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Rev. 0

River Corridor Closure Contract

Data Summary Report for Hanford Site Coal Ash Characterization

February 2012

For Public Release

Washington Closure Hanford

Prepared for the U.S. Department of Energy, Richland Operations Office
Office of Assistant Manager for River Corridor

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ACRONYMS

bgs	below ground surface
DQA	data quality assessment
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ICP-MS	inductively coupled plasma-mass spectrometry
IQR	interquartile range
KPA	kinetic phosphorescence analysis
LCL	lower confidence limit
PAH	polycyclic aromatic hydrocarbons
PQL	practical quantitation limit
QC	quality control
RCRA	Resource Conservation and Recovery Act
SAP	sampling and analysis plan
UCL	upper confidence limit
UTL	upper tolerance limit
WIDS	Waste Information Database System

METRIC CONVERSION CHART

Into Metric Units			Out of Metric Units		
If You Know	*Multiply By*	*To Get*	*If You Know*	*Multiply By*	*To Get*
Length			**Length**		
inches	25.4	millimeters	millimeters	0.039	inches
inches	2.54	centimeters	centimeters	0.394	inches
feet	0.305	meters	meters	3.281	feet
yards	0.914	meters	meters	1.094	yards
miles	1.609	kilometers	kilometers	0.621	miles
Area			**Area**		
sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.093	sq. meters	sq. meters	10.76	sq. feet
sq. yards	0.836	sq. meters	sq. meters	1.196	sq. yards
sq. miles	2.6	sq. kilometers	sq. kilometers	0.4	sq. miles
acres	0.405	hectares	hectares	2.47	acres
Mass (weight)			**Mass (weight)**		
ounces	28.35	grams	grams	0.035	ounces
pounds	0.454	kilograms	kilograms	2.205	pounds
ton	0.907	metric ton	metric ton	1.102	ton
Volume			**Volume**		
teaspoons	5	milliliters	milliliters	0.033	fluid ounces
tablespoons	15	milliliters	liters	2.1	pints
fluid ounces	30	milliliters	liters	1.057	quarts
cups	0.24	liters	liters	0.264	gallons
pints	0.47	liters	cubic meters	35.315	cubic feet
quarts	0.95	liters	cubic meters	1.308	cubic yards
gallons	3.8	liters			
cubic feet	0.028	cubic meters			
cubic yards	0.765	cubic meters			
Temperature			**Temperature**		
Fahrenheit	subtract 32, then multiply by 5/9	Celsius	Celsius	multiply by 9/5, then add 32	Fahrenheit
Radioactivity			**Radioactivity**		
picocuries	37	millibecquerel	millibecquerels	0.027	picocuries

1.0 INTRODUCTION

There are significant deposits of coal ash at various locations in the river corridor operable units from previous coal-fired power plant operations. Although coal ash from Hanford boiler facilities was previously determined to be nondangerous and nonregulated from a *Resource Conservation and Recovery Act* (RCRA) hazardous waste perspective, a more complete study of coal ash at primary disposal locations was undertaken to further characterize the concentrations and leachability of coal ash metals in various Hanford Site locations.

This study is detailed in the DOE/RL-2010-113, *Sampling and Analysis Plan for Characterization of Hanford Site Coal Ash Components* (SAP) (DOE-RL 2011a). Coal ash sampling was carried out in 2011 and included surface sampling, depth sampling, and batch leach studies from selected river corridor coal ash sites. Surface samples of coal ash from five Hanford Site operable units were analyzed for metals including mercury. A subset of these sample locations were sampled at a depth of 0.9 m (3 ft) to confirm that the concentration of metals in the coal ash is consistent between the surface and depth. A subset of the samples was analyzed for polycyclic aromatic hydrocarbons (PAHs) and total uranium (metal). In addition to directly measuring the concentration of metals in the ash, the samples obtained at depth underwent a serial batch leaching procedure to quantify potential environmental availability.

1.1 PURPOSE

The purpose of this report is to present data and findings from sampling and analysis of five distinct areas of coal ash within the Hanford Site River Corridor. The sampling objectives include the following:

- Quantify the concentration of metals in coal ash samples collected at 29 statistically determined surface locations and 3 depth locations at each of 5 separate coal ash disposal areas.

- Determine the 90th percentile values and corresponding 95% upper confidence limits (UCL) on the 90th percentile values (upper tolerance limit [UTL]) for metals from coal ash surface samples at each of five sampling areas. Compare values as appropriate to examine the relative homogeneity of metal concentrations between the coal ash areas. Prepare additional statistical tests as appropriate.

- Quantify the concentrations of metals in coal ash at 0.9 m (3 ft) below ground surface (bgs) at a subset of sample locations within each of the five sample areas. Compare with data from the corresponding surface samples to determine if the metal concentrations within the ash are relatively homogeneous.

- Perform leaching studies with pH 5.2 water on samples collected from 0.9 m (3 ft) bgs to evaluate leachability of metals from coal ash. Perform follow-on leaching studies with non-pH-adjusted water on the samples with the highest arsenic concentrations.

- Quantify PAHs and uranium (total) at a subset of the sample locations at each of the five sample areas.

1.2 LOCATION

In the Hanford Site River Corridor area, coal-fired boilers were used to generate steam in the 100-B/C, 100-D, 100-F, 100-H, and 300 Areas. Multiple coal-fired boiler houses were also constructed in Hanford Camps to support Hanford construction activities. The coal ash from Hanford Site powerhouses in reactor areas was transported to nearby unlined disposal basins via subsurface pipelines. The coal ash was mixed with river water for sluicing through these pipelines. During operations, coal ash from the disposal basins was periodically removed and deposited at various locations in the vicinity of the disposal basins during necessary cleanout operations. Coal ash remains in the various disposal basins and surrounding areas in varying quantities. Excess coal ash was also used as backfill material at unrelated sites, such as decommissioned septic tanks, as well as in Hanford Site infrastructure, such as road bedding.

As described in the SAP, coal ash from five of the River Corridor operable units was sampled. Four of the sample locations (126-B-1, 126-D-1, 126-H-1, and 600-207) are waste sites previously reclassified as Rejected in the Waste Information Database System (WIDS). The fifth sample location is a coal ash disposal area in the 300 Area that is outside of the primary ash disposal basin. The 300 Area Ash sampling location is not an identified waste site.

1.3 STATEMENT OF THE PROBLEM

While there are no current sources of coal ash production at the Hanford Site, there are multiple locations within the River Corridor where coal ash from previous production was deposited. Coal ash from Hanford boiler facilities was previously determined to be nondangerous and nonregulated from a RCRA dangerous waste perspective. In light of the U.S. Environmental Protection Agency's (EPA) proposal to regulate coal ash from operating electric utilities and independent power producers (EPA 2010a), along with EPA's risk assessment for coal combustion wastes (EPA 2010b), a study was undertaken to characterize the metals (including mercury) present in coal ash at various Hanford Site locations.

2.0 COAL ASH SAMPLING PLAN

2.1 OVERVIEW OF SAMPLE DESIGN

Hanford Site coal ash was characterized using the sampling and analytical strategies detailed in the SAP (DOE-RL 2011a). Five coal ash areas, each in a different Hanford Site operable unit, were identified for sampling. A statistical sampling design was used to locate 29 surface samples at each of the 5 sample areas. A subset of the surface sample locations (three locations per sample area) were also sampled at a depth of 0.9 m (3 ft) to assess concentration variability with depth. In addition to directly measuring the concentration of metals in the ash, batch leach testing was performed on the coal ash samples collected at depth to quantify potential environmental availability. Further analysis for PAHs and total uranium was conducted on coal ash samples collected at depth, as well as the corresponding surface sample. A summary of the analyses conducted on samples from each sample area is presented in Table 2-1.

Table 2-1. Coal Ash Sample and Analysis Summary.

Analyte	Sample Location		
	Surface Only (26 Locations/Areas)	Surface with Corresponding Depth (3 Locations/Areas)	Depth (3 Locations/Areas)
Metals and mercury	X	X	X
PAH	-	X	X
Uranium (metal)	-	X	X
Batch leach test with leachate analysis for metals, mercury, and uranium (metal)	-	-	X

- = analysis not performed
PAH = polycyclic aromatic hydrocarbons
X = analysis performed

The statistical sampling design for this study was based on obtaining sufficient samples (29 per sample area) such that 90th percentile values for the coal ash analytes could be computed. The 90th percentile values are used by the Washington State Department of Ecology (Ecology) to determine background concentrations (Ecology 1994). While the subject of this sampling is not to quantify background concentrations, determining 90th percentile values and the corresponding 95% UCL on the 90th percentile (UTL) for metals in coal ash provides a measure of metals concentrations existing in coal ash from different operable units. Additional statistical analysis of the data is reported in Section 4.0.

2.2 LEACHING AND METALS ANALYSIS

As described in the SAP, standardized batch leach tests were performed on samples collected at 0.9 m (3 ft) bgs using a leach procedure based on ASTM D3987, *Standard Test Method for Shake Extraction of Solid Waste with Water* (ASTM 2004). The procedure recommends using material screened through 0.95-cm (3/8-in.) mesh. Demineralized water (pH adjusted to 5.2)

was used as the leaching liquid. Three coal ash samples from each of the five study areas were leached at coal ash to water weight ratios of 1 to 1, 1 to 2.5, and 1 to 5 (total number of leach tests = 45) with at least one test in each series duplicated and one duplicate leach test for each coal ash sample (total number of duplicate leach tests = 15). The coal ash-water mixtures were placed in clean, water-tight sample containers (extraction vessels) and rotated end over end through the vessel centerline at a rate of about 30 rotations per minute for 18 hours. Following 18 hours of mixing, the coal ash-water slurry was filtered using a 0.45 µm filter.

The leachate was analyzed to determine the concentration of leachable metals including uranium (total) and mercury. The final pH of each leachate was also reported. Quadruplicate analyses for metals and mercury of the coal ash sample from which the batch leach test material was obtained were also performed.

To investigate any potential effect of leach fluid pH on the final concentration of leachable arsenic, a second set of batch leach tests was performed on a subset of samples. Additional coal ash had been collected during sampling for the depth samples along with the corresponding surface samples such that a second leach test could be performed. After the arsenic concentration of all surface-depth sample pairs was completed, the three samples with the highest arsenic concentrations were selected to undergo the second batch leach test. The second batch leach test was conducted identically to the first test, except the leach fluid was non-pH-adjusted demineralized water. Analytes for the leachate for the second set of batch leach tests included antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, silver, selenium, thallium, vanadium, and zinc.

2.3 CONTAMINANTS OF POTENTIAL CONCERN

The contaminants of potential concern for all coal ash samples are metals, including mercury. The metals analyzed by inductively coupled plasma-mass spectrometry (ICP-MS) using EPA method 6010 include antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc. Selected samples were also analyzed for total uranium by kinetic phosphorescence analysis (KPA) and PAHs using EPA method 8270.

2.4 DEVIATIONS FROM SAMPLING PLAN

Two approved change notices are associated with the SAP. TPA-CN-431 (DOE-RL 2011b) added analysis of uranium (total metal) to a subset of the samples. Prior to coal ash sampling, the contract laboratories tested their ability to quantify uranium metal from coal ash using ICP-MS and KPA. Due to elevated practical quantitation limits (PQLs) for uranium analysis using ICP-MS in preliminary analyses with coal ash, analysis for uranium metal was performed using KPA.

As documented in TPA-CN-451 (DOE-RL 2011c), adjustment to the original 126-D-1 sampling plan was required due to the excavation activities from the 100-D-31:7 pipeline remediation. The excavation had covered a significant portion of the coal ash sample area (nine sample locations) with up to 0.3 m (1 ft) of sand and soil with cobble. Due to the requirement that the coal ash samples be composed of no more than 5% noncoal ash material (e.g., soil, plant roots, rocks), a new sample area boundary that excluded this disturbed area was created and a new

statistical sampling design of 29 sample locations was prepared and approved by the regulators.

Due to conditions in the field, the planned locations for several samples were adjusted to a nearby location with sufficient coal ash to obtain a sample. Coordinates for the final sample locations were recorded and are presented with the sample information in Appendix A.

3.0 COAL ASH SAMPLING

3.1 SAMPLE COLLECTION

Coal ash characterization samples were collected as described in the SAP (DOE-RL 2011a). Sampling occurred at five disposal sites located in separate operable units (Table 3-1). Four of the sampling sites are rejected WIDS sites while the 300 Area Ash site is an area of coal ash deposition located in the northeast portion of the 300 Area and next to the Columbia River. Photographs of the five sample sites are presented in Appendix B.

Table 3-1. Coal Ash Sample Sites for Characterization Sampling.

Sample Site	Operable Unit	WIDS Site	WIDS Status
126-B-1	100-BC-1	126-B-1	Rejected
126-D-1	100-DR-1	126-D-1	Rejected
126-H-1	100-HR-2	126-H-1	Rejected
300 Area Ash	NA	NA	NA
600-207	100-IU-6	600-207	Rejected

NA = not applicable
WIDS = Waste Information Database System

Coal ash sampling commenced in April 2011 at the 100-B sample site (WIDS site 126-B-1). A total of 23 of the 29 sample locations were sampled in April. Sample work was suspended to address potential worker protection measures. The final six sample locations at 126-B-1 were sampled in August 2011. The remaining four coal ash sample sites were sampled in August/September 2011. Field sampling work was recorded in Logbook EL-1658, *Characterization of Hanford Coal Ash Components* (WCH 2011).

Sample coordinates from the SAP were located and staked prior to sample collection. Per the SAP instruction, coal ash samples were to contain no more than 5% soil or other non-coal ash material (such as rocks or plant roots). In cases where material from the prescribed sample locations could not meet these requirements, the sample location was moved to a nearby area of coal ash. Final coordinates for each sample location are presented in Appendix A. Photographs of representative coal ash sample locations are presented in Figures 3-1 and 3-2.

As prescribed in the SAP, three sample locations at each sample site were sampled at both the surface and at a depth of 0.9 m (3 ft). The locations for depth sampling were chosen at the sampler's discretion and were dependant on the availability of coal ash at depth. Identification of the three sample locations per sample site from which depth samples were obtained is presented in Appendix A tables.

Figure 3-1. Coal Ash at the 126-B-1 Sampling Site.

Figure 3-2. Coal Ash at the 300 Area Sampling Site.

4.0 ANALYTICAL RESULTS

4.1 RESULTS OVERVIEW

Analytical results from the coal ash samples collected under the SAP and subsequent batch leaching results are reported in Appendix C. Tabulated data is presented to facilitate comparison between the sample areas. For the purposes of calculations, all nondetect data was set to one-half the PQL, and the results of primary-duplicate sample pairs were averaged to obtain one value to represent the sample location.

4.2 METALS ANALYSIS FOR SURFACE SAMPLES

At each of the five sample sites, coal ash surface samples were collected at 29 locations. The range of sample results for each analyte is presented in Table 4-1.

Sample data from each of the five coal ash sample sites were used to compute 90th percentile values for metals with at least one detection per sample site using ProUCL 4.1 (EPA 2010c). The 90th percentile represented the value separating the lower 90% of the data set from the upper 10% of the data. The 90th percentile values are used by Ecology to determine background concentrations (Ecology 1994).

As discussed in the SAP, a statistical sampling design with 29 samples was required to further calculate a 95% UCL on the 90th percentile. This calculation is also referred to as an UTL: a one-sided upper confidence limit on the specified percentile. Data from each analyte with at least one detection per sample area were used to produce 90th percentile values using ProUCL 4.1 (EPA 2010c). For nondetect results within these data sets, one-half the PQL was used as the sample result in the calculation. In cases where a duplicate sample was obtained for quality control (QC) purposes, the results from the primary and duplicate sample were averaged to obtain a single value for the sample. Results from the 90th percentile calculation are presented in Table 4-2 and results from the 90th percentile UTL are presented in Table 4-3. Calculations of these values are provided in Appendix D. Antimony, silver, and thallium were not detected in any samples from one or more of the sampling sites. The 90th percentile UTL calculations were not performed for sample sites with no detections of these metals.

Additional statistical analysis of the surface sample data sets from the five sample sites was performed using the nonparametric Kruskal-Wallis one-way analysis of variance test using ProUCL 4.1 (EPA 2010c). The null hypothesis for the Kruskal-Wallis test is that the medians of the data sets (sample sites) are equal. The Kruskal-Wallis tests were conducted at a 5% significance level. The *p*-value calculated by the analysis determines if the null hypothesis is accepted or rejected. If the *p*-value is greater than 0.05 the null hypothesis is accepted (medians are equal), but if the *p*-value is less than or equal to 0.05 the null hypothesis is rejected (medians are not equal).

Calculation of the Kruskal-Wallis median equality test using ProUCL 4.1 (EPA 2010c) is documented in Appendix D. Of the analytes that met the threshold for analysis (detections in at least three sample sites), the null hypothesis is rejected for all except vanadium. Therefore, vanadium is the only analyte for which the Kruskal-Wallis test found the medians to be statistically equal.

Table 4-1. Range of Coal Ash Surface Sample Results for Metals (N=29). [a]

Analyte	126-B-1 (mg/kg)		126-D-1 (mg/kg)		126-H-1 (mg/kg)		300 Area Ash (mg/kg)		600-207 (mg/kg)	
	Low	High	Low	High	Low	High	Low	High	Low	High
Antimony	NA	1.91	NA	0.965	NA	0.300	NA	NA	NA	NA
Arsenic	1.33	9.59	2.15	16.7	2.05	4.72	1.60	3.91	3.39	10.6
Barium	184	2,340	407	1,770	313	1,330	177	782	379	1,250
Beryllium	0.632	3.22	0.588	2.61	0.429	1.70	0.544	1.95	0.46	1.46
Boron	66.3	328	33.6	489	20.2	455	65.4	476	31.2	162
Cadmium	0.096	0.914	0.127	0.445	0.14	0.577	0.094	0.366	0.122	0.232
Chromium, total	4.76	25.5	5.70	12.9	6.38	16.5	7.15	15.8	6.81	16.7
Cobalt	1.00	15.1	2.31	13.7	2.14	9.94	1.9	5.12	3.21	7.14
Copper	8.6	98.3	9.66	59.4	16.7	46.8	14.7	172	16.9	46.8
Lead	2.85	35.8	1.9	16.8	1.64	8.64	3.33	17.2	4.23	14.5
Manganese	13.1	521	108	890	67.7	300	35.5	213	205	537
Mercury	0.022	0.861	0.012	0.189	NA	0.177	0.034	1.02	0.009	0.046
Molybdenum	0.314	34.7	0.786	4.42	0.493	3.52	0.472	2.12	1.01	3.13
Nickel	3.02	31.5	4.63	20.5	5.88	22.4	5.73	14.9	7.95	19.7
Selenium	NA	2.00	NA	1.14	NA	2.06	0.491	2.65	0.898	2.27
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	0.242	NA	NA	NA	NA	NA	NA
Vanadium	9.73	113	20.9	77.5	22.8	60.0	21.3	46.2	25.4	102
Zinc	9.43	104	11.8	75.7	11.2	76.9	12.6	53.0	15.8	28.5

[a] For each sample site, 29 surface samples with 2 duplicates were collected. Primary-duplicate sample pairs were averaged to obtain one value for their respective sample location.

NA = not applicable, all sample results were nondetects

Table 4-2. 90th Percentile Values of Coal Ash Surface Samples from Five Sample Sites (N=29).

Analyte	90th Percentile for Coal Ash Surface Samples (mg/kg) [a]				
	100-B	100-D	100-H	300 Area	600-207
Antimony	0.844	0.633	0.290	NA	NA
Arsenic	7.46	7.78	3.80	3.64	6.69
Barium	1,988	1,480	1,024	715	989
Beryllium	1.94	1.88	1.31	1.42	1.12
Boron	271	318	300	258	87.8
Cadmium	0.508	0.383	0.353	0.313	0.205
Chromium, total	13.5	12.2	13.6	14.9	12.0
Cobalt	7.02	9.19	8.53	4.26	5.89
Copper	39.3	31.6	41.1	26.7	30.0
Lead	16.4	11.0	6.31	14.1	7.12
Manganese	350	458	246	188	415
Mercury	0.246	0.115	0.132	0.482	0.030
Molybdenum	2.58	2.86	2.06	1.39	2.34
Nickel	15.0	15.3	19.5	12.6	16.7
Selenium	1.32	0.927	1.51	1.74	1.93
Silver	NA	NA	NA	NA	NA
Thallium	NA	0.243	NA	NA	NA
Vanadium	49.8	53.8	53.0	43.1	45.5
Zinc	60.5	56.6	48.9	37.4	25.4

[a] Total of 29 surface samples with 2 duplicates collected per sample area. Each primary-duplicate sample pair was averaged to obtain one value for the sample location. Nondetect data set to one-half the practical quantitation limit.

NA = not applicable, no detections in data set

Table 4-3. 90th Percentile Upper Tolerance Limit Values of Coal Ash Surface Samples from Five Sample Sites (N=29). (2 Pages)

Analyte	90th Percentile Upper Tolerance Limit Values for Coal Ash Surface Samples (mg/kg) [a]				
	100-B	100-D	100-H	300 Area	600-207
Antimony	1.26	0.894	0.295	NA	NA
Arsenic	8.45	13.6	4.34	3.87	8.54
Barium	2,250	1,750	1,250	754	1,060
Beryllium	2.39	2.51	1.44	1.66	1.19
Boron	327	410	367	369	137
Cadmium	0.899	0.443	0.388	0.338	0.211
Chromium, total	16.2	12.5	14.4	15.6	12.9
Cobalt	8.22	11.6	9.81	4.89	6.07
Copper	94.3	34.8	43.5	28.8	37.0
Lead	19.0	15.1	7.43	15.2	9.30
Manganese	396	689	283	210	486
Mercury	0.338	0.139	0.176	0.713	0.042
Molybdenum	3.85	3.54	2.44	1.50	2.58
Nickel	15.8	17.5	20.4	13.2	16.7
Selenium	1.44	0.955	1.63	2.46	2.00
Silver	NA	NA	NA	NA	NA
Thallium	NA	0.245	NA	NA	NA
Vanadium	64.0	59.7	58.4	45.7	50.1

Table 4-3. 90th Percentile Upper Tolerance Limit Values of Coal Ash Surface Samples from Five Sample Sites (N=29). (2 Pages)

Analyte	90th Percentile Upper Tolerance Limit Values for Coal Ash Surface Samples (mg/kg) [a]				
	100-B	100-D	100-H	300 Area	600-207
Zinc	94.8	69.7	53.6	43.3	26.9

[a] Total of 29 surface samples with 2 duplicates collected per sample area. Each primary-duplicate sample pair was averaged to obtain one value for the sample location. Nondetect data set to one-half the practical quantitation limit.

NA = not applicable, no detections in data set

Further characterization of the surface sample data was prepared with box plots using ProUCL 4.1 (EPA 2010c). Box plots of analyte data sets with at least one detection per sample area are presented in Appendix E. The box plots provide a visual representation of the respective data set. The vertical width of the box in the box plot is the differences in the data percentiles or interquartile range (IQR) (75th percentile [Q3] minus the 25th percentile [Q1]). The horizontal bars, also known as whiskers or fences, represent Q1– (1.5*IQR) (lower whisker) and Q3 + (1.5*IQR) (upper whisker). The band within the box represents the median. Data points outside of the whiskers are considered potential outliers.

As seen in the Appendix E box plots, the medians of most analytes differ between the sample sites. The box plots present a visual representation of the medians for each analyte, the relative homogeneity of the data set, and data that are above the Q3. Sample sites with the maximum analyte medians relative to 90th percentile values are identified in Table 4-4. As shown in Appendix E and Table 4-4, metals concentrations are not consistently higher or lower at any one site relative to the others. While the medians of the data are not statistically equal, this is most likely a function of considerable variability in metals concentrations within coal ash, and there is limited evidence to suggest that coal ash deposits in different areas of the River Corridor are appreciably different.

Table 4-4. Coal Ash Sample Sites with Highest Median Values and 90th Percentile Values. (2 Pages)

Analyte	Site with Highest Median	Site with Highest 90th Percentile
Antimony	126-B-1	126-B-1
Arsenic	600-207	126-D-1
Barium	126-D-1	126-B-1
Beryllium	126-B-1/126-D-1	126-B-1
Boron	300 Area Ash	126-D-1
Cadmium	126-B-1	126-B-1
Chromium (total)	300 Area Ash	300 Area Ash
Cobalt	126-H-1	126-D-1
Copper	126-H-1	126-H-1
Lead	300 Area Ash	126-B-1
Manganese	600-207	126-D-1
Mercury	300 Area Ash	300 Area Ash
Molybdenum	600-207	126-D-1
Nickel	126-H-1	126-H-1
Selenium	600-207	600-207

Table 4-4. Coal Ash Sample Sites with Highest Median Values and 90th Percentile Values. (2 Pages)

Analyte	Site with Highest Median	Site with Highest 90th Percentile
Vanadium	126-H-1	126-D-1
Zinc	126-B-1	126-B-1

4.3 METALS ANALYSIS FOR DEPTH SAMPLES

Analysis of the results was conducted from the three sets of samples collected at both surface and 0.9 m (3 ft) depth at each of the five sample areas. Data results for the depth samples are presented in Appendix C. Table 4-5 compares the range of data for the three depth samples with the range of data for the corresponding three surface samples at each of the five sample sites separately. For each analyte, Table 4-6 presents the average and standard deviation as well as the lower confidence limit (LCL) and upper confidence limit (UCL) for a two-sided 95% confidence interval for the collective means of all 15 surface sample results relative to all 15 depth sample results. Box plots of the three surface and three depth results by analyte are presented in Appendix F for each analyte at each site with at least one detection in the respective data set. Given each data set contains only three samples per box plot, whiskers were not generated for these box plots.

As seen in Table 4-6, the mean analyte concentration from all 15 surface samples are slightly greater than, or essentially equal to, that of the mean concentrations for all 15 depth samples, with the exception of boron, lead, and mercury. In the case of boron, the confidence limits of the sample sets overlap, indicating that the means are not significantly different. However, for lead and mercury, the standard deviations for the depth results are up to two times the mean which skews the LCL to less than 0. This indicates that the underlying populations for these analytes are quite skewed and the two-sided 95% confidence intervals are not applicable in these cases.

Further evaluation of surface and depth sample data for lead and mercury data at each of the five sites using box plots (Appendix F) illustrates the source of the variability. As discussed, the mean concentration of lead from all depth samples is greater than that from all surface samples (Table 4-6). The box plot for lead results from the three depth samples at 126-H-1 is skewed to the high end (Figure F-10) which is due to a single, elevated result (132 mg/kg). However, all three lead depth sample results at 126-H-1 are greater than those from the three corresponding surface samples (Table 4-5), as well as all other 126-H-1 surface samples (range of 1.64 to 8.64 mg/kg) (Table 4-1). The highest lead result in the depth samples was 132 mg/kg which is over 10 times higher than the corresponding surface sample (5.21 mg/kg) and the 90th percentile value for lead at 126-H-1 (6.31 mg/kg).

Table 4-5. Range of Coal Ash Sample Results for Metals for Three Surface/Depth Sampling Locations at the Five Sample Sites (mg/kg). [a] (2 Pages)

Analyte	126-B-1		126-D-1		126-H-1		300 Area Ash		600-207	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Antimony (S)	NA	1.26	0.470	0.605	NA	NA	NA	NA	NA	NA
Antimony (D)	NA	0.956	NA	NA	NA	NA	NA	NA	NA	0.520
Arsenic (S)	2.50	8.09	2.52	6.00	2.51	2.94	2.25	2.45	4.29	4.92
Arsenic (D)	2.50	7.88	2.32	4.61	2.24	11.7	2.70	3.33	6.46	10.6
Barium (S)	556	1,164	743	1,470	527	1,017	306	590	915	1,230
Barium (D)	681	1,130	871	1,470	487	1,000	526	629	653	711
Beryllium (S)	1.03	1.35	1.21	1.31	0.833	1.31	0.544	1.09	0.903	1.43
Beryllium (D)	1.14	1.68	1.10	1.62	0.691	1.28	0.818	1.03	0.658	1.21
Boron (S)	96.3	269	142	317	145	455	65.4	198	103	146
Boron (D)	35.6	279	169	419	199	404	256	360	147	168
Cadmium (S)	0.117	0.332	0.129	0.176	0.148	0.200	0.201	0.240	0.122	0.223
Cadmium (D)	0.135	0.239	0.074	0.208	0.184	0.252	0.207	0.267	0.111	0.186
Chromium, total (S)	8.75	10.6	8.03	12.6	8.57	16.5	12.0	12.5	11.5	16.1
Chromium, total (D)	7.34	13.3	7.64	8.73	8.52	11.2	9.87	11.6	7.50	8.99
Cobalt (S)	2.51	4.42	3.46	9.87	2.14	3.77	2.83	4.23	5.74	7.11
Cobalt (D)	2.64	5.12	4.21	6.82	1.72	3.52	2.16	2.94	3.56	4.42
Copper (S)	21.9	28.8	20.8	31.0	16.7	33.8	14.7	19.6	28.2	46.8
Copper (D)	19.6	26.2	13.6	31.8	18.1	25.3	15.5	19.7	21.3	21.9
Lead (S)	5.59	11.7	1.90	16.8	4.25	5.12	7.13	9.66	5.28	9.30
Lead (D)	4.33	11.8	3.24	3.50	18.3	132	8.18	14.5	3.30	5.61
Manganese (S)	57.5	297	121	244	67.7	138	99.4	213	410	486
Manganese (D)	38.5	187	91.4	255	82.1	148	66.3	95.9	250	327
Mercury (S)	0.049	0.118	0.055	0.119	0.018	0.049	0.060	0.713	NA	0.027
Mercury (D)	0.026	0.080	0.036	0.052	0.035	0.863	0.291	3.32	NA	NA
Molybdenum (S)	1.06	1.17	1.03	2.10	0.708	2.44	0.472	0.993	2.02	2.34
Molybdenum (D)	1.31	1.59	1.47	1.67	0.916	1.96	0.690	0.923	1.78	2.16
Nickel (S)	7.02	10.1	8.04	14.9	5.88	10.9	8.37	9.21	16.2	19.3
Nickel (D)	7.29	11.2	10.6	11.5	4.79	10.6	5.84	6.53	9.42	11.2
Selenium (S)	0.331	1.31	NA	0.995	0.341	0.762	0.877	1.21	1.22	2.00
Selenium (D)	NA	0.367	0.686	0.837	NA	1.18	1.19	1.77	1.29	1.85
Thallium (S)	NA	NA	NA	0.198	NA	NA	NA	NA	NA	NA
Thallium (D)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium (metal) (S)	2.67	5.39	3.66	4.07	2.24	4.01	3.28	4.22	2.56	4.68
Uranium (metal) (D)	3.56	6.75	3.56	4.46	2.78	4.25	2.61	3.14	1.76	3.28

Table 4-5. Range of Coal Ash Sample Results for Metals for Three Surface/Depth Sampling Locations at the Five Sample Sites (mg/kg). [a] (2 Pages)

Analyte	126-B-1		126-D-1		126-H-1		300 Area Ash		600-207	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Vanadium (S)	27.3	39.3	27.6	38.5	23.8	42.2	32.8	44.4	43.7	78.7
Vanadium (D)	28.7	33.5	29.7	41.8	19.6	28.9	24.3	28.3	32.1	36.8
Zinc (S)	13.6	35.8	12.1	21.2	14.4	24.2	27.8	35.8	22.1	25.3
Zinc (D)	15.1	29.7	10.3	33.6	21.0	31.3	26.7	27.8	16.0	18.1

[a] Values determined from the three depth samples and the three corresponding surface samples for each of five sample sites. Each primary-duplicate sample pair was averaged to obtain one value for the sample location.

D = depth
Max = maximum
Min = minimum
NA = not applicable, sample results are nondetects
S = surface

Table 4-6. Mean Analyte Concentrations and Confidence Limits of Combined Surface and Depth Samples from Five Sample Sites. [a]

Analyte	Surface Concentration (N=15) (mg/kg)				Depth Concentration (N=15) (mg/kg)				Do Confidence Limits Overlap?
	Mean	Standard Deviation	LCL	UCL	Mean	Standard Deviation	LCL	UCL	
Antimony	0.372	0.267	0.224	0.519	0.296	0.142	0.218	0.375	Yes
Arsenic	4.31	2.37	3.00	5.62	4.20	2.67	2.72	5.68	Yes
Barium	833	322	654	1011	803	271	653	953	Yes
Beryllium	1.10	0.254	0.956	1.24	1.11	0.310	0.943	1.29	Yes
Boron	190	99.2	135	245	239	103	182	296	Yes
Cadmium	0.189	0.056	0.157	0.220	0.187	0.053	0.158	0.216	Yes
Chromium	11.8	2.44	10.4	13.1	9.43	1.76	8.46	10.4	Yes
Cobalt	4.58	1.98	3.49	5.67	3.65	1.42	2.86	4.44	Yes
Copper	26.2	8.46	21.5	30.9	21.2	4.56	18.7	23.8	Yes
Lead	7.82	4.08	5.57	10.1	17.0	32.5	-1.06	35.0	NA
Manganese	212	149	129	294	157	91.9	106	207	Yes
Mercury	0.116	0.185	0.013	0.219	0.359	0.853	-0.113	0.832	NA
Molybdenum	1.41	0.650	1.05	1.77	1.43	0.439	1.19	1.68	Yes
Nickel	11.0	3.91	8.88	13.2	8.78	2.33	7.48	10.1	Yes
Selenium	0.904	0.493	0.631	1.18	0.938	0.632	0.588	1.29	Yes
Uranium	3.62	0.832	3.16	4.08	3.60	1.16	2.96	4.24	Yes
Vanadium	39.3	12.8	32.2	46.4	29.9	5.29	27.0	32.9	Yes
Zinc	24.1	7.98	19.7	28.5	23.6	6.92	19.8	27.5	Yes

[a] Values determined from 15 depth samples and the 15 corresponding surface samples for each of 5 sample sites. Each primary-duplicate sample pair was averaged to obtain one value for the sample location. Nondetect data set to one-half the practical quantitation limit.

LCL = lower confidence limit
NA = not applicable
UCL = upper confidence limit

As with lead, the mean concentration of mercury from all depth samples is greater than that from all surface samples (Table 4-6). As shown in the box plots (Figure F-12), the medians for the three surface and three depth sample results for mercury in the 300 Area Ash were relatively similar, however, the depth data was skewed higher than the surface sample data. Individual mercury results from depth samples at 300 Area Ash are all higher than those from the corresponding surface samples, but 2 of the 3 sample results (0.291 and 0.501 mg/kg) were within the range of all 29 surface sample results (0.034 to 1.02 mg/kg) (Table 4-5). The single highest mercury result from 300 Area Ash (3.02 mg/kg) was from the third depth sample result. This trend of higher mercury at 300 Area Ash is also observed in the surface sample box plots (Figure E-12), which shows a similar elevated skewness to the box plot with two results greater than the Q3.

Comparison of results from the depth samples with the corresponding surface samples at each of the five sample sites indicates that the mean concentrations for all analytes, with the exception of lead and mercury, are not statistically different due to overlap of the LCL and UCL. For both lead and mercury, depth sample results from one of the five sites are greater than all other results. The potential exists that there is a significant difference in the lead concentrations between the coal ash at surface and at depth in 126-H-1 and in the mercury concentrations at 300 Area Ash

4.4 PAH ANALYSIS

Analyses for PAHs were conducted on the three coal ash samples collected at both surface and 0.9 m (3 ft) depth, at each of the five sample areas. Table 4-7 presents the data range for each of the three depth samples, along with the data range for the three corresponding surface samples, at each of the five sample sites. Due to the significant number of nondetects amongst the data sets, box plots were not prepared. In cases where a duplicate sample was obtained for QC purposes, the results from the primary and duplicate sample were averaged to obtain a single value for the sample. If the primary or duplicate sample was a nondetect result, one-half the PQL was used as the sample result prior to averaging.

Acenaphthene, acenaphthylene, benzo(a)pyrene, dibenz(a,h)anthracene, fluorene, and indeno(1,2,3-cd)pyrene were not detected in any samples. Maximum values of detected PAHs were relatively low with maximum detected values measured primarily in the surface samples.

4.5 BATCH LEACH TEST FOR DEPTH SAMPLES

To quantify the potential environmental availability of coal ash metals, all coal ash samples collected at 0.9 m (3 ft) depth underwent serial batch leaching using pH 5.2 water with subsequent analysis for metals including mercury. Coal ash samples were leached with three coal ash:water ratios of 1:1, 1:2.5, and 1:5, with one of each ratio duplicated for each sample. These ratios result in a much lower dilution than that assumed when establishing cleanup levels, where default soil-to-groundwater dilution ratios of 1:100 (WAC 173-340-740 [Ecology 1996]) or 1:20 (WAC 173-340-747 [Ecology 2007]) are used. Data results from the solid and leachate samples associated with the batch leaching tests are presented in Appendix C. A summary of the leachate results, with no adjustment for coal ash:leachate ratio, is presented in Table 4-8.

Table 4-7. Range of Coal Ash Sample Results for Detected Polycyclic Aromatic Hydrocarbons for Three Surface/Depth Sampling Locations at the Five Sample Sites. [a]

Analyte	126-B-1 (mg/kg)		126-D-1 (mg/kg)		126-H-1 (mg/kg)		300 Area Ash (mg/kg)		600-207 (mg/kg)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Anthracene (S)	NA	0.0502	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene (D)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene (S)	NA	0.117	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene (D)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene (S)	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.071
Benzo(b)fluoranthene (D)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene (S)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene (D)	NA	NA	NA	NA	NA	0.585	NA	NA	NA	NA
Benzo(k)fluoranthene (S)	NA	0.0839	NA	NA	NA	NA	NA	NA	NA	0.065
Benzo(k)fluoranthene (D)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene (S)	0.0637	0.122	NA	NA	NA	NA	NA	NA	NA	0.100
Chrysene (D)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene (S)	0.0651	0.0780	NA	NA	NA	NA	NA	NA	0.057	0.259
Fluoranthene (D)	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.195
Naphthalene (S)	0.257	0.964	NA	0.619	0.316	0.691	NA	NA	0.287	0.429
Naphthalene (D)	NA	0.234	NA	0.253	0.137	0.181	NA	0.124	NA	0.451
Phenanthrene (S)	0.164	0.281	NA	0.259	NA	0.250	NA	NA	0.095	0.316
Phenanthrene (D)	0.079	0.119	NA	NA	NA	0.111	NA	NA	NA	0.302
Pyrene (S)	0.0649	0.131	NA	NA	NA	NA	NA	NA	NA	0.115
Pyrene (D)	NA	NA	NA	NA	NA	0.104	NA	NA	NA	NA

[a] Values determined from the three depth samples and the three corresponding surface samples for each of five sample sites. Primary-duplicate sample pairs were averaged to obtain one value for the sample location, as appropriate.

D = depth
Max = maximum
Min = minimum
NA = not applicable, sample results are nondetects
S = surface

Table 4-8. Leachate Results from Coal Ash Depth Samples. (3 Pages)

Ratio, Coal	126-B-1 (mg/L)				126-D-1 (mg/L)			126-H-1 (mg/L)			300 Area Ash (mg/L)			600-207 (mg/L)		
Ash:Water	J1HHW3	J1HJ08	J1HJ09	J1HJ10[a]	J1J442	J1J443	J1J444	J1HJ80	J1HJ81	J1HJ82	J1HJV1	J1HJV2	J1HJV0	J1HHT8	J1HHT9	J1HHV0
	Arsenic															
1:1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
1:1	--	--	--	U	U	--	--	--	--	U	--	--	U	U	--	--
1:2.5	0.011	U	0.003	0.006	U	U	U	U	U	U	U	U	U	0.002	0.003	U
1:2.5	0.010	U	--	--	--	U	--	U	--	--	U	--	--	--	0.004	--
1:5	0.007	U	0.003	0.005	U	U	U	U	U	U	U	U	U	0.003	U	0.002
1:5	--	--	0.003	--	--	--	U	--	U	--	--	U	--	--	--	U
	Barium															
1:1	0.031	0.035	0.035	0.056	0.048	0.046	0.032	0.076	0.066	0.039	0.045	0.048	0.042	0.039	0.027	0.037
1:1	--	--	--	0.035	0.190	--	--	--	--	0.041	--	--	0.037	0.041	--	--
1:2.5	0.020	0.034	0.037	0.035	0.041	0.032	0.029	0.075	0.069	0.042	0.036	0.037	0.034	0.036	0.026	0.033
1:2.5	0.019	0.033	--	--	--	0.033	--	0.077	--	--	0.037	--	--	--	0.029	--
1:5	0.013	0.039	0.026	0.031	0.037	0.031	0.024	0.077	0.081	0.039	0.036	0.034	0.033	0.039	0.029	0.035
1:5	--	--	0.027	--	--	--	0.023	--	0.079	--	--	0.034	--	--	--	0.034
	Boron															
1:1	3.31	2.55	5.66	8.57	13.5	20.2	49.9	13.4	4.95	10.2	43.4	58.4	77.8	24.8	11.7	29.0
1:1	--	--	--	8.62	14.7	--	--	--	--	11.2	--	--	70.0	26.2	--	--
1:2.5	1.92	1.55	3.93	4.36	8.56	12.7	47.5	7.18	2.82	6.66	22.9	33.7	40.4	15.1	7.66	19.0
1:2.5	1.75	1.48	--	--	--	12.6	--	6.79	--	--	21.6	--	--	--	8.71	--
1:5	0.98	1.06	2.36	2.31	4.54	6.74	28.1	4.04	1.75	4.11	13.0	19.3	23.1	10.4	5.48	12.5
1:5	--	--	2.23	--	--	--	30.3	--	1.75	--	--	20.2	--	--	--	11.3
	Cadmium															
1:1	U	U	U	U	U	U	U	U	U	U	U	U	U	0.0020	0.0020	0.0020
1:1	--	--	--	U	U	--	--	--	--	U	--	--	U	0.0020	--	--
1:2.5	U	U	U	U	U	U	U	U	U	U	U	U	U	0.00047	0.0010	0.00051
1:2.5	U	U	--	--	--	U	--	U	--	--	U	--	--	--	0.0010	--
1:5	U	U	U	U	U	U	U	U	U	U	U	U	U	0.00049	0.0010	0.0010
1:5	--	--	U	--	--	--	U	--	U	--	--	U	--	--	--	0.0010
	Chromium (total)															
1:1	U	U	U	U	0.015	0.003	0.010	0.005	0.008	0.003	0.003	0.003	0.003	U	0.004	0.004
1:1	--	--	--	U	0.007	--	--	--	--	U	--	--	U	0.003	--	--
1:2.5	0.002	U	0.003	0.002	U	U	U	0.003	U	U	U	U	U	0.001	0.001	0.001
1:2.5	0.001	U	--	--	--	U	--	0.003	--	--	0.003	--	--	--	0.002	
1:5	0.001	U	0.002	0.001	U	U	U	U	U	U	U	U	U	0.001	0.002	0.001
1:5	--	--	0.002	--	--	--	U	--	U	--	--	U	--	--	--	U
	Cobalt															
1:1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
1:1	--	--	--	U	U	--	--	--	--	U	--	--	U	U	--	--
1:2.5	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
1:2.5	U	U	--	--	--	U	--	U	--	--	U	--	--	--	0.001	--
1:5	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
1:5	--	--	U	--	--	--	U	--	U	--	--	U	--	--	--	U

Table 4-8. Leachate Results from Coal Ash Depth Samples. (3 Pages)

Ratio, Coal Ash:Water	126-B-1 (mg/L)				126-D-1 (mg/L)			126-H-1 (mg/L)			300 Area Ash (mg/L)			600-207 (mg/L)		
	J1HHW3	J1HJ08	J1HJ09	J1HJ10	J1J442	J1J443	J1J444	J1HJ80	J1HJ81	J1HJ82	J1HJV1	J1HJV2	J1HJV0	J1HHT8	J1HHT9	J1HHV0
	Copper															
1:1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
1:1	--	--	--	U	U	--	--	--	--	U	--	--	U	U	--	--
1:2.5	0.003	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
1:2.5	0.003	U	--	--	--	U	--	U	--	--	U	--	--	--	U	--
1:5	0.003	U	U	U	U	U	U	U	U	U	U	U	U	0.003	U	U
1:5	--	--	U	--	--	--	U	--	U	--	--	U	--	--	--	U
	Lead															
1:1	U	U	U	U	U	U	U	U	U	U	U	U	U	0.022	U	0.022
1:1	--	--	--	U	U	--	--	--	--	U	--	--	U	0.023	--	--
1:2.5	U	U	U	U	U	U	U	U	U	U	U	U	U	0.014	0.003	0.018
1:2.5	U	U	--	--	--	U	--	0.011	--	--	U	--	--	--	0.004	--
1:5	U	U	U	U	U	U	U	U	U	U	U	U	U	0.009	0.003	0.012
1:5	--	--	U	--	--	--	U	--	U	--	--	U	--	--	--	0.010
	Manganese															
1:1	0.013	0.081	U	0.014	U	U	0.288	U	U	U	U	U	U	0.424	0.099	0.165
1:1	--	--	--	0.011	U	--	--	--	--	U	--	--	U	0.443	--	--
1:2.5	0.001	0.038	0.001	0.001	U	U	0.349	U	U	U	U	U	U	0.341	0.066	0.140
1:2.5	0.001	0.036	--	--	--	U	--	U	--	--	U	--	--	--	0.072	--
1:5	0.001	0.023	0.001	0.001	U	U	0.187	U	U	U	U	U	U	0.303	0.048	0.122
1:5	--	--	0.001	--	--	--	0.201	--	U	--	--	U	--	--	--	0.120
	Mercury															
1:1	U	U	U	U	U	U	U	0.000186	0.000339	0.000366	0.00023	0.00040	0.00023	U	U	U
1:1	--	--	--	U	U	--	--	--	--	0.000202	--	--	0.00024	U	--	--
1:2.5	U	U	U	U	U	U	U	0.000103	0.000115	0.000115	0.00013	0.00013	0.00013	U	U	U
1:2.5	U	U	--	--	--	U	--	0.000111	--	--	0.00011	--	--	--	U	--
1:5	U	U	U	U	U	U	U	0.000100	0.000117	0.000102	0.00013	0.00015	0.00012	U	U	U
1:5	--	--	U	--	--	--	U	--	0.000110	--	--	0.00013	--	--	--	U
	Molybdenum															
1:1	0.011	0.012	0.035	0.015	0.111	0.054	0.003	0.017	0.010	0.018	0.060	0.069	0.133	0.003	0.197	0.008
1:1	--	--	--	0.015	0.110	--		--	--	0.019	--	--	0.120	0.003		--
1:2.5	0.003	0.008	0.011	0.007	0.059	0.035	0.005	0.008	0.003	0.008	0.032	0.035	0.062	0.001	0.103	0.004
1:2.5	0.003	0.008	--	--	--	0.034	--	0.009	--	--	0.028		--	--	0.112	--
1:5	0.002	0.008	0.006	0.007	0.035	0.018	0.004	0.007	U	0.005	0.016	0.019	0.035	0.001	0.057	0.003
1:5	--	--	0.006	--	--	--	0.003	--	U	--	--	0.019	--	--	--	0.003

Table 4-8. Leachate Results from Coal Ash Depth Samples. (3 Pages)

Ratio, Coal	126-B-1 (mg/L)				126-D-1 (mg/L)			126-H-1 (mg/L)			300 Area Ash (mg/L)			600-207 (mg/L)		
Ash:Water	J1HHW3	J1HJ08	J1HJ09	J1HJ10	J1J442	J1J443	J1J444	J1HJ80	J1HJ81	J1HJ82	J1HJV1	J1HJV2	J1HJV0	J1HHT8	J1HHT9	J1HHV0
	Nickel															
1:1	0.005	U	U	U	0.006	U	U	U	U	U	U	U	U	U	U	0.004
1:1	--	--	--	U	U	--	--	--	--	U	--	--	U	U	--	--
1:2.5	0.001	0.001	U	0.001	U	U	0.003	U	U	U	U	U	U	0.001	U	0.001
1:2.5	0.001	U	--	--	--	U	--	0.003	--	--	U	--	--	--	U	--
1:5	0.001	0.001	0.001	0.001	U	U	U	U	U	U	U	U	U	0.001	U	0.001
1:5	--	--	0.001	--	--	--	U	--	U	--	--	U	--	--	--	0.001
	Selenium															
1:1	U	U	U	U	0.089	U	U	U	U	0.019	0.062	0.064	0.175	U	0.416	U
1:1	--	--	--	U	0.092	--	--	--	--	0.018	--	--	0.151	U	--	--
1:2.5	U	U	0.003	0.003	0.049	U	U	U	U	U	0.027	0.042	0.079	U	0.210	0.003
1:2.5	U	0.003	--	--	--	U	--	U	--	--	0.024	--	--	--	0.239	--
1:5	U	U	U	U	0.018	U	U	U	U	U	U	0.019	0.041	U	0.112	U
1:5	--	--	U	--	--	--	U	--	U	--	--	0.019	--	--	--	U
	Uranium (metal)															
1:1	0.00222	0.00006	0.00642	0.00516	0.0125	0.00366	0	0.00177	0.00109	0.00594	0.0186	0.0289	0.0273	0.000030	0.000897	U
1:1	--	--	--	0.00519	0.0110	--	--	--	--	0.00596	--	--	0.0270	U	--	--
1:2.5	0.00127	0.00005	0.00335	0.00268	0.00615	0.00235	0.000032	0.000897	0.000677	0.00334	0.00831	0.0158	0.0130	U	0.000520	U
1:2.5	0.00130	0.00005	--	--	--	0.00231	--	0.000842	--	--	0.00825	--	--	--	0.000491	--
1:5	0.00109	0.00010	0.00227	0.00211	0.00301	0.00153	0	U	0.000322	0.00228	0.00527	0.0106	0.00902	U	0.000354	U
1:5	--	--	0.00244	--	--	--	0	0.000551	0.000407	--	--	0.0109	--	--	--	U
	Vanadium															
1:1	0.067	0.039	0.035	0.057	0.116	0.088	0.106	0.046	0.032	0.033	0.077	0.073	0.123	0.090	0.073	0.092
1:1	--	--	--	0.056	0.123	--	--	--	--	0.037	--	--	0.118	0.089	--	--
1:2.5	0.061	0.017	0.037	0.047	0.094	0.066	0.114	0.034	0.028	0.025	0.049	0.049	0.083	0.015	U	0.007
1:2.5	0.058	0.017	--	--	--	0.069	--	0.032	--	--	0.048	--	--	--	U	--
1:5	0.046	0.015	0.032	0.036	0.072	0.051	0.084	0.027	0.021	0.019	0.033	0.033	0.057	0.018	0.013	0.012
1:5	--	--	0.030	--	--	--	0.085	--	0.020	--	--	0.033	--	--	--	0.014
	Zinc															
1:1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
1:1	--	--	--	U	U	--	--	--	--	U	--	--	U	U	--	--
1:2.5	U	U	U	0.012	U	U	U	U	U	U	U	U	U	U	U	U
1:2.5	U	U	--	--	--	U	--	U	--	--	U	--	--	--	U	--
1:5	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
1:5	--	--	U	--	--	--	U	--	U	--	--	U	--	--	--	U
	Final pH															
1:1	8.79	7.89	9.18	8.58	8.39	8.24	7.45	8.41	9.01	8.46	8.41	8.21	8.17	7.68	7.44	7.61
1:1	--	--	--	8.91	8.61	--	--	--	--	8.43	--	--	8.26	6.99	--	--
1:2.5	9.01	7.72	9.22	9.02	8.89	8.36	6.88	9.05	9.17	8.56	8.58	8.42	8.78	7.16	8.02	7.63
1:2.5	9.13	7.58	--	--	--	8.38	--	9.12	--	--	8.59	--	--	--	8.23	--
1:5	9.28	7.57	9.52	8.57	9.12	8.48	6.78	9.31	9.35	8.64	8.80	8.61	8.7	7.09	8.41	7.58
1:5	--	--	9.55	--	--	--	6.76	--	9.31	--	--	8.63	--	--	--	7.49

[a] Sample J1HHW3 was inadvertently processed through leach testing. J1HHW3 is the surface sample associated with depth sample J1HJ10.

-- = no leach test performed

U = undetected

Antimony, beryllium, silver, and thallium were not quantified in any leachate samples. Barium, boron, uranium, and vanadium were measured in nearly all samples. Total chromium was measured in one or more leachate samples from each area with a maximum concentration of 0.015 mg/L at a 1:1 ratio at 126-D-1. Lead was measured in a single leachate sample from 126-H-1 at 0.011 mg/L at a 1:2.5 coal ash:water ratio. Final pH values in leachate ranged from 6.99 to 9.55.

4.6 ADDITIONAL BATCH LEACH TESTS WITH NON-PH-ADJUSTED WATER

To investigate any potential effect of leach fluid pH on the final concentration of leachable arsenic, a second set of batch leach tests was performed on a subset of samples. After analysis for metals had been completed on all the surface/depth samples, the arsenic results were evaluated to choose the samples for this second leach test. Table 4-9 shows the samples with the highest arsenic results that were chosen for subsequent leach tests with non-pH-adjusted water. Two of the samples with the highest arsenic concentrations were surface samples and had not undergone batch leach testing. Therefore, these two surface samples underwent batch leach testing with both pH 5.2 and non-pH-adjusted water. A summary of the leachate results for arsenic with no adjustment for coal ash:leachate ratio is presented in Table 4-10.

Table 4-9. Identification of Coal Ash Surface/Depth Samples with Highest Arsenic Concentrations.

Sample Location	Sample Number	Arsenic			Leached with Non-pH-Adjusted Water	Leached with pH 5.2 Water
		mg/kg	Q	PQL		
100-B-25 (surface)	J1HHX8	10.3		2.83	X	X
100-B-25 (depth)	J1HJ08	8.09		2.68	X	Yes, depth sample
100-H-25 (depth)	J1HJ80	11.7		0.86	X	Yes, depth sample
600-15 (surface)	J1HHN7	10.6		0.96	X	X

PQL = practical quantitation limit
Q = qualifier
X = additional leach test performed

Table 4-10. Arsenic Leachate Results from Coal Ash Surface/Depth Samples with Highest Arsenic Concentrations. (2 Pages)

Coal Ash: Water Ratio	Arsenic (mg/L)							
	J1HHX8 (pH 5.2)	J1HHX8 (pH 6.4)	J1HJ08 (pH 5.2)	J1HJ08 (pH 6.4)	J1HJ80 (pH 5.2)	J1HJ80 (pH 6.4)	J1HHN7 (pH 5.2)	J1HHN7 (pH 6.4)
1:1	0.015	U	U	U	U	U	U	U
1:1	--	--	--	U	--	--	--	--
1:2.5	0.008	0.007	U	0.002	U	0.006	0.003	0.002
1:2.5	--	0.006	U	--	U	0.006	0.005	--
1:5	0.008	0.006	U	U	U	0.005	0.003	U

Table 4-10. Arsenic Leachate Results from Coal Ash Surface/Depth Samples with Highest Arsenic Concentrations. (2 Pages)

Coal Ash: Water Ratio	Arsenic (mg/L)							
	J1HHX8 (pH 5.2)	J1HHX8 (pH 6.4)	J1HJ08 (pH 5.2)	J1HJ08 (pH 6.4)	J1HJ80 (pH 5.2)	J1HJ80 (pH 6.4)	J1HHN7 (pH 5.2)	J1HHN7 (pH 6.4)
1:5	0.007	--	--	--	--	--	--	0.002

-- = no leach test performed
U = undetected

In some samples (J1HJ08 and J1HJ80), low-level detections of arsenic in leachate were observed with unadjusted leachate (pH 6.4) relative to pH 5.2 leachate. However, the concentrations are consistent with other pH 5.2 leach test results and were below the PQL (approximately 0.015 mg/L). Analytical results from the solid and leachate samples associated with the batch leaching tests, including other analytes, are presented in Appendix C.

4.7 DATA QUALITY ASSESSMENT

A data quality assessment (DQA) was performed to compare the sampling approach and analytical data with the sampling and data requirements specified in the SAP (DOE-RL 2011a) and associated change notices (DOE-RL 2011b, 2011c). The DQA for the coal ash characterization sampling established that the data are of the right type, quality, and quantity to support site verification decisions within specified error tolerances. The data set was found to be acceptable for decision-making purposes. The analytical sample data are stored in the environmental-restoration project-specific database for data evaluation prior to its archival in Hanford Environmental Information System and are summarized in Appendix C. The detailed DQA is presented in Appendix G.

5.0 SUMMARY

Coal ash samples from five sites in separate River Corridor operable units were collected and analyzed per the SAP with subsequent approved change notices (DOE-RL 2011a, 2011b, and 2011c). Statistical surface sample results (N = 29) from each site were used to prepare 90th percentile values and 90th percentile UTL values to characterize metal concentrations. These values for metals in coal ash provide a means to compare concentrations between coal ash from different operable units. Additional analysis of the surface sample data sets was performed using the Kruskal-Wallis median equality test. Test results indicate that vanadium is the only analyte for which the medians of the data from all five sample sites are statistically equal. Surface sample data was further characterized through box plots. Variability in the 90th percentile values is observed between the sample sites, the box plots provide a visual representation of the overall variability in the data.

Surface and depth (0.9 m [3 ft] bgs) samples were collected from a total of three locations per site to determine if the metals concentration varied with depth. Box plots were generated to depict the surface and depth sampling results by analyte at each of the sites. Determination of the means for each analyte including all surface and depth results was performed. Analytes showing significant variability are lead at 126-H-1 and mercury at 300 Area Ash. For both lead and mercury, depth sample results from the abovementioned sites are greater than all other results due to a single elevated result. A limited number of low concentration PAHs were detected in the surface and depth samples.

Batch leach tests conducted on depth samples indicate leachable barium, boron, uranium, and vanadium are present at each sample site. Additional leach tests conducted on a sample subset with the most elevated arsenic concentrations indicate that use of non-pH-adjusted leachate solution does not affect the concentration of leachable arsenic from coal ash.

Collectively, the results of this coal ash characterization effort provide data that can be used for further evaluation and consideration of coal ash throughout the river corridor.

6.0 REFERENCES

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APPENDIX A

SAMPLE SUMMARY BY SAMPLE SITE

Table A-1. 126-B-1 Sample Summary.

Sample Location	HEIS Number	Sample Date	Washington State Plane	
			Easting (m)	Northing (m)
100-B-01	J1HHV4	4/27/11	564953.23	145012.09
100-B-02	J1HHV5	4/27/11	564972.68	145007.32
100-B-03	J1HHV6	4/27/11	564992.12	145001.56
100-B-04	J1HHV7	4/27/11	564968.81	145025.55
100-B-05	J1HHV8	4/27/11	564988.26	145018.78
100-B-06	J1HHV9	4/27/11	565007.70	145012.02
100-B-07	J1HHW0	4/27/11	565027.15	145005.25
100-B-08	J1HHW1	4/27/11	565046.60	144998.49
100-B-09	J1HHW2	8/23/11	564964.94	145045.77
100-B-10	J1HHW3	4/27/11	564984.39	145039.01
100-B-10 (depth)	J1HJ10	4/27/11	564984.39	145039.01
100-B-11	J1HHW4	4/27/11	565003.84	145032.24
100-B-12	J1HHW5	4/27/11	565023.29	145025.48
100-B-13	J1HHW6	4/27/11	565039.73	145018.71
100-B-14	J1HHW7	8/23/11	564961.08	145065.99
100-B-15	J1HHW8	4/27/11	564980.53	145059.23
Duplicate of J1HHW8	J1HJ04	4/27/11	564980.53	145059.23
100-B-16	J1HHW9	4/26/11	564999.97	145052.47
100-B-17	J1HHX0	4/27/11	565019.42	145045.70
100-B-17 (depth)	J1HJ09	4/27/11	565019.42	145045.70
100-B-18	J1HHX1	4/27/11	565039.87	145038.94
100-B-19	J1HHX2	8/23/11	564957.21	145086.22
100-B-20	J1HHX3	8/23/11	564976.66	145079.45
100-B-21	J1HHX4	4/25/11	564996.11	145077.26
100-B-22	J1HHX5	4/26/11	565015.55	145065.92
100-B-23	J1HHX6	4/26/11	565035.00	145059.16
100-B-24	J1HHX7	4/26/11	564972.79	145099.68
100-B-25	J1HHX8	4/25/11	564992.24	145089.91
Duplicate of J1HHX8	J1HJ03	4/25/11	564992.24	145089.91
100-B-25 (depth)	J1HJ08	4/26/11	564992.24	145089.91
100-B-26	J1HHX9	8/23/11	565011.69	145086.15
100-B-27	J1HJ00	4/27/11	565031.14	145079.38
100-B-28	J1HJ01	8/23/11	565027.27	145099.61
100-B-29	J1HJ02	8/23/11	565046.72	145092.84
Equipment blank	J1HJ05	4/25/11	NA	NA

HEIS= Hanford Environmental Information Service
NA = not applicable

Table A-2. 126-D-1 Sample Summary.

Sample Location	HEIS Number	Sample Date	Washington State Plane	
			Easting (m)	Northing (m)
100-D-01	J1J3W3	8/9/11	573360.49	152130.02
100-D-02	J1J3W4	8/22/11	573358.68	152107.74
100-D-03	J1J3W5	8/22/11	573352.88	152085.46
100-D-04	J1J3W6	8/23/11	573381.68	152137.87
100-D-05	J1J3W7	8/23/11	573377.88	152115.59
100-D-06	J1J3W8	8/22/11	573374.07	152093.31
100-D-07	J1J3W9	8/22/11	573370.27	152071.03
100-D-08	J1J3X0	8/11/11	573366.47	152048.75
100-D-08 (depth)	J1J444	8/11/11	573366.47	152071.03
100-D-09	J1J3X1	8/11/11	573362.66	152026.46
100-D-10	J1J3X2	8/11/11	573358.86	152004.18
100-D-11	J1J3X3	8/23/11	573402.88	152145.71
100-D-12	J1J3X4	8/9/11	573399.08	152123.43
100-D-13	J1J3X5	8/22/11	573391.16	152100.95
100-D-14	J1J3X6	8/22/11	573391.47	152078.87
100-D-15	J1J3X7	8/11/11	573387.66	152056.59
100-D-16	J1J3X8	8/22/11	573383.86	152034.31
100-D-17	J1J3X9	8/22/11	573380.06	152012.03
Duplicate of J1J3X9	J1J413	8/22/11	573380.06	152012.03
100-D-18	J1J400	8/9/11	573424.08	152153.56
100-D-19	J1J401	8/11/11	573420.27	152131.28
100-D-19 (depth)	J1J443	8/11/11	573420.27	152131.28
100-D-20	J1J402	8/23/11	573416.47	152116.00
100-D-21	J1J403	8/23/11	573444.28	152161.41
100-D-22	J1J404	8/23/11	573441.47	152139.13
100-D-23	J1J405	8/23/11	573437.67	152118.85
100-D-24	J1J406	8/23/11	573466.47	152169.25
100-D-25	J1J407	8/23/11	573462.67	152146.97
100-D-26	J1J408	8/11/11	573458.87	152124.69
Duplicate of J1J408	J1J412	8/11/11	573458.87	152124.69
100-D-26 (depth)	J1J442	8/11/11	573458.87	152124.69
100-D-27	J1J409	8/23/11	573481.71	152154.62
100-D-28	J1J410	8/23/11	573480.06	152132.54
100-D-29	J1J411	8/11/11	573476.26	152110.26
Equipment blank	J1J414	8/11/11	NA	NA

HEIS= Hanford Environmental Information Service
NA = not applicable

Table A-3. 126-H-1 Sample Summary.

Sample Location	HEIS Number	Sample Date	Washington State Plane	
			Easting (m)	Northing (m)
100-H-01	J1HJ48	8/27/11	577278.93	152906.74
100-H-02	J1HJ49	8/27/11	577280.28	152927.94
100-H-03	J1HJ50	8/28/11	577297.96	152916.17
100-H-04	J1HJ51	8/28/11	577315.63	152904.40
100-H-05	J1HJ52	8/27/11	577279.63	152949.13
100-H-06	J1HJ53	8/28/11	577299.31	152937.36
100-H-07	J1HJ54	8/28/11	577316.99	152925.59
100-H-08	J1HJ55	8/28/11	577334.67	152913.82
100-H-09	J1HJ56	8/28/11	577352.34	152902.05
100-H-10	J1HJ57	8/27/11	577282.99	152970.32
100-H-11	J1HJ58	8/27/11	577300.67	152958.55
100-H-12	J1HJ59	8/28/11	577318.34	152946.78
100-H-13	J1HJ60	8/28/11	577336.02	152935.01
100-H-14	J1HJ61	8/28/11	577353.70	152923.24
100-H-15	J1HJ62	8/28/11	577371.37	152911.47
100-H-16	J1HJ63	8/27/11	577284.34	152991.52
Duplicate of J1HJ63	J1HJ78	8/27/11	577284.34	152991.52
100-H-17	J1HJ64	8/27/11	577303.02	152972.75
100-H-17 (depth)	J1HJ82	8/27/11	577303.02	152972.75
100-H-18	J1HJ65	8/27/11	577319.70	152967.98
100-H-19	J1HJ66	8/27/11	577337.37	152956.21
100-H-20	J1HJ67	8/24/11	577355.05	152944.44
100-H-20 (depth)	J1HJ81	8/24/11	577355.05	152944.44
100-H-21	J1HJ68	8/28/11	577372.73	152932.67
100-H-22	J1HJ69	8/27/11	577303.38	153000.94
100-H-23	J1HJ70	8/27/11	577321.05	152989.17
100-H-24	J1HJ71	8/27/11	577338.73	152977.40
100-H-25	J1HJ72	8/24/11	577356.41	152965.63
Duplicate of J1HJ72	J1HJ77	8/24/11	577356.41	152965.63
100-H-25 (depth)	J1HJ80	8/24/11	577356.41	152965.63
100-H-26	J1HJ73	8/28/11	577374.08	152953.86
100-H-27	J1HJ74	8/27/11	577340.08	152998.59
100-H-28	J1HJ75	8/27/11	577357.76	152986.82
100-H-29	J1HJ76	8/28/11	577375.44	152977.05
Equipment blank	J1HJ79	8/24/11	NA	NA

HEIS = Hanford Environmental Information Service
NA = not applicable

Table A-4. 300 Area Sample Summary.

Sample Location	HEIS Number	Sample Date	Washington State Plane	
			Easting (m)	Northing (m)
300-01	J1HJN8	8/26/11	594486.57	116009.32
300-02	J1HJN7	8/25/11	594495.38	116006.38
300-02 (depth)	J1HJV1	8/25/11	594495.38	116006.38
300-03	J1HJN6	8/25/11	594484.71	116018.41
300-03 (depth)	J1HJV2	8/25/11	594484.71	116018.41
300-04	J1HJN9	8/25/11	594493.52	116015.48
Duplicate of J1HJN9	J1HJT5	8/25/11	594493.52	116015.48
300-04 (depth)	J1HJV0	8/25/11	594493.52	116015.48
300-05	J1HJP0	8/26/11	594456.42	116036.32
300-06	J1HJP1	8/26/11	594482.85	116027.51
Duplicate of J1HJP1	J1HJT6	8/26/11	594482.85	116027.51
300-07	J1HJP2	8/26/11	594491.66	116024.57
300-08	J1HJP3	8/26/11	594454.56	116045.42
300-09	J1HJP4	8/26/11	594463.37	116042.48
300-10	J1HJP5	8/26/11	594472.18	116039.54
300-11	J1HJP6	8/26/11	594480.99	116036.61
300-12	J1HJP7	8/26/11	594489.80	116033.67
300-13	J1HJP8	8/26/11	594461.51	116051.58
300-14	J1HJP9	8/26/11	594470.32	116048.64
300-15	J1HJR0	8/26/11	594479.13	116045.70
300-16	J1HJR1	8/26/11	594487.94	116042.77
300-17	J1HJR2	8/26/11	594459.65	116060.67
300-18	J1HJR3	8/26/11	594468.46	116057.74
300-19	J1HJR4	8/26/11	594477.27	116054.80
300-20	J1HJR5	8/26/11	594486.07	116051.86
300-21	J1HJR6	8/26/11	594466.60	116066.83
300-22	J1HJR7	8/26/11	594475.40	116063.90
300-23	J1HJR8	8/26/11	594484.21	116060.96
300-24	J1HJR9	8/26/11	594464.73	116075.93
300-25	J1HJT0	8/26/11	594473.54	116073.00
300-26	J1HJT1	8/26/11	594482.35	116070.06
300-27	J1HJT2	8/26/11	594471.68	116082.09
300-28	J1HJT3	8/26/11	594480.49	116079.16
300-29	J1HJT4	8/26/11	594469.82	116091.19
Equipment blank	J1HJT7	8/25/11	NA	NA

HEIS = Hanford Environmental Information Service
NA = not applicable

Table A-5. 600-207 Area Sample Summary.

Sample Location	HEIS Number	Sample Date	Washington State Plane	
			Easting (m)	Northing (m)
600-01	J1HHM3	9/28/11	588354.10	136806.92
600-02	J1HHM4	9/28/11	588373.44	136806.57
600-03	J1HHM5	9/28/11	588392.78	136806.21
600-04	J1HHM6	9/28/11	588412.12	136805.86
600-05	J1HHM7	9/28/11	588344.74	136823.85
600-06	J1HHM8	9/28/11	588364.08	136823.49
600-07	J1HHM9	9/27/11	588383.42	136823.14
600-07 (depth)	J1HHT0	9/27/11	588383.42	136823.14
600-08	J1HHN0	9/28/11	588402.76	136822.78
600-09	J1HHN1	9/28/11	588422.10	136822.43
600-10	J1HHN2	9/28/11	588354.72	136840.42
600-11	J1HHN3	9/28/11	588374.06	136840.06
600-12	J1HHN4	9/28/11	588393.40	136839.71
600-13	J1HHN5	9/28/11	588412.74	136839.36
600-14	J1HHN6	9/28/11	588345.36	136857.35
600-15	J1HHN7	9/27/11	588364.70	136856.99
Duplicate of J1HHN7	J1HHR2	9/27/11	588364.70	136856.99
600-15 (depth)	J1HHT9	9/27/11	588364.70	136856.99
600-16	J1HHN8	9/28/11	588384.04	136856.64
600-17	J1HHN9	9/28/11	588403.37	136856.28
600-18	J1HHP0	9/28/11	588422.71	136855.93
600-19	J1HHP1	9/28/11	588355.33	136873.92
600-20	J1HHP2	9/28/11	588374.67	136873.56
600-21	J1HHP3	9/28/11	588394.01	136873.21
600-22	J1HHP4	9/27/11	588345.97	136890.84
600-23	J1HHP5	9/27/11	588365.31	136890.49
600-23 (depth)	J1HHV0	9/27/11	588365.31	136890.49
600-24	J1HHP6	9/28/11	588384.65	136890.13
Duplicate of J1HHP6	J1HHR3	9/28/11	588384.65	136890.13
600-25	J1HHP7	9/27/11	588355.95	136907.41
600-26	J1HHP8	9/28/11	588375.29	136907.06
600-27	J1HHP9	9/27/11	588346.59	136924.34
600-28	J1HHR0	9/27/11	588365.93	136923.98
600-29	J1HHR1	9/28/11	588355.00	136932.00
Equipment blank	J1HHT7	9/27/11	NA	NA

HEIS = Hanford Environmental Information Service
NA = not applicable

APPENDIX B

PHOTOGRAPHS OF COAL ASH SAMPLE AREAS

Figure B-1. 126-B-1 Coal Ash Sample Site and Surrounding Coal Ash Area.

Figure B-2. View of Side Ash Berm from Within 126-B-1 Site.

Figure B-3. View of Midline Berm Within 126-B-1 Site.

Figure B-4. 126-D-1 Coal Ash Sample Site and Surrounding Coal Ash Area (View to North).

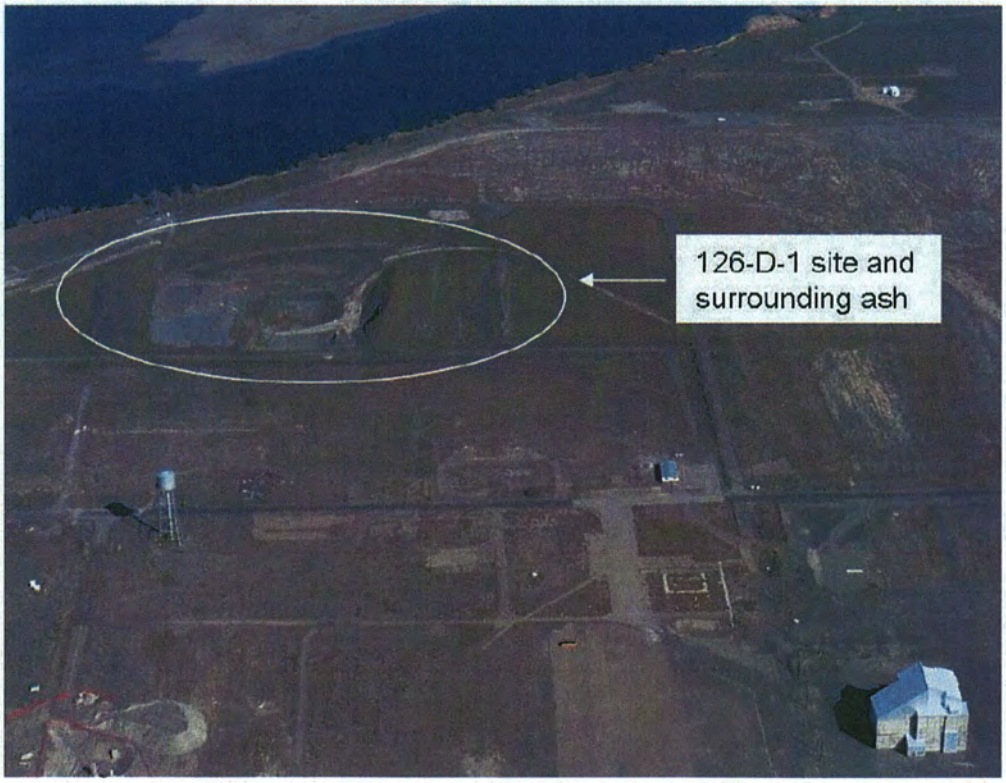

Figure B-5. 126-D-1 Coal Ash Sample Site and Surrounding Coal Ash Berms After 100-D-31:7 Pipeline Backfill (View to South).

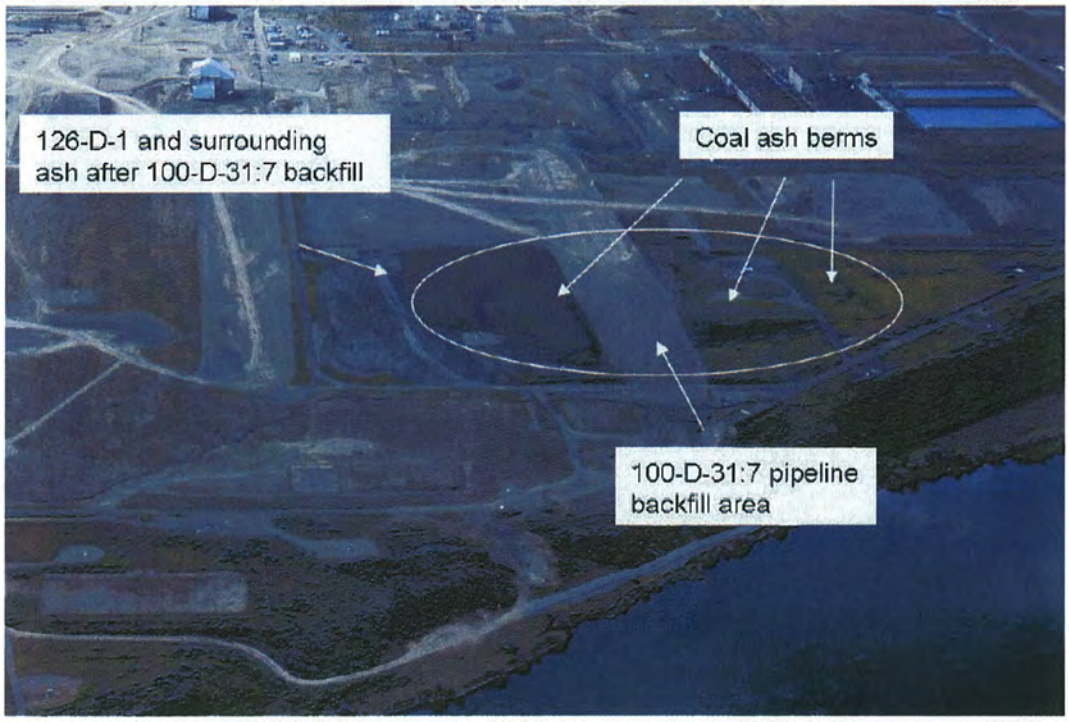

Figure B-6. View of West Coal Ash Berm from the North Coal Ash Berm at 126-D-1 Coal Ash Sample Site.

Figure B-7. View of North Coal Ash Berm from the West Coal Ash Berm at 126-D-1 Coal Ash Sample Site.

Figure B-8. Overland View of 126-H-1 Coal Ash Sample Site with Neighboring Ash Berm.

Figure B-9. View to North of Midline Berm at 126-H-1 Site.

Figure B-10. View to North of Midline Berm at 126-H-1 Site.

Figure B-11. Overland View of 300 Area Coal Ash Sample Site.

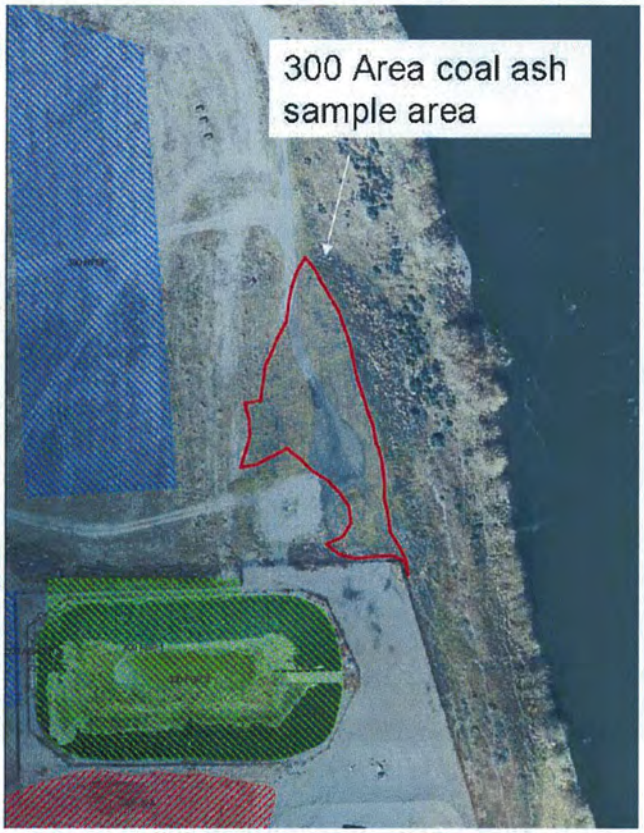

Figure B-12. 300 Area Ash Riverbank Sample Area (View to North).

Figure B-13. 300 Area Ash Sample Area (View to South).

Figure B-14. Overland View of 600-207 Coal Ash Site.

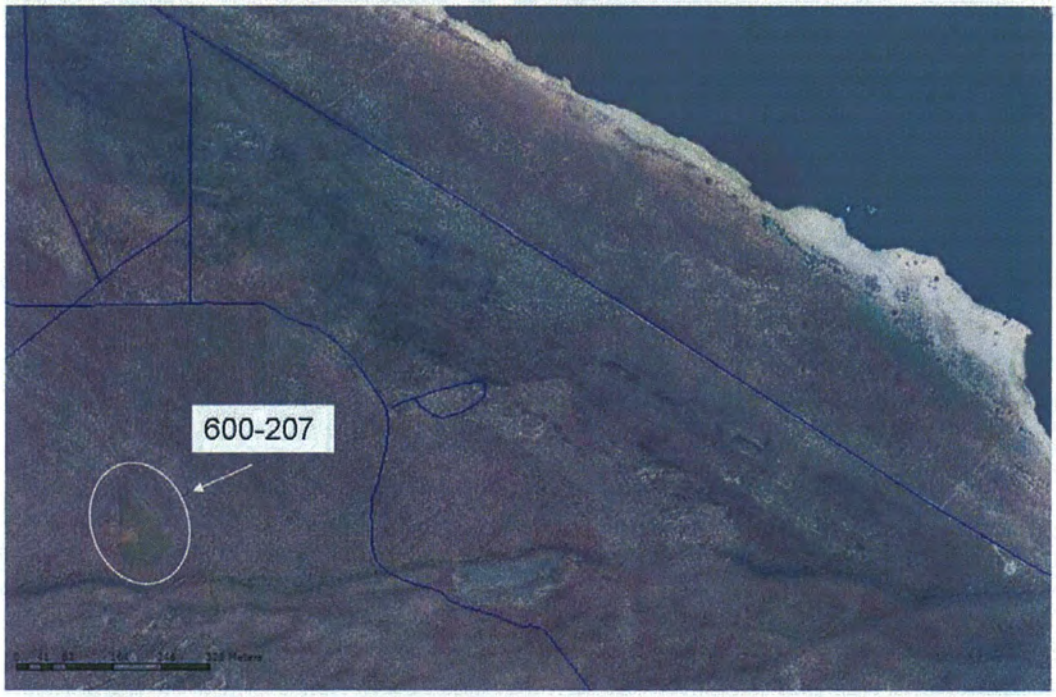

Figure B-15. 600-207 Coal Ash Site (View to South).

Figure B-16. Sample Location Within 600-207 Coal Ash Site.

APPENDIX C

COAL ASH DATA TABLES

Table C-1. 126-B-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-01	J1HHV4	4/27/11	0.588	U	0.59	5.85		0.98	1970		0.49	1.93		0.20	109		1.96
100-B-02	J1HHV5	4/27/11	0.265	B	0.52	4.21		0.86	1660		0.43	1.44		0.17	88.4		1.72
100-B-03	J1HHV6	4/27/11	0.566	U	0.57	4.62		0.94	1620		0.47	1.21		0.19	130		1.89
100-B-04	J1HHV7	4/27/11	0.588	U	0.59	2.41		0.98	793		0.49	1.15		0.20	161		1.96
100-B-05	J1HHV8	4/27/11	0.304	B	0.57	4.46		0.94	824		0.47	1.23		0.19	328		1.89
100-B-06	J1HHV9	4/27/11	0.566	U	0.57	5.37		0.94	1450		0.47	1.32		0.19	108		1.89
100-B-07	J1HHW0	4/27/11	0.536	U	0.54	3.43		0.89	1160		0.45	1.16		0.18	76.5		1.79
100-B-08	J1HHW1	4/27/11	0.517	U	0.52	4.76		0.86	2060		0.43	1.86		0.17	277		1.72
100-B-09	J1HHW2	8/23/11	0.469	U	0.47	4.28		0.78	1200		0.39	1.48		0.16	250		1.56
100-B-10	J1HHW3	4/27/11	0.566	U	0.57	2.98		0.94	597		0.47	1.03		0.19	169		1.89
100-B-10 (Depth)	J1HJ10	4/27/11	0.556	U	0.56	2.87		0.93	916		0.46	1.18		0.19	279		1.85
100-B-11	J1HHW4	4/27/11	0.577	U	0.58	3.20		0.96	958		0.48	1.56		0.19	265		1.92
100-B-12	J1HHW5	4/27/11	0.577	U	0.58	2.63		0.96	696		0.48	1.54		0.19	256		1.92
100-B-13	J1HHW6	4/27/11	0.505	B	0.54	7.36		0.89	2340		0.45	2.39		0.18	93.8		1.79
100-B-14	J1HHW7	8/23/11	0.600	U	0.60	8.45		1.00	1170		0.50	1.24		0.20	169		2.00
100-B-15	J1HHW8	4/27/11	0.545	U	0.55	3.01		0.91	792		0.46	1.17		0.18	211		1.82
Duplicate of J1HHW8	J1HJ04	4/27/11	1.76	U	1.76	3.41		2.94	753		1.47	1.19		0.59	240		5.88
100-B-16	J1HHW9	4/26/11	0.376	UJB	0.46	4.07		0.76	1360		0.38	1.50		0.15	129		1.52
100-B-17	J1HHX0	4/27/11	0.484	UJ	0.48	2.50		0.81	556		0.40	1.31		0.16	269		1.61
100-B-17 (Depth)	J1HJ09	4/27/11	0.469	UJ	0.47	2.50		0.78	681		0.39	1.68		0.16	262		1.56
100-B-18	J1HHX1	4/27/11	0.818	UJB	1.58	5.69		2.63	599		1.32	1.36		0.53	156		5.26
100-B-19	J1HHX2	8/23/11	0.469	U	0.47	2.74		0.78	783		0.39	1.16		0.16	205		1.56
100-B-20	J1HHX3	8/23/11	0.588	U	0.59	3.4		0.98	866		0.49	1.22		0.20	194		1.96
100-B-21	J1HHX4	4/25/11	0.918	UJB	1.55	4.76		2.59	406		1.29	1.12		0.52	145		5.17
100-B-22	J1HHX5	4/26/11	0.416	UJB	0.57	1.33		0.94	184		0.47	0.632		0.19	66.3		1.89
100-B-23	J1HHX6	4/26/11	1.91	J	1.70	9.59		2.83	2250		1.42	3.22		0.57	327		5.66
100-B-24	J1HHX7	4/26/11	1.00	UJB	1.76	5.42		2.94	1310		1.47	1.60		0.59	192		5.88
100-B-25	J1HHX8	4/25/11	1.69	BJ	1.70	10.3		2.83	1420		1.42	1.65		0.57	107		5.66
Duplicate of J1HHX8	J1HJ03	4/25/11	1.64	U	1.64	5.46		2.73	907		1.36	1.04		0.55	85.5		5.45
100-B-25 (Depth)	J1HJ08	4/26/11	0.956	UJB	1.61	8.09		2.68	1130		1.34	1.14		0.54	35.6		5.36
100-B-26	J1HHX9	8/23/11	0.441	U	0.44	3.14		0.74	1000		0.37	1.06		0.15	174		1.47
100-B-27	J1HJ00	4/27/11	1.67	U	1.67	3.19		2.78	497		1.39	0.894		0.56	92.6		5.56
100-B-28	J1HJ01	8/23/11	0.259	B	0.48	4.16		0.79	969		0.40	1.18		0.16	267		1.59
100-B-29	J1HJ02	8/23/11	0.550		0.44	5.94		0.73	1360		0.36	1.98		0.15	68.1		1.45
Equipment Blank	J1HJ05	4/25/11	0.429	U	0.43	0.302	B	0.71	1.94		0.36	0.054	B	0.14	1.43	U	1.43

Table C-1. 126-B-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-01	J1HHV4	4/27/11	0.198		0.20	8.33		0.20	8.22		1.96	39.2		0.98	2.89		0.49
100-B-02	J1HHV5	4/27/11	0.311		0.17	8.03		0.17	4.49		1.72	22.7		0.86	4.19		0.43
100-B-03	J1HHV6	4/27/11	0.293		0.19	9.87		0.19	6.47		1.9	32.0		0.9	4.86		0.47
100-B-04	J1HHV7	4/27/11	0.175	B	0.20	8.46		0.20	4.68		2.0	35.4		1.0	35.8		0.49
100-B-05	J1HHV8	4/27/11	0.506		0.19	16.2		0.19	4.12		1.9	98.3		0.9	13.5		0.47
100-B-06	J1HHV9	4/27/11	0.243		0.19	9.83		0.19	7.07		1.9	28.6		0.9	3.84		0.47
100-B-07	J1HHW0	4/27/11	0.224		0.18	8.47		0.18	5.31		1.8	24.6		0.9	5.55		0.45
100-B-08	J1HHW1	4/27/11	0.215		0.17	8.17		0.17	7.01		1.72	39.5		0.86	2.85		0.43
100-B-09	J1HHW2	8/23/11	0.205		0.16	12.5		0.16	5.41		1.56	32.4		0.78	6.08		0.39
100-B-10	J1HHW3	4/27/11	0.117	B	0.19	8.75		0.19	4.42		1.89	28.8		0.94	5.59		0.47
100-B-10 (Depth)	J1HJ10	4/27/11	0.239		0.19	7.34		0.19	3.44		1.85	21.0		0.93	11.8		0.46
100-B-11	J1HHW4	4/27/11	0.221		0.19	12.9		0.19	3.10		1.92	23.7		0.96	6.05		0.48
100-B-12	J1HHW5	4/27/11	0.167	B	0.19	12.7		0.19	2.98		1.92	22.2		0.96	5.80		0.48
100-B-13	J1HHW6	4/27/11	0.518		0.18	8.91		0.18	4.87		1.79	25.4		0.89	3.72		0.45
100-B-14	J1HHW7	8/23/11	0.360		0.20	11.5		0.20	4.59		2.00	27.3		1.00	7.72		0.50
100-B-15	J1HHW8	4/27/11	0.182	B	0.18	10.3		0.18	4.88		1.82	27.4		0.91	6.73		0.46
Duplicate of J1HHW8	J1HJ04	4/27/11	0.240	B	0.59	11.3		0.59	4.56	B	5.88	26.8		2.94	7.10		1.47
100-B-16	J1HHW9	4/26/11	0.182		0.15	6.74		0.15	3.55		1.52	19.1		0.76	3.18		0.38
100-B-17	J1HHX0	4/27/11	0.221		0.16	10.6		0.16	2.51		1.61	21.9		0.81	6.28		0.40
100-B-17 (Depth)	J1HJ09	4/27/11	0.135	B	0.16	13.3		0.16	2.64		1.56	19.6		0.78	4.33		0.39
100-B-18	J1HHX1	4/27/11	0.337	B	0.53	10.5		0.53	3.97	B	5.26	25.6		2.63	6.58		1.32
100-B-19	J1HHX2	8/23/11	0.265		0.16	9.66		0.16	2.79		1.56	20.9		0.78	10.7		0.39
100-B-20	J1HHX3	8/23/11	0.187	B	0.20	11.1		0.20	4.88		1.96	29.1		0.98	5.77		0.49
100-B-21	J1HHX4	4/25/11	0.914		0.52	14.4		0.52	3.06	B	5.17	25.0		2.59	18.4		1.29
100-B-22	J1HHX5	4/26/11	0.096	B	0.19	4.76		0.19	1.00	B	1.89	8.6		0.94	6.50		0.47
100-B-23	J1HHX6	4/26/11	0.899		0.57	25.5		0.57	15.1		5.66	94.3		2.83	19.0		1.42
100-B-24	J1HHX7	4/26/11	0.219	B	0.59	13.3		0.59	5.84	B	5.88	36.7		2.94	10.6		1.47
100-B-25	J1HHX8	4/25/11	0.385	B	0.57	11.2		0.57	4.66	B	5.66	28.4		2.83	13.4		1.42
Duplicate of J1HHX8	J1HJ03	4/25/11	0.278	B	0.55	8.34		0.55	4.12	B	5.45	20.2		2.73	9.95		1.36
100-B-25 (Depth)	J1HJ08	4/26/11	0.202	B	0.54	10.6		0.54	5.12	B	5.36	26.2		2.68	4.91		1.34
100-B-26	J1HHX9	8/23/11	0.354		0.15	12.3		0.15	2.18		1.47	17.7		0.74	12.2		0.37
100-B-27	J1HJ00	4/27/11	0.397	B	0.56	10.4		0.56	5.56	U	5.56	22.0		2.78	9.69		1.39
100-B-28	J1HJ01	8/23/11	0.373		0.16	13.2		0.16	2.69		1.59	26.2		0.79	15.9		0.40
100-B-29	J1HJ02	8/23/11	0.251		0.15	7.66		0.15	4.02		1.45	22.8		0.73	3.87		0.36
Equipment Blank	J1HJ05	4/25/11	0.143	U	0.14	0.206		0.14	1.43	U	1.43	0.714	U	0.71	0.405		0.36

Table C-1. 126-B-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-01	J1HHV4	4/27/11	335		4.90	0.072		0.03	2.40		1.96	11.8		3.92	0.294	U	0.29
100-B-02	J1HHV5	4/27/11	296		4.31	0.057		0.02	1.72	B	1.72	9.09		3.45	0.264		0.26
100-B-03	J1HHV6	4/27/11	396		4.72	0.060		0.03	1.47	B	1.89	15.1		3.77	0.283	U	0.28
100-B-04	J1HHV7	4/27/11	94.3		4.90	0.062		0.03	1.22	B	1.96	9.93		3.92	0.332		0.29
100-B-05	J1HHV8	4/27/11	199		4.72	0.861		0.02	2.88		1.89	15.0		3.77	0.479		0.28
100-B-06	J1HHV9	4/27/11	348		4.72	0.064		0.03	34.7		1.89	12.3		3.77	0.497		0.28
100-B-07	J1HHW0	4/27/11	218		4.46	0.065		0.03	1.16	B	1.79	10.5		3.57	0.268	U	0.27
100-B-08	J1HHW1	4/27/11	213		4.31	0.046		0.03	2.51		1.72	15.8		3.45	0.329		0.26
100-B-09	J1HHW2	8/23/11	157		3.91	0.292		0.02	2.26		1.56	13.0		3.12	0.495		0.23
100-B-10	J1HHW3	4/27/11	104		4.72	0.049		0.03	1.08	B	1.89	9.93		3.77	0.618		0.28
100-B-10 (Depth)	J1HJ10	4/27/11	110		4.63	0.042		0.03	1.40	B	1.85	7.29		3.70	0.278	U	0.28
100-B-11	J1HHW4	4/27/11	68.8		4.81	0.059		0.02	1.42	B	1.92	8.27		3.85	0.323		0.29
100-B-12	J1HHW5	4/27/11	60.9		4.81	0.062		0.03	1.34	B	1.92	8.38		3.85	0.409		0.29
100-B-13	J1HHW6	4/27/11	521		4.46	0.075		0.03	2.21		1.79	9.05		3.57	0.414		0.27
100-B-14	J1HHW7	8/23/11	182		5.00	0.196		0.03	1.63	B	2.00	10.6		4.00	1.26		0.30
100-B-15	J1HHW8	4/27/11	94.8		4.55	0.060		0.03	1.59	B	1.82	10.3		3.64	0.443		0.27
Duplicate of J1HHW8	J1HJ04	4/27/11	107		14.7	0.077		0.03	1.42	B	5.88	10.3	B	11.8	0.882	U	0.88
100-B-16	J1HHW9	4/26/11	283		3.79	0.022	B	0.03	1.33	B	1.52	7.12		3.03	0.361		0.23
100-B-17	J1HHX0	4/27/11	57.5		4.03	0.053		0.03	1.17	B	1.61	7.02		3.23	0.331		0.24
100-B-17 (Depth)	J1HJ09	4/27/11	38.5		3.91	0.080		0.03	1.31	B	1.56	7.67		3.12	0.367		0.23
100-B-18	J1HHX1	4/27/11	145		13.2	0.037		0.03	1.47	B	5.26	9.39	B	10.5	0.789	U	0.79
100-B-19	J1HHX2	8/23/11	109		3.9	0.080		0.02	1.20	B	1.56	7.20		3.12	0.798		0.23
100-B-20	J1HHX3	8/23/11	102		4.9	0.200		0.03	1.85	B	1.96	11.2		3.92	0.648		0.29
100-B-21	J1HHX4	4/25/11	116		12.9	0.338		0.03	0.752	B	5.17	9.09	B	10.3	2.00		0.78
100-B-22	J1HHX5	4/26/11	13.1		4.72	0.043		0.03	0.314	B	1.89	3.02	B	3.77	0.664		0.28
100-B-23	J1HHX6	4/26/11	344		14.2	0.146		0.03	3.85	B	5.66	31.5		11.3	1.36		0.85
100-B-24	J1HHX7	4/26/11	159		14.7	0.087		0.03	1.67	B	5.88	13.8		11.8	0.882	U	0.88
100-B-25	J1HHX8	4/25/11	391		14.2	0.115		0.03	1.14	B	5.66	10.5	B	11.3	1.58		0.85
Duplicate of J1HHX8	J1HJ03	4/25/11	202		13.6	0.120		0.03	0.972	B	5.45	9.70	B	10.9	1.03		0.82
100-B-25 (Depth)	J1HJ08	4/26/11	187		13.4	0.026	B	0.03	1.59	B	5.36	11.2		10.7	0.804	U	0.80
100-B-26	J1HHX9	8/23/11	71.2		3.7	0.092		0.03	0.734	B	1.47	6.63		2.94	1.22		0.22
100-B-27	J1HJ00	4/27/11	85.0		13.9	0.235		0.03	0.654	B	5.56	6.92	B	11.1	0.876		0.83
100-B-28	J1HJ01	8/23/11	83.5		4.0	0.195		0.03	1.10	B	1.59	8.14		3.17	1.44		0.24
100-B-29	J1HJ02	8/23/11	358		3.6	0.052		0.03	1.69		1.45	7.70		2.90	0.476		0.22
Equipment Blank	J1HJ05	4/25/11	5.24		3.57	0.025	U	0.03	1.43	U	1.43	2.86	U	2.86	0.214	U	0.21

Table C-1. 126-B-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Silver			Thallium			Uranium (KPA)			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	ug/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-01	J1HHV4	4/27/11	0.196	U	0.20	0.490	U	0.490				64.0		2.45	20.4		9.80
100-B-02	J1HHV5	4/27/11	0.172	U	0.17	0.431	U	0.431				30.6		2.16	41.8		8.62
100-B-03	J1HHV6	4/27/11	0.189	U	0.19	0.472	U	0.472				48.0		2.36	55.5		9.43
100-B-04	J1HHV7	4/27/11	0.196	U	0.20	0.490	U	0.490				37.7		2.45	38.9		9.80
100-B-05	J1HHV8	4/27/11	0.189	U	0.19	0.472	U	0.472				33.4		2.36	80.7		9.43
100-B-06	J1HHV9	4/27/11	0.189	U	0.19	0.472	U	0.472				48.7		2.36	36.0		9.43
100-B-07	J1HHW0	4/27/11	0.179	U	0.18	0.446	U	0.446				38.4		2.23	34.1		8.93
100-B-08	J1HHW1	4/27/11	0.172	U	0.17	0.431	U	0.431				54.1		2.16	23.7		8.62
100-B-9	J1HHW2	8/23/11	0.156	U	0.16	0.391	U	0.390				43.7		1.95	42.5		7.81
100-B-10	J1HHW3	4/27/11	0.189	U	0.19	0.472	U	0.472	2.67		0.123	39.3		2.36	13.6		9.43
100-B-10 (Depth)	J1HJ10	4/27/11	0.185	U	0.19	0.463	U	0.463	4.28		0.123	28.7		2.31	29.7		9.26
100-B-11	J1HHW4	4/27/11	0.192	U	0.19	0.481	U	0.481				32.1		2.40	26.8		9.62
100-B-12	J1HHW5	4/27/11	0.192	U	0.19	0.481	U	0.481				30.7		2.40	29.8		9.62
100-B-13	J1HHW6	4/27/11	0.179	U	0.18	0.446	U	0.446				32.5		2.23	54.5		8.93
100-B-14	J1HHW7	8/23/11	0.200	U	0.20	0.500	U	0.500				37.0		2.50	47.6		10.00
100-B-15	J1HHW8	4/27/11	0.182	U	0.18	0.455	U	0.455				35.7		2.27	26.9		9.09
Duplicate of J1HHW8	J1HJ04	4/27/11	0.588	U	0.59	1.47	U	1.47				37.4		7.35	48.6		29.4
100-B-16	J1HHW9	4/26/11	0.152	U	0.15	0.379	U	0.379				24.6		1.89	24.6		7.58
100-B-17	J1HHX0	4/27/11	0.161	U	0.16	0.403	U	0.403	5.39		0.128	27.3		2.02	32.4		8.06
100-B-17 (Depth)	J1HJ09	4/27/11	0.156	U	0.16	0.391	U	0.391	6.75		0.128	29.2		1.95	15.1		7.81
100-B-18	J1HHX1	4/27/11	0.526	U	0.53	1.32	U	1.32				31.4		6.58	37.3		26.3
100-B-19	J1HHX2	8/23/11	0.156	U	0.16	0.391	U	0.390				28.3		1.95	36.3		7.8
100-B-20	J1HHX3	8/23/11	0.196	U	0.20	0.490	U	0.490				38.2		2.45	21.8		9.8
100-B-21	J1HHX4	4/25/11	0.517	U	0.52	1.29	U	1.29				29.3		6.47	104		25.9
100-B-22	J1HHX5	4/26/11	0.189	U	0.19	0.472	U	0.472				9.73		2.36	9.43	B	9.43
100-B-23	J1HHX6	4/26/11	0.566	U	0.57	1.42	U	1.42				113		7.08	94.8		28.3
100-B-24	J1HHX7	4/26/11	0.588	U	0.59	1.47	U	1.47				46.3		7.35	28.0	B	29.4
100-B-25	J1HHX8	4/25/11	0.566	U	0.57	1.42	U	1.42	4.13		0.128	36.2		7.08	38.0		28.3
Duplicate of J1HHX8	J1HJ03	4/25/11	0.545	U	0.55	1.36	U	1.36	3.25		0.123	27.6		6.82	33.5		27.3
100-B-25 (Depth)	J1HJ08	4/26/11	0.536	U	0.54	1.34	U	1.34	3.56		0.128	33.5		6.70	23.8	B	26.8
100-B-26	J1HHX9	8/23/11	0.147	U	0.15	0.368	U	0.37				25.9		1.84	41.8		7.4
100-B-27	J1HJ00	4/27/11	0.556	U	0.56	1.39	U	1.39				28.9		6.94	43.4		27.8
100-B-28	J1HJ01	8/23/11	0.159	U	0.16	0.397	U	0.40				29.1		1.98	46.6		7.9
100-B-29	J1HJ02	8/23/11	0.145	U	0.15	0.362	U	0.36				30.6		1.81	29.8		7.3
Equipment Blank	J1HJ05	4/25/11	0.143	U	0.14	0.357	U	0.357				0.701	B	1.79	2.37	B	7.14

Table C-1. 126-B-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Acenaphthene			Acenaphthylene			Anthracene			Benzo(a)anthracene			Benzo(a)pyrene			Benzo(b)fluoranthene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
100-B-10	J1HHW3	4/27/11	328	U	328	328	U	328	50.2	J	328	328	U	328	328	U	328	328	U	328
100-B-10 (Depth)	J1HJ10	4/27/11	322	U	322	322	U	322	322	U	322	322	U	322	322	U	322	322	U	322
100-B-17	J1HHX0	4/27/11	324	U	324	324	U	324	324	U	324	324	U	324	324	U	324	324	U	324
100-B-17 (Depth)	J1HJ09	4/27/11	327	U	327	327	U	327	327	U	327	327	U	327	327	U	327	327	U	327
100-B-25	J1HHX8	4/25/11	328	U	328	328	U	328	328	U	328	73.6	J	328	328	U	328	328	U	328
Duplicate of J1HHX8	J1HJ03	4/25/11	322	U	322	322	U	322	322	U	322	322	U	322	322	U	322	322	U	322
100-B-25 (Depth)	J1HJ08	4/26/11	328	U	328	328	U	328	328	U	328	328	U	328	328	U	328	328	U	328
Equipment Blank	J1HJ05	4/25/11	316	U	316	316	U	316	316	U	316	316	U	316	316	U	316	316	U	316

Sample Location	HEIS Number	Sample Date	Benzo(ghi)perylene			Benzo(k)fluoranthene			Chrysene			Dibenz(a,h)anthracene			Fluoranthene			Fluorene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
100-B-10	J1HHW3	4/27/11	328	U	328	328	U	328	63.7	J	328	328	U	328	71.3	J	328	328	U	328
100-B-10 (Depth)	J1HJ10	4/27/11	322	U	322	322	U	322	322	U	322	322	U	322	322	U	322	322	U	322
100-B-17	J1HHX0	4/27/11	324	U	324	324	U	324	65.0	J	324	324	U	324	78.0	J	324	324	U	324
100-B-17 (Depth)	J1HJ09	4/27/11	327	U	327	327	U	327	327	U	327	327	U	327	327	U	327	327	U	327
100-B-25	J1HHX8	4/25/11	328	U	328	83.9	J	328	83.4	J	328	328	U	328	74.9	J	328	328	U	328
Duplicate of J1HHX8	J1HJ03	4/25/11	322	U	322	322	U	322	322	U	322	322	U	322	55.2	J	322	322	U	322
100-B-25 (Depth)	J1HJ08	4/26/11	328	U	328	328	U	328	328	U	328	328	U	328	328	U	328	328	U	328
Equipment Blank	J1HJ05	4/25/11	316	U	316	316	U	316	316	U	316	316	U	316	316	U	316	316	U	316

Sample Location	HEIS Number	Sample Date	Indeno(1,2,3-cd)pyrene			Naphthalene			Phenanthrene			Pyrene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
100-B-10	J1HHW3	4/27/11	328	U	328	257	J	328	240	J	328	64.9	J	328
100-B-10 (Depth)	J1HJ10	4/27/11	322	U	322	125	J	322	79.0	J	322	322	U	322
100-B-17	J1HHX0	4/27/11	324	U	324	852		324	164	J	324	69.4	J	324
100-B-17 (Depth)	J1HJ09	4/27/11	327	U	327	234	J	327	90.3	J	327	327	U	327
100-B-25	J1HHX8	4/25/11	328	U	328	1730		328	393		328	100	J	328
Duplicate of J1HHX8	J1HJ03	4/25/11	322	U	322	198	J	322	168	J	322	322	U	322
100-B-25 (Depth)	J1HJ08	4/26/11	328	U	328	328	U	328	119	J	328	328	U	328
Equipment Blank	J1HJ05	4/25/11	316	U	316	316	U	316	316	U	316	316	U	316

Table C-2. 126-B-1 Coal Ash Pre-Leaching Quadruplicate Sample Results. (2 Pages)

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-10	J1HHW3-1	4/27/11	0.556	U	0.56	3.10		0.93	701		0.46	1.12		0.19	217		1.85
100-B-10	J1HHW3-2	4/27/11	0.545	U	0.55	3.14		0.91	665		0.46	1.13		0.18	217		1.82
100-B-10	J1HHW3-3	4/27/11	0.566	U	0.57	2.80		0.94	609		0.47	1.09		0.19	208		1.89
100-B-10	J1HHW3-4	4/27/11	0.545	U	0.55	3.04		0.91	675		0.46	1.07		0.18	210		1.82
100-B-25 (Depth)	J1HJ08-1	4/26/11	0.657	U	0.66	11.1		1.10	1790		0.55	1.65		0.22	69.1		2.19
100-B-25 (Depth)	J1HJ08-2	4/26/11	0.635	U	0.64	9.25		1.06	2030		0.53	1.82		0.21	166		2.12
100-B-25 (Depth)	J1HJ08-3	4/26/11	0.434	B	0.64	8.86		1.06	1500		0.53	1.43		0.21	56.8		2.12
100-B-25 (Depth)	J1HJ08-4	4/26/11	0.397	B	0.72	11.1		1.20	1720		0.60	1.52		0.24	57.2		2.40
100-B-17 (Depth)	J1HJ09-1	4/27/11	0.636	U	0.64	2.66		1.06	910		0.53	1.98		0.21	352		2.12
100-B-17 (Depth)	J1HJ09-2	4/27/11	0.614	U	0.61	2.57		1.02	866		0.51	1.88		0.21	317		2.05
100-B-17 (Depth)	J1HJ09-3	4/27/11	0.614	U	0.61	2.41		1.02	766		0.51	1.76		0.21	300		2.05
100-B-17 (Depth)	J1HJ09-4	4/27/11	0.584	U	0.58	2.14		0.97	732		0.49	1.65		0.20	275		1.95
100-B-10 (Depth)	J1HJ10-1	4/27/11	0.517	U	0.52	3.30		0.86	896		0.43	1.17		0.17	247		1.72
100-B-10 (Depth)	J1HJ10-2	4/27/11	0.517	U	0.52	2.94		0.86	922		0.43	1.29		0.17	240		1.72
100-B-10 (Depth)	J1HJ10-3	4/27/11	0.353	B	0.52	3.03		0.86	1120		0.43	1.13		0.17	229		1.72
100-B-10 (Depth)	J1HJ10-4	4/27/11	0.55	U	0.55	2.94		0.91	938		0.46	1.19		0.18	292		1.82

Sample Location	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-10	J1HHW3-1	4/27/11	0.133	B	0.19	9.10		0.19	4.51		1.85	29.6		0.93	9.63		0.46
100-B-10	J1HHW3-2	4/27/11	0.119	B	0.18	9.44		0.18	4.53		1.82	30.0		0.91	7.95		0.46
100-B-10	J1HHW3-3	4/27/11	0.144	B	0.19	8.31		0.19	4.13		1.89	24.4		0.94	7.04		0.47
100-B-10	J1HHW3-4	4/27/11	0.159	B	0.18	8.23		0.18	4.37		1.82	30.1		0.91	13.7		0.46
100-B-25 (Depth)	J1HJ08-1	4/26/11	0.268		0.22	14.1		0.22	6.74		2.19	38.5		1.10	8.17		0.55
100-B-25 (Depth)	J1HJ08-2	4/26/11	0.232		0.21	10.3		0.21	6.43		2.12	31.5		1.06	5.38		0.53
100-B-25 (Depth)	J1HJ08-3	4/26/11	0.244		0.21	11		0.21	5.44		2.12	30.6		1.06	6.73		0.53
100-B-25 (Depth)	J1HJ08-4	4/26/11	0.282		0.24	13.7		0.24	6.49		2.40	34.3		1.20	7.09		0.60
100-B-17 (Depth)	J1HJ09-1	4/27/11	0.163	B	0.21	14.9		0.21	3.31		2.12	25.7		1.06	6.94		0.53
100-B-17 (Depth)	J1HJ09-2	4/27/11	0.188	B	0.21	15.1		0.21	3.13		2.05	26.6		1.02	7.00		0.51
100-B-17 (Depth)	J1HJ09-3	4/27/11	0.138	B	0.21	13.3		0.21	2.88		2.05	23.3		1.02	7.08		0.51
100-B-17 (Depth)	J1HJ09-4	4/27/11	0.128	B	0.20	11.4		0.20	2.75		1.95	21.3		0.97	5.04		0.49
100-B-10 (Depth)	J1HJ10-1	4/27/11	0.213		0.17	10.3		0.17	3.56		1.72	26.2		0.86	38.7		0.43
100-B-10 (Depth)	J1HJ10-2	4/27/11	0.227		0.17	9.20		0.17	4.14		1.72	36.8		0.86	14.9		0.43
100-B-10 (Depth)	J1HJ10-3	4/27/11	0.29		0.17	7.31		0.17	3.61		1.72	27.0		0.86	25.7		0.43
100-B-10 (Depth)	J1HJ10-4	4/27/11	0.247		0.18	8.72		0.18	3.49		1.82	25.5		0.91	12.1		0.46

Table C-2. 126-B-1 Coal Ash Pre-Leaching Quadruplicate Sample Results. (2 Pages)

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-10	J1HHW3-1	4/27/11	94.9		4.63	0.038		0.03	1.18	B	1.85	10.4		3.70	0.278	U	0.28
100-B-10	J1HHW3-2	4/27/11	96.1		4.55	0.042		0.03	1.22	B	1.82	10.1		3.64	0.367		0.27
100-B-10	J1HHW3-3	4/27/11	84.9		4.72	0.044		0.03	1.12	B	1.89	9.04		3.77	0.464		0.28
100-B-10	J1HHW3-4	4/27/11	89.6		4.55	0.045		0.03	1.26	B	1.82	9.38		3.64	0.421		0.27
100-B-25 (Depth)	J1HJ08-1	4/26/11	269		5.48	0.038		0.03	2.90		2.19	15.7		4.38	1.32		0.33
100-B-25 (Depth)	J1HJ08-2	4/26/11	175		5.29	0.046		0.03	2.43		2.12	13.8		4.23	0.823		0.32
100-B-25 (Depth)	J1HJ08-3	4/26/11	228		5.29	0.037		0.03	2.27		2.12	13.1		4.23	1.39		0.32
100-B-25 (Depth)	J1HJ08-4	4/26/11	254		6.00	0.037		0.03	3.32		2.40	15.2		4.80	1.47		0.36
100-B-17 (Depth)	J1HJ09-1	4/27/11	52.0		5.30	0.033		0.03	1.60	B	2.12	9.21		4.24	0.343		0.32
100-B-17 (Depth)	J1HJ09-2	4/27/11	46.8		5.12	0.035		0.03	1.52	B	2.05	8.90		4.09	0.307	U	0.31
100-B-17 (Depth)	J1HJ09-3	4/27/11	37.8		5.12	0.037		0.03	1.31	B	2.05	8.22		4.09	0.339		0.31
100-B-17 (Depth)	J1HJ09-4	4/27/11	43.5		4.87	0.042		0.03	1.28	B	1.95	7.52		3.89	0.292	U	0.29
100-B-10 (Depth)	J1HJ10-1	4/27/11	136		4.31	0.033		0.03	1.23	B	1.72	8.91		3.45	0.301		0.26
100-B-10 (Depth)	J1HJ10-2	4/27/11	159		4.31	0.039		0.02	1.56	B	1.72	10.5		3.45	0.259	U	0.26
100-B-10 (Depth)	J1HJ10-3	4/27/11	140		4.31	0.029		0.02	1.28	B	1.72	8.04		3.45	0.412		0.26
100-B-10 (Depth)	J1HJ10-4	4/27/11	141		4.55	0.040		0.02	1.46	B	1.82	8.20		3.64	0.273	U	0.27

Sample Location	HEIS Number	Sample Date	Silver			Thallium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-10	J1HHW3-1	4/27/11	0.185	U	0.19	0.463	U	0.46	41.1		2.31	17.5		9.26
100-B-10	J1HHW3-2	4/27/11	0.182	U	0.18	0.455	U	0.46	40.6		2.27	15.8		9.09
100-B-10	J1HHW3-3	4/27/11	0.189	U	0.19	0.472	U	0.47	35.1		2.36	14.6		9.43
100-B-10	J1HHW3-4	4/27/11	0.182	U	0.18	0.455	U	0.46	38.8		2.27	17.0		9.09
100-B-25 (Depth)	J1HJ08-1	4/26/11	0.219	U	0.22	0.548	U	0.55	52.0		2.74	31.1		11.0
100-B-25 (Depth)	J1HJ08-2	4/26/11	0.212	U	0.21	0.529	U	0.53	49.5		2.65	20.7		10.6
100-B-25 (Depth)	J1HJ08-3	4/26/11	0.212	U	0.21	0.529	U	0.53	41.4		2.65	27.8		10.6
100-B-25 (Depth)	J1HJ08-4	4/26/11	0.24	U	0.24	0.600	U	0.60	47.3		3.00	31.3		12.0
100-B-17 (Depth)	J1HJ09-1	4/27/11	0.212	U	0.21	0.530	U	0.53	37.4		2.65	19.4		10.6
100-B-17 (Depth)	J1HJ09-2	4/27/11	0.205	U	0.21	0.512	U	0.51	34.3		2.56	22.2		10.2
100-B-17 (Depth)	J1HJ09-3	4/27/11	0.205	U	0.21	0.512	U	0.51	32.2		2.56	22.5		10.2
100-B-17 (Depth)	J1HJ09-4	4/27/11	0.195	U	0.20	0.487	U	0.49	29.2		2.43	15.8		9.73
100-B-10 (Depth)	J1HJ10-1	4/27/11	0.172	U	0.17	0.431	U	0.43	28.8		2.16	31.1		8.62
100-B-10 (Depth)	J1HJ10-2	4/27/11	0.172	U	0.17	0.431	U	0.43	30.5		2.16	38.3		8.62
100-B-10 (Depth)	J1HJ10-3	4/27/11	0.172	U	0.17	0.431	U	0.43	27.4		2.16	44.5		8.62
100-B-10 (Depth)	J1HJ10-4	4/27/11	0.182	U	0.18	0.455	U	0.46	29.4		2.27	33.4		9.09

Table C-3. 126-B-1 Coal Ash Leaching Sample Results. (2 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
100-B-10	1:1	J1HHW3-A1	4/27/11	0.200	U	0.20	0.150	U	0.15	0.031		0.010	0.010	U	0.010	3.31		0.15
100-B-10	1:2.5	J1HHW3-B1	4/27/11	0.020	U	0.02	0.011	B	0.02	0.020		0.003	0.001	U	0.001	1.92		0.02
100-B-10	1:2.5	J1HHW3-B2	4/27/11	0.020	U	0.02	0.010	B	0.02	0.019		0.002	0.001	U	0.001	1.75		0.02
100-B-10	1:5	J1HHW3-C1	4/27/11	0.020	U	0.02	0.007	B	0.02	0.013		0.002	0.001	U	0.001	0.98		0.02
100-B-25 (Depth)	1:1	J1HJ08-A1	4/26/11	0.200	U	0.20	0.150	U	0.15	0.035		0.010	0.010	U	0.010	2.55		0.15
100-B-25 (Depth)	1:2.5	J1HJ08-B1	4/26/11	0.020	U	0.02	0.015	U	0.02	0.034		0.001	0.001	U	0.001	1.55		0.02
100-B-25 (Depth)	1:2.5	J1HJ08-B2	4/26/11	0.020	U	0.02	0.015	U	0.02	0.033		0.001	0.001	U	0.001	1.48		0.02
100-B-25 (Depth)	1:5	J1HJ08-C1	4/26/11	0.020	U	0.02	0.015	U	0.02	0.039		0.001	0.001	U	0.001	1.06		0.02
100-B-17 (Depth)	1:1	J1HJ09-A1	4/27/11	0.200	U	0.20	0.150	U	0.15	0.035		0.010	0.010	U	0.010	5.66		0.15
100-B-17 (Depth)	1:2.5	J1HJ09-B1	4/27/11	0.020	U	0.02	0.003	B	0.02	0.037		0.001	0.001	U	0.001	3.93		0.02
100-B-17 (Depth)	1:5	J1HJ09-C1	4/27/11	0.020	U	0.02	0.003	B	0.02	0.026		0.001	0.001	U	0.001	2.36		0.02
100-B-17 (Depth)	1:5	J1HJ09-C2	4/27/11	0.020	U	0.02	0.003	B	0.02	0.027		0.001	0.001	U	0.001	2.23		0.02
100-B-10 (Depth)	1:1	J1HJ10-A1	4/27/11	0.200	U	0.20	0.150	U	0.15	0.056		0.010	0.010	U	0.010	8.57		0.15
100-B-10 (Depth)	1:1	J1HJ10-A2	4/27/11	0.200	U	0.20	0.150	U	0.15	0.035		0.010	0.010	U	0.010	8.62		0.15
100-B-10 (Depth)	1:2.5	J1HJ10-B1	4/27/11	0.020	U	0.02	0.006	B	0.02	0.035		0.003	0.001	U	0.001	4.36		0.02
100-B-10 (Depth)	1:5	J1HJ10-C1	4/27/11	0.020	U	0.02	0.005	B	0.02	0.031		0.003	0.001	U	0.001	2.31		0.02

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
100-B-10	1:1	J1HHW3-A1	4/27/11	0.030	U	0.030	0.050	U	0.050	0.020	U	0.020	0.200	U	0.20	0.100	U	0.100
100-B-10	1:2.5	J1HHW3-B1	4/27/11	0.003	U	0.003	0.002	B	0.010	0.002	U	0.002	0.003	B	0.02	0.010	U	0.010
100-B-10	1:2.5	J1HHW3-B2	4/27/11	0.003	U	0.003	0.001	B	0.010	0.002	U	0.002	0.003	B	0.02	0.010	U	0.010
100-B-10	1:5	J1HHW3-C1	4/27/11	0.003	U	0.001	0.001	B	0.010	0.002	U	0.002	0.003	B	0.02	0.010	U	0.010
100-B-25 (Depth)	1:1	J1HJ08-A1	4/26/11	0.030	U	0.030	0.050	U	0.050	0.020	U	0.020	0.200	U	0.20	0.100	U	0.100
100-B-25 (Depth)	1:2.5	J1HJ08-B1	4/26/11	0.003	U	0.003	0.005	U	0.010	0.002	U	0.002	0.020	U	0.02	0.010	U	0.010
100-B-25 (Depth)	1:2.5	J1HJ08-B2	4/26/11	0.003	U	0.003	0.005	U	0.010	0.002	U	0.002	0.020	U	0.02	0.010	U	0.010
100-B-25 (Depth)	1:5	J1HJ08-C1	4/26/11	0.003	U	0.003	0.005	U	0.010	0.002	U	0.002	0.020	U	0.02	0.010	U	0.010
100-B-17 (Depth)	1:1	J1HJ09-A1	4/27/11	0.030	U	0.030	0.050	U	0.050	0.020	U	0.020	0.200	U	0.20	0.100	U	0.100
100-B-17 (Depth)	1:2.5	J1HJ09-B1	4/27/11	0.003	U	0.003	0.003	B	0.010	0.002	U	0.002	0.020	U	0.02	0.010	U	0.010
100-B-17 (Depth)	1:5	J1HJ09-C1	4/27/11	0.003	U	0.003	0.002	B	0.010	0.002	U	0.002	0.020	U	0.02	0.010	U	0.010
100-B-17 (Depth)	1:5	J1HJ09-C2	4/27/11	0.003	U	0.003	0.002	B	0.010	0.002	U	0.002	0.020	U	0.02	0.010	U	0.010
100-B-10 (Depth)	1:1	J1HJ10-A1	4/27/11	0.030	U	0.030	0.050	U	0.050	0.020	U	0.020	0.200	U	0.20	0.100	U	0.100
100-B-10 (Depth)	1:1	J1HJ10-A2	4/27/11	0.030	U	0.030	0.050	U	0.050	0.020	U	0.020	0.200	U	0.20	0.100	U	0.100
100-B-10 (Depth)	1:2.5	J1HJ10-B1	4/27/11	0.003	U	0.003	0.002	B	0.010	0.002	U	0.002	0.020	U	0.02	0.010	U	0.010
100-B-10 (Depth)	1:5	J1HJ10-C1	4/27/11	0.003	U	0.001	0.001	B	0.010	0.002	U	0.002	0.020	U	0.02	0.010	U	0.010

Table C-3. 126-B-1 Coal Ash Leaching Sample Results. (2 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
100-B-10	1:1	J1HHW3-A1	4/27/11	0.013	B	0.050	0.002	U	0.0020	0.011	B	0.030	0.005	B	0.200	0.200	U	0.200
100-B-10	1:2.5	J1HHW3-B1	4/27/11	0.001	B	0.010	0.0002	U	0.0004	0.003	B	0.002	0.001	B	0.020	0.020	U	0.020
100-B-10	1:2.5	J1HHW3-B2	4/27/11	0.001	B	0.010	0.0002	U	0.0002	0.003	B	0.002	0.001	B	0.020	0.020	U	0.020
100-B-10	1:5	J1HHW3-C1	4/27/11	0.001	B	0.010	0.0002	U	0.0002	0.002	B	0.001	0.001	B	0.020	0.020	U	0.020
100-B-25 (Depth)	1:1	J1HJ08-A1	4/26/11	0.081		0.050	0.002	U	0.0020	0.012	B	0.030	0.200	U	0.200	0.200	U	0.200
100-B-25 (Depth)	1:2.5	J1HJ08-B1	4/26/11	0.038		0.010	0.0002	U	0.0002	0.008		0.003	0.001	B	0.020	0.020	U	0.020
100-B-25 (Depth)	1:2.5	J1HJ08-B2	4/26/11	0.036		0.010	0.0002	U	0.0002	0.008		0.003	0.020	U	0.020	0.003	B	0.020
100-B-25 (Depth)	1:5	J1HJ08-C1	4/26/11	0.023		0.010	0.0002	U	0.0002	0.008		0.003	0.001	B	0.020	0.020	U	0.020
100-B-17 (Depth)	1:1	J1HJ09-A1	4/27/11	0.050	U	0.050	0.002	U	0.0020	0.035		0.030	0.200	U	0.200	0.200	U	0.200
100-B-17 (Depth)	1:2.5	J1HJ09-B1	4/27/11	0.001	B	0.010	0.0002	U	0.0002	0.011		0.003	0.020	U	0.020	0.003	B	0.020
100-B-17 (Depth)	1:5	J1HJ09-C1	4/27/11	0.001	B	0.010	0.0002	U	0.0002	0.006		0.003	0.001	B	0.020	0.020	U	0.020
100-B-17 (Depth)	1:5	J1HJ09-C2	4/27/11	0.001	B	0.010	0.0002	U	0.0002	0.006		0.003	0.001	B	0.020	0.020	U	0.020
100-B-10 (Depth)	1:1	J1HJ10-A1	4/27/11	0.014	B	0.050	0.002	U	0.0020	0.015	B	0.030	0.200	U	0.200	0.200	U	0.200
100-B-10 (Depth)	1:1	J1HJ10-A2	4/27/11	0.011	B	0.050	0.002	U	0.0020	0.015	B	0.030	0.200	U	0.200	0.200	U	0.200
100-B-10 (Depth)	1:2.5	J1HJ10-B1	4/27/11	0.001	B	0.010	0.0002	U	0.0002	0.007		0.007	0.001	B	0.020	0.003	B	0.020
100-B-10 (Depth)	1:5	J1HJ10-C1	4/27/11	0.001	B	0.010	0.0002	U	0.0002	0.007		0.007	0.001	B	0.020	0.020	U	0.020

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Silver			Thallium			Uranium (KPA)			Vanadium			Zinc			
				mg/L	Q	PQL	mg/L	Q	PQL	ug/L	Q	MDA	mg/L	Q	PQL	mg/L	Q	PQL	pH
100-B-10	1:1	J1HHW3-A1	4/27/11	0.060	U	0.06	0.150	U	0.15	2.22		0.02	0.067		0.05	0.500	U	0.50	8.79
100-B-10	1:2.5	J1HHW3-B1	4/27/11	0.006	U	0.01	0.015	U	0.02	1.27		0.02	0.061		0.01	0.050	U	0.05	9.01
100-B-10	1:2.5	J1HHW3-B2	4/27/11	0.006	U	0.01	0.015	U	0.02	1.30		0.02	0.058		0.01	0.050	U	0.05	9.13
100-B-10	1:5	J1HHW3-C1	4/27/11	0.006	U	0.01	0.015	U	0.02	1.09		0.02	0.046		0.01	0.050	U	0.05	9.28
100-B-25 (Depth)	1:1	J1HJ08-A1	4/26/11	0.060	U	0.06	0.150	U	0.15	0.056		0.04	0.039	B	0.05	0.500	U	0.50	7.89
100-B-25 (Depth)	1:2.5	J1HJ08-B1	4/26/11	0.006	U	0.01	0.015	U	0.02	0.050		0.02	0.017		0.01	0.050	U	0.05	7.72
100-B-25 (Depth)	1:2.5	J1HJ08-B2	4/26/11	0.006	U	0.01	0.015	U	0.02	0.046		0.02	0.017		0.01	0.050	U	0.05	7.58
100-B-25 (Depth)	1:5	J1HJ08-C1	4/26/11	0.006	U	0.01	0.015	U	0.02	0.098		0.02	0.015		0.01	0.050	U	0.05	7.57
100-B-17 (Depth)	1:1	J1HJ09-A1	4/27/11	0.060	U	0.06	0.150	U	0.15	6.42		0.13	0.035	B	0.05	0.500	U	0.50	9.18
100-B-17 (Depth)	1:2.5	J1HJ09-B1	4/27/11	0.006	U	0.01	0.015	U	0.02	3.35		0.02	0.037		0.01	0.050	U	0.05	9.22
100-B-17 (Depth)	1:5	J1HJ09-C1	4/27/11	0.006	U	0.01	0.015	U	0.02	2.27		0.02	0.032		0.01	0.050	U	0.05	9.52
100-B-17 (Depth)	1:5	J1HJ09-C2	4/27/11	0.006	U	0.01	0.015	U	0.02	2.44		0.02	0.030		0.01	0.050	U	0.05	9.55
100-B-10 (Depth)	1:1	J1HJ10-A1	4/27/11	0.060	U	0.06	0.150	U	0.15	5.16		0.02	0.057		0.05	0.500	U	0.50	8.58
100-B-10 (Depth)	1:1	J1HJ10-A2	4/27/11	0.060	U	0.06	0.150	U	0.15	5.19		0.02	0.056		0.05	0.500	U	0.50	8.91
100-B-10 (Depth)	1:2.5	J1HJ10-B1	4/27/11	0.006	U	0.01	0.015	U	0.02	2.68		0.02	0.047		0.01	0.012	B	0.05	9.02
100-B-10 (Depth)	1:5	J1HJ10-C1	4/27/11	0.006	U	0.01	0.015	U	0.02	2.11		0.02	0.036		0.01	0.050	U	0.05	8.57

Table C-4. 126-D-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-01	J1J3W3	8/9/11	0.965	J	0.49	10.2		0.82	1770		0.41	2.50		0.16	50.1	J	1.64
100-D-02	J1J3W4	8/22/11	0.536	U	0.54	3.87		0.89	1030		0.45	1.36		0.18	197		1.79
100-D-03	J1J3W5	8/22/11	0.626		0.48	13.6		0.79	1470		0.40	2.51		0.16	33.6		1.59
100-D-04	J1J3W6	8/23/11	0.448	U	0.45	2.70		0.75	949		0.37	1.04		0.15	182		1.49
100-D-05	J1J3W7	8/23/11	0.497		0.48	16.7		0.79	1750		0.40	2.61		0.16	71.3		1.59
100-D-06	J1J3W8	8/22/11	0.441	U	0.44	2.41		0.74	1080		0.37	1.53		0.15	489		1.47
100-D-07	J1J3W9	8/22/11	0.517	U	0.52	5.42		0.86	1310		0.43	1.38		0.17	324		1.72
100-D-08	J1J3X0	8/11/11	0.470	BJ	0.58	2.32		0.96	1470		0.48	1.31		0.19	317	J	1.92
100-D-08 (Depth)	J1J444	8/11/11	0.476	UJ	0.48	2.52		0.79	1060		0.40	1.45		0.16	419	J	1.59
100-D-09	J1J3X1	8/11/11	0.419	BJ	0.53	2.38		0.88	781		0.44	1.70		0.18	155	J	1.75
100-D-10	J1J3X2	8/11/11	0.894	J	0.44	3.42		0.74	526		0.37	0.595		0.15	38.4	J	1.47
100-D-11	J1J3X3	8/23/11	0.268	B	0.46	7.17		0.77	1240		0.39	1.43		0.15	115		1.54
100-D-12	J1J3X4	8/9/11	0.510	BJ	0.53	4.37		0.88	907		0.44	1.41		0.18	269	J	1.75
100-D-13	J1J3X5	8/22/11	0.566	U	0.57	3.26		0.94	972		0.47	1.06		0.19	118		1.89
100-D-14	J1J3X6	8/22/11	0.588	U	0.59	5.23		0.98	1210		0.49	1.30		0.20	94.1		1.96
100-D-15	J1J3X7	8/11/11	0.532	BJ	0.60	4.02		1.00	1520		0.50	1.43		0.20	410	J	2.00
100-D-16	J1J3X8	8/22/11	0.500	U	0.50	2.27		0.83	703		0.42	0.763		0.17	141		1.67
100-D-17	J1J3X9	8/22/11	0.517	U	0.52	3.68		0.86	1110		0.43	1.20		0.17	170		1.72
Duplicate of J1J3X9	J1J413	8/22/11	0.566	U	0.57	3.30		0.94	1410		0.47	1.28		0.19	231		1.89
100-D-18	J1J400	8/9/11	0.659	J	0.53	5.51		0.88	1380		0.44	1.43		0.18	129	J	1.75
100-D-19	J1J401	8/11/11	0.605	J	0.48	4.61		0.79	743		0.40	1.21		0.16	142	J	1.59
100-D-19 (Depth)	J1J443	8/11/11	0.545	UJ	0.55	6.00		0.91	1470		0.46	1.62		0.18	195	J	1.82
100-D-20	J1J402	8/23/11	0.500	U	0.50	3.00		0.83	733		0.42	1.09		0.17	147		1.67
100-D-21	J1J403	8/23/11	0.566	U	0.57	3.38		0.94	843		0.47	1.31		0.19	227		1.89
100-D-22	J1J404	8/23/11	0.508	U	0.51	3.19		0.85	951		0.42	1.24		0.17	249		1.69
100-D-23	J1J405	8/23/11	0.536	U	0.54	2.99		0.89	734		0.45	1.03		0.18	91.1		1.79
100-D-24	J1J406	8/23/11	0.500	U	0.50	2.15		0.83	407		0.42	0.588		0.17	86.1		1.67
100-D-25	J1J407	8/23/11	0.517	U	0.52	3.13		0.86	941		0.43	1.37		0.17	312		1.72
100-D-26	J1J408	8/11/11	0.556	J	0.51	3.91		0.85	879		0.42	1.17		0.17	181	J	1.69
Duplicate of J1J408	J1J412	8/11/11	0.545	UJ	0.55	4.34		0.91	1140		0.46	1.42		0.18	218	J	1.82
100-D-26 (Depth)	J1J442	8/11/11	0.435	UJ	0.44	3.16		0.73	871		0.36	1.10		0.15	169	J	1.45
100-D-27	J1J409	8/23/11	0.341	B	0.58	5.75		0.96	1110		0.48	1.72		0.19	234		1.92
100-D-28	J1J410	8/23/11	0.536	U	0.54	4.42		0.89	1330		0.45	1.35		0.18	118		1.79
100-D-29	J1J411	8/11/11	0.515	BJ	0.59	5.11		0.98	1320		0.49	1.25		0.20	238	J	1.96
Equip blank	J1J414	8/11/11	0.508	UJ	0.51	0.847	U	0.85	7.38		0.42	0.054	B	0.17	1.69	UJ	1.69

Table C-4. 126-D-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-01	J1J3W3	8/9/11	0.430		0.16	7.31		0.16	3.86		1.64	23.2		0.82	3.91	J	0.41
100-D-02	J1J3W4	8/22/11	0.227		0.18	7.31		0.18	6.04		1.79	19.6		0.89	3.02		0.45
100-D-03	J1J3W5	8/22/11	0.371		0.16	6.61		0.16	2.31		1.59	19.9		0.8	3.71		0.40
100-D-04	J1J3W6	8/23/11	0.208		0.15	11.1		0.15	5.04		1.49	29.1		0.8	6.19		0.37
100-D-05	J1J3W7	8/23/11	0.311		0.16	8.18		0.16	3.63		1.59	20.4		0.8	4.05		0.40
100-D-06	J1J3W8	8/22/11	0.186		0.15	8.72		0.15	11.6		1.47	12.7		0.7	1.91		0.37
100-D-07	J1J3W9	8/22/11	0.254		0.17	12.1		0.17	8.48		1.72	15.0		0.9	3.61		0.43
100-D-08	J1J3X0	8/11/11	0.129	B	0.19	8.03		0.19	9.87		1.92	20.8		0.96	1.90	J	0.48
100-D-08 (Depth)	J1J444	8/11/11	0.178		0.16	7.64		0.16	6.82		1.59	13.6		0.79	3.50	J	0.40
100-D-09	J1J3X1	8/11/11	0.127	B	0.18	5.70		0.18	4.88		1.75	9.66		0.88	2.57	J	0.44
100-D-10	J1J3X2	8/11/11	0.267		0.15	8.53		0.15	7.19		1.47	23.1		0.74	9.50	J	0.37
100-D-11	J1J3X3	8/23/11	0.445		0.15	8.72		0.15	4.41		1.54	24.2		0.77	4.09		0.39
100-D-12	J1J3X4	8/9/11	0.165	B	0.18	12.5		0.18	4.12		1.75	28.3		0.88	15.1	J	0.44
100-D-13	J1J3X5	8/22/11	0.228		0.19	6.95		0.19	6.2		1.89	34.1		0.94	2.42		0.47
100-D-14	J1J3X6	8/22/11	0.293		0.20	11.6		0.20	9.02		1.96	59.4		0.98	3.59		0.49
100-D-15	J1J3X7	8/11/11	0.138	B	0.20	11.2		0.20	13.7		2.00	13.4		1.00	3.15	J	0.50
100-D-16	J1J3X8	8/22/11	0.256		0.17	6.36		0.17	6.3		1.67	12.8		0.83	2.70		0.42
100-D-17	J1J3X9	8/22/11	0.447		0.17	9.89		0.17	5.18		1.72	20.9		0.86	10.4		0.43
Duplicate of J1J3X9	J1J413	8/22/11	0.438		0.19	10.3		0.19	4.59		1.89	17.7		0.94	8.56		0.47
100-D-18	J1J400	8/9/11	0.311		0.18	8.57		0.18	4.48		1.75	21.7		0.88	4.27	J	0.44
100-D-19	J1J401	8/11/11	0.176		0.16	12.6		0.16	4.59		1.59	31		0.79	16.8	J	0.40
100-D-19 (Depth)	J1J443	8/11/11	0.208		0.18	7.76		0.18	5.63		1.82	23.7		0.91	3.24	J	0.46
100-D-20	J1J402	8/23/11	0.211		0.17	10.6		0.17	5.24		1.67	30.9		0.83	8.68		0.42
100-D-21	J1J403	8/23/11	0.267		0.19	8.21		0.19	5.25		1.89	24.8		0.94	3.65		0.47
100-D-22	J1J404	8/23/11	0.212		0.17	10.2		0.17	3.25		1.69	23.6		0.85	10.1		0.42
100-D-23	J1J405	8/23/11	0.203		0.18	9.26		0.18	4.49		1.79	25.5		0.89	6.44		0.45
100-D-24	J1J406	8/23/11	0.270		0.17	7.29		0.17	4.46		1.67	18.2		0.83	5.01		0.42
100-D-25	J1J407	8/23/11	0.216		0.17	10.8		0.17	2.81		1.72	21.9		0.86	9.61		0.43
100-D-26	J1J408	8/11/11	0.156	B	0.17	11.4		0.17	3.44		1.69	23.8		0.85	13.2	J	0.42
Duplicate of J1J408	J1J412	8/11/11	0.190		0.18	12.9		0.18	3.48		1.82	28.0		0.91	16.4	J	0.46
100-D-26 (Depth)	J1J442	8/11/11	0.074	B	0.15	8.73		0.15	4.21		1.45	31.8		0.73	3.35	J	0.36
100-D-27	J1J409	8/23/11	0.179	B	0.19	7.72		0.19	3.97		1.92	16.5		0.96	2.18		0.48
100-D-28	J1J410	8/23/11	0.192		0.18	8.30		0.18	8.56		1.79	34.8		0.89	2.34		0.45
100-D-29	J1J411	8/11/11	0.230		0.20	12.5		0.20	4.61		1.96	28.5		0.98	7.97	J	0.49
Equip blank	J1J414	8/11/11	0.169	U	0.17	0.169	U	0.17	1.69	U	1.69	0.847	U	0.85	0.512	J	0.42

Table C-4. 126-D-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-01	J1J3W3	8/9/11	689		4.10	0.014	B	0.03	1.89		1.64	6.33		3.28	0.246	U	0.25
100-D-02	J1J3W4	8/22/11	287		4.46	0.050		0.02	1.75	B	1.79	9.76		3.57	0.280		0.27
100-D-03	J1J3W5	8/22/11	890		3.97	0.031		0.03	1.54	B	1.59	4.63		3.17	0.398		0.24
100-D-04	J1J3W6	8/23/11	163		3.73	0.024	B	0.03	1.37	B	1.49	10.4		2.99	0.286		0.22
100-D-05	J1J3W7	8/23/11	645		3.97	0.030		0.03	4.42		1.59	6.83		3.17	0.357		0.24
100-D-06	J1J3W8	8/22/11	399		3.68	0.139		0.03	2.87		1.47	16.8		2.94	0.221	U	0.22
100-D-07	J1J3W9	8/22/11	271		4.31	0.034		0.03	1.57	B	1.72	13.8		3.45	0.892		0.26
100-D-08	J1J3X0	8/11/11	244		4.81	0.119		0.03	2.10		1.92	14.9		3.85	0.288	U	0.29
100-D-08 (Depth)	J1J444	8/11/11	255	J	3.97	0.047		0.03	1.47	B	1.59	11.50		3.17	0.837		0.24
100-D-09	J1J3X1	8/11/11	161		4.39	0.020	B	0.03	1.16	B	1.75	7.42		3.51	0.570		0.26
100-D-10	J1J3X2	8/11/11	262		3.68	0.012	B	0.02	0.86	B	1.47	10.4		2.94	0.221	U	0.22
100-D-11	J1J3X3	8/23/11	366		3.85	0.054		0.03	1.49	B	1.54	9.48		3.08	0.708		0.23
100-D-12	J1J3X4	8/9/11	108		4.39	0.054		0.03	1.39	B	1.75	9.17		3.51	0.454		0.26
100-D-13	J1J3X5	8/22/11	208		4.72	0.046		0.03	1.66	B	1.89	11.8		3.77	0.283	U	0.28
100-D-14	J1J3X6	8/22/11	254		4.90	0.053		0.03	2.69		1.96	20.5		3.92	0.294	U	0.29
100-D-15	J1J3X7	8/11/11	411		5.00	0.054		0.03	2.86		2.00	17.5		4.00	0.353		0.30
100-D-16	J1J3X8	8/22/11	216		4.17	0.042		0.03	1.06	B	1.67	11.2		3.33	0.926		0.25
100-D-17	J1J3X9	8/22/11	248		4.31	0.129		0.02	1.53	B	1.72	9.91		3.45	0.425		0.26
Duplicate of J1J3X9	J1J413	8/22/11	228		4.72	0.248		0.03	1.39	B	1.89	12.1		3.8	0.511		0.28
100-D-18	J1J400	8/9/11	295		4.39	0.040		0.03	1.43	B	1.75	9.23		3.51	0.263	U	0.26
100-D-19	J1J401	8/11/11	122		3.97	0.074		0.03	1.03	B	1.59	10.5		3.17	0.995		0.24
100-D-19 (Depth)	J1J443	8/11/11	234	J	4.55	0.052		0.03	1.67	B	1.82	11.00		3.6	0.728		0.27
100-D-20	J1J402	8/23/11	141		4.17	0.056		0.03	1.11	B	1.67	10.8		3.33	0.519		0.25
100-D-21	J1J403	8/23/11	265		4.72	0.034		0.03	1.56	B	1.89	10.4		3.77	0.355		0.28
100-D-22	J1J404	8/23/11	135		4.24	0.114		0.03	1.30	B	1.69	7.90		3.4	0.749		0.25
100-D-23	J1J405	8/23/11	151		4.46	0.053		0.03	0.86	B	1.79	7.89		3.6	0.929		0.27
100-D-24	J1J406	8/23/11	208		4.17	0.043		0.02	0.79	B	1.67	8.47		3.3	0.306		0.25
100-D-25	J1J407	8/23/11	134		4.31	0.018	B	0.03	1.23	B	1.72	6.78		3.5	0.392		0.26
100-D-26	J1J408	8/11/11	105		4.24	0.061		0.03	1.11	B	1.69	7.57		3.4	0.769		0.25
Duplicate of J1J408	J1J412	8/11/11	137	J	4.55	0.048		0.03	1.27	B	1.82	8.5		3.6	1.14		0.27
100-D-26 (Depth)	J1J442	8/11/11	91.4	J	3.62	0.036		0.03	1.49		1.45	10.6		2.9	0.686		0.22
100-D-27	J1J409	8/23/11	331		4.81	0.048		0.03	3.54		1.92	7.44		3.9	0.296		0.29
100-D-28	J1J410	8/23/11	312		4.46	0.069		0.03	1.90		1.79	12.8		3.6	0.268	U	0.27
100-D-29	J1J411	8/11/11	130		4.90	0.028	B	0.03	1.28	B	1.96	9.52		3.9	0.618		0.29
Equip blank	J1J414	8/11/11	4.99	J	4.24	0.025	U	0.03	1.69	U	1.69	3.39	U	3.4	0.254	U	0.25

Table C-4. 126-D-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Silver			Thallium			Uranium (KPA)			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	ug/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-01	J1J3W3	8/9/11	0.164	U	0.16	0.410	UJ	0.41				27.9		2.05	75.7	J	8.20
100-D-02	J1J3W4	8/22/11	0.179	U	0.18	0.446	U	0.45				33.4		2.23	24.4		8.93
100-D-03	J1J3W5	8/22/11	0.159	U	0.16	0.397	U	0.40				22.2		1.98	31.4		7.94
100-D-04	J1J3W6	8/23/11	0.149	U	0.15	0.373	U	0.37				47.6		1.87	33.9		7.46
100-D-05	J1J3W7	8/23/11	0.159	U	0.16	0.397	U	0.40				26.4		1.98	43.8		7.94
100-D-06	J1J3W8	8/22/11	0.147	U	0.15	0.368	U	0.37				25.7		1.84	16.5		7.35
100-D-07	J1J3W9	8/22/11	0.172	U	0.17	0.431	U	0.43				31.8		2.16	19.0		8.62
100-D-08	J1J3X0	8/11/11	0.192	U	0.19	0.481	UJ	0.48	3.66		0.143	27.6		2.40	12.1	J	9.62
100-D-08 (Depth)	J1J444	8/11/11	0.159	U	0.16	0.397	UJ	0.40	3.56		0.143	31.2		1.98	30.8	J	7.94
100-D-09	J1J3X1	8/11/11	0.175	U	0.18	0.439	UJ	0.44				20.9		2.19	15.0	J	8.77
100-D-10	J1J3X2	8/11/11	0.147	U	0.15	0.242	BJ	0.37				52.5		1.84	69.7	J	7.35
100-D-11	J1J3X3	8/23/11	0.154	U	0.15	0.385	U	0.39				36.4		1.92	50.5		7.69
100-D-12	J1J3X4	8/9/11	0.175	U	0.18	0.439	UJ	0.44				38.9		2.19	23.4	J	8.77
100-D-13	J1J3X5	8/22/11	0.189	U	0.19	0.472	U	0.47				59.7		2.36	26.4		9.43
100-D-14	J1J3X6	8/22/11	0.196	U	0.20	0.490	U	0.49				77.5		2.45	27.4		9.80
100-D-15	J1J3X7	8/11/11	0.200	U	0.20	0.500	UJ	0.50				26.6		2.50	11.8	J	10.0
100-D-16	J1J3X8	8/22/11	0.167	U	0.17	0.417	U	0.42				27.7		2.08	31.6		8.33
100-D-17	J1J3X9	8/22/11	0.172	U	0.17	0.431	U	0.43				34.9		2.16	65.2		8.62
Duplicate of J1J3X9	J1J413	8/22/11	0.189	U	0.19	0.472	U	0.47				38.5		2.36	56.6		9.43
100-D-18	J1J400	8/9/11	0.175	U	0.18	0.439	UJ	0.44				31.8		2.19	55.5	J	8.77
100-D-19	J1J401	8/11/11	0.159	U	0.16	0.198	BJ	0.40	3.95		0.143	38.5		1.98	21.2	J	7.94
100-D-19 (Depth)	J1J443	8/11/11	0.182	U	0.18	0.455	UJ	0.46	4.46		0.143	29.7		2.27	33.6	J	9.09
100-D-20	J1J402	8/23/11	0.167	U	0.17	0.417	U	0.42				45.1		2.08	28.4		8.33
100-D-21	J1J403	8/23/11	0.189	U	0.19	0.472	U	0.47				38.3		2.36	39.5		9.43
100-D-22	J1J404	8/23/11	0.169	U	0.17	0.424	U	0.42				33.6		2.12	22.1		8.47
100-D-23	J1J405	8/23/11	0.179	U	0.18	0.446	U	0.45				47.3		2.23	24.9		8.93
100-D-24	J1J406	8/23/11	0.167	U	0.17	0.417	U	0.42				35.5		2.08	36.6		8.33
100-D-25	J1J407	8/23/11	0.172	U	0.17	0.431	U	0.43				33.3		2.16	21.8		8.62
100-D-26	J1J408	8/11/11	0.169	U	0.17	0.424	UJ	0.42	4.22		0.143	33.2		2.12	15.2	J	8.47
Duplicate of J1J408	J1J412	8/11/11	0.182	U	0.18	0.455	UJ	0.46	3.92		0.143	41.3		2.27	22.9	J	9.09
100-D-26 (Depth)	J1J442	8/11/11	0.145	U	0.15	0.362	UJ	0.36	3.85		0.143	41.8		1.81	10.3	J	7.25
100-D-27	J1J409	8/23/11	0.192	U	0.19	0.481	U	0.48				22.5		2.40	16.7		9.62
100-D-28	J1J410	8/23/11	0.179	U	0.18	0.446	U	0.45				59.1		2.23	22.5		8.93
100-D-29	J1J411	8/11/11	0.196	U	0.20	0.49	UJ	0.49				37.6		2.45	37.0	J	9.80
Equip blank	J1J414	8/11/11	0.169	U	0.17	0.424	UJ	0.42				0.308	B	2.12	1.08	J	8.47

Table C-4. 126-D-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Acenaphthene			Acenaphthylene			Anthracene			Benzo(a)anthracene			Benzo(a)pyrene			Benzo(b)fluoranthene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
100-D-08	J1J3X0	8/11/11	338	UJ	338	338	UJ	338	338	UJ	338	338	UJ	338	338	UJ	338	338	UJ	338
100-D-08 (Depth)	J1J444	8/11/11	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
100-D-19	J1J401	8/11/11	337	UDJ	337	337	UDJ	337	337	UDJ	337	337	UDJ	337	337	UDJ	337	337	UDJ	337
100-D-19 (Depth)	J1J443	8/11/11	328	UDJ	328	328	UDJ	328	328	UDJ	328	328	UDJ	328	328	UDJ	328	328	UDJ	328
100-D-26	J1J408	8/11/11	339	UDJ	339	339	UDJ	339	339	UDJ	339	339	UDJ	339	339	UDJ	339	339	UDJ	339
Duplicate of J1J408	J1J412	8/11/11	336	UDJ	336	336	UDJ	336	336	UDJ	336	336	UDJ	336	336	UDJ	336	336	UDJ	336
100-D-26 (Depth)	J1J442	8/11/11	336	UJ	336	336	UJ	336	336	UJ	336	336	UJ	336	336	UJ	336	336	UJ	336
Equip blank	J1J414	8/11/11	326	UJ	326	326	UJ	326	326	UJ	326	326	UJ	326	326	UJ	326	326	UJ	326

Sample Location	HEIS Number	Sample Date	Benzo(ghi)perylene			Benzo(k)fluoranthene			Chrysene			Dibenz(a,h)anthracene			Fluoranthene			Fluorene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
100-D-08	J1J3X0	8/11/11	338	UJ	338	338	UJ	338	338	UJ	338	338	UJ	338	338	UJ	338	338	UJ	338
100-D-08 (Depth)	J1J444	8/11/11	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
100-D-19	J1J401	8/11/11	337	UDJ	337	337	UDJ	337	337	UDJ	337	337	UDJ	337	337	UDJ	337	337	UDJ	337
100-D-19 (Depth)	J1J443	8/11/11	328	UDJ	328	328	UDJ	328	328	UDJ	328	328	UDJ	328	328	UDJ	328	328	UDJ	328
100-D-26	J1J408	8/11/11	339	UDJ	339	339	UDJ	339	339	UDJ	339	339	UDJ	339	339	UDJ	339	339	UDJ	339
Duplicate of J1J408	J1J412	8/11/11	336	UDJ	336	336	UDJ	336	336	UDJ	336	336	UDJ	336	336	UDJ	336	336	UDJ	336
100-D-26 (Depth)	J1J442	8/11/11	336	UJ	336	336	UJ	336	336	UJ	336	336	UJ	336	336	UJ	336	336	UJ	336
Equip blank	J1J414	8/11/11	326	UJ	326	326	UJ	326	326	UJ	326	326	UJ	326	326	UJ	326	326	UJ	326

Sample Location	HEIS Number	Sample Date	Indeno(1,2,3-cd)pyrene			Naphthalene			Phenanthrene			Pyrene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
100-D-08	J1J3X0	8/11/11	338	UJ	338	338	UJ	338	338	UJ	338	338	UJ	338
100-D-08 (Depth)	J1J444	8/11/11	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
100-D-19	J1J401	8/11/11	337	UDJ	337	369	DJ	1310	259	JD	1310	337	UDJ	337
100-D-19 (Depth)	J1J443	8/11/11	328	UDJ	328	253	DJ	1270	328	UDJ	328	328	UDJ	328
100-D-26	J1J408	8/11/11	339	UDJ	339	1070	DJ	1320	281	DJ	1320	339	UDJ	339
Duplicate of J1J408	J1J412	8/11/11	336	UDJ	336	336	UDJ	336	336	UDJ	336	336	UDJ	336
100-D-26 (Depth)	J1J442	8/11/11	336	UJ	336	143	J	616	336	UJ	336	336	UJ	336
Equip blank	J1J414	8/11/11	326	UJ	326	326	UJ	326	326	UJ	326	326	UJ	326

Table C-5. 126-D-1 Coal Ash Pre-Leaching Quadruplicate Sample Results. (2 Pages)

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-26 (Depth)	J1J442-1	8/11/11	0.492	U	0.49	3.51		0.82	1010		0.41	1.16		0.16	173		1.64
100-D-26 (Depth)	J1J442-2	8/11/11	0.448	U	0.45	3.34		0.75	990		0.37	1.11		0.15	180		1.49
100-D-26 (Depth)	J1J442-3	8/11/11	0.588	U	0.59	3.31		0.98	1140		0.49	1.25		0.20	207		1.96
100-D-26 (Depth)	J1J442-4	8/11/11	0.469	U	0.47	2.83		0.78	871		0.39	1.09		0.16	155		1.56
100-D-19 (Depth)	J1J443-1	8/11/11	0.526	U	0.53	8.66		0.88	1150		0.44	1.48		0.18	230		1.75
100-D-19 (Depth)	J1J443-2	8/11/11	0.435	U	0.44	9.28		0.73	1140		0.36	1.29		0.15	187		1.45
100-D-19 (Depth)	J1J443-3	8/11/11	0.556	U	0.56	8.04		0.93	1180		0.46	1.44		0.19	210		1.85
100-D-19 (Depth)	J1J443-4	8/11/11	0.536	U	0.54	7.68		0.89	1240		0.45	1.48		0.18	238		1.79
100-D-08 (Depth)	J1J444-1	8/11/11	0.545	U	0.55	2.33		0.91	1030		0.46	1.57		0.18	445		1.82
100-D-08 (Depth)	J1J444-2	8/11/11	0.476	U	0.48	2.35		0.79	1140		0.40	1.41		0.16	463		1.59
100-D-08 (Depth)	J1J444-3	8/11/11	0.545	U	0.55	2.55		0.91	1100		0.46	1.35		0.18	408		1.82
100-D-08 (Depth)	J1J444-4	8/11/11	0.600	U	0.60	2.64		1.00	1150		0.50	1.56		0.20	468		2.00

Sample Location	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-26 (Depth)	J1J442-1	8/11/11	0.078	B	0.16	9.67		0.16	6.11		1.64	35.2		0.82	3.40		0.41
100-D-26 (Depth)	J1J442-2	8/11/11	0.091	B	0.15	10.3		0.15	5.05		1.49	36.1		0.75	3.99		0.37
100-D-26 (Depth)	J1J442-3	8/11/11	0.090	B	0.20	10.5		0.20	5.48		1.96	39.2		0.98	3.37		0.49
100-D-26 (Depth)	J1J442-4	8/11/11	0.079	B	0.16	8.91		0.16	5.11		1.56	32.0		0.78	3.52		0.39
100-D-19 (Depth)	J1J443-1	8/11/11	0.243		0.18	9.35		0.18	5.35		1.75	29.1		0.88	7.60		0.44
100-D-19 (Depth)	J1J443-2	8/11/11	0.217		0.15	8.72		0.15	5.45		1.45	25.9		0.73	4.08		0.36
100-D-19 (Depth)	J1J443-3	8/11/11	0.219		0.19	8.36		0.19	4.97		1.85	26.5		0.93	3.76		0.46
100-D-19 (Depth)	J1J443-4	8/11/11	0.272		0.18	9.46		0.18	4.84		1.79	27.6		0.89	4.48		0.45
100-D-08 (Depth)	J1J444-1	8/11/11	0.171	B	0.18	7.04		0.18	6.81		1.82	11.7		0.91	3.66		0.46
100-D-08 (Depth)	J1J444-2	8/11/11	0.180		0.16	7.30		0.16	7.24		1.59	12.5		0.79	3.29		0.40
100-D-08 (Depth)	J1J444-3	8/11/11	0.171	B	0.18	7.14		0.18	7.02		1.82	15.7		0.91	3.48		0.46
100-D-08 (Depth)	J1J444-4	8/11/11	0.183	B	0.20	7.94		0.20	7.77		2.00	13.9		1.00	3.36		0.50

Table C-5. 126-D-1 Coal Ash Pre-Leaching Quadruplicate Sample Results. (2 Pages)

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-26 (Depth)	J1J442-1	8/11/11	110		4.10	0.027		0.03	1.60	B	1.64	12.9		3.28	0.465		0.25
100-D-26 (Depth)	J1J442-2	8/11/11	122		3.73	0.028		0.03	1.58		1.49	12.2		2.99	0.528		0.22
100-D-26 (Depth)	J1J442-3	8/11/11	111		4.90	0.023	B	0.03	1.82	B	1.96	12.3		3.92	0.469		0.29
100-D-26 (Depth)	J1J442-4	8/11/11	115		3.91	0.042		0.02	1.42	B	1.56	11.6		3.12	0.586		0.23
100-D-19 (Depth)	J1J443-1	8/11/11	211		4.39	0.043		0.03	1.77		1.75	11.6		3.51	0.931		0.26
100-D-19 (Depth)	J1J443-2	8/11/11	182		3.62	0.048		0.02	1.55		1.45	11.6		2.90	0.709		0.22
100-D-19 (Depth)	J1J443-3	8/11/11	208		4.63	0.057		0.02	1.81	B	1.85	10.9		3.70	1.06		0.28
100-D-19 (Depth)	J1J443-4	8/11/11	190		4.46	0.053		0.02	2.03		1.79	10.9		3.57	0.789		0.27
100-D-08 (Depth)	J1J444-1	8/11/11	264		4.55	0.049		0.03	1.59	B	1.82	11.1		3.64	0.789		0.27
100-D-08 (Depth)	J1J444-2	8/11/11	283		3.97	0.055		0.03	1.47	B	1.59	11.5		3.17	0.702		0.24
100-D-08 (Depth)	J1J444-3	8/11/11	275		4.55	0.027		0.03	1.56	B	1.82	11.8		3.64	0.919		0.27
100-D-08 (Depth)	J1J444-4	8/11/11	276		5.00	0.034		0.03	1.87	B	2.00	12.5		4.00	0.832		0.30

Sample Location	HEIS Number	Sample Date	Silver			Thallium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-26 (Depth)	J1J442-1	8/11/11	0.164	U	0.16	0.410	U	0.41	49.7		2.05	11.4		8.20
100-D-26 (Depth)	J1J442-2	8/11/11	0.149	U	0.15	0.373	U	0.37	47.8		1.87	13.4		7.46
100-D-26 (Depth)	J1J442-3	8/11/11	0.196	U	0.20	0.490	U	0.49	51.1		2.45	14.2		9.80
100-D-26 (Depth)	J1J442-4	8/11/11	0.156	U	0.16	0.391	U	0.39	42.6		1.95	23.7		7.81
100-D-19 (Depth)	J1J443-1	8/11/11	0.175	U	0.18	0.439	U	0.44	35.1		2.19	40.3		8.77
100-D-19 (Depth)	J1J443-2	8/11/11	0.145	U	0.15	0.362	U	0.36	32.0		1.81	36.4		7.25
100-D-19 (Depth)	J1J443-3	8/11/11	0.185	U	0.19	0.463	U	0.46	32.3		2.31	37.5		9.26
100-D-19 (Depth)	J1J443-4	8/11/11	0.179	U	0.18	0.446	U	0.45	34.9		2.23	43.0		8.93
100-D-08 (Depth)	J1J444-1	8/11/11	0.182	U	0.18	0.455	U	0.46	25.2		2.27	28.9		9.09
100-D-08 (Depth)	J1J444-2	8/11/11	0.159	U	0.16	0.397	U	0.40	27.1		1.98	34.9		7.94
100-D-08 (Depth)	J1J444-3	8/11/11	0.182	U	0.18	0.455	U	0.46	27.4		2.27	30.6		9.09
100-D-08 (Depth)	J1J444-4	8/11/11	0.200	U	0.20	0.500	U	0.50	29.0		2.50	29.8		10.0

Table C-6. 126-D-1 Coal Ash Leaching Sample Results. (2 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
100-D-26 (Depth)	1:1	J1J442-A1	8/11/11	0.100	U	0.10	0.075	U	0.08	0.048		0.01	0.005	U	0.01	13.5		0.08
100-D-26 (Depth)	1:1	J1J442-A2	8/11/11	0.100	U	0.10	0.075	U	0.08	0.19		0.01	0.005	U	0.01	14.7		0.08
100-D-26 (Depth)	1:2.5	J1J442-B1	8/11/11	0.100	U	0.10	0.075	U	0.08	0.041		0.01	0.005	U	0.01	8.56		0.08
100-D-26 (Depth)	1:5	J1J442-C1	8/11/11	0.100	U	0.10	0.075	U	0.08	0.037		0.01	0.005	U	0.01	4.54		0.08
100-D-19 (Depth)	1:1	J1J443-A1	8/11/11	0.100	U	0.10	0.075	U	0.08	0.046		0.01	0.005	U	0.01	20.2		0.08
100-D-19 (Depth)	1:2.5	J1J443-B1	8/11/11	0.100	U	0.10	0.075	U	0.08	0.032		0.01	0.005	U	0.01	12.7		0.08
100-D-19 (Depth)	1:2.5	J1J443-B2	8/11/11	0.100	U	0.10	0.075	U	0.08	0.033		0.01	0.005	U	0.01	12.6		0.08
100-D-19 (Depth)	1:5	J1J443-C1	8/11/11	0.100	U	0.10	0.075	U	0.08	0.031		0.01	0.005	U	0.01	6.74		0.08
100-D-08 (Depth)	1:1	J1J444-A1	8/11/11	0.100	U	0.10	0.075	U	0.08	0.032		0.01	0.005	U	0.01	49.9		0.08
100-D-08 (Depth)	1:2.5	J1J444-B1	8/11/11	0.100	U	0.10	0.075	U	0.08	0.029		0.01	0.005	U	0.01	47.5		0.08
100-D-08 (Depth)	1:5	J1J444-C1	8/11/11	0.100	U	0.10	0.075	U	0.08	0.024		0.01	0.005	U	0.01	28.1		0.08
100-D-08 (Depth)	1:5	J1J444-C2	8/11/11	0.100	U	0.10	0.075	U	0.08	0.023		0.01	0.005	U	0.01	30.3		0.08

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
100-D-26 (Depth)	1:1	J1J442-A1	8/11/11	0.015	U	0.02	0.015	B	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
100-D-26 (Depth)	1:1	J1J442-A2	8/11/11	0.015	U	0.02	0.007	B	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
100-D-26 (Depth)	1:2.5	J1J442-B1	8/11/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
100-D-26 (Depth)	1:5	J1J442-C1	8/11/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
100-D-19 (Depth)	1:1	J1J443-A1	8/11/11	0.015	U	0.02	0.003	B	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
100-D-19 (Depth)	1:2.5	J1J443-B1	8/11/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
100-D-19 (Depth)	1:2.5	J1J443-B2	8/11/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
100-D-19 (Depth)	1:5	J1J443-C1	8/11/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
100-D-08 (Depth)	1:1	J1J444-A1	8/11/11	0.015	U	0.02	0.010	B	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
100-D-08 (Depth)	1:2.5	J1J444-B1	8/11/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
100-D-08 (Depth)	1:5	J1J444-C1	8/11/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
100-D-08 (Depth)	1:5	J1J444-C2	8/11/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05

Table C-6. 126-D-1 Coal Ash Leaching Sample Results. (2 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
100-D-26 (Depth)	1:1	J1J442-A1	8/11/11	0.025	U	0.03	0.001	U	0.0010	0.111		0.02	0.006	B	0.10	0.089	B	0.10
100-D-26 (Depth)	1:1	J1J442-A2	8/11/11	0.025	U	0.03	0.001	U	0.0010	0.110		0.02	0.100	U	0.10	0.092	B	0.10
100-D-26 (Depth)	1:2.5	J1J442-B1	8/11/11	0.025	U	0.03	0.0002	U	0.0002	0.059		0.02	0.100	U	0.10	0.049	B	0.10
100-D-26 (Depth)	1:5	J1J442-C1	8/11/11	0.025	U	0.03	0.0002	U	0.0002	0.035		0.02	0.100	U	0.10	0.018	B	0.10
100-D-19 (Depth)	1:1	J1J443-A1	8/11/11	0.025	U	0.03	0.001	U	0.0010	0.054		0.02	0.100	U	0.10	0.100	U	0.10
100-D-19 (Depth)	1:2.5	J1J443-B1	8/11/11	0.025	U	0.03	0.0002	U	0.0002	0.035		0.02	0.100	U	0.10	0.100	U	0.10
100-D-19 (Depth)	1:2.5	J1J443-B2	8/11/11	0.025	U	0.03	0.0002	U	0.0002	0.034		0.02	0.100	U	0.10	0.100	U	0.10
100-D-19 (Depth)	1:5	J1J443-C1	8/11/11	0.025	U	0.03	0.0002	U	0.0002	0.018		0.02	0.100	U	0.10	0.100	U	0.10
100-D-08 (Depth)	1:1	J1J444-A1	8/11/11	0.288		0.03	0.001	U	0.0010	0.003	B	0.02	0.100	U	0.10	0.100	U	0.10
100-D-08 (Depth)	1:2.5	J1J444-B1	8/11/11	0.349		0.03	0.0002	U	0.0002	0.005	B	0.02	0.003	B	0.10	0.100	U	0.10
100-D-08 (Depth)	1:5	J1J444-C1	8/11/11	0.187		0.03	0.0002	U	0.0002	0.004	B	0.02	0.100	U	0.10	0.100	U	0.10
100-D-08 (Depth)	1:5	J1J444-C2	8/11/11	0.201		0.03	0.0002	U	0.0002	0.003	B	0.02	0.100	U	0.10	0.100	U	0.10

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Silver			Thallium			Uranium (KPA)			Vanadium			Zinc			
				mg/L	Q	PQL	mg/L	Q	PQL	ug/L	Q	MDA	mg/L	Q	PQL	mg/L	Q	PQL	pH
100-D-26 (Depth)	1:1	J1J442-A1	8/11/11	0.030	U	0.03	0.075	U	0.08	12.5		0.034	0.116		0.03	0.250	U	0.25	8.39
100-D-26 (Depth)	1:1	J1J442-A2	8/11/11	0.030	U	0.03	0.075	U	0.08	11.0		0.034	0.123		0.03	0.250	U	0.25	8.61
100-D-26 (Depth)	1:2.5	J1J442-B1	8/11/11	0.030	U	0.03	0.075	U	0.08	6.15		0.034	0.094		0.03	0.250	U	0.25	8.89
100-D-26 (Depth)	1:5	J1J442-C1	8/11/11	0.030	U	0.03	0.075	U	0.08	3.01		0.034	0.072		0.03	0.250	U	0.25	9.12
100-D-19 (Depth)	1:1	J1J443-A1	8/11/11	0.030	U	0.03	0.075	U	0.08	3.66		0.034	0.088		0.03	0.250	U	0.25	8.24
100-D-19 (Depth)	1:2.5	J1J443-B1	8/11/11	0.030	U	0.03	0.075	U	0.08	2.35		0.034	0.066		0.03	0.250	U	0.25	8.36
100-D-19 (Depth)	1:2.5	J1J443-B2	8/11/11	0.030	U	0.03	0.075	U	0.08	2.31		0.034	0.069		0.03	0.250	U	0.25	8.38
100-D-19 (Depth)	1:5	J1J443-C1	8/11/11	0.030	U	0.03	0.075	U	0.08	1.53		0.064	0.051		0.03	0.250	U	0.25	8.48
100-D-08 (Depth)	1:1	J1J444-A1	8/11/11	0.030	U	0.03	0.075	U	0.08	0	U	0.034	0.106		0.03	0.250	U	0.25	7.45
100-D-08 (Depth)	1:2.5	J1J444-B1	8/11/11	0.030	U	0.03	0.075	U	0.08	0.032	U	0.034	0.114		0.03	0.250	U	0.25	6.88
100-D-08 (Depth)	1:5	J1J444-C1	8/11/11	0.030	U	0.03	0.075	U	0.08	0	U	0.034	0.084		0.03	0.250	U	0.25	6.78
100-D-08 (Depth)	1:5	J1J444-C2	8/11/11	0.030	U	0.03	0.075	U	0.08	0	U	0.034	0.085		0.03	0.250	U	0.25	6.76

Table C-7. 126-H-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-01	J1HJ48	8/27/11	0.566	U	0.57	2.53		0.94	736		0.47	0.828		0.19	61.8		1.89
100-H-02	J1HJ49	8/27/11	0.508	U	0.51	2.60		0.85	437		0.42	0.610		0.17	37.2		1.69
100-H-03	J1HJ50	8/28/11	0.577	U	0.58	4.34		0.96	607		0.48	0.857		0.19	90.6		1.92
100-H-04	J1HJ51	8/28/11	0.484	U	0.48	2.93		0.81	979		0.40	1.70		0.16	167		1.61
100-H-05	J1HJ52	8/27/11	0.500	U	0.50	2.25		0.83	589		0.42	0.769		0.17	38.9		1.67
100-H-06	J1HJ53	8/28/11	0.526	U	0.53	3.51		0.88	681		0.44	1.16		0.18	155		1.75
100-H-07	J1HJ54	8/28/11	0.484	U	0.48	2.91		0.81	721		0.40	1.12		0.16	235		1.61
100-H-08	J1HJ55	8/28/11	0.500	U	0.50	2.74		0.83	830		0.42	0.764		0.17	31.8		1.67
100-H-09	J1HJ56	8/28/11	0.536	U	0.54	2.77		0.89	918		0.45	0.777		0.18	31.5		1.79
100-H-10	J1HJ57	8/27/11	0.588	U	0.59	2.76		0.98	617		0.49	0.771		0.20	27.5		1.96
100-H-11	J1HJ58	8/27/11	0.577	U	0.58	3.37		0.96	411		0.48	0.884		0.19	75.8		1.92
100-H-12	J1HJ59	8/28/11	0.411	U	0.41	3.03		0.69	1040		0.34	1.19		0.14	295		1.37
100-H-13	J1HJ60	8/28/11	0.492	U	0.49	2.61		0.82	982		0.41	1.33		0.16	367		1.64
100-H-14	J1HJ61	8/28/11	0.508	U	0.51	2.78		0.85	878		0.42	0.738		0.17	42.0		1.69
100-H-15	J1HJ62	8/28/11	0.492	U	0.49	2.55		0.82	476		0.41	0.632		0.16	44.3		1.64
100-H-16	J1HJ63	8/27/11	0.526	UJ	0.53	3.46		0.88	783		0.44	0.842		0.18	46.7	J	1.75
Duplicate of J1HJ63	J1HJ78	8/27/11	0.296	BJ	0.58	3.01		0.96	773		0.48	0.901		0.19	52.5	J	1.92
100-H-17	J1HJ64	8/27/11	0.492	UJ	0.49	2.51		0.82	527		0.41	0.833		0.16	145	J	1.64
100-H-17 (Depth)	J1HJ82	8/27/11	0.566	UJ	0.57	2.79		0.94	487		0.47	1.15		0.19	245	J	1.89
100-H-18	J1HJ65	8/27/11	0.545	UJ	0.55	3.34		0.91	506		0.46	1.00		0.18	150	J	1.82
100-H-19	J1HJ66	8/27/11	0.566	UJ	0.57	3.90		0.94	760		0.47	0.941		0.19	41.5	J	1.89
100-H-20	J1HJ67	8/24/11	0.508	UJ	0.51	2.94		0.85	916		0.42	1.31		0.17	455	J	1.69
100-H-20 (Depth)	J1HJ81	8/24/11	0.545	UJ	0.55	2.24		0.91	709		0.46	0.691		0.18	199	J	1.82
100-H-21	J1HJ68	8/28/11	0.492	U	0.49	3.11		0.82	313		0.41	0.429		0.16	31.6		1.64
100-H-22	J1HJ69	8/27/11	0.500	U	0.50	4.72		0.83	1250		0.42	1.25		0.17	183		1.67
100-H-23	J1HJ70	8/27/11	0.556	U	0.56	2.05		0.93	718		0.46	0.562		0.19	20.2		1.85
100-H-24	J1HJ71	8/27/11	0.600	U	0.60	2.49		1.00	722		0.50	1.22		0.20	318		2.00
100-H-25	J1HJ72	8/24/11	0.476	UJ	0.48	2.55		0.79	954		0.40	1.05		0.16	235	J	1.59
Duplicate of J1HJ72	J1HJ77	8/24/11	0.517	UJ	0.52	2.82		0.86	1080		0.43	1.11		0.17	253	J	1.72
100-H-25 (Depth)	J1HJ80	8/24/11	0.517	UJ	0.52	11.7		0.86	1000		0.43	1.28		0.17	404	J	1.72
100-H-26	J1HJ73	8/28/11	0.517	UJ	0.52	3.78		0.86	846		0.43	0.83		0.17	102	J	1.72
100-H-27	J1HJ74	8/27/11	0.476	UJ	0.48	2.28		0.79	816		0.40	0.65		0.16	24.0	J	1.59
100-H-28	J1HJ75	8/27/11	0.556	UJ	0.56	3.70		0.93	1020		0.46	1.04		0.19	84.5	J	1.85
100-H-29	J1HJ76	8/28/11	0.517	UJ	0.52	3.60		0.86	1330		0.43	1.44		0.17	243	J	1.72
Equip blank	J1HJ79	8/24/11	0.417	UJ	0.42	1.55		0.69	2.33		0.35	0.084	B	0.14	1.39	U	1.39

Table C-7. 126-H-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-01	J1HJ48	8/27/11	0.198		0.19	7.95		0.19	7.03		1.89	30.9		0.94	2.81		0.47
100-H-02	J1HJ49	8/27/11	0.170		0.17	8.92		0.17	6.68		1.69	26.8		0.85	4.36		0.42
100-H-03	J1HJ50	8/28/11	0.388		0.19	11.9		0.19	3.85		1.92	26.9		0.96	8.64		0.48
100-H-04	J1HJ51	8/28/11	0.219		0.16	8.15		0.16	7.93		1.61	24.8		0.81	3.28		0.40
100-H-05	J1HJ52	8/27/11	0.186		0.17	7.62		0.17	6.80		1.67	32.4		0.83	3.17		0.42
100-H-06	J1HJ53	8/28/11	0.376		0.18	12.0		0.18	2.59		1.75	23.0		0.88	6.11		0.44
100-H-07	J1HJ54	8/28/11	0.264		0.16	12.0		0.16	3.26		1.61	24.7		0.81	7.43		0.40
100-H-08	J1HJ55	8/28/11	0.162	B	0.17	8.16		0.17	7.20		1.67	37.2		0.83	1.83		0.42
100-H-09	J1HJ56	8/28/11	0.155	B	0.18	7.62		0.18	7.51		1.79	39.3		0.89	1.64		0.45
100-H-10	J1HJ57	8/27/11	0.145	B	0.20	8.35		0.20	7.99		1.96	40.8		0.98	1.78		0.49
100-H-11	J1HJ58	8/27/11	0.198		0.19	9.85		0.19	2.31		1.92	17.7		0.96	5.54		0.48
100-H-12	J1HJ59	8/28/11	0.577		0.14	11.1		0.14	3.60		1.37	33.2		0.69	3.75		0.34
100-H-13	J1HJ60	8/28/11	0.332		0.16	12.6		0.16	2.92		1.64	26.4		0.82	6.07		0.41
100-H-14	J1HJ61	8/28/11	0.172		0.17	8.30		0.17	7.38		1.69	37.1		0.85	1.98		0.42
100-H-15	J1HJ62	8/28/11	0.174		0.16	14.4		0.16	6.78		1.64	26.0		0.82	3.50		0.41
100-H-16	J1HJ63	8/27/11	0.180		0.18	9.38		0.18	7.98		1.75	42.1		0.88	2.46	J	0.44
Duplicate of J1HJ63	J1HJ78	8/27/11	0.176	B	0.19	9.75		0.19	8.83		1.92	44.9		0.96	2.32	J	0.48
100-H-17	J1HJ64	8/27/11	0.148	B	0.16	8.57		0.16	2.14		1.64	16.7		0.82	4.40	J	0.41
100-H-17 (Depth)	J1HJ82	8/27/11	0.252		0.19	8.52		0.19	1.72	B	1.89	18.1		0.94	27.3	J	0.47
100-H-18	J1HJ65	8/27/11	0.212		0.18	10.9		0.18	2.53		1.82	20.6		0.91	6.99	J	0.46
100-H-19	J1HJ66	8/27/11	0.176	B	0.19	10.6		0.19	9.01		1.89	46.8		0.94	1.96	J	0.47
100-H-20	J1HJ67	8/24/11	0.178		0.17	16.5		0.17	3.77		1.69	33.8		0.85	4.25	J	0.42
100-H-20 (Depth)	J1HJ81	8/24/11	0.184		0.18	9.62		0.18	3.52		1.82	25.3		0.91	18.3	J	0.46
100-H-21	J1HJ68	8/28/11	0.200		0.16	13.5		0.16	6.20		1.64	19.1		0.82	6.14		0.41
100-H-22	J1HJ69	8/27/11	0.241		0.17	8.21		0.17	9.81		1.67	35.0		0.83	2.57		0.42
100-H-23	J1HJ70	8/27/11	0.140	B	0.19	6.38		0.19	6.00		1.85	32.5		0.93	1.70		0.46
100-H-24	J1HJ71	8/27/11	0.150	B	0.20	11.2		0.20	2.42		2.00	18.4		1.00	3.11		0.50
100-H-25	J1HJ72	8/24/11	0.217		0.16	12.3		0.16	3.66		1.59	24.0		0.79	5.02	J	0.40
Duplicate of J1HJ72	J1HJ77	8/24/11	0.183		0.17	12.5		0.17	3.82		1.72	23.7		0.86	5.21	J	0.43
100-H-25 (Depth)	J1HJ80	8/24/11	0.200		0.17	11.2		0.17	2.42		1.72	22.7		0.86	132	J	0.43
100-H-26	J1HJ73	8/28/11	0.244		0.17	14.1		0.17	8.25		1.72	30.7		0.86	5.82	J	0.43
100-H-27	J1HJ74	8/27/11	0.159	B	0.16	7.39		0.16	6.80		1.59	35.4		0.79	2.50	J	0.40
100-H-28	J1HJ75	8/27/11	0.233		0.19	11.5		0.19	7.72		1.85	42.4		0.93	4.26	J	0.46
100-H-29	J1HJ76	8/28/11	0.347		0.17	10.7		0.17	9.94		1.72	31.7		0.86	4.77	J	0.43
Equip blank	J1HJ79	8/24/11	0.139	U	0.14	0.427		0.14	1.39	U	1.39	0.694	U	0.69	1.12	J	0.35

Table C-7. 126-H-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-01	J1HJ48	8/27/11	169		4.72	0.022	B	0.03	1.30	B	1.89	14.4		3.77	0.283	U	0.28
100-H-02	J1HJ49	8/27/11	172		4.24	0.035		0.03	0.997	B	1.69	13.6		3.39	0.349		0.25
100-H-03	J1HJ50	8/28/11	99.7		4.81	0.176		0.03	0.607	B	1.92	10.2		3.85	1.58		0.29
100-H-04	J1HJ51	8/28/11	146		4.03	0.100		0.03	1.52	B	1.61	16.4		3.23	0.540		0.24
100-H-05	J1HJ52	8/27/11	223		4.17	0.023	B	0.03	1.46	B	1.67	14.8		3.33	0.319		0.25
100-H-06	J1HJ53	8/28/11	84.7		4.39	0.146		0.03	0.710	B	1.75	8.08		3.51	1.63		0.26
100-H-07	J1HJ54	8/28/11	82.7		4.03	0.053		0.03	1.23	B	1.61	8.93		3.23	0.981		0.24
100-H-08	J1HJ55	8/28/11	97.8		4.17	0.015	B	0.03	1.41	B	1.67	19.3		3.33	0.250	U	0.25
100-H-09	J1HJ56	8/28/11	80.0		4.46	0.112		0.03	1.55	B	1.79	20.4		3.57	0.277		0.27
100-H-10	J1HJ57	8/27/11	128		4.90	0.012	B	0.02	1.62	B	1.96	18.5		3.92	0.294	U	0.29
100-H-11	J1HJ58	8/27/11	76.0		4.81	0.088		0.03	0.493	B	1.92	6.72		3.85	2.06		0.29
100-H-12	J1HJ59	8/28/11	96.4		3.42	0.177		0.03	2.00		1.37	9.71		2.74	0.508		0.21
100-H-13	J1HJ60	8/28/11	77.7		4.10	0.042		0.03	1.86		1.64	9.15		3.28	0.591		0.25
100-H-14	J1HJ61	8/28/11	120		4.24	0.011	B	0.03	1.46	B	1.69	18.5		3.39	0.337		0.25
100-H-15	J1HJ62	8/28/11	225		4.10	0.034		0.02	0.861	B	1.64	14.4		3.28	0.246	U	0.25
100-H-16	J1HJ63	8/27/11	134	J	4.39	0.015	B	0.03	1.51	B	1.75	20.4	J	3.51	0.263	U	0.26
Duplicate of J1HJ63	J1HJ78	8/27/11	135	J	4.81	0.029		0.03	1.78	B	1.92	20.4	J	3.85	0.288	U	0.29
100-H-17	J1HJ64	8/27/11	67.7	J	4.10	0.049		0.03	0.708	B	1.64	5.88	J	3.28	0.762		0.25
100-H-17 (Depth)	J1HJ82	8/27/11	82.1	J	4.72	0.053		0.03	0.916	B	1.89	4.79	J	3.77	1.18		0.28
100-H-18	J1HJ65	8/27/11	81.8	J	4.55	0.129		0.03	0.786	B	1.82	7.05	J	3.64	1.49		0.27
100-H-19	J1HJ66	8/27/11	154	J	4.72	0.025	U	0.03	2.11		1.89	22.4	J	3.77	0.283	U	0.28
100-H-20	J1HJ67	8/24/11	122	J	4.24	0.018	B	0.03	2.44		1.69	10.9	J	3.39	0.341		0.25
100-H-20 (Depth)	J1HJ81	8/24/11	148	J	4.55	0.863		0.02	1.96		1.82	10.6	J	3.64	0.273	U	0.27
100-H-21	J1HJ68	8/28/11	268		4.10	0.069		0.03	0.628	B	1.64	12.4		3.28	0.348		0.25
100-H-22	J1HJ69	8/27/11	240		4.17	0.012	B	0.02	3.52		1.67	16.3		3.33	0.250	U	0.25
100-H-23	J1HJ70	8/27/11	70.2		4.63	0.025	U	0.03	1.22	B	1.85	15.9		3.70	0.278	U	0.28
100-H-24	J1HJ71	8/27/11	72.2		5.00	0.023	U	0.02	1.26	B	2.00	6.94		4.00	0.571		0.30
100-H-25	J1HJ72	8/24/11	153	J	3.97	0.027		0.03	1.44	B	1.59	10.1	J	3.17	0.338		0.24
Duplicate of J1HJ72	J1HJ77	8/24/11	122	J	4.31	0.019	B	0.03	1.49	B	1.72	10.2	J	3.45	0.504		0.26
100-H-25 (Depth)	J1HJ80	8/24/11	90.9	J	4.31	0.035		0.03	1.41	B	1.72	6.96	J	3.45	0.259	U	0.26
100-H-26	J1HJ73	8/28/11	283	J	4.31	0.072		0.02	1.25	B	1.72	15.6	J	3.45	0.259	U	0.26
100-H-27	J1HJ74	8/27/11	78.8	J	3.97	0.011	B	0.03	1.40	B	1.59	17.8	J	3.17	0.238	U	0.24
100-H-28	J1HJ75	8/27/11	141	J	4.63	0.051		0.03	1.81	B	1.85	19.2	J	3.70	0.510		0.28
100-H-29	J1HJ76	8/28/11	300	J	4.31	0.075		0.03	2.05		1.72	17.8	J	3.45	0.349		0.26
Equip blank	J1HJ79	8/24/11	7.47	J	3.47	0.024	U	0.02	1.39	U	1.39	2.78	UJ	2.78	0.208	U	0.21

Table C-7. 126-H-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Silver			Thallium			Uranium (KPA)			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	ug/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-01	J1HJ48	8/27/11	0.189	U	0.19	0.472	U	0.47				48.7		2.36	25.6		9.43
100-H-02	J1HJ49	8/27/11	0.169	U	0.17	0.424	U	0.42				44.1		2.12	22.9		8.47
100-H-03	J1HJ50	8/28/11	0.192	U	0.19	0.481	U	0.48				37.6		2.40	38.0		9.62
100-H-04	J1HJ51	8/28/11	0.161	U	0.16	0.403	U	0.40				37.5		2.02	24.8		8.06
100-H-05	J1HJ52	8/27/11	0.167	U	0.17	0.417	U	0.42				47.7		2.08	20.6		8.33
100-H-06	J1HJ53	8/28/11	0.175	U	0.18	0.439	U	0.44				28.4		2.19	37.9		8.77
100-H-07	J1HJ54	8/28/11	0.161	U	0.16	0.403	U	0.40				33.0		2.02	30.4		8.06
100-H-08	J1HJ55	8/28/11	0.167	U	0.17	0.417	U	0.42				49.6		2.08	18.7		8.33
100-H-09	J1HJ56	8/28/11	0.179	U	0.18	0.446	U	0.45				46.3		2.23	11.6		8.93
100-H-10	J1HJ57	8/27/11	0.196	U	0.20	0.490	U	0.49				46.6		2.45	12.9		9.80
100-H-11	J1HJ58	8/27/11	0.192	U	0.19	0.481	U	0.48				22.8		2.40	17.3		9.62
100-H-12	J1HJ59	8/28/11	0.137	U	0.14	0.342	U	0.34				32.0		1.71	76.9		6.85
100-H-13	J1HJ60	8/28/11	0.164	U	0.16	0.410	U	0.41				29.9		2.05	50.1		8.20
100-H-14	J1HJ61	8/28/11	0.169	U	0.17	0.424	U	0.42				45.1		2.12	17.3		8.47
100-H-15	J1HJ62	8/28/11	0.164	U	0.16	0.410	U	0.41				44.8		2.05	30.4		8.20
100-H-16	J1HJ63	8/27/11	0.175	U	0.18	0.439	UJ	0.44				50.6		2.19	16.3		8.77
Duplicate of J1HJ63	J1HJ78	8/27/11	0.192	U	0.19	0.481	UJ	0.48				52.1		2.40	15.2		9.62
100-H-17	J1HJ64	8/27/11	0.164	U	0.16	0.410	UJ	0.41	2.24		0.132	23.8		2.05	14.1		8.20
100-H-17 (Depth)	J1HJ82	8/27/11	0.189	U	0.19	0.472	UJ	0.47	4.18		0.132	19.6		2.36	25.7		9.4
100-H-18	J1HJ65	8/27/11	0.182	U	0.18	0.455	UJ	0.46				26.6		2.27	22.5		9.09
100-H-19	J1HJ66	8/27/11	0.189	U	0.19	0.472	UJ	0.47				58.4		2.36	17.2		9.43
100-H-20	J1HJ67	8/24/11	0.169	U	0.17	0.424	UJ	0.42	4.01		0.132	42.2		2.12	20.1		8.47
100-H-20 (Depth)	J1HJ81	8/24/11	0.182	U	0.18	0.455	UJ	0.46	2.78		0.132	28.9		2.27	21.0		9.1
100-H-21	J1HJ68	8/28/11	0.164	U	0.16	0.410	U	0.41				45.8		2.05	45.7		8.20
100-H-22	J1HJ69	8/27/11	0.167	U	0.17	0.417	U	0.42				60.0		2.08	53.6		8.33
100-H-23	J1HJ70	8/27/11	0.185	U	0.19	0.463	U	0.46				35.8		2.31	11.2		9.26
100-H-24	J1HJ71	8/27/11	0.200	U	0.20	0.500	U	0.50				26.4		2.50	29.2		10.0
100-H-25	J1HJ72	8/24/11	0.159	U	0.16	0.397	UJ	0.40	3.06		0.132	33.8		1.98	28.9		7.9
Duplicate of J1HJ72	J1HJ77	8/24/11	0.172	U	0.17	0.431	UJ	0.43	2.91		0.132	33.3		2.16	19.5		8.6
100-H-25 (Depth)	J1HJ80	8/24/11	0.172	U	0.17	0.431	UJ	0.43	4.25		0.132	27.0		2.16	31.3		8.6
100-H-26	J1HJ73	8/28/11	0.172	U	0.17	0.431	UJ	0.43				52.6		2.16	48.6		8.62
100-H-27	J1HJ74	8/27/11	0.159	U	0.16	0.397	UJ	0.40				42.6		1.98	13.9		7.94
100-H-28	J1HJ75	8/27/11	0.185	U	0.19	0.463	UJ	0.46				54.4		2.31	24.6		9.26
100-H-29	J1HJ76	8/28/11	0.172	U	0.17	0.431	UJ	0.43				44.5		2.16	47.9		8.6
Equip blank	J1HJ79	8/24/11	0.139	U	0.14	0.347	UJ	0.35				1.01	B	1.74	4.53	UJ	6.9

Table C-7. 126-H-1 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Acenaphthene			Acenaphthylene			Anthracene			Benzo(a)anthracene			Benzo(a)pyrene			Benzo(b)fluoranthene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
100-H-17	J1HJ64	8/27/11	336	U	336	336	U	336	336	U	336	336	U	336	336	U	336	336	U	336
100-H-20	J1HJ67	8/24/11	336	UD	336	336	UD	336	336	UD	336	336	UD	336	336	UD	336	336	UD	336
100-H-25	J1HJ72	8/24/11	332	UD	332	332	UD	332	332	UD	332	332	UD	332	332	UD	332	332	UD	332
Duplicate of J1HJ72	J1HJ77	8/24/11	335	U	335	335	U	335	335	U	335	335	U	335	335	U	335	335	U	335
100-H-17 (Depth)	J1HJ82	8/27/11	335	U	335	335	U	335	335	U	335	335	U	335	335	U	335	335	U	335
100-H-20 (Depth)	J1HJ81	8/24/11	339	U	339	339	U	339	339	U	339	339	U	339	339	U	339	339	U	339
100-H-25 (Depth)	J1HJ80	8/24/11	338	U	338	338	U	338	338	U	338	338	U	338	338	U	338	338	U	338
Equip blank	J1HJ79	8/24/11	332	U	332	332	U	332	332	U	332	332	U	332	332	U	332	332	U	332

Sample Location	HEIS Number	Sample Date	Benzo(ghi)perylene			Benzo(k)fluoranthene			Chrysene			Dibenz(a,h)anthracene			Fluoranthene			Fluorene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
100-H-17	J1HJ64	8/27/11	336	U	336	336	U	336	336	U	336	336	U	336	336	U	336	336	U	336
100-H-20	J1HJ67	8/24/11	336	UD	336	336	UD	336	336	UD	336	336	UD	336	336	UD	336	336	UD	336
100-H-25	J1HJ72	8/24/11	332	UD	332	332	UD	332	332	UD	332	332	UD	332	332	UD	332	332	UD	332
Duplicate of J1HJ72	J1HJ77	8/24/11	335	U	335	335	U	335	335	U	335	335	U	335	335	U	335	335	U	335
100-H-17 (Depth)	J1HJ82	8/27/11	335	U	335	335	U	335	335	U	335	335	U	335	335	U	335	335	U	335
100-H-20 (Depth)	J1HJ81	8/24/11	339	U	339	339	U	339	339	U	339	339	U	339	339	U	339	339	U	339
100-H-25 (Depth)	J1HJ80	8/24/11	585	J	656	338	U	338	338	U	338	338	U	338	338	U	338	338	U	338
Equip blank	J1HJ79	8/24/11	332	U	332	332	U	332	332	U	332	332	U	332	332	U	332	332	U	332

Sample Location	HEIS Number	Sample Date	Indeno(1,2,3-cd)pyrene			Naphthalene			Phenanthrene			Pyrene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
100-H-17	J1HJ64	8/27/11	336	U	336	357	J	633	240	J	633	336	U	336
100-H-20	J1HJ67	8/24/11	336	UD	336	691	JD	1270	250	JD	1270	336	UD	336
100-H-25	J1HJ72	8/24/11	332	UD	332	464	JD	1260	332	UD	332	332	UD	332
Duplicate of J1HJ72	J1HJ77	8/24/11	335	U	335	335	U	335	335	U	335	335	U	335
100-H-17 (Depth)	J1HJ82	8/27/11	335	U	335	174	J	633	110	J	633	104	J	633
100-H-20 (Depth)	J1HJ81	8/24/11	339	U	339	181	J	657	111	J	657	339	U	339
100-H-25 (Depth)	J1HJ80	8/24/11	338	U	338	137	J	656	338	U	338	338	U	338
Equip blank	J1HJ79	8/24/11	332	U	332	332	U	332	332	U	332	332	U	332

Table C-8. 126-H-1 Coal Ash Pre-Leaching Quadruplicate Sample Results. (2 Pages)

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-25 (Depth)	J1HJ80-1	8/24/11	0.484	U	0.48	2.22		0.81	943		0.40	1.49		0.16	392		1.61
100-H-25 (Depth)	J1HJ80-2	8/24/11	0.441	U	0.44	2.42		0.74	964		0.37	1.39		0.15	347		1.47
100-H-25 (Depth)	J1HJ80-3	8/24/11	0.588	U	0.59	2.27		0.98	1130		0.49	1.30		0.20	377		1.96
100-H-25 (Depth)	J1HJ80-4	8/24/11	0.577	U	0.58	2.41		0.96	941		0.48	1.20		0.19	370		1.92
100-H-20 (Depth)	J1HJ81-1	8/24/11	0.455	U	0.46	1.70		0.76	468		0.38	0.525		0.15	146		1.52
100-H-20 (Depth)	J1HJ81-2	8/24/11	0.500	U	0.50	3.41		0.83	844		0.42	0.978		0.17	223		1.67
100-H-20 (Depth)	J1HJ81-3	8/24/11	0.515	B	0.60	3.20		1.00	871		0.50	0.896		0.20	276		2.00
100-H-20 (Depth)	J1HJ81-4	8/24/11	0.508	U	0.51	2.31		0.85	907		0.42	0.871		0.17	265		1.69
100-H-17 (Depth)	J1HJ82-1	8/27/11	0.588	U	0.59	2.74		0.98	559		0.49	1.20		0.20	263		1.96
100-H-17 (Depth)	J1HJ82-2	8/27/11	0.577	U	0.58	2.53		0.96	485		0.48	1.07		0.19	223		1.92
100-H-17 (Depth)	J1HJ82-3	8/27/11	0.484	U	0.48	2.78		0.81	603		0.40	1.24		0.16	263		1.61
100-H-17 (Depth)	J1HJ82-4	8/27/11	0.577	U	0.58	2.83		0.96	563		0.48	1.24		0.19	262		1.92

Sample Location	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-25 (Depth)	J1HJ80-1	8/24/11	0.172		0.16	10.7		0.16	2.26		1.61	28.2		0.81	11.9		0.40
100-H-25 (Depth)	J1HJ80-2	8/24/11	0.167		0.15	12.1		0.15	2.52		1.47	80.9		0.74	16.7		0.37
100-H-25 (Depth)	J1HJ80-3	8/24/11	0.152	B	0.20	10.4		0.20	2.48		1.96	27.2		0.98	7.79		0.49
100-H-25 (Depth)	J1HJ80-4	8/24/11	0.142	B	0.19	10.8		0.19	2.22		1.92	22.4		0.96	17.1		0.48
100-H-20 (Depth)	J1HJ81-1	8/24/11	0.156		0.15	16.1		0.15	3.08		1.52	22.8		0.76	170		0.38
100-H-20 (Depth)	J1HJ81-2	8/24/11	0.147	B	0.17	12.4		0.17	5.31		1.67	36.1		0.83	23.0		0.42
100-H-20 (Depth)	J1HJ81-3	8/24/11	0.180	B	0.20	13.7		0.20	4.48		2.00	31.7		1.00	40.0		0.50
100-H-20 (Depth)	J1HJ81-4	8/24/11	0.181		0.17	10.8		0.17	4.14		1.69	29.0		0.85	19.6		0.42
100-H-17 (Depth)	J1HJ82-1	8/27/11	0.195	B	0.20	8.38		0.20	1.61	B	1.96	18.6		0.98	25.3		0.49
100-H-17 (Depth)	J1HJ82-2	8/27/11	0.168	B	0.19	7.52		0.19	1.47	B	1.92	16.9		0.96	22.2		0.48
100-H-17 (Depth)	J1HJ82-3	8/27/11	0.212		0.16	8.45		0.16	1.72		1.61	19.7		0.81	27.0		0.40
100-H-17 (Depth)	J1HJ82-4	8/27/11	0.209		0.19	8.57		0.19	1.87	B	1.92	20.7		0.96	25.4		0.48

Table C-8. 126-H-1 Coal Ash Pre-Leaching Quadruplicate Sample Results. (2 Pages)

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-25 (Depth)	J1HJ80-1	8/24/11	95.1		4.03	0.033		0.03	1.35	B	1.61	6.25		3.23	0.242	U	0.24
100-H-25 (Depth)	J1HJ80-2	8/24/11	95.0		3.68	0.101		0.03	1.48		1.47	7.28		2.94	0.221	U	0.22
100-H-25 (Depth)	J1HJ80-3	8/24/11	94.3		4.90	0.031		0.03	1.34	B	1.96	6.66		3.92	0.383		0.29
100-H-25 (Depth)	J1HJ80-4	8/24/11	103		4.81	0.030		0.03	1.25	B	1.92	6.53		3.85	0.385		0.29
100-H-20 (Depth)	J1HJ81-1	8/24/11	110		3.79	1.65		0.08	0.977	B	1.52	8.28		3.03	0.248		0.23
100-H-20 (Depth)	J1HJ81-2	8/24/11	232		4.17	0.802		0.03	2.04		1.67	12.8		3.33	0.252		0.25
100-H-20 (Depth)	J1HJ81-3	8/24/11	144		5.00	0.829		0.03	1.59	B	2.00	9.36		4.00	0.340		0.30
100-H-20 (Depth)	J1HJ81-4	8/24/11	275		4.24	0.898		0.03	1.54	B	1.69	9.52		3.39	0.318		0.25
100-H-17 (Depth)	J1HJ82-1	8/27/11	73.0		4.90	0.063		0.03	0.879	B	1.96	4.80		3.92	0.841		0.29
100-H-17 (Depth)	J1HJ82-2	8/27/11	63.9		4.81	0.070		0.03	0.769	B	1.92	4.29		3.85	0.800		0.29
100-H-17 (Depth)	J1HJ82-3	8/27/11	70.8		4.03	0.065		0.03	0.830	B	1.61	4.81		3.23	0.877		0.24
100-H-17 (Depth)	J1HJ82-4	8/27/11	71.7		4.81	0.051		0.03	0.920	B	1.92	5.38		3.85	1.02		0.29

Sample Location	HEIS Number	Sample Date	Silver			Thallium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-25 (Depth)	J1HJ80-1	8/24/11	0.161	U	0.16	0.403	U	0.40	30.3		2.02	38.2		8.06
100-H-25 (Depth)	J1HJ80-2	8/24/11	0.147	U	0.15	0.368	U	0.37	30.3		1.84	25.8		7.35
100-H-25 (Depth)	J1HJ80-3	8/24/11	0.196	U	0.20	0.490	U	0.49	29.6		2.45	21.6		9.80
100-H-25 (Depth)	J1HJ80-4	8/24/11	0.192	U	0.19	0.481	U	0.48	29.5		2.40	24.7		9.62
100-H-20 (Depth)	J1HJ81-1	8/24/11	0.152	U	0.15	0.379	U	0.38	28.5		1.89	55.5		7.58
100-H-20 (Depth)	J1HJ81-2	8/24/11	0.167	U	0.17	0.417	U	0.42	42.4		2.08	31.8		8.33
100-H-20 (Depth)	J1HJ81-3	8/24/11	0.200	U	0.20	0.500	U	0.50	45.6		2.50	32.0		10.0
100-H-20 (Depth)	J1HJ81-4	8/24/11	0.169	U	0.17	0.424	U	0.42	35.7		2.12	34.1		8.47
100-H-17 (Depth)	J1HJ82-1	8/27/11	0.196	U	0.20	0.490	U	0.49	21.4		2.45	42.4		9.80
100-H-17 (Depth)	J1HJ82-2	8/27/11	0.192	U	0.19	0.481	U	0.48	19.2		2.40	26.7		9.62
100-H-17 (Depth)	J1HJ82-3	8/27/11	0.161	U	0.16	0.403	U	0.40	22.0		2.02	28.0		8.06
100-H-17 (Depth)	J1HJ82-4	8/27/11	0.192	U	0.19	0.481	U	0.48	22.9		2.40	28.5		9.62

Table C-9. 126-H-1 Coal Ash Leaching Sample Results. (2 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
100-H-25 (Depth)	1:1	J1HJ80-A1	8/24/11	0.100	U	0.10	0.075	U	0.08	0.076		0.01	0.005	U	0.01	13.4		0.08
100-H-25 (Depth)	1:2.5	J1HJ80-B1	8/24/11	0.100	U	0.10	0.075	U	0.08	0.075		0.01	0.005	U	0.01	7.18		0.08
100-H-25 (Depth)	1:2.5	J1HJ80-B2	8/24/11	0.100	U	0.10	0.075	U	0.08	0.077		0.01	0.005	U	0.01	6.79		0.08
100-H-25 (Depth)	1:5	J1HJ80-C1	8/24/11	0.100	U	0.10	0.075	U	0.08	0.077		0.01	0.005	U	0.01	4.04		0.08
100-H-20 (Depth)	1:1	J1HJ81-A1	8/24/11	0.100	U	0.10	0.075	U	0.08	0.066		0.01	0.005	U	0.01	4.95		0.08
100-H-20 (Depth)	1:2.5	J1HJ81-B1	8/24/11	0.100	U	0.10	0.075	U	0.08	0.069		0.01	0.005	U	0.01	2.82		0.08
100-H-20 (Depth)	1:5	J1HJ81-C1	8/24/11	0.100	U	0.10	0.075	U	0.08	0.081		0.01	0.005	U	0.01	1.75		0.08
100-H-20 (Depth)	1:5	J1HJ81-C2	8/24/11	0.100	U	0.10	0.075	U	0.08	0.079		0.01	0.005	U	0.01	1.75		0.08
100-H-17 (Depth)	1:1	J1HJ82-A1	8/27/11	0.100	U	0.10	0.075	U	0.08	0.039		0.01	0.005	U	0.01	10.2		0.08
100-H-17 (Depth)	1:1	J1HJ82-A2	8/27/11	0.100	U	0.10	0.075	U	0.08	0.041		0.01	0.005	U	0.01	11.2		0.08
100-H-17 (Depth)	1:2.5	J1HJ82-B1	8/27/11	0.100	U	0.10	0.075	U	0.08	0.042		0.01	0.005	U	0.01	6.66		0.08
100-H-17 (Depth)	1:5	J1HJ82-C1	8/27/11	0.100	U	0.10	0.075	U	0.08	0.039		0.01	0.005	U	0.01	4.11		0.08

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
100-H-25 (Depth)	1:1	J1HJ80-A1	8/24/11	0.015	U	0.02	0.005	B	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
100-H-25 (Depth)	1:2.5	J1HJ80-B1	8/24/11	0.015	U	0.02	0.003	B	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
100-H-25 (Depth)	1:2.5	J1HJ80-B2	8/24/11	0.015	U	0.02	0.003	B	0.03	0.010	U	0.01	0.100	U	0.10	0.011	B	0.05
100-H-25 (Depth)	1:5	J1HJ80-C1	8/24/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
100-H-20 (Depth)	1:1	J1HJ81-A1	8/24/11	0.015	U	0.02	0.008	B	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
100-H-20 (Depth)	1:2.5	J1HJ81-B1	8/24/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
100-H-20 (Depth)	1:5	J1HJ81-C1	8/24/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
100-H-20 (Depth)	1:5	J1HJ81-C2	8/24/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
100-H-17 (Depth)	1:1	J1HJ82-A1	8/27/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
100-H-17 (Depth)	1:1	J1HJ82-A2	8/27/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
100-H-17 (Depth)	1:2.5	J1HJ82-B1	8/27/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
100-H-17 (Depth)	1:5	J1HJ82-C1	8/27/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05

Table C-9. 126-H-1 Coal Ash Leaching Sample Results. (2 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
100-H-25 (Depth)	1:1	J1HJ80-A1	8/24/11	0.025	U	0.03	0.000186	B	0.0004	0.017		0.02	0.100	U	0.10	0.100	U	0.10
100-H-25 (Depth)	1:2.5	J1HJ80-B1	8/24/11	0.025	U	0.03	0.000103	B	0.0002	0.008	B	0.02	0.100	U	0.10	0.100	U	0.10
100-H-25 (Depth)	1:2.5	J1HJ80-B2	8/24/11	0.025	U	0.03	0.000111	B	0.0002	0.009	B	0.02	0.003	B	0.10	0.100	U	0.10
100-H-25 (Depth)	1:5	J1HJ80-C1	8/24/11	0.025	U	0.03	0.000100	B	0.0002	0.007	B	0.02	0.100	U	0.10	0.100	U	0.10
100-H-17 (Depth)	1:1	J1HJ81-A1	8/24/11	0.025	U	0.03	0.000339	B	0.0006	0.010	B	0.02	0.100	U	0.10	0.100	U	0.10
100-H-17 (Depth)	1:2.5	J1HJ81-B1	8/24/11	0.025	U	0.03	0.000115	B	0.0002	0.003	B	0.02	0.100	U	0.10	0.100	U	0.10
100-H-17 (Depth)	1:5	J1HJ81-C1	8/24/11	0.025	U	0.03	0.000117	B	0.0002	0.015	U	0.02	0.100	U	0.10	0.100	U	0.10
100-H-17 (Depth)	1:5	J1HJ81-C2	8/24/11	0.025	U	0.03	0.000110	B	0.0002	0.015	U	0.02	0.100	U	0.10	0.100	U	0.10
100-H-20 (Depth)	1:1	J1HJ82-A1	8/27/11	0.025	U	0.03	0.000366	B	0.0006	0.018		0.02	0.100	U	0.10	0.019	B	0.10
100-H-20 (Depth)	1:1	J1HJ82-A2	8/27/11	0.025	U	0.03	0.000202	B	0.0004	0.019		0.02	0.100	U	0.10	0.018	B	0.10
100-H-20 (Depth)	1:2.5	J1HJ82-B1	8/27/11	0.025	U	0.03	0.000115	B	0.0002	0.008	B	0.02	0.100	U	0.10	0.100	U	0.10
100-H-20 (Depth)	1:5	J1HJ82-C1	8/27/11	0.025	U	0.03	0.000102	B	0.0002	0.005	B	0.02	0.100	U	0.10	0.100	U	0.10

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Silver			Thallium			Uranium (KPA)			Vanadium			Zinc			
				mg/L	Q	PQL	mg/L	Q	PQL	ug/L	Q	MDA	mg/L	Q	PQL	mg/L	Q	PQL	pH
100-H-25 (Depth)	1:1	J1HJ80-A1	8/24/11	0.030	U	0.03	0.075	U	0.08	1.77		0.032	0.046		0.03	0.250	U	0.25	8.41
100-H-25 (Depth)	1:2.5	J1HJ80-B1	8/24/11	0.030	U	0.03	0.075	U	0.08	0.897		0.032	0.034		0.03	0.250	U	0.25	9.05
100-H-25 (Depth)	1:2.5	J1HJ80-B2	8/24/11	0.030	U	0.03	0.075	U	0.08	0.842		0.032	0.032		0.03	0.250	U	0.25	9.12
100-H-25 (Depth)	1:5	J1HJ80-C1	8/24/11	0.030	U	0.03	0.075	U	0.08	0.551		0.032	0.027		0.03	0.250	U	0.25	9.31
100-H-20 (Depth)	1:1	J1HJ81-A1	8/24/11	0.030	U	0.03	0.075	U	0.08	1.09		0.032	0.032		0.03	0.250	U	0.25	9.01
100-H-20 (Depth)	1:2.5	J1HJ81-B1	8/24/11	0.030	U	0.03	0.075	U	0.08	0.677		0.032	0.028		0.03	0.250	U	0.25	9.17
100-H-20 (Depth)	1:5	J1HJ81-C1	8/24/11	0.030	U	0.03	0.075	U	0.08	0.322		0.032	0.021	B	0.03	0.250	U	0.25	9.35
100-H-20 (Depth)	1:5	J1HJ81-C2	8/24/11	0.030	U	0.03	0.075	U	0.08	0.407		0.032	0.020	B	0.03	0.250	U	0.25	9.31
100-H-17 (Depth)	1:1	J1HJ82-A1	8/27/11	0.030	U	0.03	0.075	U	0.08	5.94		0.032	0.033		0.03	0.250	U	0.25	8.46
100-H-17 (Depth)	1:1	J1HJ82-A2	8/27/11	0.030	U	0.03	0.075	U	0.08	5.96		0.032	0.037		0.03	0.250	U	0.25	8.43
100-H-17 (Depth)	1:2.5	J1HJ82-B1	8/27/11	0.030	U	0.03	0.075	U	0.08	3.34		0.032	0.025	B	0.03	0.250	U	0.25	8.56
100-H-17 (Depth)	1:5	J1HJ82-C1	8/27/11	0.030	U	0.03	0.075	U	0.08	2.28		0.032	0.019	B	0.03	0.250	U	0.25	8.64

Table C-10. 300 Area Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
300-01	J1HJN8	8/26/11	0.469	UJ	0.47	3.30		0.78	486		0.39	0.934		0.16	129		1.56
300-02	J1HJN7	8/25/11	0.448	UJ	0.45	2.89		0.75	490		0.37	0.784		0.15	161		1.49
300-02 (Depth)	J1HJV1	8/25/11	0.545	UJ	0.55	2.25		0.91	527		0.46	0.862		0.18	288		1.82
300-03	J1HJN6	8/25/11	0.455	UJ	0.46	3.33		0.76	306		0.38	0.544		0.15	65.4		1.52
300-03 (Depth)	J1HJV2	8/25/11	0.526	UJ	0.53	2.37		0.88	526		0.44	0.818		0.18	256		1.75
300-04	J1HJN9	8/25/11	0.588	UJ	0.59	2.71		0.98	541		0.49	1.14		0.20	196		1.96
Duplicate of J1HJN9	J1HJT5	8/25/11	0.484	UJ	0.48	2.66		0.81	639		0.40	1.03		0.16	199		1.61
300-04 (Depth)	J1HJV0	8/25/11	0.476	UJ	0.48	2.45		0.79	629		0.40	1.03		0.16	360		1.59
300-05	J1HJP0	8/26/11	0.577	UJ	0.58	3.10		0.96	608		0.48	0.995		0.19	177		1.92
300-06	J1HJP1	8/26/11	0.492	UJ	0.49	2.30		0.82	521	J	0.41	0.878		0.16	459		1.64
Duplicate of J1HJP1	J1HJT6	8/26/11	0.462	UJ	0.46	2.36		0.77	564		0.39	0.853		0.15	492		1.54
300-07	J1HJP2	8/26/11	0.492	UJ	0.49	3.07		0.82	636	J	0.41	1.22		0.16	211		1.64
300-08	J1HJP3	8/26/11	0.566	UJ	0.57	2.98		0.94	754	J	0.47	1.14		0.19	257		1.89
300-09	J1HJP4	8/26/11	0.484	UJ	0.48	1.60		0.81	177	J	0.40	0.588		0.16	139		1.61
300-10	J1HJP5	8/26/11	0.517	UJ	0.52	3.63		0.86	782	J	0.43	1.15		0.17	253		1.72
300-11	J1HJP6	8/26/11	0.508	UJ	0.51	3.08		0.85	748	J	0.42	1.09		0.17	369		1.69
300-12	J1HJP7	8/26/11	0.536	UJ	0.54	2.92		0.89	552	J	0.45	1.37		0.18	193		1.79
300-13	J1HJP8	8/26/11	0.476	UJ	0.48	2.41		0.79	297	J	0.40	0.948		0.16	260		1.59
300-14	J1HJP9	8/26/11	0.492	UJ	0.49	2.09		0.82	204	J	0.41	0.572		0.16	135		1.64
300-15	J1HJR0	8/26/11	0.484	UJ	0.48	2.41		0.81	586	J	0.40	0.783		0.16	215		1.61
300-16	J1HJR1	8/26/11	0.588	UJ	0.59	2.21		0.98	374	J	0.49	1.00		0.20	148		1.96
300-17	J1HJR2	8/26/11	0.500	UJ	0.50	3.36		0.83	542	J	0.42	0.919		0.17	99		1.67
300-18	J1HJR3	8/26/11	0.536	UJ	0.54	2.17		0.89	244	J	0.45	0.813		0.18	208		1.79
300-19	J1HJR4	8/26/11	0.517	UJ	0.52	2.28		0.86	472	J	0.43	0.817		0.17	156		1.72
300-20	J1HJR5	8/26/11	0.545	UJ	0.55	3.30		0.91	651	J	0.46	1.60		0.18	190		1.82
300-21	J1HJR6	8/26/11	0.556	UJ	0.56	3.87		0.93	569	J	0.46	0.926		0.19	128		1.85
300-22	J1HJR7	8/26/11	0.476	UJ	0.48	3.31		0.79	407	J	0.40	0.79		0.16	74.5		1.59
300-23	J1HJR8	8/26/11	0.536	UJ	0.54	3.00		0.89	492	J	0.45	1.30		0.18	185		1.79
300-24	J1HJR9	8/26/11	0.429	UJ	0.43	1.62		0.71	208	J	0.36	0.644		0.14	137		1.43
300-25	J1HJT0	8/26/11	0.441	UJ	0.44	3.34		0.74	707	J	0.37	1.30		0.15	251		1.47
300-26	J1HJT1	8/26/11	0.517	UJ	0.52	3.28		0.86	680		0.43	1.22		0.17	181		1.72
300-27	J1HJT2	8/26/11	0.56	UJ	0.56	3.70		0.93	450		0.46	1.95		0.19	157		1.85
300-28	J1HJT3	8/26/11	0.469	UJ	0.47	2.66		0.78	273		0.39	0.824		0.16	104		1.56
300-29	J1HJT4	8/26/11	0.526	UJ	0.53	3.91		0.88	464		0.44	1.66		0.18	171		1.75
Equip Blank	J1HJT7	8/25/11	0.484	UJ	0.48	0.50	B	0.81	2.22		0.40	0.046	B	0.16	1.61	U	1.61

Table C-10. 300 Area Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
300-01	J1HJN8	8/26/11	0.312		0.16	14.6		0.16	4.37		1.56	19.3		0.78	10.0		0.39
300-02	J1HJN7	8/25/11	0.226		0.15	12.5		0.15	3.82		1.49	19.6		0.75	9.66		0.37
300-02 (Depth)	J1HJV1	8/25/11	0.207		0.18	9.87		0.18	2.16		1.82	16.4		0.91	8.18		0.46
300-03	J1HJN6	8/25/11	0.201		0.15	12.0		0.15	4.23		1.52	14.7		0.76	7.13		0.38
300-03 (Depth)	J1HJV2	8/25/11	0.222		0.18	10.6		0.18	2.94		1.75	15.5		0.88	9.12		0.44
300-04	J1HJN9	8/25/11	0.253		0.20	12.8		0.20	3.00		1.96	20.3		0.98	9.41		0.49
Duplicate of J1HJN9	J1HJT5	8/25/11	0.227		0.16	11.2		0.16	2.66		1.61	18.5		0.81	7.74		0.40
300-04 (Depth)	J1HJV0	8/25/11	0.267		0.16	11.6		0.16	2.19		1.59	19.7		0.79	14.5		0.40
300-05	J1HJP0	8/26/11	0.254		0.19	13.1		0.19	3.28		1.92	23.5		0.96	14.3		0.48
300-06	J1HJP1	8/26/11	0.188		0.16	9.84		0.16	2.51		1.64	18.2		0.82	7.19		0.41
Duplicate of J1HJP1	J1HJT6	8/26/11	0.187		0.15	10.6		0.15	2.47		1.54	15.5		0.77	8.78		0.39
300-07	J1HJP2	8/26/11	0.285		0.16	14.9		0.16	3.28		1.64	23.1		0.82	8.29		0.41
300-08	J1HJP3	8/26/11	0.229		0.19	11.6		0.19	2.92		1.89	25.9		0.94	11.6		0.47
300-09	J1HJP4	8/26/11	0.106	B	0.16	7.15		0.16	2.45		1.61	16.2		0.81	5.33		0.40
300-10	J1HJP5	8/26/11	0.239		0.17	11.5		0.17	2.97		1.72	22.1		0.86	13.0		0.43
300-11	J1HJP6	8/26/11	0.237		0.17	11.1		0.17	2.76		1.69	21.2		0.85	11.8		0.42
300-12	J1HJP7	8/26/11	0.310		0.18	14.1		0.18	4.05		1.79	24.5		0.89	11.5		0.45
300-13	J1HJP8	8/26/11	0.094	B	0.16	10.4		0.16	1.90		1.59	24.3		0.79	3.33		0.40
300-14	J1HJP9	8/26/11	0.130	B	0.16	8.46		0.16	3.24		1.64	19.9		0.82	5.23		0.41
300-15	J1HJR0	8/26/11	0.214		0.16	10.2		0.16	3.46		1.61	18.3		0.81	7.70		0.40
300-16	J1HJR1	8/26/11	0.226		0.20	10.5		0.20	3.20		1.96	19.2		0.98	7.88		0.49
300-17	J1HJR2	8/26/11	0.193		0.17	12.9		0.17	4.89		1.67	21.0		0.83	8.51		0.42
300-18	J1HJR3	8/26/11	0.154	B	0.18	9.93		0.18	2.69		1.79	22.4		0.89	6.38		0.45
300-19	J1HJR4	8/26/11	0.256		0.17	10.9		0.17	3.50		1.72	17.7		0.86	7.54		0.43
300-20	J1HJR5	8/26/11	0.317		0.18	14.2		0.18	2.85		1.82	24.2		0.91	9.95		0.46
300-21	J1HJR6	8/26/11	0.213		0.19	11.5		0.19	3.86		1.85	21.1		0.93	12.0		0.46
300-22	J1HJR7	8/26/11	0.202		0.16	13.2		0.16	5.12		1.59	19.9		0.79	8.96		0.40
300-23	J1HJR8	8/26/11	0.307		0.18	15.6		0.18	3.67		1.79	26.8		0.89	12.5		0.45
300-24	J1HJR9	8/26/11	0.122	B	0.14	9.74		0.14	2.44		1.43	172		0.71	5.36		0.36
300-25	J1HJT0	8/26/11	0.260		0.15	15.1		0.15	3.28		1.47	26.7		0.74	15.2		0.37
300-26	J1HJT1	8/26/11	0.239		0.17	14.2		0.17	3.77		1.72	24.3		0.86	9.76		0.43
300-27	J1HJT2	8/26/11	0.338		0.19	15.8		0.19	3.51		1.85	24.6		0.93	11.8		0.46
300-28	J1HJT3	8/26/11	0.302		0.16	11.6		0.16	3.56		1.56	28.8		0.78	14.0		0.39
300-29	J1HJT4	8/26/11	0.366		0.18	14.9		0.18	2.97		1.75	25.2		0.88	17.2		0.44
Equip Blank	J1HJT7	8/25/11	0.161	U	0.16	0.316		0.16	1.61	U	1.61	0.806	U	0.81	0.475	UJ	0.40

Table C-10. 300 Area Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
300-01	J1HJN8	8/26/11	176		3.91	0.211		0.03	0.832	B	1.56	9.09	J	3.12	1.02	J	0.23
300-02	J1HJN7	8/25/11	186		3.73	0.713		0.03	0.851	B	1.49	8.37	J	2.99	0.943		0.22
300-02 (Depth)	J1HJV1	8/25/11	85.6		4.55	3.32		0.16	0.830	B	1.82	5.84	J	3.64	1.19		0.27
300-03	J1HJN6	8/25/11	213		3.79	0.060		0.03	0.472	B	1.52	9.21	J	3.03	0.877		0.23
300-03 (Depth)	J1HJV2	8/25/11	95.9		4.39	0.291		0.02	0.690	B	1.75	6.53	J	3.51	1.53		0.26
300-04	J1HJN9	8/25/11	107		4.90	0.365		0.03	1.04	B	1.96	8.97	J	3.92	1.24		0.29
Duplicate of J1HJN9	J1HJT5	8/25/11	91.7		4.03	0.344		0.03	0.946	B	1.61	8.07	J	3.23	1.17		0.24
300-04 (Depth)	J1HJV0	8/25/11	66.3		3.97	0.501		0.03	0.923	B	1.59	6.43	J	3.17	1.77		0.24
300-05	J1HJP0	8/26/11	131		4.81	0.083		0.03	1.02	B	1.92	8.10	J	3.85	1.27	J	0.29
300-06	J1HJP1	8/26/11	106	J	4.10	0.370		0.02	0.968	B	1.64	6.36		3.28	1.16		0.25
Duplicate of J1HJP1	J1HJT6	8/26/11	101		3.85	0.706		0.03	1.12	B	1.54	6.29	J	3.08	1.14		0.23
300-07	J1HJP2	8/26/11	87.5	J	4.10	0.119		0.02	1.26	B	1.64	12.5		3.28	1.460		0.25
300-08	J1HJP3	8/26/11	92.8	J	4.72	0.293		0.03	1.23	B	1.89	8.20		3.77	1.34		0.28
300-09	J1HJP4	8/26/11	69.5	J	4.03	0.115		0.02	0.717	B	1.61	5.73		3.23	0.67		0.24
300-10	J1HJP5	8/26/11	96.6	J	4.31	0.170		0.03	0.952	B	1.72	8.72		3.45	1.63		0.26
300-11	J1HJP6	8/26/11	101	J	4.24	0.321		0.02	1.43	B	1.69	7.09		3.39	1.65		0.25
300-12	J1HJP7	8/26/11	94.5	J	4.46	0.115		0.03	1.11	B	1.79	11.2		3.57	1.62		0.27
300-13	J1HJP8	8/26/11	93.3	J	3.97	1.02		0.03	1.50	B	1.59	7.62		3.17	0.491		0.24
300-14	J1HJP9	8/26/11	142	J	4.10	0.181		0.03	0.706	B	1.64	7.27		3.28	0.688		0.25
300-15	J1HJR0	8/26/11	132	J	4.03	0.044		0.02	1.17	B	1.61	8.25		3.23	0.911		0.24
300-16	J1HJR1	8/26/11	111	J	4.90	0.087		0.03	0.879	B	1.96	9.10		3.92	1.10		0.29
300-17	J1HJR2	8/26/11	195	J	4.17	0.062		0.02	0.701	B	1.67	9.26		3.33	0.884		0.25
300-18	J1HJR3	8/26/11	101	J	4.46	0.468		0.02	0.981	B	1.79	7.24		3.57	0.840		0.27
300-19	J1HJR4	8/26/11	146	J	4.31	0.034		0.02	0.916	B	1.72	8.09		3.45	0.815		0.26
300-20	J1HJR5	8/26/11	35.5	J	4.55	0.132		0.03	1.03	B	1.82	11.4		3.64	2.46		0.27
300-21	J1HJR6	8/26/11	134	J	4.63	0.284		0.03	0.812	B	1.85	8.28		3.70	1.09		0.28
300-22	J1HJR7	8/26/11	210	J	3.97	0.052		0.03	0.762	B	1.59	9.84		3.17	0.929		0.24
300-23	J1HJR8	8/26/11	107	J	4.46	0.068		0.03	1.23	B	1.79	14.9		3.57	1.08		0.27
300-24	J1HJR9	8/26/11	81.4	J	3.57	0.274		0.03	2.12		1.43	9.99		2.86	0.571		0.21
300-25	J1HJT0	8/26/11	81.1	J	3.68	0.176		0.02	1.38	B	1.47	8.91		2.94	1.63		0.22
300-26	J1HJT1	8/26/11	144		4.31	0.101		0.03	1.18	B	1.72	10.4	J	3.45	1.40		0.26
300-27	J1HJT2	8/26/11	61.8		4.63	0.107		0.03	1.07	B	1.85	13.0	J	3.70	2.12		0.28
300-28	J1HJT3	8/26/11	136		3.91	0.086		0.03	0.708	B	1.56	10.8	J	3.12	1.18		0.23
300-29	J1HJT4	8/26/11	43.9		4.39	0.157		0.03	0.807	B	1.75	13.2	J	3.51	2.65		0.26
Equip Blank	J1HJT7	8/25/11	5.6		4.03	0.024	U	0.02	1.61	U	1.61	3.23	J	3.23	0.346		0.24

Table C-10. 300 Area Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Silver			Thallium			Uranium (KPA)			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	ug/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL
300-01	J1HJN8	8/26/11	0.156	U	0.16	0.391	U	0.390				42.4		1.95	53.0	J	7.81
300-02	J1HJN7	8/25/11	0.149	U	0.15	0.373	U	0.370	4.22		0.132	42.8		1.87	35.8	J	7.46
300-02 (Depth)	J1HJV1	8/25/11	0.182	U	0.18	0.455	U	0.460	2.61		0.132	25.1		2.27	27.8	J	9.09
300-03	J1HJN6	8/25/11	0.152	U	0.15	0.379	U	0.380	3.70		0.132	44.4		1.89	35.3	J	7.58
300-03 (Depth)	J1HJV2	8/25/11	0.175	U	0.18	0.439	U	0.440	2.86		0.132	28.3		2.19	26.7	J	8.77
300-04	J1HJN9	8/25/11	0.196	U	0.20	0.490	U	0.490	3.36		0.132	34.0		2.45	27.2	J	9.80
Duplicate of J1HJN9	J1HJT5	8/25/11	0.161	U	0.16	0.403	U	0.400	3.20		0.132	31.5		2.02	28.3	J	8.06
300-04 (Depth)	J1HJV0	8/25/11	0.159	U	0.16	0.397	U	0.400	3.14		0.132	24.3		1.98	26.9	J	7.94
300-05	J1HJP0	8/26/11	0.192	U	0.19	0.481	U	0.480				36.8		2.40	43.3	J	9.62
300-06	J1HJP1	8/26/11	0.164	U	0.16	0.410	U	0.410				26.4		2.05	43.0	J	8.20
Duplicate of J1HJP1	J1HJT6	8/26/11	0.154	U	0.15	0.385	U	0.39				28.3		1.92	23.3	J	7.69
300-07	J1HJP2	8/26/11	0.164	U	0.16	0.410	U	0.410				39.9		2.05	26.1	J	8.20
300-08	J1HJP3	8/26/11	0.189	U	0.19	0.472	U	0.470				29.6		2.36	25.5	J	9.43
300-09	J1HJP4	8/26/11	0.161	U	0.16	0.403	U	0.400				21.3		2.02	18.3	J	8.06
300-10	J1HJP5	8/26/11	0.172	U	0.17	0.431	U	0.430				27.8		2.16	23.3	J	8.62
300-11	J1HJP6	8/26/11	0.169	U	0.17	0.424	U	0.420				29.9		2.12	24.6	J	8.47
300-12	J1HJP7	8/26/11	0.179	U	0.18	0.446	U	0.450				35.9		2.23	30.3	J	8.93
300-13	J1HJP8	8/26/11	0.159	U	0.16	0.397	U	0.400				22.1		1.98	12.6	J	7.94
300-14	J1HJP9	8/26/11	0.164	U	0.16	0.410	U	0.410				33.0		2.05	26.0	J	8.20
300-15	J1HJR0	8/26/11	0.161	U	0.16	0.403	U	0.400				32.8		2.02	27.7	J	8.06
300-16	J1HJR1	8/26/11	0.196	U	0.20	0.490	U	0.490				32.4		2.45	29.7	J	9.80
300-17	J1HJR2	8/26/11	0.167	U	0.17	0.417	U	0.420				46.2		2.08	31.2	J	8.33
300-18	J1HJR3	8/26/11	0.179	U	0.18	0.446	U	0.450				29.6		2.23	22.2	J	8.93
300-19	J1HJR4	8/26/11	0.172	U	0.17	0.431	U	0.430				34.5		2.16	34.4	J	8.62
300-20	J1HJR5	8/26/11	0.182	U	0.18	0.455	U	0.460				34.1		2.27	23.4	J	9.09
300-21	J1HJR6	8/26/11	0.185	U	0.19	0.463	U	0.460				37.3		2.31	28.5	J	9.26
300-22	J1HJR7	8/26/11	0.159	U	0.16	0.397	U	0.400				45.7		1.98	34.7	J	7.94
300-23	J1HJR8	8/26/11	0.179	U	0.18	0.446	U	0.450				41.3		2.23	36.0	J	8.93
300-24	J1HJR9	8/26/11	0.143	U	0.14	0.357	U	0.360				24.8		1.79	23.7	J	7.14
300-25	J1HJT0	8/26/11	0.147	U	0.15	0.368	U	0.370				34.1		1.84	25.8	J	7.35
300-26	J1HJT1	8/26/11	0.172	U	0.17	0.431	U	0.430				40.4		2.16	26.8	J	8.62
300-27	J1HJT2	8/26/11	0.185	U	0.19	0.463	U	0.46				38.2		2.31	35.1	J	9.26
300-28	J1HJT3	8/26/11	0.156	U	0.16	0.391	U	0.390				36.7		1.95	43.0	J	7.81
300-29	J1HJT4	8/26/11	0.175	U	0.18	0.439	U	0.440				34.6		2.19	29.1	J	8.77
Equip Blank	J1HJT7	8/25/11	0.161	U	0.16	0.403	U	0.40				0.581	B	2.02	2.00	UJB	8.06

Table C-10. 300 Area Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Acenaphthene			Acenaphthylene			Anthracene			Benzo(a)anthracene			Benzo(a)pyrene			Benzo(b)fluoranthene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
300-02	J1HJN7	8/25/11	338	U	338	338	U	338	338	U	338	338	U	338	338	U	338	338	U	338
300-03	J1HJN6	8/25/11	330	U	330	330	U	330	330	U	330	330	U	330	330	U	330	330	U	330
300-04	J1HJN9	8/25/11	333	U	333	333	U	333	333	U	333	333	U	333	333	U	333	333	U	333
Duplicate of J1HJN9	J1HJT5	8/25/11	359	UD	359	359	UD	359	359	UD	359	359	UD	359	359	UD	359	359	UD	359
300-02 (Depth)	J1HJV1	8/25/11	328	U	328	328	U	328	328	U	328	328	U	328	328	U	328	328	U	328
300-03 (Depth)	J1HJV2	8/25/11	352	UD	352	352	UD	352	352	UD	352	352	UD	352	352	UD	352	352	UD	352
300-04 (Depth)	J1HJV0	8/25/11	334	U	334	334	U	334	334	U	334	334	U	334	334	U	334	334	U	334
Equip Blank	J1HJT7	8/25/11	324	U	324	324	U	324	324	U	324	324	U	324	324	U	324	324	U	324

Sample Location	HEIS Number	Sample Date	Benzo(ghi)perylene			Benzo(k)fluoranthene			Chrysene			Dibenz(a,h)anthracene			Fluoranthene			Fluorene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
300-02	J1HJN7	8/25/11	338	U	338	338	U	338	338	U	338	338	U	338	338	U	338	338	U	338
300-03	J1HJN6	8/25/11	330	U	330	330	U	330	330	U	330	330	U	330	330	U	330	330	U	330
300-04	J1HJN9	8/25/11	333	U	333	333	U	333	333	U	333	333	U	333	333	U	333	333	U	333
Duplicate of J1HJN9	J1HJT5	8/25/11	359	UD	359	359	UD	359	359	UD	359	359	UD	359	359	UD	359	359	UD	359
300-02 (Depth)	J1HJV1	8/25/11	328	U	328	328	U	328	328	U	328	328	U	328	328	U	328	328	U	328
300-03 (Depth)	J1HJV2	8/25/11	352	UD	352	352	UD	352	352	UD	352	352	UD	352	352	UD	352	352	UD	352
300-04 (Depth)	J1HJV0	8/25/11	334	U	334	334	U	334	334	U	334	334	U	334	334	U	334	334	U	334
Equip Blank	J1HJT7	8/25/11	324	U	324	324	U	324	324	U	324	324	U	324	324	U	324	324	U	324

Sample Location	HEIS Number	Sample Date	Indeno(1,2,3-cd)pyrene			Naphthalene			Phenanthrene			Pyrene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
300-02	J1HJN7	8/25/11	338	U	338	338	U	338	338	U	338	338	U	338
300-03	J1HJN6	8/25/11	330	U	330	330	U	330	330	U	330	330	U	330
300-04	J1HJN9	8/25/11	333	U	333	333	U	333	333	U	333	333	U	333
Duplicate of J1HJN9	J1HJT5	8/25/11	359	UD	359	359	UD	359	359	UD	359	359	UD	359
300-02 (Depth)	J1HJV1	8/25/11	328	U	328	124	J	602	328	U	328	328	U	328
300-03 (Depth)	J1HJV2	8/25/11	352	UD	352	352	UD	352	352	UD	352	352	UD	352
300-04 (Depth)	J1HJV0	8/25/11	334	U	334	334	U	334	334	U	334	334	U	334
Equip Blank	J1HJT7	8/25/11	324	U	324	324	U	324	324	U	324	324	U	324

Table C-11. 300 Area Coal Ash Pre-Leaching Quadruplicate Sample Results. (2 Pages)

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
300-04 (Depth)	J1HJV0-1	8/25/11	0.526	U	0.53	2.03		0.88	555		0.44	0.906		0.18	352		1.75
300-04 (Depth)	J1HJV0-2	8/25/11	0.448	U	0.45	2.35		0.75	548		0.37	0.993		0.15	367		1.49
300-04 (Depth)	J1HJV0-3	8/25/11	0.400	U	0.40	1.98		0.67	498		0.33	0.905		0.13	353		1.33
300-04 (Depth)	J1HJV0-4	8/25/11	0.390	U	0.39	2.11		0.65	558		0.33	0.976		0.13	392		1.30
300-02 (Depth)	J1HJV1-1	8/25/11	0.423	U	0.42	2.41		0.70	542		0.35	0.886		0.14	273		1.41
300-02 (Depth)	J1HJV1-2	8/25/11	0.435	U	0.44	2.05		0.73	550		0.36	0.845		0.15	296		1.45
300-02 (Depth)	J1HJV1-3	8/25/11	0.476	U	0.48	1.91		0.79	699		0.40	0.838		0.16	283		1.59
300-02 (Depth)	J1HJV1-4	8/25/11	0.517	U	0.52	2.16		0.86	613		0.43	0.903		0.17	297		1.72
300-03 (Depth)	J1HJV2-1	8/25/11	0.536	U	0.54	2.55		0.89	601		0.45	0.846		0.18	298		1.79
300-03 (Depth)	J1HJV2-2	8/25/11	0.536	U	0.54	2.60		0.89	527		0.45	0.922		0.18	281		1.79
300-03 (Depth)	J1HJV2-3	8/25/11	0.469	U	0.47	2.69		0.78	513		0.39	0.868		0.16	294		1.56
300-03 (Depth)	J1HJV2-4	8/25/11	0.469	U	0.47	2.62		0.78	561		0.39	0.952		0.16	298		1.56

Sample Location	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
300-04 (Depth)	J1HJV0-1	8/25/11	0.236		0.18	10.6		0.18	2.53		1.75	16.1		0.88	11.9		0.44
300-04 (Depth)	J1HJV0-2	8/25/11	0.233		0.15	11.2		0.15	2.41		1.49	17.7		0.75	13.0		0.37
300-04 (Depth)	J1HJV0-3	8/25/11	0.224		0.13	9.76		0.13	1.97		1.33	16.0		0.67	13.0		0.33
300-04 (Depth)	J1HJV0-4	8/25/11	0.210		0.13	11.7		0.13	2.02		1.30	17.7		0.65	14.1		0.33
300-02 (Depth)	J1HJV1-1	8/25/11	0.191		0.14	9.67		0.14	2.48		1.41	16.8		0.70	8.41		0.35
300-02 (Depth)	J1HJV1-2	8/25/11	0.211		0.15	9.33		0.15	2.16		1.45	16.1		0.73	7.96		0.36
300-02 (Depth)	J1HJV1-3	8/25/11	0.196		0.16	9.23		0.16	2.20		1.59	16.3		0.79	7.84		0.40
300-02 (Depth)	J1HJV1-4	8/25/11	0.197		0.17	9.51		0.17	2.29		1.72	19.6		0.86	7.97		0.43
300-03 (Depth)	J1HJV2-1	8/25/11	0.215		0.18	11.1		0.18	2.65		1.79	17.0		0.89	12.1		0.45
300-03 (Depth)	J1HJV2-2	8/25/11	0.232		0.18	11.7		0.18	3.04		1.79	17.2		0.89	10.5		0.45
300-03 (Depth)	J1HJV2-3	8/25/11	0.217		0.16	11.9		0.16	3.13		1.56	17.5		0.78	10.4		0.39
300-03 (Depth)	J1HJV2-4	8/25/11	0.250		0.16	11.6		0.16	2.76		1.56	17.4		0.78	10.3		0.39

Table C-11. 300 Area Coal Ash Pre-Leaching Quadruplicate Sample Results. (2 Pages)

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
300-04 (Depth)	J1HJV0-1	8/25/11	64.0		4.39	0.447		0.03	0.831	B	1.75	6.38		3.51	1.40		0.26
300-04 (Depth)	J1HJV0-2	8/25/11	56.0		3.73	1.15		0.03	0.863	B	1.49	6.32		2.99	1.65		0.22
300-04 (Depth)	J1HJV0-3	8/25/11	78.9		3.33	0.563		0.03	0.812	B	1.33	5.63		2.67	1.61		0.20
300-04 (Depth)	J1HJV0-4	8/25/11	72.2		3.25	0.546		0.03	1.02	B	1.30	5.90		2.60	1.54		0.20
300-02 (Depth)	J1HJV1-1	8/25/11	96.5		3.52	1.61		0.08	0.735	B	1.41	5.97		2.82	1.04		0.21
300-02 (Depth)	J1HJV1-2	8/25/11	79.6		3.62	1.46		0.08	0.849	B	1.45	5.58		2.90	1.14		0.22
300-02 (Depth)	J1HJV1-3	8/25/11	80.7		3.97	1.22		0.03	0.764	B	1.59	5.48		3.17	0.928		0.24
300-02 (Depth)	J1HJV1-4	8/25/11	79.6		4.31	1.55		0.07	0.890	B	1.72	5.74		3.45	1.20		0.26
300-03 (Depth)	J1HJV2-1	8/25/11	90.8		4.46	0.604		0.02	0.718	B	1.79	6.47		3.57	1.29		0.27
300-03 (Depth)	J1HJV2-2	8/25/11	104		4.46	0.543		0.03	0.688	B	1.79	7.24		3.57	1.58		0.27
300-03 (Depth)	J1HJV2-3	8/25/11	110		3.91	0.158		0.03	0.802	B	1.56	7.15		3.12	1.49		0.23
300-03 (Depth)	J1HJV2-4	8/25/11	86.7		3.91	0.159		0.03	0.704	B	1.56	6.85		3.12	1.44		0.23

Sample Location	HEIS Number	Sample Date	Silver			Thallium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
300-04 (Depth)	J1HJV0-1	8/25/11	0.175	U	0.18	0.439	U	0.44	21.0		2.19	25.6		8.77
300-04 (Depth)	J1HJV0-2	8/25/11	0.149	U	0.15	0.373	U	0.37	22.8		1.87	26.1		7.46
300-04 (Depth)	J1HJV0-3	8/25/11	0.133	U	0.13	0.333	U	0.33	21.1		1.67	24.8		6.67
300-04 (Depth)	J1HJV0-4	8/25/11	0.130	U	0.13	0.325	U	0.33	23.7		1.62	22.6		6.49
300-02 (Depth)	J1HJV1-1	8/25/11	0.141	U	0.14	0.352	U	0.35	26.1		1.76	27.8		7.04
300-02 (Depth)	J1HJV1-2	8/25/11	0.145	U	0.15	0.362	U	0.36	23.8		1.81	25.1		7.25
300-02 (Depth)	J1HJV1-3	8/25/11	0.159	U	0.16	0.397	U	0.40	23.1		1.98	26.4		7.94
300-02 (Depth)	J1HJV1-4	8/25/11	0.172	U	0.17	0.431	U	0.43	23.8		2.16	30.0		8.62
300-03 (Depth)	J1HJV2-1	8/25/11	0.179	U	0.18	0.446	U	0.45	28.1		2.23	25.8		8.93
300-03 (Depth)	J1HJV2-2	8/25/11	0.179	U	0.18	0.446	U	0.45	29.6		2.23	30.3		8.93
300-03 (Depth)	J1HJV2-3	8/25/11	0.156	U	0.16	0.391	U	0.39	29.9		1.95	29.3		7.81
300-03 (Depth)	J1HJV2-4	8/25/11	0.156	U	0.16	0.391	U	0.39	27.4		1.95	31.5		7.81

Table C-12. 300 Area Coal Ash Leaching Sample Results. (2 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
300-04 (Depth)	1:1	J1HJV0-A1	8/25/11	0.100	U	0.10	0.075	U	0.08	0.042		0.01	0.005	U	0.01	77.8		0.08
300-04 (Depth)	1:1	J1HJV0-A2	8/25/11	0.100	U	0.10	0.075	U	0.08	0.037		0.01	0.005	U	0.01	70.0		0.08
300-04 (Depth)	1:2.5	J1HJV0-B1	8/25/11	0.100	U	0.10	0.075	U	0.08	0.034		0.01	0.005	U	0.01	40.4		0.08
300-04 (Depth)	1:5	J1HJV0-C1	8/25/11	0.100	U	0.10	0.075	U	0.08	0.033		0.01	0.005	U	0.01	23.1		0.08
300-02 (Depth)	1:1	J1HJV1-A1	8/25/11	0.100	U	0.10	0.075	U	0.08	0.045		0.01	0.005	U	0.01	43.4		0.08
300-02 (Depth)	1:2.5	J1HJV1-B1	8/25/11	0.100	U	0.10	0.075	U	0.08	0.036		0.01	0.005	U	0.01	22.9		0.08
300-02 (Depth)	1:2.5	J1HJV1-B2	8/25/11	0.100	U	0.10	0.075	U	0.08	0.037		0.01	0.005	U	0.01	21.6		0.08
300-02 (Depth)	1:5	J1HJV1-C1	8/25/11	0.100	U	0.10	0.075	U	0.08	0.036		0.01	0.005	U	0.01	13.0		0.08
300-03 (Depth)	1:1	J1HJV2-A1	8/25/11	0.100	U	0.10	0.075	U	0.08	0.048		0.01	0.005	U	0.01	58.4		0.08
300-03 (Depth)	1:2.5	J1HJV2-B1	8/25/11	0.100	U	0.10	0.075	U	0.08	0.037		0.01	0.005	U	0.01	33.7		0.08
300-03 (Depth)	1:5	J1HJV2-C1	8/25/11	0.100	U	0.10	0.075	U	0.08	0.034		0.01	0.005	U	0.01	19.3		0.08
300-03 (Depth)	1:5	J1HJV2-C2	8/25/11	0.100	U	0.10	0.075	U	0.08	0.034		0.01	0.005	U	0.01	20.2		0.08

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
300-04 (Depth)	1:1	J1HJV0-A1	8/25/11	0.015	U	0.02	0.003	B	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
300-04 (Depth)	1:1	J1HJV0-A2	8/25/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
300-04 (Depth)	1:2.5	J1HJV0-B1	8/25/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
300-04 (Depth)	1:5	J1HJV0-C1	8/25/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
300-02 (Depth)	1:1	J1HJV1-A1	8/25/11	0.015	U	0.02	0.003	B	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
300-02 (Depth)	1:2.5	J1HJV1-B1	8/25/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
300-02 (Depth)	1:2.5	J1HJV1-B2	8/25/11	0.015	U	0.02	0.003	B	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
300-02 (Depth)	1:5	J1HJV1-C1	8/25/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
300-03 (Depth)	1:1	J1HJV2-A1	8/25/11	0.015	U	0.02	0.003	B	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
300-03 (Depth)	1:2.5	J1HJV2-B1	8/25/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
300-03 (Depth)	1:5	J1HJV2-C1	8/25/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05
300-03 (Depth)	1:5	J1HJV2-C2	8/25/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.050	U	0.05

Table C-12. 300 Area Coal Ash Leaching Sample Results. (2 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
300-04 (Depth)	1:1	J1HJV0-A1	8/25/11	0.025	U	0.03	0.00023	B	0.00	0.133		0.02	0.100	U	0.10	0.175		0.10
300-04 (Depth)	1:1	J1HJV0-A2	8/25/11	0.025	U	0.03	0.000236	B	0.00	0.120		0.02	0.100	U	0.10	0.151		0.10
300-04 (Depth)	1:2.5	J1HJV0-B1	8/25/11	0.025	U	0.03	0.00013	B	0.00	0.062		0.02	0.100	U	0.10	0.079	B	0.10
300-04 (Depth)	1:5	J1HJV0-C1	8/25/11	0.025	U	0.03	0.00012	B	0.00	0.035		0.02	0.100	U	0.10	0.041	B	0.10
300-02 (Depth)	1:1	J1HJV1-A1	8/25/11	0.025	U	0.03	0.00023	B	0.00	0.060		0.02	0.100	U	0.10	0.062	B	0.10
300-02 (Depth)	1:2.5	J1HJV1-B1	8/25/11	0.025	U	0.03	0.00013	B	0.00	0.032		0.02	0.100	U	0.10	0.027	B	0.10
300-02 (Depth)	1:2.5	J1HJV1-B2	8/25/11	0.025	U	0.03	0.00011	B	0.00	0.028		0.02	0.100	U	0.10	0.024	B	0.10
300-02 (Depth)	1:5	J1HJV1-C1	8/25/11	0.025	U	0.03	0.00013	B	0.00	0.016		0.02	0.100	U	0.10	0.100	U	0.10
300-03 (Depth)	1:1	J1HJV2-A1	8/25/11	0.025	U	0.03	0.00040	B	0.00	0.069		0.02	0.100	U	0.10	0.064	B	0.10
300-03 (Depth)	1:2.5	J1HJV2-B1	8/25/11	0.025	U	0.03	0.00013	B	0.00	0.035		0.02	0.100	U	0.10	0.042	B	0.10
300-03 (Depth)	1:5	J1HJV2-C1	8/25/11	0.025	U	0.03	0.00015	B	0.00	0.019		0.02	0.100	U	0.10	0.019	B	0.10
300-03 (Depth)	1:5	J1HJV2-C2	8/25/11	0.025	U	0.03	0.00013	B	0.00	0.019		0.02	0.100	U	0.10	0.019	B	0.10

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Silver			Thallium			Uranium (KPA)			Vanadium			Zinc			pH
				mg/L	Q	PQL	mg/L	Q	PQL	ug/L	Q	MDA	mg/L	Q	PQL	mg/L	Q	PQL	
300-04 (Depth)	1:1	J1HJV0-A1	8/25/11	0.030	U	0.03	0.075	U	0.08	27.3		0.32	0.123		0.03	0.250	U	0.25	8.17
300-04 (Depth)	1:1	J1HJV0-A2	8/25/11	0.030	U	0.03	0.075	U	0.08	27.0		0.32	0.118		0.03	0.250	U	0.25	8.26
300-04 (Depth)	1:2.5	J1HJV0-B1	8/25/11	0.030	U	0.03	0.075	U	0.08	13.0		0.03	0.083		0.03	0.250	U	0.25	8.78
300-04 (Depth)	1:5	J1HJV0-C1	8/25/11	0.030	U	0.03	0.075	U	0.08	9.02		0.03	0.057		0.03	0.250	U	0.25	8.69
300-02 (Depth)	1:1	J1HJV1-A1	8/25/11	0.030	U	0.03	0.075	U	0.08	18.6		0.32	0.077		0.03	0.250	U	0.25	8.41
300-02 (Depth)	1:2.5	J1HJV1-B1	8/25/11	0.030	U	0.03	0.075	U	0.08	8.31		0.03	0.049		0.03	0.250	U	0.25	8.58
300-02 (Depth)	1:2.5	J1HJV1-B2	8/25/11	0.030	U	0.03	0.075	U	0.08	8.25		0.03	0.048		0.03	0.250	U	0.25	8.59
300-02 (Depth)	1:5	J1HJV1-C1	8/25/11	0.030	U	0.03	0.075	U	0.08	5.27		0.03	0.033		0.03	0.250	U	0.25	8.80
300-03 (Depth)	1:1	J1HJV2-A1	8/25/11	0.030	U	0.03	0.075	U	0.08	28.9		0.32	0.073		0.03	0.250	U	0.25	8.21
300-03 (Depth)	1:2.5	J1HJV2-B1	8/25/11	0.030	U	0.03	0.075	U	0.08	15.8		0.03	0.049		0.03	0.250	U	0.25	8.42
300-03 (Depth)	1:5	J1HJV2-C1	8/25/11	0.030	U	0.03	0.075	U	0.08	10.6		0.03	0.033		0.03	0.250	U	0.25	8.61
300-03 (Depth)	1:5	J1HJV2-C2	8/25/11	0.030	U	0.03	0.075	U	0.08	10.9		0.03	0.033		0.03	0.250	U	0.25	8.63

Table C-13. 600-207 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-01	J1HHM3	9/28/11	0.526	U	0.53	3.73		0.88	656		0.44	0.691		0.18	60.9		1.75
600-02	J1HHM4	9/28/11	0.536	U	0.54	5.29		0.89	673		0.45	0.655		0.18	42.7		1.79
600-03	J1HHM5	9/28/11	0.556	U	0.56	5.19		0.93	721		0.46	0.730		0.19	55.1		1.85
600-04	J1HHM6	9/28/11	0.517	U	0.52	3.82		0.86	552		0.43	0.556		0.17	44.3		1.72
600-05	J1HHM7	9/28/11	0.556	U	0.56	4.91		0.93	645		0.46	0.619		0.19	44.7		1.85
600-06	J1HHM8	9/28/11	0.526	U	0.53	3.63		0.88	695		0.44	0.592		0.18	42.7		1.75
600-07	J1HHM9	9/27/11	0.577	UJ	0.58	6.60		0.96	958	J	0.48	0.903		0.19	146	J	1.92
600-07 (depth)	J1HHT8	9/27/11	0.476	UJ	0.48	4.29		0.79	711	J	0.40	1.21		0.16	147	J	1.59
600-08	J1HHN0	9/28/11	0.492	U	0.49	5.18		0.82	686		0.41	0.676		0.16	43.1		1.64
600-09	J1HHN1	9/28/11	0.545	U	0.55	5.42		0.91	643		0.46	0.800		0.18	50.9		1.82
600-10	J1HHN2	9/28/11	0.508	U	0.51	4.62		0.85	608		0.42	0.592		0.17	44.7		1.69
600-11	J1HHN3	9/28/11	0.508	U	0.51	3.71		0.85	379		0.42	0.627		0.17	31.2		1.69
600-12	J1HHN4	9/28/11	0.492	U	0.49	3.39		0.82	632		0.41	0.460		0.16	41.6		1.64
600-13	J1HHN5	9/28/11	0.517	U	0.52	3.90		0.86	609		0.43	0.529		0.17	35.4		1.72
600-14	J1HHN6	9/28/11	0.545	U	0.55	4.46		0.91	606		0.46	0.696		0.18	44.8		1.82
600-15	J1HHN7	9/27/11	0.577	UJ	0.58	10.6		0.96	1210	J	0.48	1.43		0.19	112	J	1.92
Duplicate of J1HHN7	J1HHR2	9/27/11	0.508	UJ	0.51	9.58		0.85	1250	J	0.42	1.46		0.17	162	J	1.69
600-15 (depth)	J1HHT9	9/27/11	0.269	BJ	0.52	4.92		0.86	653	J	0.43	0.658		0.17	168	J	1.72
600-16	J1HHN8	9/28/11	0.526	U	0.53	5.38		0.88	767		0.44	0.772		0.18	60.6		1.75
600-17	J1HHN9	9/28/11	0.476	U	0.48	5.02		0.79	678		0.40	0.629		0.16	58.8		1.59
600-18	J1HHP0	9/28/11	0.484	U	0.48	4.89		0.81	683		0.40	0.84		0.16	50.2		1.61
600-19	J1HHP1	9/28/11	0.517	U	0.52	4.56		0.86	705		0.43	0.737		0.17	60.3		1.72
600-20	J1HHP2	9/28/11	0.536	U	0.54	6.63		0.89	805		0.45	0.992		0.18	57.1		1.79
600-21	J1HHP3	9/28/11	0.588	UJ	0.59	6.30		0.98	1060	J	0.49	1.01		0.20	84.0	J	1.96
600-22	J1HHP4	9/27/11	0.500	UJ	0.50	6.19		0.83	796	J	0.42	0.957		0.17	58.3	J	1.67
600-23	J1HHP5	9/27/11	0.536	UJ	0.54	6.46		0.89	915	J	0.45	0.969		0.18	103	J	1.79
600-23 (depth)	J1HHV0	9/27/11	0.556	UJ	0.56	4.83		0.93	680	J	0.46	0.847		0.19	155	J	1.85
600-24	J1HHP6	9/28/11	0.588	UJ	0.59	7.25		0.98	910	J	0.49	1.19		0.20	69.8	J	1.96
Duplicate of J1HHP6	J1HHR3	9/27/11	0.500	UJ	0.50	6.57		0.83	1030	J	0.42	1.18		0.17	81.7	J	1.67
600-25	J1HHP7	9/27/11	0.600	UJ	0.60	5.52		1.00	694	J	0.50	0.907		0.20	48.0	J	2.00
600-26	J1HHP8	9/28/11	0.577	UJ	0.58	8.54		0.96	1030		0.48	1.18		0.19	66.0	J	1.92
600-27	J1HHP9	9/27/11	0.500	UJ	0.50	6.17		0.83	944	J	0.42	1.05		0.17	63.7	J	1.67
600-28	J1HHR0	9/27/11	0.566	UJ	0.57	4.90		0.94	979	J	0.47	1.11		0.19	71.3	J	1.89
600-29	J1HHR1	9/28/11	0.435	UJ	0.44	5.58		0.73	802	J	0.36	0.833		0.15	57.4	J	1.45
Equip blank	J1HHT7	9/27/11	0.395	UJ	0.40	0.658	U	0.66	2.47	UJ	0.33	0.035	B	0.13	1.32	UJ	1.32

Table C-13. 600-207 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-01	J1HHM3	9/28/11	0.178		0.18	8.27		0.18	3.88		1.75	20.0		0.88	4.69		0.44
600-02	J1HHM4	9/28/11	0.186		0.18	8.66		0.18	4.02		1.79	20.4		0.89	5.08		0.45
600-03	J1HHM5	9/28/11	0.187		0.19	9.26		0.19	4.05		1.9	21.1		0.9	7.21		0.5
600-04	J1HHM6	9/28/11	0.204		0.17	7.82		0.17	3.51		1.7	17.1		0.9	5.2		0.4
600-05	J1HHM7	9/28/11	0.188		0.19	9.00		0.19	3.94		1.9	20.2		0.9	6.07		0.5
600-06	J1HHM8	9/28/11	0.211		0.18	8.04		0.18	3.30		1.8	18.7		0.9	5.77		0.4
600-07	J1HHM9	9/27/11	0.122	B	0.19	12.9	J	0.19	5.74		1.9	46.8	J	1.0	5.28		0.5
600-07 (depth)	J1HHT8	9/27/11	0.111	B	0.16	7.50	J	0.16	4.42		1.59	21.9	J	0.79	3.3		0.40
600-08	J1HHN0	9/28/11	0.194		0.16	8.91		0.16	4.28		1.64	22.2		0.82	5.35		0.41
600-09	J1HHN1	9/28/11	0.211		0.18	9.33		0.18	4.49		1.82	24.1		0.91	5.75		0.46
600-10	J1HHN2	9/28/11	0.178		0.17	8.09		0.17	3.53		1.69	19.2		0.85	5.24		0.42
600-11	J1HHN3	9/28/11	0.166	B	0.17	9.70		0.17	4.83		1.69	18.5		0.85	4.26		0.42
600-12	J1HHN4	9/28/11	0.182		0.16	8.08		0.16	3.24		1.64	16.9		0.82	4.23		0.41
600-13	J1HHN5	9/28/11	0.153	B	0.17	6.81		0.17	3.21		1.72	19.4		0.86	4.58		0.43
600-14	J1HHN6	9/28/11	0.173	B	0.18	8.29		0.18	3.70		1.82	20.1		0.91	7		0.46
600-15	J1HHN7	9/27/11	0.232		0.19	15.5	J	0.19	7.14		1.92	35.4	J	0.96	11.1		0.48
Duplicate of J1HHN7	J1HHR2	9/27/11	0.213		0.17	16.7	J	0.17	7.08		1.69	38.6	J	0.85	7.5		0.42
600-15 (depth)	J1HHT9	9/27/11	0.186		0.17	8.99	J	0.17	3.56		1.72	21.6	J	0.86	5.61		0.43
600-16	J1HHN8	9/28/11	0.186		0.18	9.14		0.18	4.69		1.75	20.3		0.88	5.45		0.44
600-17	J1HHN9	9/28/11	0.202		0.16	9.87		0.16	4.70		1.59	23.2		0.79	7.1		0.40
600-18	J1HHP0	9/28/11	0.189		0.16	8.23		0.16	4.16		1.61	20.6		0.81	5.93		0.40
600-19	J1HHP1	9/28/11	0.172	B	0.17	8.55		0.17	4.31		1.72	20.9		0.86	4.99		0.43
600-20	J1HHP2	9/28/11	0.193		0.18	11.4		0.18	5.65		1.79	26.7		0.89	5.44		0.45
600-21	J1HHP3	9/28/11	0.127	B	0.20	11.8	J	0.20	5.46		1.96	24.6	J	0.98	4.94		0.49
600-22	J1HHP4	9/27/11	0.14	B	0.17	11.4	J	0.17	5.52		1.67	24.6	J	0.83	6.92		0.42
600-23	J1HHP5	9/27/11	0.143	B	0.18	11.5	J	0.18	6.07		1.79	28.2	J	0.89	6.61		0.45
600-23 (depth)	J1HHV0	9/27/11	0.139	B	0.19	8.11	J	0.19	3.98		1.85	21.3	J	0.93	5.08		0.46
600-24	J1HHP6	9/28/11	0.174	B	0.20	12.3	J	0.20	5.92		1.96	32.3	J	0.98	7.03		0.49
Duplicate of J1HHP6	J1HHR3	9/27/11	0.157	B	0.17	11.4	J	0.17	5.85		1.67	28.0	J	0.83	5.6		0.42
600-25	J1HHP7	9/27/11	0.176	B	0.20	11.3	J	0.20	5.38		2.00	26.8	J	1.00	6.06		0.50
600-26	J1HHP8	9/28/11	0.149	B	0.19	12.8		0.19	5.93		1.92	29.9		0.96	14.5		0.48
600-27	J1HHP9	9/27/11	0.175		0.17	11.1	J	0.17	4.91		1.67	25.2	J	0.83	6.15		0.42
600-28	J1HHR0	9/27/11	0.138	B	0.19	9.85	J	0.19	4.83		1.89	24.3	J	0.94	5.47		0.47
600-29	J1HHR1	9/28/11	0.151		0.15	10.9	J	0.15	4.96		1.45	23.2	J	0.73	5.3		0.36
Equip blank	J1HHT7	9/27/11	0.132	U	0.13	0.298	J	0.13	1.32	U	1.32	0.658	UJ	0.66	0.528		0.33

Table C-13. 600-207 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-01	J1HHM3	9/28/11	244		4.39	0.026	U	0.03	1.37	B	1.75	9.86		3.51	1.33		0.26
600-02	J1HHM4	9/28/11	259		4.46	0.027	U	0.03	1.57	B	1.79	10.3		3.57	1.72		0.27
600-03	J1HHM5	9/28/11	293		4.63	0.042		0.03	1.58	B	1.9	10.9		3.70	1.76		0.28
600-04	J1HHM6	9/28/11	209		4.31	0.026	U	0.03	1.27	B	1.7	8.92		3.45	1.36		0.26
600-05	J1HHM7	9/28/11	266		4.63	0.027	U	0.03	1.59	B	1.9	10.3		3.70	1.42		0.28
600-06	J1HHM8	9/28/11	229		4.39	0.009	B	0.03	1.25	B	1.8	8.87		3.51	1.29		0.26
600-07	J1HHM9	9/27/11	486	J	4.81	0.027	U	0.03	2.34		1.9	16.7	J	3.85	1.22		0.29
600-07 (depth)	J1HHT8	9/27/11	327	J	4.0	0.026	U	0.03	1.91		1.59	11.2	J	3.2	1.29		0.24
600-08	J1HHN0	9/28/11	270		4.10	0.046		0.03	1.42	B	1.64	10.8		3.28	1.5		0.25
600-09	J1HHN1	9/28/11	291		4.55	0.027	U	0.03	1.78	B	1.82	12.7		3.64	1.33		0.27
600-10	J1HHN2	9/28/11	227		4.24	0.024	U	0.02	1.28	B	1.69	9.12		3.39	1.35		0.25
600-11	J1HHN3	9/28/11	237		4.24	0.027	U	0.03	1.38	B	1.69	11.7		3.39	0.946		0.25
600-12	J1HHN4	9/28/11	205		4.10	0.027	U	0.03	1.01	B	1.64	7.95		3.28	0.898		0.25
600-13	J1HHN5	9/28/11	209		4.31	0.012	B	0.03	1.26	B	1.72	8.10		3.45	1.08		0.26
600-14	J1HHN6	9/28/11	260		4.55	0.013	B	0.03	1.47	B	1.82	10.0		3.64	1.41		0.27
600-15	J1HHN7	9/27/11	481	J	4.81	0.025	U	0.03	2.11		1.92	18.9	J	3.85	2.27		0.29
Duplicate of J1HHN7	J1HHR2	9/27/11	537	J	4.2	0.017	B	0.02	2.49		1.69	19.7	J	3.4	1.73		0.25
600-15 (depth)	J1HHT9	9/27/11	250	J	4.3	0.025	U	0.03	2.16		1.72	9.42	J	3.5	1.83		0.26
600-16	J1HHN8	9/28/11	293		4.39	0.010	B	0.03	1.75		1.75	12.6		3.51	1.37		0.26
600-17	J1HHN9	9/28/11	264		3.97	0.027	U	0.03	1.62		1.59	11.9		3.17	1.30		0.24
600-18	J1HHP0	9/28/11	280		4.03	0.027	U	0.03	1.53	B	1.61	10.9		3.23	1.56		0.24
600-19	J1HHP1	9/28/11	271		4.31	0.026	U	0.03	1.74		1.72	11.1		3.45	1.51		0.26
600-20	J1HHP2	9/28/11	349		4.46	0.025	U	0.03	2.26		1.79	14.6		3.57	1.77		0.27
600-21	J1HHP3	9/28/11	357	J	4.90	0.026	U	0.03	2.35		1.96	14.4	J	3.92	1.51		0.29
600-22	J1HHP4	9/27/11	359	J	4.2	0.027	U	0.03	2.25		1.67	15.8	J	3.3	1.88		0.25
600-23	J1HHP5	9/27/11	410	J	4.46	0.027	B	0.03	2.02		1.79	16.2	J	3.6	1.44		0.27
600-23 (depth)	J1HHV0	9/27/11	286	J	4.63	0.026	U	0.03	1.78	B	1.85	10.6	J	3.70	1.85		0.28
600-24	J1HHP6	9/28/11	373	J	4.90	0.045		0.03	2.69		1.96	15.7	J	3.9	2.10		0.29
Duplicate of J1HHP6	J1HHR3	9/27/11	390	J	4.2	0.030		0.03	2.46		1.67	17.7	J	3.3	1.64		0.25
600-25	J1HHP7	9/27/11	252	J	5.00	0.021	B	0.03	1.88	B	2.00	13.1	J	4.0	1.95		0.30
600-26	J1HHP8	9/28/11	435		4.8	0.022	B	0.03	3.13		1.92	16.7		3.9	2.06		0.29
600-27	J1HHP9	9/27/11	379	J	4.2	0.028		0.03	1.88		1.67	14.5	J	3.3	1.92		0.25
600-28	J1HHR0	9/27/11	401	J	4.72	0.019	B	0.02	2.11		1.89	14.3	J	3.8	1.60		0.28
600-29	J1HHR1	9/28/11	315	J	3.6	0.028		0.02	1.89		1.45	13.0	J	2.9	1.61		0.22
Equip blank	J1HHT7	9/27/11	7	UJ	3.3	0.011	B	0.03	1.32	U	1.32	2.63	UJ	2.6	0.197	U	0.20

Table C-13. 600-207 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Silver			Thallium			Uranium (KPA)			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	ug/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL
600-01	J1HHM3	9/28/11	0.175	U	0.18	0.439	U	0.440				32.0		2.19	17.1		8.77
600-02	J1HHM4	9/28/11	0.179	U	0.18	0.446	U	0.450				32.2		2.23	17.3		8.93
600-03	J1HHM5	9/28/11	0.185	U	0.19	0.463	U	0.460				33.0		2.31	21.6		9.26
600-04	J1HHM6	9/28/11	0.172	U	0.17	0.431	U	0.430				29.0		2.16	26		8.62
600-05	J1HHM7	9/28/11	0.185	U	0.19	0.463	U	0.460				30.6		2.31	21.1		9.26
600-06	J1HHM8	9/28/11	0.175	U	0.18	0.439	U	0.440				28.2		2.19	20.9		8.77
600-07	J1HHM9	9/27/11	0.192	U	0.19	0.481	UJ	0.480	2.56		0.136	43.7	J	2.40	22.1		9.62
600-07 (depth)	J1HHT8	9/27/11	0.159	U	0.16	0.397	UJ	0.40	2.64		0.136	36.8	J	1.98	17.7		7.9
600-08	J1HHN0	9/28/11	0.164	U	0.16	0.41	U	0.410				32.3		2.05	22.4		8.20
600-09	J1HHN1	9/28/11	0.182	U	0.18	0.455	U	0.460				33.2		2.27	24.8		9.09
600-10	J1HHN2	9/28/11	0.169	U	0.17	0.424	U	0.420				26.7		2.12	16.6		8.47
600-11	J1HHN3	9/28/11	0.169	U	0.17	0.424	U	0.420				38.7		2.12	24.5		8.47
600-12	J1HHN4	9/28/11	0.164	U	0.16	0.41	U	0.410				26.2		2.05	22.8		8.20
600-13	J1HHN5	9/28/11	0.172	U	0.17	0.431	U	0.430				25.4		2.16	15.8		8.62
600-14	J1HHN6	9/28/11	0.182	U	0.18	0.455	U	0.460				29.8		2.27	17.6		9.09
600-15	J1HHN7	9/27/11	0.192	U	0.19	0.481	UJ	0.480	4.18		0.136	55.3	J	2.40	28.5		9.62
Duplicate of J1HHN7	J1HHR2	9/27/11	0.169	U	0.17	0.424	UJ	0.42	5.18		0.136	102	J	2.12	22.1		8.5
600-15 (depth)	J1HHT9	9/27/11	0.172	U	0.17	0.431	UJ	0.43	1.76		0.136	32.9	J	2.16	18.1		8.6
600-16	J1HHN8	9/28/11	0.175	U	0.18	0.439	U	0.440				32.2		2.19	19.1		8.77
600-17	J1HHN9	9/28/11	0.159	U	0.16	0.397	U	0.400				36.2		1.98	23.7		7.94
600-18	J1HHP0	9/28/11	0.161	U	0.16	0.403	U	0.400				32.6		2.02	19.2		8.06
600-19	J1HHP1	9/28/11	0.172	U	0.17	0.431	U	0.430				32.1		2.16	17.3		8.62
600-20	J1HHP2	9/28/11	0.179	U	0.18	0.446	U	0.450				40.4		2.23	17.6		8.93
600-21	J1HHP3	9/28/11	0.196	U	0.20	0.49	UJ	0.490				44.4	J	2.45	19.3		9.80
600-22	J1HHP4	9/27/11	0.167	U	0.17	0.417	UJ	0.42				41.0	J	2.08	22.3		8.33
600-23	J1HHP5	9/27/11	0.179	U	0.18	0.446	UJ	0.450	3.23		0.136	45.3	J	2.23	22.9		8.93
600-23 (depth)	J1HHV0	9/27/11	0.185	U	0.19	0.463	UJ	0.460	3.28		0.136	32.1	J	2.31	16		9.3
600-24	J1HHP6	9/28/11	0.196	U	0.20	0.49	UJ	0.490				47.9	J	2.45	24.1		9.80
Duplicate of J1HHP6	J1HHR3	9/27/11	0.167	U	0.17	0.417	UJ	0.42				44.4	J	2.08	19.2		8.33
600-25	J1HHP7	9/27/11	0.2	U	0.20	0.5	UJ	0.500				38.5	J	2.50	20.2		10.0
600-26	J1HHP8	9/28/11	0.192	U	0.19	0.481	U	0.48				50.1		2.40	26.9		9.62
600-27	J1HHP9	9/27/11	0.167	U	0.17	0.417	UJ	0.42				40.4	J	2.08	27.1		8.33
600-28	J1HHR0	9/27/11	0.189	U	0.19	0.472	UJ	0.470				40.8	J	2.36	19.3		9.43
600-29	J1HHR1	9/28/11	0.145	U	0.15	0.362	UJ	0.36				40.6	J	1.81	22.1		7.3
Equip blank	J1HHT7	9/27/11	0.132	U	0.13	0.329	UJ	0.330				0.392	BJ	1.64	1.52	B	6.6

Table C-13. 600-207 Coal Ash Sample Results. (5 Pages)

Sample Location	HEIS Number	Sample Date	Acenaphthene			Acenaphthylene			Anthracene			Benzo(a)anthracene			Benzo(a)pyrene			Benzo(b)fluoranthene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
600-07	J1HHM9	9/27/11	328	UD	328	328	UD	328	328	UD	328	328	UD	328	328	UDJ	328	328	UD	328
600-15	J1HHN7	9/27/11	326	U	326	326	U	326	326	U	326	326	U	326	326	UJ	326	326	U	326
Duplicate of J1HHN7	J1HHR2	9/27/11	328	U	328	328	U	328	328	U	328	328	U	328	328	UJ	328	328	U	328
600-23	J1HHP5	9/27/11	329	U	329	329	U	329	329	U	329	329	U	329	329	UJ	329	71	J	329
600-07 (depth)	J1HHT8	9/27/11	329	UD	329	329	UD	329	329	UD	329	329	UD	329	329	UDJ	329	329	UD	329
600-15 (depth)	J1HHT9	9/27/11	329	U	329	329	U	329	329	U	329	329	U	329	329	UJ	329	329	U	329
600-23 (depth)	J1HHV0	9/27/11	326	UD	326	326	UD	326	326	UD	326	326	UD	326	326	UDJ	326	326	UD	326
Equip blank	J1HHT7	9/27/11	316	U	316	316	U	316	316	U	316	316	U	316	316	UJ	316	316	U	316

Sample Location	HEIS Number	Sample Date	Benzo(ghi)perylene			Benzo(k)fluoranthene			Chrysene			Dibenz(a,h)anthracene			Fluoranthene			Fluorene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
600-07	J1HHM9	9/27/11	328	UDJ	328	328	UD	328	328	UD	328	328	UDJ	328	224	JD	985	328	UD	328
600-15	J1HHN7	9/27/11	326	UJ	326	326	U	326	326	U	326	326	UJ	326	56	J	326	326	U	326
Duplicate of J1HHN7	J1HHR2	9/27/11	328	UJ	328	328	U	328	328	U	328	328	UJ	328	58	J	328	328	U	328
600-23	J1HHP5	9/27/11	329	UJ	329	65	J	329	100	J	329	329	UJ	329	259	J	329	329	U	329
600-07 (depth)	J1HHT8	9/27/11	329	UDJ	329	329	UD	329	329	UD	329	329	UDJ	329	195	JD	986	329	UD	329
600-15 (depth)	J1HHT9	9/27/11	329	UJ	329	329	U	329	329	U	329	329	UJ	329	329	U	329	329	U	329
600-23 (depth)	J1HHV0	9/27/11	326	UDJ	326	326	UD	326	326	UD	326	326	UDJ	326	326	UD	326	326	UD	326
Equip blank	J1HHT7	9/27/11	316	UJ	316	316	U	316	316	U	316	316	UJ	316	316	U	316	316	U	316

Sample Location	HEIS Number	Sample Date	Indeno(1,2,3-cd)pyrene			Naphthalene			Phenanthrene			Pyrene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
600-07	J1HHM9	9/27/11	328	UDJ	328	429	JD	985	316	JD	985	328	UD	328
600-15	J1HHN7	9/27/11	326	UJ	326	263	J	326	94	J	326	326	U	326
Duplicate of J1HHN7	J1HHR2	9/27/11	328	UJ	328	310	J	328	96	J	328	328	U	328
600-23	J1HHP5	9/27/11	329	UJ	329	417		329	306	J	329	115	J	329
600-07 (depth)	J1HHT8	9/27/11	329	UDJ	329	451	JD	986	302	JD	986	329	UD	329
600-15 (depth)	J1HHT9	9/27/11	329	UJ	329	51	J	329	329	U	329	329	U	329
600-23 (depth)	J1HHV0	9/27/11	326	UDJ	326	326	UD	326	326	UD	326	326	UD	326
Equip blank	J1HHT7	9/27/11	316	UJ	316	316	U	316	316	U	316	316	U	316

Table C-14. 600-207 Coal Ash Pre-Leaching Quadruplicate Sample Results. (2 Pages)

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-07 (depth)	J1HHT8-1	9/27/11	0.500	U	0.50	3.36		0.83	459		0.42	0.636		0.17	137		1.67
600-07 (depth)	J1HHT8-2	9/27/11	0.600	U	0.60	5.56		1.00	536		0.50	0.827		0.20	128		2.00
600-07 (depth)	J1HHT8-3	9/27/11	0.298	B	0.58	3.52		0.96	565		0.48	0.720		0.19	112		1.92
600-07 (depth)	J1HHT8-4	9/27/11	0.253	B	0.42	3.98		0.70	679		0.35	1.08		0.14	141		1.41
600-15 (depth)	J1HHT9-1	9/27/11	0.266	B	0.53	4.29		0.88	600		0.44	0.628		0.18	165		1.75
600-15 (depth)	J1HHT9-2	9/27/11	0.577	U	0.58	4.25		0.96	605		0.48	0.601		0.19	177		1.92
600-15 (depth)	J1HHT9-3	9/27/11	0.455	U	0.46	3.56		0.76	513		0.38	0.502		0.15	122		1.52
600-15 (depth)	J1HHT9-4	9/27/11	0.347	B	0.60	5.18		1.00	754		0.50	0.721		0.20	162		2.00
600-23 (depth)	J1HHV0-1	9/27/11	0.469	U	0.47	4.14		0.78	696		0.39	0.902		0.16	171		1.56
600-23 (depth)	J1HHV0-2	9/27/11	0.441	U	0.44	4.72		0.74	650		0.37	0.750		0.15	153		1.47
600-23 (depth)	J1HHV0-3	9/27/11	0.276	B	0.49	4.26		0.82	593		0.41	0.834		0.16	177		1.64
600-23 (depth)	J1HHV0-4	9/27/11	0.405	U	0.41	4.24		0.68	605		0.34	0.828		0.14	162		1.35

Sample Location	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-07 (depth)	J1HHT8-1	9/27/11	0.113	B	0.17	5.56		0.17	2.95		1.67	14.0		0.83	4.28		0.42
600-07 (depth)	J1HHT8-2	9/27/11	0.100	B	0.20	7.68		0.20	3.70		2.00	30.0		1.00	4.90		0.50
600-07 (depth)	J1HHT8-3	9/27/11	0.137	B	0.19	6.41		0.19	3.32		1.92	15.8		0.96	5.40		0.48
600-07 (depth)	J1HHT8-4	9/27/11	0.115	B	0.14	7.15		0.14	5.10		1.41	17.3		0.70	5.76		0.35
600-15 (depth)	J1HHT9-1	9/27/11	0.150	B	0.18	7.97		0.18	3.19		1.75	19.8		0.88	4.40		0.44
600-15 (depth)	J1HHT9-2	9/27/11	0.160	B	0.19	8.17		0.19	3.52		1.92	18.6		0.96	5.64		0.48
600-15 (depth)	J1HHT9-3	9/27/11	0.145	B	0.15	7.45		0.15	2.72		1.52	17.3		0.76	4.44		0.38
600-15 (depth)	J1HHT9-4	9/27/11	0.195	B	0.20	9.52		0.20	4.12		2.00	23.2		1.00	5.92		0.50
600-23 (depth)	J1HHV0-1	9/27/11	0.144	B	0.16	8.24		0.16	4.12		1.56	22.7		0.78	8.41		0.39
600-23 (depth)	J1HHV0-2	9/27/11	0.134	B	0.15	7.23		0.15	3.60		1.47	23.0		0.74	12.7		0.37
600-23 (depth)	J1HHV0-3	9/27/11	0.117	B	0.16	8.00		0.16	3.49		1.64	18.8		0.82	6.96		0.41
600-23 (depth)	J1HHV0-4	9/27/11	0.131	B	0.14	7.07		0.14	4.06		1.35	20.9		0.68	8.94		0.34

Table C-14. 600-207 Coal Ash Pre-Leaching Quadruplicate Sample Results. (2 Pages)

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-07 (depth)	J1HHT8-1	9/27/11	203		4.17	0.027	U	0.03	1.21	B	1.67	7.88		3.33	1.24		0.25
600-07 (depth)	J1HHT8-2	9/27/11	270		5.00	0.026	U	0.03	1.70	B	2.00	10.2		4.00	1.47		0.30
600-07 (depth)	J1HHT8-3	9/27/11	245		4.81	0.026	U	0.03	1.37	B	1.92	8.23		3.85	1.29		0.29
600-07 (depth)	J1HHT8-4	9/27/11	306		3.52	0.024	U	0.02	1.64		1.41	11.0		2.82	1.14		0.21
600-15 (depth)	J1HHT9-1	9/27/11	242		4.39	0.027	U	0.03	2.02		1.75	8.34		3.51	1.98		0.26
600-15 (depth)	J1HHT9-2	9/27/11	225		4.81	0.027	U	0.03	2.00		1.92	9.21		3.85	1.79		0.29
600-15 (depth)	J1HHT9-3	9/27/11	177		3.79	0.026	U	0.03	1.57		1.52	7.33		3.03	1.32		0.23
600-15 (depth)	J1HHT9-4	9/27/11	257		5.00	0.026	U	0.03	2.38		2.00	10.5		4.00	1.92		0.30
600-23 (depth)	J1HHV0-1	9/27/11	294		3.91	0.024	U	0.02	1.91		1.56	10.1		3.12	1.50		0.23
600-23 (depth)	J1HHV0-2	9/27/11	275		3.68	0.026	U	0.03	1.57		1.47	9.73		2.94	1.37		0.22
600-23 (depth)	J1HHV0-3	9/27/11	241		4.10	0.026	U	0.03	1.99		1.64	10.1		3.28	1.62		0.25
600-23 (depth)	J1HHV0-4	9/27/11	274		3.38	0.024	U	0.02	1.72		1.35	9.84		2.70	1.39		0.20

Sample Location	HEIS Number	Sample Date	Silver			Thallium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-07 (depth)	J1HHT8-1	9/27/11	0.167	U	0.17	0.417	U	0.42	21.1		2.08	12.8		8.33
600-07 (depth)	J1HHT8-2	9/27/11	0.200	U	0.20	0.500	U	0.50	29.5		2.50	14.6		10.0
600-07 (depth)	J1HHT8-3	9/27/11	0.192	U	0.19	0.481	U	0.48	24.1		2.40	15.7		9.62
600-07 (depth)	J1HHT8-4	9/27/11	0.141	U	0.14	0.352	U	0.35	27.5		1.76	15.6		7.04
600-15 (depth)	J1HHT9-1	9/27/11	0.175	U	0.18	0.439	U	0.44	31.0		2.19	15.6		8.77
600-15 (depth)	J1HHT9-2	9/27/11	0.192	U	0.19	0.481	U	0.48	29.1		2.40	16.1		9.62
600-15 (depth)	J1HHT9-3	9/27/11	0.152	U	0.15	0.379	U	0.38	25.1		1.89	14.3		7.58
600-15 (depth)	J1HHT9-4	9/27/11	0.200	U	0.20	0.500	U	0.50	35.8		2.50	19.4		10.0
600-23 (depth)	J1HHV0-1	9/27/11	0.156	U	0.16	0.391	U	0.39	36.1		1.95	18.3		7.81
600-23 (depth)	J1HHV0-2	9/27/11	0.147	U	0.15	0.368	U	0.37	29.4		1.84	14.8		7.35
600-23 (depth)	J1HHV0-3	9/27/11	0.164	U	0.16	0.410	U	0.41	34.5		2.05	12.8		8.20
600-23 (depth)	J1HHV0-4	9/27/11	0.135	U	0.14	0.338	U	0.34	30.8		1.69	13.9		6.76

Table C-15. 600-207 Coal Ash Leaching Sample Results. (2 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
600-07 (depth)	1:1	J1HHT8-A1	9/27/11	0.10	U	0.10	0.075	U	0.08	0.039		0.01	0.005	U	0.01	24.8		0.08
600-07 (depth)	1:1	J1HHT8-A2	9/27/11	0.10	U	0.10	0.075	U	0.08	0.041		0.01	0.005	U	0.01	26.2		0.08
600-07 (depth)	1:2.5	J1HHT8-B1	9/27/11	0.02	U	0.02	0.002	B	0.02	0.036		0.00	0.001	U	0.00	15.1		0.02
600-07 (depth)	1:5	J1HHT8-C1	9/27/11	0.02	U	0.02	0.003	B	0.02	0.039		0.00	0.001	U	0.00	10.4		0.02
600-15 (depth)	1:1	J1HHT9-A1	9/27/11	0.10	U	0.10	0.075	U	0.08	0.027		0.01	0.005	U	0.01	11.7		0.08
600-15 (depth)	1:2.5	J1HHT9-B1	9/27/11	0.02	U	0.02	0.003	B	0.02	0.026		0.00	0.001	U	0.00	7.66		0.02
600-15 (depth)	1:2.5	J1HHT9-B2	9/27/11	0.02	U	0.02	0.004	B	0.02	0.029		0.00	0.001	U	0.00	8.71		0.02
600-15 (depth)	1:5	J1HHT9-C1	9/27/11	0.02	U	0.02	0.015	U	0.02	0.029		0.00	0.001	U	0.00	5.48		0.02
600-23 (depth)	1:1	J1HHV0-A1	9/27/11	0.10	U	0.10	0.075	U	0.08	0.037		0.01	0.005	U	0.01	29.0		0.08
600-23 (depth)	1:2.5	J1HHV0-B1	9/27/11	0.02	U	0.02	0.015	U	0.02	0.033		0.00	0.001	U	0.00	19.0		0.02
600-23 (depth)	1:5	J1HHV0-C1	9/27/11	0.02	U	0.02	0.002	B	0.02	0.035		0.00	0.001	U	0.00	12.5		0.02
600-23 (depth)	1:5	J1HHV0-C2	9/27/11	0.02	U	0.02	0.015	U	0.02	0.034		0.00	0.001	U	0.00	11.3		0.02

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
600-07 (depth)	1:1	J1HHT8-A1	9/27/11	0.0020	B	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.022	B	0.05
600-07 (depth)	1:1	J1HHT8-A2	9/27/11	0.0020	B	0.02	0.003	B	0.03	0.010	U	0.01	0.100	U	0.10	0.023	B	0.05
600-07 (depth)	1:2.5	J1HHT8-B1	9/27/11	0.000474	B	0.00	0.001	B	0.01	0.002	U	0.00	0.020	U	0.02	0.014		0.01
600-07 (depth)	1:5	J1HHT8-C1	9/27/11	0.00049	B	0.00	0.001	B	0.01	0.002	U	0.00	0.003	B	0.02	0.009	B	0.01
600-15 (depth)	1:1	J1HHT9-A1	9/27/11	0.0020	B	0.02	0.004	B	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
600-15 (depth)	1:2.5	J1HHT9-B1	9/27/11	0.0010	B	0.00	0.001	B	0.01	0.002	U	0.00	0.020	U	0.02	0.003	B	0.01
600-15 (depth)	1:2.5	J1HHT9-B2	9/27/11	0.0010	B	0.00	0.002	B	0.01	0.001	B	0.00	0.020	U	0.02	0.004	B	0.01
600-15 (depth)	1:5	J1HHT9-C1	9/27/11	0.0010	B	0.00	0.002	B	0.01	0.002	U	0.00	0.020	U	0.02	0.003	B	0.01
600-23 (depth)	1:1	J1HHV0-A1	9/27/11	0.0020	B	0.02	0.004	B	0.03	0.010	U	0.01	0.100	U	0.10	0.022	B	0.05
600-23 (depth)	1:2.5	J1HHV0-B1	9/27/11	0.000514	B	0.00	0.001	B	0.01	0.002	U	0.00	0.020	U	0.02	0.018		0.01
600-23 (depth)	1:5	J1HHV0-C1	9/27/11	0.0010	B	0.00	0.001	B	0.01	0.002	U	0.00	0.020	U	0.02	0.012		0.01
600-23 (depth)	1:5	J1HHV0-C2	9/27/11	0.0010	B	0.00	0.005	U	0.01	0.002	U	0.00	0.020	U	0.02	0.010		0.01

Table C-15. 600-207 Coal Ash Leaching Sample Results. (2 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
600-07 (depth)	1:1	J1HHT8-A1	9/27/11	0.424		0.03	0.002	U	0.00	0.003	B	0.02	0.100	U	0.10	0.100	U	0.10
600-07 (depth)	1:1	J1HHT8-A2	9/27/11	0.443		0.03	0.0020	U	0.00	0.003	B	0.02	0.100	U	0.10	0.100	U	0.10
600-07 (depth)	1:2.5	J1HHT8-B1	9/27/11	0.341		0.01	0.0002	U	0.00	0.001	B	0.00	0.001	B	0.02	0.020	U	0.02
600-07 (depth)	1:5	J1HHT8-C1	9/27/11	0.303		0.01	0.0002	U	0.00	0.001	B	0.00	0.001	B	0.02	0.020	U	0.02
600-15 (depth)	1:1	J1HHT9-A1	9/27/11	0.099		0.03	0.0020	U	0.00	0.197		0.02	0.100	U	0.10	0.416		0.10
600-15 (depth)	1:2.5	J1HHT9-B1	9/27/11	0.066		0.01	0.0002	U	0.00	0.103		0.00	0.020	U	0.02	0.210		0.02
600-15 (depth)	1:2.5	J1HHT9-B2	9/27/11	0.072		0.01	0.0002	U	0.00	0.112		0.00	0.020	U	0.02	0.239		0.02
600-15 (depth)	1:5	J1HHT9-C1	9/27/11	0.048		0.01	0.0002	U	0.00	0.057		0.00	0.020	U	0.02	0.112		0.02
600-23 (depth)	1:1	J1HHV0-A1	9/27/11	0.165		0.03	0.0020	U	0.00	0.008	B	0.02	0.004	B	0.10	0.100	U	0.10
600-23 (depth)	1:2.5	J1HHV0-B1	9/27/11	0.140		0.01	0.0002	U	0.00	0.004		0.00	0.001	B	0.02	0.003	B	0.02
600-23 (depth)	1:5	J1HHV0-C1	9/27/11	0.122		0.01	0.0002	U	0.00	0.003	B	0.00	0.001	B	0.02	0.020	U	0.02
600-23 (depth)	1:5	J1HHV0-C2	9/27/11	0.120		0.01	0.0002	U	0.00	0.003	B	0.00	0.001	B	0.02	0.020	U	0.02

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Silver			Thallium			Uranium (KPA)			Vanadium			Zinc			
				mg/L	Q	PQL	mg/L	Q	PQL	ug/L	Q	MDA	mg/L	Q	PQL	mg/L	Q	PQL	pH
600-07 (depth)	1:1	J1HHT8-A1	9/27/11	0.03	U	0.03	0.075	U	0.08	0.030		0.025	0.090		0.03	0.25	U	0.25	7.68
600-07 (depth)	1:1	J1HHT8-A2	9/27/11	0.03	U	0.03	0.075	U	0.08	0.013	U	0.025	0.089		0.03	0.25	U	0.25	6.99
600-07 (depth)	1:2.5	J1HHT8-B1	9/27/11	0.006	U	0.01	0.015	U	0.02	0.008	U	0.025	0.015		0.01	0.05	U	0.05	7.16
600-07 (depth)	1:5	J1HHT8-C1	9/27/11	0.006	U	0.01	0.015	U	0.02	0	U	0.025	0.018		0.01	0.05	U	0.05	7.09
600-15 (depth)	1:1	J1HHT9-A1	9/27/11	0.03	U	0.03	0.075	U	0.08	0.897		0.025	0.073		0.03	0.25	U	0.25	7.44
600-15 (depth)	1:2.5	J1HHT9-B1	9/27/11	0.006	U	0.01	0.015	U	0.02	0.520		0.025	0.005	U	0.01	0.05	U	0.05	8.02
600-15 (depth)	1:2.5	J1HHT9-B2	9/27/11	0.006	U	0.01	0.015	U	0.02	0.491		0.025	0.005	U	0.01	0.05	U	0.05	8.23
600-15 (depth)	1:5	J1HHT9-C1	9/27/11	0.006	U	0.01	0.015	U	0.02	0.354		0.025	0.013		0.01	0.05	U	0.05	8.41
600-23 (depth)	1:1	J1HHV0-A1	9/27/11	0.03	U	0.03	0.075	U	0.08	0.015	U	0.025	0.092		0.03	0.25	U	0.25	7.61
600-23 (depth)	1:2.5	J1HHV0-B1	9/27/11	0.006	U	0.01	0.015	U	0.02	0.014	U	0.025	0.007		0.01	0.05	U	0.05	7.63
600-23 (depth)	1:5	J1HHV0-C1	9/27/11	0.006	U	0.01	0.015	U	0.02	0	U	0.025	0.012		0.01	0.05	U	0.05	7.58
600-23 (depth)	1:5	J1HHV0-C2	9/27/11	0.006	U	0.01	0.015	U	0.02	0.006	U	0.025	0.014		0.01	0.05	U	0.05	7.49

Table C-16. Coal Ash Follow on Leaching Test Pre-Leaching Quadruplicate Sample Results. (4 Pages)

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-207 SURFACE	J1HHN7-1	9/27/11	0.926	U	0.93	10.9		0.93	1100		0.46	1.45		0.19	114		1.85
600-207 SURFACE	J1HHN7-2	9/27/11	0.820	U	0.82	11.7		0.82	1110		0.41	1.39		0.16	116		1.64
600-207 SURFACE	J1HHN7-3	9/27/11	0.288	B	0.77	11.6		0.77	1090		0.39	1.36		0.15	115		1.54
600-207 SURFACE	J1HHN7-4	9/27/11	0.847	U	0.85	10.7		0.85	1070		0.42	1.32		0.17	109		1.69
600-207 SURFACE	J1HHN7-5	9/27/11	0.330	B	0.94	10.8		0.94	1140		0.47	1.5		0.19	120		1.89
600-207 SURFACE	J1HHN7-6	9/27/11	0.893	U	0.89	9.81		0.89	1030		0.45	1.36		0.18	112		1.79
600-207 SURFACE	J1HHN7-7	9/27/11	0.806	U	0.81	11.1		0.81	1050		0.40	1.36		0.16	114		1.61
600-207 SURFACE	J1HHN7-8	9/27/11	0.943	U	0.94	11.3		0.94	1100		0.47	1.41		0.19	113		1.89
126-B-1 SURFACE	J1HHX8-1	4/25/11	0.909	U	0.91	6.23		0.91	1010		0.46	1.12		0.18	84.4		1.82
126-B-1 SURFACE	J1HHX8-2	4/25/11	0.847	U	0.85	7.04		0.85	1380		0.42	1.6		0.17	143		1.69
126-B-1 SURFACE	J1HHX8-3	4/25/11	0.926	U	0.93	6.68		0.93	1170		0.46	1.31		0.19	101		1.85
126-B-1 SURFACE	J1HHX8-4	4/25/11	0.345	B	0.94	6.43		0.94	1920		0.47	1.19		0.19	89.8		1.89
126-B-1 SURFACE	J1HHX8-5	4/25/11	0.372	B	0.78	7.24		0.78	1300		0.39	1.75		0.16	101		1.56
126-B-1 SURFACE	J1HHX8-6	4/25/11	0.847	U	0.85	6.85		0.85	1300		0.42	1.33		0.17	110		1.69
126-B-1 SURFACE	J1HHX8-7	4/25/11	0.877	U	0.88	6.71		0.88	1040		0.44	1.35		0.18	98.6		1.75
126-B-1 SURFACE	J1HHX8-8	4/25/11	0.962	U	0.96	6.87		0.96	1120		0.48	1.370		0.19	108		1.92
126-B-1 DEPTH	J1HJ08-5	4/26/11	0.909	U	0.91	8.08		0.91	1210		0.46	0.976		0.18	38.4		1.82
126-B-1 DEPTH	J1HJ08-6	4/26/11	1	U	1.00	7.34		1.00	1230		0.50	0.968		0.20	50.1		2.00
126-B-1 DEPTH	J1HJ08-7	4/26/11	0.277	B	0.73	7.67		0.73	1110		0.36	0.979		0.15	34.9		1.45
126-B-1 DEPTH	J1HJ08-8	4/26/11	0.35	B	0.89	7.44		0.89	1070		0.45	0.979		0.18	41		1.79
126-H-1 DEPTH	J1HJ80-5	8/24/11	0.862	U	0.86	2.73		0.86	1190		0.43	1.5		0.17	393		1.72
126-H-1 DEPTH	J1HJ80-6	8/24/11	0.962	U	0.96	2.49		0.96	1200		0.48	1.61		0.19	448		1.92
126-H-1 DEPTH	J1HJ80-7	8/24/11	0.893	U	0.89	2.53		0.89	1110		0.45	1.370		0.18	391		1.79
126-H-1 DEPTH	J1HJ80-8	8/24/11	0.839		0.71	2.47		0.71	990		0.36	1.46		0.14	411		1.43

Table C-16. Coal Ash Follow on Leaching Test Pre-Leaching Quadruplicate Sample Results. (4 Pages)

Sample Location	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-207 SURFACE	J1HHN7-1	9/27/11	0.286		0.23	15.0		0.9	6.85		2.78	35.9		1.85	9.53		0.93
600-207 SURFACE	J1HHN7-2	9/27/11	0.177	B	0.21	15.7		0.8	7.28		2.46	35.0		1.64	9.67		0.82
600-207 SURFACE	J1HHN7-3	9/27/11	0.192		0.19	15.5		0.8	6.91		2.31	36.0		1.54	8.48		0.77
600-207 SURFACE	J1HHN7-4	9/27/11	0.192	B	0.21	14.7		0.9	6.78		2.54	33.6		1.69	8.15		0.85
600-207 SURFACE	J1HHN7-5	9/27/11	0.176	B	0.24	15.2		0.9	6.94		2.83	34.3		1.89	8.32		0.94
600-207 SURFACE	J1HHN7-6	9/27/11	0.169	B	0.22	14.1		0.9	6.53		2.68	32.6		1.79	7.99		0.89
600-207 SURFACE	J1HHN7-7	9/27/11	0.182	B	0.20	15.3		0.8	6.80		2.42	34.9		1.61	8.67		0.81
600-207 SURFACE	J1HHN7-8	9/27/11	0.157	B	0.24	14.4		0.9	6.70		2.83	34.3		1.89	7.92		0.94
126-B-1 SURFACE	J1HHX8-1	4/25/11	0.245		0.23	8.8		0.9	3.29		2.73	22.0		1.82	10.4		0.91
126-B-1 SURFACE	J1HHX8-2	4/25/11	0.258		0.21	11.1		0.9	4.62		2.54	34.2		1.69	10.1		0.85
126-B-1 SURFACE	J1HHX8-3	4/25/11	0.269		0.23	10.2		0.9	3.81		2.78	25.4		1.85	10.8		0.93
126-B-1 SURFACE	J1HHX8-4	4/25/11	0.253		0.24	9.1		0.9	3.54		2.83	22.6		1.89	10.3		0.94
126-B-1 SURFACE	J1HHX8-5	4/25/11	0.241		0.20	9.7		0.8	3.90		2.34	30.3		1.56	9.08		0.78
126-B-1 SURFACE	J1HHX8-6	4/25/11	0.234		0.21	10.3		0.9	4.12		2.54	25.5		1.69	9.90		0.85
126-B-1 SURFACE	J1HHX8-7	4/25/11	0.234		0.22	12.3		0.9	4.15		2.63	23.5		1.75	8.98		0.88
126-B-1 SURFACE	J1HHX8-8	4/25/11	0.252		0.24	9.8		1.0	3.97		2.88	25.5		1.92	9.75		0.96
126-B-1 DEPTH	J1HJ08-5	4/26/11	0.094	B	0.23	10.3		0.9	4.60		2.73	26.9		1.82	3.92		0.91
126-B-1 DEPTH	J1HJ08-6	4/26/11	0.075	B	0.25	9.8		1.0	4.40		3.00	23.9		2.00	3.56		1.00
126-B-1 DEPTH	J1HJ08-7	4/26/11	0.105	B	0.18	10.7		0.7	4.02		2.17	24.9		1.45	3.97		0.73
126-B-1 DEPTH	J1HJ08-8	4/26/11	0.087	B	0.22	10.0		0.9	4.26		2.68	24.4		1.79	3.87		0.89
126-H-1 DEPTH	J1HJ80-5	8/24/11	0.085	B	0.22	13.0		0.9	2.70		2.59	24.1		1.72	13.6		0.86
126-H-1 DEPTH	J1HJ80-6	8/24/11	0.218	B	0.24	13.7		1.0	2.33	B	2.88	31.1		1.92	14.5		0.96
126-H-1 DEPTH	J1HJ80-7	8/24/11	0.16	B	0.22	12.0		0.9	2.51	B	2.68	39.8		1.79	10.1		0.89
126-H-1 DEPTH	J1HJ80-8	8/24/11	0.147	B	0.18	10.5		0.7	2.14		2.14	60.6		1.43	267		0.71

Table C-16. Coal Ash Follow on Leaching Test Pre-Leaching Quadruplicate Sample Results. (4 Pages)

Sample Location	HEIS Number	Sample Date	Manganese			Molybdenum			Nickel			Selenium			Silver		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-207 SURFACE	J1HHN7-1	9/27/11	465		0.93	2.15		0.93	18		2.31	2.16		0.93	0.926	U	0.93
600-207 SURFACE	J1HHN7-2	9/27/11	483		0.82	2.31		0.82	19.9		2.05	2.13		0.82	0.82	U	0.82
600-207 SURFACE	J1HHN7-3	9/27/11	498		0.77	2.39		0.77	19.3		1.92	2.12		0.77	0.769	U	0.77
600-207 SURFACE	J1HHN7-4	9/27/11	472		0.85	1.99		0.85	17.4		2.12	2.11		0.85	0.847	U	0.85
600-207 SURFACE	J1HHN7-5	9/27/11	511		0.94	2.19		0.94	18.6		2.36	2.18		0.94	0.943	U	0.94
600-207 SURFACE	J1HHN7-6	9/27/11	486		0.89	2.07		0.89	16.9		2.23	2.01		0.89	0.893	U	0.89
600-207 SURFACE	J1HHN7-7	9/27/11	460		0.81	2.18		0.81	18.2		2.02	2.04		0.81	0.806	U	0.81
600-207 SURFACE	J1HHN7-8	9/27/11	476		0.94	2.09		0.94	18.8		2.36	2.18		0.94	0.943	U	0.94
126-B-1 SURFACE	J1HHX8-1	4/25/11	211		0.91	0.833	B	0.91	8.18		2.27	1.08		0.91	0.909	U	0.91
126-B-1 SURFACE	J1HHX8-2	4/25/11	243		0.85	1.34		0.85	11.8		2.12	1.03		0.85	0.847	U	0.85
126-B-1 SURFACE	J1HHX8-3	4/25/11	241		0.93	0.994		0.93	9.15		2.31	1.27		0.93	0.926	U	0.93
126-B-1 SURFACE	J1HHX8-4	4/25/11	243		0.94	1.31		0.94	8.38		2.36	1.07		0.94	0.943	U	0.94
126-B-1 SURFACE	J1HHX8-5	4/25/11	248		0.78	1.21		0.78	9.58		1.95	0.964		0.78	0.781	U	0.78
126-B-1 SURFACE	J1HHX8-6	4/25/11	269		0.85	1.11		0.85	10.10		2.12	1.11		0.85	0.847	U	0.85
126-B-1 SURFACE	J1HHX8-7	4/25/11	238		0.88	1.29		0.88	11.10		2.19	1.4		0.88	0.877	U	0.88
126-B-1 SURFACE	J1HHX8-8	4/25/11	264		0.96	1.25		0.96	9.88		2.40	1.1		0.96	0.962	U	0.96
126-B-1 DEPTH	J1HJ08-5	4/26/11	177		0.91	1.78		0.91	11.10		2.27	0.797	B	0.91	0.909	U	0.91
126-B-1 DEPTH	J1HJ08-6	4/26/11	258		1.00	1.62		1.00	10.30		2.50	0.708	B	1.00	1	U	1.00
126-B-1 DEPTH	J1HJ08-7	4/26/11	170		0.73	2.29		0.73	10.7		1.81	0.977		0.73	0.725	U	0.73
126-B-1 DEPTH	J1HJ08-8	4/26/11	171		0.89	1.78		0.89	10.5		2.23	0.706	B	0.89	0.893	U	0.89
126-H-1 DEPTH	J1HJ80-5	8/24/11	117		0.86	1.52		0.86	7.84		2.16	0.862	U	0.86	0.63	B	0.86
126-H-1 DEPTH	J1HJ80-6	8/24/11	135		0.96	1.66		0.96	6.99		2.40	0.962	U	0.96	0.962	U	0.96
126-H-1 DEPTH	J1HJ80-7	8/24/11	127		0.89	1.48		0.89	7.79		2.23	0.893	U	0.89	0.893	U	0.89
126-H-1 DEPTH	J1HJ80-8	8/24/11	93.4		0.71	1.46		0.71	6.15		1.79	0.714	U	0.71	0.66	B	0.71

Table C-16. Coal Ash Follow on Leaching Test Pre-Leaching Quadruplicate Sample Results. (4 Pages)

Sample Location	HEIS Number	Sample Date	Thallium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-207 SURFACE	J1HHN7-1	9/27/11	0.926	U	0.93	54.4		0.93	25.4		2.8
600-207 SURFACE	J1HHN7-2	9/27/11	0.82	U	0.82	55.8		0.82	25.6		2.5
600-207 SURFACE	J1HHN7-3	9/27/11	0.769	U	0.77	54.4		0.77	26.8		2.3
600-207 SURFACE	J1HHN7-4	9/27/11	0.847	U	0.85	53.3		0.85	27.1		2.5
600-207 SURFACE	J1HHN7-5	9/27/11	0.943	U	0.94	55		0.94	24		2.8
600-207 SURFACE	J1HHN7-6	9/27/11	0.893	U	0.89	53.2		0.89	23.9		2.7
600-207 SURFACE	J1HHN7-7	9/27/11	0.806	U	0.81	54.7		0.81	24.8		2.4
600-207 SURFACE	J1HHN7-8	9/27/11	0.943	U	0.94	53.3		0.94	23.2		2.8
126-B-1 SURFACE	J1HHX8-1	4/25/11	0.909	U	0.91	28		0.91	30.6		2.7
126-B-1 SURFACE	J1HHX8-2	4/25/11	0.847	U	0.85	49.4		0.85	34.1		2.5
126-B-1 SURFACE	J1HHX8-3	4/25/11	0.926	U	0.93	32.7		0.93	37.2		2.8
126-B-1 SURFACE	J1HHX8-4	4/25/11	0.943	U	0.94	28.9		0.94	30		2.8
126-B-1 SURFACE	J1HHX8-5	4/25/11	0.781	U	0.78	34.9		0.78	33.9		2.3
126-B-1 SURFACE	J1HHX8-6	4/25/11	0.847	U	0.85	30.800		0.85	35.1		2.5
126-B-1 SURFACE	J1HHX8-7	4/25/11	0.877	U	0.88	32.100		0.88	36.5		2.6
126-B-1 SURFACE	J1HHX8-8	4/25/11	0.962	U	0.96	32.600		0.96	37.3		2.9
126-B-1 DEPTH	J1HJ08-5	4/26/11	0.909	U	0.91	35.300		0.91	23.6		2.7
126-B-1 DEPTH	J1HJ08-6	4/26/11	1.000	U	1.00	35.100		1.00	22.7		3.0
126-B-1 DEPTH	J1HJ08-7	4/26/11	0.725	U	0.73	32.900		0.73	22.7		2.2
126-B-1 DEPTH	J1HJ08-8	4/26/11	0.893	U	0.89	34.600		0.89	23.3		2.7
126-H-1 DEPTH	J1HJ80-5	8/24/11	0.862	U	0.86	34.500		0.86	23.1		2.6
126-H-1 DEPTH	J1HJ80-6	8/24/11	0.962	U	0.96	34.200		0.96	42.7		2.9
126-H-1 DEPTH	J1HJ80-7	8/24/11	0.893	U	0.89	31.100		0.89	31.6		2.7
126-H-1 DEPTH	J1HJ80-8	8/24/11	0.714	U	0.71	29.4		0.71	74		2.1

Table C-17. Coal Ash Follow on Leaching Test Coal Ash Leaching Sample Results. (4 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
600-207 SURFACE	1:1	J1HHN7-A1	9/27/11	0.10	U	0.10	0.075	U	0.08	0.081		0.01	0.005	U	0.01	2.78		0.08
600-207 SURFACE	1:2.5	J1HHN7-B1	9/27/11	0.02	U	0.02	0.003	B	0.02	0.087		0.00	0.001	U	0.00	2.1		0.02
600-207 SURFACE	1:2.5	J1HHN7-B2	9/27/11	0.02	U	0.02	0.005	B	0.02	0.085		0.00	0.001	U	0.00	1.89		0.02
600-207 SURFACE	1:5	J1HHN7-C1	9/27/11	0.02	U	0.02	0.003	B	0.02	0.132		0.00	0.001	U	0.00	1.42		0.02
600-207 SURFACE	1:1	J1HHN7-D1	9/27/11	0.10	U	0.10	0.075	U	0.08	0.097		0.01	0.005	U	0.01	2.58		0.08
600-207 SURFACE	1:2.5	J1HHN7-E1	9/27/11	0.02	U	0.02	0.002	B	0.02	0.092		0.00	0.001	U	0.00	2.14		0.02
600-207 SURFACE	1:5	J1HHN7-F1	9/27/11	0.02	U	0.02	0.015	U	0.02	0.079		0.00	0.001	U	0.00	1.42		0.02
600-207 SURFACE	1:5	J1HHN7-F2	9/27/11	0.02	U	0.02	0.002	B	0.02	0.079		0.00	0.001	U	0.00	1.45		0.02
126-B-1 SURFACE	1:1	J1HHX8-A1	4/25/11	0.10	U	0.10	0.015	B	0.08	0.068		0.01	0.005	U	0.01	1.86		0.08
126-B-1 SURFACE	1:2.5	J1HHX8-B1	4/25/11	0.02	U	0.02	0.008	B	0.02	0.054		0.00	0.001	U	0.00	1.22		0.02
126-B-1 SURFACE	1:5	J1HHX8-C1	4/25/11	0.02	U	0.02	0.008	B	0.02	0.047		0.00	0.001	U	0.00	0.766		0.02
126-B-1 SURFACE	1:5	J1HHX8-C2	4/25/11	0.02	U	0.02	0.007	B	0.02	0.041		0.00	0.001	U	0.00	0.85		0.02
126-B-1 SURFACE	1:1	J1HHX8-D1	4/25/11	0.10	U	0.10	0.075	U	0.08	0.073		0.01	0.005	U	0.01	2.07		0.08
126-B-1 SURFACE	1:2.5	J1HHX8-E1	4/25/11	0.02	U	0.02	0.007	B	0.02	0.057		0.00	0.001	U	0.00	1.3		0.02
126-B-1 SURFACE	1:2.5	J1HHX8-E2	4/25/11	0.02	U	0.02	0.006	B	0.02	0.054		0.00	0.001	U	0.00	1.27		0.02
126-B-1 SURFACE	1:5	J1HHX8-F1	4/25/11	0.02	U	0.02	0.006	B	0.02	0.042		0.00	0.001	U	0.00	0.826		0.02
126-B-1 DEPTH	1:1	J1HJ08-D1	4/26/11	0.10	U	0.10	0.075	U	0.08	0.031		0.01	0.005	U	0.01	3.34		0.08
126-B-1 DEPTH	1:1	J1HJ08-D2	4/26/11	0.10	U	0.10	0.075	U	0.08	0.032		0.01	0.005	U	0.01	3.11		0.08
126-B-1 DEPTH	1:2.5	J1HJ08-E1	4/26/11	0.02	U	0.02	0.002	B	0.02	0.036		0.00	0.001	U	0.00	1.9		0.02
126-B-1 DEPTH	1:5	J1HJ08-F1	4/26/11	0.02	U	0.02	0.015	U	0.02	0.037		0.00	0.001	U	0.00	1.19		0.02
126-H-1 DEPTH	1:1	J1HJ80-D1	8/24/11	0.10	U	0.10	0.075	U	0.08	0.071		0.01	0.005	U	0.01	13.6		0.08
126-H-1 DEPTH	1:2.5	J1HJ80-E1	8/24/11	0.02	U	0.02	0.006	B	0.02	0.072		0.00	0.001	U	0.00	7.2		0.02
126-H-1 DEPTH	1:2.5	J1HJ80-E2	8/24/11	0.02	U	0.02	0.006	B	0.02	0.075		0.00	0.001	U	0.00	7.4		0.02
126-H-1 DEPTH	1:5	J1HJ80-F1	8/24/11	0.02	U	0.02	0.005	B	0.02	0.077		0.00	0.001	U	0.00	4.44		0.02

Table C-17. Coal Ash Follow on Leaching Test Coal Ash Leaching Sample Results. (4 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Cadmium			Chromium			Cobalt			Copper			Lead		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
600-207 SURFACE	1:1	J1HHN7-A1	9/27/11	0.0150	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
600-207 SURFACE	1:2.5	J1HHN7-B1	9/27/11	0.0004	B	0.00	0.005	U	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
600-207 SURFACE	1:2.5	J1HHN7-B2	9/27/11	0.0002	B	0.00	0.001	B	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
600-207 SURFACE	1:5	J1HHN7-C1	9/27/11	0.0030	U	0.00	0.001	B	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
600-207 SURFACE	1:1	J1HHN7-D1	9/27/11	0.0150	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
600-207 SURFACE	1:2.5	J1HHN7-E1	9/27/11	0.0004	B	0.00	0.005	U	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
600-207 SURFACE	1:5	J1HHN7-F1	9/27/11	0.0003	B	0.00	0.002	B	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
600-207 SURFACE	1:5	J1HHN7-F2	9/27/11	0.0003	B	0.00	0.005	U	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
126-B-1 SURFACE	1:1	J1HHX8-A1	4/25/11	0.0150	U	0.02	0.003	B	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
126-B-1 SURFACE	1:2.5	J1HHX8-B1	4/25/11	0.0030	U	0.00	0.001	B	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
126-B-1 SURFACE	1:5	J1HHX8-C1	4/25/11	0.0030	U	0.00	0.001	B	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
126-B-1 SURFACE	1:5	J1HHX8-C2	4/25/11	0.0030	U	0.00	0.001	B	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
126-B-1 SURFACE	1:1	J1HHX8-D1	4/25/11	0.0150	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
126-B-1 SURFACE	1:2.5	J1HHX8-E1	4/25/11	0.0030	U	0.00	0.001	B	0.01	0.002	U	0.00	0.002	B	0.02	0.01	U	0.01
126-B-1 SURFACE	1:2.5	J1HHX8-E2	4/25/11	0.0030	U	0.00	0.001	B	0.01	0.002	U	0.00	0.002	B	0.02	0.01	U	0.01
126-B-1 SURFACE	1:5	J1HHX8-F1	4/25/11	0.003	U	0.00	0.001	B	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
126-B-1 DEPTH	1:1	J1HJ08-D1	4/26/11	0.015	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
126-B-1 DEPTH	1:1	J1HJ08-D2	4/26/11	0.0150	U	0.02	0.025	U	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
126-B-1 DEPTH	1:2.5	J1HJ08-E1	4/26/11	0.0002	B	0.00	0.005	U	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
126-B-1 DEPTH	1:5	J1HJ08-F1	4/26/11	0.0030	U	0.00	0.005	U	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
126-H-1 DEPTH	1:1	J1HJ80-D1	8/24/11	0.0150	U	0.02	0.006	B	0.03	0.010	U	0.01	0.100	U	0.10	0.05	U	0.05
126-H-1 DEPTH	1:2.5	J1HJ80-E1	8/24/11	0.0030	U	0.00	0.004	B	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
126-H-1 DEPTH	1:2.5	J1HJ80-E2	8/24/11	0.003	U	0.00	0.004	B	0.01	0.002	U	0.00	0.020	U	0.02	0.01	U	0.01
126-H-1 DEPTH	1:5	J1HJ80-F1	8/24/11	0.0030	U	0.00	0.002	B	0.01	0.002	U	0.00	0.020	U	0.02	0.010	U	0.01

Table C-17. Coal Ash Follow on Leaching Test Coal Ash Leaching Sample Results. (4 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Manganese			Molybdenum			Nickel			Selenium			Silver		
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
600-207 SURFACE	1:1	J1HHN7-A1	9/27/11	0.01	B	0.03	0.0130	B	0.02	0.1	U	0.10	0.018	B	0.10	0.030	U	0.03
600-207 SURFACE	1:2.5	J1HHN7-B1	9/27/11	0.006		0.01	0.0080		0.00	0.02	U	0.02	0.008	B	0.02	0.006	U	0.01
600-207 SURFACE	1:2.5	J1HHN7-B2	9/27/11	0.006		0.01	0.0080		0.00	0.02	U	0.02	0.007	B	0.02	0.006	U	0.01
600-207 SURFACE	1:5	J1HHN7-C1	9/27/11	0.036		0.01	0.0080		0.00	0.02	U	0.02	0.006	B	0.02	0.006	U	0.01
600-207 SURFACE	1:1	J1HHN7-D1	9/27/11	0.003	B	0.03	0.0150		0.02	0.1	U	0.10	0.100	U	0.10	0.030	U	0.03
600-207 SURFACE	1:2.5	J1HHN7-E1	9/27/11	0.006		0.01	0.0100		0.00	0.02	U	0.02	0.010	B	0.02	0.006	U	0.01
600-207 SURFACE	1:5	J1HHN7-F1	9/27/11	0.003	B	0.01	0.0070		0.00	0.001	B	0.02	0.007	B	0.02	0.006	U	0.01
600-207 SURFACE	1:5	J1HHN7-F2	9/27/11	0.003	B	0.01	0.0070		0.00	0.02	U	0.02	0.005	B	0.02	0.006	U	0.01
126-B-1 SURFACE	1:1	J1HHX8-A1	4/25/11	0.005	B	0.03	0.0100	B	0.02	0.1	U	0.10	0.015	B	0.10	0.030	U	0.03
126-B-1 SURFACE	1:2.5	J1HHX8-B1	4/25/11	0.001	B	0.01	0.0040		0.00	0.001	B	0.02	0.007	B	0.02	0.006	U	0.01
126-B-1 SURFACE	1:5	J1HHX8-C1	4/25/11	0.001	B	0.01	0.0030		0.00	0.001	B	0.02	0.005	B	0.02	0.006	U	0.01
126-B-1 SURFACE	1:5	J1HHX8-C2	4/25/11	0.001	B	0.01	0.0020	B	0.00	0.001	B	0.02	0.007	B	0.02	0.006	U	0.01
126-B-1 SURFACE	1:1	J1HHX8-D1	4/25/11	0.025	U	0.03	0.0080	B	0.02	0.004	B	0.10	0.100	U	0.10	0.030	U	0.03
126-B-1 SURFACE	1:2.5	J1HHX8-E1	4/25/11	0.001	B	0.01	0.0040		0.00	0.001	B	0.02	0.007	B	0.02	0.006	U	0.01
126-B-1 SURFACE	1:2.5	J1HHX8-E2	4/25/11	0.001	B	0.01	0.0040		0.00	0.001	B	0.02	0.007	B	0.02	0.006	U	0.01
126-B-1 SURFACE	1:5	J1HHX8-F1	4/25/11	0.001	B	0.01	0.0020	B	0.00	0.001	B	0.02	0.007	B	0.02	0.006	U	0.01
126-B-1 DEPTH	1:1	J1HJ08-D1	4/26/11	0.149		0.03	0.0070	B	0.02	0.004	B	0.10	0.100	U	0.10	0.030	U	0.03
126-B-1 DEPTH	1:1	J1HJ08-D2	4/26/11	0.108		0.03	0.0070	B	0.02	0.1	U	0.10	0.100	U	0.10	0.030	U	0.03
126-B-1 DEPTH	1:2.5	J1HJ08-E1	4/26/11	0.056		0.01	0.0060		0.01	0.02	U	0.02	0.005	B	0.02	0.006	U	0.01
126-B-1 DEPTH	1:5	J1HJ08-F1	4/26/11	0.031		0.01	0.0060		0.00	0.02	U	0.02	0.004	B	0.02	0.006	U	0.01
126-H-1 DEPTH	1:1	J1HJ80-D1	8/24/11	0.025	U	0.03	0.0210		0.02	0.1	U	0.10	0.1	U	0.10	0.030	U	0.03
126-H-1 DEPTH	1:2.5	J1HJ80-E1	8/24/11	0.005	U	0.01	0.0090		0.00	0.02	U	0.02	0.005	B	0.02	0.006	U	0.01
126-H-1 DEPTH	1:2.5	J1HJ80-E2	8/24/11	0.001	B	0.01	0.0100		0.00	0.02	U	0.02	0.006	B	0.02	0.006	U	0.01
126-H-1 DEPTH	1:5	J1HJ80-F1	8/24/11	0.005	U	0.01	0.0080		0.00	0.02	U	0.02	0.005	B	0.02	0.006	U	0.01

Table C-17. Coal Ash Follow on Leaching Test Coal Ash Leaching Sample Results. (4 Pages)

Sample Location	Coal Ash:Water Ratio	HEIS Number	Sample Date	Thallium			Vanadium			Zinc			pH
				mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	
600-207 SURFACE	1:1	J1HHN7-A1	9/27/11	0.075	U	0.08	0.063		0.03	0.25	U	0.3	7.60
600-207 SURFACE	1:2.5	J1HHN7-B1	9/27/11	0.015	U	0.02	0.037		0.01	0.05	U	0.1	7.68
600-207 SURFACE	1:2.5	J1HHN7-B2	9/27/11	0.015	U	0.02	0.039		0.01	0.05	U	0.1	7.70
600-207 SURFACE	1:5	J1HHN7-C1	9/27/11	0.015	U	0.02	0.035		0.01	0.05	U	0.1	7.62
600-207 SURFACE	1:1	J1HHN7-D1	9/27/11	0.075	U	0.08	0.063		0.03	0.25	U	0.3	7.80
600-207 SURFACE	1:2.5	J1HHN7-E1	9/27/11	0.015	U	0.02	0.037		0.01	0.05	U	0.1	7.82
600-207 SURFACE	1:5	J1HHN7-F1	9/27/11	0.015	U	0.02	0.032		0.01	0.05	U	0.1	7.79
600-207 SURFACE	1:5	J1HHN7-F2	9/27/11	0.015	U	0.02	0.032		0.01	0.05	U	0.1	7.89
126-B-1 SURFACE	1:1	J1HHX8-A1	4/25/11	0.075	U	0.08	0.03		0.03	0.25	U	0.3	8.50
126-B-1 SURFACE	1:2.5	J1HHX8-B1	4/25/11	0.015	U	0.02	0.028		0.01	0.05	U	0.1	8.71
126-B-1 SURFACE	1:5	J1HHX8-C1	4/25/11	0.015	U	0.02	0.027		0.01	0.05	U	0.1	8.72
126-B-1 SURFACE	1:5	J1HHX8-C2	4/25/11	0.015	U	0.02	0.029		0.01	0.013	B	0.1	8.71
126-B-1 SURFACE	1:1	J1HHX8-D1	4/25/11	0.075	U	0.08	0.03		0.03	0.25	U	0.3	8.50
126-B-1 SURFACE	1:2.5	J1HHX8-E1	4/25/11	0.015	U	0.02	0.027		0.01	0.05	U	0.1	8.60
126-B-1 SURFACE	1:2.5	J1HHX8-E2	4/25/11	0.015	U	0.02	0.027		0.01	0.05	U	0.1	8.64
126-B-1 SURFACE	1:5	J1HHX8-F1	4/25/11	0.015	U	0.02	0.025		0.01	0.05	U	0.1	8.71
126-B-1 DEPTH	1:1	J1HJ08-D1	4/26/11	0.075	U	0.08	0.044		0.03	0.25	U	0.3	6.71
126-B-1 DEPTH	1:1	J1HJ08-D2	4/26/11	0.075	U	0.08	0.036		0.03	0.25	U	0.3	6.79
126-B-1 DEPTH	1:2.5	J1HJ08-E1	4/26/11	0.015	U	0.02	0.019		0.01	0.05	U	0.1	6.88
126-B-1 DEPTH	1:5	J1HJ08-F1	4/26/11	0.015	U	0.02	0.015		0.01	0.05	U	0.1	6.93
126-H-1 DEPTH	1:1	J1HJ80-D1	8/24/11	0.075	U	0.08	0.053		0.03	0.25	U	0.3	9.36
126-H-1 DEPTH	1:2.5	J1HJ80-E1	8/24/11	0.015	U	0.02	0.037		0.01	0.05	U	0.1	9.51
126-H-1 DEPTH	1:2.5	J1HJ80-E2	8/24/11	0.015	U	0.02	0.039		0.01	0.05	U	0.1	9.59
126-H-1 DEPTH	1:5	J1HJ80-F1	8/24/11	0.015	U	0.02	0.03		0.01	0.05	U	0.1	9.71

APPENDIX D

COAL ASH CALCULATIONS

APPENDIX D

CALCULATION BRIEFS

The calculations in this appendix are kept in the active Washington Closure Hanford project files and are available upon request. When the project is completed, the file will be stored in a U.S. Department of Energy, Richland Operations Office, repository. These calculations have been prepared in accordance with ENG-1, *Engineering Services*, ENG-1-4.5, "Project Calculation," Washington Closure Hanford, Richland, Washington. The following calculations are provided in this appendix.

Coal Ash Relative Percent Difference (RPD) Calculations, 0100X-CA-V0070, Rev. 0*,* Washington Closure Hanford, Richland, Washington.

Coal Ash Characterization 90th Percentile and Median Equality Calculations, 0100X-CA-V0073, Rev. 0*,* Washington Closure Hanford, Richland, Washington.

Coal Ash Depth and Corresponding Surface Sample Confidence Limit Calculations, 0100X-CA-V0075, Rev. 0*,* Washington Closure Hanford, Richland, Washington.

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 100 and 300 Areas Coal Ash Characterization **Job No. 14655**

Area: 100-B, 100-D, 100-H, 100-IU-6, and 300 Areas

Discipline: Environmental *Calculation No: 0100X-CA-V0070

Subject: Coal Ash Relative Percent Difference (RPD) Calculations

Computer Program: Excel Program No: Excel 2003

The attached calculations have been generated for a specific purpose and task. Use of the calculations by persons who do not have access to all pertinent facts may lead to incorrect conclusions and/or results. Before applying these calculations to your work, the underlying basis, rationale, and other pertinent information relevant to these calculations must be thoroughly reviewed with appropriate Washington Closure Hanford LLC (WCH) officials or other authorized personnel. WCH is not responsible for the use of a calculation not under its direct control.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 7 Total = 8	H. M. Sulloway	T. O. Howell		J. M. Capron	12/15/11

SUMMARY OF REVISION

WCH-DE-019 (05/08/2007)

*Obtain Calc. No. from Document Control and Form from Intranet

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/15/2011 **Calc. No.** 0100X-CA-V0070 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** T. Q. Howell **Date** 12/15/2011
Subject Coal Ash Characterization Relative Percent Difference (RPD) Calculations **Sheet No.** 1 of 7

Summary

PURPOSE:

Provide documentation to support the calculation of the relative percent difference (RPD) for primary-duplicate sample pairs from coal ash characterization sample results, as necessary.

TABLE OF CONTENTS:

GIVEN/REFERENCES:

1) DOE-RL, 2011, *Sampling and Analysis Plan for Characterization of Hanford Site Coal Ash Components,* DOE/RL-2010-113, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Solution:

1) Use data obtained from remedial investigation coal ash samples to perform the RPD calculations for primary-duplicate sample pairs, as required.

METHODOLOGY:

The RPD is calculated when both the primary value and the duplicate value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The TDL is a laboratory detection limit pre-determined for each analytical method and is listed in Table II-1 of the SAP (DOE-RL 2011). Where direct evaluation of the attached sample data showed that a given analyte was not detected in the primary and/or duplicate sample, further evaluation of the RPD value was not performed.

The RPD calculations use the following formula:

$$RPD = [\ |M-D|/((M+D)/2)]*100$$

where, M = main sample value D = duplicate sample value

When an analyte is detected in the primary or duplicate sample, but is quantified at less than 5 times the TDL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate/split results exceeds a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed as part of the overall quality assessment.

For quality assurance/quality control (QA/QC) duplicate RPD calculations, a value less than 30% indicates the data compare favorably. If the RPD is greater than 30%, further investigation regarding the usability of the data is performed. Additional discussion is provided in the data quality assessment.

RESULTS:

The results presented in the tables that follow include the summary of the results of the RPD calculations and are for use in data quality assessment of the remedial investigation sampling.

Washington Closure Hanford

CALCULATION SHEET

Originator H. M. Sulloway **Date** 12/15/2011 **Calc. No.** 0100X-CA-V0070 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** T. Q. Howell **Date** 12/15/2011
Subject Coal Ash Characterization Relative Percent Difference (RPD) Calculations **Sheet No.** 2 of 7

Summary (continued)

Relative Percent Difference Results and QA/QC Analysis

Analyte	Sample Location									
	100-B-15	100-B-25	100-D-17	100-D-26	100-H-16	100-H-25	300-04	300-06	600-15	600-24
Arsenic	--	*61.4%*	--	--	--	--	--	--	10.1%	9.8%
Barium	5.0%	*44.1%*	23.8%	25.9%	1.3%	12.4%	16.6%	7.9%	3.3%	12.4%
Beryllium	1.7%	*45.4%*	6.5%	19.3%	--	5.6%	10.1%	--	2.1%	0.8%
Boron	12.9%	22.3%	*30.4%*	18.5%	11.7%	7.4%	1.5%	6.9%	*36.5%*	15.7%
Chromium	9.3%	29.3%	4.1%	12.3%	3.9%	1.6%	13.3%	7.4%	7.5%	7.6%
Copper	2.2%	*33.7%*	16.6%	16.2%	6.4%	1.3%	9.3%	16.0%	8.6%	14.3%
Lead	5.4%	29.6%	19.4%	21.6%	--	3.7%	19.5%	19.9%	*38.7%*	22.6%
Manganese	--	--	--	--	--	--	--	--	11.0%	--
Nickel	--	--	--	--	0.0%	--	--	--	--	--
Vanadium	4.7%	27.0%	9.8%	21.7%	2.9%	1.5%	7.6%	6.9%	*59.4%*	7.6%
Zinc	*57.5%*	12.6%	14.1%	*40.4%*	7.0%	*38.8%*	4.0%	*59.4%*	25.3%	22.6%

-- = RPD analysis not required

CALCULATION SHEET

Washington Closure Hanford
Originator H. M. Sulloway
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Characterization Relative Percent Difference (RPD) Calculations

Date 12/15/2011
Job No. 14655

Calc. No. 0100X-CA-V0070
Checked T. Q. Howell

Rev. No. 0
Date 12/15/2011
Sheet No. 3 of 7

Duplicate Analysis at Sample Location 100-B-15

Sampling Area	HEIS Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-15	J1HHW8	4/27/11	3.01		0.91	792		0.46	1.17		0.18	211		1.82	0.182	B	0.18	10.3		0.18	4.88		1.82	27.4		0.91	6.73		0.46
Duplicate of J1HHW8	J1HJ04	4/27/11	3.41		2.94	753		1.47	1.19		0.59	240		5.88	0.240	B	0.59	11.3		0.59	4.56	B	5.88	26.8		2.94	7.10		1.47

Analysis:

		Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead
	TDL	1	0.5	0.2	2	0.2	0.2	2	1	0.5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**		**Yes (calc RPD)**		**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD		5.0%	1.7%	12.9%		9.3%		2.2%	5.4%
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

Sampling Area	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-15	J1HHW8	4/27/11	94.8		4.55	0.060		0.03	1.59	B	1.82	10.3		3.64	35.7		2.27	26.9		9.09
Duplicate of J1HHW8	J1HJ04	4/27/11	107		14.7	0.077		0.03	1.42	B	5.88	10.3	B	11.8	37.4		7.35	48.6		29.4

Analysis:

		Manganese	Mercury	Molybdenum	Nickel	Vanadium	Zinc
	TDL	75	0.2	2	4	2.5	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)			**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD					4.7%	*57.5%*
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable

Duplicate Analysis at Sample Location 100-B-25

Sampling Area	HEIS Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-25	J1HHX8	4/25/11	10.3		2.83	1420		1.42	1.65		0.57	107		5.66	0.385	B	0.57	11.2		0.57	4.66	B	5.66	28.4		2.83	13.4		1.42
Duplicate of J1HHX8	J1HJ03	4/25/11	5.46		2.73	907		1.36	1.04		0.55	85.5		5.45	0.278	B	0.55	8.3		0.55	4.12	B	5.45	20.2		2.73	9.95		1.36

Analysis:

		Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead
	TDL	1	0.5	0.2	2	0.2	0.2	2	1	0.5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**		**Yes (calc RPD)**		**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD	*61.4%*	*44.1%*	*45.4%*	22.3%		29.3%		*33.7%*	29.6%
	Difference > 2 TDL?	Not applicable	Not applicable	Not applicable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

Sampling Area	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium			Uranium (Total)			Vanadium			Zinc			Fluoranthene		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL
100-B-25	J1HHX8	4/25/11	391		14.2	0.115		0.03	1.14	B	5.66	10.5	B	11.3	1.58		0.85	4.13		0.128	36.2		7.08	38.0		28.3	74.9	J	328
Duplicate of J1HHX8	J1HJ03	4/25/11	202		13.6	0.120		0.03	0.972	B	5.45	9.70	B	10.9	1.03		0.82	3.25		0.123	27.6		6.82	33.5		27.3	55.2	J	322

Analysis:

		Manganese	Mercury	Molybdenum	Nickel	Selenium	Uranium (Total)	Vanadium	Zinc	Fluoranthene
	TDL	75	0.2	2	4	1	1	2.5	1	330
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)			No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	
	RPD							27.0%	12.6%	
	Difference > 2 TDL?	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable

Sampling Area	HEIS Number	Sample Date	Naphthalene			Phenanthrene		
			ug/kg	Q	PQL	ug/kg	Q	PQL
100-B-25	J1HHX8	4/25/11	1730		328	393		328
Duplicate of J1HHX8	J1HJ03	4/25/11	198	J	322	168	J	322

Analysis:

		Naphthalene	Phenanthrene
	TDL	330	330
Duplicate Analysis	Both > PQL?	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?		
	RPD		
	Difference > 2 TDL?	Yes - assess further	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/15/2011 **Calc. No.** 0100X-CA-V0070 **Rev. No.** 0

Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** T. Q. Howell **Date** 12/15/11

Subject Coal Ash Characterization Relative Percent Difference (RPD) Calculations **Sheet No.** 4 of 7

Duplicate Analysis at Sample Location 100-D-17

Sampling Area	HEIS Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-17	J1J3X9	8/22/11	3.68		0.86	1110		0.43	1.20		0.17	170		1.72	0.447		0.17	9.89		0.17	5.18		1.72	20.9		0.86	10.4		0.43
Duplicate of J1J3X9	J1J413	8/22/11	3.30		0.94	1410		0.47	1.28		0.19	231		1.89	0.438		0.19	10.3		0.19	4.59		1.89	17.7		0.94	8.56		0.47

Analysis:

	TDL	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead
Duplicate Analysis		1	0.5	0.2	2	0.2	0.2	2	1	0.5
	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD		23.8%	6.5%	*30.4%*		4.1%		16.6%	19.4%
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

Sampling Area	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-17	J1J3X9	8/22/11	248		4.31	0.129		0.02	1.53	B	1.72	9.91		3.45	0.425		0.26	34.9		2.16	65.2		8.62
Duplicate of J1J3X9	J1J413	8/22/11	228		4.72	0.248		0.03	1.39	B	1.89	12.1		3.77	0.511		0.28	38.5		2.36	56.6		9.43

Analysis:

	TDL	Manganese	Mercury	Molybdenum	Nickel	Selenium	Vanadium	Zinc
Duplicate Analysis		75	0.2	2	4	1	2.5	1
	Both > PQL?	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)		No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD						9.8%	14.1%
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable

Duplicate Analysis at Sample Location 100-D-26

Sampling Area	HEIS Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-26	J1J408	8/11/11	3.91		0.85	879		0.42	1.17		0.17	181		1.69	0.156	B	0.17	11.4		0.17	3.44		1.69	23.8		0.85	13.2		0.42
Duplicate of J1J408	J1J412	8/11/11	4.34		0.91	1140		0.46	1.42		0.18	218		1.82	0.190		0.18	12.9		0.18	3.48		1.82	28.0		0.91	16.4		0.46

Analysis:

	TDL	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead
Duplicate Analysis		1	0.5	0.2	2	0.2	0.2	2	1	0.5
	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**		**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD		25.9%	19.3%	18.5%		12.3%		16.2%	21.6%
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

Sampling Area	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium			Uranium (Total)			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-26	J1J408	8/11/11	105		4.24	0.061		0.03	1.11	B	1.69	7.57		3.39	0.769		0.25	4.22		0.143	33.2		2.12	15.2		8.47
Duplicate of J1J408	J1J412	8/11/11	137		4.55	0.048		0.03	1.27	B	1.82	8.50		3.64	1.14		0.27	3.92		0.143	41.3		2.27	22.9		9.09

Analysis:

	TDL	Manganese	Mercury	Molybdenum	Nickel	Selenium	Uranium (Total)	Vanadium	Zinc
Duplicate Analysis		75	0.2	2	4	1	1	2.5	1
	Both > PQL?	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)		No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD							21.7%	*40.4%*
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS **Date** 12/15/2011 **Calc. No.** 0100X-CA-V0070 **Rev. No.** 0

Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** T. Q. Howell TQH **Date** 12/15/11

Subject Coal Ash Characterization Relative Percent Difference (RPD) Calculations **Sheet No.** 5 of 7

Duplicate Analysis at Sample Location 100-H-16

Sampling Area	HEIS Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-16	J1HJ63	8/27/11	3.46		0.88	783		0.44	0.84		0.18	46.7		1.75	0.18		0.18	9.38		0.18	7.98		1.75	42.1		0.88	2.46		0.44
Duplicate of J1HJ63	J1HJ78	8/27/11	3.01		0.96	773		0.48	0.90		0.19	52.5		1.92	0.176	B	0.19	9.75		0.19	8.83		1.92	44.9		0.96	2.32		0.48

Analysis:

TDL		1	0.5	0.2	2	0.2	0.2	2	1	0.5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**		**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)
	RPD		1.3%		11.7%		3.9%		6.4%	
	Difference > 2 TDL?	No - acceptable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	No - acceptable

Sampling Area	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-16	J1HJ63	8/27/11	134		4.39	0.015	B	0.03	1.51	B	1.75	20.4		3.51	50.6		2.19	16.3		8.77
Duplicate of J1HJ63	J1HJ78	8/27/11	135		4.81	0.029		0.03	1.78	B	1.92	20.4		3.9	52.1		2.40	15.2		9.62

Analysis:

TDL		75	0.2	2	4	2.5	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)			**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD				0.0%	2.9%	7.0%
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable	Not applicable

Duplicate Analysis at Sample Location 100-H-25

Sampling Area	HEIS Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-25	J1HJ72	8/24/11	2.55		0.79	954		0.40	1.05		0.16	235		1.59	0.217		0.16	12.3		0.16	3.66		1.59	24.0		0.79	5.02		0.40
Duplicate of J1HJ72	J1HJ77	8/24/11	2.82		0.86	1080		0.43	1.11		0.17	253		1.72	0.183		0.17	12.5		0.17	3.82		1.72	23.7		0.86	5.21		0.43

Analysis:

TDL		1	0.5	0.2	2	0.2	0.2	2	1	0.5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD		12.4%	5.6%	7.4%		1.6%		1.3%	3.7%
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

Sampling Area	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium			Uranium (Total)			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-25	J1HJ72	8/24/11	153		3.97	0.027		0.03	1.44	B	1.59	10.1		3.17	0.338		0.24	3.06		0.132	33.8		1.98	28.9		7.94
Duplicate of J1HJ72	J1HJ77	8/24/11	122		4.31	0.019	B	0.03	1.49	B	1.72	10.2		3.45	0.504		0.26	2.91		0.132	33.3		2.16	19.5		8.62

Analysis:

TDL		75	0.2	2	4	1	1	2.5	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)			No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD							1.5%	*38.8%*
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/15/2011 **Calc. No.** 0100X-CA-V0070 **Rev. No.** 0

Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** T. Q. Howell **Date** 12/15/11

Subject Coal Ash Characterization Relative Percent Difference (RPD) Calculations **Sheet No.** 6 of 7

Duplicate Analysis at Sample Location 300-04

Sampling Area	HEIS Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
300-04	J1HJN9	8/25/11	2.71		0.98	541		0.49	1.14		0.20	196		1.96	0.253		0.20	12.8		0.20	3.00		1.96	20.3		0.98	9.41		0.49
Duplicate of J1HJN9	J1HJT5	8/25/11	2.66		0.81	639		0.40	1.03		0.16	199		1.61	0.227		0.16	11.2		0.16	2.66		1.61	18.5		0.81	7.74		0.40

Analysis:

TDL		1	0.5	0.2	2	0.2	0.2	2	1	0.5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD		16.6%	10.1%	1.5%		13.3%		9.3%	19.5%
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

Sampling Area	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium			Uranium (Total)			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
300-04	J1HJN9	8/25/11	107		4.90	0.365		0.03	1.04	B	1.96	8.97		3.92	1.24		0.29	3.36		0.132	34.0		2.45	27.2		9.80
Duplicate of J1HJN9	J1HJT5	8/25/11	91.7		4.03	0.344		0.03	0.946	B	1.61	8.07		3.23	1.17		0.24	3.20		0.132	31.5		2.02	28.3		8.06

Analysis:

TDL		75	0.2	2	4	1	1	2.5	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)		No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD							7.6%	4.0%
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable

Duplicate Analysis at Sample Location 300-06

Sampling Area	HEIS Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
300-06	J1HJP1	8/26/11	2.30		0.82	521		0.41	0.878		0.16	459		1.64	0.188		0.16	9.84		0.16	2.51		1.64	18.2		0.82	7.19		0.41
Duplicate of J1HJP1	J1HJT6	8/26/11	2.36		0.77	564		0.39	0.853		0.15	492		1.54	0.187		0.15	10.6		0.15	2.47		1.54	15.5		0.77	8.78		0.39

Analysis:

TDL		1	0.5	0.2	2	0.2	0.2	2	1	0.5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD		7.9%		6.9%		7.4%		16.0%	19.9%
	Difference > 2 TDL?	No - acceptable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

Sampling Area	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
300-06	J1HJP1	8/26/11	106		4.10	0.370		0.02	0.968	B	1.64	6.36		3.28	1.16		0.25	26.4		2.05	43.0		8.20
Duplicate of J1HJP1	J1HJT6	8/26/11	101		3.85	0.706		0.03	1.12	B	1.54	6.29		3.08	1.14		0.23	28.3		1.92	23.3		7.69

Analysis:

TDL		75	0.2	2	4	1	2.5	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)		No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD						6.9%	*59.4%*
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/15/2011 **Calc. No.** 0100X-CA-V0070 **Rev. No.** 0

Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** T. Q. Howell **Date** 12/15/11

Subject Coal Ash Characterization Relative Percent Difference (RPD) Calculations **Sheet No.** 7 of 7

Duplicate Analysis at Sample Location 600-15

Sampling Area	HEIS Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-15	J1HHN7	9/27/11	10.6		0.96	1210		0.48	1.43		0.19	112		1.92	0.232		0.19	15.5		0.19	7.14		1.92	35.4		0.96	11.1		0.48
Duplicate of J1HHN7	J1HHR2	9/27/11	9.58		0.85	1250		0.42	1.46		0.17	162		1.69	0.213		0.17	16.7		0.17	7.08		1.69	38.6		0.85	7.50		0.42

Analysis:

	TDL	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead
		1	0.5	0.2	2	0.2	0.2	2	1	0.5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD	10.1%	3.3%	2.1%	*36.5%*		7.5%		8.6%	*38.7%*
	Difference > 2 TDL?	Not applicable	Not applicable	Not applicable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

Sampling Area	HEIS Number	Sample Date	Manganese			Molybdenum			Nickel			Selenium			Uranium (Total)			Vanadium			Zinc			Fluoranthene			Naphthalene		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
600-15	J1HHN7	9/27/11	481		4.81	2.11		1.92	18.9		3.85	2.27		0.29	4.18		0.136	55.3		2.40	28.5		9.62	56.4	J	326	263	J	326
Duplicate of J1HHN7	J1HHR2	9/27/11	537		4.24	2.49		1.69	19.7		3.39	1.73		0.25	5.18		0.136	102		2.12	22.1		8.47	58.1	J	328	310	J	328

Analysis:

	TDL	Manganese	Molybdenum	Nickel	Selenium	Uranium (Total)	Vanadium	Zinc	Fluoranthene	Naphthalene
		75	2	4	1	1	2.5	1	330	330
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**		
	RPD	11.0%					*59.4%*	25.3%		
	Difference > 2 TDL?	Not applicable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable

Sampling Area	HEIS Number	Sample Date	Phenanthrene		
			ug/kg	Q	PQL
600-15	J1HHN7	9/27/11	93.6	J	326
Duplicate of J1HHN7	J1HHR2	9/27/11	95.5	J	328

Analysis:

	TDL	Phenanthrene
		330
Duplicate Analysis	Both > PQL?	No-Stop (acceptable)
	Both >5xTDL?	
	RPD	
	Difference > 2 TDL?	No - acceptable

Duplicate Analysis at Sample Location 600-24

Sampling Area	HEIS Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-24	J1HHP6	9/28/11	7.25		0.98	910		0.49	1.19		0.20	69.8		1.96	0.174	B	0.20	12.3		0.20	5.92		1.96	32.3		0.98	7.03		0.49
Duplicate of J1HHP6	J1HHR3	9/28/11	6.57		0.83	1030		0.42	1.18		0.17	81.7		1.67	0.157	B	0.17	11.4		0.17	5.85		1.67	28.0		0.83	5.60		0.42

Analysis:

	TDL	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead
		1	0.5	0.2	2	0.2	0.2	2	1	0.5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**		**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD	9.8%	12.4%	0.8%	15.7%		7.6%		14.3%	22.6%
	Difference > 2 TDL?	Not applicable	Not applicable	Not applicable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

Sampling Area	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
600-24	J1HHP6	9/28/11	373		4.90	0.045		0.03	2.69		1.96	15.7		3.92	2.10		0.29	47.9		2.45	24.1		9.80
Duplicate of J1HHP6	J1HHR3	9/28/11	390		4.17	0.030		0.03	2.46		1.67	17.7		3.33	1.64		0.25	44.4		2.08	19.2		8.33

Analysis:

	TDL	Manganese	Mercury	Molybdenum	Nickel	Selenium	Vanadium	Zinc
		75	0.2	2	4	1	2.5	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)		No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD						7.6%	22.6%
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 100 and 300 Areas Coal Ash Characterization **Job No. 14655**

Area: 100-B, 100-D, 100-H, 100-IU-6, and 300 Areas

Discipline: Environmental *Calculation No: 0100X-CA-V0073

Subject: Coal Ash Characterization 90th Percentile and Median Equality Calculations

Computer Program: Excel Program No: Excel 2003

The attached calculations have been generated for a specific purpose and task. Use of the calculations by persons who do not have access to all pertinent facts may lead to incorrect conclusions and/or results. Before applying these calculations to your work, the underlying basis, rationale, and other pertinent information relevant to these calculations must be thoroughly reviewed with appropriate Washington Closure Hanford LLC (WCH) officials or other authorized personnel. WCH is not responsible for the use of a calculation not under its direct control.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 35 Total = 36	H. M. Sulloway	J. R. Davidson		J. M. Capron	12/27/11

SUMMARY OF REVISION

WCH-DE-019 (05/08/2007)

*Obtain Calc. No. from Document Control and Form from Intranet

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	H. M. Sulloway	Date:	12/20/11	Calc. No.:	0100X-CA-V0073	Rev.:	0
Project:	100 and 300 Areas Coal Ash Characterization	Job No:	14655	Checked:	J. R. Davidson JRD	Date:	12/20/11
Subject:	Coal Ash Characterization 90th Percentile and Median Equality Calculations					Sheet No.	1 of 35

PURPOSE:

The calculation provides documentation to support the calculation of the 90th percentile values, 90th percentile upper tolerance limit (UTL) values, and statistical analysis of median equality using the nonparametric Kruskal-Wallis one-way analysis of variance test on coal ash surface sample data from five sample sites. ProUCL 4.1 (EPA 2010) software was used for all calculations.

TABLE OF CONTENTS:

GIVEN/REFERENCES:

1) DOE-RL, 2011, Sampling and Analysis Plan for Characterization of Hanford Site Coal Ash Components, DOE/RL-2010-113, Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

2) Ecology, 1993, *Statistical Guidance for Ecology Site Managers, Supplement S-6, Analyzing Site or Background Data with Below-detection Limit or Below-PQL Values (Censored Data Sets),* Publication #92-54, Washington Department of Ecology, Olympia, Washington.

3) EPA, 2010, *ProUCL*, Version 4.1, U.S. Environmental Protection Agency, Washington, D.C. <http://www.epa.gov/osp/hstl/tsc/software.htm>.

SOLUTION:

The calculation of 90th percentile values, 90th percentile UTL values, and Kruskal-Wallis test for coal ash constituents was performed using ProUCL 4.1 with the attached data.

METHODOLOGY:

Five sample sites underwent statistical sampling of coal ash as described in DOE-RL, 2011. A total of 29 surface samples were collected at each of the five sample sites and analyzed for metals. Analytes with at least one detection within a given sample site data set were chosen for 90th percentile, 90th percentile UTL, and potential Kruskal-Wallis test calculations. The 90th percentile UTL represents the 95% upper confidence level on the 90th percentile value. Nonparametric methods were used for the 90th percentile and 90th percentile UTL calculations. All data reported as being undetected were set to ½ the detection limit value for calculation of the statistics (Ecology 1993). For the statistical evaluation of primary-duplicate sample pairs, the sample results were averaged before being included in the data set, after adjustments for censored data as described above. All statistical analyses with ProUCL 4.1 (EPA 2010) were performed using these adjusted data sets (sheets 17 to 26).

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	H. M. Sulloway	Date:	12/20/11	Calc. No.:	0100X-CA-V0073	Rev.:	0
Project:	100 and 300 Areas Coal Ash Characterization	Job No:	14655	Checked:	J. R. Davidson	Date:	12/20/11
Subject:	Coal Ash Characterization 90th Percentile and Median Equality Calculations					Sheet No.	2 of 35

RESULTS:

ProUCL output from 90th percentile analysis using nonparametric methods provides additional statistics. This output generated by ProUCL including these additional statistics is presented, but only the 90th percentile and UTL values are summarized. ProUCL data output on sheets 5 through 9 is presented exactly as generated from the software. Arrangement of the ProUCL data output into formatted tables was performed for this calculation to optimize data presentation for each sample site.

Analysis for median equality by the Kruskal-Wallis test was performed for analytes with detections in three or more sample sites. Of the analytes with detections in coal ash, all met this threshold for analysis except for thallium which was detected at only a single sample site.

The null hypothesis for the Kruskal-Wallis test is that the medians of the data sets (sample sites) are equal. The Kruskal-Wallis tests were conducted at a 5% significance level. The *p*-value calculated by the analysis determines if the null hypothesis is accepted or rejected. If the *p*-value is greater than 0.05 the null hypothesis is accepted (medians are equal), but if the *p*-value is less than or equal to 0.05 the null hypothesis is rejected (medians are not equal). Of the analytes that met the threshold for analysis (detections in three or more sample sites), the null hypothesis is rejected for all except vanadium. Therefore, vanadium is the only analyte for which the medians of data from the sample sites are equal at a 5% significance level.

Washington Closure Hanford **CALCULATION SHEET**

Originator H. M. Sulloway **Date** 12/27/2011 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/27/2011
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 3 of 35

Summary

90th Percentile and 90th Percentile UTL Summary

Analyte	90th Percentile					90th Percentile UTL				
	126-B-1	126-D-1	126-H-1	300 Area Ash	600-207	126-B-1	126-D-1	126-H-1	300 Area Ash	600-207
Antimony	0.844	0.633	0.290	--	--	1.26	0.894	0.295	--	--
Arsenic	7.46	7.78	3.80	3.64	6.69	8.45	13.6	4.34	3.87	8.54
Barium	1988	1480	1024	715	989	2250	1750	1250	754	1060
Beryllium	1.94	1.88	1.31	1.42	1.12	2.39	2.51	1.44	1.66	1.19
Boron	271	318	300	258	87.8	327	410	367	369	137
Cadmium	0.508	0.383	0.353	0.313	0.205	0.899	0.443	0.388	0.338	0.211
Chromium	13.5	12.2	13.6	14.9	12.0	16.2	12.5	14.4	15.6	12.9
Cobalt	7.02	9.19	8.53	4.26	5.89	8.22	11.6	9.81	4.89	6.07
Copper	39.3	31.6	41.1	26.7	30.0	94.3	34.8	43.5	28.8	37.0
Lead	16.4	11.0	6.31	14.1	7.12	19.0	15.1	7.43	15.2	9.30
Manganese	350	458	246	188	415	396	689	283	210	486
Mercury	0.246	0.115	0.132	0.482	0.030	0.338	0.139	0.176	0.713	0.042
Molybdenum	2.58	2.86	2.06	1.39	2.34	3.85	3.54	2.44	1.50	2.58
Nickel	15.0	15.3	19.5	12.6	16.7	15.8	17.5	20.4	13.2	16.7
Selenium	1.32	0.927	1.51	1.74	1.93	1.44	0.955	1.63	2.46	2.00
Thallium	--	0.243	--	--	--	--	0.245	--	--	--
Vanadium	49.8	53.8	53.0	43.1	45.5	64.0	59.7	58.4	45.7	50.1
Zinc	60.5	56.6	48.9	37.4	25.4	94.8	69.7	53.6	43.3	26.9

-- = Value not determined as no detections in subject data set

Washington Closure Hanford **CALCULATION SHEET**

Originator H. M. Sulloway **Date** 12/27/2011 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/27/2011
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 4 of 35

Summary (continued)

Kruskal-Wallis test results (surface samples)

Analyte	p-Value	Accept/Reject Null
Antimony	0.0013	Reject
Arsenic	2.4E-11	Reject
Barium	3.0E-11	Reject
Beryllium	3.3E-10	Reject
Boron	1.4E-09	Reject
Cadmium	1.6E-05	Reject
Chromium	2.6E-04	Reject
Cobalt	7.3E-06	Reject
Copper	1.9E-04	Reject
Lead	6.1E-09	Reject
Manganese	7.0E-12	Reject
Mercury	1.1E-15	Reject
Molybdenum	5.5E-07	Reject
Nickel	1.2E-04	Reject
Selenium	3.3E-15	Reject
Thallium	NA	NA
Vanadium	0.16	Accept
Zinc	5.3E-06	Reject

NA = not applicable, insufficient number of data sets for test

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson JRD **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 5 of 35

126-B-1 Coal Ash
ProUCL 4.1 Generated Analysis of 90th percentile statistic

Nonparametric Background Statistics for Full Data Sets

User Selected Options

From File	T:\COAL ASH Sampling\Calcs\ProUCL results for calcs\All coal ash results w averaging.xls.wst
Full Precision	OFF
Confidence Coefficient	95%
Coverage	90%
Number of Bootstrap Operations	2000

	Antimony, 126-B-1	Arsenic, 126-B-1	Barium, 126-B-1	Beryllium, 126-B-1	Boron, 126-B-1	Cadmium, 126-B-1	Chromium, 126-B-1	Cobalt, 126-B-1	Copper, 126-B-1	Lead, 126-B-1	Manganese, 126-B-1	Mercury, 126-B-1	Molybdenum, 126-B-1	Nickel, 126-B-1	Selenium, 126-B-1	Vanadium, 126-B-1	Zinc, 126-B-1
Some Non-Parametric Statistics																	
Number of Valid Observations	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
Number of Distinct Observations	22	28	28	27	28	28	29	29	29	29	29	28	28	27	29	28	27
Minimum	0.22	1.33	184	0.632	66.3	0.096	4.76	1	8.6	2.85	13.1	0.022	0.314	3.02	0.135	9.73	9.43
Maximum	1.91	9.59	2340	3.22	328	0.914	25.5	15.1	98.3	35.8	521	0.861	34.7	31.5	2	113	104
Second Largest	1.255	8.45	2250	2.39	327	0.899	16.2	8.22	94.3	19	396	0.338	3.85	15.8	1.44	64	94.8
Mean	0.466	4.518	1123	1.424	175.4	0.31	10.87	4.697	31.08	8.818	190.2	0.131	2.702	10.62	0.641	37.98	40.34
Geometric Mean	0.381	4.142	983.9	1.358	157.9	0.27	10.37	4.183	27.72	7.183	148.3	0.0898	1.559	9.809	0.51	35.09	35.72
First Quartile	0.265	3.19	772.5	1.16	108	0.205	8.47	3.06	22.7	4.86	94.3	0.057	1.16	8.14	0.332	29.3	28
Median	0.29	4.21	1000	1.31	169	0.243	10.4	4.42	25.6	6.28	157	0.069	1.47	9.93	0.476	32.5	36.3
Third Quartile	0.55	5.42	1360	1.54	250	0.354	12.5	5.31	32	10.7	296	0.146	1.85	11.8	0.798	39.3	43.4
SD	0.378	1.938	552.9	0.493	78.64	0.193	3.734	2.565	19.21	6.85	126.4	0.162	6.197	4.935	0.461	17.71	21.43
Variance	0.143	3.757	305678	0.243	6184	0.0374	13.94	6.578	369	46.93	15987	0.0261	38.4	24.35	0.212	313.7	459.2
Coefficient of Variation	0.813	0.429	0.492	0.346	0.448	0.624	0.343	0.546	0.618	0.777	0.665	1.238	2.294	0.465	0.719	0.466	0.531
Skewness	2.505	0.959	0.645	1.981	0.385	2.162	2.16	2.474	2.901	2.477	0.825	3.606	5.269	2.782	1.365	2.859	1.611
Mean of Log-Transformed data	-0.964	1.421	6.892	0.306	5.062	-1.309	2.339	1.431	3.322	1.972	4.999	-2.41	0.444	2.283	-0.674	3.558	3.576
SD of Log-Transformed data	0.577	0.43	0.559	0.305	0.48	0.508	0.305	0.491	0.449	0.618	0.787	0.785	0.773	0.397	0.696	0.399	0.507
	Data do not follow a Discernable Distribution (0.05)	**Data appear Normal at 5% Significance Level**	**Data appear Normal at 5% Significance Level**	**Data Follow Appr. Gamma Distribution at 5% Significance Level)**	**Data appear Normal at 5% Significance Level**	**Data Follow Appr. Gamma Distribution at 5% Significance Level)**	**Data appear Gamma Distributed at 5% Significance Level**	**Data appear Gamma Distributed at 5% Significance Level**	**Data do not follow a Discernable Distribution (0.05)**	**Data appear Lognormal at 5% Significance Level**	**Data appear Gamma Distributed at 5% Significance Level**	**Data do not follow a Discernable Distribution (0.05)**	**Data do not follow a Discernable Distribution (0.05)**	**Data Follow Appr. Gamma Distribution at 5% Significance Level)**	**Data Follow Appr. Gamma Distribution at 5% Significance Level)**	**Data do not follow a Discernable Distribution (0.05)**	**Data appear Gamma Distributed at 5% Significance Level**
Non-Parametric Background Statistics																	
90% Percentile	**0.844**	**7.464**	**1988**	**1.94**	**270.6**	**0.508**	**13.52**	**7.022**	**39.26**	**16.4**	**350**	**0.246**	**2.584**	**15.02**	**1.316**	**49.78**	**60.54**
95% Percentile	1.105	8.222	2174	2.226	307	0.747	15.48	7.76	72.38	18.76	380.8	0.32	3.462	15.52	1.408	60.04	89.16
99% Percentile	1.727	9.271	2315	2.988	327.7	0.91	22.9	13.17	97.18	31.1	486	0.715	26.06	27.1	1.843	99.28	101.4
95% UTL with 90% Coverage																	
Order Statistic	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Achieved CC	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953
UTL	**1.255**	**8.45**	**2250**	**2.39**	**327**	**0.899**	**16.2**	**8.22**	**94.3**	**19**	**396**	**0.338**	**3.85**	**15.8**	**1.44**	**64**	**94.8**
95% BCA Bootstrap UTL with 90% Coverage	1.255	8.45	2250	2.39	327	0.902	16.62	8.676	94.3	22.36	421	0.443	8.948	18.38	1.488	65.88	94.8
95% Percentile Bootstrap UTL with 90% Coverage	1.386	8.678	2268	2.556	327	0.902	16.62	8.676	95.1	22.36	421	0.443	9.244	18.94	1.552	73.8	96.64
95% UPL	1.583	9.02	2295	2.805	327.5	0.907	20.85	11.66	96.3	27.4	458.5	0.6	19.28	23.65	1.72	88.5	99.4
95% Chebyshev UPL	2.143	13.11	3574	3.609	524.1	1.168	27.43	16.07	116.2	39.19	750.8	0.847	30.17	32.49	2.685	116.5	135.3
Upper Limit Based upon IQR	0.978	8.765	2241	2.11	463	0.578	18.55	8.685	45.95	19.46	598.6	0.28	2.885	17.29	1.497	54.3	66.5

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations

Date 12/20/11
Job No. 14655

Calc. No. 0100X-CA-V0073
Checked J. R. Davidson 3RD

Rev. No. 0
Date 12/20/11
Sheet No. 6 of 35

126-D-1 Coal Ash
ProUCL 4.1 Generated Analysis of 90th percentile statistic

Nonparametric Background Statistics for Full Data Sets

User Selected Options

From File	T:\COAL ASH Sampling\Calcs\ProUCL results for calcs\All coal ash results w averaging.xls.wst
Full Precision	OFF
Confidence Coefficient	95%
Coverage	90%
Number of Bootstrap Operations	2000

	Antimony, 126-D-1	Arsenic, 126-D-1	Barium, 126-D-1	Beryllium, 126-D-1	Boron, 126-D-1	Cadmium, 126-D-1	Chromium, 126-D-1	Cobalt, 126-D-1	Copper, 126-D-1	Lead, 126-D-1	Manganese, 126-D-1	Mercury, 126-D-1	Molybdenum, 126-D-1	Nickel, 126-D-1	Selenium, 126-D-1	Thallium, 126-D-2	Vanadium, 126-D-1	Zinc, 126-D-1
Some Non-Parametric Statistics																		
Number of Valid Observations	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
Number of Distinct Observations	23	29	28	25	28	27	26	29	29	29	28	25	29	27	27	14	28	29
Minimum	0.22	2.15	407	0.588	33.6	0.127	5.7	2.31	9.66	1.9	108	0.012	0.786	4.63	0.11	0.185	20.9	11.8
Maximum	0.965	16.7	1770	2.61	489	0.445	12.6	13.7	59.4	16.8	890	0.189	4.42	20.5	0.995	0.25	77.5	75.7
Second Largest	0.894	13.6	1750	2.51	410	0.443	12.5	11.6	34.8	15.1	689	0.139	3.54	17.5	0.955	0.245	59.7	69.7
Mean	0.401	4.834	1084	1.381	185.4	0.245	9.283	5.748	23.73	5.957	281.3	0.055	1.702	10.4	0.443	0.219	37.22	31.68
Geometric Mean	0.364	4.16	1028	1.306	153.5	0.232	9.058	5.259	22.22	4.822	240.5	0.045	1.551	9.876	0.35	0.218	35.41	28.09
First Quartile	0.26	3	843	1.21	115	0.186	7.72	4.12	19.3	3.02	151	0.031	1.19	7.9	0.145	0.21	27.7	21.2
Median	0.285	3.87	1030	1.31	155	0.227	8.72	4.88	23.1	4.05	244	0.048	1.46	9.76	0.357	0.22	35.5	26.4
Third Quartile	0.51	5.23	1320	1.43	238	0.27	11.1	6.3	28.3	8.68	312	0.0545	1.89	11.2	0.618	0.235	38.9	37
SD	0.198	3.347	341.4	0.48	110.2	0.0876	2.075	2.678	9.397	4.202	183.5	0.0395	0.839	3.557	0.29	0.0179	12.77	16.76
Variance	0.0392	11.2	116587	0.23	12149	0.00767	4.304	7.171	88.3	17.66	33660	0.00156	0.704	12.65	0.0843	0.00032096	163	280.9
Coefficient of Variation	0.493	0.692	0.315	0.348	0.594	0.357	0.223	0.466	0.396	0.705	0.652	0.717	0.493	0.342	0.655	0.0818	0.343	0.529
Skewness	1.463	2.441	0.16	1.177	0.94	1.025	0.193	1.44	1.892	1.288	1.946	1.932	1.758	1.136	0.647	-0.104	1.391	1.236
Mean of Log-Transformed data	-1.01	1.426	6.936	0.267	5.034	-1.461	2.204	1.66	3.101	1.573	5.483	-3.102	0.439	2.29	-1.05	-1.522	3.567	3.335
SD of Log-Transformed data	0.427	0.51	0.344	0.342	0.665	0.339	0.227	0.417	0.366	0.647	0.544	0.642	0.419	0.325	0.732	0.0826	0.313	0.492

	Antimony, 126-D-1	Arsenic, 126-D-1	Barium, 126-D-1	Beryllium, 126-D-1	Boron, 126-D-1	Cadmium, 126-D-1	Chromium, 126-D-1	Cobalt, 126-D-1	Copper, 126-D-1	Lead, 126-D-1	Manganese, 126-D-1	Mercury, 126-D-1	Molybdenum, 126-D-1	Nickel, 126-D-1	Selenium, 126-D-1	Thallium, 126-D-2	Vanadium, 126-D-1	Zinc, 126-D-1
	Data do not follow a Discernable Distribution (0.05)	Data do not follow a Discernable Distribution (0.05)	Data appear Normal at 5% Significance Level	Data do not follow a Discernable Distribution (0.05)	Data appear Normal at 5% Significance Level	Data appear Gamma Distributed at 5% Significance Level	Data appear Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level	Data appear Gamma Distributed at 5% Significance Level	Data appear Lognormal at 5% Significance Level	Data Follow Appr. Gamma Distribution at 5% Significance Level)	Data Follow Appr. Gamma Distribution at 5% Significance Level)	Data appear Lognormal at 5% Significance Level	Data appear Gamma Distributed at 5% Significance Level	Data appear Gamma Distributed at 5% Significance Level	Data appear Normal at 5% Significance Level	Data appear Gamma Distributed at 5% Significance Level	Data appear Gamma Distributed at 5% Significance Level
Non-Parametric Background Statistics																		
90% Percentile	**0.633**	**7.776**	**1480**	**1.876**	**318.4**	**0.383**	**12.22**	**9.19**	**31.62**	**11.04**	**457.8**	**0.115**	**2.862**	**15.28**	**0.927**	**0.243**	**53.82**	**56.58**
95% Percentile	0.8	12.24	1658	2.506	375.6	0.438	12.5	10.91	34.52	14.98	671.4	0.131	3.272	17.22	0.944	0.245	59.46	66.18
99% Percentile	0.945	15.83	1764	2.582	466.9	0.444	12.57	13.11	52.51	16.32	833.7	0.175	4.174	19.66	0.984	0.249	72.52	74.02
95% UTL with 90% Coverage																		
Order Statistic	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Achieved CC	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953
UTL	**0.894**	**13.6**	**1750**	**2.51**	**410**	**0.443**	**12.5**	**11.6**	**34.8**	**15.1**	**689**	**0.139**	**3.54**	**17.5**	**0.955**	**0.245**	**59.7**	**69.7**
95% BCA Bootstrap UTL with 90% Coverage	0.894	14.22	1750	2.53	410	0.443	12.52	11.6	39.72	15.44	694	0.139	3.54	18.1	0.955	0.246	63.26	70.9
95% Percentile Bootstrap UTL with 90% Coverage	0.908	14.22	1754	2.522	425.8	0.443	12.52	12.02	39.72	15.2	729.2	0.149	3.716	18.1	0.963	0.246	63.26	69.7
95% UPL	0.93	15.15	1760	2.56	449.5	0.444	12.55	12.65	47.1	15.95	789.5	0.164	3.98	19	0.975	0.248	68.6	70.9
95% Chebyshev UPL	1.279	19.67	2598	3.509	674.1	0.634	18.48	17.62	65.39	24.59	1095	0.23	5.422	26.17	1.73	0.298	93.82	69.7
Upper Limit Based upon IQR	0.885	8.575	2036	1.76	422.5	0.396	16.17	9.57	41.8	17.17	553.5	0.0898	2.94	16.15	1.328	0.273	55.7	60.7

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS | **Date** 12/20/11 | **Calc. No.** 0100X-CA-V0073 | **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization | **Job No.** 14655 | **Checked** J. R. Davidson JRD | **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations | **Sheet No.** 7 of 35

126-H-1 Coal Ash
ProUCL 4.1 Generated Analysis of 90th percentile statistic

Nonparametric Background Statistics for Full Data Sets

User Selected Options

From File	T:\COAL ASH Sampling\Calcs\ProUCL results for calcs\All coal ash results w averaging.xls.wst
Full Precision	OFF
Confidence Coefficient	95%
Coverage	90%
Number of Bootstrap Operations	2000

	Antimony, 126-H-1	Arsenic, 126-H-1	Barium, 126-H-1	Beryllium, 126-H-1	Boron, 126-H-1	Cadmium, 126-H-1	Chromium, 126-H-1	Cobalt, 126-H-1	Copper, 126-H-1	Lead, 126-H-1	Manganese, 126-H-1	Mercury, 126-H-1	Molybdenum, 126-H-1	Nickel, 126-H-1	Selenium, 126-H-1	Vanadium, 126-H-1	Zinc, 126-H-1
Some Non-Parametric Statistics																	
Number of Valid Observations	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
Number of Distinct Observations	15	29	29	29	29	26	27	28	29	29	29	23	28	25	24	29	27
Minimum	0.205	2.05	313	0.429	20.2	0.14	6.38	2.14	16.7	1.64	67.7	0.01	0.493	5.88	0.12	22.8	11.2
Maximum	0.3	4.72	1330	1.7	455	0.577	16.5	9.94	46.8	8.64	300	0.177	3.52	22.4	2.06	60	76.9
Second Largest	0.295	4.34	1250	1.44	367	0.388	14.4	9.81	43.5	7.43	283	0.176	2.44	20.4	1.63	58.4	53.6
Mean	0.262	3.035	773.1	0.951	130.8	0.225	10.36	5.882	30.26	4.064	138.9	0.0558	1.427	13.86	0.527	41.11	28.41
Geometric Mean	0.261	2.977	734	0.909	87.26	0.211	10.08	5.289	29.15	3.635	124.7	0.0373	1.297	12.95	0.354	39.76	24.99
First Quartile	0.245	2.6	607	0.769	38.9	0.17	8.21	3.6	24.7	2.5	81.8	0.015	0.997	9.71	0.14	33	17.3
Median	0.255	2.91	760	0.872	84.5	0.198	10.6	6.78	30.9	3.75	122	0.035	1.41	14.4	0.348	44.1	24.2
Third Quartile	0.28	3.37	918	1.16	183	0.241	12	7.72	35.4	5.54	169	0.075	1.645	17.8	0.571	47.7	37.9
SD	0.0215	0.63	243.4	0.29	117.7	0.0963	2.479	2.476	8.188	1.915	69.33	0.0506	0.636	4.84	0.525	10.32	15.63
Variance	0.00046335	0.397	59225	0.0843	13846	0.00928	6.146	6.133	67.05	3.669	4806	0.00256	0.404	23.43	0.275	106.5	244.4
Coefficient of Variation	0.0823	0.208	0.315	0.305	0.9	0.428	0.239	0.421	0.271	0.471	0.499	0.907	0.446	0.349	0.995	0.251	0.55
Skewness	-0.185	0.92	0.256	0.583	1.202	2.179	0.538	-0.178	0.132	0.599	1.039	1.214	1.187	-0.0897	1.709	-0.146	1.35
Mean of Log-Transformed data	-1.344	1.091	6.598	-0.0951	4.469	-1.557	2.311	1.666	3.373	1.291	4.826	-3.288	0.26	2.561	-1.038	3.683	3.218
SD of Log-Transformed data	0.0836	0.198	0.339	0.31	0.936	0.344	0.237	0.496	0.283	0.489	0.463	0.928	0.453	0.389	0.888	0.27	0.506
	Data appear Normal at 5% Significance Level	Data appear Normal at 5% Significance Level	Data appear Normal at 5% Significance Level	Data appear Normal at 5% Significance Level	Data Follow Appr. Gamma Distribution at 5% Significance Level)	Data do not follow a Discernable Distribution (0.05)	Data appear Normal at 5% Significance Level	Data do not follow a Discernable Distribution (0.05)	Data appear Normal at 5% Significance Level	Data appear Normal at 5% Significance Level	Data Follow Appr. Gamma Distribution at 5% Significance Level)	Data Follow Appr. Gamma Distribution at 5% Significance Level)	Data appear Gamma Distributed at 5% Significance Level	Data appear Normal at 5% Significance Level	Data do not follow a Discernable Distribution (0.05)	Data appear Normal at 5% Significance Level	Data appear Gamma Distributed at 5% Significance Level
Non-Parametric Background Statistics																	
90% Percentile	**0.29**	**3.804**	**1024**	**1.314**	**299.6**	**0.353**	**13.62**	**8.526**	**41.12**	**6.31**	**245.6**	**0.132**	**2.062**	**19.52**	**1.508**	**52.96**	**48.9**
95% Percentile	0.293	4.164	1166	1.396	347.4	0.383	14.28	9.49	43.06	7.254	277	0.164	2.308	20.4	1.61	56.8	52.2
99% Percentile	0.299	4.614	1308	1.627	430.4	0.524	15.91	9.904	45.88	8.301	295.2	0.177	3.218	21.84	1.94	59.55	70.38
95% UTL with 90% Coverage																	
Order Statistic	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Achieved CC	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953
UTL	**0.295**	**4.34**	**1250**	**1.44**	**367**	**0.388**	**14.4**	**9.81**	**43.5**	**7.43**	**283**	**0.176**	**2.44**	**20.4**	**1.63**	**58.4**	**53.6**
95% BCA Bootstrap UTL with 90% Coverage	0.295	4.34	1250	1.44	384.6	0.416	14.58	9.81	44.16	7.43	286.4	0.176	2.44	20.8	1.716	58.4	55.46
95% Percentile Bootstrap UTL with 90% Coverage	0.296	4.416	1250	1.492	367	0.416	14.82	9.836	44.16	7.672	286.4	0.176	2.656	20.8	1.716	58.72	55.46
95% UPL	0.298	4.53	1290	1.57	411	0.483	15.45	9.875	45.15	8.035	291.5	0.177	2.98	21.4	1.845	59.2	65.25
95% Chebyshev UPL	0.357	5.83	1852	2.239	652.4	0.652	21.35	16.86	66.57	12.56	446.3	0.28	4.246	35.31	2.854	86.87	97.72
Upper Limit Based upon IQR	0.333	4.525	1385	1.747	399.2	0.348	17.69	13.9	51.45	10.1	299.8	0.165	2.617	29.94	1.218	69.75	68.8

Washington Closure Hanford

CALCULATION SHEET

Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson JRD **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 8 of 35

300 Area Ash Coal Ash
ProUCL 4.1 Generated Analysis of 90th percentile statistic

Nonparametric Background Statistics for Full Data Sets

User Selected Options

From File	T:\COAL ASH Sampling\Calcs\ProUCL results for calcs\All coal ash results w averaging.xls.wst
Full Precision	OFF
Confidence Coefficient	95%
Coverage	90%
Number of Bootstrap Operations	2000

	Arsenic, 300 Area	Barium, 300 Area	Beryllium, 300 Area	Boron, 300 Area	Cadmium, 300 Area	Chromium, 300 Area	Cobalt, 300 Area	Copper, 300 Area	Lead, 300 Area	Manganese, 300 Area	Mercury, 300 Area	Molybdenum, 300 Area	Nickel, 300 Area	Selenium, 300 Area	Vanadium, 300 Area	Zinc, 300 Area
Some Non-Parametric Statistics																
Number of Valid Observations	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
Number of Distinct Observations	27	29	27	29	27	24	26	27	28	28	28	28	29	28	27	29
Minimum	1.6	177	0.544	65.4	0.094	7.15	1.9	14.7	3.33	35.5	0.034	0.472	5.73	0.491	21.3	12.6
Maximum	3.91	782	1.95	475.5	0.366	15.8	5.12	172	17.2	213	1.02	2.12	14.9	2.65	46.2	53
Second Largest	3.87	754	1.66	369	0.338	15.6	4.89	28.8	15.2	210	0.713	1.5	13.2	2.46	45.7	43.3
Mean	2.891	492.8	1.029	187.1	0.233	12.2	3.357	26.99	9.74	117.4	0.222	1.03	9.331	1.23	34.78	29.87
Geometric Mean	2.82	456.9	0.98	171.7	0.222	12	3.281	23.13	9.165	108.3	0.153	0.986	9.108	1.136	34.13	28.83
First Quartile	2.41	374	0.813	137	0.201	10.5	2.85	19.4	7.7	92.8	0.086	0.812	8.1	0.884	29.9	25.5
Median	3	492	0.948	177	0.237	12	3.28	22.1	9.66	103.5	0.132	0.993	8.91	1.1	34.5	28.5
Third Quartile	3.31	608	1.22	211	0.285	14.2	3.77	24.5	11.8	142	0.284	1.18	10.4	1.46	39.9	34.7
SD	0.62	175.4	0.333	84.07	0.0691	2.21	0.731	28.1	3.285	46.05	0.222	0.321	2.144	0.521	6.637	8.022
Variance	0.384	30763	0.111	7067	0.00478	4.882	0.535	789.7	10.79	2121	0.0495	0.103	4.596	0.272	44.05	64.35
Coefficient of Variation	0.214	0.356	0.324	0.449	0.297	0.181	0.218	1.041	0.337	0.392	1.004	0.312	0.23	0.424	0.191	0.269
Skewness	-0.411	-0.25	0.92	1.672	-0.231	-0.184	0.51	5.255	0.246	0.514	2.21	1.362	0.835	1.182	-0.18	0.716
Mean of Log-Transformed data	1.037	6.124	-0.0199	5.146	-1.507	2.485	1.188	3.141	2.215	4.685	-1.876	-0.0136	2.209	0.128	3.53	3.362
SD of Log-Transformed data	0.235	0.421	0.315	0.422	0.341	0.191	0.219	0.419	0.369	0.425	0.851	0.296	0.222	0.404	0.202	0.276
	Data appear Normal at 5% Significance Level	Data appear Normal at 5% Significance Level	Data appear Normal at 5% Significance Level	Data appear Gamma Distributed at 5% Significance Level	Data appear Normal at 5% Significance Level	Data appear Normal at 5% Significance Level	Data appear Normal at 5% Significance Level	Data do not follow a Discernable Distribution (0.05)	Data appear Normal at 5% Significance Level	Data appear Normal at 5% Significance Level	Data appear Gamma Distributed at 5% Significance Level	Data appear Gamma Distributed at 5% Significance Level	Data appear Normal at 5% Significance Level	Data appear Gamma Distributed at 5% Significance Level	Data appear Normal at 5% Significance Level	Data appear Normal at 5% Significance Level
Non-Parametric Background Statistics																
90% Percentile	**3.644**	**715.2**	**1.416**	**257.6**	**0.313**	**14.94**	**4.258**	**26.72**	**14.06**	**187.8**	**0.482**	**1.39**	**12.6**	**1.744**	**43.12**	**37.4**
95% Percentile	3.802	751.6	1.636	325.4	0.33	15.4	4.682	28	14.84	204	0.643	1.472	13.12	2.324	45.18	43.18
99% Percentile	3.899	774.2	1.869	445.7	0.358	15.74	5.056	131.9	16.64	212.2	0.934	1.946	14.42	2.597	46.06	50.28
95% UTL with 90% Coverage																
Order Statistic	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Achieved CC	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953
UTL	**3.87**	**754**	**1.66**	**369**	**0.338**	**15.6**	**4.89**	**28.8**	**15.2**	**210**	**0.713**	**1.5**	**13.2**	**2.46**	**45.7**	**43.3**
95% BCA Bootstrap UTL with 90% Coverage	3.878	754.8	1.718	390.3	0.338	15.6	4.936	57.44	15.6	210	0.713	1.568	13.38	2.46	45.8	45
95% Percentile Bootstrap UTL with 90% Coverage	3.878	759.6	1.718	369	0.344	15.64	4.89	57.44	15.6	210.6	0.774	1.624	13.38	2.46	45.8	45.24
95% UPL	3.89	768	1.805	422.3	0.352	15.7	5.005	100.4	16.2	211.5	0.867	1.81	14.05	2.555	45.95	48.15
95% Chebyshev UPL	5.639	1270	2.506	559.8	0.54	22	6.6	151.6	24.31	321.6	1.208	2.453	18.84	3.541	64.21	65.44
Upper Limit Based upon IQR	4.66	959	1.831	322	0.411	19.75	5.15	32.15	17.95	215.8	0.581	1.732	13.85	2.324	54.9	48.5

Washington Closure Hanford

CALCULATION SHEET

Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 9 of 35

600-207 Coal Ash
ProUCL 4.1 Generated Analysis of 90th percentile statistic

Nonparametric Background Statistics for Full Data Sets

User Selected Options	
From File	T:\COAL ASH Sampling\Calcs\ProUCL results for calcs\All coal ash results w averaging.xls.wst
Full Precision	OFF
Confidence Coefficient	95%
Coverage	90%
Number of Bootstrap Operations	2000

	Arsenic, 600-207	Barium, 600-207	Beryllium, 600-207	Boron, 600-207	Cadmium, 600-207	Chromium, 600-207	Cobalt, 600-207	Copper, 600-207	Lead, 600-207	Manganese, 600-207	Mercury, 600-207	Molybdenum, 600-207	Nickel, 600-207	Selenium, 600-207	Vanadium, 600-207	Zinc, 600-207
Some Non-Parametric Statistics																
Number of Valid Observations	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
Number of Distinct Observations	29	29	28	27	26	28	28	27	29	27	14	28	25	27	27	25
Minimum	3.39	379	0.46	31.2	0.122	6.81	3.21	16.9	4.23	205	0.009	1.01	7.95	0.898	25.4	15.8
Maximum	10.09	1230	1.445	146	0.223	16.1	7.11	46.8	14.5	509	0.046	3.13	19.3	2.06	78.65	27.1
Second Largest	8.54	1060	1.185	137	0.211	12.9	6.07	37	9.3	486	0.042	2.575	16.7	2	50.1	26.9
Mean	5.413	762.8	0.819	61.36	0.175	9.964	4.665	23.81	6.076	308.3	0.019	1.788	12.46	1.516	37.26	21.19
Geometric Mean	5.241	742.2	0.789	57.26	0.173	9.784	4.566	23.17	5.875	298.5	0.0174	1.73	12.12	1.485	36.17	20.96
First Quartile	4.56	645	0.629	44.7	0.153	8.29	3.94	20.1	5.2	252	0.015	1.42	10.3	1.33	32	19.1
Median	5.19	695	0.772	57.1	0.178	9.33	4.69	22.2	5.47	280	0.015	1.74	11.9	1.5	33.2	21.6
Third Quartile	6.19	915	0.969	63.7	0.189	11.4	5.46	25.2	6.315	359	0.021	2.11	14.5	1.76	40.8	22.9
SD	1.477	182.1	0.232	26.79	0.0258	2.01	0.988	6.275	1.932	82.91	0.0093	0.479	2.994	0.303	10.33	3.205
Variance	2.18	33173	0.054	717.6	0.00066313	4.038	0.975	39.37	3.733	6874	0.000086401	0.23	8.963	0.0919	106.7	10.27
Coefficient of Variation	0.273	0.239	0.284	0.437	0.148	0.202	0.212	0.264	0.318	0.269	0.49	0.268	0.24	0.2	0.277	0.151
Skewness	1.296	0.611	0.772	2.057	-0.309	1.048	0.436	2.122	3.245	0.888	1.737	0.808	0.43	-0.0316	2.367	0.142
Mean of Log-Transformed data	1.656	6.61	-0.237	4.048	-1.757	2.281	1.519	3.143	1.771	5.699	-4.054	0.548	2.495	0.396	3.588	3.042
SD of Log-Transformed data	0.255	0.24	0.276	0.357	0.154	0.192	0.211	0.226	0.244	0.255	0.407	0.26	0.24	0.209	0.237	0.152

	Arsenic, 600-207	Barium, 600-207	Beryllium, 600-207	Boron, 600-207	Cadmium, 600-207	Chromium, 600-207	Cobalt, 600-207	Copper, 600-207	Lead, 600-207	Manganese, 600-207	Mercury, 600-207	Molybdenum, 600-207	Nickel, 600-207	Selenium, 600-207	Vanadium, 600-207	Zinc, 600-207
	Data appear Gamma Distributed at 5% Significance Level	Data appear Normal at 5% Significance Level	Data appear Normal at 5% Significance Level	Data do not follow a Discernable Distribution (0.05)	Data appear Normal at 5% Significance Level	Data appear Gamma Distributed at 5% Significance Level	Data appear Normal at 5% Significance Level	Data Follow Appr. Gamma Distribution at 5% Significance Level)	Data do not follow a Discernable Distribution (0.05)	Data Follow Appr. Gamma Distribution at 5% Significance Level)	Data do not follow a Discernable Distribution (0.05)	Data appear Normal at 5% Significance Level	Data appear Normal at 5% Significance Level	Data appear Normal at 5% Significance Level	Data do not follow a Discernable Distribution (0.05)	Data appear Normal at 5% Significance Level
Non-Parametric Background Statistics																
90% Percentile	**6.686**	**989.2**	**1.124**	**87.8**	**0.205**	**12.04**	**5.894**	**29.95**	**7.122**	**415**	**0.0299**	**2.342**	**16.7**	**1.926**	**45.47**	**25.44**
95% Percentile	7.888	1048	1.183	123.4	0.211	12.86	6.014	34.26	8.464	465.6	0.0402	2.485	16.7	1.98	48.52	26.54
99% Percentile	9.656	1182	1.372	143.5	0.219	15.2	6.819	44.06	13.04	502.6	0.0449	2.975	18.57	2.043	70.66	27.04
95% UTL with 90% Coverage																
Order Statistic	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Achieved CC	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953
UTL	**8.54**	**1060**	**1.185**	**137**	**0.211**	**12.9**	**6.07**	**37**	**9.3**	**486**	**0.042**	**2.575**	**16.7**	**2**	**50.1**	**26.9**
95% BCA Bootstrap UTL with 90% Coverage	8.54	1070	1.233	137	0.213	13.54	6.278	37	9.3	486	0.042	2.575	16.7	2	52.65	26.9
95% Percentile Bootstrap UTL with 90% Coverage	8.85	1070	1.237	138.8	0.213	13.54	6.278	37	10.34	490.6	0.0428	2.686	17.22	2.012	52.65	26.94
95% UPL	9.315	1145	1.315	141.5	0.217	14.5	6.59	41.9	11.9	497.5	0.044	2.853	18	2.03	64.38	27
95% Chebyshev UPL	11.96	1570	1.849	180.1	0.289	18.87	9.043	51.62	14.64	675.9	0.0602	3.913	25.73	2.86	83.05	35.4
Upper Limit Based upon IQR	8.635	1320	1.479	92.2	0.243	16.07	7.74	32.85	7.988	519.5	0.03	3.145	20.8	2.405	54	28.6

CALCULATION SHEET

Washington Closure Hanford
Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 10 of 35

Coal Ash Data from all Sample Areas
ProUCL 4.1 Generated Analysis of Kruskal-Wallis Test of Median Equality

Nonparametric One Way ANOVA (Kruskal-Wallis Test)

User Selected Options	
Date/Time of Computation	12/8/2011 8:06:56 AM
From File	ANOVA_NP
Full Precision	OFF

Arsenic

Group	Obs	Median	Ave Rank	Z
1	29	4.21	85.07	1.73
2	29	3.87	78.97	0.855
3	29	2.91	46.28	-3.831
4	29	3	42.34	-4.394
5	29	5.19	112.3	5.64
Overall	145	3.43	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
55.61	4	2.416E-11	
55.62	4	2.412E-11	(Adjusted for Ties)

Barium

Group	Obs	Median	Ave Rank	Z
1	29	1000	95.45	3.218
2	29	1030	102.7	4.256
3	29	760	69.91	-0.442
4	29	492	28.98	-6.31
5	29	695	67.97	-0.722
Overall	145	760	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
55.2	4	2.955E-11	
55.2	4	2.953E-11	(Adjusted for Ties)

Beryllium

Group	Obs	Median	Ave Rank	Z
1	29	1.31	103.1	4.313
2	29	1.31	100.2	3.9
3	29	0.872	57.07	-2.284
4	29	0.948	64.55	-1.211
5	29	0.772	40.09	-4.718
Overall	145	1.085	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
50.2	4	3.278E-10	
50.21	4	3.269E-10	(Adjusted for Ties)

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0

Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/20/11

Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 11 of 35

Coal Ash Data from all Sample Areas

ProUCL 4.1 Generated Analysis of Kruskal-Wallis Test of Median Equality

Nonparametric One Way ANOVA (Kruskal-Wallis Test)

User Selected Options	
Date/Time of Computation	12/8/2011 8:06:56 AM
From File	ANOVA_NP
Full Precision	OFF

Boron

Group	Obs	Median	Ave Rank	Z
1	29	169	90.93	2.57
2	29	155	88.16	2.172
3	29	84.5	59.12	-1.99
4	29	177	94.53	3.087
5	29	57.1	32.26	-5.84
Overall	145	135	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
47.14	4	1.4287E-09	
47.14	4	1.4277E-09	(Adjusted for Ties)

Cadmium

Group	Obs	Median	Ave Rank	Z
1	29	0.243	93.38	2.921
2	29	0.227	82.22	1.322
3	29	0.198	65.4	-1.09
4	29	0.237	82.84	1.411
5	29	0.178	41.16	-4.565
Overall	145	0.211	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
27.44	4	0.0000162	
27.44	4	1.6174E-05	(Adjusted for Ties)

Chromium

Group	Obs	Median	Ave Rank	Z
1	29	10.4	74.66	0.237
2	29	8.72	53.67	-2.771
3	29	10.6	70.17	-0.405
4	29	12	102.1	4.164
5	29	9.33	64.45	-1.226
Overall	145	10.4	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
21.39	4	0.00026459	
21.4	4	0.00026408	(Adjusted for Ties)

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0

Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson JRD **Date** 12/20/11

Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 12 of 35

Coal Ash Data from all Sample Areas

ProUCL 4.1 Generated Analysis of Kruskal-Wallis Test of Median Equality

Nonparametric One Way ANOVA (Kruskal-Wallis Test)

User Selected Options	
Date/Time of Computation	12/8/2011 8:06:56 AM
From File	ANOVA_NP
Full Precision	OFF

Cobalt

Group	Obs	Median	Ave Rank	Z
1	29	4.42	68.79	-0.603
2	29	4.88	89.24	2.328
3	29	6.78	89.48	2.363
4	29	3.28	38.59	-4.933
5	29	4.69	78.9	0.845
Overall	145	4.39	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
29.13	4	7.3468E-06	
29.13	4	7.3417E-06	(Adjusted for Ties)

Copper

Group	Obs	Median	Ave Rank	Z
1	29	25.6	87.07	2.017
2	29	23.1	61.93	-1.587
3	29	30.9	97.84	3.561
4	29	22.1	55.83	-2.462
5	29	22.2	62.33	-1.53
Overall	145	24.3	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
22.13	4	0.00018844	
22.14	4	0.00018821	(Adjusted for Ties)

Lead

Group	Obs	Median	Ave Rank	Z
1	29	6.28	85.17	1.745
2	29	4.05	58.81	-2.034
3	29	3.75	40.43	-4.669
4	29	9.66	108.7	5.111
5	29	5.47	71.93	-0.153
Overall	145	5.8	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
44.1	4	6.1192E-09	
44.1	4	6.1177E-09	(Adjusted for Ties)

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0

Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/20/11

Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 13 of 35

Coal Ash Data from all Sample Areas

ProUCL 4.1 Generated Analysis of Kruskal-Wallis Test of Median Equality

Nonparametric One Way ANOVA (Kruskal-Wallis Test)

User Selected Options	
Date/Time of Computation	12/8/2011 8:06:56 AM
From File	ANOVA_NP
Full Precision	OFF

Manganese

Group	Obs	Median	Ave Rank	Z
1	29	157	67.28	-0.821
2	29	244	93.88	2.993
3	29	122	49.76	-3.332
4	29	103.5	41.71	-4.486
5	29	280	112.4	5.645
Overall	145	172	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
58.17	4	7.019E-12	
58.17	4	7.014E-12	(Adjusted for Ties)

Mercury

Group	Obs	Median	Ave Rank	Z
1	29	0.069	96.72	3.401
2	29	0.048	67.24	-0.825
3	29	0.035	60.41	-1.804
4	29	0.132	114.2	5.907
5	29	0.015	26.41	-6.678
Overall	145	0.053	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
75.99	4	1.221E-15	
76.12	4	1.11E-15	(Adjusted for Ties)

Molybdenum

Group	Obs	Median	Ave Rank	Z
1	29	1.47	78.29	0.759
2	29	1.46	81.69	1.246
3	29	1.41	69.38	-0.519
4	29	0.993	36.69	-5.205
5	29	1.74	98.95	3.72
Overall	145	1.4	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
34.66	4	5.4595E-07	
34.66	4	5.4519E-07	(Adjusted for Ties)

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0

Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/20/11

Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 14 of 35

Coal Ash Data from all Sample Areas

ProUCL 4.1 Generated Analysis of Kruskal-Wallis Test of Median Equality

Nonparametric One Way ANOVA (Kruskal-Wallis Test)

User Selected Options	
Date/Time of Computation	12/8/2011 8:06:56 AM
From File	ANOVA_NP
Full Precision	OFF

Nickel

Group	Obs	Median	Ave Rank	Z
1	29	9.93	62.9	-1.448
2	29	9.76	64.33	-1.243
3	29	14.4	94.64	3.102
4	29	8.91	52.05	-3.003
5	29	11.9	91.09	2.593
Overall	145	10.3	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
23.2	4	0.00011541	
23.2	4	0.00011528	(Adjusted for Ties)

Selenium

Group	Obs	Median	Ave Rank	Z
1	29	0.476	58.64	-2.059
2	29	0.357	42.81	-4.328
3	29	0.348	46.71	-3.769
4	29	1.1	98.91	3.715
5	29	1.5	117.9	6.441
Overall	145	0.762	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
73.96	4	3.331E-15	
73.97	4	3.331E-15	(Adjusted for Ties)

Vanadium

Group	Obs	Median	Ave Rank	Z
1	29	32.5	67.59	-0.776
2	29	35.5	68.71	-0.615
3	29	44.1	90.41	2.496
4	29	34.5	66.31	-0.959
5	29	33.2	71.98	-0.146
Overall	145	35.9	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
6.522	4	0.163	
6.523	4	0.163	(Adjusted for Ties)

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0

Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/20/11

Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 15 of 35

Coal Ash Data from all Sample Areas

ProUCL 4.1 Generated Analysis of Kruskal-Wallis Test of Median Equality

Nonparametric One Way ANOVA (Kruskal-Wallis Test)

User Selected Options	
Date/Time of Computation	12/8/2011 8:06:56 AM
From File	ANOVA_NP
Full Precision	OFF

Zinc

Group	Obs	Median	Ave Rank	Z
1	29	36.3	99.43	3.789
2	29	26.4	74.86	0.267
3	29	24.2	64.64	-1.199
4	29	28.5	83.57	1.515
5	29	21.6	42.5	-4.372
Overall	145	25.8	73	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
29.82	4	5.3296E-06	
29.82	4	5.3242E-06	(Adjusted for Ties)

Coal Ash Data for Antimony from Three Sample Areas

ProUCL 4.1 Generated Analysis of Kruskal-Wallis Test of Median Equality

Nonparametric One Way ANOVA (Kruskal-Wallis Test)

User Selected Options	
Date/Time of Computation	12/8/2011 8:01:56 AM
From File	ANOVA_NP
Full Precision	OFF

Antimony

Group	Obs	Median	Ave Rank	Z
1	29	0.29	51.62	1.99
2	29	0.285	50.31	1.648
3	29	0.255	30.07	-3.638
Overall	87	0.28	44	

K-W (H-Stat)	DOF	P-Value	(Approx. Chisquare)
13.27	2	0.00131	
13.3	2	0.00129	(Adjusted for Ties)

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations

Date 12/20/11
Job No. 14655

Calc. No. 0100X-CA-V0073
Checked J. R. Davidson JRD

Rev. No. 0
Date 12/20/11
Sheet No. 16 of 35

126-B-1 Coal Ash Sample Results

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-01	J1HHV4	4/27/11	0.588	U	0.59	5.85		0.98	1970		0.49	1.93		0.20	109		1.96	0.198		0.20	8.33		0.20	8.22		1.96	39.2		0.98	2.89		0.49
100-B-02	J1HHV5	4/27/11	0.265	B	0.52	4.21		0.86	1660		0.43	1.44		0.17	88.4		1.72	0.311		0.17	8.03		0.17	4.49		1.72	22.7		0.86	4.19		0.43
100-B-03	J1HHV6	4/27/11	0.566	U	0.57	4.62		0.94	1620		0.47	1.21		0.19	130		1.89	0.293		0.19	9.87		0.19	6.47		1.89	32.0		0.94	4.86		0.5
100-B-04	J1HHV7	4/27/11	0.588	U	0.59	2.41		0.98	793		0.49	1.15		0.20	161		1.96	0.175	B	0.20	8.46		0.20	4.68		1.96	35.4		0.98	35.8		0.5
100-B-05	J1HHV8	4/27/11	0.304	B	0.57	4.46		0.94	824		0.47	1.23		0.19	328		1.89	0.506		0.19	16.2		0.19	4.12		1.89	98.3		0.94	13.5		0.5
100-B-06	J1HHV9	4/27/11	0.566	U	0.57	5.37		0.94	1450		0.47	1.32		0.19	108		1.89	0.243		0.19	9.83		0.19	7.07		1.89	28.6		0.94	3.84		0.5
100-B-07	J1HHW0	4/27/11	0.536	U	0.54	3.43		0.89	1160		0.45	1.16		0.18	76.5		1.79	0.224		0.18	8.47		0.18	5.31		1.79	24.6		0.89	5.55		0.5
100-B-08	J1HHW1	4/27/11	0.517	U	0.52	4.76		0.86	2060		0.43	1.86		0.17	277		1.72	0.215		0.17	8.17		0.17	7.01		1.72	39.5		0.86	2.85		0.43
100-B-09	J1HHW2	8/23/11	0.469	U	0.47	4.28		0.78	1200		0.39	1.48		0.16	250		1.56	0.205		0.16	12.5		0.16	5.41		1.56	32.4		0.78	6.08		0.39
100-B-10	J1HHW3	4/27/11	0.566	U	0.57	2.98		0.94	597		0.47	1.03		0.19	169		1.89	0.117	B	0.19	8.75		0.19	4.42		1.89	28.8		0.94	5.59		0.47
100-B-11	J1HHW4	4/27/11	0.577	U	0.58	3.20		0.96	958		0.48	1.56		0.19	265		1.92	0.221		0.19	12.9		0.19	3.10		1.92	23.7		0.96	6.05		0.48
100-B-12	J1HHW5	4/27/11	0.577	U	0.58	2.63		0.96	696		0.48	1.54		0.19	256		1.92	0.167	B	0.19	12.7		0.19	2.98		1.92	22.2		0.96	5.80		0.48
100-B-13	J1HHW6	4/27/11	0.505	B	0.54	7.36		0.89	2340		0.45	2.39		0.18	93.8		1.79	0.518		0.18	8.91		0.18	4.87		1.79	25.4		0.89	3.72		0.45
100-B-14	J1HHW7	8/23/11	0.600	U	0.60	8.45		1.00	1170		0.50	1.24		0.20	169		2.00	0.36		0.20	11.5		0.20	4.59		2.00	27.3		1.00	7.72		0.50
100-B-15	J1HHW8	4/27/11	0.545	U	0.55	3.01		0.91	792		0.46	1.17		0.18	211		1.82	0.182	B	0.18	10.3		0.18	4.88		1.82	27.4		0.91	6.73		0.46
Duplicate of J1HHW8	J1HJ04	4/27/11	1.76	U	1.76	3.41		2.94	753		1.47	1.19		0.59	240		5.88	0.240	B	0.59	11.3		0.59	4.56	B	5.88	26.8		2.94	7.10		1.47
100-B-16	J1HHW9	4/26/11	0.376	U	0.46	4.07		0.76	1360		0.38	1.50		0.15	129		1.52	0.182		0.15	6.74		0.15	3.55		1.52	19.1		0.76	3.18		0.38
100-B-17	J1HHX0	4/27/11	0.484	UJ	0.48	2.50		0.81	556		0.40	1.31		0.16	269		1.61	0.221		0.16	10.6		0.16	2.51		1.61	21.9		0.81	6.28		0.40
100-B-18	J1HHX1	4/27/11	0.818	UJB	1.58	5.69		2.63	599		1.32	1.36		0.53	156		5.26	0.337	B	0.53	10.5		0.53	3.97	B	5.26	25.6		2.63	6.58		1.32
100-B-19	J1HHX2	8/23/11	0.469	U	0.47	2.74		0.78	783		0.39	1.16		0.16	205		1.56	0.265		0.16	9.66		0.16	2.79		1.56	20.9		0.78	10.7		0.39
100-B-20	J1HHX3	8/23/11	0.588	U	0.59	3.40		0.98	866		0.49	1.22		0.20	194		1.96	0.187	B	0.20	11.1		0.20	4.88		1.96	29.1		0.98	5.77		0.49
100-B-21	J1HHX4	4/25/11	0.918	UJB	1.55	4.76		2.59	406		1.29	1.12		0.52	145		5.17	0.914		0.52	14.4		0.52	3.06	B	5.17	25.0		2.59	18.4		1.29
100-B-22	J1HHX5	4/26/11	0.416	UJB	0.57	1.33		0.94	184		0.47	0.632		0.19	66.3		1.89	0.096	B	0.19	4.76		0.19	1.00	B	1.89	8.60		0.94	6.50		0.47
100-B-23	J1HHX6	4/26/11	1.91	J	1.70	9.59		2.83	2250		1.42	3.22		0.57	327		5.66	0.899		0.57	25.5		0.57	15.1		5.66	94.3		2.83	19.0		1.42
100-B-24	J1HHX7	4/26/11	1.00	UJB	1.76	5.42		2.94	1310		1.47	1.60		0.59	192		5.88	0.219	B	0.59	13.3		0.59	5.84	B	5.88	36.7		2.94	10.6		1.47
100-B-25	J1HHX8	4/25/11	1.69	BJ	1.70	10.3		2.83	1420		1.42	1.65		0.57	107		5.66	0.385	B	0.57	11.2		0.57	4.66	B	5.66	28.4		2.83	13.4		1.42
Duplicate of J1HHX8	J1HJ03	4/25/11	1.64	U	1.64	5.46		2.73	907		1.36	1.04		0.55	85.5		5.45	0.278	B	0.55	8.34		0.55	4.12	B	5.45	20.2		2.73	9.95		1.36
100-B-26	J1HHX9	8/23/11	0.441	U	0.44	3.14		0.74	1000		0.37	1.06		0.15	174		1.47	0.354		0.15	12.3		0.15	2.18		1.47	17.7		0.74	12.2		0.37
100-B-27	J1HJ00	4/27/11	1.67	U	1.67	3.19		2.78	497		1.39	0.894		0.56	92.6		5.56	0.397	B	0.56	10.4		0.56	5.56	U	5.56	22.0		2.78	9.69		1.39
100-B-28	J1HJ01	8/23/11	0.259	B	0.48	4.16		0.79	969		0.40	1.18		0.16	267		1.59	0.373		0.16	13.2		0.16	2.69		1.59	26.2		0.79	15.9		0.40
100-B-29	J1HJ02	8/23/11	0.550		0.44	5.94		0.73	1360		0.36	1.98		0.15	68.1		1.45	0.251		0.15	7.66		0.15	4.02		1.45	22.8		0.73	3.87		0.36

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 17 of 35

126-B-1 Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg
100-B-01	J1HHV4	4/27/11	0.295	5.85	1970	1.93	109	0.198	8.33	8.22	39.2	2.89
100-B-02	J1HHV5	4/27/11	0.265	4.21	1660	1.44	88.4	0.311	8.03	4.49	22.7	4.19
100-B-03	J1HHV6	4/27/11	0.285	4.62	1620	1.21	130	0.293	9.87	6.47	32.0	4.86
100-B-04	J1HHV7	4/27/11	0.295	2.41	793	1.15	161	0.175	8.46	4.68	35.4	35.8
100-B-05	J1HHV8	4/27/11	0.304	4.46	824	1.23	328	0.506	16.2	4.12	98.3	13.5
100-B-06	J1HHV9	4/27/11	0.285	5.37	1450	1.32	108	0.243	9.83	7.07	28.6	3.84
100-B-07	J1HHW0	4/27/11	0.270	3.43	1160	1.16	76.5	0.224	8.47	5.31	24.6	5.55
100-B-08	J1HHW1	4/27/11	0.260	4.76	2060	1.86	277	0.215	8.17	7.01	39.5	2.85
100-B-09	J1HHW2	8/23/11	0.235	4.28	1200	1.48	250	0.205	12.5	5.41	32.4	6.08
100-B-10	J1HHW3	4/27/11	0.285	2.98	597	1.03	169	0.117	8.75	4.42	28.8	5.59
100-B-11	J1HHW4	4/27/11	0.290	3.20	958	1.56	265	0.221	12.9	3.10	23.7	6.05
100-B-12	J1HHW5	4/27/11	0.290	2.63	696	1.54	256	0.167	12.7	2.98	22.2	5.80
100-B-13	J1HHW6	4/27/11	0.505	7.36	2340	2.39	93.8	0.518	8.91	4.87	25.4	3.72
100-B-14	J1HHW7	8/23/11	0.300	8.45	1170	1.24	169	0.360	11.5	4.59	27.3	7.72
100-B-15	J1HHW8/ J1HJ04	4/27/11	0.578	3.21	773	1.18	226	0.211	10.8	4.72	27.1	6.92
100-B-16	J1HHW9	4/26/11	0.230	4.07	1360	1.50	129	0.182	6.74	3.55	19.1	3.18
100-B-17	J1HHX0	4/27/11	0.240	2.50	556	1.31	269	0.221	10.6	2.51	21.9	6.28
100-B-18	J1HHX1	4/27/11	0.790	5.69	599	1.36	156	0.337	10.5	3.97	25.6	6.58
100-B-19	J1HHX2	8/23/11	0.235	2.74	783	1.16	205	0.265	9.66	2.79	20.9	10.7
100-B-20	J1HHX3	8/23/11	0.295	3.40	866	1.22	194	0.187	11.1	4.88	29.1	5.77
100-B-21	J1HHX4	4/25/11	0.775	4.76	406	1.12	145	0.914	14.4	3.06	25.0	18.4
100-B-22	J1HHX5	4/26/11	0.285	1.33	184	0.632	66.3	0.096	4.76	1.00	8.60	6.50
100-B-23	J1HHX6	4/26/11	1.91	9.59	2250	3.22	327	0.899	25.5	15.1	94.3	19.0
100-B-24	J1HHX7	4/26/11	0.880	5.42	1310	1.60	192	0.219	13.3	5.84	36.7	10.6
100-B-25	J1HHX8/J 1HJ03	4/25/11	1.26	7.88	1164	1.35	96.3	0.332	9.77	4.39	24.3	11.7
100-B-26	J1HHX9	8/23/11	0.220	3.14	1000	1.06	174	0.354	12.3	2.18	17.7	12.2
100-B-27	J1HJ00	4/25/11	0.835	3.19	497	0.89	92.6	0.397	10.4	2.78	22.0	9.69
100-B-28	J1HJ01	8/23/11	0.259	4.16	969	1.18	267	0.373	13.2	2.69	26.2	15.9
100-B-29	J1HJ02	4/27/11	0.550	5.94	1360	1.98	68.1	0.251	7.66	4.02	22.8	3.87

CALCULATION SHEET

Washington Closure Hanford
Originator H. M. Sulloway
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations

Date 12/20/11
Job No. 14655

Calc. No. 0100X-CA-V0073
Checked J. R. Davidson JRD

Rev. No. 0
Date 12/20/11
Sheet No. 18 of 35

126-B-1 Coal Ash Sample Results

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-01	J1HHV4	4/27/11	335		4.90	0.072		0.03	2.40		1.96	11.8		3.92	0.294	U	0.29	64.0		2.45	20.4		9.80
100-B-02	J1HHV5	4/27/11	296		4.31	0.057		0.02	1.72	B	1.72	9.09		3.45	0.264		0.26	30.6		2.16	41.8		8.62
100-B-03	J1HHV6	4/27/11	396		4.72	0.060		0.03	1.47	B	1.89	15.1		3.77	0.283	U	0.28	48.0		2.36	55.5		9.43
100-B-04	J1HHV7	4/27/11	94.3		4.90	0.062		0.03	1.22	B	1.96	9.93		3.92	0.332		0.29	37.7		2.45	38.9		9.80
100-B-05	J1HHV8	4/27/11	199		4.72	0.861		0.02	2.88		1.89	15.0		3.77	0.479		0.28	33.4		2.36	80.7		9.43
100-B-06	J1HHV9	4/27/11	348		4.72	0.064		0.03	34.7		1.89	12.3		3.77	0.497		0.28	48.7		2.36	36.0		9.43
100-B-07	J1HHW0	4/27/11	218		4.46	0.065		0.03	1.16	B	1.79	10.5		3.57	0.268	U	0.27	38.4		2.23	34.1		8.93
100-B-08	J1HHW1	4/27/11	213		4.31	0.046		0.03	2.51		1.72	15.8		3.45	0.329		0.26	54.1		2.16	23.7		8.62
100-B-09	J1HHW2	8/23/11	157		3.91	0.292		0.02	2.26		1.56	13.0		3.12	0.495		0.23	43.7		1.95	42.5		7.81
100-B-10	J1HHW3	4/27/11	104		4.72	0.049		0.03	1.08	B	1.89	9.93		3.77	0.618		0.28	39.3		2.36	13.6		9.43
100-B-11	J1HHW4	4/27/11	68.8		4.81	0.059		0.02	1.42	B	1.92	8.27		3.85	0.323		0.29	32.1		2.40	26.8		9.62
100-B-12	J1HHW5	4/27/11	60.9		4.81	0.062		0.03	1.34	B	1.92	8.38		3.85	0.409		0.29	30.7		2.40	29.8		9.62
100-B-13	J1HHW6	4/27/11	521		4.46	0.075		0.03	2.21		1.79	9.05		3.57	0.414		0.27	32.5		2.23	54.5		8.93
100-B-14	J1HHW7	8/23/11	182		5.00	0.196		0.03	1.63	B	2.00	10.6		4.00	1.26		0.30	37.0		2.50	47.6		10.0
100-B-15	J1HHW8	4/27/11	94.8		4.55	0.060		0.03	1.59	B	1.82	10.3		3.64	0.443		0.27	35.7		2.27	26.9		9.09
Duplicate of J1HHW8	J1HJ04	4/27/11	107		14.7	0.077		0.03	1.42	B	5.88	10.3	B	11.8	0.882	U	0.88	37.4		7.35	48.6		29.4
100-B-16	J1HHW9	4/26/11	283		3.79	0.022	B	0.03	1.33	B	1.52	7.12		3.03	0.361		0.23	24.6		1.89	24.6		7.58
100-B-17	J1HHX0	4/27/11	57.5		4.03	0.053		0.03	1.17	B	1.61	7.02		3.23	0.331		0.24	27.3		2.02	32.4		8.06
100-B-18	J1HHX1	4/27/11	145		13.2	0.037		0.03	1.47	B	5.26	9.39	B	10.5	0.789	U	0.79	31.4		6.58	37.3		26.3
100-B-19	J1HHX2	8/23/11	109		3.91	0.080		0.02	1.20	B	1.56	7.20		3.12	0.798		0.23	28.3		1.95	36.3		7.81
100-B-20	J1HHX3	8/23/11	102		4.90	0.200		0.03	1.85	B	1.96	11.2		3.92	0.648		0.29	38.2		2.45	21.8		9.80
100-B-21	J1HHX4	4/25/11	116		12.9	0.338		0.03	0.752	B	5.17	9.09	B	10.3	2.00		0.78	29.3		6.47	104		25.9
100-B-22	J1HHX5	4/26/11	13.1		4.72	0.043		0.03	0.314	B	1.89	3.02	B	3.77	0.664		0.28	9.73		2.36	9.43	B	9.43
100-B-23	J1HHX6	4/26/11	344		14.2	0.146		0.03	3.85	B	5.66	31.5		11.3	1.36		0.85	113		7.08	94.8		28.3
100-B-24	J1HHX7	4/26/11	159		14.7	0.087		0.03	1.67	B	5.88	13.8		11.8	0.882	U	0.88	46.3		7.35	28.0	B	29.4
100-B-25	J1HHX8	4/25/11	391		14.2	0.115		0.03	1.14	B	5.66	10.5	B	11.3	1.58		0.85	36.2		7.08	38.0		28.3
Duplicate of J1HHX8	J1HJ03	4/25/11	202		13.6	0.120		0.03	0.972	B	5.45	9.70	B	10.9	1.03		0.82	27.6		6.82	33.5		27.3
100-B-26	J1HHX9	8/23/11	71.2		3.68	0.092		0.03	0.734	B	1.47	6.63		2.94	1.22		0.22	25.9		1.84	41.8		7.35
100-B-27	J1HJ00	4/27/11	85.0		13.9	0.235		0.03	0.654	B	5.56	6.92	B	11.1	0.876		0.83	28.9		6.94	43.4		27.8
100-B-28	J1HJ01	8/23/11	83.5		3.97	0.195		0.03	1.10	B	1.59	8.14		3.17	1.44		0.24	29.1		1.98	46.6		7.94
100-B-29	J1HJ02	8/23/11	358		3.62	0.052		0.03	1.69		1.45	7.70		2.90	0.476		0.22	30.6		1.81	29.8		7.25

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0

Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson JRD **Date** 12/20/11

Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 19 of 35

126-B-1 Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Manganese mg/kg		Mercury mg/kg		Molybdenum mg/kg		Nickel mg/kg		Selenium mg/kg		Vanadium mg/kg		Zinc mg/kg	
100-B-01	J1HHV4	4/27/11	335		0.072		2.40		11.8		0.145		64.0		20.4	
100-B-02	J1HHV5	4/27/11	296		0.057		1.72		9.09		0.264		30.6		41.8	
100-B-03	J1HHV6	4/27/11	396		0.060		1.47		15.1		0.140		48.0		55.5	
100-B-04	J1HHV7	4/27/11	94.3		0.062		1.22		9.93		0.332		37.7		38.9	
100-B-05	J1HHV8	4/27/11	199		0.861		2.88		15.0		0.479		33.4		80.7	
100-B-06	J1HHV9	4/27/11	348		0.064		34.7		12.3		0.497		48.7		36.0	
100-B-07	J1HHW0	4/27/11	218		0.065		1.16		10.5		0.135		38.4		34.1	
100-B-08	J1HHW1	4/27/11	213		0.046		2.51		15.8		0.329		54.1		23.7	
100-B-09	J1HHW2	8/23/11	157		0.292		2.26		13.0		0.495		43.7		42.5	
100-B-10	J1HHW3	4/27/11	104		0.049		1.08		9.93		0.618		39.3		13.6	
100-B-11	J1HHW4	4/27/11	68.8		0.059		1.42		8.27		0.323		32.1		26.8	
100-B-12	J1HHW5	4/27/11	60.9		0.062		1.34		8.38		0.409		30.7		29.8	
100-B-13	J1HHW6	4/27/11	521		0.075		2.21		9.05		0.414		32.5		54.5	
100-B-14	J1HHW7	8/23/11	182		0.196		1.63		10.6		1.26		37.0		47.6	
100-B-15	J1HHW8/ J1HJ04	4/27/11	101		0.069		1.51		10.3		0.442		36.6		37.8	
100-B-16	J1HHW9	4/26/11	283		0.022		1.33		7.12		0.361		24.6		24.6	
100-B-17	J1HHX0	4/27/11	57.5		0.053		1.17		7.02		0.331		27.3		32.4	
100-B-18	J1HHX1	4/27/11	145		0.037		1.47		9.39		0.395		31.4		37.3	
100-B-19	J1HHX2	8/23/11	109		0.080		1.20		7.20		0.798		28.3		36.3	
100-B-20	J1HHX3	8/23/11	102		0.200		1.85		11.2		0.648		38.2		21.8	
100-B-21	J1HHX4	4/25/11	116		0.338		0.752		9.09		2.00		29.3		104	
100-B-22	J1HHX5	4/26/11	13.1		0.043		0.314		3.02		0.664		9.73		9.43	
100-B-23	J1HHX6	4/26/11	344		0.146		3.85		31.5		1.36		113		94.8	
100-B-24	J1HHX7	4/26/11	159		0.087		1.67		13.8		0.440		46.3		28.0	
100-B-25	J1HHX8/J 1HJ03	4/25/11	297		0.118		1.06		10.1		1.31		31.9		35.8	
100-B-26	J1HHX9	8/23/11	71.2		0.092		0.734		6.63		1.22		25.9		41.8	
100-B-27	J1HJ00	4/25/11	85.0		0.235		0.654		6.92		0.876		28.9		43.4	
100-B-28	J1HJ01	8/23/11	83.5		0.195		1.10		8.14		1.44		29.1		46.6	
100-B-29	J1HJ02	4/27/11	358		0.052		1.69		7.70		0.476		30.6		29.8	

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 20 of 35

126-D-1 Coal ash sample results

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-01	J1J3W3	8/9/11	0.965		0.49	10.2		0.82	1770		0.41	2.50		0.16	50.1		1.64	0.430		0.16	7.31		0.16	3.86		1.64	23.2		0.82
100-D-02	J1J3W4	8/22/11	0.536	U	0.54	3.87		0.89	1030		0.45	1.36		0.18	197		1.79	0.227		0.18	7.31		0.18	6.04		1.79	19.6		0.89
100-D-03	J1J3W5	8/22/11	0.626		0.48	13.6		0.79	1470		0.40	2.51		0.16	33.6		1.59	0.371		0.16	6.61		0.16	2.31		1.59	19.9		0.79
100-D-04	J1J3W6	8/23/11	0.448	U	0.45	2.70		0.75	949		0.37	1.04		0.15	182		1.49	0.208		0.15	11.1		0.15	5.04		1.49	29.1		0.75
100-D-05	J1J3W7	8/23/11	0.497		0.48	16.7		0.79	1750		0.40	2.61		0.16	71.3		1.59	0.311		0.16	8.18		0.16	3.63		1.59	20.4		0.79
100-D-06	J1J3W8	8/22/11	0.441	U	0.44	2.41		0.74	1080		0.37	1.53		0.15	489		1.47	0.186		0.15	8.72		0.15	11.6		1.47	12.7		0.74
100-D-07	J1J3W9	8/22/11	0.517	U	0.52	5.42		0.86	1310		0.43	1.38		0.17	324		1.72	0.254		0.17	12.1		0.17	8.48		1.72	15.0		0.86
100-D-08	J1J3X0	8/11/11	0.470	B	0.58	2.32		0.96	1470		0.48	1.31		0.19	317		1.92	0.129	B	0.19	8.03		0.19	9.87		1.92	20.8		0.96
100-D-09	J1J3X1	8/11/11	0.419	B	0.53	2.38		0.88	781		0.44	1.70		0.18	155		1.75	0.127	B	0.18	5.70		0.18	4.88		1.75	9.66		0.88
100-D-10	J1J3X2	8/11/11	0.894		0.44	3.42		0.74	526		0.37	0.595		0.15	38.4		1.47	0.267		0.15	8.53		0.15	7.19		1.47	23.1		0.74
100-D-11	J1J3X3	8/23/11	0.268	B	0.46	7.17		0.77	1240		0.39	1.43		0.15	115		1.54	0.445		0.15	8.72		0.15	4.41		1.54	24.2		0.77
100-D-12	J1J3X4	8/9/11	0.510	B	0.53	4.37		0.88	907		0.44	1.41		0.18	269		1.75	0.165	B	0.18	12.5		0.18	4.12		1.75	28.3		0.88
100-D-13	J1J3X5	8/22/11	0.566	U	0.57	3.26		0.94	972		0.47	1.06		0.19	118		1.89	0.228		0.19	6.95		0.19	6.20		1.89	34.1		0.94
100-D-14	J1J3X6	8/22/11	0.588	U	0.59	5.23		0.98	1210		0.49	1.3		0.20	94.1		1.96	0.293		0.20	11.6		0.20	9.02		1.96	59.4		0.98
100-D-15	J1J3X7	8/11/11	0.532	B	0.60	4.02		1.00	1520		0.50	1.43		0.20	410		2.00	0.138	B	0.20	11.2		0.20	13.7		2.00	13.4		1.00
100-D-16	J1J3X8	8/22/11	0.500	U	0.50	2.27		0.83	703		0.42	0.763		0.17	141		1.67	0.256		0.17	6.36		0.17	6.30		1.67	12.8		0.83
100-D-17	J1J3X9	8/22/11	0.517	U	0.52	3.68		0.86	1110		0.43	1.20		0.17	170		1.72	0.447		0.17	9.89		0.17	5.18		1.72	20.9		0.86
Duplicate of J1J3X9	J1J413	8/22/11	0.566	U	0.57	3.30		0.94	1410		0.47	1.28		0.19	231		1.89	0.438		0.19	10.3		0.19	4.59		1.89	17.7		0.94
100-D-18	J1J400	8/9/11	0.659		0.53	5.51		0.88	1380		0.44	1.43		0.18	129		1.75	0.311		0.18	8.57		0.18	4.48		1.75	21.7		0.88
100-D-19	J1J401	8/11/11	0.605		0.48	4.61		0.79	743		0.40	1.21		0.16	142		1.59	0.176		0.16	12.6		0.16	4.59		1.59	31.0		0.79
100-D-20	J1J402	8/23/11	0.500	U	0.50	3.00		0.83	733		0.42	1.09		0.17	147		1.67	0.211		0.17	10.6		0.17	5.24		1.67	30.9		0.83
100-D-21	J1J403	8/23/11	0.566	U	0.57	3.38		0.94	843		0.47	1.31		0.19	227		1.89	0.267		0.19	8.21		0.19	5.25		1.89	24.8		0.94
100-D-22	J1J404	8/23/11	0.508	U	0.51	3.19		0.85	951		0.42	1.24		0.17	249		1.69	0.212		0.17	10.2		0.17	3.25		1.69	23.6		0.85
100-D-23	J1J405	8/23/11	0.536	U	0.54	2.99		0.89	734		0.45	1.03		0.18	91.1		1.79	0.203		0.18	9.26		0.18	4.49		1.79	25.5		0.89
100-D-24	J1J406	8/23/11	0.500	U	0.50	2.15		0.83	407		0.42	0.588		0.17	86.1		1.67	0.270		0.17	7.29		0.17	4.46		1.67	18.2		0.83
100-D-25	J1J407	8/23/11	0.517	U	0.52	3.13		0.86	941		0.43	1.37		0.17	312		1.72	0.216		0.17	10.8		0.17	2.81		1.72	21.9		0.86
100-D-26	J1J408	8/11/11	0.556		0.51	3.91		0.85	879		0.42	1.17		0.17	181		1.69	0.156	B	0.17	11.4		0.17	3.44		1.69	23.8		0.85
Duplicate of J1J408	J1J412	8/11/11	0.545	U	0.55	4.34		0.91	1140		0.46	1.42		0.18	218		1.82	0.190		0.18	12.9		0.18	3.48		1.82	28.0		0.91
100-D-27	J1J409	8/23/11	0.341	B	0.58	5.75		0.96	1110		0.48	1.72		0.19	234		1.92	0.179	B	0.19	7.72		0.19	3.97		1.92	16.5		0.96
100-D-28	J1J410	8/23/11	0.536	U	0.54	4.42		0.89	1330		0.45	1.35		0.18	118		1.79	0.192		0.18	8.30		0.18	8.56		1.79	34.8		0.89
100-D-29	J1J411	8/11/11	0.515	B	0.59	5.11		0.98	1320		0.49	1.25		0.20	238		1.96	0.230		0.20	12.5		0.20	4.61		1.96	28.5		0.98

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations

Date 12/20/11
Job No. 14655

Calc. No. 0100X-CA-V0073
Checked J. R. Davidson JRD

Rev. No. 0
Date 12/20/11
Sheet No. 21 of 35

126-D-1 Statistical Computation Input Data

	Sample Location	HEIS Number	Sample Date	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg
1												
2	100-D-01	J1J3W3	8/9/11	0.965	10.2	1770	2.50	50.1	0.430	7.31	3.86	23.2
3	100-D-02	J1J3W4	8/22/11	0.270	3.87	1030	1.36	197	0.227	7.31	6.04	19.6
4	100-D-03	J1J3W5	8/22/11	0.626	13.6	1470	2.51	33.6	0.371	6.61	2.31	19.9
5	100-D-04	J1J3W6	8/23/11	0.225	2.70	949	1.04	182	0.208	11.1	5.04	29.1
6	100-D-05	J1J3W7	8/23/11	0.497	16.7	1750	2.61	71.3	0.311	8.18	3.63	20.4
7	100-D-06	J1J3W8	8/22/11	0.220	2.41	1080	1.53	489	0.186	8.72	11.6	12.7
8	100-D-07	J1J3W9	8/22/11	0.260	5.42	1310	1.38	324	0.254	12.1	8.48	15.0
9	100-D-08	J1J3X0	8/11/11	0.470	2.32	1470	1.31	317	0.129	8.03	9.87	20.8
10	100-D-09	J1J3X1	8/11/11	0.419	2.38	781	1.70	155	0.127	5.70	4.88	9.66
11	100-D-10	J1J3X2	8/11/11	0.894	3.42	526	0.595	38.4	0.267	8.53	7.19	23.1
12	100-D-11	J1J3X3	8/23/11	0.268	7.17	1240	1.43	115	0.445	8.72	4.41	24.2
13	100-D-12	J1J3X4	8/9/11	0.510	4.37	907	1.41	269	0.165	12.5	4.12	28.3
14	100-D-13	J1J3X5	8/22/11	0.285	3.26	972	1.06	118	0.228	6.95	6.20	34.1
15	100-D-14	J1J3X6	8/22/11	0.295	5.23	1210	1.30	94.1	0.293	11.6	9.02	59.4
16	100-D-15	J1J3X7	8/11/11	0.532	4.02	1520	1.43	410	0.138	11.2	13.7	13.4
17	100-D-16	J1J3X8	8/22/11	0.250	2.27	703	0.763	141	0.256	6.36	6.30	12.8
18	100-D-17	J1J3X9/ J1J413	8/22/11	0.273	3.49	1260	1.24	201	0.443	10.1	4.89	19.3
19	100-D-18	J1J400	8/9/11	0.659	5.51	1380	1.43	129	0.311	8.57	4.48	21.7
20	100-D-19	J1J401	8/11/11	0.605	4.61	743	1.21	142	0.176	12.6	4.59	31.0
21	100-D-20	J1J402	8/23/11	0.250	3.00	733	1.09	147	0.211	10.6	5.24	30.9
22	100-D-21	J1J403	8/23/11	0.285	3.38	843	1.31	227	0.267	8.21	5.25	24.8
23	100-D-22	J1J404	8/23/11	0.255	3.19	951	1.24	249	0.212	10.2	3.25	23.6
24	100-D-23	J1J405	8/23/11	0.270	2.99	734	1.03	91.1	0.203	9.26	4.49	25.5
25	100-D-24	J1J406	8/23/11	0.250	2.15	407	0.588	86.1	0.270	7.29	4.46	18.2
26	100-D-25	J1J407	8/23/11	0.260	3.13	941	1.37	312	0.216	10.8	2.81	21.9
27	100-D-26	J1J408/ J1J412	8/11/11	0.416	4.13	1010	1.30	200	0.173	12.2	3.46	25.9
28	100-D-27	J1J409	8/23/11	0.341	5.75	1110	1.72	234	0.179	7.72	3.97	16.5
29	100-D-28	J1J410	8/23/11	0.270	4.42	1330	1.35	118	0.192	8.30	8.56	34.8
30	100-D-29	J1J411	8/11/11	0.515	5.11	1320	1.25	238	0.230	12.5	4.61	28.5
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CALCULATION SHEET

Washington Closure Hanford
Originator H. M. Sulloway
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations

Date 12/20/11
Job No. 14655

Calc. No. 0100X-CA-V0073
Checked J. R. Davidson JRD

Rev. No. 0
Date 12/20/11
Sheet No. 22 of 35

126-D-1 Coal Ash Sample Results

Sample Location	HEIS Numbe	Sample Date	Lead			Manganese			Mercury			Molybdenum			Nickel			Selenium			Thallium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-01	J1J3W3	8/9/11	3.91		0.41	689		4.10	0.014	B	0.03	1.89		1.64	6.33		3.28	0.246	U	0.25	0.410	U	0.41	27.9		2.05	75.7		8.20
100-D-02	J1J3W4	8/22/11	3.02		0.45	287		4.46	0.050		0.02	1.75	B	1.79	9.76		3.57	0.280		0.27	0.446	U	0.45	33.4		2.23	24.4		8.93
100-D-03	J1J3W5	8/22/11	3.71		0.40	890		3.97	0.031		0.03	1.54	B	1.59	4.63		3.17	0.398		0.24	0.397	U	0.40	22.2		1.98	31.4		7.94
100-D-04	J1J3W6	8/23/11	6.19		0.37	163		3.73	0.024	B	0.03	1.37	B	1.49	10.4		2.99	0.286		0.22	0.373	U	0.37	47.6		1.87	33.9		7.46
100-D-05	J1J3W7	8/23/11	4.05		0.40	645		3.97	0.030		0.03	4.42		1.59	6.83		3.17	0.357		0.24	0.397	U	0.40	26.4		1.98	43.8		7.94
100-D-06	J1J3W8	8/22/11	1.91		0.37	399		3.68	0.139		0.03	2.87		1.47	16.8		2.94	0.221	U	0.22	0.368	U	0.37	25.7		1.84	16.5		7.35
100-D-07	J1J3W9	8/22/11	3.61		0.43	271		4.31	0.034		0.03	1.57	B	1.72	13.8		3.45	0.892		0.26	0.431	U	0.43	31.8		2.16	19.0		8.62
100-D-08	J1J3X0	8/11/11	1.90		0.48	244		4.81	0.119		0.03	2.10		1.92	14.9		3.85	0.288	U	0.29	0.481	U	0.48	27.6		2.40	12.1		9.62
100-D-09	J1J3X1	8/11/11	2.57		0.44	161		4.39	0.020	B	0.03	1.16	B	1.75	7.42		3.51	0.570		0.26	0.439	U	0.44	20.9		2.19	15.0		8.77
100-D-10	J1J3X2	8/11/11	9.50		0.37	262		3.68	0.012	B	0.02	0.86	B	1.47	10.4		2.94	0.221	U	0.22	0.242	B	0.37	52.5		1.84	69.7		7.35
100-D-11	J1J3X3	8/23/11	4.09		0.39	366		3.85	0.054		0.03	1.49	B	1.54	9.48		3.08	0.708		0.23	0.385	U	0.39	36.4		1.92	50.5		7.69
100-D-12	J1J3X4	8/9/11	15.1		0.44	108		4.39	0.054		0.03	1.39	B	1.75	9.17		3.51	0.454		0.26	0.439	U	0.44	38.9		2.19	23.4		8.77
100-D-13	J1J3X5	8/22/11	2.42		0.47	208		4.72	0.046		0.03	1.66	B	1.89	11.8		3.77	0.283	U	0.28	0.472	U	0.47	59.7		2.36	26.4		9.43
100-D-14	J1J3X6	8/22/11	3.59		0.49	254		4.90	0.053		0.03	2.69		1.96	20.5		3.92	0.294	U	0.29	0.490	U	0.49	77.5		2.45	27.4		9.80
100-D-15	J1J3X7	8/11/11	3.15		0.50	411		5.00	0.054		0.03	2.86		2.00	17.5		4.00	0.353		0.30	0.500	U	0.50	26.6		2.50	11.8		10.00
100-D-16	J1J3X8	8/22/11	2.70		0.42	216		4.17	0.042		0.03	1.06	B	1.67	11.2		3.33	0.926		0.25	0.417	U	0.42	27.7		2.08	31.6		8.33
100-D-17	J1J3X9	8/22/11	10.4		0.43	248		4.31	0.129		0.02	1.53	B	1.72	9.91		3.45	0.425		0.26	0.431	U	0.43	34.9		2.16	65.2		8.62
Duplicate of J1J3X9	J1J413	8/22/11	8.56		0.47	228		4.72	0.248		0.03	1.39	B	1.89	12.1		3.77	0.511		0.28	0.472	U	0.47	38.5		2.36	56.6		9.43
100-D-18	J1J400	8/9/11	4.27		0.44	295		4.39	0.040		0.03	1.43	B	1.75	9.23		3.51	0.263	U	0.26	0.439	U	0.44	31.8		2.19	55.5		8.77
100-D-19	J1J401	8/11/11	16.8		0.40	122		3.97	0.074		0.03	1.03	B	1.59	10.5		3.17	0.995		0.24	0.198	B	0.40	38.5		1.98	21.2		7.94
100-D-20	J1J402	8/23/11	8.68		0.42	141		4.17	0.056		0.03	1.11	B	1.67	10.8		3.33	0.519		0.25	0.417	U	0.42	45.1		2.08	28.4		8.33
100-D-21	J1J403	8/23/11	3.65		0.47	265		4.72	0.034		0.03	1.56	B	1.89	10.4		3.77	0.355		0.28	0.472	U	0.47	38.3		2.36	39.5		9.43
100-D-22	J1J404	8/23/11	10.1		0.42	135		4.24	0.114		0.03	1.30	B	1.69	7.90		3.39	0.749		0.25	0.424	U	0.42	33.6		2.12	22.1		8.47
100-D-23	J1J405	8/23/11	6.44		0.45	151		4.46	0.053		0.03	0.863	B	1.79	7.89		3.57	0.929		0.27	0.446	U	0.45	47.3		2.23	24.9		8.93
100-D-24	J1J406	8/23/11	5.01		0.42	208		4.17	0.043		0.02	0.786	B	1.67	8.47		3.33	0.306		0.25	0.417	U	0.42	35.5		2.08	36.6		8.33
100-D-25	J1J407	8/23/11	9.61		0.43	134		4.31	0.018	B	0.03	1.23	B	1.72	6.78		3.45	0.392		0.26	0.431	U	0.43	33.3		2.16	21.8		8.62
100-D-26	J1J408	8/11/11	13.2		0.42	105		4.24	0.061		0.03	1.11	B	1.69	7.57		3.39	0.769		0.25	0.424	U	0.42	33.2		2.12	15.2		8.47
Duplicate of J1J408	J1J412	8/11/11	16.4		0.46	137		4.55	0.048		0.03	1.27	B	1.82	8.50		3.64	1.14		0.27	0.455	U	0.46	41.3		2.27	22.9		9.09
100-D-27	J1J409	8/23/11	2.18		0.48	331		4.81	0.048		0.03	3.54		1.92	7.44		3.85	0.296		0.29	0.481	U	0.48	22.5		2.40	16.7		9.62
100-D-28	J1J410	8/23/11	2.34		0.45	312		4.46	0.069		0.03	1.90		1.79	12.8		3.57	0.268	U	0.27	0.446	U	0.45	59.1		2.23	22.5		8.93
100-D-29	J1J411	8/11/11	7.97		0.49	130		4.90	0.028	B	0.03	1.28	B	1.96	9.52		3.92	0.618		0.29	0.490	U	0.49	37.6		2.45	37.0		9.80

CALCULATION SHEET

Washington Closure Hanford
Originator H. M. Sulloway HMS **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson JRD **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 23 of 35

126-D-1 Statistical Computation Input Data

Sample Location	HEIS Numbe	Sample Date	Lead mg/kg		Manganese mg/kg		Mercury mg/kg		Molybdenum mg/kg		Nickel mg/kg		Selenium mg/kg		Thallium mg/kg		Vanadium mg/kg		Zinc mg/kg	
100-D-01	J1J3W3	8/9/11	3.91		689		0.014		1.89		6.33		0.125		0.205		27.9		75.7	
100-D-02	J1J3W4	8/22/11	3.02		287		0.050		1.75		9.76		0.280		0.225		33.4		24.4	
100-D-03	J1J3W5	8/22/11	3.71		890		0.031		1.54		4.63		0.398		0.200		22.2		31.4	
100-D-04	J1J3W6	8/23/11	6.19		163		0.024		1.37		10.4		0.286		0.185		47.6		33.9	
100-D-05	J1J3W7	8/23/11	4.05		645		0.030		4.42		6.83		0.357		0.200		26.4		43.8	
100-D-06	J1J3W8	8/22/11	1.91		399		0.139		2.87		16.8		0.110		0.185		25.7		16.5	
100-D-07	J1J3W9	8/22/11	3.61		271		0.034		1.57		13.8		0.892		0.215		31.8		19.0	
100-D-08	J1J3X0	8/11/11	1.90		244		0.119		2.10		14.9		0.145		0.240		27.6		12.1	
100-D-09	J1J3X1	8/11/11	2.57		161		0.020		1.16		7.42		0.570		0.220		20.9		15.0	
100-D-10	J1J3X2	8/11/11	9.50		262		0.012		0.860		10.4		0.110		0.242		52.5		69.7	
100-D-11	J1J3X3	8/23/11	4.09		366		0.054		1.49		9.48		0.708		0.195		36.4		50.5	
100-D-12	J1J3X4	8/9/11	15.1		108		0.054		1.39		9.17		0.454		0.220		38.9		23.4	
100-D-13	J1J3X5	8/22/11	2.42		208		0.046		1.66		11.8		0.140		0.235		59.7		26.4	
100-D-14	J1J3X6	8/22/11	3.59		254		0.053		2.69		20.5		0.145		0.245		77.5		27.4	
100-D-15	J1J3X7	8/11/11	3.15		411		0.054		2.86		17.5		0.353		0.250		26.6		11.8	
100-D-16	J1J3X8	8/22/11	2.70		216		0.042		1.06		11.2		0.926		0.210		27.7		31.6	
100-D-17	J1J3X9/ J1J413	8/22/11	9.48		238		0.189		1.46		11.0		0.468		0.225		36.7		60.9	
100-D-18	J1J400	8/9/11	4.27		295		0.040		1.43		9.23		0.130		0.220		31.8		55.5	
100-D-19	J1J401	8/11/11	16.8		122		0.074		1.03		10.5		0.995		0.198		38.5		21.2	
100-D-20	J1J402	8/23/11	8.68		141		0.056		1.11		10.8		0.519		0.210		45.1		28.4	
100-D-21	J1J403	8/23/11	3.65		265		0.034		1.56		10.4		0.355		0.235		38.3		39.5	
100-D-22	J1J404	8/23/11	10.1		135		0.114		1.30		7.90		0.749		0.210		33.6		22.1	
100-D-23	J1J405	8/23/11	6.44		151		0.053		0.863		7.89		0.929		0.225		47.3		24.9	
100-D-24	J1J406	8/23/11	5.01		208		0.043		0.786		8.47		0.306		0.210		35.5		36.6	
100-D-25	J1J407	8/23/11	9.61		134		0.018		1.23		6.78		0.392		0.215		33.3		21.8	
100-D-26	J1J408/ J1J412	8/11/11	14.8		121		0.055		1.19		8.04		0.955		0.220		37.3		19.1	
100-D-27	J1J409	8/23/11	2.18		331		0.048		3.54		7.44		0.296		0.240		22.5		16.7	
100-D-28	J1J410	8/23/11	2.34		312		0.069		1.90		12.8		0.135		0.225		59.1		22.5	
100-D-29	J1J411	8/11/11	7.97		130		0.028		1.28		9.52		0.618		0.245		37.6		37.0	

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations

Date 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Job No. 14655 **Checked** J. R. Davidson JRD **Date** 12/20/11
Sheet No. 24 of 35

126-H-1 Coal ash sample results

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-01	J1HJ48	8/27/11	0.566	U	0.57	2.53		0.94	736		0.47	0.828		0.19	61.8		1.89	0.198		0.19	7.95		0.19	7.03		1.89	30.9		0.94
100-H-02	J1HJ49	8/27/11	0.508	U	0.51	2.60		0.85	437		0.42	0.610		0.17	37.2		1.69	0.170		0.17	8.92		0.17	6.68		1.69	26.8		0.85
100-H-03	J1HJ50	8/28/11	0.577	U	0.58	4.34		0.96	607		0.48	0.857		0.19	90.6		1.92	0.388		0.19	11.9		0.19	3.85		1.92	26.9		0.96
100-H-04	J1HJ51	8/28/11	0.484	U	0.48	2.93		0.81	979		0.40	1.70		0.16	167		1.61	0.219		0.16	8.15		0.16	7.93		1.61	24.8		0.81
100-H-05	J1HJ52	8/27/11	0.500	U	0.50	2.25		0.83	589		0.42	0.769		0.17	38.9		1.67	0.186		0.17	7.62		0.17	6.80		1.67	32.4		0.83
100-H-06	J1HJ53	8/28/11	0.526	U	0.53	3.51		0.88	681		0.44	1.16		0.18	155		1.75	0.376		0.18	12.0		0.18	2.59		1.75	23.0		0.88
100-H-07	J1HJ54	8/28/11	0.484	U	0.48	2.91		0.81	721		0.40	1.12		0.16	235		1.61	0.264		0.16	12.0		0.16	3.26		1.61	24.7		0.81
100-H-08	J1HJ55	8/28/11	0.500	U	0.50	2.74		0.83	830		0.42	0.764		0.17	31.8		1.67	0.162	B	0.17	8.16		0.17	7.20		1.67	37.2		0.83
100-H-09	J1HJ56	8/28/11	0.536	U	0.54	2.77		0.89	918		0.45	0.777		0.18	31.5		1.79	0.155	B	0.18	7.62		0.18	7.51		1.79	39.3		0.89
100-H-10	J1HJ57	8/27/11	0.588	U	0.59	2.76		0.98	617		0.49	0.771		0.20	27.5		1.96	0.145	B	0.20	8.35		0.20	7.99		1.96	40.8		0.98
100-H-11	J1HJ58	8/27/11	0.577	U	0.58	3.37		0.96	411		0.48	0.884		0.19	75.8		1.92	0.198		0.19	9.85		0.19	2.31		1.92	17.7		0.96
100-H-12	J1HJ59	8/28/11	0.411	U	0.41	3.03		0.69	1040		0.34	1.19		0.14	295		1.37	0.577		0.14	11.1		0.14	3.60		1.37	33.2		0.69
100-H-13	J1HJ60	8/28/11	0.492	U	0.49	2.61		0.82	982		0.41	1.33		0.16	367		1.64	0.332		0.16	12.6		0.16	2.92		1.64	26.4		0.82
100-H-14	J1HJ61	8/28/11	0.508	U	0.51	2.78		0.85	878		0.42	0.738		0.17	42.0		1.69	0.172		0.17	8.3		0.17	7.38		1.69	37.1		0.85
100-H-15	J1HJ62	8/28/11	0.492	U	0.49	2.55		0.82	476		0.41	0.632		0.16	44.3		1.64	0.174		0.16	14.4		0.16	6.78		1.64	26.0		0.82
100-H-16	J1HJ63	8/27/11	0.526	U	0.53	3.46		0.88	783		0.44	0.842		0.18	46.7		1.75	0.180		0.18	9.38		0.18	7.98		1.75	42.1		0.88
Duplicate of J1HJ63	J1HJ78	8/27/11	0.296	B	0.58	3.01		0.96	773		0.48	0.901		0.19	52.5		1.92	0.176	B	0.19	9.75		0.19	8.83		1.92	44.9		0.96
100-H-17	J1HJ64	8/27/11	0.492	U	0.49	2.51		0.82	527		0.41	0.833		0.16	145		1.64	0.148	B	0.16	8.57		0.16	2.14		1.64	16.7		0.82
100-H-18	J1HJ65	8/27/11	0.545	U	0.55	3.34		0.91	506		0.46	1.00		0.18	150		1.82	0.212		0.18	10.9		0.18	2.53		1.82	20.6		0.91
100-H-19	J1HJ66	8/27/11	0.566	U	0.57	3.90		0.94	760		0.47	0.941		0.19	41.5		1.89	0.176	B	0.19	10.6		0.19	9.01		1.89	46.8		0.94
100-H-20	J1HJ67	8/24/11	0.508	U	0.51	2.94		0.85	916		0.42	1.31		0.17	455		1.69	0.178		0.17	16.5		0.17	3.77		1.69	33.8		0.85
100-H-21	J1HJ68	8/28/11	0.492	U	0.49	3.11		0.82	313		0.41	0.429		0.16	31.6		1.64	0.200		0.16	13.5		0.16	6.20		1.64	19.1		0.82
100-H-22	J1HJ69	8/27/11	0.500	U	0.50	4.72		0.83	1250		0.42	1.25		0.17	183		1.67	0.241		0.17	8.21		0.17	9.81		1.67	35.0		0.83
100-H-23	J1HJ70	8/27/11	0.556	U	0.56	2.05		0.93	718		0.46	0.562		0.19	20.2		1.85	0.140	B	0.19	6.38		0.19	6.00		1.85	32.5		0.93
100-H-24	J1HJ71	8/27/11	0.600	U	0.60	2.49		1.00	722		0.50	1.22		0.20	318		2.00	0.150	B	0.20	11.2		0.20	2.42		2.00	18.4		1.00
100-H-25	J1HJ72	8/24/11	0.476	U	0.48	2.55		0.79	954		0.40	1.05		0.16	235		1.59	0.217		0.16	12.3		0.16	3.66		1.59	24.0		0.79
Duplicate of J1HJ72	J1HJ77	8/24/11	0.517	U	0.52	2.82		0.86	1080		0.43	1.11		0.17	253		1.72	0.183		0.17	12.5		0.17	3.82		1.72	23.7		0.86
100-H-26	J1HJ73	8/28/11	0.517	U	0.52	3.78		0.86	846		0.43	0.83		0.17	102		1.72	0.244		0.17	14.1		0.17	8.25		1.72	30.7		0.86
100-H-27	J1HJ74	8/27/11	0.476	U	0.48	2.28		0.79	816		0.40	0.65		0.16	24.0		1.59	0.159	B	0.16	7.39		0.16	6.80		1.59	35.4		0.79
100-H-28	J1HJ75	8/27/11	0.556	U	0.56	3.70		0.93	1020		0.46	1.04		0.19	84.5		1.85	0.233		0.19	11.5		0.19	7.72		1.85	42.4		0.93
100-H-29	J1HJ76	8/28/11	0.517	U	0.52	3.60		0.86	1330		0.43	1.44		0.17	243		1.72	0.347		0.17	10.7		0.17	9.94		1.72	31.7		0.86

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 25 of 35

126-H-1 Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg
100-H-01	J1HJ48	8/27/11	0.285	2.53	736	0.828	61.8	0.198	7.95	7.03	30.9
100-H-02	J1HJ49	8/27/11	0.255	2.60	437	0.610	37.2	0.170	8.92	6.68	26.8
100-H-03	J1HJ50	8/28/11	0.290	4.34	607	0.857	90.6	0.388	11.9	3.85	26.9
100-H-04	J1HJ51	8/28/11	0.240	2.93	979	1.70	167	0.219	8.15	7.93	24.8
100-H-05	J1HJ52	8/27/11	0.250	2.25	589	0.769	38.9	0.186	7.62	6.80	32.4
100-H-06	J1HJ53	8/28/11	0.265	3.51	681	1.16	155	0.376	12.0	2.59	23.0
100-H-07	J1HJ54	8/28/11	0.240	2.91	721	1.12	235	0.264	12.0	3.26	24.7
100-H-08	J1HJ55	8/28/11	0.250	2.74	830	0.764	31.8	0.162	8.16	7.20	37.2
100-H-09	J1HJ56	8/28/11	0.270	2.77	918	0.777	31.5	0.155	7.62	7.51	39.3
100-H-10	J1HJ57	8/27/11	0.295	2.76	617	0.771	27.5	0.145	8.35	7.99	40.8
100-H-11	J1HJ58	8/27/11	0.290	3.37	411	0.884	75.8	0.198	9.85	2.31	17.7
100-H-12	J1HJ59	8/28/11	0.205	3.03	1040	1.19	295	0.577	11.1	3.60	33.2
100-H-13	J1HJ60	8/28/11	0.245	2.61	982	1.33	367	0.332	12.6	2.92	26.4
100-H-14	J1HJ61	8/28/11	0.255	2.78	878	0.738	42.0	0.172	8.30	7.38	37.1
100-H-15	J1HJ62	8/28/11	0.245	2.55	476	0.632	44.3	0.174	14.4	6.78	26.0
100-H-16	J1HJ63/ J1HJ78	8/27/11	0.281	3.24	778	0.872	49.6	0.178	9.57	8.41	43.5
100-H-17	J1HJ64	8/27/11	0.245	2.51	527	0.833	145	0.148	8.57	2.14	16.7
100-H-18	J1HJ65	8/27/11	0.275	3.34	506	1.00	150	0.212	10.9	2.53	20.6
100-H-19	J1HJ66	8/27/11	0.285	3.90	760	0.941	41.5	0.176	10.6	9.01	46.8
100-H-20	J1HJ67	8/24/11	0.255	2.94	916	1.31	455	0.178	16.5	3.77	33.8
100-H-21	J1HJ68	8/28/11	0.245	3.11	313	0.429	31.6	0.200	13.5	6.20	19.1
100-H-22	J1HJ69	8/27/11	0.250	4.72	1250	1.25	183	0.241	8.21	9.81	35.0
100-H-23	J1HJ70	8/27/11	0.280	2.05	718	0.562	20.2	0.140	6.38	6.00	32.5
100-H-24	J1HJ71	8/27/11	0.300	2.49	722	1.22	318	0.150	11.2	2.42	18.4
100-H-25	J1HJ72/	8/24/11	0.250	2.69	1017	1.08	244	0.200	12.4	3.74	23.9
100-H-26	J1HJ73	8/28/11	0.260	3.78	846	0.830	102	0.244	14.1	8.25	30.7
100-H-27	J1HJ74	8/27/11	0.240	2.28	816	0.654	24.0	0.159	7.39	6.80	35.4
100-H-28	J1HJ75	8/27/11	0.280	3.70	1020	1.04	84.5	0.233	11.5	7.72	42.4
100-H-29	J1HJ76	8/28/11	0.260	3.60	1330	1.44	243	0.347	10.7	9.94	31.7

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations

Date 12/20/11
Job No. 14655

Calc. No. 0100X-CA-V0073
Checked J. R. Davidson JRD 12/20/11

Rev. No. 0
Date 12/20/11
Sheet No. 26 of 35

1 **126-H-1 Coal ash sample results**

2	Sample Location	HEIS Number	Sample Date	Lead			Manganese			Mercury			Molybdenum			Nickel			Selenium			Vanadium			Zinc		
3				mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
4	100-H-01	J1HJ48	8/27/11	2.81		0.47	169		4.72	0.022	B	0.03	1.30	B	1.89	14.4		3.77	0.283	U	0.28	48.7		2.36	25.6		9.43
5	100-H-02	J1HJ49	8/27/11	4.36		0.42	172		4.24	0.035		0.03	0.997	B	1.69	13.6		3.39	0.349		0.25	44.1		2.12	22.9		8.47
6	100-H-03	J1HJ50	8/28/11	8.64		0.48	99.7		4.81	0.176		0.03	0.607	B	1.92	10.2		3.85	1.58		0.29	37.6		2.40	38.0		9.62
7	100-H-04	J1HJ51	8/28/11	3.28		0.40	146		4.03	0.100		0.03	1.52	B	1.61	16.4		3.23	0.540		0.24	37.5		2.02	24.8		8.06
8	100-H-05	J1HJ52	8/27/11	3.17		0.42	223		4.17	0.023	B	0.03	1.46	B	1.67	14.8		3.33	0.319		0.25	47.7		2.08	20.6		8.33
9	100-H-06	J1HJ53	8/28/11	6.11		0.44	84.7		4.39	0.146		0.03	0.710	B	1.75	8.08		3.51	1.63		0.26	28.4		2.19	37.9		8.77
10	100-H-07	J1HJ54	8/28/11	7.43		0.40	82.7		4.03	0.053		0.03	1.23	B	1.61	8.93		3.23	0.981		0.24	33.0		2.02	30.4		8.06
11	100-H-08	J1HJ55	8/28/11	1.83		0.42	97.8		4.17	0.015	B	0.03	1.41	B	1.67	19.3		3.33	0.250	U	0.25	49.6		2.08	18.7		8.33
12	100-H-09	J1HJ56	8/28/11	1.64		0.45	80.0		4.46	0.112		0.03	1.55	B	1.79	20.4		3.57	0.277		0.27	46.3		2.23	11.6		8.93
13	100-H-10	J1HJ57	8/27/11	1.78		0.49	128		4.90	0.012	B	0.02	1.62	B	1.96	18.5		3.92	0.294	U	0.29	46.6		2.45	12.9		9.80
14	100-H-11	J1HJ58	8/27/11	5.54		0.48	76.0		4.81	0.088		0.03	0.493	B	1.92	6.72		3.85	2.06		0.29	22.8		2.40	17.3		9.62
15	100-H-12	J1HJ59	8/28/11	3.75		0.34	96.4		3.42	0.177		0.03	2.00		1.37	9.71		2.74	0.508		0.21	32.0		1.71	76.9		6.85
16	100-H-13	J1HJ60	8/28/11	6.07		0.41	77.7		4.10	0.042		0.03	1.86		1.64	9.15		3.28	0.591		0.25	29.9		2.05	50.1		8.20
17	100-H-14	J1HJ61	8/28/11	1.98		0.42	120		4.24	0.011	B	0.03	1.46	B	1.69	18.5		3.39	0.337		0.25	45.1		2.12	17.3		8.47
18	100-H-15	J1HJ62	8/28/11	3.50		0.41	225		4.10	0.034		0.02	0.861	B	1.64	14.4		3.28	0.246	U	0.25	44.8		2.05	30.4		8.20
19	100-H-16	J1HJ63	8/27/11	2.46		0.44	134		4.39	0.015	B	0.03	1.51	B	1.75	20.4		3.51	0.263	U	0.26	50.6		2.19	16.3		8.77
20	Duplicate of J1HJ63	J1HJ78	8/27/11	2.32		0.48	135		4.81	0.029		0.03	1.78	B	1.92	20.4		3.85	0.288	U	0.29	52.1		2.40	15.2		9.62
21	100-H-17	J1HJ64	8/27/11	4.40		0.41	67.7		4.10	0.049		0.03	0.708	B	1.64	5.88		3.28	0.762		0.25	23.8		2.05	14.1		8.20
22	100-H-18	J1HJ65	8/27/11	6.99		0.46	81.8		4.55	0.129		0.03	0.786	B	1.82	7.05		3.64	1.49		0.27	26.6		2.27	22.5		9.09
23	100-H-19	J1HJ66	8/27/11	1.96		0.47	154		4.72	0.025	U	0.03	2.11		1.89	22.4		3.77	0.283	U	0.28	58.4		2.36	17.2		9.43
24	100-H-20	J1HJ67	8/24/11	4.25		0.42	122		4.24	0.018	B	0.03	2.44		1.69	10.9		3.39	0.341		0.25	42.2		2.12	20.1		8.47
25	100-H-21	J1HJ68	8/28/11	6.14		0.41	268		4.10	0.069		0.03	0.628	B	1.64	12.4		3.28	0.348		0.25	45.8		2.05	45.7		8.20
26	100-H-22	J1HJ69	8/27/11	2.57		0.42	240		4.17	0.012	B	0.02	3.52		1.67	16.3		3.33	0.250	U	0.25	60.0		2.08	53.6		8.33
27	100-H-23	J1HJ70	8/27/11	1.70		0.46	70.2		4.63	0.025	U	0.03	1.22	B	1.85	15.9		3.70	0.278	U	0.28	35.8		2.31	11.2		9.26
28	100-H-24	J1HJ71	8/27/11	3.11		0.50	72.2		5.00	0.023	U	0.02	1.26	B	2.00	6.94		4.00	0.571		0.30	26.4		2.50	29.2		10.0
29	100-H-25	J1HJ72	8/24/11	5.02		0.40	153		3.97	0.027		0.03	1.44	B	1.59	10.1		3.17	0.338		0.24	33.8		1.98	28.9		7.94
30	Duplicate of J1HJ72	J1HJ77	8/24/11	5.21		0.43	122		4.31	0.019	B	0.03	1.49	B	1.72	10.2		3.45	0.504		0.26	33.3		2.16	19.5		8.62
31	100-H-26	J1HJ73	8/28/11	5.82		0.43	283		4.31	0.072		0.02	1.25	B	1.72	15.6		3.45	0.259	U	0.26	52.6		2.16	48.6		8.62
32	100-H-27	J1HJ74	8/27/11	2.50		0.40	78.8		3.97	0.011	B	0.03	1.40	B	1.59	17.8		3.17	0.238	U	0.24	42.6		1.98	13.9		7.94
33	100-H-28	J1HJ75	8/27/11	4.26		0.46	141		4.63	0.051		0.03	1.81	B	1.85	19.2		3.70	0.510		0.28	54.4		2.31	24.6		9.26
34	100-H-29	J1HJ76	8/28/11	4.77		0.43	300		4.31	0.075		0.03	2.05		1.72	17.8		3.45	0.349		0.26	44.5		2.16	47.9		8.62

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS | Date 12/20/11 | Calc. No. 0100X-CA-V0073 | Rev. No. 0
Project 100 and 300 Areas Coal Ash Characterization | Job No. 14655 | Checked J. R. Davidson JRD | Date 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations | Sheet No. 27 of 35

126-H-1 Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Lead mg/kg	Manganese mg/kg	Mercury mg/kg	Molybdenum mg/kg	Nickel mg/kg	Selenium mg/kg	Vanadium mg/kg	Zinc mg/kg
100-H-01	J1HJ48	8/27/11	2.81	169	0.022	1.30	14.4	0.140	48.7	25.6
100-H-02	J1HJ49	8/27/11	4.36	172	0.035	.0.997	13.6	0.349	44.1	22.9
100-H-03	J1HJ50	8/28/11	8.64	99.7	0.176	0.607	10.2	1.58	37.6	38.0
100-H-04	J1HJ51	8/28/11	3.28	146	0.100	1.52	16.4	0.540	37.5	24.8
100-H-05	J1HJ52	8/27/11	3.17	223	0.023	1.46	14.8	0.319	47.7	20.6
100-H-06	J1HJ53	8/28/11	6.11	84.7	0.146	0.710	8.08	1.63	28.4	37.9
100-H-07	J1HJ54	8/28/11	7.43	82.7	0.053	1.23	8.93	0.981	33.0	30.4
100-H-08	J1HJ55	8/28/11	1.83	97.8	0.015	1.41	19.3	0.125	49.6	18.7
100-H-09	J1HJ56	8/28/11	1.64	80.0	0.112	1.55	20.4	0.277	46.3	11.6
100-H-10	J1HJ57	8/27/11	1.78	128	0.012	1.62	18.5	0.145	46.6	12.9
100-H-11	J1HJ58	8/27/11	5.54	76.0	0.088	0.493	6.72	2.06	22.8	17.3
100-H-12	J1HJ59	8/28/11	3.75	96.4	0.177	2.00	9.71	0.508	32.0	76.9
100-H-13	J1HJ60	8/28/11	6.07	77.7	0.042	1.86	9.15	0.591	29.9	50.1
100-H-14	J1HJ61	8/28/11	1.98	120	0.011	1.46	18.5	0.337	45.1	17.3
100-H-15	J1HJ62	8/28/11	3.50	225	0.034	0.861	14.4	0.125	44.8	30.4
100-H-16	J1HJ63/ J1HJ78	8/27/11	2.39	135	0.022	1.65	20.4	0.138	51.4	15.8
100-H-17	J1HJ64	8/27/11	4.40	67.7	0.049	0.708	5.88	0.762	23.8	14.1
100-H-18	J1HJ65	8/27/11	6.99	81.8	0.129	0.786	7.05	1.49	26.6	22.5
100-H-19	J1HJ66	8/27/11	1.96	154	0.015	2.11	22.4	0.140	58.4	17.2
100-H-20	J1HJ67	8/24/11	4.25	122	0.018	2.44	10.9	0.341	42.2	20.1
100-H-21	J1HJ68	8/28/11	6.14	268	0.069	0.628	12.4	0.348	45.8	45.7
100-H-22	J1HJ69	8/27/11	2.57	240	0.012	3.52	16.3	0.125	60.0	53.6
100-H-23	J1HJ70	8/27/11	1.70	70.2	0.015	1.22	15.9	0.140	35.8	11.2
100-H-24	J1HJ71	8/27/11	3.11	72.2	0.010	1.26	6.94	0.571	26.4	29.2
100-H-25	J1HJ72/ J1HJ77	8/24/11	5.12	138	0.023	1.47	10.2	0.421	33.6	24.2
100-H-26	J1HJ73	8/28/11	5.82	283	0.072	1.25	15.6	0.130	52.6	48.6
100-H-27	J1HJ74	8/27/11	2.50	78.8	0.011	1.40	17.8	0.120	42.6	13.9
100-H-28	J1HJ75	8/27/11	4.26	141	0.051	1.81	19.2	0.510	54.4	24.6
100-H-29	J1HJ76	8/28/11	4.77	300	0.075	2.05	17.8	0.349	44.5	47.9

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations

Date 12/20/11
Job No. 14655

Calc. No. 0100X-CA-V0073
Checked J. R. Davidson JRD

Rev. No. 0
Date 12/20/11
Sheet No. 28 of 35

300 Area Coal ash sample results

Sample Location	HEIS Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
300-01	J1HJN8	8/26/11	3.30		0.78	486		0.39	0.934		0.16	129		1.56	0.312		0.16	14.6		0.16	4.37		1.56	19.3		0.78	10.0		0.39
300-02	J1HJN7	8/25/11	2.89		0.75	490		0.37	0.784		0.15	161		1.49	0.226		0.15	12.5		0.15	3.82		1.49	19.6		0.75	9.66		0.37
300-03	J1HJN6	8/25/11	3.33		0.76	306		0.38	0.544		0.15	65.4		1.52	0.201		0.15	12.0		0.15	4.23		1.52	14.7		0.76	7.13		0.38
300-04	J1HJN9	8/25/11	2.71		0.98	541		0.49	1.14		0.20	196		1.96	0.253		0.20	12.8		0.20	3.00		1.96	20.3		0.98	9.41		0.49
Duplicate of J1HJN9	J1HJT5	8/25/11	2.66		0.81	639		0.40	1.03		0.16	199		1.61	0.227		0.16	11.2		0.16	2.66		1.61	18.5		0.81	7.74		0.40
300-05	J1HJP0	8/26/11	3.10		0.96	608		0.48	0.995		0.19	177		1.92	0.254		0.19	13.1		0.19	3.28		1.92	23.5		0.96	14.3		0.48
300-06	J1HJP1	8/26/11	2.30		0.82	521		0.41	0.878		0.16	459		1.64	0.188		0.16	9.84		0.16	2.51		1.64	18.2		0.82	7.19		0.41
Duplicate of J1HJP1	J1HJT6	8/26/11	2.36		0.77	564		0.39	0.853		0.15	492		1.54	0.187		0.15	10.6		0.15	2.47		1.54	15.5		0.77	8.78		0.39
300-07	J1HJP2	8/26/11	3.07		0.82	636		0.41	1.22		0.16	211		1.64	0.285		0.16	14.90		0.16	3.28		1.64	23.1		0.82	8.29		0.41
300-08	J1HJP3	8/26/11	2.98		0.94	754		0.47	1.14		0.19	257		1.89	0.229		0.19	11.6		0.19	2.92		1.89	25.9		0.94	11.6		0.47
300-09	J1HJP4	8/26/11	1.60		0.81	177		0.40	0.588		0.16	139		1.61	0.106	B	0.16	7.15		0.16	2.45		1.61	16.2		0.81	5.33		0.40
300-10	J1HJP5	8/26/11	3.63		0.86	782		0.43	1.15		0.17	253		1.72	0.239		0.17	11.5		0.17	2.97		1.72	22.1		0.86	13.0		0.43
300-11	J1HJP6	8/26/11	3.08		0.85	748		0.42	1.09		0.17	369		1.69	0.237		0.17	11.1		0.17	2.76		1.69	21.2		0.85	11.8		0.42
300-12	J1HJP7	8/26/11	2.92		0.89	552		0.45	1.37		0.18	193		1.79	0.310		0.18	14.1		0.18	4.05		1.79	24.5		0.89	11.5		0.45
300-13	J1HJP8	8/26/11	2.41		0.79	297		0.40	0.948		0.16	260		1.59	0.094	B	0.16	10.4		0.16	1.90		1.59	24.3		0.79	3.33		0.40
300-14	J1HJP9	8/26/11	2.09		0.82	204		0.41	0.572		0.16	135		1.64	0.130	B	0.16	8.46		0.16	3.24		1.64	19.9		0.82	5.23		0.41
300-15	J1HJR0	8/26/11	2.41		0.81	586		0.40	0.783		0.16	215		1.61	0.214		0.16	10.2		0.16	3.46		1.61	18.3		0.81	7.70		0.40
300-16	J1HJR1	8/26/11	2.21		0.98	374		0.49	1.00		0.20	148		1.96	0.226		0.20	10.5		0.20	3.20		1.96	19.2		0.98	7.88		0.49
300-17	J1HJR2	8/26/11	3.36		0.83	542		0.42	0.919		0.17	99.0		1.67	0.193		0.17	12.9		0.17	4.89		1.67	21.0		0.83	8.51		0.42
300-18	J1HJR3	8/26/11	2.17		0.89	244		0.45	0.813		0.18	208		1.79	0.154	B	0.18	9.93		0.18	2.69		1.79	22.4		0.89	6.38		0.45
300-19	J1HJR4	8/26/11	2.28		0.86	472		0.43	0.817		0.17	156		1.72	0.256		0.17	10.9		0.17	3.50		1.72	17.7		0.86	7.54		0.43
300-20	J1HJR5	8/26/11	3.30		0.91	651		0.46	1.60		0.18	190		1.82	0.317		0.18	14.2		0.18	2.85		1.82	24.2		0.91	9.95		0.46
300-21	J1HJR6	8/26/11	3.87		0.93	569		0.46	0.926		0.19	128		1.85	0.213		0.19	11.5		0.19	3.86		1.85	21.1		0.93	12.0		0.46
300-22	J1HJR7	8/26/11	3.31		0.79	407		0.40	0.790		0.16	74.5		1.59	0.202		0.16	13.2		0.16	5.12		1.59	19.9		0.79	8.96		0.40
300-23	J1HJR8	8/26/11	3.00		0.89	492		0.45	1.30		0.18	185		1.79	0.307		0.18	15.6		0.18	3.67		1.79	26.8		0.89	12.5		0.45
300-24	J1HJR9	8/26/11	1.62		0.71	208		0.36	0.644		0.14	137		1.43	0.122	B	0.14	9.74		0.14	2.44		1.43	172		0.71	5.36		0.36
300-25	J1HJT0	8/26/11	3.34		0.74	707		0.37	1.30		0.15	251		1.47	0.260		0.15	15.1		0.15	3.28		1.47	26.7		0.74	15.2		0.37
300-26	J1HJT1	8/26/11	3.28		0.86	680		0.43	1.22		0.17	181		1.72	0.239		0.17	14.2		0.17	3.77		1.72	24.3		0.86	9.76		0.43
300-27	J1HJT2	8/26/11	3.70		0.93	450		0.46	1.95		0.19	157		1.85	0.338		0.19	15.8		0.19	3.51		1.85	24.6		0.93	11.8		0.46
300-28	J1HJT3	8/26/11	2.66		0.78	273		0.39	0.824		0.16	104		1.56	0.302		0.16	11.6		0.16	3.56		1.56	28.8		0.78	14.0		0.39
300-29	J1HJT4	8/26/11	3.91		0.88	464		0.44	1.66		0.18	171		1.75	0.366		0.18	14.9		0.18	2.97		1.75	25.2		0.88	17.2		0.44

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 29 of 35

300 Area Ash Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg
300-01	J1HJN8	8/26/11	3.30	486	0.934	129	0.312	14.6	4.37	19.3	10.0
300-02	J1HJN7	8/25/11	2.89	490	0.784	161	0.226	12.5	3.82	19.6	9.66
300-03	J1HJN6	8/25/11	3.33	306	0.544	65	0.201	12.0	4.23	14.7	7.13
300-04	J1HJN9/ J1HJT5	8/25/11	2.69	590	1.09	198	0.240	12.0	2.83	19.4	8.58
300-05	J1HJP0	8/26/11	3.10	608	0.995	177	0.254	13.1	3.28	23.5	14.3
300-06	J1HJP1/ J1HJT6	8/26/11	2.33	543	0.866	476	0.188	10.2	2.49	16.9	7.99
300-07	J1HJP2	8/26/11	3.07	636	1.22	211	0.285	14.9	3.28	23.1	8.29
300-08	J1HJP3	8/26/11	2.98	754	1.14	257	0.229	11.6	2.92	25.9	11.6
300-09	J1HJP4	8/26/11	1.60	177	0.588	139	0.106	7.15	2.45	16.2	5.33
300-10	J1HJP5	8/26/11	3.63	782	1.15	253	0.239	11.5	2.97	22.1	13.0
300-11	J1HJP6	8/26/11	3.08	748	1.09	369	0.237	11.1	2.76	21.2	11.8
300-12	J1HJP7	8/26/11	2.92	552	1.37	193	0.310	14.1	4.05	24.5	11.5
300-13	J1HJP8	8/26/11	2.41	297	0.948	260	0.094	10.4	1.90	24.3	3.33
300-14	J1HJP9	8/26/11	2.09	204	0.572	135	0.130	8.46	3.24	19.9	5.23
300-15	J1HJR0	8/26/11	2.41	586	0.783	215	0.214	10.2	3.46	18.3	7.70
300-16	J1HJR1	8/26/11	2.21	374	1.00	148	0.226	10.5	3.20	19.2	7.88
300-17	J1HJR2	8/26/11	3.36	542	0.919	99	0.193	12.9	4.89	21.0	8.51
300-18	J1HJR3	8/26/11	2.17	244	0.813	208	0.154	9.93	2.69	22.4	6.38
300-19	J1HJR4	8/26/11	2.28	472	0.817	156	0.256	10.9	3.50	17.7	7.54
300-20	J1HJR5	8/26/11	3.30	651	1.60	190	0.317	14.2	2.85	24.2	9.95
300-21	J1HJR6	8/26/11	3.87	569	0.926	128	0.213	11.5	3.86	21.1	12.0
300-22	J1HJR7	8/26/11	3.31	407	0.790	74.5	0.202	13.2	5.12	19.9	8.96
300-23	J1HJR8	8/26/11	3.00	492	1.30	185	0.307	15.6	3.67	26.8	12.5
300-24	J1HJR9	8/26/11	1.62	208	0.644	137	0.122	9.74	2.44	172	5.36
300-25	J1HJT0	8/26/11	3.34	707	1.30	251	0.260	15.1	3.28	26.7	15.2
300-26	J1HJT1	8/26/11	3.28	680	1.22	181	0.239	14.2	3.77	24.3	9.76
300-27	J1HJT2	8/26/11	3.70	450	1.95	157	0.338	15.8	3.51	24.6	11.8
300-28	J1HJT3	8/26/11	2.66	273	0.824	104	0.302	11.6	3.56	28.8	14.0
300-29	J1HJT4	8/26/11	3.91	464	1.66	171	0.366	14.9	2.97	25.2	17.2

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations

Date 12/20/11
Job No. 14655

Calc. No. 0100X-CA-V0073
Checked J. R. Davidson JRD

Rev. No. 0
Date 12/20/11
Sheet No. 30 of 35

300 Area Coal ash sample results

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Selenium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
300-01	J1HJN8	8/26/11	176		3.91	0.211		0.03	0.832	B	1.56	9.09		3.12	1.02		0.23	42.4		1.95	53.0		7.81
300-02	J1HJN7	8/25/11	186		3.73	0.713		0.03	0.851	B	1.49	8.37		2.99	0.943		0.22	42.8		1.87	35.8		7.46
300-03	J1HJN6	8/25/11	213		3.79	0.060		0.03	0.472	B	1.52	9.21		3.03	0.877		0.23	44.4		1.89	35.3		7.58
300-04	J1HJN9	8/25/11	107		4.90	0.365		0.03	1.04	B	1.96	8.97		3.92	1.24		0.29	34.0		2.45	27.2		9.80
Duplicate of J1HJN9	J1HJT5	8/25/11	91.7		4.03	0.344		0.03	0.946	B	1.61	8.07		3.23	1.17		0.24	31.5		2.02	28.3		8.06
300-05	J1HJP0	8/26/11	131		4.81	0.083		0.03	1.02	B	1.92	8.10		3.85	1.27		0.29	36.8		2.40	43.3		9.62
300-06	J1HJP1	8/26/11	106		4.10	0.370		0.02	0.968	B	1.64	6.36		3.28	1.16		0.25	26.4		2.05	43.0		8.20
Duplicate of J1HJP1	J1HJT6	8/26/11	101		3.85	0.706		0.03	1.12	B	1.54	6.29		3.08	1.14		0.23	28.3		1.92	23.3		7.69
300-07	J1HJP2	8/26/11	87.5		4.10	0.119		0.02	1.26	B	1.64	12.5		3.28	1.46		0.25	39.9		2.05	26.1		8.20
300-08	J1HJP3	8/26/11	92.8		4.72	0.293		0.03	1.23	B	1.89	8.20		3.77	1.34		0.28	29.6		2.36	25.5		9.43
300-09	J1HJP4	8/26/11	69.5		4.03	0.115		0.02	0.717	B	1.61	5.73		3.23	0.67		0.24	21.3		2.02	18.3		8.06
300-10	J1HJP5	8/26/11	96.6		4.31	0.170		0.03	0.952	B	1.72	8.72		3.45	1.63		0.26	27.8		2.16	23.3		8.62
300-11	J1HJP6	8/26/11	101		4.24	0.321		0.02	1.43	B	1.69	7.09		3.39	1.65		0.25	29.9		2.12	24.6		8.47
300-12	J1HJP7	8/26/11	94.5		4.46	0.115		0.03	1.11	B	1.79	11.2		3.57	1.62		0.27	35.9		2.23	30.3		8.93
300-13	J1HJP8	8/26/11	93.3		3.97	1.02		0.03	1.50	B	1.59	7.62		3.17	0.491		0.24	22.1		1.98	12.6		7.94
300-14	J1HJP9	8/26/11	142		4.10	0.181		0.03	0.706	B	1.64	7.27		3.28	0.688		0.25	33.0		2.05	26.0		8.20
300-15	J1HJR0	8/26/11	132		4.03	0.044		0.02	1.17	B	1.61	8.25		3.23	0.911		0.24	32.8		2.02	27.7		8.06
300-16	J1HJR1	8/26/11	111		4.90	0.087		0.03	0.879	B	1.96	9.10		3.92	1.10		0.29	32.4		2.45	29.7		9.80
300-17	J1HJR2	8/26/11	195		4.17	0.062		0.02	0.701	B	1.67	9.26		3.33	0.884		0.25	46.2		2.08	31.2		8.33
300-18	J1HJR3	8/26/11	101		4.46	0.468		0.02	0.981	B	1.79	7.24		3.57	0.840		0.27	29.6		2.23	22.2		8.93
300-19	J1HJR4	8/26/11	146		4.31	0.034		0.02	0.916	B	1.72	8.09		3.45	0.815		0.26	34.5		2.16	34.4		8.62
300-20	J1HJR5	8/26/11	35.5		4.55	0.132		0.03	1.03	B	1.82	11.4		3.64	2.46		0.27	34.1		2.27	23.4		9.09
300-21	J1HJR6	8/26/11	134		4.63	0.284		0.03	0.812	B	1.85	8.28		3.70	1.09		0.28	37.3		2.31	28.5		9.26
300-22	J1HJR7	8/26/11	210		3.97	0.052		0.03	0.762	B	1.59	9.84		3.17	0.929		0.24	45.7		1.98	34.7		7.94
300-23	J1HJR8	8/26/11	107		4.46	0.068		0.03	1.23	B	1.79	14.9		3.57	1.08		0.27	41.3		2.23	36.0		8.93
300-24	J1HJR9	8/26/11	81.4		3.57	0.274		0.03	2.12		1.43	9.99		2.86	0.571		0.21	24.8		1.79	23.7		7.14
300-25	J1HJT0	8/26/11	81.1		3.68	0.176		0.02	1.38	B	1.47	8.91		2.94	1.63		0.22	34.1		1.84	25.8		7.35
300-26	J1HJT1	8/26/11	144		4.31	0.101		0.03	1.18	B	1.72	10.4		3.45	1.40		0.26	40.4		2.16	26.8		8.62
300-27	J1HJT2	8/26/11	61.8		4.63	0.107		0.03	1.07	B	1.85	13.0		3.70	2.12		0.28	38.2		2.31	35.1		9.26
300-28	J1HJT3	8/26/11	136		3.91	0.086		0.03	0.708	B	1.56	10.8		3.12	1.18		0.23	36.7		1.95	43.0		7.81
300-29	J1HJT4	8/26/11	43.9		4.39	0.157		0.03	0.807	B	1.75	13.2		3.51	2.65		0.26	34.6		2.19	29.1		8.77

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson JRD 12/20/11 **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 31 of 35

300 Area Ash Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Manganese mg/kg	Mercury mg/kg	Molybdenum mg/kg	Nickel mg/kg	Selenium mg/kg	Vanadium mg/kg	Zinc mg/kg
300-01	J1HJN8	8/26/11	176	0.211	0.832	9.09	1.02	42.4	53.0
300-02	J1HJN7	8/25/11	186	0.713	0.851	8.37	0.943	42.8	35.8
300-03	J1HJN6	8/25/11	213	0.060	0.472	9.21	0.877	44.4	35.3
300-04	J1HJN9/ J1HJT5	8/25/11	99.4	0.355	0.993	8.52	1.21	32.8	27.8
300-05	J1HJP0	8/26/11	131	0.083	1.02	8.10	1.27	36.8	43.3
300-06	J1HJP1/ J1HJT6	8/26/11	104	0.538	1.04	6.33	1.15	27.4	33.2
300-07	J1HJP2	8/26/11	87.5	0.119	1.26	12.5	1.46	39.9	26.1
300-08	J1HJP3	8/26/11	92.8	0.293	1.23	8.20	1.34	29.6	25.5
300-09	J1HJP4	8/26/11	69.5	0.115	0.717	5.73	0.670	21.3	18.3
300-10	J1HJP5	8/26/11	96.6	0.170	0.952	8.72	1.63	27.8	23.3
300-11	J1HJP6	8/26/11	101	0.321	1.43	7.09	1.65	29.9	24.6
300-12	J1HJP7	8/26/11	94.5	0.115	1.11	11.2	1.62	35.9	30.3
300-13	J1HJP8	8/26/11	93.3	1.020	1.50	7.62	0.491	22.1	12.6
300-14	J1HJP9	8/26/11	142	0.181	0.706	7.27	0.688	33.0	26.0
300-15	J1HJR0	8/26/11	132	0.044	1.17	8.25	0.911	32.8	27.7
300-16	J1HJR1	8/26/11	111	0.087	0.879	9.10	1.10	32.4	29.7
300-17	J1HJR2	8/26/11	195	0.062	0.701	9.26	0.884	46.2	31.2
300-18	J1HJR3	8/26/11	101	0.468	0.981	7.24	0.840	29.6	22.2
300-19	J1HJR4	8/26/11	146	0.034	0.916	8.09	0.815	34.5	34.4
300-20	J1HJR5	8/26/11	35.5	0.132	1.03	11.4	2.46	34.1	23.4
300-21	J1HJR6	8/26/11	134	0.284	0.812	8.28	1.09	37.3	28.5
300-22	J1HJR7	8/26/11	210	0.052	0.762	9.84	0.929	45.7	34.7
300-23	J1HJR8	8/26/11	107	0.068	1.23	14.9	1.08	41.3	36.0
300-24	J1HJR9	8/26/11	81.4	0.274	2.12	9.99	0.571	24.8	23.7
300-25	J1HJT0	8/26/11	81.1	0.176	1.38	8.91	1.63	34.1	25.8
300-26	J1HJT1	8/26/11	144	0.101	1.18	10.4	1.40	40.4	26.8
300-27	J1HJT2	8/26/11	61.8	0.107	1.07	13.0	2.12	38.2	35.1
300-28	J1HJT3	8/26/11	136	0.086	0.708	10.8	1.18	36.7	43.0
300-29	J1HJT4	8/26/11	43.9	0.157	0.807	13.2	2.65	34.6	29.1

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations

Date 12/20/11
Job No. 14655

Calc. No. 0100X-CA-V0073
Checked J. R. Davidson JRD

Rev. No. 0
Date 12/20/11
Sheet No. 32 of 35

1 **600-207 Coal ash sample results**

2	Sample	HEIS	Sample	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
3	Location	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
4	600-01	J1HHM3	9/28/11	3.73		0.88	656		0.44	0.691		0.18	60.9		1.75	0.178		0.18	8.27		0.18	3.88		1.75	20.0		0.88	4.69		0.44
5	600-02	J1HHM4	9/28/11	5.29		0.89	673		0.45	0.655		0.18	42.7		1.79	0.186		0.18	8.66		0.18	4.02		1.79	20.4		0.89	5.08		0.45
6	600-03	J1HHM5	9/28/11	5.19		0.93	721		0.46	0.730		0.19	55.1		1.85	0.187		0.19	9.26		0.19	4.05		1.85	21.1		0.9	7.21		0.46
7	600-04	J1HHM6	9/28/11	3.82		0.86	552		0.43	0.556		0.17	44.3		1.72	0.204		0.17	7.82		0.17	3.51		1.72	17.1		0.9	5.20		0.43
8	600-05	J1HHM7	9/28/11	4.91		0.93	645		0.46	0.619		0.19	44.7		1.85	0.188		0.19	9.00		0.19	3.94		1.85	20.2		0.9	6.07		0.46
9	600-06	J1HHM8	9/28/11	3.63		0.88	695		0.44	0.592		0.18	42.7		1.75	0.211		0.18	8.04		0.18	3.30		1.75	18.7		0.9	5.77		0.44
10	600-07	J1HHM9	9/27/11	6.60		0.96	958		0.48	0.903		0.19	146		1.92	0.122	B	0.19	12.9		0.19	5.74		1.92	46.8		1.0	5.28		0.48
11	600-08	J1HHN0	9/28/11	5.18		0.82	686		0.41	0.676		0.16	43.1		1.64	0.194		0.16	8.91		0.16	4.28		1.64	22.2		0.82	5.35		0.41
12	600-09	J1HHN1	9/28/11	5.42		0.91	643		0.46	0.800		0.18	50.9		1.82	0.211		0.18	9.33		0.18	4.49		1.82	24.1		0.91	5.75		0.46
13	600-10	J1HHN2	9/28/11	4.62		0.85	608		0.42	0.592		0.17	44.7		1.69	0.178		0.17	8.09		0.17	3.53		1.69	19.2		0.85	5.24		0.42
14	600-11	J1HHN3	9/28/11	3.71		0.85	379		0.42	0.627		0.17	31.2		1.69	0.166	B	0.17	9.70		0.17	4.83		1.69	18.5		0.85	4.26		0.42
15	600-12	J1HHN4	9/28/11	3.39		0.82	632		0.41	0.460		0.16	41.6		1.64	0.182		0.16	8.08		0.16	3.24		1.64	16.9		0.82	4.23		0.41
16	600-13	J1HHN5	9/28/11	3.90		0.86	609		0.43	0.529		0.17	35.4		1.72	0.153	B	0.17	6.81		0.17	3.21		1.72	19.4		0.86	4.58		0.43
17	600-14	J1HHN6	9/28/11	4.46		0.91	606		0.46	0.696		0.18	44.8		1.82	0.173	B	0.18	8.29		0.18	3.70		1.82	20.1		0.91	7.00		0.46
18	600-15	J1HHN7	9/27/11	10.6		0.96	1210		0.48	1.43		0.19	112		1.92	0.232		0.19	15.5		0.19	7.14		1.92	35.4		0.96	11.1		0.48
19	Duplicate of J1HHN7	J1HHR2	9/27/11	9.58		0.85	1250		0.42	1.46		0.17	162		1.69	0.213		0.17	16.7		0.17	7.08		1.69	38.6		0.85	7.5		0.42
20	600-16	J1HHN8	9/28/11	5.38		0.88	767		0.44	0.772		0.18	60.6		1.75	0.186		0.18	9.14		0.18	4.69		1.75	20.3		0.88	5.45		0.44
21	600-17	J1HHN9	9/28/11	5.02		0.79	678		0.40	0.629		0.16	58.8		1.59	0.202		0.16	9.87		0.16	4.70		1.59	23.2		0.79	7.10		0.40
22	600-18	J1HHP0	9/28/11	4.89		0.81	683		0.40	0.84		0.16	50.2		1.61	0.189		0.16	8.23		0.16	4.16		1.61	20.6		0.81	5.93		0.40
23	600-19	J1HHP1	9/28/11	4.56		0.86	705		0.43	0.737		0.17	60.3		1.72	0.172	B	0.17	8.55		0.17	4.31		1.72	20.9		0.86	4.99		0.43
24	600-20	J1HHP2	9/28/11	6.63		0.89	805		0.45	0.992		0.18	57.1		1.79	0.193		0.18	11.4		0.18	5.65		1.79	26.7		0.89	5.44		0.45
25	600-21	J1HHP3	9/28/11	6.30		0.98	1060		0.49	1.01		0.20	84.0		1.96	0.127	B	0.20	11.8		0.20	5.46		1.96	24.6		0.98	4.94		0.49
26	600-22	J1HHP4	9/27/11	6.19		0.83	796		0.42	0.957		0.17	58.3		1.67	0.140	B	0.17	11.4		0.17	5.52		1.67	24.6		0.83	6.92		0.42
27	600-23	J1HHP5	9/27/11	6.46		0.89	915		0.45	0.969		0.18	103		1.79	0.143	B	0.18	11.5		0.18	6.07		1.79	28.2		0.89	6.61		0.45
28	600-24	J1HHP6	9/28/11	7.25		0.98	910		0.49	1.19		0.20	69.8		1.96	0.174	B	0.20	12.3		0.20	5.92		1.96	32.3		0.98	7.03		0.49
29	Duplicate of J1HHP6	J1HHR3	9/27/11	6.57		0.83	1030		0.42	1.18		0.17	81.7		1.67	0.157	B	0.17	11.4		0.17	5.85		1.67	28.0		0.83	5.60		0.42
30	600-25	J1HHP7	9/27/11	5.52		1.00	694		0.50	0.907		0.20	48.0		2.00	0.176	B	0.20	11.3		0.20	5.38		2.00	26.8		1.00	6.06		0.50
31	600-26	J1HHP8	9/28/11	8.54		0.96	1030		0.48	1.18		0.19	66.0		1.92	0.149	B	0.19	12.8		0.19	5.93		1.92	29.9		0.96	14.5		0.48
32	600-27	J1HHP9	9/27/11	6.17		0.83	944		0.42	1.05		0.17	63.7		1.67	0.175		0.17	11.1		0.17	4.91		1.67	25.2		0.83	6.15		0.42
33	600-28	J1HHR0	9/27/11	4.90		0.94	979		0.47	1.11		0.19	71.3		1.89	0.138	B	0.19	9.85		0.19	4.83		1.89	24.3		0.94	5.47		0.47
34	600-29	J1HHR1	9/28/11	5.58		0.73	802		0.36	0.833		0.15	57.4		1.45	0.151		0.15	10.9		0.15	4.96		1.45	23.2		0.73	5.32		0.36

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 33 of 35

600-207 Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg
600-01	J1HHM3	9/28/11	3.73	656	0.691	60.9	0.178	8.27	3.88	20.0	4.69
600-02	J1HHM4	9/28/11	5.29	673	0.655	42.7	0.186	8.66	4.02	20.4	5.08
600-03	J1HHM5	9/28/11	5.19	721	0.730	55.1	0.187	9.26	4.05	21.1	7.21
600-04	J1HHM6	9/28/11	3.82	552	0.556	44.3	0.204	7.82	3.51	17.1	5.20
600-05	J1HHM7	9/28/11	4.91	645	0.619	44.7	0.188	9.00	3.94	20.2	6.07
600-06	J1HHM8	9/28/11	3.63	695	0.592	42.7	0.211	8.04	3.30	18.7	5.77
600-07	J1HHM9	9/27/11	6.60	958	0.903	146	0.122	12.9	5.74	46.8	5.28
600-08	J1HHN0	9/28/11	5.18	686	0.676	43.1	0.194	8.91	4.28	22.2	5.35
600-09	J1HHN1	9/28/11	5.42	643	0.800	50.9	0.211	9.33	4.49	24.1	5.75
600-10	J1HHN2	9/28/11	4.62	608	0.592	44.7	0.178	8.09	3.53	19.2	5.24
600-11	J1HHN3	9/28/11	3.71	379	0.627	31.2	0.166	9.70	4.83	18.5	4.26
600-12	J1HHN4	9/28/11	3.39	632	0.460	41.6	0.182	8.08	3.24	16.9	4.23
600-13	J1HHN5	9/28/11	3.90	609	0.529	35.4	0.153	6.81	3.21	19.4	4.58
600-14	J1HHN6	9/28/11	4.46	606	0.696	44.8	0.173	8.29	3.70	20.1	7.00
600-15	J1HHN7/ J1HHR2	9/27/11	10.1	1230	1.45	137	0.223	16.1	7.11	37.0	9.30
600-16	J1HHN8	9/28/11	5.38	767	0.772	60.6	0.186	9.14	4.69	20.3	5.45
600-17	J1HHN9	9/28/11	5.02	678	0.629	58.8	0.202	9.87	4.70	23.2	7.10
600-18	J1HHP0	9/28/11	4.89	683	0.839	50.2	0.189	8.23	4.16	20.6	5.93
600-19	J1HHP1	9/28/11	4.56	705	0.737	60.3	0.172	8.55	4.31	20.9	4.99
600-20	J1HHP2	9/28/11	6.63	805	0.992	57.1	0.193	11.4	5.65	26.7	5.44
600-21	J1HHP3	9/28/11	6.30	1060	1.01	84.0	0.127	11.8	5.46	24.6	4.94
600-22	J1HHP4	9/27/11	6.19	796	0.957	58.3	0.140	11.4	5.52	24.6	6.92
600-23	J1HHP5	9/27/11	6.46	915	0.969	103	0.143	11.5	6.07	28.2	6.61
600-24	J1HHP6/ J1HHR3	9/28/11	6.91	970	1.19	75.8	0.166	11.9	5.89	30.2	6.32
600-25	J1HHP7	9/27/11	5.52	694	0.907	48.0	0.176	11.3	5.38	26.8	6.06
600-26	J1HHP8	9/28/11	8.54	1030	1.18	66.0	0.149	12.8	5.93	29.9	14.5
600-27	J1HHP9	9/27/11	6.17	944	1.05	63.7	0.175	11.1	4.91	25.2	6.15
600-28	J1HHR0	9/27/11	4.90	979	1.11	71.3	0.138	9.85	4.83	24.3	5.47
600-29	J1HHR1	9/28/11	5.58	802	0.833	57.4	0.151	10.9	4.96	23.2	5.32

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 34 of 35

1 **600-207 Coal ash sample results**

2	Sample	HEIS	Sample	Manganese			Mercury			Molybdenum			Nickel			Selenium			Vanadium			Zinc		
3	Location	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
4	600-01	J1HHM3	9/28/11	244		4.39	0.026	U	0.03	1.37	B	1.75	9.86		3.51	1.33		0.26	32.0		2.19	17.1		8.77
5	600-02	J1HHM4	9/28/11	259		4.46	0.027	U	0.03	1.57	B	1.79	10.3		3.57	1.72		0.27	32.2		2.23	17.3		8.93
6	600-03	J1HHM5	9/28/11	293		4.63	0.042		0.03	1.58	B	1.85	10.9		3.70	1.76		0.28	33.0		2.31	21.6		9.26
7	600-04	J1HHM6	9/28/11	209		4.31	0.026	U	0.03	1.27	B	1.72	8.92		3.45	1.36		0.26	29.0		2.16	26.0		8.62
8	600-05	J1HHM7	9/28/11	266		4.63	0.027	U	0.03	1.59	B	1.85	10.3		3.70	1.42		0.28	30.6		2.31	21.1		9.26
9	600-06	J1HHM8	9/28/11	229		4.39	0.009	B	0.03	1.25	B	1.75	8.87		3.51	1.29		0.26	28.2		2.19	20.9		8.77
10	600-07	J1HHM9	9/27/11	486		4.81	0.027	U	0.03	2.34		1.92	16.7		3.85	1.22		0.29	43.7		2.40	22.1		9.62
11	600-08	J1HHN0	9/28/11	270		4.10	0.046		0.03	1.42	B	1.64	10.8		3.28	1.50		0.25	32.3		2.05	22.4		8.20
12	600-09	J1HHN1	9/28/11	291		4.55	0.027	U	0.03	1.78	B	1.82	12.7		3.64	1.33		0.27	33.2		2.27	24.8		9.09
13	600-10	J1HHN2	9/28/11	227		4.24	0.024	U	0.02	1.28	B	1.69	9.12		3.39	1.35		0.25	26.7		2.12	16.6		8.47
14	600-11	J1HHN3	9/28/11	237		4.24	0.027	U	0.03	1.38	B	1.69	11.7		3.39	0.946		0.25	38.7		2.12	24.5		8.47
15	600-12	J1HHN4	9/28/11	205		4.10	0.027	U	0.03	1.01	B	1.64	7.95		3.28	0.898		0.25	26.2		2.05	22.8		8.20
16	600-13	J1HHN5	9/28/11	209		4.31	0.012	B	0.03	1.26	B	1.72	8.10		3.45	1.08		0.26	25.4		2.16	15.8		8.62
17	600-14	J1HHN6	9/28/11	260		4.55	0.013	B	0.03	1.47	B	1.82	10.0		3.64	1.41		0.27	29.8		2.27	17.6		9.09
18	600-15	J1HHN7	9/27/11	481		4.81	0.025	U	0.03	2.11		1.92	18.9		3.85	2.27		0.29	55.3		2.40	28.5		9.62
19	Duplicate of J1HHN7	J1HHR2	9/27/11	537		4.24	0.017	B	0.02	2.49		1.69	19.7		3.39	1.73		0.25	102		2.12	22.1		8.47
20	600-16	J1HHN8	9/28/11	293		4.39	0.010	B	0.03	1.75		1.75	12.6		3.51	1.37		0.26	32.2		2.19	19.1		8.77
21	600-17	J1HHN9	9/28/11	264		3.97	0.027	U	0.03	1.62		1.59	11.9		3.17	1.30		0.24	36.2		1.98	23.7		7.94
22	600-18	J1HHP0	9/28/11	280		4.03	0.027	U	0.03	1.53	B	1.61	10.9		3.23	1.56		0.24	32.6		2.02	19.2		8.06
23	600-19	J1HHP1	9/28/11	271		4.31	0.026	U	0.03	1.74		1.72	11.1		3.45	1.51		0.26	32.1		2.16	17.3		8.62
24	600-20	J1HHP2	9/28/11	349		4.46	0.025	U	0.03	2.26		1.79	14.6		3.57	1.77		0.27	40.4		2.23	17.6		8.93
25	600-21	J1HHP3	9/28/11	357		4.90	0.026	U	0.03	2.35		1.96	14.4		3.92	1.51		0.29	44.4		2.45	19.3		9.80
26	600-22	J1HHP4	9/27/11	359		4.17	0.027	U	0.03	2.25		1.67	15.8		3.33	1.88		0.25	41.0		2.08	22.3		8.33
27	600-23	J1HHP5	9/27/11	410		4.46	0.027	B	0.03	2.02		1.79	16.2		3.57	1.44		0.27	45.3		2.23	22.9		8.93
28	600-24	J1HHP6	9/28/11	373		4.90	0.045		0.03	2.69		1.96	15.7		3.92	2.10		0.29	47.9		2.45	24.1		9.80
29	Duplicate of J1HHP6	J1HHR3	9/27/11	390		4.17	0.030		0.03	2.46		1.67	17.7		3.33	1.64		0.25	44.4		2.08	19.2		8.33
30	600-25	J1HHP7	9/27/11	252		5.00	0.021	B	0.03	1.88	B	2.00	13.1		4.00	1.95		0.30	38.5		2.50	20.2		10.0
31	600-26	J1HHP8	9/28/11	435		4.81	0.022	B	0.03	3.13		1.92	16.7		3.85	2.06		0.29	50.1		2.40	26.9		9.62
32	600-27	J1HHP9	9/27/11	379		4.17	0.028		0.03	1.88		1.67	14.5		3.33	1.92		0.25	40.4		2.08	27.1		8.33
33	600-28	J1HHR0	9/27/11	401		4.72	0.019	B	0.02	2.11		1.89	14.3		3.77	1.60		0.28	40.8		2.36	19.3		9.43
34	600-29	J1HHR1	9/28/11	315		3.62	0.028		0.02	1.89		1.45	13.0		2.90	1.61		0.22	40.6		1.81	22.1		7.25

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway HMS **Date** 12/20/11 **Calc. No.** 0100X-CA-V0073 **Rev. No.** 0
Project 100 and 300 Areas Coal Ash Characterization **Job No.** 14655 **Checked** J. R. Davidson JRD 12/20/11 **Date** 12/20/11
Subject Coal Ash Characterization 90th Percentile and Median Equality Calculations **Sheet No.** 35 of 35

600-207 Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Manganese mg/kg	Mercury mg/kg	Molybdenum mg/kg	Nickel mg/kg	Selenium mg/kg	Vanadium mg/kg	Zinc mg/kg
600-01	J1HHM3	9/28/11	244	0.015	1.37	9.86	1.33	32.0	17.1
600-02	J1HHM4	9/28/11	259	0.015	1.57	10.3	1.72	32.2	17.3
600-03	J1HHM5	9/28/11	293	0.042	1.58	10.9	1.76	33.0	21.6
600-04	J1HHM6	9/28/11	209	0.015	1.27	8.92	1.36	29.0	26.0
600-05	J1HHM7	9/28/11	266	0.015	1.59	10.3	1.42	30.6	21.1
600-06	J1HHM8	9/28/11	229	0.009	1.25	8.87	1.29	28.2	20.9
600-07	J1HHM9	9/27/11	486	0.015	2.34	16.7	1.22	43.7	22.1
600-08	J1HHN0	9/28/11	270	0.046	1.42	10.8	1.50	32.3	22.4
600-09	J1HHN1	9/28/11	291	0.015	1.78	12.7	1.33	33.2	24.8
600-10	J1HHN2	9/28/11	227	0.010	1.28	9.12	1.35	26.7	16.6
600-11	J1HHN3	9/28/11	237	0.015	1.38	11.7	0.946	38.7	24.5
600-12	J1HHN4	9/28/11	205	0.015	1.01	7.95	0.898	26.2	22.8
600-13	J1HHN5	9/28/11	209	0.012	1.26	8.10	1.08	25.4	15.8
600-14	J1HHN6	9/28/11	260	0.013	1.47	10.0	1.41	29.8	17.6
600-15	J1HHN7/ J1HHR2	9/27/11	509	0.016	2.30	19.3	2.00	78.7	25.3
600-16	J1HHN8	9/28/11	293	0.010	1.75	12.6	1.37	32.2	19.1
600-17	J1HHN9	9/28/11	264	0.015	1.62	11.9	1.30	36.2	23.7
600-18	J1HHP0	9/28/11	280	0.015	1.53	10.9	1.56	32.6	19.2
600-19	J1HHP1	9/28/11	271	0.015	1.74	11.1	1.51	32.1	17.3
600-20	J1HHP2	9/28/11	349	0.015	2.26	14.6	1.77	40.4	17.6
600-21	J1HHP3	9/28/11	357	0.015	2.35	14.4	1.51	44.4	19.3
600-22	J1HHP4	9/27/11	359	0.015	2.25	15.8	1.88	41.0	22.3
600-23	J1HHP5	9/27/11	410	0.027	2.02	16.2	1.44	45.3	22.9
600-24	J1HHP6/ J1HHR3	9/28/11	382	0.038	2.58	16.7	1.87	46.2	21.7
600-25	J1HHP7	9/27/11	252	0.021	1.88	13.1	1.95	38.5	20.2
600-26	J1HHP8	9/28/11	435	0.022	3.13	16.7	2.06	50.1	26.9
600-27	J1HHP9	9/27/11	379	0.028	1.88	14.5	1.92	40.4	27.1
600-28	J1HHR0	9/27/11	401	0.019	2.11	14.3	1.60	40.8	19.3
600-29	J1HHR1	9/28/11	315	0.028	1.89	13.0	1.61	40.6	22.1

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 100 and 300 Areas Coal Ash Characterization **Job No. 14655**

Area: 100-B, 100-D, 100-H, 100-IU-6, and 300 Areas

Discipline: Environmental *Calculation No: 0100X-CA-V0075

Subject: Coal Ash Depth and Corresponding Surface Sample Confidence Limit Calculations

Computer Program: Excel Program No: Excel 2003

The attached calculations have been generated for a specific purpose and task. Use of the calculations by persons who do not have access to all pertinent facts may lead to incorrect conclusions and/or results. Before applying these calculations to your work, the underlying basis, rationale, and other pertinent information relevant to these calculations must be thoroughly reviewed with appropriate Washington Closure Hanford LLC (WCH) officials or other authorized personnel. WCH is not responsible for the use of a calculation not under its direct control.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 13 Total = 14	H. M. Sulloway	J. R. Davidson J. R. DAVIDSON		J. M. Capron	2/21/12

SUMMARY OF REVISION

WCH-DE-019 (05/08/2007) *Obtain Calc. No. from Document Control and Form from Intranet

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	H. M. Sulloway		Date:	2/21/12	Calc. No.:	0100X-CA-V0075	Rev.: 0
Project:	100 and 300 Areas Coal Ash Characterization		Job No:	14655	Checked:	J. R. Davidson	Date: 2/21/12
Subject:	Coal Ash Depth and Corresponding Surface Sample Confidence Limit Calculations						Sheet No. 1 of 13

PURPOSE:

The calculation provides documentation to support the calculation of the lower confidence limit (LCL), upper confidence limit (UCL), mean, and standard deviation on a subset of coal ash samples. Each of the five coal ash sample sites had three sample locations from which material was collected at both the surface and at a depth of 0.9 m (3 ft). Sample data from the three surface sample locations at all five sample sites (N=15) was compiled. A second data compilation was prepared for all depth sample data (N =15).

TABLE OF CONTENTS:

GIVEN/REFERENCES:

1) DOE-RL, 2011a, *Sampling and Analysis Plan for Characterization of Hanford Site Coal Ash Components*, DOE/RL-2010-113, Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

2) DOE-RL, 2011b, Tri-Party Agreement Change Notice, TPA-CN-431, Modify *Sampling and Analysis Plan for Characterization of Hanford Site Coal Ash Components* to add Additional Analysis for Total Uranium on a Subset of Coal Ash Samples, (DOE/RL-2010-113, Rev. 0), U.S. Department of Energy, Richland Operations Office, Richland, Washington.

3) DOE-RL, 2011c, Tri-Party Agreement Change Notice, TPA-CN-451, Modify *Sampling and Analysis Plan for Characterization of Hanford Site Coal Ash Components* to 1) Update Sample Area of 126-D-1 to Exclude an Area Containing Minimal Coal Ash and 2) Identify Waste Management Approach for Waste Related to Coal Ash Sampling Activities (DOE/RL-2010-113, Rev. 0), U.S. Department of Energy, Richland Operations Office, Richland, Washington.

4) Ecology, 1993, *Statistical Guidance for Ecology Site Managers, Supplement S-6, Analyzing Site or Background Data with Below-detection Limit or Below-PQL Values (Censored Data Sets)*, Publication #92-54, Washington Department of Ecology, Olympia, Washington.

5) Gilbert, R. O., 1987, *Statistical Methods for Environmental Pollution Monitoring*, John Wiley & Sons, Inc., New York, New York.

SOLUTION:

The calculation of data mean, standard deviation, LCL, and UCL was performed as described in the Methodology section using the data provided.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	H. M. Sulloway	Date:	2/21/12	Calc. No.:	0100X-CA-V0075	Rev.:	0
Project:	100 and 300 Areas Coal Ash Characterization	Job No:	14655	Checked:	J. R. Davidson	Date:	2/21/12
Subject:	Coal Ash Depth and Corresponding Surface Sample Confidence Limit Calculations					Sheet No.	2 of 13

METHODOLOGY:

Five coal ash sample sites underwent sampling as described in *Sampling and Analysis Plan for Characterization of Hanford Site Coal Ash Components* and subsequent change notices (DOE-RL 2011a, 2011b, and 2011c). Amongst the five sample sites, a total of 15 surface samples were collected at a depth of 3 ft (0.9 m). A surface sample was also collected at each of the 15 depth sample locations. All samples were analyzed for metals, mercury, and total uranium.

All analytes were detected in at least one sample, with the exception of silver. All data reported as being undetected were set to ½ the detection limit value for calculation of the statistics (Ecology 1993). For the statistical evaluation of primary-duplicate sample pairs, the sample results were averaged before being included in the data set, after adjustments for censored data as described above. All statistical analyses were performed using these adjusted data sets. Data means and standard deviations were determined using preset Excel functions.

The LCL and UCL were determined based on formulae provided in Gilbert (1987).

LCL = lower confidence limit for a two-sided 95% confidence interval for the population mean.
UCL = upper confidence limit for a two-sided 95% confidence interval for the population mean.

Formulas

$$LCL = \bar{x} - t_{1-\alpha/2,N-1}\frac{s}{\sqrt{N}}$$

$$UCL = \bar{x} + t_{1-\alpha/2,N-1}\frac{s}{\sqrt{N}}$$

where

$\bar{x} = \dfrac{\sum_{i=1}^{i=N} x_i}{N}$ = sample mean;

N = number of values in data set, sample size;

$t_{1-\alpha/2,N-1}$ = Student's t-score where $\alpha = 0.05$ in this case for a 95% confidence interval, N - 1 is the degrees of freedom;

α = long run proportion of confidence intervals that may not contain population mean, $\alpha = 0.05$ in this case;

$s = \sqrt{\dfrac{\sum_{i=1}^{i=N}\left(x_i - \bar{x}\right)^2}{N-1}}$ = sample standard deviation.

CALCULATION SHEET

Washington Closure Hanford
Originator H. M. Sulloway Date 02/21/12 Calc. No. 0100X-CA-V0075 Rev. No. 0
Project 100 and 300 Areas Coal Ash Characterization Job No. 14655 Checked J. R. Davidson Date 02/21/12
Subject Coal Ash Depth and Corresponding Surface Sample Confidence Limit Calculations Sheet No. 3 of 13

Summary

Results:
The results presented in the following table summarizes the average, standard deviation, LCL, and UCL for each of the respective data sets.

Statistics and Confidence Limits for Depth and Corresponding Surface Coal Ash Samples

Analyte	Surface Concentrations and Confidence Limits				Depth Concentrations and Confidence Limits			
	Mean (mg/kg)	Standard Deviation (mg/kg)	LCL (mg/kg)	UCL (mg/kg)	Mean (mg/kg)	Standard Deviation (mg/kg)	LCL (mg/kg)	UCL (mg/kg)
Antimony	0.372	0.267	0.224	0.519	0.296	0.142	0.218	0.375
Arsenic	4.31	2.37	3.00	5.62	4.20	2.67	2.72	5.68
Barium	833	322	654	1011	803	271	653	953
Beryllium	1.10	0.254	0.956	1.24	1.11	0.310	0.943	1.29
Boron	190	99.2	135	245	239	103	182	296
Cadmium	0.189	0.056	0.157	0.220	0.187	0.053	0.158	0.216
Chromium	11.8	2.44	10.4	13.1	9.43	1.76	8.45	10.4
Cobalt	4.58	1.98	3.49	5.67	3.65	1.42	2.86	4.44
Copper	26.2	8.46	21.5	30.9	21.2	4.56	18.7	23.8
Lead	7.82	4.08	5.57	10.1	17.0	32.5	-1.06	35.0
Manganese	212	149	129	294	157	91.9	106	207
Mercury	0.116	0.185	0.013	0.219	0.359	0.853	-0.113	0.832
Molybdenum	1.41	0.650	1.05	1.77	1.43	0.439	1.19	1.68
Nickel	11.0	3.91	8.88	13.2	8.78	2.33	7.48	10.1
Selenium	0.904	0.493	0.631	1.18	0.938	0.632	0.588	1.29
Silver	--	--	--	--	--	--	--	--
Thallium	0.247	0.125	0.177	0.316	--	--	--	--
Uranium	3.62	0.832	3.16	4.08	3.60	1.16	2.96	4.24
Vanadium	39.3	12.8	32.2	46.4	29.9	5.29	27.0	32.9
Zinc	24.1	7.98	19.7	28.5	23.6	6.92	19.8	27.5

-- = Value not reported as no detections in subject data set
LCL = lower confidence limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway — Date 02/21/12 — Calc. No. 0100X-CA-V0075 — Rev. No. 0

Project 100 and 300 Areas Coal Ash Characterization — Job No. 14655 — Checked J. R. Davidson — Date 02/21/12 — Sheet No. 4 of 13

Subject Coal Ash Depth and Corresponding Surface Sample Confidence Limit Calculations

Coal Ash Surface Sample Data

Sample Location	HEIS Number	Sample Date	Antimony mg/kg	Antimony Q	Antimony PQL	Arsenic mg/kg	Arsenic Q	Arsenic PQL	Barium mg/kg	Barium Q	Barium PQL	Beryllium mg/kg	Beryllium Q	Beryllium PQL
100-B-10	J1HHW3	4/27/2011	0.566	U	0.57	2.98		0.94	597		0.47	1.03		0.19
100-B-17	J1HHX0	4/27/2011	0.484	UJ	0.48	2.50		0.81	556		0.40	1.31		0.16
100-B-25	J1HHX8	4/25/2011	1.69	BJ	1.70	10.3		2.83	1420		1.42	1.65		0.57
Duplicate of J1HHX8	J1HJ03	4/25/2011	1.64	U	1.64	5.46		2.73	907		1.36	1.04		0.55
100-D-08	J1J3X0	8/11/2011	0.470	BJ	0.58	2.32		0.96	1470		0.48	1.31		0.19
100-D-19	J1J401	8/11/2011	0.605	J	0.48	4.61		0.79	743		0.40	1.21		0.16
100-D-26	J1J408	8/11/2011	0.556	J	0.51	3.91		0.85	879		0.42	1.17		0.17
Duplicate of J1J408	J1J412	8/11/2011	0.545	UJ	0.55	4.34		0.91	1140		0.46	1.42		0.18
100-H-17	J1HJ64	8/27/2011	0.492	UJ	0.49	2.51		0.82	527		0.41	0.833		0.16
100-H-20	J1HJ67	8/24/2011	0.508	UJ	0.51	2.94		0.85	916		0.42	1.31		0.17
100-H-25	J1HJ72	8/24/2011	0.476	UJ	0.48	2.55		0.79	954		0.40	1.05		0.16
Duplicate of J1HJ72	J1HJ77	8/24/2011	0.517	UJ	0.52	2.82		0.86	1080		0.43	1.11		0.17
300-02	J1HJN7	8/25/2011	0.448	UJ	0.45	2.89		0.75	490		0.37	0.784		0.15
300-03	J1HJN6	8/25/2011	0.455	UJ	0.46	3.33		0.76	306		0.38	0.544		0.15
300-04	J1HJN9	8/25/2011	0.588	UJ	0.59	2.71		0.98	541		0.49	1.14		0.20
Duplicate of J1HJN9	J1HJT5	8/25/2011	0.484	UJ	0.48	2.66		0.81	639		0.40	1.03		0.16
600-07	J1HHM9	9/27/2011	0.577	UJ	0.58	6.60		0.96	958	J	0.48	0.903		0.19
600-15	J1HHN7	9/27/2011	0.577	UJ	0.58	10.6		0.96	1210	J	0.48	1.43		0.19
Duplicate of J1HHN7	J1HHR2	9/27/2011	0.508	UJ	0.51	9.58		0.85	1250	J	0.42	1.46		0.17
600-23	J1HHP5	9/27/2011	0.536	UJ	0.54	6.46		0.89	915	J	0.45	0.969		0.18

Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg
100-B-10	J1HHW3	4/27/2011	0.285	2.98	597	1.03
100-B-17	J1HHX0	4/27/2011	0.240	2.50	556	1.31
100-B-25	J1HHX8/ J1HJ03	4/25/2011	1.26	7.88	1164	1.35
100-D-08	J1J3X0	8/11/2011	0.470	2.32	1470	1.31
100-D-19	J1J401	8/11/2011	0.605	4.61	743	1.21
100-D-26	J1J408/ J1J412	8/11/2011	0.416	4.13	1010	1.30
100-H-17	J1HJ64	8/27/2011	0.245	2.51	527	0.833
100-H-20	J1HJ67	8/24/2011	0.255	2.94	916	1.31
100-H-25	J1HJ72/ J1HJ77	8/24/2011	0.250	2.69	1017	1.08
300-02	J1HJN7	8/25/2011	0.225	2.89	490	0.784
300-03	J1HJN6	8/25/2011	0.230	3.33	306	0.544
300-04	J1HJN9/ J1HJT5	8/25/2011	0.268	2.69	590	1.09
600-07	J1HHM9	9/27/2011	0.290	6.60	958	0.903
600-15	J1HHN7/ J1HHR2	9/27/2011	0.273	10.1	1230	1.45
600-23	J1HHP5	9/27/2011	0.270	6.46	915	0.969

Computations

	Antimony	Arsenic	Barium	Beryllium
N	15	15	15	15
Percent below detection limit	73%	0%	0%	0%
Mean	0.372	4.31	833	1.10
Standard Deviation	0.267	2.37	322	0.254
Lower Confidence Limit	0.224	3.00	654	0.956
Upper Confidence Limit	0.519	5.62	1011	1.24

B = blank contamination — J = estimate — Q = qualifier

HEIS = Hanford Environmental Information System — PQL = practical quantitation limit — U = undetected

CALCULATION SHEET

Washington Closure Hanford
Originator H. M. Sulloway
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Depth and Corresponding Surface Sample Confidence Limit Calculations

Date 02/21/12 Calc. No. 0100X-CA-V0075 Rev. No. 0
Job No. 14655 Checked J. R. Davidson Date 02/21/12
Sheet No. 5 of 13

Coal Ash Surface Sample Data

Sample Location	HEIS Number	Sample Date	Boron			Cadmium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-10	J1HHW3	4/27/2011	169		1.89	0.117	B	0.19	8.75		0.19	4.42		1.89
100-B-17	J1HHX0	4/27/2011	269		1.61	0.221		0.16	10.6		0.16	2.51		1.61
100-B-25	J1HHX8	4/25/2011	107		5.66	0.385	B	0.57	11.2		0.57	4.66	B	5.66
Duplicate of J1HHX8	J1HJ03	4/25/2011	85.5		5.45	0.278	B	0.55	8.34		0.55	4.12	B	5.45
100-D-08	J1J3X0	8/11/2011	317	J	1.92	0.129	B	0.19	8.03		0.19	9.87		1.92
100-D-19	J1J401	8/11/2011	142	J	1.59	0.176		0.16	12.6		0.16	4.59		1.59
100-D-26	J1J408	8/11/2011	181	J	1.69	0.156	B	0.17	11.4		0.17	3.44		1.69
Duplicate of J1J408	J1J412	8/11/2011	218	J	1.82	0.190		0.18	12.9		0.18	3.48		1.82
100-H-17	J1HJ64	8/27/2011	145	J	1.64	0.148	B	0.16	8.57		0.16	2.14		1.64
100-H-20	J1HJ67	8/24/2011	455	J	1.69	0.178		0.17	16.5		0.17	3.77		1.69
100-H-25	J1HJ72	8/24/2011	235	J	1.59	0.217		0.16	12.3		0.16	3.66		1.59
Duplicate of J1HJ72	J1HJ77	8/24/2011	253	J	1.72	0.183		0.17	12.5		0.17	3.82		1.72
300-02	J1HJN7	8/25/2011	161		1.49	0.226		0.15	12.5		0.15	3.82		1.49
300-03	J1HJN6	8/25/2011	65.4		1.52	0.201		0.15	12.0		0.15	4.23		1.52
300-04	J1HJN9	8/25/2011	196		1.96	0.253		0.20	12.8		0.20	3.00		1.96
Duplicate of J1HJN9	J1HJT5	8/25/2011	199		1.61	0.227		0.16	11.2		0.16	2.66		1.61
600-07	J1HHM9	9/27/2011	146	J	1.92	0.122	B	0.19	12.9	J	0.19	5.74		1.9
600-15	J1HHN7	9/27/2011	112	J	1.92	0.232		0.19	15.5	J	0.19	7.14		1.92
Duplicate of J1HHN7	J1HHR2	9/27/2011	162	J	1.69	0.213		0.17	16.7	J	0.17	7.08		1.69
600-23	J1HHP5	9/27/2011	103	J	1.79	0.143	B	0.18	11.5	J	0.18	6.07		1.79

Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Boron	Cadmium	Chromium	Cobalt
			mg/kg	mg/kg	mg/kg	mg/kg
100-B-10	J1HHW3	4/27/2011	169	0.117	8.75	4.42
100-B-17	J1HHX0	4/27/2011	269	0.221	10.6	2.51
100-B-25	J1HHX8/ J1HJ03	4/25/2011	96.3	0.332	9.77	4.39
100-D-08	J1J3X0	8/11/2011	317	0.129	8.03	9.87
100-D-19	J1J401	8/11/2011	142	0.176	12.6	4.59
100-D-26	J1J408/ J1J412	8/11/2011	200	0.173	12.2	3.46
100-H-17	J1HJ64	8/27/2011	145	0.148	8.57	2.14
100-H-20	J1HJ67	8/24/2011	455	0.178	16.5	3.77
100-H-25	J1HJ72/ J1HJ77	8/24/2011	244	0.200	12.4	3.74
300-02	J1HJN7	8/25/2011	161	0.226	12.5	3.82
300-03	J1HJN6	8/25/2011	65	0.201	12.0	4.23
300-04	J1HJN9/ J1HJT5	8/25/2011	198	0.240	12.0	2.83
600-07	J1HHM9	9/27/2011	146	0.122	12.9	5.74
600-15	J1HHN7/ J1HHR2	9/27/2011	137	0.223	16.1	7.11
600-23	J1HHP5	9/27/2011	103	0.143	11.5	6.07

Computations

	Boron	Cadmium	Chromium	Cobalt
N	15	15	15	15
Percent below detection limit	0%	0%	0%	0%
Mean	190	0.189	11.8	4.58
Standard Deviation	99.2	0.056	2.44	1.98
Lower Confidence Limit	135	0.157	10.4	3.49
Upper Confidence Limit	245	0.220	13.1	5.67

CALCULATION SHEET

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Subject Coal Ash Depth and Corresponding Surface Sample Confidence Limit Calculations

Coal Ash Surface Sample Data

Sample Location	HEIS Number	Sample Date	Copper mg/kg	Copper Q	Copper PQL	Lead mg/kg	Lead Q	Lead PQL	Manganese mg/kg	Manganese Q	Manganese PQL	Mercury mg/kg	Mercury Q	Mercury PQL
100-B-10	J1HHW3	4/27/2011	28.8		0.94	5.59		0.47	104		4.72	0.049		0.03
100-B-17	J1HHX0	4/27/2011	21.9		0.81	6.28		0.40	57.5		4.03	0.053		0.03
100-B-25	J1HHX8	4/25/2011	28.4		2.83	13.4		1.42	391		14.2	0.115		0.03
Duplicate of J1HHX8	J1HJ03	4/25/2011	20.2		2.73	9.95		1.36	202		13.6	0.120		0.03
100-D-08	J1J3X0	8/11/2011	20.8		0.96	1.90	J	0.48	244		4.81	0.119		0.03
100-D-19	J1J401	8/11/2011	31.0		0.79	16.8	J	0.40	122		3.97	0.074		0.03
100-D-26	J1J408	8/11/2011	23.8		0.85	13.2	J	0.42	105		4.24	0.061		0.03
Duplicate of J1J408	J1J412	8/11/2011	28.0		0.91	16.4	J	0.46	137	J	4.55	0.048		0.03
100-H-17	J1HJ64	8/27/2011	16.7		0.82	4.40	J	0.41	67.7	J	4.10	0.049		0.03
100-H-20	J1HJ67	8/24/2011	33.8		0.85	4.25	J	0.42	122	J	4.24	0.018	B	0.03
100-H-25	J1HJ72	8/24/2011	24.0		0.79	5.02	J	0.40	153	J	3.97	0.027		0.03
Duplicate of J1HJ72	J1HJ77	8/24/2011	23.7		0.86	5.21	J	0.43	122	J	4.31	0.019	B	0.03
300-02	J1HJN7	8/25/2011	19.6		0.75	9.66		0.37	186		3.73	0.713		0.03
300-03	J1HJN6	8/25/2011	14.7		0.76	7.13		0.38	213		3.79	0.060		0.03
300-04	J1HJN9	8/25/2011	20.3		0.98	9.41		0.49	107		4.90	0.365		0.03
Duplicate of J1HJN9	J1HJT5	8/25/2011	18.5		0.81	7.74		0.40	91.7		4.03	0.344		0.03
600-07	J1HHM9	9/27/2011	46.8	J	1.0	5.28		0.5	486	J	4.81	0.027	U	0.03
600-15	J1HHN7	9/27/2011	35.4	J	0.96	11.1		0.48	481	J	4.81	0.025	U	0.03
Duplicate of J1HHN7	J1HHR2	9/27/2011	38.6	J	0.85	7.5		0.42	537	J	4.2	0.017	B	0.02
600-23	J1HHP5	9/27/2011	28.2	J	0.89	6.61		0.45	410	J	4.46	0.027	B	0.03

Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Copper mg/kg	Lead mg/kg	Manganese mg/kg	Mercury mg/kg
100-B-10	J1HHW3	4/27/2011	28.8	5.59	104	0.049
100-B-17	J1HHX0	4/27/2011	21.9	6.28	57.5	0.053
100-B-25	J1HHX8/ J1HJ03	4/25/2011	24.3	11.7	297	0.118
100-D-08	J1J3X0	8/11/2011	20.8	1.90	244	0.119
100-D-19	J1J401	8/11/2011	31.0	16.8	122	0.074
100-D-26	J1J408/ J1J412	8/11/2011	25.9	14.8	121	0.055
100-H-17	J1HJ64	8/27/2011	16.7	4.40	67.7	0.049
100-H-20	J1HJ67	8/24/2011	33.8	4.25	122	0.018
100-H-25	J1HJ72/ J1HJ77	8/24/2011	23.9	5.12	138	0.023
300-02	J1HJN7	8/25/2011	19.6	9.66	186	0.713
300-03	J1HJN6	8/25/2011	14.7	7.13	213	0.060
300-04	J1HJN9/ J1HJT5	8/25/2011	19.4	8.58	99.4	0.355
600-07	J1HHM9	9/27/2011	46.8	5.28	486	0.015
600-15	J1HHN7/ J1HHR2	9/27/2011	37.0	9.30	509	0.016
600-23	J1HHP5	9/27/2011	28.2	6.61	410	0.027

Computations

	Copper	Lead	Manganese	Mercury
N	15	15	15	15
Percent below detection limit	0%	0%	0%	7%
Mean	26.2	7.82	212	0.116
Standard Deviation	8.46	4.08	149	0.185
Lower Confidence Limit	21.5	5.57	129	0.013
Upper Confidence Limit	30.9	10.1	294	0.219

CALCULATION SHEET

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Coal Ash Surface Sample Data

Sample Location	HEIS Number	Sample Date	Molybdenum mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Selenium mg/kg	Q	PQL	Silver mg/kg	Q	PQL
100-B-10	J1HHW3	4/27/2011	1.08	B	1.89	9.93		3.77	0.618		0.28	0.189	U	0.19
100-B-17	J1HHX0	4/27/2011	1.17	B	1.61	7.02		3.23	0.331		0.24	0.161	U	0.16
100-B-25	J1HHX8	4/25/2011	1.14	B	5.66	10.5	B	11.3	1.58		0.85	0.566	U	0.57
Duplicate of J1HHX8	J1HJ03	4/25/2011	0.972	B	5.45	9.70	B	10.9	1.03		0.82	0.545	U	0.55
100-D-08	J1J3X0	8/11/2011	2.10		1.92	14.9		3.85	0.288	U	0.29	0.192	U	0.19
100-D-19	J1J401	8/11/2011	1.03	B	1.59	10.5		3.17	0.995		0.24	0.159	U	0.16
100-D-26	J1J408	8/11/2011	1.11	B	1.69	7.57		3.4	0.769		0.25	0.169	U	0.17
Duplicate of J1J408	J1J412	8/11/2011	1.27	B	1.82	8.50		3.6	1.14		0.27	0.182	U	0.18
100-H-17	J1HJ64	8/27/2011	0.708	B	1.64	5.88	J	3.28	0.762		0.25	0.164	U	0.16
100-H-20	J1HJ67	8/24/2011	2.44		1.69	10.9	J	3.39	0.341		0.25	0.169	U	0.17
100-H-25	J1HJ72	8/24/2011	1.44	B	1.59	10.1	J	3.17	0.338		0.24	0.159	U	0.16
Duplicate of J1HJ72	J1HJ77	8/24/2011	1.49	B	1.72	10.2	J	3.45	0.504		0.26	0.172	U	0.17
300-02	J1HJN7	8/25/2011	0.851	B	1.49	8.37	J	2.99	0.943		0.22	0.149	U	0.15
300-03	J1HJN6	8/25/2011	0.472	B	1.52	9.21	J	3.03	0.877		0.23	0.152	U	0.15
300-04	J1HJN9	8/25/2011	1.04	B	1.96	8.97	J	3.92	1.24		0.29	0.196	U	0.20
Duplicate of J1HJN9	J1HJT5	8/25/2011	0.946	B	1.61	8.07	J	3.23	1.17		0.24	0.161	U	0.16
600-07	J1HHM9	9/27/2011	2.34		1.9	16.7	J	3.85	1.22		0.29	0.192	U	0.19
600-15	J1HHN7	9/27/2011	2.11		1.92	18.9	J	3.85	2.27		0.29	0.192	U	0.19
Duplicate of J1HHN7	J1HHR2	9/27/2011	2.49		1.69	19.7	J	3.4	1.73		0.25	0.169	U	0.17
600-23	J1HHP5	9/27/2011	2.02		1.79	16.2	J	3.6	1.44		0.27	0.179	U	0.18

Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Molybdenum mg/kg	Nickel mg/kg	Selenium mg/kg	Silver mg/kg
100-B-10	J1HHW3	4/27/2011	1.08	9.93	0.618	0.095
100-B-17	J1HHX0	4/27/2011	1.17	7.02	0.331	0.080
100-B-25	J1HHX8/ J1HJ03	4/25/2011	1.06	10.1	1.31	0.280
100-D-08	J1J3X0	8/11/2011	2.10	14.9	0.145	0.095
100-D-19	J1J401	8/11/2011	1.03	10.5	0.995	0.080
100-D-26	J1J408/ J1J412	8/11/2011	1.19	8.04	0.955	0.088
100-H-17	J1HJ64	8/27/2011	0.708	5.88	0.762	0.080
100-H-20	J1HJ67	8/24/2011	2.44	10.9	0.341	0.085
100-H-25	J1HJ72/ J1HJ77	8/24/2011	1.47	10.2	0.421	0.083
300-02	J1HJN7	8/25/2011	0.851	8.37	0.943	0.075
300-03	J1HJN6	8/25/2011	0.472	9.21	0.877	0.075
300-04	J1HJN9/ J1HJT5	8/25/2011	0.993	8.52	1.21	0.090
600-07	J1HHM9	9/27/2011	2.34	16.7	1.22	0.095
600-15	J1HHN7/ J1HHR2	9/27/2011	2.30	19.3	2.00	0.090
600-23	J1HHP5	9/27/2011	2.02	16.2	1.44	0.090

Computations

	Molybdenum mg/kg	Nickel mg/kg	Selenium mg/kg	Silver mg/kg
N	15	15	15	15
Percent below detection limit	0%	0%	7%	100%
Mean	1.41	11.0	0.904	0.099
Standard Deviation	0.650	3.91	0.493	0.051
Lower Confidence Limit	1.05	8.88	0.631	0.071
Upper Confidence Limit	1.77	13.2	1.18	0.127

CALCULATION SHEET

Washington Closure Hanford

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Subject Coal Ash Depth and Corresponding Surface Sample Confidence Limit Calculations

Coal Ash Surface Sample Data

Sample Location	HEIS Number	Sample Date	Thallium			Uranium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-10	J1HHW3	4/27/2011	0.472	U	0.472	2.67		0.123	39.3		2.36	13.6		9.43
100-B-17	J1HHX0	4/27/2011	0.403	U	0.403	5.39		0.128	27.3		2.02	32.4		8.06
100-B-25	J1HHX8	4/25/2011	1.42	U	1.42	4.13		0.128	36.2		7.08	38.0		28.3
Duplicate of J1HHX8	J1HJ03	4/25/2011	1.36	U	1.36	3.25		0.123	27.6		6.82	33.5		27.3
100-D-08	J1J3X0	8/11/2011	0.481	UJ	0.48	3.66		0.143	27.6		2.40	12.1	J	9.62
100-D-19	J1J401	8/11/2011	0.198	BJ	0.40	3.95		0.143	38.5		1.98	21.2	J	7.94
100-D-26	J1J408	8/11/2011	0.424	UJ	0.42	4.22		0.143	33.2		2.12	15.2	J	8.47
Duplicate of J1J408	J1J412	8/11/2011	0.455	UJ	0.46	3.92		0.143	41.3		2.27	22.9	J	9.09
100-H-17	J1HJ64	8/27/2011	0.410	UJ	0.41	2.24		0.132	23.8		2.05	14.1		8.20
100-H-20	J1HJ67	8/24/2011	0.424	UJ	0.42	4.01		0.132	42.2		2.12	20.1		8.47
100-H-25	J1HJ72	8/24/2011	0.397	UJ	0.40	3.06		0.132	33.8		1.98	28.9		7.9
Duplicate of J1HJ72	J1HJ77	8/24/2011	0.431	UJ	0.43	2.91		0.132	33.3		2.16	19.5		8.6
300-02	J1HJN7	8/25/2011	0.373	U	0.370	4.22		0.132	42.8		1.87	35.8	J	7.46
300-03	J1HJN6	8/25/2011	0.379	U	0.380	3.70		0.132	44.4		1.89	35.3	J	7.58
300-04	J1HJN9	8/25/2011	0.490	U	0.490	3.36		0.132	34.0		2.45	27.2	J	9.80
Duplicate of J1HJN9	J1HJT5	8/25/2011	0.403	U	0.400	3.20		0.132	31.5		2.02	28.3	J	8.06
600-07	J1HHM9	9/27/2011	0.481	UJ	0.480	2.56		0.136	43.7	J	2.40	22.1		9.62
600-15	J1HHN7	9/27/2011	0.481	UJ	0.480	4.18		0.136	55.3	J	2.40	28.5		9.62
Duplicate of J1HHN7	J1HHR2	9/27/2011	0.424	UJ	0.42	5.18		0.136	102	J	2.12	22.1		8.5
600-23	J1HHP5	9/27/2011	0.446	UJ	0.450	3.23		0.136	45.3	J	2.23	22.9		8.93

Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Thallium	Uranium	Vanadium	Zinc
			mg/kg	mg/kg	mg/kg	mg/kg
100-B-10	J1HHW3	4/27/2011	0.236	2.67	39.3	13.6
100-B-17	J1HHX0	4/27/2011	0.202	5.39	27.3	32.4
100-B-25	J1HHX8/ J1HJ03	4/25/2011	0.695	3.69	31.9	35.8
100-D-08	J1J3X0	8/11/2011	0.240	3.66	27.6	12.1
100-D-19	J1J401	8/11/2011	0.198	3.95	38.5	21.2
100-D-26	J1J408/ J1J412	8/11/2011	0.220	4.07	37.3	19.1
100-H-17	J1HJ64	8/27/2011	0.205	2.24	23.8	14.1
100-H-20	J1HJ67	8/24/2011	0.210	4.01	42.2	20.1
100-H-25	J1HJ72/ J1HJ77	8/24/2011	0.208	2.99	33.6	24.2
300-02	J1HJN7	8/25/2011	0.185	4.22	42.8	35.8
300-03	J1HJN6	8/25/2011	0.190	3.70	44.4	35.3
300-04	J1HJN9/ J1HJT5	8/25/2011	0.223	3.28	32.8	27.8
600-07	J1HHM9	9/27/2011	0.240	2.56	43.7	22.1
600-15	J1HHN7/ J1HHR2	9/27/2011	0.225	4.68	78.7	25.3
600-23	J1HHP5	9/27/2011	0.225	3.23	45.3	22.9

Computations

	Thallium	Uranium	Vanadium	Zinc
N	15	15	15	15
Percent below detection limit	93%	0%	0%	0%
Mean	0.247	3.62	39.3	24.1
Standard Deviation	0.125	0.832	12.8	7.98
Lower Confidence Limit	0.177	3.16	32.2	19.7
Upper Confidence Limit	0.316	4.08	46.4	28.5

CALCULATION SHEET

Washington Closure Hanford
Originator H. M. Sullaway
Project 100 and 300 Areas Coal Ash Characterization
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Coal Ash Depth Sample Data

Sample Location	HEIS Number	Sample Date	Antimony mg/kg	Antimony Q	Antimony PQL	Arsenic mg/kg	Arsenic Q	Arsenic PQL	Barium mg/kg	Barium Q	Barium PQL	Beryllium mg/kg	Beryllium Q	Beryllium PQL
100-B-10 (D)	J1HJ10	4/27/2011	0.556	U	0.56	2.87		0.93	916		0.46	1.18		0.19
100-B-17 (D)	J1HJ09	4/27/2011	0.469	UJ	0.47	2.50		0.78	681		0.39	1.68		0.16
100-B-25 (D)	J1HJ08	4/26/2011	0.956	UJB	1.61	8.09		2.68	1130		1.34	1.14		0.54
100-D-08 (D)	J1J444	8/11/2011	0.476	UJ	0.48	2.52		0.79	1060		0.40	1.45		0.16
100-D-19 (D)	J1J443	8/11/2011	0.545	UJ	0.55	6.00		0.91	1470		0.46	1.62		0.18
100-D-26 (D)	J1J442	8/11/2011	0.435	UJ	0.44	3.16		0.73	871		0.36	1.10		0.15
100-H-17 (D)	J1HJ82	8/27/2011	0.566	UJ	0.57	2.79		0.94	487		0.47	1.15		0.19
100-H-20 (D)	J1HJ81	8/24/2011	0.545	UJ	0.55	2.24		0.91	709		0.46	0.691		0.18
100-H-25 (D)	J1HJ80	8/24/2011	0.517	UJ	0.52	11.7		0.86	1000		0.43	1.28		0.17
300-02 (D)	J1HJV1	8/25/2011	0.545	UJ	0.55	2.25		0.91	527		0.46	0.862		0.18
300-03 (D)	J1HJV2	8/25/2011	0.526	UJ	0.53	2.37		0.88	526		0.44	0.818		0.18
300-04 (D)	J1HJV0	8/25/2011	0.476	UJ	0.48	2.45		0.79	629		0.40	1.03		0.16
600-07 (D)	J1HHT8	9/27/2011	0.476	UJ	0.48	4.29		0.79	711	J	0.40	1.21		0.16
600-15 (D)	J1HHT9	9/27/2011	0.269	BJ	0.52	4.92		0.86	653	J	0.43	0.658		0.17
600-23 (D)	J1HHV0	9/27/2011	0.556	UJ	0.56	4.83		0.93	680	J	0.46	0.847		0.19

Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg
100-B-10 (D)	J1HJ10	4/27/2011	0.280	2.87	916	1.18
100-B-17 (D)	J1HJ09	4/27/2011	0.235	2.50	681	1.68
100-B-25 (D)	J1HJ08	4/26/2011	0.805	8.09	1130	1.14
100-D-08 (D)	J1J444	8/11/2011	0.240	2.52	1060	1.45
100-D-19 (D)	J1J443	8/11/2011	0.275	6.00	1470	1.62
100-D-26 (D)	J1J442	8/11/2011	0.220	3.16	871	1.10
100-H-17 (D)	J1HJ82	8/27/2011	0.285	2.79	487	1.150
100-H-20 (D)	J1HJ81	8/24/2011	0.275	2.24	709	0.69
100-H-25 (D)	J1HJ80	8/24/2011	0.260	11.7	1000	1.28
300-02 (D)	J1HJV1	8/25/2011	0.275	2.25	527	0.862
300-03 (D)	J1HJV2	8/25/2011	0.265	2.37	526	0.818
300-04 (D)	J1HJV0	8/25/2011	0.240	2.45	629	1.03
600-07 (D)	J1HHT8	9/27/2011	0.240	4.29	711	1.21
600-15 (D)	J1HHT9	9/27/2011	0.269	4.92	653	0.66
600-23 (D)	J1HHV0	9/27/2011	0.280	4.83	680	0.847

Computations

	Antimony	Arsenic	Barium	Beryllium
N	15	15	15	15
Percent below detection limit	67%	0%	0%	0%
Mean	0.296	4.20	803	1.11
Standard Deviation	0.142	2.67	271	0.310
Lower Confidence Limit	0.218	2.72	653	0.943
Upper Confidence Limit	0.375	5.68	953	1.29

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway — Date 02/21/12 — Calc. No. 0100X-CA-V0075 — Rev. No. 0

Project 100 and 300 Areas Coal Ash Characterization — Job No. 14655 — Checked J. R. Davidson — Date 02/21/12

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Subject Coal Ash Depth and Corresponding Surface Sample Confidence Limit Calculations

Coal Ash Depth Sample Data

Sample Location	HEIS Number	Sample Date	Boron			Cadmium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-10 (D)	J1HJ10	4/27/2011	279		1.85	0.239		0.19	7.34		0.19	3.44		1.85
100-B-17 (D)	J1HJ09	4/27/2011	262		1.56	0.135	B	0.16	13.3		0.16	2.64		1.56
100-B-25 (D)	J1HJ08	4/26/2011	35.6		5.36	0.202	B	0.54	10.6		0.54	5.12	B	5.36
100-D-08 (D)	J1J444	8/11/2011	419	J	1.59	0.178		0.16	7.64		0.16	6.82		1.59
100-D-19 (D)	J1J443	8/11/2011	195	J	1.82	0.208		0.18	7.76		0.18	5.63		1.82
100-D-26 (D)	J1J442	8/11/2011	169	J	1.45	0.074	B	0.15	8.73		0.15	4.21		1.45
100-H-17 (D)	J1HJ82	8/27/2011	245	J	1.89	0.252		0.19	8.52		0.19	1.72	B	1.89
100-H-20 (D)	J1HJ81	8/24/2011	199	J	1.82	0.184		0.18	9.62		0.18	3.52		1.82
100-H-25 (D)	J1HJ80	8/24/2011	404	J	1.72	0.200		0.17	11.2		0.17	2.42		1.72
300-02 (D)	J1HJV1	8/25/2011	288		1.82	0.207		0.18	9.87		0.18	2.16		1.82
300-03 (D)	J1HJV2	8/25/2011	256		1.75	0.222		0.18	10.6		0.18	2.94		1.75
300-04 (D)	J1HJV0	8/25/2011	360		1.59	0.267		0.16	11.6		0.16	2.19		1.59
600-07 (D)	J1HHT8	9/27/2011	147	J	1.59	0.111	B	0.16	7.50	J	0.16	4.42		1.59
600-15 (D)	J1HHT9	9/27/2011	168	J	1.72	0.186		0.17	8.99	J	0.17	3.56		1.72
600-23 (D)	J1HHV0	9/27/2011	155	J	1.85	0.139	B	0.19	8.11	J	0.19	3.98		1.85

Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Boron	Cadmium	Chromium	Cobalt
			mg/kg	mg/kg	mg/kg	mg/kg
100-B-10 (D)	J1HJ10	4/27/2011	279	0.239	7.34	3.44
100-B-17 (D)	J1HJ09	4/27/2011	262	0.135	13.3	2.64
100-B-25 (D)	J1HJ08	4/26/2011	35.6	0.202	10.6	5.12
100-D-08 (D)	J1J444	8/11/2011	419	0.178	7.64	6.82
100-D-19 (D)	J1J443	8/11/2011	195	0.208	7.76	5.63
100-D-26 (D)	J1J442	8/11/2011	169	0.074	8.73	4.21
100-H-17 (D)	J1HJ82	8/27/2011	245	0.252	8.52	1.72
100-H-20 (D)	J1HJ81	8/24/2011	199	0.184	9.62	3.52
100-H-25 (D)	J1HJ80	8/24/2011	404	0.200	11.2	2.42
300-02 (D)	J1HJV1	8/25/2011	288	0.207	9.87	2.16
300-03 (D)	J1HJV2	8/25/2011	256	0.222	10.6	2.94
300-04 (D)	J1HJV0	8/25/2011	360	0.267	11.6	2.19
600-07 (D)	J1HHT8	9/27/2011	147	0.111	7.50	4.42
600-15 (D)	J1HHT9	9/27/2011	168	0.186	8.99	3.56
600-23 (D)	J1HHV0	9/27/2011	155	0.139	8.11	3.98

Computations

	Boron	Cadmium	Chromium	Cobalt
N	15	15	15	15
Percent below detection limit	0%	0%	0%	0%
Mean	239	0.187	9.43	3.65
Standard Deviation	103	0.053	1.76	1.42
Lower Confidence Limit	182	0.158	8.45	2.86
Upper Confidence Limit	296	0.216	10.4	4.44

CALCULATION SHEET

Washington Closure Hanford
Originator H. M. Sulloway
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Depth and Corresponding Surface Sample Confidence Limit Calculations

Date 02/21/12 | Job No. 14655 | Calc. No. 0100X-CA-V0075 | Checked J. R. Davidson | Rev. No. 0 | Date 02/21/12 | Sheet No. 11 of 13

Coal Ash Depth Sample Data

Sample Location	HEIS Number	Sample Date	Copper			Lead			Manganese			Mercury		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-10 (D)	J1HJ10	4/27/2011	21.0		0.93	11.8		0.46	110		4.63	0.042		0.03
100-B-17 (D)	J1HJ09	4/27/2011	19.6		0.78	4.33		0.39	38.5		3.91	0.080		0.03
100-B-25 (D)	J1HJ08	4/26/2011	26.2		2.68	4.91		1.34	187		13.4	0.026	B	0.03
100-D-08 (D)	J1J444	8/11/2011	13.6		0.79	3.50	J	0.40	255	J	3.97	0.047		0.03
100-D-19 (D)	J1J443	8/11/2011	23.7		0.91	3.24	J	0.46	234	J	4.55	0.052		0.03
100-D-26 (D)	J1J442	8/11/2011	31.8		0.73	3.35	J	0.36	91.4	J	3.62	0.036		0.03
100-H-17 (D)	J1HJ82	8/27/2011	18.1		0.94	27.3	J	0.47	82.1	J	4.72	0.053		0.03
100-H-20 (D)	J1HJ81	8/24/2011	25.3		0.91	18.3	J	0.46	148	J	4.55	0.863		0.02
100-H-25 (D)	J1HJ80	8/24/2011	22.7		0.86	132	J	0.43	90.9	J	4.31	0.035		0.03
300-02 (D)	J1HJV1	8/25/2011	16.4		0.91	8.18		0.46	85.6		4.55	3.32		0.16
300-03 (D)	J1HJV2	8/25/2011	15.5		0.88	9.12		0.44	95.9		4.39	0.291		0.02
300-04 (D)	J1HJV0	8/25/2011	19.7		0.79	14.5		0.40	66.3		3.97	0.501		0.03
600-07 (D)	J1HHT8	9/27/2011	21.9	J	0.79	3.30		0.40	327	J	4.0	0.026	U	0.03
600-15 (D)	J1HHT9	9/27/2011	21.6	J	0.86	5.61		0.43	250	J	4.3	0.025	U	0.03
600-23 (D)	J1HHV0	9/27/2011	21.3	J	0.93	5.08		0.46	286	J	4.63	0.026	U	0.03

Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Copper	Lead	Manganese	Mercury
			mg/kg	mg/kg	mg/kg	mg/kg
100-B-10 (D)	J1HJ10	4/27/2011	21.0	11.8	110	0.042
100-B-17 (D)	J1HJ09	4/27/2011	19.6	4.33	38.5	0.080
100-B-25 (D)	J1HJ08	4/26/2011	26.2	4.91	187	0.026
100-D-08 (D)	J1J444	8/11/2011	13.6	3.50	255	0.047
100-D-19 (D)	J1J443	8/11/2011	23.7	3.24	234	0.052
100-D-26 (D)	J1J442	8/11/2011	31.8	3.35	91.4	0.036
100-H-17 (D)	J1HJ82	8/27/2011	18.1	27.3	82.1	0.053
100-H-20 (D)	J1HJ81	8/24/2011	25.3	18.3	148	0.863
100-H-25 (D)	J1HJ80	8/24/2011	22.7	132	90.9	0.035
300-02 (D)	J1HJV1	8/25/2011	16.4	8.18	85.6	3.32
300-03 (D)	J1HJV2	8/25/2011	15.5	9.12	95.9	0.291
300-04 (D)	J1HJV0	8/25/2011	19.7	14.5	66.3	0.501
600-07 (D)	J1HHT8	9/27/2011	21.9	3.30	327	0.015
600-15 (D)	J1HHT9	9/27/2011	21.6	5.61	250	0.015
600-23 (D)	J1HHV0	9/27/2011	21.3	5.08	286	0.015

Computations

	Copper	Lead	Manganese	Mercury
N	15	15	15	15
Percent below detection limit	0%	0%	0%	13%
Mean	21.2	17.0	157	0.359
Standard Deviation	4.56	32.5	91.9	0.853
Lower Confidence Limit	18.7	-1.06	106	-0.113
Upper Confidence Limit	23.8	35.0	207	0.832

CALCULATION SHEET

Washington Closure Hanford
Originator H. M. Sulloway
Project 100 and 300 Areas Coal Ash Characterization
Subject Coal Ash Depth and Corresponding Surface Sample Confidence Limit Calculations

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Coal Ash Depth Sample Data

Sample Location	HEIS Number	Sample Date	Molybdenum mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Selenium mg/kg	Q	PQL	Silver mg/kg	Q	PQL
100-B-10 (D)	J1HJ10	4/27/2011	1.40	B	1.85	7.29		3.70	0.278	U	0.28	0.185	U	0.19
100-B-17 (D)	J1HJ09	4/27/2011	1.31	B	1.56	7.67		3.12	0.367		0.23	0.156	U	0.16
100-B-25 (D)	J1HJ08	4/26/2011	1.59	B	5.36	11.2		10.7	0.804	U	0.80	0.536	U	0.54
100-D-08 (D)	J1J444	8/11/2011	1.47	B	1.59	11.5		3.17	0.837		0.24	0.159	U	0.16
100-D-19 (D)	J1J443	8/11/2011	1.67	B	1.82	11.0		3.6	0.728		0.27	0.182	U	0.18
100-D-26 (D)	J1J442	8/11/2011	1.49		1.45	10.6		2.9	0.686		0.22	0.145	U	0.15
100-H-17 (D)	J1HJ82	8/27/2011	0.916	B	1.89	4.79	J	3.77	1.18		0.28	0.189	U	0.19
100-H-20 (D)	J1HJ81	8/24/2011	1.96		1.82	10.6	J	3.64	0.273	U	0.27	0.182	U	0.18
100-H-25 (D)	J1HJ80	8/24/2011	1.41	B	1.72	6.96	J	3.45	0.259	U	0.26	0.172	U	0.17
300-02 (D)	J1HJV1	8/25/2011	0.830	B	1.82	5.84	J	3.64	1.19		0.27	0.182	U	0.18
300-03 (D)	J1HJV2	8/25/2011	0.690	B	1.75	6.53	J	3.51	1.53		0.26	0.175	U	0.18
300-04 (D)	J1HJV0	8/25/2011	0.923	B	1.59	6.43	J	3.17	1.77		0.24	0.159	U	0.16
600-07 (D)	J1HHT8	9/27/2011	1.91		1.59	11.2	J	3.2	1.29		0.24	0.159	U	0.16
600-15 (D)	J1HHT9	9/27/2011	2.16		1.72	9.42	J	3.5	1.83		0.26	0.172	U	0.17
600-23 (D)	J1HHV0	9/27/2011	1.78	B	1.85	10.6	J	3.70	1.85		0.28	0.185	U	0.19

Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Molybdenum mg/kg	Nickel mg/kg	Selenium mg/kg	Silver mg/kg
100-B-10 (D)	J1HJ10	4/27/2011	1.40	7.29	0.140	0.095
100-B-17 (D)	J1HJ09	4/27/2011	1.31	7.67	0.367	0.080
100-B-25 (D)	J1HJ08	4/26/2011	1.59	11.2	0.400	0.270
100-D-08 (D)	J1J444	8/11/2011	1.47	11.5	0.837	0.080
100-D-19 (D)	J1J443	8/11/2011	1.67	11.0	0.728	0.090
100-D-26 (D)	J1J442	8/11/2011	1.49	10.6	0.686	0.075
100-H-17 (D)	J1HJ82	8/27/2011	0.916	4.79	1.18	0.095
100-H-20 (D)	J1HJ81	8/24/2011	1.96	10.6	0.135	0.090
100-H-25 (D)	J1HJ80	8/24/2011	1.41	6.96	0.130	0.085
300-02 (D)	J1HJV1	8/25/2011	0.830	5.84	1.19	0.090
300-03 (D)	J1HJV2	8/25/2011	0.690	6.53	1.53	0.090
300-04 (D)	J1HJV0	8/25/2011	0.923	6.43	1.77	0.080
600-07 (D)	J1HHT8	9/27/2011	1.91	11.2	1.29	0.080
600-15 (D)	J1HHT9	9/27/2011	2.16	9.42	1.83	0.085
600-23 (D)	J1HHV0	9/27/2011	1.78	10.6	1.85	0.095

Computations

	Molybdenum mg/kg	Nickel mg/kg	Selenium mg/kg	Silver mg/kg
N	15	15	15	15
Percent below detection limit	0%	0%	13%	73%
Mean	1.43	8.78	0.938	0.099
Standard Deviation	0.439	2.33	0.632	0.048
Lower Confidence Limit	1.19	7.48	0.588	0.072
Upper Confidence Limit	1.68	10.1	1.29	0.125

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway | Date 02/21/12 | Calc. No. 0100X-CA-V0075 | Rev. No. 0
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Coal Ash Depth Sample Data

Sample Location	HEIS Number	Sample Date	Thallium			Uranium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-B-10 (D)	J1HJ10	4/27/2011	0.463	U	0.463	4.28		0.123	28.7		2.31	29.7		9.26
100-B-17 (D)	J1HJ09	4/27/2011	0.391	U	0.391	6.75		0.128	29.2		1.95	15.1		7.81
100-B-25 (D)	J1HJ08	4/26/2011	1.34	U	1.34	3.56		0.128	33.5		6.70	23.8	B	26.8
100-D-08 (D)	J1J444	8/11/2011	0.397	UJ	0.400	3.56		0.143	31.2		1.98	30.8	J	7.94
100-D-19 (D)	J1J443	8/11/2011	0.455	UJ	0.460	4.46		0.143	29.7		2.27	33.6	J	9.09
100-D-26 (D)	J1J442	8/11/2011	0.362	UJ	0.360	3.85		0.143	41.8		1.81	10.3	J	7.25
100-H-17 (D)	J1HJ82	8/27/2011	0.472	UJ	0.470	4.18		0.132	19.6		2.36	25.7		9.43
100-H-20 (D)	J1HJ81	8/24/2011	0.455	UJ	0.460	2.78		0.132	28.9		2.27	21.0		9.09
100-H-25 (D)	J1HJ80	8/24/2011	0.431	UJ	0.430	4.25		0.132	27.0		2.16	31.3		8.62
300-02 (D)	J1HJV1	8/25/2011	0.455	U	0.460	2.61		0.132	25.1		2.27	27.8	J	9.09
300-03 (D)	J1HJV2	8/25/2011	0.439	U	0.440	2.86		0.132	28.3		2.19	26.7	J	8.77
300-04 (D)	J1HJV0	8/25/2011	0.397	U	0.400	3.14		0.132	24.3		1.98	26.9	J	7.94
600-07 (D)	J1HHT8	9/27/2011	0.397	UJ	0.400	2.64		0.136	36.8	J	1.98	17.7		7.94
600-15 (D)	J1HHT9	9/27/2011	0.431	UJ	0.430	1.76		0.136	32.9	J	2.16	18.1		8.62
600-23 (D)	J1HHV0	9/27/2011	0.463	UJ	0.460	3.28		0.136	32.1	J	2.31	16.0		9.26

Statistical Computation Input Data

Sample Location	HEIS Number	Sample Date	Thallium	Uranium	Vanadium	Zinc
			mg/kg	mg/kg	mg/kg	mg/kg
100-B-10 (D)	J1HJ10	4/27/2011	0.232	4.28	28.7	29.7
100-B-17 (D)	J1HJ09	4/27/2011	0.196	6.75	29.2	15.1
100-B-25 (D)	J1HJ08	4/26/2011	0.670	3.56	33.5	23.8
100-D-08 (D)	J1J444	8/11/2011	0.200	3.56	31.2	30.8
100-D-19 (D)	J1J443	8/11/2011	0.230	4.46	29.7	33.6
100-D-26 (D)	J1J442	8/11/2011	0.180	3.85	41.8	10.3
100-H-17 (D)	J1HJ82	8/27/2011	0.235	4.18	19.6	25.7
100-H-20 (D)	J1HJ81	8/24/2011	0.230	2.78	28.9	21.0
100-H-25 (D)	J1HJ80	8/24/2011	0.215	4.25	27.0	31.3
300-02 (D)	J1HJV1	8/25/2011	0.230	2.61	25.1	27.8
300-03 (D)	J1HJV2	8/25/2011	0.220	2.86	28.3	26.7
300-04 (D)	J1HJV0	8/25/2011	0.200	3.14	24.3	26.9
600-07 (D)	J1HHT8	9/27/2011	0.200	2.64	36.8	17.7
600-15 (D)	J1HHT9	9/27/2011	0.215	1.76	32.9	18.1
600-23 (D)	J1HHV0	9/27/2011	0.230	3.28	32.1	16.0

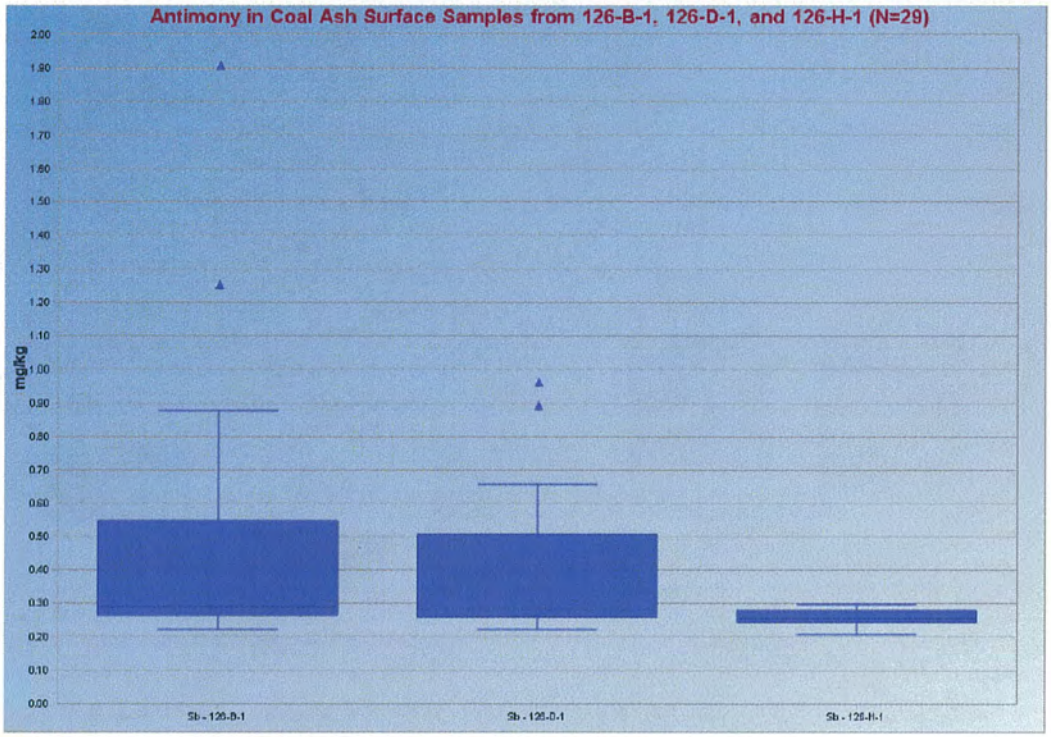
Computations

	Thallium	Uranium	Vanadium	Zinc
N	15	15	15	15
Percent below detection limit	73%	0%	0%	0%
Mean	0.245	3.60	29.9	23.6
Standard Deviation	0.119	1.16	5.29	6.92
Lower Confidence Limit	0.180	2.96	27.0	19.8
Upper Confidence Limit	0.311	4.24	32.9	27.5

APPENDIX E

COAL ASH SURFACE SAMPLES BOXPLOTS

Figure E-1. Boxplots of Antimony Results from 126-B-1, 126-E-1, and 126-H-1 Coal Ash Surface Samples (N=29). [a]



[a] Antimony was detected at only three of the five sample sites.

Figure E-2. Boxplots of Arsenic Results from Coal Ash Surface Samples (N=29).

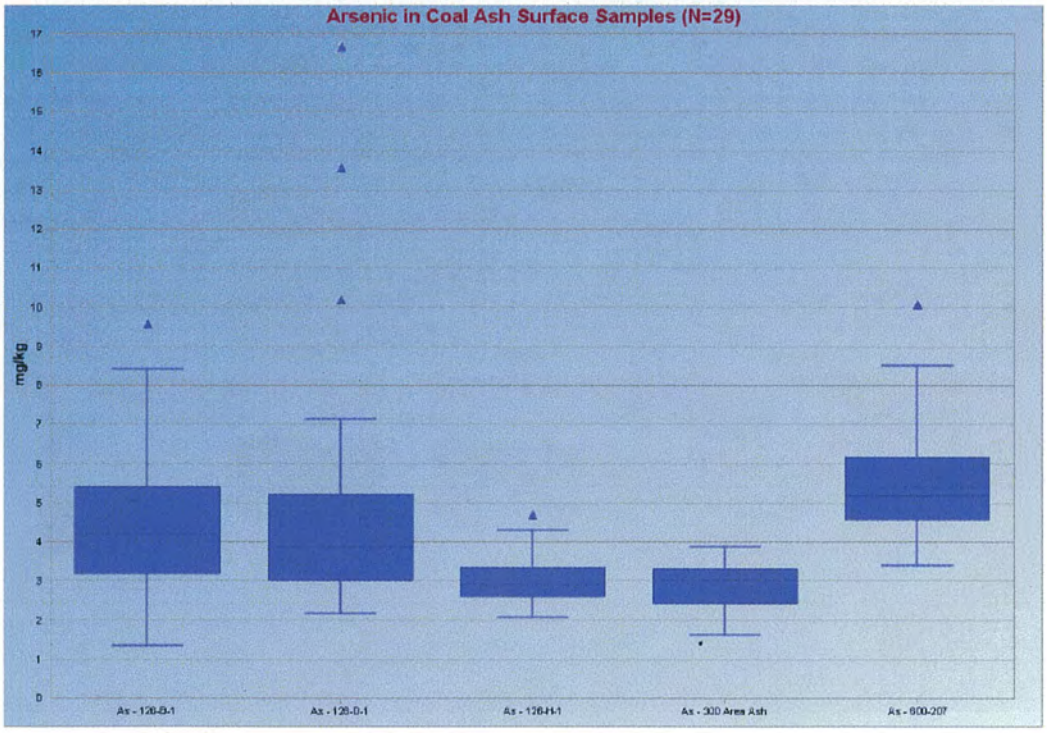


Figure E-3. Boxplots of Barium Results from Coal Ash Surface Samples (N=29).

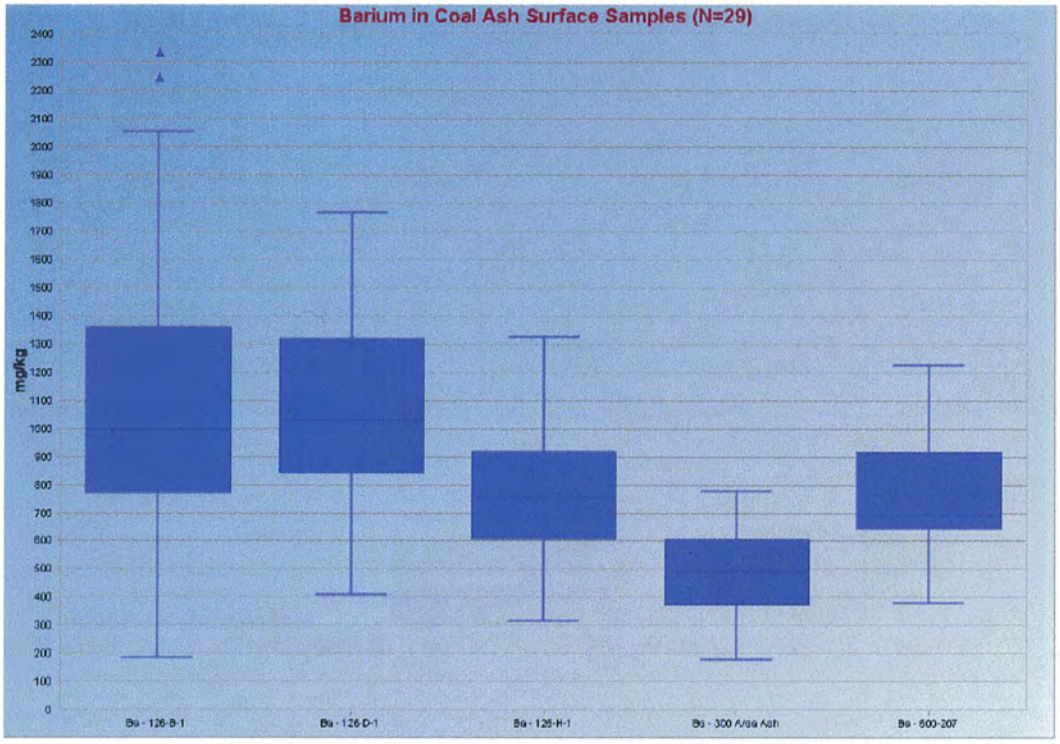


Figure E-4. Boxplots of Beryllium Results from Coal Ash Surface Samples (N=29).

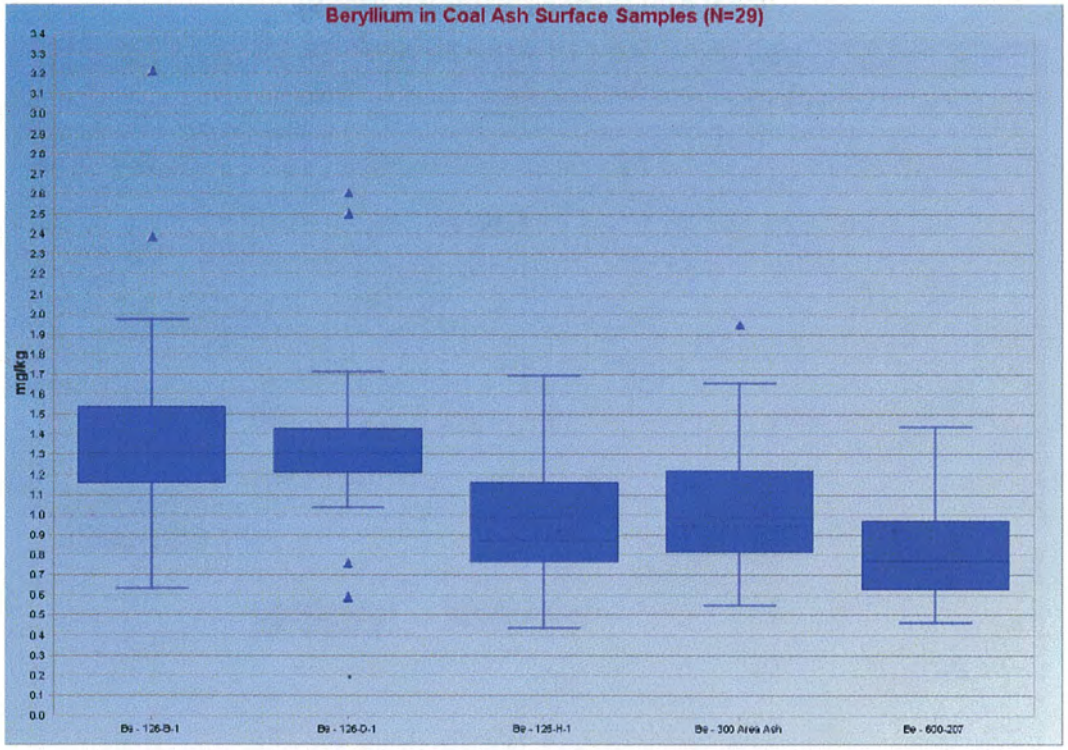


Figure E-5. Boxplots of Boron Results from Coal Ash Surface Samples (N=29).

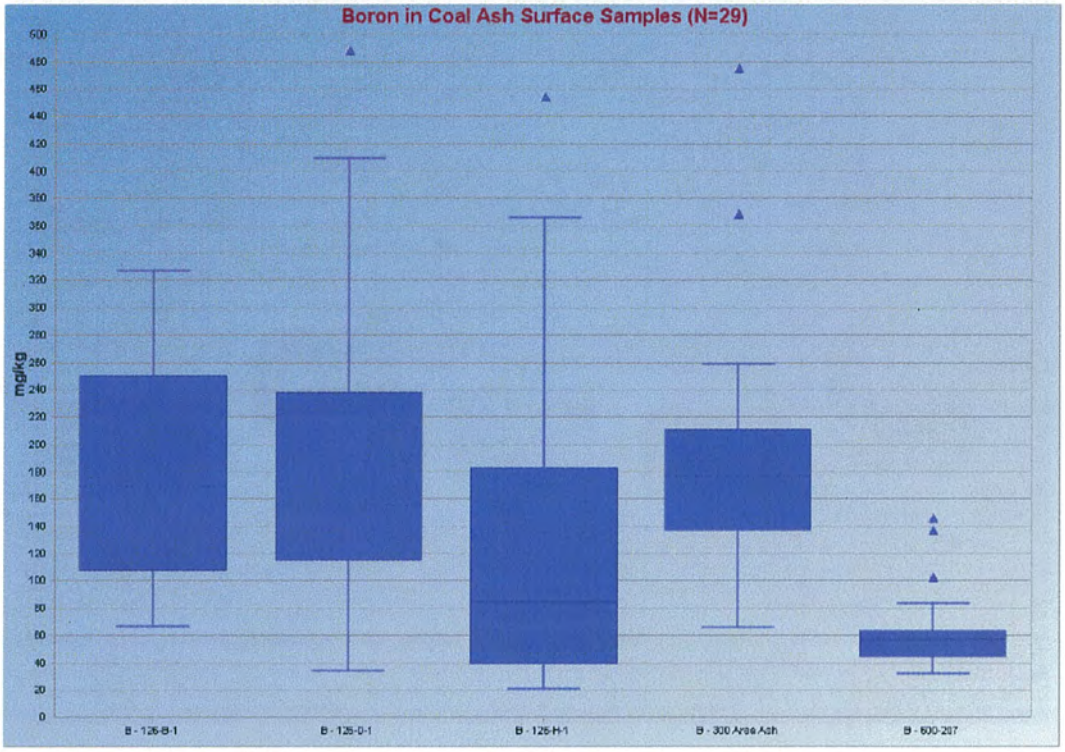


Figure E-6. Boxplots of Cadmium Results from Coal Ash Surface Samples (N=29).

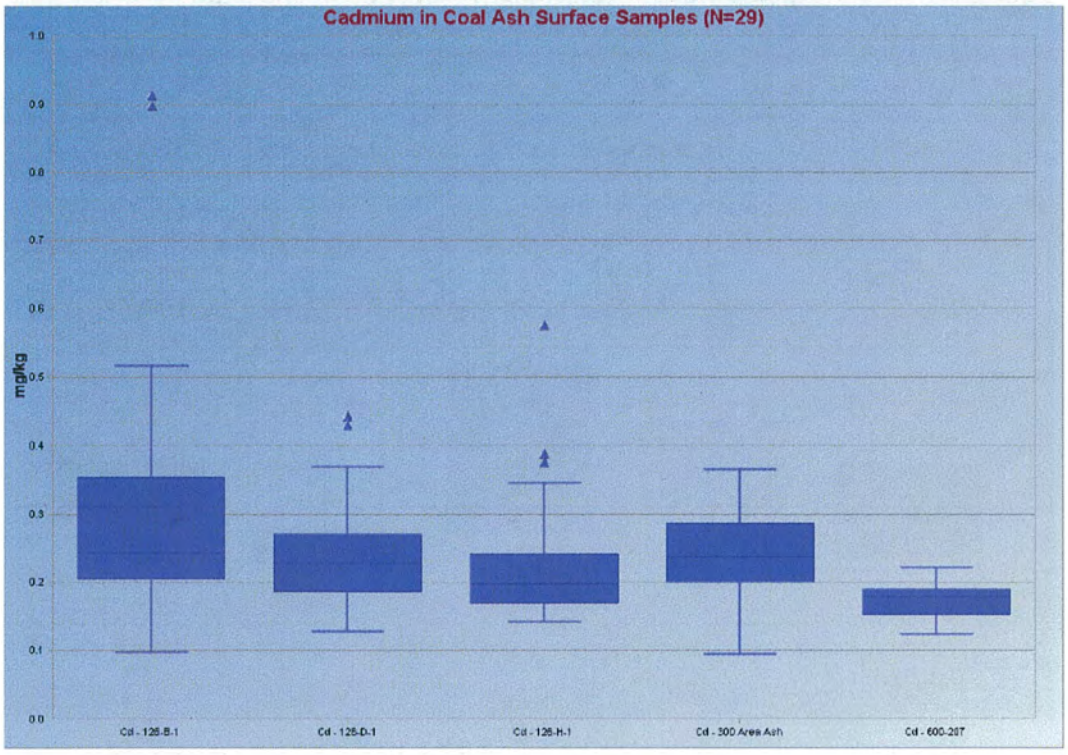


Figure E-7. Boxplots of Total Chromium Results from Coal Ash Surface Samples (N=29).

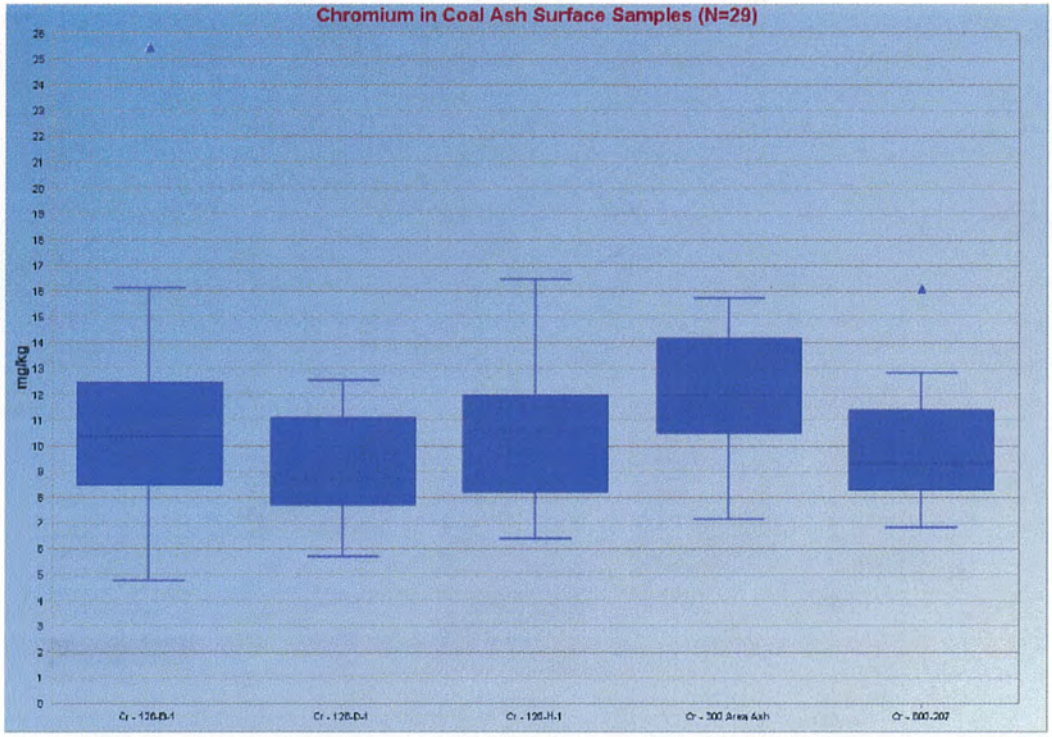


Figure E-8. Boxplots of Cobalt Results from Coal Ash Surface Samples (N=29).

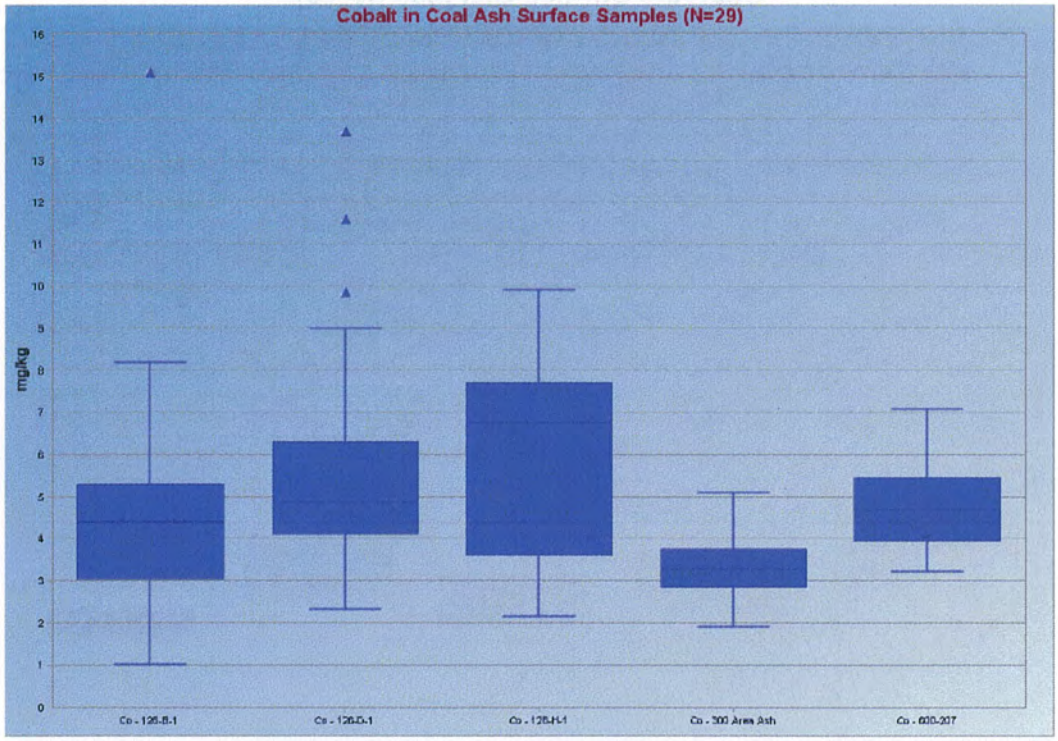


Figure E-9. Boxplots of Copper Results from Coal Ash Surface Samples (N=29).

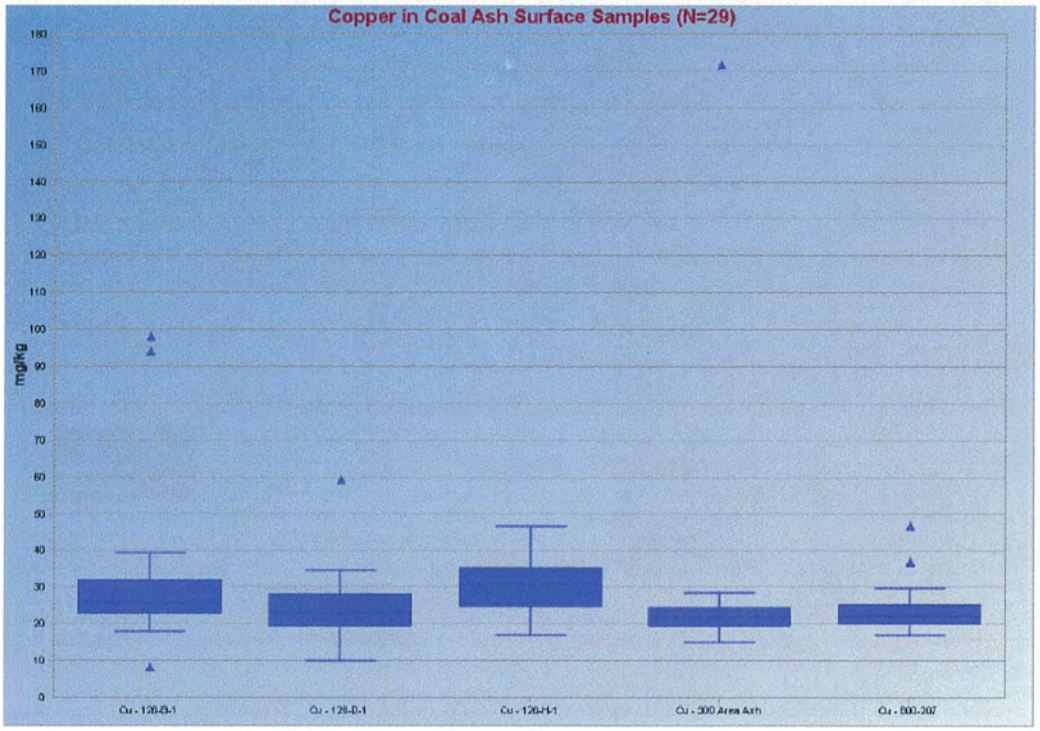


Figure E-10. Boxplots of Lead Results from Coal Ash Surface Samples (N=29).

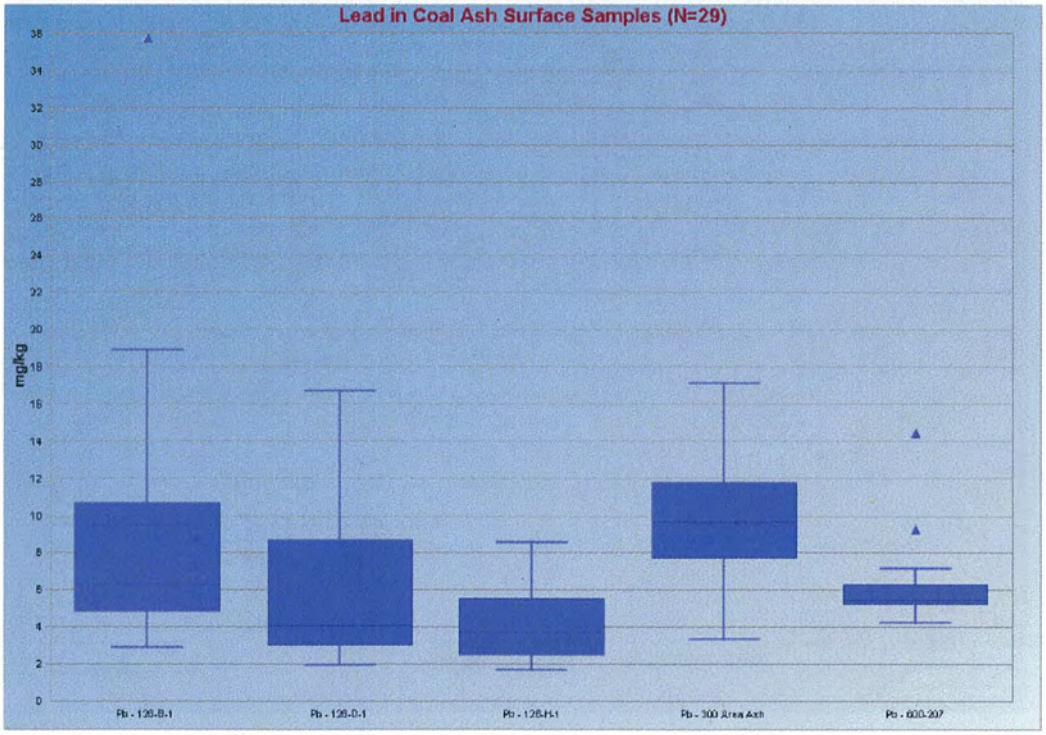


Figure E-11. Boxplots of Manganese Results from Coal Ash Surface Samples (N=29).

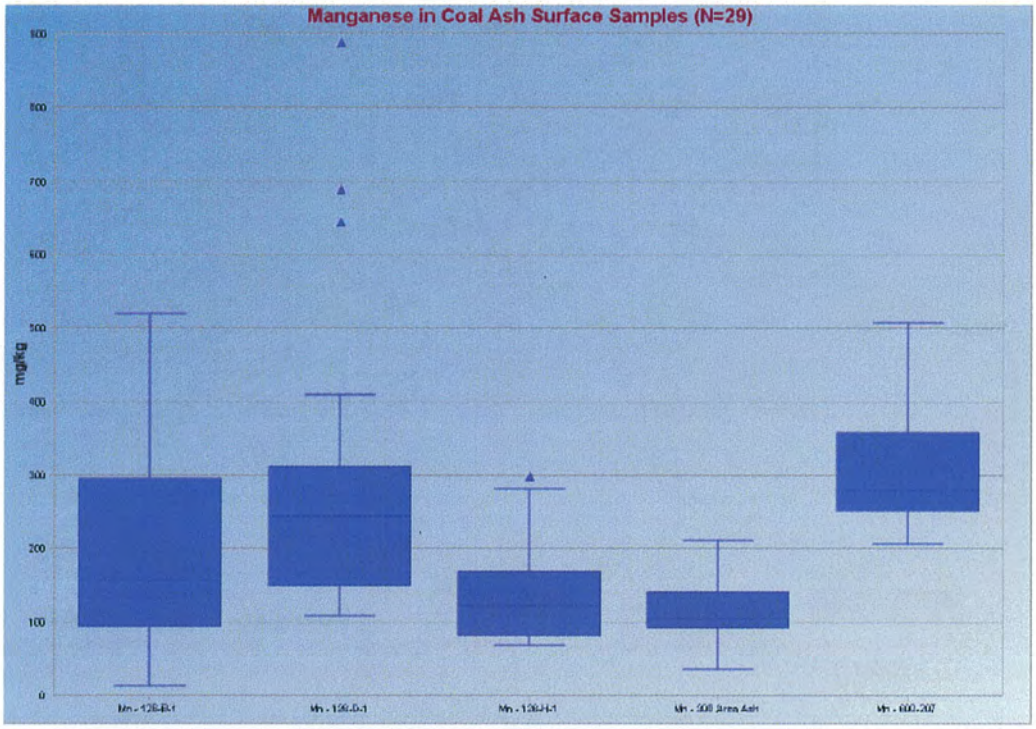


Figure E-12. Boxplots of Mercury Results from Coal Ash Surface Samples (N=29).

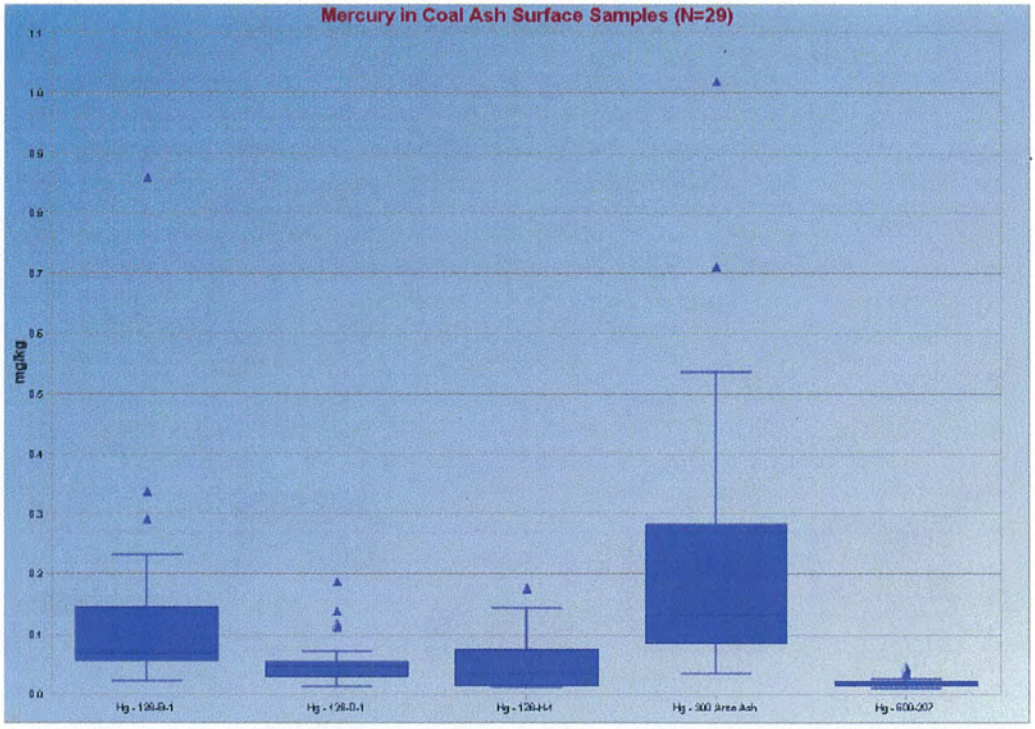


Figure E-13. Boxplots of Molybdenum Results from Coal Ash Surface Samples (N=29).

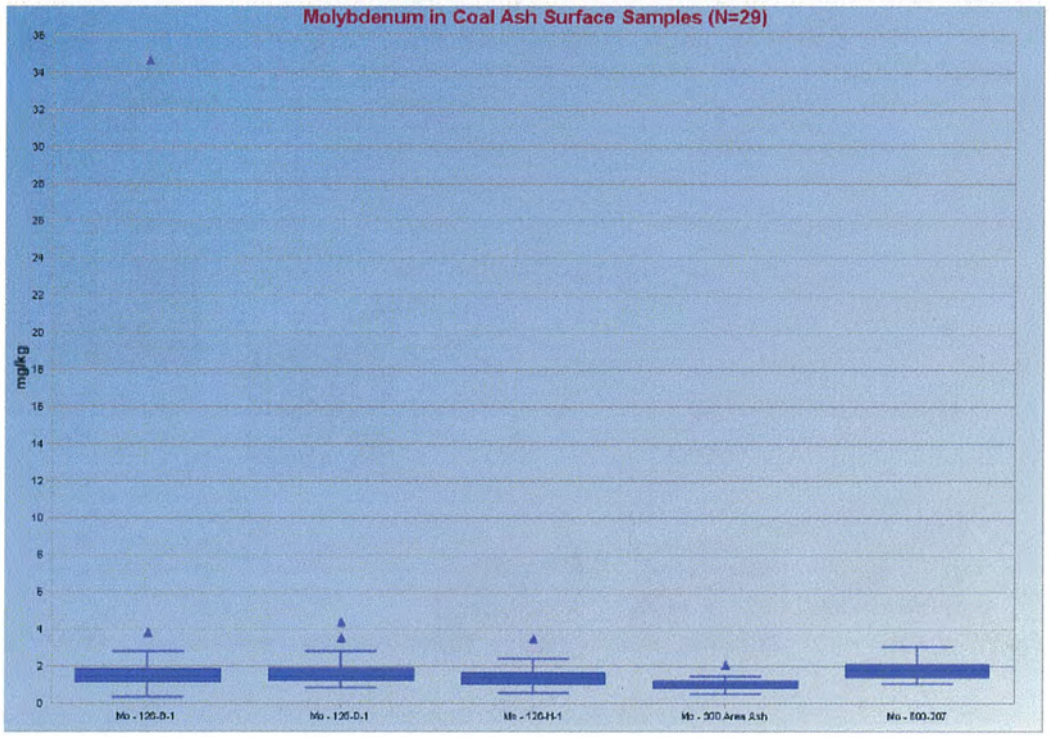


Figure E-14. Boxplots of Nickel Results from Coal Ash Surface Samples (N=29).

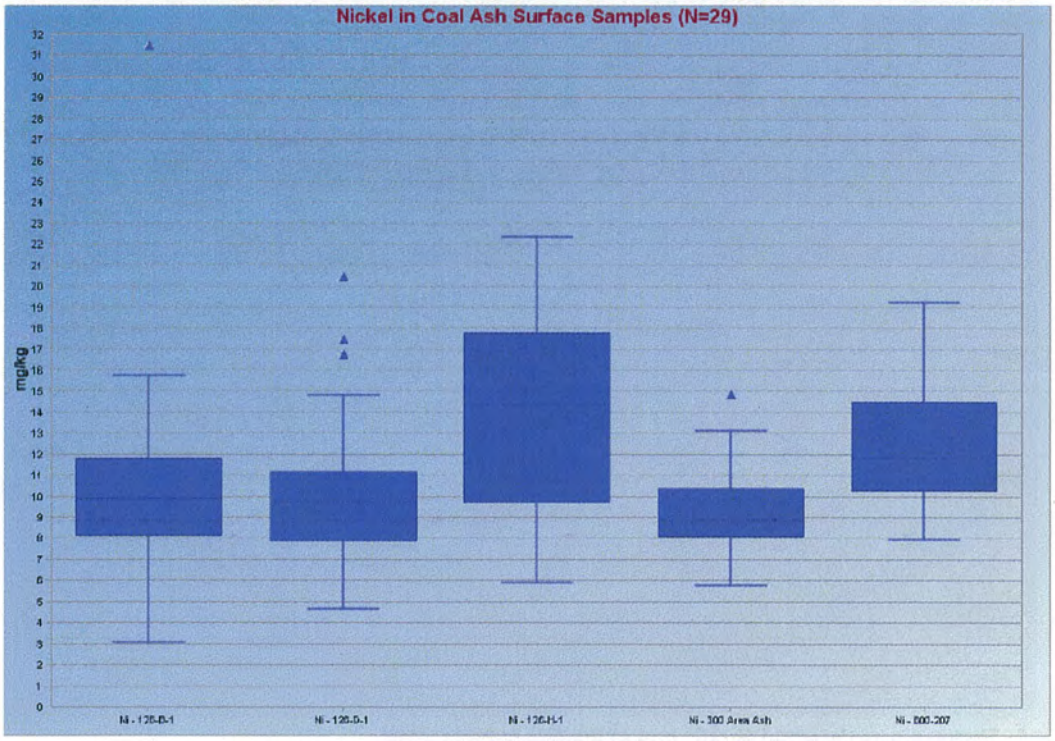


Figure E-15. Boxplots of Selenium Results from Coal Ash Surface Samples (N=29).

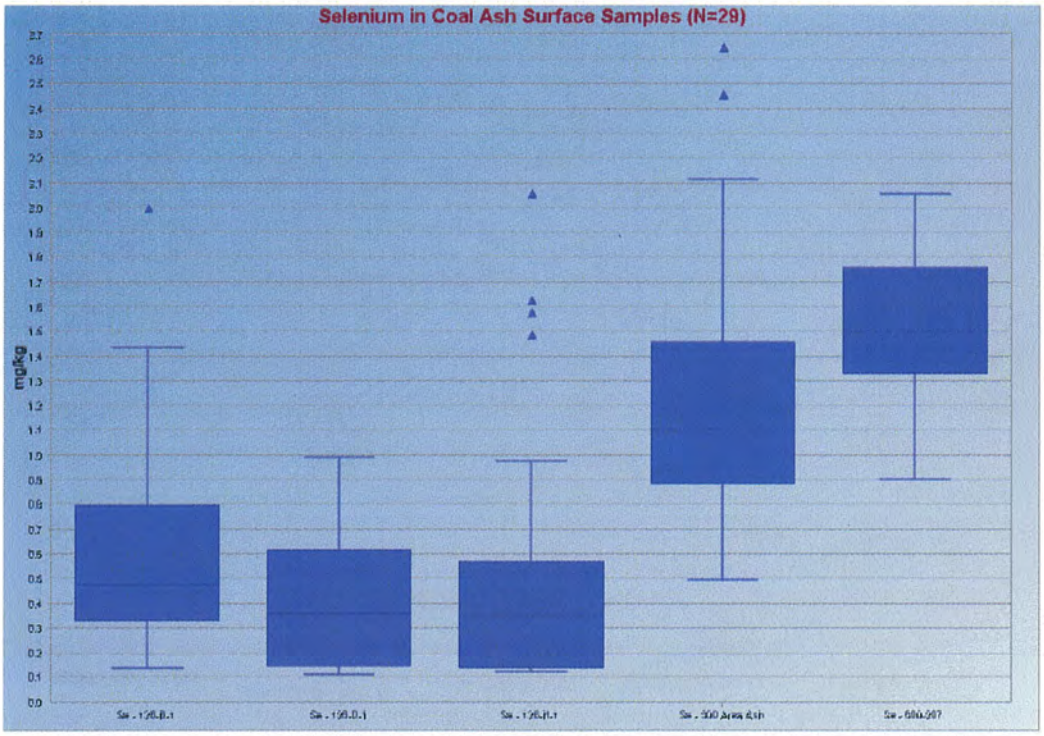
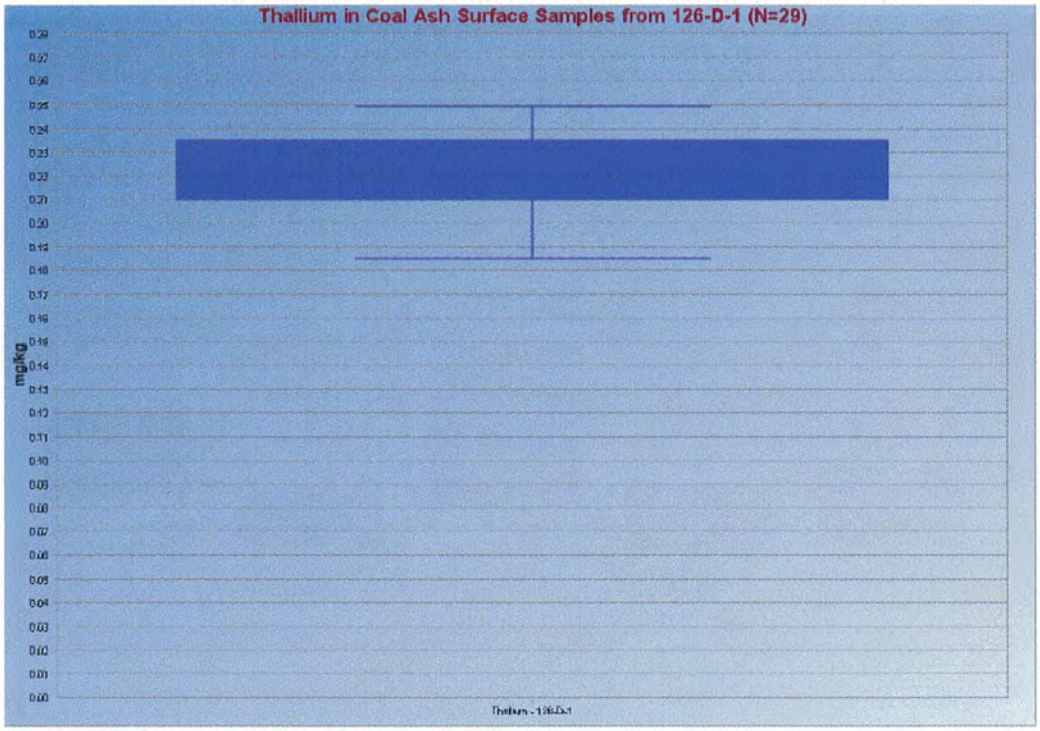


Figure E-16. Boxplots of Thallium Results from Coal Ash Surface Samples (N=29). [a]



[a] Thallium was detected at only one of the five sample sites.

Figure E-17. Boxplots of Vanadium Results from Coal Ash Surface Samples (N=29).

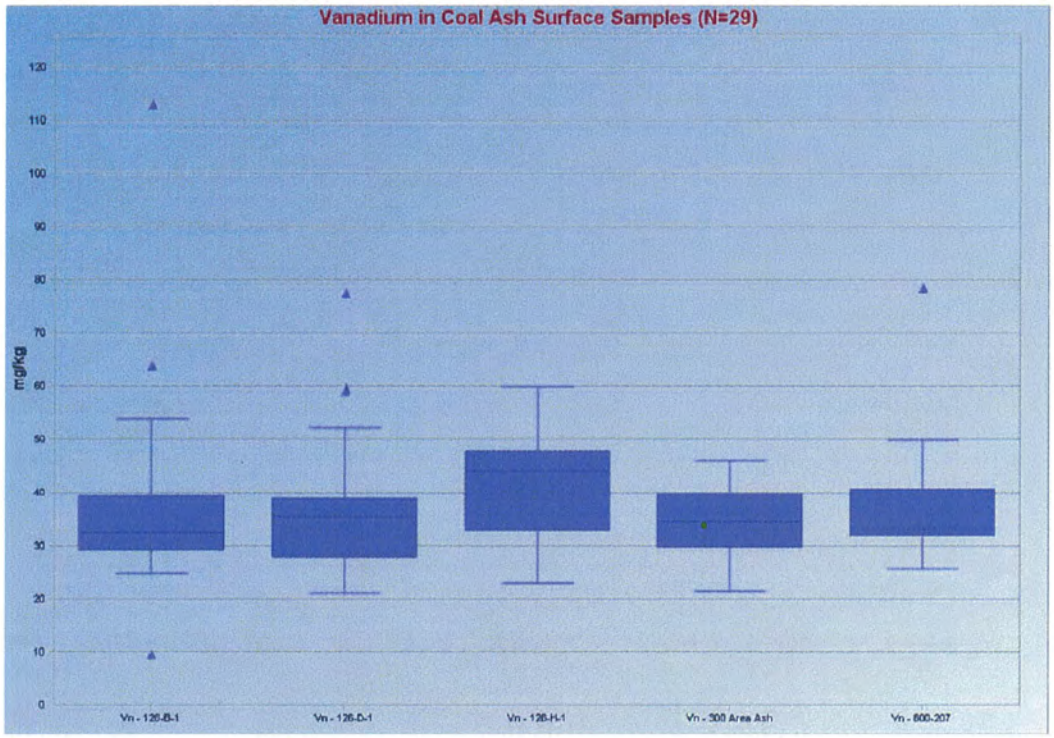
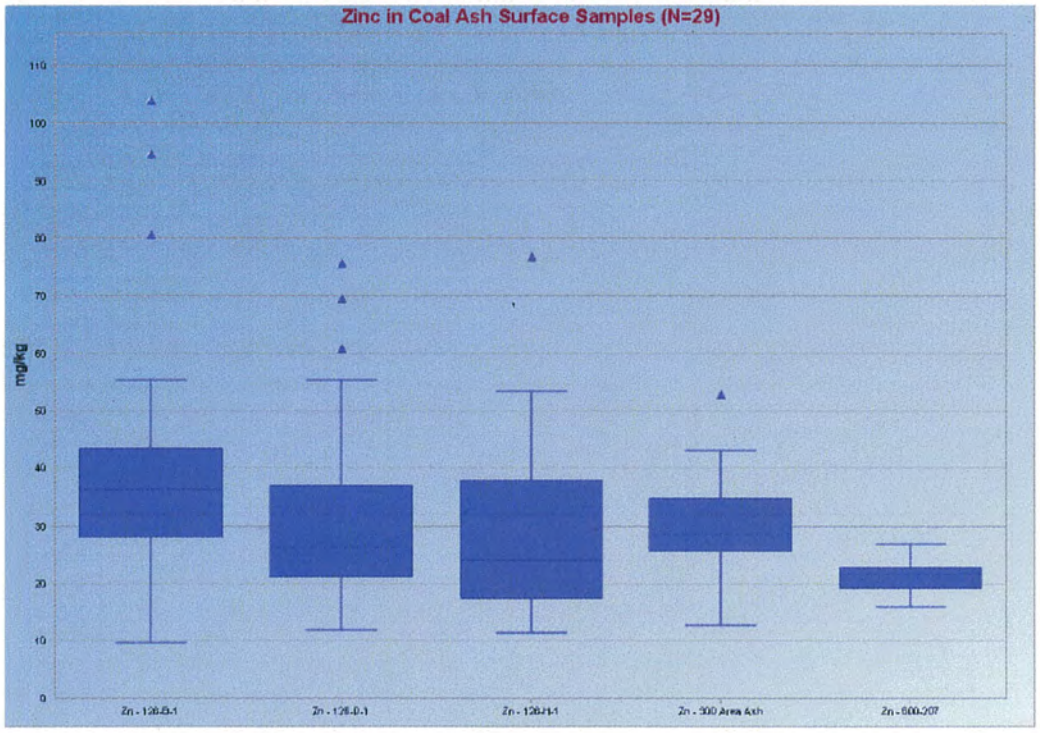


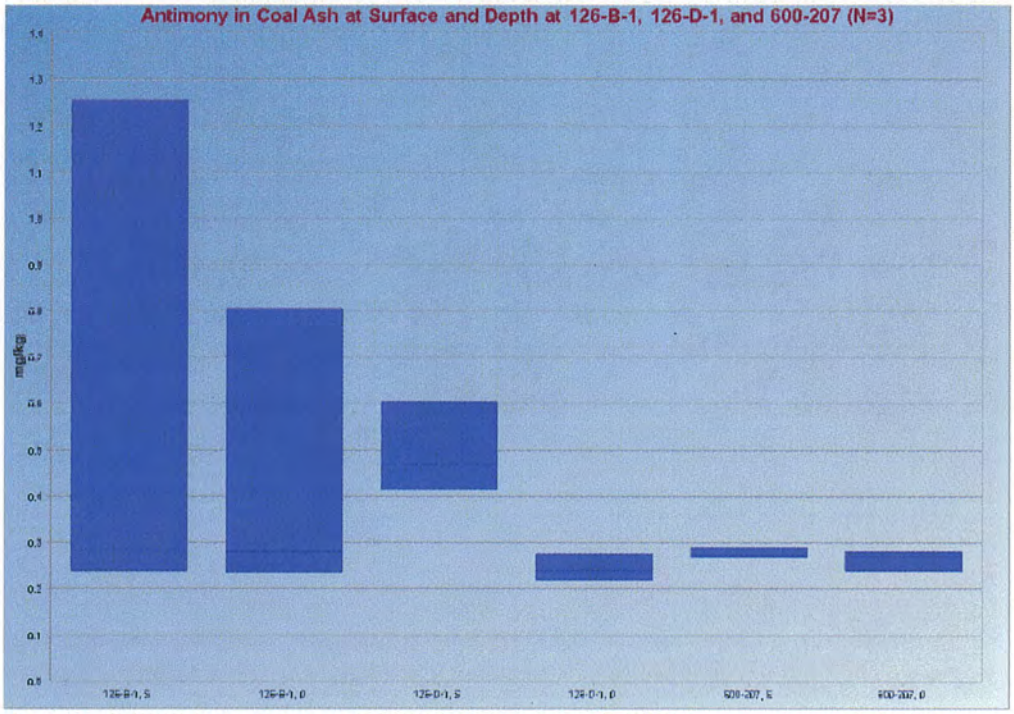
Figure E-18. Boxplots of Zinc Results from Coal Ash Surface Samples (N=29).



APPENDIX F

COAL ASH SURFACE AND DEPTH SAMPLE BOXPLOTS

Figure F-1. Boxplots of Antimony Results from 126-B-1, 126-D-1, and 600-207 Coal Ash Surface (S) and Depth (D) Samples (N=3). [a]



[a] Antimony was detected at only three of the five sample sites.

Figure F-2. Boxplots of Arsenic Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

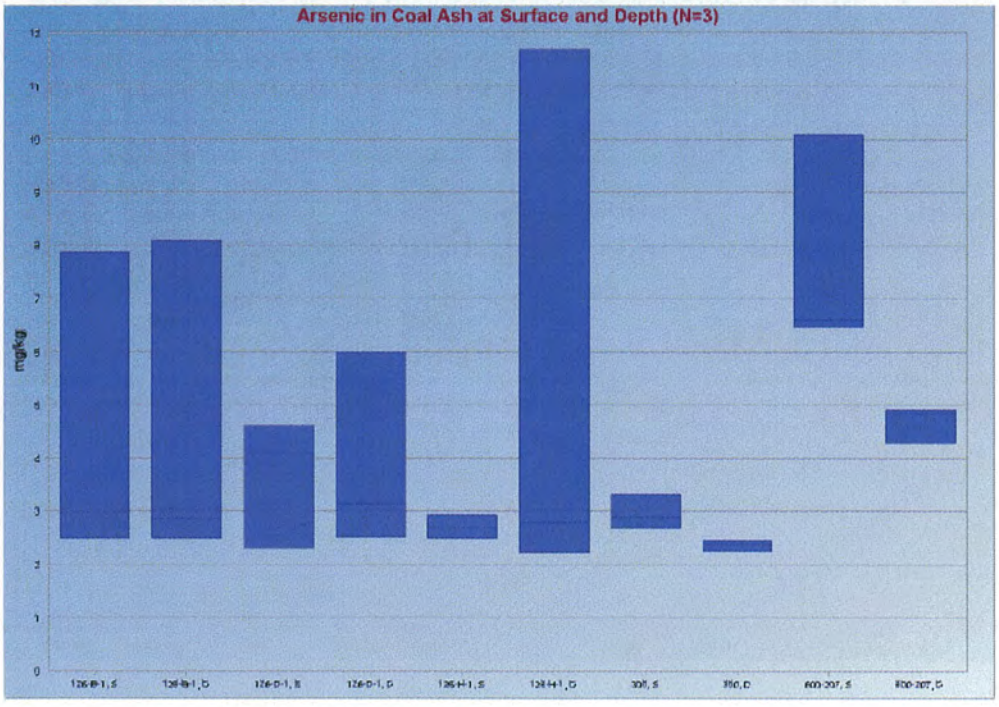


Figure F-3. Boxplots of Barium Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

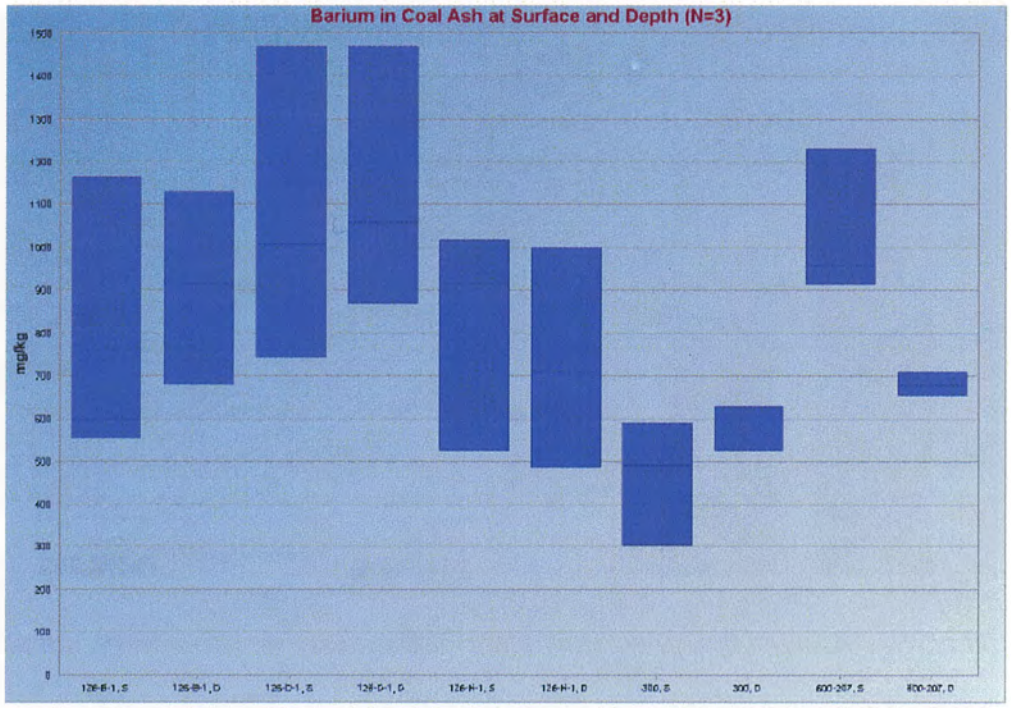


Figure F-4. Boxplots of Beryllium Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

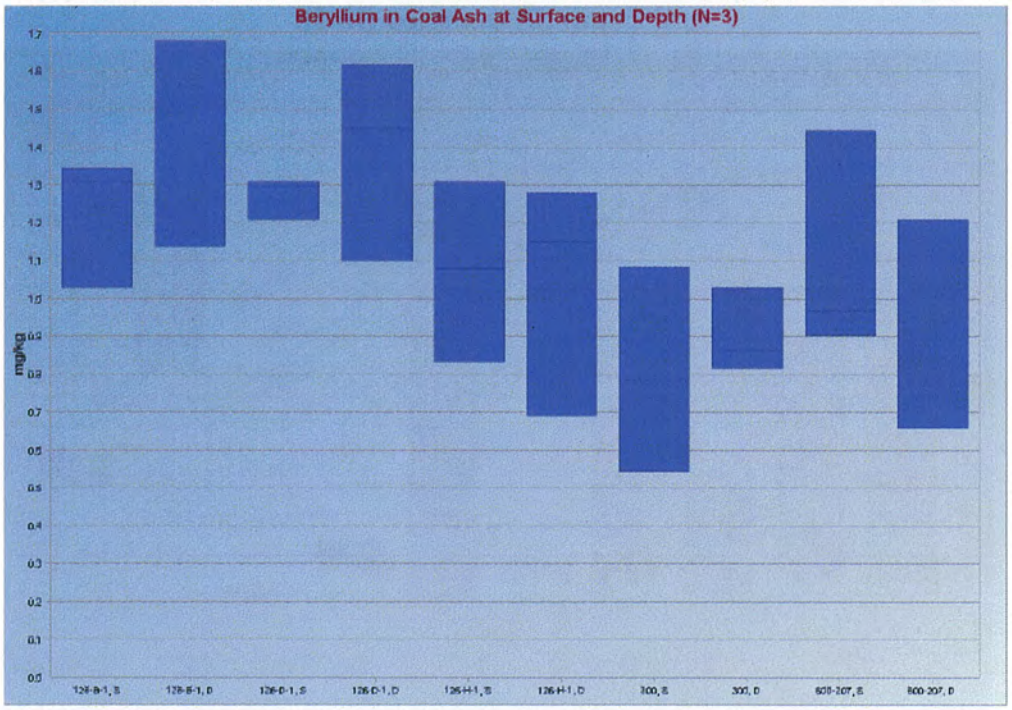


Figure F-5. Boxplots of Boron Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

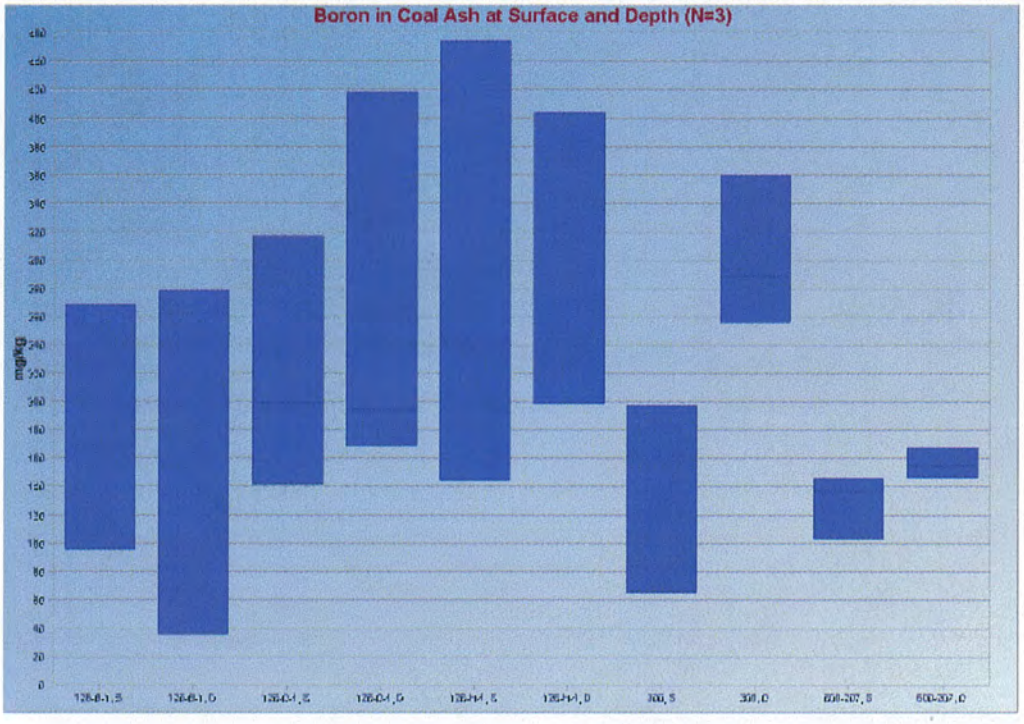


Figure F-6. Boxplots of Cadmium Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

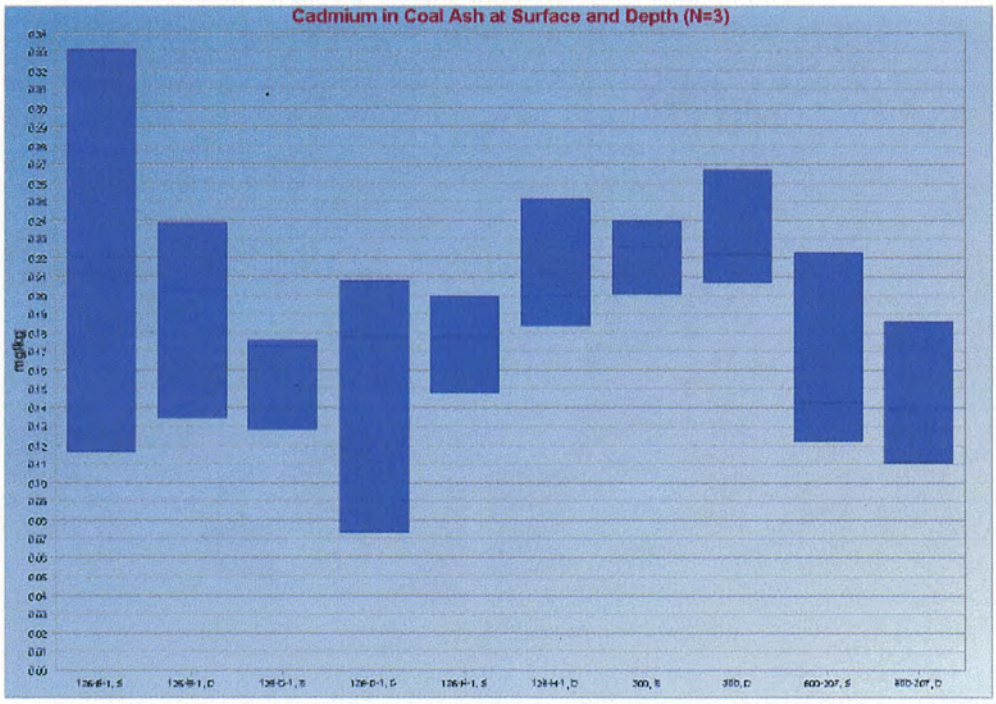


Figure F-7. Boxplots of Total Chromium Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

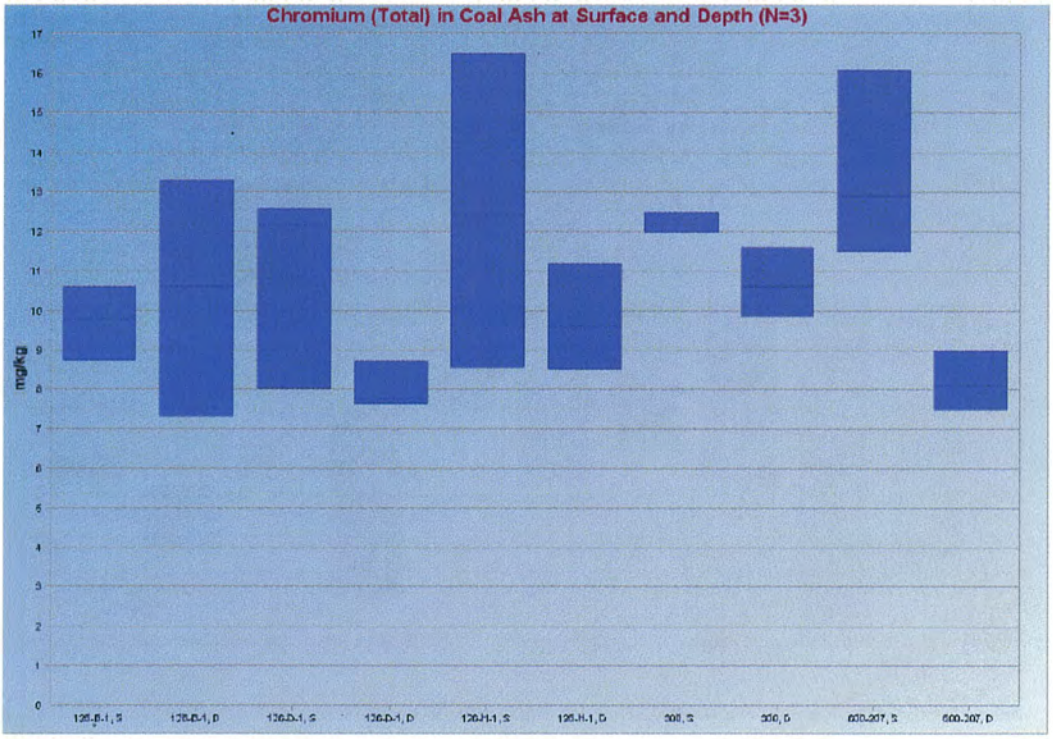


Figure F-8. Boxplots of Cobalt Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

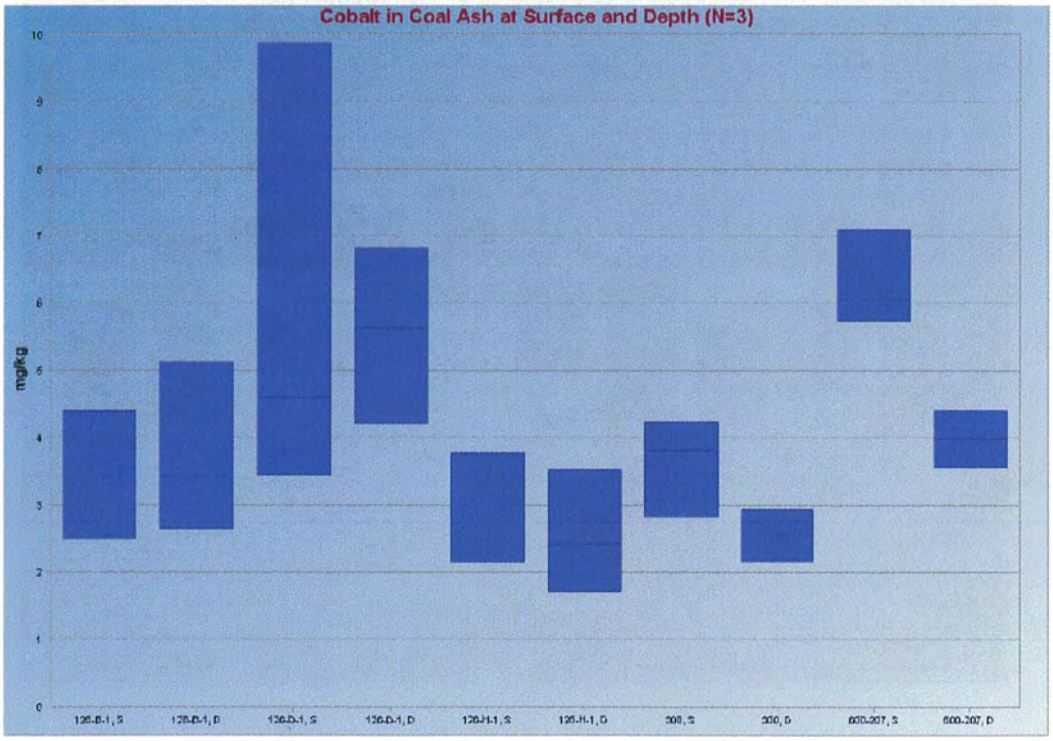


Figure F-9. Boxplots of Copper Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

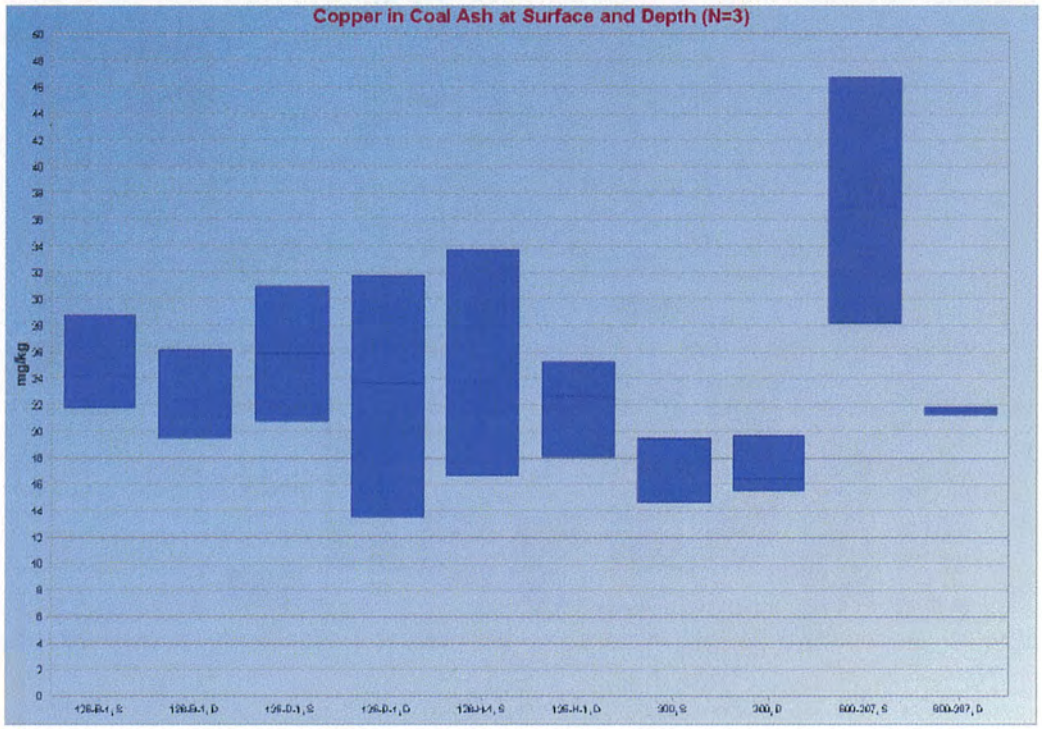


Figure F-10. Boxplots of Lead Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

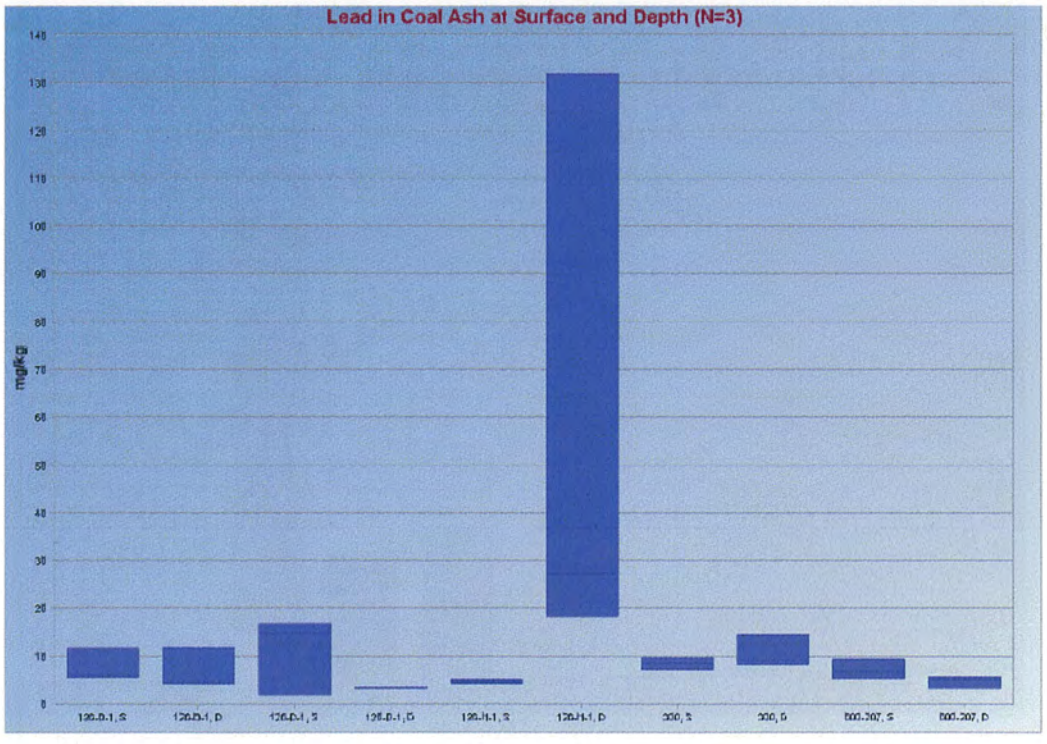


Figure F-11. Boxplots of Manganese Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

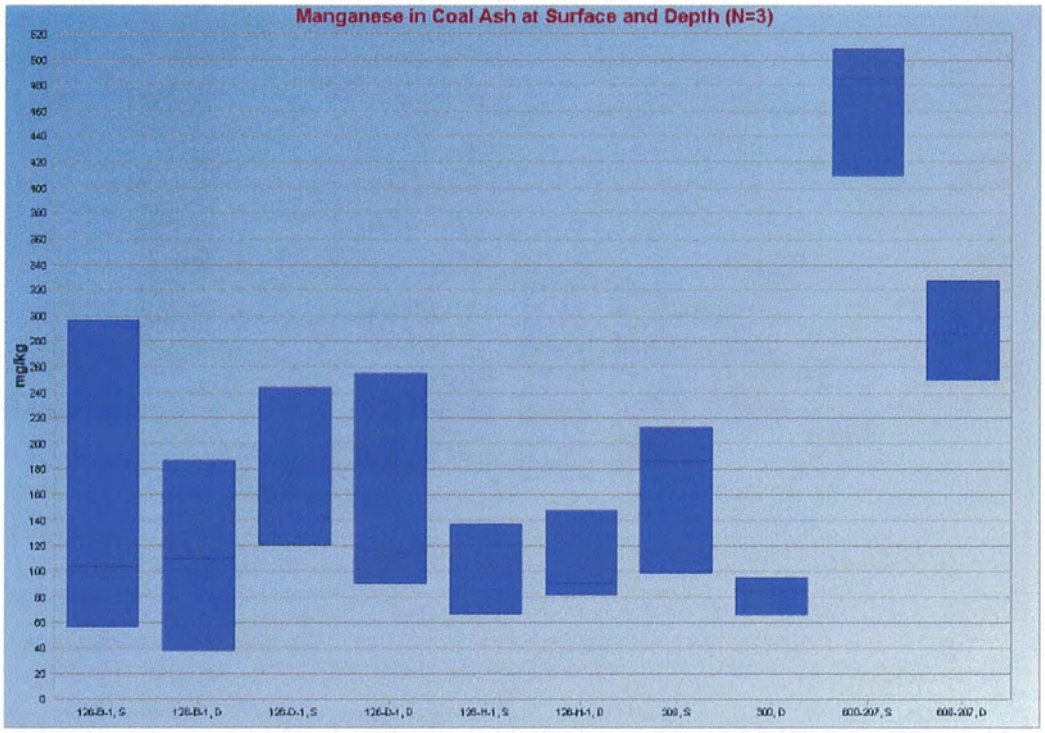


Figure F-12. Boxplots of Mercury Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

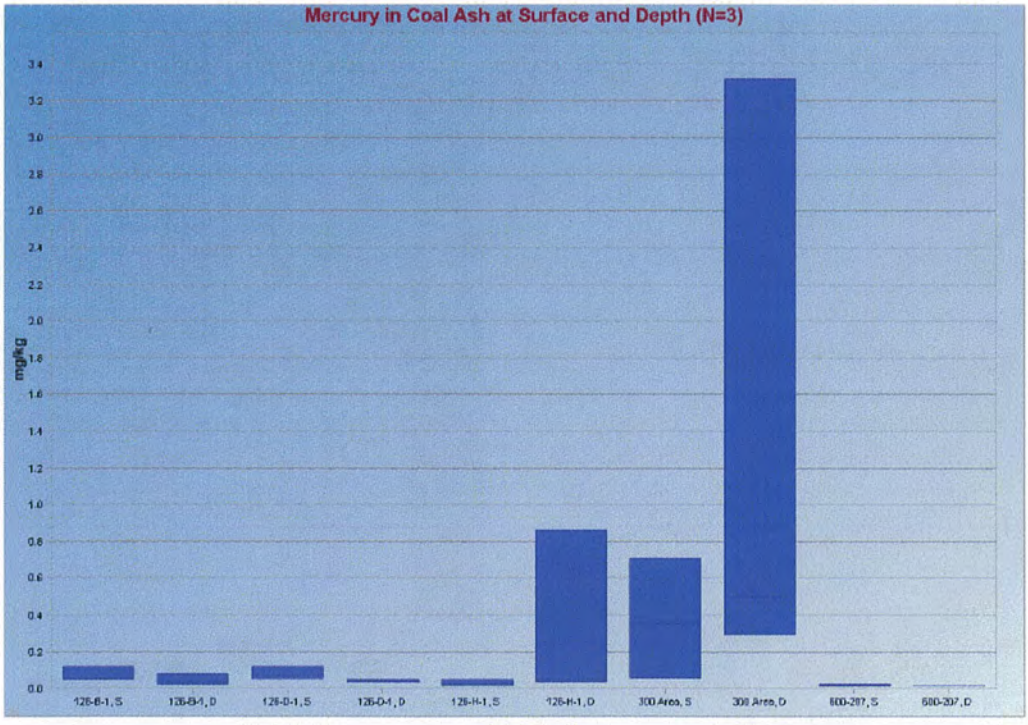


Figure F-13. Boxplots of Molybdenum Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

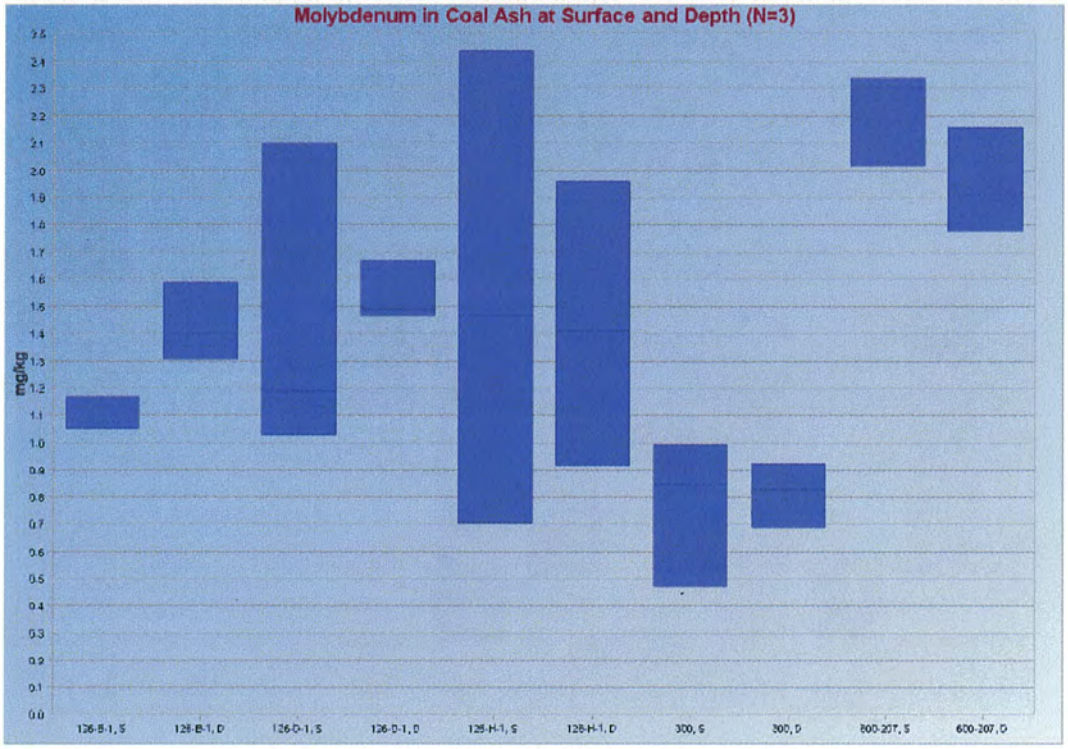


Figure F-14. Boxplots of Nickel Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

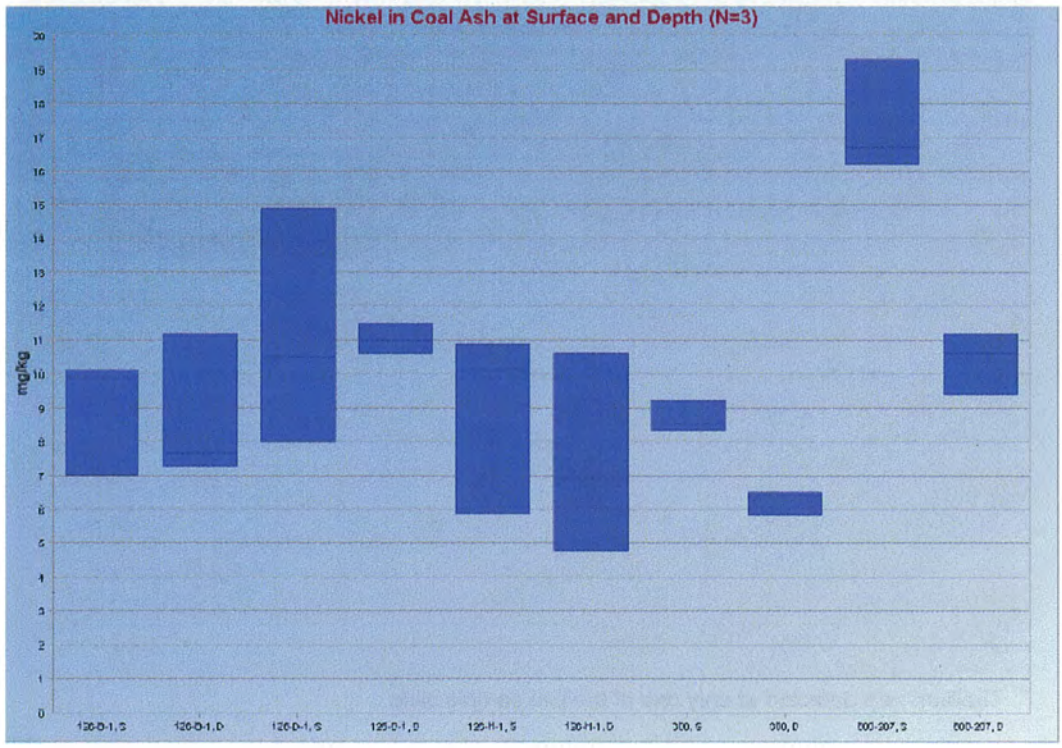


Figure F-15. Boxplots of Selenium Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

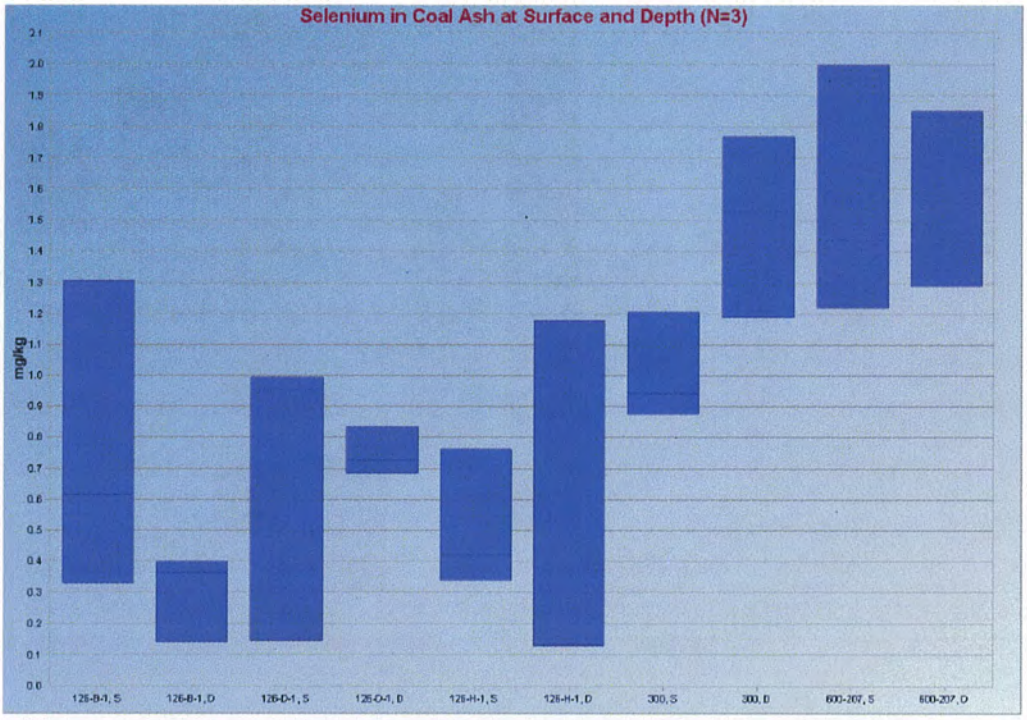
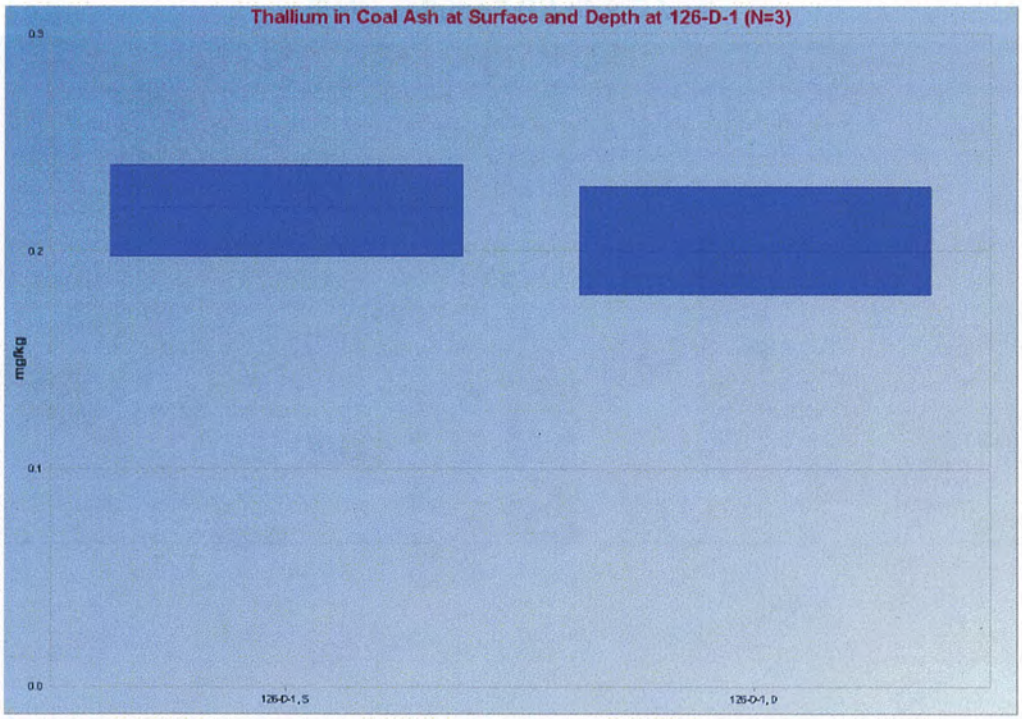


Figure F-16. Boxplots of Thallium Results from Coal Ash Surface (S) and Depth (D) Samples at 126-D-1 (N=3). [a]



[a] Thallium was detected at only one of the five sample sites.

Figure F-17. Boxplots of Uranium Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

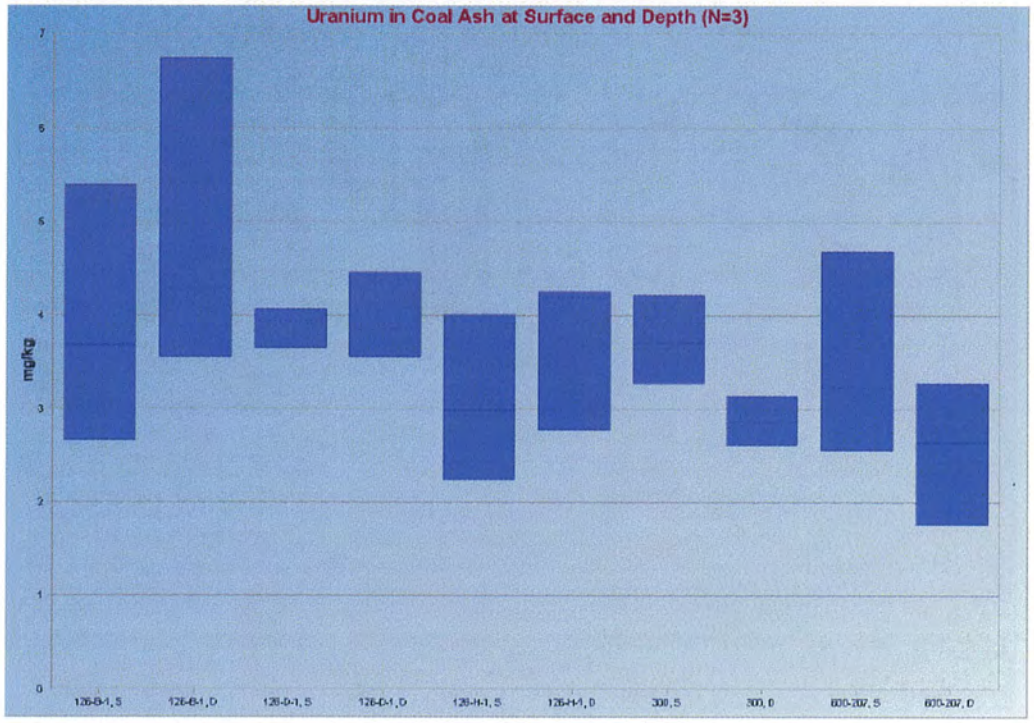


Figure F-18. Boxplots of Vanadium Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).

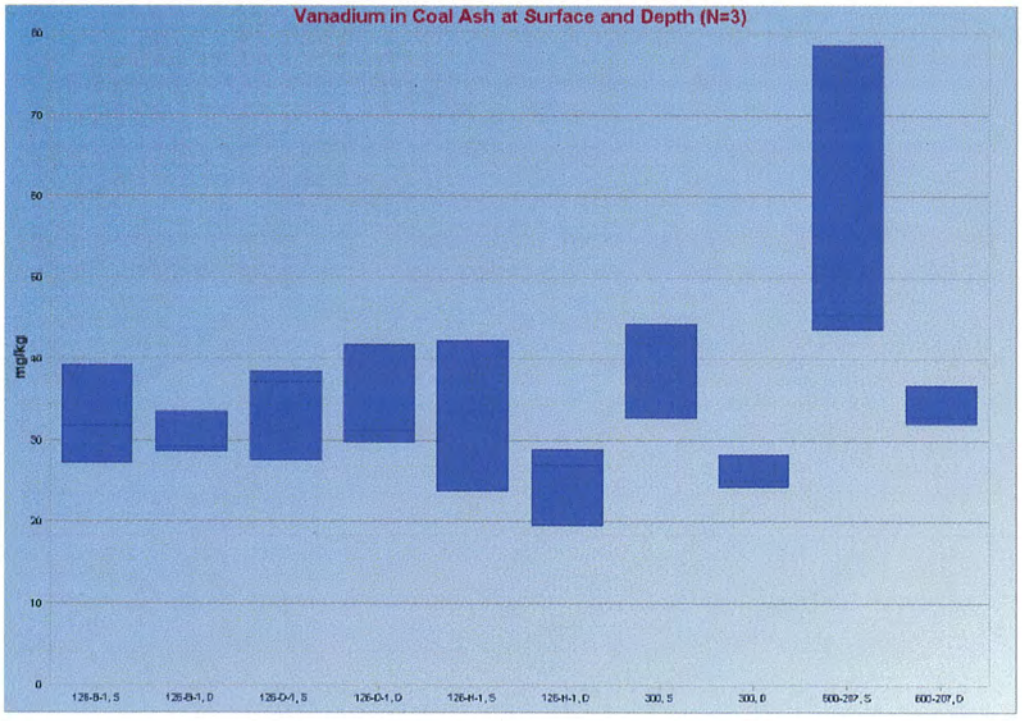
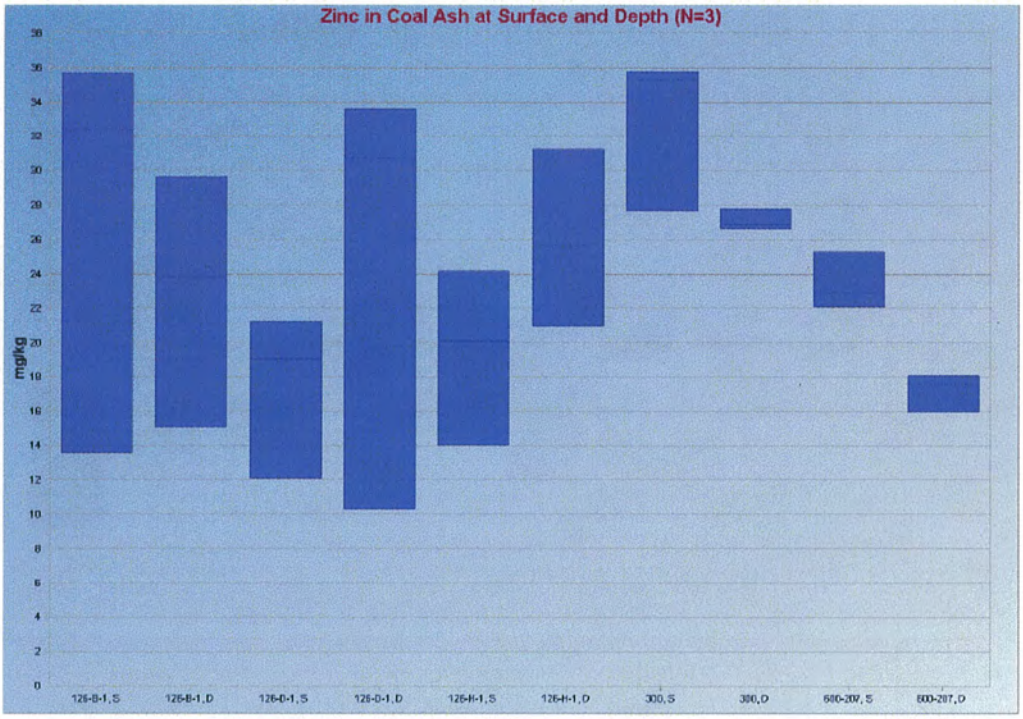


Figure F-19. Boxplots of Zinc Results from Coal Ash Surface (S) and Depth (D) Samples (N=3).



APPENDIX G

DATA QUALITY ANALYSIS

APPENDIX G

DATA QUALITY ANALYSIS

A data quality analysis (DQA) was performed to compare the sampling approach and resulting analytical data with the sampling and data requirements specified in the *Sampling and Analysis Plan for Characterization of Hanford Site Coal Ash Components* (SAP) (DOE-RL 2011a). This DQA was performed in accordance with data quality objectives described in Section 2.5.2 of the SAP.

A review of the sample designs in the SAP, associated change notices (DOE-RL 2011b, 2011c), field logbook (WCH 2011), and applicable analytical data packages has been performed as part of this DQA. All samples that were required by the SAP were collected.

To ensure quality data, the SAP data assurance requirements and the data validation procedures for chemical and radiochemical analysis (BHI 2000a, 2000b) are used as appropriate. This review involves evaluation of the data to determine if they are of the right type, quality, and quantity to support the intended use (i.e., decision-making purposes). The DQA completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data quality objectives process (EPA 2000).

G.1 COAL ASH ANALYSES

Samples collected from prescribed locations at each of the five coal ash sample sites were analyzed for inductively coupled plasma (ICP) metals (antimony, arsenic, barium, beryllium, boron, cadmium, chromium [total], cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc) and mercury. A subset of samples were analyzed for total uranium, and polycyclic aromatic hydrocarbons (PAHs) (acenaththene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) by U.S. Environmental Protection Agency SW-846 method 8270.

A subset of coal ash samples underwent serial batch leach testing with pH 5.2 water (three dilutions with one replicate) with analysis of the subsequent leachate for ICP metals, mercury, and uranium (total). Each of the coal ash samples (solid) used for batch leaching testing was analyzed in quadruplicate for ICP metals and mercury.

A separate subset of coal ash samples underwent additional serial batch leach testing with non-pH-adjusted water (three dilutions with one replicate) with analysis of the subsequent leachate for ICP metals only. Each of the coal ash samples (solid) used for batch leaching testing was analyzed in quadruplicate for ICP metals.

G.1.1 Major Deficiencies

Major deficiencies are discussed by the following sample delivery group (SDG). If no comments are made about a specific analysis it should be assumed that no deficiencies in the quality of

the data were found. Unless otherwise noted, deficiencies listed below are specific to the individual SDG and apply to all samples within that SDG.

G.1.2 Minor Deficiencies

Minor deficiencies are discussed by SDG as follows. If no comments are made about a specific analysis it should be assumed that no deficiencies in the quality of the data were found. Unless otherwise noted, deficiencies listed below are specific to the individual SDG and apply to all samples within that SDG.

G.2 126-B-1 COAL ASH SAMPLES

Coal ash samples collected at 126-B-1 were provided by the laboratories in three SDGs: SDG K3346, SDG K3365, and SDG K3599. SDG K3346 was submitted for third-party validation.

G.2.1 SDG K3346

This SDG comprises 10 field samples (J1HHW9, J1HHX0, J1HHX1, J1HHX4 through J1HHX8, J1HJ08, and J1HJ09) collected from the 126-B-1 coal ash site.

G.2.2 SDG K3346, Coal Ash Samples

Minor deficiencies noted in SDG K3346 are as follows:

- In the ICP metals analysis, the matrix spike (MS) recoveries for antimony (31%) are outside the quality control (QC) limits of 70% to 130% (DOE-RL 2011a). Third-party validation qualified all antimony results in SDG K3346 with "J" flags as estimated data. Estimated data are usable for decision-making purposes. Due to method blank contamination, UJ flags were added to antimony results for samples J1HJ08, J1HHW9, J1HHX1, J1HHX4, J1HHX5, and J1HHX7.

- There are no major or minor deficiencies for uranium by kinetic phosphorescence analysis (KPA).

- In the semivolatile organic compound (SVOC) analysis for PAHs, sample J1HHX8 had a single surrogate recovery just below the laboratory QC acceptance criteria. Other acid surrogates were relatively low but were within acceptance criteria. Since only a single surrogate was outside of control limits, no qualifiers were added to the data by third-party validation.

- In the SVOC analysis for PAHs (J1HJ08, J1HJ09, J1HHX0, and J1HHX8), the laboratory control sample (LCS) for naphthalene and matrix spike duplicate (MSD) recoveries for benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene were within the specified lab control limits but were below the control limits specified in DOE-RL (2011a) (70% to 130%) in the range of 56% to 68%. Results for these PAHs detected above the practical quantitation limit (PQL) were not qualified as estimated in the laboratory or validation report, but may be considered estimated. Estimated data are usable for decision-making purposes.

The relative percent difference (RPD) values for the laboratory duplicate were evaluated. The laboratory duplicate associated with SDG K3346 calculated for metals and SVOC analysis were all within the acceptance criteria. The data are usable for decision-making purposes.

G.2.3 SDG K3346, Coal Ash Batch Leach Solid and Leachate Samples

In the ICP metals analysis of the coal ash quadruplicate solid samples (J1HJ08 and J1HJ09, -1, -2, -3, and -4), the MS recoveries for seven ICP metals (antimony, barium, chromium, copper, lead, manganese, and vanadium) are out of acceptance criteria. An MSD was not performed given these samples were quadruplicate analyses of the primary sample. For barium, chromium, copper, manganese, and vanadium, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. For these analytes, the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, a post digestion spike (PDS) and serial dilution was prepared for all seven analytes with acceptable results. The analytes antimony and lead did not have mismatched spike and native concentrations in the original MS measured 35.7% and 69.1%, respectively. These data may be considered estimated. Estimated data are usable for decision-making purposes.

There are no major or minor deficiencies for ICP metals or KPA analyses of leachate samples (J1HJ08-A1, -B1, -B2, and -C1 and J1HJ09 -A1, -B1, -C1, and -C2).

G.2.4 SDG K3346, Coal Ash Batch Leach Solid and Leachate Samples – Follow-On Analysis with Non-pH-Adjusted Leachate

In the ICP metals analysis of the coal ash quadruplicate solid samples (J1HHX8 -1, -2, -3, and -4, and J1HHX8 and J1HJ08, -5, -6, -7, and -8), the MS recoveries for five ICP metals (antimony, barium, lead, selenium, and thallium) are out of acceptance criteria. An MSD was not performed given these samples were quadruplicate analyses of the primary sample. For barium, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared and the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, a PDS and serial dilutions were prepared for all five analytes with acceptable results. The analytes antimony, lead, selenium, and thallium did not have mismatched spike and native concentrations in the original MS. The original MS recoveries measured 27.1%, 64.4%, 68.4%, and 61.1%, respectively. These data may be considered estimated. Estimated data are usable for decision-making purposes.

ICP metals analysis of leachate samples (J1HHX8-A1, -B1, -C1, -C2, -D1, -E1, -E2, and -F1 and J1HJ08 -D1, -D2, -E1, and -F1) – no major or minor deficiencies.

G.2.5 SDG K3365

This SDG comprises 18 field samples (J1HJ00, J1HJ03 through J1HJ05, J1HJ10, J1HHV4 through J1HHV9, J1HHW0, J1HHW1, J1HHW3 through J1HHW6, and J1HHW8) collected from the 126-B-1 coal ash site.

G.2.6 SDG K3365, Coal Ash Samples

Minor deficiencies noted in SDG K3365 are as follows:

- In the ICP metals analysis, the MS recovery for antimony was outside the QC limits. To confirm quantitation, a PDS and serial dilution was prepared with acceptable recovery for antimony (98.7%). The original MS recovery for antimony was 25%. The results for antimony were not qualified as estimated by the laboratory, but may be considered estimated. Estimated data are usable for decision-making purposes.

- There are no major or minor deficiencies for uranium by KPA.

- In the SVOC analysis for PAHs (J1HJ03, J1HJ05, J1HJ10, J1HHW3), the LCS result for naphthalene and MS recoveries for acenaphthalene, acenaphthylene, benzo(a)pyrene, benzo(g,h,i)perylene, dibenz[a,h]anthracene, fluorene, indeno(1,2,3-cd)pyrene, and naphthalene were within the specified lab control limits but were below the control limits specified in DOE-RL 2011a (70% to130%) in the range of 62% to 68%. All MSD results were within QC control limits. No other QC deficiencies were noted in the field samples. The detected results for these PAHs were qualified as estimated in the laboratory report. Estimated data are usable for decision-making purposes.

- The RPD values for the laboratory duplicate were evaluated. The laboratory duplicate associated with SDG K3346 calculated for metals analysis were all within the acceptance criteria. The data are usable for decision-making purposes.

G.2.7 SDG K3599

This SDG comprises seven field samples (J1HHX9, J1HJ01, J1HJ02, J1HHX2, J1HHX3, J1HHW2, and J1HHW7) collected from the 126-B-1 coal ash site.

Minor deficiencies noted in SDG K3599 are as follows:

- In the ICP metals analysis, the MS recovery for antimony was outside the QC limits. To confirm quantitation, a PDS and serial dilution was prepared with acceptable recovery for antimony (105.1%). The original MS recovery for antimony was 19%. The results for antimony were not qualified as estimated by the laboratory, but may be considered estimated. Estimated data are usable for decision-making purposes.

- The laboratory duplicate associated with SDG K3599 indicated elevated RPDs for the analytes beryllium, chromium, cobalt, copper, lead, vanadium and zinc were above the acceptance criteria ranging from 31.7% to 37.1%. The data are usable for decision-making purposes.

- There are no major or minor deficiencies for uranium by KPA.

G.2.8 126-B-1 Field Quality Assurance/Quality Control

Relative percent difference evaluations of main sample(s) versus the laboratory duplicate(s) were performed and reported by the laboratory. Any deficiencies in those calculations are reported by SDG in the previous sections.

Field quality assurance (QA)/QC measures are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples from 126-B-1, listed in the field logbook (WCH 2011), are shown in Table G-1. The main and QA/QC sample results are presented in Appendix C.

Table G-1. Field Quality Assurance/Quality Control Samples at 126-B-1.

Sample Area	Main Sample	Duplicate Sample
100-B-15	J1HHW8	J1HJ04
100-B-25	J1HHX8	J1HJ03

Field duplicate samples are collected to provide a relative measure of the degree of local heterogeneity in the sampling medium, unlike laboratory duplicates that are used to evaluate precision in the analytical process. The field duplicates are evaluated by computing the RPD of the sample/duplicate pair(s) for each contaminant of potential concern (COPC). Relative percent differences are not calculated for analytes that are not detected in both the main and duplicate sample at more than five times the target detection limit. Relative percent differences of analytes detected at low concentrations (less than five times the detection limit) are not considered to be indicative of the analytical system performance. The calculation brief in Appendix D provides details on duplicate pair evaluation and RPD calculation.

The RPDs for zinc (57.5%) in the duplicate sample from sample location 100-B-15 and for arsenic (61.4%), barium (44.1%), beryllium (45.4%), and copper (33.7%) in the duplicate from sample location 100-B-25 are above the acceptance criteria of 30%. A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) is less than five times the target detection limit (TDL), including undetected analytes. In these cases, a control limit of ±2 times the TDL is used (Appendix D) to indicate that a visual check of the data is required by the reviewer. For the 100-B-25 primary and duplicate (J1HHX8 and J1HJ03), this review was indicated. The results show a difference of more than two times the TDL. The review determined that the primary and duplicate samples had been split into separate analytical batches. Therefore, the difference in the primary and duplicate results between J1HHX8 and J1HJ03 are at least partially attributable to the separate batch analyses in addition to the natural heterogeneities inherent to environmental samples. The data are usable for decision-making purposes.

A visual inspection of all of the data was also performed. No additional major or minor deficiencies were noted. The data are usable for decision-making purposes.

G.3 126-D-1 COAL ASH SAMPLES

Coal ash sample data collected at 126-D-1 were provided by the laboratories in two SDGs: SDG K3572 and SDG K3600. SDG K3572 was submitted for third-party validation.

G.3.1 SDG K3572

There are two, separate analytical batches contained in SDG K3572 with a total of 15 field samples collected from the 126-D-1 coal ash site. One batch was analyzed for ICP metals and mercury with select samples analyzed for PAHs and KPA (J1J3W3, J1J3X0 through J1J3X2, J1J3X4, J1J3X7, J1J400, J1J401, J1J408, J1J411). The other analytical batch (J1J412, J1J414, and J1J442 through J1J444) included these analyses as well as subsequent batch leach testing on appropriate samples.

G.3.2 SDG K3572, Coal Ash and Coal Ash Batch Leach Samples (Pre-Leach Quadruplicate Analysis)

Minor deficiencies noted in SDG K3572 are as follows:

- In the ICP metals analysis, the MS recoveries for antimony (30.2%), boron (64.2%), lead (69.1%), thallium (66.6%), and zinc (23.8%) associated with J1J3W3, J1J3X0 through J1J3X2, J1J3X4, J1J3X7, J1J400, J1J401, J1J408, and J1J411 were outside the QC limits. Third-party validation qualified all subject analyte results with "J" flags as estimated data. MS recoveries for barium (-86.6%) and manganese (-120%) are also outside of QC limits. For barium, boron, manganese, and zinc, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared and the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, a PDS and serial dilution was prepared for with acceptable recovery for all subject analytes. The data are usable for decision-making purposes.

- The MS recoveries for antimony (21.3%), boron (65.8%), lead (57.6%), manganese (53.1%), thallium (64%), and zinc (66.1%) associated with J1J412, J1J414, and J1J442 through J1J444 were outside the QC limits. For barium, boron, lead, manganese, and zinc, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared and the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. These MS recovery results are also associated with coal ash quadruplicate solid samples J1J442 through J1J444, -1, -2, -3, and -4. These samples are part of the batch leaching analysis but were not subject to validation. To confirm quantitation, a PDS and serial dilution was prepared with acceptable recovery for all subject analytes. Third-party validation qualified all subject analyte results for samples J1J412, J1J414, and J1J442 through J1J444 with "J" flags as estimated data. The subject results for samples J1J442 through J1J444, -1, -2, -3, and -4 were not qualified as estimated by the laboratory, but may be considered estimated. The data are usable for decision-making purposes.

- The LCS recovery for antimony (69.9%) in the LCS associated with J1J412, J1J414, and J1J442 through J1J444 was outside of control limits and was qualified by third-party validation with a "J" flag as estimated data. Estimated data are usable for decision-making purposes.

- The RPD values for the laboratory duplicate in each analytical batch within SDG K3572 were evaluated. The laboratory duplicate associated with samples J1J3W3, J1J3X0 through J1J3X2, J1J3X4, J1J3X7, J1J400, J1J401, J1J408, and J1J411 calculated for metals showed zinc was outside of QC limits at 42%, therefore, the associated zinc results

were qualified by third-party validation with a "J" flag as estimated data. The data are usable for decision-making purposes.

- The laboratory duplicate associated with J1J3W3, J1J3X0 through J1J3X2, J1J3X4, J1J3X7, J1J400, J1J401, J1J408, and J1J411 indicated an elevated RPD for zinc (32%) slightly above the acceptance criteria. The associated zinc results were qualified by third-party validation with a "J" flag as estimated data and are usable for decision-making purposes. All other laboratory duplicate results were acceptable.

- There are no major or minor deficiencies for uranium by KPA.

- In the SVOC analysis for PAHs (J1J3X0, J1J408, and J1J401), MS recoveries for benzo(a)pyrene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, and naphthalene were below the control limits specified in DOE-RL 2011a (70% to 130%) in the range of 44% to 49%. Results for those PAHs detected above the PQL were not qualified as estimated in the laboratory or validation report, but may be considered estimated. Estimated data are usable for decision-making purposes.

- Samples J1J412, J1J414, and J1J442 through J1J444 were originally extracted with the hold time for SVOC analysis but the LCS was inadvertently not spiked. Therefore, all five samples were reextracted within two times the hold time. All results associated with these samples were qualified by third-party validation with a "J" flag as estimated data and are usable for decision-making purposes. Estimated data are usable for decision-making purposes.

- In the SVOC analysis for PAHs, sample J1J444 had a single surrogate recovery below the QC acceptance criteria. Other surrogates were also low but within acceptance criteria. Since only a single surrogate was outside of control limits, no qualifiers were added to the data by third-party validation.

- In the SVOC analysis for PAHs associated with J1J412, J1J414, and J1J442 through J1J444, the MS recoveries for acenaphthene, acenaphthylene, anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, and pyrene were within the specified lab control limits but were below the control limits specified in DOE-RL (2011a) (70% to 130%), in the range of 55% to 67%. The MSD recoveries were within control limits with the exception of benzo(g,h,i)perylene (66%) and naphthalene (68%). Results for those PAHs may be considered estimated. Estimated data are usable for decision-making purposes.

- The laboratory duplicate associated with J1J412, J1J414, and J1J442 through J1J444 indicated an elevated RPD for benzo(k)fluoranthene (32%) slightly above the acceptance criteria. The associated benzo(k)fluoranthene results were qualified by third-party validation with a "J" flag as estimated data. Estimated data are usable for decision-making purposes. All other laboratory duplicate results were acceptable.

G.3.3 SDG K3572, Coal Ash Batch Leach Leachate Samples

In the ICP metals analysis of the coal leachate samples (J1J442-A1, -A2, -B1, and -C1, J1J443- A1, -B1, -B2, and -C1, and J1J444-A1, -B1, -C1, and -C2), the MS recoveries for barium (8.35%) and silver (43.2%) are out of acceptance criteria. An MSD was not performed given these samples were quadruplicate analyses of the primary sample. Results for both barium and silver in the leachate and originating solid sample are consistent with results from other coal ash samples. Therefore, it is possible that the low recoveries are due to analytical variability of the native concentration rather than a measure of the recovery from the sample. These data may be considered estimated. Estimated data are usable for decision-making purposes.

There are no major or minor deficiencies for uranium by KPA.

G.3.4 SDG K3600, Coal Ash Samples

SDG K3600 comprises 20 field samples (J1J3W4 through J1J3W9, J1J3X3, J1J3X5, J1J3X6, J1J3X8, J1J3X9, J1J402 through J1J407, J1J409, J1J410, and J1J413) collected from the 126-D-1 coal ash site.

Minor deficiencies noted in SDG K3600 are as follows:

In the ICP metals analysis, the MS recoveries for antimony (21.1%), barium (55.0%), boron (56.1%), copper (60.4%), mercury (139%), and thallium (69.7%) were outside the QC limits. For barium, boron, and copper, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared and the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, a PDS and serial dilution was prepared for with acceptable recovery for all subject analytes. These data may be considered estimated. Estimated data are usable for decision-making purposes.

G.4 126-D-1 FIELD QUALITY ASSURANCE/QUALITY CONTROL

Relative percent difference evaluations of main sample(s) versus the laboratory duplicate(s) were performed and reported by the laboratory. Any deficiencies in those calculations are reported by SDG in the previous sections.

Field QA/QC measures are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples from 126-D-1, listed in the field logbook (WCH 2011), are shown in Table G-2. The main and QA/QC sample results are presented in Appendix C.

Table G-2. Field Quality Assurance/Quality Control Samples at 126-D-1.

Sample Area	Main Sample	Duplicate Sample
100-D-17	J1J3X9	J1J413
100-D-26	J1J408	J1J412

Field duplicate samples are collected to provide a relative measure of the degree of local heterogeneity in the sampling medium, unlike laboratory duplicates that are used to evaluate precision in the analytical process. The field duplicates are evaluated by computing the RPD of the sample/duplicate pair(s) for each COPC. Relative percent differences are not calculated for analytes that are not detected in both the main and duplicate sample at more than five times the target detection limit. Relative percent differences of analytes detected at low concentrations (less than five times the detection limit) are not considered to be indicative of the analytical system performance. The calculation brief in Appendix D provides details on duplicate pair evaluation and RPD calculation.

The RPDs for boron (30.4%) in the duplicate sample from sample location 100-D-17 and for zinc (40.4%) in the duplicate from sample location 100-D-26 are above the acceptance criteria of 30%. Elevated RPDs in environmental samples are generally attributed to natural heterogeneity in the sample matrix. The data are usable for decision-making purposes.

A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) is less than five times the TDL, including undetected analytes. In these cases, a control limit of ±2 times the TDL is used (Appendix D) to indicate that a visual check of the data is required by the reviewer. No data required this check. A visual inspection of all of the data is also performed. No additional major or minor deficiencies are noted. The data are usable for decision-making purposes.

G.5 126-H-1 COAL ASH SAMPLES

Coal ash sample data collected at 126-H-1 were provided by the laboratories in two SDGs: SDG K3632 and SDG K3649. SDG K3632 was submitted for third-party validation.

G.5.1 SDG K3632

This SDG comprises 16 field samples (J1HJ63 through J1HJ67 and J1HJ72 through J1HJ82) collected from the 126-H-1 coal ash site.

G.5.2 SDG K3632, Coal Ash Samples

Minor deficiencies noted in SDG K3632 are as follows:

- In the ICP metals analysis, the MS recoveries for antimony (32.3%), barium (354%), boron (212%), lead (63.5%), manganese (51.1%), mercury (131%), nickel (65.3%), and thallium (62.6%) are outside the QC limits of 70 to 130% (DOE-RL, 2011a). Third-party validation qualified associated results for antimony, lead, manganese, mercury, nickel, and thallium in SDG K3632 with "J" flags as estimated data. For barium, boron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared and the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, a PDS and serial dilution was prepared for all abovementioned analytes with acceptable recovery reported. Associated data not qualified with "J" flags by third-party validation may be considered estimated. Estimated data are usable for decision-making purposes.

- Due to method blank contamination, UJ flags were added to the zinc result in the equipment blank, J1JH79 by third-party validation.

- There are no major or minor deficiencies for uranium by KPA.

- In the SVOC analysis for PAH, sample J1HJ72 had a single surrogate recovery just below the QC acceptance criteria. Other acid surrogates were relatively low but were within acceptance criteria. Since only a single surrogate was outside of control limits, no qualifiers were added to the data by third-party validation. Sample J1HJ77 had three surrogate recoveries slightly below the QC acceptance criteria, however, these surrogates are associated with halogenated organics and are not applicable to PAH results. The data are usable for decision-making purposes.

- The RPD values for the laboratory duplicate were evaluated. The laboratory duplicate associated with SDG K3632 calculated for metals and SVOC analysis were all within the acceptance criteria. The data are usable for decision-making purposes.

G.5.3 SDG K3632, Coal Ash Batch Leach Solid and Leachate Samples

In the ICP metals analysis of the coal ash quadruplicate solid samples (J1HJ80 through J1HJ82, -1, -2, -3, and -4), the MS recoveries for antimony (29.7%), barium (164%), copper (144%), and manganese (68.0%) are out of acceptance criteria. An MSD was not performed given these samples were quadruplicate analyses of the primary sample. For barium, copper, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. For these analytes, the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, a PDS and serial dilution were prepared for all seven analytes with acceptable results. These data may be considered estimated. Estimated data are usable for decision-making purposes.

There are no major or minor deficiencies for ICP metals analysis of leachate samples (J1HJ80-A1, -B1, -B2, and -C1, J1HJ81 -A1, -B1, -C1, and -C2, and J1HJ82 -A1, -A2, -B1, and -C1).

There are no major or minor deficiencies for uranium analysis of leachate samples by KPA.

G.5.4 SDG K3632, Coal Ash Batch Leach Solid and Leachate Samples – Follow-On Analysis With Non-pH-Adjusted Leachate (Sample J1HJ80)

In the ICP metals analysis of the coal ash quadruplicate solid sample J1HJ80 -5, -6, -7, and -8, the MS recoveries for antimony (25.1%), barium (-44.3%), copper (194%), manganese (60.8%) silver (69.3%), and thallium (66.4%) were outside the QC limits. For barium, copper, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared and the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, a PDS and serial dilution was prepared for with acceptable recovery for all subject analytes. These data may be considered estimated and are usable for decision-making purposes.

ICP metals analysis of leachate samples J1HJ80-D1, -E1, -E2, and -F1 (non-pH-adjusted leachate), no major or minor deficiencies are noted.

G.5.5 SDG K3649

This SDG comprises 19 field samples (J1HJ48 through J1HJ62 and J1HJ68 through J1HJ71) collected from the 126-H-1 coal ash site.

G.5.6 SDG K3649, Coal Ash Samples

Minor deficiencies noted in SDG K3649 are as follows:

- In the ICP metals analysis, the MS recovery for antimony (28.4%) is outside the QC limits of 70% to 130% (DOE-RL 2011a). To confirm quantitation, a PDS and serial dilution was prepared for antimony with an acceptable result. The antimony data may be considered estimated. Estimated data are usable for decision-making purposes.

- The RPD values for the laboratory duplicate were evaluated. The laboratory duplicate associated with SDG K3649 calculated for metals analysis were all within the acceptance criteria. The data are usable for decision-making purposes.

G.6 126-H-1 FIELD QUALITY ASSURANCE/QUALITY CONTROL

Relative percent difference evaluations of main sample(s) versus the laboratory duplicate(s) were performed and reported by the laboratory. Any deficiencies in those calculations are reported by SDG in the previous sections.

Field QA/QC measures are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples from 126-H-1, listed in the field logbook (WCH 2011), are shown in Table G-3. The main and QA/QC sample results are presented in Appendix C.

Table G-3. Field Quality Assurance/Quality Control Samples at 126-H-1.

Sample Area	Main Sample	Duplicate Sample
100-H-16	J1HJ63	J1HJ78
100-H-26	J1HJ72	J1HJ77

Field duplicate samples are collected to provide a relative measure of the degree of local heterogeneity in the sampling medium, unlike laboratory duplicates that are used to evaluate precision in the analytical process. The field duplicates are evaluated by computing the RPD of the sample/duplicate pair(s) for each COPC. Relative percent differences are not calculated for analytes that are not detected in both the main and duplicate sample at more than five times the target detection limit. Relative percent differences of analytes detected at low concentrations (less than five times the detection limit) are not considered to be indicative of the analytical

system performance. The calculation brief in Appendix D provides details on duplicate pair evaluation and RPD calculation.

The RPD for zinc (38.8%) in the duplicate from sample location 100-H-25 is above the acceptance criteria of 30%. Elevated RPDs in environmental samples are generally attributed to natural heterogeneity in the sample matrix. The data are usable for decision-making purposes.

A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) is less than five times the TDL, including undetected analytes. In these cases, a control limit of ±2 times the TDL is used (Appendix X) to indicate that a visual check of the data is required by the reviewer. No data required this check. A visual inspection of all of the data is also performed. No additional major or minor deficiencies are noted. The data are usable for decision-making purposes.

G.7 300 AREA COAL ASH SAMPLES

Coal ash sample data collected at the 300 Area coal ash sampling site were provided by the laboratories in two SDGs: SDG K3648 and SDG K3669. Both SDGs were submitted for third-party validation.

G.7.1 SDG K3648

This SDG comprises 20 field samples (J1HJP1 through J1HJP9, J1HJR0 through J1HJR9, and J1HJT0) collected from the 300 Area coal ash sampling site.

Minor deficiencies noted in SDG K3648 are as follows:

- In the ICP metals analysis, the MS recoveries for antimony (28.0%), barium (186%), manganese (141%), mercury (252%), and zinc (46.4%) are outside the QC limits of 70% to 130% (DOE-RL 2011a). Third-party validation qualified associated results for antimony, barium, manganese, and zinc with "J" flags as estimated data. For barium, manganese, mercury, and zinc, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared and the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, a PDS and serial dilution was prepared for all abovementioned analytes with acceptable recovery reported for all. Associated data not qualified with "J" flags by third-party validation (mercury) may be considered estimated and are usable for decision-making purposes.

- The laboratory duplicate indicated elevated RPDs for nickel (53.9%) and zinc (33.7%) above the acceptance criteria. The associated zinc results were both greater than five times the TDL and were qualified by third-party validation with a "J" flag as estimated data. Results for nickel are both less than five times the associated TDL. Elevated RPDs in environmental samples are generally attributed to natural heterogeneity in the sample matrix. These data are usable for decision-making purposes. All other laboratory duplicate results were acceptable.

G.7.2 SDG K3669, Coal Ash and Coal Ash Batch Leach Samples

This SDG comprises 15 field samples (J1HJN6 through J1HJN9, J1HJP0, J1HJT1 through J1HJT7, and J1HJV0 through J1HJV2) collected from the 300 Area coal ash sampling site.

Minor deficiencies noted in SDG K3669 are as follows:

- In the ICP metals analysis, the MS recoveries for antimony (27.9%) and zinc (68.4%) were outside the QC limits. Third-party validation qualified all subject analyte results with "J" flags as estimated data. For zinc, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared and the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, a PDS and serial dilution was prepared for antimony with acceptable recovery. The data are usable for decision-making purposes.

- Due to method blank contamination, UJ flags were added to lead and zinc results in the equipment blank sample J1HJT7.

- Data validation noted the detection of selenium in the laboratory QC blank and, therefore, applied UJ flags to selenium data less than five times the blank result (all samples except J1HJT2, J1HJT4, and J1HJV0). However, the preponderance of other coal ash data in this characterization study clearly indicates that low levels of selenium are present in the substrate. Therefore, the project regarded the associated selenium data as detections with a "J" flag as estimated data and reported these data as detections. The subject selenium data are usable for decision-making purposes.

- There are no major or minor deficiencies for uranium by KPA.

- In the SVOC analysis for PAH, sample J1HJV2 had a single surrogate recovery below the QC acceptance criteria. Other surrogates were relatively low but were within acceptance criteria. Since only a single surrogate was outside of control limits, no qualifiers were added to the data by third-party validation. The data are usable for decision-making purposes.

G.7.3 SDG K3669, Coal Ash Batch Leach Solid and Leachate Samples

In the ICP metals analysis of the coal ash quadruplicate solid samples (J1HJV0 through J1HJV2, -1, -2, -3, and -4), the MS recoveries for antimony (22.8%), barium (145%), mercury (294%), and thallium (69.5%) are out of acceptance criteria. An MSD was not performed given these samples were quadruplicate analyses of the primary sample. For barium and mercury, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. For these analytes, the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, a PDS and serial dilution was prepared for all four analytes with acceptable results. These data may be considered estimated. Estimated data are usable for decision-making purposes.

There are no major or minor deficiencies for ICP metals or KPA analyses of leachate samples (J1HJV0 -A1, -A2, -B1, and -C1, J1HJV1 -A1, -B1, -B2, and -C1, and J1HJV2 -A1, -B1, -C1, and -C2).

G.8 300 AREA ASH FIELD QUALITY ASSURANCE/QUALITY CONTROL

Relative percent difference evaluations of main sample(s) versus the laboratory duplicate(s) were performed and reported by the laboratory. Any deficiencies in those calculations are reported by SDG in the previous sections.

Field QA/QC measures are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples from 300 Area ash, listed in the field logbook (WCH 2011), are shown in Table G-4. The main and QA/QC sample results are presented in Appendix C.

Table G-4. Field Quality Assurance/Quality Control Samples at 300 Area Ash.

Sample Area	Main Sample	Duplicate Sample
300-04	J1HJN9	J1HJT5
300-06	J1HJP1	J1HJT6

Field duplicate samples are collected to provide a relative measure of the degree of local heterogeneity in the sampling medium, unlike laboratory duplicates that are used to evaluate precision in the analytical process. The field duplicates are evaluated by computing the RPD of the sample/duplicate pair(s) for each COPC. Relative percent differences are not calculated for analytes that are not detected in both the main and duplicate sample at more than five times the target detection limit. Relative percent differences of analytes detected at low concentrations (less than five times the detection limit) are not considered to be indicative of the analytical system performance. The calculation brief in Appendix D provides details on duplicate pair evaluation and RPD calculation.

The RPD for zinc (59.4%) in the duplicate from sample location 300-06 is above the acceptance criteria of 30%. Elevated RPDs in environmental samples are generally attributed to natural heterogeneity in the sample matrix. The data are usable for decision-making purposes.

A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) is less than five times the TDL, including undetected analytes. In these cases, a control limit of ±2 times the TDL is used (Appendix D) to indicate that a visual check of the data is required by the reviewer. No data required this check. A visual inspection of all of the data is also performed. No additional major or minor deficiencies are noted. The data are usable for decision-making purposes.

G.9 600-207 COAL ASH SAMPLES

Coal ash sample data collected at 600-207 were provided by the laboratories in two SDGs: SDG K3702 and SDG K3704. SDG K3702 was submitted for third-party validation.

G.9.1 SDG K3702

There are three, separate analytical batches contained in K3702 with a total of 17 field samples collected from the 600-207 coal ash site. One batch with 14 samples was analyzed for ICP metals and mercury with select samples analyzed for PAHs and KPA (samples J1HHM9, J1HHN7, J1HHT7, J1HHP3 through J1HHP9, and J1HHR0 through J1HHR3), a second batch included the same analyses for samples J1HHT8, J1HHT9, and J1HHV0, and the third batch of samples (J1HHT8, J1HHT9, and J1HHV0 -1, -2, -3, and -4) includes batch leach testing on appropriate the subject samples. Additional leach tests were performed on sample J1HHN7 with both pH-adjusted 5.2 water as well unadjusted water.

G.9.2 SDG K3702, Coal Ash Samples

Minor deficiencies noted in SDG K3702 are as follows:

- In the ICP metals analysis associated with samples J1HHM9, J1HHN7, J1HHT7, J1HHP3 through J1HHP9, and J1HHR0 through J1HHR3, the MS recoveries for antimony (40.9%), barium (-18.8%), boron (-0.300%), chromium (61.1%), copper (28.8%), manganese (-296%), nickel (66.5%), thallium (69.8%), and vanadium (66.3%) are outside the QC limits of 70% to 130% (DOE-RL 2011a). Third-party validation qualified associated results for antimony, boron, chromium, copper, nickel, thallium, and vanadium in SDG K3702 with "J" flags as estimated data. For barium, boron, chromium, copper, manganese, nickel, and vanadium the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared and the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, a PDS and serial dilution was prepared for all abovementioned analytes with acceptable recovery reported for all analytes except for barium which was slightly less than QC limits at 68.8%. Associated data not qualified with "J" flags by third-party validation (barium, manganese, and thallium) may be considered estimated and are usable for decision-making purposes.

- The laboratory duplicate associated with J1HHM9, J1HHN7, J1HHT7, J1HHP3 through J1HHP9, and J1HHR0 through J1HHR3 indicated an elevated RPD for barium (35.2%), boron (83.7%), copper (70.6%), manganese (35.4%), molybdenum (35.0%), and nickel (30.1%) above the acceptance criteria. The associated barium, boron, copper, and manganese results were qualified by third-party validation with a "J" flag as estimated data and are usable for decision-making purposes. Associated data not qualified with "J" flags by validation (molybdenum and nickel) may be considered estimated and are usable for decision-making purposes. All other laboratory duplicate results were acceptable.

- In the ICP metals analysis associated with samples J1HHT8, J1HHT9, and J1HHV0, the MS recoveries for antimony (35.5%), barium (-78.4%), beryllium (69.5%), chromium (66.8%), copper (41.1%), manganese (-204%), and vanadium (49.7%) are outside the QC limits of 70% to 130% (DOE-RL 2011a). Third-party validation qualified associated results for antimony, beryllium, chromium, copper, and vanadium in SDG K3702 with "J" flags as estimated data. For barium, beryllium, chromium, copper, manganese, and vanadium the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared and the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, a PDS and serial dilution was prepared for all

abovementioned analytes with acceptable recovery reported for all analytes. Associated data not qualified with "J" flags by third-party validation (manganese) may be considered estimated and are usable for decision-making purposes.

- The laboratory duplicate associated with J1HHT8, J1HHT9, and J1HHV0 indicated an elevated RPD for beryllium (41.7%) above the acceptance criteria. The associated beryllium results were qualified by third-party validation with a "J" flag as estimated data and are usable for decision-making purposes. All other laboratory duplicate results were acceptable.

- There are no major or minor deficiencies for uranium by KPA.

- In the SVOC analysis for PAH associated with samples J1HHM9, J1HHN7, J1HHT7, J1HHP5, and J1HHR2, the MS and MSD recoveries for benzo(a)anthracene (63% and 65%), benzo(a)pyrene (47% and 44%), benzo(b)fluoranthene (62% and 63%), benzo(ghi)perylene (34% and 32%), benzo(k)fluoranthene (58% and 65%), chrysene (65% and 68%), dibenz(a,h)anthracene (38% and 37%), fluoranthene (69% in MS only), and indeno(1,2,3-cd)pyrene (36% and 34%), respectively, are outside the QC limits of 70% to 130% (DOE-RL 2011a). Third-party validation qualified associated results for benzo(a)pyrene, benzo(ghi)perylene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene, with "J" flags as estimated data. The sample material from which the MS and MSD were prepared was J1HHM9. Analysis of J1HHM9, as well as both the MS and MSD, required 3X dilutions due to matrix interference from the coal ash. Associated data not qualified with "J" flags by third-party validation (benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and fluoranthene) may be considered estimated and are usable for decision-making purposes.

- In the SVOC analysis for PAH associated with samples J1HHT8, J1HHT9, and J1HHV0, the MS and MSD recoveries for acenaphthylene (62% in MSD only), anthracene (63% in MSD only), benzo(a)anthracene (60% in MSD only), benzo(a)pyrene (47% and 36%), benzo(b)fluoranthene (68% and 57%), benzo(ghi)perylene (35% and 25%), benzo(k)fluoranthene (65% and 55%), chrysene (63% in MSD only), dibenz(a,h)anthracene (45% and 32%), fluoranthene (65% in MSD only), indeno(1,2,3-cd)pyrene (41% and 29%), and phenanthrene (66% in MSD only) respectively, are outside the QC limits of 70% to 130% (DOE-RL 2011a). Third-party validation qualified associated results for benzo(a)pyrene, benzo(ghi)perylene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene, with "J" flags as estimated data. The sample material from which the MS and MSD were prepared was J1HHT8. Analysis of J1HHT8, as well as both the MS and MSD, required a 3X dilution in order to compensate for matrix interference from the coal ash. Therefore, the deficiency in the MS and MSD is attributable to the analytical variability from matrix interference rather than a measure of the recovery from the sample. Associated data not qualified with "J" flags by validation (acenaphthylene, anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and fluoranthene) may be considered estimated and are usable for decision-making purposes.

- The laboratory duplicate for SVOC analysis associated with J1HHT8, J1HHT9, and J1HHV0 indicated an elevated RPD for benzo(ghi)perylene (33%), dibenz(a,h)anthracene (33%), and indeno(1,2,3-cd)pyrene (32%) above the acceptance criteria. The associated results were qualified by third-party validation with a "J" flag as estimated data and are usable for decision-making purposes. All other laboratory duplicate results were acceptable.

G.9.3 SDG K3702, Coal Ash Batch Leach Solid and Leachate Samples

In the ICP metals analysis of the coal ash quadruplicate solid samples J1HHT8, J1HHT9, and J1HHV0 -1, -2, -3, and -4, MS recoveries associated with antimony (30.8%), barium (168%), and manganese (238%) were outside the QC limits. For barium and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared and the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, a PDS and serial dilution was prepared with acceptable recovery for all subject analytes. The subject results were not qualified as estimated by the laboratory, but may be considered estimated. The data are usable for decision-making purposes.

The MS recoveries associated with leachate samples J1HJV0-A1, -A2, -B1, and -C1, J1HJV1 -A1, -B1, -B2, and -C1, and J1HJV2 -A1, -B1, -C1, and -C2 for antimony (59.2%) and barium (0.290%) were outside the QC limits. An MSD was not performed given these samples were quadruplicate analyses of the primary sample. Results for both barium and silver in the leachate and originating solid sample are consistent with results from other coal ash samples. Therefore, it is possible that the low recoveries are due to analytical variability of the native concentration rather than a measure of the recovery from the sample. These data may be considered estimated. Estimated data are usable for decision-making purposes.

There are no major or minor deficiencies for uranium analysis of leachate samples by KPA. .

G.9.4 SDG K3702, Coal Ash Batch Leach Solid and Leachate Samples – Additional Leach Test Follow-On Analysis with pH-Adjusted and Non-pH-Adjusted Leachate for J1HHN7

There are no major or minor deficiencies noted in the ICP metals analysis of the coal ash quadruplicate solid sample J1HHN7 -1, -2, -3, and -4 and J1HHN7 -5, -6, -7, and -8.

There are no major or minor deficiencies noted in the ICP metals analysis of leachate samples J1HHN7-A1, -B1, -B2, -C1, (pH 5.2 leachate) and J1HHN7-D1, -E1, -F1, -F2 (non-pH-adjusted leachate).

G.9.5 SDG K3704

This SDG comprises 18 field samples (J1HHM3 through J1HHM8, J1HHN0 through J1HHN6, J1HHN8 through J1HHN9 and J1HHP0 through J1HHP2) collected from the 600-207 coal ash site.

Minor deficiencies noted in SDG K3704 are as follows:

In the ICP metals analysis, the MS recoveries for antimony (28.0%), barium (38.3%), beryllium (68.0%), boron (56.3%), chromium (66.3%), cobalt (66.2%), copper (60.4%), lead (64.9%), manganese (-3.29%), molybdenum (66.3%), nickel (63.9%), thallium (61.6%), and vanadium (58.9%) are outside the QC limits of 70 to 130% (DOE-RL 2011a). For barium, beryllium, boron, chromium, copper, manganese, and vanadium, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared and the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation,

a PDS and serial dilution was prepared for all abovementioned analytes with acceptable recovery reported for all. Associated data may be considered estimated and are usable for decision-making purposes.

The laboratory duplicate indicated elevated RPDs for cobalt (34.8%) and nickel (30.1%) above the acceptance criteria. Results for cobalt and nickel are both less than five times the associated TDL. Elevated RPDs in environmental samples are generally attributed to natural heterogeneity in the sample matrix. These data are usable for decision-making purposes. All other laboratory duplicate results were acceptable.

G.12 600-207 COAL ASH FIELD QUALITY ASSURANCE/QUALITY CONTROL

Relative percent difference evaluations of main sample(s) versus the laboratory duplicate(s) were performed and reported by the laboratory. Any deficiencies in those calculations are reported by SDG in the previous sections.

Field QA/QC measures are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples from 600-207, listed in the field logbook (WCH 2011), are shown in Table G-5. The main and QA/QC sample results are presented in Appendix C.

Table G-5. Field Quality Assurance/Quality Control Samples at 600-207.

Sample Area	Main Sample	Duplicate Sample
600-15	J1HHN7	J1HHR2
600-24	J1HHP6	J1HHR3

Field duplicate samples are collected to provide a relative measure of the degree of local heterogeneity in the sampling medium, unlike laboratory duplicates that are used to evaluate precision in the analytical process. The field duplicates are evaluated by computing the RPD of the sample/duplicate pair(s) for each COPC. Relative percent differences are not calculated for analytes that are not detected in both the main and duplicate sample at more than five times the target detection limit. Relative percent differences of analytes detected at low concentrations (less than five times the detection limit) are not considered to be indicative of the analytical system performance. The calculation brief in Appendix D provides details on duplicate pair evaluation and RPD calculation.

The RPDs for boron (36.5%), lead (38.7%), and vanadium (59.4%) in the duplicate from sample location 600-15 are above the acceptance criteria of 30%. Elevated RPDs in environmental samples are generally attributed to natural heterogeneity in the sample matrix. The data are usable for decision-making purposes.

A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) is less than five times the TDL, including undetected analytes. In these cases, a control limit of ±2 times the TDL is used (Appendix D) to indicate that a visual check of the data is required by the reviewer. No data required this check. A visual inspection

of all of the data is also performed. No additional major or minor deficiencies are noted. The data are usable for decision-making purposes.

G.13 SUMMARY

Limited, random, or sample matrix-specific influenced batch QC issues such as those discussed above, are a potential for any analysis. The number and types seen in these data sets are within expectations for the matrix types and analyses performed. The DQA review of the coal ash characterization sampling data found that the analytical results are accurate within the standard errors associated with the analytical methods, sampling, and sample handling. This DQA review concludes that the reviewed data are of the right type, quality, and quantity to support the intended use. The analytical data were found acceptable for decision-making purposes. The verification sample analytical data are stored in the Environmental Restoration project-specific database prior to being submitted for inclusion in the Hanford Environmental Information System database. The verification sample analytical data are also summarized in Appendix C.

G.14 REFERENCES

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