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## Data Review Memoranda



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## DATA REVIEW MEMORANDUM

**DATE:** March 9, 2016  
**TO:** Mark Longtine, Project Manager, E & E, Seattle, WA  
**FROM:** Steven Elliott, E & E, Pensacola, FL  
**SUBJ:** Data Review: Red Devil Mine

**REFERENCE:**

Project ID	Lab Work Order	Lab
1001095.0002.03 Task 3 - GW/SW Monitoring Spring 2015	J51184-1	TestAmerica – Seattle (Mercury subcontracted to Brooks Rand Labs – Seattle)

### 1. SAMPLE IDENTIFICATION

For the sampling activities at Red Devil Mine, Ecology and Environment, Inc. (E & E) collected the samples listed in Table 1. Project-specific matrix spike/matrix spike duplicates (MS/MSD) were designated in the field; the laboratory also identified batch MS/MSD's as batch quality control (QC) for additional analytical testing. All samples were sent to TestAmerica's labs in Seattle, WA for analysis; select mercury analyses were forwarded to Brooks Rand Labs in Seattle Washington. All tables are included at the end of this memorandum.

Data were reviewed for field and laboratory precision, accuracy, and completeness in accordance with procedures and QC limits, the current laboratory Quality Assurance Manual (QAM), and current standard operating procedures (SOPs).

Laboratory data qualifiers for compound identification and quantitation were accepted. Any additional data review qualifiers added are noted below and listed on the tables at the end of this memorandum. Definitions of all data qualifiers are given in the report.

**Work Orders, Tests and Number of Samples included in this Data Review Memo**

Work Orders	Matrix	Test Method	Method Name	Number of Samples
J51184-1	SW	SM 2540C	TDS	9
J51184-1	GW & SW	SM 2540D	TSS	23
J51184-1	GW & SW	SM 2320B	Alkalinity	25
J51184-1	SW	EPA 9060	TOC	9
J51184-1	GW & SW	EPA 300.0	Anions	25
J51184-1	GW & SW	EPA 353.2	Nitrate/Nitrite	25
J51184-1	SW	EPA 6010B/3005A	Dissolved Metals (ICP_Fld Fltr)	9
J51184-1	GW & SW	EPA 6010B/3005A	Total Metals (ICP)	25
J51184-1	SW	EPA 6020A/3005A	Dissolved Metals (ICP/MS_Fld Fltr)	9
J51184-1	GW & SW	EPA 6020A/3005A	Total Metals (ICP/MS)	25
J51184-1	SW	EPA 7470A	Mercury (Dissolved)	24
J51184-1	GW & SW	EPA 7470A	Mercury (Total)	29
J51184-1	GW & SW	EPA 1631	Mercury (Low Level)	29
J51184-1	GW	EPA 8260C/5030B	VOC	4
J51184-1	GW	EPA 8270D/3520C	SVOC	4
J51184-1	GW	ADEC AK101	AK -GRO	4
J51184-1	GW	ADEC AK102&103	AK – DRO & RRO	4

**2. SAMPLE PROCEDURES**

All samples were collected as specified in the work plan and documented on the chain-of-custody (COC) and in field notebooks. Samples were analyzed as specified on the COC. Samples were packaged, shipped and received as specified in the work plan. All samples must be received cold (4 ±2 degrees Celsius [°C ]) and in good condition as documented on the Cooler Receipt Form. These results are presented in Table 2 (if applicable).

**REVIEW RESULTS**

All sample procedures were followed and the sample coolers were received at 2.4 to 5.8 °C. No problems with the condition of the sample upon receipt are documented.

### **3. LABORATORY DATA**

#### **3.1 HOLDING TIMES**

Holding times are established and monitored to ensure analytical results accurately represent analyte concentrations in a sample at the time of collection. These results are presented in Table 2 (if applicable). Exceeding the holding time for a sample generally results in a loss of the analyte due to a variety of mechanisms, such as deposition on the sample container walls or precipitation.

#### **REVIEW RESULTS**

All samples were analyzed within the project and method specified holding times for all analytes except for several samples for TDS, TSS, and SVOCs. The associated detected TDS and TSS results were qualified as estimated (J) and the non-detected results were qualified as estimated (UJ). The SVOC samples run outside of holding time were a reanalysis and were not used for final reporting so no qualification was necessary.

#### **3.2 BLANKS**

Laboratory and field blank samples are analyzed and evaluated to determine the existence and magnitude of possible contamination during the sampling and analysis process. These results are presented in Table 3 (if applicable). If the analyte is present in the sample at similar trace levels (less than 5 times the blank concentration), then the analyte is likely a common background contaminant from some phase of the sampling, extraction, or analytical procedure and associated low level sample concentrations are not considered to be site related. Sample results in these cases are qualified as not detected (U).

#### **REVIEW RESULTS**

All blanks were performed at the required frequency. It should be noted the field blank was collected on a day where no samples were collected but were applied to all samples collected for the event. The rinsate blank collected was applied to all samples collected with a submersible pump and associated materials.

As noted in Table 3a, analyte concentrations in the method blanks are below the practical quantitation limit (PQL). Calcium and barium were detected in method blanks however all associated sample results were greater than 5 times the blank result so qualification was not necessary (Table 3b).

Mercury was detected in a field blank at a concentration above the reporting limit resulting in two samples being qualified as not detected. Copper, chromium, manganese, TSS, and sulfate were detected in the rinsate blank at concentrations above the PQL (multiple other analytes were detected at concentrations between the PQL and MDL). Associated sample results above the PQL but less than 5 times the blank concentration have been qualified as not detected. A summary of samples qualified due to field blank contamination are presented in Table 3c.

### **3.3 SURROGATE SPIKE RECOVERY**

Laboratory performance for individual samples analyzed for organic compounds is established by means of surrogate spiking activities. Samples are spiked with surrogate compounds prior to preparation and analysis. Unusually low or high surrogate recovery values may indicate some deficiency in the analytical system or that some matrix effects exist, resulting in low or high sample results for target compounds. Sample surrogate recoveries outside QC limits (if applicable) are presented in Table 4.

### **REVIEW RESULTS**

Not applicable for these analyses.

### **3.4 MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS**

The MS/MSD analyses are intended to provide information about the effects that the sample matrix exerts on the digestion/extraction and measurement methodology. MS recovery values that do not meet laboratory QC criteria may indicate that sample analyte results are being attenuated in the analysis procedure. These results are presented in Table 5 (if applicable). The potential sample bias may be estimated by noting the degree to which the MS concentration was elevated or lowered in the spike analysis. However, this estimated bias should serve only as an approximation; sample-specific problems may be the cause of the discrepancy, particularly in soil samples. Recoveries of a post-digestion spike or a laboratory control sample (LCS) are used to verify that the analytical

methodology is acceptable and that MS recoveries are due to matrix effects. An MSD analysis is performed to evaluate the precision of the sample results. Precision is measured as the relative percent difference (RPD) between analytical results for duplicate samples. The laboratory's failure to produce similar results for MSD samples may indicate that the samples were non-homogeneous (particularly in soil samples), or that method defects may exist in the laboratory's techniques.

## **REVIEW RESULTS**

The MS/MSD sample analyses were performed on sample 0615MW19GW and 0615RD10SW at the required frequency. MS/MSD recoveries were within the control limits generated by the laboratory with the following exceptions:

- The MS and/or MSD recoveries of several SVOC analytes and diesel-range organics (DRO) in sample 0615MW19GW were below laboratory limits while the associated sample results were reported as not detected.
- The parent sample results have been qualified as estimated not detected with a low bias, "UJ-" (Table 5).
- Several other analytes were detected above the lab limits; however, since the recoveries were high and the bias is low, no qualification was necessary.

### **3.5 LABORATORY CONTROL SAMPLE ANALYSIS**

The LCS is analyzed to monitor the efficiency of the digestion/extraction procedure and analytical instrument operation. The ability of the laboratory to successfully analyze an LCS demonstrates that there are no analytical problems related to the digestion/sample preparation procedures and/or instrument operations. The LCS results outside QC limits are presented in Table 6 (if applicable). Sporadic and marginal QC failures for multiple component methods do not indicate an analytical concern. If recoveries are high and the compounds are not detected in the samples, then no data qualification is required. All recoveries should be above 10% or the non-detect results flagged "UR" as rejected.

## **REVIEW RESULTS**

All LCS analyses were within control limits and performed at the required frequency with the following exceptions:

- LCS 580-193674 had high recoveries for several analytes; however, the associated samples were all reported as not detected and since the bias is high, no qualification was necessary.
- The same LCS had low recoveries of 2,4-dinitrophenol, 3,3-dichlorobenzidine, 4-chloroaniline, and hexachlorocyclopentadiene; recoveries for 4-chloroaniline and hexachlorocyclopentadiene were less than 10%.
- All associated sample results for 2,4-dinitrophenol and 3,3-dichlorobenzidine were reported as not detected and have been qualified as estimated not detected, "UJ", in samples 0615MW19GW, 0615MW22GW, 0615MW50GW, and 0615MW54GW.
- All associated sample results for 4-chloroaniline and hexachlorocyclopentadiene were reported as not detected and have been qualified as rejected not detected, "UR", in the same samples.

### **3.6 COMPOUND IDENTIFICATION AND QUANTITATION**

Compound identities are assigned by comparing sample compound retention times to retention times from known (standard) compounds and identification of an acceptable mass spectrum. Compounds detected below the PQL in samples should be considered estimated and are qualified "J."

### **REVIEW RESULTS**

All compound identification and quantitation criteria were achieved.

As noted in Table 7, several samples were reanalyzed due to LCS issues with several analytes. However, the samples were reanalyzed outside of holding time and as a result, all analytes in those runs are qualified as estimated. The original results, run within holding time, have been used for final reporting purposes.

### **4. FIELD DUPLICATE SAMPLE RESULTS**

Field duplicate samples were collected and analyzed as an indication of overall precision for both field and laboratory. Field duplicate results are summarized in Table 8 (if applicable). The results are expected to have more variability than laboratory duplicates, which measure only laboratory precision. It is expected also that soil field duplicates will exhibit greater variance than water field duplicates due to the difficulties associated with



collecting identical field samples. The QC criteria used to assess field duplicate samples for this project was limits of 70% RPD for soils and 40% RPD for waters, or twice the general laboratory duplicate criteria. If a given compound in both the regular sample and associated field duplicate sample was below the laboratory PQL, or the compound was not detected in one of the samples, then the compound is generally not qualified due to field duplicate precision.

## **REVIEW RESULTS**

Two field duplicate analyses were performed on this SDG. The RPD ratings are listed on Tables 8a and 8b as “Good” if the RPD is less than field duplicate QC criteria of 40% and as “Poor” if the RPD exceeded the field duplicate QC criteria.

All the results show good precision in the sample pair as noted on Table 8b with the exception of manganese in samples 0615MW19GW and 0615MW51GW. Manganese has been qualified as estimated, “J”, in these samples.

## **5. OVERALL ASSESSMENT OF DATA**

All data were reviewed and considered usable with qualification as noted in this report with the exceptions of the associated sample results for 4-chloroaniline and hexachlorocyclopentadiene (reported as not detected in associated samples) which have been qualified as rejected not detected, “UR”, in the associated batch samples, due to low LCS recoveries.

TSS was not collected for sample 0615MW51GW (field duplicate of 0615MW19GW) due to a field sampling error.

Several samples were reanalyzed outside of the holding time for SVOCs due to an LCS error. However, the original sample result is used for final reporting as fewer analytes were qualified. The reanalysis results can be used for supporting data.

**Table 1 - Sample Listing**

Work Order	Matrix	Sample ID	Lab ID	Sample Date	QA/QC	Analyses
J51184-1	Water	0615MW01GW	580-51184-1	6/19/2015		6010B(T), 6020A(T), 7470A(T), 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW06GW	580-51184-2	6/20/2015		6010B(T), 6020A(T), 7470A(T), 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW08GW	580-51184-3	6/20/2015		6010B(T), 6020A(T), 7470A(T), 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW10GW	580-51184-4	6/20/2015		6010B(T), 6020A(T), 7470A(T), 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW19GW	580-51184-5	6/23/2015	MS/MSD	8260, 8270, AK101, AK102&1036010B, 6020A(T), 7470A(T) 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW22GW	580-51184-6	6/23/2015	FD1	8260, 8270, AK101, AK102&1036010B, 6020A(T), 7470A(T) 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW26GW	580-51184-7	6/22/2015		6010B(T), 6020A(T), 7470A(T), 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW27GW	580-51184-8	6/21/2015		6010B(T), 6020A(T), 7470A(T), 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW28GW	580-51184-9	6/22/2015		6010B(T), 6020A(T), 7470A(T), 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW29GW	580-51184-10	6/23/2015		6010B(T), 6020A(T), 7470A(T), 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW31GW	580-51184-11	6/22/2015		6010B(T), 6020A(T), 7470A(T), 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW32GW	580-51184-12	6/21/2015		6010B(T), 6020A(T), 7470A(T), 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW33GW	580-51184-13	6/21/2015		6010B(T), 6020A(T), 7470A(T), 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW50GW	580-51184-14	6/23/2015	FD1	8260, 8270, AK101, AK102&1036010B(T), 6020A(T), 7470A(T) 2320B, 2540D, 300, 353.2, 1631(T&D)
J51184-1	Water	0615MW51GW	580-51184-15	6/23/2015		6010B(T), 6020A(T), 7470A(T), 2320B, 2540D, 300, 353.2, 1631(T&D)

**Table 1 - Sample Listing**

Work Order	Matrix	Sample ID	Lab ID	Sample Date	QA/QC	Analyses
J51184-1	Water	0615RD05SW	580-51184-17	6/18/2015		6010B(T&D),6020A (T&D), 7470A (T&D) 2320B, 2540C, 2540D, 300, 353.2, 9060, 1631(T&D)
J51184-1	Water	0615RD06SW	580-51184-18	6/17/2015		6010B(T&D),6020A (T&D), 7470A (T&D) 2320B, 2540C, 300, 353.2, 9060, 1631(T&D)
J51184-1	Water	0615RD08SW	580-51184-19	6/17/2015		6010B(T&D),6020A (T&D), 7470A (T&D) 2320B, 2540C, 2540D, 300, 353.2, 9060, 1631(T&D)
J51184-1	Water	0615RD09SW	580-51184-20	6/18/2015		6010B(T&D),6020A (T&D), 7470A (T&D) 2320B, 2540C, 2540D, 300, 353.2, 9060, 1631(T&D)
J51184-1	Water	0615RD10SW	580-51184-21	6/18/2015	MS/MSD	6010B(T&D), 6020A (T&D), 7470A (T&D) 2320B, 2540C, 2540D, 300, 353.2, 9060, 1631(T&D)
J51184-1	Water	0615RD14SW	580-51184-22	6/18/2015		6010B(T&D),6020A (T&D), 7470A (T&D) 2320B, 2540C, 2540D, 300, 353.2, 9060, 1631(T&D)
J51184-1	Water	0615RD15SW	580-51184-23	6/18/2015		6010B(T&D),6020A (T&D), 7470A (T&D) 2320B, 2540C, 2540D , 300, 353.2, 9060, 1631(T&D)
J51184-1	Water	0615RD16SW	580-51184-24	6/18/2015		6010B(T&D),6020A (T&D), 7470A (T&D) 2320B, 2540C, 2540D, 300, 353.2, 9060, 1631(T&D)
J51184-1	Water	0615RD50SW	580-51184-25	6/18/2015		6010B(T&D),6020A (T&D), 7470A (T&D) 2320B, 2540C, 2540D, 300, 353.2, 9060, 1631(T&D)
J51184-1	Water	0615RD51SW	580-51184-26	6/24/2015	Ambient Blank	1631(T)
J51184-1	Water	0615MW52GW	580-51184-28	6/24/2015	Ambient Blank	1631(T)
J51184-1	Water	0615MW53GW	580-51184-16	6/24/2015	Ambient Blank	1631(T)
J51184-1	Water	0615MW54GW	580-51184-29	6/24/2015	Rinsate Blank: submersible pump*	8260, 8270, AK101, AK102&103, 6010B(T), 6020A(T) 7470A(T), 2320B, 2540D, 300, 353.2, 9060, 1631(T&D)
J51184-1	Water	LL Trip Blank	580-51184-27	6/25/2015	Trip Blank	1631(T)

NOTE: EPA 1631 performed by Brooks Rand Labs

\*applicable to 0615MW01GW, 0615MW10GW, 0615MW26GW, 0615MW27GW, 0615MW28GW, 0615MW29GW, 0615MW31GW

**Table 2 - List of Samples Qualified for Holding Time Exceedance**

Method	Analyte	Sample IDs	HT	Sampling Date	Analysis Date	Qual
SM 2540D	TSS	0615MW01GW	7 days	6/19/2015	6/29/2015	J/UJ
SM 2540D	TSS	0615MW06GW	7 days	6/20/2015	6/29/2015	J/UJ
SM 2540D	TSS	0615MW08GW	7 days	6/20/2015	6/29/2015	J/UJ
SM 2540D	TSS	0615MW10GW	7 days	6/20/2015	6/29/2015	J/UJ
SM 2540D	TSS	0615MW27GW	7 days	6/21/2015	6/29/2015	J/UJ
SM 2540D	TSS	0615MW32GW	7 days	6/21/2015	6/29/2015	J/UJ
SM 2540D	TSS	0615MW33GW	7 days	6/21/2015	6/29/2015	J/UJ
SM 2540D	TSS	0615RD05SW	7 days	6/18/2015	6/29/2015	J/UJ
SM 2540D	TSS	0615RD06SW	7 days	6/17/2015	6/30/2015	J/UJ
SM 2540D	TSS	0615RD08SW	7 days	6/17/2015	6/30/2015	J/UJ
SM 2540D	TSS	0615RD09SW	7 days	6/18/2015	6/30/2015	J/UJ
SM 2540D	TSS	0615RD10SW	7 days	6/18/2015	6/29/2015	J/UJ
SM 2540D	TSS	0615RD14SW	7 days	6/18/2015	6/29/2015	J/UJ
SM 2540D	TSS	0615RD15SW	7 days	6/18/2015	6/29/2015	J/UJ
SM 2540D	TSS	0615RD16SW	7 days	6/18/2015	6/29/2015	J/UJ
SM 2540D	TSS	0615RD50SW	7 days	6/18/2015	6/29/2015	J/UJ
SM 2540C	TDS	0615RD05SW	7 days	6/18/2015	6/29/2015	J/UJ
SM 2540C	TDS	0615RD06SW	7 days	6/17/2015	6/30/2015	J/UJ
SM 2540C	TDS	0615RD08SW	7 days	6/17/2015	6/30/2015	J/UJ
SM 2540C	TDS	0615RD09SW	7 days	6/18/2015	6/30/2015	J/UJ
SM 2540C	TDS	0615RD10SW	7 days	6/18/2015	6/29/2015	J/UJ
SM 2540C	TDS	0615RD14SW	7 days	6/18/2015	6/29/2015	J/UJ
SM 2540C	TDS	0615RD15SW	7 days	6/18/2015	6/29/2015	J/UJ
SM 2540C	TDS	0615RD16SW	7 days	6/18/2015	6/29/2015	J/UJ
SM 2540C	TDS	0615RD50SW	7 days	6/18/2015	6/29/2015	J/UJ

**Table 3a - List of Positive Results for Blank Samples**

Method	Sample ID	Sample Type	Analyte	Result	Qual	Anal Type	Units	PQL
EPA 8270D	MB 580-193674	Water	Diethyl Phthalate	0.220	J	MB	ug/L	0.40
EPA 8270D	MB 580-195222	Water	Diethyl Phthalate	0.441	J	MB	ug/L	0.40
EPA 6010C	MB 580-194099	Water	Calcium	0.024	J	MB	mg/L	1.1
EPA 6010C	MB 580-194493	Water	Calcium	0.054	J	MB	mg/L	1.1
EPA 6020A (Total)	MB 580-194060	Water	Barium	0.0008	J	MB	mg/L	0.0012
EPA 6020A (Total)	MB 580-194060	Water	Manganese	0.0005	J	MB	mg/L	0.0020
EPA 1631	0615MW53GW	Water	Mercury	0.44		Ambient	ng/L	0.40
EPA 8270D	0615MW54GW	Water	Benzoic Acid	1.0	J	Rinsate	ug/L	2.8
EPA 8270D	0615MW54GW	Water	Benzyl Alcohol	0.19	J	Rinsate	ug/L	0.38
EPA 8270D	0615MW54GW	Water	Butyl benzyl phthalate	0.19	J	Rinsate	ug/L	0.57
EPA 8270D	0615MW54GW	Water	Diethyl phthalate	0.22	J	Rinsate	ug/L	0.38
EPA 8270D	0615MW54GW	Water	Di-n-octyl phthalate	0.33	J	Rinsate	ug/L	0.38
EPA 8270D	0615MW54GW	Water	DRO	0.095	J	Rinsate	mg/L	0.100
EPA 6010B (Total)	0615MW54GW	Water	Calcium	0.082	J	Rinsate	mg/L	1.1
EPA 6020A (Total)	0615MW54GW	Water	Arsenic	0.00068	J	Rinsate	mg/L	0.0010
EPA 6020A (Total)	0615MW54GW	Water	Antimony	0.00022	J	Rinsate	mg/L	0.00040
EPA 6020A (Total)	0615MW54GW	Water	Barium	0.0011	J	Rinsate	mg/L	0.0012
EPA 6020A (Total)	0615MW54GW	Water	Cadmium	0.000043	J	Rinsate	mg/L	0.00040
EPA 6020A (Total)	0615MW54GW	Water	Chromium	0.00065		Rinsate	mg/L	0.00040
EPA 6020A (Total)	0615MW54GW	Water	Cobalt	0.00011	J	Rinsate	mg/L	0.00040
EPA 6020A (Total)	0615MW54GW	Water	Copper	0.0022		Rinsate	mg/L	0.0020
EPA 6020A (Total)	0615MW54GW	Water	Lead	0.00012	J	Rinsate	mg/L	0.00040
EPA 6020A (Total)	0615MW54GW	Water	Manganese	0.0056		Rinsate	mg/L	0.0020
EPA 6020A (Total)	0615MW54GW	Water	Nickel	0.0027	J	Rinsate	mg/L	0.0030
EPA 6020A (Total)	0615MW54GW	Water	Zinc	0.0064	J	Rinsate	mg/L	0.0070
EPA 300	0615MW54GW	Water	Sulfate	300		Rinsate	mg/L	12
EPA 353.2	0615MW54GW	Water	Nitrate/Nitrite	0.0070	J	Rinsate	mg/L	0.050
SM 2540D	0615MW54GW	Water	TSS	9.7		Rinsate	mg/L	2.2
EPA 1631 (Total)	0615MW54GW	Water	Mercury	6.28		Rinsate	ng/L	0.40
EPA 1631 (Dissolved)	0615MW54GW	Water	Mercury	1.77		Rinsate	ng/L	0.40

**Table 3b - List of Samples Qualified for Method Blank Contamination**

Method	Sample ID	Analyte	Blank Result	Sample Result	Sample Qual	PQL
None						

**Table 3c - List of Samples Qualified for Field Blank Contamination**

Method	Sample ID	Analyte	Blank Result	Sample Result	Sample Qual	PQL
EPA 6020A	0615MW01GW	Copper	0.0022	0.0072	U	0.0020
EPA 300	0615MW01GW	Sulfate	300	11	U	1.2
EPA 300	0615MW10GW	Sulfate	300	8.9	U	1.2
EPA 6020A	0615MW26GW	Chromium	0.00065	0.0019	U	0.00040
EPA 300	0615MW26GW	Sulfate	300	70	U	1.2
EPA 6020A	0615MW27GW	Copper	0.0022	0.0040	U	0.0020
EPA 300	0615MW27GW	Sulfate	300	170	U	1.2
EPA 300	0615MW28GW	Sulfate	300	40	U	1.2
EPA 6020A	0615MW29GW	Copper	0.0022	0.0029	U	0.0020
EPA 300	0615MW29GW	Sulfate	300	32	U	1.2
EPA 6020A	0615MW31GW	Copper	0.0022	0.011	U	0.0020
EPA 300	0615MW31GW	Sulfate	300	1.0	U	1.2
SM 2540D	0615MW31GW	TSS	9.7	35	U	2.0
EPA 1631 (Total)*	0615MW19GW	Mercury	0.44	2.01	U	0.40
EPA 1631 (Total)*	0615MW51GW	Mercury	0.44	2.20	U	0.40

**Table 4 - List of Samples with Surrogates outside Control Limits**

Method	Sample ID	Sample Type	Analyte	Rec.	Low Limit	High Limit	Dil Fac	Sample Qual.
None.								

**Table 5 - List of MS/MSD Recoveries and RPDs outside Control Limits**

Method	Sample ID	Sample Type	Analyte	Orig. Result	Spike Amount	Rec.	Dil Fac.	Low Limit	High Limit	Sample Qual	Reportable
EPA 8270D	0615MW19GW	Water	2,4-Dimethylphenol	ND	1.90	22	1	30	135	UJ-	Yes
EPA 8270D	0615MW19GW	Water	3,3-Dichlorobenzidine	ND	3.80	6	1	20	175	UJ-	Yes
EPA 8270D	0615MW19GW	Water	3-Nitroaniline	ND	1.90	45	1	75	140	UJ-	Yes
EPA 8270D	0615MW19GW	Water	4-Chloroaniline	ND	1.90	0	1	35	175	UJ-	Yes
EPA 8270D	0615MW19GW	Water	Benzo(ghi)perylene	ND	1.90	55	1	75	125	UJ-	Yes
EPA 8270D	0615MW19GW	Water	Dibenz(ah)anthracene	ND	1.90	60	1	75	130	UJ-	Yes
EPA 8270D	0615MW19GW	Water	Hexachlorocyclopentadiene	ND	1.90	0	1	20	125	UJ-	Yes
EPA 8270D	0615MW19GW	Water	Indeno (123cd)pyrene	ND	1.90	70	1	75	125	UJ-	Yes
AK102	0615MW19GW	Water	DRO	0.055	2.05	71	1	75	125	UJ-	Yes

**Table 6 - List of LCS Recoveries outside Control Limits**

Method	LCS ID	Analyte	%Rec.	Low Limit	High Limit	No. of Affected Samples	Samp Qual
EPA 8270D	580-193674	2,4-Dimethylphenol	28	30	135	4 (0615MW19GW, 0615MW22GW, 0615MW50GW, 0615MW54GW)	UJ
EPA 8270D	580-193674	3,3-Dichlorobenzidine	16	20	175	4 (0615MW19GW, 0615MW22GW, 0615MW50GW, 0615MW54GW)	UJ
EPA 8270D	580-193674	4-Chloroaniline	8	20	150	4 (0615MW19GW, 0615MW22GW, 0615MW50GW, 0615MW54GW)	UR
EPA 8270D	580-193674	Hexachlorocyclopentadiene	3	20	125	4 (0615MW19GW, 0615MW22GW, 0615MW50GW, 0615MW54GW)	UR

**Table 7 –Samples that were Re-analyzed**

<b>Sample ID</b>	<b>Lab ID</b>	<b>Method</b>	<b>Sample Type</b>	<b>Action</b>
0615MW19GW	580-51184-5	EPA 8270D	GW	Not used due to holding time exceedance but can be used for supporting data. Original analysis used for reporting purposes.
0615MW22GW	580-51184-6	EPA 8270D	GW	Not used due to holding time exceedance but can be used for supporting data. Original analysis used for reporting purposes.
0615MW50GW	580-51184-14	EPA 8270D	GW	Not used due to holding time exceedance but can be used for supporting data. Original analysis used for reporting purposes.
0615MW54GW	580-51184-29	EPA 8270D	GW	Not used due to holding time exceedance but can be used for supporting data. Original analysis used for reporting purposes.



**Table 8a – Summary of Field Duplicate Results**

Method	Analyte	Units	0615MW22GW	0615MW50GW	RPD	Rating	Sample Qualifier
EPA 300	Fluoride	mg/L	0.12	0.11	8.7%	Good	None
EPA 300	Sulfate	mg/L	5.3	5.3	0.0%	Good	None
SM 2320B	Alkalinity	mg/L	78	75	3.9%	Good	None
SM 2320B	Bicarbonate	mg/L	78	75	3.9%	Good	None
EPA 6010B	Calcium	mg/L	14	13	7.4%	Good	None
EPA 6010B	Magnesium	mg/L	11	10	9.5%	Good	None
EPA 6010B	Sodium	mg/L	2.6	2.7	3.8%	Good	None
EPA 6020A	Arsenic	mg/L	0.059	0.061	3.3%	Good	None
EPA 6020A	Antimony	mg/L	0.34	0.35	2.9%	Good	None
EPA 6020A	Barium	mg/L	0.046	0.045	2.2%	Good	None

**Table 8b – Summary of Field Duplicate Results**

Method	Analyte	Units	0615MW19GW	0615MW51GW	RPD	Rating	Sample Qualifier
EPA 300	Fluoride	mg/L	0.13	0.13	0.0%	Good	None
EPA 300	Sulfate	mg/L	5.6	5.5	1.8%	Good	None
EPA 353.2	Nitrate/nitrite	mg/L	0.12	0.12	0.0%	Good	None
SM 2320B	Alkalinity	mg/L	110	96	13.6%	Good	None
SM 2320B	Bicarbonate	mg/L	110	96	13.6%	Good	None
EPA 6010B	Calcium	mg/L	18	19	5.4%	Good	None
EPA 6010B	Magnesium	mg/L	13	12	8.0%	Good	None
EPA 6010B	Sodium	mg/L	2.4	2.4	0.0%	Good	None
EPA 6020A	Barium	mg/L	0.046	0.051	10.3%	Good	None
EPA 6020A	Manganese	mg/L	0.0067	0.0037	57.7%	Poor	J

## DATA REVIEW MEMORANDUM

**DATE:** May 11, 2016  
**TO:** Mark Longtine, Project Manager, E & E, Seattle, WA  
**FROM:** Steven Elliott, E & E, Pensacola, FL  
**SUBJ:** Data Review: Red Devil Mine

**REFERENCE:**

Project ID	Lab Work Order	Lab
1001095.0002.02 Task 2 - Soil Characterization	J52160-1	TestAmerica – Seattle (Mercury subcontracted to Brooks Rand Labs – Seattle)

### 1. SAMPLE IDENTIFICATION

For the sampling activities at Red Devil Mine, Ecology and Environment, Inc. (E & E) collected the samples listed in Table 1. Project-specific matrix spike/matrix spike duplicates (MS/MSD) were designated in the field; the laboratory also identified batch MS/MSD's as batch quality control (QC) for additional analytical testing. All samples were sent to TestAmerica's labs in Seattle, Washington, for analysis; select mercury analyses were forwarded to Brooks Rand Labs in Seattle, Washington. All tables are included at the end of this memorandum.

A revision to the lab report was issued by TestAmerica (Revision 1, dated April 21, 2016) to correct three sample IDs and associated results. At the time of sample log in, the lab misidentified sample 15MP097SB06 as 15MP097SB05; however, no sample identified as 15MP097SB05 was collected. Results for the sample originally misidentified and reported by the lab as 15MP097SB05 have been reassigned to the correct sample ID of 15MP097SB06 for total metals and Hg SSE in the revised lab report and EDD. In addition, E & E collected sample 15MP097SB09 for total metals; however, no results were provided for this sample in the original report. Results for the sample originally

misidentified as 15MP097SB06 have been reassigned to the correct sample ID of 15MP097SB09 for total metals in the revised lab report and EDD.

Data were reviewed for field and laboratory precision, accuracy, and completeness in accordance with procedures and quality control (QC) limits, the current laboratory Quality Assurance Manual (QAM) and current standard operating procedures (SOPs).

Laboratory data qualifiers for compound identification and quantitation were accepted. Any additional data review qualifiers added are noted below and listed on the tables at the end of this memorandum. Definitions of all data qualifiers are given in the report.

**Work Orders, Tests and Number of Samples included in this Data Review Memo**

Work Orders	Matrix	Test Method	Method Name	Number of Samples
580-52160-1	Soil	EPA 6010B/3050B	Total Metals (ICP)	50
580-52160-1	Soil	EPA 6020A/3050B	Total Metals (ICP/MS)	50
580-52160-1	Soil	EPA 7471A	Mercury (CVAA)	50
580-52160-1	Soil	ASTM D 2216	Percent Moisture	50
580-52160-1	Soil	Hg SSE (F0-F5) *	Subcontract	28
580-52160-1	Water	EPA 6010B/3050B	Total Recoverable Metals (ICP)	4
580-52160-1	Water	EPA 6020A/3050B	Metals (ICP/MS)	4
580-52160-1	Water	EPA 7470A	Mercury (CVAA)	4

\*Brooks Rand Labs proprietary method

**2. SAMPLE PROCEDURES**

All samples were collected as specified in the work plan and documented on the chain-of-custody (COC) and in field notebooks. Samples were analyzed as specified on the COC. Samples were packaged, shipped and received as specified in the work plan. All samples must be received cold (4 ±2 degrees Celsius [°C]) and in good condition as documented on the Cooler Receipt Form.

**REVIEW RESULTS**

All sample procedures were followed and the sample coolers were received at -0.2 to 2.5 °C. No problems with the condition of the samples upon receipt are documented.

### **3. LABORATORY DATA**

#### **3.1 HOLDING TIMES**

Holding times are established and monitored to ensure analytical results accurately represent analyte concentrations in a sample at the time of collection. These results are presented in Table 2 (if applicable). Exceeding the holding time for a sample generally results in a loss of the analyte due to a variety of mechanisms, such as deposition on the sample container walls or precipitation.

#### **REVIEW RESULTS**

All samples were analyzed within the project and method specified holding times for all analytes (see Table 2).

#### **3.2 BLANKS**

Laboratory and field blank samples are analyzed and evaluated to determine the existence and magnitude of possible contamination during the sampling and analysis process. These results are presented in Table 3 (if applicable). If the analyte is present in the sample at similar trace levels (less than 5 times the blank concentration), then the analyte is likely a common background contaminant from some phase of the sampling, extraction, or analytical procedure and associated low level sample concentrations are not considered to be site related. Sample results in these cases are qualified as not detected, U.

#### **REVIEW RESULTS**

All laboratory blanks were performed at the required frequency. As noted in Table 3a, analyte concentrations in the blanks are generally below the practical quantitation limit (PQL); the only exception was cobalt detected in two method blanks. All cobalt sample results associated with the MB199100 detection were reported at concentrations greater than 5 times the blank and therefore no qualification was necessary. The method blank 198020 applies to all rinsate blank samples only. The cobalt results in all four rinsate blanks have been qualified as not detected, "U". A summary of qualified data due to method blank contamination is presented in Table 3b.

Four equipment rinsate blanks were collected for the split spoon equipment, with several Method 6010 and 6020 analytes detected in each at concentrations greater than the PQL. As the field blanks were collected the same day and no specific associations were noted, the highest concentration of each analyte detected has been used for comparison purposes. Blank results reported in mg/L were converted to mg/Kg equivalents using the volume of water and weight of soil analyzed. All sample results were detected at levels greater than 5 times the blank and therefore no qualification was necessary (Table 3c).

### **3.3 SURROGATE SPIKE RECOVERY**

Laboratory performance for individual samples analyzed for organic compounds is established by means of surrogate spiking activities. Samples are spiked with surrogate compounds prior to preparation and analysis. Unusually low or high surrogate recovery values may indicate some deficiency in the analytical system or that some matrix effects exist, resulting in low or high sample results for target compounds. Sample surrogate recoveries outside QC limits (if applicable) are presented in Table 4.

## **REVIEW RESULTS**

All surrogates were run at the required frequency with no exceptions noted.

### **3.4 MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS**

The matrix spike and matrix spike duplicate (MS/MSD) analyses are intended to provide information about the effects that the sample matrix exerts on the digestion / extraction and measurement methodology. MS recovery values that do not meet laboratory QC criteria may indicate that sample analyte results are being attenuated in the analysis procedure. The potential sample bias may be estimated by noting the degree to which the MS concentration was elevated or lowered in the spike analysis. However, this estimated bias should serve only as an approximation; sample-specific problems may be the cause of the discrepancy, particularly in soil samples.

Recoveries of a post-digestion spike or a laboratory control sample (LCS) are used to verify that the analytical methodology is acceptable and that MS recoveries are due to matrix effects. An MSD analysis is performed to evaluate the precision of the sample results. Precision is measured as the relative percent difference (RPD) between analytical results for duplicate samples. The laboratory's failure to produce similar results

for MSD samples may indicate that the samples were non-homogeneous (particularly in soil samples), or that method defects may exist in the laboratory's techniques.

Recovery calculations are not required if the spiking concentration added is less than 25% of the sample background concentration.

## **REVIEW RESULTS**

The MS/MSD sample analyses were performed on samples 15MP094SB17, 15MP097SB11, 15MP100SB19, and 15RD22SB09 at the required frequency. MS/MSD recoveries were within the control limits generated by the laboratory with the following exceptions:

- For sample 15MP094SB17, the EPA Methods 6010, 6020, and 7470 MS and/or MSD recoveries of several analytes were above laboratory limits. The sample result for aluminum, iron, magnesium, arsenic, manganese, antimony, and mercury were greater than 4 times the spiking concentration and therefore MS evaluation is not appropriate and no results are qualified. The results for calcium, potassium, barium, chromium, nickel, vanadium in the parent sample have been qualified as estimated with a high bias, "J+".
- For sample 15MP097SB11, the EPA Methods 6010, 6020, and 7470 MS and/or MSD recoveries of several analytes were above laboratory limits. The sample result for aluminum, antimony, iron, manganese and mercury were greater than 4 times the spiking concentration and therefore MS evaluation is not appropriate and no results are qualified. The results for potassium, arsenic, barium, chromium, lead, nickel, silver, vanadium and zinc in the parent sample have been qualified as estimated with a high bias, "J+".
- For sample 15MP100SB19, the EPA Methods 6010, 6020, and 7470 MS and/or MSD recoveries of several analytes were above laboratory limits. The sample result for aluminum, iron, magnesium, manganese and mercury were greater than 4 times the spiking concentration and therefore MS evaluation is not appropriate and no results are qualified. The results for calcium, potassium, and all Method 6020 analytes except manganese in the parent sample have been qualified as estimated with a high bias, "J+". Potassium and sodium had high MS/MSD RPDs and have been qualified as estimated, "J".

- For sample 15RD22SB09, the EPA Methods 6010, 6020, and 7470 MS and/or MSD recoveries of several analytes were above laboratory limits. The sample result for aluminum, iron, and mercury were greater than 4 times the spiking concentration and therefore MS evaluation is not appropriate and no results are qualified. The results for calcium, magnesium, potassium, arsenic, barium, chromium, cobalt, copper, lead, manganese, nickel, silver, vanadium, and zinc in the parent sample have been qualified as estimated with a high bias, “J+”. Manganese had a high MS/MSD RPD and has been qualified as estimated, “J”.

A summary of sample data qualified due to MS/MSD precision and accuracy are presented in Tables 5a and 5b.

### **3.5 LABORATORY CONTROL SAMPLE ANALYSIS**

The LCS is analyzed to monitor the efficiency of the digestion/extraction procedure and analytical instrument operation. The ability of the laboratory to successfully analyze an LCS demonstrates that there are no analytical problems related to the digestion/sample preparation procedures and/or instrument operations. The LCS results outside QC limits are presented in Table 6 (if applicable). Sporadic and marginal QC failures for multiple component methods do not indicate an analytical concern. If recoveries are high and the compounds are not detected in the samples, then no data qualification is required. All recoveries should be above 10% or the non-detect results flagged “UR” as rejected.

### **REVIEW RESULTS**

All LCS analyses were within control limits and performed at the required frequency.

### **3.6 MERCURY SPECIATION ASSESSMENT**

Mercury is extracted from an accurately weighed sediment sample into five different solutions that can be broadly linked to types of mercury compounds based on solubility under the various test conditions. The extractants used are: deionized water (F0 & F1), a synthetic “stomach acid” (F2), 1M potassium hydroxide solution (F3), 12M nitric acid (F4), and aqua regia (F5). All sample extracts are analyzed in accordance with EPA Method 1631.

## REVIEW RESULTS

All data were reviewed and considered usable with qualification as noted in this report with the following exceptions:

- Sample 15MP094SB17 had a high lab duplicate RPD in fractions F1 and F4.
- Sample 15MP100SB19 had a high lab duplicate RPD in fractions F4 and F5.
- Sample 15RD22SB09 had a high lab duplicate RPD in fractions F1, F3, and F5.

Associated sample results have been qualified as estimated, "J".

Method blank detections are subtracted out per the method so no qualification was necessary for any method blank detections

### 3.7 COMPOUND IDENTIFICATION AND QUANTITATION

Compound identities are assigned by comparing sample compound retention times to retention times from known (standard) compounds and identification of an acceptable mass spectrum. Compounds detected below the PQL in samples should be considered estimated and are qualified "J." The samples with compounds above the linear range were all re-analyzed at a higher dilution factor.

## REVIEW RESULTS

All compound identification and quantitation criteria were achieved. As noted in Table 7, no samples were reported as reanalyzed.

## 4. FIELD DUPLICATE SAMPLE RESULTS

Field duplicate samples were collected and analyzed as an indication of overall precision for both field and laboratory. Field duplicate results are summarized in Table 8 (if applicable). The results are expected to have more variability than laboratory duplicates, which measure only laboratory precision. It is expected also that soil field duplicates will exhibit greater variance than water field duplicates due to the difficulties associated with collecting identical field samples. The QC criteria used to assess field duplicate samples for this project was limits of 70% RPD for soils and 40% RPD for waters, or twice the general laboratory duplicate criteria. If a given compound in both the regular sample and associated field duplicate sample was below the laboratory PQL, or the compound was not detected in one of the samples, then the compound is generally not qualified due to field duplicate precision. There are no guidelines regarding data qualification based on



poor field duplicate precision. Professional judgment was used to determine whether or not to qualify results.

## **REVIEW RESULTS**

Five field duplicates analyses were performed on this SDG. The RPD ratings are listed on Tables 8a through 8e as “Good” if the RPD is less than field duplicate QC criteria of 70% (for soils) and as “Poor” if the RPD exceeded the field duplicate QC criteria.

All the results show good precision in the sample pair with the exceptions noted on Tables 8a through 8e. Qualifiers were only added to the field duplicate sample pair results as noted.

## **5. OVERALL ASSESSMENT OF DATA**

All data were reviewed and considered usable with qualification as noted in this report.

**Table 1 - Sample Listing**

Work Order	Matrix	Sample ID	Lab ID	Sample Date	QA/QC	Analysis
580-52160-1	Soil	15MP094SB13	580-52160-1	7/8/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP094SB17	580-52160-2	7/8/2015	MS/MSD	6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP094SB19	580-52160-3	7/8/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP094SB20	580-52160-4	7/8/2015	FD1	6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP095SB04	580-52160-5	7/7/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP095SB05	580-52160-6	7/7/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP095SB10	580-52160-7	7/7/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP095SB11	580-52160-8	7/7/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP095SB13	580-52160-9	7/7/2015	FD2	6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP096SB06	580-52160-10	7/8/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP096SB13	580-52160-11	7/8/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP096SB17	580-52160-12	7/8/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP096SB19	580-52160-13	7/8/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP096SB26	580-52160-14	7/8/2015	FD3	6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP097SB02	580-52160-15	7/8/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP097SB09	580-52160-16	7/8/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP097SB11	580-52160-17	7/8/2015	MS/MSD, FD4	6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP097SB13	580-52160-18	7/8/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP098SB20	580-52160-19	7/9/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP098SB26	580-52160-20	7/9/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP098SB33	580-52160-21	7/9/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP098SB36	580-52160-22	7/9/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP098SB38	580-52160-23	7/9/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP099SB11	580-52160-24	7/9/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP099SB12	580-52160-25	7/9/2015		6010B, 6020A, 7471A, D2216

**Table 1 - Sample Listing**

Work Order	Matrix	Sample ID	Lab ID	Sample Date	QA/QC	Analysis
580-52160-1	Soil	15MP099SB13	580-52160-26	7/9/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP099SB17	580-52160-27	7/9/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP099SB19	580-52160-28	7/9/2015	FD5	6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP100SB09	580-52160-29	7/10/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP100SB11	580-52160-30	7/10/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP100SB17	580-52160-31	7/10/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP100SB19	580-52160-32	7/10/2015	MS/MSD	6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP100SB21	580-52160-33	7/10/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP101SB11	580-52160-34	7/10/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP101SB13	580-52160-35	7/10/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP101SB14	580-52160-36	7/10/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP200SB01	580-52160-37	7/8/2015	FD1	6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP200SB02	580-52160-38	7/7/2015	FD2	6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP200SB03	580-52160-39	7/8/2015	FD3	6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP200SB04	580-52160-40	7/8/2015	FD4	6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP200SB05	580-52160-41	7/9/2015	FD5	6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Water	15MP202RS01	580-52160-42	7/10/2015	Rinsate	6010B, 6020A, 7471A, D2216
580-52160-1	Water	15MP202RS02	580-52160-43	7/10/2015	Rinsate	6010B, 6020A, 7471A, D2216
580-52160-1	Water	15MP202RS03	580-52160-44	7/10/2015	Rinsate	6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15RD21SB05	580-52160-45	7/11/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15RD22SB01	580-52160-46	7/11/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15RD22SB09	580-52160-47	7/11/2015	MS/MSD	6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15SM200RS04	580-52160-48	7/10/2015	Rinsate	6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15SM200SB02	580-52160-49	7/21/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15SM68SB11	580-52160-50	7/16/2015		6010B, 6020A, 7471A, D2216

**Table 1 - Sample Listing**

<b>Work Order</b>	<b>Matrix</b>	<b>Sample ID</b>	<b>Lab ID</b>	<b>Sample Date</b>	<b>QA/QC</b>	<b>Analysis</b>
580-52160-1	Soil	15SM70SB02	580-52160-51	7/18/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15SM71SB12	580-52160-52	7/21/2015		6010B, 6020A, 7471A, D2216
580-52160-1	Soil	15MP094SB11	580-52160-53	7/8/2015		6010B, 6020A, 7471A, D2216, Hg Speciation
580-52160-1	Soil	15MP097SB06	580-52160-54	7/8/2015		6010B, 6020A, 7471A, D2216, Hg Speciation

**Table 2 - List of Samples Qualified for Holding Time Exceedance**

Method	Analyte	Sample IDs	HT	Sampling Date	Analysis Date	Qual
None						

**Table 3a - List of Positive Results for Blank Samples**

Method	Sample ID	Sample Type	Analyte	Result	Analysis Type	Units	PQL
EPA 6020A	MB 198020	AQ	Cobalt	0.0000442	MB	mg/L	0.0004
EPA 6020A	MB 199100	AQ	Cobalt	0.00992	MB	mg/L	0.0004
EPA 6010B	15MP202RS01	AQ	Iron	3.4	Rinsate	mg/L	0.5
EPA 6020A	15MP202RS01	AQ	Chromium	0.014	Rinsate	mg/L	0.0004
EPA 6020A	15MP202RS01	AQ	Copper	0.0033	Rinsate	mg/L	0.0020
EPA 6020A	15MP202RS01	AQ	Manganese	0.036	Rinsate	mg/L	0.0020
EPA 6010B	15MP202RS02	AQ	Iron	2.1	Rinsate	mg/L	0.50
EPA 6020A	15MP202RS02	AQ	Arsenic	0.0013	Rinsate	mg/L	0.0004
EPA 6020A	15MP202RS02	AQ	Manganese	0.023	Rinsate	mg/L	0.0020
EPA 6010B	15MP202RS03	AQ	Iron	0.67	Rinsate	mg/L	0.5
EPA 6020A	15MP202RS03	AQ	Chromium	0.00083	Rinsate	mg/L	0.0004
EPA 6020A	15MP202RS03	AQ	Manganese	0.011	Rinsate	mg/L	0.0020
EPA 6010B	15SM200RS04	AQ	Iron	2.0	Rinsate	mg/L	0.50
EPA 6020A	15SM200RS04	AQ	Copper	0.0048	Rinsate	mg/L	0.0020
EPA 6020A	15SM200RS04	AQ	Chromium	0.0090	Rinsate	mg/L	0.0004
EPA 6020A	15SM200RS04	AQ	Manganese	0.024	Rinsate	mg/L	0.0020
EPA 6020A	15SM200RS04	AQ	Nickel	0.003	Rinsate	mg/L	0.0030

**Table 3b - List of Samples Qualified for Method Blank Contamination**

Method	Sample ID	Analyte	Blank Result	Sample Result	Sample Qual	PQL
EPA 6020A	15MP202RS01	Cobalt	0.0000442	0.00024	U	0.0004
EPA 6020A	15MP202RS02	Cobalt	0.0000442	0.00014	U	0.0004
EPA 6020A	15MP202RS03	Cobalt	0.0000442	0.000073	U	0.0004
EPA 6020A	15SM200RS04	Cobalt	0.0000442	0.00025	U	0.0004

**Table 3c - List of Samples Qualified for Field Blank Contamination**

Method	Sample ID	Analyte	Blank Result	Sample Result	Sample Qual	PQL
None.						

**Table 4 - List of Samples with Surrogates outside Control Limits**

Method	Sample ID	Sample Type	Analyte	Rec.	Low Limit	High Limit	Dil Fac	Sample Qual.
None.								

**Table 5a - List of MS/MSD Recoveries outside Control Limits**

Method	Sample ID	Sample Type	Analyte	Orig. Result	Spike Amount	Rec.	Dil Fac.	Low Limit	High Limit	Sample Qual
EPA 6010B	15MP100SB19	Soil	Aluminum	7400	449	173	1.0	80	120	None – 4X
EPA 6010B	15MP100SB19	Soil	Iron	20000	968	833	1.0	80	120	None – 4X
EPA 6010B	15MP100SB19	Soil	Magnesium	3000	707	164	1.0	80	120	None – 4X
EPA 6010B	15MP100SB19	Soil	Calcium	1700	898	171	1.0	80	120	J+
EPA 6010B	15MP100SB19	Soil	Potassium	550	898	160	1.0	80	120	J+
EPA 7471A	15MP100SB19	Soil	Mercury	28.0	0.172	3602	100	80	120	None – 4X
EPA 6020A	15MP100SB19	Soil	All analytes except Mn	NA	NA	NA	NA	NA	NA	J+ (Mn 4x)
EPA 6010B	15MP097SB11	Soil	Aluminum	7000	416	650	1.0	80	120	None – 4X
EPA 6010B	15MP097SB11	Soil	Iron	21000	916	352	1.0	80	120	None – 4X

**Table 5a - List of MS/MSD Recoveries outside Control Limits**

Method	Sample ID	Sample Type	Analyte	Orig. Result	Spike Amount	Rec.	Dil Fac.	Low Limit	High Limit	Sample Qual
EPA 6010B	15MP097SB11	Soil	Potassium	700	833	128	1.0	80	120	J+
EPA 7471A	15MP097SB13	Soil	Mercury	24.9	0.159	2070	200	80	120	None – 4X
EPA 6010B	15RD22SB09	Soil	Aluminum	6400	435	763	1.0	80	120	None – 4X
EPA 6010B	15RD22SB09	Soil	Iron	15000	956	586	1.0	80	120	None – 4X
EPA 6010B	15RD22SB09	Soil	Calcium	1700	869	137	1.0	80	120	J+
EPA 6010B	15RD22SB09	Soil	Magnesium	2600	870	157	1.0	80	120	J+
EPA 6010B	15RD22SB09	Soil	Potassium	470	869	158	1.0	80	120	J+
EPA 7471A	15RD22SB09	Soil	Mercury	3.5	0.152	473	100	80	120	None – 4X
EPA 6010B	15MP094SB17	Soil	Aluminum	6500	407	1003	1.0	80	120	None – 4X
EPA 6010B	15MP094SB17	Soil	Iron	23000	896	610	1.0	80	120	None – 4X
EPA 6010B	15MP094SB17	Soil	Magnesium	3400	815	243	1.0	80	120	None – 4X
EPA 6010B	15MP094SB17	Soil	Calcium	1900	815	195	1.0	80	120	J+
EPA 6010B	15MP094SB17	Soil	Potassium	730	815	168	1.0	80	120	J+
EPA 6020A	15MP097SB11	Soil	Arsenic	800	218	156	50	80	120	J+
EPA 6020A	15MP097SB11	Soil	Antimony	650	160	538	50	80	120	None – 4X
EPA 6020A	15MP097SB11	Soil	Barium	160	218	141	50	80	120	J+
EPA 6020A	15MP097SB11	Soil	Chromium	24	21.8	151	50	80	120	J+
EPA 6020A	15MP097SB11	Soil	Copper	36	27.2	123	50	80	120	J+
EPA 6020A	15MP097SB11	Soil	Lead	9.9	53.3	126	50	80	120	J+
EPA 6020A	15MP097SB11	Soil	Manganese	330	54	314	50	80	120	None – 4X
EPA 6020A	15MP097SB11	Soil	Nickel	40	54	127	50	80	120	J+
EPA 6020A	15MP097SB11	Soil	Silver	0.12	32	128	50	80	120	J+
EPA 6020A	15MP097SB11	Soil	Vanadium	33	54	136	50	80	120	J+
EPA 6020A	15MP097SB11	Soil	Zinc	93	213	126	50	80	120	J+
EPA 6020A	15RD22SB09	Soil	Arsenic	24	207	122	50	80	120	J+
EPA 6020A	15RD22SB09	Soil	Barium	74	207	141	50	80	120	J+
EPA 6020A	15RD22SB09	Soil	Chromium	20	20.7	182	50	80	120	J+
EPA 6020A	15RD22SB09	Soil	Cobalt	9.4	52	136	50	80	120	J+

**Table 5a - List of MS/MSD Recoveries outside Control Limits**

Method	Sample ID	Sample Type	Analyte	Orig. Result	Spike Amount	Rec.	Dil Fac.	Low Limit	High Limit	Sample Qual
EPA 6020A	15RD22SB09	Soil	Copper	26	26	156	50	80	120	J+
EPA 6020A	15RD22SB09	Soil	Lead	8.2	52	123	50	80	120	J+
EPA 6020A	15RD22SB09	Soil	Manganese	170	52	499	50	80	120	J+
EPA 6020A	15RD22SB09	Soil	Nickel	29	52	151	50	80	120	J+
EPA 6020A	15RD22SB09	Soil	Silver	0.12	31	124	50	80	120	J+
EPA 6020A	15RD22SB09	Soil	Vanadium	30	52	148	50	80	120	J+
EPA 6020A	15RD22SB09	Soil	Zinc	68	207	124	50	80	120	J+
EPA 6020A	15MP094SB17	Soil	Arsenic	1100	169	192	50	80	120	None – 4X
EPA 6020A	15MP094SB17	Soil	Barium	190	188	134	50	80	120	J+
EPA 6020A	15MP094SB17	Soil	Chromium	21	19	162	50	80	120	J+
EPA 6020A	15MP094SB17	Soil	Nickel	44	42	128	50	80	120	J+
EPA 6020A	15MP094SB17	Soil	Vanadium	30	47	126	50	80	120	J+
EPA 6020A	15MP094SB17	Soil	Manganese	380	46.9	292	50	80	120	None – 4X
EPA 6020A	15MP094SB17	Soil	Antimony	2300	141	369	5000	80	120	None – 4X
EPA 7471A	15MP094SB17	Soil	Mercury	120	0.19	7138	200	80	120	None – 4X



**Table 5b - List of Lab and MS Duplicate RPDs outside Control Limits**

Sample ID	Analyte	Method	RPD	RPD Limit	No. of Affected Samples	Samp Qual
15MP100SB19	Potassium	EPA 6010B	21	20	1	J*
15MP100SB19	Sodium	EPA 6010B	25	20	1	J
15MP100SB19	Hg F4 Fraction	Hg SSE	38	35	1	J
15MP100SB19	Hg F5 Fraction	Hg SSE	98	35	1	J
15RD22SB09	Manganese	EPA 6020A	25	20	1	J*
15RD22SB09	Hg F1 Fraction	Hg SSE	49	35	1	J
15RD22SB09	Hg F3 Fraction	Hg SSE	48	35	1	J
15RD22SB09	Hg F5 Fraction	Hg SSE	72	35	1	J
15MP094SB17	Hg F1 Fraction	Hg SSE	47	35	1	J
15MP094SB17	Hg F4 Fraction	Hg SSE	44	35	1	J

\*already qualified due to MS/MSD recoveries.

**Table 6 - List of LCS Recoveries outside Control Limits**

Method	Sample ID	Analyte	%Rec.	Low Limit	High Limit	No. of Affected Samples	Samp Qual
None							

**Table 7 –Samples that were Re-analyzed**

Sample ID	Lab ID	Method	Sample Type	Action
None.				

**Table 8a – Summary of Field Duplicate Results**

Method	Analyte	Units	15MP094SB20	15MP200SB01	RPD	Rating	Sample Qualifier
EPA 6010B	Aluminum	mg/Kg	7300	8900	19.8%	Good	None
EPA 6010B	Calcium	mg/Kg	1600	1600	0.0%	Good	None
EPA 6010B	Iron	mg/Kg	26000	26000	0.0%	Good	None
EPA 6010B	Magnesium	mg/Kg	2300	2900	23.1%	Good	None
EPA 6010B	Potassium	mg/Kg	570	580	1.7%	Good	None
EPA 6020A	Antimony	mg/Kg	410	1300	104.1%	Poor	J
EPA 6020A	Arsenic	mg/Kg	37	48	25.9%	Good	None
EPA 6020A	Barium	mg/Kg	110	140	24.0%	Good	None
EPA 6020A	Beryllium	mg/Kg	0.55	0.54	1.8%	Good	None
EPA 6020A	Cadmium	mg/Kg	0.66	0.60	9.5%	Good	None
EPA 6020A	Chromium	mg/Kg	22	25	12.8%	Good	None
EPA 6020A	Cobalt	mg/Kg	13	15	14.3%	Good	None
EPA 6020A	Copper	mg/Kg	47	48	2.1%	Good	None
EPA 6020A	Lead	mg/Kg	12	14	15.4%	Good	None
EPA 6020A	Manganese	mg/Kg	330	610	59.6%	Good	None
EPA 6020A	Nickel	mg/Kg	44	53	18.6%	Good	None
EPA 6020A	Selenium	mg/Kg	3.2	2.1	41.5%	Good	None
EPA 6020A	Silver	mg/Kg	0.10	0.15	40.0%	Good	None
EPA 6020A	Vanadium	mg/Kg	40	39	2.5%	Good	None
EPA 6020A	Zinc	mg/Kg	100	120	18.2%	Good	None
EPA 7471	Mercury	mg/Kg	1.8	1.1	48.3%	Good	None
D 2216	% solids	%	86	86	0.0%	Good	None

**Table 8b – Summary of Field Duplicate Results**

Method	Analyte	Units	15MP095SB13	15MP200SB02	RPD	Rating	Sample Qualifier
EPA 6010B	Aluminum	mg/Kg	9500	9500	0.0%	Good	None
EPA 6010B	Calcium	mg/Kg	2000	2300	14.0%	Good	None
EPA 6010B	Iron	mg/Kg	19000	26000	31.1%	Good	None
EPA 6010B	Magnesium	mg/Kg	3200	3200	0.0%	Good	None
EPA 6010B	Potassium	mg/Kg	590	600	1.7%	Good	None
EPA 6020A	Antimony	mg/Kg	140	540	117.6%	Poor	J
EPA 6020A	Arsenic	mg/Kg	80	360	127.3%	Poor	J
EPA 6020A	Barium	mg/Kg	160	180	11.8%	Good	None
EPA 6020A	Beryllium	mg/Kg	0.58	0.51	12.8%	Good	None
EPA 6020A	Cadmium	mg/Kg	0.41	0.40	2.5%	Good	None
EPA 6020A	Chromium	mg/Kg	26	31	17.5%	Good	None
EPA 6020A	Cobalt	mg/Kg	13	13	0.0%	Good	None
EPA 6020A	Copper	mg/Kg	49	44	10.8%	Good	None
EPA 6020A	Lead	mg/Kg	13	13	0.0%	Good	None
EPA 6020A	Manganese	mg/Kg	530	660	21.8%	Good	None
EPA 6020A	Nickel	mg/Kg	45	44	2.2%	Good	None
EPA 6020A	Selenium	mg/Kg	1.7	1.5	12.5%	Good	None
EPA 6020A	Silver	mg/Kg	0.14	0.15	6.9%	Good	None
EPA 6020A	Vanadium	mg/Kg	39	39	0.0%	Good	None
EPA 6020A	Zinc	mg/Kg	110	110	0.0%	Good	None
EPA 7471	Mercury	mg/Kg	29	6.4	127.7%	Poor	J
D 2216	% solids	%	86	85	1.2%	Good	None

**Table 8c – Summary of Field Duplicate Results**

Method	Analyte	Units	15MP096SB26	15MP200SB03	RPD	Rating	Sample Qualifier
EPA 6010B	Aluminum	mg/Kg	7100	10000	33.9%	Good	None
EPA 6010B	Calcium	mg/Kg	1800	1700	5.7%	Good	None
EPA 6010B	Iron	mg/Kg	23000	12000	62.9%	Good	None
EPA 6010B	Magnesium	mg/Kg	2800	3900	32.8%	Good	None
EPA 6010B	Potassium	mg/Kg	510	440	14.7%	Good	None
EPA 6020A	Antimony	mg/Kg	60	20	100.0%	Poor	J
EPA 6020A	Arsenic	mg/Kg	71	16	126.4%	Poor	J
EPA 6020A	Barium	mg/Kg	120	160	28.6%	Good	None
EPA 6020A	Beryllium	mg/Kg	0.43	0.42	2.4%	Good	None
EPA 6020A	Cadmium	mg/Kg	0.26	0.36	32.3%	Good	None
EPA 6020A	Chromium	mg/Kg	24	33	31.6%	Good	None
EPA 6020A	Cobalt	mg/Kg	13	9.6	30.1%	Good	None
EPA 6020A	Copper	mg/Kg	31	29	6.7%	Good	None
EPA 6020A	Lead	mg/Kg	8.0	9.2	14.0%	Good	None
EPA 6020A	Manganese	mg/Kg	310	180	53.1%	Good	None
EPA 6020A	Nickel	mg/Kg	36	29	21.5%	Good	None
EPA 6020A	Selenium	mg/Kg	1.6	1.9	17.1%	Good	None
EPA 6020A	Vanadium	mg/Kg	38	44	14.6%	Good	None
EPA 6020A	Zinc	mg/Kg	84	79	6.1%	Good	None
EPA 7471	Mercury	mg/Kg	19	0.90	181.9%	Poor	J
D 2216	% solids	%	83	79	4.9%	Good	None

**Table 8d – Summary of Field Duplicate Results**

Method	Analyte	Units	15MP097SB11	15MP200SB04	RPD	Rating	Sample Qualifier
EPA 6010B	Aluminum	mg/Kg	6700	7300	8.6%	Good	None
EPA 6010B	Calcium	mg/Kg	1800	1600	11.8%	Good	None
EPA 6010B	Iron	mg/Kg	20000	38000	62.1%	Good	None
EPA 6010B	Magnesium	mg/Kg	2900	3000	3.4%	Good	None
EPA 6010B	Potassium	mg/Kg	700	600	15.4%	Good	None
EPA 6020A	Antimony	mg/Kg	650	1100	51.4%	Good	None
EPA 6020A	Arsenic	mg/Kg	800	760	5.1%	Good	None
EPA 6020A	Barium	mg/Kg	160	140	13.3%	Good	None
EPA 6020A	Beryllium	mg/Kg	0.44	0.51	14.7%	Good	None
EPA 6020A	Cadmium	mg/Kg	0.36	0.39	8.0%	Good	None
EPA 6020A	Chromium	mg/Kg	24	23	4.3%	Good	None
EPA 6020A	Cobalt	mg/Kg	14	16	13.3%	Good	None
EPA 6020A	Copper	mg/Kg	36	42	15.4%	Good	None
EPA 6020A	Lead	mg/Kg	9.9	11	10.5%	Good	None
EPA 6020A	Manganese	mg/Kg	330	410	21.6%	Good	None
EPA 6020A	Nickel	mg/Kg	40	53	28.0%	Good	None
EPA 6020A	Selenium	mg/Kg	1.5	1.7	12.5%	Good	None
EPA 6020A	Vanadium	mg/Kg	33	34	3.0%	Good	None
EPA 6020A	Zinc	mg/Kg	93	110	16.7%	Good	None
EPA 7471	Mercury	mg/Kg	110	95	14.6%	Good	None
D 2216	% solids	%	76	87	13.5%	Good	None

**Table 8e – Summary of Field Duplicate Results**

Method	Analyte	Units	15MP099SB19	15MP200SB05	RPD	Rating	Sample Qualifier
EPA 6010B	Aluminum	mg/Kg	1400	2000	35.3%	Good	None
EPA 6010B	Calcium	mg/Kg	890	960	7.6%	Good	None
EPA 6010B	Iron	mg/Kg	37000	41000	10.3%	Good	None
EPA 6010B	Magnesium	mg/Kg	240	490	68.5%	Good	None
EPA 6010B	Potassium	mg/Kg	540	650	18.5%	Good	None
EPA 6020A	Antimony	mg/Kg	25	170	148.7%	Poor	J
EPA 6020A	Arsenic	mg/Kg	200	230	14.0%	Good	None
EPA 6020A	Barium	mg/Kg	120	110	8.7%	Good	None
EPA 6020A	Beryllium	mg/Kg	0.52	0.65	22.2%	Good	None
EPA 6020A	Cadmium	mg/Kg	1.2	0.60	66.7%	Good	None
EPA 6020A	Chromium	mg/Kg	14	20	35.3%	Good	None
EPA 6020A	Cobalt	mg/Kg	14	15	6.9%	Good	None
EPA 6020A	Copper	mg/Kg	53	70	27.6%	Good	None
EPA 6020A	Lead	mg/Kg	9.1	15	49.0%	Good	None
EPA 6020A	Manganese	mg/Kg	1900	540	111.5%	Poor	J
EPA 6020A	Nickel	mg/Kg	46	60	26.4%	Good	None
EPA 6020A	Selenium	mg/Kg	1.2	1.6	28.6%	Good	None
EPA 6020A	Vanadium	mg/Kg	21	35	50.0%	Good	None
EPA 6020A	Zinc	mg/Kg	150	130	14.3%	Good	None
EPA 7471	Mercury	mg/Kg	16	14	13.3%	Good	None
D 2216	% solids	%	88	90	2.2%	Good	None

**DATA REVIEW MEMORANDUM**

**DATE:** March 9, 2016  
**TO:** Mark Longtine, Project Manager, E & E, Seattle, WA  
**FROM:** Steven Elliott, E & E, Pensacola, FL  
**SUBJ:** Data Review: Red Devil Mine

**REFERENCE:**

Project ID	Lab Work Order	Lab
1001095.0002.03 Task 3 - GW/SW Monitoring Summer/Fall	53253-1	TestAmerica – Seattle (Mercury subcontracted to Brooks Rand Labs – Seattle)
1001095.0002.04 Task 4 - Kuskokwim River Sediment		

**1. SAMPLE IDENTIFICATION**

For the sampling activities at Red Devil Mine, Ecology and Environment, Inc. (E & E) collected the samples listed on Table 1. Project-specific matrix spike/matrix spike duplicates (MS/MSD) were designated in the field; the laboratory also identified batch MS/MSD's as batch QC for additional analytical testing. All samples were sent to TestAmerica Labs in Seattle, WA for analysis; select mercury analyses were forwarded to Brooks Rand Labs in Seattle WA. All tables are included at the end of this memorandum.

Data were reviewed for field and laboratory precision, accuracy, and completeness in accordance with procedures and quality control (QC) limits, the current laboratory Quality Assurance Manual (QAM) and current standard operating procedures (SOPs). Laboratory data qualifiers for compound identification and quantitation were accepted. Any additional data review qualifiers added are noted below and listed on the tables at the end of this memorandum. Definitions of all data qualifiers are given in the report.

## Work Orders, Tests and Number of Samples included in this Data Review Memo

Work Orders	Matrix	Test Method	Method Name	Number of Samples
580-53253-1	SW	SM 2540C	TDS	9
580-53253-1	GW & SW	SM 2540D	TSS	32
580-53253-1	GW & SW	SM 2320B	Alkalinity	32
580-53253-1	SW	EPA 9060	TOC	39
580-53253-1	GW & SW	EPA 300.0	Anions	32
580-53253-1	GW & SW	EPA 353.2	Nitrate/Nitrite	32
580-53253-1	SW	EPA 6010B/3005A	Dissolved Metals (ICP_Fld Fltr)	13
580-53253-1	Soil, GW & SW	EPA 6010B/3005A	Total Metals (ICP)	67
580-53253-1	SW	EPA 6020A/3005A	Dissolved Metals (ICP/MS_Fld Fltr)	13
580-53253-1	Soil, GW & SW	EPA 6020A/3005A	Total Metals (ICP/MS)	67
580-53253-1	SW	EPA 7470A	Mercury (Dissolved)	13
580-53253-1	GW & SW	EPA 7470A	Mercury (Total)	35
580-53253-1	Soil	EPA 7471A	Mercury (Total)	32
580-53253-1	GW	EPA 8260C/5030B	VOC	3
580-53253-1	GW	EPA 8270D/3520C	SVOC	3
580-53253-1	GW	ADEC AK101	AK -GRO	3
580-53253-1	GW	ADEC AK102&103	AK – DRO & RRO	3
580-53253-1	Soil	ASTM D422	Grain Size	23
580-53253-1	Soil	Hg SSE (F0-F5)	Subcontract	16
580-53253-1	Water	EPA 1631	Total Mercury	33
580-53253-1	Water	EPA 1631	Dissolved Mercury	29
580-53253-1	Soil	EPA 1630	Methyl Mercury	16
580-53253-1	Solids	SM 2540G	Percent Solids	16
580-53253-1	Solids	ASTM D2216	Percent Moisture	28



## **2. SAMPLE PROCEDURES**

All samples were collected as specified in the work plan and documented on the chain-of-custody (COC) and in field notebooks. Samples were analyzed as specified on the COC. Samples were packaged, shipped and received as specified in the work plan. All samples must be received cold ( $4 \pm 2$ ) °C and in good condition as documented on the Cooler Receipt Form.

## **REVIEW RESULTS**

All sample procedures were followed. All of the coolers containing all water and soil (sediment) samples were received by TestAmerica in good condition and at temperatures of 4 °C or colder. TestAmerica subsequently delivered one cooler each of water samples and soil (sediment) samples to TestAmerica's sub-subcontract lab, Brooks Rand Labs, for selected mercury analyses. The cooler containing the water samples (for EPA Method 1631 analysis) was received at 5.9 °C and the cooler containing 16 soil (sediment) samples (for EPA Method 1630 for methyl mercury and Hg SSE analyses) was received at 7.3 °C. All methyl mercury and Hg SSE results for the 14 soil samples have been qualified as estimated, "J", due to the temperature exceedance. While the data has been qualified, the temperature exceedance was less than 2 °C above the limit indicating the samples were preserved on ice for shipping, although not enough to maintain the required temperature. It is likely the samples were exposed to the slightly elevated temperature for only a short time and results should not have been impacted significantly.

The Method 1631 sample bottle for 0915TB01 was broken while in the custody of the lab. No result has been reported. No other problems with the condition of the samples upon receipt are documented.

## **3. LABORATORY DATA**

### **3.1 HOLDING TIMES**

Holding times are established and monitored to ensure analytical results accurately represent analyte concentrations in a sample at the time of collection. Exceeding the holding time for a sample generally results in a loss of the analyte due to a variety of mechanisms, such as deposition on the sample container walls or precipitation.

## REVIEW RESULTS

All samples were analyzed within the project and method specified holding times for all analytes.

### 3.2 BLANKS

Laboratory and field blank samples are analyzed and evaluated to determine the existence and magnitude of possible contamination during the sampling and analysis process. These results are presented in Table 3 (if applicable). As noted in Table 3a, analyte concentrations in the blanks are generally below the practical quantitation limit (PQL). If the analyte is present in the sample at similar trace levels (less than 5 times the blank concentration), then the analyte is likely a common background contaminant from some phase of the sampling, extraction, or analytical procedure and associated low level sample concentrations are not considered to be site related. Sample results in these cases are qualified as not detected, U.

## REVIEW RESULTS

All laboratory blanks were performed at the required frequency. No analytes were detected in the laboratory blanks with the following exceptions:

- DRO was detected in one Method AK102&103 method blank at a concentration between the MDL and PQL. Associated sample results less than 5 times the blank results have been qualified as not detected, "U" (Table 3b).
- Calcium was detected in one Method 6010 method blank at a concentration between the MDL and PQL. However all associated sample results were either not detected or detected at concentrations greater than 5 times the blank concentration and therefore no qualification was necessary.
- Mercury was detected in the Method 1631 method blank at a concentration between the MDL and PQL; reanalysis confirmed results. Associated detected sample results less than 5 times the blank have been qualified as not detected, "U". A summary of qualified samples is presented in Table 3b.
- A total of ten blanks were submitted with this event: six equipment blanks; three ambient field blanks; and one trip blank.

- For the groundwater samples, two equipment rinsate blanks (one for the submersible pump: 0915RS01GW; and one for the bladder pump: 0915RS02GW) were submitted for the analyses noted in Table 1. Fourteen analytes were detected in each blank. Associated sample results less than 5 times the blank concentration have been qualified as not detected, “U”. Data qualified due to these detections are noted in Table 3c.
- For the groundwater and surface water samples, three ambient field blanks (0915FB01, 0915FB02, 0915FB03) and one trip blank (0915TB01) were submitted for total low level mercury. Mercury was detected in one ambient field blank and the trip blank. However, these results have been qualified due to method blank contamination and are therefore not appropriate for field blank evaluation.
- Surface waters and some groundwater samples were collected using a peristaltic pump with dedicated tubing so no equipment blank was applicable.
- For the soil (sediment) samples, four equipment rinsate blanks (hand scoop: 0915EB01; van Veen sampler: 0915RS03; large auger types 0915RS04; small auger: 0915RS05) were submitted the analyses noted in Table 1.

Blank results reported in mg/L were converted to mg/kg equivalents using the volume of water and weight of soil analyzed. Six analytes were detected in the hand scoop equipment blank; eight in the van Veen sampler blank; five in the large auger blank; and three in the small auger blank. A summary of the detections is presented in Table 3a. All associated sample results were either not detected or detected at levels greater than 5 times the corresponding blank and therefore no qualification was necessary. No soil (sediment samples that were collected using the van Veen sampler were submitted for analysis.

### **3.3 SURROGATE SPIKE RECOVERY**

Laboratory performance for individual samples analyzed for organic compounds is established by means of surrogate spiking activities. Samples are spiked with surrogate compounds prior to preparation and analysis. Unusually low or high surrogate recovery values may indicate some deficiency in the analytical system or that some matrix effects exist, resulting in low or high sample results for target compounds. Sample surrogate recoveries outside QC limits (if applicable) are presented in Table 4.

## **REVIEW RESULTS**

Not applicable for these analyses.

### **3.4 MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS**

The matrix spike and matrix spike duplicate (MS/MSD) analyses are intended to provide information about the effects that the sample matrix exerts on the digestion/extraction and measurement methodology. MS recovery values that do not meet laboratory QC criteria may indicate that sample analyte results are being attenuated in the analysis procedure. These results are presented in Table 5 (if applicable). The potential sample bias may be estimated by noting the degree to which the MS concentration was elevated or lowered in the spike analysis. However, this estimated bias should serve only as an approximation; sample-specific problems may be the cause of the discrepancy, particularly in soil samples. Recoveries of a post-digestion spike or a laboratory control sample (LCS) are used to verify that the analytical methodology is acceptable and that MS recoveries are due to matrix effects. An MSD analysis is performed to evaluate the precision of the sample results. Precision is measured as the relative percent difference (RPD) between analytical results for duplicate samples. The laboratory's failure to produce similar results for MSD samples may indicate that the samples were non-homogeneous (particularly in soil samples), or that method defects may exist in the laboratory's techniques.

## **REVIEW RESULTS**

The MS/MSD sample analyses were performed on sample 0915MW17GW, 0915MW28GW, 0915RD05SW, and 15KR089SD at the required frequency. MS/MSD recoveries were within the control limits generated by the laboratory with the following exceptions:

- The Method 1630 MS/MSD recoveries of total mercury were above laboratory limits in sample 15KR089SD. The parent sample results have been qualified as estimated with a high bias, "J+".
- The Method 1631 MS/MSD RPDs for total mercury were above laboratory limits in samples 0915MW17GW, 0915MW28GW, and 0915RD05SW. The total mercury results in the parent samples have been qualified as estimated, "J".
- The Method 8260 MS/MSD recoveries for toluene, ethyl benzene, and o-xylene were above laboratory limits in sample 0915MW19GW. Parent sample results for

- these analytes were reported as not detected and since the bias was high, no qualification was necessary.
- The Method 8270 MS/MSD recoveries for 16 analytes were below laboratory limits and 2 were above laboratory limits in sample 0915MW19GW; 2 of these analytes had high RPDs as well. Of the 16 analytes below limits, 13 were already qualified as estimated with a low bias due to LCS recoveries. 2,6-Dinitrotoluene, 4-nitroaniline, and nitrobenzene have been qualified as estimated with a low bias, "UJ-"/"J-", in the parent sample. Butyl benzyl phthalate and benzoic acid, detected above laboratory limits, were reported as not detected and since the bias was high, were not qualified.
  - The Method AK102&103 MS/MSD recoveries for DRO was below laboratory limits in sample 0915MW19GW. Parent sample results have been qualified as estimated with a low bias, "J-".
  - The Method 300 MS/MSD recoveries for calcium, fluoride, and sulfate were above laboratory limits in sample 0915MW19GW. Parent sample results have been qualified as estimated with a high bias, "J+".
  - The Method 6010 MS/MSD recoveries for aluminum, calcium, iron, and magnesium were below laboratory limits in sample 15KR089SD; calcium also had a high RPD. However, the sample results were greater than 4 times the spiking concentration and therefore no qualification was necessary. Sodium had a high MS/MSD RPD and parent sample results have been qualified as estimated.
  - The Method 6020 MS/MSD recoveries for 9 analytes were above laboratory limits in sample 15KR089SD. These analytes have been qualified as estimated with high bias, "J+", with the exception of manganese. The manganese result was greater than 4 times the spiking concentration so no qualification was necessary. Eleven analytes had high RPDs. Three of these were qualified due to MS recoveries. Eight analytes have been qualified as estimated, "J", due to the high RPDs.
  - The Method 7470 MS/MSD recoveries for mercury were above laboratory limits in sample 15KR089SD; the RPD was high as well. The parent sample result was greater than 4 times the spiking concentration so no qualification was necessary.
  - The Method 6010 MS/MSD recoveries for aluminum, calcium, iron, magnesium, and potassium were above laboratory limits in sample 15KR097SD. Parent sample results for calcium, magnesium, and potassium have been qualified as

estimated with a high bias, "J+". The sample results for aluminum and iron were greater than 4 times the spiking concentration and therefore no qualification was necessary.

- The Method 6020 MS/MSD recoveries for 6 analytes were above laboratory limits in sample 15KR097SD. These analytes have been qualified as estimated with high bias, "J+", with the exception of manganese. The manganese result was greater than 4 times the spiking concentration so no qualification was necessary.

### **3.5 LABORATORY CONTROL SAMPLE ANALYSIS**

The LCS is analyzed to monitor the efficiency of the digestion/extraction procedure and analytical instrument operation. The ability of the laboratory to successfully analyze an LCS demonstrates that there are no analytical problems related to the digestion/sample preparation procedures and/or instrument operations. Sporadic and marginal QC failures for multiple component methods do not indicate an analytical concern. If recoveries are high and the compounds are not detected in the samples, then no data qualification is required. All recoveries should be above 10% or the non-detect results flagged "UR" as rejected.

### **REVIEW RESULTS**

All LCS analyses performed at the required frequency and within control limits with the following exceptions:

- The Method 8260 LCS recoveries for o-xylene were above laboratory limits. Associated sample results were reported as not detected and since the bias was high, no qualification was necessary.
- The Method 8270 LCS recoveries were below laboratory limits for twelve analytes; nine of those had high duplicate RPDs. Associated sample results have been qualified as estimated with a low bias, "UJ-/J-".

### **3.6 MERCURY SPECIATION ASSESSMENT**

Mercury is extracted from an accurately weighed sediment sample into five different solutions that can be broadly linked to types of mercury compounds based on solubility under the various test conditions. The extractants used are: deionized water (F0 & F1), a synthetic "stomach acid" (F2), 1M potassium hydroxide solution (F3), 12M nitric acid (F4),

and aqua regia (F5). All sample extracts are analyzed in accordance with EPA Method 1631.

## **REVIEW RESULTS**

All data were reviewed and considered usable with qualification as noted in this report with the following exception:

- Sample 15KR089SD had a high lab duplicate RPD in fractions F3, F4, and F5. Associated sample results have been qualified as estimated, "J".

Method blank detections are subtracted out per the method so no qualification was necessary for any method blank detections.

### **3.7 COMPOUND IDENTIFICATION AND QUANTITATION**

Compound identities are assigned by comparing sample compound retention times to retention times from known (standard) compounds and identification of an acceptable mass spectrum. Compounds detected below the PQL in samples should be considered estimated and are qualified "J." The samples with compounds above the linear range were all re-analyzed at a higher dilution factor.

## **REVIEW RESULTS**

All compound identification and quantitation criteria were achieved.

Samples 0915FB03 and 0915TB02 were reanalyzed due to detections. Reanalysis confirmed results.

## **4. FIELD DUPLICATE SAMPLE RESULTS**

Field duplicate samples were collected and analyzed as an indication of overall precision for both field and laboratory. Field duplicate results are summarized in Table 8 (if applicable). The results are expected to have more variability than laboratory duplicates, which measure only laboratory precision. It is expected also that soil field duplicates will exhibit greater variance than water field duplicates due to the difficulties associated with collecting identical field samples. The QC criteria used to assess field duplicate samples for this project was limits of 70% RPD for soils and 40% RPD for waters, or twice the general laboratory duplicate criteria. If a given compound in both the regular sample and

associated field duplicate sample was below the laboratory PQL, or the compound was not detected in one of the samples, then the compound is generally not qualified due to field duplicate precision.

## **REVIEW RESULTS**

Three groundwater, one surface water, and three soil field duplicates were analyzed in this SDG. The RPD ratings are listed on Table 8 as “Good” if the RPD is less than field duplicate QC criteria of 40% for waters and 70% for soils and as “Poor” if the RPD exceeded the field duplicate QC criteria.

All the results show good precision in the sample pairs with the exceptions noted in Tables 8a through 8g.

## **5. OVERALL ASSESSMENT OF DATA**

All data were reviewed and considered usable with qualification as noted in this report.

All of the coolers containing all water and soil (sediment) samples were received by TestAmerica in good condition and at temperatures of 4 °C or colder. TestAmerica subsequently delivered one cooler each of water samples and soil (sediment) samples to TestAmerica’s sub-subcontract lab, Brooks Rand Labs for selected mercury analyses. The cooler containing the water samples (for EPA Method 1631 analysis) was received at 5.9 °C and the cooler containing 14 soil (sediment) samples (for EPA Method 1630 for methyl mercury and Hg SSE analyses) was received at 7.3 °C. All methyl mercury and Hg SSE results for the 14 soil samples have been qualified as estimated, “J”, due to the temperature exceedance. While the data has been qualified, the temperature exceedance was less than 2 °C above the limit indicating the samples were preserved on ice for shipping, although not enough to maintain the required temperature. It is likely the samples were exposed to the slightly elevated temperature for only a short time and results should not have been impacted significantly.



**Table 1 - Sample Listing**

Work Order	Matrix	Sample ID	Lab ID	Sample Date	QA/QC	Analysis
580-53253-1	GW	0915MW01GW	580-53253-5	9/3/2015	RS01	6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW06GW	580-53253-6	9/8/2015		6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW08GW	580-53253-7	9/8/2015		6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW09GW	580-53253-8	9/9/2015	RS02	6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW10GW	580-53253-9	9/5/2015	FD1, RS01	6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW16GW	580-53253-10	9/5/2015	RS01	6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW17GW	580-53253-11	9/5/2015	RS01	6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW19GW	580-53253-12	9/8/2015	MS/MSD	8260, 8270, AK101, 102, 103, 6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW22GW	580-53253-13	9/9/2015		8260, 8270, AK101, 102, 103, 6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW26GW	580-53253-14	9/4/2015	RS01	6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW27GW	580-53253-15	9/4/2015	RS01	6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW28GW	580-53253-16	9/4/2015	RS01	6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW29GW	580-53253-17	9/7/2015	RS02	6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW31GW	580-53253-18	9/6/2015	RS01	6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW32GW	580-53253-19	9/8/2015		6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	GW	0915MW33GW	580-53253-20	9/8/2015		6010, 6020, 7470, 300, 353.2, 2320, 2540D, 1631 (T&D)

**Table 1 - Sample Listing**

Work Order	Matrix	Sample ID	Lab ID	Sample Date	QA/QC	Analysis
580-53253-1	GW	0915MW40GW	580-53253-21	9/6/2015	RS02	6010, 6020, 7470, 300, 353.2, 2320, 2540D,1631 (T&D)
580-53253-1	GW	0915MW42GW	580-53253-22	9/6/2015	RS02	6010, 6020, 7470, 300, 353.2, 2320, 2540D,1631 (T&D)
580-53253-1	GW	0915MW43GW	580-53253-23	9/6/2015	FD2, RS02	6010, 6020, 7470, 300, 353.2, 2320, 2540D,1631 (T&D)
580-53253-1	GW	0915MW50GW	580-53253-24	9/5/2015	FD1, RS01	6010, 6020, 7470, 300, 353.2, 2320, 2540D,1631 (T&D)
580-53253-1	GW	0915MW51GW	580-53253-25	9/6/2015	FD2, RS02	6010, 6020, 7470, 300, 353.2, 2320, 2540D,1631 (T&D)
580-53253-1	SW	0915RD52GW	580-53253-26	9/9/2015		8260, 8270, AK101, 102, 103,
580-53253-1	SW	0915RD05SW	580-53253-27	9/9/2015		6010(T&D), 6020 (T&D), 7470(T&D), 300, 353.2, 2320, 2540(C&D), 9060, 1631 (T&D)
580-53253-1	SW	0915RD06SW	580-53253-28	9/9/2015		6010(T&D), 6020 (T&D), 7470(T&D), 300, 353.2, 2320, 2540(C&D), 9060, 1631 (T&D)
580-53253-1	SW	0915RD08SW	580-53253-29	9/9/2015		6010(T&D), 6020 (T&D), 7470(T&D), 300, 353.2, 2320, 2540(C&D), 9060, 1631 (T&D)
580-53253-1	SW	0915RD09SW	580-53253-30	9/9/2015		6010(T&D), 6020 (T&D), 7470(T&D), 300, 353.2, 2320, 2540(C&D), 9060, 1631 (T&D)
580-53253-1	SW	0915RD10SW	580-53253-31	9/9/2015		6010(T&D), 6020 (T&D), 7470(T&D), 300, 353.2, 2320, 2540(C&D), 9060, 1631 (T&D)
580-53253-1	SW	0915RD14SW	580-53253-32	9/9/2015		6010(T&D), 6020 (T&D), 7470(T&D), 300, 353.2, 2320, 2540(C&D), 9060, 1631 (T&D)
580-53253-1	SW	0915RD15SW	580-53253-33	9/9/2015		6010(T&D), 6020 (T&D), 7470(T&D), 300, 353.2, 2320, 2540(C&D), 9060, 1631 (T&D)
580-53253-1	SW	0915RD16SW	580-53253-34	9/9/2015		6010(T&D), 6020 (T&D), 7470(T&D), 300, 353.2, 2320, 2540(C&D), 9060, 1631 (T&D)

**Table 1 - Sample Listing**

Work Order	Matrix	Sample ID	Lab ID	Sample Date	QA/QC	Analysis
580-53253-1	SW	0915RD25SW	580-53253-35	9/9/2015		6010(T&D), 6020 (T&D), 7470(T&D), 300, 353.2, 2320, 2540(C&D), 9060, 1631 (T&D)
580-53253-1	AQ	0915RS01GW	580-53253-36	9/7/2015	Rinsate - Submersible pump	6010(T&D), 6020 (T&D), 7470(T&D), 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	AQ	0915RS02GW	580-53253-37	9/7/2015	Rinsate - Bladder Pump	6010(T&D), 6020 (T&D), 7470(T&D), 300, 353.2, 2320, 2540D, 1631 (T&D)
580-53253-1	AQ	0915FB01	580-53253-2	9/10/2015	Ambient Field Blank	1631 (T)
580-53253-1	AQ	0915FB02	580-53253-3	9/10/2015	Ambient Field Blank	1631 (T)
580-53253-1	AQ	0915FB03	580-53253-4	9/10/2015	Ambient Field Blank	1631 (T)
580-53253-1	AQ	0915TB02	580-53253-42	9/10/2015	Trip Blank	1631 (T)
580-53253-1	Soil	15KR082SD	580-53253-43	9/2/2015		6010, 6020, 7471, 9060, 2216, 422
580-53253-1	Soil	15KR083SD	580-53253-44	9/2/2015		6010, 6020, 7471, 9060, 2216, 422
580-53253-1	Soil	15KR084SD	580-53253-45	9/5/2015	FD5, RS05	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR085SD	580-53253-46	9/5/2015		6010, 6020, 7471, 9060, 2216, 422
580-53253-1	Soil	15KR086SD	580-53253-47	9/2/2015		6010, 6020, 7471, 9060, 2216, 422
580-53253-1	Soil	15KR087SD	580-53253-48	9/6/2015		6010, 6020, 7471, 9060, 2216, 422
580-53253-1	Soil	15KR088SD	580-53253-49	9/2/2015	RS05	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR089SD	580-53253-50	9/6/2015	MS/MSD RS05	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR090SD	580-53253-51	9/3/2015		6010, 6020, 7471, 9060, 2216, 422
580-53253-1	Soil	15KR091SD	580-53253-52	9/6/2015	RS05	6010, 6020, 7471, 9060, 2216, , 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR092SD	580-53253-53	9/3/2015	RS04	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR093SD	580-53253-54	9/6/2015	RS05	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G

**Table 1 - Sample Listing**

Work Order	Matrix	Sample ID	Lab ID	Sample Date	QA/QC	Analysis
580-53253-1	Soil	15KR094SD	580-53253-55	9/3/2015		6010, 6020, 7471, 9060, 2216, 422,
580-53253-1	Soil	15KR095SD	580-53253-56	9/3/2015		6010, 6020, 7471, 9060, 2216, 422,
580-53253-1	Soil	15KR096SD	580-53253-57	9/3/2015	FD3, RS04	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR097SD	580-53253-58	9/3/2015	MS/MSD, RS04	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR098SD	580-53253-59	9/4/2015	RS04	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR099SD	580-53253-60	9/5/2015	FD4	6010, 6020, 7471, 9060, 2216, 422,
580-53253-1	Soil	15KR100SD	580-53253-61	9/4/2015	RS05	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR101SD	580-53253-62	9/4/2015	RS05	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR102SD	580-53253-63	9/5/2015	RS05	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR103SD	580-53253-64	9/5/2015		6010, 6020, 7471, 9060, 2216, 422,
580-53253-1	Soil	15KR104SD	580-53253-65	9/5/2015	RS05	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR105SD	580-53253-66	9/5/2015	RS05	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR106SD	580-53253-67	9/4/2015		6010, 6020, 7471, 2216
580-53253-1	Soil	15KR107SD	580-53253-68	9/4/2015		6010, 6020, 7471, 2216
580-53253-1	Soil	15KR108SD	580-53253-69	9/4/2015	EB	6010, 6020, 7471, 2216
580-53253-1	Soil	15KR109SD	580-53253-70	9/4/2015		6010, 6020, 7471, 2216
580-53253-1	Soil	15KR200SD	580-53253-71	9/4/2015	FD3, RS04	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	Soil	15KR201SD	580-53253-72	9/5/2015	FD4	6010, 6020, 7471, 9060, 2216, 422,
580-53253-1	Soil	15KR202SD	580-53253-73	9/5/2015	FD5, RS05	6010, 6020, 7471, 9060, 2216, 422, Hg Speciation, 1630, 2540G
580-53253-1	AQ	0915EB01	580-53253-1	9/10/2015	Hand Scoop	6010, 6020, 7470, 1630 (T)
580-53253-1	AQ	0915RS03	580-53253-38	9/7/2015	Rinsate van Veen	6010, 6020, 7471, 1630 (T)
580-53253-1	AQ	0915RS04	580-53253-39	9/7/2015	Rinsate Lg auger	6010(T&D), 6020 (T&D), 7470(T&D), 1630 (T)

**Table 1 - Sample Listing**

Work Order	Matrix	Sample ID	Lab ID	Sample Date	QA/QC	Analysis
580-53253-1	AQ	0915RS05	580-53253-40	9/7/2015	Rinsate auger	6010(T&D), 6020 (T&D), 7470(T&D), 1630 (T)

**Table 2 - List of Samples Qualified for Preservation Exceedance**

Analyses	Sample IDs	Cooler Temp (°C)	Temp Limit (°C)	Qual
Hg Speciation, 1630, 2540G	15KR084SD	7.3	6.0	J
Hg Speciation, 1630, 2540G	15KR088SD	7.3	6.0	J
Hg Speciation, 1630, 2540G	15KR089SD	7.3	6.0	J
Hg Speciation, 1630, 2540G	15KR091SD	7.3	6.0	J
Hg Speciation, 1630, 2540G	15KR092SD	7.3	6.0	J
Hg Speciation, 1630, 2540G	15KR093SD	7.3	6.0	J
1630, 2540G	15KR096SD	7.3	6.0	J
Hg Speciation, 1630, 2540G	15KR097SD	7.3	6.0	J
1630, 2540G	15KR098SD	7.3	6.0	J
1630, 2540G	15KR100SD	7.3	6.0	J
1630, 2540G	15KR101SD	7.3	6.0	J
1630, 2540G	15KR102SD	7.3	6.0	J
1630, 2540G	15KR104SD	7.3	6.0	J
1630, 2540G	15KR105SD	7.3	6.0	J
1630, 2540G	15KR200SD	7.3	6.0	J
Hg Speciation, 1630, 2540G	15KR202SD	7.3	6.0	J

**Table 3a - List of Positive Results for Blank Samples**

Method	Sample ID	Sample Type	Analyte	Result	Qual	Anal Type	Units	PQL
AK102&103	580-201180	Method Blank	DRO	0.031	J	MB	mg/L	0.10
EPA 6010	580-202249	Method Blank	Calcium	0.119	J	MB	mg/L	1.1
EPA 1631	MB 151533	Method Blank	Mercury (T&D)	0.50	None	MB	ng/L	0.58
EPA 300	0915RS01GW	Rinsate Blank	Chloride	0.090	J	Water	mg/L	0.50
EPA 300	0915RS01GW	Rinsate Blank	Fluoride	0.030	J	Water	mg/L	0.20
EPA 300	0915RS01GW	Rinsate Blank	Sulfate	410		Water	mg/L	12
EPA 6010	0915RS01GW	Rinsate Blank	Calcium	0.33	J	Water	mg/L	1.1
EPA 6020	0915RS01GW	Rinsate Blank	Antimony	0.0014		Water	mg/L	0.0004
EPA 6020	0915RS01GW	Rinsate Blank	Arsenic	0.0057		Water	mg/L	0.0010
EPA 6020	0915RS01GW	Rinsate Blank	Barium	0.0015		Water	mg/L	0.0012
EPA 6020	0915RS01GW	Rinsate Blank	Cadmium	0.00005	J	Water	mg/L	0.0004
EPA 6020	0915RS01GW	Rinsate Blank	Chromium	0.00081		Water	mg/L	0.0004
EPA 6020	0915RS01GW	Rinsate Blank	Copper	0.0021		Water	mg/L	0.002
EPA 6020	0915RS01GW	Rinsate Blank	Lead	0.00023	J	Water	mg/L	0.0004
EPA 6020	0915RS01GW	Rinsate Blank	Manganese	0.0028		Water	mg/L	0.002
EPA 6020	0915RS01GW	Rinsate Blank	Nickel	0.00089	J	Water	mg/L	0.003
EPA 6020	0915RS01GW	Rinsate Blank	Zinc	0.0055	J	Water	mg/L	0.007
EPA 1631	0915RS01GW	Rinsate Blank	Mercury (T)	41.1	None	Water	ng/L	0.58
EPA 1631	0915RS01GW	Rinsate Blank	Mercury (D)	1.40	J*	Water	ng/L	0.58
EPA 300	0915RS02GW	Rinsate Blank	Chloride	0.14	J	Water	mg/L	0.50
EPA 300	0915RS02GW	Rinsate Blank	Fluoride	0.040	J	Water	mg/L	0.20
EPA 300	0915RS02GW	Rinsate Blank	Sulfate	1500		Water	mg/L	120
EPA 353.2	0915RS02GW	Rinsate Blank	Nitrate/nitrite	0.0084	J	Water	mg/L	0.050
EPA 6010	0915RS02GW	Rinsate Blank	Calcium	0.11	J	Water	mg/L	1.1
EPA 6020	0915RS02GW	Rinsate Blank	Antimony	0.0012		Water	mg/L	0.0004
EPA 6020	0915RS02GW	Rinsate Blank	Arsenic	0.0063		Water	mg/L	0.0010
EPA 6020	0915RS02GW	Rinsate Blank	Barium	0.0012		Water	mg/L	0.0012
EPA 6020	0915RS02GW	Rinsate Blank	Chromium	0.00071		Water	mg/L	0.00040
EPA 6020	0915RS02GW	Rinsate Blank	Copper	0.0013	J	Water	mg/L	0.0020
EPA 6020	0915RS02GW	Rinsate Blank	Lead	0.000096	J	Water	mg/L	0.00040

**Table 3a - List of Positive Results for Blank Samples**

Method	Sample ID	Sample Type	Analyte	Result	Qual	Anal Type	Units	PQL
EPA 6020	0915RS02GW	Rinsate Blank	Manganese	0.0018	J	Water	mg/L	0.0020
EPA 6020	0915RS02GW	Rinsate Blank	Nickel	0.00064	J	Water	mg/L	0.0030
EPA 6020	0915RS02GW	Rinsate Blank	Zinc	0.0051	J	Water	mg/L	0.0070
EPA 1631	0915RS02GW	Rinsate Blank	Mercury (T)	69.7	None	Water	ng/L	0.58
EPA 1631	0915RS02GW	Rinsate Blank	Mercury (D)	2.04	J*	Water	ng/L	0.58
EPA 1631	0915FB03	GW Ambient	Mercury (T)	1.82	J*	Water	ng/L	0.58
EPA 1631	0915TB02	Trip Blank	Mercury (T)	0.88	J*	Water	ng/L	0.58
EPA 6020	0915EB01	Equipment Blank	Antimony	0.000084	J	Water	mg/L	0.00040
EPA 6020	0915EB01	Equipment Blank	Barium	0.00012	J	Water	mg/L	0.0012
EPA 6020	0915EB01	Equipment Blank	Cadmium	0.00041		Water	mg/L	0.00040
EPA 6020	0915EB01	Equipment Blank	Chromium	0.00021	J	Water	mg/L	0.00040
EPA 6020	0915EB01	Equipment Blank	Lead	0.000042	J	Water	mg/L	0.00040
EPA 6020	0915EB01	Equipment Blank	Zinc	0.0019	J	Water	mg/L	0.0070
EPA 6010	0915RS03	Rinsate Blank	Calcium	0.036	J	Water	mg/L	1.1
EPA 6020	0915RS03	Rinsate Blank	Antimony	0.00018	J	Water	mg/L	0.00040
EPA 6020	0915RS03	Rinsate Blank	Barium	0.00072	J	Water	mg/L	0.0012
EPA 6020	0915RS03	Rinsate Blank	Chromium	0.00031	J	Water	mg/L	0.00040
EPA 6020	0915RS03	Rinsate Blank	Copper	0.00076	J	Water	mg/L	0.0020
EPA 6020	0915RS03	Rinsate Blank	Lead	0.00012	J	Water	mg/L	0.00040
EPA 6020	0915RS03	Rinsate Blank	Manganese	0.0040		Water	mg/L	0.0020
EPA 6020	0915RS03	Rinsate Blank	Zinc	0.0033	J	Water	mg/L	0.0070
EPA 6020	0915RS04	Rinsate Blank	Antimony	0.00012	J	Water	mg/L	0.00040
EPA 6020	0915RS04	Rinsate Blank	Barium	0.0083		Water	mg/L	0.0012
EPA 6020	0915RS04	Rinsate Blank	Chromium	0.00042		Water	mg/L	0.00040
EPA 6020	0915RS04	Rinsate Blank	Manganese	0.0013	J	Water	mg/L	0.0020
EPA 6020	0915RS04	Rinsate Blank	Zinc	0.0027	J	Water	mg/L	0.0070
EPA 6020	0915RS05	Rinsate Blank	Barium	0.00026	J	Water	mg/L	0.0012
EPA 6020	0915RS05	Rinsate Blank	Chromium	0.00025	J	Water	mg/L	0.00040
EPA 6020	0915RS05	Rinsate Blank	Manganese	0.00061	J	Water	mg/L	0.0020

\*qualified due to MB contamination and not appropriate for field blank evaluation



**Table 3b - List of Samples Qualified for Method Blank Contamination**

Method	Sample ID	Analyte	Blank Result	Sample Result	Sample Qual	PQL
AK102&103	0915MW19GW	DRO	0.031	0.052	U	0.10
AK102&103	0915MW52GW	DRO	0.031	0.072	U	0.10
EPA 1631	0915MW08GW	Mercury (D)	0.50	0.45	U	0.58
EPA 1631	0915MW19GW	Mercury (D)	0.50	1.15	U	0.58
EPA 1631	0915MW31GW	Mercury (D)	0.50	1.12	U	0.58
EPA 1631	0915MW40GW	Mercury (D)	0.50	1.87	U	0.58
EPA 1631	0915RD05SW	Mercury (D)	0.50	1.48	U	0.58
EPA 1631	0915RD10SW	Mercury (D)	0.50	1.96	U	0.58
EPA 1631	0915RS01GW	Mercury (D)	0.50	1.40	U	0.58
EPA 1631	0915RS02GW	Mercury (D)	0.50	2.04	U	0.58
EPA 1631	0915TB02	Mercury (T)	0.50	0.88	U	1.44
EPA 1631	0915FB03	Mercury (T)	0.50	1.82	U	0.58

**Table 3c - List of Samples Qualified for Field Blank Contamination**

Method	Sample ID	Analyte	Blank Result	Sample Result	Sample Qual	PQL
EPA 300	0915MW01GW	Fluoride	0.030	0.13	U	0.2
EPA 300	0915MW01GW	Sulfate	410	10	U	1.2
EPA 6020	0915MW01GW	Antimony	0.0014	0.0018	U	0.00040
EPA 6020	0915MW01GW	Arsenic	0.0057	0.0068	U	0.001
EPA 6020	0915MW01GW	Cadmium	0.00005	0.00020	U	0.00040
EPA 6020	0915MW01GW	Chromium	0.00081	0.00120	U	0.00040
EPA 6020	0915MW01GW	Copper	0.0021	0.0029	U	0.002
EPA 6020	0915MW01GW	Lead	0.00023	0.00039	U	0.00040
EPA 6020	0915MW01GW	Nickel	0.00089	0.0042	U	0.003

**Table 3c - List of Samples Qualified for Field Blank Contamination**

Method	Sample ID	Analyte	Blank Result	Sample Result	Sample Qual	PQL
EPA 6020	0915MW01GW	Zinc	0.0055	0.016	U	0.007
EPA 300	0915MW10GW	Sulfate	410	7.9	U	1.2
EPA 6020	0915MW10GW	Antimony	0.0014	0.0056	U	0.00040
EPA 6020	0915MW10GW	Cadmium	0.00005	0.000037	U	0.00040
EPA 6020	0915MW10GW	Chromium	0.00081	0.00017	U	0.00040
EPA 6020	0915MW10GW	Lead	0.00023	0.00011	U	0.00040
EPA 300	0915MW16GW	Sulfate	410	220	U	1.2
EPA 6020	0915MW16GW	Cadmium	0.00005	0.0005	U	0.00040
EPA 6020	0915MW16GW	Chromium	0.00081	0.0012	U	0.00040
EPA 6020	0915MW16GW	Copper	0.0021	0.0016	U	0.002
EPA 6020	0915MW16GW	Lead	0.00023	0.00034	U	0.00040
EPA 6020	0915MW16GW	Zinc	0.0055	0.0077	U	0.007
EPA 300	0915MW17GW	Fluoride	0.030	0.12	U	0.2
EPA 6020	0915MW17GW	Sulfate	410	7.1	U	1.2
EPA 6020	0915MW17GW	Arsenic	0.0057	0.0053	U	0.00040
EPA 6020	0915MW17GW	Cadmium	0.00005	0.00013	U	0.00040
EPA 6020	0915MW17GW	Chromium	0.00081	0.00053	U	0.00040
EPA 6020	0915MW17GW	Lead	0.00023	0.00033	U	0.00040
EPA 6020	0915MW17GW	Nickel	0.00089	0.00056	U	0.003
EPA 6020	0915MW17GW	Zinc	0.0055	0.0024	U	0.007
EPA 300	0915MW26GW	Sulfate	410	45	U	1.2
EPA 6020	0915MW26GW	Cadmium	0.00005	0.000076	U	0.00040
EPA 6020	0915MW26GW	Chromium	0.00081	0.00080	U	0.00040
EPA 6020	0915MW26GW	Copper	0.0021	0.00087	U	0.002
EPA 6020	0915MW26GW	Lead	0.00023	0.00011	U	0.00040
EPA 6020	0915MW26GW	Zinc	0.0055	0.0042	U	0.007
EPA 300	0915MW27GW	Sulfate	410	170	U	1.2
EPA 6020	0915MW27GW	Cadmium	0.00005	0.00013	U	0.00040
EPA 6020	0915MW27GW	Chromium	0.00081	0.00068	U	0.00040

**Table 3c - List of Samples Qualified for Field Blank Contamination**

Method	Sample ID	Analyte	Blank Result	Sample Result	Sample Qual	PQL
EPA 6020	0915MW27GW	Zinc	0.0055	0.22	U	0.007
EPA 300	0915MW28GW	Sulfate	410	37	U	1.2
EPA 6020	0915MW28GW	Cadmium	0.00005	0.00003	U	0.00040
EPA 6020	0915MW28GW	Chromium	0.00081	0.0033	U	0.00040
EPA 6020	0915MW28GW	Copper	0.0021	0.0018	U	0.002
EPA 6020	0915MW28GW	Lead	0.00023	0.00045	U	0.00040
EPA 6020	0915MW28GW	Nickel	0.00089	0.010	U	0.003
EPA 6020	0915MW28GW	Zinc	0.0055	0.0051	U	0.007
EPA 6020	0915MW31GW	Fluoride	0.030	0.090	U	0.2
EPA 6020	0915MW31GW	Sulfate	410	0.78	U	1.2
EPA 6020	0915MW31GW	Antimony	0.0014	0.00014	U	0.00040
EPA 6020	0915MW31GW	Arsenic	0.0057	0.00082	U	0.001
EPA 6020	0915MW31GW	Cadmium	0.00005	0.0028	U	0.00040
EPA 6020	0915MW31GW	Chromium	0.00081	0.00093	U	0.00040
EPA 6020	0915MW31GW	Lead	0.00023	0.00033	U	0.00040
EPA 6020	0915MW31GW	Nickel	0.00089	0.0014	U	0.003
EPA 6020	0915MW31GW	Zinc	0.0055	0.0035	U	0.007
EPA 300	0915MW50GW	Sulfate	410	8.0	U	1.2
EPA 6020	0915MW50GW	Antimony	0.0014	0.00060	U	0.00040
EPA 6020	0915MW50GW	Chromium	0.00081	0.00021	U	0.00040
EPA 6020	0915MW50GW	Lead	0.00023	0.00075	U	0.00040
EPA 300	0915MW09GW	Fluoride	0.040	0.17	U	0.2
EPA 300	0915MW09GW	Sulfate	1500	6.9	U	1.2
EPA 6020	0915MW09GW	Arsenic	0.0063	0.0076	U	0.0010
EPA 6020	0915MW09GW	Chromium	0.00071	0.00047	U	0.0004
EPA 6020	0915MW09GW	Copper	0.0013	0.0017	U	0.002
EPA 6020	0915MW09GW	Zinc	0.0051	0.0053	U	0.007
EPA 300	0915MW29GW	Fluoride	0.040	0.14	U	0.2
EPA 300	0915MW29GW	Sulfate	1500	32	U	1.2

**Table 3c - List of Samples Qualified for Field Blank Contamination**

Method	Sample ID	Analyte	Blank Result	Sample Result	Sample Qual	PQL
EPA 6020	0915MW29GW	Antimony	0.0012	0.00023	U	0.0004
EPA 6020	0915MW29GW	Chromium	0.00071	0.00032	U	0.0004
EPA 6020	0915MW29GW	Zinc	0.0051	0.0022	U	0.007
EPA 300	0915MW40GW	Fluoride	0.040	0.23	U	0.2
EPA 300	0915MW40GW	Sulfate	1500	9.3	U	1.2
EPA 6020	0915MW40GW	Chromium	0.00071	0.00037	U	0.0004
EPA 6020	0915MW40GW	Lead	0.000096	0.000075	U	0.0004
EPA 6020	0915MW40GW	Zinc	0.0051	0.0050	U	0.007
EPA 300	0915MW42GW	Fluoride	0.040	0.16	U	0.2
EPA 300	0915MW42GW	Sulfate	1500	17	U	1.2
EPA 6020	0915MW42GW	Chromium	0.00071	0.0016	U	0.0004
EPA 6020	0915MW42GW	Copper	0.0013	0.0014	U	0.002
EPA 6020	0915MW42GW	Lead	0.000096	0.00018	U	0.0004
EPA 6020	0915MW42GW	Zinc	0.0051	0.012	U	0.007
EPA 300	0915MW43GW	Fluoride	0.040	0.19	U	0.2
EPA 300	0915MW43GW	Sulfate	1500	15	U	1.2
EPA 6020	0915MW43GW	Chromium	0.00071	0.0013	U	0.0004
EPA 6020	0915MW43GW	Copper	0.0013	0.00075	U	0.002
EPA 6020	0915MW43GW	Lead	0.000096	0.00010	U	0.0004
EPA 6020	0915MW43GW	Zinc	0.0051	0.0060	U	0.007
EPA 300	0915MW51GW	Fluoride	0.040	0.19	U	0.2
EPA 300	0915MW51GW	Sulfate	1500	15	U	1.2
EPA 6020	0915MW51GW	Chromium	0.00071	0.00034	U	0.0004
EPA 6020	0915MW51GW	Copper	0.0013	0.00061	U	0.002
EPA 6020	0915MW51GW	Lead	0.000096	0.000097	U	0.0004
EPA 6020	0915MW51GW	Zinc	0.0051	0.0064	U	0.007
EPA 1631	0915MW01GW	Mercury (T)	41.1	16.9	U	0.58
EPA 1631	0915MW10GW	Mercury (T)	41.1	26.1	U	0.58
EPA 1631	0915MW31GW	Mercury (T)	41.1	35.5	U	0.58

**Table 3c - List of Samples Qualified for Field Blank Contamination**

Method	Sample ID	Analyte	Blank Result	Sample Result	Sample Qual	PQL
EPA 1631	0915MW50GW	Mercury (T)	41.1	37.2	U	0.58
EPA 1631	0915MW29GW	Mercury (T)	69.7	11.7	U	0.58
EPA 1631	0915MW40GW	Mercury (T)	69.7	30.9	U	0.58
EPA 1631	0915MW42GW	Mercury (T)	69.7	259	U	0.58
EPA 1631	0915MW43GW	Mercury (T)	69.7	74.2	U	0.58
EPA 1631	0915MW51GW	Mercury (T)	69.7	68.2	U	0.58

**Table 4 - List of Samples with Surrogates outside Control Limits**

Method	Sample ID	Sample Type	Analyte	Rec.	Low Limit	High Limit	Dil Fac.	Sample Qual.
None.								

**Table 5a - List of MS/MSD Recoveries outside Control Limits**

Method	Sample ID	Sample Type	Analyte	Orig. Result	Spike Amount	Rec.	Dil Fac.	Low Limit	High Limit	Sample Qual	Reportable
EPA 8260	0915MW19GW	Water	Toluene	ND	5.0	128	1.0	80	126	None	Yes
EPA 8260	0915MW19GW	Water	Ethyl benzene	ND	5.0	133	1.0	79	132	None	Yes
EPA 8260	0915MW19GW	Water	o-Xylene	ND	5.0	141	1.0	72	137	None	Yes
EPA 8270	0915MW19GW	Water	2,4-Dimethylphenol	ND	2.0	21	1.0	30	135	UJ-	Yes
EPA 8270	0915MW19GW	Water	2,4-Dinitrophenol	ND	4.0	0	1.0	50	130	UJ-	Yes
EPA 8270	0915MW19GW	Water	2,4-Dinitrotoluene	ND	2.0	73	1.0	75	125	UJ-	Yes
EPA 8270	0915MW19GW	Water	2,6-Dinitrotoluene	ND	2.0	68	1.0	75	125	UJ-	Yes
EPA 8270	0915MW19GW	Water	2-Nitrophenol	ND	2.0	33	1.0	55	140	UJ-	Yes

**Table 5a - List of MS/MSD Recoveries outside Control Limits**

Method	Sample ID	Sample Type	Analyte	Orig. Result	Spike Amount	Rec.	Dil Fac.	Low Limit	High Limit	Sample Qual	Reportable
EPA 8270	0915MW19GW	Water	3,3'-Dichlorobenzidine	ND	2.0	4	1.0	20	175	UJ-	Yes
EPA 8270	0915MW19GW	Water	3-Nitroaniline	ND	2.0	18	1.0	75	140	UJ-	Yes
EPA 8270	0915MW19GW	Water	4,6-Dinitro-2-methylphenol	ND	4.0	0	1.0	50	125	UJ-	Yes
EPA 8270	0915MW19GW	Water	4-Chloroaniline	ND	2.0	0	1.0	35	175	UJ-	Yes
EPA 8270	0915MW19GW	Water	4-Nitroaniline	ND	2.0	51	1.0	70	125	UJ-	Yes
EPA 8270	0915MW19GW	Water	Acenaphthylene	ND	2.0	34	1.0	65	125	UJ-	Yes
EPA 8270	0915MW19GW	Water	Anthracene	ND	2.0	20	1.0	50	125	UJ-	Yes
EPA 8270	0915MW19GW	Water	Benzo[a]pyrene	ND	2.0	15	1.0	45	125	UJ-	Yes
EPA 8270	0915MW19GW	Water	Benzoic acid	ND	4.0	148	1.0	20	140	None	Yes
EPA 8270	0915MW19GW	Water	Benzyl alcohol	ND	2.0	21	1.0	65	125	UJ-	Yes
EPA 8270	0915MW19GW	Water	Butyl benzyl phthalate	ND	2.0	151	1.0	60	150	None	Yes
EPA 8270	0915MW19GW	Water	Hexachlorocyclopentadiene	ND	2.0	0	1.0	20	125	UJ-	Yes
EPA 8270	0915MW19GW	Water	Nitrobenzene	0.83	2.0	38	1.0	70	125	J-	Yes
AK102&103	0915MW19GW	Water	DRO	0.052	2.0	61	1.0	75	125	J-	Yes
EPA 300	0915MW19GW	Water	Chloride	0.59	50	127	1.0	90	110	J+	Yes
EPA 300	0915MW19GW	Water	Fluoride	0.13	5	120	1.0	90	110	J+	Yes
EPA 300	0915MW19GW	Water	Sulfate	4.8	50	123	1.0	90	110	J+	Yes
EPA 6010	15KR089SD	Soil	Aluminum	8600	364	985	1.0	80	120	None – 4X	Yes
EPA 6010	15KR089SD	Soil	Calcium	3300	728	31	1.0	80	120	None – 4X	Yes
EPA 6010	15KR089SD	Soil	Iron	57000	801	- 1746	1.0	80	120	None – 4X	Yes
EPA 6010	15KR089SD	Soil	Magnesium	6600	728	63	1.0	80	120	None – 4X	Yes
EPA 6020	15KR089SD	Soil	Arsenic	27	168	145	50	80	120	J+	Yes
EPA 6020	15KR089SD	Soil	Antimony	17	126	163	50	80	120	J+	Yes
EPA 6020	15KR089SD	Soil	Barium	96	168	123	50	80	120	J+	Yes
EPA 6020	15KR089SD	Soil	Chromium	23	17	180	50	80	120	J+	Yes

**Table 5a - List of MS/MSD Recoveries outside Control Limits**

Method	Sample ID	Sample Type	Analyte	Orig. Result	Spike Amount	Rec.	Dil Fac.	Low Limit	High Limit	Sample Qual	Reportable
EPA 6020	15KR089SD	Soil	Copper	40	21	202	50	80	120	J+	Yes
EPA 6020	15KR089SD	Soil	Manganese	3800	42	- 2343	50	80	120	None – 4X	Yes
EPA 6020	15KR089SD	Soil	Nickel	51	42	172	50	80	120	J+	Yes
EPA 6020	15KR089SD	Soil	Vanadium	32	42	131	50	80	120	J+	Yes
EPA 6020	15KR089SD	Soil	Zinc	96	168	124	50	80	120	J+	Yes
EPA 7470	15KR089SD	Soil	Mercury	2.1	0.17	2788	10	80	120	None – 4X	Yes
EPA 6010	15KR097SD	Soil	Aluminum	4700	423	433	1.0	80	120	None – 4X	Yes
EPA 6010	15KR097SD	Soil	Calcium	2400	847	312	1.0	80	120	J+	Yes
EPA 6010	15KR097SD	Soil	Iron	12000	931	238	1.0	80	120	None – 4X	Yes
EPA 6010	15KR097SD	Soil	Magnesium	2800	847	149	1.0	80	120	J+	Yes
EPA 6010	15KR097SD	Soil	Potassium	480	847	141	1.0	80	120	J+	Yes
EPA 6020	15KR097SD	Soil	Barium	74	210	142	50	80	120	J+	Yes
EPA 6020	15KR097SD	Soil	Chromium	15	21	133	50	80	120	J+	Yes
EPA 6020	15KR097SD	Soil	Copper	9.3	26	126	50	80	120	J+	Yes
EPA 6020	15KR097SD	Soil	Manganese	340	52	299	50	80	120	None – 4X	Yes
EPA 6020	15KR097SD	Soil	Nickel	18	52	123	50	80	120	J+	Yes
EPA 6020	15KR097SD	Soil	Vanadium	22	52	127	50	80	120	J+	Yes
EPA 1630	15KR089SD	Soil	Methyl Mercury	0.061	93	62	1	65	135	UJ-	Yes

**Table 5b – List of Lab Duplicate and MSD RPDs outside Control Limits**

Sample ID	Analyte	Method	RPD	RPD Limit	No. of Affected Samples	Samp Qual
LCS 580-200775	2,4-Dimethylphenol	EPA 8270	31	20	3	J
LCS 580-200775	2,4-Dinitrophenol	EPA 8270	38	20	3	J
LCS 580-200775	2-Nitrophenol	EPA 8270	33	20	3	J
LCS 580-200775	4,6-Dinitro-2-methylphenol	EPA 8270	37	20	3	J
LCS 580-200775	4-Chloroaniline	EPA 8270	24	20	3	J
LCS 580-200775	Acenaphthylene	EPA 8270	28	20	3	J
LCS 580-200775	Benzo[a]pyrene	EPA 8270	29	20	3	J
LCS 580-200775	Benzyl alcohol	EPA 8270	185	20	3	J
LCS 580-200775	Hexachlorocyclopentadiene	EPA 8270	101	20	3	J
0915MW19GW	2,4-Dimethylphenol	EPA 8270	54	20	1	J
0915MW19GW	Benzo[a]pyrene	EPA 8270	35	20	1	J
15KR089SD	Sodium	EPA 6010	30	20	1	J
15KR089SD	Calcium	EPA 6010	21	20	1	J
15KR089SD	Arsenic	EPA 6020	56	20	1	J
15KR089SD	Antimony	EPA 6020	48	20	1	J
15KR089SD	Barium	EPA 6020	31	20	1	J
15KR089SD	Beryllium	EPA 6020	24	20	1	J
15KR089SD	Cadmium	EPA 6020	30	20	1	J
15KR089SD	Cobalt	EPA 6020	21	20	1	J
15KR089SD	Lead	EPA 6020	24	20	1	J
15KR089SD	Manganese	EPA 6020	24	20	1	None – 4X
15KR089SD	Selenium	EPA 6020	30	20	1	J
15KR089SD	Silver	EPA 6020	29	20	1	J
15KR089SD	Thallium	EPA 6020	30	20	1	J
15KR089SD	Mercury	7470	122	20	1	None – 4X
15KR097SD	Manganese	EPA 6020	39	20	1	None – 4X
0915MW17GW	Mercury (T)	EPA 1631	27	24	1	J



**Table 5b – List of Lab Duplicate and MSD RPDs outside Control Limits**

Sample ID	Analyte	Method	RPD	RPD Limit	No. of Affected Samples	Samp Qual
0915MW28GW	Mercury (T)	EPA 1631	33	24	1	J
0915RD05SW	Mercury (T)	EPA 1631	32	24	1	J
15KR097SD	Mercury (T)	EPA 1630	41	30	1	J
15KR089SD	Hg Spec (F3)	Hg Speciation	88	35	1	J
15KR089SD	Hg Spec (F4)	Hg Speciation	70	35	1	J
15KR089SD	Hg Spec (F5)	Hg Speciation	85	35	1	J
15KR089SD	Methyl mercury	EPA 1630	42	35	1	J

**Table 6 - List of LCS Recoveries outside Control Limits**

Method	Sample ID	Analyte	%Rec.	Low Limit	High Limit	No. of Affected Samples	Samp Qual
EPA 8260	LCS 580-200928	o-Xylene	128	80	120	3	Det results J+, ND no qual
EPA 8270	LCS 580-200775	2,4-Dimethylphenol	13	30	125	3	UJ-/J-
EPA 8270	LCS 580-200775	2,4-Dinitrophenol	19	24	146	3	UJ-/J-
EPA 8270	LCS 580-200775	2-Nitrophenol	48	55	140	3	UJ-/J-
EPA 8270	LCS 580-200775	3,3'-Dichlorobenzidine	4	20	175	3	UJ-/J-
EPA 8270	LCS 580-200775	3-Nitroaniline	19	22	124	3	UJ-/J-
EPA 8270	LCS 580-200775	4,6-Dinitro-2-methylphenol	13	50	136	3	UJ-/J-
EPA 8270	LCS 580-200775	4-Chloroaniline	1	20	150	3	UJ-/J-
EPA 8270	LCS 580-200775	Acenaphthylene	46	62	125	3	UJ-/J-
EPA 8270	LCS 580-200775	Anthracene	32	50	125	3	UJ-/J-
EPA 8270	LCS 580-200775	Benzo[a]pyrene	20	45	125	3	UJ-/J-
EPA 8270	LCS 580-200775	Benzyl alcohol	3	41	144	3	UJ-/J-
EPA 8270	LCS 580-200775	Hexachlorocyclopentadiene	3	20	125	3	UJ-/J-

**Table 7 –Samples that were Re-analyzed**

Sample ID	Method	Sample Type	Action
0915FB03	EPA 1631	FB	Confirmed
0915TB02	EPA 1631	FB	Confirmed

**Table 8a – Summary of Field Duplicate Results**

Method	Analyte	Units	0915MW10GW	0915MW50GW	RPD	Rating	Sample Qualifier
EPA 300	Chloride	mg/L	0.76	0.75	1.3%	Good	None
EPA 300	Sulfate	mg/L	7.9	8.0	1.3%	Good	None
SM 2320	Alkalinity	mg/L	170	170	0.0%	Good	None
EPA 6010	Calcium	mg/L	21	21	0.0%	Good	None
EPA 6010	Magnesium	mg/L	32	31	3.2%	Good	None
EPA 6010	Sodium	mg/L	3.3	3.2	3.1%	Good	None
EPA 6020	Antimony	mg/L	0.00056	0.00060	6.9%	Good	None
EPA 6020	Arsenic	mg/L	0.10	0.032	103.0%	Poor	J
EPA 6020	Barium	mg/L	0.086	0.086	0.0%	Good	None
EPA 6020	Manganese	mg/L	0.13	0.12	8.0%	Good	None
EPA 1631	Mercury (T)	ng/L	26.1	37.2	35.1%	Good	None
EPA 1631	Mercury (D)	ng/L	32.3	6.43	133.6%	Poor	J

**Table 8b – Summary of Field Duplicate Results**

Method	Analyte	Units	0915MW43GW	0915MW51GW	RPD	Rating	Sample Qualifier
EPA 300	Chloride	mg/L	1.3	1.3	0.0%	Good	None
EPA 300	Sulfate	mg/L	15	15	0.0%	Good	None
SM 2320	Alkalinity	mg/L	120	120	0.0%	Good	None
SM 2540	TSS	mg/L	3.2	3.0	6.5%	Good	None
EPA 6010	Calcium	mg/L	22	22	0.0%	Good	None
EPA 6010	Magnesium	mg/L	17	17	0.0%	Good	None
EPA 6010	Sodium	mg/L	5.3	5.5	3.7%	Good	None
EPA 6020	Antimony	mg/L	0.0092	0.0090	2.2%	Good	None
EPA 6020	Arsenic	mg/L	0.038	0.039	2.6%	Good	None
EPA 6020	Barium	mg/L	0.086	0.087	1.2%	Good	None
EPA 6020	Cobalt	mg/L	0.033	0.034	3.0%	Good	None
EPA 6020	Manganese	mg/L	2.5	2.5	0.0%	Good	None
EPA 6020	Nickel	mg/L	0.10	0.10	0.0%	Good	None
EPA 1631	Mercury (T)	ng/L	74.3	68.2	8.6%	Good	None
EPA 1631	Mercury (D)	ng/L	7.55	4.48	51.0%	Poor	J

**Table 8c – Summary of Field Duplicate Results**

Method	Analyte	Units	0915MW22GW	0915MW52GW	RPD	Rating	Sample Qualifier
EPA 1631	Mercury (T)	ng/L	74.3	68.2	8.6%	Good	None

**Table 8d – Summary of Field Duplicate Results**

Method	Analyte	Units	0915RD14SW	0915RD25SW	RPD	Rating	Sample Qualifier
EPA 300	Chloride	mg/L	0.57	0.50	13.1%	Good	None
EPA 300	Sulfate	mg/L	8.4	8.4	0.0%	Good	None
EPA 353.2	Nitrate/nitrite	mg/L	0.14	0.15	6.9%	Good	None
EPA 9060	TOC	mg/L	2.4	2.4	0.0%	Good	None
SM 2320	Alkalinity	mg/L	86	110	24.5%	Good	None
SM 2540	TDS	mg/L	120	100	18.2%	Good	None
EPA 6010	Calcium (D)	mg/L	20	20	0.0%	Good	None
EPA 6010	Magnesium (D)	mg/L	11	11	0.0%	Good	None
EPA 6020	Antimony (D)	mg/L	0.0086	0.0086	0.0%	Good	None
EPA 6020	Arsenic (D)	mg/L	0.0062	0.0063	1.6%	Good	None
EPA 6020	Barium (D)	mg/L	0.026	0.026	0.0%	Good	None
EPA 6020	Manganese (D)	mg/L	0.015	0.015	0.0%	Good	None
EPA 6010	Calcium (T)	mg/L	20	19	5.1%	Good	None
EPA 6010	Magnesium (T)	mg/L	11	11	0.0%	Good	None
EPA 6020	Antimony (T)	mg/L	0.0085	0.0083	2.4%	Good	None
EPA 6020	Arsenic (T)	mg/L	0.0064	0.0064	0.0%	Good	None
EPA 6020	Barium (T)	mg/L	0.025	0.025	0.0%	Good	None
EPA 6020	Manganese (T)	mg/L	0.020	0.020	0.0%	Good	None
EPA 1631	Mercury (T)	ng/L	10.1	8.43	18.0%	Good	None
EPA 1631	Mercury (D)	ng/L	3.32	4.47	29.5%	Good	None

**Table 8e – Summary of Field Duplicate Results**

Method	Analyte	Units	15KR098SD	15KR200SD	RPD	Rating	Sample Qualifier
EPA 6010	Aluminum	mg/Kg	3700	5300	35.6%	Good	None
EPA 6010	Calcium	mg/Kg	1000	1900	62.1%	Good	None
EPA 6010	Iron	mg/Kg	9800	14000	35.3%	Good	None
EPA 6010	Magnesium	mg/Kg	2100	2900	32.0%	Good	None
EPA 6010	Potassium	mg/Kg	410	460	11.5%	Good	None
EPA 6020	Arsenic	mg/Kg	8.6	14	47.8%	Good	None
EPA 6020	Antimony	mg/Kg	0.85	1.7	66.7%	Good	None
EPA 6020	Barium	mg/Kg	58	65	11.4%	Good	None
EPA 6020	Beryllium	mg/Kg	0.14	0.20	35.3%	Good	None
EPA 6020	Cadmium	mg/Kg	0.14	0.19	30.3%	Good	None
EPA 6020	Chromium	mg/Kg	12	15	22.2%	Good	None
EPA 6020	Cobalt	mg/Kg	4.8	7.6	45.2%	Good	None
EPA 6020	Copper	mg/Kg	7.0	12	52.6%	Good	None
EPA 6020	Lead	mg/Kg	2.6	3.8	37.5%	Good	None
EPA 6020	Manganese	mg/Kg	310	420	30.1%	Good	None
EPA 6020	Nickel	mg/Kg	15	22	37.8%	Good	None
EPA 6020	Vanadium	mg/Kg	17	23	30.0%	Good	None
EPA 6020	Zinc	mg/Kg	29	43	38.9%	Good	None
EPA 7471	Mercury	mg/Kg	0.37	2.1	140.1%	Poor	J
EPA 9060	TOC - Quad	mg/Kg	2400	1700	34.1%	Good	None
D 422	Gravel	%	43.2	47.7	9.9%	Good	None
D 422	Course sand	%	15.1	13.9	8.3%	Good	None
D 422	Medium sand	%	17.1	15.7	8.5%	Good	None
D 422	Fine sand	%	23.1	21.9	5.3%	Good	None
D 422	Silt	%	1.1	0.9	20.0%	Good	None
D2216	% Solids	%	81	85	4.8%	Good	None
2540G	% Solids	%	80.09	80.81	0.9%	Good	None

**Table 8f – Summary of Field Duplicate Results**

Method	Analyte	Units	15KR099SD	15KR201SD	RPD	Rating	Sample Qualifier
EPA 6010	Aluminum	mg/Kg	5300	5200	1.9%	Good	None
EPA 6010	Calcium	mg/Kg	1700	2000	16.2%	Good	None
EPA 6010	Iron	mg/Kg	12000	13000	8.0%	Good	None
EPA 6010	Magnesium	mg/Kg	3000	3000	0.0%	Good	None
EPA 6010	Potassium	mg/Kg	510	540	5.7%	Good	None
EPA 6020	Arsenic	mg/Kg	8.4	8.1	3.6%	Good	None
EPA 6020	Antimony	mg/Kg	0.51	0.55	7.5%	Good	None
EPA 6020	Barium	mg/Kg	70	71	1.4%	Good	None
EPA 6020	Beryllium	mg/Kg	0.25	0.23	8.3%	Good	None
EPA 6020	Cadmium	mg/Kg	0.14	0.42	100.0%	Poor	J
EPA 6020	Chromium	mg/Kg	17	16	6.1%	Good	None
EPA 6020	Cobalt	mg/Kg	6.7	6.2	7.8%	Good	None
EPA 6020	Copper	mg/Kg	12	12	0.0%	Good	None
EPA 6020	Lead	mg/Kg	4.6	4.4	4.4%	Good	None
EPA 6020	Manganese	mg/Kg	180	170	5.7%	Good	None
EPA 6020	Nickel	mg/Kg	22	21	4.7%	Good	None
EPA 6020	Selenium	mg/Kg	0.89	0.95	6.5%	Good	None
EPA 6020	Vanadium	mg/Kg	24	24	0.0%	Good	None
EPA 6020	Zinc	mg/Kg	52	49	5.9%	Good	None
EPA 9060	TOC - Quad	mg/Kg	4200	3900	7.4%	Good	None
D 422	Gravel	%	10.4	3.7	95.0%	Poor	J
D 422	Course sand	%	3.5	2.7	25.8%	Good	None
D 422	Medium sand	%	4.6	4.8	4.3%	Good	None
D 422	Fine sand	%	73.4	80.3	9.0%	Good	None
D 422	Silt	%	4.5	6.6	37.8%	Good	None
D 422	Clay	%	3.6	2.1	52.6%	Good	None
D2216	% Solids	%	68	77	12.4%	Good	None
SM 2540G	% Solids	%	80.09	80.81	0.9%	Good	None

**Table 8g – Summary of Field Duplicate Results**

Method	Analyte	Units	15KR084SD	15KR202SD	RPD	Rating	Sample Qualifier
EPA 6010	Aluminum	mg/Kg	5200	5100	1.9%	Good	None
EPA 6010	Calcium	mg/Kg	1600	1600	0.0%	Good	None
EPA 6010	Iron	mg/Kg	19000	19000	0.0%	Good	None
EPA 6010	Magnesium	mg/Kg	2500	2500	0.0%	Good	None
EPA 6010	Potassium	mg/Kg	590	600	1.7%	Good	None
EPA 6020	Arsenic	mg/Kg	510	320	45.8%	Good	None
EPA 6020	Antimony	mg/Kg	920	880	4.4%	Good	None
EPA 6020	Barium	mg/Kg	120	120	0.0%	Good	None
EPA 6020	Beryllium	mg/Kg	0.29	0.29	0.0%	Good	None
EPA 6020	Cadmium	mg/Kg	0.18	0.23	24.4%	Good	None
EPA 6020	Chromium	mg/Kg	19	19	0.0%	Good	None
EPA 6020	Cobalt	mg/Kg	8.0	8.9	10.7%	Good	None
EPA 6020	Copper	mg/Kg	19	21	10.0%	Good	None
EPA 6020	Lead	mg/Kg	6.7	6.3	6.2%	Good	None
EPA 6020	Manganese	mg/Kg	350	320	9.0%	Good	None
EPA 6020	Nickel	mg/Kg	27	31	13.8%	Good	None
EPA 6020	Selenium	mg/Kg	0.88	1.0	12.8%	Good	None
EPA 6020	Vanadium	mg/Kg	23	25	8.3%	Good	None
EPA 6020	Zinc	mg/Kg	54	60	10.5%	Good	None
EPA 7471	Mercury	mg/Kg	31	27	13.8%	Good	None
EPA 9060	TOC - Quad	mg/Kg	4500	5500	20.0%	Good	None
D 422	Gravel	%	48.3	24.7	64.7%	Good	None
D 422	Course sand	%	9.1	14.3	44.4%	Good	None
D 422	Medium sand	%	10.4	15.7	40.6%	Good	None
D 422	Fine sand	%	25.3	35.3	33.0%	Good	None
D 422	Silt	%	5.5	7.7	33.3%	Good	None
D 422	Clay	%	1.5	2.2	37.8%	Good	None
D2216	% Solids	%	82	82	0.0%	Good	None



**Table 8g – Summary of Field Duplicate Results**

<b>Method</b>	<b>Analyte</b>	<b>Units</b>	<b>15KR084SD</b>	<b>15KR202SD</b>	<b>RPD</b>	<b>Rating</b>	<b>Sample Qualifier</b>
2540G	% Solids	%	81.84	76.81	6.3%	Good	None
EPA 1630	Mercury	ng/g	18700	33100	55.6%	Good	None
Hg Speciation	Mercury F1	ng/g	271	244	10.5%	Good	None
Hg Speciation	Mercury F3	ng/g	1680	1960	15.4%	Good	None
Hg Speciation	Mercury F4	ng/g	6000	3720	46.9%	Good	None
Hg Speciation	Mercury F5	ng/g	9140	9790	6.9%	Good	None
Hg Speciation	Methyl mercury	ng/g	0.788	1.05	28.5%	Good	None



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