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EXECUTIVE SUMMARY

The Hanford Waste Treatment and Immobilization Plant (WTP) Low Activity Waste (LAW) vitrification facility will generate an aqueous condensate recycle stream (LAW Melter Off-Gas Condensate) from the primary off-gas system. This stream is a combination of the liquid produced in the Submerged Bed Scrubber (SBS) and Wet Electrostatic Precipitator (WESP). The baseline plan for disposition of this stream during full WTP operations is to send it to the WTP Pretreatment Facility, where it will be blended with LAW, concentrated by evaporation, and recycled to the LAW vitrification facility. However, in the direct feed LAW (DFLAW) scenario, planned disposition of this stream involves evaporating the condensate in a new evaporator at the Effluent Management Facility (EMF) and returning it to the LAW melter. It is important to understand the composition of the effluents from the melter and new evaporator so that the disposition of these streams can be accurately planned and accommodated. Alternate disposition would also eliminate this stream from recycling within WTP when it begins operations and would decrease the LAW vitrification mission duration and quantity of glass waste. Furthermore, alternate disposition of this stream would eliminate recycling of problematic components, and would enable less integrated operation of the LAW melter and the Pretreatment Facilities.

This LAW Melter Off-Gas Condensate stream will contain problematic components that are volatile at melter temperatures and problematic for the glass waste form, such as halides and sulfate, along with entrained, volatile, and semi-volatile metals, such as mercury, arsenic, and selenium. The plan is to have the stream recycle through the melter in order to incorporate the technetium-99 that is partially vaporized. Because this stream will recycle within WTP, these problematic components will accumulate in the Melter Condensate stream, exacerbating their impact on the number of LAW glass containers that must be produced. Diverting the stream reduces the halides and sulfate that get recycled to the melter, and is a key objective of this work. This overall program examines the potential treatment and immobilization of this stream for alternative disposal. The objectives of earlier tasks were to (1) formulate and prepare a simulant of the LAW Melter Off-gas Condensate expected during DFLAW operations, (2) use the simulant in evaporator testing to predict the composition of the effluents from the Effluent Management Facility (EMF) evaporator to aid in planning for their disposition, and (3) produce the evaporator concentrate stream to use in this immobilization testing. The objective of this task was to test immobilization methods for the evaporator bottoms aqueous stream. This document describes the method used to immobilize the simulant produced in the EMF evaporator test and measure the leaching performance of the immobilized waste form for comparison to an assumed disposal criteria (Universal Treatment Standards).

The simulant formulation fed to the evaporator was designated as the “core simulant” plus other additives. The additives were contaminants of concern added prior to evaporation, including arsenic, selenium, mercury, and cyanide. Antifoam was also added to the evaporator in order to determine its impact on the chemistry and waste form.

This work examined three waste form formulations based on previous testing with related simulants: 8 wt% ordinary portland cement (OPC), 47 wt% blast furnace slag (BFS), 45 wt% fly ash (FA) known as Cast Stone formulation; 20 wt% Aquaset® II-GH and 80 wt% BFS; 20 wt% OPC and 80 wt% BFS. These tests successfully produced one waste form that set within five days (Cast Stone formulation); however the other two formulations, Aquaset® II-GH/BFS and OPC/BFS, took approximately eight and fourteen days to set, respectively. All of the formulations treated the simulant to meet the Universal Treatment Standards (UTS) limits for all constituents of concern; however, all three formulations exceeded the Toxicity Characteristic Leaching Procedure (TCLP) limit for selenium (which is approximately six times lower than the UTS limit).

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LIST OF ABBREVIATIONS

BFS	(Ground granulated) blast furnace slag
CoC	Contaminants of Concern
DFLAW	Direct Feed Low-Activity Waste
DI	deionized (water)
DOE	Department Of Energy
EMF	Effluent Management Facility
EPA	Environmental Protection Agency
FA	(Class F) fly ash
g	gram
^{129}I	iodine-129
ICP-OES	inductively coupled plasma – optical emission spectroscopy
L	liter
LAW	low-activity waste
LOD	level of detection
LOQ	level of quantification
M	molar
mg	milligram
mL	milliliter
OPC	ordinary portland cement
ppb	parts per billion
RCRA	Resource Conservation and Recovery Act
SBS	submerged bed scrubber
SRNL	Savannah River National Laboratory
^{99}Tc	technetium-99
TCLP	Toxicity Characteristic Leaching Procedure
UTS	Universal Treatment Standard
VSL	Vitreous State Laboratory
WESP	wet electrostatic precipitator
WRPS	Washington River Protection Solutions
Wt%	weight percent
WTP	Waste Treatment and Immobilization Plant
W/DM	Ratio of water content in the waste to dry mix

1.0 Introduction

1.1 Background

The Hanford Low-Activity Waste Melter Off-Gas Condensate waste stream will be generated in the Waste Treatment and Immobilization Plant (WTP) by condensation and scrubbing of the Low-Activity Waste (LAW) melter off-gas system by a Submerged Bed Scrubber (SBS) and Wet Electrostatic Precipitator (WESP), as shown in Figure 1-1. This stream, which will contain substantial amounts of chloride, fluoride, ammonium, and sulfate ions, as well as technetium-99 (^{99}Tc) and other radionuclides, will get recycled to the LAW melter after evaporation. During direct feed LAW (DFLAW) operations, the evaporation will be performed in the planned Effluent Management Facility (EMF), as shown in Figure 1-2. Most of the evaporator bottoms will be returned to the LAW melter, but some may be returned without evaporation to the tank farms when the EMF evaporator is unavailable. The volatile and corrosive halide and sulfate components that accumulate in this stream are only marginally soluble in glass, [1] and often dictate the LAW glass waste loading, thereby increasing the total quantity of glass canisters produced. The radionuclides present in this stream that are the principal dose contributors for onsite disposal are ^{99}Tc and iodine-129 (^{129}I). [2] These radionuclides are volatile in the melter and accumulate in the LAW condensate system. Diverting this EMF evaporator bottoms stream to an alternate disposal path would have substantial beneficial impacts on the cost, life cycle, and operational complexity of WTP,[3] but disposition of ^{99}Tc and ^{129}I must be appropriately managed.

1.2 Testing Basis and Objective

The scope of this task supports Washington River Protection Solutions (WRPS) in evaluating options for disposition of this EMF evaporator bottoms waste stream. To accomplish this, several steps were performed: (1) a simulant of the SBS/WESP condensate from the LAW melter was generated, (2) the SBS/WESP condensate was evaporated in a laboratory-scale vacuum evaporator, (3) the evaporator bottoms were characterized, (4) the bottoms from the simulant evaporator were immobilized in three candidate waste forms, and (5) the immobilized simulant was tested and analyzed for leaching of hazardous metals using the EPA Method 1311 Toxicity Characteristic Leaching Procedure (TCLP).[4] This document describes the last two steps. Results, for the core simulant, from the first three steps were reported previously.[5,6] Preparation and evaporation of the simulant used in this testing has also been reported previously.[7]

The basis for the simulant of the stream prior to evaporation, was developed using analytical results from melter off-gas condensate samples obtained from two DuraMelter-10 (DM-10) tests at Vitreous State Laboratory (VSL) at the Catholic University of America.[8] During tests at VSL, the SBS and WESP condensate was found to be near neutral pH. Prior to evaporation in the EMF evaporator, the pH will be raised to 12 to minimize corrosion of the evaporator materials.[9] For this phase of testing, an evaporator was used at Savannah River National Laboratory (SRNL) to generate the evaporator bottoms, so that they would resemble the chemistry and speciation of the future facility as much as possible.[7] The evaporated simulant went through the same heating and concentrating cycle, including antifoam addition and any reaction or decomposition chemistry that would occur. This ensured that if any organomercury species form, or any minor components complex with the hazardous metals during the evaporation process, they would also be present in the simulant, and would thus yield more realistic leaching results.

1.3 EMF Evaporator Bottoms Simulant Composition

Evaporator bottoms from the evaporation test were characterized for chemical composition.[7] Most constituents remained soluble, but the solution was slightly hazy solution with a few black flecks, but the insoluble solids was not measured because it was beneath the quantitation limit. Energy Dispersive X-ray analysis indicated that the dark flecks were due to zinc, and the haziness was attributed to the antifoam,

which was cloudy prior to adding to the evaporator. Most of the ammonia had stripped from the bottoms, and the final concentration was found to be approximately 80 mg/L. That test generated approximately 700 mL of simulated EMF evaporator bottoms to be used in this immobilization testing. The slightly hazy simulant was not filtered prior to use in the immobilization tests. The total solids target for the final evaporated simulant was 15 wt% total solids, based on information in the specification for the EMF evaporator at Hanford, as described in the Task Technical and Quality Assurance Plan for this work.[10]

Only inorganic mercury (mercury(II) nitrate) and arsenic (arsenic(III) oxide) were added to the simulant. However, one objective of the testing was to determine if the speciation of these metals changes during evaporation and if this affects the leaching performance of the waste form. Since the alkaline simulant was heated in the evaporator, and an antifoam agent was included (100 mg/L of Xiameter® ACP-3183[a]), it was possible that a change in speciation of mercury and arsenic could have occurred. Organomercury compounds have been found in the tank waste system at SRS,[11] and the evaporator task that preceded this immobilization task examined if these species formed. Samples of the feed, evaporator concentrate, and condensate streams were all sent to Eurofins Frontier Global Sciences for speciation analysis.[6]

[a] Xiameter ACP-3183 is a trademark of Dow Corning, Midland, Michigan, U.S.A.

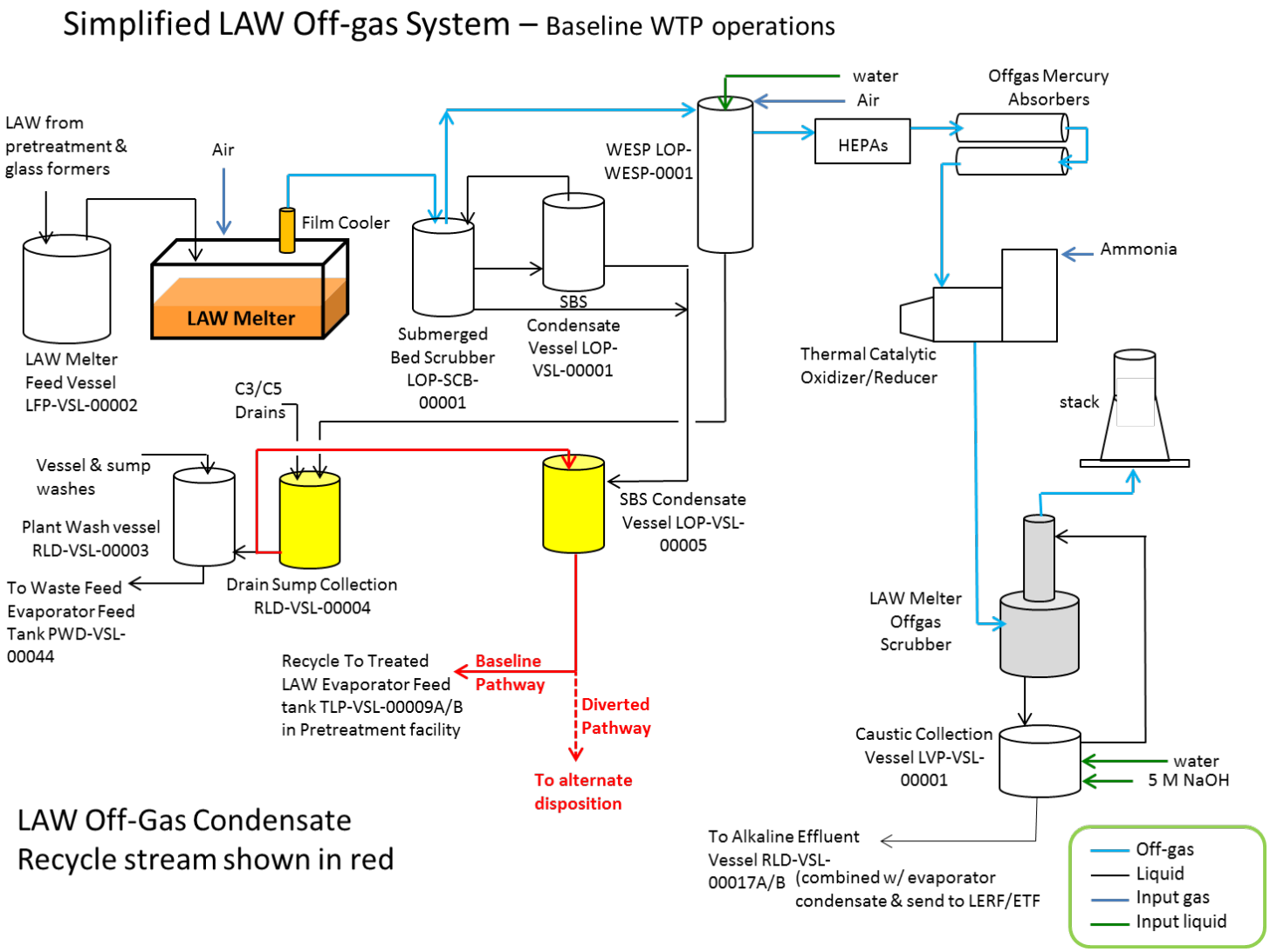

Figure 1-1. Simplified LAW Off-gas System (Note: Yellow indicates SBS/WESP LAW Off-Gas Condensate collection tanks, red lines indicate the collected off-gas condensate pathway, adapted from Reference 12.)

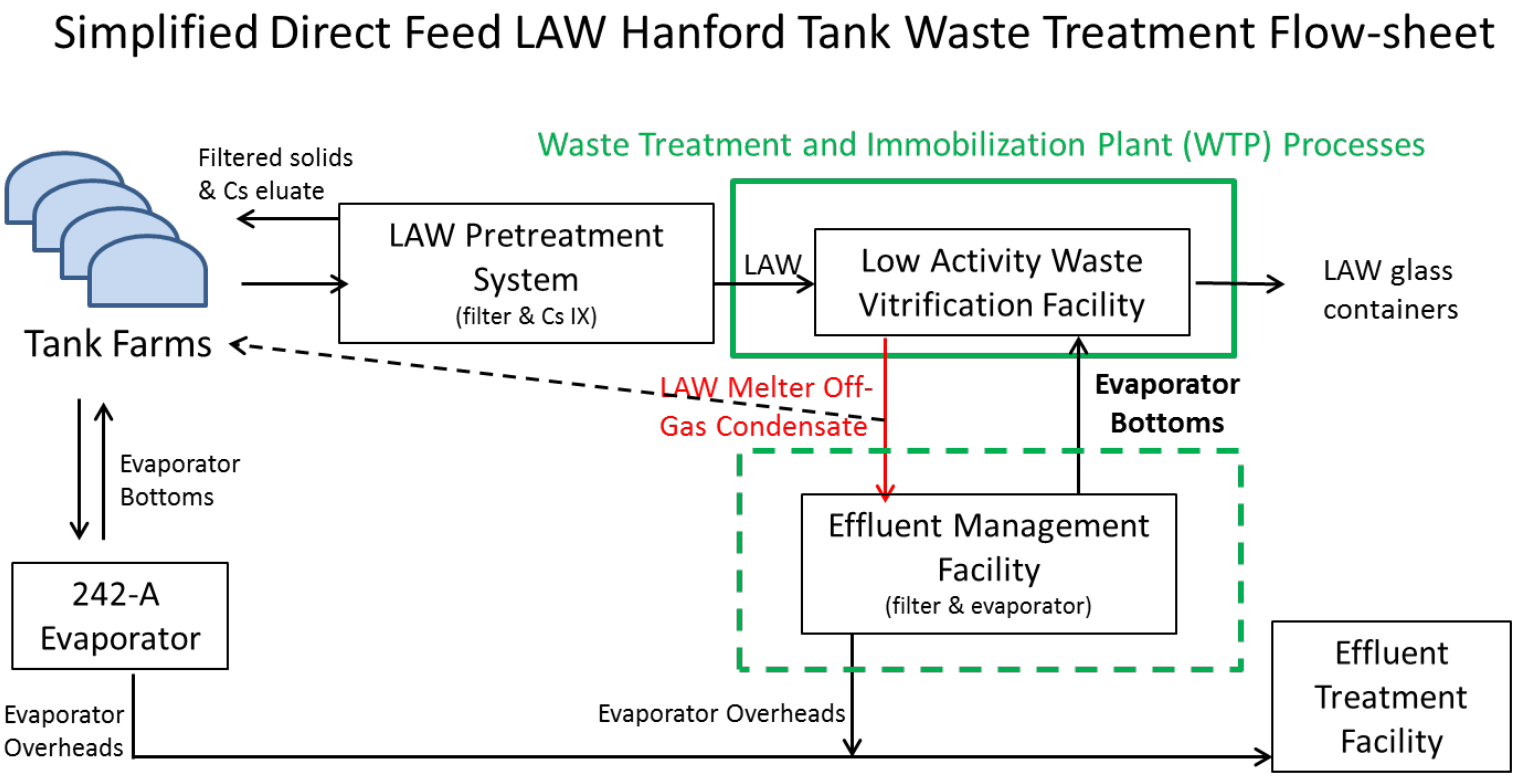

Figure 1-2. Simplified Schematic of the Direct Feed LAW (DFLAW) Scenario.

2.0 Experimental Procedure

2.1 Simulant Preparation and Analysis

Simulant prepared for previous EMF evaporator tests[7] was processed through the lab-scale vacuum evaporator system designed and constructed at SRNL. The simulant was concentrated approximately 6.5X. During the evaporation, antifoam (Xiameter® ACP-3183) was added to the evaporator feed at a dosage of 100 mg/L. Selection of the antifoam and final concentration target for the evaporation were provided by WRPS based on information from the WTP Project.

Analysis of the concentrated simulant was performed on samples collected during the semi-continuous evaporation process. As evaporation progressed, samples of the concentrate were collected each time the pot reached the target weight percent solids concentration, which was 6.5X the feed concentration. Concentrate samples were analyzed separately by Inductively Coupled Plasma – Emission Spectroscopy (ICP-ES) and ion chromatography (IC). Metals were analyzed by diluting samples into 4 vol% nitric acid and anions were analyzed by diluting samples in deionized water (DI). The pH of undiluted samples was measured using an IQ Scientific Instruments meter, model: IQ150, equipped with an ISFET (HACH) stainless steel general purpose probe (model PH77-SS). The density was measured on all six concentrate samples by weighing a known volume of liquid in a volumetric flask. The weight percent (wt%) total solids was measured for concentrate samples by heating a specified amount of each sample to 110 °C using a Mettler Toledo HR83 Halogen Moisture Analyzer until constant weight was achieved. The trace amount of insoluble solids was too low to accurately determine their concentration, but these filtered insoluble solids were examined using a Scanning Electron Microscope and measured with ICP-OES. The solids only partially dissolved when mixed into hydrofluoric acid during the acid digestion for ICP-OES. The details of the solids analysis are documented in another report.[7] Samples of the first fraction of the concentrate from the evaporation step were also prepared and shipped to an off-site laboratory (Eurofins Frontier Global Sciences) for analysis and speciation of mercury and arsenic. Duplicate samples were diluted 25,000:1 (vol:vol) into either DI or dilute hydrochloric acid, depending on the analyte of interest, with acid used when samples needed to be stabilized to prevent degradation or reaction of monomethyl mercury or inorganic arsenic during shipping as specified by the laboratory. The DI used for the dilutions, including that used to dilute the hydrochloric acid, was provided by the Eurofins Frontier Global Sciences to ensure no background contamination of mercury species.

2.2 Simulant Immobilization Tests

Select dry feed formulations were evaluated as candidates for immobilizing the evaporator concentrate simulant. Formulations were selected to meet the treatment technology for stabilization, as defined in the U.S. Code of Federal Regulations governing the U.S. Environmental Protection Agency, which specifies the addition of: (1) ordinary portland cement; or (2) lime / pozzolans (e.g., fly ash and cement kiln dust) as the reagents (or waste reagents) or combinations of reagents to achieve stabilization.[13] The properties of the waste concentrate simulant pertinent to solidification are shown in Table 2-1.

Table 2-1. Average EMF Concentrate Simulant Properties for Solidification.

Property	Value
pH	11.6
Density	1.104 g/ml
Wt % total solids	15.5

Based on previous testing at Pacific Northwest National Laboratory,[14] three mixes were prepared using blends of four solidification agents: Aquaset® II-GH (a blend of granular sepiolite, a non-swelling clay, and ordinary portland cement), fly ash (FA), ordinary portland cement (OPC), and granulated blast

furnace slag (BFS). The Aquaset® II-GH and BFS blend was prepared with 20 wt% Aquaset® II-GH blended with 80 wt% ground granulated blast furnace slag (BFS). The Hanford Supplemental LAW Cast Stone dry blend, 8 wt% OPC, 47 wt% BFS, and 45 wt% FA was tested, as well as 20 wt% OPC combined with 80 wt% BFS. Table 2-2 shows the makeup of each of the solidification agent blends used for initial testing. For the candidate waste forms, W/DM refers to the ratio of the water content of the evaporator simulant to dry materials (solidification reagents) in the waste form formulation.

Table 2-2. Dry Blends Used for Testing

Solidification Reagent	Mass Fraction	Resonant mixing	Dry solid:Simulant (g:g)	W/DM
Aquaset® II-GH/BFS	20/80	No	2:1	0.42
OPC/BFS	20/80	Yes	2:1	0.42
Cast Stone (OPC/BFS/FA)	8/47/45	Yes	2:1	0.42

For these tests, the pH adjustment step recommended in the Aquaset® Process Control Program[15] was omitted because the material made up a significantly small portion of the dry ingredients and it was deemed more valuable to evaluate the reagents ability to solidify the projected waste simulant without additional operations, vapor production, or increase in waste volume. The mix containing Aquaset® reagents was not mixed, per Aquaset® instructions, in order to determine if using this material could have the advantage of avoiding a mixing step in the process. Because of limited availability of the simulant, 75 mL of simulant was used for each mix rather than the recommended 200 mL per Aquaset® instructions.[15] The waste simulant was measured into a polycarbonate container. Initially, approximately two thirds of the reagent blend was cast over the surface of the waste simulant per the Aquaset® instructions.[15] The mix was visually monitored for absorption/swelling of the reagents. After approximately two minutes, the remaining solidification reagent was cast over the simulant, resulting in no observable free water. Mixes not containing Aquaset® reagents were prepared by adding the premeasured dry materials into the waste simulant and mixed in a resonant acoustic mixer.[b] The mixer was operated for approximately one minute after it was observed that the dry materials were fully incorporated into the waste simulant resulting in a visually homogenous mixture.

Replicates of each formulation were made, one for TCLP analysis at an off-site vendor (Southwest Research Institute) and a second for set time determination at SRNL. The TCLP samples were also used to monitor standing free liquid on the samples. Set times for the mixes were measured following a modified version of ASTM C191-13, "Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle".[16] The method was modified such that the measurements were taken at a lower frequency. Whereas the ASTM method was developed for measuring hydraulic cements that reach final set within the first day, waste forms often take several days to set, and therefore the measurements were not as frequent as prescribed. Set measurments were perfomed once or twice daily, depending on shift schedules. The standing free liquid (otherwise known as residual liquid or bleed water) was monitored for all three formulations by visual observation of the samples. Each day the samples were inspected and it was noted if any residual liquid remained on the surface of the samples. Samples were determined to no longer have residual liquid once zero liquid remained on the sample surface.

[b] LabRAM , Resodyne™ Acoustic Mixers, Inc., Butte, MOMTMO

2.3 Quality Assurance

Requirements for performing reviews of technical reports and the extent of review are established in manual E7 2.60. SRNL documents the extent and type of review using the SRNL Technical Report Design Checklist contained in WSRC-IM-2002-00011, Rev. 2. Results are recorded in Electronic Laboratory Notebooks #E7518-00159 and B7899-00070. This report documents completion of scope for FY17 for Task 3.4 in the Task Technical and Quality Assurance Plan.[10]

3.0 Results and Discussion

3.1 Simulant Analysis Results

The EMF Concentrate simulant exhibited a trace amount of insoluble solids, which were found to contain zinc, and the solution was slightly hazy due to the antifoam. More information on these solids can be found in the evaporator test report.[7] The solids were not removed from the simulant used in this testing, and as a result the simulant appeared slightly hazy. Analysis and results of the simulant was performed as part of the evaporation test[7] are reproduced in Table 3-1. The measured ammonium concentration was much lower than the calculated value because it converts to ammonia at the high pH, and most of the ammonia vaporizes and collects in the condensate. Based on analysis of the liquid, about half of the zinc was insoluble, although the chemical form of this zinc is not known. The measured amount of silicon exceeds the calculated value from the simulant because silicon is a constituent in the antifoam. The insoluble silicon is expected to be due to the antifoam, which was milky in appearance prior to being added to the simulant. The silicon concentration in the initial simulant was at the saturation limit, so the added silicon in the antifoam would be expected to cause it to exceed the solubility.

Table 3-1. Compositions of EMF Concentrate Simulant Analysis Results.[7]

Species	Average Concentrate*	
	Results (mg/L)	Std. Dev.
B	5.94E+03	2.16E+02
Cr	2.07E+02	4.79E+00
K	1.59E+04	3.68E+02
Li	2.08E+02	5.38E+00
Na	4.40E+04	1.12E+03
Si	2.41E+01	9.61E+00
Zn	3.54E+02	2.85E+01
As	3.95E+02	1.12E+01
Se	3.77E+02	9.14E+00
Hg	9.27E+01	3.29E+00
NH_4^+	8.53E+01	9.12E+00
Cl^-	1.11E+04	8.16E+01
F^-	2.59E+03	1.68E+01
NO_3^-	6.18E+03	2.87E+01
NO_2^-	3.69E+04	2.27E+02
SO_4^{-2}	1.52E+04	8.54E+01
CN^-	56.4	--
VOA	<0.25	-
Total Carbon	2.12E+02	8.50E+00
Total Inorganic carbon	1.46E+02	6.03E+00
Total Organic carbon	6.60E+01	2.50E+00

VOA = volatile organic analysis; - = standard deviation is not applicable, since these were single measurements; results are average of duplicates of concentrate samples

After the evaporation of the simulant, samples of the first concentrate fraction were sent to Eurofins Frontier Global Sciences for speciation analysis of mercury and arsenic, including organomercury compounds. Analysis results for these samples are shown in Table 3-2 and additional discussion on the results is documented in a previously published report.[7] Although it appears from these results that the total arsenic is significantly higher than the inorganic arsenic, implying that there is organoarsenic present, the difference is attributed to analysis variance. Also, the difference between total and inorganic mercury implies a large amount of mercury is organic or unaccounted for is attributed to the preparation method used for the analysis.

Table 3-2. EMF Concentrate Speciation Analysis from Eurofins.[7]

Analyte	Simulant Analysis Average*(mg/L)	Standard Deviation of duplicate analyses
Total As	437	39
Inorganic As	311	4
Total Hg	78.7	8.3
Dissolved Hg	70.6	9.4
Inorganic Hg	29.4	6.9
Elemental Hg	0.072	0.009
Dimethyl Hg	< 0.00300	--
Methyl Hg	< 0.0290	--

*Average of duplicate analyses

3.2 Immobilization Tests

Testing with the evaporator concentrate simulant was performed using the mixtures of dry solids shown in Table 2-2. For the Aquaset-II GH and BFS mixture, all of the dry feed blend was added to the simulant in order to absorb all of the free liquid (Figure 3-1) per the Aquaset® vendor instructions.[15] Figure 3-2 and Figure 3-3 show the OPC/BFS and Cast Stone OPC/BFS/FA immediately after the addition of the dry blend materials to the EMF concentrate simulant and after mixing for approximately one minute, respectively. It is obvious that all of the simulant was absorbed by the Aquaset® II-GH/BFS mixture (Figure 3-1) and that the one minute of mixing fully incorporated the dry blend and simulant without layering or clumping for the other two mixtures (Figure 3-2, Figure 3-3).

Figure 3-1. Aquaset® II-GH/BFS formulation after addition of dry blend.

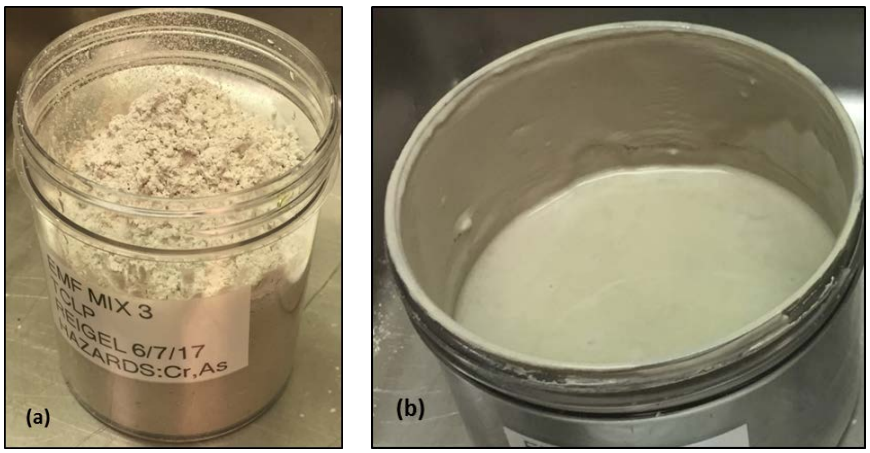

Figure 3-2. OPC/BFS formulation (a) immediately after dry blend addition and (b) after mixing.

Figure 3-3. Cast Stone OPC/BFS/FA formulation (a) immediately after dry blend addition and (b) after mixing.

Final set times for the mixes were measured using ASTM C191-13 method for hydraulic cements as mentioned in Section 2.2. Table 3-3 shows the elapsed time (in hours) for each formulation sample to set, determined via penetration by Vicat needle. The penetration depths of the Vicat needle reported are relative, as the ASTM method only specifies samples as "unset" or "set". For this report, set time was declared when the needle had no penetration (0 mm) into the waste form. It can be seen from the set times that "time to set" was influenced by the type of solidification reagent used. The Cast Stone dry blend set within five days; however, the Aquaset II-GH/BFS and OPC/BFS mixtures did not set within five days. The Aquaset II-GH/BFS set after approximately eight days and the OPC/BFS set after approximately fourteen days (Table 3-3). It should be noted that the three samples were sent to the off-site laboratory for TCLP analysis six days after they were formulated, which means the Aquaset II-GH/BFS and OPC/BFS formulations were shipped prior to those two samples setting.

The residual free liquid was observed once a day on the TCLP samples until all samples had no liquid remaining on top of the sample. The Aquaset® II-GH/BFS formulation had no residual free liquid after the dry feeds were added, while the other two formulations had residual free liquid that was re-absorbed within five days. There was no residual free liquid remaining on any of the TCLP samples that were shipped.

Table 3-3. Set Time Measurements for each of the Formulations Tested with EMF Evaporator Concentrate Simulant.

Elapsed Time	Aquaset® II-GH/BFS 20/80	OPC/BFS 20/80	OPC/BFS/FA 8/47/45
(hr)	Set (mm)		
3	∞	∞	∞
19	∞	∞	∞
27	∞	∞	∞
44	18	∞	19
50	18	∞	17
69	17	∞	1
94	12	∞	SET
101	12	∞	
115	12	∞	
123	10	∞	
139	9	∞	
145	6	18	
163	2	12	
170	1	12	
189	SET	12	
194		12	
212		15	
216		15	
284		12	
289		11	
306		10	
315		10	
330		5	
338		2	
354		SET	

∞ - Infinite penetration – Vicat needle extended full scale

3.3 TCLP Test Results

The waste form formulations using the EMF Evaporator Concentrate simulant were produced in individual sample jars (Figure 3-1 - Figure 3-3) and submitted for TCLP analysis at Southwest Research Institute, an Environmental Protection Agency (EPA) certified laboratory. As mentioned in Section 3.2, the OPC/BFS formulation took approximately fourteen days to set. The off-site laboratory began the TCLP analysis on June 20, which was approximately two days before the OPC/BFS formulation had fully set. Table 3-4 shows the results of the TCLP leachate analysis, for the contaminants of concern (COC), for each of the formulations tested. The full report from Southwest Research Institute is provided in

Appendix A. The table also contains the level of detection (LOD) and level of quantification (LOQ) of the analytical laboratory. The LOD is the minimum concentration of an analyte that can be identified, measured, and reported with 99% confidence that the concentration is above zero. The LOQ is the lowest level at which an analyte may be accurately and reproducibly quantified. Since the final disposal for this waste stream is not determined, the TCLP toxicity characteristic limit and the Universal Treatment Standards (UTS)[c] for each of the analytes is also provided in Table 3-4. However, the land disposal requirements, UTS limits, are expected to apply to the waste forms discussed in this report. Cadmium, lead, and silver results reported for all of the formulations were below the laboratory detection limits (LOD). All solidification agents treated chromium to meet TCLP characteristic and UTS limits, but only the Cast Stone formulation treated the waste simulant for chromium to below the analytical detection limit (LOD). This was expected since chromium can substitute for aluminum in cement phases,[17] immobilizing a portion of the chromium. Barium was detected at non-hazardous levels in every sample. This result was not unexpected as barium is a known component in cement. All of the formulations treated arsenic to meet the TCLP and UTS limits; however, only the OPC/BFS formulation treated the waste simulant for arsenic to below the analytical detection limit. Only the OPC/BFS formulation had a measureable concentration of zinc in the TCLP leachate, but the formulation still treated the waste simulant for zinc to meet the UTS limit. All the formulations treated the waste simulant for mercury to below TCLP and UTS limits. However, while the mercury results for the Cast Stone formulation were greater than the LOD they were still less than the LOQ (Table 3-4). All of the formulations treated the simulant to meet the UTS limits; however, all three formulations exceeded the TCLP characteristic limit for selenium (Table 3-1). This was unexpected, but the concentration of selenium in this simulant is approximately higher than any previous simulant tested with similar formulations,[18] which evidently overwhelmed the ability of the solidification agents to immobilize it. Conversely, the mercury and arsenic apparently react with the BFS to form insoluble species that resist leaching, since they otherwise would have been present in higher concentrations in the leachate. Table 3-5 shows the maximum calculated potential leachate concentration of the COCs with measurable concentrations in the TCLP leachate from Table 3-4 as well as the calculated leach factor for each COC. Leach factors for barium were not calculated since it was not present in the simulant.

[c] Code of Federal Regulations 40CFR 268.48 Universal treatment standards.

Table 3-4. TCLP Results for Formulations Prepared with Evaporator Concentrate Simulant.

CoC	Cast Stone OPC/BFS/FA (μg/L)	Aquaset® II-GH/BFS (μg/L)	OPC/BFS (μg/L)	LOD* (μg/L)	LOQ# (μg/L)	Toxicity Characteristic Limit (μg/L)	UTS (μg/L)
Arsenic (As)	52.4	103	ND	20.0	30.0	5,000	5,000
Barium (Ba)	342	406	693	5.00	10.0	100,000	21,000
Cadmium (Cd)	ND	ND	ND	5.00	10.0	1,000	110
Chromium (Cr)	ND	218	75.0	5.00	10.0	5,000	600
Lead (Pb)	ND	ND	ND	5.00	10.0	5,000	750
Mercury (Hg)	0.133	ND	ND	0.100	0.200	200	25
Selenium (Se)	1070	1040	1270	25.0	40.0	1,000	5,700
Silver (Ag)	ND	ND	ND	10.0	20.0	5,000	140
Zinc (Zn)	ND	ND	2130	5.00	10.0	--	4,200
Amenable Cyanide	9.6	17.5	15.7	--	--	--	30,000
Total Cyanide	22.2	39.1	42.7	--	--	--	590,000

*LOD – Level of Detection; The minimum concentration of an analyte that can be identified, measured, and reported with 99% confidence that the concentration is above zero.
#LOQ – Level of Quantification; The lowest level at which an analyte may be accurately and reproducibly quantitated.

Table 3-5. Calculated Maximum TCLP Release and Leach Factor for Measurable COCs in TCLP Leachate.

CoC	TCLP Leachate Concentrations			Calculated Leach Factor			
	Cast Stone OPC/BFS/FA (μg/L)	Aquaset® II-GH/BFS (μg/L)	OPC/BFS (μg/L)	Max. TCLP Release (μg/L)*	Cast Stone OPC/BFS/FA (%)^	Aquaset® II-GH/BFS (%)^	OPC/BFS (%)^
Arsenic (As)	52.4	103	ND	5966	1%	2%	--
Chromium (Cr)	ND#	218	75.0	3121	--	7%	2%
Mercury (Hg)	0.133	ND	ND	1399	0%	--	--
Selenium (Se)	1070	1040	1270	5687	19%	18%	22%
Zinc (Zn)	ND	ND	2130	5343	--	--	40%
Amenable Cyanide	9.6	17.5	15.7	851	1%	2%	2%
Total Cyanide	22.2	39.1	42.7	851	3%	5%	5%

*Maximum theoretical COC leached from 100g of waste form into 2 L of leachate
ND = not detectable result (result below LOD)
^ Percentage of COC actually leached compared to maximum theoretical TCLP release

4.0 Conclusions and Recommendations

This work examined three waste forms based on previous testing with related simulants. The select dry feed formulations were evaluated as candidates for immobilizing the evaporator concentrate simulant. The Cast Stone formulation set within 5 days; however, the other two formulations, Aquaset® II-GH/BFS and OPC/BFS took approximately eight and fourteen days to set, respectively. The samples were examined for residual free liquid once a day until all samples had no liquid remaining on top of the sample. The Aquaset® II-GH/BFS formulation had no residual free liquid at all, while the other two formulations had residual free liquid that was re-absorbed within five days.

All of the formulations treated the simulant to meet the UTS limits for all constituents of concern; however, all three formulations exceeded the TCLP characteristic limit for selenium. All solidification agents treated the chromium to meet TCLP characteristic and UTS limits, but only the Cast Stone formulation treated the waste simulant for chromium to below the analytical detection limit. All of the formulations treated arsenic to meet the TCLP and UTS limits; however, only the OPC/BFS formulation treated the waste simulant for arsenic to below the analytical detection limit. Only the OPC/BFS formulation had a measureable concentration of zinc in the TCLP leachate, but the formulation still treated the waste simulant for zinc to meet the UTS limit. All the formulations treated the waste simulant for mercury to below TCLP and UTS limits, the mercury results for the Cast Stone formulation were greater than the LOD, and less than the LOQ.

5.0 References

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Appendix A. Results Package from Southwest Research Institute

SOUTHWEST RESEARCH INSTITUTE®

6220 CULEBRA ROAD 78238-5166 • P.O. DRAWER 28510 78228-0510 • SAN ANTONIO, TEXAS, USA • (210) 684-5111 • WWW.SWRI.ORG

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION
DEPARTMENT OF ANALYTICAL AND ENVIRONMENTAL CHEMISTRY

Registered to ISO 9001:2008

June 30, 2017

Savannah River Nuclear Solutions, LLC
6160 Woodside Executive Court
Aiken, South Carolina 29808

Attention: Natalia E. Johnson

Subject:	Contract No.:	78769
	Delivery No:	SWR-17-W-17030
	SDG Number:	616635
	SwRI Project Number:	17995.23.00X
	SwRI Task Order Number:	170620-3
	SwRI Sample Receipt Number:	59875
	Samples Received	06/14/2017
	Line Item(s):	2, 11, 29

Dear Ms. Johnson:

Please find the enclosed results for the three (03) overall samples received on the above referenced date. Should you have any questions, please feel free to contact me at 210-522-3320, or at jacqueline.ranger@swri.org.

Sincerely,

Jackie Ranger
Manager

APPROVED:

Director

JR: mg
Encl

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

CHAIN-OF-CUSTODY

Total Page Count:
Fraction: Line Items) Pages: 2, 11, 29.

CHAIN-OF-CUSTODY

010002 Page 1 of 1

☐ Organic ☐ Aqueous ☐ Soil ☒ Solid ☐ Sludge ☐ gr water ☐ Smears ☐ Swipes ☐ Gas

17030	Customer Name: HILL, KATIE	LQB	Company: SWRI
Contract Number	Customer Department: E&CPT	**Ship to:**	Address:
	Customer Address: 999-W 391		Attention:
	Customer Phone/Beeper: 819-8469 10395		

Savannah River Nuclear Solutions
Aiken, SC 29808
Environmental Services Section
Waste Sample Management Group

COC creation date. 6/5/17

Matrix: S=Soil,SO=Solid,SL=Sludge,O=Organic,A=Aqueous, SM=Smear

Sample Analysis Requested	Sample ID: W-17030-00001 ~~EMF MIX 1 KP~~	Sample ID: W-17030-00002 ~~EMF MIX 2 KP~~	Sample ID: W-17030-00003 ~~EMF MIX 3 KP~~
Collect Date	6/7/17	6/7/17	6/7/17
Collect Time	0800	0800	0800
No. Containers	1	1	1
Matrix	SO	SO	SO
TCLP, 8 RCRA Metals (Prep & Analysis) (33)	✓	✓	✓
Cyanide-Total (spectrophotometric manual) (282)	✓	✓	✓
Cyanide-Amendable	✓	✓	✓
Zinc (ICP) - Total (141)	✓	✓	✓

Client: Savannah River Nuclear Solutions, LLC
SwRI Project # 17995.23.001
VTSR: 06/14/17 10:00
Battery Check: Y
Cooler/Container Wipe: <150 cpm
Total cpm-mR/h (samples): ~150 cpm; <0.5 mR/hr
(see Radioactive Material Receiving Form for more information)

SwRI SRR # 59875
Case: FPEM03575
Sample(s) Received: Intact
Background Check: <150 cpm (Lab 103)
Temp.: 3.5°C (blue ice) / SN # 021055
Wipe Frisk Description: Coolers - (1)

TAT Days	Activity Code	Comments	RAD SCREEN REQUIRED?	STR Authorization
28	08YRL3C06I	EMF MIX 1-00001, EMF MIX 2-00002 EMF MIX 3-00003	NO	

1 Relinquished by:	Date/Time	Received by:	2 Relinquished by:	Date/Time	Received by:
	Date 6/13/17			Date 6/13/17	
	Time 0830			Time 1000	
	Date/Time			Date/Time	
(Print)	06/14/17		(Print)		(Print)
(Sign)	Time 10:00		(Sign)	Time	(Sign)

010003

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

SAMPLE RECEIPT PAPERWORK

010004

Southwest Research Institute

Laboratory Task Order

TO #: 170620-3 Revision: 0

Project(s): 17995.23.001
Manager(s): DAMMANN, MIKE
To Client: 06/27/17

SDG: 616635
VTSR: 06/14/17
CASE: 17030

SRR #'s: 59875
Client(s): Savannah River Nuclear Solutions, LLC

Instructions

Savannah River Nuclear Solutions, LLC. Contract 78769. Release Order # SWR-17-W-17030.
SDG is 616635

14-day TAT. Using 13-day TAT for Report/EDD.
FINAL DATA/HARDCOPY IS DUE TO THE CLIENT ON 06/28/2017.

3 overall samples were received on 06/14/17.

****
Samples are non-radiological simulated material made up of cement, fly ash, blast furnace slag and Aquaset II GH and salt solution.
****
PER REQUEST:
_ Pay Item: 2 _ TCLP Metals As, Ba, Cd, Cr, Pb, Hg, Se, Ag
_ Pay Item: 29 _ ICP Metals 6010 _ Zn
_ Pay Item: 11 _ EPA 9012B Total and Amenable Cyanide

See SAVANNAH SOW EC & ACP for all requirements.
3.1.2.7 Analytical Requirements
3.1.2.11.1 Analytical Data Report
3.1.2.11.2 Laboratory Case Narrative
CONTACT: Ms. Natalia Johnson, natalia.johnson@srs.gov, 803.952.6203

Documents Related to this task order: 223472[COC for SRR 59875], 223473[Paperwork for SRR 59875]

Deliverables --> Hard Copy: no EDD: no PDF: -YES-

Test: AMENCN_9012 Holding: 14 days from CED
Section: WETCHEM **Amenable Cyanide by SW846 9012** Cnt: 3

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
616635		1	Solid	W-17030-00001	07 Jun 17	21 Jun 17
616636		1	Solid	W-17030-00002	07 Jun 17	21 Jun 17
616637		1	Solid	W-17030-00003	07 Jun 17	21 Jun 17

Test: CN_9012B Holding: 14 days from CED
Section: WETCHEM **Cyanide by Method 9012B (Automated)** Cnt: 3

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
616635		1	Solid	W-17030-00001	07 Jun 17	21 Jun 17
616636		1	Solid	W-17030-00002	07 Jun 17	21 Jun 17
616637		1	Solid	W-17030-00003	07 Jun 17	21 Jun 17

Test: CVAA-HG_7470A-TCLP Holding: 28 days from CED
Section: METALS **CVAA Method 7470A Mercury on TCLP Extract** Cnt: 3

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
616635		1	Solid	W-17030-00001	07 Jun 17	05 Jul 17
616636		1	Solid	W-17030-00002	07 Jun 17	05 Jul 17
616637		1	Solid	W-17030-00003	07 Jun 17	05 Jul 17

Test: DIG-3010A-TCLP Holding: 180 days from CED
Section: METALPREP **Digestion Method 3010A ICP Total Metals on TCLP Extract** Cnt: 3

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
616635		1	Solid	W-17030-00001	07 Jun 17	04 Dec 17

Southwest Research Institute

Laboratory Task Order

TO #: 170620-3 Revision: 0

Project(s): 17995.23.001
Manager(s): DAMMANN, MIKE
To Client: 06/27/17

SDG: 616635
VTSR: 06/14/17
CASE: 17030

SRR #'s: 59875
Client(s): Savannah River Nuclear Solutions, LLC

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
616636		1	Solid	W-17030-00002	07 Jun 17	04 Dec 17
616637		1	Solid	W-17030-00003	07 Jun 17	04 Dec 17

Test: DIG-7470A-TCLP
Section: METALPREP

Holding: 28 days from CED

Digestion Method 7470A on TCLP Extract for Total Mercury

Cnt: 3

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
616635		1	Solid	W-17030-00001	07 Jun 17	05 Jul 17
616636		1	Solid	W-17030-00002	07 Jun 17	05 Jul 17
616637		1	Solid	W-17030-00003	07 Jun 17	05 Jul 17

Test: EXT-1311
Section: METALPREP

Holding: 28 days from CED

Extraction TCLP Metals

Cnt: 3

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
616635		1	Solid	W-17030-00001	07 Jun 17	05 Jul 17
616636		1	Solid	W-17030-00002	07 Jun 17	05 Jul 17
616637		1	Solid	W-17030-00003	07 Jun 17	05 Jul 17

Test: ICP-6010D-TCLP
Section: METALS

Holding: 180 days from CED

ICP Method 6010D on TCLP Extract

Cnt: 3

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
616635		1	Solid	W-17030-00001	07 Jun 17	04 Dec 17
616636		1	Solid	W-17030-00002	07 Jun 17	04 Dec 17
616637		1	Solid	W-17030-00003	07 Jun 17	04 Dec 17

Sample Receipt

Southwest Research Institute

Project: 17995.23.001
Case #: 17030
Client: Savannah River Nuclear Solutions, LLC

Sample Receipt Number: 59875
Revision: 1

This Receipt was Revised 06/20/2017

VTSR: 06/14/17

Time: 10:00:00

Manager: DAMMANN, MIKE
Logged in by: DXGARCIA
Creation Date: 06/14/17

Notes

Samples were received intact.

Fed Ex Tracking #(s): - 3.5°C (blue ice)
7793 8706 4070

Test requirements located on Task Order.

See chain-of-custody as part of the SRR system for more information.

ALL SAMPLE CONTAINERS / APPLICABLE ITEMS WERE RECEIVED OK.

Phases:
001 - admin
006 - metals/radchem
007 - drg
REVISION 1, DRmz 06/20/17: SRR revised to change the matrix from soil to SOLID.

Background CPM: <150 cpm
Container Wipe CPM: <150 cpm
Total CPM: <150

System ID	Customer ID	CED	Matrix	Containers	Special Reqs.
616635	W-17030-00001	06/07/17	Solid	1	
616636	W-17030-00002	06/07/17	Solid	1	
616637	W-17030-00003	06/07/17	Solid	1	

Containers: 3

Samples: 3

These documents are associated with this receipt: 223472[COC for SRR 59875], 223473[Paperwork for SRR 59875]

Thermometer: 021055
Temperature: 3.5

Page Printed: 06/30/2017 15:12
ver: (4/10/2017)

59875 Savannah River Nuclear Solut

Southwest Research Institute

Sample Custodian Signature: _____

1. Custody Seal	Present	
2. Chain of Custody	Present	
3. Sample Tags	Not Present	N/A
Sample Tag Numbers	Not on COC	
4. SMO Forms	Present	

Client: Savannah River Nuclear Solutions, LLC

Project: 17995.23.001

Case: 17030 / SDG: See T.O.

Sample Receipt: 59875

Airbill: 7793 8706 4070

Custody Seal #(s): N/A

Date Received	Time Received	COC Record	SMO Sample #	Corresponding		Traffic Rpt, Tags, COC Agree	Sample Condition
				Sample Tag #	SwRI #		
06/14/17	10:00:00	17030	W-17030-00001	N/A	616635	YES	Intact
06/14/17	10:00:00	17030	W-17030-00002	N/A	616636	YES	Intact
06/14/17	10:00:00	17030	W-17030-00003	N/A	616637	YES	Intact

010008

SAMPLE LOG-IN SHEET

Lab Name: Southwest Research Institute	Page 1 of 1
Received By (Print Name): DAVID GARCIA	Log-in Date: 06/14/2017
Received By (Signature):	
Case Number: 17030	Sample Delivery Group No.: N/A
	SAS Number: N/A

Remarks: 17995.23.001

1. Custody Seal(s)	Present/Absent* Intact/Broken		
2. Custody Seal Nos.	N/A		
3. Chain-of Custody Records	Present/Absent*		
4. Traffic Reports or Packing Lists	Present/Absent*		
5. Airbill	Airbill/Sticker Present/Absent*		
6. Airbill No.	7793 8706 4070		
7. Sample Tags	Present/Absent*		
Sample Tag Numbers	Listed/Not listed on Chain of Custody	N/A	
8. Sample Condition	Intact/Broken*/ Leaking		
9. Cooler Temperature	3.5C		
10. Does Information on custody records, traffic reports, and sample tags agree?	Yes/No*		
11. Date Received at Lab	06/14/2017		
12. Time Received	10:00:00		

EPA Sample #	Corresponding Sample Tag #	Corresponding Assigned Lab #	Remarks: Condition of Sample Shipment, etc
W-17030-00001	N/A	616635	Intact
W-17030-00002	N/A	616636	Intact
W-17030-00003	N/A	616637	Intact

Sample Transfer	
Fraction: In Dry	Fraction
Area #: R. 13	Area #
By: DAVID GARCIA	By
On: 06/14/2017	On

* Contact SMO and attach record of resolution

Reviewed By	Logbook No.: Sample Receipt (59875)
Date	Logbook Page No.: V9851 SOC 2, 3 of 4

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

SW-846 METHOD 9012B
CASE NARRATIVE

Client: Savannah River Nuclear Solutions, LLC
SDG: 616635
SwRI Project Number: 17995.23.00X
SwRI Task Order Number: 170620-3

WETCHEM ANALYSES-Cyanide

The samples were prepared for Total and Amenable Cyanides using SW 846 9010C and analyzed using 9012B. All holding times were met.

Instrument QC: All instrument QC criteria were met. The recoveries were within 90-110% for the initial and continuing calibration verifications. No analytes were detected above SwRI's reporting limits in the initial and continuing calibration blanks.

Total Cyanide QC: Cyanide was not detected in the prep blanks above SwRI's RLs. The solid laboratory control sample had a 145% recovery, which was within the manufactures acceptance limit. The aqueous laboratory control sample and its duplicate were within 80-120% recovery. SwRI system ID 616635 was QC'd. All matrix spike recoveries for total cyanide were within their specified criteria and did not require any data qualifiers. The duplicate RPD was 4.61%, which is less than 35%; therefore, no flag was required.

Amenable Cyanide QC: No cyanide was detected in the prep blanks above SwRI's RLs. The laboratory control sample and matrix spike are not applicable to amenable cyanide. The duplicate RPD was 8.70%, which is less than 35%; therefore, no flag was required.

Description of "Q" column qualifiers on SwRI report forms: "U" indicates that an analyte was not detected above SwRI's reporting limit (RL). SwRI's RLs were used as CRDLs for reporting. A "J" flag indicates if the duplicate criteria was not met. "D" indicates the result is reported from a dilution.

Laboratory Qualifiers used on Certificate of Analysis and EDD:
"U" is used for non-detected analytes, and a "J" flag indicates if a duplicate criteria was not met.

"I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the laboratory manager or his/her designee, as verified by the following signature. This report shall not be reproduced except in full without the written approval of SwRI."

6/30/17

Principal Scientist **Date**

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

SW-846 METHOD 9012B

Sample Results

WetChem Report

Cover Page

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3

SDG: 616635
SRR: 59875

Case: 17030
Project: 17995.23.001

Client Sample ID	Lab Sample ID
W-17030-00001	616635
W-17030-00001D	616635D
W-17030-00001MS	616635S
W-17030-00002	616636
W-17030-00003	616637

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and the electronic data submitted has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: Radonna Spies

Date: 6/30/17 Title: Principal Scientist

SOUTHWEST RESEARCH INSTITUTE **010013** **Client Sample ID**

WetChem Report - Form I

W-17030-00001

Certificate of Analysis

Type: Unknown

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: 616635
Result Units: mg/Kg

SDG: 616635
SRR: 59875
Matrix: Solid
% Solids: NA

Case: 17030
Project: 17995.23.001
Receipt Date: 06/14/2017
Collection Date: 06/07/2017

CAS No.	Analyte	Result	Qual	M	RL	CRDL	DF	Prep Batch	Analysis Date/Time
	Amenable Cyanide	9.60		KNO	0.229		1	NA	06/21/2017 18:46
57-12-5	Total Cyanide	22.2	J	KNO	0.243	0.486	1	20170621-P002	06/21/2017 17:48

Data Reporting Qualifiers (Qual)	*Columns*	*Instruments/Methods (M)*
B - Result is greater than or equal to the SwRI Reporting Limit (RL) and less than the Contract Required Detection Limit (CRDL)	RL - SwRI Reporting Limit	KNO - Konelab/Cyanide 9012
U - Result is less than the SwRI Reporting Limit (RL)	CRDL - Contract Req. Det. Limit	KNO - Konelab/Amenable Cyanide
J - Matrix spike and/or matrix spike duplicate criteria was not met	DF - Dilution Factor	NA - Not Applicable
X - Analytical spike criteria was not met	M - Instrument	
E - Result is estimated due to interferences		
D - Result is reported from a dilution		
J - Duplicate criteria was not met		

SOUTHWEST RESEARCH INSTITUTE **010014** **Client Sample ID**

WetChem Report - Form I

W-17030-00002

Certificate of Analysis

Type: Unknown

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: 616636
Result Units: mg/Kg

SDG: 616635
SRR: 59875
Matrix: Solid
% Solids: NA

Case: 17030
Project: 17995.23.001
Receipt Date: 06/14/2017
Collection Date: 06/07/2017

CAS No.	Analyte	Result	Qual	M	RL	CRDL	DF	Prep Batch	Analysis Date/Time
	Amenable Cyanide	17.5		KNO	0.243		1	NA	06/21/2017 18:46
57-12-5	Total Cyanide	39.1	DJ	KNO	1.14	0.453	5	20170621-P002	06/21/2017 20:03

Data Reporting Qualifiers (Qual)	***Columns***	***Instruments/Methods (M)***
B - Result is greater than or equal to the SwRI Reporting Limit (RL) and less than the Contract Required Detection Limit (CRDL)	RL - SwRI Reporting Limit	KNO - Konelab/Cyanide 9012
U - Result is less than the SwRI Reporting Limit (RL)	CRDL - Contract Req. Det. Limit	KNO - Konelab/Amenable Cyanide
J - Matrix spike and/or matrix spike duplicate criteria was not met	DF - Dilution Factor	NA - Not Applicable
X - Analytical spike criteria was not met	M - Instrument	
E - Result is estimated due to interferences		
D - Result is reported from a dilution		
J - Duplicate criteria was not met		

SOUTHWEST RESEARCH INSTITUTE **010015** **Client Sample ID**

WetChem Report - Form I

Certificate of Analysis

W-17030-00003

Type: Unknown

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: 616637
Result Units: mg/Kg

SDG: 616635
SRR: 59875
Matrix: Solid
% Solids: NA

Case: 17030
Project: 17995.23.001
Receipt Date: 06/14/2017
Collection Date: 06/07/2017

CAS No.	Analyte	Result	Qual	M	RL	CRDL	DF	Prep Batch	Analysis Date/Time
	Amenable Cyanide	15.7		KNO	0.470		1	NA	06/21/2017 20:03
57-12-5	Total Cyanide	42.7	DJ	KNO	1.20	0.480	5	20170621-P002	06/21/2017 20:03

Data Reporting Qualifiers (Qual)	***Columns***	***Instruments/Methods (M)***
B - Result is greater than or equal to the SwRI Reporting Limit (RL) and less than the Contract Required Detection Limit (CRDL)	RL - SwRI Reporting Limit	KNO - Konelab/Cyanide 9012
U - Result is less than the SwRI Reporting Limit (RL)	CRDL - Contract Req. Det. Limit	KNO - Konelab/Amenable Cyanide
J - Matrix spike and/or matrix spike duplicate criteria was not met	DF - Dilution Factor	NA - Not Applicable
X - Analytical spike criteria was not met	M - Instrument	
E - Result is estimated due to interferences		
D - Result is reported from a dilution		
J - Duplicate criteria was not met		

SOUTHWEST RESEARCH INSTITUTE **010016**

WetChem Report - Form I

Certificate of Analysis

SwRI ID

PB17F21JH1

Type: Blank

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: PB17F21JH1
Result Units: mg/Kg

SDG: 616635
SRR: 59875
Matrix: Solid
% Solids: NA

Case: 17030
Project: 17995.23.001
Receipt Date: NA
Collection Date: NA

CAS No.	Analyte	Result	Qual	M	RL	CRDL	DF	Prep Batch	Analysis Date/Time
57-12-5	Total Cyanide	0.232	U	KNO	0.232	0.464	1	20170621-P002	06/21/2017 17:48

Comments: Solid

Data Reporting Qualifiers (Qual)	*Columns*	*Instruments/Methods (M)*
B - Result is greater than or equal to the SwRI Reporting Limit (RL) and less than the Contract Required Detection Limit (CRDL)	RL - SwRI Reporting Limit	KNO - Konelab/Cyanide 9012
U - Result is less than the SwRI Reporting Limit (RL)	CRDL - Contract Req. Det. Limit	KNO - Konelab/Amenable Cyanide
J - Matrix spike and/or matrix spike duplicate criteria was not met	DF - Dilution Factor	NA - Not Applicable
X - Analytical spike criteria was not met	M - Instrument	
E - Result is estimated due to interferences		
D - Result is reported from a dilution		
J - Duplicate criteria was not met		

SOUTHWEST RESEARCH INSTITUTE **010017**

WetChem Report - Form I

Certificate of Analysis

SwRI ID

PB17F21JH2

Type: Blank

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: PB17F21JH2
Result Units: mg/Kg

SDG: 616635
SRR: 59875
Matrix: Solid
% Solids: NA

Case: 17030
Project: 17995.23.001
Receipt Date: NA
Collection Date: NA

CAS No.	Analyte	Result	Qual	M	RL	CRDL	DF	Prep Batch	Analysis Date/Time
	Amenable Cyanide	0.232	U	KNO	0.232		1	20170621-P002	06/21/2017 18:46

Data Reporting Qualifiers (Qual)	*Columns*	*Instruments/Methods (M)*
B - Result is greater than or equal to the SwRI Reporting Limit (RL) and less than the Contract Required Detection Limit (CRDL)	RL - SwRI Reporting Limit	KNO - Konelab/Cyanide 9012
U - Result is less than the SwRI Reporting Limit (RL)	CRDL - Contract Req. Det. Limit	KNO - Konelab/Amenable Cyanide
J - Matrix spike and/or matrix spike duplicate criteria was not met	DF - Dilution Factor	NA - Not Applicable
X - Analytical spike criteria was not met	M - Instrument	
E - Result is estimated due to interferences		
D - Result is reported from a dilution		
J - Duplicate criteria was not met		

SOUTHWEST RESEARCH INSTITUTE **010018**

WetChem Report - Form IIA

Initial and Continuing Calibration Verification

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: mg/L
Associated Analytical Batches: 20170629-A001

SDG: 616635
SRR: 59875
Initial Calibration Source: See Raw Data
Continuing Calibration Source: See Raw Data

Case: 17030
Project: 17995.23.001

	Initial Calibration Verification				Continuing Calibration Verification						
Analyte	True	Found	%Rec	Limit	True	Found1	%Rec	Found2	%Rec	Limit	M
Total Cyanide	0.680	0.702	103.2%	90%-110%	0.680	0.686	100.9%	0.681	100.2%	90%-110%	KNO

Instruments/Methods (M)
KNO - Konelab/Cyanide 9012
KNO - Konelab/Amenable Cyanide
NA - Not Applicable

Form IIA-IN

SOUTHWEST RESEARCH INSTITUTE **010019**

WetChem Report - Form IIA

Initial and Continuing Calibration Verification

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: mg/L
Associated Analytical Batches: 20170629-A001

SDG: 616635
SRR: 59875
Initial Calibration Source: See Raw Data
Continuing Calibration Source: See Raw Data

Case: 17030
Project: 17995.23.001

	Continuing Calibration Verification				
Analyte	True	Found3	%Rec	Limit	M
Total Cyanide	0.680	0.688	101.2%	90%-110%	KNO

Instruments/Methods (M)
KNO - Konelab/Cyanide 9012
KNO - Konelab/Amenable Cyanide
NA - Not Applicable

Form IIA-IN

SOUTHWEST RESEARCH INSTITUTE **010020**

WetChem Report - Form IIB

Low Level Check Standard

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: mg/L
Associated Analytical Batch: 20170629-A001

SDG: 616635
SRR: 59875

Case: 17030
Project: 17995.23.001

	LLC Standards				
Analyte	True	Found1	%Rec	Limit	M
Total Cyanide	0.00500	0.00394	78.8%	50%-150%	KNO

Instruments/Methods (M)
KNO - Konelab/Cyanide 9012
KNO - Konelab/Amenable Cyanide
NA - Not Applicable

Form IIB-IN

SOUTHWEST RESEARCH INSTITUTE **010021**

WetChem Report - Form III

Blanks

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Preparation Blank Result Units: mg/Kg
Initial/Continuing Blank Result Units: RL

SDG: 616635
SRR: 59875
Preparation Blank Matrix: Solid
Associated Prep Batches: 20170621-P002

Case: 17030
Project: 17995.23.001
Associated Analytical Batches: 20170629-A001

	Preparation Blank		Initial Calibration Blank		Continuing Calibration Blank						
Analyte	Result	Qual	Found	Qual	Found1	Qual	Found2	Qual	Found3	Qual	M
Total Cyanide	0.232	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	KNO

Data Reporting Qualifiers (Qual)	***Instruments/Methods (M)***
B - Result is greater than or equal to the SwRI Reporting Limit (RL) and less than the Contract Required Detection Limit (CRDL)	KNO - Konelab/Cyanide 9012
U - Result is less than the SwRI Reporting Limit (RL)	KNO - Konelab/Amenable Cyanide
J - Matrix spike and/or matrix spike duplicate criteria was not met	NA - Not Applicable
X - Analytical spike criteria was not met	
E - Result is estimated due to interferences	
D - Result is reported from a dilution	
J - Duplicate criteria was not met	

SOUTHWEST RESEARCH INSTITUTE **010022**

WetChem Report - Form III

Blanks

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Preparation Blank Result Units: mg/Kg
Initial/Continuing Blank Result Units: RL

SDG: 616635
SRR: 59875
Preparation Blank Matrix: Solid
Associated Prep Batches: 20170621-P002

Case: 17030
Project: 17995.23.001
Associated Analytical Batches: 20170629-A002

	Preparation Blank		Initial Calibration Blank		Continuing Calibration Blank		
Analyte	Result	Qual	Found	Qual	Found1	Qual	M
Amenable Cyanide	0.232	U	-	-	-	-	KNO

Data Reporting Qualifiers (Qual)	***Instruments/Methods (M)***
B - Result is greater than or equal to the SwRI Reporting Limit (RL) and less than the Contract Required Detection Limit (CRDL)	KNO - Konelab/Cyanide 9012
U - Result is less than the SwRI Reporting Limit (RL)	KNO - Konelab/Amenable Cyanide
J - Matrix spike and/or matrix spike duplicate criteria was not met	NA - Not Applicable
X - Analytical spike criteria was not met	
E - Result is estimated due to interferences	
D - Result is reported from a dilution	
J - Duplicate criteria was not met	

SOUTHWEST RESEARCH INSTITUTE **010023** **Client Sample ID**

WetChem Report - Form VA

W-17030-00001MS/MSD

Matrix Spike/Matrix Spike Duplicate Sample Recovery

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: 616635S, 616635SD
Result Units: mg/Kg

SDG: 616635
SRR: 59875
Matrix: Solid
% Solids: NA

Case: 17030
Project: 17995.23.001

Analyte	Parent Sample Result	Qual	MS Result	MS Spike Added	MS %Rec	MSD Result	MSD Spike Added	MSD %Rec	%RPD	Control Limit %Rec	Control Limit %RPD	M	Note
Total Cyanide	22.2	J	41.6	24.0	80.8%	48.7	23.9	110.9%	**31.0%**	75%-125%	20%	KNO	

Data Reporting Qualifiers (Qual)	***Columns***	***Instruments/Methods (M)***
B - Result is greater than or equal to the SwRI Reporting Limit (RL) and less than the Contract Required Detection Limit (CRDL)	M - Instrument	KNO - Konelab/Cyanide 9012
U - Result is less than the SwRI Reporting Limit (RL)	MS - Matrix Spike	KNO - Konelab/Amenable Cyanide
J - Matrix spike and/or matrix spike duplicate criteria was not met	MSD - Matrix Spike Duplicate	NA - Not Applicable
X - Analytical spike criteria was not met	Q - Qualifier	
E - Result is estimated due to interferences	RPD - Relative Percent Difference	
D - Result is reported from a dilution		
J - Duplicate criteria was not met		

SOUTHWEST RESEARCH INSTITUTE **010024** **Client Sample ID**

WetChem Report - Form VI

W-17030-00001D

Duplicates

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: 616635D
Result Units: mg/Kg

SDG: 616635
SRR: 59875
Matrix: Solid
% Solids: NA

Case: 17030
Project: 17995.23.001

Analyte	Parent Sample Result	Qual	Duplicate Result	Qual	RPD	RPD Limit	Control Limit	M	Note
Amenable Cyanide	9.60		8.80		8.70%	35%	-	KNO	
Total Cyanide	22.2	J	21.2	J	4.61%	20%	-	KNO	

Data Reporting Qualifiers (Qual)	***Columns***	***Instruments/Method (M)***
B - Result is greater than or equal to the SwRI Reporting Limit (RL) and less than the Contract Required Detection Limit (CRDL) U - Result is less than the SwRI Reporting Limit (RL) J - Matrix spike and/or matrix spike duplicate criteria was not met X - Analytical spike criteria was not met E - Result is estimated due to interferences D - Result is reported from a dilution J - Duplicate criteria was not met	M - Instrument RPD - Relative Percent Difference	KNO - Konelab/Cyanide 9012 KNO - Konelab/Amenable Cyanide NA - Not Applicable

Form VI-IN

SOUTHWEST RESEARCH INSTITUTE **010025** **SwRI ID**

WetChem Report - Form VII

LCS17F21JH1

Laboratory Control Sample

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: LCS17F21JH1
Result Units: mg/Kg

SDG: 616635
SRR: 59875
Matrix: Solid
Associated Prep Batches: 20170621-P002

Case: 17030
Project: 17995.23.001
LCS Source: ERA

Analyte	True	Found	Qual	%Rec.	Limit	M	Analysis Date/Time
Total Cyanide	53.9	78.0	D	NA	23.1 - 116	KNO	06/21/2017 17:48

Instruments/Methods (M)

KNO - Konelab/Cyanide 9012
KNO - Konelab/Amenable Cyanide
NA - Not Applicable

Form VII-IN

SOUTHWEST RESEARCH INSTITUTE **010026** **SwRI ID**

WetChem Report - Form VII

LCS17F21JH2

Laboratory Control Sample

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: LCS17F21JH2
Result Units: mg/L

SDG: 616635
SRR: 59875
Matrix: Solid
Associated Prep Batches: 20170621-P002

Case: 17030
Project: 17995.23.001
LCS Source: ERA

Analyte	True	Found	Qual	%Rec.	Limit	M	Analysis Date/Time
Total Cyanide	0.680	0.710	D	104.4%	85%-115%	KNO	06/21/2017 17:48

Instruments/Methods (M)

KNO - Konelab/Cyanide 9012
KNO - Konelab/Amenable Cyanide
NA - Not Applicable

Form VII-IN

SOUTHWEST RESEARCH INSTITUTE **010027**

WetChem Report - Form VII

Laboratory Control Sample

SwRI ID

LCS17F21SW2

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: LCS17F21SW2
Result Units: mg/L

SDG: 616635
SRR: 59875
Matrix: Solid
Associated Prep Batches: 20170621-P002

Case: 17030
Project: 17995.23.001
LCS Source: ERA

Analyte	True	Found	Qual	%Rec.	Limit	M	Analysis Date/Time
Total Cyanide	0.680	0.721	D	106.0%	85%-115%	KNO	06/21/2017 17:48

Instruments/Methods (M)

KNO - Konelab/Cyanide 9012
KNO - Konelab/Amenable Cyanide
NA - Not Applicable

Form VII-IN

SOUTHWEST RESEARCH INSTITUTE **010028** **SwRI ID**

WetChem Report - Form VII

LCS17F21JH3

Laboratory Control Sample

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: LCS17F21JH3
Result Units: mg/L

SDG: 616635
SRR: 59875
Matrix: Solid
Associated Prep Batches: 20170621-P002

Case: 17030
Project: 17995.23.001
LCS Source:

Analyte	True	Found	Qual	%Rec.	Limit	M	Analysis Date/Time
Total Cyanide	0.500	0.472		94.4%	90%-110%	KNO	06/21/2017 17:48

Instruments/Methods (M)

KNO - Konelab/Cyanide 9012
KNO - Konelab/Amenable Cyanide
NA - Not Applicable

Form VII-IN

SOUTHWEST RESEARCH INSTITUTE **010029** **SwRI ID**

WetChem Report - Form VII

LCS17F21JH4

Laboratory Control Sample

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: LCS17F21JH4
Result Units: mg/L

SDG: 616635
SRR: 59875
Matrix: Solid
Associated Prep Batches: 20170621-P002

Case: 17030
Project: 17995.23.001
LCS Source:

Analyte	True	Found	Qual	%Rec.	Limit	M	Analysis Date/Time
Total Cyanide	0.0500	0.0476		95.2%	90%-110%	KNO	06/21/2017 17:48

Instruments/Methods (M)
KNO - Konelab/Cyanide 9012
KNO - Konelab/Amenable Cyanide
NA - Not Applicable

Form VII-IN

SOUTHWEST RESEARCH INSTITUTE **010030**

WetChem Report - Form IX

Detection Limits

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: mg/Kg

SDG: 616635
SRR: 59875
Instrument: Konelab

Case: 17030
Project: 17995.23.001
Date: 01/09/2014

Analyte	Wavelength	RL	CRDL
Amenable Cyanide	575 nm	0.232	
Total Cyanide	575 nm	0.00500	0.464

Columns	
RL	- SwRI Reporting Limit
CRDL	- Contract Req. Det. Limit

SOUTHWEST RESEARCH INSTITUTE **010031**

WetChem Report - Form XII

Analysis Run Log

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Analytical Batch: 20170629-A001
Analysis Method: Cyanide 9012

SDG: 616635
SRR: 59875
Instrument: Konelab

Case: 17030
Project: 17995.23.001
Start Date: 06/21/2017
End Date: 06/21/2017

Lab Sample ID	Client Sample ID	Time	DF	ACN	TCN
CN-0	CN-0	15:08	1		X
CN-0.005	CN-0.005	15:08	1		X
CN-0.01	CN-0.01	15:08	1		X
CN-0.05	CN-0.05	15:08	1		X
CN-0.1	CN-0.1	15:08	1		X
CN-0.25	CN-0.25	15:08	1		X
CN-0.5	CN-0.5	15:08	1		X
CN-ICV	CN-ICV	17:48	2		X
CN-ICB	CN-ICB	17:48	1		X
CN-LLC	NA	17:48	1		X
PB17F21JH1	NA	17:48	1		X
LCS17F21JH1	NA	17:48	10		X
LCS17F21JH2	NA	17:48	2		X
LCS17F21SW2	NA	17:48	2		X
LCS17F21JH3	NA	17:48	1		X
LCS17F21JH4	NA	17:48	1		X
616635	W-17030-00001	17:48	1		X
616635D	W-17030-00001D	17:48	1		X
616635S	W-17030-00001MS	17:50	2		X
CN-CCV	CN-CCV	18:46	2		X
CN-CCB	CN-CCB	18:46	1		X
Z	Z	18:46	2		
Z	Z	18:46	1		
Z	Z	18:46	1		
PB17F21JH2	NA	18:46	1		
Z	Z	18:46	1		
Z	Z	18:46	1		
Z	Z	18:46	1		
Z	Z	18:46	1		
Z	Z	18:46	1		
Z	Z	18:46	1		
CN-CCV2	CN-CCV2	20:03	2		X
CN-CCB2	CN-CCB2	20:03	1		X
616635SD	W-17030-00001MSD	20:03	5		X
616636	W-17030-00002	20:03	5		X
616637	W-17030-00003	20:03	5		X
Z	Z	20:03	2		
CN-CCV3	CN-CCV3	20:30	2		X
CN-CCB3	CN-CCB3	20:30	1		X

SOUTHWEST RESEARCH INSTITUTE **010032**

WetChem Report - Form XII

Analysis Run Log

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Analytical Batch: 20170629-A002
Analysis Method: Amenable Cyanide

SDG: 616635
SRR: 59875
Instrument: Konelab

Case: 17030
Project: 17995.23.001
Start Date: 06/21/2017
End Date: 06/21/2017

Lab Sample ID	Client Sample ID	Time	DF	ACN	TCN
PB17F21JH2	NA	18:46	1	X	
616635	W-17030-00001	18:46	1	X	
616635D	W-17030-00001D	18:46	1	X	
616636	W-17030-00002	18:46	1	X	
616637	W-17030-00003	20:03	1	X	

SOUTHWEST RESEARCH INSTITUTE **010033**

WetChem Report - Form XVIII

Preparation/Digestion Summary

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3

SDG: 616635
SRR: 59875

Case: 17030
Project: 17995.23.001

Prep Batch	Method	Preparation Date
20170621-P002	CN prep	06/21/2017

Digestion Log

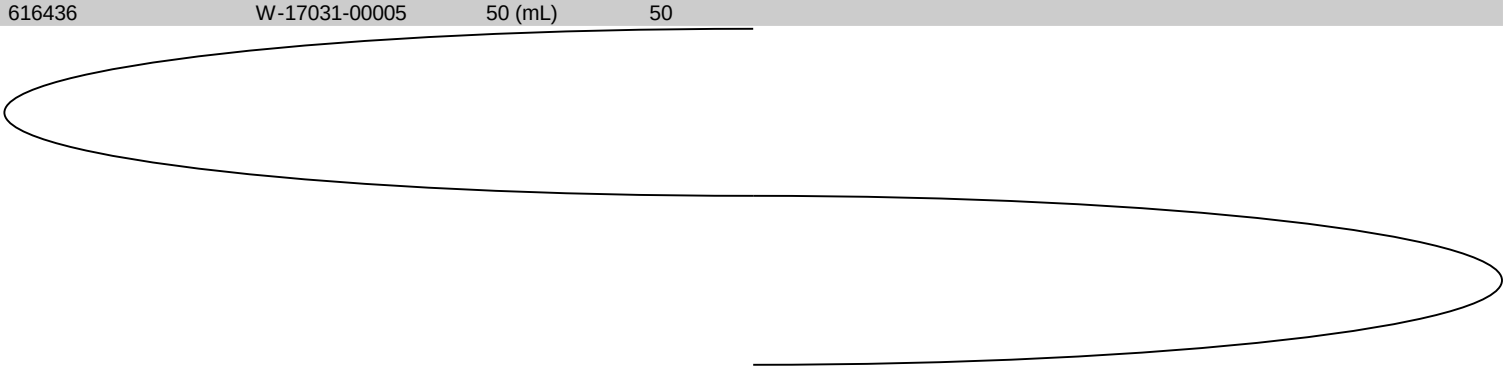
010034

Southwest Research Institute
San Antonio, Texas 78228

Batch: 20170621-P002 (Ver. 2)
Status: APPROVED

Client(s): Savannah River Nuclear Solutions, LLC
Task Order(s): 170620-3
SDG(s): 616635
Project(s): 17995.23.001
Method(s): CN prep (TAP: 01-0406-134)
Matrix(s): Solid
Reagent(s): (CN) 2.5M MgCl2 #135-02-WCS13, (CN) H2SO4 #76373, (CN) 0.25N NaOH #185-01-WCS13, 0.35M Calcium Hypochlorite #48-02-WCS13, 0.1N Sodium Arsenite #140-02-WCS13, KI #85038
Balance(s): #135
Pipette(s): 5000-M, 1000-1, 200-2
Heating Device: MIDI-STIL Temperature (C): 125C
Time In: 06/21/2017 09:16:52 Time Out: NA

Sample Identification	Client Identification	Initial Weight (g)	Final Volume (mL)
PB17F21JH1 Ⓐ	NA	1.0771	50
LCS17F21JH1 ①Ⓐ	NA	1.1281	50
616635	W-17030-00001	1.0291	50
616635D	W-17030-00001	1.0206	50
616635MS ②	W-17030-00001	1.0416	50
616635MSD ②	W-17030-00001	1.0479	50
616636	W-17030-00002	1.1034	50
616637	W-17030-00003	1.0422	50
LCS17F21JH2 ③Ⓑ	NA	50 (mL)	50
LCS17F21JH3 ②Ⓒ	NA	50 (mL)	50
LCS17F21JH4 ④Ⓓ	NA	50 (mL)	50
616635-CL	W-17030-00001	1.0902	50
616635D-CL	W-17030-00001	1.0276	50
616635S-CL ②	W-17030-00001	1.0242	50
616635SD-CL ②	W-17030-00001	1.0947	50
616636-CL	W-17030-00002	1.0287	50
616637-CL	W-17030-00003	1.0641	50
PB17F21JH2	NA	1.0502	50
LCS17F21SW2 ③Ⓔ	NA	50 (mL)	50
PB17F21PB1 Ⓑ	NA	50 (mL)	50
616432	W-17031-00001	10 (mL)	50
616432D	W-17031-00001	10 (mL)	50
616432S	W-17031-00001	10 (mL)	50
616432SD	W-17031-00001	10 (mL)	50
616433	W-17031-00002	50 (mL)	50
616434	W-17031-00003	50 (mL)	50
616435	W-17031-00004	50 (mL)	50
616436	W-17031-00005	50 (mL)	50



Prepared by: HERRERA, JUDY Date: 06/21/2017

Reviewed by: MOKEN, JAMES Date: 06/30/2017

Disposal Int/Date/Loc: _____

Program version(8/11/2011)

Digestion Log

010035

Southwest Research Institute
San Antonio, Texas 78228

Batch: 20170621-P002 (Ver. 2)
Status: APPROVED

Client(s): Savannah River Nuclear Solutions, LLC
Task Order(s): 170620-3
SDG(s): 616635
Project(s): 17995.23.001
Method(s): CN prep (TAP: 01-0406-134)
Matrix(s): Solid
Reagent(s): (CN) 2.5M MgCl2 #135-02-WCS13, (CN) H2SO4 #76373, (CN) 0.25N NaOH #185-01-WCS13, 0.35M Calcium Hypochlorite #48-02-WCS13, 0.1N Sodium Arsenite #140-02-WCS13, KI #85038
Balance(s): #135
Pipette(s): 5000-M, 1000-1, 200-2
Heating Device: MIDI-STIL Temperature (C): 125C
Time In: 06/21/2017 09:16:52 Time Out: NA

Sample Identification	Client Identification	Initial Weight (g)	Final Volume (mL)

① spiked 1.1281 g of CI# 67469 Cyanide in Soil (Lot# D088-541, Source: ERA, Exp: 07/31/2018)
② spiked 0.250 mL of 113-02-WCS13 (Lot# 83333, Source: ERA, Exp: 02/01/2018)
③ spiked 50 mL of CI# 83495 Total Cyanide (Lot# P261-502, Source: ERA, Exp: 07/31/2019)
④ spiked 0.025 mL of 113-02-WCS13 (Lot# 83333, Source: ERA, Exp: 02/01/2018)

Ⓐ Solid
Ⓑ Water
Ⓒ High
Ⓓ Low
Ⓔ Water Dup

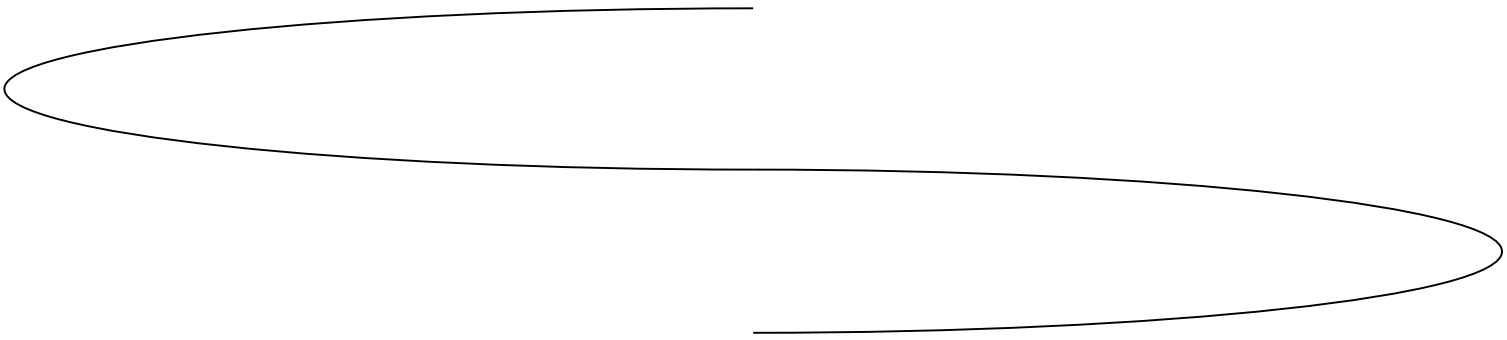
Comments:
PB #76031

1-Distillation
Start: 10:30 a.m.
Stop: 12:30 p.m.

2-Distillation
Start: 3:30 p.m.
Stop: 5:30 p.m.

3-Distillation
Start: 6:00 p.m.
Stop: 8:00 p.m.

LCS17F21JH1 and LCS17F21SW2 prepared by taking 0.25mL of concentrated ERA std (#83495) to FV 50mL with DI H2O and 1mL 0.25N NaOH (185-01-WCS13)
TV = 0.680 mg/L



Prepared by: HERRERA, JUDY Date: 06/21/2017

Reviewed by: MOKEN, JAMES Date: 06/30/2017

Disposal Int/Date/Loc: _____

Program version(8/11/2011)

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

SW-846 METHOD 9012B

Raw Data

Client: *Savannah River Nuclear Solutions, LLC*
SDG: *616635*
SwRI Project Number *17995.23.001*
SwRI Task Order Number(s): *170620-3*

Sample Calculation Sheet

CN 9012B
A = Analyte Result (mg/L)
B = Final Volume (mL)
C = Sample Weight (g)
Final Results (mg/Kg) = A X (B/C) X (1 L/1000 ml) X (1000 g/ 1 Kg)

616635

$$0.457\ \frac{mg}{L} \times \frac{50mL}{1.0291g} \times \frac{1L}{1000mL} \times \frac{1000g}{1kg} = 22.2\ mg/kg$$

010038

CN SW846 9012

Southwest Research Institute
San Antonio, Texas 78228

Batch: 20170629-A001 (Ver. 5)
Status: CONSUMED

Analyte Test: CN SW846 9012
Limit: CN water limit
Analysis Method: Cyanide 9012 (TAP: TAP-01-0406-134)
Instrument: Konelab
Data File Name: cn-non rad.xls
Start Time: 06/21/2017 15:08:00
Stop Time: 06/21/2017 20:30:00
Task Order: 170620-3
Project: 17995.23.001
Customer: Savannah River Nuclear Solutions, LLC
SDG: 616635
Qualifier Set: SavRiver
Reagent: Phosphate Buffer #106-03-WCS13, Pyridine #135-03-WCS13, Chloramine-T #185-02-WCS13, 0.25N NaOH #185-01-WCS13
Pipette: 5000-M, 1000-1, 200-2

			Total Cyanide				
Sample Identification	Client Identification	DF	Cyanide result water (mg/L)	Final Result (mg/L)	RL (mg/L)	Rec (%)	RPD (%)
CN-0	NA		0.000610 U	0.00500 U	0.00500		
CN-0.005	NA		0.00505	0.00505	0.00500		
CN-0.01	NA		0.00993	0.00993	0.00500		
CN-0.05	NA		0.0490	0.0490	0.00500		
CN-0.1	NA		0.100	0.100	0.00500		
CN-0.25	NA		0.250	0.250	0.00500		
CN-0.5	NA		0.500	0.500	0.00500		
CN-ICV ①	NA	2	0.702 D	0.702 D	0.0100 D	103 D	
CN-ICB	NA		0.000870 U	0.00500 U	0.00500		
CN-LLC	NA		0.00394	0.00394	0.00500	78.8	
PB17F21JH1 ①	NA		0.00119 U	0.232 U (mg/Kg)	0.232 (mg/Kg)		
LCS17F21JH1 ①	NA	10	1.76 D	78.0 D (mg/Kg)	2.22 D (mg/Kg)	145 D	
LCS17F21JH2 ①	NA	2	0.710 D	0.710 D	0.0100 D	104 D	
LCS17F21SW2 ①	NA	2	0.721 D	0.721 D	0.0100 D	106 D	
LCS17F21JH3 ①	NA		0.472	0.472	0.00500	94.4	
LCS17F21JH4 ①	NA		0.0476	0.0476	0.00500	95.2	
616635 ①	W-17030-00001		0.457 J	22.2 J (mg/Kg)	0.243 (mg/Kg)		4.61
616635D ①	W-17030-00001		0.433 J	21.2 J (mg/Kg)	0.245 (mg/Kg)		~~5.39~~ (RE) 6/30/17
616635S ①	W-17030-00001	2	0.866 DJ	41.6 DJ (mg/Kg)	0.480 D (mg/Kg)	80.8 D	
CN-CCV ①	NA	2	0.686 D	0.686 D	0.0100 D	101 D	
CN-CCB	NA		0.00176 U	0.00500 U	0.00500		
616635SD ①	W-17030-00001	2	*1.01 DJ*	*48.2 DJ (mg/Kg)*	*0.478 D (mg/Kg)*	*109 D*	*29.9 J*
616636 ①	W-17030-00002		*0.844 HJ*	*38.2 HJ (mg/Kg)*	*0.227 (mg/Kg)*		
616637 ①	W-17030-00003		*0.839 HJ*	*40.3 HJ (mg/Kg)*	*0.240 (mg/Kg)*		
PB17F21JH2 ①	NA		*0.00188 U*	*0.238 U (mg/Kg)*	*0.238 (mg/Kg)*		
616635-CL ①	W-17030-00001		*0.275 J*	*12.6 J (mg/Kg)*	*0.229 (mg/Kg)*		*44.6*
616635D-CL ①	W-17030-00001		*0.254 J*	*12.4 J (mg/Kg)*	*0.243 (mg/Kg)*		*109*
616635S-CL ①	W-17030-00001		*0.233 J*	*11.4 J (mg/Kg)*	*0.244 (mg/Kg)*	*2760*	
616635SD-CL ①	W-17030-00001		*0.282 J*	*12.9 J (mg/Kg)*	*0.228 (mg/Kg)*	*40.7*	
616636-CL ①	W-17030-00002		*0.445 JJ*	*21.6 J (mg/Kg)*	*0.243 (mg/Kg)*		*63.8 J*
616637-CL ①	W-17030-00003		*0.573 HJ*	*26.9 HJ (mg/Kg)*	*0.235 (mg/Kg)*		*43.3 J*
CN-CCV2 ①	NA	2	0.681 D	0.681 D	0.0100 D	100 D	
CN-CCB2	NA		0.00131 U	0.00500 U	0.00500		
616635SD ①	W-17030-00001	5	1.02 DJ	48.7 DJ (mg/Kg)	1.20 D (mg/Kg)	111 D	31.7
616636 ①	W-17030-00002	5	0.862 DJ	39.1 DJ (mg/Kg)	1.14 D (mg/Kg)		
616637 ①	W-17030-00003	5	0.890 DJ	42.7 DJ (mg/Kg)	1.20 D (mg/Kg)		

U - Result is less than the SwRI Reporting Limit (RL)

Prepared by: HERRERA, JUDY Date: 06/21/2017

Reviewed by: MOKEN, JAMES Date: 06/30/2017

CN SW846 9012

Southwest Research Institute
San Antonio, Texas 78228

Batch: 20170629-A001 (Ver. 5)
Status: CONSUMED

Analyte Test: CN SW846 9012
Limit: CN water limit
Analysis Method: Cyanide 9012 (TAP: TAP-01-0406-134)
Instrument: Konelab
Data File Name: cn-non rad.xls
Start Time: 06/21/2017 15:08:00
Stop Time: 06/21/2017 20:30:00
Task Order: 170620-3
Project: 17995.23.001
Customer: Savannah River Nuclear Solutions, LLC
SDG: 616635
Qualifier Set: SavRiver
Reagent: Phosphate Buffer #106-03-WCS13, Pyridine #135-03-WCS13, Chloramine-T #185-02-WCS13, 0.25N NaOH #185-01-WCS13
Pipette: 5000-M, 1000-1, 200-2

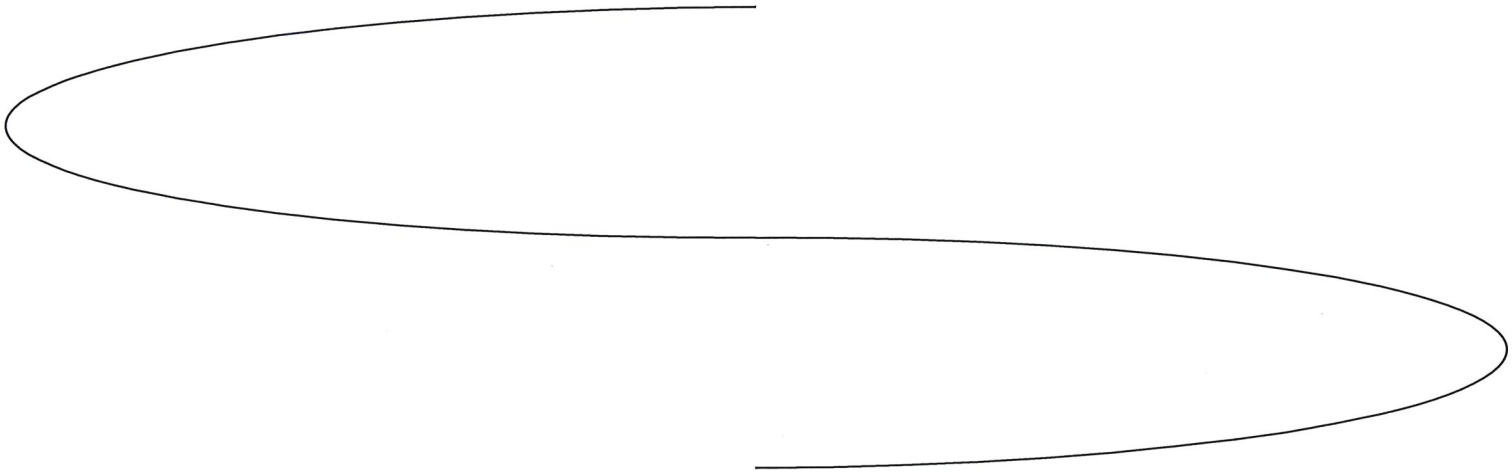
			Total Cyanide				
Sample Identification	Client Identification	DF	Cyanide result water (mg/L)	Final Result (mg/L)	RL (mg/L)	Rec (%)	RPD (%)
616637-CL ①	W-17030-00003	2	*0.575 DJ*	*27.0 DJ (mg/Kg)*	*0.470 D (mg/Kg)*		*43.0 J*
CN-CCV3 ①	NA	2	0.688 D	0.688 D	0.0100 D	101 D	
CN-CCB3	NA		0.00335 U	0.00500 U	0.00500		

+ all samples prepared in batch 20170621-P002

Comments:
Calibration Curve:

1 ppm CN std was prepared from 100 ppm CN std, 200uL of #113-02-WCS13 to final volume 20 mL with DI water.

point (mg/L)	1 ppm (mL)	DI water (mL)
0.5	5.0	5.0
0.25	2.5	7.5
0.1	4.0	5.0
0.05	4.5	5.0
0.01	4.9	5.0
0.005	4.95	5.0



U - Result is less than the SwRI Reporting Limit (RL)

Prepared by: HERRERA, JUDY Date: 06/21/2017

Reviewed by: MOKEN, JAMES Date: 06/30/2017

010040

Amenable cyanide (S)

Southwest Research Institute
San Antonio, Texas 78228

Batch: 20170629-A002 (Ver. 5)
Status: CONSUMED

Analysis Method: Amenable Cyanide (TAP: 01-0406-134)
Analyte Test: Amenable cyanide (S)
Instrument: Konelab
Reagent: 0.35M Calcium Hypochlorite #48-02-WCS13, 0.1N Sodium Arsenite #140-02-WCS13, KI #85038
Pipette: 5000-M, 1000-1, 200-2
Limit: Savannah CN solid
SDG: 616635
Project: 17995.23.001
Task Order: 170620-3
Customer: Savannah River Nuclear Solutions, LLC
Qualifier Set: SavRiver

		Amenable Cyanide	
Sample Identification	Client Identification	Instrument Result (mg/Kg)	Final Result (mg/Kg)
PB17F21JH2 ①	NA	0 U	0.232 U
616635	W-17030-00001	9.6	9.60
616635D	W-17030-00001	8.8	8.80
616636	W-17030-00002	17.5	17.5
616637	W-17030-00003	15.7	15.7

+ all samples prepared in batch 20170621-P002

Comments:
Batch is for Amenable Cyanide summary. For run results and method performance please refer to batch #20170629-A001

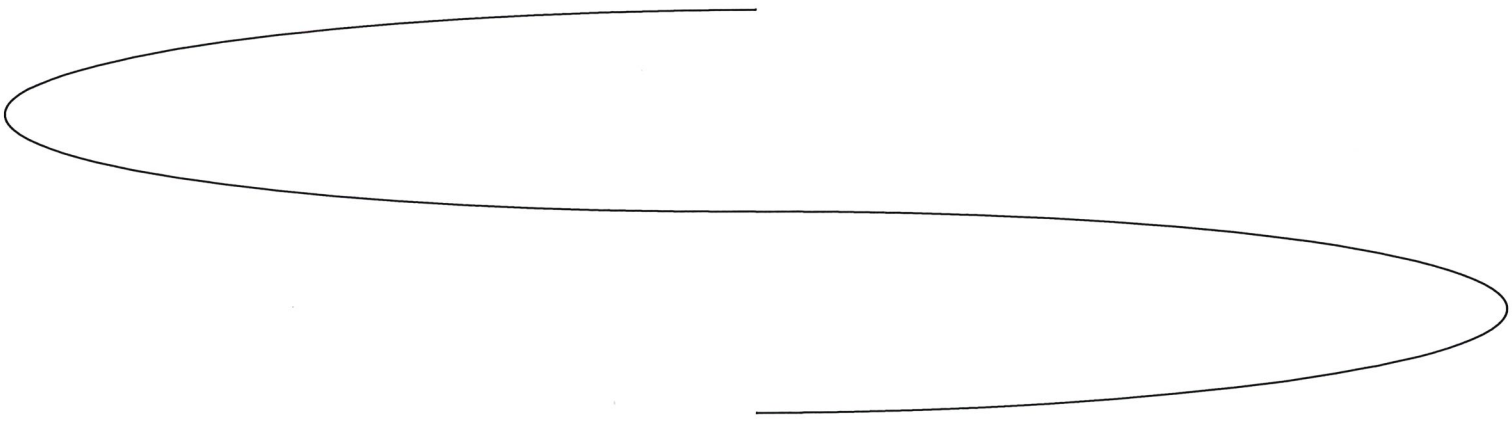
Calculation:
Amenable Cyanide = Total Cyanide - Chlorinated Cyanide (CL)

Example: 616635

22.2 mg/kg - 12.6 mg/kg = 9.60 mg/kg

If no Amenable Cyanide is present, the RL for Total Cyanide is used for the Amenable Cyanide sample result.

Konelab CL sample results:
616635 12.6 mg/kg
616635D 12.4 mg/kg
616636 21.6 mg/kg
616637 27.0 mg/kg



U - Result is less than the SwRI Reporting Limit (RL)

Prepared by: HERRERA, JUDY Date: 06/30/2017

Reviewed by: MOKEN, JAMES Date: 06/30/2017

Program version(8/11/2011)

010041

Southwest Research Institute®
Logbook: Konelab Aqua20
Serial #: S4119353
(CE032101)

Book I.D. # 17-0406-009

Analysis/ Method: CN SW846 9012 Project # 17995.23.001; 179524.00
Client: Savannah River Nuclear TO# 170620-3; 170609-5

Standard Source: 113-02-WS13 Stock TV: 100 ppm
ICV: #83495 ICV TV: 0.680 ppm
CCV: #83495 CCV TV: 0.680 ppm

Solutions Prepared for Analysis:

1. Phosphate Buffer # 106-03-WS13
2. Pyridine # 135-03-WS13
3. Chloramine-T # 185-02-WS13
4.
5.

Wash Solution: 0.25N NaOH # 185-01-WS13
Cuvettes Refilled? Yes

Additional Comments: Ep: 5000-M
1000-1
200-2

Solids non-rad (3)
Waters w/Cr6 (5)

Analyst S Date: 6/21/17
Reviewed Date: 6/30/17

Logbook#/ Page# 16 0017

FRM-329 (Rev 2/Dec 09)

010042

Calibration results AquaKem 6.5 Page: 1

Laboratory
Konelab User

21.06.2017 15:08

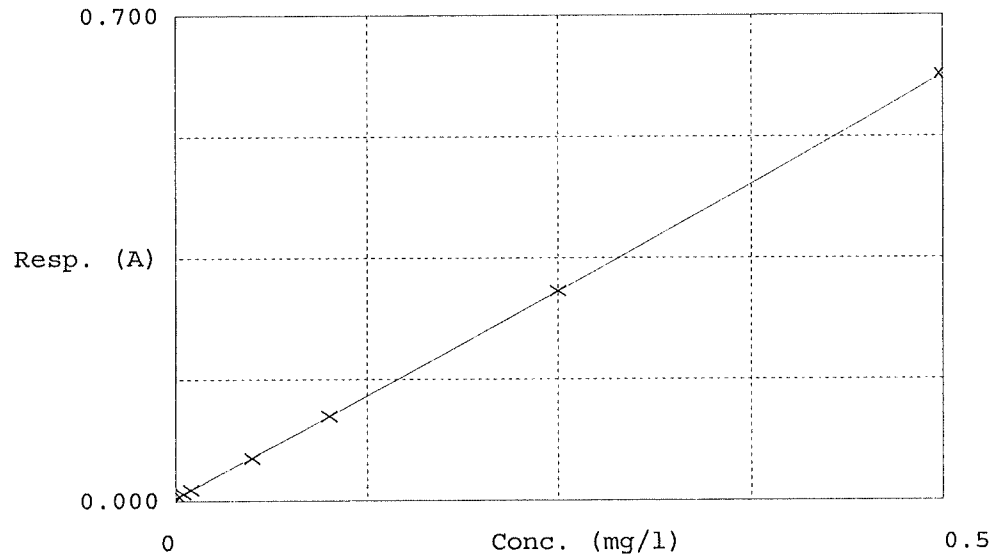
Test Cyanide

Accepted 21.06.2017 15:08

Resp. = A * Conc. ^ 2 + B * Conc. + C
A = 0.121
B = 1.16
C = 0.005

Coeff. of det. 0.999993

Errors



	Calibrator	Response	Calc. con.	Conc.	Errors
1	CN-0	0.005	0.00061	0.00000	
2	CN-0.005	0.010	0.00505	0.00500	
3	CN-0.01	0.016	0.00993	0.01000	
4	CN-0.05	0.062	0.04895	0.05000	
5	CN-0.1	0.122	0.10034	0.10000	
6	CN-0.25	0.302	0.25016	0.25000	
7	CN-0.5	0.615	0.49996	0.50000	

20170621-P002
20170629-A001
20170629-A002

Test results AquaKem 6.5 Page: 1

Laboratory
Konelab User

Printed:

22.06.2017 07:11

Analyzed on: 6/21/17

Test: Cyanide

Sample Id	Result	Dil. 1 +	Response	Errors
CN-ICV DF2	0.7021	0.0	0.427	
CN-ICB	0.0009	0.0	0.006	
CN-LLC	0.0039	0.0	0.009	
PBS	0.0012	0.0	0.006	
LCSS DF10	1.7558	0.0	0.212	
LCSW DF2	0.7096	0.0	0.431	
LCSWD DF2	0.7214	0.0	0.439	
LCSH	0.4723	0.0	0.579	
LCSL	0.0476	0.0	0.060	
616635	0.4572	0.0	0.560	
616635D	0.4329	0.0	0.529	
616635S DF2	0.8656	0.0	0.529	
CN-CCV DF2	0.6861	0.0	0.417	
CN-CCB	0.0018	0.0	0.007	
616635SD DF2	1.0063	0.0	0.619	
616636	0.8439	0.0	1.055	
616637	0.8393	0.0	1.049	
PB-CL	0.0019	0.0	0.007	
616635-CL	0.2751	0.0	0.333	
616635D-CL	0.2542	0.0	0.307	
616635S-CL	0.2334	0.0	0.282	
616635SD-CL	0.2816	0.0	0.341	
616636-CL	0.4448	0.0	0.544	
616637-CL	0.5735	0.0	0.709	
CN-CCV2 DF2	0.6806	0.0	0.413	
CN-CCB2	0.0013	0.0	0.006	
616432 df10	2.6203	0.0	0.317	
616432D df10	2.8301	0.0	0.342	
616432S df10	3.1814	0.0	0.386	
616432SD df10	1.9976	0.0	0.241	
616433 df50	15.3875	0.0	0.373	
616635SD DF5	1.0158	0.0	0.245	
616636 DF5	0.8615	0.0	0.208	
616637 DF5	0.8897	0.0	0.215	
616637-CL DF2	0.5751	0.0	0.348	
PBW	0.0017	0.0	0.006	
CN-CCV3 DF2	0.6875	0.0	0.417	
CN-CCB3	0.0033	0.0	0.008	
616434 df10	78.5066	0.0	10.027	Abs. high
616435 df10	0.2796	0.0	0.037	
616436 df10	0.2421	0.0	0.033	
616434 DF100	51.5550	0.0	0.635	
616435	2.5618	0.0	0.310	
616436	0.2268	0.0	0.274	
616432SD DF10	2.0294	0.0	0.245	
CN-CCV4 DF2	0.7086	0.0	0.431	
CN-CCB4	0.0011	0.0	0.006	
616434 DF250	56.4430	0.0	0.273	
616435-R	0.2218	0.0	0.268	
616436-R	0.2354	0.0	0.284	
CN-CCV5 DF2	0.7191	0.0	0.437	
CN-CCB5	0.0015	0.0	0.006	

Laboratory
Konelab User

22.06.2017 07:11

Test: Cyanide

Sample Id	Result	Dil. 1 +	Response

N	52
Mean	4.5400
SD	14.83670
CV%	326.80

010045

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

SW-846 METHOD 9012B

Standard Logs and Certificates

010046

Chemical Information Sheet

#67469

Cyanide in Soil

Grade:	Analytical
Type:	Commercial Stock
CAS:	- No Data -
Lot:	D088-541
Received:	10/01/2014
Expiration:	07/31/2018
Location:	Bldg 70 Lab 42
Current Lab:	Lab 42 Bldg 70
Original Amount:	50 g
Amount Remaining:	50
Supplier:	ERA
Concentration:	
Project:	- No Data -
PO Number:	PE sample
Internal Lab ID:	- No Data -
Density:	- No Data -
Storage Requirement:	Ambient
Measuring Device ID:	- No Data -
Date Disposed:	- No Data -
Notes:	

Component Table

Compound	Conc/Activity	CAS
Total Cyanide	53.9 mg/kg	

010047

Reference Material

▪ Certificate of Analysis ▪

Product: Cyanide in Soil
Catalog Number: 541
Lot No. D088-541
Certificate Issue Date: January 13, 2015
Expiration Date: July 31, 2018
Revision Number: Original

CERTIFICATION

Parameter	Total Concentration	Certified Value[1]	Uncertainty[2]	QC Performance Acceptance Limits[3]	PT Performance Acceptance Limits[4]
	mgKg	mgKg	%	mg/Kg	mg/Kg
Cyanide, Total	105	59.9	10.4	D.L - 122	23.1 - 116
Amenable Cyanide	< 25.0	< 25.0	10.4	-	0.00 - 25.0

PT DATA/TRACEABILITY

Parameter	Certified Value[1]	Proficiency Testing Study[5]			NIST Traceability	
		Mean	Recovery	n	SRM Number	Recovery
	mg/Kg	mg/Kg	%			%
Cyanide, Total	59.9	59.9	57.1	63	-	-
Amenable Cyanide	< 25.0	-	-	5	-	-

SwRI Chem ID: 67469

ACCREDITED ACCREDITED

SwRI Chem ID: 67469

ERA
A Waters Company

Reference Material

▪ Certificate of Analysis ▪

1. The **Certified Values** are equal to the mean recoveries for the parameters as determined in an interlaboratory round robin study. The Certified Values are based on an "as received" basis, assuming 100% solids content. The certified values are monitored and the purchasers will be notified of any significant changes resulting in recertification or withdrawal of this certified reference material during the period of validity of this certificate.

2. The stated **Uncertainty** is the total propagated uncertainty at the 95% confidence interval. The uncertainty is based on the preparation and internal analytical verification of the product by ERA, multiplied by a coverage factor. The uncertainty applies to the product as supplied and does not take into account any required or optional dilution and/or preparations the laboratory may perform while using this product.

3. The **QC Performance Acceptance Limits (QC PALs™)** are based on actual historical data collected in ERA's Proficiency Testing program. The QC PALs™ reflect any inherent biases in the methods used to establish the limits and closely approximate a 95% confidence interval of the performance that experienced laboratories should achieve using accepted environmental methods. Use the QC PALs™ to realistically evaluate your performance against your peers.

4. The **PT Performance Acceptance Limits (PT PALs™)** are calculated using the regression equations and fixed acceptance criteria specified in the NELAC proficiency testing requirements. Use the PT PALs™ when analyzing this QC standard alongside USEPA and NELAC compliant PT standards. Please note that many PT study acceptance limits are concentration dependent (some non-linearly) and, therefore, the acceptance limits of this QC standard and any PT standard may differ relative to their difference in concentrations.

5. The **PT Data/Traceability** data include the mean value, percent recovery and number of data points reported by the laboratories in our Proficiency Testing study compared to the Certified Values. In addition, where NIST Standard Reference Materials (SRMs) are available, each analyte has been analytically traced to the NIST SRM listed.
Traceability Recovery (%) = [(% recovery certified standard)/(% recovery NIST SRM)]*100
The traceability data shown were compiled by analyzing the ERA standards or their associated stock solutions against the applicable NIST SRMs.

6. The Total Concentrations are equal to the background concentrations in the blank soil matrix (measured using EPA Method 9010, followed by colorimetric analysis), plus the amount of each analyte spiked onto the soil.

7. For additional information on this product such as intended use, instructions for use, level of homogeneity, and safety information, please refer to the provided Instruction Sheet.

If you have any questions or need technical assistance, please call ERA technical assistance at 1-800-372-0122 or send an email to info@eraqc.com.

Certifying Officer
Tom Widera

Quality Officer
Kristina Sanchez

ACCREDITED

ACCREDITED

Chemical Information Sheet

#83333

Free Cyanide

Grade:	Analytical
Type:	Commercial Stock
CAS:	- No Data -
Lot:	140217
Received:	03/13/2017
Expiration:	02/01/2018
Location:	Fridge
Current Lab:	Lab 47 Bldg 70
Original Amount:	125 mL
Amount Remaining:	125
Supplier:	Environmental Resource Associate
Concentration:	1000 mg/L
Project:	- No Data -
PO Number:	K47829MM
Internal Lab ID:	- No Data -
Density:	- No Data -
Storage Requirement:	Ambient
Measuring Device ID:	- No Data -
Date Disposed:	- No Data -
Notes:	Cat Log 048

Component Table

Compound	Conc/Activity	CAS

ERA

A Waters Company

Certificate of Analysis

PRODUCT:	1000 mg/L Free Cyanide
CATALOG NUMBER:	048 – 125 mL; 997 – 500 mL
LOT NUMBER:	140217
ISSUE DATE:	February 13, 2017
REVISION DATE:	Original
STARTING MATERIAL:	Potassium Cyanide (KCN)
CERTIFIED CONCENTRATION[1]:	1000 mg/L
UNCERTAINTY[2]:	0.6%
MATRIX:	18 megohm deionized water and 0.5% (v/v) NaOH
DENSITY:	1.0075 ± 0.0008 g/mL at 21.5°C and 756 mm Hg
TRACEABILITY[3]:	See Footnote 3
NIST/SRM:	-
VERIFICATION METHOD:	Spectrophotometry
STORAGE:	Store at 20-25°C

1. The **Certified Concentration** is the actual made-to concentration confirmed by ERA analytical verification.

2. The stated **Uncertainty** is the total propagated uncertainty at the 95% confidence interval. The uncertainty is based on the preparation of the product and includes uncertainty related to the starting material used and the volumetric and gravimetric measurements made. The method of calculating uncertainty is taken from the ISO Guide to the Expression of Uncertainty in Measurement (current version). The uncertainty applies to the product as supplied and does not take into account any required or optional dilutions and/or preparations the laboratory may perform while using this product.

3. Traceability ((% Recovery Certified Standard)/(% Recovery NIST SRM))* 100.

The traceability data shown were compiled by analyzing the ERA standards or their associated stock solutions against the applicable NIST SRMs. Where a NIST SRM is not available, the product is metrologically traceable through an unbroken chain of calibrations to NIST weights, each having stated uncertainties and utilizing measurement standards that are appropriate for the physical and/or chemical property being measured.

This standard **expires 2/2018.** The certified values are monitored and purchasers will be notified of any significant changes resulting in recertification or withdrawal of this certified reference material during the period of validity of this certificate.

This product is intended to be used as either a calibration standard or a quality control check of the entire analytical process for the analytes/matrix included in the standard.

If you have any questions or need technical assistance, please call ERA technical assistance at 1-800-372-0122 or email to info@eraqc.com

Certifying Officer: Brian Miller - Product Line Manager

ISO/IEC GUIDE 34:2009

ACCREDITED

REFERENCE MATERIAL PRODUCER
CERTIFICATE NO. 1539.03

ISO/IEC 17025:2005

ACCREDITED

CHEMICAL TESTING LABORATORY
CERTIFICATE NO. 1539.02

16341 Table Mtn Pkwy, Golden, CO 80403 800-372-0122 fax: 303-421-0159 www.eraqc.com

010051

Chemical Information Sheet

#83495

Total Cyanide

Grade:	Analytical
Type:	Neat
CAS:	143-33-9
Lot:	P261-502
Received:	10/01/2016
Expiration:	07/31/2019
Location:	- No Data -
Current Lab:	Lab 42 Bldg 70
Original Amount:	15 mL
Amount Remaining:	15
Supplier:	ERA
Concentration:	
Project:	- No Data -
PO Number:	PE sample
Internal Lab ID:	- No Data -
Density:	- No Data -
Storage Requirement:	- No Data -
Measuring Device ID:	- No Data -
Date Disposed:	- No Data -
Notes:	

Component Table

Compound	Conc/Activity	CAS
cyanide	0.680 mg/L	143-33-9

010052

Reference Materials

▪ Certificate of Analysis ▪

Product:	WatR™ Pollution Total Cyanide
Catalog Number:	502
Lot No.	P261-502
Certificate Issue Date:	February 24, 2017
Expiration Date:	July 31, 2019
Revision Number:	1.0
Revision Date:	February 24, 2017

CERTIFICATION

Parameter	Certified Value[1]	Uncertainty[2]	QC Performance Acceptance Limits[3]	PT Performance Acceptance Limits[4]
	mg/L	%	mg/L	mg/L
Phenol	0.958	0.404	0.718 - 1.20	-
Cyanide, total	0.680	5.30	0.515 - 0.836	0.442 - 0.918
Amenable Cyanide	0.214	10.1	0.162 - 0.263	0.139 - 0.289

ANALYTICAL VERIFICATION

Parameter	Certified Value[1]	Proficiency Testing Study			NIST Traceability	
		Mean	Recovery[5]	n	SRM Number	Recovery
	mg/L	mg/L	%			%
Phenol	0.958	-	-	-	-	-
Cyanide, total	0.680	0.732	108	83	-	-
Amenable Cyanide	0.214	0.263	123	29	-	-

16341 Table Mountain Pkwy ▪ Golden, CO 80403 ▪ T: 800.372.0122 ▪ 303.431.8454 ▪ www.eraqc.com

▪ Certificate of Analysis ▪

1. The **Certified Values** are the actual "made-to" concentrations confirmed by ERA analytical verification. The certified values are monitored and purchasers will be notified of any significant changes resulting in recertification or withdrawal of this certified reference material during the period of validity of this certificate.

2. The **Uncertainty** is the total propagated uncertainty at the 95% confidence interval. The uncertainty is based on the preparation and internal analytical verification of the product by ERA, multiplied by a coverage factor. The uncertainty applies to the product as supplied and does not take into account any required or optional dilution and/or preparations the laboratory may perform while using this product.

3. The **QC Performance Acceptance Limits (QC PALs™)**are based on actual historical data collected in ERA's Proficiency Testing program. The QC PALs™ reflect any inherent biases in the methods used to establish the limits and closely approximate a 95% confidence interval of the performance that experienced laboratories should achieve using accepted environmental methods. Use the QC PALs™ to realistically evaluate your performance against your peers.

4. The **PT Performance Acceptance Limits (PT PALs™)** are calculated using the regression equations and fixed acceptance criteria specified in the NELAC proficiency testing requirements. Use the PT PALs™ when analyzing this QC standard alongside USEPA and NELAC compliant PT standards. Please note that many PT study acceptance limits are concentration dependent (some non-linearly) and, therefore, the acceptance limits of this QC standard and any PT standard may differ relative to their difference in concentrations.

5. The **PT Data/Traceability** data include the mean value, percent recovery and number of data points reported by the laboratories in our Proficiency Testing study compared to the Certified Values. In addition, where NIST Standard Reference Materials (SRMs) are available, each analyte has been analytically traced to the NIST SRM listed. This product is traceable to the lot numbers of its starting materials. All gravimetric and volumetric measurements related to its manufacture are traceable to NIST through an unbroken chain of comparisons.
Traceability Recovery (%) = [(% recovery certified standard)/(% recovery NIST SRM)]*100
The traceability data shown were compiled by analyzing the ERA standards or their associated stock solutions against the applicable NIST SRMs.

6. For additional information on this product such as intended use, instructions for use, level of homogeneity, and safety information, please refer to the provided Instruction Sheet

If you have any questions or need technical assistance, please call ERA technical assistance at 1-800-372-0122 or send an email to info@eraqc.com.

Certifying Officer	Quality Officer
Brian Miller	Patrick Larson

16341 Table Mountain Pkwy ▪ Golden, CO 80403 ▪ T: 800.372.0122 ▪ 303.431.8454 ▪ www.eraqc.com

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

TCLP Metals

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

TCLP Metals

Case Narrative

Client: Savannah River Site
SDG: 616635
SwRI Project Number: 17995.23.001
SwRI Task Order Number: 170620-3

TCLP METALS ANALYSIS

The samples were extracted by SW-846 Method 1311. The samples were 100% solid, and were extracted with extraction fluid#2. For SwRI system id 616635, particle size reduction was done manually. Particle size reduction was not required for the other two samples. The extracts were prepared and analyzed for mercury by SW-846 Method 7470A. The extracts were digested according to SW-846 Method 3010A for the remaining metals. Those digestates were analyzed by ICP SW-846 Method 6010D. All holding times were met.

All instrument QC criteria were evaluated. The recoveries were within 90-110% for the initial and continuing calibration verifications. No analytes were detected above SwRI's limits of detection (LOD) in the initial and continuing calibration blanks. The low level check standard recoveries were within 80-120% except for arsenic (at 60.8%). The samples were either undetected for arsenic (<LOD) or contained arsenic at levels greater than its LOQ. No re-analysis was performed for arsenic. The percent recoveries for the ICP ICSAB interference check sample were within 80-120%. The ICSA interference check sample results were within the limits of the ICSA true value ± 2 times the associated LOD. There are no internal standard criteria defined in ICP Method 6010D. However, the ICP internal standard recoveries are reported on Form XIV.

Description of "Qual" column qualifiers on SwRI report forms: "U" indicates that an analyte was not detected above SwRI's LOD. "B" indicates that an analyte was detected at the instrument at or above SwRI's LOD, but less than SwRI's LOQ (limit of quantitation). "D" indicates that the reported result is from a dilution of the sample digestate.

No analytes were detected in the preparation blanks and extraction fluid blank (Sample ID: EFB#2-84825) above SwRI's LODs. All analytes were within 80-120% recovery for the aqueous laboratory control samples. SwRI system ID 616635 was QC'd. The MS/MSD recoveries were within 75-125%. The MS/MSD and duplicate RPDs were less than 20%. The QC criteria was met for the ICP serial dilution analyses, for which no limits are applied unless the initial parent sample result is greater than 50 times SwRI's LOD. The limit is then 10% difference.

Laboratory Qualifiers used on Certificate of Analysis and/or EDD: "U" is used for nondetected analytes.

Qualification Codes applied to EDD: None are applicable.

"I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the laboratory manager or his/her designee, as verified by the following signature. This report shall not be reproduced except in full without the written approval of SwRI."

6/28/17

Manager **Date**

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

TCLP Metals

Sample Results

SOUTHWEST RESEARCH INSTITUTE
Metals Report
Cover Page

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3

SDG: 616635
SRR: 59875

Case: 17030
Project: 17995.23.001

Client Sample ID	Lab Sample ID
Extraction Fluid Blank 2	EFB#2-84825
W-17030-00001	616635
W-17030-00001D	616635D
W-17030-00001MS	616635MS
W-17030-00001MSD	616635MSD
W-17030-00002	616636
W-17030-00003	616637

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and the electronic data submitted has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature:

Name: Jackie Ranger

Date: 6/28/17

Title: Manager

SOUTHWEST RESEARCH INSTITUTE **010059** **Client Sample ID**

Metals Report - Form I

Certificate of Analysis

EFB#2-84825

Type: EF Blank 2

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: EFB#2-84825
Result Units: ug/L

SDG: 616635
SRR: 59875
Matrix: SO, Solid
% Solids: NA

Case: 17030
Project: 17995.23.001
Receipt Date: NA
Collection Date: NA

CAS No.	Analyte	Result	Qual	M	LOD	LOQ	DF	Prep Batch	Analysis Date/Time
7440-38-2	Arsenic	20.0	U	P1	20.0	30.0	1	20170623-P003	06/27/2017 19:46
7440-39-3	Barium	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 19:46
7440-43-9	Cadmium	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 19:46
7440-47-3	Chromium	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 19:46
7439-92-1	Lead	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 19:46
7439-97-6	Mercury	0.100	U	CV1	0.100	0.200	1	20170622-P001	06/22/2017 15:30
7782-49-2	Selenium	25.0	U	P1	25.0	40.0	1	20170623-P003	06/27/2017 19:46
7440-22-4	Silver	10.0	U	P1	10.0	20.0	1	20170623-P003	06/27/2017 19:46
7440-66-6	Zinc	8.29	B	P1	5.00	10.0	1	20170623-P003	06/27/2017 19:46

Data Reporting Qualifiers (Qual)	***Columns***	***Instruments/Methods (M)***
B - Result is greater than or equal to the Limit of Detection (LOD) and less than the Limit of Quantitation (LOQ)	LOD - Limit of Detection	P1 - ICP TJA Trace 1/SW846 Method 6010D
U - Result is less than the Limit of Detection (LOD)	LOQ - Limit of Quantitation	CV1 - CVAA PE FIMS 400/SW846 Method 7470A
J - Matrix spike and/or matrix spike duplicate criteria was not met	DF - Dilution Factor	NA - Not Applicable
X - Analytical spike criteria was not met	M - Instrument	
E - Result is estimated due to interferences		
D - Result is reported from a dilution		
J - Duplicate criteria was not met		

SOUTHWEST RESEARCH INSTITUTE **010060**

Metals Report - Form I

Certificate of Analysis

Client Sample ID

W-17030-00001

Type: Unknown

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: 616635
Result Units: ug/L

SDG: 616635
SRR: 59875
Matrix: Solid
% Solids: NA

Case: 17030
Project: 17995.23.001
Receipt Date: 06/14/2017
Collection Date: 06/07/2017

CAS No.	Analyte	Result	Qual	M	LOD	LOQ	DF	Prep Batch	Analysis Date/Time
7440-38-2	Arsenic	52.4		P1	20.0	30.0	1	20170623-P003	06/27/2017 20:34
7440-39-3	Barium	342		P1	5.00	10.0	1	20170623-P003	06/27/2017 20:34
7440-43-9	Cadmium	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 20:34
7440-47-3	Chromium	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 20:34
7439-92-1	Lead	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 20:34
7439-97-6	Mercury	0.133	B	CV1	0.100	0.200	1	20170622-P001	06/22/2017 15:39
7782-49-2	Selenium	1,070		P1	25.0	40.0	1	20170623-P003	06/27/2017 20:34
7440-22-4	Silver	10.0	U	P1	10.0	20.0	1	20170623-P003	06/27/2017 20:34
7440-66-6	Zinc	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 20:34

Data Reporting Qualifiers (Qual)	***Columns***	***Instruments/Methods (M)***
B - Result is greater than or equal to the Limit of Detection (LOD) and less than the Limit of Quantitation (LOQ)	LOD - Limit of Detection	P1 - ICP TJA Trace 1/SW846 Method 6010D
U - Result is less than the Limit of Detection (LOD)	LOQ - Limit of Quantitation	CV1 - CVAA PE FIMS 400/SW846 Method 7470A
J - Matrix spike and/or matrix spike duplicate criteria was not met	DF - Dilution Factor	NA - Not Applicable
X - Analytical spike criteria was not met	M - Instrument	
E - Result is estimated due to interferences		
D - Result is reported from a dilution		
J - Duplicate criteria was not met		

SOUTHWEST RESEARCH INSTITUTE **010061**

Metals Report - Form I

Certificate of Analysis

Client Sample ID

W-17030-00002

Type: Unknown

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: 616636
Result Units: ug/L

SDG: 616635
SRR: 59875
Matrix: Solid
% Solids: NA

Case: 17030
Project: 17995.23.001
Receipt Date: 06/14/2017
Collection Date: 06/07/2017

CAS No.	Analyte	Result	Qual	M	LOD	LOQ	DF	Prep Batch	Analysis Date/Time
7440-38-2	Arsenic	103		P1	20.0	30.0	1	20170623-P003	06/27/2017 21:06
7440-39-3	Barium	406		P1	5.00	10.0	1	20170623-P003	06/27/2017 21:06
7440-43-9	Cadmium	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 21:06
7440-47-3	Chromium	218		P1	5.00	10.0	1	20170623-P003	06/27/2017 21:06
7439-92-1	Lead	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 21:06
7439-97-6	Mercury	0.100	U	CV1	0.100	0.200	1	20170622-P001	06/22/2017 15:51
7782-49-2	Selenium	1,040		P1	25.0	40.0	1	20170623-P003	06/27/2017 21:06
7440-22-4	Silver	10.0	U	P1	10.0	20.0	1	20170623-P003	06/27/2017 21:06
7440-66-6	Zinc	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 21:06

Data Reporting Qualifiers (Qual)	***Columns***	***Instruments/Methods (M)***
B - Result is greater than or equal to the Limit of Detection (LOD) and less than the Limit of Quantitation (LOQ)	LOD - Limit of Detection	P1 - ICP TJA Trace 1/SW846 Method 6010D
U - Result is less than the Limit of Detection (LOD)	LOQ - Limit of Quantitation	CV1 - CVAA PE FIMS 400/SW846 Method 7470A
J - Matrix spike and/or matrix spike duplicate criteria was not met	DF - Dilution Factor	NA - Not Applicable
X - Analytical spike criteria was not met	M - Instrument	
E - Result is estimated due to interferences		
D - Result is reported from a dilution		
J - Duplicate criteria was not met		

SOUTHWEST RESEARCH INSTITUTE **010062** **Client Sample ID**

Metals Report - Form I

Certificate of Analysis

W-17030-00003

Type: Unknown

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: 616637
Result Units: ug/L

SDG: 616635
SRR: 59875
Matrix: Solid
% Solids: NA

Case: 17030
Project: 17995.23.001
Receipt Date: 06/14/2017
Collection Date: 06/07/2017

CAS No.	Analyte	Result	Qual	M	LOD	LOQ	DF	Prep Batch	Analysis Date/Time
7440-38-2	Arsenic	20.0	U	P1	20.0	30.0	1	20170623-P003	06/27/2017 21:11
7440-39-3	Barium	693		P1	5.00	10.0	1	20170623-P003	06/27/2017 21:11
7440-43-9	Cadmium	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 21:11
7440-47-3	Chromium	75.0		P1	5.00	10.0	1	20170623-P003	06/27/2017 21:11
7439-92-1	Lead	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 21:11
7439-97-6	Mercury	0.100	U	CV1	0.100	0.200	1	20170622-P001	06/22/2017 15:59
7782-49-2	Selenium	1,270		P1	25.0	40.0	1	20170623-P003	06/27/2017 21:11
7440-22-4	Silver	10.0	U	P1	10.0	20.0	1	20170623-P003	06/27/2017 21:11
7440-66-6	Zinc	2,130		P1	5.00	10.0	1	20170623-P003	06/27/2017 21:11

Data Reporting Qualifiers (Qual)	***Columns***	***Instruments/Methods (M)***
B - Result is greater than or equal to the Limit of Detection (LOD) and less than the Limit of Quantitation (LOQ)	LOD - Limit of Detection	P1 - ICP TJA Trace 1/SW846 Method 6010D
U - Result is less than the Limit of Detection (LOD)	LOQ - Limit of Quantitation	CV1 - CVAA PE FIMS 400/SW846 Method 7470A
J - Matrix spike and/or matrix spike duplicate criteria was not met	DF - Dilution Factor	NA - Not Applicable
X - Analytical spike criteria was not met	M - Instrument	
E - Result is estimated due to interferences		
D - Result is reported from a dilution		
J - Duplicate criteria was not met		

SOUTHWEST RESEARCH INSTITUTE **010063** **SwRI ID**

Metals Report - Form I

Certificate of Analysis

PB17F22KE1

Type: Blank

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: PB17F22KE1
Result Units: ug/L

SDG: 616635
SRR: 59875
Matrix: SO, Solid
% Solids: NA

Case: 17030
Project: 17995.23.001
Receipt Date: NA
Collection Date: NA

CAS No.	Analyte	Result	Qual	M	LOD	LOQ	DF	Prep Batch	Analysis Date/Time
7440-38-2	Arsenic	-		NA	-	-	-	-	-
7440-39-3	Barium	-		NA	-	-	-	-	-
7440-43-9	Cadmium	-		NA	-	-	-	-	-
7440-47-3	Chromium	-		NA	-	-	-	-	-
7439-92-1	Lead	-		NA	-	-	-	-	-
7439-97-6	Mercury	0.100	U	CV1	0.100	0.200	1	20170622-P001	06/22/2017 15:24
7782-49-2	Selenium	-		NA	-	-	-	-	-
7440-22-4	Silver	-		NA	-	-	-	-	-
7440-66-6	Zinc	-		NA	-	-	-	-	-

Data Reporting Qualifiers (Qual)	***Columns***	***Instruments/Methods (M)***
B - Result is greater than or equal to the Limit of Detection (LOD) and less than the Limit of Quantitation (LOQ)	LOD - Limit of Detection	P1 - ICP TJA Trace 1/SW846 Method 6010D
U - Result is less than the Limit of Detection (LOD)	LOQ - Limit of Quantitation	CV1 - CVAA PE FIMS 400/SW846 Method 7470A
J - Matrix spike and/or matrix spike duplicate criteria was not met	DF - Dilution Factor	NA - Not Applicable
X - Analytical spike criteria was not met	M - Instrument	
E - Result is estimated due to interferences		
D - Result is reported from a dilution		
J - Duplicate criteria was not met		

SOUTHWEST RESEARCH INSTITUTE **010064** **SwRI ID**

Metals Report - Form I

Certificate of Analysis

PB17F23KE1

Type: Blank

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: PB17F23KE1
Result Units: ug/L

SDG: 616635
SRR: 59875
Matrix: SO, Solid
% Solids: NA

Case: 17030
Project: 17995.23.001
Receipt Date: NA
Collection Date: NA

CAS No.	Analyte	Result	Qual	M	LOD	LOQ	DF	Prep Batch	Analysis Date/Time
7440-38-2	Arsenic	20.0	U	P1	20.0	30.0	1	20170623-P003	06/27/2017 19:30
7440-39-3	Barium	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 19:30
7440-43-9	Cadmium	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 19:30
7440-47-3	Chromium	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 19:30
7439-92-1	Lead	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 19:30
7439-97-6	Mercury	-		NA	-	-	-	-	-
7782-49-2	Selenium	25.0	U	P1	25.0	40.0	1	20170623-P003	06/27/2017 19:30
7440-22-4	Silver	10.0	U	P1	10.0	20.0	1	20170623-P003	06/27/2017 19:30
7440-66-6	Zinc	5.00	U	P1	5.00	10.0	1	20170623-P003	06/27/2017 19:30

Data Reporting Qualifiers (Qual)	***Columns***	***Instruments/Methods (M)***
B - Result is greater than or equal to the Limit of Detection (LOD) and less than the Limit of Quantitation (LOQ)	LOD - Limit of Detection	P1 - ICP TJA Trace 1/SW846 Method 6010D
U - Result is less than the Limit of Detection (LOD)	LOQ - Limit of Quantitation	CV1 - CVAA PE FIMS 400/SW846 Method 7470A
J - Matrix spike and/or matrix spike duplicate criteria was not met	DF - Dilution Factor	NA - Not Applicable
X - Analytical spike criteria was not met	M - Instrument	
E - Result is estimated due to interferences		
D - Result is reported from a dilution		
J - Duplicate criteria was not met		

SOUTHWEST RESEARCH INSTITUTE **010065**

Metals Report - Form IIA

Initial and Continuing Calibration Verification

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: mg/L
Associated Analytical Batches: 20170628-A011

SDG: 616635
SRR: 59875
Initial Calibration Source: SPEX
Continuing Calibration Source: SPEX

Case: 17030
Project: 17995.23.001

	Initial Calibration Verification				Continuing Calibration Verification						
Analyte	True	Found	%Rec	Limit	True	Found1	%Rec	Found2	%Rec	Limit	M
Arsenic	5	5.25	105.0%	90%-110%	5	5.16	103.3%	5.20	104.1%	90%-110%	P1
Barium	10	9.66	96.6%	90%-110%	10	9.71	97.1%	9.82	98.2%	90%-110%	P1
Cadmium	1	1.01	100.7%	90%-110%	1	0.986	98.6%	0.996	99.6%	90%-110%	P1
Chromium	2	1.96	97.8%	90%-110%	2	1.94	96.8%	1.97	98.5%	90%-110%	P1
Lead	5	4.94	98.7%	90%-110%	5	4.84	96.9%	4.92	98.4%	90%-110%	P1
Mercury	-	-	-	-	-	-	-	-	-	-	-
Selenium	5	5.13	102.5%	90%-110%	5	5.04	100.8%	5.15	103.0%	90%-110%	P1
Silver	1	0.975	97.5%	90%-110%	1	0.984	98.4%	0.992	99.2%	90%-110%	P1
Zinc	1	0.994	99.4%	90%-110%	1	0.971	97.1%	0.986	98.6%	90%-110%	P1

Instruments/Methods (M)

P1 - ICP TJA Trace 1/SW846 Method 6010D
CV1 - CVAA PE FIMS 400/SW846 Method 7470A
NA - Not Applicable

Form IIA-IN

SOUTHWEST RESEARCH INSTITUTE **010066**

Metals Report - Form IIA

Initial and Continuing Calibration Verification

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: mg/L
Associated Analytical Batches: 20170628-A011

SDG: 616635
SRR: 59875
Initial Calibration Source: SPEX
Continuing Calibration Source: SPEX

Case: 17030
Project: 17995.23.001

	Continuing Calibration Verification								
Analyte	True	Found3	%Rec	Found4	%Rec	Found5	%Rec	Limit	M
Arsenic	5	5.22	104.3%	5.22	104.4%	5.23	104.6%	90%-110%	P1
Barium	10	9.77	97.7%	9.71	97.1%	9.87	98.7%	90%-110%	P1
Cadmium	1	1.01	101.3%	0.996	99.6%	0.995	99.5%	90%-110%	P1
Chromium	2	1.96	98.1%	1.94	96.9%	1.96	98.2%	90%-110%	P1
Lead	5	4.99	99.8%	4.88	97.5%	4.88	97.6%	90%-110%	P1
Mercury	-	-	-	-	-	-	-	-	-
Selenium	5	5.22	104.5%	5.13	102.5%	5.19	103.8%	90%-110%	P1
Silver	1	0.987	98.7%	0.980	98.0%	0.983	98.3%	90%-110%	P1
Zinc	1	0.987	98.7%	0.977	97.7%	0.982	98.2%	90%-110%	P1

Instruments/Methods (M)

P1 - ICP TJA Trace 1/SW846 Method 6010D
CV1 - CVAA PE FIMS 400/SW846 Method 7470A
NA - Not Applicable

Form IIA-IN

SOUTHWEST RESEARCH INSTITUTE **010067**

Metals Report - Form IIA

Initial and Continuing Calibration Verification

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: µg/L
Associated Analytical Batches: 20170628-A013

SDG: 616635
SRR: 59875
Initial Calibration Source: See Raw Data
Continuing Calibration Source: See Raw Data

Case: 17030
Project: 17995.23.001

	Initial Calibration Verification				Continuing Calibration Verification						
Analyte	True	Found	%Rec	Limit	True	Found1	%Rec	Found2	%Rec	Limit	M
Arsenic	-	-	-	-	-	-	-	-	-	-	-
Barium	-	-	-	-	-	-	-	-	-	-	-
Cadmium	-	-	-	-	-	-	-	-	-	-	-
Chromium	-	-	-	-	-	-	-	-	-	-	-
Lead	-	-	-	-	-	-	-	-	-	-	-
Mercury	3	3.03	100.8%	90%-110%	3	3.01	100.3%	2.92	97.3%	90%-110%	CV1
Selenium	-	-	-	-	-	-	-	-	-	-	-
Silver	-	-	-	-	-	-	-	-	-	-	-
Zinc	-	-	-	-	-	-	-	-	-	-	-

Instruments/Methods (M)

P1 - ICP TJA Trace 1/SW846 Method 6010D
CV1 - CVAA PE FIMS 400/SW846 Method 7470A
NA - Not Applicable

Form IIA-IN

SOUTHWEST RESEARCH INSTITUTE **010068**

Metals Report - Form IIA

Initial and Continuing Calibration Verification

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: µg/L
Associated Analytical Batches: 20170628-A013

SDG: 616635
SRR: 59875
Initial Calibration Source: See Raw Data
Continuing Calibration Source: See Raw Data

Case: 17030
Project: 17995.23.001

	Continuing Calibration Verification				
Analyte	True	Found3	%Rec	Limit	M
Arsenic	-	-	-	-	-
Barium	-	-	-	-	-
Cadmium	-	-	-	-	-
Chromium	-	-	-	-	-
Lead	-	-	-	-	-
Mercury	3	2.88	96.0%	90%-110%	CV1
Selenium	-	-	-	-	-
Silver	-	-	-	-	-
Zinc	-	-	-	-	-

Instruments/Methods (M)
P1 - ICP TJA Trace 1/SW846 Method 6010D
CV1 - CVAA PE FIMS 400/SW846 Method 7470A
NA - Not Applicable

Form IIA-IN

SOUTHWEST RESEARCH INSTITUTE **010069**

Metals Report - Form IIB

Low Level Check Standard

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: mg/L
Associated Analytical Batch: 20170628-A011

SDG: 616635
SRR: 59875

Case: 17030
Project: 17995.23.001

	CRI/CRA Standards				
Analyte	True	Found1	%Rec	Limit	M
Arsenic	0.03	0.0183	**60.8%**	80%-120%	P1
Barium	0.01	0.0103	103.4%	80%-120%	P1
Cadmium	0.01	0.0102	101.5%	80%-120%	P1
Chromium	0.01	0.00991	99.1%	80%-120%	P1
Lead	0.01	0.0107	106.7%	80%-120%	P1
Mercury	-	-	-	-	NA
Selenium	0.04	0.0446	111.4%	80%-120%	P1
Silver	0.02	0.0190	94.9%	80%-120%	P1
Zinc	0.01	0.00933	93.3%	80%-120%	P1

Instruments/Methods (M)
P1 - ICP TJA Trace 1/SW846 Method 6010D
CV1 - CVAA PE FIMS 400/SW846 Method 7470A
NA - Not Applicable

Form IIB-IN

SOUTHWEST RESEARCH INSTITUTE **010070**

Metals Report - Form IIB

Low Level Check Standard

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: µg/L
Associated Analytical Batch: 20170628-A013

SDG: 616635
SRR: 59875

Case: 17030
Project: 17995.23.001

	CRI/CRA Standards				
Analyte	True	Found1	%Rec	Limit	M
Arsenic	-	-	-	-	NA
Barium	-	-	-	-	NA
Cadmium	-	-	-	-	NA
Chromium	-	-	-	-	NA
Lead	-	-	-	-	NA
Mercury	0.1	0.0982	98.2%	80%-120%	CV1
Selenium	-	-	-	-	NA
Silver	-	-	-	-	NA
Zinc	-	-	-	-	NA

Instruments/Methods (M)
P1 - ICP TJA Trace 1/SW846 Method 6010D
CV1 - CVAA PE FIMS 400/SW846 Method 7470A
NA - Not Applicable

Form IIB-IN

SOUTHWEST RESEARCH INSTITUTE **010071**

Metals Report - Form III

Blanks

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Preparation Blank Result Units: ug/L
Initial/Continuing Blank Result Units: mg/L

SDG: 616635
SRR: 59875
Preparation Blank Matrix: Solid
Associated Prep Batches: 20170623-P003

Case: 17030
Project: 17995.23.001
Associated Analytical Batches: 20170628-A011

	Preparation Blank		Initial Calibration Blank		Continuing Calibration Blank										
Analyte	Result	Qual	Found	Qual	Found1	Qual	Found2	Qual	Found3	Qual	Found4	Qual	Found5	Qual	M
Arsenic	20.0	U	0.0200	U	0.0200	U	0.0200	U	0.0200	U	0.0200	U	0.0200	U	P1
Barium	5.00	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	P1
Cadmium	5.00	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	P1
Chromium	5.00	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	P1
Lead	5.00	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	P1
Mercury	-		-	-	-	-	-	-	-	-	-	-	-	-	NA
Selenium	25.0	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	P1
Silver	10.0	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	P1
Zinc	5.00	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	P1

Data Reporting Qualifiers (Qual)	***Instruments/Methods (M)***
B - Result is greater than or equal to the Limit of Detection (LOD) and less than the Limit of Quantitation (LOQ)	P1 - ICP TJA Trace 1/SW846 Method 6010D
U - Result is less than the Limit of Detection (LOD)	CV1 - CVAA PE FIMS 400/SW846 Method 7470A
J - Matrix spike and/or matrix spike duplicate criteria was not met	NA - Not Applicable
X - Analytical spike criteria was not met	
E - Result is estimated due to interferences	
D - Result is reported from a dilution	
J - Duplicate criteria was not met	

SOUTHWEST RESEARCH INSTITUTE **010072**

Metals Report - Form III

Blanks

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Preparation Blank Result Units: ug/L
Initial/Continuing Blank Result Units: µg/L

SDG: 616635
SRR: 59875
Preparation Blank Matrix: Solid
Associated Prep Batches: 20170622-P001

Case: 17030
Project: 17995.23.001
Associated Analytical Batches: 20170628-A013

	Preparation Blank		Initial Calibration Blank		Continuing Calibration Blank						
Analyte	Result	Qual	Found	Qual	Found1	Qual	Found2	Qual	Found3	Qual	M
Arsenic	-		-	-	-	-	-	-	-	-	NA
Barium	-		-	-	-	-	-	-	-	-	NA
Cadmium	-		-	-	-	-	-	-	-	-	NA
Chromium	-		-	-	-	-	-	-	-	-	NA
Lead	-		-	-	-	-	-	-	-	-	NA
Mercury	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	CV1
Selenium	-		-	-	-	-	-	-	-	-	NA
Silver	-		-	-	-	-	-	-	-	-	NA
Zinc	-		-	-	-	-	-	-	-	-	NA

Data Reporting Qualifiers (Qual)	***Instruments/Methods (M)***
B - Result is greater than or equal to the Limit of Detection (LOD) and less than the Limit of Quantitation (LOQ)	P1 - ICP TJA Trace 1/SW846 Method 6010D
U - Result is less than the Limit of Detection (LOD)	CV1 - CVAA PE FIMS 400/SW846 Method 7470A
J - Matrix spike and/or matrix spike duplicate criteria was not met	NA - Not Applicable
X - Analytical spike criteria was not met	
E - Result is estimated due to interferences	
D - Result is reported from a dilution	
J - Duplicate criteria was not met	

SOUTHWEST RESEARCH INSTITUTE **010073**

Metals Report - Form IVA

ICP-AES Interference Check Sample

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Instrument: ICP TJA Trace 1
Result Units: mg/L

SDG: 616635
SRR: 59875
ICSA Source: See Raw Data
ICSB Source: See Raw Data

Case: 17030
Project: 17995.23.001
Analysis Date: 06/27/2017
Associated Analytical Batch: 20170628-A011

Analyte	True		Found				Limit	Limit
	ICSA	ICSAB	ICSA	%Rec	ICSAB	%Rec	ICSA	ICSAB
Arsenic	0	1	-0.0137	-	1.06	105.7%	-0.0400 to 0.0400	80%-120%
Barium	0	0.5	0.00121	-	0.533	106.5%	-0.0100 to 0.0100	80%-120%
Cadmium	0	1	-0.000210	-	1.02	102.2%	-0.0100 to 0.0100	80%-120%
Chromium	0	0.5	-0.00102	-	0.506	101.1%	-0.0100 to 0.0100	80%-120%
Lead	0	1	0.00431	-	1.03	102.7%	-0.0100 to 0.0100	80%-120%
Mercury	-	-	-	-	-	-	-	-
Selenium	0	1	-0.00114	-	1.04	103.7%	-0.0500 to 0.0500	80%-120%
Silver	0	1	-0.00293	-	1.08	107.8%	-0.0200 to 0.0200	80%-120%
Zinc	0	1	-0.00462	-	1.02	102.1%	-0.0100 to 0.0100	80%-120%

SOUTHWEST RESEARCH INSTITUTE **010074** **Client Sample ID**

Metals Report - Form VA

W-17030-00001MS/MSD

Matrix Spike/Matrix Spike Duplicate Sample Recovery

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: 616635MS
Result Units: ug/L

SDG: 616635
SRR: 59875
Matrix: Solid
% Solids: NA

Case: 17030
Project: 17995.23.001

Analyte	Parent Sample Result	Qual	MS Result	MS Spike Added	MS %Rec	MSD Result	MSD Spike Added	MSD %Rec	%RPD	Control Limit %Rec	Control Limit %RPD	M	Note
Arsenic	52.4		2650	2500	103.9%	2600	2500	101.9%	1.9%	75%-125%	20%	P1	
Barium	342		4720	5000	87.6%	4610	5000	85.4%	2.5%	75%-125%	20%	P1	
Cadmium	5.00	U	457	500	91.4%	449	500	89.8%	1.8%	75%-125%	20%	P1	
Chromium	5.00	U	895	1000	89.5%	875	1000	87.5%	2.3%	75%-125%	20%	P1	
Lead	5.00	U	2160	2500	86.4%	2110	2500	84.4%	2.3%	75%-125%	20%	P1	
Mercury	0.133	B	2.21	2.00	103.8%	2.21	2.00	103.8%	0.0%	75%-125%	20%	CV1	
Selenium	1070		3440	2500	94.8%	3430	2500	94.4%	0.4%	75%-125%	20%	P1	
Silver	10.0	U	455	500	91.0%	393	500	78.6%	15.0%	75%-125%	20%	P1	
Zinc	5.00	U	449	500	89.8%	439	500	87.8%	2.3%	75%-125%	20%	P1	

Data Reporting Qualifiers (Qual)	***Columns***	***Instruments/Methods (M)***
B - Result is greater than or equal to the Limit of Detection (LOD) and less than the Limit of Quantitation (LOQ)	M - Instrument	P1 - ICP TJA Trace 1/SW846 Method 6010D
U - Result is less than the Limit of Detection (LOD)	MS - Matrix Spike	CV1 - CVAA PE FIMS 400/SW846 Method 7470A
J - Matrix spike and/or matrix spike duplicate criteria was not met	MSD - Matrix Spike Duplicate	NA - Not Applicable
X - Analytical spike criteria was not met	Q - Qualifier	
E - Result is estimated due to interferences	RPD - Relative Percent Difference	
D - Result is reported from a dilution		
J - Duplicate criteria was not met		

Form VA-IN

SOUTHWEST RESEARCH INSTITUTE **010075** **Client Sample ID**

Metals Report - Form VI

W-17030-00001D

Duplicates

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: 616635D
Result Units: ug/L

SDG: 616635
SRR: 59875
Matrix: Solid
% Solids: NA

Case: 17030
Project: 17995.23.001

Analyte	Parent Sample Result	Qual	Duplicate Result	Qual	RPD	RPD Limit	Control Limit	M	Note
Arsenic	52.4		54.4		3.7%	-	20.0	P1	
Barium	342		341		0.3%	20%	-	P1	
Cadmium	5.00	U	5.00	U	-	-	-	P1	#
Chromium	5.00	U	5.00	U	-	-	-	P1	#
Lead	5.00	U	5.00	U	-	-	-	P1	#
Mercury	0.133	B	0.130	B	2.3%	-	0.100	CV1	
Selenium	1070		1100		2.8%	20%	-	P1	
Silver	10.0	U	10.0	U	-	-	-	P1	#
Zinc	5.00	U	5.00	U	-	-	-	P1	#

# indicates that both the parent and duplicate sample results are below the LOD, therefore no RPD limit or control limit is applicable.

Data Reporting Qualifiers (Qual)	***Columns***	***Instruments/Method (M)***
B - Result is greater than or equal to the Limit of Detection (LOD) and less than the Limit of Quantitation (LOQ) U - Result is less than the Limit of Detection (LOD) J - Matrix spike and/or matrix spike duplicate criteria was not met X - Analytical spike criteria was not met E - Result is estimated due to interferences D - Result is reported from a dilution J - Duplicate criteria was not met	M - Instrument RPD - Relative Percent Difference	P1 - ICP TJA Trace 1/SW846 Method 6010D CV1 - CVAA PE FIMS 400/SW846 Method 7470A NA - Not Applicable

SOUTHWEST RESEARCH INSTITUTE **010076** **SwRI ID**

Metals Report - Form VII

LCS17F23KE1

Laboratory Control Sample

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: LCS17F23KE1
Result Units: ug/L

SDG: 616635
SRR: 59875
Matrix: Solid
Associated Prep Batches: 20170623-P003

Case: 17030
Project: 17995.23.001
LCS Source: Spex Certiprep

Analyte	True	Found	Qual	%Rec.	Limit	M	Analysis Date/Time
Arsenic	4000	3970		99.2%	80%-120%	P1	06/27/2017 19:35
Barium	4000	3900		97.5%	80%-120%	P1	06/27/2017 19:35
Cadmium	100	96.0		96.0%	80%-120%	P1	06/27/2017 19:35
Chromium	400	385		96.2%	80%-120%	P1	06/27/2017 19:35
Lead	1000	942		94.2%	80%-120%	P1	06/27/2017 19:35
Mercury	-	-	-	-	-	NA	-
Selenium	4000	3680		92.0%	80%-120%	P1	06/27/2017 19:35
Silver	100	95.4		95.4%	80%-120%	P1	06/27/2017 19:35
Zinc	1000	955		95.5%	80%-120%	P1	06/27/2017 19:35

Instruments/Methods (M)

P1 - ICP TJA Trace 1/SW846 Method 6010D
CV1 - CVAA PE FIMS 400/SW846 Method 7470A
NA - Not Applicable

Form VII-IN

SOUTHWEST RESEARCH INSTITUTE **010077** **SwRI ID**

Metals Report - Form VII

LCS17F23KE2

Laboratory Control Sample

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: LCS17F23KE2
Result Units: ug/L

SDG: 616635
SRR: 59875
Matrix: Solid
Associated Prep Batches: 20170623-P003

Case: 17030
Project: 17995.23.001
LCS Source: Spex Certiprep

Analyte	True	Found	Qual	%Rec.	Limit	M	Analysis Date/Time
Arsenic	4000	3930		98.2%	80%-120%	P1	06/27/2017 19:40
Barium	4000	3840		96.0%	80%-120%	P1	06/27/2017 19:40
Cadmium	100	94.0		94.0%	80%-120%	P1	06/27/2017 19:40
Chromium	400	382		95.5%	80%-120%	P1	06/27/2017 19:40
Lead	1000	933		93.3%	80%-120%	P1	06/27/2017 19:40
Mercury	-	-	-	-	-	NA	-
Selenium	4000	3630		90.8%	80%-120%	P1	06/27/2017 19:40
Silver	100	93.4		93.4%	80%-120%	P1	06/27/2017 19:40
Zinc	1000	952		95.2%	80%-120%	P1	06/27/2017 19:40

Instruments/Methods (M)

P1 - ICP TJA Trace 1/SW846 Method 6010D
CV1 - CVAA PE FIMS 400/SW846 Method 7470A
NA - Not Applicable

Form VII-IN

SOUTHWEST RESEARCH INSTITUTE **010078** **SwRI ID**

Metals Report - Form VII

LCS17F22KE1

Laboratory Control Sample

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: LCS17F22KE1
Result Units: ug/L

SDG: 616635
SRR: 59875
Matrix: Solid
Associated Prep Batches: 20170622-P001

Case: 17030
Project: 17995.23.001
LCS Source: Inorganic Ventures

Analyte	True	Found	Qual	%Rec.	Limit	M	Analysis Date/Time
Arsenic	-	-	-	-	-	NA	-
Barium	-	-	-	-	-	NA	-
Cadmium	-	-	-	-	-	NA	-
Chromium	-	-	-	-	-	NA	-
Lead	-	-	-	-	-	NA	-
Mercury	1.00	0.996		99.6%	80%-120%	CV1	06/22/2017 15:26
Selenium	-	-	-	-	-	NA	-
Silver	-	-	-	-	-	NA	-
Zinc	-	-	-	-	-	NA	-

Instruments/Methods (M)

P1 - ICP TJA Trace 1/SW846 Method 6010D
CV1 - CVAA PE FIMS 400/SW846 Method 7470A
NA - Not Applicable

Form VII-IN

SOUTHWEST RESEARCH INSTITUTE **010079** **SwRI ID**

Metals Report - Form VII

LCS17F22KE2

Laboratory Control Sample

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: LCS17F22KE2
Result Units: ug/L

SDG: 616635
SRR: 59875
Matrix: Solid
Associated Prep Batches: 20170622-P001

Case: 17030
Project: 17995.23.001
LCS Source: Inorganic Ventures

Analyte	True	Found	Qual	%Rec.	Limit	M	Analysis Date/Time
Arsenic	-	-	-	-	-	NA	-
Barium	-	-	-	-	-	NA	-
Cadmium	-	-	-	-	-	NA	-
Chromium	-	-	-	-	-	NA	-
Lead	-	-	-	-	-	NA	-
Mercury	1.00	0.999		99.9%	80%-120%	CV1	06/22/2017 15:28
Selenium	-	-	-	-	-	NA	-
Silver	-	-	-	-	-	NA	-
Zinc	-	-	-	-	-	NA	-

Instruments/Methods (M)

P1 - ICP TJA Trace 1/SW846 Method 6010D
CV1 - CVAA PE FIMS 400/SW846 Method 7470A
NA - Not Applicable

Form VII-IN

SOUTHWEST RESEARCH INSTITUTE **010080** **Client Sample ID**

Metals Report - Form VIII

W-17030-00001L

ICP-AES and ICP-MS Serial Dilutions

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Lab ID: 616635L
Result Units: ug/L

SDG: 616635
SRR: 59875
Matrix: SO, Solid

Case: 17030
Project: 17995.23.001

Analyte	Parent Sample Result	Qual	Serial Dilution Result	Qual	% Diff.	% Diff. Limit	M	Note	DF	Prep Batch	Analysis Date/Time
Arsenic	52.4		100	UD	100.0%	-	P1	#	5	20170623-P003	06/27/2017 20:44
Barium	342		359	D	5.11%	10%	P1		5	20170623-P003	06/27/2017 20:44
Cadmium	5.00	U	25.0	UD	-	-	P1	#	5	20170623-P003	06/27/2017 20:44
Chromium	5.00	U	25.0	UD	-	-	P1	#	5	20170623-P003	06/27/2017 20:44
Lead	5.00	U	25.0	UD	-	-	P1	#	5	20170623-P003	06/27/2017 20:44
Mercury	-	-	-	-	-	-	NA		-	-	-
Selenium	1070		1130	D	4.72%	-	P1	#	5	20170623-P003	06/27/2017 20:44
Silver	10.0	U	50.0	UD	-	-	P1	#	5	20170623-P003	06/27/2017 20:44
Zinc	5.00	U	25.0	UD	-	-	P1	#	5	20170623-P003	06/27/2017 20:44

# Indicates that the parent sample result is less than 50 times the LOD, therefore no percent difference limit is applicable.

Data Reporting Qualifiers (Qual)	***Instruments/Methods (M)***
B - Result is greater than or equal to the Limit of Detection (LOD) and less than the Limit of Quantitation (LOQ)	P1 - ICP TJA Trace 1/SW846 Method 6010D
U - Result is less than the Limit of Detection (LOD))	CV1 - CVAA PE FIMS 400/SW846 Method 7470A
J - Matrix spike and/or matrix spike duplicate criteria was not met	NA - Not Applicable
X - Analytical spike criteria was not met	
E - Result is estimated due to interferences	
D - Result is reported from a dilution	
J - Duplicate criteria was not met	

SOUTHWEST RESEARCH INSTITUTE **010081**

Metals Report - Form IX

Detection Limits

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: µg/L

SDG: 616635
SRR: 59875
Instrument: CVAA PE FIMS 400

Case: 17030
Project: 17995.23.001

Analyte	Wavelength	LOD	LOQ
Mercury	253.7	0.100	0.200

Columns	
LOD	- Limit of Detection
LOQ	- Limit of Quantitation

SOUTHWEST RESEARCH INSTITUTE **010082**

Metals Report - Form IX

Detection Limits

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: mg/L

SDG: 616635
SRR: 59875
Instrument: ICP TJA Trace 1

Case: 17030
Project: 17995.23.001

Analyte	Wavelength	LOD	LOQ
Arsenic	189	0.0200	0.0300
Barium	493.4	0.00500	0.0100
Cadmium	226.5	0.00500	0.0100
Chromium	267.7	0.00500	0.0100
Lead	220.3	0.00500	0.0100
Selenium	196	0.0250	0.0400
Silver	328	0.0100	0.0200
Zinc	206.2	0.00500	0.0100

Columns	
LOD	- Limit of Detection
LOQ	- Limit of Quantitation

SOUTHWEST RESEARCH INSTITUTE **010083**

Metals Report - Form XA

Interelement Correction Factors

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Instrument: ICP TJA Trace 1

SDG: 616635
SRR: 59875
Run Date: 07/14/2016

Case: 17030
Project: 17995.23.001

Analyte	Wavelength	Interelement Correction Factors for:				
		Al	Ca	Fe	Mg	Ag
Arsenic	189	0.0	0.0	-0.00008998	0.0	0.000025315
Barium	493.4	0.0	0.0	0.0	0.0	0.0
Cadmium	226.5	-0.00000688	0.0	0.00002382	0.0	0.0
Chromium	267.7	0.0	0.0	0.0	0.0	0.0
Lead/1	220.3	0.0	0.0	0.0000687	0.0	0.0
Lead/2	220.3	-0.00045235	0.0	0.00003133	0.0	0.0
Selenium/1	196	0.0	0.0	0.0	0.0	0.0
Selenium/2	196	0.0	0.0	-0.00033672	0.0	0.0
Silver	328	0.0	0.0	0.0	0.0	0.0
Zinc	206.2	0.0	0.0	0.00000754	0.0	0.0

SOUTHWEST RESEARCH INSTITUTE **010084**

Metals Report - Form XB

Interelement Correction Factors

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Instrument: ICP TJA Trace 1

SDG: 616635
SRR: 59875
Run Date: 07/14/2016

Case: 17030
Project: 17995.23.001

Analyte	Wavelength	Interelement Correction Factors for:						
		As	B	Ba	Be	Bi	Cd	Co
Arsenic	189	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Barium	493.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cadmium	226.5	0.0	0.0	0.0	0.0	0.0	0.0	-0.000153835
Chromium	267.7	0.0	0.0	0.0	0.0	0.0	-0.00005818	0.0
Lead/1	220.3	0.0	0.0	0.0	0.0	-0.000734365	0.0	0.0
Lead/2	220.3	0.0	0.0	0.0	0.0	0.0001095	0.0	0.000126535
Selenium/1	196	0.0	0.0	0.0	0.000150585	0.0	0.0	0.0
Selenium/2	196	0.0	0.0	0.0	0.0	0.000019615	0.0	-0.000596785
Silver	328	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zinc	206.2	0.0	0.0	0.0	0.00001441	-0.001408385	0.0	0.0

SOUTHWEST RESEARCH INSTITUTE **010085**

Metals Report - Form XB

Interelement Correction Factors

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Instrument: ICP TJA Trace 1

SDG: 616635
SRR: 59875
Run Date: 07/14/2016

Case: 17030
Project: 17995.23.001

Analyte	Wavelength	Interelement Correction Factors for:						
		Cr	Cu	K	La	Li	Mn	Mo
Arsenic	189	0.00014254	0.0	0.0	0.033563795	0.0	0.0	0.00029071
Barium	493.4	0.0	0.0	0.0	-0.000005335	0.0	0.0	0.0
Cadmium	226.5	0.0	0.0	0.0	0.0	0.0	0.0	0.000020205
Chromium	267.7	0.0	0.0	0.0	0.000022585	0.0	0.00021676	0.00016651
Lead/1	220.3	0.0	-0.00084971	0.0	0.000552045	0.0	0.0000944	0.0
Lead/2	220.3	-0.000022445	0.0	0.0	0.000417895	0.0	0.000132165	-0.001298075
Selenium/1	196	0.0	0.0	0.0	0.0	0.0	0.00073635	0.0
Selenium/2	196	-0.00004316	0.0	0.0	0.00056464	0.0	0.000800615	0.0
Silver	328	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zinc	206.2	-0.002002	0.0	0.0	0.0	0.0	0.0	-0.00020819

SOUTHWEST RESEARCH INSTITUTE **010086**

Metals Report - Form XB

Interelement Correction Factors

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Instrument: ICP TJA Trace 1

SDG: 616635
SRR: 59875
Run Date: 07/14/2016

Case: 17030
Project: 17995.23.001

Analyte	Wavelength	Interelement Correction Factors for:						
		Na	Ni	P	Pb	Pd	S	Sb
Arsenic	189	0.0	0.0	0.0	0.0	0.01298656	0.0	0.0
Barium	493.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cadmium	226.5	0.0	-0.00003477	0.0	0.0	0.0	0.0	0.0
Chromium	267.7	0.0	0.0	0.00003101	0.0	0.0	0.0	0.000050535
Lead/1	220.3	0.0	0.000715515	0.0	0.0	0.0	0.0	-0.00003337
Lead/2	220.3	0.0	0.0	0.0	0.942878255	0.000735565	0.0	-0.000038505
Selenium/1	196	0.0	0.0	0.0	0.0	0.002765495	0.0	0.0
Selenium/2	196	0.000020625	0.0	0.000028775	0.0	0.000243375	0.000015495	0.000063145
Silver	328	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zinc	206.2	0.0	0.000004265	0.0	-0.00000649	0.0	0.00001251	0.00000529

SOUTHWEST RESEARCH INSTITUTE **010087**

Metals Report - Form XB

Interelement Correction Factors

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Instrument: ICP TJA Trace 1

SDG: 616635
SRR: 59875
Run Date: 07/14/2016

Case: 17030
Project: 17995.23.001

Analyte	Wavelength	Interelement Correction Factors for:						
		Se	Si	Sn	Sr	Th	Ti	Tl
Arsenic	189	0.0	0.0	0.00001755	0.0	0.0	0.0	0.0
Barium	493.4	0.0	0.0	0.0	0.000018465	0.0	0.0	0.0
Cadmium	226.5	0.0	0.0	0.0	0.0	0.00004316	0.00000843	0.0
Chromium	267.7	0.0	0.0	0.0	0.0	-0.00026514	0.000042845	0.0
Lead/1	220.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lead/2	220.3	0.0	0.0	0.0	0.0	0.000032365	-0.001043215	0.0
Selenium/1	196	0.0	0.00005089	0.0	0.0	0.0	0.0	0.0
Selenium/2	196	0.78757207	0.000032275	0.0	0.0	0.0	0.0	0.0
Silver	328	0.0	0.0	0.0	0.0	-0.010668525	0.0	0.0
Zinc	206.2	0.0	0.0	0.0	0.0	0.0	-0.0000465	0.0

SOUTHWEST RESEARCH INSTITUTE **010088**

Metals Report - Form XB

Interelement Correction Factors

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Instrument: ICP TJA Trace 1

SDG: 616635
SRR: 59875
Run Date: 07/14/2016

Case: 17030
Project: 17995.23.001

Analyte	Wavelength	Interelement Correction Factors for:					
		U	V	W	Y	Zn	Zr
Arsenic	189	0.0	0.000044035	-0.00235	0.0	0.0	0.000053795
Barium	493.4	-0.00001206	0.0	0.0	0.0	0.0	0.0
Cadmium	226.5	0.0	0.0	0.0	0.0	0.0	0.000152395
Chromium	267.7	0.00073015	-0.0002106	0.00015876	0.0	0.0	0.0
Lead/1	220.3	0.00048143	0.0	-0.00017504	-0.001179825	0.0	-0.000032975
Lead/2	220.3	0.000669175	0.0	-0.000666775	0.000118865	0.0	-0.000409645
Selenium/1	196	0.0	0.0	0.0	0.0	0.0	0.0
Selenium/2	196	0.00017127	-0.000217715	0.0087919	0.0	0.0	0.000139075
Silver	328	0.000499375	0.00010423	0.0	0.00029224	0.0	0.0042672
Zinc	206.2	0.00000678	0.000008255	0.000365875	0.0	0.0	0.0

SOUTHWEST RESEARCH INSTITUTE **010089**

Metals Report - Form XII

Analysis Run Log

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Analytical Batch: 20170628-A013
Analysis Method: SW846 Method 7470A

SDG: 616635
SRR: 59875
Instrument: CVAA PE FIMS 400

Case: 17030
Project: 17995.23.001
Start Date: 06/22/2017
End Date: 06/22/2017

Lab Sample ID	Client Sample ID	Time	DF	As	Ba	Cd	Cr	Pb	Hg	Se	Ag	Zn
S0	S0	15:05	1						X			
S0.1	S0.1	15:07	1						X			
S0.5	S0.5	15:09	1						X			
S1.0	S1.0	15:11	1						X			
S2.0	S2.0	15:13	1						X			
S5.0	S5.0	15:15	1						X			
S10.0	S10.0	15:17	1						X			
ICV 3.0 UG/L	ICV 3.0 UG/L	15:19	1						X			
ICB	ICB	15:21	1						X			
CRA 0.10 UG/L	CRA 0.10 UG/L	15:22	1						X			
PB17F22KE1	NA	15:24	1						X			
LCS17F22KE1	NA	15:26	1						X			
LCS17F22KE2	NA	15:28	1						X			
EFB#2-84825	EFB#2-84825	15:30	1						X			
Z	Z	15:32	1									
Z	Z	15:34	1									
Z	Z	15:36	1									
Z	Z	15:38	1									
616635	W-17030-00001	15:39	1						X			
CCV 3.0 UG/L	CCV 3.0 UG/L	15:41	1						X			
CCB	CCB	15:43	1						X			
616635D	W-17030-00001D	15:45	1						X			
616635MS	W-17030-00001MS	15:47	1						X			
616635MSD	W-17030-00001MSD	15:49	1						X			
616636	W-17030-00002	15:51	1						X			
CCV 3.0 UG/L	CCV 3.0 UG/L	15:53	1						X			
CCB	CCB	15:54	1						X			
616637	W-17030-00003	15:59	1						X			
CCV 3.0 UG/L	CCV 3.0 UG/L	16:01	1						X			
CCB	CCB	16:03	1						X			

SOUTHWEST RESEARCH INSTITUTE **010090**

Metals Report - Form XII

Analysis Run Log

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Analytical Batch: 20170628-A011
Analysis Method: SW846 Method 6010D

SDG: 616635
SRR: 59875
Instrument: ICP TJA Trace 1

Case: 17030
Project: 17995.23.001
Start Date: 06/27/2017
End Date: 06/27/2017

Lab Sample ID	Client Sample ID	Time	DF	As	Ba	Cd	Cr	Pb	Hg	Se	Ag	Zn
BLK	BLK	16:02	1	X	X	X	X	X		X	X	X
CLP_STD4	CLP_STD4	16:07	1					X		X	X	
CLP_STD1	CLP_STD1	16:12	1									
CLP_STD3	CLP_STD3	16:16	1	X		X						X
CLP_STD5	CLP_STD5	16:21	1									
CLP_STD2	CLP_STD2	16:25	1		X		X					
CLP_STD6	CLP_STD6	16:29	1									
ICV	ICV	16:34	1	X	X	X	X	X		X	X	X
ICB	ICB	16:40	1	X	X	X	X	X		X	X	X
CRI	CRI	16:46	1	X	X	X	X	X		X	X	X
ICSA	ICSA	16:51	1	X	X	X	X	X		X	X	X
ICSAB	ICSAB	16:57	1	X	X	X	X	X		X	X	X
UCL1	UCL1	17:02	1	X	X	X	X	X		X	X	X
UCL2	UCL2	17:08	1	X	X	X	X	X		X	X	X
ZZZZ	ZZZZ	17:13	1									
CCV	CCV	17:19	1	X	X	X	X	X		X	X	X
CCB	CCB	17:24	1	X	X	X	X	X		X	X	X
Z	Z	17:32	1									
Z	Z	17:38	1									
Z	Z	17:43	1									
Z	Z	17:48	1									
Z	Z	17:54	1									
Z	Z	17:59	1									
Z	Z	18:04	1									
Z	Z	18:10	1									
Z	Z	18:15	1									
CCV	CCV	18:20	1	X	X	X	X	X		X	X	X
CCB	CCB	18:26	1	X	X	X	X	X		X	X	X
Z	Z	18:31	1									
Z	Z	18:36	1									
Z	Z	18:42	1									
Z	Z	18:47	1									
Z	Z	18:52	1									
Z	Z	18:58	1									
Z	Z	19:03	1									
Z	Z	19:08	1									
Z	Z	19:14	1									
CCV	CCV	19:19	1	X	X	X	X	X		X	X	X
CCB	CCB	19:24	1	X	X	X	X	X		X	X	X
PB17F23KE1	NA	19:30	1	X	X	X	X	X		X	X	X
LCS17F23KE1	NA	19:35	1	X	X	X	X	X		X	X	X
LCS17F23KE2	NA	19:40	1	X	X	X	X	X		X	X	X
EFB#2-84825	EFB#2-84825	19:46	1	X	X	X	X	X		X	X	X
Z	Z	19:51	1									
Z	Z	19:56	1									
Z	Z	20:02	5									
Z	Z	20:07	1									
Z	Z	20:12	1									
Z	Z	20:18	1									
CCV	CCV	20:23	1	X	X	X	X	X		X	X	X
CCB	CCB	20:28	1	X	X	X	X	X		X	X	X
616635	W-17030-00001	20:34	1	X	X	X	X	X		X	X	X
616635D	W-17030-00001D	20:39	1	X	X	X	X	X		X	X	X
616635L	W-17030-00001L	20:44	5	X	X	X	X	X		X	X	X
616635MS	W-17030-00001MS	20:50	1	X	X	X	X	X		X	X	X
616635MSD	W-17030-00001MSD	20:55	1	X	X	X	X	X		X	X	X
Z	Z	21:00	1									

SOUTHWEST RESEARCH INSTITUTE **010091**

Metals Report - Form XII

Analysis Run Log

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Analytical Batch: 20170628-A011
Analysis Method: SW846 Method 6010D

SDG: 616635
SRR: 59875
Instrument: ICP TJA Trace 1

Case: 17030
Project: 17995.23.001
Start Date: 06/27/2017
End Date: 06/27/2017

Lab Sample ID	Client Sample ID	Time	DF	As	Ba	Cd	Cr	Pb	Hg	Se	Ag	Zn
616636	W-17030-00002	21:06	1	X	X	X	X	X		X	X	X
616637	W-17030-00003	21:11	1	X	X	X	X	X		X	X	X
CCV	CCV	21:17	1	X	X	X	X	X		X	X	X
CCB	CCB	21:22	1	X	X	X	X	X		X	X	X

SOUTHWEST RESEARCH INSTITUTE **010092**

Metals Report - Form XIV

Internal Standards Relative Intensity Summary

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Analytical Batch: 20170628-A011
Analysis Method: SW846 Method 6010D

SDG: 616635
SRR: 59875
Instrument: ICP TJA Trace 1

Case: 17030
Project: 17995.23.001
Start Date: 06/27/2017
End Date: 06/27/2017

Lab Sample ID	Client Sample ID	Time	DF	Sc
BLK	BLK	16:02	1	-
CLP_STD4	CLP_STD4	16:07	1	-
CLP_STD1	CLP_STD1	16:12	1	-
CLP_STD3	CLP_STD3	16:16	1	-
CLP_STD5	CLP_STD5	16:21	1	-
CLP_STD2	CLP_STD2	16:25	1	-
CLP_STD6	CLP_STD6	16:29	1	-
ICV	ICV	16:34	1	101
ICB	ICB	16:40	1	99.3
CRI	CRI	16:46	1	99.8
ICSA	ICSA	16:51	1	90.8
ICSAB	ICSAB	16:57	1	90.0
UCL1	UCL1	17:02	1	88.6
UCL2	UCL2	17:08	1	98.7
ZZZZ	ZZZZ	17:13	1	98.6
CCV	CCV	17:19	1	100
CCB	CCB	17:24	1	99.2
Z	Z	17:32	1	106
Z	Z	17:38	1	103
Z	Z	17:43	1	104
Z	Z	17:48	1	104
Z	Z	17:54	1	104
Z	Z	17:59	1	107
Z	Z	18:04	1	99.2
Z	Z	18:10	1	104
Z	Z	18:15	1	102
CCV	CCV	18:20	1	98.3
CCB	CCB	18:26	1	98.2
Z	Z	18:31	1	104
Z	Z	18:36	1	104
Z	Z	18:42	1	103
Z	Z	18:47	1	103
Z	Z	18:52	1	105
Z	Z	18:58	1	98.9
Z	Z	19:03	1	102
Z	Z	19:08	1	103
Z	Z	19:14	1	103
CCV	CCV	19:19	1	98.5
CCB	CCB	19:24	1	97.5
PB17F23KE1	NA	19:30	1	104
LCS17F23KE1	NA	19:35	1	103
LCS17F23KE2	NA	19:40	1	103
EFB#2-84825	EFB#2-84825	19:46	1	105
Z	Z	19:51	1	94.2
Z	Z	19:56	1	93.6
Z	Z	20:02	5	96.5
Z	Z	20:07	1	94.6
Z	Z	20:12	1	92.5
Z	Z	20:18	1	-
CCV	CCV	20:23	1	101
CCB	CCB	20:28	1	98.5
616635	W-17030-00001	20:34	1	94.7
616635D	W-17030-00001D	20:39	1	94.8
616635L	W-17030-00001L	20:44	5	97.3
616635MS	W-17030-00001MS	20:50	1	94.5
616635MSD	W-17030-00001MSD	20:55	1	95.6

SOUTHWEST RESEARCH INSTITUTE **010093**

Metals Report - Form XIV

Internal Standards Relative Intensity Summary

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Analytical Batch: 20170628-A011
Analysis Method: SW846 Method 6010D

SDG: 616635
SRR: 59875
Instrument: ICP TJA Trace 1

Case: 17030
Project: 17995.23.001
Start Date: 06/27/2017
End Date: 06/27/2017

Lab Sample ID	Client Sample ID	Time	DF	Sc
616635AS	W-17030-00001AS	21:00	1	-
616636	W-17030-00002	21:06	1	93.1
616637	W-17030-00003	21:11	1	94.8
CCV	CCV	21:17	1	99.9
CCB	CCB	21:22	1	100

Metals Report - Form XVII

Linear Ranges

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: µg/L

SDG: 616635
SRR: 59875
Instrument: CVAA PE FIMS 400

Case: 17030
Project: 17995.23.001
Date: 06/22/2017

Analyte	Upper Calibration Limit
Mercury	10

SOUTHWEST RESEARCH INSTITUTE **010095**

Metals Report - Form XVII

Linear Ranges

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3
Result Units: mg/L

SDG: 616635
SRR: 59875
Instrument: ICP TJA Trace 1

Case: 17030
Project: 17995.23.001
Date: 06/27/2017

Analyte	Upper Calibration Limit
Arsenic	20
Barium	20
Cadmium	10
Chromium	20
Lead	20
Selenium	20
Silver	2
Zinc	20

SOUTHWEST RESEARCH INSTITUTE **010096**

Metals Report - Form XVIII

Preparation/Digestion Summary

Client: Savannah River Nuclear Solutions, LLC
Task Order: 170620-3

SDG: 616635
SRR: 59875

Case: 17030
Project: 17995.23.001

Prep Batch	Method	Preparation Date
20170622-P001	SW-846 Method 7470A	06/22/2017
20170623-P003	SW-846 Method 3010A	06/23/2017

Digestion Log

010097

Southwest Research Institute
San Antonio, Texas 78228

Batch: 20170622-P001 (Ver. 2)
Status: APPROVED

Rad Samples Present

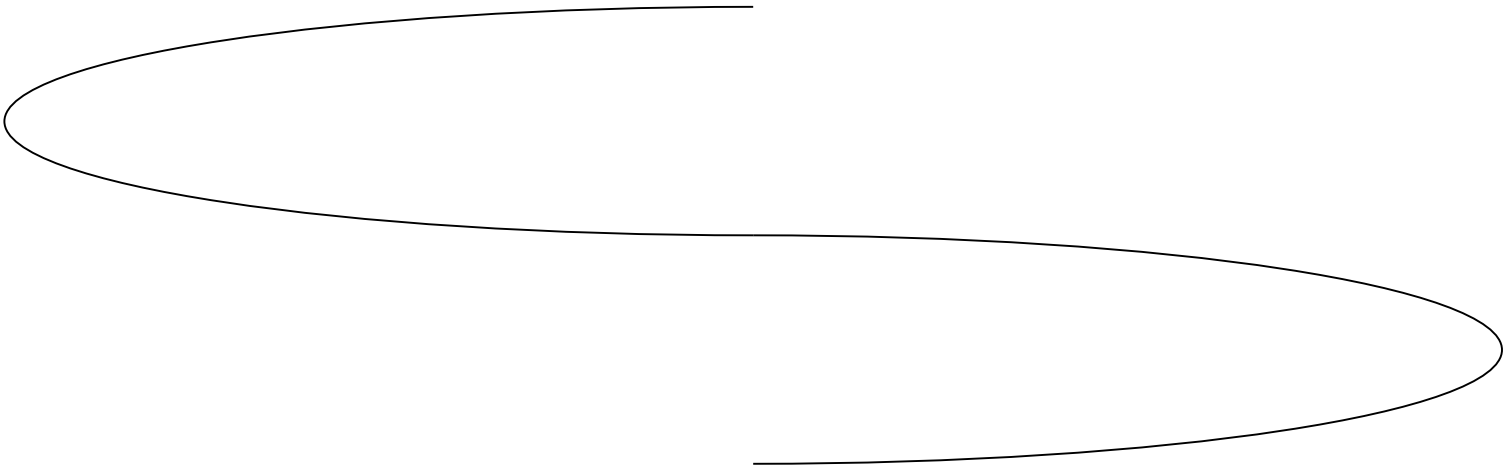
Client(s): Savannah River Nuclear Solutions, LLC
Task Order(s): 170601-2, 170620-3
SDG(s): 616029, 616635
Project(s): 17995.22.00X, 17995.23.001
Method(s): SW-846 Method 7470A (TAP: 01-0406-048)
Matrix(s): SO, Solid
Intrument(s): CVAA
Reagent(s): HNO3 84666, H2SO4 69377, 5% K Persulfate 76296, 5% KMnO4 83328, 12% HAH 74872
Pipette(s): 1000-3, 200-1, 5000-2
Heating Device: Oven #35 Temperature (C): 95
Time In: 06/22/2017 10:55:01 Time Out: 06/22/2017 13:00:46

Sample Identification	Client Identification	pH	Initial Volume (mL)	Final Volume (mL)
PB17F22KE1	NA	6	10	10
LCS17F22KE1 ①	NA	6	10	10
LCS17F22KE2 ①	NA	6	10	10
EFB#2-84825	NA	< 2	10	10
616029	W-17028-00001	< 2	1	10
616029D	W-17028-00001	< 2	1	10
616029MS ②	W-17028-00001	< 2	1	10
616029MSD ②	W-17028-00001	< 2	1	10
616635	W-17030-00001	< 2	10	10
616635D	W-17030-00001	< 2	10	10
616635MS ③	W-17030-00001	< 2	10	10
616635MSD ③	W-17030-00001	< 2	10	10
616636	W-17030-00002	< 2	10	10
616637	W-17030-00003	< 2	10	10

① spiked 0.1 mL of CI# 86201 Hg Working 100ppb (IV) (Lot# K2-HG03002, Source: Inorganic Ventures, Exp: 07/12/2017)
② spiked 0.0004 mL of CI# 86199 Hg Intermediate10ppm-A (Lot# K2-HG03002, Source: Inorganic Ventures, Exp: 07/12/2017)
③ spiked 0.002 mL of CI# 86199 Hg Intermediate10ppm-A (Lot# K2-HG03002, Source: Inorganic Ventures, Exp: 07/12/2017)

Comments:
bk 17-0406-020 pg 033
pH paper #62597

refer to tclp logbook 11(15-0406-016) pg 100-101



Prepared by: EDRISI, KHALED Date: 06/22/2017

Reviewed by: RANGER, JACKIE Date: 06/28/2017

Disposal Int/Date/Loc: _____

Program version(8/11/2011)

Digestion Log

010098

Southwest Research Institute
San Antonio, Texas 78228

Batch: 20170623-P003 (Ver. 1)
Status: APPROVED

Rad Samples Present

Client(s): Savannah River Nuclear Solutions, LLC
Task Order(s): 170601-2, 170620-3
SDG(s): 616029, 616635
Project(s): 17995.22.00X, 17995.23.001
Method(s): SW-846 Method 3010A (TAP: 01-0406-113)
Matrix(s): SO, Solid
Intrument(s): ICP
Reagent(s): HNO3 84666 1.5mL, HCl 84668 1.5mL
Pipette(s): 1000-3, 200-1
Equipment: CT #497
Internal Standard --> Name: Scandium-83636 ChemInv#: M2-SC655002 Source: Inorganic Ventures Amt: 0.025 mL Exp: 03/24/2018
Heating Device: ModBlock#1 Temperature (C): 95
Time In: 06/23/2017 09:45:40 Time Out: NA
Location: S18-B5

Sample Identification	Client Identification	pH	Initial Volume (mL)	Final Volume (mL)
PB17F23KE1	NA	6	25	25
LCS17F23KE1 ①	NA	6	25	25
LCS17F23KE2 ①	NA	6	25	25
EFB#2-84825	NA	< 2	25	25
616029	W-17028-00001	< 2	25	25
616029D	W-17028-00001	< 2	25	25
616029MS ②	W-17028-00001	< 2	25	25
616029MSD ②	W-17028-00001	< 2	25	25
616635	W-17030-00001	< 2	25	25
616635D	W-17030-00001	< 2	25	25
616635MS ②	W-17030-00001	< 2	25	25
616635MSD ②	W-17030-00001	< 2	25	25
616636	W-17030-00002	< 2	25	25
616637	W-17030-00003	< 2	25	25

① spiked 0.1 mL of CI# 83549 Instrument Calibration Standard 1 (Lot# 1-133MKBY, Source: Spex Certiprep, Exp: 03/30/2018) and 0.5 mL of CI# 83548 Spike Sample Standard I (Lot# 1-143MKBX, Source: Spex Certiprep, Exp: 03/30/2018)

② spiked 0.125 mL of CI# 84895 Antimony (Lot# 22-27SBX, Source: Spex Certiprep, Exp: 04/30/2018) and 0.125 mL of CI# 84894 ICV-2A (Lot# 1-162MKBX, Source: Spex Certiprep, Exp: 04/30/2018) and 0.125 mL of CI# 84896 ICV-2C (Lot# 1-161MKBX, Source: Spex Certiprep, Exp: 04/28/2018)

Comments:
bk 17-0406-020 pg 035
pH paper #62597

refer to TCLP logbook #11(15-0406-016) pgs 100 and 101

Prepared by: EDRISI, KHALED Date: 06/23/2017

Reviewed by: RANGER, JACKIE Date: 06/27/2017

Disposal Int/Date/Loc: _____

Program version(8/11/2011)

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

TCLP Metals

Sample Calculations

Savannah River to#170620-3

010100

system id	instr	elem	I @instr (ug/mL)	A @instr (ug/L)	B FV (mL)	C IV (mL)	D DF	E result (ug/L)	reported ug/L
616635	ICP	barium	0.3418	341.8	25	25	1	342	342
616635	Hg	mercury	----	0.133	10	10	1	0.133	0.133

sample calculations:

A = I * 1000

E = (A * D * B) / C

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

TCLP Metals

SW-846 Method 7470A Raw Data

Southwest Research Institute

- ☐ HCLO4 Digest
  TAP 01-0406-034
- ☐ EPA 600 Hg 245.5
  TAP 01-0406-024
- ☐ EPA 600 Hg 245.1
  TAP 01-0406-112
- ☑ SW-846 Hg 7470A
  TAP 01-0406-048
- ☐ SW-846 Hg 7471A
  TAP 01-0406-047
- ☐ Inorganic Testing For Samples
  TAP 01-0406-148
- ☐ Hg Analysis of HCLO4 Digested Biota by Method 245.6
  TAP 01-0406-149

CVAA CALIB. & QC STD. ID's

1%SnCl/1.8%HCl	86517
3% HCl	86518
S-0	86519
S-0.1	86520
S-0.2	N/A
S-0.5	86521
S-1.0	86522
S-2.0	86523
S-5.0	86524
S-10.0	86525
ICV/CCV	86526

6/26/17 KEE ME

ANALYSIS: Hg

IDL Analyzed: 2/1/2017

170601-2 : ANALYTICAL BATCH # 20170628-A012

20170628-A013

PROJ. NO.	CLIENT	TO#	DATE	MATRIX	LOGBK PG
17995.22.00X	Savannah	170601-2	6/22/17	TCLP Ext.	20170622-P001
17995.23.001	"	170620-3	"	"	"

INSTRUMENT: FIMS-400 FILENAME: 170622HB .PRN

ANALYST: DATE: 6-26-17

Cover Revision Date : 02/01/2017

SWRI
Savannah river 170601-2/ 170620-3
Datafile: 170622hb.prn

Sample_ID	EL	Sam_Date	Sam_Time
S0	Hg	06/22/17	15:05:42
S0.1	Hg	06/22/17	15:07:32
S0.5	Hg	06/22/17	15:09:24
S1.0	Hg	06/22/17	15:11:18
S2.0	Hg	06/22/17	15:13:14
S5.0	Hg	06/22/17	15:15:10
S10.0	Hg	06/22/17	15:17:06
ICV 3.0 UG/L	Hg	06/22/17	15:19:09
ICB	Hg	06/22/17	15:21:02
CRA 0.10 UG/L	Hg	06/22/17	15:22:53
PB17F22KE1	Hg	06/22/17	15:24:45
LCS17F22KE1	Hg	06/22/17	15:26:37
LCS17F22KE2	Hg	06/22/17	15:28:28
EFB#2-84825	Hg	06/22/17	15:30:27
616029	Hg	06/22/17	15:32:20
616029D	Hg	06/22/17	15:34:14
616029MS	Hg	06/22/17	15:36:09
616029MSD	Hg	06/22/17	15:38:05
616635	Hg	06/22/17	15:39:59
CCV 3.0 UG/L	Hg	06/22/17	15:41:52
CCB	Hg	06/22/17	15:43:45
616635D	Hg	06/22/17	15:45:34
616635MS	Hg	06/22/17	15:47:25
616635MSD	Hg	06/22/17	15:49:16
616636	Hg	06/22/17	15:51:07
CCV 3.0 UG/L	Hg	06/22/17	15:53:02
CCB	Hg	06/22/17	15:54:55
616637	Hg	06/22/17	15:59:40
CCV 3.0 UG/L	Hg	06/22/17	16:01:35
CCB	Hg	06/22/17	16:03:28

010104

Method Name: HG_0.1 CRI
Method Description: FIMS400 Southwest Research Instute
Element: Hg

Date: 06/22/2017
Technique:FI-MHS
Calibration Type:
Hg, Zero Intercept: Nonlinear
Wavelength: 253.7 nm
Sample Info Name: 170622HB.SIF Results Data Set Name: 170622hb

Element: Hg Seq. No.: 1 AS Loc.: 1 Date: 06/22/2017
Sample ID: S0

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1			0.0001	0.0001	0.0001	03:05:08	No
2			0.0001	0.0005	0.0001	03:05:42	No
Mean:			0.0001				
SD :			0.0000				
%RSD:			15.0083				

Auto-zero performed.

Element: Hg Seq. No.: 2 AS Loc.: 2 Date: 06/22/2017
Sample ID: S0.1

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1			0.0014	0.0078	0.0015	03:06:58	No
2			0.0015	0.0079	0.0015	03:07:32	No
Mean:			0.0014				
SD :			0.0000				
%RSD:			1.0653				

[Hg] Standard number 1 applied. [0.100]
Correlation Coefficient: 1.00000 Slope: 0.01441

Element: Hg Seq. No.: 3 AS Loc.: 3 Date: 06/22/2017
Sample ID: S0.5

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1			0.0070	0.0358	0.0071	03:08:50	No
2			0.0071	0.0373	0.0072	03:09:24	No
Mean:			0.0071				
SD :			0.0001				
%RSD:			1.6376				

[Hg] Standard number 2 applied. [0.500]
Correlation Coefficient: 1.00000 Slope: 0.01449

Element: Hg Seq. No.: 4 AS Loc.: 4 Date: 06/22/2017
Sample ID: S1.0

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1			0.0145	0.0753	0.0146	03:10:44	No
2			0.0143	0.0739	0.0143	03:11:18	No
Mean:			0.0144				
SD :			0.0002				
%RSD:			1.0586				

S-shaped calibration curve detected. Two-coefficient equation used.
[Hg] Standard number 3 applied. [1.000]
Correlation Coefficient: 0.99991 Slope: 0.01432

Element: Hg Seq. No.: 5 AS Loc.: 5 Date: 06/22/2017
Sample ID: S2.0

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1			0.0283	0.1496	0.0284	03:12:39	No
2			0.0282	0.1490	0.0283	03:13:14	No
Mean:			0.0283				
SD :			0.0000				
%RSD:			0.1200				

[Hg] Standard number 4 applied. [2.000]
Correlation Coefficient: 0.99997 Slope: 0.01435

Element: Hg Seq. No.: 6 AS Loc.: 6 Date: 06/22/2017
Sample ID: S5.0

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1			0.0706	0.3736	0.0706	03:14:35	No
2			0.0705	0.3734	0.0706	03:15:10	No
Mean:			0.0705				
SD :			0.0000				
%RSD:							

[Hg] Standard number 5 applied. [5.000]
Correlation Coefficient: 0.99999 Slope: 0.01431

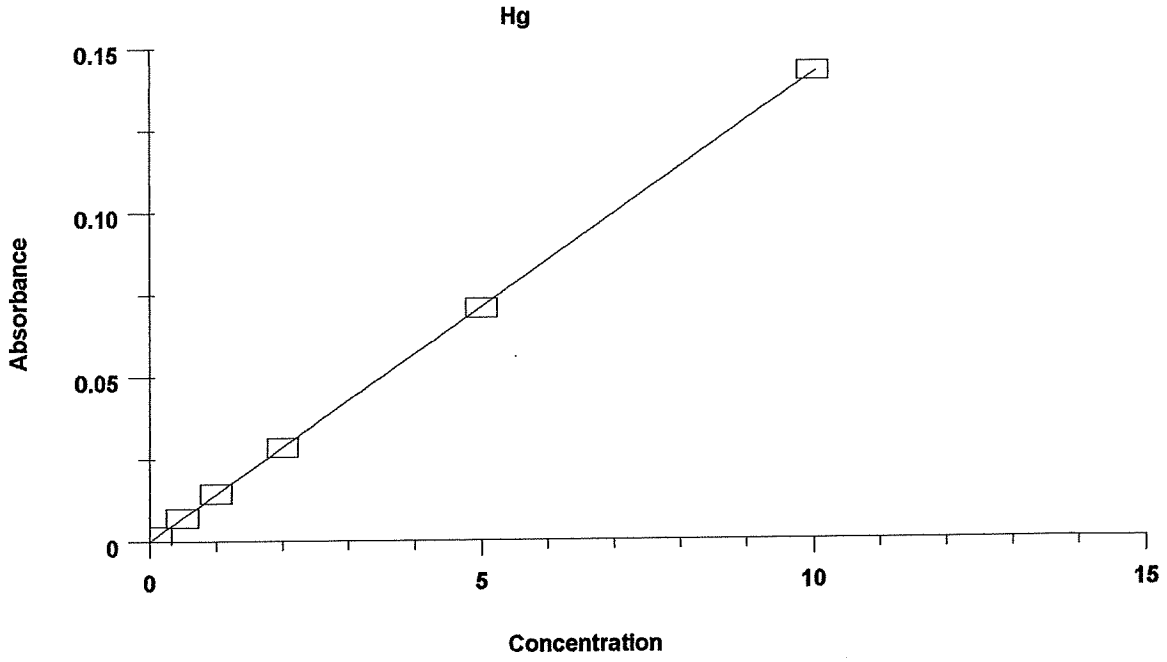
Element: Hg Seq. No.: 7 AS Loc.: 7 Date: 06/22/2017
Sample ID: S10.0

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1			0.1434	0.7635	0.1434	03:16:32	No
2			0.1411	0.7446	0.1412	03:17:06	No
Mean:			0.1422				
SD :			0.0016				
%RSD:			1.1271				

[Hg] Standard number 6 applied. [10.00]
Correlation Coefficient: 0.99997 Slope: 0.01426

Calibration data for Hg

Standard ID	Mean Signal (Pk Height)	Entered Concentration (µg/L)	Calculated Concentration (µg/L)	Standard Deviation	%RSD
S0	0.0001	---	----	----	----
S0.1	0.0014	0.100	0.101	0.0000	1.1
S0.5	0.0071	0.500	0.495	0.0001	1.6
S1.0	0.0144	1.000	1.008	0.0002	1.1
S2.0	0.0283	2.000	1.984	0.0000	0.1
S5.0	0.0705	5.000	4.964	0.0000	----
S10.0	0.1422	10.000	10.05	0.0016	1.1
Correlation Coefficient: 0.99997		Slope:	0.01426	----	



Element: Hg Seq. No.: 8 AS Loc.: 8 Date: 06/22/2017
Sample ID: ICV 3.0 UG/L

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	3.036	3.036	0.0432	0.2278	0.0433	03:18:35	No
2	3.014	3.014	0.0429	0.2242	0.0430	03:19:09	No
Mean:	3.025	3.025	0.0430				
SD :	0.0159	0.0159	0.0002				
%RSD:	0.5	0.5	0.5237				

QC value within specified limits.

Element: Hg Seq. No.: 9 AS Loc.: 1 Date: 06/22/2017
Sample ID: ICB

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	-0.003	-0.003	0.0000	-0.0003	0.0000	03:20:28	No
2	-0.002	-0.002	0.0000	-0.0001	0.0000	03:21:02	No
Mean:	-0.002	-0.002	0.0000				
SD :	0.0003	0.0003	0.0000				
%RSD:	12.4	12.4	12.4312				

QC value within specified limits.

Element: Hg Seq. No.: 10 AS Loc.: 2 Date: 06/22/2017
Sample ID: CRA 0.10 UG/L

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	0.099	0.099	0.0014	0.0078	0.0015	03:22:18	No
2	0.097	0.097	0.0014	0.0077	0.0015	03:22:53	No
Mean:	0.098	0.098	0.0014				
SD :	0.0012	0.0012	0.0000				

%RSD: 1.2 1.2 1.2115
QC value within specified limits.

Element: Hg Seq. No.: 11 AS Loc.: 9 Date: 06/22/2017
Sample ID: PB17F22KE1

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	0.002	0.002	0.0000	0.0005	0.0001	03:24:11	No
2	0.003	0.003	0.0000	0.0007	0.0001	03:24:45	No
Mean:	0.002	0.002	0.0000				
SD :	0.0007	0.0007	0.0000				
%RSD:	35.2	35.2	35.2232				

Element: Hg Seq. No.: 12 AS Loc.: 10 Date: 06/22/2017
Sample ID: LCS17F22KE1

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	0.997	0.997	0.0142	0.0748	0.0143	03:26:02	No
2	0.995	0.995	0.0142	0.0752	0.0143	03:26:37	No
Mean:	0.996	0.996	0.0142				
SD :	0.0012	0.0012	0.0000				
%RSD:	0.1	0.1	0.1201				

Element: Hg Seq. No.: 13 AS Loc.: 11 Date: 06/22/2017
Sample ID: LCS17F22KE2

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	0.995	0.995	0.0142	0.0738	0.0143	03:27:54	No
2	1.003	1.003	0.0143	0.0749	0.0144	03:28:28	No
Mean:	0.999	0.999	0.0142				
SD :	0.0052	0.0052	0.0001				
%RSD:	0.5	0.5	0.5210				

Element: Hg Seq. No.: 14 AS Loc.: 12 Date: 06/22/2017
Sample ID: EFB#2-84825

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	0.025	0.025	0.0004	0.0024	0.0004	03:29:52	No
2	0.019	0.019	0.0003	0.0013	0.0004	03:30:27	No
Mean:	0.022	0.022	0.0003				
SD :	0.0040	0.0040	0.0001				
%RSD:	18.1	18.1	18.1067				

Element: Hg Seq. No.: 15 AS Loc.: 13 Date: 06/22/2017
Sample ID: 616029

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	1.346	1.346	0.0192	0.0991	0.0192	03:31:46	No
2	1.330	1.330	0.0189	0.0985	0.0190	03:32:20	No
Mean:	1.338	1.338	0.0191				
SD :	0.0110	0.0110	0.0002				
%RSD:	0.8	0.8	0.8206				

Element: Hg Seq. No.: 16 AS Loc.: 14 Date: 06/22/2017
Sample ID: 616029D

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	1.334	1.334	0.0190	0.0980	0.0191	03:33:40	No
2	1.342	1.342	0.0191	0.0991	0.0192	03:34:14	No
Mean:	1.338	1.338	0.0191				
SD :	0.0056	0.0056	0.0001				
%RSD:	0.4	0.4	0.4156				

Element: Hg Seq. No.: 17 AS Loc.: 15 Date: 06/22/2017
Sample ID: 616029MS

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	1.783	1.783	0.0254	0.1306	0.0255	03:35:35	No
2	1.763	1.763	0.0251	0.1302	0.0252	03:36:09	No
Mean:	1.773	1.773	0.0252				
SD :	0.0139	0.0139	0.0002				
%RSD:	0.8	0.8	0.7807				

Element: Hg Seq. No.: 18 AS Loc.: 16 Date: 06/22/2017
Sample ID: 616029MSD

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	1.772	1.772	0.0252	0.1310	0.0253	03:37:32	No
2	1.759	1.759	0.0251	0.1300	0.0251	03:38:05	No
Mean:	1.766	1.766	0.0251				
SD :	0.0087	0.0087	0.0001				
%RSD:	0.5	0.5	0.4910				

Element: Hg Seq. No.: 19 AS Loc.: 17 Date: 06/22/2017
Sample ID: 616635

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	0.132	0.132	0.0019	0.0100	0.0020	03:39:25	No
2	0.134	0.134	0.0019	0.0106	0.0020	03:39:59	No
Mean:	0.133	0.133	0.0019				
SD :	0.0013	0.0013	0.0000				
%RSD:	1.0	1.0	0.9890				

Element: Hg Seq. No.: 20 AS Loc.: 8 Date: 06/22/2017
Sample ID: CCV 3.0 UG/L

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	3.009	3.009	0.0428	0.2230	0.0429	03:41:18	No
2	3.010	3.010	0.0428	0.2237	0.0429	03:41:52	No
Mean:	3.010	3.010	0.0428				
SD :	0.0007	0.0007	0.0000				
%RSD:							

QC value within specified limits.

Element: Hg Seq. No.: 21 AS Loc.: 1 Date: 06/22/2017
Sample ID: CCB

010109

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	-0.002	-0.002	0.0000	0.0001	0.0001	03:43:11	No
2	-0.004	-0.004	-0.0001	-0.0005	0.0000	03:43:45	No
Mean:	-0.003	-0.003	0.0000				
SD :	0.0018	0.0018	0.0000				
%RSD:	61.8	61.8	61.7764				

QC value within specified limits.

Element: Hg Seq. No.: 22 AS Loc.: 18 Date: 06/22/2017
Sample ID: 616635~~MS~~D KE 6/22/17 (TE) 616635D

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	0.130	0.130	0.0019	0.0096	0.0019	03:45:00	No
2	0.130	0.130	0.0019	0.0098	0.0019	03:45:34	No
Mean:	0.130	0.130	0.0019				
SD :	0.0001	0.0001	0.0000				
%RSD:							

Element: Hg Seq. No.: 23 AS Loc.: 19 Date: 06/22/2017
Sample ID: 616635MS~~D~~ KE 6/22/17 (TE) 616635 MS

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	2.208	2.208	0.0314	0.1640	0.0315	03:46:50	No
2	2.210	2.210	0.0315	0.1643	0.0315	03:47:25	No
Mean:	2.209	2.209	0.0315				
SD :	0.0013	0.0013	0.0000				
%RSD:							

Element: Hg Seq. No.: 24 AS Loc.: 20 Date: 06/22/2017
Sample ID: 616635 MSD KE 6/22/17 (TE) 616635 MSD

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	2.187	2.187	0.0311	0.1635	0.0312	03:48:41	No
2	2.232	2.232	0.0318	0.1636	0.0319	03:49:16	No
Mean:	2.210	2.210	0.0315				
SD :	0.0322	0.0322	0.0005				
%RSD:	1.5	1.5	1.4554				

Element: Hg Seq. No.: 25 AS Loc.: 21 Date: 06/22/2017
Sample ID: 616635 KE 6/22/17 (TE) 616636

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	0.015	0.015	0.0002	0.0014	0.0003	03:50:33	No
2	0.016	0.016	0.0002	0.0016	0.0003	03:51:07	No
Mean:	0.016	0.016	0.0002				
SD :	0.0009	0.0009	0.0000				
%RSD:	5.5	5.5	5.4808				

Element: Hg Seq. No.: 26 AS Loc.: 8 Date: 06/22/2017
Sample ID: CCV 3.0 UG/L

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	2.926	2.926	0.0416	0.2178	0.0417	03:52:27	No

2	2.914	2.914	0.0415	0.2167	0.0415	03:53:02	No
Mean:	2.920	2.920	0.0416				
SD :	0.0082	0.0082	0.0001				
%RSD:	0.3	0.3	0.2815				

QC value within specified limits.

==========

Element: Hg Seq. No.: 27 AS Loc.: 1 Date: 06/22/2017
Sample ID: CCB

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	-0.003	-0.003	0.0000	-0.0001	0.0000	03:54:21	No
2	-0.002	-0.002	0.0000	0.0001	0.0000	03:54:55	No
Mean:	-0.003	-0.003	0.0000				
SD :	0.0008	0.0008	0.0000				
%RSD:	30.6	30.6	30.6093				

QC value within specified limits.

Element: Hg Seq. No.: 28 AS Loc.: 22 Date: 06/22/2017
Sample ID: ~~Sample022~~ 616635D (JE) 6/22/17 KE 616637

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	0.031	0.031	0.0004	0.0024	0.0005	03:59:07	No
2	0.030	0.030	0.0004	0.0026	0.0005	03:59:40	No
Mean:	0.030	0.030	0.0004				
SD :	0.0012	0.0012	0.0000				
%RSD:	4.0	4.0	3.9533				

Element: Hg Seq. No.: 29 AS Loc.: 8 Date: 06/22/2017
Sample ID: CCV 3.0 UG/L

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	2.879	2.879	0.0410	0.2141	0.0410	04:00:57	No
2	2.878	2.878	0.0410	0.2157	0.0410	04:01:35	No
Mean:	2.879	2.879	0.0410				
SD :	0.0002	0.0002	0.0000				
%RSD:							

QC value within specified limits.

Element: Hg Seq. No.: 30 AS Loc.: 1 Date: 06/22/2017
Sample ID: CCB

Repl #	SampleConc µg/L	StndConc µg/L	BlnkCorr Signal	Peak Area	Peak Height	Time	Peak Stored
1	-0.004	-0.004	-0.0001	-0.0004	0.0000	04:02:54	No
2	-0.002	-0.002	0.0000	0.0001	0.0001	04:03:28	No
Mean:	-0.003	-0.003	0.0000				
SD :	0.0018	0.0018	0.0000				
%RSD:	59.1	59.1	59.1261				

QC value within specified limits.

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

TCLP Metals

SW-846 Method 6010D Raw Data

Southwest Research Institute

QC STD. ID's		ICP CAL. STD.	
CCV	84897	ID's	
CRI	85036	STD0	86568
ICSA	83728	STD1	86153
ICSAB	83729	STD2	83700
		STD3	85166
UCL1	85340	STD4	83702
UCL2	85221	STD5	83703
Dilution Solution	86569	STD6	85769

☐ 200.7 TAP No. 01-0406-028

☑ 6010B, 6010C, 6010D TAP No. 01-0406-130

☐ SWRI TAP No. 01-0406-148

☐ OTHER _____

QC Earliest Expiration Date 6/30/2017

Internal Standard (Sc) @10ppm Added in **Prep lab:** (YES) **NO**
Internal Standard (Sc) @10ppm Added in **ICP lab:** Inorg# Exp: .

Pipettes
200- N
1000- M
5000- I

IDL run date: **06/17/17**

IEC run date: 07/14/16

PROJ. NO.	PROJECT	TO#	DATE	MATRIX	LOGBOOK PG
17995.22.00X	Savannah River	170601-2	6/27/17	TCLPExt	20170623-P003
17995.23.001	↓	170620-3	↓	↓	↓

INSTRUMENT: TRACE1

FILENAME: A170628 (7) (22) JL 6/28/17

Analytical Batch # 20170628-A001 -170601-2
20170628-A003 -170620-3

File converted to wsl? ☐

ICP Dilutions and Spikes

☐	DF2	2.5mL sample	+ 2.5mL ☐ S0 or ☐ Dilution Solution
☑	DF2 (for DF500)	0.1mL sample	+ 0.1mL ☐ S0 or ☑ Dilution Solution
☑	DF5	1.0mL sample	+ 4.0mL ☑ S0 or ☐ Dilution Solution
☑	DF10	0.5mL sample	+ 4.5mL ☐ S0 or ☑ Dilution Solution
☐	DF20	0.25mL sample	+ 4.75mL ☐ S0 or ☐ Dilution Solution
☐	DF25	0.2mL sample	+ 4.8mL ☐ S0 or ☐ Dilution Solution
☐	DF50	0.1mL sample	+ 4.9mL ☐ S0 or ☐ Dilution Solution
☑	DF100	0.05mL sample	+ 4.95mL ☐ S0 or ☑ Dilution Solution
☐	DF200	0.025mL sample	+ 4.975mL ☐ S0 or ☐ Dilution Solution
☑	~~DF250~~	0.020mL sample	+ 4.98mL ☐ S0 or ☐ Dilution Solution
☑	DF500	0.020mL DF2 (for DF500)	+ 4.98mL ☐ S0 or ☑ Dilution Solution
☑	DF 2500	0.02 mL ~~Sample~~ DF10	+ ____mL ☐ S0 or ☑ Dilution Solution
☐	DF ____	____mL sample	+ ____mL ☐ S0 or ☐ Dilution Solution

NW JR 6/27/17

JR 6/27/17 PE JR 6/27/17

☑ ① 5mL Final Volume Sample Spiked With

SRNS

- ☑ 50µL Spike Sample Standard I 83548
- ☐ 20µL ICAL-I 83549
- ☐ 20µL Li 73897
- ☐ 20µL B 76465
- ☐ 20µL P 77718
- ☐ 20µL S 74566
- ☐ 20µL Mo 82425
- ☐ 20µL Si 73416
- ☐ 20µL Sr 76667
- ☐ 20µL Bi 77528
- ☐ 20µL Sn 77530
- ☐ 20µL Ti 82581
- ☐ 20µL U 83639
- ☐ 20µL _____
- ☐ 20µL _____

☑ ② 5mL Final Volume Sample Spiked With

div 3

- ☑ 50µL Spike Sample Standard I 83548
- ☑ 20µL ICAL-I 83549
- ☐ 20µL Li 73897
- ☐ 20µL B 76465
- ☐ 20µL P 77718
- ☐ 20µL S 74566
- ☐ 20µL Mo 82425
- ☑ 20µL Si 73416
- ☐ 20µL Sr 76667
- ☐ 20µL Bi 77528
- ☐ 20µL Sn 77530
- ☐ 20µL Ti 82581
- ☐ 20µL U 83639
- ☐ 20µL _____
- ☐ 20µL _____

✓ ③ 5mL FV Sample Spiked w/ 20µl Si #73416

NA

21

010115

#	Sample Name	File	Method	Date	Time	OpID	Type	Mode
1	blk	Y17JUN	DAILY1	06/27/17	16:02		X	IR
2	clp_std4	Y17JUN	DAILY1	06/27/17	16:07		X	IR
3	clp_std1	Y17JUN	DAILY1	06/27/17	16:12		X	IR
4	clp_std3	Y17JUN	DAILY1	06/27/17	16:16		X	IR
5	clp_std5	Y17JUN	DAILY1	06/27/17	16:21		X	IR
6	clp_std2	Y17JUN	DAILY1	06/27/17	16:25		X	IR
7	clp_std6	Y17JUN	DAILY1	06/27/17	16:29		X	IR
8	ICV	Y17JUN	DAILY1	06/27/17	16:34		S	CONC
9	ICB	Y17JUN	DAILY1	06/27/17	16:40		S	CONC
10	CRI	Y17JUN	DAILY1	06/27/17	16:46		S	CONC
11	ICSA	Y17JUN	DAILY1	06/27/17	16:51		S	CONC
12	ICSAB	Y17JUN	DAILY1	06/27/17	16:57		S	CONC
13	UCL1	Y17JUN	DAILY1	06/27/17	17:02		S	CONC
14	UCL2	Y17JUN	DAILY1	06/27/17	17:08		S	CONC
15	ZZZZ	Y17JUN	DAILY1	06/27/17	17:13		S	CONC
16	CCV	Y17JUN	DAILY1	06/27/17	17:19		S	CONC
17	CCB	Y17JUN	DAILY1	06/27/17	17:24		S	CONC
18	PB17F23KE3	Y17JUN	DAILY1	06/27/17	17:32		S	CONC
19	LCS17F23KE5	Y17JUN	DAILY1	06/27/17	17:38		S	CONC
20	LCS17F23KE6	Y17JUN	DAILY1	06/27/17	17:43		S	CONC
21	615785	Y17JUN	DAILY1	06/27/17	17:48		S	CONC
22	615791	Y17JUN	DAILY1	06/27/17	17:54		S	CONC
23	615791D	Y17JUN	DAILY1	06/27/17	17:59		S	CONC
24	615791L	Y17JUN	DAILY1	06/27/17	18:04		S	CONC
25	615791MS	Y17JUN	DAILY1	06/27/17	18:10		S	CONC
26	615791MSD	Y17JUN	DAILY1	06/27/17	18:15		S	CONC
27	CCV	Y17JUN	DAILY1	06/27/17	18:20		S	CONC
28	CCB	Y17JUN	DAILY1	06/27/17	18:26		S	CONC
29	PB17F26KE1	Y17JUN	DAILY1	06/27/17	18:31		S	CONC
30	LCS17F26KE1	Y17JUN	DAILY1	06/27/17	18:36		S	CONC
31	LCS17F26KE2	Y17JUN	DAILY1	06/27/17	18:42		S	CONC
32	615785	Y17JUN	DAILY1	06/27/17	18:47		S	CONC
33	615785D	Y17JUN	DAILY1	06/27/17	18:52		S	CONC
34	615785L	Y17JUN	DAILY1	06/27/17	18:58		S	CONC
35	615785MS	Y17JUN	DAILY1	06/27/17	19:03		S	CONC
36	615785MSD	Y17JUN	DAILY1	06/27/17	19:08		S	CONC
37	615791	Y17JUN	DAILY1	06/27/17	19:14		S	CONC
38	CCV	Y17JUN	DAILY1	06/27/17	19:19		S	CONC
39	CCB	Y17JUN	DAILY1	06/27/17	19:24		S	CONC
40	PB17F23KE1	Y17JUN	DAILY1	06/27/17	19:30		S	CONC
41	LCS17F23KE1	Y17JUN	DAILY1	06/27/17	19:35		S	CONC
42	LCS17F23KE2	Y17JUN	DAILY1	06/27/17	19:40		S	CONC
43	EFB#2-84825	Y17JUN	DAILY1	06/27/17	19:46		S	CONC
44	616029	Y17JUN	DAILY1	06/27/17	19:51		S	CONC
45	616029D	Y17JUN	DAILY1	06/27/17	19:56		S	CONC
46	616029L	Y17JUN	DAILY1	06/27/17	20:02		S	CONC
47	616029MS	Y17JUN	DAILY1	06/27/17	20:07		S	CONC
48	616029MSD	Y17JUN	DAILY1	06/27/17	20:12		S	CONC
49	616029AS	Y17JUN	DAILY1	06/27/17	20:18		S	CONC
50	CCV	Y17JUN	DAILY1	06/27/17	20:23		S	CONC
51	CCB	Y17JUN	DAILY1	06/27/17	20:28		S	CONC
52	616635	Y17JUN	DAILY1	06/27/17	20:34		S	CONC
53	616635D	Y17JUN	DAILY1	06/27/17	20:39		S	CONC

Analysis Report Summary 06/28/17 07:06:00 AM

#	Sample Name	File	Method	Date	Time	OpID	Type	Mode
54	616635L	Y17JUN	DAILY1	06/27/17	20:44		S	CONC
55	616635MS	Y17JUN	DAILY1	06/27/17	20:50		S	CONC
56	616635MSD	Y17JUN	DAILY1	06/27/17	20:55		S	CONC
57	616635AS	Y17JUN	DAILY1	06/27/17	21:00		S	CONC
58	616636	Y17JUN	DAILY1	06/27/17	21:06		S	CONC
59	616637	Y17JUN	DAILY1	06/27/17	21:11		S	CONC
60	CCV	Y17JUN	DAILY1	06/27/17	21:17		S	CONC
61	CCB	Y17JUN	DAILY1	06/27/17	21:22		S	CONC
62	~~PB17F21KE1~~	Y17JUN	DAILY1	06/27/17	21:27		S	CONC
63	LCS17F21KE1	Y17JUN	DAILY1	06/27/17	21:33		S	CONC
64	615917R	Y17JUN	DAILY1	06/27/17	21:38		S	CONC
65	615917RL	Y17JUN	DAILY1	06/27/17	21:43		S	CONC
66	615917RAS	Y17JUN	DAILY1	06/27/17	21:49		S	CONC
67	615918R	Y17JUN	DAILY1	06/27/17	21:54		S	CONC
68	615919R	Y17JUN	DAILY1	06/27/17	21:59		S	CONC
69	615920R	Y17JUN	DAILY1	06/27/17	22:05		S	CONC
70	615921R	Y17JUN	DAILY1	06/27/17	22:10		S	CONC
71	CCV	Y17JUN	DAILY1	06/27/17	22:15		S	CONC
72	CCB	Y17JUN	DAILY1	06/27/17	22:21		S	CONC
73	~~PB17F20JH1~~	Y17JUN	DAILY1	06/27/17	22:26		S	CONC
74	LCS17F20JH2	Y17JUN	DAILY1	06/27/17	22:31		S	CONC
75	616573 DF100	Y17JUN	DAILY1	06/27/17	22:37		S	CONC
76	616573D DF100	Y17JUN	DAILY1	06/27/17	22:42		S	CONC
77	616573L DF500	Y17JUN	DAILY1	06/27/17	22:48		S	CONC
78	616573AS DF100	Y17JUN	DAILY1	06/27/17	22:53		S	CONC
79	CCV	Y17JUN	DAILY1	06/27/17	22:58		S	CONC
80	CCB	Y17JUN	DAILY1	06/27/17	23:04		S	CONC
81	616573 DF500	Y17JUN	DAILY1	06/27/17	23:09		S	CONC
82	616573D DF500	Y17JUN	DAILY1	06/27/17	23:14		S	CONC
83	616573L DF2500	Y17JUN	DAILY1	06/27/17	23:20		S	CONC
84	616573AS DF500	Y17JUN	DAILY1	06/27/17	23:25		S	CONC
85	CCV	Y17JUN	DAILY1	06/27/17	23:30		S	CONC
86	CCB	Y17JUN	DAILY1	06/27/17	23:36		S	CONC

NW JD 6/28/17

NW JR 6/28/17

Standardization Rpt. 06/27/17 04:07:34 PM

Method: DAILY1 Standard: blk
Run Time: 06/27/17 16:02:21

6/28/17

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Avge	.0000	.0003	.0000	.0001	-.0000	-.0001	.0000
SDev	.0000	.0000	.0000	.0000	.0000	.0000	.0001
%RSD	19.82	5.014	113.9	29.59	15.77	1.545	878.8
#1	.0000	.0003	.0000	.0001	-.0001	-.0001	.0000
#2	.0000	.0003	.0000	.0001	-.0000	-.0001	-.0000

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Avge	.0000	-.0000	.0000	.0000	.0001	-.0000	.0020
SDev	.0000	.0000	.0000	.0000	.0000	.0000	.0016
%RSD	6.049	935.7	642.7	253.7	5.077	52.70	82.69
#1	.0000	-.0000	-.0000	-.0000	.0001	-.0000	.0008
#2	.0000	.0000	.0000	.0000	.0001	-.0000	.0031

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Avge	.0007	-.0000	-.0000	.0000	-.0000	-.1120	-.0002
SDev	.0000	.0001	.0000	.0000	.0000	.0017	.0002
%RSD	4.049	2601.	141.4	19.82	141.4	1.475	103.9
#1	.0007	-.0001	.0000	.0000	-.0000	-.1132	-.0003
#2	.0007	.0000	-.0000	.0000	.0000	-.1109	-.0001

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Avge	.0000	-.0000	.0001	.0001	.0000	-.0000	70.61
SDev	.0001	.0001	.0001	.0000	.0000	.0000	.27
%RSD	383.2	337.7	97.33	49.30	21.95	297.0	.3843
#1	-.0001	-.0001	.0001	.0000	.0000	-.0000	70.80
#2	.0001	.0000	.0000	.0001	.0000	.0000	70.41

Elem	1960/1	1960/2	Si2881	Sn1899	Sr4215	Th2837	Ti3372
Avge	-.0000	-.0000	.0005	.0000	.0000	.0000	-.0020
SDev	.0000	.0000	.0000	.0001	.0000	.0000	.0000
%RSD	335.4	133.4	6.604	1403.	47.49	20.48	.2699
#1	.0000	-.0000	.0005	-.0000	.0000	.0000	-.0020
#2	-.0000	-.0000	.0006	.0000	.0000	.0000	-.0020

Elem	Tl1908	U_3859	V_2924	W_2079	Y_3710	Zn2062	Zr3496
Avge	-.0000	.0089	-.0000	.0001	.0000	.0000	.0002
SDev	.0000	.0001	.0000	.0000	.0000	.0000	.0000
%RSD	74.59	.6164	20.59	24.58	197.6	14.53	18.15
#1	-.0000	.0089	-.0000	.0001	-.0000	.0000	.0001
#2	-.0000	.0090	-.0000	.0001	.0000	.0000	.0002

Elem	P_1782
Avge	.0003
SDev	.0000
%RSD	11.81
#1	.0003
#2	.0004

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	706018	10000	--	--	--	--	--
SDev	2771.859	.0000000	--	--	--	--	--
%RSD	.3926045	.0000000	--	--	--	--	--
#1	707978	10000	--	--	--	--	--
#2	704058	10000	--	--	--	--	--

Standardization Rpt. 06/27/17 04:12:02 PM

Method: DAILY1 Standard: clp_std4
Run Time: 06/27/17 16:07:55

Elem	Ag3280	2203/1	2203/2	Sb2068	1960/1	1960/2	Tl1908
Avge	.0493	.4576	.4860	.0415	.0845	.1191	.0107
SDev	.0000	.0037	.0032	.0001	.0006	.0003	.0000
%RSD	.0244	.8135	.6630	.2872	.6708	.2628	.1852
#1	.0493	.4602	.4837	.0414	.0849	.1189	.0107
#2	.0493	.4550	.4883	.0416	.0841	.1193	.0107

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	727844	10000	--	--	--	--	--
SDev	2346.180	.0000000	--	--	--	--	--
%RSD	.3223466	.0000000	--	--	--	--	--
#1	729503	10000	--	--	--	--	--
#2	726185	10000	--	--	--	--	--

Standardization Rpt. 06/27/17 04:16:29 PM

Method: DAILY1 Standard: clp_std1
Run Time: 06/27/17 16:12:22

Elem	Al3082	Ca3179	Fe2714	K_7664	Li6707	Mg2790	Na3302
Avge	.1175	.2357	.1365	2.318	6.305	.0993	.0158
SDev	.0006	.0008	.0012	.017	.049	.0008	.0000
%RSD	.5183	.3202	.8463	.7308	.7707	.8085	.0772
#1	.1179	.2362	.1374	2.330	6.339	.0998	.0159
#2	.1171	.2352	.1357	2.306	6.271	.0987	.0158

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	709796	10000	--	--	--	--	--
SDev	6037.985	.0000000	--	--	--	--	--
%RSD	.8506654	.0000000	--	--	--	--	--
#1	705526	10000	--	--	--	--	--
#2	714065	10000	--	--	--	--	--

Standardization Rpt. 06/27/17 04:20:55 PM

Method: DAILY1 Standard: clp_std3
Run Time: 06/27/17 16:16:47

Elem	As1890	Cd2265	Co2286	Mn2576	V_2924	Zn2062
Avge	.0383	1.394	.2598	.4506	.0871	.0812
SDev	.0000	.007	.0019	.0025	.0001	.0009
%RSD	.0109	.4700	.7258	.5586	.1779	1.150
#1	.0383	1.399	.2612	.4524	.0872	.0819
#2	.0383	1.390	.2585	.4488	.0869	.0805

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	720998	10000	--	--	--	--	--
SDev	106.0660	.0000000	--	--	--	--	--
%RSD	.0147110	.0000000	--	--	--	--	--
#1	721073	10000	--	--	--	--	--
#2	720923	10000	--	--	--	--	--

Standardization Rpt. 06/27/17 04:25:01 PM

Method: DAILY1 Standard: clp_std5
Run Time: 06/27/17 16:21:16

Elem	B_2496	Bi2230	Mo2020	Si2881	Sn1899	Sr4215	Ti3372
Avge	.3254	.0304	.0544	.1258	.0861	1.499	1.088
SDev	.0017	.0002	.0001	.0015	.0009	.009	.001
%RSD	.5346	.5656	.1888	1.205	1.091	.6157	.0703
#1	.3241	.0303	.0543	.1247	.0854	1.505	1.089
#2	.3266	.0305	.0544	.1268	.0867	1.492	1.088

Elem	P_1782
Avge	.0170
SDev	.0003
%RSD	1.603
#1	.0172
#2	.0168

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	725998	10000	--	--	--	--	--
SDev	3078.036	.0000000	--	--	--	--	--
%RSD	.4239728	.0000000	--	--	--	--	--
#1	723822	10000	--	--	--	--	--
#2	728175	10000	--	--	--	--	--

Standardization Rpt. 06/27/17 04:29:26 PM

Method: DAILY1 Standard: clp_std2
Run Time: 06/27/17 16:25:20

Elem	Ba4934	Be3130	Cr2677	Cu3247	Ni2316
Avge	.6963	.0761	.3891	.2530	.8687
SDev	.0007	.0107	.0020	.0006	.0041
%RSD	.0957	14.13	.5163	.2170	.4730
#1	.6968	.0837	.3905	.2534	.8658
#2	.6959	.0685	.3877	.2526	.8716

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	710807	10000	--	--	--	--	--
SDev	1634.831	.0000000	--	--	--	--	--
%RSD	.2299965	.0000000	--	--	--	--	--
#1	711963	10000	--	--	--	--	--
#2	709651	10000	--	--	--	--	--

Standardization Rpt. 06/27/17 04:34:35 PM

Method: DAILY1 Standard: clp_std6
Run Time: 06/27/17 16:29:45

Elem	La4086	Na5889	Pd3404	S_1820	Th2837	U_3859	W_2079
Avge	.3580	.2591	.1297	.0146	.0571	.0311	.0614
SDev	.0016	.0023	.0001	.0001	.0004	.0001	.0001
%RSD	.4385	.8909	.1145	.6025	.7692	.4080	.1018
#1	.3569	.2575	.1298	.0147	.0568	.0310	.0615
#2	.3591	.2607	.1296	.0145	.0574	.0312	.0614

Elem	Y_3710	Zr3496
Avge	1.077	1.260
SDev	.000	.003
%RSD	.0178	.2206
#1	1.077	1.262
#2	1.077	1.258

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	720317	10000	--	--	--	--	--
SDev	118.7939	.0000000	--	--	--	--	--
%RSD	.0164919	.0000000	--	--	--	--	--
#1	720401	10000	--	--	--	--	--
#2	720233	10000	--	--	--	--	--

Standardization Report 06/27/17 04:34:35 PM page 1

Method: DAILY1 Slope = Conc(SIR)/IR

Element	Wavelen	High std	Low std	Slope	Y-intercept	Date Standardized
Ag3280	328.068	clp_std4	blk	40.5649	-.000201	06/27/17 04:29:45
Al3082	308.215	clp_std1	blk	426.729	-.138727	06/27/17 04:29:45
As1890	189.042	clp_std3	blk	261.480	-.005728	06/27/17 04:29:45
B_2496	249.678	clp_std5	blk	30.7435	-.002636	06/27/17 04:29:45
Ba4934	493.409	clp_std2	blk	14.3600	.000712	06/27/17 04:29:45
Be3130	313.042	clp_std2	blk	13.1376	.000679	06/27/17 04:29:45
Bi2230	223.061	clp_std5	blk	163.574	-.001025	06/27/17 04:29:45
Ca3179	317.933	clp_std1	blk	212.174	-.007514	06/27/17 04:29:45
Cd2265	226.502	clp_std3	blk	7.17179	.000020	06/27/17 04:29:45
Co2286	228.616	clp_std3	blk	38.4862	-.000138	06/27/17 04:29:45
Cr2677	267.716	clp_std2	blk	25.6997	-.000091	06/27/17 04:29:45
Cu3247	324.753	clp_std2	blk	39.5422	-.005068	06/27/17 04:29:45
Fe2714	271.441	clp_std1	blk	366.111	.004144	06/27/17 04:29:45
K_7664	766.491	clp_std1	blk	21.5878	-.042219	06/27/17 04:29:45
La4086	408.672	clp_std6	blk	27.1409	-.018588	06/27/17 04:29:45
Li6707	670.784	clp_std1	blk	1.58604	.000004	06/27/17 04:29:45
Mg2790	279.078	clp_std1	blk	251.685	.001251	06/27/17 04:29:45
Mn2576	257.610	clp_std3	blk	22.1917	-.000110	06/27/17 04:29:45
Mo2020	202.030	clp_std5	blk	183.928	.001299	06/27/17 04:29:45
Na5889	588.995	clp_std6	blk	2.70177	.302691	06/27/17 04:29:45
Na3302	330.232	clp_std1	blk	3118.20	.601639	06/27/17 04:29:45
Ni2316	231.604	clp_std2	blk	11.5121	-.000361	06/27/17 04:29:45
2203/1	220.351	clp_std4	blk	21.8513	.000738	06/27/17 04:29:45
2203/2	220.352	clp_std4	blk	20.5802	-.001687	06/27/17 04:29:45
Pd3404	340.458	clp_std6	blk	78.7803	-.005808	06/27/17 04:29:45
S_1820	182.040	clp_std6	blk	691.997	-.009307	06/27/17 04:29:45
Sb2068	206.838	clp_std4	blk	241.022	.001867	06/27/17 04:29:45
Sc3613	361.384	blk	dark	1.41884	-.179697	06/27/17 04:29:45
1960/1	196.021	clp_std4	blk	118.304	.001096	06/27/17 04:29:45
1960/2	196.022	clp_std4	blk	83.9647	.002087	06/27/17 04:29:45
Si2881	288.158	clp_std5	blk	79.4352	-.043548	06/27/17 04:29:45
Pb220	220.353	NONE	NONE	.000000	.000000	*NOT STANDARDIZED
Se196	196.026	NONE	NONE	1.00000	.000000	*NOT STANDARDIZED
Sn1899	189.989	clp_std5	blk	116.215	-.000423	06/27/17 04:29:45
Sr4215	421.552	clp_std5	blk	6.67322	-.000043	06/27/17 04:29:45
Th2837	283.730	clp_std6	blk	183.389	-.007919	06/27/17 04:29:45
Ti3372	337.280	clp_std5	blk	9.17270	.018027	06/27/17 04:29:45
Tl1908	190.864	clp_std4	blk	931.852	.011202	06/27/17 04:29:45
U_3859	385.958	clp_std6	blk	452.026	-4.04513	06/27/17 04:29:45
V_2924	292.402	clp_std3	blk	114.863	.000570	06/27/17 04:29:45
W_2079	207.910	clp_std6	blk	81.5030	-.007846	06/27/17 04:29:45
Y_3710	371.030	clp_std6	blk	9.28275	-.000033	06/27/17 04:29:45
Zn2062	206.200	clp_std3	blk	123.174	-.001745	06/27/17 04:29:45
Zr3496	349.621	clp_std6	blk	8.83059	-.001345	06/27/17 04:29:45
P_1782	178.287	clp_std5	blk	599.697	-.205180	06/27/17 04:29:45

Standardization Readback Report 06/27/17 04:34:35 PM

Method: DAILY1

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Ag3280	328.068	blk	.000000	-.000000	.000000
		clp_std4	2.00000	2.00000	.000000
Al3082	308.215	blk	.000000	-.000000	.000000
		clp_std1	50.0000	50.0000	.000000
As1890	189.042	blk	.000000	.000000	-.000000
		clp_std3	10.0000	10.0002	-.000170
B_2496	249.678	blk	.000000	-.000000	.000000
		clp_std5	10.0000	10.0000	.000000
Ba4934	493.409	blk	.000000	-.000000	.000000
		clp_std2	10.0000	10.0000	.000000
Be3130	313.042	blk	.000000	-.000000	.000000
		clp_std2	1.00000	1.00000	.000000
Bi2230	223.061	blk	.000000	.000000	-.000000
		clp_std5	5.00000	4.97386	.026140
Ca3179	317.933	blk	.000000	.000000	-.000000
		clp_std1	50.0000	50.0000	.000000
Cd2265	226.502	blk	.000000	-.000000	.000000
		clp_std3	10.0000	9.99846	.001540
Co2286	228.616	blk	.000000	.000000	-.000000
		clp_std3	10.0000	10.0004	-.000420
Cr2677	267.716	blk	.000000	.000000	-.000000
		clp_std2	10.0000	10.0000	.000000

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Cu3247	324.753	blk	.000000	-.000000	.000000
		clp_std2	10.0000	10.0000	.000000
Fe2714	271.441	blk	.000000	-.000000	.000000
		clp_std1	50.0000	49.9950	.005001
K_7664	766.491	blk	.000000	-.000000	.000000
		clp_std1	50.0000	50.0000	.000000
La4086	408.672	blk	.000000	-.000000	.000000
		clp_std6	10.0000	9.69870	.301300
Li6707	670.784	blk	.000000	-.000000	.000000
		clp_std1	10.0000	10.0000	.000000
Mg2790	279.078	blk	.000000	-.000000	.000000
		clp_std1	25.0000	24.9857	.014299
Mn2576	257.610	blk	.000000	.000000	-.000000
		clp_std3	10.0000	9.99965	.000350
Mo2020	202.030	blk	.000000	.000000	-.000000
		clp_std5	10.0000	10.0000	.000000
Na5889	588.995	blk	.000000	-.000000	.000000
		clp_std6	1.00000	1.00274	-.002745
Na3302	330.232	blk	.000000	-.000000	.000000
		clp_std1	50.0000	50.0000	.000000
Ni2316	231.604	blk	.000000	.000000	-.000000
		clp_std2	10.0000	10.0000	.000000

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
2203/1	220.351	blk	.000000	-.000000	.000000
		clp_std4	10.0000	10.0000	-.000032
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
2203/2	220.352	blk	.000000	-.000000	.000000
		clp_std4	10.0000	10.0000	.000000
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Pd3404	340.458	blk	.000000	.000000	-.000000
		clp_std6	10.0000	10.2090	-.208981
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
S_1820	182.040	blk	.000000	.000000	-.000000
		clp_std6	10.0000	10.0875	-.087481
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Sb2068	206.838	blk	.000000	.000000	-.000000
		clp_std4	10.0000	10.0000	.000000
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Sc3613	361.384	dark blk	.000000	-.000000	.000000
			100.000	100.000	.000000
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
1960/1	196.021	blk	.000000	-.000000	.000000
		clp_std4	10.0000	10.0000	.000000
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
1960/2	196.022	blk	.000000	.000000	-.000000
		clp_std4	10.0000	10.0006	-.000630
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Si2881	288.158	blk	.000000	.000000	-.000000
		clp_std5	10.0000	9.94651	.053490
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Pb220	220.353	NONE	.000000	.000000	.000000
		NONE	.000000	.000000	.000000
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Se196	196.026	NONE	.000000	.000000	.000000
		NONE	.000000	.000000	.000000

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Sn1899	189.989	blk	.000000	-.000000	.000000
		clp_std5	10.0000	10.0019	-.001910
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Sr4215	421.552	blk	.000000	.000000	-.000000
		clp_std5	10.0000	10.0000	.000000
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Th2837	283.730	blk	.000000	.000000	-.000000
		clp_std6	10.0000	10.4674	-.467404
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Ti3372	337.280	blk	.000000	.000000	-.000000
		clp_std5	10.0000	10.0002	-.000200
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Tl1908	190.864	blk	.000000	-.000000	.000000
		clp_std4	10.0000	10.0000	.000000
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
U_3859	385.958	blk	.000000	.000000	-.000000
		clp_std6	10.0000	10.0073	-.007320
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
V_2924	292.402	blk	.000000	.000000	-.000000
		clp_std3	10.0000	10.0000	.000000
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
W_2079	207.910	blk	.000000	.000000	-.000000
		clp_std6	5.00000	4.99865	.001350
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Y_3710	371.030	blk	.000000	-.000000	.000000
		clp_std6	10.0000	9.99724	.002760
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Zn2062	206.200	blk	.000000	-.000000	.000000
		clp_std3	10.0000	10.0000	.000000
Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
Zr3496	349.621	blk	.000000	-.000000	.000000
		clp_std6	10.0000	11.1223	-1.12233

Element	Wavelength	Standard	Known Concentration	Measured Concentration	Residual Concentration
P_1782	178.287	blk	.000000	-.000000	.000000
		clp_std5	10.0000	10.0008	-.000780

Analysis Report 06/27/17 04:40:09 PM

Method: DAILY1 Sample Name: ICV Operator:
Run Time: 06/27/17 16:34:54
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.9749	10.28	5.252	5.175	9.657	1.050	4.944
SDev	.0061	.02	.004	.053	.078	.101	.029
%RSD	.6277	.1624	.0769	1.017	.8094	9.572	.5844
#1	.9793	10.26	5.249	5.137	9.602	H1.121	4.924
#2	.9706	10.29	5.255	5.212	9.712	.9793	4.964
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	1.100	11.00	5.500	5.500	11.00	1.100	5.500
Low	.9000	9.000	4.500	4.500	9.000	.9000	4.500

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.55	1.007	4.877	1.956	1.926	9.998	19.51
SDev	.01	.007	.003	.003	.003	.043	.11
%RSD	.0444	.7245	.0706	.1335	.1410	.4339	.5690
#1	20.56	1.002	4.879	1.958	1.924	10.03	19.44
#2	20.54	1.013	4.874	1.954	1.928	9.967	19.59
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	22.00	1.100	5.500	2.200	2.200	11.00	22.00
Low	18.00	.9000	4.500	1.800	1.800	9.000	18.00

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.349	5.436	20.30	.9803	4.948	H37.96	29.57
SDev	.016	.049	.03	.0005	.030	.27	.02
%RSD	.2913	.9012	.1515	.0509	.6155	.7001	.0611
#1	5.338	5.401	20.28	.9800	4.927	H37.77	29.56
#2	5.360	5.470	20.32	.9807	4.970	H38.15	29.59
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass
High	5.500	5.500	22.00	1.100	5.500	33.00	33.00
Low	4.500	4.500	18.00	.9000	4.500	27.00	27.00

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	4.830	4.907	4.958	.9898	1.058	1.009	101.0
SDev	.006	.023	.064	.0003	.082	.013	1.2
%RSD	.1280	.4593	1.289	.0248	7.759	1.261	1.183
#1	4.825	4.891	4.913	.9900	1.000	1.000	101.8
#2	4.834	4.923	5.003	.9896	H1.116	1.018	100.1
Errors	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	NOCHECK
High	5.500			1.100	1.100	1.100	
Low	4.500			.9000	.9000	.9000	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.107	5.145	5.003	4.936	5.127	4.964	4.965
SDev	.002	.038	.010	.050	.026	.007	.016
%RSD	.0338	.7454	.2009	1.014	.5093	.1468	.3321
#1	5.106	5.118	5.010	4.901	5.109	4.959	4.953
#2	5.108	5.172	4.995	4.972	5.146	4.969	4.976
Errors	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High			5.500	5.500	5.500	5.500	5.500
Low			4.500	4.500	4.500	4.500	4.500

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.9803	4.953	5.116	4.860	5.017	1.030	4.953
SDev	.0087	.009	.054	.030	.005	.001	.005
%RSD	.8830	.1730	1.049	.6145	.1021	.0728	.1109
#1	.9864	4.959	5.078	4.838	5.020	1.029	4.949
#2	.9742	4.947	5.154	4.881	5.013	1.030	4.957
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	1.100	5.500	5.500	5.500	5.500	1.100	5.500
Low	.9000	4.500	4.500	4.500	4.500	.9000	4.500

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.9938	4.866	5.172
SDev	.0015	.005	.083
%RSD	.1555	.0951	1.599
#1	.9927	4.863	5.114
#2	.9949	4.869	5.231
Errors	LC Pass	LC Pass	LC Pass
High	1.100	5.500	5.500
Low	.9000	4.500	4.500

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	712756	10000	--	--	--	--	--
SDev	8436.491	.0000000	--	--	--	--	--
%RSD	1.183643	.0000000	--	--	--	--	--
#1	718722	10000	--	--	--	--	--
#2	706791	10000	--	--	--	--	--

Analysis Report 06/27/17 04:45:42 PM

Method: DAILY1 Sample Name: ICB Operator:
Run Time: 06/27/17 16:40:28
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0011	.0030	-.0036	.0084	-.0000	-.0001	-.0058
SDev	.0003	.0020	.0029	.0029	.0001	.0000	.0104
%RSD	23.64	68.39	81.33	34.76	686.3	18.17	178.9
#1	-.0009	.0015	-.0056	.0104	.0001	-.0001	-.0132
#2	-.0012	.0044	-.0015	.0063	-.0001	-.0001	.0015
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0100	.0750	.0150	.1000	.0050	.0050	.0250
Low	-.0100	-.0750	-.0150	-.1000	-.0050	-.0050	-.0250

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0022	-.0000	-.0005	-.0002	-.0005	.0030	-.0070
SDev	.0006	.0000	.0000	.0001	.0006	.0160	.0194
%RSD	27.17	137.0	6.709	33.01	118.7	528.6	279.7
#1	.0018	-.0000	-.0005	-.0002	-.0010	-.0083	-.0207
#2	.0027	-.0000	-.0005	-.0003	-.0001	.0144	.0068
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0500	.0050	.0050	.0050	.0050	.1000	.1500
Low	-.0500	-.0050	-.0050	-.0050	-.0050	-.1000	-.1500

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0004	.0000	.0031	-.0000	.0005	-.0006	-.0159
SDev	.0002	.0001	.0028	.0000	.0011	.0034	.1609
%RSD	41.95	184.2	90.53	193.6	217.8	543.7	1010.
#1	-.0006	-.0000	.0051	-.0000	-.0003	-.0030	-.1297
#2	-.0003	.0001	.0011	.0000	.0013	.0018	.0978
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0100	.0100	.0500	.0050	.0075	.1500	.1500
Low	-.0100	-.0100	-.0500	-.0050	-.0075	-.1500	-.1500

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0010	.0036	.0001	-.0065	-.0014	-.0057	99.32
SDev	.0002	.0036	.0019	.0002	.0112	.0132	.01
%RSD	22.10	100.6	1279.	2.939	816.6	231.7	.0065
#1	-.0012	.0010	-.0012	-.0063	-.0093	-.0150	99.32
#2	-.0008	.0061	.0015	-.0066	.0065	.0036	99.32
Errors	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	NOCHECK
High	.0050			.0250	.0500	.0200	
Low	-.0050			-.0250	-.0500	-.0200	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0100	-.0081	.0064	.0013	-.0020	.0008	-.0000
SDev	.0010	.0015	.0029	.0025	.0006	.0062	.0000
%RSD	9.958	18.00	44.99	191.9	31.22	762.0	28.81
#1	.0093	-.0070	.0084	-.0005	-.0016	.0052	-.0001
#2	.0107	-.0091	.0043	.0030	-.0025	-.0036	-.0000
Errors	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High			.1000	.0050	.0200	.0150	.0050
Low			-.1000	-.0050	-.0200	-.0150	-.0050

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0047	-.0006	-.0074	.0546	-.0001	.0035	.0000
SDev	.0025	.0002	.0077	.0362	.0000	.0012	.0000
%RSD	52.88	37.16	102.8	66.29	21.23	35.08	497.5
#1	-.0029	-.0008	-.0020	.0290	-.0001	.0026	-.0000
#2	-.0064	-.0005	-.0129	.0802	-.0001	.0044	.0000
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0200	.0050	.0500	.2000	.0050	.0200	.0050
Low	-.0200	-.0050	-.0500	-.2000	-.0050	-.0200	-.0050

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0008	.0000	-.0174
SDev	.0009	.0003	.0187
%RSD	112.0	654.0	107.5
#1	-.0014	-.0002	-.0307
#2	-.0002	.0003	-.0042
Errors	LC Pass	LC Pass	LC Pass
High	.0050	.0100	.0750
Low	-.0050	-.0100	-.0750

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	701191	10000	--	--	--	--	--
SDev	25.45585	.0000000	--	--	--	--	--
%RSD	.0036304	.0000000	--	--	--	--	--
#1	701209	10000	--	--	--	--	--
#2	701173	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: CRI Operator:
Run Time: 06/27/17 16:46:00
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0190	.1764	L.0183	.2130	.0103	H.0129	.0472
SDev	.0018	.0003	.0130	.0003	.0001	.0001	.0009
%RSD	9.518	.1771	71.38	.1465	.6286	.6600	1.821
#1	.0177	.1766	.0275	.2127	.0104	H.0128	.0466
#2	.0203	.1762	L.0090	.2132	.0103	H.0130	.0478
Errors	LC Pass	LC Pass	LC Low	LC Pass	LC Pass	LC High	LC Pass
High	.0240	.1800	.0360	.2400	.0120	.0120	.0600
Low	.0160	.1200	.0240	.1600	.0080	.0080	.0400

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.1051	.0102	.0090	.0099	.0093	.2119	L.1993
SDev	.0004	.0003	.0003	.0002	.0006	.0037	.0245
%RSD	.3598	2.496	3.411	2.244	6.387	1.728	12.29
#1	.1048	.0100	.0088	.0098	.0088	.2145	L.1820
#2	.1054	.0103	.0092	.0101	.0097	.2093	L.2167
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Low
High	.1200	.0120	.0120	.0120	.0120	.2400	.3600
Low	.0800	.0080	.0080	.0080	.0080	.1600	.2400

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0220	.0207	.1084	.0103	.0168	.2966	L.1940
SDev	.0001	.0001	.0024	.0001	.0012	.0018	.3593
%RSD	.5324	.3103	2.261	1.038	7.342	.6117	185.2
#1	.0219	.0206	.1066	.0102	.0177	.2953	L-.0600
#2	.0220	.0207	.1101	.0104	.0159	.2979	H.4481
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Low
High	.0240	.0240	.1200	.0120	.0180	.3600	.3600
Low	.0160	.0160	.0800	.0080	.0120	.2400	.2400

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.0087	.0135	.0093	.0478	H.1248	.0379	99.83
SDev	.0000	.0033	.0014	.0006	.0246	.0061	.37
%RSD	.1355	24.47	15.24	1.327	19.69	16.19	.3662
#1	.0087	.0112	.0103	.0483	H.1422	.0336	100.1
#2	.0087	.0159	.0083	.0474	.1074	.0423	99.57
Errors	LC Pass	NOCHECK	NOCHECK	LC Pass	LC High	LC Pass	NOCHECK
High	.0120			.0600	.1200	.0480	
Low	.0080			.0400	.0800	.0320	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0535	.0401	H.2400	.0107	.0446	.0349	.0108
SDev	.0067	.0029	.0030	.0002	.0003	.0005	.0000
%RSD	12.55	7.260	1.268	1.535	.6610	1.305	.3737
#1	.0487	.0422	.2379	.0106	.0443	.0352	.0108
#2	.0582	.0381	H.2422	.0108	.0448	.0345	.0108
Errors	NOCHECK	NOCHECK	LC High	LC Pass	LC Pass	LC Pass	LC Pass
High			.2400	.0120	.0480	.0360	.0120
Low			.1600	.0080	.0320	.0240	.0080

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	L.0314	.0092	.0895	H.4960	.0094	H.0502	.0106
SDev	.0063	.0001	.0043	.0005	.0003	.0068	.0000
%RSD	19.93	1.527	4.864	.0993	3.548	13.60	.1157
#1	L.0270	.0093	.0926	H.4957	.0097	H.0550	.0106
#2	.0359	.0091	.0864	H.4964	.0092	.0453	.0106

Errors	LC Low	LC Pass	LC Pass	LC High	LC Pass	LC High	LC Pass
High	.0480	.0120	.1200	.4800	.0120	.0480	.0120
Low	.0320	.0080	.0800	.3200	.0080	.0320	.0080

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.0093	.0209	.1580
SDev	.0005	.0002	.0251
%RSD	5.776	.7630	15.90
#1	.0090	.0210	.1758
#2	.0097	.0208	.1403

Errors	LC Pass	LC Pass	LC Pass
High	.0120	.0240	.1800
Low	.0080	.0160	.1200

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	704834	10000	--	--	--	--	--
SDev	2621.245	.0000000	--	--	--	--	--
%RSD	.3718956	.0000000	--	--	--	--	--
#1	706687	10000	--	--	--	--	--
#2	702980	10000	--	--	--	--	--

Analysis Report 06/27/17 04:56:46 PM

Method: DAILY1 Sample Name: ICSA Operator:
Run Time: 06/27/17 16:51:33
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0029	469.3	-.0137	.0197	.0012	-.0001	-.0080
SDev	.0000	4.5	.0102	.0003	.0001	.0001	.0067
%RSD	1.580	.9593	74.41	1.427	5.263	65.20	83.96
#1	-.0029	472.5	-.0209	.0199	.0012	-.0002	-.0033
#2	-.0030	466.1	-.0065	.0195	.0013	-.0001	-.0128
Errors	NOCHECK	LC Pass	NOCHECK	NOCHECK	NOCHECK	NOCHECK	NOCHECK
High		600.0					
Low		400.0					

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	445.3	-.0002	-.0031	-.0010	-.0007	190.9	-.0308
SDev	3.4	.0003	.0006	.0000	.0011	2.0	.0415
%RSD	.7668	143.8	18.28	3.679	147.3	1.046	134.6
#1	447.7	.0000	-.0027	-.0010	.0000	192.3	-.0602
#2	442.9	-.0004	-.0035	-.0010	-.0015	189.5	-.0015
Errors	LC Pass	NOCHECK	NOCHECK	NOCHECK	NOCHECK	LC Pass	NOCHECK
High	600.0					240.0	
Low	400.0					160.0	

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0026	.0015	501.7	.0191	-.0027	-.0126	-.4190
SDev	.0014	.0001	5.3	.0000	.0040	.0089	.4012
%RSD	54.49	4.289	1.051	.2139	149.0	70.53	95.75
#1	-.0037	.0014	505.5	.0191	.0001	-.0189	-.7027
#2	-.0016	.0015	498.0	.0191	-.0056	-.0063	-.1353
Errors	NOCHECK	NOCHECK	LC Pass	NOCHECK	NOCHECK	NOCHECK	NOCHECK
High			600.0				
Low			400.0				

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.0013	.0189	-.0030	-.0196	-.0926	.0001	90.83
SDev	.0001	.0022	.0023	.0116	.0098	.0058	.60
%RSD	9.843	11.47	77.79	59.18	10.56	8563.	.6625
#1	.0012	.0204	-.0046	-.0114	-.0995	-.0041	90.41
#2	.0014	.0173	-.0013	-.0277	-.0857	.0042	91.26
Errors	NOCHECK	NOCHECK	NOCHECK	NOCHECK	NOCHECK	NOCHECK	NOCHECK
High							
Low							

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0080	-.0057	-.0003	.0043	-.0011	-.0033	.0067
SDev	.0007	.0264	.0008	.0008	.0178	.0040	.0000
%RSD	9.299	460.2	285.1	18.78	1551.	122.0	.6463
#1	.0075	-.0244	.0003	.0037	-.0138	-.0004	.0067
#2	.0085	.0129	-.0008	.0049	.0115	-.0061	.0068
Errors	NOCHECK	NOCHECK	NOCHECK	NOCHECK	NOCHECK	NOCHECK	NOCHECK
High							
Low							

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0197	.0073	-.0044	.0470	-.0063	.0055	.0004
SDev	.0012	.0001	.0149	.0069	.0010	.0063	.0002
%RSD	5.872	.7666	339.9	14.71	16.27	115.1	36.48
#1	-.0189	.0073	-.0150	.0421	-.0070	.0010	.0003
#2	-.0205	.0073	.0062	.0519	-.0056	.0099	.0005
Errors	NOCHECK	NOCHECK	NOCHECK	NOCHECK	NOCHECK	NOCHECK	NOCHECK
High							
Low							

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0046	.0003	-.0240
SDev	.0001	.0006	.0122
%RSD	2.387	198.1	50.70
#1	-.0046	-.0001	-.0326
#2	-.0047	.0007	-.0154
Errors	NOCHECK	NOCHECK	NOCHECK
High			
Low			

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	641402	10000	--	--	--	--	--
SDev	4213.649	.0000000	--	--	--	--	--
%RSD	.6569431	.0000000	--	--	--	--	--
#1	638423	10000	--	--	--	--	--
#2	644382	10000	--	--	--	--	--

Analysis Report 06/27/17 05:02:21 PM

Method: DAILY1 Sample Name: ICSAB Operator:
Run Time: 06/27/17 16:57:05
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.078	466.0	1.057	1.079	.5325	H.6274	-.0234
SDev	.012	4.7	.016	.014	.0066	.0315	.0162
%RSD	1.155	1.011	1.517	1.326	1.238	5.020	68.94
#1	1.087	469.4	1.045	1.069	.5278	H.6497	-.0120
#2	1.069	462.7	1.068	1.089	.5372	H.6052	-.0349
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	NOCHECK
High	1.200	600.0	1.200	1.200	.6000	.6000	
Low	.8000	400.0	.8000	.8000	.4000	.4000	

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	449.3	1.022	.5020	.5055	.5256	192.0	-.0046
SDev	2.5	.021	.0019	.0032	.0033	.8	.0316
%RSD	.5635	2.082	.3719	.6233	.6293	.4393	692.8
#1	451.1	1.007	.5007	.5077	.5232	192.6	-.0269
#2	447.5	1.037	.5033	.5033	.5279	191.4	.0178
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	NOCHECK
High	600.0	1.200	.6000	.6000	.6000	240.0	
Low	400.0	.8000	.4000	.4000	.4000	160.0	

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0015	1.187	507.5	.5327	1.042	-.0204	-.1217
SDev	.0004	.010	1.3	.0006	.048	.0013	.1988
%RSD	29.84	.8378	.2565	.1141	4.580	6.400	163.3
#1	-.0018	1.180	508.4	.5331	1.008	-.0213	-.2623
#2	-.0012	1.194	506.5	.5322	1.076	-.0195	.0188
Errors	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass	NOCHECK	NOCHECK
High		1.200	600.0	.6000	1.200		
Low		.8000	400.0	.4000	.8000		

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	1.001	1.047	1.018	-.0227	-.0882	1.065	89.96
SDev	.010	.017	.004	.0086	.0055	.027	.73
%RSD	.9948	1.648	.3689	37.80	6.235	2.578	.8115
#1	.9937	1.035	1.021	-.0166	-.0843	1.046	90.48
#2	1.008	1.059	1.016	-.0288	-.0921	1.085	89.44
Errors	LC Pass	NOCHECK	NOCHECK	NOCHECK	NOCHECK	LC Pass	NOCHECK
High	1.200					1.200	
Low	.8000					.8000	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.035	1.040	1.027	1.027	1.037	.9948	1.061
SDev	.021	.005	.004	.003	.004	.0074	.009
%RSD	2.011	.4538	.4039	.3160	.3654	.7443	.8851
#1	1.020	1.043	1.030	1.024	1.035	.9895	1.054
#2	1.050	1.037	1.024	1.029	1.040	1.000	1.068
Errors	NOCHECK	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass
High				1.200	1.200	1.200	1.200
Low				.8000	.8000	.8000	.8000

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0212	1.020	.9975	1.105	.5231	.0116	.0006
SDev	.0001	.000	.0115	.034	.0004	.0052	.0001
%RSD	.2353	.0423	1.150	3.076	.0809	44.94	17.16
#1	-.0212	1.021	1.006	1.081	.5228	.0079	.0007
#2	-.0212	1.020	.9894	1.129	.5234	.0153	.0005
Errors	NOCHECK	LC Pass	LC Pass	NOCHECK	LC Pass	NOCHECK	NOCHECK
High		1.200	1.200		.6000		
Low		.8000	.8000		.4000		

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	1.021	.9791	1.092
SDev	.001	.0001	.054
%RSD	.1173	.0115	4.944
#1	1.020	.9790	1.054
#2	1.022	.9792	1.130
Errors	LC Pass	NOCHECK	LC Pass
High	1.200		1.200
Low	.8000		.8000

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	635245	10000	--	--	--	--	--
SDev	5129.352	.0000000	--	--	--	--	--
%RSD	.8074606	.0000000	--	--	--	--	--
#1	638872	10000	--	--	--	--	--
#2	631618	10000	--	--	--	--	--

Method: DAILY1 Sample Name: UCL1 Operator:
Run Time: 06/27/17 17:02:41
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0070	550.4	-.0137	.0545	.0012	-.0003	-.0640
SDev	.0040	.3	.0059	.0011	.0003	.0000	.0063
%RSD	57.15	.0567	43.32	2.084	20.54	5.255	9.859
#1	-.0098	550.2	-.0095	.0553	.0014	-.0003	-.0684
#2	-.0042	550.7	-.0178	.0537	.0010	-.0003	-.0595

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	232.7	-.0006	-.0079	-.0059	-.0018	578.0	122.4
SDev	.2	.0013	.0003	.0000	.0010	2.0	.4
%RSD	.0673	220.7	3.187	.2586	57.52	.3382	.3331
#1	232.6	-.0015	-.0077	-.0059	-.0010	579.3	122.1
#2	232.8	.0003	-.0081	-.0059	-.0025	576.6	122.7

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.1146	17.89	591.7	.0040	-.0040	S27.04	273.0
SDev	.0182	.02	1.6	.0001	.0037	.05	2.5
%RSD	15.87	.1287	.2635	1.471	93.70	.1714	.9110
#1	-.1275	17.87	592.8	.0040	-.0066	S27.07	271.2
#2	-.1018	17.91	590.6	.0040	-.0013	S27.01	274.8

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.0019	.0364	-.0038	-.0757	.1604	-.0169	88.61
SDev	.0006	.0004	.0104	.0088	.0469	.0174	.03
%RSD	32.38	1.067	275.2	11.68	29.22	103.1	.0376
#1	.0024	.0362	-.0112	-.0694	.1272	-.0292	88.58
#2	.0015	.0367	.0036	-.0819	.1935	-.0046	88.63

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0918	-.0453	-.0028	.0096	-.0607	.0223	.0172
SDev	.0115	.0079	.0132	.0071	.0014	.0098	.0002
%RSD	12.56	17.35	472.6	73.54	2.298	44.20	1.140
#1	-.0836	-.0509	-.0121	.0046	-.0617	.0153	.0170
#2	-.0999	-.0397	.0065	.0146	-.0597	.0292	.0173

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.04	-.0313	.0263	.0001	-.0070	-.0051	-.0004
SDev	.07	.0021	.0049	.0699	.0003	.0204	.0002
%RSD	.3247	6.704	18.52	56390.	3.637	395.9	39.25
#1	20.00	-.0328	.0298	-.0493	-.0072	-.0195	-.0003
#2	20.09	-.0298	.0229	.0496	-.0069	.0093	-.0005

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0032	-.0003	.0515
SDev	.0007	.0003	.0513
%RSD	21.57	90.42	99.64
#1	-.0027	-.0001	.0152
#2	-.0037	-.0006	.0878

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	625751	10000	--	--	--	--	--
SDev	227.6884	.0000000	--	--	--	--	--
%RSD	.0363864	.0000000	--	--	--	--	--
#1	625590	10000	--	--	--	--	--
#2	625912	10000	--	--	--	--	--

Analysis Report 06/27/17 05:13:28 PM

Method: DAILY1 Sample Name: UCL2 Operator:
Run Time: 06/27/17 17:08:17
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.962	.0285	19.65	19.33	19.37	1.049	19.64
SDev	.002	.0080	.05	.10	.06	.096	.11
%RSD	.1211	27.98	.2653	.5211	.2978	9.164	.5795
#1	1.964	.0341	19.61	19.26	19.33	1.117	19.56
#2	1.961	.0228	19.68	19.40	19.41	.9813	19.72

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0453	9.623	19.71	19.96	20.34	.1172	.0106
SDev	.0027	.021	.05	.00	.03	.0469	.0126
%RSD	5.872	.2229	.2622	.0192	.1698	40.01	118.7
#1	-.0434	9.608	19.75	19.96	20.36	.0841	.0017
#2	-.0472	9.638	19.68	19.95	20.31	.1504	.0195

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	22.36	.0001	-.0040	18.96	19.60	-.0012	-.5138
SDev	.08	.0001	.0037	.00	.09	.0015	.0048
%RSD	.3657	53.91	90.50	.0156	.4348	125.3	.9431
#1	22.31	.0001	-.0015	18.96	19.54	-.0023	-.5172
#2	22.42	.0002	-.0066	18.96	19.67	-.0001	-.5104

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	19.71	19.19	19.48	20.90	19.63	19.80	98.71
SDev	.18	.06	.02	.05	.03	.11	.18
%RSD	.8891	.3281	.0983	.2461	.1637	.5407	.1820
#1	19.83	19.15	19.49	20.93	19.61	19.73	98.84
#2	19.58	19.23	19.47	20.86	19.66	19.88	98.59

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	19.47	19.67	20.65	19.36	19.58	19.51	18.62
SDev	.00	.13	.33	.01	.09	.02	.02
%RSD	.0253	.6627	1.621	.0424	.4517	.0851	.0898
#1	19.46	19.58	20.41	19.36	19.52	19.52	18.63
#2	19.47	19.76	20.89	19.37	19.64	19.50	18.61

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0653	20.02	19.39	20.15	20.02	20.32	19.60
SDev	.0100	.08	.06	.03	.03	.10	.02
%RSD	15.32	.3949	.2918	.1317	.1262	.4870	.1214
#1	.0582	20.08	19.35	20.13	20.00	20.25	19.61
#2	.0723	19.97	19.43	20.17	20.04	20.39	19.58

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	19.08	20.40	19.66
SDev	.05	.06	.02
%RSD	.2746	.3021	.1141
#1	19.12	20.44	19.68
#2	19.04	20.35	19.65

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	696965	10000	--	--	--	--	--
SDev	1285.520	.0000000	--	--	--	--	--
%RSD	.1844454	.0000000	--	--	--	--	--
#1	697874	10000	--	--	--	--	--
#2	696056	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: ZZZZ Operator:
Run Time: 06/27/17 17:13:46
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0004	.0153	-.0086	.0211	.0002	-.0001	-.0115
SDev	.0010	.0025	.0100	.0082	.0003	.0001	.0027
%RSD	258.4	16.19	116.4	38.85	175.3	63.51	23.18
#1	.0003	.0171	-.0015	.0269	.0004	-.0001	-.0134
#2	-.0011	.0135	-.0156	.0153	-.0000	-.0001	-.0096

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0015	.0002	-.0002	.0012	.0007	.1092	.0053
SDev	.0007	.0000	.0003	.0008	.0005	.0107	.0156
%RSD	46.03	17.99	153.7	70.93	65.40	9.822	297.3
#1	.0020	.0002	.0000	.0018	.0011	.1016	-.0058
#2	.0010	.0002	-.0004	.0006	.0004	.1168	.0163

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0008	.0001	.0021	.0010	.0008	-.0071	.0721
SDev	.0003	.0001	.0002	.0002	.0026	.0113	.1991
%RSD	37.12	72.52	11.16	18.36	327.4	157.7	276.1
#1	.0010	.0000	.0019	.0009	.0026	-.0151	-.0687
#2	.0006	.0001	.0022	.0011	-.0010	.0008	.2129

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0005	.0033	.0012	-.0020	-.0084	-.0029	98.59
SDev	.0007	.0015	.0020	.0043	.0112	.0019	2.08
%RSD	142.2	44.54	164.0	218.3	134.6	65.17	2.113
#1	.0000	.0043	.0027	.0011	-.0163	-.0016	97.11
#2	-.0009	.0022	-.0002	-.0051	-.0004	-.0043	100.1

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0006	-.0033	.0164	.0019	-.0020	-.0010	.0000
SDev	.0106	.0074	.0066	.0018	.0014	.0001	.0001
%RSD	1679.	222.0	40.55	95.74	69.98	13.51	128.7
#1	-.0069	.0019	.0210	.0032	-.0010	-.0011	.0001
#2	.0081	-.0086	.0117	.0006	-.0030	-.0009	.0000

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0080	-.0005	.0012	.0763	.0013	.0174	.0003
SDev	.0014	.0003	.0150	.0306	.0007	.0081	.0004
%RSD	18.06	59.92	1292.	40.16	59.45	46.48	126.0
#1	-.0070	-.0003	.0118	.0979	.0018	.0231	.0006
#2	-.0090	-.0007	-.0095	.0546	.0007	.0117	.0000

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.0001	.0016	.0198
SDev	.0001	.0018	.0108
%RSD	99.23	112.0	54.75
#1	.0000	.0028	.0275
#2	.0002	.0003	.0121

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	696058	10000	--	--	--	--	--
SDev	14705.70	.0000000	--	--	--	--	--
%RSD	2.112713	.0000000	--	--	--	--	--
#1	685659	10000	--	--	--	--	--
#2	706456	10000	--	--	--	--	--

Analysis Report 06/27/17 05:24:34 PM

Method: DAILY1 Sample Name: CCV Operator:
Run Time: 06/27/17 17:19:15
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.9841	10.25	5.163	5.143	9.708	1.068	4.910
SDev	.0084	.07	.037	.019	.057	.082	.042
%RSD	.8564	.6819	.7151	.3615	.5868	7.720	.8520
#1	.9782	10.20	5.189	5.156	9.749	H1.126	4.940
#2	.9901	10.30	5.137	5.130	9.668	1.010	4.880
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	1.100	11.00	5.500	5.500	11.00	1.100	5.500
Low	.9000	9.000	4.500	4.500	9.000	.9000	4.500

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.29	.9864	4.809	1.937	1.945	9.855	19.71
SDev	.00	.0046	.003	.016	.008	.103	.07
%RSD	.0032	.4613	.0724	.8115	.4324	1.048	.3318
#1	20.29	.9896	4.806	1.926	1.951	9.782	19.76
#2	20.29	.9832	4.811	1.948	1.939	9.928	19.67
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	22.00	1.100	5.500	2.200	2.200	11.00	22.00
Low	18.00	.9000	4.500	1.800	1.800	9.000	18.00

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.391	5.475	19.75	.9722	4.812	H38.22	30.05
SDev	.026	.009	.17	.0059	.070	.04	.55
%RSD	.4795	.1706	.8659	.6042	1.451	.1003	1.840
#1	5.409	5.482	19.63	.9681	4.862	H38.25	29.66
#2	5.372	5.469	19.88	.9764	4.763	H38.19	30.44
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass
High	5.500	5.500	22.00	1.100	5.500	33.00	33.00
Low	4.500	4.500	18.00	.9000	4.500	27.00	27.00

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	4.752	4.778	4.885	.9958	1.024	1.002	100.4
SDev	.014	.052	.006	.0016	.001	.009	.2
%RSD	.2992	1.080	.1161	.1648	.1191	.8919	.1517
#1	4.762	4.742	4.889	.9970	1.023	1.009	100.2
#2	4.742	4.815	4.881	.9947	1.024	.9959	100.5
Errors	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	NOCHECK
High	5.500			1.100	1.100	1.100	
Low	4.500			.9000	.9000	.9000	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.000	5.071	4.936	4.845	5.042	4.886	4.952
SDev	.022	.020	.068	.013	.020	.039	.031
%RSD	.4375	.3862	1.386	.2766	.4031	.7919	.6294
#1	4.984	5.057	4.888	4.835	5.028	4.858	4.974
#2	5.015	5.085	4.985	4.854	5.057	4.913	4.930
Errors	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High			5.500	5.500	5.500	5.500	5.500
Low			4.500	4.500	4.500	4.500	4.500

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.9774	4.976	5.054	4.891	5.006	1.021	4.947
SDev	.0198	.002	.092	.004	.030	.004	.012
%RSD	2.022	.0460	1.815	.0761	.5913	.3804	.2409
#1	.9634	4.978	5.119	4.893	4.986	1.024	4.955
#2	.9913	4.975	4.989	4.888	5.027	1.018	4.938
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	1.100	5.500	5.500	5.500	5.500	1.100	5.500
Low	.9000	4.500	4.500	4.500	4.500	.9000	4.500

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.9706	4.876	5.076
SDev	.0047	.010	.148
%RSD	.4798	.1954	2.909
#1	.9674	4.882	4.972
#2	.9739	4.869	5.181
Errors	LC Pass	LC Pass	LC Pass
High	1.100	5.500	5.500
Low	.9000	4.500	4.500

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	708506	10000	--	--	--	--	--
SDev	1067.024	.0000000	--	--	--	--	--
%RSD	.1506019	.0000000	--	--	--	--	--
#1	707752	10000	--	--	--	--	--
#2	709261	10000	--	--	--	--	--

Analysis Report 06/27/17 05:30:04 PM

Method: DAILY1 Sample Name: CCB Operator:
Run Time: 06/27/17 17:24:53
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0001	.0144	.0079	.0132	-.0000	-.0002	-.0044
SDev	.0002	.0004	.0029	.0037	.0001	.0001	.0065
%RSD	156.2	2.575	37.33	28.36	575.9	39.37	146.6
#1	.0000	.0141	.0100	.0158	.0001	-.0001	.0002
#2	-.0003	.0146	.0058	.0105	-.0001	-.0002	-.0090
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0100	.0750	.0150	.1000	.0050	.0050	.0250
Low	-.0100	-.0750	-.0150	-.1000	-.0050	-.0050	-.0250

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0011	.0001	-.0001	-.0004	-.0006	-.0080	-.0031
SDev	.0005	.0003	.0000	.0007	.0007	.0039	.0041
%RSD	45.66	347.1	2.815	201.9	109.0	48.82	131.1
#1	.0015	.0003	-.0002	.0002	-.0011	-.0052	-.0060
#2	.0008	-.0001	-.0001	-.0009	-.0001	-.0107	-.0002
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0500	.0050	.0050	.0050	.0050	.1000	.1500
Low	-.0500	-.0050	-.0050	-.0050	-.0050	-.1000	-.1500

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0005	.0001	.0025	-.0001	.0008	-.0063	.0922
SDev	.0004	.0000	.0005	.0000	.0004	.0007	.2230
%RSD	83.87	.2149	19.48	38.92	47.82	10.60	242.0
#1	.0009	.0001	.0029	-.0002	.0010	-.0067	-.0655
#2	.0002	.0001	.0022	-.0001	.0005	-.0058	H.2499
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0100	.0100	.0500	.0050	.0075	.1500	.1500
Low	-.0100	-.0100	-.0500	-.0050	-.0075	-.1500	-.1500

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0004	.0016	-.0019	-.0014	.0174	-.0048	99.23
SDev	.0003	.0040	.0020	.0022	.0153	.0002	.23
%RSD	73.20	257.5	105.1	155.0	87.83	4.840	.2300
#1	-.0006	-.0013	-.0005	-.0029	.0066	-.0046	99.07
#2	-.0002	.0044	-.0033	.0001	.0283	-.0050	99.39
Errors	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	NOCHECK
High	.0050			.0250	.0500	.0200	
Low	-.0050			-.0250	-.0500	-.0200	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0085	.0090	.0043	-.0007	.0089	.0025	.0000
SDev	.0013	.0050	.0020	.0000	.0029	.0050	.0000
%RSD	14.86	55.25	46.37	3.137	32.76	204.5	315.6
#1	.0076	.0126	.0056	-.0007	.0109	-.0011	.0000
#2	.0094	.0055	.0029	-.0007	.0068	.0060	-.0000
Errors	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High			.1000	.0050	.0200	.0150	.0050
Low			-.1000	-.0050	-.0200	-.0150	-.0050

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0080	-.0008	.0046	.0880	-.0001	.0059	-.0000
SDev	.0015	.0003	.0038	.0341	.0007	.0025	.0002
%RSD	18.63	34.72	83.24	38.72	1043.	42.48	581.3
#1	-.0070	-.0010	.0019	.1121	.0004	.0077	.0001
#2	-.0091	-.0006	.0073	.0639	-.0006	.0041	-.0001
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0200	.0050	.0500	.2000	.0050	.0200	.0050
Low	-.0200	-.0050	-.0500	-.2000	-.0050	-.0200	-.0050

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0003	.0004	.0361
SDev	.0002	.0004	.0442
%RSD	67.75	81.38	122.4
#1	-.0005	.0007	.0049
#2	-.0002	.0002	.0674
Errors	LC Pass	LC Pass	LC Pass
High	.0050	.0100	.0750
Low	-.0050	-.0100	-.0750

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	700624	10000	--	--	--	--	--
SDev	1594.526	.0000000	--	--	--	--	--
%RSD	.2275867	.0000000	--	--	--	--	--
#1	699496	10000	--	--	--	--	--
#2	701751	10000	--	--	--	--	--

Method: DAILY1 Sample Name: PB17F23KE3 Operator:
Run Time: 06/27/17 17:32:38
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0013	-.0008	-.0090	.0052	-.0002	-.0001	.0060
SDev	.0006	.0020	.0002	.0014	.0001	.0000	.0011
%RSD	47.14	258.1	2.637	26.74	47.14	51.38	18.54
#1	-.0017	.0006	-.0091	.0042	-.0001	-.0001	.0068
#2	-.0009	-.0022	-.0088	.0062	-.0002	-.0001	.0053

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0028	-.0001	-.0002	-.0004	.0012	-.0028	-.0085
SDev	.0004	.0000	.0005	.0004	.0006	.0043	.0097
%RSD	15.94	77.25	209.7	102.6	51.84	156.0	114.5
#1	.0031	-.0000	.0001	-.0001	.0017	.0003	-.0153
#2	.0025	-.0001	-.0006	-.0008	.0008	-.0058	-.0016

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0001	.0001	.0007	-.0001	.0008	.0145	.1235
SDev	.0002	.0000	.0026	.0000	.0007	.0012	.0693
%RSD	273.0	31.71	381.3	21.22	85.49	8.506	56.08
#1	.0001	.0001	-.0012	-.0001	.0013	.0136	.0745
#2	-.0002	.0001	.0025	-.0001	.0003	.0154	.1725

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0009	.0021	-.0012	-.0040	.0064	-.0032	106.3
SDev	.0006	.0012	.0030	.0008	.0117	.0045	.2
%RSD	60.93	58.30	259.1	20.71	182.2	140.5	.2219
#1	-.0013	.0012	.0010	-.0045	-.0019	-.0000	106.1
#2	-.0005	.0030	-.0033	-.0034	.0147	-.0065	106.5

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0091	-.0030	.0141	-.0001	.0010	.0008	-.0000
SDev	.0059	.0024	.0032	.0016	.0003	.0009	.0000
%RSD	64.65	80.07	22.60	2253.	33.73	107.1	49.74
#1	.0133	-.0048	.0163	.0011	.0013	.0014	-.0001
#2	.0050	-.0013	.0118	-.0012	.0008	.0002	-.0000

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0069	-.0007	-.0105	.0175	.0002	.0085	-.0000
SDev	.0003	.0001	.0203	.0140	.0003	.0050	.0001
%RSD	4.552	19.96	192.6	80.15	156.0	58.65	795.9
#1	-.0067	-.0008	-.0249	.0274	-.0000	.0120	.0001
#2	-.0071	-.0006	.0038	.0076	.0004	.0049	-.0001

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.0002	-.0002	.1644
SDev	.0002	.0000	.0133
%RSD	99.09	19.27	8.079
#1	.0001	-.0002	.1550
#2	.0004	-.0002	.1738

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	750444	10000	--	--	--	--	--
SDev	1717.562	.0000000	--	--	--	--	--
%RSD	.2288727	.0000000	--	--	--	--	--
#1	749230	10000	--	--	--	--	--
#2	751659	10000	--	--	--	--	--

Analysis Report 06/27/17 05:43:04 PM

Method: DAILY1 Sample Name: LCS17F23KE5 Operator:
Run Time: 06/27/17 17:38:00
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0952	4.036	4.040	.0043	3.900	.1234	-.0119
SDev	.0017	.035	.050	.0018	.051	.0006	.0127
%RSD	1.814	.8760	1.233	40.99	1.313	.4790	106.7
#1	.0940	4.011	4.005	.0030	3.864	.1238	-.0208
#2	.0965	4.061	4.075	.0055	3.936	.1230	-.0029

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.83	.0977	.9688	.3901	.4804	1.951	18.29
SDev	.13	.0021	.0210	.0073	.0026	.039	.13
%RSD	.6093	2.158	2.172	1.884	.5339	1.992	.7367
#1	20.74	.0962	.9540	.3850	.4785	1.923	18.20
#2	20.92	.0991	.9837	.3953	.4822	1.978	18.39

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0006	.0002	20.64	.9782	.0006	25.14	19.89
SDev	.0017	.0001	.25	.0157	.0011	.17	.23
%RSD	283.5	41.29	1.232	1.605	190.6	.6729	1.173
#1	-.0018	.0002	20.46	.9671	-.0002	25.02	19.72
#2	.0006	.0003	20.82	.9893	.0013	25.26	20.05

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.9731	.9641	.9646	-.0034	-.0153	.9992	103.5
SDev	.0087	.0060	.0095	.0019	.0040	.0076	1.0
%RSD	.8930	.6218	.9851	56.00	26.10	.7577	.9667
#1	.9670	.9598	.9579	-.0048	-.0181	.9939	104.2
#2	.9793	.9683	.9713	-.0021	-.0125	1.005	102.8

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	3.912	3.934	1.960	.9635	3.923	-.0030	.0003
SDev	.032	.032	.023	.0083	.032	.0024	.0001
%RSD	.8289	.8258	1.192	.8640	.8268	82.55	21.90
#1	3.889	3.911	1.943	.9576	3.900	-.0047	.0003
#2	3.935	3.957	1.976	.9693	3.945	-.0012	.0004

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0104	-.0005	3.909	-.0353	.9933	.0166	-.0000
SDev	.0009	.0001	.011	.0442	.0102	.0062	.0001
%RSD	8.490	15.53	.2919	125.2	1.026	37.14	503.4
#1	-.0110	-.0006	3.901	-.0665	.9861	.0122	-.0001
#2	-.0098	-.0005	3.917	-.0040	1.001	.0209	.0001

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.9888	.0007	.1803
SDev	.0245	.0008	.0275
%RSD	2.481	113.4	15.28
#1	.9714	.0001	.1608
#2	1.006	.0013	.1998

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	730618	10000	--	--	--	--	--
SDev	7088.746	.0000000	--	--	--	--	--
%RSD	.9702390	.0000000	--	--	--	--	--
#1	735631	10000	--	--	--	--	--
#2	725606	10000	--	--	--	--	--

Analysis Report 06/27/17 05:48:25 PM

Method: DAILY1 Sample Name: LCS17F23KE6 Operator:
Run Time: 06/27/17 17:43:23
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0954	4.026	4.017	.0045	3.862	.1215	-.0003
SDev	.0003	.007	.004	.0006	.030	.0003	.0058
%RSD	.3558	.1837	.1067	13.18	.7756	.2088	2226.
#1	.0952	4.031	4.014	.0041	3.841	.1217	.0039
#2	.0957	4.021	4.020	.0050	3.883	.1213	-.0044

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.71	.0971	.9541	.3839	.4790	1.919	18.15
SDev	.07	.0011	.0077	.0033	.0044	.009	.22
%RSD	.3482	1.115	.8028	.8635	.9239	.4699	1.237
#1	20.66	.0963	.9487	.3816	.4758	1.913	17.99
#2	20.76	.0978	.9595	.3863	.4821	1.926	18.31

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0002	.0002	20.41	.9674	.0006	24.98	20.05
SDev	.0011	.0001	.16	.0096	.0003	.38	.31
%RSD	463.4	36.58	.7762	.9916	61.52	1.510	1.567
#1	.0010	.0002	20.30	.9607	.0003	24.71	19.83
#2	-.0006	.0003	20.53	.9742	.0008	25.25	20.27

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.9453	.9454	.9553	-.0019	-.0245	.9879	104.4
SDev	.0094	.0021	.0145	.0022	.0251	.0083	1.2
%RSD	.9991	.2225	1.518	117.9	102.5	.8371	1.168
#1	.9386	.9439	.9451	-.0003	-.0422	.9820	105.3
#2	.9520	.9469	.9656	-.0034	-.0067	.9937	103.5

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	3.858	3.893	1.957	.9511	3.877	.0001	.0003
SDev	.026	.065	.002	.0104	.052	.0026	.0000
%RSD	.6662	1.658	.0811	1.089	1.329	1879.	4.948
#1	3.839	3.847	1.956	.9437	3.841	-.0017	.0003
#2	3.876	3.938	1.958	.9584	3.914	.0020	.0003

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0101	-.0005	3.887	-.0429	.9858	.0134	.0000
SDev	.0003	.0005	.009	.0017	.0052	.0043	.0002
%RSD	2.750	92.53	.2402	4.023	.5282	32.12	331.4
#1	-.0103	-.0002	3.893	-.0441	.9822	.0165	-.0001
#2	-.0099	-.0008	3.880	-.0416	.9895	.0104	.0002

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.9687	.0003	.1674
SDev	.0070	.0001	.0106
%RSD	.7275	37.70	6.337
#1	.9637	.0002	.1749
#2	.9737	.0004	.1599

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	736988	10000	--	--	--	--	--
SDev	8589.226	.0000000	--	--	--	--	--
%RSD	1.165449	.0000000	--	--	--	--	--
#1	743062	10000	--	--	--	--	--
#2	730915	10000	--	--	--	--	--

Analysis Report 06/27/17 05:53:44 PM

Method: DAILY1 Sample Name: 615785 Operator:
Run Time: 06/27/17 17:48:43
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0015	.0158	.0015	.0020	.0001	-.0000	-.0024
SDev	.0020	.0026	.0056	.0002	.0000	.0000	.0112
%RSD	137.1	16.64	370.2	9.581	35.86	185.3	474.5
#1	-.0029	.0140	.0055	.0021	.0000	-.0000	-.0102
#2	-.0000	.0177	-.0024	.0018	.0001	.0000	.0055

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0296	-.0002	-.0005	.0001	-.0011	.0016	-.0050
SDev	.0001	.0002	.0004	.0002	.0002	.0002	.0298
%RSD	.2921	92.61	76.44	166.0	19.25	11.37	598.6
#1	.0295	-.0004	-.0008	.0002	-.0009	.0015	-.0260
#2	.0297	-.0001	-.0002	-.0000	-.0012	.0018	.0161

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0014	.0000	-.0035	.0000	.0007	.0321	.0838
SDev	.0007	.0001	.0060	.0000	.0005	.0081	.4222
%RSD	55.10	179.1	172.8	95.43	77.85	25.10	503.6
#1	-.0019	-.0000	-.0077	.0000	.0010	.0264	-.2147
#2	-.0008	.0001	.0008	.0001	.0003	.0378	.3824

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.0001	.0039	-.0004	-.0022	.0072	.0012	104.1
SDev	.0004	.0007	.0017	.0027	.0032	.0037	1.0
%RSD	514.1	17.65	431.2	122.3	44.51	304.8	.9538
#1	-.0002	.0034	-.0016	-.0003	.0050	-.0014	103.4
#2	.0004	.0043	.0008	-.0042	.0095	.0038	104.8

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0065	.0002	.0025	.0010	.0023	.0012	.0000
SDev	.0058	.0015	.0011	.0014	.0010	.0010	.0001
%RSD	89.62	873.9	43.74	134.3	41.81	81.99	669.3
#1	.0106	-.0009	.0018	.0001	.0030	.0020	-.0000
#2	.0024	.0012	.0033	.0020	.0016	.0005	.0001

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0099	-.0011	-.0136	.0087	.0006	.0086	.0000
SDev	.0070	.0006	.0065	.0249	.0004	.0009	.0000
%RSD	70.94	55.06	47.88	287.1	74.62	9.974	43.92
#1	-.0049	-.0016	-.0182	-.0089	.0009	.0092	.0001
#2	-.0148	-.0007	-.0090	.0263	.0003	.0080	.0000

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0002	.0001	.2033
SDev	.0000	.0003	.0057
%RSD	.4236	414.7	2.787
#1	-.0002	-.0002	.2074
#2	-.0002	.0003	.1993

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	734769	10000	--	--	--	--	--
SDev	7076.725	.0000000	--	--	--	--	--
%RSD	.9631224	.0000000	--	--	--	--	--
#1	729765	10000	--	--	--	--	--
#2	739773	10000	--	--	--	--	--

Analysis Report 06/27/17 05:59:04 PM

Method: DAILY1 Sample Name: 615791 Operator:
Run Time: 06/27/17 17:54:02
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0003	.0319	-.0137	.0032	-.0001	-.0001	-.0007
SDev	.0004	.0009	.0002	.0003	.0000	.0000	.0068
%RSD	126.6	2.849	1.716	10.81	11.41	1.089	1016.
#1	-.0007	.0313	-.0139	.0035	-.0002	-.0001	.0041
#2	-.0000	.0326	-.0135	.0030	-.0001	-.0001	-.0055

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0355	.0000	-.0004	-.0001	-.0006	-.0025	-.0066
SDev	.0004	.0003	.0001	.0000	.0003	.0054	.0299
%RSD	1.087	1069.	29.25	10.17	51.27	218.0	455.9
#1	.0352	-.0002	-.0005	-.0001	-.0004	-.0063	-.0277
#2	.0358	.0003	-.0003	-.0001	-.0007	.0013	.0146

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0005	.0001	.0038	-.0001	.0012	.0202	.0736
SDev	.0012	.0001	.0012	.0000	.0009	.0054	.1959
%RSD	246.7	162.6	31.49	87.36	75.64	26.74	266.1
#1	-.0004	-.0000	.0029	-.0000	.0018	.0164	-.0649
#2	.0014	.0001	.0046	-.0001	.0005	.0240	.2122

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0013	.0045	-.0012	-.0036	-.0135	.0006	103.8
SDev	.0003	.0003	.0026	.0013	.0261	.0000	.2
%RSD	20.96	6.178	225.4	35.22	193.2	4.060	.2261
#1	-.0011	.0043	-.0030	-.0027	.0049	.0006	103.6
#2	-.0014	.0047	.0007	-.0045	-.0319	.0006	104.0

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0061	-.0001	.0007	.0007	.0020	.0011	.0001
SDev	.0057	.0034	.0005	.0018	.0042	.0037	.0000
%RSD	93.60	3287.	64.22	257.0	208.7	341.9	39.51
#1	.0102	.0023	.0004	-.0006	.0049	-.0015	.0001
#2	.0021	-.0025	.0011	.0020	-.0009	.0037	.0001

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0047	-.0008	.0011	.0294	-.0003	.0135	-.0000
SDev	.0019	.0001	.0144	.0194	.0001	.0052	.0001
%RSD	41.34	17.46	1371.	66.19	36.40	38.73	121.4
#1	-.0061	-.0007	.0112	.0156	-.0003	.0172	-.0001
#2	-.0033	-.0009	-.0091	.0431	-.0002	.0098	-.0000

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0002	-.0005	.1798
SDev	.0001	.0005	.0448
%RSD	84.36	100.1	24.94
#1	-.0001	-.0008	.1481
#2	-.0002	-.0001	.2115

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	732884	10000	--	--	--	--	--
SDev	1675.843	.0000000	--	--	--	--	--
%RSD	.2286642	.0000000	--	--	--	--	--
#1	731699	10000	--	--	--	--	--
#2	734069	10000	--	--	--	--	--

Analysis Report 06/27/17 06:04:26 PM

Method: DAILY1 Sample Name: 615791D Operator:
Run Time: 06/27/17 17:59:22
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0004	.0284	.0026	.0017	-.0001	-.0001	.0057
SDev	.0002	.0029	.0128	.0003	.0000	.0001	.0033
%RSD	48.90	10.14	489.4	16.01	64.17	97.28	58.76
#1	-.0006	.0264	.0117	.0019	-.0001	-.0000	.0033
#2	-.0003	.0304	-.0065	.0015	-.0000	-.0001	.0080

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0293	.0000	-.0002	-.0002	-.0011	.0046	-.0030
SDev	.0002	.0002	.0005	.0001	.0007	.0146	.0272
%RSD	.5662	18070.	214.4	23.94	66.81	317.8	912.5
#1	.0294	.0001	-.0006	-.0002	-.0016	-.0057	-.0222
#2	.0292	-.0001	.0001	-.0003	-.0006	.0149	.0163

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	.0001	.0035	.0000	.0019	.0189	.1125
SDev	.0012	.0001	.0028	.0000	.0015	.0045	.2680
%RSD	1771.	161.7	81.54	152.9	81.40	23.90	238.3
#1	-.0008	-.0000	.0015	-.0000	.0030	.0157	-.0771
#2	.0009	.0001	.0054	.0000	.0008	.0222	.3020

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0006	.0039	-.0007	-.0034	.0027	-.0034	106.8
SDev	.0008	.0010	.0008	.0031	.0038	.0012	.3
%RSD	134.3	26.32	128.9	90.36	141.9	35.61	.3146
#1	-.0011	.0046	-.0001	-.0056	.0054	-.0025	107.0
#2	-.0000	.0032	-.0013	-.0012	-.0000	-.0042	106.6

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0053	.0055	-.0009	.0009	.0019	.0008	.0001
SDev	.0053	.0034	.0025	.0009	.0005	.0002	.0000
%RSD	100.7	62.46	282.8	105.7	27.10	27.90	29.51
#1	-.0015	.0031	-.0027	.0015	.0016	.0006	.0001
#2	-.0090	.0080	.0009	.0002	.0023	.0010	.0001

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0087	-.0011	.0105	.0731	-.0000	.0014	-.0002
SDev	.0022	.0003	.0008	.0208	.0000	.0137	.0002
%RSD	25.55	25.28	7.275	28.45	320.1	983.8	123.5
#1	-.0071	-.0009	.0100	.0878	.0000	.0110	-.0003
#2	-.0102	-.0013	.0111	.0584	-.0000	-.0083	-.0000

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0003	.0002	.1798
SDev	.0001	.0001	.0439
%RSD	29.20	79.54	24.43
#1	-.0003	.0001	.1488
#2	-.0004	.0003	.2109

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	754020	10000	--	--	--	--	--
SDev	2331.331	.0000000	--	--	--	--	--
%RSD	.3091871	.0000000	--	--	--	--	--
#1	755668	10000	--	--	--	--	--
#2	752371	10000	--	--	--	--	--

Analysis Report 06/27/17 06:09:43 PM

Method: DAILY1 Sample Name: 615791L Operator:
Run Time: 06/27/17 18:04:43
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0009	.0251	.0020	.0010	-.0001	-.0000	-.0039
SDev	.0012	.0056	.0108	.0013	.0000	.0000	.0048
%RSD	132.5	22.40	548.4	123.4	30.34	40.32	122.7
#1	-.0018	.0211	.0096	.0001	-.0001	-.0000	-.0073
#2	-.0001	.0291	-.0057	.0019	-.0001	-.0000	-.0005

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0151	-.0003	-.0001	.0000	-.0008	.0009	.0338
SDev	.0001	.0001	.0006	.0002	.0003	.0137	.0426
%RSD	.6445	25.34	695.6	911.3	32.90	1580.	125.8
#1	.0150	-.0003	-.0005	.0001	-.0009	-.0088	.0640
#2	.0152	-.0004	.0004	-.0001	-.0006	.0105	.0037

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0004	.0001	.0001	-.0001	.0026	.0006	.5563
SDev	.0006	.0001	.0005	.0001	.0030	.0080	.4651
%RSD	172.2	83.89	570.5	109.5	113.9	1360.	83.60
#1	-.0001	.0002	-.0003	-.0001	.0047	.0062	.8852
#2	.0008	.0001	.0005	-.0000	.0005	-.0050	.2275

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0006	-.0002	-.0018	-.0036	.0016	-.0025	99.24
SDev	.0000	.0007	.0007	.0025	.0098	.0033	.31
%RSD	2.284	353.3	42.53	67.63	603.2	131.9	.3149
#1	-.0006	-.0007	-.0023	-.0054	.0085	-.0049	99.46
#2	-.0006	.0003	-.0012	-.0019	-.0053	-.0002	99.02

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0142	.0010	-.0015	-.0012	.0054	-.0004	-.0000
SDev	.0007	.0047	.0020	.0007	.0029	.0069	.0000
%RSD	4.703	475.3	128.1	59.14	54.12	1949.	88.36
#1	.0146	-.0023	-.0029	-.0018	.0033	.0045	-.0000
#2	.0137	.0043	-.0001	-.0007	.0075	-.0052	-.0000

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0061	-.0012	.0058	.0648	.0004	.0149	.0000
SDev	.0014	.0002	.0227	.0048	.0012	.0039	.0002
%RSD	22.95	14.99	389.6	7.394	339.4	26.45	1463.
#1	-.0071	-.0013	.0219	.0681	-.0005	.0121	-.0001
#2	-.0051	-.0010	-.0102	.0614	.0012	.0177	.0002

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0003	.0002	.0726
SDev	.0006	.0006	.0063
%RSD	233.4	414.3	8.712
#1	.0002	-.0003	.0681
#2	-.0007	.0006	.0770

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	700677	10000	--	--	--	--	--
SDev	2209.001	.0000000	--	--	--	--	--
%RSD	.3152668	.0000000	--	--	--	--	--
#1	702239	10000	--	--	--	--	--
#2	699115	10000	--	--	--	--	--

Analysis Report 06/27/17 06:15:04 PM

Method: DAILY1 Sample Name: 615791MS Operator:
Run Time: 06/27/17 18:10:00
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0470	2.046	2.005	.0028	1.958	.0622	-.0030
SDev	.0000	.017	.016	.0013	.004	.0004	.0102
%RSD	.0483	.8514	.7906	48.08	.2197	.7021	342.9
#1	.0470	2.058	2.016	.0037	1.961	.0625	.0042
#2	.0469	2.034	1.993	.0018	1.955	.0619	-.0102

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.88	.0482	.4735	.1912	.2410	1.209	18.32
SDev	.14	.0008	.0026	.0017	.0008	.025	.02
%RSD	.6512	1.645	.5449	.8793	.3344	2.040	.0974
#1	20.97	.0488	.4753	.1924	.2415	1.227	18.33
#2	20.78	.0476	.4716	.1900	.2404	1.192	18.31

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0013	.0002	20.26	.4836	-.0003	25.08	20.11
SDev	.0006	.0001	.14	.0018	.0009	.01	.31
%RSD	42.52	36.13	.7023	.3647	276.0	.0294	1.534
#1	-.0009	.0001	20.36	.4849	.0003	25.08	19.89
#2	-.0017	.0002	20.16	.4824	-.0009	25.09	20.33

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.4733	.4724	.4738	-.0034	.0121	.5045	104.3
SDev	.0047	.0025	.0041	.0007	.0080	.0070	.2
%RSD	.9840	.5367	.8710	21.02	66.10	1.396	.2041
#1	.4700	.4706	.4709	-.0029	.0178	.5095	104.2
#2	.4766	.4742	.4767	-.0039	.0065	.4995	104.5

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.917	1.932	1.923	.4728	1.925	.0004	.0004
SDev	.003	.003	.027	.0036	.003	.0030	.0000
%RSD	.1425	.1322	1.393	.7598	.1356	704.7	10.36
#1	1.919	1.933	1.942	.4703	1.927	-.0017	.0004
#2	1.915	1.930	1.904	.4754	1.923	.0026	.0003

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0112	-.0004	1.947	-.0738	.4941	.0133	.0000
SDev	.0008	.0000	.030	.0542	.0039	.0012	.0000
%RSD	6.989	12.11	1.526	73.41	.7850	9.283	162.3
#1	-.0117	-.0003	1.968	-.0355	.4968	.0124	.0000
#2	-.0106	-.0004	1.926	-.1122	.4913	.0141	-.0000

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.4777	.0001	.2198
SDev	.0037	.0009	.0181
%RSD	.7767	884.6	8.255
#1	.4803	.0007	.2070
#2	.4751	-.0005	.2326

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	736478	10000	--	--	--	--	--
SDev	1494.117	.0000000	--	--	--	--	--
%RSD	.2028731	.0000000	--	--	--	--	--
#1	735422	10000	--	--	--	--	--
#2	737535	10000	--	--	--	--	--

Analysis Report 06/27/17 06:20:23 PM

Method: DAILY1 Sample Name: 615791MSD Operator:
Run Time: 06/27/17 18:15:22
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0477	2.066	2.025	.0020	1.981	.0628	-.0033
SDev	.0003	.028	.022	.0009	.016	.0004	.0030
%RSD	.5681	1.368	1.065	46.70	.7846	.6038	91.49
#1	.0475	2.046	2.010	.0026	1.970	.0625	-.0054
#2	.0479	2.086	2.041	.0013	1.992	.0630	-.0012

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.84	.0483	.4748	.1926	.2435	.9526	18.37
SDev	.13	.0008	.0091	.0031	.0014	.0070	.19
%RSD	.6193	1.585	1.916	1.633	.5905	.7356	1.039
#1	20.75	.0477	.4684	.1904	.2425	.9477	18.24
#2	20.93	.0488	.4812	.1948	.2445	.9576	18.51

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0004	.0001	20.30	.4868	.0011	25.38	19.87
SDev	.0003	.0001	.25	.0062	.0014	.25	.58
%RSD	93.65	120.6	1.245	1.275	136.0	.9812	2.935
#1	-.0006	.0000	20.12	.4824	.0000	25.20	19.46
#2	-.0001	.0002	20.48	.4912	.0021	25.55	20.28

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.4790	.4774	.4791	-.0042	.0250	.4970	102.5
SDev	.0063	.0108	.0006	.0041	.0145	.0035	.9
%RSD	1.323	2.269	.1260	97.97	57.99	.7129	.9109
#1	.4835	.4698	.4787	-.0071	.0353	.4995	103.1
#2	.4746	.4851	.4796	-.0013	.0148	.4945	101.8

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.949	1.945	1.932	.4781	1.944	-.0024	.0004
SDev	.029	.011	.026	.0040	.017	.0004	.0000
%RSD	1.486	.5812	1.340	.8388	.8833	18.31	1.008
#1	1.929	1.937	1.914	.4753	1.932	-.0027	.0004
#2	1.970	1.953	1.951	.4809	1.956	-.0021	.0004

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0109	-.0005	1.947	-.0435	.4978	.0099	.0001
SDev	.0038	.0004	.014	.0002	.0066	.0130	.0002
%RSD	34.85	94.46	.6942	.4165	1.333	132.0	254.6
#1	-.0082	-.0002	1.957	-.0434	.4932	.0191	-.0001
#2	-.0136	-.0008	1.938	-.0437	.5025	.0007	.0002

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.4809	.0003	.2179
SDev	.0093	.0004	.0114
%RSD	1.933	132.3	5.243
#1	.4743	.0000	.2260
#2	.4875	.0005	.2098

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	723426	10000	--	--	--	--	--
SDev	6518.817	.0000000	--	--	--	--	--
%RSD	.9011030	.0000000	--	--	--	--	--
#1	728036	10000	--	--	--	--	--
#2	718817	10000	--	--	--	--	--

Analysis Report 06/27/17 06:25:46 PM

Method: DAILY1 Sample Name: CCV Operator:
Run Time: 06/27/17 18:20:41
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.9917	10.31	5.203	5.201	9.821	1.095	4.926
SDev	.0058	.07	.006	.001	.015	.094	.032
%RSD	.5885	.6332	.1122	.0239	.1574	8.573	.6410
#1	.9958	10.36	5.199	5.202	9.832	H1.161	4.948
#2	.9875	10.26	5.207	5.201	9.810	1.028	4.904
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	1.100	11.00	5.500	5.500	11.00	1.100	5.500
Low	.9000	9.000	4.500	4.500	9.000	.9000	4.500

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.47	.9960	4.855	1.970	1.962	10.01	20.10
SDev	.10	.0088	.003	.010	.009	.04	.05
%RSD	.5086	.8834	.0536	.4828	.4618	.4236	.2705
#1	20.55	1.002	4.854	1.963	1.968	9.979	20.07
#2	20.40	.9897	4.857	1.977	1.956	10.04	20.14
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	22.00	1.100	5.500	2.200	2.200	11.00	22.00
Low	18.00	.9000	4.500	1.800	1.800	9.000	18.00

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.425	H5.590	20.17	.9880	4.797	H39.21	30.24
SDev	.001	.021	.05	.0012	.075	.02	.07
%RSD	.0219	.3723	.2434	.1256	1.570	.0585	.2346
#1	5.424	H5.575	20.14	.9871	4.850	H39.19	30.19
#2	5.426	H5.605	20.21	.9889	4.743	H39.22	30.29
Errors	LC Pass	LC High	LC Pass	LC Pass	LC Pass	LC High	LC Pass
High	5.500	5.500	22.00	1.100	5.500	33.00	33.00
Low	4.500	4.500	18.00	.9000	4.500	27.00	27.00

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	4.821	4.843	4.970	1.001	1.026	1.018	98.32
SDev	.096	.091	.013	.006	.004	.009	.94
%RSD	1.988	1.876	.2557	.6251	.3978	.9093	.9527
#1	4.753	4.778	4.961	1.005	1.029	1.025	98.98
#2	4.889	4.907	4.979	.9961	1.023	1.012	97.66
Errors	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	NOCHECK
High	5.500			1.100	1.100	1.100	
Low	4.500			.9000	.9000	.9000	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.103	5.184	4.968	4.922	5.152	4.954	5.005
SDev	.072	.023	.005	.039	.039	.012	.015
%RSD	1.408	.4393	.0977	.7866	.7589	.2365	.2948
#1	5.052	5.168	4.972	4.895	5.124	4.946	5.016
#2	5.153	5.200	4.965	4.950	5.179	4.962	4.995
Errors	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High			5.500	5.500	5.500	5.500	5.500
Low			4.500	4.500	4.500	4.500	4.500

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.9921	4.987	5.046	4.950	5.077	1.034	4.971
SDev	.0063	.024	.001	.031	.015	.009	.003
%RSD	.6351	.4912	.0199	.6261	.2950	.8621	.0641
#1	.9876	5.004	5.045	4.928	5.088	1.028	4.973
#2	.9965	4.969	5.047	4.972	5.067	1.041	4.969
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	1.100	5.500	5.500	5.500	5.500	1.100	5.500
Low	.9000	4.500	4.500	4.500	4.500	.9000	4.500

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.9858	4.898	5.197
SDev	.0013	.010	.163
%RSD	.1335	.2116	3.138
#1	.9848	4.905	5.082
#2	.9867	4.891	5.313
Errors	LC Pass	LC Pass	LC Pass
High	1.100	5.500	5.500
Low	.9000	4.500	4.500

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	694124	10000	--	--	--	--	--
SDev	6590.942	.0000000	--	--	--	--	--
%RSD	.9495332	.0000000	--	--	--	--	--
#1	698785	10000	--	--	--	--	--
#2	689464	10000	--	--	--	--	--

Analysis Report 06/27/17 06:31:09 PM

Method: DAILY1 Sample Name: CCB Operator:
Run Time: 06/27/17 18:26:05
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0015	.0133	.0001	.0089	-.0001	-.0002	-.0027
SDev	.0006	.0002	.0104	.0014	.0000	.0000	.0036
%RSD	40.32	1.830	7734.	16.05	23.21	20.70	132.6
#1	-.0019	.0135	.0075	.0099	-.0001	-.0002	-.0002
#2	-.0010	.0132	-.0072	.0079	-.0001	-.0001	-.0053
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0100	.0750	.0150	.1000	.0050	.0050	.0250
Low	-.0100	-.0750	-.0150	-.1000	-.0050	-.0050	-.0250

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0028	-.0001	-.0007	.0000	-.0000	-.0002	-.0104
SDev	.0008	.0002	.0005	.0005	.0007	.0094	.0327
%RSD	28.41	130.6	78.64	1151.	2693.	3846.	313.3
#1	.0023	-.0003	-.0011	-.0003	-.0005	-.0069	-.0335
#2	.0034	-.0000	-.0003	.0004	.0005	.0064	.0127
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0500	.0050	.0050	.0050	.0050	.1000	.1500
Low	-.0500	-.0050	-.0050	-.0050	-.0050	-.1000	-.1500

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0004	.0000	.0003	-.0000	.0008	-.0067	L-.1930
SDev	.0016	.0001	.0028	.0001	.0011	.0041	.4365
%RSD	417.0	409.9	1041.	512.4	147.8	61.09	226.1
#1	-.0015	-.0000	-.0017	-.0001	.0016	-.0095	L-.5017
#2	.0007	.0001	.0023	.0000	-.0000	-.0038	.1156
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Low
High	.0100	.0100	.0500	.0050	.0075	.1500	.1500
Low	-.0100	-.0100	-.0500	-.0050	-.0075	-.1500	-.1500

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0002	.0034	-.0026	-.0027	-.0002	.0012	98.21
SDev	.0004	.0037	.0021	.0001	.0212	.0064	.67
%RSD	180.9	108.8	79.58	4.211	12230.	548.5	.6773
#1	.0001	.0061	-.0041	-.0026	-.0152	.0057	98.68
#2	-.0005	.0008	-.0012	-.0027	.0148	-.0034	97.74
Errors	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	NOCHECK
High	.0050			.0250	.0500	.0200	
Low	-.0050			-.0250	-.0500	-.0200	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0064	.0066	.0009	-.0006	.0065	-.0032	-.0000
SDev	.0056	.0022	.0016	.0002	.0004	.0027	.0000
%RSD	87.86	33.60	174.6	25.86	6.126	85.97	114.5
#1	.0103	.0050	-.0002	-.0007	.0068	-.0013	-.0000
#2	.0024	.0081	.0021	-.0005	.0062	-.0051	-.0000
Errors	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High			.1000	.0050	.0200	.0150	.0050
Low			-.1000	-.0050	-.0200	-.0150	-.0050

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0083	-.0012	-.0043	.0146	-.0003	.0021	-.0001
SDev	.0026	.0000	.0163	.0157	.0006	.0062	.0000
%RSD	30.86	2.871	378.8	107.9	188.9	303.2	1.048
#1	-.0101	-.0012	.0072	.0035	.0001	-.0023	-.0001
#2	-.0065	-.0011	-.0159	.0257	-.0008	.0065	-.0001
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0200	.0050	.0500	.2000	.0050	.0200	.0050
Low	-.0200	-.0050	-.0500	-.2000	-.0050	-.0200	-.0050

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0002	-.0002	.0210
SDev	.0004	.0001	.0009
%RSD	154.9	57.69	4.331
#1	.0000	-.0003	.0203
#2	-.0005	-.0001	.0216
Errors	LC Pass	LC Pass	LC Pass
High	.0050	.0100	.0750
Low	-.0050	-.0100	-.0750

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	693416	10000	--	--	--	--	--
SDev	4650.641	.0000000	--	--	--	--	--
%RSD	.6706861	.0000000	--	--	--	--	--
#1	696704	10000	--	--	--	--	--
#2	690127	10000	--	--	--	--	--

Analysis Report 06/27/17 06:36:31 PM

Method: DAILY1 Sample Name: PB17F26KE1 Operator:
Run Time: 06/27/17 18:31:29
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0006	.0214	-.0051	.0058	-.0001	-.0001	-.0016
SDev	.0001	.0012	.0073	.0003	.0001	.0000	.0065
%RSD	18.69	5.781	141.6	4.921	117.4	12.26	404.5
#1	-.0006	.0222	.0000	.0060	-.0002	-.0001	-.0062
#2	-.0005	.0205	-.0103	.0056	-.0000	-.0001	.0030

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0085	-.0002	-.0005	.0002	-.0012	.0020	.0003
SDev	.0001	.0000	.0001	.0001	.0001	.0056	.0221
%RSD	.5550	32.00	23.17	19.55	6.036	281.2	7564.
#1	.0086	-.0001	-.0004	.0003	-.0012	.0059	-.0153
#2	.0085	-.0002	-.0006	.0002	-.0013	-.0020	.0159

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0003	.0001	.0025	.0000	-.0005	.0153	.0967
SDev	.0003	.0001	.0024	.0000	.0018	.0022	.1839
%RSD	104.6	87.63	95.92	32.33	384.9	14.49	190.2
#1	.0005	.0000	.0042	.0000	-.0017	.0137	-.0333
#2	.0001	.0001	.0008	.0000	.0008	.0169	.2268

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0007	.0027	-.0005	-.0034	-.0050	-.0001	103.7
SDev	.0002	.0012	.0034	.0019	.0114	.0010	.0
%RSD	25.58	46.20	723.4	57.01	228.6	878.1	.0163
#1	-.0005	.0018	-.0028	-.0020	-.0130	-.0008	103.7
#2	-.0008	.0036	.0019	-.0048	.0031	.0006	103.6

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0081	.0077	.0040	.0006	.0078	-.0022	.0000
SDev	.0057	.0031	.0009	.0027	.0002	.0049	.0000
%RSD	69.91	40.40	23.79	454.6	2.101	227.5	67.63
#1	.0122	.0055	.0033	-.0013	.0077	.0013	.0000
#2	.0041	.0098	.0047	.0025	.0079	-.0057	.0001

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0088	-.0012	.0067	.0466	.0004	.0095	-.0000
SDev	.0014	.0005	.0100	.0079	.0005	.0083	.0000
%RSD	15.76	46.92	148.2	16.92	111.9	87.56	74.42
#1	-.0078	-.0015	-.0003	.0521	.0001	.0036	-.0000
#2	-.0098	-.0008	.0138	.0410	.0007	.0154	-.0000

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.0004	.0001	.7925
SDev	.0004	.0001	.0062
%RSD	103.0	61.20	.7792
#1	.0001	.0001	.7969
#2	.0006	.0002	.7882

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	731800	10000	--	--	--	--	--
SDev	144.9569	.0000000	--	--	--	--	--
%RSD	.0198083	.0000000	--	--	--	--	--
#1	731902	10000	--	--	--	--	--
#2	731697	10000	--	--	--	--	--

Analysis Report 06/27/17 06:41:49 PM

Method: DAILY1 Sample Name: LCS17F26KE1 Operator:
Run Time: 06/27/17 18:36:48
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0939	4.045	4.046	.0041	3.868	.1251	-.0080
SDev	.0002	.019	.016	.0004	.035	.0012	.0097
%RSD	.2248	.4596	.3979	9.312	.9056	.9365	122.5
#1	.0941	4.032	4.057	.0038	3.893	.1259	-.0011
#2	.0938	4.058	4.035	.0043	3.844	.1242	-.0148

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.55	.0966	.9492	.3817	.4801	1.913	17.83
SDev	.01	.0013	.0012	.0016	.0001	.020	.06
%RSD	.0247	1.292	.1218	.4276	.0109	1.023	.3184
#1	20.55	.0975	.9500	.3805	.4801	1.899	17.87
#2	20.56	.0957	.9484	.3828	.4802	1.927	17.79

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0017	.0002	20.20	.9644	-.0021	24.52	19.37
SDev	.0002	.0001	.06	.0015	.0019	.01	.30
%RSD	9.178	51.91	.2961	.1601	93.55	.0500	1.561
#1	-.0018	.0001	20.15	.9634	-.0007	24.53	19.15
#2	-.0016	.0002	20.24	.9655	-.0034	24.51	19.58

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.9540	.9424	.9449	-.0067	-.0161	.9930	104.0
SDev	.0001	.0131	.0084	.0006	.0014	.0002	.3
%RSD	.0156	1.388	.8925	8.713	8.379	.0208	.2412
#1	.9539	.9516	.9389	-.0071	-.0152	.9931	103.8
#2	.9541	.9331	.9509	-.0063	-.0171	.9928	104.1

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	3.878	3.859	1.935	.9431	3.862	-.0036	.0003
SDev	.061	.049	.013	.0013	.012	.0040	.0000
%RSD	1.567	1.266	.6640	.1337	.3184	112.1	4.549
#1	3.921	3.825	1.926	.9422	3.853	-.0065	.0003
#2	3.835	3.894	1.944	.9440	3.870	-.0007	.0003

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0083	-.0007	3.939	-.0464	.9841	.0113	-.0001
SDev	.0015	.0001	.065	.0036	.0047	.0013	.0001
%RSD	17.86	19.68	1.640	7.777	.4805	11.30	62.52
#1	-.0094	-.0006	3.984	-.0438	.9808	.0104	-.0001
#2	-.0073	-.0008	3.893	-.0489	.9875	.0122	-.0001

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.9660	.0000	.7504
SDev	.0015	.0003	.0132
%RSD	.1511	562.2	1.763
#1	.9671	-.0001	.7411
#2	.9650	.0002	.7598

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	733894	10000	--	--	--	--	--
SDev	1819.386	.0000000	--	--	--	--	--
%RSD	.2479087	.0000000	--	--	--	--	--
#1	732607	10000	--	--	--	--	--
#2	735180	10000	--	--	--	--	--

Analysis Report 06/27/17 06:47:15 PM

Method: DAILY1 Sample Name: LCS17F26KE2 Operator:
Run Time: 06/27/17 18:42:08
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0964	4.063	3.975	.0041	3.868	.1232	-.0060
SDev	.0003	.006	.004	.0005	.006	.0008	.0049
%RSD	.3255	.1490	.0943	11.54	.1554	.6248	81.19
#1	.0966	4.067	3.972	.0037	3.873	.1237	-.0026
#2	.0962	4.058	3.977	.0044	3.864	.1226	-.0095

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.55	.0939	.9487	.3841	.4825	1.966	18.24
SDev	.01	.0007	.0075	.0015	.0008	.002	.14
%RSD	.0377	.7086	.7925	.3990	.1547	.0785	.7544
#1	20.56	.0934	.9540	.3852	.4830	1.967	18.33
#2	20.55	.0944	.9434	.3830	.4819	1.965	18.14

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0006	.0002	20.16	.9665	.0012	25.04	20.15
SDev	.0002	.0000	.10	.0031	.0009	.21	.02
%RSD	28.65	11.40	.4890	.3177	75.78	.8341	.0937
#1	.0005	.0002	20.23	.9687	.0018	25.19	20.14
#2	.0007	.0002	20.09	.9643	.0005	24.89	20.16

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.9509	.9434	.9432	-.0021	.0257	.9926	102.5
SDev	.0171	.0222	.0084	.0073	.0294	.0040	1.0
%RSD	1.796	2.356	.8909	350.3	114.7	.4026	1.002
#1	.9629	.9591	.9491	.0031	.0465	.9954	101.8
#2	.9388	.9277	.9373	-.0072	.0049	.9898	103.2

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	3.894	3.841	1.953	.9423	3.855	.0025	.0004
SDev	.056	.025	.002	.0130	.002	.0005	.0000
%RSD	1.448	.6446	.1131	1.379	.0592	21.28	6.728
#1	3.933	3.824	1.954	.9515	3.856	.0022	.0004
#2	3.854	3.859	1.951	.9331	3.853	.0029	.0003

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0083	-.0012	3.787	-.0699	.9856	.0067	.0000
SDev	.0013	.0005	.031	.0072	.0018	.0029	.0001
%RSD	15.32	41.04	.8123	10.27	.1850	43.50	339.5
#1	-.0092	-.0015	3.765	-.0750	.9869	.0088	.0001
#2	-.0074	-.0008	3.808	-.0648	.9843	.0047	-.0000

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.9606	.0002	.7632
SDev	.0102	.0007	.0020
%RSD	1.057	384.7	.2627
#1	.9678	.0007	.7646
#2	.9534	-.0003	.7617

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	723646	10000	--	--	--	--	--
SDev	7184.205	.0000000	--	--	--	--	--
%RSD	.9927789	.0000000	--	--	--	--	--
#1	718566	10000	--	--	--	--	--
#2	728726	10000	--	--	--	--	--

Analysis Report 06/27/17 06:52:36 PM

Method: DAILY1 Sample Name: 615785 Operator:
Run Time: 06/27/17 18:47:34
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0010	.0418	.0016	.0024	.0000	-.0002	-.0073
SDev	.0002	.0020	.0093	.0003	.0002	.0001	.0028
%RSD	19.32	4.686	571.7	13.98	595.9	35.62	38.59
#1	-.0011	.0432	-.0049	.0022	.0002	-.0001	-.0053
#2	-.0008	.0404	.0082	.0027	-.0001	-.0002	-.0093

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0563	-.0001	-.0006	.0000	-.0006	-.0039	-.0091
SDev	.0010	.0002	.0002	.0000	.0003	.0069	.0191
%RSD	1.804	182.7	37.47	73.35	47.22	177.9	209.9
#1	.0556	-.0002	-.0008	.0001	-.0004	-.0088	-.0226
#2	.0570	.0000	-.0004	.0000	-.0009	.0010	.0044

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0004	.0001	.0029	-.0001	.0000	.0392	-.0226
SDev	.0004	.0000	.0009	.0000	.0021	.0059	.3163
%RSD	95.74	62.27	31.52	28.98	4365.	15.13	1401.
#1	.0007	.0000	.0023	-.0001	.0016	.0350	-.2462
#2	.0001	.0001	.0036	-.0001	-.0015	.0434	.2011

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0013	.0065	-.0019	-.0042	.0206	-.0037	103.4
SDev	.0012	.0017	.0022	.0033	.0063	.0019	.9
%RSD	87.54	26.13	117.1	79.19	30.50	50.16	.9184
#1	-.0005	.0053	-.0003	-.0065	.0251	-.0024	102.7
#2	-.0021	.0077	-.0035	-.0018	.0162	-.0051	104.1

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0074	-.0047	.0014	.0009	-.0006	.0007	.0001
SDev	.0051	.0076	.0003	.0009	.0033	.0034	.0000
%RSD	68.97	162.5	18.94	102.7	539.5	496.0	31.37
#1	.0111	-.0100	.0012	.0015	-.0030	-.0017	.0001
#2	.0038	.0007	.0016	.0002	.0017	.0031	.0001

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0051	-.0016	-.0163	.0036	-.0003	.0031	-.0001
SDev	.0020	.0005	.0155	.0005	.0001	.0052	.0001
%RSD	38.92	28.95	95.40	13.91	33.32	170.7	127.1
#1	-.0037	-.0012	-.0273	.0033	-.0004	.0068	-.0000
#2	-.0065	-.0019	-.0053	.0040	-.0002	-.0006	-.0002

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0001	-.0002	.8219
SDev	.0002	.0006	.0377
%RSD	312.7	230.3	4.592
#1	-.0002	.0002	.7952
#2	.0001	-.0006	.8486

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	730004	10000	--	--	--	--	--
SDev	6617.812	.0000000	--	--	--	--	--
%RSD	.9065453	.0000000	--	--	--	--	--
#1	725324	10000	--	--	--	--	--
#2	734683	10000	--	--	--	--	--

Analysis Report 06/27/17 06:57:55 PM

Method: DAILY1 Sample Name: 615785D Operator:
Run Time: 06/27/17 18:52:55
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0009	.0389	-.0119	.0030	-.0001	-.0001	-.0087
SDev	.0006	.0037	.0124	.0000	.0002	.0000	.0032
%RSD	73.96	9.413	103.5	.3019	189.4	32.35	37.32
#1	-.0013	.0363	-.0207	.0030	-.0002	-.0002	-.0109
#2	-.0004	.0414	-.0032	.0030	.0000	-.0001	-.0064

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0704	-.0002	-.0010	-.0004	-.0013	-.0074	-.0074
SDev	.0001	.0002	.0008	.0005	.0000	.0076	.0353
%RSD	.1913	98.41	76.43	126.6	1.764	103.5	476.2
#1	.0703	-.0003	-.0015	-.0007	-.0013	-.0128	-.0323
#2	.0705	-.0001	-.0005	-.0000	-.0013	-.0020	.0175

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0006	.0001	.0088	.0000	.0014	.0360	-.0764
SDev	.0013	.0001	.0021	.0001	.0026	.0045	.4536
%RSD	212.3	186.3	23.86	121.0	185.6	12.48	594.1
#1	-.0016	-.0000	.0073	.0000	.0033	.0328	-.3971
#2	.0003	.0001	.0102	.0001	-.0004	.0392	.2444

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.0021	.0057	-.0018	-.0047	-.0180	-.0056	105.2
SDev	.0008	.0001	.0009	.0002	.0204	.0015	.5
%RSD	38.41	2.673	48.78	4.759	113.1	26.62	.4321
#1	.0016	.0056	-.0012	-.0045	-.0325	-.0045	105.5
#2	.0027	.0058	-.0024	-.0048	-.0036	-.0066	104.9

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0085	.0008	-.0013	.0007	.0034	.0013	.0001
SDev	.0067	.0075	.0017	.0005	.0028	.0004	.0001
%RSD	77.91	984.8	126.0	73.96	82.18	34.13	42.52
#1	.0038	.0060	-.0025	.0011	.0053	.0016	.0001
#2	.0133	-.0045	-.0001	.0003	.0014	.0010	.0002

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0094	-.0012	-.0088	.0435	-.0003	.0041	-.0001
SDev	.0020	.0006	.0016	.0539	.0001	.0054	.0003
%RSD	21.02	50.50	18.14	123.9	56.75	132.3	455.1
#1	-.0080	-.0008	-.0100	.0054	-.0002	.0079	-.0003
#2	-.0108	-.0017	-.0077	.0817	-.0004	.0003	.0002

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.0041	-.0005	.7416
SDev	.0006	.0010	.0330
%RSD	14.98	212.4	4.449
#1	.0037	-.0012	.7649
#2	.0046	.0002	.7182

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	742644	10000	--	--	--	--	--
SDev	3232.185	.0000000	--	--	--	--	--
%RSD	.4352270	.0000000	--	--	--	--	--
#1	744929	10000	--	--	--	--	--
#2	740358	10000	--	--	--	--	--

Analysis Report 06/27/17 07:03:14 PM

Method: DAILY1 Sample Name: 615785L Operator:
Run Time: 06/27/17 18:58:13
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0005	.0316	.0014	.0013	.0001	-.0001	-.0013
SDev	.0000	.0060	.0020	.0003	.0001	.0000	.0046
%RSD	6.994	18.91	143.7	23.67	203.6	34.55	362.9
#1	-.0005	.0274	.0028	.0016	-.0000	-.0002	.0020
#2	-.0005	.0359	-.0000	.0011	.0001	-.0001	-.0045

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0234	.0000	-.0001	.0000	-.0008	.0179	-.0026
SDev	.0006	.0000	.0003	.0001	.0006	.0184	.0272
%RSD	2.622	79.38	308.3	332.5	78.87	103.0	1029.
#1	.0230	.0000	-.0004	-.0000	-.0003	.0049	-.0218
#2	.0238	.0001	.0001	.0001	-.0012	.0309	.0166

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0007	.0000	.0024	.0006	-.0005	.0044	.1239
SDev	.0004	.0001	.0008	.0001	.0004	.0016	.3072
%RSD	53.80	313.3	31.65	7.841	65.41	36.50	248.0
#1	.0009	-.0000	.0030	.0006	-.0008	.0033	-.0933
#2	.0004	.0001	.0019	.0007	-.0003	.0056	.3411

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0002	.0027	-.0011	-.0021	-.0003	-.0018	98.90
SDev	.0006	.0040	.0030	.0004	.0184	.0012	.85
%RSD	273.3	148.2	278.1	20.06	6759.	69.82	.8545
#1	.0002	.0055	.0011	-.0024	-.0132	-.0009	99.50
#2	-.0006	-.0001	-.0032	-.0018	.0127	-.0026	98.30

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0004	.0010	.0014	.0002	.0008	-.0013	.0000
SDev	.0038	.0052	.0021	.0033	.0047	.0079	.0000
%RSD	957.5	510.3	148.8	2091.	573.6	602.8	75.62
#1	.0031	.0047	-.0001	.0025	.0042	-.0069	.0000
#2	-.0023	-.0027	.0029	-.0022	-.0025	.0043	.0000

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0043	-.0016	.0058	.0445	.0002	.0084	.0000
SDev	.0032	.0000	.0262	.0173	.0002	.0122	.0001
%RSD	75.60	1.857	450.3	38.95	98.53	144.7	262.8
#1	-.0020	-.0016	-.0127	.0322	.0001	-.0002	-.0000
#2	-.0066	-.0015	.0244	.0567	.0004	.0170	.0001

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.0013	.0005	.1647
SDev	.0006	.0004	.0341
%RSD	47.71	80.82	20.71
#1	.0009	.0002	.1406
#2	.0018	.0008	.1888

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	698251	10000	--	--	--	--	--
SDev	5911.413	.0000000	--	--	--	--	--
%RSD	.8466028	.0000000	--	--	--	--	--
#1	702431	10000	--	--	--	--	--
#2	694071	10000	--	--	--	--	--

Analysis Report 06/27/17 07:08:34 PM

Method: DAILY1 Sample Name: 615785MS Operator:
Run Time: 06/27/17 19:03:33
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0489	2.069	2.014	.0026	1.954	.0621	-.0008
SDev	.0002	.004	.029	.0003	.002	.0004	.0082
%RSD	.5009	.2109	1.425	13.43	.1180	.6428	1007.
#1	.0487	2.072	1.994	.0029	1.952	.0624	-.0066
#2	.0491	2.066	2.034	.0024	1.955	.0618	.0050

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.54	.0478	.4730	.1908	.2408	.9494	18.10
SDev	.02	.0001	.0028	.0013	.0001	.0092	.01
%RSD	.0848	.2165	.5994	.6691	.0431	.9679	.0500
#1	20.55	.0477	.4750	.1917	.2409	.9559	18.10
#2	20.52	.0479	.4710	.1899	.2407	.9429	18.11

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0007	.0002	20.01	.4825	-.0002	24.83	19.83
SDev	.0008	.0001	.11	.0042	.0004	.05	.22
%RSD	106.9	46.27	.5590	.8667	154.4	.2071	1.115
#1	.0002	.0001	20.09	.4855	.0000	24.86	19.68
#2	.0013	.0002	19.93	.4796	-.0005	24.79	19.99

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.4714	.4665	.4725	-.0032	.0240	.5040	101.9
SDev	.0066	.0042	.0007	.0018	.0172	.0097	.4
%RSD	1.406	.9026	.1556	55.97	71.58	1.931	.3658
#1	.4761	.4695	.4731	-.0020	.0361	.4971	101.6
#2	.4667	.4636	.4720	-.0045	.0118	.5108	102.2

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.923	1.927	1.948	.4701	1.924	-.0005	.0004
SDev	.023	.007	.001	.0019	.012	.0032	.0000
%RSD	1.182	.3525	.0441	.4025	.6288	677.3	5.078
#1	1.939	1.932	1.948	.4714	1.933	-.0027	.0005
#2	1.907	1.923	1.949	.4687	1.916	.0018	.0004

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0105	-.0007	1.952	-.0151	.4919	.0111	.0000
SDev	.0007	.0005	.009	.0285	.0004	.0010	.0001
%RSD	6.538	67.16	.4610	189.3	.0846	8.838	539.0
#1	-.0110	-.0010	1.958	-.0353	.4916	.0104	-.0001
#2	-.0100	-.0004	1.946	.0051	.4922	.0118	.0001

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.4795	.0003	.7001
SDev	.0024	.0007	.0302
%RSD	.4990	229.3	4.316
#1	.4812	-.0002	.6787
#2	.4778	.0008	.7214

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	719340	10000	--	--	--	--	--
SDev	2686.299	.0000000	--	--	--	--	--
%RSD	.3734391	.0000000	--	--	--	--	--
#1	717441	10000	--	--	--	--	--
#2	721240	10000	--	--	--	--	--

Analysis Report 06/27/17 07:13:53 PM

Method: DAILY1 Sample Name: 615785MSD Operator:
Run Time: 06/27/17 19:08:51
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0486	2.080	2.033	.0043	1.946	.0628	-.0059
SDev	.0020	.006	.024	.0022	.000	.0002	.0061
%RSD	4.098	.3068	1.187	52.55	.0019	.3086	103.8
#1	.0500	2.084	2.050	.0058	1.946	.0629	-.0102
#2	.0472	2.075	2.016	.0027	1.946	.0626	-.0016

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.71	.0486	.4750	.1920	.2416	.9496	17.96
SDev	.02	.0006	.0049	.0015	.0004	.0057	.03
%RSD	.0969	1.265	1.020	.7956	.1809	.6012	.1549
#1	20.72	.0491	.4715	.1909	.2419	.9456	17.98
#2	20.69	.0482	.4784	.1931	.2413	.9536	17.94

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0021	.0003	20.24	.4852	-.0006	24.67	20.20
SDev	.0012	.0001	.02	.0023	.0044	.11	.22
%RSD	58.28	23.93	.0991	.4748	766.4	.4345	1.093
#1	.0030	.0004	20.22	.4835	-.0037	24.59	20.36
#2	.0012	.0003	20.25	.4868	.0026	24.74	20.05

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.4717	.4746	.4728	-.0056	.0025	.5011	103.4
SDev	.0020	.0078	.0057	.0001	.0235	.0039	.3
%RSD	.4240	1.642	1.210	1.009	930.2	.7836	.3182
#1	.4703	.4690	.4687	-.0057	-.0141	.5038	103.6
#2	.4731	.4801	.4768	-.0056	.0192	.4983	103.2

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.935	1.947	1.963	.4729	1.941	.0011	.0005
SDev	.030	.014	.005	.0064	.019	.0020	.0001
%RSD	1.553	.7212	.2603	1.354	.9974	179.4	22.28
#1	1.914	1.937	1.967	.4684	1.927	-.0003	.0006
#2	1.957	1.957	1.959	.4774	1.955	.0026	.0004

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0125	.0001	1.945	-.0049	.4934	.0086	-.0001
SDev	.0010	.0009	.053	.0420	.0004	.0106	.0001
%RSD	8.182	601.9	2.748	863.7	.0745	123.1	153.5
#1	-.0118	.0008	1.983	.0248	.4937	.0161	-.0002
#2	-.0132	-.0005	1.907	-.0345	.4931	.0011	.0000

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.4847	.0001	.8024
SDev	.0085	.0009	.0183
%RSD	1.751	1672.	2.284
#1	.4787	.0007	.7894
#2	.4907	-.0006	.8153

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	729986	10000	--	--	--	--	--
SDev	2331.331	.0000000	--	--	--	--	--
%RSD	.3193667	.0000000	--	--	--	--	--
#1	731634	10000	--	--	--	--	--
#2	728337	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 615791 Operator:
Run Time: 06/27/17 19:14:12
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0001	.0618	.0009	.0038	.0001	-.0001	-.0074
SDev	.0009	.0101	.0079	.0005	.0001	.0000	.0097
%RSD	733.4	16.36	863.2	13.36	103.1	31.84	130.0
#1	-.0008	.0546	.0065	.0034	.0000	-.0001	-.0143
#2	.0005	.0689	-.0047	.0041	.0001	-.0001	-.0006

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0593	-.0003	.0002	.0004	-.0002	-.0033	.0046
SDev	.0006	.0003	.0004	.0000	.0006	.0022	.0259
%RSD	1.061	99.29	199.3	8.364	335.7	65.40	567.9
#1	.0588	-.0006	.0005	.0005	.0003	-.0018	-.0137
#2	.0597	-.0001	-.0001	.0004	-.0006	-.0049	.0228

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0012	.0001	.0005	-.0000	.0000	.0186	.0861
SDev	.0024	.0001	.0024	.0000	.0014	.0034	.1175
%RSD	189.2	125.0	442.0	75.17	4004.	18.13	136.6
#1	-.0004	.0000	-.0012	-.0000	-.0010	.0163	.0030
#2	.0029	.0001	.0022	-.0001	.0010	.0210	.1692

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0013	.0043	.0004	-.0021	.0045	-.0003	102.9
SDev	.0000	.0008	.0021	.0013	.0114	.0035	.4
%RSD	3.696	18.76	505.7	64.43	253.2	1276.	.4025
#1	-.0013	.0037	-.0011	-.0011	.0125	-.0028	103.2
#2	-.0013	.0049	.0019	-.0030	-.0036	.0022	102.6

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0098	.0004	.0017	.0017	.0036	-.0035	.0002
SDev	.0096	.0162	.0006	.0017	.0140	.0033	.0000
%RSD	97.21	3982.	32.76	98.44	392.9	92.43	24.62
#1	.0031	-.0111	.0021	.0005	-.0063	-.0058	.0001
#2	.0166	.0119	.0013	.0029	.0135	-.0012	.0002

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0035	-.0012	.0022	-.0004	-.0002	.0079	-.0000
SDev	.0025	.0002	.0145	.0203	.0005	.0059	.0001
%RSD	71.18	19.26	657.9	5035.	214.7	74.47	202.5
#1	-.0017	-.0014	.0125	-.0148	-.0005	.0121	-.0001
#2	-.0052	-.0011	-.0081	.0139	.0001	.0037	.0000

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.0002	-.0001	.7401
SDev	.0001	.0003	.0453
%RSD	74.64	273.3	6.124
#1	.0001	-.0003	.7722
#2	.0003	.0001	.7081

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	726328	10000	--	--	--	--	--
SDev	2855.297	.0000000	--	--	--	--	--
%RSD	.3931140	.0000000	--	--	--	--	--
#1	728347	10000	--	--	--	--	--
#2	724309	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: CCV Operator:
Run Time: 06/27/17 19:19:31
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.9871	10.22	5.216	5.226	9.770	H1.112	4.896
SDev	.0001	.02	.023	.020	.000	.104	.024
%RSD	.0066	.2123	.4332	.3891	.0019	9.315	.4861
#1	.9870	10.24	5.200	5.212	9.770	H1.185	4.913
#2	.9871	10.20	5.232	5.241	9.770	1.039	4.879
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass
High	1.100	11.00	5.500	5.500	11.00	1.100	5.500
Low	.9000	9.000	4.500	4.500	9.000	.9000	4.500

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.60	1.013	4.840	1.963	1.965	9.986	20.16
SDev	.02	.002	.002	.002	.005	.023	.25
%RSD	.0881	.1995	.0326	.1159	.2315	.2312	1.224
#1	20.59	1.014	4.839	1.961	1.962	9.969	19.99
#2	20.61	1.011	4.841	1.964	1.968	10.00	20.34
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	22.00	1.100	5.500	2.200	2.200	11.00	22.00
Low	18.00	.9000	4.500	1.800	1.800	9.000	18.00

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.421	H5.603	20.32	.9848	4.844	H39.46	30.13
SDev	.016	.058	.06	.0007	.005	.38	.59
%RSD	.3038	1.043	.3085	.0734	.0937	.9738	1.963
#1	5.410	H5.561	20.28	.9843	4.847	H39.19	29.71
#2	5.433	H5.644	20.37	.9853	4.841	H39.73	30.55
Errors	LC Pass	LC High	LC Pass	LC Pass	LC Pass	LC High	LC Pass
High	5.500	5.500	22.00	1.100	5.500	33.00	33.00
Low	4.500	4.500	18.00	.9000	4.500	27.00	27.00

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	4.879	4.977	5.002	.9964	1.002	1.015	98.54
SDev	.070	.019	.097	.0027	.038	.003	1.30
%RSD	1.440	.3919	1.947	.2729	3.814	.2940	1.316
#1	4.829	4.963	4.933	.9984	1.029	1.017	99.46
#2	4.928	4.991	5.071	.9945	.9749	1.013	97.62
Errors	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	NOCHECK
High	5.500			1.100	1.100	1.100	
Low	4.500			.9000	.9000	.9000	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.238	5.224	4.915	4.989	5.224	4.984	5.021
SDev	.038	.067	.006	.071	.057	.023	.010
%RSD	.7184	1.276	.1228	1.431	1.090	.4708	.1962
#1	5.211	5.177	4.920	4.938	5.183	4.967	5.014
#2	5.265	5.272	4.911	5.039	5.264	5.000	5.027
Errors	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High			5.500	5.500	5.500	5.500	5.500
Low			4.500	4.500	4.500	4.500	4.500

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.9842	4.992	5.005	4.932	5.076	1.036	4.970
SDev	.0011	.007	.003	.006	.008	.003	.013
%RSD	.1097	.1434	.0624	.1279	.1531	.2795	.2577
#1	.9834	4.997	5.007	4.928	5.071	1.038	4.979
#2	.9849	4.987	5.003	4.937	5.082	1.034	4.961
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	1.100	5.500	5.500	5.500	5.500	1.100	5.500
Low	.9000	4.500	4.500	4.500	4.500	.9000	4.500

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.9873	4.901	5.215
SDev	.0026	.006	.057
%RSD	.2594	.1203	1.098
#1	.9855	4.905	5.175
#2	.9891	4.897	5.256
Errors	LC Pass	LC Pass	LC Pass
High	1.100	5.500	5.500
Low	.9000	4.500	4.500

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	695733	10000	--	--	--	--	--
SDev	9149.962	.0000000	--	--	--	--	--
%RSD	1.315154	.0000000	--	--	--	--	--
#1	702203	10000	--	--	--	--	--
#2	689263	10000	--	--	--	--	--

Analysis Report 06/27/17 07:29:50 PM

Method: DAILY1 Sample Name: CCB Operator:
Run Time: 06/27/17 19:24:50
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0010	.0194	-.0035	.0097	-.0001	-.0002	-.0031
SDev	.0010	.0081	.0101	.0031	.0002	.0000	.0062
%RSD	96.24	42.01	284.9	31.81	149.0	23.11	202.8
#1	-.0017	.0136	.0036	.0119	-.0002	-.0001	-.0074
#2	-.0003	.0251	-.0107	.0075	.0000	-.0002	.0013
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0100	.0750	.0150	.1000	.0050	.0050	.0250
Low	-.0100	-.0750	-.0150	-.1000	-.0050	-.0050	-.0250

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0010	-.0000	-.0005	-.0002	-.0009	-.0045	-.0146
SDev	.0017	.0000	.0000	.0002	.0002	.0100	.0509
%RSD	165.9	3051.	.7332	93.13	18.12	223.4	348.0
#1	-.0002	.0000	-.0005	-.0004	-.0010	-.0115	-.0506
#2	.0022	-.0000	-.0005	-.0001	-.0008	.0026	.0214
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0500	.0050	.0050	.0050	.0050	.1000	.1500
Low	-.0500	-.0050	-.0050	-.0050	-.0050	-.1000	-.1500

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0001	-.0000	-.0025	-.0001	.0026	-.0101	-.0773
SDev	.0012	.0002	.0020	.0000	.0000	.0118	.6074
%RSD	1865.	1581.	80.56	30.65	.2522	116.5	785.4
#1	-.0009	-.0001	-.0039	-.0001	.0026	-.0184	L-.5069
#2	.0008	.0001	-.0011	-.0001	.0026	-.0018	H.3522
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0100	.0100	.0500	.0050	.0075	.1500	.1500
Low	-.0100	-.0100	-.0500	-.0050	-.0075	-.1500	-.1500

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0006	.0011	-.0020	-.0047	-.0077	-.0030	97.53
SDev	.0002	.0003	.0018	.0056	.0220	.0000	.38
%RSD	29.16	27.85	91.52	120.7	286.2	.2252	.3909
#1	-.0005	.0014	-.0007	-.0086	.0079	-.0030	97.26
#2	-.0008	.0009	-.0033	-.0007	-.0232	-.0030	97.80
Errors	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	NOCHECK
High	.0050			.0250	.0500	.0200	
Low	-.0050			-.0250	-.0500	-.0200	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0119	.0005	-.0017	-.0010	.0043	.0018	-.0000
SDev	.0079	.0060	.0013	.0013	.0066	.0061	.0001
%RSD	66.24	1264.	77.13	138.9	155.0	329.5	311.8
#1	.0175	.0048	-.0026	-.0000	.0090	-.0025	-.0001
#2	.0063	-.0038	-.0008	-.0019	-.0004	.0061	.0000
Errors	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High			.1000	.0050	.0200	.0150	.0050
Low			-.1000	-.0050	-.0200	-.0150	-.0050

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0054	-.0016	-.0063	.0403	-.0001	.0099	-.0001
SDev	.0034	.0003	.0134	.0485	.0007	.0078	.0003
%RSD	63.15	20.22	211.3	120.2	1196.	79.50	280.0
#1	-.0030	-.0019	.0031	.0061	-.0006	.0154	-.0003
#2	-.0078	-.0014	-.0158	.0746	.0004	.0043	.0001
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0200	.0050	.0500	.2000	.0050	.0200	.0050
Low	-.0200	-.0050	-.0500	-.2000	-.0050	-.0200	-.0050

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0005	-.0001	.0091
SDev	.0005	.0011	.0131
%RSD	102.2	2034.	144.7
#1	-.0009	-.0009	.0184
#2	-.0001	.0007	-.0002
Errors	LC Pass	LC Pass	LC Pass
High	.0050	.0100	.0750
Low	-.0050	-.0100	-.0750

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	688634	10000	--	--	--	--	--
SDev	2626.902	.0000000	--	--	--	--	--
%RSD	.3814653	.0000000	--	--	--	--	--
#1	686777	10000	--	--	--	--	--
#2	690492	10000	--	--	--	--	--

Analysis Report 06/27/17 07:35:12 PM

Method: DAILY1 Sample Name: PB17F23KE1 Operator:
Run Time: 06/27/17 19:30:08
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0001	.0114	-.0061	.0043	-.0001	-.0001	-.0023
SDev	.0001	.0042	.0010	.0006	.0001	.0000	.0180
%RSD	146.3	36.51	16.81	13.74	140.5	15.22	796.6
#1	-.0002	.0144	-.0054	.0039	-.0002	-.0001	.0105
#2	.0000	.0085	-.0068	.0047	-.0000	-.0001	-.0150

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0053	-.0001	.0000	.0002	-.0008	.0019	.0443
SDev	.0002	.0000	.0010	.0008	.0008	.0131	.0378
%RSD	3.007	2.462	2179.	479.2	99.78	692.7	85.33
#1	.0052	-.0001	.0008	-.0004	-.0002	-.0074	.0710
#2	.0055	-.0001	-.0007	.0007	-.0014	.0111	.0176

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0012	.0002	.0033	-.0001	.0013	.0174	.6920
SDev	.0007	.0001	.0009	.0001	.0000	.0121	.5312
%RSD	54.16	63.42	27.80	123.4	.0255	70.01	76.77
#1	.0008	.0003	.0040	-.0002	.0013	.0259	1.068
#2	.0017	.0001	.0027	-.0000	.0013	.0088	.3164

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0014	.0067	-.0016	-.0001	-.0039	.0011	103.7
SDev	.0000	.0036	.0000	.0007	.0288	.0016	1.2
%RSD	1.077	53.33	.3612	686.5	736.2	153.2	1.145
#1	-.0014	.0092	-.0017	.0004	-.0243	.0022	104.6
#2	-.0014	.0042	-.0016	-.0006	.0165	-.0001	102.9

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0125	.0051	-.0000	.0011	.0076	.0033	.0000
SDev	.0062	.0018	.0017	.0012	.0009	.0030	.0000
%RSD	49.95	35.75	5158.	104.8	11.42	90.51	3.406
#1	.0169	.0038	.0012	.0020	.0082	.0054	.0000
#2	.0081	.0064	-.0012	.0003	.0070	.0012	.0000

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0046	-.0008	.0082	-.0413	.0004	.0114	-.0000
SDev	.0010	.0011	.0224	.0102	.0011	.0002	.0002
%RSD	21.34	149.0	274.6	24.61	252.2	1.892	963.5
#1	-.0053	.0000	-.0077	-.0341	-.0003	.0113	-.0001
#2	-.0039	-.0016	.0240	-.0485	.0012	.0116	.0001

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0014	-.0000	.1799
SDev	.0002	.0006	.0345
%RSD	15.39	366400.	19.18
#1	-.0016	-.0004	.1555
#2	-.0013	.0004	.2043

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	732382	10000	--	--	--	--	--
SDev	8353.760	.0000000	--	--	--	--	--
%RSD	1.140629	.0000000	--	--	--	--	--
#1	738289	10000	--	--	--	--	--
#2	726475	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: LCS17F23KE1 Operator:
Run Time: 06/27/17 19:35:30
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0954	4.001	3.967	.0030	3.898	.1254	.0051
SDev	.0013	.051	.034	.0009	.015	.0001	.0135
%RSD	1.405	1.275	.8517	29.69	.3864	.1198	263.5
#1	.0944	3.965	3.991	.0036	3.908	.1255	.0147
#2	.0963	4.038	3.943	.0024	3.887	.1253	-.0044

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.81	.0960	.9463	.3846	.4836	1.916	17.28
SDev	.22	.0017	.0088	.0030	.0039	.004	.13
%RSD	1.056	1.787	.9324	.7756	.7959	.2019	.7519
#1	20.66	.0973	.9400	.3824	.4809	1.918	17.19
#2	20.97	.0948	.9525	.3867	.4863	1.913	17.37

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0000	.0002	20.25	.9687	-.0021	24.60	19.48
SDev	.0000	.0001	.14	.0072	.0016	.26	.44
%RSD	100.1	52.73	.6802	.7479	76.79	1.044	2.258
#1	.0001	.0001	20.15	.9636	-.0010	24.42	19.17
#2	.0000	.0002	20.35	.9739	-.0032	24.78	19.79

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.9400	.9430	.9432	-.0036	.0028	.9810	103.5
SDev	.0099	.0017	.0046	.0019	.0041	.0045	.2
%RSD	1.056	.1842	.4873	52.28	143.9	.4583	.1539
#1	.9330	.9418	.9400	-.0022	.0057	.9778	103.6
#2	.9470	.9442	.9465	-.0049	-.0000	.9841	103.4

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	3.671	3.685	.0017	.9422	3.677	.0048	.0003
SDev	.019	.063	.0026	.0036	.035	.0017	.0000
%RSD	.5127	1.699	152.8	.3862	.9635	34.82	1.631
#1	3.684	3.641	.0035	.9396	3.652	.0060	.0003
#2	3.658	3.729	-.0001	.9448	3.702	.0036	.0003

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0119	-.0006	3.848	-.1006	.9990	.0219	-.0000
SDev	.0040	.0005	.060	.0291	.0076	.0021	.0001
%RSD	33.56	74.98	1.554	28.92	.7651	9.722	304.0
#1	-.0147	-.0003	3.890	-.0801	.9936	.0204	.0000
#2	-.0091	-.0009	3.805	-.1212	1.004	.0234	-.0001

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.9548	-.0004	.1582
SDev	.0132	.0009	.0139
%RSD	1.378	247.1	8.796
#1	.9454	.0003	.1483
#2	.9641	-.0010	.1680

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	730460	10000	--	--	--	--	--
SDev	1134.906	.0000000	--	--	--	--	--
%RSD	.1553686	.0000000	--	--	--	--	--
#1	731263	10000	--	--	--	--	--
#2	729658	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: LCS17F23KE2 Operator:
Run Time: 06/27/17 19:40:51
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0934	3.947	3.933	.0036	3.836	.1231	-.0065
SDev	.0012	.008	.008	.0002	.010	.0012	.0031
%RSD	1.269	.1986	.2033	4.340	.2624	.9434	47.07
#1	.0925	3.952	3.928	.0035	3.843	.1239	-.0087
#2	.0942	3.941	3.939	.0037	3.829	.1222	-.0043

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.74	.0940	.9425	.3823	.4796	1.907	17.21
SDev	.03	.0002	.0027	.0009	.0001	.011	.06
%RSD	.1340	.2393	.2914	.2489	.0141	.5703	.3275
#1	20.76	.0942	.9445	.3830	.4797	1.915	17.25
#2	20.72	.0938	.9406	.3817	.4796	1.899	17.17

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0006	.0002	20.23	.9622	.0008	24.47	19.36
SDev	.0005	.0001	.10	.0053	.0011	.05	.20
%RSD	77.20	23.17	.5081	.5461	135.5	.1958	1.048
#1	-.0010	.0002	20.30	.9659	.0000	24.51	19.22
#2	-.0003	.0002	20.16	.9585	.0016	24.44	19.51

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.9412	.9361	.9330	-.0047	-.0146	.9679	102.6
SDev	.0148	.0061	.0027	.0012	.0034	.0053	.7
%RSD	1.574	.6531	.2864	24.95	23.06	.5451	.7204
#1	.9517	.9404	.9311	-.0038	-.0122	.9716	102.1
#2	.9307	.9318	.9349	-.0055	-.0169	.9641	103.1

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	3.657	3.625	-.0049	.9331	3.632	.0040	.0003
SDev	.036	.037	.0008	.0003	.037	.0053	.0000
%RSD	.9900	1.034	16.03	.0274	1.019	131.4	7.922
#1	3.683	3.652	-.0043	.9333	3.658	.0003	.0003
#2	3.632	3.599	-.0054	.9329	3.606	.0078	.0003

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0102	-.0006	3.843	-.1224	.9873	.0215	-.0001
SDev	.0037	.0002	.033	.0245	.0049	.0052	.0000
%RSD	35.85	26.80	.8467	20.01	.4987	24.28	15.61
#1	-.0076	-.0005	3.820	-.1397	.9908	.0251	-.0001
#2	-.0128	-.0007	3.866	-.1051	.9838	.0178	-.0001

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.9524	-.0007	.2296
SDev	.0001	.0000	.0277
%RSD	.0101	3.302	12.07
#1	.9525	-.0007	.2492
#2	.9523	-.0007	.2100

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	724492	10000	--	--	--	--	--
SDev	5192.285	.0000000	--	--	--	--	--
%RSD	.7166799	.0000000	--	--	--	--	--
#1	720820	10000	--	--	--	--	--
#2	728163	10000	--	--	--	--	--

Analysis Report 06/27/17 07:51:12 PM

Method: DAILY1 Sample Name: EFB#2-84825 Operator:
Run Time: 06/27/17 19:46:11
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0006	.0495	-.0071	.0312	.0007	-.0001	-.0069
SDev	.0003	.0019	.0035	.0019	.0000	.0001	.0042
%RSD	61.93	3.730	49.27	6.026	4.085	96.96	60.74
#1	-.0008	.0482	-.0046	.0298	.0007	-.0000	-.0099
#2	-.0003	.0508	-.0095	.0325	.0007	-.0001	-.0040

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.1901	.0001	-.0010	-.0000	.0006	.0006	.0038
SDev	.0002	.0000	.0005	.0003	.0003	.0024	.0356
%RSD	.1183	38.20	49.55	745.4	42.71	402.1	945.5
#1	.1900	.0001	-.0013	-.0003	.0008	-.0011	-.0214
#2	.1903	.0000	-.0006	.0002	.0004	.0023	.0289

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0002	.0020	.0759	.0013	-.0019	.5256	.6017
SDev	.0003	.0001	.0000	.0000	.0007	.0088	.3285
%RSD	132.7	6.517	.0115	2.399	36.72	1.678	54.60
#1	.0000	.0019	.0759	.0013	-.0014	.5194	.3694
#2	.0005	.0021	.0759	.0013	-.0024	.5319	.8340

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0011	.0050	.0010	-.0049	.0392	.0018	105.0
SDev	.0009	.0039	.0005	.0010	.0066	.0037	.2
%RSD	83.27	77.19	50.32	20.72	16.76	200.0	.1908
#1	-.0005	.0023	.0014	-.0042	.0438	-.0008	105.2
#2	-.0018	.0078	.0007	-.0056	.0345	.0044	104.9

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0086	.0113	.0758	.0024	.0104	.0073	.0003
SDev	.0089	.0121	.0017	.0009	.0110	.0042	.0000
%RSD	102.9	107.2	2.245	40.10	105.9	58.08	1.531
#1	.0149	.0198	.0770	.0017	.0182	.0043	.0003
#2	.0024	.0027	.0746	.0030	.0026	.0103	.0003

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0026	-.0008	-.0070	-.1481	-.0003	.0060	.0000
SDev	.0043	.0000	.0009	.0637	.0001	.0028	.0000
%RSD	165.3	1.524	13.18	43.02	30.83	46.84	238.4
#1	-.0057	-.0008	-.0063	-.1031	-.0004	.0040	.0000
#2	.0004	-.0008	-.0076	-.1932	-.0002	.0080	-.0000

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.0083	-.0008	.1879
SDev	.0001	.0000	.0107
%RSD	1.711	4.794	5.691
#1	.0082	-.0009	.1955
#2	.0084	-.0008	.1804

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	741390	10000	--	--	--	--	--
SDev	1409.971	.0000000	--	--	--	--	--
%RSD	.1901794	.0000000	--	--	--	--	--
#1	742387	10000	--	--	--	--	--
#2	740393	10000	--	--	--	--	--

Analysis Report 06/27/17 07:56:32 PM

Method: DAILY1 Sample Name: 616029 Operator:
Run Time: 06/27/17 19:51:30
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0016	.1049	.0120	.7778	.6146	-.0001	-.0063
SDev	.0008	.0041	.0089	.0056	.0036	.0001	.0050
%RSD	54.83	3.893	73.95	.7220	.5803	44.22	78.83
#1	-.0009	.1077	.0183	.7817	.6172	-.0001	-.0028
#2	-.0022	.1020	.0057	.7738	.6121	-.0002	-.0099

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	991.4	-.0003	.0011	.0007	-.0023	-.0009	70.43
SDev	5.3	.0000	.0009	.0003	.0003	.0075	.13
%RSD	.5347	11.88	77.22	35.63	11.73	823.6	.1890
#1	995.1	-.0004	.0017	.0005	-.0021	-.0062	70.52
#2	987.6	-.0003	.0005	.0009	-.0025	.0044	70.33

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0019	.3674	53.97	1.045	.1930	S3.635	1162.
SDev	.0015	.0021	.60	.008	.0012	.373	2.
%RSD	82.92	.5767	1.119	.7851	.6212	10.26	.1752
#1	.0030	.3689	54.40	1.050	.1921	S3.898	1163.
#2	.0008	.3659	53.55	1.039	.1938	S3.371	1160.

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.0057	.0016	-.0038	-.0049	89.34	.0047	94.19
SDev	.0009	.0012	.0031	.0030	.57	.0038	.37
%RSD	15.41	75.82	81.58	60.64	.6335	80.51	.3951
#1	.0063	.0025	-.0060	-.0028	88.94	.0074	93.93
#2	.0050	.0007	-.0016	-.0070	89.74	.0020	94.45

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0292	.0242	15.65	-.0020	.0258	.0126	3.411
SDev	.0104	.0089	.17	.0017	.0094	.0014	.018
%RSD	35.54	36.98	1.055	83.11	36.42	11.25	.5266
#1	.0365	.0305	15.77	-.0032	.0325	.0136	3.424
#2	.0218	.0178	15.53	-.0008	.0192	.0116	3.398

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0211	.0036	-.0041	.0168	.0330	.0298	.0066
SDev	.0021	.0009	.0070	.0236	.0004	.0014	.0001
%RSD	9.936	26.39	169.5	140.2	1.156	4.762	1.029
#1	-.0226	.0029	-.0090	.0001	.0327	.0288	.0065
#2	-.0197	.0042	.0008	.0335	.0332	.0308	.0066

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0008	-.0008	.1520
SDev	.0003	.0007	.0164
%RSD	34.15	83.35	10.82
#1	-.0006	-.0013	.1404
#2	-.0010	-.0003	.1637

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	665040	10000	--	--	--	--	--
SDev	2623.366	.0000000	--	--	--	--	--
%RSD	.3944674	.0000000	--	--	--	--	--
#1	663185	10000	--	--	--	--	--
#2	666895	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 616029D Operator:
Run Time: 06/27/17 19:56:52
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0008	.1077	-.0056	.7792	.6174	-.0001	-.0068
SDev	.0001	.0093	.0004	.0006	.0024	.0001	.0091
%RSD	9.505	8.599	6.316	.0752	.3946	56.50	134.2
#1	-.0008	.1143	-.0058	.7796	.6192	-.0001	-.0003
#2	-.0009	.1012	-.0053	.7788	.6157	-.0002	-.0133

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	987.7	.0001	.0008	.0008	-.0038	.0055	70.80
SDev	12.3	.0000	.0002	.0007	.0003	.0162	.72
%RSD	1.242	26.75	23.04	88.66	7.605	293.9	1.012
#1	996.4	.0001	.0007	.0014	-.0036	.0170	71.31
#2	979.1	.0001	.0010	.0003	-.0040	-.0060	70.30

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0028	.3680	54.22	1.049	.1895	S3.857	1172.
SDev	.0014	.0032	.58	.008	.0014	.772	19.
%RSD	51.02	.8657	1.062	.7750	.7488	20.03	1.604
#1	.0038	.3703	54.63	1.055	.1905	S4.403	1185.
#2	.0018	.3658	53.81	1.044	.1885	S3.311	1159.

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.0066	.0012	-.0053	-.0043	89.61	.0036	93.58
SDev	.0003	.0009	.0003	.0012	1.15	.0033	1.29
%RSD	5.312	78.15	5.350	28.70	1.279	93.67	1.383
#1	.0068	.0019	-.0055	-.0035	88.80	.0059	92.66
#2	.0063	.0005	-.0051	-.0052	90.42	.0012	94.49

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0231	.0249	15.75	-.0032	.0243	.0050	3.440
SDev	.0027	.0056	.18	.0001	.0046	.0059	.030
%RSD	11.57	22.39	1.155	4.049	18.95	117.5	.8628
#1	.0250	.0289	15.87	-.0031	.0276	.0008	3.461
#2	.0212	.0210	15.62	-.0032	.0210	.0092	3.419

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0203	.0035	-.0104	.0490	.0325	.0286	.0067
SDev	.0072	.0004	.0255	.0191	.0006	.0047	.0001
%RSD	35.32	11.95	244.8	39.03	1.711	16.52	.7046
#1	-.0254	.0038	.0076	.0625	.0329	.0253	.0068
#2	-.0153	.0032	-.0285	.0355	.0321	.0320	.0067

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0008	-.0003	.1534
SDev	.0003	.0009	.0454
%RSD	37.01	265.5	29.60
#1	-.0006	.0003	.1854
#2	-.0010	-.0010	.1213

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	660722	10000	--	--	--	--	--
SDev	9130.163	.0000000	--	--	--	--	--
%RSD	1.381846	.0000000	--	--	--	--	--
#1	654266	10000	--	--	--	--	--
#2	667178	10000	--	--	--	--	--

Analysis Report 06/27/17 08:07:15 PM

Method: DAILY1 Sample Name: 616029L Operator:
Run Time: 06/27/17 20:02:13
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0009	.0434	-.0090	.1662	.1306	-.0002	-.0113
SDev	.0001	.0025	.0035	.0001	.0004	.0000	.0059
%RSD	10.19	5.808	39.54	.0748	.3412	7.787	52.20
#1	-.0009	.0452	-.0065	.1661	.1303	-.0002	-.0071
#2	-.0010	.0417	-.0115	.1663	.1309	-.0002	-.0155

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	269.2	-.0000	-.0005	.0004	-.0014	-.0104	13.43
SDev	1.6	.0002	.0000	.0005	.0002	.0080	.03
%RSD	.5892	22080.	8.306	118.5	16.89	76.61	.2364
#1	270.3	-.0001	-.0005	.0001	-.0016	-.0161	13.45
#2	268.0	.0001	-.0006	.0008	-.0013	-.0048	13.41

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0006	.0967	11.90	.2225	.0382	S24.62	278.4
SDev	.0006	.0002	.01	.0006	.0034	.14	3.4
%RSD	98.76	.2140	.0663	.2829	8.909	.5553	1.229
#1	.0002	.0968	11.90	.2230	.0406	S24.71	280.9
#2	.0010	.0965	11.89	.2221	.0358	S24.52	276.0

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.0006	.0031	-.0005	-.0031	18.50	.0026	96.46
SDev	.0002	.0026	.0029	.0013	.32	.0117	.40
%RSD	36.11	82.01	645.9	42.76	1.729	457.1	.4148
#1	.0005	.0013	-.0025	-.0040	18.27	-.0057	96.18
#2	.0008	.0049	.0016	-.0021	18.72	.0108	96.74

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0130	.0056	3.379	.0007	.0080	.0001	.7339
SDev	.0018	.0093	.009	.0028	.0056	.0019	.0001
%RSD	14.01	166.9	.2527	376.7	69.43	1447.	.0191
#1	.0117	.0121	3.385	-.0012	.0120	-.0012	.7338
#2	.0143	-.0010	3.373	.0027	.0041	.0015	.7340

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0025	-.0007	.0045	-.1599	.0063	.0094	.0006
SDev	.0025	.0001	.0126	.0499	.0001	.0029	.0003
%RSD	100.2	8.458	283.0	31.19	.9867	30.82	39.85
#1	-.0007	-.0007	.0134	-.1952	.0063	.0074	.0004
#2	-.0043	-.0008	-.0045	-.1247	.0063	.0115	.0008

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0005	-.0009	.0407
SDev	.0005	.0008	.0332
%RSD	107.6	87.01	81.61
#1	-.0001	-.0014	.0172
#2	-.0009	-.0003	.0642

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	681026	10000	--	--	--	--	--
SDev	2826.306	.0000000	--	--	--	--	--
%RSD	.4150073	.0000000	--	--	--	--	--
#1	679027	10000	--	--	--	--	--
#2	683024	10000	--	--	--	--	--

010220

Analysis Report 06/27/17 08:12:33 PM

Method: DAILY1 Sample Name: 616029MS Operator:
Run Time: 06/27/17 20:07:33
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.4328	4.474	2.621	.7530	5.148	.5803	-.0067
SDev	.0036	.010	.028	.0037	.042	.0245	.0098
%RSD	.8249	.2335	1.050	.4985	.8078	4.222	145.7
#1	.4354	4.482	2.640	.7556	5.178	.5976	.0002
#2	.4303	4.467	2.601	.7503	5.119	.5630	-.0136

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	967.6	.4642	2.281	.9013	.9340	4.494	80.02
SDev	6.3	.0050	.019	.0039	.0075	.009	.59
%RSD	.6485	1.081	.8238	.4272	.8070	.1906	.7345
#1	972.1	.4678	2.294	.9040	.9393	4.500	80.43
#2	963.2	.4607	2.267	.8986	.9287	4.488	79.60

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0021	.3556	61.40	1.474	.1826	S4.122	1143.
SDev	.0020	.0030	.31	.009	.0031	1.041	6.
%RSD	95.53	.8424	.5095	.6385	1.671	25.26	.5100
#1	.0035	.3577	61.62	1.480	.1847	S4.858	1147.
#2	.0007	.3535	61.18	1.467	.1804	S3.385	1139.

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	2.225	2.230	2.264	-.0045	86.43	5.025	94.63
SDev	.050	.031	.008	.0015	.47	.072	1.08
%RSD	2.252	1.408	.3323	33.89	.5466	1.432	1.144
#1	2.261	2.252	2.269	-.0035	86.09	5.076	93.87
#2	2.190	2.207	2.258	-.0056	86.76	4.974	95.40

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	2.493	2.482	15.44	2.250	2.483	.0040	3.319
SDev	.017	.008	.01	.015	.011	.0008	.028
%RSD	.6650	.3209	.0623	.6871	.4360	19.18	.8570
#1	2.505	2.488	15.43	2.261	2.491	.0046	3.339
#2	2.481	2.476	15.45	2.239	2.476	.0035	3.299

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0199	.0034	2.378	-.0047	2.444	.0407	.0066
SDev	.0025	.0001	.006	.0192	.011	.0073	.0000
%RSD	12.44	3.410	.2622	406.2	.4457	17.88	.5510
#1	-.0182	.0034	2.374	.0088	2.452	.0356	.0066
#2	-.0217	.0033	2.383	-.0183	2.436	.0459	.0067

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.4599	-.0010	.1855
SDev	.0049	.0002	.0013
%RSD	1.067	21.80	.7069
#1	.4633	-.0009	.1865
#2	.4564	-.0012	.1846

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	668190	10000	--	--	--	--	--
SDev	7662.916	.0000000	--	--	--	--	--
%RSD	1.146818	.0000000	--	--	--	--	--
#1	662771	10000	--	--	--	--	--
#2	673608	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 616029MSD Operator:
Run Time: 06/27/17 20:12:51
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.4286	4.448	2.626	.7557	5.196	.5588	-.0019
SDev	.0069	.014	.035	.0073	.061	.0169	.0023
%RSD	1.608	.3081	1.329	.9686	1.168	3.018	116.8
#1	.4334	4.457	2.601	.7505	5.153	.5707	-.0036
#2	.4237	4.438	2.650	.7609	5.239	.5468	-.0003

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	956.0	.4616	2.251	.8949	.9408	4.471	81.60
SDev	4.2	.0089	.007	.0011	.0006	.020	.34
%RSD	.4380	1.938	.3223	.1230	.0588	.4401	.4135
#1	959.0	.4552	2.246	.8941	.9404	4.457	81.36
#2	953.1	.4679	2.257	.8957	.9412	4.485	81.84

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0024	.3605	60.40	1.466	.1916	S4.480	1153.
SDev	.0015	.0028	.14	.002	.0039	.929	11.
%RSD	60.50	.7779	.2336	.1410	2.009	20.74	.9619
#1	.0035	.3586	60.30	1.464	.1889	S5.137	1161.
#2	.0014	.3625	60.50	1.467	.1943	S3.823	1145.

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	2.229	2.239	2.255	-.0068	86.70	5.063	92.47
SDev	.005	.014	.021	.0005	1.21	.062	.41
%RSD	.2079	.6230	.9208	8.070	1.394	1.228	.4481
#1	2.226	2.229	2.241	-.0071	85.85	5.019	92.76
#2	2.233	2.249	2.270	-.0064	87.55	5.107	92.17

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	2.512	2.458	15.31	2.248	2.474	.0106	3.348
SDev	.038	.015	.02	.018	.023	.0013	.023
%RSD	1.518	.6221	.1474	.8219	.9251	12.67	.6902
#1	2.485	2.447	15.32	2.235	2.457	.0115	3.331
#2	2.539	2.469	15.29	2.261	2.490	.0096	3.364

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0166	.0035	2.367	-.0203	2.430	.0250	.0069
SDev	.0002	.0006	.037	.0026	.001	.0008	.0001
%RSD	1.129	15.90	1.554	12.81	.0291	3.391	.8070
#1	-.0165	.0039	2.341	-.0184	2.430	.0244	.0069
#2	-.0167	.0031	2.393	-.0221	2.431	.0256	.0068

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.4498	.0008	.1437
SDev	.0027	.0003	.0296
%RSD	.6021	36.57	20.61
#1	.4479	.0006	.1646
#2	.4518	.0010	.1227

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	652920	10000	--	--	--	--	--
SDev	2954.292	.0000000	--	--	--	--	--
%RSD	.4524738	.0000000	--	--	--	--	--
#1	655009	10000	--	--	--	--	--
#2	650831	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 616029AS Operator:
Run Time: 06/27/17 20:18:12
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0457	1.804	2.045	.7729	2.393	.0575	-.0054
SDev	.0002	.000	.021	.0009	.009	.0005	.0003
%RSD	.4896	.0127	1.032	.1200	.3812	.8980	5.651
#1	.0459	1.804	2.031	.7723	2.399	.0572	-.0056
#2	.0456	1.804	2.060	.7736	2.386	.0579	-.0052

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	976.7	.0448	.4467	.1761	.2260	.8794	71.06
SDev	2.6	.0002	.0008	.0010	.0016	.0024	.59
%RSD	.2662	.3808	.1912	.5808	.7294	.2754	.8322
#1	974.9	.0450	.4473	.1753	.2272	.8812	70.64
#2	978.6	.0447	.4461	.1768	.2248	.8777	71.48

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0020	.3670	54.05	1.491	.1909	S3.548	1169.
SDev	.0004	.0009	.20	.002	.0053	.428	2.
%RSD	19.30	.2568	.3697	.1298	2.758	12.05	.1428
#1	.0022	.3663	53.91	1.490	.1872	S3.850	1168.
#2	.0017	.3676	54.20	1.493	.1946	S3.245	1170.

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.4429	.4308	.4335	-.0047	88.42	.4971	93.17
SDev	.0009	.0025	.0046	.0015	.09	.0048	.65
%RSD	.2134	.5866	1.057	32.15	.0974	.9637	.6976
#1	.4423	.4290	.4302	-.0057	88.48	.4937	93.63
#2	.4436	.4326	.4367	-.0036	88.36	.5004	92.71

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.948	1.896	15.76	.4321	1.912	.0105	3.399
SDev	.002	.029	.01	.0039	.020	.0002	.025
%RSD	.1249	1.504	.0629	.9011	1.036	1.803	.7287
#1	1.947	1.876	15.75	.4294	1.898	.0103	3.381
#2	1.950	1.916	15.77	.4349	1.926	.0106	3.416

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0190	.0034	1.804	-.0044	.5032	.0263	.0072
SDev	.0001	.0003	.015	.0291	.0014	.0011	.0002
%RSD	.4036	9.491	.8528	661.2	.2784	4.080	2.244
#1	-.0190	.0036	1.793	-.0250	.5022	.0255	.0070
#2	-.0191	.0032	1.815	.0162	.5041	.0271	.0073

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.4486	-.0008	.1492
SDev	.0013	.0007	.0102
%RSD	.2846	85.54	6.815
#1	.4495	-.0012	.1421
#2	.4477	-.0003	.1564

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	657896	10000	--	--	--	--	--
SDev	4516.291	.0000000	--	--	--	--	--
%RSD	.6864755	.0000000	--	--	--	--	--
#1	661089	10000	--	--	--	--	--
#2	654702	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: CCV Operator:
Run Time: 06/27/17 20:23:30
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.9797	10.14	5.219	5.139	9.706	H1.101	4.850
SDev	.0058	.06	.048	.009	.080	.096	.070
%RSD	.5907	.5817	.9199	.1764	.8201	8.761	1.433
#1	.9756	10.10	5.253	5.145	9.762	H1.170	4.899
#2	.9838	10.18	5.185	5.132	9.650	1.033	4.801
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass
High	1.100	11.00	5.500	5.500	11.00	1.100	5.500
Low	.9000	9.000	4.500	4.500	9.000	.9000	4.500

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.03	.9958	4.815	1.937	1.953	9.877	19.90
SDev	.06	.0118	.002	.004	.002	.029	.02
%RSD	.3191	1.181	.0363	.1879	.0805	.2967	.0899
#1	19.98	1.004	4.814	1.935	1.954	9.857	19.88
#2	20.07	.9875	4.816	1.940	1.951	9.898	19.91
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	22.00	1.100	5.500	2.200	2.200	11.00	22.00
Low	18.00	.9000	4.500	1.800	1.800	9.000	18.00

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.417	5.496	20.03	.9765	4.792	H38.57	29.81
SDev	.008	.017	.04	.0009	.033	.07	.28
%RSD	.1508	.3144	.2155	.0920	.6877	.1719	.9362
#1	5.411	H5.509	20.00	.9759	4.815	H38.62	29.62
#2	5.423	5.484	20.06	.9771	4.769	H38.53	30.01
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass
High	5.500	5.500	22.00	1.100	5.500	33.00	33.00
Low	4.500	4.500	18.00	.9000	4.500	27.00	27.00

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	4.780	4.815	4.914	.9913	1.050	1.005	101.4
SDev	.006	.031	.030	.0006	.015	.002	.1
%RSD	.1234	.6417	.6041	.0652	1.467	.1632	.1421
#1	4.776	4.793	4.935	.9918	1.061	1.006	101.3
#2	4.785	4.837	4.893	.9909	1.039	1.004	101.5
Errors	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	NOCHECK
High	5.500			1.100	1.100	1.100	
Low	4.500			.9000	.9000	.9000	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.113	5.141	4.849	4.876	5.127	4.959	4.952
SDev	.021	.003	.029	.009	.005	.019	.009
%RSD	.4051	.0517	.6048	.1944	.1000	.3909	.1774
#1	5.099	5.143	4.829	4.883	5.123	4.946	4.959
#2	5.128	5.139	4.870	4.869	5.130	4.973	4.946
Errors	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High			5.500	5.500	5.500	5.500	5.500
Low			4.500	4.500	4.500	4.500	4.500

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.9719	4.981	5.046	4.959	5.036	1.027	4.988
SDev	.0071	.002	.064	.001	.012	.016	.002
%RSD	.7300	.0456	1.262	.0253	.2300	1.574	.0392
#1	.9669	4.980	5.001	4.960	5.028	1.038	4.987
#2	.9769	4.983	5.091	4.958	5.045	1.015	4.989
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	1.100	5.500	5.500	5.500	5.500	1.100	5.500
Low	.9000	4.500	4.500	4.500	4.500	.9000	4.500

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.9770	4.894	5.308
SDev	.0021	.006	.088
%RSD	.2117	.1157	1.666
#1	.9755	4.898	5.371
#2	.9784	4.890	5.246
Errors	LC Pass	LC Pass	LC Pass
High	1.100	5.500	5.500
Low	.9000	4.500	4.500

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	715576	10000	--	--	--	--	--
SDev	1013.284	.0000000	--	--	--	--	--
%RSD	.1416039	.0000000	--	--	--	--	--
#1	714860	10000	--	--	--	--	--
#2	716293	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: CCB Operator:
Run Time: 06/27/17 20:28:49
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0015	.0244	-.0040	.0181	.0000	-.0002	-.0134
SDev	.0002	.0076	.0024	.0066	.0004	.0000	.0010
%RSD	11.29	31.10	61.45	36.38	1601.	4.443	7.309
#1	-.0013	.0298	-.0057	.0228	.0003	-.0002	-.0141
#2	-.0016	.0191	-.0023	.0135	-.0002	-.0002	-.0127
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0100	.0750	.0150	.1000	.0050	.0050	.0250
Low	-.0100	-.0750	-.0150	-.1000	-.0050	-.0050	-.0250

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0144	-.0002	.0001	.0000	-.0012	.0065	-.0105
SDev	.0034	.0000	.0000	.0003	.0004	.0081	.0040
%RSD	23.25	4.636	39.32	882.4	31.10	124.4	37.80
#1	.0168	-.0002	.0001	.0003	-.0009	.0122	-.0133
#2	.0120	-.0002	.0001	-.0002	-.0014	.0008	-.0077
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0500	.0050	.0050	.0050	.0050	.1000	.1500
Low	-.0500	-.0050	-.0050	-.0050	-.0050	-.1000	-.1500

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	.0001	-.0017	-.0001	.0001	.0077	-.0688
SDev	.0008	.0000	.0025	.0001	.0017	.0013	.1805
%RSD	1023.	20.62	143.5	173.7	1689.	16.53	262.4
#1	.0007	.0001	.0000	.0000	-.0011	.0068	L-.1964
#2	-.0005	.0001	-.0035	-.0001	.0013	.0086	.0588
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0100	.0100	.0500	.0050	.0075	.1500	.1500
Low	-.0100	-.0100	-.0500	-.0050	-.0075	-.1500	-.1500

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0009	.0042	-.0008	-.0035	.0150	-.0063	98.54
SDev	.0002	.0003	.0005	.0025	.0272	.0016	.91
%RSD	26.26	6.680	70.81	71.10	180.9	25.47	.9186
#1	-.0010	.0044	-.0011	-.0017	-.0042	-.0051	97.90
#2	-.0007	.0040	-.0004	-.0053	.0343	-.0074	99.18
Errors	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	NOCHECK
High	.0050			.0250	.0500	.0200	
Low	-.0050			-.0250	-.0500	-.0200	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0029	-.0022	-.0018	.0009	-.0005	.0003	.0000
SDev	.0107	.0019	.0004	.0003	.0023	.0004	.0001
%RSD	363.0	83.77	21.01	28.96	460.7	109.8	573.0
#1	.0105	-.0036	-.0016	.0007	.0011	.0006	.0001
#2	-.0046	-.0009	-.0021	.0011	-.0021	.0001	-.0000
Errors	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High			.1000	.0050	.0200	.0150	.0050
Low			-.1000	-.0050	-.0200	-.0150	-.0050

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0094	-.0017	-.0035	.0443	-.0001	.0099	.0001
SDev	.0028	.0001	.0131	.0082	.0009	.0042	.0002
%RSD	29.78	6.738	369.2	18.45	1221.	42.72	241.7
#1	-.0114	-.0017	.0057	.0385	.0006	.0069	.0002
#2	-.0074	-.0018	-.0128	.0501	-.0007	.0129	-.0001
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0200	.0050	.0500	.2000	.0050	.0200	.0050
Low	-.0200	-.0050	-.0500	-.2000	-.0050	-.0200	-.0050

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0007	.0007	.0154
SDev	.0002	.0011	.0102
%RSD	34.00	163.2	65.98
#1	-.0009	.0015	.0082
#2	-.0005	-.0001	.0226
Errors	LC Pass	LC Pass	LC Pass
High	.0050	.0100	.0750
Low	-.0050	-.0100	-.0750

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	695773	10000	--	--	--	--	--
SDev	6344.162	.0000000	--	--	--	--	--
%RSD	.9118149	.0000000	--	--	--	--	--
#1	691287	10000	--	--	--	--	--
#2	700259	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 616635 Operator:
Run Time: 06/27/17 20:34:12
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0008	.0617	.0524	46.64	.3418	-.0002	-.0036
SDev	.0008	.0000	.0055	.48	.0030	.0000	.0159
%RSD	99.81	.0311	10.55	1.020	.8892	5.131	445.8
#1	-.0014	.0617	.0485	46.30	.3396	-.0002	.0077
#2	-.0002	.0617	.0563	46.97	.3439	-.0002	-.0149

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1075.	-.0002	.0027	.0030	-.0038	.0042	210.5
SDev	.	.0003	.0003	.0001	.0003	.0010	1.0
%RSD	.0102	172.0	10.96	3.327	8.317	24.62	.4736
#1	1075.	-.0004	.0025	.0031	-.0035	.0050	209.8
#2	1075.	.0000	.0029	.0029	-.0040	.0035	211.2

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0044	2.633	102.5	1.379	.1041	S16.89	618.5
SDev	.0007	.011	.3	.008	.0007	.41	4.4
%RSD	15.91	.4217	.2536	.5812	.6389	2.410	.7089
#1	.0039	2.625	102.3	1.373	.1036	S17.18	621.6
#2	.0049	2.641	102.7	1.385	.1045	S16.60	615.4

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.0110	.0025	-.0066	-.0086	142.6	.0032	94.67
SDev	.0011	.0003	.0029	.0015	1.7	.0071	.44
%RSD	9.910	11.97	43.39	17.56	1.198	224.5	.4647
#1	.0102	.0027	-.0086	-.0075	141.4	.0082	94.98
#2	.0117	.0022	-.0046	-.0096	143.8	-.0019	94.36

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.085	1.071	7.901	-.0036	1.074	.0070	8.795
SDev	.000	.021	.000	.0018	.014	.0006	.039
%RSD	.0146	1.998	.0052	50.54	1.331	8.302	.4418
#1	1.085	1.056	7.901	-.0049	1.064	.0074	8.768
#2	1.085	1.086	7.901	-.0023	1.085	.0066	8.823

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0219	.0027	-.0203	-.0192	.0251	.0265	.0087
SDev	.0061	.0005	.0048	.0386	.0001	.0020	.0000
%RSD	28.03	19.88	23.54	201.2	.4845	7.488	.4592
#1	-.0176	.0031	-.0236	-.0464	.0252	.0251	.0087
#2	-.0263	.0023	-.0169	.0081	.0250	.0279	.0087

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.0001	.0003	.0860
SDev	.0008	.0003	.0629
%RSD	735.7	125.8	73.08
#1	.0007	.0005	.0416
#2	-.0005	.0000	.1305

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	668454	10000	--	--	--	--	--
SDev	3067.429	.0000000	--	--	--	--	--
%RSD	.4588841	.0000000	--	--	--	--	--
#1	670623	10000	--	--	--	--	--
#2	666285	10000	--	--	--	--	--

010234

Method: DAILY1 Sample Name: 616635D Operator:
Run Time: 06/27/17 20:39:31
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0010	.0643	.0544	47.06	.3414	-.0002	-.0030
SDev	.0007	.0028	.0194	.10	.0021	.0000	.0009
%RSD	73.77	4.377	35.68	.2221	.6173	13.43	30.28
#1	-.0015	.0663	.0681	47.14	.3429	-.0002	-.0036
#2	-.0005	.0623	.0407	46.99	.3399	-.0002	-.0023

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1083.	-.0002	.0031	.0022	-.0042	-.0058	209.8
SDev	5.	.0000	.0001	.0003	.0006	.0031	.0
%RSD	.4206	6.317	2.800	11.92	12.99	52.18	.0099
#1	1086.	-.0003	.0032	.0021	-.0039	-.0080	209.8
#2	1080.	-.0002	.0030	.0024	-.0046	-.0037	209.8

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0043	2.624	104.8	1.401	.1025	S16.74	614.9
SDev	.0008	.006	.2	.004	.0012	.39	3.5
%RSD	18.66	.2339	.2152	.2807	1.162	2.319	.5769
#1	.0049	2.629	104.7	1.398	.1034	S17.02	617.4
#2	.0038	2.620	105.0	1.404	.1017	S16.47	612.4

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.0122	.0043	-.0041	-.0043	143.4	.0003	94.81
SDev	.0008	.0034	.0018	.0021	1.0	.0025	.21
%RSD	6.133	81.18	44.31	49.35	.6763	927.0	.2199
#1	.0127	.0067	-.0054	-.0028	142.7	-.0015	94.67
#2	.0116	.0018	-.0028	-.0058	144.1	.0021	94.96

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.103	1.098	7.956	-.0013	1.098	.0121	8.804
SDev	.024	.011	.019	.0001	.015	.0053	.039
%RSD	2.196	1.006	.2378	4.413	1.404	43.95	.4462
#1	1.121	1.105	7.943	-.0014	1.109	.0158	8.832
#2	1.086	1.090	7.970	-.0013	1.088	.0083	8.776

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0260	.0023	-.0036	.0221	.0240	.0192	.0089
SDev	.0025	.0001	.0167	.0044	.0007	.0050	.0001
%RSD	9.634	5.912	460.1	20.01	2.756	26.16	.5718
#1	-.0278	.0024	-.0155	.0252	.0236	.0157	.0089
#2	-.0242	.0022	.0082	.0190	.0245	.0228	.0088

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.0004	-.0020	.1387
SDev	.0009	.0001	.0043
%RSD	237.2	6.774	3.110
#1	.0010	-.0021	.1357
#2	-.0003	-.0019	.1418

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	669468	10000	--	--	--	--	--
SDev	1458.761	.0000000	--	--	--	--	--
%RSD	.2178987	.0000000	--	--	--	--	--
#1	668436	10000	--	--	--	--	--
#2	670499	10000	--	--	--	--	--

Analysis Report 06/27/17 08:49:52 PM

Method: DAILY1 Sample Name: 616635L Operator:
Run Time: 06/27/17 20:44:50
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0009	.0277	.0160	10.18	.0719	-.0002	-.0024
SDev	.0015	.0044	.0151	.02	.0003	.0000	.0137
%RSD	172.2	15.82	94.53	.2183	.3732	.5418	563.4
#1	-.0019	.0246	.0266	10.16	.0717	-.0002	-.0121
#2	.0002	.0308	.0053	10.19	.0720	-.0002	.0072

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	311.0	-.0002	.0009	.0006	-.0011	-.0130	46.69
SDev	1.0	.0002	.0000	.0006	.0008	.0116	.07
%RSD	.3109	133.4	4.813	107.4	67.92	89.28	.1556
#1	311.7	-.0000	.0009	.0001	-.0016	-.0212	46.74
#2	310.3	-.0003	.0009	.0010	-.0006	-.0048	46.64

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0013	.6850	23.00	.2969	.0218	S27.57	141.0
SDev	.0006	.0003	.06	.0013	.0002	.03	.0
%RSD	44.92	.0383	.2633	.4373	.8356	.0967	.0316
#1	.0009	.6852	23.04	.2978	.0217	S27.58	140.9
#2	.0017	.6849	22.95	.2959	.0219	S27.55	141.0

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.0022	.0047	-.0046	-.0017	29.91	-.0013	97.29
SDev	.0008	.0029	.0007	.0023	.02	.0037	.04
%RSD	36.00	61.52	14.54	139.1	.0549	283.7	.0379
#1	.0028	.0067	-.0041	-.0000	29.90	-.0039	97.26
#2	.0016	.0026	-.0051	-.0033	29.92	.0013	97.32

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.2255	.2251	1.688	-.0015	.2250	.0027	1.931
SDev	.0018	.0019	.009	.0014	.0007	.0037	.001
%RSD	.7753	.8417	.5510	92.47	.3019	138.4	.0351
#1	.2268	.2238	1.694	-.0005	.2246	.0053	1.932
#2	.2243	.2264	1.681	-.0025	.2255	.0001	1.931

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0103	-.0006	.0101	-.1141	.0047	.0098	.0006
SDev	.0076	.0001	.0173	.0173	.0005	.0082	.0001
%RSD	73.64	19.62	172.0	15.18	9.816	83.57	15.69
#1	-.0157	-.0007	.0223	-.1019	.0044	.0155	.0006
#2	-.0050	-.0005	-.0022	-.1264	.0051	.0040	.0007

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0001	-.0006	.0188
SDev	.0008	.0004	.0172
%RSD	589.9	58.16	91.49
#1	-.0007	-.0009	.0066
#2	.0004	-.0004	.0310

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	686884	10000	--	--	--	--	--
SDev	263.0437	.0000000	--	--	--	--	--
%RSD	.0382952	.0000000	--	--	--	--	--
#1	686698	10000	--	--	--	--	--
#2	687070	10000	--	--	--	--	--

Analysis Report 06/27/17 08:55:11 PM

Method: DAILY1 Sample Name: 616635MS Operator:
Run Time: 06/27/17 20:50:11
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.4547	4.423	2.646	46.10	4.721	.5696	-.0094
SDev	.0012	.036	.039	.44	.063	.0271	.0030
%RSD	.2703	.8155	1.483	.9448	1.332	4.753	31.62
#1	.4555	4.449	2.674	46.41	4.766	.5888	-.0116
#2	.4538	4.398	2.619	45.79	4.677	.5505	-.0073

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1079.	.4569	2.227	.8953	.9330	4.454	216.5
SDev	10.	.0073	.046	.0146	.0043	.065	1.9
%RSD	.9079	1.605	2.079	1.631	.4577	1.457	.8903
#1	1086.	.4621	2.260	.9056	.9361	4.500	217.9
#2	1072.	.4517	2.194	.8849	.9300	4.409	215.2

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0055	2.591	112.0	1.823	.1029	S16.92	619.1
SDev	.0012	.034	1.6	.031	.0007	.66	1.5
%RSD	21.54	1.302	1.402	1.708	.6876	3.886	.2455
#1	.0064	2.614	113.1	1.845	.1034	S17.39	620.2
#2	.0047	2.567	110.9	1.801	.1024	S16.46	618.0

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	2.174	2.125	2.176	-.0042	142.3	5.030	94.51
SDev	.008	.013	.011	.0019	2.2	.072	1.57
%RSD	.3615	.6344	.5156	44.59	1.534	1.428	1.658
#1	2.180	2.134	2.184	-.0055	143.8	5.081	93.40
#2	2.169	2.115	2.168	-.0029	140.7	4.979	95.61

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	3.475	3.430	7.851	2.157	3.442	.0127	8.682
SDev	.033	.050	.072	.012	.044	.0070	.119
%RSD	.9465	1.447	.9189	.5546	1.279	54.81	1.370
#1	3.498	3.465	7.902	2.165	3.473	.0177	8.766
#2	3.451	3.395	7.800	2.148	3.411	.0078	8.597

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0246	.0025	2.320	.0365	2.403	.0257	.0087
SDev	.0035	.0002	.020	.0722	.026	.0003	.0000
%RSD	14.05	7.586	.8710	197.5	1.064	1.282	.3145
#1	-.0222	.0026	2.306	.0876	2.422	.0254	.0087
#2	-.0270	.0023	2.334	-.0145	2.385	.0259	.0088

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.4494	-.0009	.0820
SDev	.0103	.0001	.0105
%RSD	2.303	6.145	12.77
#1	.4567	-.0008	.0746
#2	.4421	-.0009	.0894

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	667250	10000	--	--	--	--	--
SDev	11062.69	.0000000	--	--	--	--	--
%RSD	1.657951	.0000000	--	--	--	--	--
#1	659428	10000	--	--	--	--	--
#2	675073	10000	--	--	--	--	--

Analysis Report 06/27/17 09:00:33 PM

Method: DAILY1 Sample Name: 616635MSD Operator:
Run Time: 06/27/17 20:55:28
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.3932	4.323	2.605	45.28	4.607	.5394	-.0014
SDev	.0010	.012	.014	.10	.006	.0133	.0074
%RSD	.2643	.2837	.5276	.2139	.1261	2.458	515.8
#1	.3924	4.314	2.614	45.21	4.603	.5488	-.0067
#2	.3939	4.331	2.595	45.35	4.611	.5300	.0038

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1053.	.4493	2.184	.8746	.9126	4.337	212.8
SDev	.	.0026	.015	.0026	.0017	.004	.3
%RSD	.0241	.5763	.6727	.2920	.1905	.0810	.1262
#1	1053.	.4474	2.194	.8764	.9139	4.340	213.0
#2	1053.	.4511	2.174	.8728	.9114	4.335	212.6

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0043	2.546	109.4	1.786	.1002	S16.72	605.2
SDev	.0013	.010	.4	.009	.0020	.48	.2
%RSD	29.17	.3931	.3517	.4905	2.033	2.871	.0408
#1	.0052	2.553	109.6	1.792	.0988	S17.06	605.4
#2	.0034	2.539	109.1	1.779	.1017	S16.38	605.0

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	2.157	2.067	2.130	-.0064	138.6	4.923	95.59
SDev	.018	.037	.006	.0020	.0	.023	.64
%RSD	.8356	1.788	.2714	31.58	.0351	.4683	.6665
#1	2.169	2.093	2.134	-.0050	138.7	4.907	95.13
#2	2.144	2.041	2.126	-.0078	138.6	4.939	96.04

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	3.424	3.434	7.692	2.107	3.427	.0028	8.490
SDev	.034	.020	.021	.016	.002	.0046	.013
%RSD	.9886	.5722	.2766	.7668	.0529	166.4	.1578
#1	3.448	3.420	7.677	2.119	3.426	.0061	8.480
#2	3.400	3.448	7.707	2.096	3.429	-.0005	8.499

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0153	.0022	2.271	.0070	2.354	.0175	.0085
SDev	.0058	.0001	.039	.0213	.000	.0075	.0002
%RSD	38.03	6.665	1.703	303.3	.0098	43.11	2.344
#1	-.0194	.0021	2.243	-.0080	2.354	.0121	.0084
#2	-.0112	.0023	2.298	.0221	2.354	.0228	.0087

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.4388	-.0013	.0404
SDev	.0036	.0001	.0563
%RSD	.8127	8.254	139.6
#1	.4413	-.0013	.0802
#2	.4363	-.0012	.0005

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	674920	10000	--	--	--	--	--
SDev	4496.492	.0000000	--	--	--	--	--
%RSD	.6662265	.0000000	--	--	--	--	--
#1	671740	10000	--	--	--	--	--
#2	678099	10000	--	--	--	--	--

010242

Analysis Report 06/27/17 09:05:57 PM

Method: DAILY1 Sample Name: 616635AS Operator:
Run Time: 06/27/17 21:00:52
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0459	1.795	2.078	46.60	2.157	.0570	.0069
SDev	.0017	.019	.010	.49	.018	.0007	.0042
%RSD	3.623	1.034	.4873	1.054	.8444	1.185	60.13
#1	.0447	1.782	2.071	46.26	2.144	.0566	.0040
#2	.0471	1.808	2.085	46.95	2.170	.0575	.0099

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1077.	.0439	.4437	.1749	.2275	.8129	213.3
SDev	9.	.0007	.0034	.0017	.0006	.0659	1.9
%RSD	.7910	1.552	.7703	.9560	.2620	8.109	.8827
#1	1071.	.0435	.4413	.1761	.2279	.8595	211.9
#2	1083.	.0444	.4461	.1737	.2271	.7663	214.6

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0031	2.650	103.1	1.827	.0997	S17.35	623.2
SDev	.0001	.021	.8	.014	.0064	.27	4.8
%RSD	2.028	.7984	.7642	.7483	6.435	1.566	.7724
#1	.0031	2.635	102.5	1.818	.1042	S17.54	619.8
#2	.0031	2.665	103.6	1.837	.0951	S17.16	626.6

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.4365	.4415	.4150	-.0045	143.1	.4915	92.80
SDev	.0043	.0279	.0059	.0002	.2	.0084	.88
%RSD	.9748	6.311	1.428	4.688	.1235	1.709	.9489
#1	.4335	.4218	.4192	-.0047	143.2	.4855	93.42
#2	.4395	.4612	.4108	-.0044	143.0	.4974	92.18

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	2.973	2.930	7.963	.4234	2.942	.0101	8.783
SDev	.080	.045	.041	.0053	.057	.0056	.039
%RSD	2.703	1.533	.5158	1.259	1.927	55.53	.4465
#1	2.916	2.899	7.934	.4197	2.902	.0061	8.755
#2	3.030	2.962	7.992	.4272	2.982	.0141	8.811

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0404	.0025	1.786	-.0151	.4913	.0222	.0076
SDev	.0213	.0000	.015	.0382	.0001	.0068	.0013
%RSD	52.73	.1859	.8334	252.8	.0255	30.75	17.28
#1	-.0254	.0025	1.796	-.0422	.4912	.0270	.0086
#2	-.0555	.0025	1.775	.0119	.4914	.0174	.0067

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.4395	-.0047	.0934
SDev	.0027	.0052	.0216
%RSD	.6194	110.7	23.14
#1	.4376	-.0010	.0781
#2	.4415	-.0083	.1087

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	655229	10000	--	--	--	--	--
SDev	6212.640	.0000000	--	--	--	--	--
%RSD	.9481632	.0000000	--	--	--	--	--
#1	659622	10000	--	--	--	--	--
#2	650836	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 616636 Operator:
Run Time: 06/27/17 21:06:16
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0018	.0067	.1026	63.99	.4063	-.0002	-.0100
SDev	.0000	.0014	.0023	.11	.0020	.0000	.0085
%RSD	1.821	21.55	2.243	.1680	.4893	8.764	84.33
#1	-.0018	.0077	.1010	64.07	.4077	-.0001	-.0160
#2	-.0018	.0057	.1042	63.91	.4049	-.0002	-.0041

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1148.	-.0000	.0180	.2177	.0812	.0055	227.9
SDev	5.	.0001	.0001	.0011	.0012	.0011	.2
%RSD	.4099	5983.	.2542	.4893	1.429	20.94	.0768
#1	1151.	.0001	.0180	.2184	.0804	.0046	228.1
#2	1144.	-.0001	.0181	.2169	.0820	.0063	227.8

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0027	3.218	70.04	.1706	.0329	S16.90	634.0
SDev	.0004	.010	.41	.0010	.0005	.37	2.4
%RSD	14.29	.3080	.5911	.6101	1.386	2.211	.3746
#1	.0030	3.225	70.33	.1713	.0332	S17.17	635.7
#2	.0024	3.211	69.75	.1699	.0326	S16.64	632.4

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.0349	-.0004	-.0063	-.0048	157.2	-.0032	93.10
SDev	.0004	.0025	.0013	.0026	.0	.0036	.17
%RSD	1.119	591.4	20.09	55.32	.0027	115.0	.1815
#1	.0347	-.0022	-.0054	-.0067	157.2	-.0057	92.98
#2	.0352	.0014	-.0072	-.0029	157.2	-.0006	93.22

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.057	1.037	20.08	-.0044	1.042	.0085	2.638
SDev	.014	.005	.14	.0000	.008	.0066	.008
%RSD	1.338	.5104	.7149	.1230	.7897	78.01	.3097
#1	1.067	1.040	20.18	-.0044	1.048	.0038	2.643
#2	1.047	1.033	19.97	-.0044	1.037	.0131	2.632

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0191	-.0010	.0124	-.0088	.0203	.0041	.0106
SDev	.0018	.0002	.0050	.0227	.0003	.0015	.0002
%RSD	9.459	16.27	40.43	259.2	1.629	36.68	2.012
#1	-.0178	-.0011	.0160	-.0248	.0200	.0052	.0105
#2	-.0204	-.0009	.0089	.0073	.0205	.0030	.0108

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0003	-.0018	.0382
SDev	.0001	.0010	.0034
%RSD	43.36	58.37	8.942
#1	-.0002	-.0025	.0358
#2	-.0004	-.0010	.0406

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	657360	10000	--	--	--	--	--
SDev	1245.215	.0000000	--	--	--	--	--
%RSD	.1894268	.0000000	--	--	--	--	--
#1	656479	10000	--	--	--	--	--
#2	658240	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 616637 Operator:
Run Time: 06/27/17 21:11:38
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0022	.5521	-.0103	79.17	.6935	.0088	.0048
SDev	.0004	.0012	.0055	.07	.0007	.0000	.0057
%RSD	19.28	.2160	53.70	.0937	.0949	.2385	119.0
#1	-.0025	.5512	-.0064	79.12	.6939	.0088	.0008
#2	-.0019	.5529	-.0142	79.23	.6930	.0087	.0088

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1098.	-.0003	.0128	.0750	.0134	11.32	206.9
SDev	.	.0004	.0003	.0002	.0005	.08	.2
%RSD	.0185	148.7	2.378	.3194	3.468	.7262	.0914
#1	1098.	-.0005	.0126	.0752	.0131	11.38	206.8
#2	1098.	.0000	.0130	.0749	.0137	11.26	207.0

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0311	3.277	101.8	6.991	.0370	S17.13	598.4
SDev	.0013	.008	.2	.005	.0005	.51	3.8
%RSD	4.095	.2437	.2027	.0784	1.356	3.002	.6295
#1	.0302	3.283	101.9	6.994	.0367	S17.49	595.7
#2	.0320	3.272	101.6	6.987	.0374	S16.77	601.0

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	.0291	.0021	-.0060	-.0058	178.3	.0043	94.76
SDev	.0000	.0050	.0034	.0016	2.2	.0025	.73
%RSD	.0353	235.6	57.76	27.49	1.241	58.45	.7705
#1	.0291	.0057	-.0084	-.0047	179.9	.0025	94.25
#2	.0291	-.0014	-.0035	-.0070	176.8	.0061	95.28

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.273	1.263	54.73	-.0033	1.265	.0061	2.858
SDev	.030	.007	.20	.0006	.015	.0052	.007
%RSD	2.395	.5809	.3680	19.13	1.189	86.19	.2450
#1	1.294	1.268	54.87	-.0037	1.276	.0024	2.853
#2	1.251	1.258	54.58	-.0028	1.254	.0098	2.863

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0239	-.0006	.0119	.0573	.0050	.0325	.0383
SDev	.0075	.0001	.0120	.0068	.0001	.0019	.0003
%RSD	31.43	19.76	100.5	11.94	1.804	5.699	.7358
#1	-.0292	-.0005	.0204	.0524	.0049	.0339	.0381
#2	-.0186	-.0006	.0034	.0621	.0050	.0312	.0385

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	2.130	-.0004	.0585
SDev	.001	.0003	.0208
%RSD	.0366	74.64	35.46
#1	2.130	-.0007	.0439
#2	2.129	-.0002	.0732

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	669101	10000	--	--	--	--	--
SDev	5150.566	.0000000	--	--	--	--	--
%RSD	.7697740	.0000000	--	--	--	--	--
#1	665459	10000	--	--	--	--	--
#2	672743	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: CCV Operator:
Run Time: 06/27/17 21:17:00
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.9833	10.22	5.229	5.494	9.869	H1.110	4.875
SDev	.0082	.03	.007	.078	.069	.099	.012
%RSD	.8360	.3369	.1426	1.419	.6965	8.961	.2363
#1	.9775	10.20	5.234	H5.550	9.918	H1.180	4.867
#2	.9891	10.25	5.223	5.439	9.821	1.040	4.883
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass
High	1.100	11.00	5.500	5.500	11.00	1.100	5.500
Low	.9000	9.000	4.500	4.500	9.000	.9000	4.500

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	19.92	.9955	4.837	1.964	1.961	9.945	20.17
SDev	.04	.0008	.008	.004	.006	.019	.20
%RSD	.2213	.0835	.1571	.2161	.3296	.1872	.9789
#1	19.89	.9961	4.832	1.967	1.966	9.958	20.31
#2	19.95	.9949	4.842	1.961	1.957	9.932	20.03
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	22.00	1.100	5.500	2.200	2.200	11.00	22.00
Low	18.00	.9000	4.500	1.800	1.800	9.000	18.00

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.474	H5.590	19.97	.9840	4.817	H39.22	29.78
SDev	.034	.064	.03	.0006	.027	.59	.11
%RSD	.6220	1.148	.1592	.0631	.5572	1.494	.3790
#1	5.498	H5.635	20.00	.9844	4.836	H39.63	29.86
#2	5.450	H5.544	19.95	.9835	4.798	H38.80	29.70
Errors	LC Pass	LC High	LC Pass	LC Pass	LC Pass	LC High	LC Pass
High	5.500	5.500	22.00	1.100	5.500	33.00	33.00
Low	4.500	4.500	18.00	.9000	4.500	27.00	27.00

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	4.839	4.823	4.914	.9982	1.039	1.018	99.94
SDev	.091	.081	.110	.0009	.031	.001	1.12
%RSD	1.886	1.688	2.239	.0896	3.023	.1090	1.120
#1	4.903	4.880	4.991	.9989	1.017	1.017	99.15
#2	4.774	4.765	4.836	.9976	1.061	1.019	100.7
Errors	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	NOCHECK
High	5.500			1.100	1.100	1.100	
Low	4.500			.9000	.9000	.9000	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.139	5.223	4.883	4.879	5.189	4.990	4.970
SDev	.099	.124	.027	.100	.115	.003	.035
%RSD	1.922	2.368	.5490	2.057	2.221	.0633	.7099
#1	5.208	5.310	4.864	4.949	5.271	4.992	4.995
#2	5.069	5.135	4.902	4.808	5.108	4.987	4.945
Errors	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High			5.500	5.500	5.500	5.500	5.500
Low			4.500	4.500	4.500	4.500	4.500

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.9853	4.993	4.921	4.990	5.075	1.037	4.999
SDev	.0072	.006	.019	.018	.002	.003	.021
%RSD	.7285	.1200	.3858	.3640	.0310	.3303	.4177
#1	.9803	4.989	4.934	5.003	5.074	1.040	5.014
#2	.9904	4.997	4.907	4.977	5.076	1.035	4.984
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	1.100	5.500	5.500	5.500	5.500	1.100	5.500
Low	.9000	4.500	4.500	4.500	4.500	.9000	4.500

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	.9818	4.910	5.260
SDev	.0020	.000	.014
%RSD	.2071	.0079	.2604
#1	.9832	4.910	5.250
#2	.9803	4.911	5.270
Errors	LC Pass	LC Pass	LC Pass
High	1.100	5.500	5.500
Low	.9000	4.500	4.500

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	705593	10000	--	--	--	--	--
SDev	7929.496	.0000000	--	--	--	--	--
%RSD	1.123806	.0000000	--	--	--	--	--
#1	699986	10000	--	--	--	--	--
#2	711200	10000	--	--	--	--	--

Analysis Report 06/27/17 09:27:28 PM

Method: DAILY1 Sample Name: CCB Operator:
Run Time: 06/27/17 21:22:24
Comment: Southwest Research Institute
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0006	.0182	-.0009	H.1853	-.0001	-.0001	.0052
SDev	.0013	.0016	.0063	.0258	.0000	.0001	.0017
%RSD	209.2	9.000	729.9	13.93	14.76	53.32	32.19
#1	-.0016	.0170	-.0053	H.2035	-.0001	-.0001	.0040
#2	.0003	.0193	.0036	H.1670	-.0001	-.0001	.0064
Errors	LC Pass	LC Pass	LC Pass	LC High	LC Pass	LC Pass	LC Pass
High	.0100	.0750	.0150	.1000	.0050	.0050	.0250
Low	-.0100	-.0750	-.0150	-.1000	-.0050	-.0050	-.0250

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0147	-.0001	-.0010	-.0005	-.0022	-.0058	-.0097
SDev	.0039	.0003	.0011	.0000	.0000	.0025	.0308
%RSD	26.64	260.9	112.8	1.050	1.707	43.51	319.3
#1	.0174	-.0003	-.0002	-.0005	-.0022	-.0040	-.0315
#2	.0119	.0001	-.0017	-.0005	-.0023	-.0076	.0122
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0500	.0050	.0050	.0050	.0050	.1000	.1500
Low	-.0500	-.0050	-.0050	-.0050	-.0050	-.1000	-.1500

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0009	.0001	.0020	-.0000	.0003	.0069	-.0491
SDev	.0001	.0001	.0013	.0000	.0018	.0016	.2167
%RSD	11.44	63.59	60.81	64.84	717.9	23.75	441.4
#1	.0009	.0001	.0029	-.0001	.0016	.0058	L-.2023
#2	.0010	.0002	.0012	-.0000	-.0010	.0081	.1041
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0100	.0100	.0500	.0050	.0075	.1500	.1500
Low	-.0100	-.0100	-.0500	-.0050	-.0075	-.1500	-.1500

Elem	Ni2316	2203/1	2203/2	Pd3404	S_1820	Sb2068	Sc3613
Units	ppm	ppm	ppm	ppm	ppm	ppm	%R
Avge	-.0008	.0036	-.0022	-.0053	-.0029	-.0008	100.3
SDev	.0017	.0007	.0014	.0009	.0131	.0009	.2
%RSD	220.5	19.91	62.56	17.21	455.3	110.1	.2225
#1	.0004	.0031	-.0031	-.0047	-.0122	-.0015	100.4
#2	-.0020	.0041	-.0012	-.0060	.0064	-.0002	100.1
Errors	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	NOCHECK
High	.0050			.0250	.0500	.0200	
Low	-.0050			-.0250	-.0500	-.0200	

Elem	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899	Sr4215

Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0116	-.0043	-.0029	-.0003	.0010	-.0034	.0000
SDev	.0014	.0006	.0025	.0011	.0001	.0053	.0000
%RSD	11.81	14.21	84.83	448.8	4.966	157.9	43.34
#1	.0125	-.0047	-.0046	-.0011	.0011	.0004	.0001
#2	.0106	-.0038	-.0012	.0006	.0010	-.0072	.0000
Errors	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High			.1000	.0050	.0200	.0150	.0050
Low			-.1000	-.0050	-.0200	-.0150	-.0050

Elem	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0062	-.0018	.0033	.0418	-.0006	.0073	.0000
SDev	.0021	.0001	.0019	.0062	.0005	.0053	.0001
%RSD	33.27	4.594	55.99	14.84	87.71	72.89	1756.
#1	-.0076	-.0019	.0046	.0375	-.0002	.0035	.0001
#2	-.0047	-.0018	.0020	.0462	-.0009	.0111	-.0001
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0200	.0050	.0500	.2000	.0050	.0200	.0050
Low	-.0200	-.0050	-.0500	-.2000	-.0050	-.0200	-.0050

Elem	Zn2062	Zr3496	P_1782
Units	ppm	ppm	ppm
Avge	-.0003	-.0002	.0434
SDev	.0000	.0005	.0096
%RSD	.9151	314.3	22.13
#1	-.0004	.0002	.0502
#2	-.0003	-.0005	.0366
Errors	LC Pass	LC Pass	LC Pass
High	.0050	.0100	.0750
Low	-.0050	-.0100	-.0750

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	707917	10000	--	--	--	--	--
SDev	1622.103	.0000000	--	--	--	--	--
%RSD	.2291374	.0000000	--	--	--	--	--
#1	709064	10000	--	--	--	--	--
#2	706770	10000	--	--	--	--	--

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

TCLP Metals

Method 1311 Extraction Logs

010255

TOXICITY CHARACTERISTIC LEACHING PROCEDURE LOGBOOK

SOUTHWEST RESEARCH INSTITUTE® - TRACE METALS LABORATORY
SAN ANTONIO, TX 78228

Book/Page 15-0406-016
Book I.D.# 11 00100

CLIENT(S): Savannah River
TASK ORDER(S): 170601-2 / 170620-3 SDG: 616029 / 616635
PROJ. NO(S): 17995.22.00X / 17995.23.00X
STARTING DATE: 6/8/17 / 6-21-17
METHOD: ☑ 1311 TAP-01-0406-108 / ☐ 1312 TAP-01-0406-147

Particle Size Reduction Method:

placed samples in a zip loc bag
crushed with a hammer into smaller pieces,
pass through 9.5mm. KE 6/22/17

med. Limited Sample elevated level.

PRELIMINARY DETERMINATIONS

		DETERMINATION OF PERCENT SOLIDS															PART SIZE REDUC		EXTRACTION FLUID DETERMINATION			
	SAMPLE ID	S *	L *	M *	FULL SMPL CONT WT(g)	EMPTY SMPL CONT WT(g)	TOT SMPL WT (g)	JAR WT(g)	JAR +LIQ WT(g)	LIQ WT(g)	FILTR WT(g)	FILTER +SLD WT(g)	SLD WT(g)	% SLDS	FILTR +SLD DRY WT(g)	SLD DRY WT(g)	% DRY SLDS	REQ	Not REQ	pH-1 **	pH-2 **	EF #1	EF #2
1	616029	✓																✓		11.80	9.20		✓
2	616635	✓																	✓	12.02	9.89		✓
3	36	✓																	✓	12.15	10.57		✓
4	37	✓																	✓	11.99	9.02		✓
5	EPB#2-84825																			2.85			
6																							
7																							
8																							
9																							
10																							
11																							
12																							
13																							
14																							
15																							

6/20/17

S - SAMPLE IS 100% SOLID
L - SAMPLE IS 100% LIQUID
M – Sample is Multiphasic

EF: #2-84825
EF: —

pH Logsheet Page #: ~~209~~ 203 (re) 6-21-17 KE
pH Logsheet Page #: —

** pH-1: pH IN WATER
pH-2: pH AFTER adding 1N HCl: INV # 82715

010256

TOXICITY CHARACTERISTIC LEACHING PROCEDURE LOGBOOK

SOUTHWEST RESEARCH INSTITUTE® - TRACE METALS LABORATORY
SAN ANTONIO, TX 78228

Book/Page 15-0406-016
Book I.D.# 11 00101

Procedure when volatiles are not involved:

Initial Rotation Date/Time: 6-21-17 15:30
Final Rotation: 6-22-17 08:30
Total Rotation: 17 HRS 0 MINS
No Rotation Required, Samples are 100% Liquid N/A

Start Temp: 23.8 (23 +/- 2)°C Final Temp: 24.2 ° C
Thermometer ID: Roommonitor Location: Lab-24
# of RPM: 32 6.21.17 KE (30 +/- 2)
TCLP Filter Lot #: 102807-5043
pH paper Lot #: 62597
Tumbler ID: 2

Filtration Date: 6-22-17 KE (ME)
Start Time: 0845 Stop Time: 09:30
Extracts location:
Organics: N/A
Inorganics: Lab 47 1
Balance: 16 / 5 6-28-17 (RE) KE
pH preserved to < 2 with HNO3: (Yes) / No
HNO_3 INV #: 84666
Pipette I.D.: 5000-2/1000-3/200-1
Spike Level(s) for Inorganics:

*150mL of sample ID #616029 was spiked with: 750uL each: ICV-2A (SPEX, #84894), Sb (ICV-2B) (SPEX, #84895), ICV-2C (SPEX, #84896) all Exp.4/30/18, and 60uL of 10mg/L Hg #86199 Exp.07/12/17)

KE 6/22/17

	BOTTLE NUMBER	SAMPLE ID	MULTI PHASE WT(g)	SOLID WT (g)	LIQ PHASE VOL (mL)	EXTRACTION FLUID WT (g)	AMT LIQ PHASE (mL) COMBINED WITH LIQ OF SOLID EXTN	LIQ PHASE COMPATIBLE W/ LIQ OF SOLID EXTN	FINAL pH
1	Nalgene	616029 *		18.3165		366 mL			7.15
2	23	61-6635 **		100.077		2001 mL			8.31
3	12	616636		100.060		2001 mL			8.80
4	9	616637		100.020		2000 mL			6.50
5	17	EPA#2-84825		—		500 mL			2.87
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

**500mL of sample ID #616635 was spiked with: 2.5ml each: ICV-2A (SPEX, #84894), Sb (ICV-2B) (SPEX, #84895), ICV-2C (SPEX, #84896) all Exp.4/30/18, and 100uL of 10mg/L Hg #86199 Exp. 07/12/17)

KE 6/22/17

6/28/17

Prepared By: ___ Date: 6-21-17

Reviewed By: ___ Date: 6/28/17

Disposal Int/Date/Loc: _____

SOUTHWEST RESEARCH INSTITUTE
CLIENT: Savannah River Nuclear
SwRI PROJECT#: 17995.23.001
SwRI TASK ORDER: 170620-3
SwRI SRR: 59875
SDG: 616635
CONTRACT: 78769
ORDER: SWR-17-W-17030
RECEIVED: 06/14/2017

TCLP Metals

Standard Logs and Certificates

010258

Chemical Information Sheet

#86201

Hg Working 100ppb (IV)

Grade:	Analytical
Type:	Working Level Solution
CAS:	- No Data -
Lot:	- No Data -
Received:	06/12/2017
Expiration:	07/12/2017
Location:	- No Data -
Current Lab:	Lab 48 Bldg 70
Original Amount:	250 mL
Amount Remaining:	194.2
Supplier:	- No Data -
Concentration:	
Project:	- No Data -
PO Number:	- No Data -
Internal Lab ID:	- No Data -
Density:	- No Data -
Storage Requirement:	- No Data -
Measuring Device ID:	- No Data -
Date Disposed:	- No Data -
Notes:	pipette: 5000-2

Sources Table

Mix created by kedrisi on 06/12/17 12:18:13 PM.

ID	Source	Manufacturer	Lot	Amount
86199	Hg Intermediate10ppm-A			2.5 mL

Solvent Table

ID	Solvent	Manufacturer	Lot	Amount
	DI Water			remaining
84665	Nitric Acid, Trace Metals	Fisher Scientific	1116100	1 mL

Component Table

Compound	Conc/Activity	CAS
Mercury	0.1 mg/L	7439-97-6

010259

Chemical Information Sheet

#86199

Hg Intermediate10ppm-A

Grade:	Analytical
Type:	Working Level Solution
CAS:	- No Data -
Lot:	- No Data -
Received:	06/12/2017
Expiration:	07/12/2017
Location:	- No Data -
Current Lab:	Lab 48 Bldg 70
Original Amount:	100 mL
Amount Remaining:	97.5
Supplier:	- No Data -
Concentration:	
Project:	- No Data -
PO Number:	- No Data -
Internal Lab ID:	- No Data -
Density:	- No Data -
Storage Requirement:	- No Data -
Measuring Device ID:	- No Data -
Date Disposed:	- No Data -
Notes:	pipette: 1000-3

Sources Table

Mix created by kedrisi on 06/12/17 12:15:48 PM.

ID	Source	Manufacturer	Lot	Amount
76670	Mercury	Inorganic Ventures	K2-HG03002	1.0 mL

Solvent Table

ID	Solvent	Manufacturer	Lot	Amount
84665	Nitric Acid, Trace Metals	Fisher Scientific	1116100	1 mL
	DI Water			remaining

Component Table

Compound	Conc/Activity	CAS
Mercury	10 mg/L	7439-97-6

Chemical Information Sheet

#76670

Mercury

Grade:	Analytical
Type:	Commercial Stock
CAS:	7439-97-6
Lot:	K2-HG03002
Received:	11/29/2016
Expiration:	11/30/2017
Location:	- No Data -
Current Lab:	Lab 48 Bldg 70
Original Amount:	125 mL
Amount Remaining:	118
Supplier:	Inorganic Ventures
Concentration:	1000 mg/L
Project:	- No Data -
PO Number:	K46813MM
Internal Lab ID:	- No Data -
Density:	1.023 g/mL
Storage Requirement:	Ambient
Measuring Device ID:	- No Data -
Date Disposed:	- No Data -
Notes:	TCT OPEN DATE: 11/30/16

Component Table

Compound	Conc/Activity	CAS

INORGANIC VENTURES
300 Technology Drive
Christiansburg, VA 24073 - USA
inorganicventures.com

CERTIFICATE OF ANALYSIS

tel: (800) 669-6729 - (540) 585-3030
fax: (540) 585-3012
info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

2.0 PRODUCT DESCRIPTION

Product Code:	Single Analyte Atomic Absorption Solution
Catalog Number:	AAHG1
Lot Number:	K2-HG03002
Matrix:	5% (v/v) HNO3
Value / Analyte(s):	1 000 µg/mL ea: Mercury

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value:	1000 ± 10 µg/mL
Certified Density:	1.023 g/mL (measured at 20 ± 1 °C)

4.0 TRACEABILITY TO NIST

The concentration of this solution standard has been verified by Inductively Coupled Plasma Spectroscopy (ICP) and is traceable to NIST SRM 3133

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

SwRI Chem ID: 76670

SwRI Chem ID: 76670

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag keep cap tightly sealed when not in use. Store and use at 20° ± 4° C. Do not pippette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 200.59 +2 4 Hg(OH)(aq) 1+
Chemical Compatibility - Stable in HNO3. Avoid basic media forming insoluble carbonate. The sulfide, basic carbonate, oxalate, phosphate, arsenite, arsenate and iodide are insoluble in water.
Stability - 2-100 ppb levels not stable in 1% HNO3 / LDPE container, stable in 10% HNO3 packaged in borosilicate glass. 1-100 ppm levels stable in 7% HNO3 packaged in borosilicate glass. 1000-10,000 ppm solutions are chemically stable for years in 5-10% HNO3 / LDPE container.
Hg Containing Samples (Preparation and Solution) - Metal (soluble in HNO3); Oxide (Soluble in HNO3); Ores and Organic based (The literature has more references to the preparation of Hg containing samples than any other element. Please consult the literature for your specific sample type, since such preparations are prone to error. Or e-mail our technical staff and we will contact you to discuss your particular sample preparation questions in further detail.).
Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 202 amu	9 ppt	n/a	186W16O
ICP-OES 184.950 nm	0.03 / 0.005 µg/mL	1	
ICP-OES 194.227 nm	0.03 / 0.005 µg/mL	1	V
ICP-OES 253.652 nm	0.1 / 0.03 µg/mL	1	Ta, Co, Th ,Rh , Fe, U

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

June 21, 2016

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- June 21, 2020

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _11/30/2016_Exp:_11/30/2017____

- This CRM/RM should not be used longer than one year from the date of removal from the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being handled and stored in accordance with the instructions given in Sec 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Brenda Francis
Product Documentation Technician

Certificate Approved By:

Michael Booth
QC Supervisor

Certifying Officer:

Paul Gaines
PhD., Senior Technical Director

010264

Chemical Information Sheet

#84894

ICV-2A

Grade:	Analytical
Type:	Commercial Stock
CAS:	- No Data -
Lot:	1-162MKBX
Received:	04/28/2017
Expiration:	04/30/2018
Location:	- No Data -
Current Lab:	Lab 48 Bldg 70
Original Amount:	500 mL
Amount Remaining:	480
Supplier:	Spex Certiprep
Concentration:	
Project:	- No Data -
PO Number:	K48304MM
Internal Lab ID:	- No Data -
Density:	- No Data -
Storage Requirement:	Ambient
Measuring Device ID:	- No Data -
Date Disposed:	- No Data -
Notes:	ICV-2

Component Table

Compound	Conc/Activity	CAS
Calcium	2000 mg/L	1305-78-8
Potassium	2000 mg/L	7440-09-7
Magnesium	2000 mg/L	7439-95-4
Sodium	2000 mg/L	7440-23-5
Aluminum	1000 mg/L	7429-90-5
Barium	1000 mg/L	10022-31-8
Iron	1000 mg/L	7439-89-6
Cobalt	500 mg/L	7440-48-4
Nickel	500 mg/L	7440-02-0
Vanadium	500 mg/L	7647-01-0
Chromium	200 mg/L	7440-47-3
Copper	200 mg/L	7440-50-8
Silver	100 mg/L	7440-22-4
Beryllium	100 mg/L	7440-41-7
Manganese	100 mg/L	7439-96-5
Zinc	100 mg/L	7440-66-6

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Chemical Testing
Cert #2495.02

Catalog Number: ICV-2A **Lot No.** 1-162MKBX

Description: Initial Calibration Verification Standard II

Matrix: 5% HNO_3

This **ASSURANCE®** Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations. See side 2 for details of certification.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Certified	Uncertainty	SRM	Analyte	Labeled	Certified	Uncertainty	SRM
Ca	2000 µg/mL	1976 µg/mL	±10 µg/mL	3109a*	Ni	500 µg/mL	495 µg/mL	±3 µg/mL	3136*
K	2000 µg/mL	1975 µg/mL	±10 µg/mL	3141a*	V	500 µg/mL	497 µg/mL	±3 µg/mL	3165*
Mg	2000 µg/mL	1974 µg/mL	±10 µg/mL	3131a*	Cr	200 µg/mL	198 µg/mL	±1 µg/mL	3112a*
Na	2000 µg/mL	1976 µg/mL	±10 µg/mL	3152a*	Cu	200 µg/mL	199 µg/mL	±1 µg/mL	3114*
Al	1000 µg/mL	987 µg/mL	±5 µg/mL	3101a*	Ag	100 µg/mL	99.4 µg/mL	±0.5 µg/mL	3151*
Ba	1000 µg/mL	994 µg/mL	±5 µg/mL	3104a*	Be	100 µg/mL	98.6 µg/mL	±0.5 µg/mL	3105a*
Fe	1000 µg/mL	993 µg/mL	±5 µg/mL	3126a*	Mn	100 µg/mL	98.7 µg/mL	±0.5 µg/mL	3132*
Co	500 µg/mL	495 µg/mL	±3 µg/mL	3113*	Zn	100 µg/mL	99.1 µg/mL	±0.5 µg/mL	3168a*

* - indicates NIST SRM † - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# 11-72YP, 10-17YP

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ±0.5% of the certified (measured) value. This includes uncertainty components due to preparation, measurement, homogeneity, and short-term and long-term stability. No measured concentration of any individual component exceeds ±2% of the labeled value. This guarantee is valid for a period of one year from the date of certification only when the material is unopened and stored under ambient laboratory conditions.

Date of Certification: APR 2017 Certifying Officer:

Chemical Information Sheet

#84895

Antimony

Grade:	Analytical
Type:	Commercial Stock
CAS:	7440-36-0
Lot:	22-27SBX
Received:	04/28/2017
Expiration:	04/30/2018
Location:	- No Data -
Current Lab:	Lab 48 Bldg 70
Original Amount:	500 mL
Amount Remaining:	498
Supplier:	Spex Certiprep
Concentration:	1000 mg/L
Project:	- No Data -
PO Number:	K48304MM
Internal Lab ID:	- No Data -
Density:	1.003 g/mL
Storage Requirement:	Ambient
Measuring Device ID:	- No Data -
Date Disposed:	- No Data -
Notes:	ICV-2

Component Table

Compound	Conc/Activity	CAS

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Cert #2495.02

Catalog Number: PLSB7-2X **Lot No.** 22-27SBX

Description: 1000 µg/mL Antimony

Matrix: H_2O / 0.6% Tart. Acid / Tr. HNO_3

This **ASSURANCE®** Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1001 µg/mL ±5 µg/mL

Certified Value is Traceable to: 3102a*

* - indicates NIST SRM † - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

The CRM is prepared gravimetrically using high purity Antimony Metal, Lot# 01131A. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis.

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1001 µg/mL

Method: Evaporate to dryness. Fume with Nitric Acid. Ignite and weigh as Sb_2O_4.

Instrumental Analysis by ICP Spectrometer: 1001 µg/mL

Uncertified Properties

Density: 1.003 g/mL @ 20.0°C

Trace Metallic Impurities in the Actual Solution via ICP-MS Analysis:

Element	µg/mL	Element	µg/mL	Element	µg/mL	Element	µg/mL	Element	µg/mL	Element	µg/mL
Ag	<0.001	Cr	0.002	Hg	<0.001	Na	<0.01	Rh	<0.001	Th	0.005
Al	0.008	Cs	<0.001	Ho	0.001	Nb	<0.001	Ru	<0.001	Ti	<0.003
As	<0.002	Cu	0.002	In	<0.001	Nd	0.001	Sc	0.005	Tl	<0.001
Au	<0.001	Dy	0.001	Ir	<0.001	Ni	0.003	Se	<0.002	Tm	<0.001
B	0.01	Er	<0.001	K	<0.1	P	<0.2	Si	<0.1	U	<0.001
Ba	0.001	Eu	0.001	La	0.01	Pb	0.002	Sm	0.001	V	<0.001
Be	<0.001	Fe	<0.04	Li	<0.002	Pd	<0.001	Sn	<0.001	W	<0.001
Bi	<0.001	Ga	<0.001	Lu	<0.001	Pr	0.001	Sr	<0.001	Y	0.005
Ca	<0.05	Gd	<0.001	Mg	0.01	Pt	<0.001	Ta	<0.001	Yb	<0.001
Cd	0.001	Ge	<0.001	Mn	<0.001	Rb	<0.001	Tb	0.001	Zn	0.01
Ce	0.002	Hf	<0.001	Mo	<0.001	Re	<0.001	Te	<0.001	Zr	0.002
Co	<0.001										

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32867 and others. This CRM is guaranteed stable and accurate to +/- 0.5% of the certified value. This includes uncertainty components due to preparation, homogeneity by the most precise method, and short-term and long-term stability. This guarantee is valid for a period of one year from the date of certification only when the material is unopened and stored under ambient laboratory conditions.

Date of Certification: APR 2017 Certifying Officer:

010268

Chemical Information Sheet

#84896

ICV-2C

Grade:	Analytical
Type:	Commercial Stock
CAS:	7697-37-2
Lot:	1-161MKBX
Received:	04/28/2017
Expiration:	04/28/2018
Location:	- No Data -
Current Lab:	Lab 48 Bldg 70
Original Amount:	500 mL
Amount Remaining:	478
Supplier:	Spex Certiprep
Concentration:	
Project:	- No Data -
PO Number:	K48304MM
Internal Lab ID:	- No Data -
Density:	- No Data -
Storage Requirement:	Ambient
Measuring Device ID:	- No Data -
Date Disposed:	- No Data -
Notes:	ICV-2

Component Table

Compound	Conc/Activity	CAS
Arsenic	500 mg/L	7440-38-2
Lead	500 mg/L	7439-92-1
Selenium	500 mg/L	7782-49-2
Thallium	500 mg/L	7440-28-0
Cadmium	100 mg/L	7440-43-9

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Chemical Testing
Cert #2495.02

Catalog Number: ICV-2C **Lot No.** 1-161MKBX

Description: Initial Calibration Verification Standard II

Matrix: 5% HNO_3

This **ASSURANCE®** Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations. See side 2 for details of certification.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Certified	Uncertainty	SRM	Analyte	Labeled	Certified	Uncertainty	SRM
As	500 µg/mL	498 µg/mL	±3 µg/mL	3103a*	Tl	500 µg/mL	497 µg/mL	±3 µg/mL	3158*
Pb	500 µg/mL	498 µg/mL	±3 µg/mL	3128*	Cd	100 µg/mL	101 µg/mL	±0.5 µg/mL	3108*
Se	500 µg/mL	498 µg/mL	±3 µg/mL	3149*					

* - Indicates NIST SRM † - Indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# 10-18YP

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ±0.5% of the certified (measured) value. This includes uncertainty components due to preparation, measurement, homogeneity, and short-term and long-term stability. No measured concentration of any individual component exceeds ±2% of the labeled value. This guarantee is valid for a period of one year from the date of certification only when the material is unopened and stored under ambient laboratory conditions.

Date of Certification: APR 2017 Certifying Officer:

Chemical Information Sheet

#83549

Instrument Calibration Standard 1

Grade:	Analytical
Type:	Commercial Stock
CAS:	- No Data -
Lot:	1-133MKBY
Received:	03/21/2017
Expiration:	03/30/2018
Location:	- No Data -
Current Lab:	Lab 48 Bldg 70
Original Amount:	125 mL
Amount Remaining:	125
Supplier:	Spex Certiprep
Concentration:	
Project:	- No Data -
PO Number:	K37507E
Internal Lab ID:	- No Data -
Density:	- No Data -
Storage Requirement:	Ambient
Measuring Device ID:	- No Data -
Date Disposed:	- No Data -
Notes:	

Component Table

Compound	Conc/Activity	CAS
Calcium	5000 mg/L	1305-78-8
Magnesium	5000 mg/L	7439-95-4
Potassium	5000 mg/L	7440-09-7
Sodium	5000 mg/L	7440-23-5

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SPEXertificate®

Certificate of Reference Material

ilac-MRA ACCREDITED
Chemical Testing
Cert #2495.02

Catalog Number: ICAL-1 **Lot No.** 1-133MKBY

Description: Instrument Calibration Standard 1

Matrix: 5% HNO_3

This **ASSURANCE®** Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations. See side 2 for details of certification.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Certified	Uncertainty	SRM	Analyte	Labeled	Certified	Uncertainty	SRM
Ca	5000 µg/mL	5014 µg/mL	±30 µg/mL	3109a*	Mg	5000 µg/mL	4997 µg/mL	±30 µg/mL	3131a*
K	5000 µg/mL	4965 µg/mL	±30 µg/mL	3141a*	Na	5000 µg/mL	5023 µg/mL	±30 µg/mL	3152a*

* - indicates NIST SRM † - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# 12-164YP,12-56YP

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ±0.5% of the certified (measured) value. This includes uncertainty components due to preparation, measurement, homogeneity, and short-term and long-term stability. No measured concentration of any individual component exceeds ±2% of the labeled value. This guarantee is valid for a period of one year from the date of certification only when the material is unopened and stored under ambient laboratory conditions.

Date of Certification: **MAR 2017** Certifying Officer:

Report of Certification

This Certified Reference Material (CRM) has been prepared and certified under an ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 quality system consistent with the following guides:

- ISO 9001: Quality management systems – Requirements – certified by UL-DQS
- ISO 17025: General requirements for the competence of testing and calibration laboratories – accredited by A2LA
- ISO Guide 34: General requirements for the competence of reference material producers – accredited by A2LA
- ISO Guide 31: Reference Materials – Contents of certificates and labels
- ISO Guide 35: Reference Materials – General & Statistical Principals for Certification
- Guide To The Expression Of Uncertainty In Measurement 1997
- EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
- ASTM Guide D6362-98
- NIST Technical Note 1297
- ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
- ISO/REMCO N280

Material Source:

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Instructions for Use:

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Method of Preparation:

Clean laboratory procedures and techniques have been used throughout the preparation. All materials, equipment, analytical instrumentation and personnel have been qualified prior to use. The highest purity acids applicable, 18 megohm, double deionized water, acid-leached triple-rinsed bottles (where appropriate), and Class A/calibrated volumetrics have been used in all preparations.

Homogeneity:

The homogeneity of the CRM has been confirmed by procedures consistent with ISO 17025:2005, ISO Guide 34:2009, and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed to prove homogeneity in accordance with our internal procedure 4600-HOMOGEN-1A. Since the product is highly homogeneous, any sample size taken for analysis would be within the uncertainty budget. This is consistent with the intended use of the CRM.

Statistical Estimator and Confidence Limits:

The certified value 'X' listed on the reverse of this document is at the 95% level of confidence and can be expressed as:

- $X = x \pm U$ where X = certified value, U = expanded uncertainty, x = property value
- $U = ku_c$ where $k = 2$ is the coverage factor at the 95% confidence level
- u_c is obtained by combining the individual element standard uncertainty components u_i, and $u_c = \sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from the Traveler Report (SPEX CertiPrep's traceability documentation) identified by the lot number of this CRM. During the stated period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

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Your Science is Our Passion®

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010273

Chemical Information Sheet

#83548

Spike Sample Standard I

Grade:	Analytical
Type:	Commercial Stock
CAS:	- No Data -
Lot:	1-143MKBX
Received:	03/21/2017
Expiration:	03/30/2018
Location:	- No Data -
Current Lab:	Lab 48 Bldg 70
Original Amount:	500 mL
Amount Remaining:	500
Supplier:	Spex Certiprep
Concentration:	
Project:	- No Data -
PO Number:	K37507E
Internal Lab ID:	- No Data -
Density:	- No Data -
Storage Requirement:	Ambient
Measuring Device ID:	- No Data -
Date Disposed:	- No Data -
Notes:	

Component Table

Compound	Conc/Activity	CAS
Aluminum	200 mg/L	7429-90-5
Arsenic	200 mg/L	7440-38-2
Barium	200 mg/L	10022-31-8
Selenium	200 mg/L	7782-49-2
Thallium	200 mg/L	10102-45-1
Iron	100 mg/L	7439-89-6
Cobalt	50 mg/L	7440-48-4
Manganese	50 mg/L	7439-96-5
Nickel	50 mg/L	7440-02-0
Lead	50 mg/L	10099-74-8
Antimony	50 mg/L	7440-36-0
Vanadium	50 mg/L	7647-01-0
Zinc	50 mg/L	7440-66-6
Copper	25 mg/L	7440-50-8
Chromium	20 mg/L	7440-47-3
Silver	5 mg/L	7440-22-4
Beryllium	5 mg/L	7440-41-7
Cadmium	5 mg/L	7440-43-9

ACCREDITED
Reference Materials Producer
Cert #2495.01

SPEXertificate®

Certificate of Reference Material

ilac-MRA ACCREDITED
Chemical Testing
Cert #2495.02

Catalog Number: SPIKE-1-500 **Lot No.** 1-143MKBX

Description: Spike Sample Standard I

Matrix: 5% HNO_3 / Tr. Tart. Acid / Tr. HF

This **ASSURANCE®** Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations. See side 2 for details of certification.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Certified	Uncertainty	SRM	Analyte	Labeled	Certified	Uncertainty	SRM
Al	200 µg/mL	199 µg/mL	±1 µg/mL	3101a*	Pb	50 µg/mL	49.4 µg/mL	±0.3 µg/mL	3128*
As	200 µg/mL	200 µg/mL	±1 µg/mL	3103a*	Sb	50 µg/mL	49.3 µg/mL	±0.3 µg/mL	3102a*
Ba	200 µg/mL	199 µg/mL	±1 µg/mL	3104a*	V	50 µg/mL	49.8 µg/mL	±0.3 µg/mL	3165*
Se	200 µg/mL	198 µg/mL	±1 µg/mL	3149*	Zn	50 µg/mL	49.5 µg/mL	±0.3 µg/mL	3168a*
Tl	200 µg/mL	198 µg/mL	±1 µg/mL	3158*	Cu	25 µg/mL	25.3 µg/mL	±0.1 µg/mL	3114*
Fe	100 µg/mL	99.0 µg/mL	±0.5 µg/mL	3126a*	Cr	20 µg/mL	20.1 µg/mL	±0.1 µg/mL	3112a*
Co	50 µg/mL	50.3 µg/mL	±0.3 µg/mL	3113*	Ag	5 µg/mL	4.95 µg/mL	±0.03 µg/mL	3151*
Mn	50 µg/mL	49.5 µg/mL	±0.3 µg/mL	3132*	Be	5 µg/mL	4.99 µg/mL	±0.03 µg/mL	3105a*
Ni	50 µg/mL	49.7 µg/mL	±0.3 µg/mL	3136*	Cd	5 µg/mL	4.98 µg/mL	±0.03 µg/mL	3108*

* - indicates NIST SRM † - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# 11-23YP, 12-62YP

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ±0.5% of the certified (measured) value. This includes uncertainty components due to preparation, measurement, homogeneity, and short-term and long-term stability. No measured concentration of any individual component exceeds ±2% of the labeled value. This guarantee is valid for a period of one year from the date of certification only when the material is unopened and stored under ambient laboratory conditions.

Date of Certification: **MAR 2017** Certifying Officer:

Report of Certification

This Certified Reference Material (CRM) has been prepared and certified under an ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 quality system consistent with the following guides:

- ISO 9001: Quality management systems – Requirements – certified by UL-DQS
- ISO 17025: General requirements for the competence of testing and calibration laboratories – accredited by A2LA
- ISO Guide 34: General requirements for the competence of reference material producers – accredited by A2LA
- ISO Guide 31: Reference Materials – Contents of certificates and labels
- ISO Guide 35: Reference Materials – General & Statistical Principals for Certification
- Guide To The Expression Of Uncertainty In Measurement 1997
- EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
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