2540 D-2011

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|------------------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Suspended Solids | ND | | 2.50 | 1 | 09/30/2015 01:26 | WG817922 |

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Wet Chemistry by Method 9056MOD

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Fluoride | ND | | 0.100 | 1 | 10/01/2015 21:46 | WG818435 |

Mercury by Method 7470A

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|---------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Mercury | ND | | 0.000200 | 1 | 09/25/2015 17:30 | WG817535 |

⁵ Sr⁶ Qc⁷ Gl

Metals (ICPMS) by Method 6020

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|-----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Antimony | ND | | 0.00200 | 1 | 10/02/2015 11:05 | WG818559 |
| Arsenic | ND | | 0.00200 | 1 | 10/02/2015 11:05 | WG818559 |
| Barium | 0.0174 | | 0.00500 | 1 | 10/02/2015 11:05 | WG818559 |
| Beryllium | ND | | 0.00200 | 1 | 10/02/2015 11:05 | WG818559 |
| Cadmium | ND | | 0.00100 | 1 | 10/02/2015 11:05 | WG818559 |
| Chromium | ND | | 0.00200 | 1 | 10/02/2015 11:05 | WG818559 |
| Copper | ND | | 0.00500 | 1 | 10/02/2015 11:05 | WG818559 |
| Cobalt | ND | | 0.00200 | 1 | 10/02/2015 11:05 | WG818559 |
| Lead | ND | | 0.00200 | 1 | 10/02/2015 11:05 | WG818559 |
| Nickel | 0.00940 | | 0.00200 | 1 | 10/02/2015 11:05 | WG818559 |
| Selenium | ND | | 0.00200 | 1 | 10/02/2015 11:05 | WG818559 |
| Silver | ND | | 0.00200 | 1 | 10/02/2015 11:05 | WG818559 |
| Thallium | ND | | 0.00200 | 1 | 10/02/2015 11:05 | WG818559 |
| Vanadium | ND | | 0.00500 | 1 | 10/02/2015 11:05 | WG818559 |
| Zinc | ND | | 0.0250 | 1 | 10/02/2015 11:05 | WG818559 |



Gravimetric Analysis by Method 2540 D-2011

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|------------------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Suspended Solids | ND | | 2.50 | 1 | 09/26/2015 17:29 | WG817633 |

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Wet Chemistry by Method 9056MOD

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Fluoride | ND | | 0.100 | 1 | 10/01/2015 22:00 | WG818435 |

Mercury by Method 7470A

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|---------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Mercury | ND | | 0.000200 | 1 | 09/25/2015 17:32 | WG817535 |

Metals (ICPMS) by Method 6020

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|-----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Antimony | ND | | 0.00200 | 1 | 10/02/2015 11:15 | WG818559 |
| Arsenic | ND | | 0.00200 | 1 | 10/02/2015 11:15 | WG818559 |
| Barium | 0.0301 | | 0.00500 | 1 | 10/02/2015 11:15 | WG818559 |
| Beryllium | ND | | 0.00200 | 1 | 10/02/2015 11:15 | WG818559 |
| Cadmium | ND | | 0.00100 | 1 | 10/02/2015 11:15 | WG818559 |
| Chromium | ND | | 0.00200 | 1 | 10/02/2015 11:15 | WG818559 |
| Copper | ND | | 0.00500 | 1 | 10/02/2015 11:15 | WG818559 |
| Cobalt | ND | | 0.00200 | 1 | 10/02/2015 11:15 | WG818559 |
| Lead | ND | | 0.00200 | 1 | 10/02/2015 11:15 | WG818559 |
| Nickel | 0.00999 | | 0.00200 | 1 | 10/02/2015 11:15 | WG818559 |
| Selenium | ND | | 0.00200 | 1 | 10/02/2015 11:15 | WG818559 |
| Silver | ND | | 0.00200 | 1 | 10/02/2015 11:15 | WG818559 |
| Thallium | ND | | 0.00200 | 1 | 10/02/2015 11:15 | WG818559 |
| Vanadium | ND | | 0.00500 | 1 | 10/02/2015 11:15 | WG818559 |
| Zinc | ND | | 0.0250 | 1 | 10/02/2015 11:15 | WG818559 |



Gravimetric Analysis by Method 2540 D-2011

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|------------------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Suspended Solids | ND | | 2.50 | 1 | 09/26/2015 17:37 | WG817633 |

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Wet Chemistry by Method 9056MOD

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Fluoride | ND | | 0.100 | 1 | 10/01/2015 22:14 | WG818435 |

Mercury by Method 7470A

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|---------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Mercury | ND | | 0.000200 | 1 | 09/25/2015 17:34 | WG817535 |

Metals (ICPMS) by Method 6020

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|-----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Antimony | ND | | 0.00200 | 1 | 10/02/2015 11:17 | WG818559 |
| Arsenic | ND | | 0.00200 | 1 | 10/02/2015 11:17 | WG818559 |
| Barium | 0.00574 | | 0.00500 | 1 | 10/02/2015 11:17 | WG818559 |
| Beryllium | ND | | 0.00200 | 1 | 10/02/2015 11:17 | WG818559 |
| Cadmium | ND | | 0.00100 | 1 | 10/02/2015 11:17 | WG818559 |
| Chromium | ND | | 0.00200 | 1 | 10/02/2015 11:17 | WG818559 |
| Copper | ND | | 0.00500 | 1 | 10/02/2015 11:17 | WG818559 |
| Cobalt | ND | | 0.00200 | 1 | 10/02/2015 11:17 | WG818559 |
| Lead | ND | | 0.00200 | 1 | 10/02/2015 11:17 | WG818559 |
| Nickel | ND | | 0.00200 | 1 | 10/02/2015 11:17 | WG818559 |
| Selenium | ND | | 0.00200 | 1 | 10/02/2015 11:17 | WG818559 |
| Silver | ND | | 0.00200 | 1 | 10/02/2015 11:17 | WG818559 |
| Thallium | ND | | 0.00200 | 1 | 10/02/2015 11:17 | WG818559 |
| Vanadium | ND | | 0.00500 | 1 | 10/02/2015 11:17 | WG818559 |
| Zinc | ND | | 0.0250 | 1 | 10/02/2015 11:17 | WG818559 |



Gravimetric Analysis by Method 2540 D-2011

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|------------------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Suspended Solids | ND | | 2.50 | 1 | 09/26/2015 17:36 | WG817633 |

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Wet Chemistry by Method 9056MOD

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Fluoride | ND | | 0.100 | 1 | 10/01/2015 22:28 | WG818435 |

Mercury by Method 7470A

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|---------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Mercury | ND | | 0.000200 | 1 | 09/25/2015 17:41 | WG817535 |

⁵ Sr⁶ Qc⁷ Gl⁸ Al

Metals (ICPMS) by Method 6020

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|-----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Antimony | ND | | 0.00200 | 1 | 10/02/2015 11:20 | WG818559 |
| Arsenic | ND | | 0.00200 | 1 | 10/02/2015 11:20 | WG818559 |
| Barium | 0.00650 | | 0.00500 | 1 | 10/02/2015 11:20 | WG818559 |
| Beryllium | ND | | 0.00200 | 1 | 10/02/2015 11:20 | WG818559 |
| Cadmium | ND | | 0.00100 | 1 | 10/02/2015 11:20 | WG818559 |
| Chromium | ND | | 0.00200 | 1 | 10/02/2015 11:20 | WG818559 |
| Copper | ND | | 0.00500 | 1 | 10/02/2015 11:20 | WG818559 |
| Cobalt | ND | | 0.00200 | 1 | 10/02/2015 11:20 | WG818559 |
| Lead | ND | | 0.00200 | 1 | 10/02/2015 11:20 | WG818559 |
| Nickel | ND | | 0.00200 | 1 | 10/02/2015 11:20 | WG818559 |
| Selenium | ND | | 0.00200 | 1 | 10/02/2015 11:20 | WG818559 |
| Silver | ND | | 0.00200 | 1 | 10/02/2015 11:20 | WG818559 |
| Thallium | ND | | 0.00200 | 1 | 10/02/2015 11:20 | WG818559 |
| Vanadium | ND | | 0.00500 | 1 | 10/02/2015 11:20 | WG818559 |
| Zinc | ND | | 0.0250 | 1 | 10/02/2015 11:20 | WG818559 |



Gravimetric Analysis by Method 2540 D-2011

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|------------------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Suspended Solids | ND | | 2.50 | 1 | 09/26/2015 17:31 | WG817633 |

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Wet Chemistry by Method 9056MOD

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Fluoride | ND | | 0.100 | 1 | 10/01/2015 23:10 | WG818435 |

Mercury by Method 7470A

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|---------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Mercury | ND | | 0.000200 | 1 | 09/25/2015 17:43 | WG817535 |

⁵ Sr⁶ Qc⁷ Gl

Metals (ICPMS) by Method 6020

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|-----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Antimony | ND | | 0.00200 | 1 | 10/02/2015 11:31 | WG818559 |
| Arsenic | ND | | 0.00200 | 1 | 10/02/2015 11:31 | WG818559 |
| Barium | 0.0206 | | 0.00500 | 1 | 10/02/2015 11:31 | WG818559 |
| Beryllium | ND | | 0.00200 | 1 | 10/02/2015 11:31 | WG818559 |
| Cadmium | ND | | 0.00100 | 1 | 10/02/2015 11:31 | WG818559 |
| Chromium | 0.00247 | | 0.00200 | 1 | 10/02/2015 11:31 | WG818559 |
| Copper | ND | | 0.00500 | 1 | 10/02/2015 11:31 | WG818559 |
| Cobalt | ND | | 0.00200 | 1 | 10/02/2015 11:31 | WG818559 |
| Lead | ND | | 0.00200 | 1 | 10/02/2015 11:31 | WG818559 |
| Nickel | 0.00493 | | 0.00200 | 1 | 10/02/2015 11:31 | WG818559 |
| Selenium | ND | | 0.00200 | 1 | 10/02/2015 11:31 | WG818559 |
| Silver | ND | | 0.00200 | 1 | 10/02/2015 11:31 | WG818559 |
| Thallium | ND | | 0.00200 | 1 | 10/02/2015 11:31 | WG818559 |
| Vanadium | ND | | 0.00500 | 1 | 10/02/2015 11:31 | WG818559 |
| Zinc | ND | | 0.0250 | 1 | 10/02/2015 11:31 | WG818559 |



Gravimetric Analysis by Method 2540 D-2011

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|------------------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Suspended Solids | ND | | 2.50 | 1 | 09/26/2015 17:36 | WG817633 |

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Wet Chemistry by Method 9056MOD

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Fluoride | ND | | 0.100 | 1 | 10/01/2015 23:24 | WG818435 |

Mercury by Method 7470A

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|---------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Mercury | ND | | 0.000200 | 1 | 09/25/2015 17:45 | WG817535 |

⁵ Sr⁶ Qc⁷ Gl

Metals (ICPMS) by Method 6020

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|-----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Antimony | ND | | 0.00200 | 1 | 10/02/2015 11:33 | WG818559 |
| Arsenic | ND | | 0.00200 | 1 | 10/02/2015 11:33 | WG818559 |
| Barium | 0.244 | | 0.00500 | 1 | 10/02/2015 11:33 | WG818559 |
| Beryllium | ND | | 0.00200 | 1 | 10/02/2015 11:33 | WG818559 |
| Cadmium | ND | | 0.00100 | 1 | 10/02/2015 11:33 | WG818559 |
| Chromium | ND | | 0.00200 | 1 | 10/02/2015 11:33 | WG818559 |
| Copper | ND | | 0.00500 | 1 | 10/02/2015 11:33 | WG818559 |
| Cobalt | ND | | 0.00200 | 1 | 10/02/2015 11:33 | WG818559 |
| Lead | ND | | 0.00200 | 1 | 10/02/2015 11:33 | WG818559 |
| Nickel | 0.00622 | | 0.00200 | 1 | 10/02/2015 11:33 | WG818559 |
| Selenium | ND | | 0.00200 | 1 | 10/02/2015 11:33 | WG818559 |
| Silver | ND | | 0.00200 | 1 | 10/02/2015 11:33 | WG818559 |
| Thallium | ND | | 0.00200 | 1 | 10/02/2015 11:33 | WG818559 |
| Vanadium | ND | | 0.00500 | 1 | 10/02/2015 11:33 | WG818559 |
| Zinc | ND | | 0.0250 | 1 | 10/02/2015 11:33 | WG818559 |



Gravimetric Analysis by Method 2540 D-2011

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|------------------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Suspended Solids | ND | | 2.50 | 1 | 09/26/2015 17:35 | WG817633 |

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Wet Chemistry by Method 9056MOD

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Fluoride | ND | | 0.100 | 1 | 10/01/2015 23:51 | WG818435 |

Mercury by Method 7470A

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|---------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Mercury | ND | | 0.000200 | 1 | 09/25/2015 17:47 | WG817535 |

⁵ Sr⁶ Qc⁷ Gl

Metals (ICPMS) by Method 6020

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|-----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Antimony | ND | | 0.00200 | 1 | 10/02/2015 11:35 | WG818559 |
| Arsenic | ND | | 0.00200 | 1 | 10/02/2015 11:35 | WG818559 |
| Barium | 0.502 | | 0.00500 | 1 | 10/02/2015 11:35 | WG818559 |
| Beryllium | ND | | 0.00200 | 1 | 10/02/2015 11:35 | WG818559 |
| Cadmium | ND | | 0.00100 | 1 | 10/02/2015 11:35 | WG818559 |
| Chromium | ND | | 0.00200 | 1 | 10/02/2015 11:35 | WG818559 |
| Copper | ND | | 0.00500 | 1 | 10/02/2015 11:35 | WG818559 |
| Cobalt | ND | | 0.00200 | 1 | 10/02/2015 11:35 | WG818559 |
| Lead | ND | | 0.00200 | 1 | 10/02/2015 11:35 | WG818559 |
| Nickel | 0.0175 | | 0.00200 | 1 | 10/02/2015 11:35 | WG818559 |
| Selenium | ND | | 0.00200 | 1 | 10/02/2015 11:35 | WG818559 |
| Silver | ND | | 0.00200 | 1 | 10/02/2015 11:35 | WG818559 |
| Thallium | ND | | 0.00200 | 1 | 10/02/2015 11:35 | WG818559 |
| Vanadium | ND | | 0.00500 | 1 | 10/02/2015 11:35 | WG818559 |
| Zinc | 0.0259 | | 0.0250 | 1 | 10/02/2015 11:35 | WG818559 |



Gravimetric Analysis by Method 2540 D-2011

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|------------------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Suspended Solids | 3.00 | | 2.50 | 1 | 09/26/2015 17:32 | WG817633 |

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Wet Chemistry by Method 9056MOD

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Fluoride | ND | | 0.100 | 1 | 10/02/2015 00:33 | WG818435 |

Mercury by Method 7470A

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|---------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Mercury | 0.000301 | | 0.000200 | 1 | 09/25/2015 17:50 | WG817535 |

⁵ Sr⁶ Qc⁷ Gl

Metals (ICPMS) by Method 6020

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|-----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Antimony | ND | | 0.00200 | 1 | 10/02/2015 11:38 | WG818559 |
| Arsenic | ND | | 0.00200 | 1 | 10/02/2015 11:38 | WG818559 |
| Barium | 0.826 | | 0.00500 | 1 | 10/02/2015 11:38 | WG818559 |
| Beryllium | ND | | 0.00200 | 1 | 10/02/2015 11:38 | WG818559 |
| Cadmium | 0.00205 | | 0.00100 | 1 | 10/02/2015 11:38 | WG818559 |
| Chromium | 0.00558 | | 0.00200 | 1 | 10/02/2015 11:38 | WG818559 |
| Copper | ND | | 0.00500 | 1 | 10/02/2015 11:38 | WG818559 |
| Cobalt | 0.00311 | | 0.00200 | 1 | 10/02/2015 11:38 | WG818559 |
| Lead | ND | | 0.00200 | 1 | 10/02/2015 11:38 | WG818559 |
| Nickel | 0.0192 | | 0.00200 | 1 | 10/02/2015 11:38 | WG818559 |
| Selenium | ND | | 0.00200 | 1 | 10/02/2015 11:38 | WG818559 |
| Silver | ND | | 0.00200 | 1 | 10/02/2015 11:38 | WG818559 |
| Thallium | ND | | 0.00200 | 1 | 10/02/2015 11:38 | WG818559 |
| Vanadium | ND | | 0.00500 | 1 | 10/02/2015 11:38 | WG818559 |
| Zinc | 0.0306 | | 0.0250 | 1 | 10/02/2015 11:38 | WG818559 |



Gravimetric Analysis by Method 2540 D-2011

| Analyte | Result | <u>Qualifier</u> | RDL | Dilution | Analysis date / time | Batch |
|------------------|--------|------------------|------|----------|----------------------|--------------------------|
| Suspended Solids | ND | | 2.50 | 1 | 09/26/2015 17:26 | WG817633 |

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Wet Chemistry by Method 9056MOD

| Analyte | Result | <u>Qualifier</u> | RDL | Dilution | Analysis date / time | Batch |
|----------|--------|------------------|-------|----------|----------------------|--------------------------|
| Fluoride | ND | | 0.100 | 1 | 10/02/2015 00:47 | WG818435 |

Mercury by Method 7470A

| Analyte | Result | <u>Qualifier</u> | RDL | Dilution | Analysis date / time | Batch |
|---------|--------|------------------|----------|----------|----------------------|--------------------------|
| Mercury | ND | | 0.000200 | 1 | 09/25/2015 17:52 | WG817535 |

Metals (ICPMS) by Method 6020

| Analyte | Result | <u>Qualifier</u> | RDL | Dilution | Analysis date / time | Batch |
|-----------|--------|------------------|---------|----------|----------------------|--------------------------|
| Antimony | ND | | 0.00200 | 1 | 10/02/2015 11:40 | WG818559 |
| Arsenic | ND | | 0.00200 | 1 | 10/02/2015 11:40 | WG818559 |
| Barium | ND | | 0.00500 | 1 | 10/02/2015 11:40 | WG818559 |
| Beryllium | ND | | 0.00200 | 1 | 10/02/2015 11:40 | WG818559 |
| Cadmium | ND | | 0.00100 | 1 | 10/02/2015 11:40 | WG818559 |
| Chromium | ND | | 0.00200 | 1 | 10/02/2015 11:40 | WG818559 |
| Copper | ND | | 0.00500 | 1 | 10/02/2015 11:40 | WG818559 |
| Cobalt | ND | | 0.00200 | 1 | 10/02/2015 11:40 | WG818559 |
| Lead | ND | | 0.00200 | 1 | 10/02/2015 11:40 | WG818559 |
| Nickel | ND | | 0.00200 | 1 | 10/02/2015 11:40 | WG818559 |
| Selenium | ND | | 0.00200 | 1 | 10/02/2015 11:40 | WG818559 |
| Silver | ND | | 0.00200 | 1 | 10/02/2015 11:40 | WG818559 |
| Thallium | ND | | 0.00200 | 1 | 10/02/2015 11:40 | WG818559 |
| Vanadium | ND | | 0.00500 | 1 | 10/02/2015 11:40 | WG818559 |
| Zinc | ND | | 0.0250 | 1 | 10/02/2015 11:40 | WG818559 |



Gravimetric Analysis by Method 2540 D-2011

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|------------------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Suspended Solids | ND | | 2.50 | 1 | 09/30/2015 01:24 | WG817922 |

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Wet Chemistry by Method 9056MOD

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Fluoride | ND | | 0.100 | 1 | 10/02/2015 01:01 | WG818435 |

Mercury by Method 7470A

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|---------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Mercury | ND | | 0.000200 | 1 | 09/25/2015 17:54 | WG817535 |

⁵ Sr⁶ Qc⁷ Gl⁸ Al

Metals (ICPMS) by Method 6020

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|-----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Antimony | ND | | 0.00200 | 1 | 10/02/2015 11:43 | WG818559 |
| Arsenic | ND | | 0.00200 | 1 | 10/02/2015 11:43 | WG818559 |
| Barium | ND | | 0.00500 | 1 | 10/02/2015 11:43 | WG818559 |
| Beryllium | ND | | 0.00200 | 1 | 10/02/2015 11:43 | WG818559 |
| Cadmium | ND | | 0.00100 | 1 | 10/02/2015 11:43 | WG818559 |
| Chromium | ND | | 0.00200 | 1 | 10/02/2015 11:43 | WG818559 |
| Copper | ND | | 0.00500 | 1 | 10/02/2015 11:43 | WG818559 |
| Cobalt | ND | | 0.00200 | 1 | 10/02/2015 11:43 | WG818559 |
| Lead | ND | | 0.00200 | 1 | 10/02/2015 11:43 | WG818559 |
| Nickel | ND | | 0.00200 | 1 | 10/02/2015 11:43 | WG818559 |
| Selenium | ND | | 0.00200 | 1 | 10/02/2015 11:43 | WG818559 |
| Silver | ND | | 0.00200 | 1 | 10/02/2015 11:43 | WG818559 |
| Thallium | ND | | 0.00200 | 1 | 10/02/2015 11:43 | WG818559 |
| Vanadium | ND | | 0.00500 | 1 | 10/02/2015 11:43 | WG818559 |
| Zinc | ND | | 0.0250 | 1 | 10/02/2015 11:43 | WG818559 |



Gravimetric Analysis by Method 2540 D-2011

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|------------------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Suspended Solids | ND | | 2.50 | 1 | 09/28/2015 00:40 | WG817444 |

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Wet Chemistry by Method 9056MOD

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Fluoride | ND | | 0.100 | 1 | 10/02/2015 01:15 | WG818435 |

Mercury by Method 7470A

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|---------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Mercury | ND | | 0.000200 | 1 | 09/25/2015 17:56 | WG817535 |

⁵ Sr⁶ Qc⁷ Gl

Metals (ICPMS) by Method 6020

| Analyte | Result mg/l | <u>Qualifier</u> | RDL mg/l | Dilution | Analysis date / time | Batch |
|-----------|----------------|------------------|-------------|----------|-------------------------|--------------------------|
| Antimony | ND | | 0.00200 | 1 | 10/02/2015 11:45 | WG818559 |
| Arsenic | ND | | 0.00200 | 1 | 10/02/2015 11:45 | WG818559 |
| Barium | 0.492 | | 0.00500 | 1 | 10/02/2015 11:45 | WG818559 |
| Beryllium | ND | | 0.00200 | 1 | 10/02/2015 11:45 | WG818559 |
| Cadmium | ND | | 0.00100 | 1 | 10/02/2015 11:45 | WG818559 |
| Chromium | ND | | 0.00200 | 1 | 10/02/2015 11:45 | WG818559 |
| Lead | ND | | 0.00200 | 1 | 10/02/2015 11:45 | WG818559 |
| Nickel | 0.0171 | | 0.00200 | 1 | 10/02/2015 11:45 | WG818559 |
| Selenium | ND | | 0.00200 | 1 | 10/02/2015 11:45 | WG818559 |
| Silver | ND | | 0.00200 | 1 | 10/02/2015 11:45 | WG818559 |
| Thallium | ND | | 0.00200 | 1 | 10/02/2015 11:45 | WG818559 |

⁸ Al⁹ Sc



L790477-11

Method Blank (MB)

(MB) 09/28/15 00:38

| Analyte | MB Result mg/l | <u>MB Qualifier</u> | MB RDL mg/l |
|------------------|-------------------|---------------------|----------------|
| Suspended Solids | ND | | 2.50 |

¹Cp²Tc³Ss⁴Cn⁵Sr⁶Qc⁷Gl⁸Al⁹Sc

L790142-01 Original Sample (OS) • Duplicate (DUP)

(OS) 09/28/15 00:40 • (DUP) 09/28/15 00:40

| Analyte | Original Result mg/l | DUP Result mg/l | Dilution | DUP RPD % | <u>DUP Qualifier</u> | DUP RPD Limits % |
|------------------|-------------------------|--------------------|----------|--------------|----------------------|---------------------|
| Suspended Solids | 272 | 248 | 1 | 9.23 | J3 | 5 |

L790337-01 Original Sample (OS) • Duplicate (DUP)

(OS) 09/28/15 00:37 • (DUP) 09/28/15 00:37

| Analyte | Original Result mg/l | DUP Result mg/l | Dilution | DUP RPD % | <u>DUP Qualifier</u> | DUP RPD Limits % |
|------------------|-------------------------|--------------------|----------|--------------|----------------------|---------------------|
| Suspended Solids | 72.0 | 75.0 | 1 | 4.08 | | 5 |

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

(LCS) 09/28/15 00:39 • (LCSD) 09/28/15 00:38

| 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 % |
|------------------|----------------------|--------------------|---------------------|---------------|----------------|------------------|----------------------|-----------------------|----------|-----------------|
| Suspended Solids | 773 | 816 | 820 | 106 | 106 | 85.0-115 | | | 0.489 | 5 |



Method Blank (MB)

(MB) 09/26/15 17:14

| Analyte | MB Result mg/l | <u>MB Qualifier</u> | MB RDL mg/l |
|------------------|-------------------|---------------------|----------------|
| Suspended Solids | ND | | 2.50 |

¹Cp²Tc³Ss⁴Cn⁵Sr⁶Qc⁷Gl⁸Al⁹Sc

L790606-01 Original Sample (OS) • Duplicate (DUP)

(OS) 09/26/15 17:26 • (DUP) 09/26/15 17:40

| Analyte | Original Result mg/l | DUP Result mg/l | Dilution | DUP RPD % | <u>DUP Qualifier</u> | DUP RPD Limits % |
|------------------|-------------------------|--------------------|----------|--------------|----------------------|---------------------|
| Suspended Solids | 12400 | 12500 | 1 | 1.36 | | 5 |

L790606-05 Original Sample (OS) • Duplicate (DUP)

(OS) 09/26/15 17:21 • (DUP) 09/26/15 17:20

| Analyte | Original Result mg/l | DUP Result mg/l | Dilution | DUP RPD % | <u>DUP Qualifier</u> | DUP RPD Limits % |
|------------------|-------------------------|--------------------|----------|--------------|----------------------|---------------------|
| Suspended Solids | 299 | 294 | 1 | 1.59 | | 5 |

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

(LCS) 09/26/15 17:31 • (LCSD) 09/26/15 17:30

| 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 % |
|------------------|----------------------|--------------------|---------------------|---------------|----------------|------------------|----------------------|-----------------------|----------|-----------------|
| Suspended Solids | 773 | 800 | 808 | 103 | 105 | 85.0-115 | | | 0.995 | 5 |

[L790477-01,10](#)

Method Blank (MB)

(MB) 09/30/15 01:24

| Analyte | MB Result mg/l | <u>MB Qualifier</u> | MB RDL mg/l |
|------------------|-------------------|---------------------|----------------|
| Suspended Solids | ND | | 2.50 |

¹Cp²Tc³Ss⁴Cn⁵Sr⁶Qc⁷Gl⁸Al⁹Sc

L790553-01 Original Sample (OS) • Duplicate (DUP)

(OS) 09/30/15 01:25 • (DUP) 09/30/15 01:25

| Analyte | Original Result mg/l | DUP Result mg/l | Dilution | DUP RPD % | <u>DUP Qualifier</u> | DUP RPD Limits % |
|------------------|-------------------------|--------------------|----------|--------------|----------------------|---------------------|
| Suspended Solids | 24.6 | 25.0 | 1 | 1.44 | | 5 |

L790631-01 Original Sample (OS) • Duplicate (DUP)

(OS) 09/30/15 01:29 • (DUP) 09/30/15 01:28

| Analyte | Original Result mg/l | DUP Result mg/l | Dilution | DUP RPD % | <u>DUP Qualifier</u> | DUP RPD Limits % |
|------------------|-------------------------|--------------------|----------|--------------|----------------------|---------------------|
| Suspended Solids | 128 | 129 | 1 | 0.778 | | 5 |

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

(LCS) 09/30/15 01:24 • (LCSD) 09/30/15 01:24

| 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 % |
|------------------|----------------------|--------------------|---------------------|---------------|----------------|------------------|----------------------|-----------------------|----------|-----------------|
| Suspended Solids | 773 | 752 | 756 | 97.3 | 97.8 | 85.0-115 | | | 0.531 | 5 |



Method Blank (MB)

(MB) 10/01/15 18:33

| Analyte | MB Result mg/l | <u>MB Qualifier</u> | MB RDL mg/l |
|----------|-------------------|---------------------|----------------|
| Fluoride | ND | | 0.100 |

¹Cp²Tc³Ss⁴Cn⁵Sr⁶Qc⁷Gl⁸Al⁹Sc

L790475-01 Original Sample (OS) • Duplicate (DUP)

(OS) 10/01/15 20:24 • (DUP) 10/01/15 20:38

| Analyte | Original Result mg/l | DUP Result mg/l | Dilution | DUP RPD % | <u>DUP Qualifier</u> | DUP RPD Limits % |
|----------|-------------------------|--------------------|----------|--------------|----------------------|---------------------|
| Fluoride | 0.125 | 0.124 | 1 | 0 | | 20 |

L790477-06 Original Sample (OS) • Duplicate (DUP)

(OS) 10/01/15 23:24 • (DUP) 10/01/15 23:38

| Analyte | Original Result mg/l | DUP Result mg/l | Dilution | DUP RPD % | <u>DUP Qualifier</u> | DUP RPD Limits % |
|----------|-------------------------|--------------------|----------|--------------|----------------------|---------------------|
| Fluoride | ND | -0.0166 | 1 | 0 | | 20 |

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

(LCS) 10/01/15 18:47 • (LCSD) 10/01/15 19:01

| 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 % |
|----------|----------------------|--------------------|---------------------|---------------|----------------|------------------|----------------------|-----------------------|----------|-----------------|
| Fluoride | 8.00 | 7.82 | 7.85 | 98 | 98 | 90-110 | | | 0 | 20 |

L790475-02 Original Sample (OS) • Matrix Spike (MS)

(OS) 10/01/15 20:52 • (MS) 10/01/15 21:06

| Analyte | Spike Amount mg/l | Original Result mg/l | MS Result mg/l | MS Rec. % | Dilution | Rec. Limits % | <u>MS Qualifier</u> |
|----------|----------------------|-------------------------|-------------------|--------------|----------|------------------|---------------------|
| Fluoride | 5.00 | 0.115 | 5.33 | 104 | 1 | 80-120 | |

L790477-01,02,03,04,05,06,07,08,09,10,11

L790477-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 10/01/15 23:51 • (MS) 10/02/15 00:05 • (MSD) 10/02/15 00:19

| Analyte | Spike Amount mg/l | Original Result mg/l | MS Result mg/l | MSD Result mg/l | MS Rec. % | MSD Rec. % | Dilution 1 | Rec. Limits 80-120 | <u>MS Qualifier</u> | <u>MSD Qualifier</u> | RPD % | RPD Limits % |
|----------|----------------------|-------------------------|-------------------|--------------------|--------------|---------------|---------------|-----------------------|---------------------|----------------------|----------|-----------------|
| Fluoride | 5.00 | ND | 4.96 | 5.00 | 99 | 100 | | | | | 1 | 20 |

¹Cp²Tc³Ss⁴Cn⁵Sr⁶Qc⁷Gl⁸Al⁹Sc

L790477-01,02,03,04,05,06,07,08,09,10,11

Method Blank (MB)

(MB) 09/25/15 17:07

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

¹Cp²Tc³Ss⁴Cn⁵Sr⁶Qc⁷Gl⁸Al⁹Sc

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

(LCS) 09/25/15 19:09 • (LCSD) 09/25/15 19:12

| 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 | 0.00270 | 0.00264 | 90 | 88 | 80-120 | | | 2 | 20 |

L790475-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 09/25/15 17:19 • (MS) 09/25/15 17:21 • (MSD) 09/25/15 17:23

| 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 | ND | 0.00195 | 0.00221 | 65 | 74 | 1 | 75-125 | J6 | J6 | 13 | 20 |

⁹Sc



Method Blank (MB)

(MB) 10/02/15 10:58

| Analyte | MB Result mg/l | <u>MB Qualifier</u> | 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 |
| Nickel | ND | | 0.00200 |
| Selenium | ND | | 0.00200 |
| Silver | ND | | 0.00200 |
| Thallium | ND | | 0.00200 |
| Vanadium | ND | | 0.00500 |
| Zinc | ND | | 0.0250 |

¹Cp²Tc³Ss⁴Cn⁵Sr⁶Qc⁷Gl⁸Al⁹Sc

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

(LCS) 10/02/15 11:01 • (LCSD) 10/02/15 11:03

| 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 % |
|-----------|----------------------|--------------------|---------------------|---------------|----------------|------------------|----------------------|-----------------------|----------|-----------------|
| Antimony | 0.0500 | 0.0500 | 0.0493 | 100 | 99 | 80-120 | | | 1 | 20 |
| Arsenic | 0.0500 | 0.0494 | 0.0475 | 99 | 95 | 80-120 | | | 4 | 20 |
| Barium | 0.0500 | 0.0477 | 0.0478 | 95 | 96 | 80-120 | | | 0 | 20 |
| Beryllium | 0.0500 | 0.0486 | 0.0468 | 97 | 94 | 80-120 | | | 4 | 20 |
| Cadmium | 0.0500 | 0.0500 | 0.0478 | 100 | 96 | 80-120 | | | 4 | 20 |
| Chromium | 0.0500 | 0.0481 | 0.0487 | 96 | 97 | 80-120 | | | 1 | 20 |
| Copper | 0.0500 | 0.0507 | 0.0512 | 101 | 102 | 80-120 | | | 1 | 20 |
| Cobalt | 0.0500 | 0.0491 | 0.0499 | 98 | 100 | 80-120 | | | 2 | 20 |
| Lead | 0.0500 | 0.0483 | 0.0472 | 97 | 94 | 80-120 | | | 2 | 20 |
| Nickel | 0.0500 | 0.0493 | 0.0498 | 99 | 100 | 80-120 | | | 1 | 20 |
| Selenium | 0.0500 | 0.0501 | 0.0490 | 100 | 98 | 80-120 | | | 2 | 20 |
| Silver | 0.0500 | 0.0499 | 0.0499 | 100 | 100 | 80-120 | | | 0 | 20 |
| Thallium | 0.0500 | 0.0472 | 0.0458 | 94 | 92 | 80-120 | | | 3 | 20 |
| Vanadium | 0.0500 | 0.0476 | 0.0484 | 95 | 97 | 80-120 | | | 2 | 20 |
| Zinc | 0.0500 | 0.0482 | 0.0474 | 96 | 95 | 80-120 | | | 2 | 20 |

L790477-01,02,03,04,05,06,07,08,09,10,11

L790477-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 10/02/15 11:05 • (MS) 10/02/15 11:10 • (MSD) 10/02/15 11:13

| 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 | 0.000178 | 0.0509 | 0.0517 | 101 | 103 | 1 | 75-125 | | | 2 | 20 |
| Arsenic | 0.0500 | 0.000913 | 0.0535 | 0.0550 | 105 | 108 | 1 | 75-125 | | | 3 | 20 |
| Barium | 0.0500 | 0.0174 | 0.0651 | 0.0647 | 95 | 95 | 1 | 75-125 | | | 1 | 20 |
| Beryllium | 0.0500 | 0.0000909 | 0.0487 | 0.0496 | 97 | 99 | 1 | 75-125 | | | 2 | 20 |
| Cadmium | 0.0500 | 0.000535 | 0.0522 | 0.0545 | 103 | 108 | 1 | 75-125 | | | 4 | 20 |
| Chromium | 0.0500 | 0.000553 | 0.0473 | 0.0498 | 93 | 98 | 1 | 75-125 | | | 5 | 20 |
| Copper | 0.0500 | 0.000749 | 0.0491 | 0.0512 | 97 | 101 | 1 | 75-125 | | | 4 | 20 |
| Cobalt | 0.0500 | 0.0000832 | 0.0480 | 0.0503 | 96 | 100 | 1 | 75-125 | | | 5 | 20 |
| Lead | 0.0500 | 0.000564 | 0.0490 | 0.0493 | 97 | 98 | 1 | 75-125 | | | 1 | 20 |
| Nickel | 0.0500 | 0.00940 | 0.0572 | 0.0590 | 96 | 99 | 1 | 75-125 | | | 3 | 20 |
| Selenium | 0.0500 | 0.000287 | 0.0503 | 0.0514 | 100 | 102 | 1 | 75-125 | | | 2 | 20 |
| Silver | 0.0500 | 0.000130 | 0.0506 | 0.0514 | 101 | 102 | 1 | 75-125 | | | 2 | 20 |
| Thallium | 0.0500 | 0.0000751 | 0.0477 | 0.0476 | 95 | 95 | 1 | 75-125 | | | 0 | 20 |
| Vanadium | 0.0500 | 0.000390 | 0.0474 | 0.0499 | 94 | 99 | 1 | 75-125 | | | 5 | 20 |
| Zinc | 0.0500 | 0.0235 | 0.0680 | 0.0707 | 89 | 94 | 1 | 75-125 | | | 4 | 20 |

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



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. |
| J6 | The sample matrix interfered with the ability to make any accurate determination; spike value is low. |

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ GI⁸ AI⁹ 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 | | |

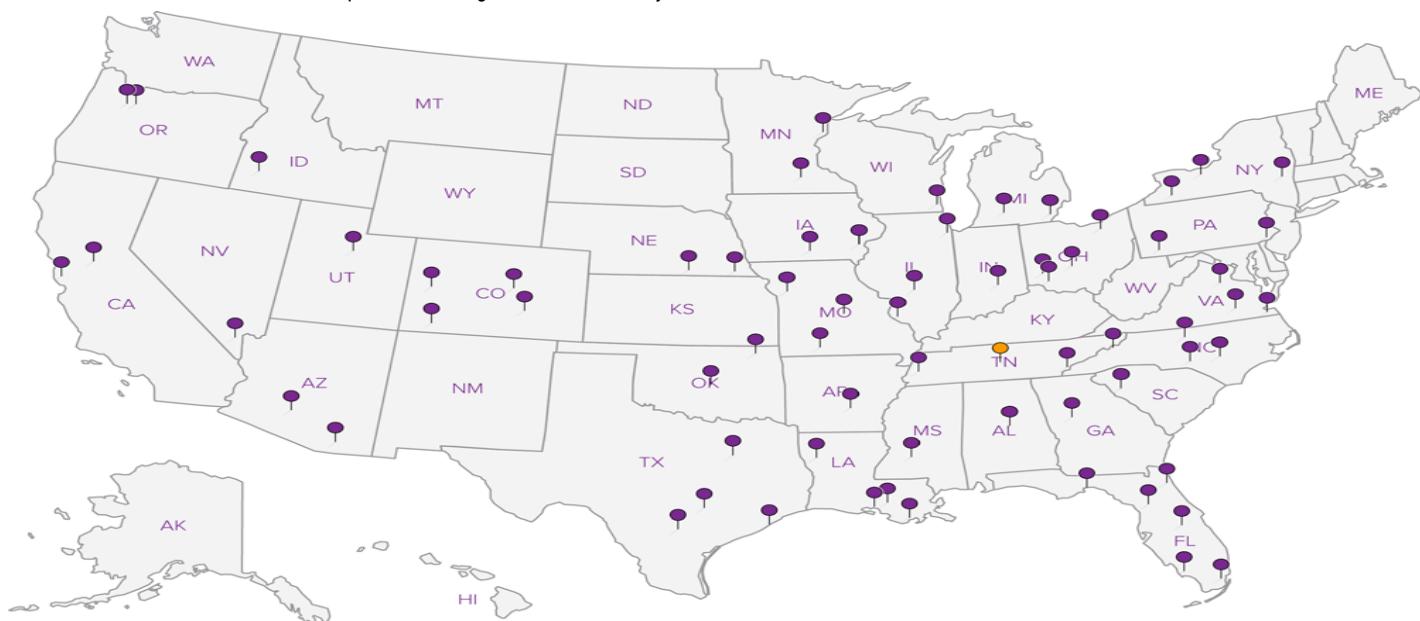
¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

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.**

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

TVA-Environmental Affairs

400 W. Summit Hill Mailstop TVA WT 9D-K
Knoxville, TN 37902

Report to:
Ronda Hooper

Project:
Description: JOF GW WEL

Phone: 865-632-6941
Fax:

Collected by (print):
Monte W. Stares

Collected by (signature):
Monte W. Stares

Immediately
Packed on Ice N Y

Sample ID Comp/Grab Matrix * Depth

JOF-B6R-0915 GRAB GW

JOF-B8R-0915 ↑ GW

JOF-B9-0915 DUP GW

JOF-B9-0915 GW

JOF-B10-0915 GW

JOF-B11-0915 GW

JOF-B12-0915 GW

JOF-B13-0915 GW

~~JOF-B14-0915 DUP~~ GW

JOF-DRFEQ-0915 GRAB GW

Billing Information:

TVA Accounts Payable
1101 Market St. Mailstop: LP-5D-C
Chattanooga, TN 37402

Email To: TVA_GW_Analytical@tva.gov

City/State *NEW JOHNSONVILLE*
Collected: *TN*

Lab Project #
TVAENVAFF-JOF GW WEL

P.O. #
727593

Date Results Needed

STD

Email? No Yes

FAX? No Yes

No.
of
Cntrs

FLUORIDE 125mlHDPE-NoPres

Metals 500mlHDPE-HNO3

TSS 1L-HDPE NoPres

-01

-02

-03

-04

-05

-06

-07

-08

-09

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

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Hold #

Relinquished by : (Signature)
Monte W. Stares

Date: 9-23-15 Time: 1600

Received by: (Signature)

Samples returned via: UPS
 FedEx Courier _____

Condition: (lab use only) *NII*

Relinquished by : (Signature)

Date: Time:

Received by: (Signature)

Temp: 37 °C Bottles Received: 33

COC Seal Intact: Y N NA

Relinquished by : (Signature)

Date: Time:

Received for lab by: (Signature)
Sherry Deaum

Date: 9-24-15 Time: 900

pH Checked: *62* NCF:



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



L# *1790477*

T **1002**

Acctnum: TVAENVAFF

Template: T81496

Prelogin: P521342

TSR: 633 - Pam Langford

PB: *8-25 KJ*

Shipped Via: FedEX Ground

Rem./Contaminant Sample # (lab only)

TVA-Environmental Affairs

400 W. Summit Hill Mailstop TVA WT 9D-K
Knoxville, TN 37902

Billing Information:

TVA Accounts Payable
1101 Market St. Mailstop: LP-5D-C
Chattanooga, TN 37402

Report to:
Ronda Hooper

Email To: **TVA_GW_Analytical@tva.gov**

Project
Description: **JOF GW WEL**

City/State **NEW JOHNSONVILLE**
Collected: **TN**

Phone: **865-632-6941**
Fax:

Client Project #
JOF GW WEL
Lab Project #
TVAENVAFF-JOF GW WEL

Collected by (print):

Monte W. Stark

Collected by (signature):

*Monte W. Stark*Immediately
Packed on ice N Y

Site/Facility ID #
727593
P.O. #

Date Results Needed

STD

Email? No Yes
FAX? No Yes

No.
of
Cntrs

| Sample ID | Comp/Grab | Matrix * | Depth | Date | Time | FLUORIDE 125mlHDPE-NoPres | Metals 500mlHDPE-HNO3 C2 | TSS 1L-HDPE NoPres |
|-------------------------|-------------|-----------|-------|----------------|-------------|---------------------------|--------------------------|--------------------|
| JOF-SRLEQ-0915 | GRAB | GW | | 9-23-15 | 0715 | 3 | X | X |
| JOF-B12-0915-DUP | GRAB | GW | | 9-22-15 | 1315 | 3 | X | X |

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

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Hold #

Relinquished by : (Signature)

Monte W. Stark

Date:

9-23-15 1600

Time:

Received by: (Signature)

Samples returned via: UPS FedEx Courier Condition: (lab use only) *AVAIL*

Relinquished by : (Signature)

Date:

Time:

Received by: (Signature)

Temp: **37** °C Bottles Received: **33**COC Seal Intact: Y N NA *OK*

Relinquished by : (Signature)

Date:

Time:

Received for lab by: (Signature)

*Dug Neam*Date: **9-24-15** Time: **900**pH Checked: **62** NCF: **62**

Appendix C

Outliers

APPENDIX C. BACKGROUND MONITORING DATA FOR WELL JOF-B9

| Well | Sample Date | Antimony, total (ug/L) | Arsenic, total (ug/L) | Barium, total (ug/L) | Beryllium, total (ug/L) | Cadmium, total (ug/L) | Chromium, total (ug/L) | Cobalt, total (ug/L) | Copper, total (ug/L) | Fluoride, total (mg/L) | Lead, total (ug/L) | Mercury, total (ug/L) | Nickel, total (ug/L) | Selenium, total (ug/L) | Silver, total (ug/L) | Thallium, total (ug/L) | Vanadium, total (ug/L) | Zinc, total (ug/L) | Total Suspended Solids (mg/L) | |
|--------|-------------|------------------------|-----------------------|----------------------|-------------------------|-----------------------|------------------------|----------------------|----------------------|------------------------|--------------------|-----------------------|----------------------|------------------------|----------------------|------------------------|------------------------|--------------------|-------------------------------|----|
| JOF-B9 | 3/7/2000 | 1 | 1 | 38 | 1 | 0.1 | 1.8 | 2.2 | 10 | 0.1 | 1.4 | 0.2 | 1 | 1 | 10 | 2 | 10 | 10 | 20 | |
| JOF-B9 | 9/19/2000 | 1 | 1 | 21 | 1.1 | 0.11 | 1 | 1 | 10 | 0.11 | 1.8 | 0.2 | 1.8 | 1 | 10 | 2 | 10 | 10 | 6 | |
| JOF-B9 | 3/20/2001 | 1 | 1 | 17 | 1 | 0.1 | 1 | 1 | 10 | 0.1 | 1 | 0.2 | 1 | 1 | 10 | 2 | 10 | 10 | 1 | |
| JOF-B9 | 9/18/2001 | 1 | 1 | 10 | 1 | 0.1 | 1 | 1 | 10 | 0.11 | 1 | 0.1 | 1 | 1 | 10 | 2 | 10 | 10 | 4 | |
| JOF-B9 | 3/12/2002 | 1 | 1 | 40 | 1 | 0.1 | 1 | 1 | 10 | 0.1 | 1 | 0.1 | 1 | 1 | 10 | 2 | 10 | 10 | 20 | |
| JOF-B9 | 9/10/2002 | 1 | 1 | 30 | 1 | 0.1 | 1 | 1 | 10 | 0.19 | 1 | 0.1 | 1 | 1 | 10 | 2 | 10 | 10 | 18 | |
| JOF-B9 | 3/11/2003 | 1 | 2 | 60 | 1 | 0.1 | 2 | 1 | 10 | 0.1 | 17 | 0.1 | 1 | 1 | 10 | 2 | 10 | 20 | 36 | |
| JOF-B9 | 9/9/2003 | 0.1 | 0.7 | 50 | 1 | 0.1 | 1 | 2.5 | 10 | 0.1 | 3.5 | 0.1 | 4.3 | 20.5 | 10 | 0.1 | 10 | 10 | 35 | |
| JOF-B9 | 3/9/2004 | 0.6 | 0.5 | 40 | 1 | 0.17 | 1.9 | 1.8 | 10 | 0.1 | 2.5 | 0.1 | 1.6 | 0.2 | 10 | 0.1 | 10 | 10 | 38 | |
| JOF-B9 | 9/14/2004 | 3 | 1 | 20 | 1 | 0.1 | 2 | 1 | 10 | 0.1 | 1 | 0.1 | 1 | 1 | 10 | 2 | 10 | 10 | 11 | |
| JOF-B9 | 3/8/2005 | 3 | 1 | 30 | 1 | 0.1 | 3 | 3 | 10 | 0.1 | 1 | 0.1 | 1 | 1 | 10 | 2 | 10 | 10 | 8 | |
| JOF-B9 | 9/7/2005 | 3 | 1 | 20 | 1 | 0.1 | 2 | 1 | 10 | 0.1 | 1 | 0.1 | 1 | 1 | 10 | 2 | 10 | 10 | 8 | |
| JOF-B9 | 3/22/2006 | 3 | 1 | 30 | 1 | 0.1 | 4 | 1 | 10 | 0.1 | 2 | 0.1 | 2 | 1 | 10 | 2 | 10 | 10 | 10 | |
| JOF-B9 | 9/19/2006 | 3 | 1 | 20 | 1 | 0.1 | 1 | 1 | 10 | 0.1 | 1 | 0.1 | 1 | 1 | 10 | 2 | 10 | 10 | 10 | |
| JOF-B9 | 3/6/2007 | 1 | 1 | 24 | 2 | 0.5 | 1.7 | 1 | 1.6 | 0.1 | 1.5 | 0.2 | 1.3 | 1 | 0.5 | 1 | 10 | 10 | 8 | |
| JOF-B9 | 9/19/2007 | 1 | 1 | 10 | 2 | 0.5 | 1 | 10 | 1 | 0.1 | 1 | 0.2 | 1 | 1 | 0.5 | 1 | 10 | 10 | 3 | |
| JOF-B9 | 3/12/2008 | 1 | 1 | 28 | 2 | 0.5 | 2.1 | 10 | 1 | 0.1 | 1 | 0.2 | 1.6 | 1 | 0.53 | 1 | 10 | 10 | 10 | |
| JOF-B9 | 9/16/2008 | 1 | 1.5 | 11 | 2 | 0.5 | 1 | 10 | 1 | 0.1 | 1 | 0.2 | 1.4 | 1 | 0.5 | 1 | 10 | 10 | 2 | |
| JOF-B9 | 3/10/2009 | 1 | 1 | 25 | 2 | 0.5 | 2.2 | 10 | 4 | 0.1 | 1 | 0.2 | 1.5 | 1 | 0.5 | 1 | 10 | 10 | 7 | |
| JOF-B9 | 9/15/2009 | 1 | 1 | 22 | 2 | 0.5 | 2 | 10 | 2 | 0.1 | 1.1 | 0.2 | 1.3 | 1 | 1 | 1 | 10 | 13 | 7 | |
| JOF-B9 | 3/10/2010 | 1 | 1 | 41 | 2 | 0.5 | 2.6 | 10 | 2 | 0.1 | 1.9 | 0.2 | 2.1 | 1 | 1 | 1 | 1 | 3.5 | 10 | 25 |
| JOF-B9 | 9/14/2010 | 1 | 1 | 53 | 2 | 0.5 | 12 | 10 | 2 | 0.1 | 1.4 | 0.2 | 7.7 | 1 | 1 | 1 | 1 | 3.4 | 15 | 30 |
| JOF-B9 | 3/15/2011 | 1 | 1 | 27 | 2 | 0.5 | 2 | 10 | 2 | 0.1 | 1 | 0.2 | 1 | 1 | 1 | 1 | 10 | 10 | 17 | |
| JOF-B9 | 9/13/2011 | 1 | 1 | 10 | 2 | 0.5 | 2 | 10 | 2 | 0.1 | 1 | 0.2 | 1 | 1 | 1 | 1 | 10 | 10 | 4 | |
| JOF-B9 | 11/30/2011 | 1 | 1 | 8.7 | 1 | 0.5 | 2 | 1 | 2 | 0.1 | 1 | 0.2 | 1 | 1 | 1 | 1 | 1 | 2 | 10 | |
| JOF-B9 | 3/21/2012 | 1 | 1 | 6.6 | 2 | 0.5 | 2 | 10 | 2 | 0.1 | 1 | 0.2 | 1 | 1.7 | 1 | 1 | 10 | 10 | 4.5 | |
| JOF-B9 | 9/18/2012 | 1 | 1 | 8 | 1 | 0.5 | 2 | 1 | 2 | 0.1 | 1 | 0.2 | 1 | 1 | 1 | 1 | 2 | 10 | 4.2 | |
| JOF-B9 | 3/19/2013 | 1 | 1 | 8.5 | 1 | 0.5 | 2 | 1 | 2 | 0.1 | 1 | 0.2 | 1 | 1 | 1 | 1 | 2 | 10 | 4.5 | |
| JOF-B9 | 9/24/2013 | 1 | 1 | 14.8 | 1 | 1 | 1.3 | 1 | 1 | 0.4 | 1 | 0.2 | 1.2 | 1 | 0.5 | 1 | 1.4 | 10 | 6.4 | |
| JOF-B9 | 3/11/2014 | 1 | 1 | 9.3 | 1 | 1 | 1 | 5 | 1 | 0.4 | 1 | 0.2 | 1 | 1 | 0.5 | 1 | 10 | 10 | 2.2 | |
| JOF-B9 | 9/8/2014 | 1 | 1 | 6.7 | 1 | 0.5 | 2 | 1 | 2 | 0.1 | 1 | 0.2 | 1 | 1 | 1 | 1 | 2 | 10 | 2.5 | |
| JOF-B9 | 3/17/2015 | 2 | 2 | 6.9 | 2 | 1 | 2 | 2 | 5 | 0.1 | 2 | 0.2 | 2 | 2 | 2 | 2 | 5 | 25 | 4.1 | |
| JOF-B9 | 9/22/2015 | 2 | 2 | 5.74 | 2 | 1 | 2 | 2 | 5 | 0.1 | 2 | 0.2 | 2 | 2 | 2 | 2 | 5 | 25 | 2.5 | |

Estimation of Box Plot Upper Extreme Outlier Limits

| | | | | | | | | | | | | | | | | | | |
|-----------------------------|----|----|----|----|-----|----|----|----|-----|-----|-----|-----|----|----|----|----|----|----|
| 25th percentile | 1 | 1 | 10 | 1 | 0 | 1 | 1 | 2 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 5 | 10 |
| 75th percentile | 1 | 1 | 30 | 2 | 1 | 2 | 10 | 10 | 0 | 1 | 0 | 1 | 1 | 10 | 2 | 10 | 10 | |
| Interquartile Range (IQR) | 0 | 0 | 20 | 1 | 0 | 1 | 9 | 8 | 0 | 0 | 0 | 0 | 0 | 9 | 1 | 5 | 0 | |
| Upper Extreme Outlier Limit | 1 | 1 | 90 | 5 | 1.7 | 5 | 37 | 34 | 0.1 | 2.3 | 0.5 | 2.8 | 1 | 37 | 5 | 25 | 10 | |
| Background value count | 33 | 32 | 33 | 33 | 33 | 32 | 33 | 33 | 33 | 30 | 33 | 31 | 31 | 33 | 33 | 31 | 31 | |

NOTES:

Highlighted data outliers removed before computing constituent UPLs.

Upper extreme outlier limit defined as 75th percentile plus 3 times IQR.

Appendix D

Statistics

Statistical Analysis Procedure

Background Date Range: 03/07/2000 to 09/23/2015

Background Locations: JOF-B9

Compliance Date Range: 09/22/2015 to 09/23/2015

Compliance Locations: JOF-B6R,JOF-B8R

Comparison Method if all Background Results are Non-Detect:

STmdl = Last MDL

Statistical Test for Parametric Background Data Distributions:

STpar = Parametric Prediction Interval on Background

Statistical Test for Cases with High Percentage of Non-Detect Background Data:

STlow1 = Non-Parametric Prediction Interval on Background (ND Frequency > 55%)

Statistical Test for Cases with High Percentage of Non-Detect Background Data:

STlow2 = Non-Parametric Prediction Interval on Background (ND Frequency > 55%)

Statistical Test for Non-Parametric Background Data Distributions:

STnon = Non-Parametric Prediction Interval on Background

Background Comparison:

Interwell

Number of Verification Samples:

1

Default Type 1 Individual Comparison Error Level

0.01

(False Positive Rate) for tests other than Prediction Interval

D ->

Non-Detect Processing (Parametric Tests):

<=55% using MDL * 1.0

>55% using MDL * 1.0

Non-Detect Processing (All Other):

<=55% using MDL * 1.0

>55% using MDL * 1.0

| Compliance Location | Parameter | Sample Date | Count Of Bkg Results | Percent of Non detects | Normal / Lognormal | Test | Confidence Level | Upper Limit | Lower Limit | Analysis Result | Exceedance Trend |
|---------------------|------------------------|-------------|----------------------|------------------------|--------------------|--------|------------------|-------------|-------------|-----------------|------------------|
| JOF-B6R | Antimony, total, ug/L | 09/23/2015 | 33 | 93.94 | No/No | STlow1 | 99.67 | 3.000 | | <2.000 | No |
| JOF-B6R | Arsenic, total, ug/L | 09/23/2015 | 32 | 87.50 | No/No | STlow1 | 99.65 | 2.000 | | <2.000 | No |
| JOF-B6R | Barium, total, ug/L | 09/23/2015 | 33 | 3.03 | No/Yes | STpar | 96.23 | 65.209 | | 17.400 | No |
| JOF-B6R | Beryllium, total, ug/L | 09/23/2015 | 33 | 93.94 | No/No | STlow1 | 99.67 | 2.000 | | <2.000 | No |
| JOF-B6R | Cadmium, total, ug/L | 09/23/2015 | 33 | 87.88 | No/No | STlow1 | 99.67 | 1.000 | | <1.000 | No |
| JOF-B6R | Chromium, total, ug/L | 09/23/2015 | 32 | 62.50 | No/No | STlow1 | 99.65 | 4.000 | | <2.000 | No |
| JOF-B6R | Cobalt, total, ug/L | 09/23/2015 | 33 | 84.85 | No/No | STlow1 | 99.67 | 10.000 | | <2.000 | No |
| JOF-B6R | Copper, total, ug/L | 09/23/2015 | 33 | 84.85 | No/No | STlow1 | 99.67 | 10.000 | | <5.000 | No |
| JOF-B6R | Fluoride, total, mg/L | 09/23/2015 | 33 | 87.88 | No/No | STlow1 | 99.67 | 0.400 | | <0.100 | No |
| JOF-B6R | Lead, total, ug/L | 09/23/2015 | 30 | 76.67 | No/No | STlow1 | 99.60 | 2.000 | | <2.000 | No |

D - 2

| Compliance Location | Parameter | Sample Date | Count Of Bkg Results | Percent of Non detects | Normal / Lognormal | Test | Confidence Level | Upper Limit | Lower Limit | Analysis Result | Exceedance Trend |
|---------------------|-----------------------|-------------|----------------------|------------------------|--------------------|--------|------------------|-------------|-------------|-----------------|------------------|
| JOF-B6R | Mercury, total, ug/L | 09/23/2015 | 33 | 93.94 | No/No | STlow1 | 99.67 | 0.200 | | <0.200 | No |
| JOF-B6R | Nickel, total, ug/L | 09/23/2015 | 31 | 64.52 | No/No | STlow1 | 99.62 | 2.500 | | 9.400 | Yes |
| JOF-B6R | Selenium, total, ug/L | 09/23/2015 | 31 | 93.55 | No/No | STlow1 | 99.62 | 2.000 | | <2.000 | No |
| JOF-B6R | Silver, total, ug/L | 09/23/2015 | 33 | 93.94 | No/No | STlow1 | 99.67 | 10.000 | | <2.000 | No |
| JOF-B6R | Thallium, total, ug/L | 09/23/2015 | 33 | 96.97 | No/No | STlow1 | 99.67 | 2.000 | | <2.000 | No |
| JOF-B6R | Vanadium, total, ug/L | 09/23/2015 | 33 | 87.88 | No/No | STlow1 | 99.67 | 10.000 | | <5.000 | No |
| JOF-B6R | Zinc, total, ug/L | 09/23/2015 | 31 | 80.65 | No/No | STlow1 | 99.62 | 25.000 | | <25.000 | No |

D-3

| Compliance Location | Parameter | Sample Date | Count Of Bkg Results | Percent of Non detects | Normal / Lognormal | Test | Confidence Level | Upper Limit | Lower Limit | Analysis Result | Exceedance Trend |
|---------------------|------------------------|-------------|----------------------|------------------------|--------------------|--------|------------------|-------------|-------------|-----------------|------------------|
| JOF-B8R | Antimony, total, ug/L | 09/22/2015 | 33 | 93.94 | No/No | STlow1 | 99.67 | 3.000 | | <2.000 | No |
| JOF-B8R | Arsenic, total, ug/L | 09/22/2015 | 32 | 87.50 | No/No | STlow1 | 99.65 | 2.000 | | <2.000 | No |
| JOF-B8R | Barium, total, ug/L | 09/22/2015 | 33 | 3.03 | No/Yes | STpar | 96.23 | 65.209 | | 30.100 | No |
| JOF-B8R | Beryllium, total, ug/L | 09/22/2015 | 33 | 93.94 | No/No | STlow1 | 99.67 | 2.000 | | <2.000 | No |
| JOF-B8R | Cadmium, total, ug/L | 09/22/2015 | 33 | 87.88 | No/No | STlow1 | 99.67 | 1.000 | | <1.000 | No |
| JOF-B8R | Chromium, total, ug/L | 09/22/2015 | 32 | 62.50 | No/No | STlow1 | 99.65 | 4.000 | | <2.000 | No |
| JOF-B8R | Cobalt, total, ug/L | 09/22/2015 | 33 | 84.85 | No/No | STlow1 | 99.67 | 10.000 | | <2.000 | No |
| JOF-B8R | Copper, total, ug/L | 09/22/2015 | 33 | 84.85 | No/No | STlow1 | 99.67 | 10.000 | | <5.000 | No |
| JOF-B8R | Fluoride, total, mg/L | 09/22/2015 | 33 | 87.88 | No/No | STlow1 | 99.67 | 0.400 | | <0.100 | No |
| JOF-B8R | Lead, total, ug/L | 09/22/2015 | 30 | 76.67 | No/No | STlow1 | 99.60 | 2.000 | | <2.000 | No |

D - 4

| Compliance Location | Parameter | Sample Date | Count Of Bkg Results | Percent of Non detects | Normal / Lognormal | Test | Confidence Level | Upper Limit | Lower Limit | Analysis Result | Exceedance Trend |
|---------------------|-----------------------------|-------------|----------------------|------------------------|--------------------|--------|------------------|-------------|-------------|-----------------|------------------|
| JOF-B8R | Mercury, total, ug/L | 09/22/2015 | 33 | 93.94 | No/No | STlow1 | 99.67 | 0.200 | | <0.200 | No |
| JOF-B8R | Nickel, total, ug/L | 09/22/2015 | 31 | 64.52 | No/No | STlow1 | 99.62 | 2.500 | | 9.990 | Yes |
| JOF-B8R | Selenium, total, ug/L | 09/22/2015 | 31 | 93.55 | No/No | STlow1 | 99.62 | 2.000 | | <2.000 | No |
| JOF-B8R | Silver, total, ug/L | 09/22/2015 | 33 | 93.94 | No/No | STlow1 | 99.67 | 10.000 | | <2.000 | No |
| JOF-B8R | Thallium, total, ug/L | 09/22/2015 | 33 | 96.97 | No/No | STlow1 | 99.67 | 2.000 | | <2.000 | No |
| JOF-B8R | Turbidity, field (NTU), NTU | 09/22/2015 | 11 | 0.00 | Yes/Yes | STpar | 96.23 | 27.6 | | 3.7 | No |
| JOF-B8R | Vanadium, total, ug/L | 09/22/2015 | 33 | 87.88 | No/No | STlow1 | 99.67 | 10.000 | | <5.000 | No |
| JOF-B8R | Zinc, total, ug/L | 09/22/2015 | 31 | 80.65 | No/No | STlow1 | 99.62 | 25.000 | | <25.000 | No |

D-5

Appendix E

Time Series

