Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

APR 07 2014

14-AMRP-0140

Mr. D. A. Faulk, Program Manager
Office of Environmental Cleanup
Hanford Project Office
U.S. Environmental Protection Agency
309 Bradley Boulevard, Suite 115
Richland, Washington 99352

Dear Mr. Faulk:

TRANSMITTAL OF APPROVED WASTE SITE RECLASSIFICATION FORM AND SUPPORTING DOCUMENTATION FOR THE 100-C-7:1, 183-C WATER TREATMENT FACILITY HEAD HOUSE FOUNDATION AND STAINED SOILS SUBSITE, REVISION 0

Attached for your use is the approved Waste Site Reclassification Form No. 2013-031 and supporting, "Remaining Sites Verification Package for the 100-C-7:1, 183C Water Treatment Facility Head House Foundation and Stained Soils Subsite," Rev. 0. If you have questions, please contact me or your staff may contact Tom Post, of my staff, at (509) 376-3232.

Sincerely,

Mark S. French

Mark S. French, Federal Project Director
for the River Corridor Closure Project

AMRC:TCP

Attachment

cc w/attach:
L. C. Buelow, EPA
Administrative Record, H6-08

cc w/o attach:
S. L. Feaster, WCH
T. Q. Howell, WCH
D. L. Plung, WCH
J. P. Shearer, CHPRC
C. P. Strand, WCH

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-BC-2 **Control No.:** 2013-031

Waste Site Code(s)/Subsite Code(s): 100-C-7:1

Reclassification Category: Interim ☒ Final ☐

Reclassification Status: Closed Out ☒ No Action ☐ Rejected ☐
RCRA Postclosure ☐ Consolidated ☐ None ☐

Approvals Needed: DOE ☒ Ecology ☐ EPA ☒

Description of current waste site condition:

The 100-C-7:1, 183-C Water Treatment Facility Head House Foundation and Stained Soils subsite is located in the southwestern portion of the 100-B/C Area west of the 105-C Reactor Building and is associated with the decommissioned 183-C water treatment facilities. The 183-C water treatment facilities included the 183-C Head House, the 183-C Sedimentation Basins, the 183-C Filter Building/Pumproom Facility, the 183-C Clearwells, and the 190-C Pump House. The 100-C-7:1 subsite encompassed stained surface soil that was observed in 2002 just north of the 183-C Head House and adjacent to the northwest corner of the 183-C Sedimentation Basins.

Remedial action at the 100-C-7:1 subsite was initiated in December 2004 and extended to 4.6 m (15 ft) below ground surface (bgs). However, it was determined that total chromium and hexavalent chromium were present in the subsurface at concentrations exceeding the remedial action objectives (RAOs) and remedial action goals (RAGs). Several potholes and boreholes were excavated at the 100-C-7:1 subsite to evaluate the distribution of sodium dichromate contamination. The initial pothole in April 2005 showed residual soil contamination present at 10 m (33 ft) bgs with total chromium at 1,230 mg/kg and hexavalent chromium at 1,620 mg/kg. In 2009, it was determined that the hexavalent chromium in the vadose zone below 4.6 m (15 ft) required remedial action in order to protect groundwater in the 100-B/C Area.

Further remedial action, including demolition of reinforced concrete substructures associated with the 183-C Head House, 183-C Sedimentation Basins, 183-C Filter Building, and 183-C Clearwell pads in the vicinity of the 100-C-7 and 100-C-7:1 waste sites, began on June 8, 2010. The 100-C-7:1 subsite, with the exception of the west sidewall, was excavated to groundwater and was completed on February 27, 2012. Approximately 45,000 bank cubic meters (BCM) (58,858 bank cubic yards [BCY]) of concrete and building slab rubble was transported to U-Canyon, located in the 200 West Area, to be used as fill. Approximately 261,414 BCM (341,917 BCY) of contaminated soil was excavated for disposal at the Environmental Restoration Disposal Facility (ERDF).

Additional remedial action at the 100-C-7:1 west sidewall was performed from October 3, 2012 to January 31, 2013. Approximately 32,430 BCM (42,417 BCY) of contaminated soil was excavated for disposal at the ERDF. The final excavation depth was approximately 27 m (89 ft) bgs.

Remediation, verification sampling, and comparison of residual contaminant concentrations against cleanup levels have been performed in accordance with RAOs and goals established by the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 1999). The selected remedy involved (1) excavating the site to the extent required to meet specified soil cleanup levels, (2) disposing of contaminated excavation materials at the ERDF and at the U-Canyon in the 200 Area of the Hanford Site, (3) demonstrating through verification sampling that cleanup goals have been achieved, and (4) proposing the site for reclassification as Interim Closed Out.

Basis for reclassification:

Evaluation of cleanup verification sampling results in comparison to the RAGs demonstrates that the 100-C-7:1 subsite meets the RAOs specified in the Remaining Sites ROD (EPA 1999). The results demonstrate that residual contaminant concentrations do not preclude any future land uses (as bounded by a rural-residential scenario) and allows for unrestricted future use of shallow zone soils (i.e., surface to 4.6 m [15 ft]). The results also show that contaminant levels remaining in the soil are protective of groundwater and the Columbia River. The site has been excavated to groundwater, and all verification sampling results have been determined to meet the more restrictive shallow zone RAGs; therefore, no institutional controls for deep zone soils are required. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 100-C-7:1, 183-C Water Treatment Facility Head House Foundation and Stained Soils Subsite* (attached).

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-BC-2 **Control No.:** 2013-031

Waste Site Code(s)/Subsite Code(s): 100-C-7:1

Regulator comments:

None

Waste Site Controls:

Engineered Controls: ☐ Yes ☒ No Institutional Controls: ☐ Yes ☒ No O&M Requirements: ☐ Yes ☒ No

If any of the Waste Site Controls are checked Yes, specify control requirements including reference to the Record of Decision, TSD Closure Letter, or other relevant documents:

J. P. Neath		1/6/14
DOE Federal Project Director (printed)	Signature	Date
N/A		
Ecology Project Manager (printed)	Signature	Date
L. C. Buelow		3·11·14
EPA Project Manager (printed)	Signature	Date

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-C-7:1, 183-C WATER TREATMENT FACILITY HEAD HOUSE FOUNDATION AND STAINED SOILS SUBSITE

Attachment to Waste Site Reclassification Form 2013-031

March 2014

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-C-7:1, 183-C WATER TREATMENT FACILITY HEAD HOUSE FOUNDATION AND STAINED SOILS SUBSITE

EXECUTIVE SUMMARY

The 100-C-7:1, 183-C Water Treatment Facility Head House Foundation and Stained Soils subsite is located in the southwestern portion of the 100-B/C Area, approximately 557 m (1,828 ft) west of the 105-C Reactor Building, and is associated with the decommissioned 183-C water treatment facilities. The 183-C water treatment facilities included the 183-C Head House, the 183-C Sedimentation Basins, the 183-C Filter Building/Pumproom Facility, the 183-C Clearwells, and the 190-C Pump House. The 100-C-7:1 subsite encompassed stained surface soil that was observed in 2002 just north of the 183-C Head House and adjacent to the northwest corner of the 183-C Sedimentation Basins.

Remedial action at the 100-C-7:1 subsite was initiated in 2004, and excavation was completed to a depth of 4.6 m (15 ft). However, extensive soil discoloration by hexavalent chromium was still evident. Characterization test pits and boreholes were completed in 2005 and 2007 to help determine the lateral and vertical extent of the contamination. Analytical results indicated significant concentrations of chromium throughout the vadose zone beneath the site. In 2009, it was determined that the hexavalent chromium in the vadose zone below 4.6 m (15 ft) would be remediated to protect groundwater in the 100-B/C Area. In 2010 through 2011, the export water pipeline was relocated in order to expand 100-C-7:1 remediation and excavation layback to the north and remove the remaining section of the 7.6-cm (3-in.)-diameter steel soft-water pipeline (grouted 100-B-28 pipeline segment).

Following remedial design in 2010, additional remedial effort began on January 27, 2011. In April 2011, an additional stained area was discovered on the west sidewall of the 100-C-7:1 excavation. In-process sampling of this stained area indicated significant concentrations of hexavalent chromium. Overhead power lines had to be rerouted around the south side of the 100-C-7/100-C-7:1 excavations before additional remediation of west sidewall area began in October 2012.

The original planned 100-C-7:1 subsite remediation was competed in February, 2012. The additional necessary west sidewall remediation was completed in February 2013. Approximately 293,844 bank cubic meters (BCM) (384,283 bank cubic yards [BCY]) of contaminated soil was excavated for disposal of the Environmental Restoration Disposal Facility (ERDF) and 504,869 BCM (660,256 BCY) of overburden/layback soil was excavated and used to backfill the 100-C-7:1 excavation. The final excavation depth was approximately 27 m (89 ft) below ground surface (bgs), extending below the high fluctuation point of the local groundwater table.

Verification sampling of the 100-C-7:1 subsite overburden stockpiles and layback material within the west sidewall expansion was continuously performed from September 2010 to February 2013 as material was stockpiled or was used to backfill the 100-C-7:1 excavation. Verification sampling of the 100-C-7:1 subsite upper excavation sidewall was performed on

October 17 and 18, 2011, and the lower sidewalls were sampled on April 24, 2012. Verification sampling on the staging pile areas (SPA1 and SPA2) was completed on July 9 and 11, 2012.

Verification sampling of the west sidewall following the plume chase remediation was performed on December 27, 2012, January 15, 2013, and February 11, 2013. Verification sampling of the staging pile area 3 (SPA3) was performed on February 7 and March 21, 2013. Sample location SPA3-4 had elevated hexavalent chromium results slightly above the river protection remedial action goals (RAGs). Following additional remediation on March 28, 2013, location SPA3-4 was resampled for hexavalent chromium only. Verification sampling of staging pile area 4 (SPA4) was performed on February 4, 2013. The results indicate that the waste removal action achieved compliance with the remedial action objectives (RAOs) and RAGs.

A summary of the cleanup evaluation for the soil results against the applicable criteria is presented in Table ES-1. The results of the verification sampling are used to make reclassification decisions for the 100-C-7:1 subsite in accordance with the TPA-MP-14 procedure in the *Tri-Party Agreement Handbook Management Procedures* (DOE-RL 2011). In accordance with this evaluation, the verification sampling results support a reclassification of this site to Interim Closed Out. The current site conditions achieve the RAOs and the corresponding RAGs established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE-RL 2009b) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD) (EPA 1999). The results of verification sampling show that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. The excavation was backfilled and revegetated. Site contamination above cleanup levels that extended into the deep zone soils was completely removed; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone are not required.

Table ES-1. Summary of Remedial Action Goals for the 100-C-7:1 Subsite. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain 15-mrem/yr dose rate above background over 1,000 years.	There were no radionuclide COCs for this site.	NA
Direct Exposure – Nonradionuclides	Attain individual COC RAGs.	All individual COC concentrations are below the direct exposure criteria.	Yes

Table ES-1. Summary of Remedial Action Goals for the 100-C-7:1 Subsite. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Risk Requirements – Nonradionuclides	Attain a hazard quotient of <1 for all individual noncarcinogens.	All individual hazard quotients are <1.	Yes
	Attain a cumulative hazard quotient of <1 for noncarcinogens.	The cumulative hazard quotient (4.5×10^{-1}) is < 1.	
	Attain an excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	The excess cancer risk for hexavalent chromium, the only carcinogenic contaminant detected above background levels, is 5.4×10^{-7}, which is $<1 \times 10^{-6}$.	
	Attain a cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	The total excess cancer risk value (5.4×10^{-7}) for hexavalent chromium (the only carcinogenic constituent detected above background levels) is $<1 \times 10^{-5}$.	
Groundwater/River Protection – Radionuclides	Attain single-COC groundwater and river protection RAGs.	There were no radionuclide COCs for this site.	NA
	Attain national primary drinking water standards [a]: 4 mrem/yr (beta/gamma) dose rate to target receptor/organs.		
	Meet drinking water standards for alpha emitters: the most stringent of 15 pCi/L MCL or 1/25th of the derived concentration guides from DOE Order 5400.5 [b].		
	Meet total uranium standard of 30 µg/L (21.2 pCi/L) [c].		
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and river cleanup requirements.	Copper, lead, manganese, mercury, selenium, and vanadium are present within some locations of the overburden stockpiles at concentrations slightly above soil RAGs for groundwater and/or river protection. However, RESRAD evaluation indicated that residual concentrations of copper, lead, manganese, mercury, and vanadium are protective of groundwater and the Columbia River provided that the overburden material is placed at least 3 m (10 ft) above the groundwater rewetted zone [d]. Residual concentrations of selenium are considered to be protective because the results are within the range of Hanford background levels [e].	Yes

[a] "National Primary Drinking Water Regulations" (40 *Code of Federal Regulations* 141).

[b] *Radiation Protection of the Public and Environment* (DOE Order 5400.5).

[c] Based on the isotopic distribution of uranium in the 100 Areas, the 30 µg/L MCL corresponds to 21.2 pCi/L. Concentration-to-activity calculations are documented in *Calculation of Total Uranium Activity Corresponding to a Maximum Contaminant Level for Total Uranium of 30 Micrograms per Liter in Groundwater* (BHI 2001).

[d] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of copper, lead, and vanadium are not expected to migrate more than 3 m (10 ft) vertically in 1,000 years (based on the constituent with the lowest distribution coefficient of 22 mL/g for copper). Therefore, overburden used for backfill that contains concentrations of copper, lead, and vanadium exceeding Hanford Site background was placed at least 3 m (10 ft) above the groundwater rewetted zone.

[e] The maximum reported concentration of selenium in overburden stockpiles was 1.2 mg/kg. The maximum concentration reported during the Hanford Background study (DOE-RL 1995) was 6 mg/kg. Since the reported values for the overburden stockpile are within the range of the Hanford background value, and since there is no indication that selenium is attributable to the sodium dichromate contamination, the residual concentrations of selenium are considered to be indicative of natural occurrence and are therefore considered protective.

COC = contaminant of concern
MCL = maximum contaminant level
RAG = remedial action goal
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
RESRAD = RESidual RADioactivity (dose model)

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based on a limited ecological risk assessment. Although not required by the ROD, a comparison against ecological risk screening levels has been made for the site contaminants of concern and other constituents. Those constituents exceeding the *Washington Administrative Code* 173-340 ecological soil screening levels were barium, boron, mercury, selenium, and vanadium. U.S. Environmental Protection Agency ecological soil screening levels were exceeded for antimony, copper, lead, manganese, selenium, vanadium, and zinc. Exceedance of screening values does not necessarily indicate the existence of risk to ecological receptors. Because concentrations of antimony and zinc are below background levels, it is believed that the presence of these constituents does not pose a risk to ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for ecological effects as a part of the final closeout decision for the Columbia River corridor portion of the Hanford Site.

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-C-7:1, 183-C WATER TREATMENT FACILITY HEAD HOUSE FOUNDATION AND STAINED SOILS SUBSITE

STATEMENT OF PROTECTIVENESS

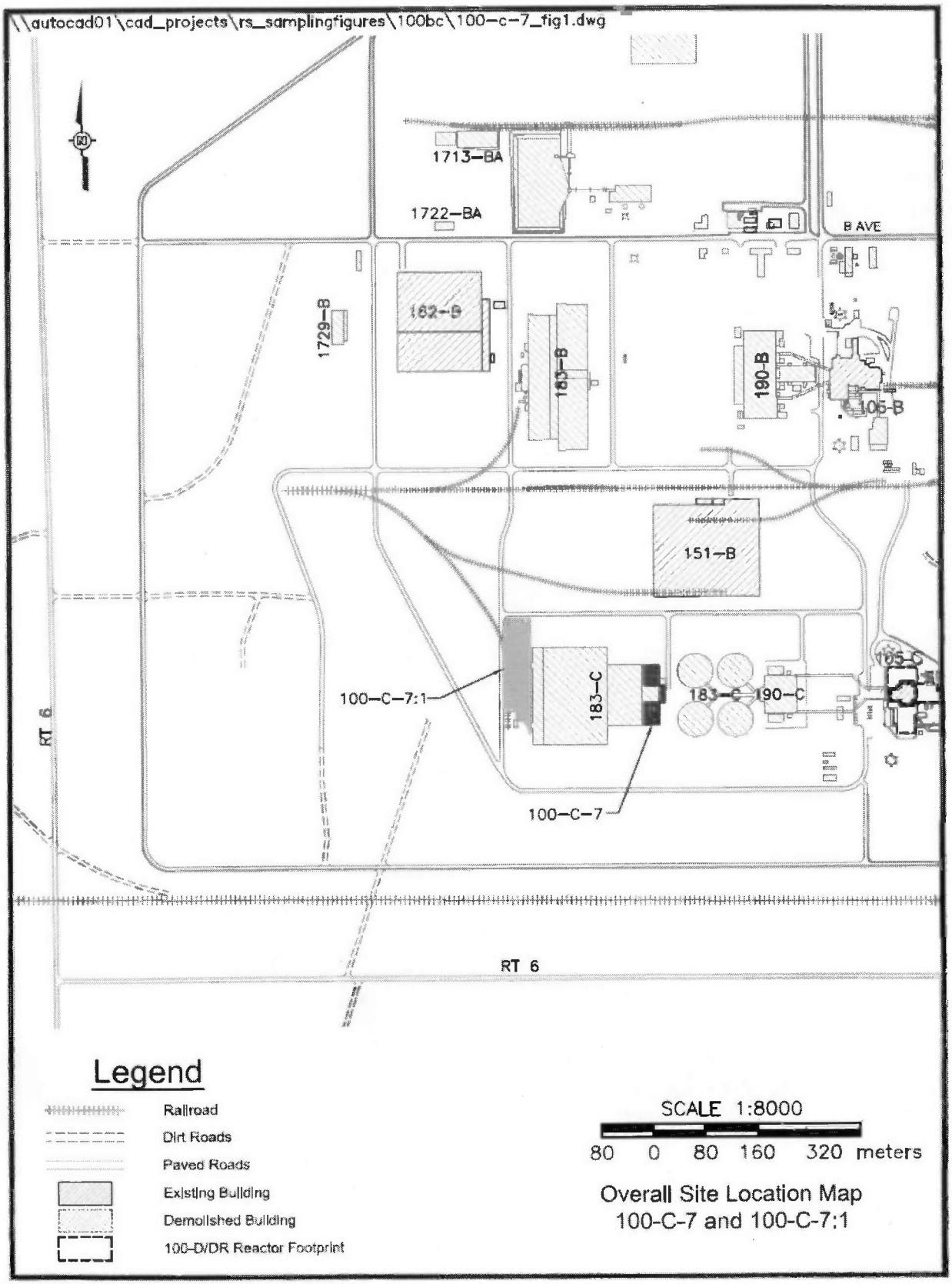
The 100-C-7:1, 183-C Water Treatment Facility Head House Foundation and Stained Soils subsite verification sampling data demonstrate that this site meets the objectives established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (100 Area RDR/RAWP) (DOE-RL 2009b) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD) (EPA 1999). These results show that residual soil concentrations support future land uses that can be represented (or bounded) by a rural-residential scenario. The results also demonstrate that residual contaminant concentrations support unrestricted future use of shallow zone soil (i.e., surface to 4.6 m [15 ft]), and that contaminant levels remaining in the soil are protective of groundwater and the Columbia River. Site contamination that extended into the deep zone soils was completely removed; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone are not required.

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based on a limited ecological risk assessment. Although not required by the ROD, a comparison against ecological risk screening levels has been made for the site contaminants of concern (COCs) and other constituents. Those constituents exceeding the *Washington Administrative Code* (WAC) 173-340 ecological soil screening levels were barium, boron, mercury, selenium, and vanadium. U.S. Environmental Protection Agency (EPA) ecological soil screening levels were exceeded for antimony, copper, lead, manganese, selenium, vanadium, and zinc. Exceedance of screening values does not necessarily indicate the existence of risk to ecological receptors. Because concentrations of antimony and zinc are below background levels, it is believed that the presence of these constituents does not pose a risk to ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for ecological effects as a part of the final closeout decision for the Columbia River corridor portion of the Hanford Site.

GENERAL SITE INFORMATION AND BACKGROUND

The 100-C-7:1 subsite, part of the 100-BC-1 Operable Unit, included a large area (approximately 6,600 m^2) of yellow stained soil mostly free of vegetation that was observed in 2002, just north of the 183-C Head House and adjacent to the northwest corner of the 183-C Sedimentation Basins. The 100-C-7:1 subsite is located in the southwestern portion of the 100-B/C Area, approximately 557 m (1,828 ft) west of the 105-C Reactor Building (Figure 1). The 183-C water treatment facilities included the 183-C Head House, the 183-C Sedimentation Basins, the 183-C Filter Building Pumproom Facility, and the 183-C Clearwells (Appendix A, Figure A-1).

Figure 1. The 100-C-7 and 100-C-7:1 Waste Site Location Map.



The 183-C water treatment facilities were constructed to provide treated water to the 105-C Reactor Building. Chemical additions of alum, sulfuric acid, and chlorine were proportioned and added to the raw water in the 183-C Head House (Appendix A, Figure A-2). Alum was used as a flocculating agent. Sulfuric acid was used for pH control and alum production by mixing bauxite and water. Chlorine was added to control algae. The outdoor chemical storage tanks were located on the north side of the 183-C Head House (Appendix A, Figure A-3).

The 183-C Sedimentation Basins were used to store the flocculated water prior to filtering at the 183-C Filter Building. The 183-C pumproom joined the filter building on the east side. An 18.9-million L (5-million gal) aboveground storage tank (known as a clearwell) was located in each side of the pumproom. The water was drawn from these clearwells and injected with sodium dichromate in the pumproom prior to being pumped to four large clearwells, just upstream of the 190-C Pump House. Sodium dichromate was added to the filtered water to preclude corrosion of the process tubes in the 105-C Reactor.

Decommissioning and demolition (D&D) of the 183-C Filter Building/Pumproom Facility was completed in September 1996 (BHI 1997). Asbestos-lagged pipes, hazardous materials, pumping equipment and valves, transite siding and roofing, and the structural steel were all removed. Demolition of the below-grade concrete structures occurred during the steel removal activities. The amount of contaminated concrete turned out to be significantly more than what was originally estimated. Characterization data showed sodium dichromate contamination penetrating up to 20 cm (8 in.) into the concrete floor at the worst-case location. As efforts were initiated on chiseling up the concrete, it became evident that there was no simple method to control the depth of concrete removal. It was determined that continued removal of the sodium dichromate-contaminated concrete was not cost efficient using the available resources and additional removal would occur during remediation of 100-B/C waste sites. In order to stabilize the remaining contaminated concrete, also known as the "monolith," in a manner that would not hinder future cleanup activities, the contaminated concrete was covered with a plastic barrier and then a soil layer (Appendix A, Figure A-4). This contamination was identified in the Waste Information Data System (WIDS) as the 100-C-7 waste site.

In 2002, an area of yellow soil was observed and added as a subsite (100-C-7:1) to the 100-C-7 waste site (Appendix A, Figure A-5). It is speculated that the stained area may be a result of transferring sodium dichromate from the head house, where chemicals were received by rail, to the pumproom facility.

The 183-C Head House received raw water pumped from the 181-B River Pumphouse through four pipelines (included in the Not Accepted 100-C-5 pipelines waste site) on the west side of the building. Alum, sulfuric acid, and chlorine were added to the raw water in the head house. Ferric sulphate and lime were received by rail adjacent to the pump house. Screw conveyors and bucket elevators were used to deliver the chemicals to their respective storage silos. Sodium dichromate solution storage, emergency mixing, and feeding facilities were provided in the pump house. The dichromate solution was fed to each of the four pipelines to the clearwells. The discharge lines were extended from the head house to the filter building pump room by means of a pipe trench in the basin wall.

PREVIOUS INVESTIGATIONS AND REMEDIATION

Sampling and analysis was performed as part of characterization of the 183-C Filter Building/ Pumphouse to support D&D activities. The results of this characterization effort are reported in the *183-C Filter Plant/Pump Room Facility Characterization Sample Data Report* (BHI 1994). Additional references for samples collected during remediation of the filter building are provided in the *Final Decommissioning Report for the 183-C Filter Building/Pumproom Facility* (BHI 1997). In-process samples of soil and concrete were collected during the 2006 remediation to support waste characterization and designation.

A sample of the stained soil north of the 183-C Head House was collected April 9, 2003, and submitted for analysis of inductively coupled plasma (ICP) metals, radionuclides, anions, hexavalent chromium, and pH (Shea 2003). Total chromium was present at 4,090 mg/kg, hexavalent chromium was present at 1,110 mg/kg, and mercury was measured at 1.2 mg/kg. Subsequently, this stained soil location was entered into WIDS as a subsite to the 100-C-7 (100-C-7:1) waste site and identified for remedial action.

Remedial action at the 100-C-7:1 subsite was initiated in December 2004 with excavation of the stained soil area located north of the 183-C Head House to a depth of approximately 3.5 m (11.5 ft). Excavation adjacent to the north side of the 183-C Head House, where the outdoor chemical storage tanks were once located, proceeded to a depth of 4.6 m (15 ft) where in-process sampling indicated residual chromium contamination exceeding cleanup criteria. Chromium staining was also observed on the outside foundation wall of the 183-C Sedimentation Basins exposed in the east sidewall of the excavation (Appendix A, Figure A-6).

Following initial remediation of the 100-C-7 waste site, it was determined that total chromium and hexavalent chromium were present in the subsurface soil beyond the boundaries of the remediation excavations at both the 100-C-7:1 and 100-C-7 monolith waste sites at concentrations exceeding the remedial action objectives and goals established by the 100 Area RDR/RAWP (DOE-RL 2009b). The *Sampling and Analysis Instruction for Borehole Sampling at 100-C-7* (BHI 2005b) was developed to provide the sampling and analytical requirements for characterizing the vertical distribution of chromium contamination in the deep zone soil in the vicinity of the 100-C-7:1 stained soil area north of the 183-C Head House. The data were to be used to refine the conceptual model and to support remedial action and closure decisions for the 100-C-7:1 and100-C-7 waste site.

Several potholes and boreholes were excavated at 100-C-7:1 to evaluate the distribution of sodium dichromate contamination (WCH 2008). The initial pothole in April 2005 showed residual soil contamination present at 10 m (33 ft) below ground surface (bgs) with total chromium at 1,230 mg/kg and hexavalent chromium at 1,620 mg/kg (Appendix A, Figure A-7). In 2009, it was determined that the hexavalent chromium in the vadose zone below 4.6 m (15 ft) would need to be remediated in order to protect groundwater in the 100-B/C Area.

In order to support preparation of the engineering design for remediation activities, additional information on the extent of hexavalent chromium contamination was required. The *Sampling and Analysis Instruction for Evaluation of Residual Chromium Contamination in Subsurface Soil*

at 100-C-7 (WCH 2007) was prepared to obtain additional information on the extent of 100-C-7 and 100-C-7:1 contamination to guide engineering design.

A 7.6-cm (3-in.) pipe was breached on March 17, 2005, within the 100-C-7:1 excavation that contained a reddish brown liquid (Appendix A, Figure A-8). The pipeline was subsequently identified for remediation as the 100-B-28, 183-C Head House to 183-B Pump House Sodium Dichromate Transfer Pipeline waste site. Remediation of the 100-B-28 waste site was performed from February to April 2009. Approximately 757 L (200 gal) of sodium dichromate liquid was drained from the pipeline and collected for treatment and disposal. Additional information concerning the remediation and closeout of the pipeline is provided in the *Remaining Sites Verification Package for the 100-B-28 183-C Headhouse to the 183-B Pumproom Sodium Dichromate Transfer Pipeline* (WCH 2010b). At the time of the 100-B-28 waste site remediation, a section could not be removed due to the presence of an active export water line. Following discussion with the U.S. Department of Energy, Richland Operations Office (DOE-RL), and EPA, the section was filled with grout to flush residual sodium dichromate liquid out for collection. The section was administratively reassigned to be addressed under the 100-C-7:1 subsite and was removed with remediation.

To support execution of the engineering design for remediation activities and to remove the remaining section of 7.6-cm (3-in.) pipeline, the 107-cm (42-in.) export water line located at the 100-B/C Area was relocated during 2010. Two additional characterization boreholes were drilled to obtain information concerning the extent of chromium contamination to ensure that rerouting of the export water line occurred outside of the area where residual chromium contamination was present.

REMEDIAL ACTION SUMMARY

Following completion of the initial remedial design in 2010, demolition of reinforced concrete substructures associated with the 183-C Head House, 183-C Sedimentation Basins, 183-C Filter Building, and 183-C Clearwell pads in the vicinity of the 100-C-7 and 100-C-7:1 waste sites began on June 8, 2010. Demolition of concrete foundations included shearing pipes and rebar and staging concrete rubble to the designated staging areas.

The active 106.7-cm (42-in.) concrete export water line that was located along the northern edge of the 100-C-7:1 waste site was relocated farther north to support remedial activities at 100-C-7:1.

Following subsurface concrete demolition, remedial activities to remove contaminated soil and portions of inactive pipeline resumed on January 27, 2011. Remediation of the 100-C-7:1 subsite included removal and disposal of the inactive section of the relocated export water line, a segment of fire water piping, and the segment of 7.6-cm (3-in.) sodium dichromate pipeline from beneath the export water line crossing.

Visual observation, x-ray fluorescence (XRF) measurements, and in-process samples were used during remediation to guide excavation and identify contaminated soil. The 100-C-7:1 subsite

excavation, with the exception of the west sidewall, was excavated to groundwater and was completed on February 27, 2012 (Appendix A, Figure A-9 through A-15). Approximately 45,000 bank cubic meters (BCM) (58,858 bank cubic yards [BCY]) of concrete and building slab rubble was transported to U-Canyon, located in the 200 West Area, to be used as fill. By March 2012, approximately 261,414 BCM (341,917 BCY) of contaminated soil was excavated for disposal to the Environmental Restoration Disposal Facility (ERDF) and 373,403 BCM (488,393 BCY) of overburden/layback soil was excavated and stockpiled at the 100-C-7:1 waste site for use as backfill material.

Groundwater Study

A groundwater study was conducted by Pacific Northwest National Laboratory (PNNL) while the 100-C-7:1 excavation was accessible for characterization activities between April 2012 and September 2012 (Appendix A, Figure A-16). Soil sampling showed that hexavalent chromium was still present at the bottom of the 100-C-7:1 excavation, in the groundwater rewetted zone. In addition, hexavalent chromium concentrations in a downgradient monitoring well showed a transient spike of increased hexavalent chromium concentration following initiation of the 100-C-7:1 excavation. A groundwater study was performed to determine if the transient spike of hexavalent chromium concentrations seen in the groundwater well data could be attributed to the 100-C-7:1 subsite excavation.

The key objective of the study was to quantify the flux of hexavalent chromium from the vadose zone waste site into the groundwater. The hexavalent chromium data showed a short-lived pulse of hexavalent chromium was released to the groundwater at the excavation site during the study period, corresponding to the seasonal rise in the water table associated with increased Columbia River stage. By the end of the study period, even though the water table was still high, hexavalent chromium concentrations in the downgradient well had dissipated to levels at or below the ambient water quality criteria with no significant continuing source observed. Therefore, hexavalent chromium present in the lower vadose zone was readily mobilized to the groundwater when the groundwater table rose and contacted contaminated sediments (PNNL 2012).

West Sidewall Remediation

On April 18, 2011, additional soil staining was observed on the west sidewall of the 100-C-7:1 excavation. The excavation was at 6.7 m (22 ft) bgs and staining was visible at this depth. Extensive in-process sampling was performed at this location to investigate the nature and extent of soil staining on the west sidewall of the excavation. Analytical data results for this in-process sampling investigation are provided in the *100-C-7:1 Cleanup Verification 95% UCL Calculation* in Appendix B. In-process data showed that hexavalent chromium was present at levels exceeding river protection remedial action goals (RAGs). Remediation was performed to remove additional hexavalent chromium stained soil from the west sidewall to the extent possible. It was determined that the hexavalent chromium plume extended further west and deeper than 6.7 m (22 ft) bgs. The extent of the west sidewall of the 100-C-7:1 excavation was hindered by existing 230-kV power poles and overhead power lines, which required relocation before additional remediation was performed (Figure A-17).

Following the relocation of the 230-kV power line, the west sidewall remediation began on October 4, 2012, and was completed on January 31, 2013. Approximately 32,430 BCM (42,417 BCY) of contaminated soil was excavated for disposal at ERDF and 72,608 BCM (94,968 BCY) of overburden/layback material soil was excavated from the west sidewall and used for direct backfill of the 100-C-7:1 excavation. The final excavation depth is approximately 27 m (89 ft) bgs (Appendix A, Figure A-18 and A-19). No anomalous materials were encountered during the excavation; therefore, there were no anomaly staging areas.

Post-Excavation Survey

A post-excavation civil survey of the 100-C-7:1 excavation is provided in Figure 2. The post-excavation civil survey of the west sidewall remediation is included in Figure 3. No anomalous materials were encountered during the excavations.

In-Process Sampling

In-process samples were collected throughout the duration of the 100-C-7:1 waste site remediation to guide excavation and identify contaminated soil. Following completion of remedial activities at 100-C-7:1, with the exception of the west sidewall, in-process sampling was performed across the floor of the excavation (approximately 0.3 to 0.6 m [1 to 2 ft] above the high fluctuation point of the local groundwater table) to determine the amount of residual hexavalent chromium present at the bottom of the excavation. Ten samples were focused at locations where field XRF measurements identified higher potential concentrations of chromium. Analytical results showed a maximum concentration of 39.6 mg/kg for hexavalent chromium. The final excavation depth was approximately 27.0 m (89 ft) bgs, extending below the high fluctuation point of the local groundwater table.

Radiological Surveys

No post-excavation radiological surveys were conducted of the 100-C-7:1 subsite because radiological constituents are not COCs. The 100-C-7:1 subsite is not associated with any radiological operational processes.

VERIFICATION SAMPLING ACTIVITIES

All verification sampling at the 100-C-7:1 subsite was performed to support a determination that residual contaminant concentrations in the soil meet cleanup criteria specified in the 100 Area RDR/RAWP (DOE-RL 2009b) and the Remaining Sites ROD (EPA 1999). A statistical sampling design was used to collect verification soil samples from the upper sidewalls of the excavation, lower sidewalls of the excavation, west sidewall of the excavation, and staging pile areas SPA1through SPA4. The results of verification sampling are included in the *100-C-7:1 Cleanup Verification 95% UCL Calculation* in Appendix B to support interim closure of the site. A composite sampling approach was used to perform verification sampling of overburden soil during the stockpiling process and west sidewall remediation.

Figure 2. Post-Excavation Topographical Map for the 100-C-7:1 Subsite Excavation.

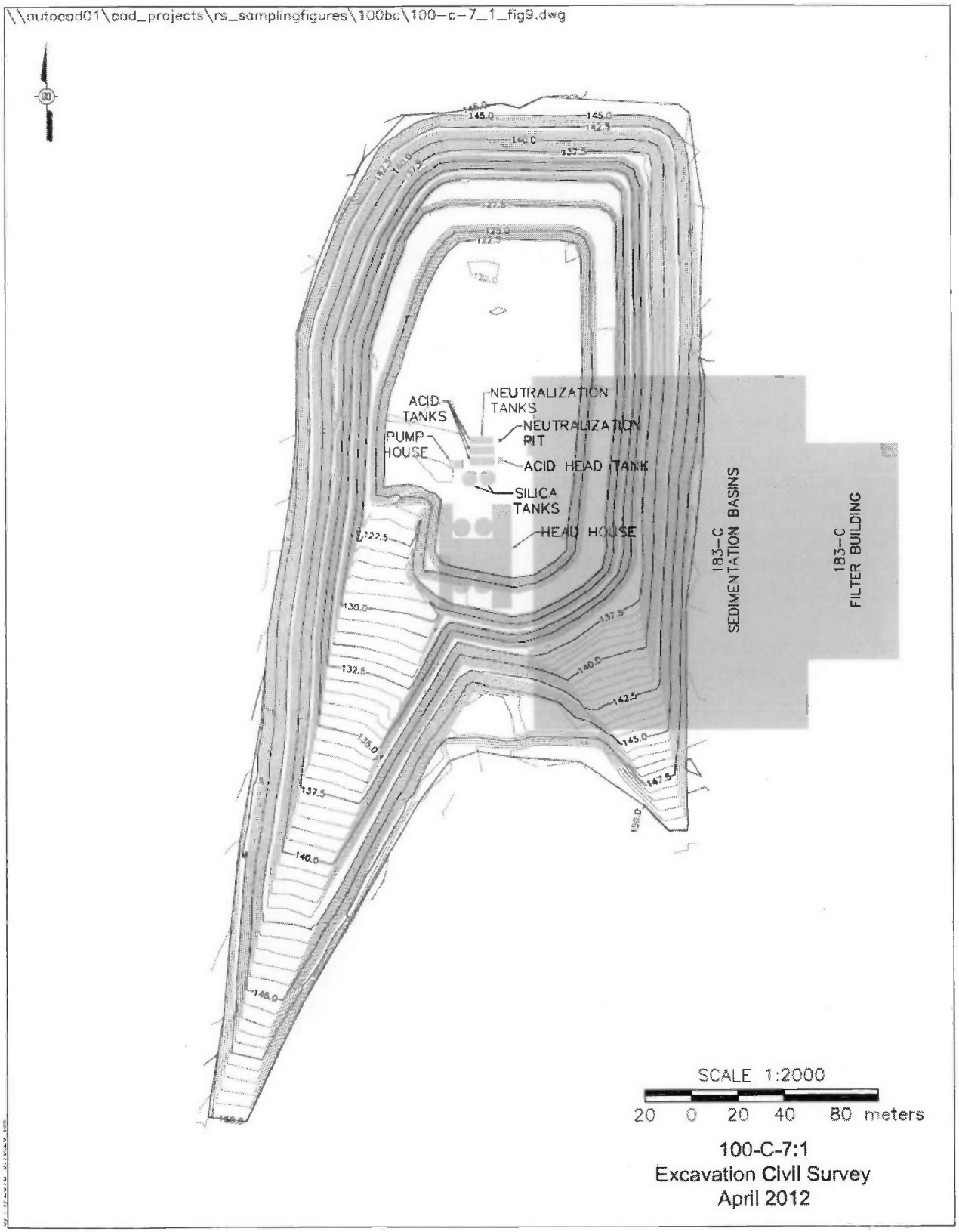
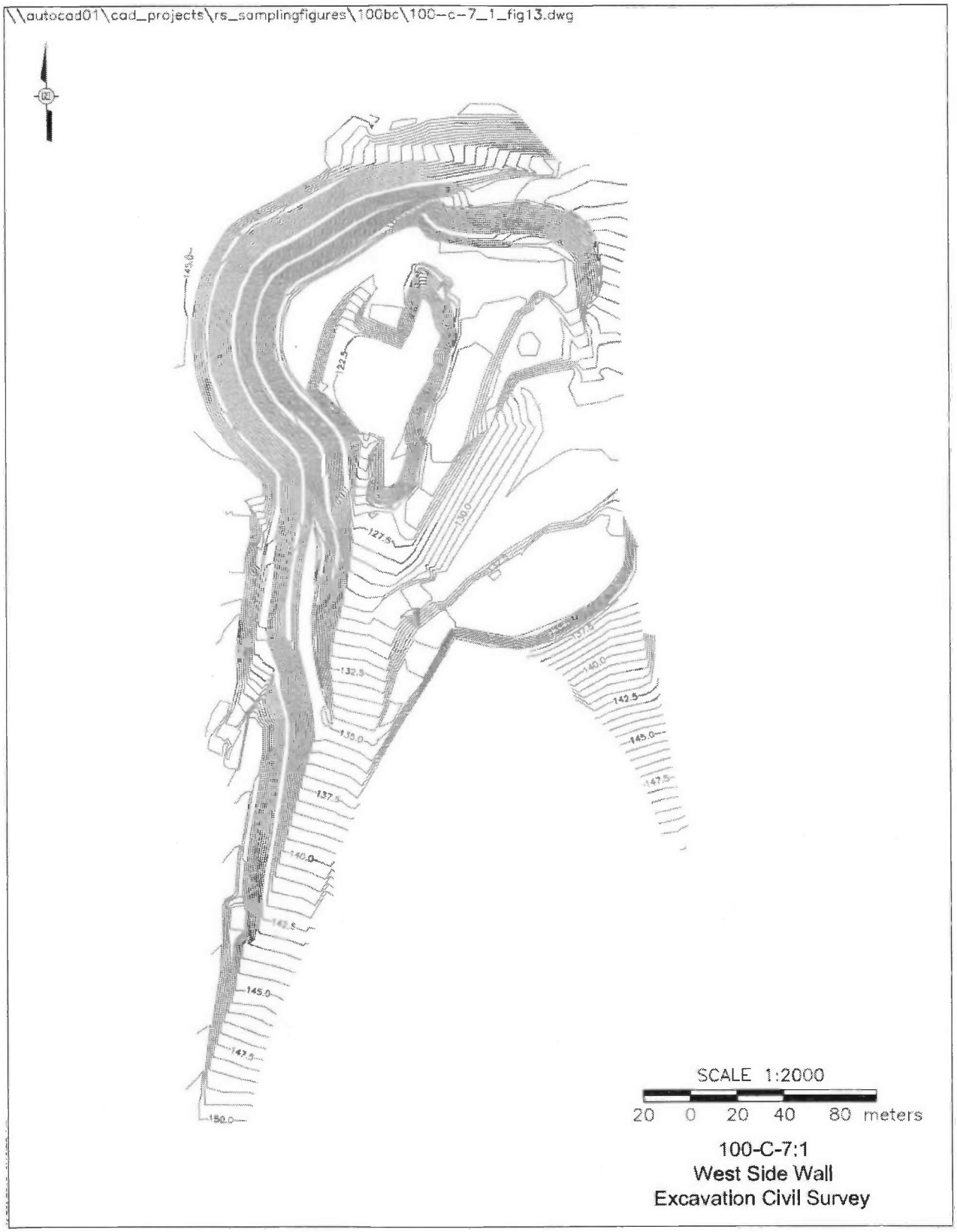


Figure 3. Post-Excavation Topographical Map for the 100-C-7:1 Subsite, West Sidewall Excavation.



CONTAMINANTS OF CONCERN

The results from previous investigations and process knowledge identified total chromium, mercury, and hexavalent chromium as COCs at the 100-C-7:1 subsite. While not considered COCs, antimony, arsenic, barium, beryllium, boron, cadmium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc concentrations were evaluated by requesting the expanded ICP metals analytical list. Table 1 identifies the analyses performed for the 100-C-7:1 waste site verification sampling.

Table 1. Laboratory Analytical Methods.

Analytical Method	Contaminants of Concern
ICP metals – EPA Method 6010	Chromium [a]
Mercury – EPA Method 7471	Mercury
Cr VI – EPA Method 7196	Hexavalent chromium

[a] Analysis for the expanded list of ICP metals included antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc in the analytical results package.
EPA = U.S. Environmental Protection Agency
ICP = inductively coupled plasma

Verification Sampling Design

This section describes the basis for selection of an appropriate sample design and determination of the number of verification samples that were collected. The 100-C-7:1 subsite consists of 13 decision units for verification sampling (Table 2).

Table 2. 100-C-7:1 Excavation Decision Units and Sample Information. (2 Pages)

Decision Unit Number	Description	Sampling Method	Number of Samples
1	Excavation - Upper Sidewalls	Statistical	13 (SS-1 to SS-13)
2	Excavation - Lower Sidewalls	Statistical	12 (LSW-1 to LSW-12)
3	Excavation - West Sidewall	Statistical	12 (WSW-1 to WSW-12)
4	Staging Pile Area 1	Statistical	15 (SPA1-1 to SPA1-15)
5	Staging Pile Area 2	Statistical	13 (SPA2-1 to SPA2-13)
6	Staging Pile Area 3	Statistical	12 (SPA3-1 to SPA3-12)
7	Staging Pile Area 4	Statistical	12 (SPA4-1 to SPA4-12)
8	Comp-1 (Staging Pile Area 2 Focused Sample)	Focused	1 (Composite)

Table 2. 100-C-7:1 Excavation Decision Units and Sample Information. (2 Pages)

Decision Unit Number	Description	Sampling Method	Number of Samples
9	Overburden Layback 100-C-001	Focused	85 (Composites)
10	Overburden/Layback 100-C-023	Focused	9 (Composites)
11	Overburden/Layback 100-C-024A	Focused	3 (Composites)
12	Overburden/Layback 100-C-030	Focused	10 (Composites)
13	Overburden/Layback West Sidewall	Focused	58 (Composites)

Decision unit 1 includes the upper sidewalls of the 100-C-7:1 excavation. Decision unit 2 includes the lower sidewalls of the 100-C-7:1 waste site excavation. Decision unit 3 includes the west sidewall of the 100-C-7:1 waste site excavation. Decision units 4 through 7 include staging pile areas 1 through 4. Decision unit 8 includes the composite sample (Comp-1) from the staging pile area 2. Decision units 9 through 12 include four overburden stockpiles that surround the 100-C-7:1 excavation and are labeled as follows: 100-C-001, 100-C-023, 100-C-24A, and 100-C-030 (Figure 4). Decision unit 13 includes west sidewall overburden material. Two methods for selecting the sampling locations were utilized: statistical sampling designs of decision units 1 through 7, and focused sampling of the staging pile area adjacent to decision unit 5, overburden stockpiles, and west sidewall overburden material. Thirteen grab soil samples were collected on the sampling grids within decision unit 1. Twelve grab soil samples were collected on the sampling grids within decision units 2, 3, 6, and 7. Fifteen and 13 grab soil samples were collected on the sampling grids within decision units 4 and 5, respectively. The statistical sample locations are shown in Figures 5 through 13. Focused samples were collected using a composite sampling approach for each lift of stockpiled overburden materials. Details of composite sampling for 100-C-7:1 waste site overburden stockpiles are further discussed in the following paragraphs. All sampling was performed in accordance with ENV-1, *Environmental Monitoring & Management*, to fulfill the requirements of the *100 Area Remedial Action Sampling and Analysis Plan* (DOE-RL 2009a).

Figure 4. 100-C-7:1 Subsite Overburden Stockpile Areas (Decision Units 9 Through 12).

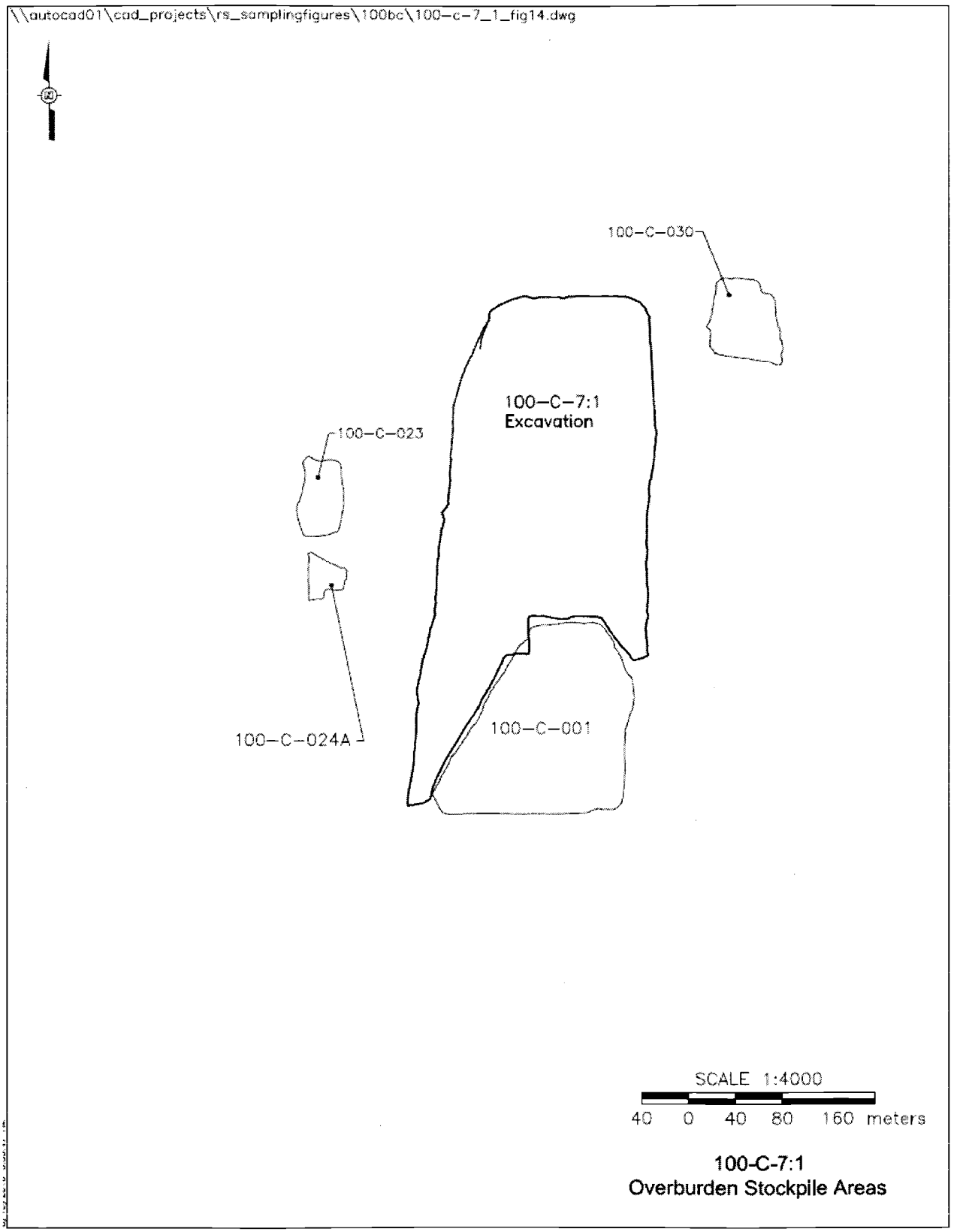


Figure 5. 100-C-7:1 Excavation Upper Sidewall Verification Sample Locations (Decision Unit 1).

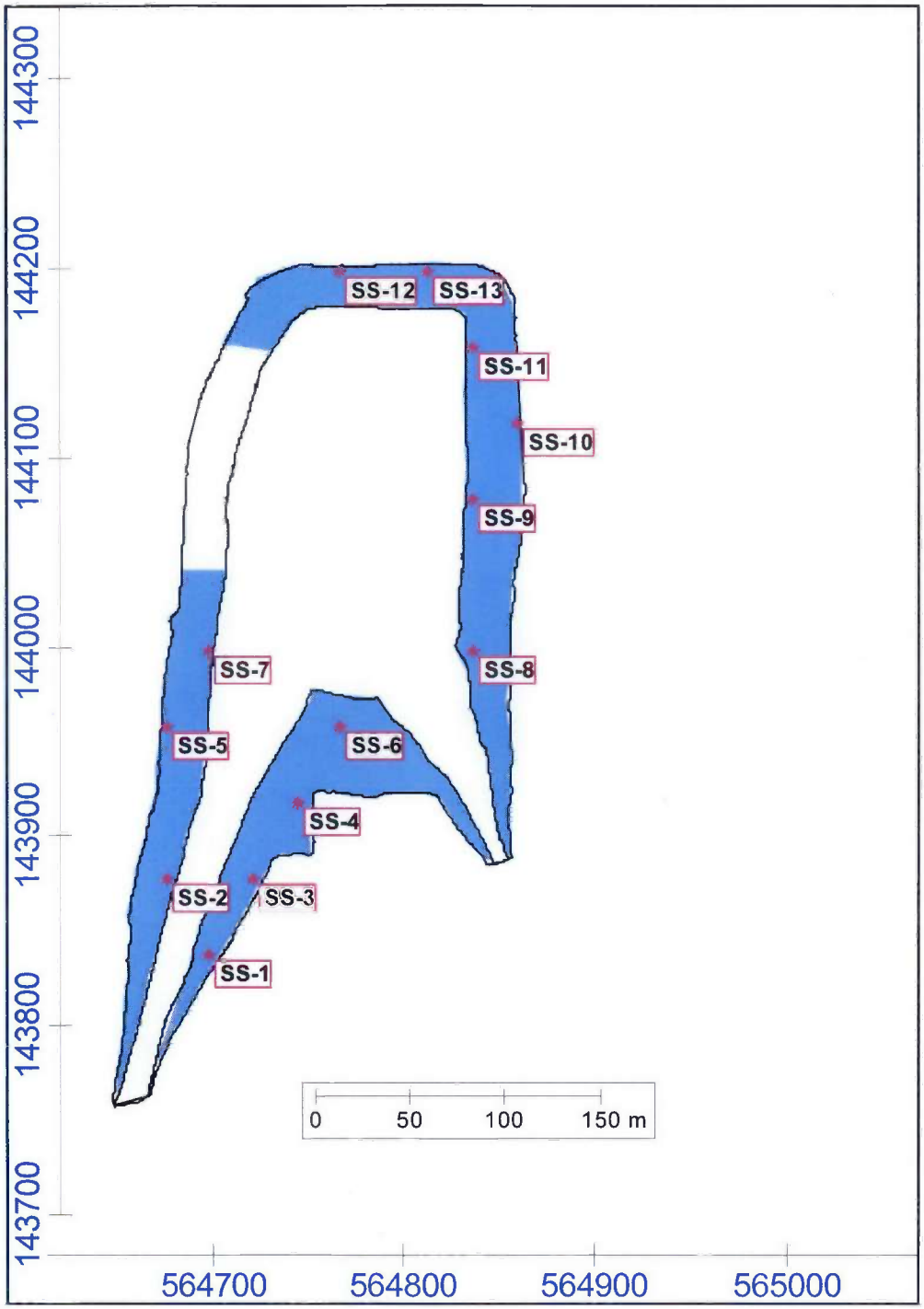


Figure 6. 100-C-7:1 Excavation Lower Sidewall Verification Sample Locations (Decision Unit 2).

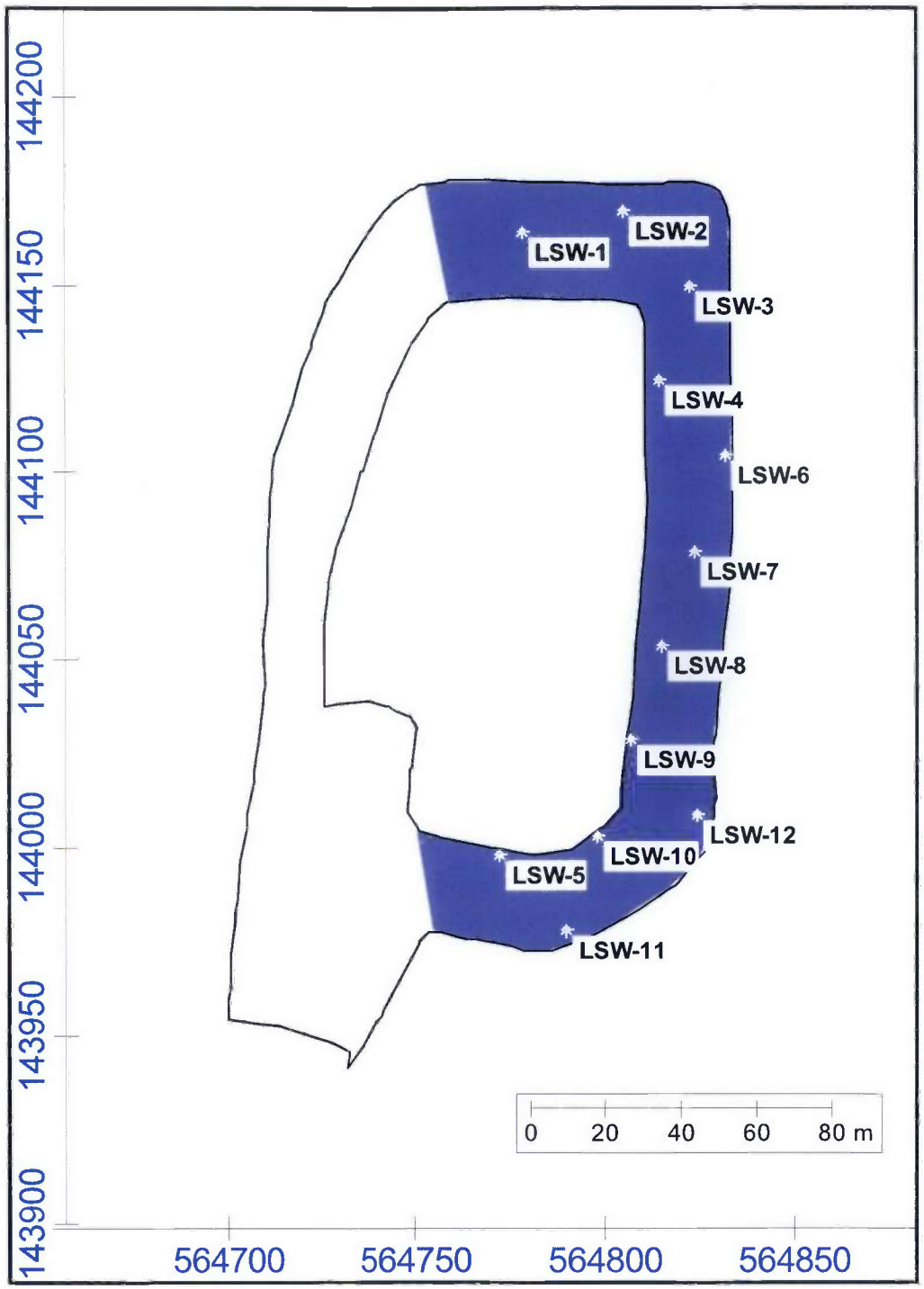


Figure 7. 100-C-7:1 West Sidewall Verification Sample Locations (Decision Unit 3).

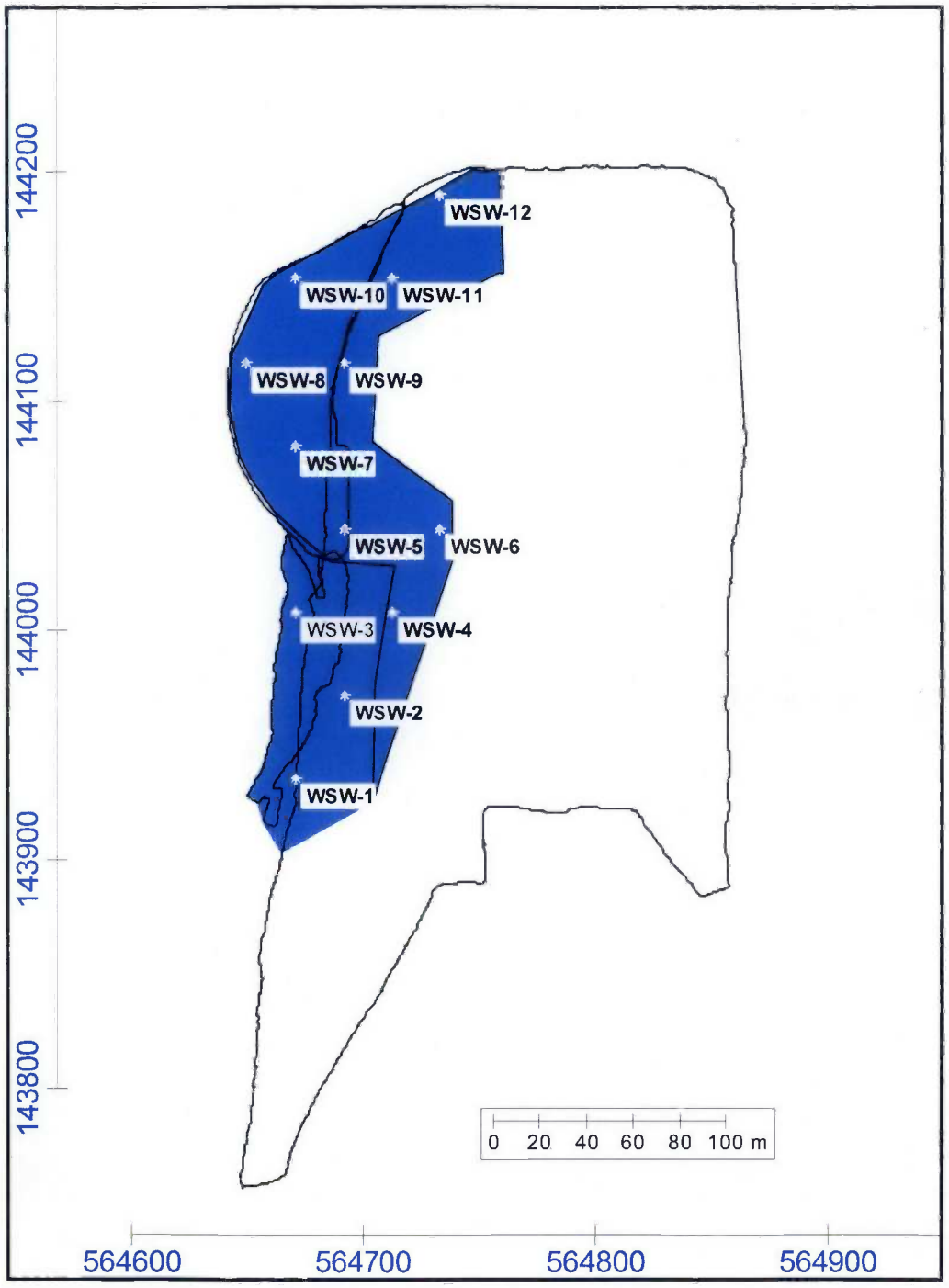


Figure 8. 100-C-7:1 Staging Pile Area 1 and 2 Verification Sample Locations (Decision Units 4 and 5).

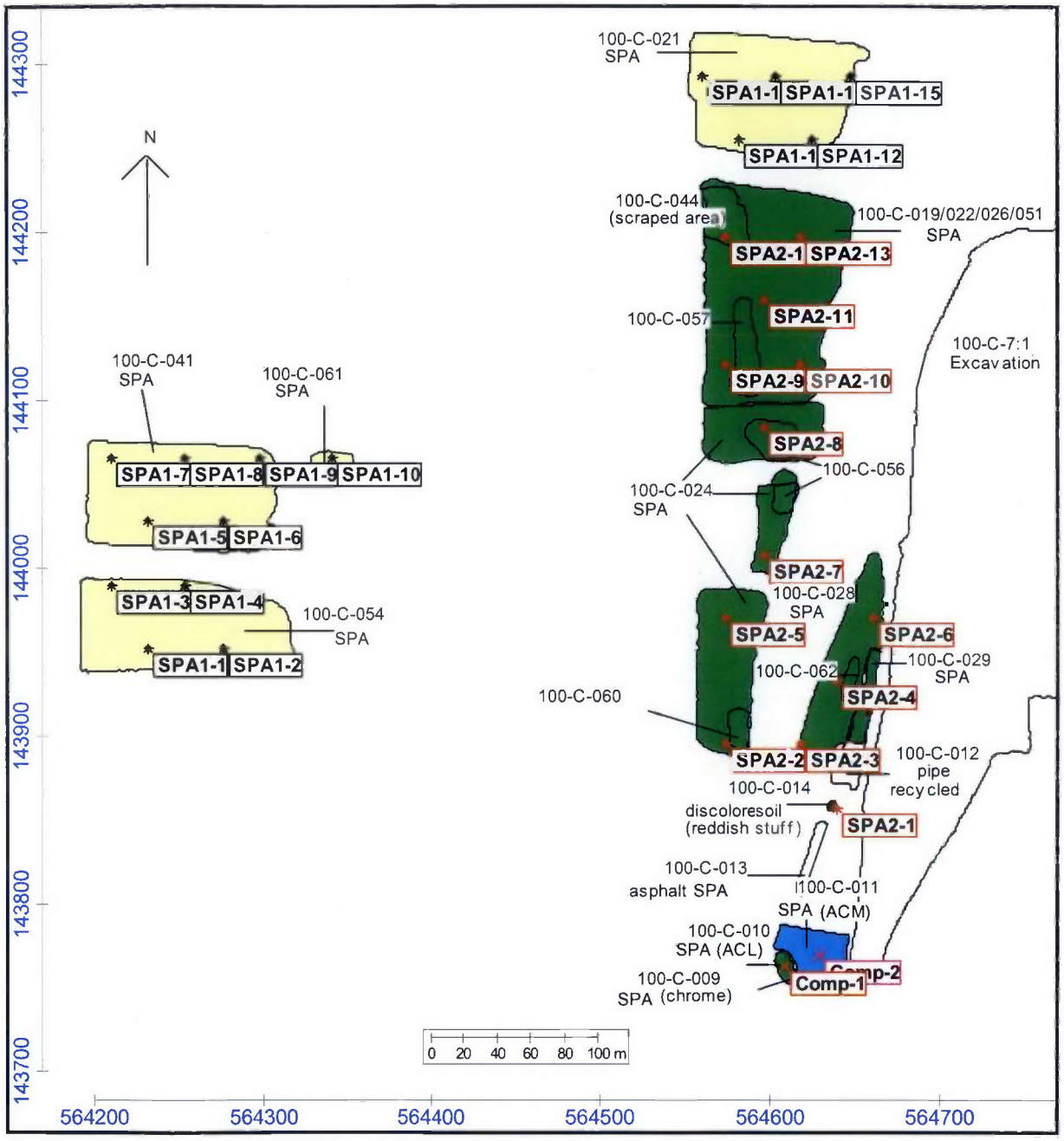


Figure 9. 100-C-7:1 Staging Pile Area 1 Verification Sample Locations (Decision Unit 4) (Map 1 of 2).

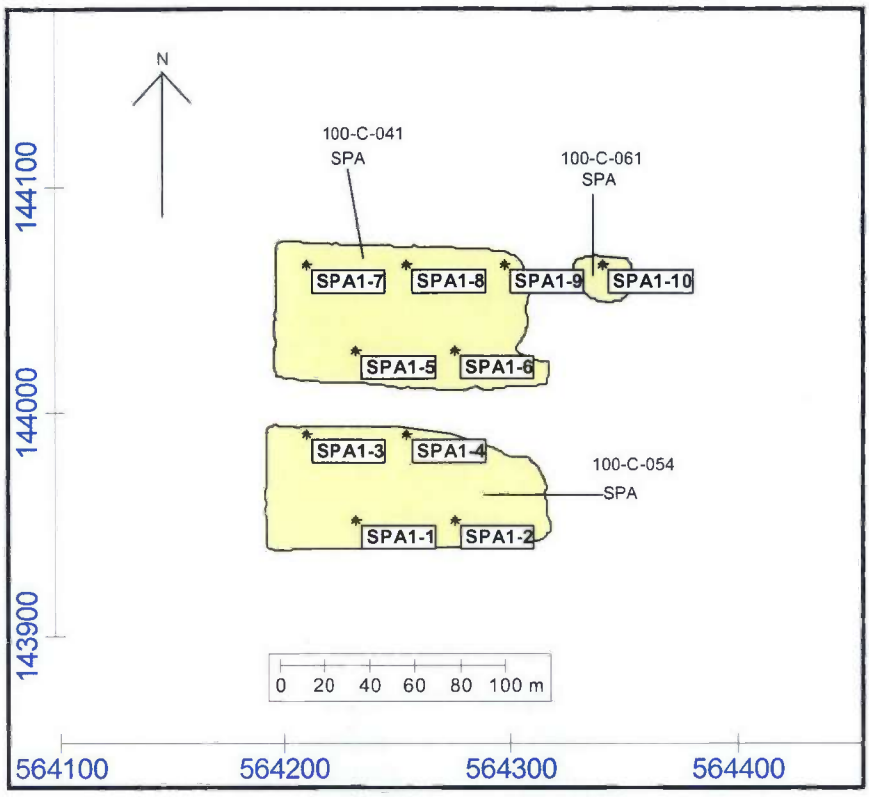


Figure 10. 100-C-7:1 Staging Pile Area 1 Verification Sample Locations (Decision Units 4) (Map 2 of 2).

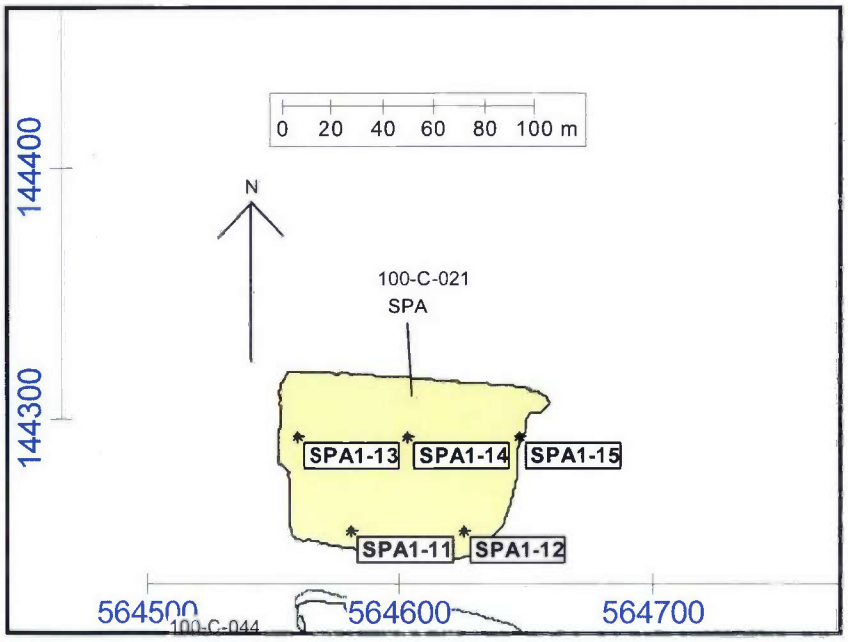


Figure 11. 100-C-7:1 Staging Pile Area 2 Verification Sample Locations (Decision Unit 5).

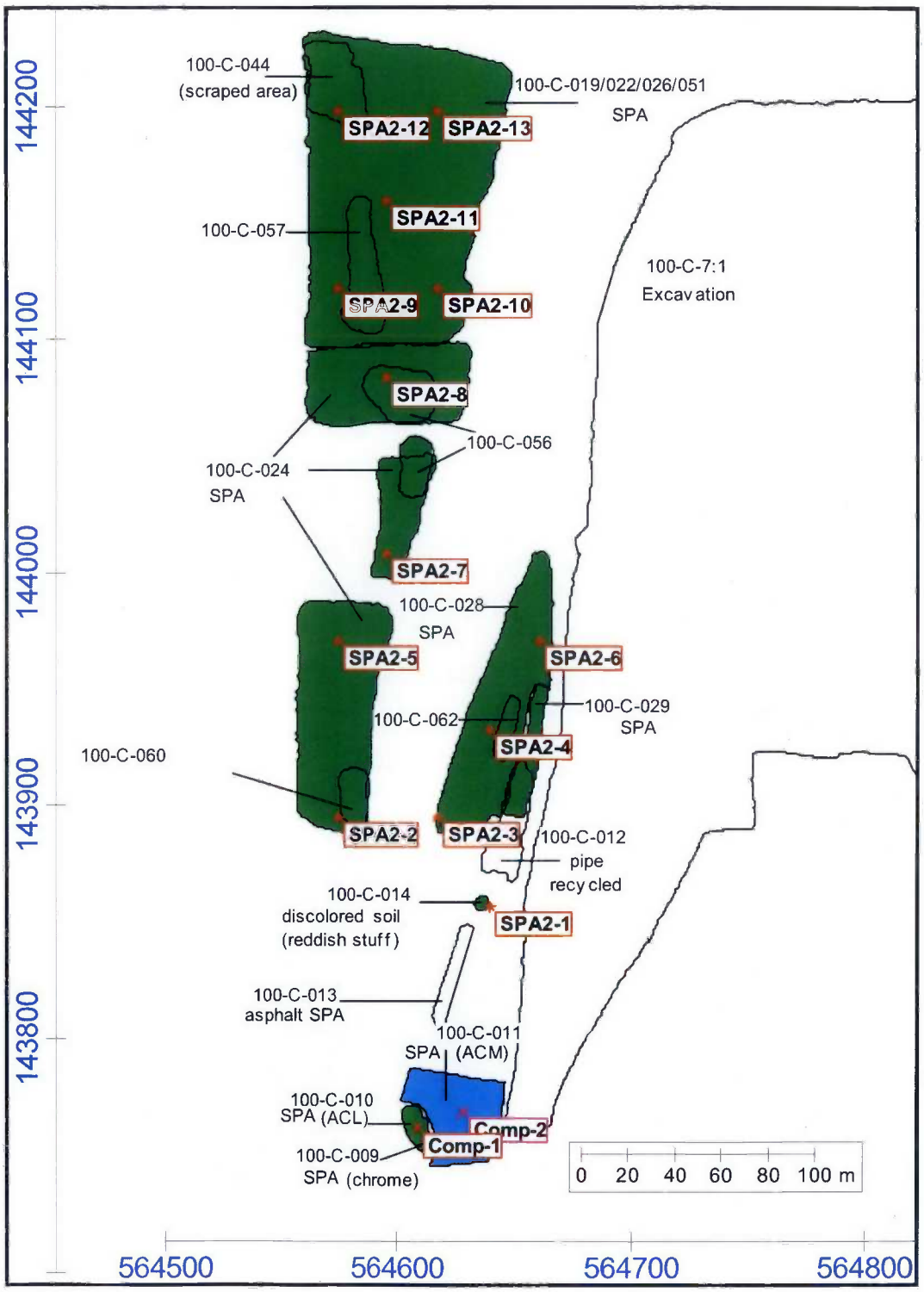


Figure 12. 100-C-7:1 Staging Pile Area 3 Verification Sample Locations (Decision Unit 6).

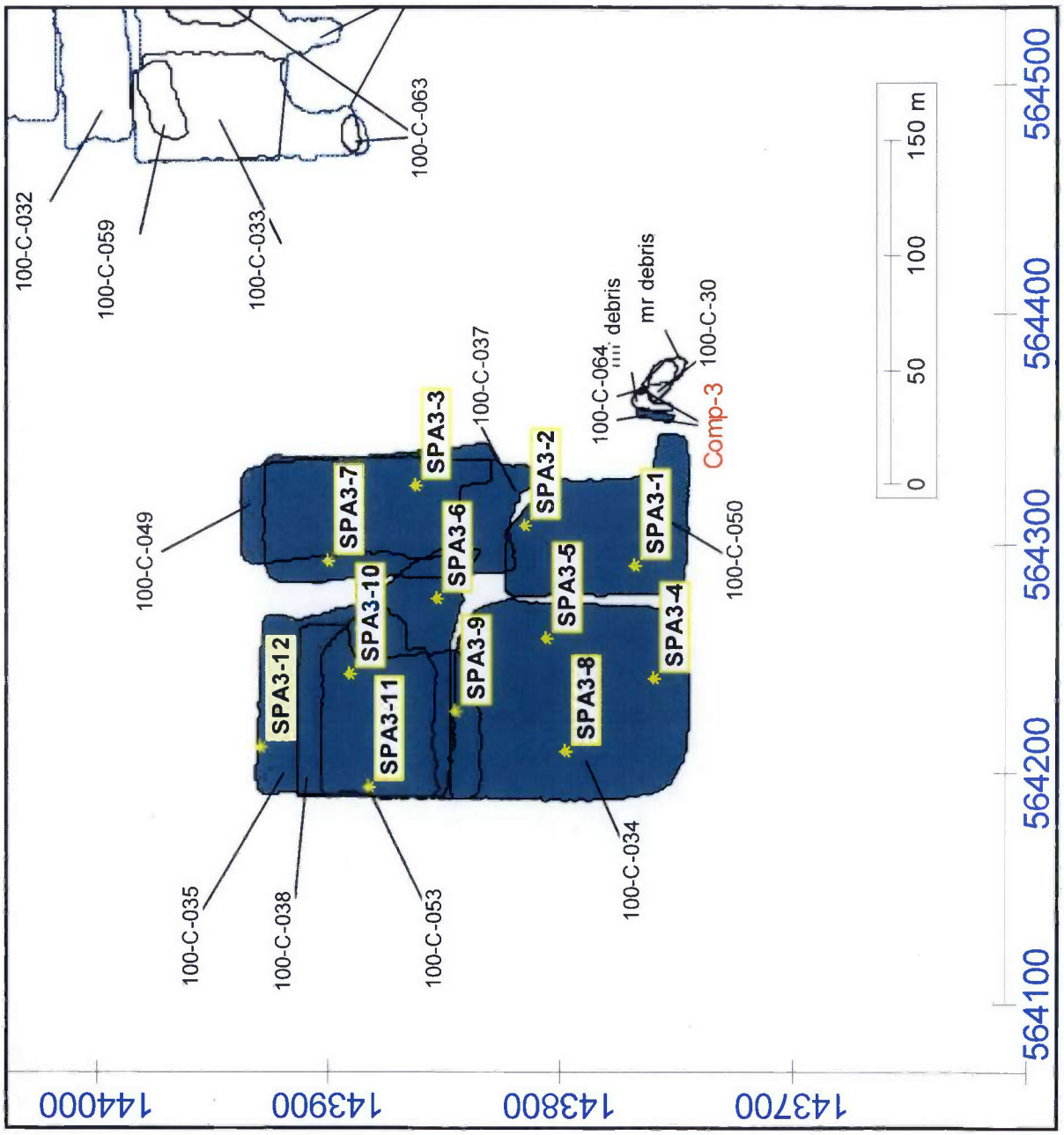
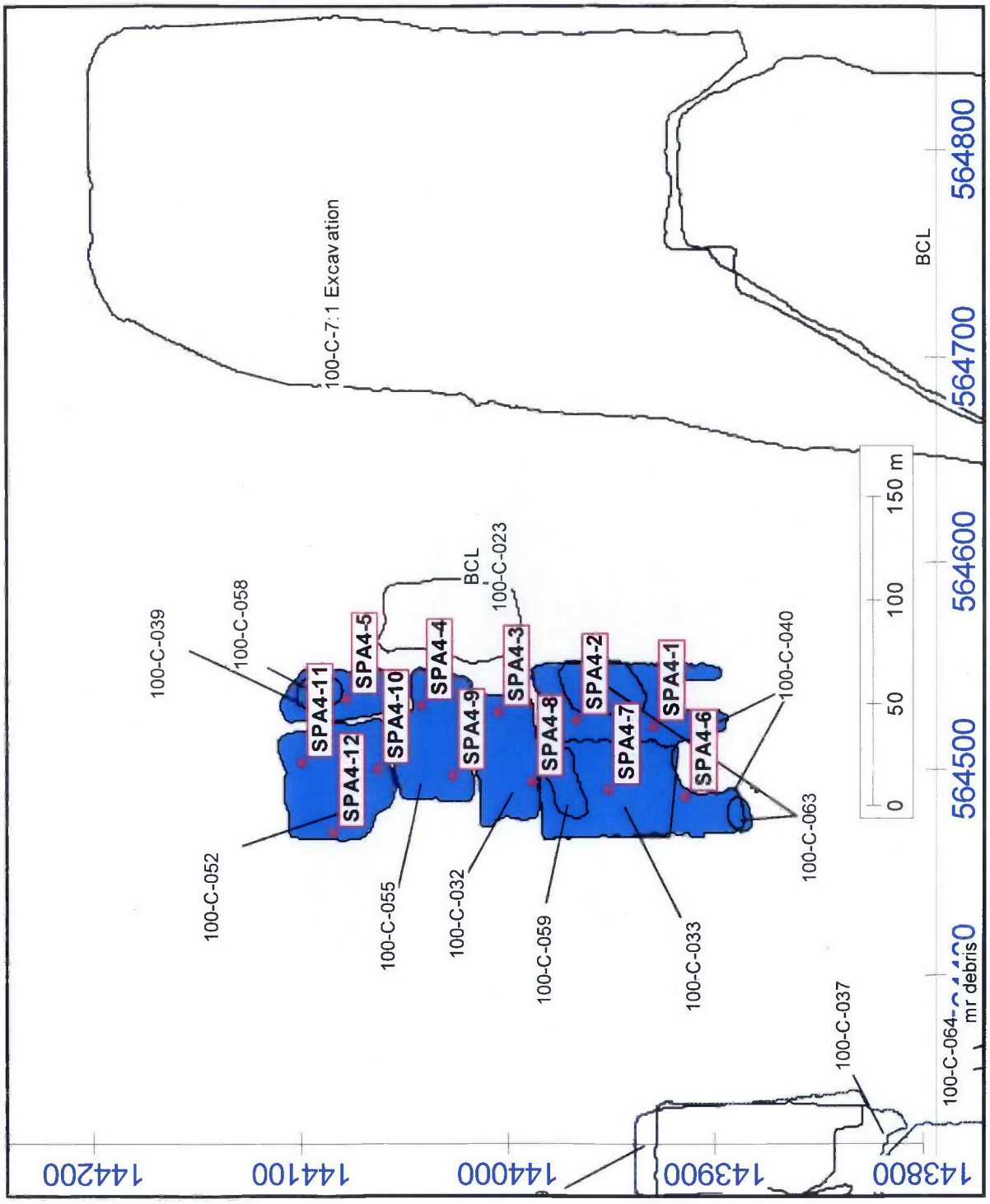


Figure 13. 100-C-7:1 Staging Pile Area 4 Verification Sample Locations (Decision Unit 7).



The footprints of upper, lower, and west sidewalls of the 100-C-7:1 waste site excavation and the combined staging pile areas 1 through 4 were delineated in Visual Sample Plan[1] (VSP) software and used as the basis for a random-start systematic grid for collection of statistical verification soil samples at the site. Statistical soil samples were collected on the sampling grids within each of the decision units selected for statistical sampling. A triangular grid was selected for this investigation based on studies that indicate triangular grids are superior to square grids (Gilbert 1987). Additional details concerning the use of VSP to develop the statistical sampling designs and derive the number of verification samples to collect for each decision unit are discussed in the "100-C-7 and 100-C-7:1 Sidewall Sampling Designs" (WCH 2011a); *Work Instruction for Verification Sampling of the 100-C-7, 183-C Filter Building/Pumproom Facility Foundation and Demolition Waste Site* (WCH 2012g); and *Work Instruction for Verification Sampling of the 100-C-7:1 Subsite, Staging Pile Areas Only* (WCH 2012k).

Field quality control samples consisted of one equipment blank sample and one field duplicate sample for each of the following decision units: upper sidewalls, lower sidewalls, west sidewall, staging pile area 1, staging pile area 2, staging pile area 3, and staging pile area 4. Five field duplicate samples were collected from the 100-C-001 overburden decision unit and three field duplicates were collected from the west sidewall overburden/layback material. All samples were submitted for full protocol laboratory analysis. A summary of the verification samples collected and laboratory analyses performed for decision units 1 through 7 is provided in Table 3. Additional information related to verification sampling can be found in the field sampling logbooks (WCH 2010a, 2011b, 2011c, 2011d, 2012b, 2012c, 2012d, 2012e, 2012f, 2013).

Table 3. 100-C-7:1 Subsite Verification Sampling Summary Table. (4 Pages)

Sample Location	HEIS Sample Number	Washington State Plane Coordinates		Sample Analysis
		Northing (m)	Easting (m)	
Upper Sidewall Excavation Samples				
SS-1	J1LHR6	143837.8	564697.5	ICP metals [a], mercury, hexavalent chromium
SS-2	J1LHR7	143877.8	564674.4	
SS-3	J1LHR5	143877.8	564720.7	
SS-4	J1LHR4	143917.9	564743.8	
SS-5	J1LHT0	143958.0	564674.4	
SS-6	J1LHR3	143958.0	564766.9	
SS-7	J1LHR8	143998.0	564697.5	
SS-8	J1LHR1	143998.0	564836.3	
SS-9	J1LHT4	144078.2	564836.3	
SS-10	J1LHR9	144118.3	564859.5	
SS-11	J1LHT3	144158.3	564836.3	
SS-12	J1LHT1	144198.4	564766.9	
SS-13	J1LHT2	144198.4	564813.2	
Duplicate of J1LHR1	J1LHR2	143998.0	564836.3	
Equipment blank	J1LHR0	NA	NA	ICP metals [a] and mercury

[1] Visual Sample Plan is a site map-based user-interface program that may be downloaded at http://dqo.pnl.gov.

Table 3. 100-C-7:1 Subsite Verification Sampling Summary Table. (4 Pages)

Sample Location	HEIS Sample Number	Washington State Plane Coordinates		Sample Analysis
		Northing (m)	Easting (m)	
Lower Sidewall Excavation Samples				
LSW-1	J1NPN3	144164.3	564778.9	ICP metals [a], mercury, hexavalent chromium
LSW-2 [b]	J1NPN4	144163.5	564804.8	
LSW-3	J1NPN5	144149.7	564822.7	
LSW-4	J1NPN6	144124.4	564814.2	
LSW-5	J1NPN7	143998.2	564772.2	
LSW-6 [b]	J1NPN8	144105.4	564827.3	
LSW-7	J1NPN9	144079.3	564823.5	
LSW-8	J1NPP0	144054.0	564815.1	
LSW-9	J1NPP1	144028.8	564806.7	
LSW-10	J1NPP2	144003.5	564798.2	
LSW-11	J1NPP3	143978.3	564789.8	
LSW-12	J1NPP4	144008.9	564824.3	
Duplicate of J1NPN7	J1NPP5	143998.2	564772.2	
Equipment blank	J1NPP6	NA	NA	ICP metals [a], mercury
West Sidewall Excavation Samples				
WSW-1 [b]	J1R613	143936.7	564672.5	ICP metals [a], mercury, hexavalent chromium
WSW-2	J1R614	143972.2	564691.5	
WSW-3 [b]	J1R615	144008.7	564673.9	
WSW-4	J1R616	144008.5	564712.5	
WSW-5	J1R617	144044.9	564691.5	
WSW-6 [b]	J1R618	144044.0	564721.0	
WSW-7	J1R619	144081.2	564670.5	
WSW-8	J1R620	144117.6	564649.6	
WSW-9	J1R621	144117.6	564691.5	
WSW-10	J1R622	144153.9	564670.5	
WSW-11	J1R623	144153.9	564712.5	
WSW-12	J1R624	144190.3	564733.5	
Duplicate of J1R620	J1R625	144117.6	564649.6	
Equipment blank	J1R626	NA	NA	ICP metals [a], mercury
Staging Pile Area (SPA1) Samples				
SPA1-1	J1PTJ7	143952.3	564231.8	ICP metals [a], mercury, hexavalent chromium
SPA1-2	J1PTJ8	143952.3	564275.5	
SPA1-3	J1PTJ9	143990.2	564209.9	
SPA1-4	J1PTK0	143990.2	564253.7	
SPA1-5	J1PTK1	144028.0	564231.8	
SPA1-6	J1PTK2	144028.0	564275.5	
SPA1-7	J1PTK3	144065.9	564209.9	
SPA1-8	J1PTK4	144065.9	564253.7	
SPA1-9	J1PTK5	144065.9	564297.4	
SPA1-10	J1PTK6	144065.9	564341.1	
SPA1-11	J1PTK7	144255.3	564581.7	
SPA1-12	J1PTK8	144255.3	564625.4	
SPA1-13	J1PTK9	144293.2	564559.8	
SPA1-14	J1PTL0	144293.2	564603.6	
SPA1-15	J1PTL1	144293.2	564647.3	
Duplicate of J1PTJ7	J1PTL2	143952.3	564231.8	

Table 3. 100-C-7:1 Subsite Verification Sampling Summary Table. (4 Pages)

Sample Location	HEIS Sample Number	Washington State Plane Coordinates		Sample Analysis
		Northing (m)	Easting (m)	
Staging Pile Area (SPA2) Samples				
SPA2-1	J1PTL4	143857.1	564639.8	ICP metals [a], mercury, hexavalent chromium
SPA2-2	J1PTL5	143895.0	564574.2	
SPA2-3	J1PTL6	143895.0	564617.9	
SPA2-4	J1PTL7	143932.8	564639.8	
SPA2-5	J1PTL8	143970.7	564574.2	
SPA2-6	J1PTL9	143970.7	564661.6	
SPA2-7	J1PTM0	144008.5	564596.1	
SPA2-8	J1PTM1	144084.2	564596.1	
SPA2-9	J1PTM2	144122.0	564574.2	
SPA2-10	J1PTM3	144122.0	564617.9	
SPA2-11	J1PTM4	144159.9	564596.1	
SPA2-12	J1PTM5	144197.7	564574.2	
SPA2-13	J1PTM6	144197.7	564617.9	
Duplicate of J1PTL4	J1PTM7	143857.1	564639.8	
Comp-1	J1PTN8	NA	NA	ICP metals [a], mercury, hexavalent chromium (composite sample) [c]
Comp-2	J1PTN9	NA	NA	Asbestos only (composite sample) [c]
Equipment blank	J1PTL3	NA	NA	ICP metals [a], mercury
Staging Pile Area (SPA3) Samples				
SPA3-1	J1RDP5	143767.9	564291.0	ICP metals [a], mercury, hexavalent chromium
SPA3-2	J1RDP6	143814.9	564308.0	
SPA3-3	J1RDP7	143861.8	564325.0	
SPA3-4	J1RDP8	143759.1	564241.8	
Resample of SPA3-4 (hexavalent chromium only)	J1RJT2	143759.1	564241.8	
SPA3-5	J1RDP9	143806.1	564258.8	
SPA3-6	J1RDR0	143853.1	564275.8	
SPA3-7	J1RDR1	143900.1	564292.8	
SPA3-8	J1RDR2	143797.4	564209.6	
SPA3-9	J1RDR3	143844.3	564226.6	
SPA3-10	J1RDR4	143891.3	564243.6	
SPA3-11	J1RDR5	143882.6	564194.4	
SPA3-12	J1RDR6	143929.5	564211.4	
Duplicate of J1RDP5	J1RDR7	143767.9	564291.0	
Staging Pile Area (SPA4) Samples				
SPA4-1	J1RDR8	143930.0	564520.2	ICP metals [a], mercury, hexavalent chromium
SPA4-2	J1RDR9	143967.2	564523.6	
SPA4-3	J1RDT0	144004.3	564527.0	
SPA4-4	J1RDT1	144041.4	564530.4	
SPA4-5	J1RDT2	144078.6	564533.7	
SPA4-6	J1RDT3	143914.4	564486.4	

Table 3. 100-C-7:1 Subsite Verification Sampling Summary Table. (4 Pages)

Sample Location	HEIS Sample Number	Washington State Plane Coordinates		Sample Analysis
		Northing (m)	Easting (m)	
SPA4-7	J1RDT4	143951.5	564489.8	ICP metals [a], mercury, hexavalent chromium
SPA4-8	J1RDT5	143988.7	564493.1	
SPA4-9	J1RDT6	144025.8	564496.5	
SPA4-10	J1RDT7	144062.9	564499.9	
SPA4-11	J1RDT8	144100.1	564503.3	
SPA4-12	J1RDT9	144084.4	564469.4	
Duplicate of J1RDT9	J1RDV0	144084.4	564469.4	
Comp-3	J1RJ63	NA	NA	Asbestos only (composite sample) [c]
Equipment blank	J1RDV1	NA	NA	ICP metals [a], mercury
Overburden Stockpiles				
Overburden	Various [d]	NA	NA	ICP metals [a], mercury, hexavalent chromium

[a] The expanded list of ICP metals included antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc.
[b] Verification sample required adjustment due to field conditions.
[c] Each composite sample consists of 25 aliquots collected across the surface of the staging pile area combined into one sample for analysis.
[d] A total of 166 composite samples of overburden were collected from overburden stockpiles 100-C-001, 100-C-023, 100-C-024A, 100-C-030, and west sidewall overburden material. The samples are presented in Attachment 1 of the *100-C-7:1 Waste Site Cleanup Verification 95% UCL Calculations* in Appendix C.

HEIS = Hanford Environmental Information System
ICP = inductively coupled plasma
LSW = lower sidewall
NA = not applicable
SPA = staging pile area
WSW= west sidewall

100-C-7:1 Excavation – Upper Sidewall Sampling

Due to fall hazard and safety concerns, verification sampling of the 100-C-7:1 upper sidewalls was performed prior to completion of remedial activities due to the expected depth of the final excavation (approximately 25.6 m [84 ft] bgs). Verification sampling of the upper sidewalls was performed on October 17 and 18, 2011. Thirteen statistical samples were collected across the upper sidewall boundary (Figure 5). A walkaround boundary using a hand-held global positioning survey (GPS) instrument was used to delineate the excavation footprint at the toe of the existing 100-C-7:1 subsite excavation. The toe of the excavation was approximately 13.7 m (45 ft) bgs when verification sampling of the upper sidewalls was performed.

100-C-7:1 Excavation – Lower Sidewall Sampling

The verification sampling of the 100-C-7:1 lower sidewalls, above the excavation floor, was conducted on April 24, 2012, per the sample design shown in Figure 6. Twelve statistical samples were collected across the lower sidewall boundary. The floor of the excavation exists within the rewetted zone and was therefore not sampled per agreement between EPA and DOE-RL. The groundwater elevation at the nearest monitoring well (199-B8-6) during periods of typical high flow in the Columbia River was at 123.6 m (405.5 ft). According to the 100-C-7:1 post-excavation civil survey, the lowest elevation at the bottom of the excavation is

122.0 m (400.3 ft) mean sea level. Therefore, the 100-C-7:1 excavation floor is approximately 1.6 m (5 ft) below the top of the groundwater rewetted zone.

Due to the nature of soils within the lower portion of the 100-C-7:1 excavation as well as adverse windy weather conditions, the benches within the excavation began sloughing. Two of the 12 verification sample locations (LSW-2 and LSW-6) could not be accessed safely by field sampling personnel. Various alternatives were discussed, including the use of a long-handled reach tool and using an excavator to reach sampling locations. However, because it was decided that the two listed samples could not be safely reached by any alternative methods, they were relocated towards lower accessible locations within the excavation. This was a conservative bias because the lower excavation slopes were closer in elevation to the former contaminant mass.

100-C-7:1 Excavation – West Sidewall Sampling

Sampling of the soils removed from the west sidewall excavation was performed as discussed in the regulatory agreement for the "100-C-7:1 Sidewall Sampling Approach" (WCH 2012g). In-process sampling was performed on every 1.5-m (5-ft) lift of material, prior to removal. Each lift of material was divided into sections and composite samples were collected from each of the sections. The in-process samples were requested on quick turnaround data analysis to support field determination of the contaminated soils versus clean overburden/layback material. Excess sample material from all samples was salvaged until data results were obtained. For samples identified as clean overburden/layback material, the excess material was composited and submitted for full protocol laboratory analysis. All full protocol samples are included in the overburden/layback verification data set decision unit. Following the evaluation of the quick turnaround sampling data results, the overburden/layback material was excavated from the west sidewall and used to backfill the 100-C-7:1 excavation.

The boundary for verification sampling design for the west sidewall excavation was determined based on the excavation design drawing 0100C-DD-C0053 Rev. 2 (WCH 2012a). This boundary was slightly modified, using a boundary walk-around to include the full extent of the ramp's west side. Due to the sandy nature of the soils and the potential of sidewall sloughing, it was determined that verification samples should be collected from within the west sidewall excavation when they could be safely accessed. Therefore, verification sampling of the west sidewall excavation was performed during remediation to allow safe access to sample location points.

The verification sampling of the west sidewall was performed on December 27, 2012, January 15, 2013, and February 11, 2013, per the sample design shown in Figure 7, with the exception of sample locations WSW-1, WSW-3, and WSW-6. The WSW-1 sampling location was relocated 2 m northwest, because its original location was on the top of the berm material that surrounded the top of the west sidewall excavation. The WSW-3 sampling location was relocated 3 m west due to padding material interference. The padding material was in place to support the capping effort of the 100-C-5 Clean Water Pipelines entering the west sidewall of the 100-C-7:1 excavation. The toe of the west sidewall excavation was slightly different from the design drawing; therefore, the sample location WSW-6 fell within the excavation floor, near the west sidewall. Sample location WSW-6 was relocated approximately 12 m to the west, per

agreement between EPA and DOE-RL. Twelve statistical samples were collected across the west sidewall boundary. The floor of the excavation exists within the rewetted zone and was therefore not sampled per agreement between EPA and DOE-RL. According to the 100-C-7:1 west sidewall post-excavation civil survey, the lowest elevation of the west sidewall excavation was 122.5 m (400.6 ft). Therefore, the 100-C-7:1 west sidewall excavation floor is approximately 1.1 m (3.6 ft) below the top of the groundwater rewetted zone.

Overburden

A large amount of overburden/layback soil was generated due to requirements for safely excavating the site to the required depth. The overburden/layback was not in the immediate proximity of the hexavalent chromium soil contamination and, therefore, does not present a credible potential for having chromium contamination. Large amounts of overburden/layback were stockpiled in lifts near the 100-C-7:1 excavation. Verification sampling for overburden/layback material was performed prior to an approved verification work instruction. Because sampling was conducted during the stockpiling activities, samples were collected from the lower lifts of overburden while the material was readily accessible.

Based on discussions with DOE-RL and EPA and an agreement via e-mail (EPA 2010), it was agreed that as a lift of material was completed, the field personnel would map the stockpile boundary using a hand-held GPS instrument. Each lift was then divided into approximate quadrants, and a composite sample was collected from each quadrant. Each composite sample consisted of 25 aliquots collected across the surface of the quadrant, combined into 1 sample for analysis. Each sample was submitted for full protocol analysis for ICP metals, mercury, and hexavalent chromium.

The general guideline for verification sampling of overburden/layback stockpiles was performed by field personnel to the extent practicable. Due to safety concerns with ongoing remediation, the rigorous remediation schedule, and additions of overburden/layback materials to the sides of the stockpiles, sampling had to be performed whenever possible. This resulted in a higher number of samples being collected per stockpile lift than was originally anticipated. Each stockpile lift contained at least 4 samples, and some contained as many as 12.

A total of 12 overburden/layback stockpiles were generated from the 100-C-7 and 100-C-7:1 excavations. The overburden/layback stockpiles are labeled as follows: 100-C-001, 100-C-002, 100-C-015, 100-C-018, 100-C-023, 100-C-24A, 100-C-025 (used as padding material in 100-C-7:1), 100-C-027, 100-C-030, 100-C-031, 100-C-045, and 100-C-047. Four of these stockpiles (100-C-027, 100-C-031, 100-C-045, and 100-C-047) contained only 100-C-7 overburden/layback material. All other stockpiles contained both 100-C-7 and 100-C-7:1 waste site overburden/layback materials.

The following seven overburden piles were addressed by the Remaining Sites Verification Package for the 100-C-7 Waste Site: 100-C-002, 100-C-015, 100-C-018, 100-C-027, 100-C-031, 100-C-045, and 100-C-047. The remaining overburden stockpiles (100-C-001, 100-C-023, 100-C-024A, 100-C-025, and 100-C-030) are included in the 100-C-7:1 subsite closure document. The 100-C-025 overburden/layback stockpile was used for padding material

within the exclusion zone of the 100-C-7:1 excavation. Due to the sandy nature of soils at the depth of the excavation, use of soil padding material was necessary to allow trucks and excavators to drive in and out of the excavation.

Staging Piles

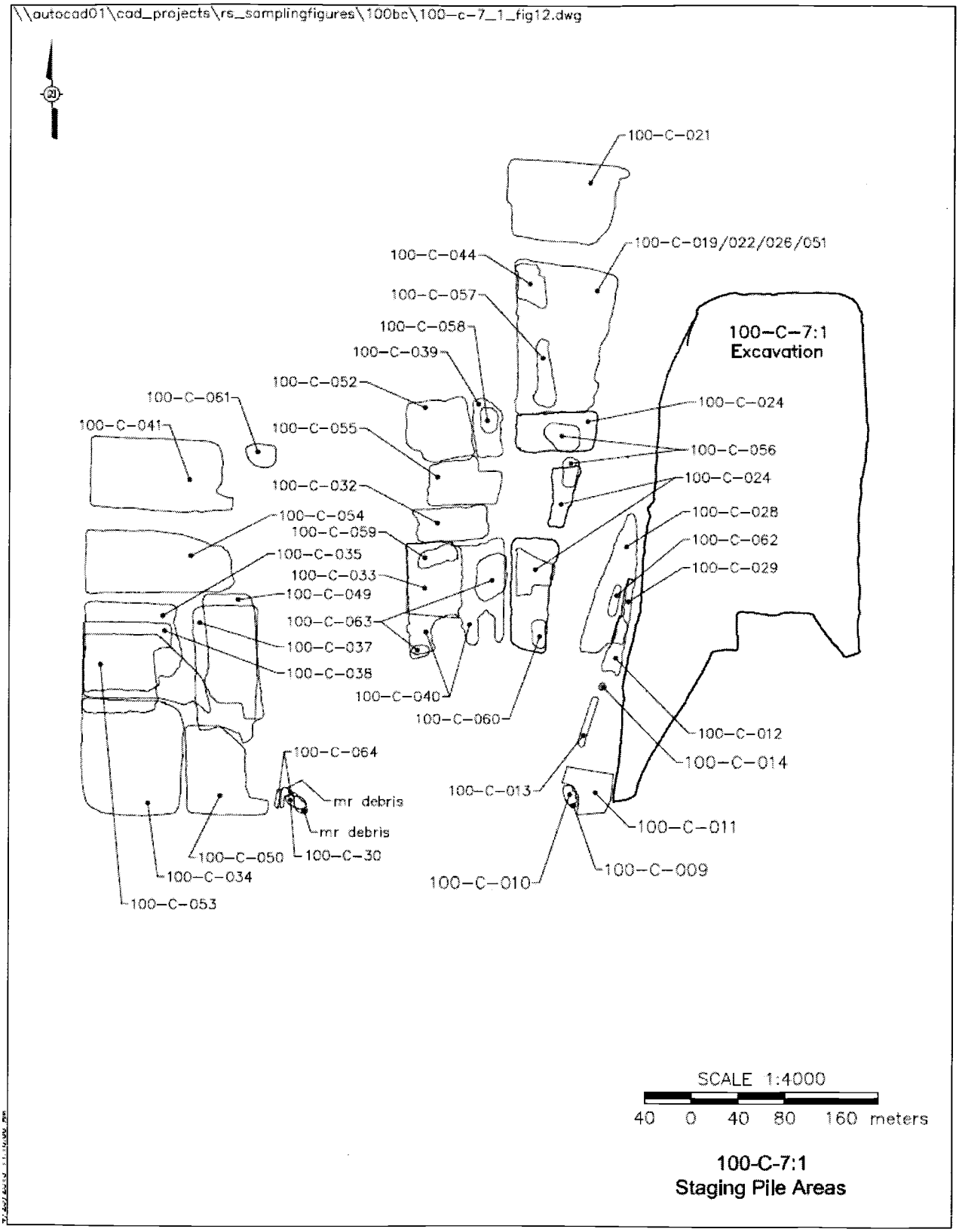
Contaminated and stained soils were stockpiled on approved waste staging pile areas during the 100-C-7:1 subsite remediation. Contaminated material was staged at the surface surrounding the 100-C-7:1 subsite excavation for future removal to ERDF. The staged and loaded-out material consisted of soil, sand, gravel, boulders, concrete, pieces of pipe, rebar, and other inert materials from associated building slabs and structures. Some asbestos-containing material was also removed and staged in designated staging pile areas, within SPA2 and SPA4. Verification samples (Comp-2 and Comp-3) were collected from these staging pile areas and analyzed for asbestos. Loadout and staging of contaminated materials was performed simultaneously throughout remediation of 100-C-7:1; therefore, some staging piles overlap on the 100-C-7:1 staging pile area map (Figure 14). All staged materials were loaded out and the surface soils of staging pile areas were scraped a minimum of 0.3 m (1 ft) bgs and removed to ERDF, with some areas extending deeper. Staging pile areas were divided into four decision units (SPA1, SPA2, SPA3, and SPA4) for verification sampling purposes.

100-C-7:1 Excavation Backfill

Prior to use of the overburden/layback material from the 100-C-7:1 west sidewall excavation for direct backfill of the 100-C-7:1 excavation, it was determined that at least 3 m (10 ft) of overburden material must be placed above the groundwater rewetted zone to be protective of groundwater and the Columbia River.

Some of the overburden/layback material from 100-C-7 stockpile 100-C-015 was accidentally placed into the 100-C-7:1 excavation at groundwater while attempting to place at least 3 m (10 ft) of overburden material above the groundwater rewetted zone. The overburden/layback stockpile 100-C-015 was restricted for use at a minimum of 1 m above the ground table due to manganese in a focused sample detected at 516 mg/kg. The background value and cleanup number for protection of groundwater is 512 mg/kg. The distribution coefficient (K_d) of manganese is 50 mg/L, which indicates a need for approximately 0.75 m of clean vadose zone soil below the overburden material to protect groundwater. Manganese was not a waste site COC for the 100-C-7 or 100-C-7:1 waste sites. Although the manganese result of 516 mg/kg for the utilized portion of the 100-C-015 stockpile exceeded the background-based cleanup level, it did not exceed the maximum value seen in background samples (DOE-RL 1995). It is well within the range of background values, although above the 90th percentile.

Figure 14. 100-C-7:1 Subsite Staging Pile Areas.



The Washington State Department of Ecology's statistical guidance manual contains a procedure for evaluating whether a result exceeds background, recognizing that, in using a 90th percentile value to establish background, approximately 10% of true background samples will exceed the 90th percentile "background level." For the 100-C-015 sample results, only 2 samples out of more than 100 samples exceeded the 90th percentile background level; therefore, these results are consistent with the background study results.

The material backfilled with the 516 mg/kg manganese results was left in place inside the 100-C-7:1 excavation because it was determined to be within the range of manganese background levels (DOE-RL 1995) and manganese is not a 100-C-7:1 subsite COC. The remainder of the 100-C-015 overburden/stockpile material was used after a minimum of 3 m (10 ft) of clean overburden material was placed in the bottom of the 100-C-7:1 excavation.

On January 22, 2013, when excavating the layback material from the west sidewall excavation, some material containing concentrations of hexavalent chromium was accidentally mixed with overburden/layback material and placed inside the 100-C-7:1 excavation. Following further investigation, the materials erroneously placed inside the 100-C-7:1 excavation were removed and staged for disposal at ERDF. Following the removal of the contaminated materials from the 100-C-7:1 excavation, in-process and verification composite sampling was performed to confirm that all contaminated material was removed from the 100-C-7:1 excavation. The verification sample (J1RDC3) collected from this footprint was included in the west sidewall overburden/layback decision unit for data evaluation.

Verification Sampling Results

All verification samples were analyzed using analytical methods approved by the EPA (DOE-RL 2009b). Evaluation of the verification data from the 100-C-7:1 subsite was performed by direct comparison of the statistical or maximum sample results for each COC against cleanup criteria.

The primary statistical calculation to evaluate compliance with cleanup standards is the 95% upper confidence limit (UCL) on the arithmetic mean of the data. The 95% UCL values for each detected COC are computed for each of the 100-C-7:1 subsite decision units as specified by the 100 Area RDR/RAWP (DOE-RL 2009b). The calculations are provided in the *100-C-7:1 Cleanup Verification 95% UCL Calculation* in Appendix B. When a COC was detected in fewer than 50% of the verification samples collected for a decision unit, the maximum detected value was used for comparison to RAGs. If no detections for a given COC were reported in the data set, then no statistical calculation or evaluation was performed for that COC.

Comparisons of the results for site COCs with the RAGs for each of the decision units associated with the 100-C-7:1 excavation (upper excavation sidewalls, lower excavation sidewalls, west sidewall, staging pile area 1, staging pile area 2, staging pile area composite -1, staging pile area 3, staging pile area 4, and four overburden stockpiles) are listed in Tables 4 through 16. Contaminants that were not detected by laboratory analysis are excluded from these tables.

Table 4. Comparison of Statistical Results to Remedial Action Goals for the 100-C-7:1 Excavation, Upper Sidewall Verification Samples.

COC	Statistical Result [a] (mg/kg)	Remedial Action Goals [b]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Levels Protective of Groundwater	Soil Levels Protective of the River		
Arsenic	3.75 (<BG)	20 [c]	20 [c]	20 [c]	No	--
Barium	68.8 (<BG)	5,600	200	400	No	--
Beryllium	0.305 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	1.72	7,200	320	--	No	--
Cadmium	0.0873 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium, total	11.2 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	8.34 (<BG)	24	15.7 [c]	--	No	--
Copper	15.7 (<BG)	2,960	59.2	22.0 [c]	No	--
Lead	5.80 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	351 (<BG)	3,760	512 [c]	512 [c]	No	--
Mercury	0.0239 (<BG)	24	0.33 [c]	0.33 [c]	No	--
Molybdenum [e]	0.377	400	8	--	No	--
Nickel	11.0 (<BG)	1,600	19.1 [c]	27.4	No	--
Vanadium	62.0 (<BG)	560	85.1 [c]	--	No	--
Zinc	45.0 (<BG)	24,000	480	67.8 [c]	No	--

[a] 95% upper confidence level or maximum value, depending on data censorship, as described in Appendix B.
[b] RAGs obtained from the *100 Area Remedial Design Report/ Remedial Action Work Plan* (RDR/RAWP) (DOE-RL 2009) unless otherwise noted.
[c] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the RDR/RAWP.
[d] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[e] No Hanford Site-specific or Washington State background value available.

-- = not applicable
BG = background
COC = contaminant of concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
RESRAD = RESidual RADioactivity (dose model)
WAC = *Washington Administrative Code*

Table 5. Comparison of Statistical Results to Remedial Action Goals for the 100-C-7:1 Excavation, Lower Sidewall Verification Samples.

COC	Statistical Result [b] (mg/kg)	Remedial Action Goals [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Levels Protective of Groundwater	Soil Levels Protective of the River		
Arsenic	1.44 (<BG)	20 [c]	20 [c]	20 [c]	No	--
Barium	58.0 (<BG)	5,600	200	400	No	--
Beryllium	0.209 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	0.633	7,200	320	--	No	--
Cadmium	0.0722 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium, total	3.66 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	7.17 (<BG)	24	15.7 [c]	--	No	--
Copper	12.7 (<BG)	2,960	59.2	22.0 [c]	No	--
Hexavalent chromium [e]	0.62	2.1	4.8	2	No	--
Lead	1.86 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	301 (<BG)	3,760	512 [c]	512 [c]	No	--
Molybdenum [e]	0.370	400	8	--	No	--
Nickel	5.64 (<BG)	1,600	19.1 [c]	27.4	No	--
Vanadium	55.0 (<BG)	560	85.1 [c]	--	No	--
Zinc	36.3 (<BG)	24,000	480	67.8 [c]	No	--

[a] RAGs obtained from the *100 Area Remedial Design Report/ Remedial Action Work Plan* (RDR/RAWP) (DOE-RL 2009) unless otherwise noted.

[b] 95% upper confidence level or maximum value, depending on data censorship, as described in Appendix B.

[c] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the RDR/RAWP.

[d] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).

[e] No Hanford Site-specific or Washington State background value available.

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Table 6. Comparison of Statistical Results to Remedial Action Goals for the 100-C-7:1 Excavation, West Sidewall Verification Samples.

COC	Statistical Result [a] (mg/kg)	Remedial Action Goals [b]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Levels Protective of Groundwater	Soil Levels Protective of the River		
Arsenic	2.64 (<BG)	20 [c]	20 [c]	20 [c]	No	--
Barium	76.2 (<BG)	5,600	200	400	No	--
Beryllium	0.293 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	1.77	7,200	320	--	No	--
Cadmium	0.152 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium, total	12.6 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	9.67 (<BG)	24	15.7 [c]	--	No	--
Copper	18.6 (<BG)	2,960	59.2	22.0 [c]	No	--
Lead	3.96 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	357 (<BG)	3,760	512 [c]	512 [c]	No	--
Mercury	0.0117 (<BG)	24	0.33 [c]	0.33 [c]	No	--
Molybdenum [e]	0.645	400	8	--	No	--
Nickel	10.3 (<BG)	1,600	19.1 [c]	27.4	No	--
Vanadium	82.5 (<BG)	560	85.1 [c]	--	No	--
Zinc	51.0 (<BG)	24,000	480	67.8 [c]	No	--

[a] 95% upper confidence level or maximum value, depending on data censorship, as described in Appendix B.
[b] RAGs obtained from the *100 Area Remedial Design Report/ Remedial Action Work Plan* (RDR/RAWP) (DOE-RL 2009) unless otherwise noted.
[c] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the RDR/RAWP.
[d] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[e] No Hanford Site-specific or Washington State background value available.

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COC = contaminant of concern
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Table 7. Comparison of Statistical Results to Remedial Action Goals for the 100-C-7:1 Subsite, Staging Pile Area 1 Verification Samples.

COC	Statistical Result [a] (mg/kg)	Remedial Action Goals [b]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Levels Protective of Groundwater	Soil Levels Protective of the River		
Antimony	0.978 (<BG)	32	5 [c]	5 [c]	No	--
Arsenic	5.97 (<BG)	20 [c]	20 [c]	20 [c]	No	--
Barium	74.7 (<BG)	5,600	200	400	No	--
Beryllium	0.285 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	2.99	7,200	320	--	No	--
Cadmium	0.0947 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium, total	11.9 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	6.66 (<BG)	24	15.7 [c]	--	No	--
Copper	16.3 (<BG)	2,960	59.2	22.0 [c]	No	--
Hexavalent chromium [e]	0.45	2.1	4.8	2	No	--
Lead	4.77 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	284 (<BG)	3,760	512 [c]	512 [c]	No	--
Mercury	0.0550 (<BG)	24	0.33 [c]	0.33 [c]	No	--
Molybdenum [e]	0.516	400	8	--	No	--
Nickel	11.8 (<BG)	1,600	19.1 [c]	27.4	No	--
Vanadium	47.4 (<BG)	560	85.1 [c]	--	No	--
Zinc	53.9 (<BG)	24,000	480	67.8 [c]	No	--

[a] 95% upper confidence level or maximum value, depending on data censorship, as described in Appendix B.
[b] RAGs obtained from the *100 Area Remedial Design Report/ Remedial Action Work Plan* (RDR/RAWP) (DOE-RL 2009) unless otherwise noted.
[c] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the RDR/RAWP.
[d] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[e] No Hanford Site-specific or Washington State background value available.

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COC = contaminant of concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
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Table 8. Comparison of Statistical Results to Remedial Action Goals for the 100-C-7:1 Subsite, Staging Pile Area 2 Verification Samples.

COC	Statistical Result [a] (mg/kg)	Remedial Action Goals [b]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Levels Protective of Groundwater	Soil Levels Protective of the River		
Antimony	0.402 (<BG)	32	5 [c]	5 [c]	No	--
Arsenic	2.66 (<BG)	20 [c]	20 [c]	20 [c]	No	--
Barium	65.3 (<BG)	5,600	200	400	No	--
Beryllium	0.269 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	1.55	7,200	320	--	No	--
Cadmium	0.0977 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium, total	10.4 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	6.44 (<BG)	24	15.7 [c]	--	No	--
Copper	13.5 (<BG)	2,960	59.2	22.0 [c]	No	--
Lead	3.36 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	268 (<BG)	3,760	512 [c]	512 [c]	No	--
Mercury	0.0482 (<BG)	24	0.33 [c]	0.33 [c]	No	--
Molybdenum [e]	0.426	400	8	--	No	--
Nickel	9.88 (<BG)	1,600	19.1 [c]	27.4	No	--
Vanadium	53.0 (<BG)	560	85.1 [c]	--	No	--
Zinc	39.2 (<BG)	24,000	480	67.8 [c]	No	--

[a] 95% upper confidence level or maximum value, depending on data censorship, as described in Appendix B.
[b] RAGs obtained from the *100 Area Remedial Design Report/ Remedial Action Work Plan* (RDR/RAWP) (DOE-RL 2009) unless otherwise noted.
[c] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the RDR/RAWP.
[d] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[e] No Hanford Site-specific or Washington State background value available.

-- = not applicable
BG = background
COC = contaminant of concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
RESRAD = RESidual RADioactivity (dose model)
WAC = *Washington Administrative Code*

Table 9. Comparison of Maximum Results to Remedial Action Goals for the 100-C-7:1 Subsite, Staging Pile Area –Composite 1, Focused Verification Sample.

COC	Maximum Result (mg/kg)	Remedial Action Goals [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Levels Protective of Groundwater	Soil Levels Protective of the River		
Antimony	0.384 (<BG)	32	5[b]	5[b]	No	--
Arsenic	2.19 (<BG)	20[b]	20[b]	20[b]	No	--
Barium	61.3 (<BG)	5,600	200	400	No	--
Beryllium	0.232 (<BG)	10.4[c]	1.51[b]	1.51[b]	No	--
Boron[d]	1.68	7,200	320	--	No	--
Cadmium	0.0939 (<BG)	13.9[c]	0.81[b]	0.81[b]	No	--
Chromium, total	9.05 (<BG)	80,000	18.5[b]	18.5[b]	No	--
Cobalt	5.77 (<BG)	24	15.7[b]	--	No	--
Copper	11.1 (<BG)	2,960	59.2	22.0[b]	No	--
Lead	3.15 (<BG)	353	10.2[b]	10.2[b]	No	--
Manganese	250 (<BG)	3,760	512[b]	512[b]	No	--
Mercury	0.0253 (<BG)	24	0.33[b]	0.33[b]	No	--
Molybdenum[d]	0.282	400	8	--	No	--
Nickel	7.37 (<BG)	1,600	19.1[b]	27.4	No	--
Vanadium	45.5 (<BG)	560	85.1[b]	--	No	--
Zinc	36.6 (<BG)	24,000	480	67.8[b]	No	--

[a] RAGs obtained from the *100 Area Remedial Design Report/ Remedial Action Work Plan* (RDR/RAWP) (DOE-RL 2009) unless otherwise noted.

[b] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the RDR/RAWP.

[c] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).

[d] No Hanford Site-specific or Washington State background value available.

-- = not applicable
BG = background
COC = contaminant of concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
RESRAD = RESidual RADioactivity (dose model)
WAC = *Washington Administrative Code*

Table 10. Comparison of Statistical Results to Remedial Action Goals for the 100-C-7:1 Subsite, Staging Pile Area 3, Verification Samples.

COC	Statistical Result [a] (mg/kg)	Remedial Action Goals [b]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Levels Protective of Groundwater	Soil Levels Protective of the River		
Arsenic	2.6 (<BG)	20 [c]	20 [c]	20 [c]	No	--
Barium	70.1 (<BG)	5,600	200	400	No	--
Beryllium	0.46 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	1.6	7,200	320	--	No	--
Cadmium	0.079 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium, total	11.3 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	8.7 (<BG)	24	15.7 [c]	--	No	--
Copper	16.2 (<BG)	2,960	59.2	22.0 [c]	No	--
Hexavalent chromium [e]	0.415	2.1	4.8	2	No	--
Lead	5.1 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	343 (<BG)	3,760	512 [c]	512 [c]	No	--
Mercury	0.031 (<BG)	24	0.33 [c]	0.33 [c]	No	--
Molybdenum [e]	0.46	400	8	--	No	--
Nickel	11.3 (<BG)	1,600	19.1 [c]	27.4	No	--
Vanadium	61.1 (<BG)	560	85.1 [c]	--	No	--
Zinc	46.6 (<BG)	24,000	480	67.8 [c]	No	--

[a] 95% upper confidence level or maximum value, depending on data censorship, as described in Appendix B.
[b] RAGs obtained from the *100 Area Remedial Design Report/ Remedial Action Work Plan* (RDR/RAWP) (DOE-RL 2009) unless otherwise noted.
[c] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the RDR/RAWP.
[d] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[e] No Hanford Site-specific or Washington State background value available.

-- = not applicable
BG = background
COC = contaminant of concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
RESRAD = RESidual RADioactivity (dose model)
WAC = *Washington Administrative Code*

Table 11. Comparison of Statistical Results to Remedial Action Goals for the 100-C-7:1 Subsite, Staging Pile Area 4, Verification Samples.

COC	Statistical Result [a] (mg/kg)	Remedial Action Goals [b]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Levels Protective of Groundwater	Soil Levels Protective of the River		
Antimony	0.50 (<BG)	32	5 [c]	5 [c]	No	--
Arsenic	2.0 (<BG)	20 [c]	20 [c]	20 [c]	No	--
Barium	65.8 (<BG)	5,600	200	400	No	--
Beryllium	0.38 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	2.1	7,200	320	--	No	--
Cadmium	0.072 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium, total	10.3 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	9.1 (<BG)	24	15.7 [c]	--	No	--
Copper	14.6 (<BG)	2,960	59.2	22.0 [c]	No	--
Hexavalent chromium [e]	0.367	2.1	4.8	2	No	--
Lead	4.0 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	313 (<BG)	3,760	512 [c]	512 [c]	No	--
Mercury	0.16 (<BG)	24	0.33 [c]	0.33 [c]	No	--
Molybdenum [e]	0.31	400	8	--	No	--
Nickel	12.5 (<BG)	1,600	19.1 [c]	27.4	No	--
Vanadium	64.1 (<BG)	560	85.1 [c]	--	No	--
Zinc	39.3 (<BG)	24,000	480	67.8 [c]	No	--

[a] 95% upper confidence level or maximum value, depending on data censorship, as described in Appendix B.
[b] RAGs obtained from the *100 Area Remedial Design Report/ Remedial Action Work Plan* (RDR/RAWP) (DOE-RL 2009) unless otherwise noted.
[c] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the RDR/RAWP.
[d] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[e] No Hanford Site-specific or Washington State background value available.

-- = not applicable
BG = background
COC = contaminant of concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
RESRAD = RESidual RADioactivity (dose model)
WAC = *Washington Administrative Code*

Table 12. Comparison of Maximum Results to Remedial Action Goals for the 100-C-7:1 Subsite, 100-C-001 Overburden Stockpile Verification Samples.

COC	Maximum Result (mg/kg)	Remedial Action Goals [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Levels Protective of Groundwater	Soil Levels Protective of the River		
Antimony	0.281 (<BG)	32	5 [b]	5 [b]	No	--
Arsenic	6.49 (<BG)	20 [b]	20 [b]	20 [b]	No	--
Barium	80.8 (<BG)	5,600	200	400	No	--
Beryllium	0.391 (<BG)	10.4 [c]	1.51 [b]	1.51 [b]	No	--
Boron [d]	2.15	7,200	320	--	No	--
Cadmium [f]	0.158 (<BG)	13.9 [c]	0.81 [b]	0.81 [b]	No	--
Chromium, total	13.4 (<BG)	80,000	18.5 [b]	18.5 [b]	No	--
Cobalt	11.4 (<BG)	24	15.7 [b]	--	No	--
Copper	32.8	2,960	59.2	22.0 [b]	Yes	Yes [e]
Hexavalent chromium [d]	0.22	2.1	4.8	2	No	--
Lead	15.6	353	10.2 [b]	10.2 [b]	Yes	Yes [e]
Manganese	514	3,760	512 [b]	512 [b]	Yes	Yes [e]
Mercury	0.299 (<BG)	24	0.33 [b]	0.33 [b]	No	--
Molybdenum [d]	1.11	400	8	--	No	--
Nickel	14.1 (<BG)	1,600	19.1 [b]	27.4	No	--
Selenium [f]	0.267 (<BG)	400	5	1	No	--
Vanadium	107	560	85.1 [b]	--	Yes	Yes [e]
Zinc	58.8 (<BG)	24,000	480	67.8 [b]	No	--

[a] RAGs obtained from the *100 Area Remedial Design Report/ Remedial Action Work Plan* (RDR/RAWP) (DOE-RL 2009) unless otherwise noted.

[b] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the RDR/RAWP.

[c] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).

[d] No Hanford Site-specific or Washington State background value available.

[e] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of copper, lead, manganese, and vanadium are not predicted to migrate more than 3 m (10 ft) vertically within 1,000 years (based on the lowest distribution coefficient of 22 mL/g for copper). Therefore, overburden containing concentrations of copper, lead, manganese, and vanadium should be placed at least 3 m (10 ft) above the groundwater rewetted zone to be predicted to be protective of groundwater and the Columbia River.

[f] Hanford Site-specific background value is not available. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).

-- = not applicable
BG = background
COC = contaminant of concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
RESRAD = RESidual RADioactivity (dose model)
WAC = *Washington Administrative Code*

Table 13. Comparison of Maximum Results to Remedial Action Goals for the 100-C-7:1 Subsite, 100-C-023 Overburden Stockpile Verification Samples.

COC	Maximum Result (mg/kg)	Remedial Action Goals [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Levels Protective of Groundwater	Soil Levels Protective of the River		
Arsenic	4.95 (<BG)	20 [b]	20 [b]	20 [b]	No	--
Barium	152	5,600	200	400	No	--
Beryllium	0.422 (<BG)	10.4 [c]	1.51 [b]	1.51 [b]	No	--
Boron [d]	9.43	7,200	320	--	No	--
Cadmium	0.145 (<BG)	13.9 [c]	0.81 [b]	0.81 [b]	No	--
Chromium, total	15.0 (<BG)	80,000	18.5 [b]	18.5 [b]	No	--
Cobalt	8.50 (<BG)	24	15.7 [b]	--	No	--
Copper	19.3 (<BG)	2,960	59.2	22.0 [b]	No	--
Lead	6.86 (<BG)	353	10.2 [b]	10.2 [b]	No	--
Manganese	410 (<BG)	3,760	512 [b]	512 [b]	No	--
Mercury	1.72	24	0.33 [b]	0.33 [b]	Yes	Yes [e]
Molybdenum [d]	0.378	400	8	--	No	--
Nickel	15.3 (<BG)	1,600	19.1 [b]	27.4	No	--
Vanadium	64.6 (<BG)	560	85.1 [b]	--	No	--
Zinc	55.1 (<BG)	24,000	480	67.8 [b]	No	--

[a] RAGs obtained from the *100 Area Remedial Design Report/ Remedial Action Work Plan* (RDR/RAWP) (DOE-RL 2009) unless otherwise noted.

[b] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the RDR/RAWP.

[c] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).

[d] No Hanford Site-specific or Washington State background value available.

[e] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of mercury are not predicted to migrate more than 3 m (10 ft) vertically within 1,000 years (based on the lowest distribution coefficient of 30 mL/g for mercury). Therefore, overburden containing concentrations of mercury should be placed at least 2 m (6.6 ft) above the groundwater rewetted zone to be predicted to be protective of groundwater and the Columbia River.

-- = not applicable
BG = background
COC = contaminant of concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
RESRAD = RESidual RADioactivity (dose model)
WAC = *Washington Administrative Code*

Table 14. Comparison of Maximum Results to Remedial Action Goals for the 100-C-7:1 Subsite, 100-C-024A Overburden Stockpile Verification Samples.

COC	Maximum Result (mg/kg)	Remedial Action Goals [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Levels Protective of Groundwater	Soil Levels Protective of the River		
Arsenic	1.6 (<BG)	20 [b]	20 [b]	20 [b]	No	--
Barium	45.1 (<BG)	5,600	200	400	No	--
Cadmium	0.090 (<BG)	13.9 [c]	0.81 [b]	0.81 [b]	No	--
Chromium, total	2.9 (<BG)	80,000	18.5 [b]	18.5 [b]	No	--
Cobalt	8.0 (<BG)	24	15.7 [b]	--	No	--
Copper	13.2 (<BG)	2,960	59.2	22.0 [b]	No	--
Lead	1.9 (<BG)	353	10.2 [b]	10.2 [b]	No	--
Manganese	231 (<BG)	3,760	512 [b]	512 [b]	No	--
Molybdenum [d]	0.42	400	8	--	No	--
Nickel	4.9 (<BG)	1,600	19.1 [b]	27.4	No	--
Vanadium	38.6 (<BG)	560	85.1 [b]	--	No	--
Zinc	31.3 (<BG)	24,000	480	67.8 [b]	No	--

[a] RAGs obtained from the *100 Area Remedial Design Report/ Remedial Action Work Plan* (RDR/RAWP) (DOE-RL 2009) unless otherwise noted.

[b] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the RDR/RAWP.

[c] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).

[d] No Hanford Site-specific or Washington State background value available.

-- = not applicable
BG = background
COC = contaminant of concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
RESRAD = RESidual RADioactivity (dose model)
WAC = *Washington Administrative Code*

Table 15. Comparison of Maximum Results to Remedial Action Goals for the 100-C-7:1 Subsite, 100-C-030 Overburden Stockpile Verification Samples.

COC	Maximum Result (mg/kg)	Remedial Action Goals [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Levels Protective of Groundwater	Soil Levels Protective of the River		
Arsenic	7.34	20 [b]	20 [b]	20 [b]	No	--
Barium	103 (<BG)	5,600	200	400	No	--
Beryllium	0.537 (<BG)	10.4 [c]	1.51 [b]	1.51 [b]	No	--
Boron [d]	1.26	7,200	320	--	No	--
Cadmium	0.142 (<BG)	13.9 [c]	0.81 [b]	0.81 [b]	No	--
Chromium, total	13.6 (<BG)	80,000	18.5 [b]	18.5 [b]	No	--
Cobalt	11.4 (<BG)	24	15.7 [b]	--	No	--
Copper	21.5 (<BG)	2,960	59.2	22.0 [b]	No	--
Hexavalent chromium [d]	0.68	2.1	4.8	2	No	--
Lead	9.28 (<BG)	353	10.2 [b]	10.2 [b]	No	--
Manganese	488 (<BG)	3,760	512 [b]	512 [b]	No	--
Molybdenum [d]	0.593	400	8	--	No	--
Nickel	14.8 (<BG)	1,600	19.1 [b]	27.4	No	--
Vanadium	78.5 (<BG)	560	85.1 [b]	--	No	--
Zinc	63.3 (<BG)	24,000	480	67.8 [b]	No	--

[a] RAGs obtained from the *100 Area Remedial Design Report/ Remedial Action Work Plan* (RDR/RAWP) (DOE-RL 2009) unless otherwise noted.

[b] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the RDR/RAWP.

[c] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).

[d] No Hanford Site-specific or Washington State background value available.

-- = not applicable
BG = background
COC = contaminant of concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
RESRAD = RESidual RADioactivity (dose model)
WAC = *Washington Administrative Code*

Table 16. Comparison of Maximum Results to Remedial Action Goals for the 100-C-7:1 Subsite, West Sidewall Overburden Material Verification Samples.

COC	Maximum Result (mg/kg)	Remedial Action Goals [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Levels Protective of Groundwater	Soil Levels Protective of the River		
Antimony	0.76 (<BG)	32	5 [b]	5 [b]	No	--
Arsenic	4.6 (<BG)	20 [b]	20 [b]	20 [b]	No	--
Barium	83.5 (<BG)	5,600	200	400	No	--
Beryllium	1.1 (<BG)	10.4 [c]	1.51 [b]	1.51 [b]	No	--
Boron [d]	3.9	7,200	320	--	No	--
Cadmium [e]	0.17 (<BG)	13.9 [c]	0.81 [b]	0.81 [b]	No	--
Chromium, total	17.1 (<BG)	80,000	18.5 [b]	18.5 [b]	No	--
Cobalt	10.1 (<BG)	24	15.7 [b]	--	No	--
Copper	18.6 (<BG)	2,960	59.2	22.0 [b]	No	--
Hexavalent chromium [d]	1.14	2.1	4.8	2	No	--
Lead	7.6 (<BG)	353	10.2 [b]	10.2 [b]	No	--
Manganese	420 (<BG)	3,760	512 [b]	512 [b]	No	--
Mercury	0.22(<BG)	24	0.33 [b]	0.33 [b]	No	--
Molybdenum [d]	0.97	400	8	--	No	--
Nickel	11.8 (<BG)	1,600	19.1 [b]	27.4	No	--
Selenium [e]	1.2	400	5	1	Yes	No [f]
Vanadium	67.3 (<BG)	560	85.1 [b]	--	No	--
Zinc	50.9 (<BG)	24,000	480	67.8 [b]	No	--

[a] RAGs obtained from the *100 Area Remedial Design Report/ Remedial Action Work Plan* (RDR/RAWP) (DOE-RL 2009) unless otherwise noted.

[b] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the RDR/RAWP.

[c] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).

[d] No Hanford Site-specific or Washington State background value available.

[e] Hanford Site-specific background value is not available. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).

[f] The maximum selenium results reported in the Hanford Site background effort was 6 mg/kg. Although the verification sampling value is above the background value specified in the RDR/RAWP (DOE-RL 2009) from Ecology (1994), the sample results are protective of the Columbia River because they are below the mean selenium results detected during the Hanford Site background determination (DOE-RL 1995).

-- = not applicable
BG = background
COC = contaminant of concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
RESRAD = RESidual RADioactivity (dose model)
WAC = *Washington Administrative Code*

Calculated cleanup levels are not presented in the Cleanup Levels and Risk Calculations Database (Ecology 2012) under WAC 173-340-740(3) for calcium, magnesium, potassium, silicon, and sodium. The EPA's *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A)* (EPA 1989) recommends that aluminum and iron not be considered in site risk evaluations. Therefore, aluminum, calcium, iron, magnesium, potassium, silicon, and sodium are not considered site COCs and are also not included in these tables. The complete laboratory results are stored in the Environmental Restoration (ENRE) project-specific database prior to submitting to the Hanford Environmental Information System (HEIS) for archiving and are provided in the *100-C-7:1 Cleanup Verification 95% UCL Calculation* in Appendix B.

DATA EVALUATION

Evaluation of the results listed in Tables 4 through 16 from verification sampling at the 100-C-7:1 subsite indicates that residual concentrations of all site COCs are below soil RAGs, except for copper, lead, manganese, mercury, selenium, and vanadium. However, selenium is not attributable to the sodium dichromate contamination and is present within the range of natural background values. It is therefore concluded that the selenium results are indicative of natural occurrence, not residual contamination.

Residual concentrations of copper, lead, manganese, mercury, and vanadium are above the Hanford Site background 90th percentile of the lognormal distribution value (DOE-RL 1995) and are therefore further evaluated using *100 Area Analogous Sites RESRAD Calculations* (BHI 2005a). Based on the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005a) and modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), residual concentrations of copper, lead, manganese, mercury, and vanadium (having K_d values of 22 mL/g or greater) are predicted to not migrate more than 3 m (10 ft) vertically in 1,000 years. Therefore, overburden stockpile material containing residual concentrations of copper, lead, manganese, mercury, and vanadium will be protective of groundwater and the Columbia River when placed at least 3 m (10 ft) above the groundwater rewetted zone. This determination showed that at least 3 m (10 ft) of clean overburden must be placed in the excavations to provide appropriate clean vadose zone material before any overburden material from stockpiles 100-C-001, 100-C-023, or overburden/layback from the west sidewall could be used to backfill the 100-C-7 or 100-C-7:1 excavations. This overburden stockpile/layback material was only used after a minimum of 3 m (10 ft) of clean overburden material was placed in the bottom of the excavations.

Assessment of the risk requirements for the 100-C-7:1 subsite is determined by calculation of the hazard quotient and excess cancer risk values for nonradionuclides. These calculations are located in the *100-C-7:1 Direct Contact Hazard Quotient and Carcinogenic Risk Calculation* in Appendix B. The requirements include an individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual contaminant carcinogenic risk of less than 1×10^{-6}, and a cumulative carcinogenic risk of less than 1×10^{-5}. These risk values were not calculated for constituents that were not detected or were detected at concentrations below Hanford Site or Washington State background values. The results (Appendix B) indicate that all individual hazard

quotients for noncarcinogenic constituents are less than 1.0. The cumulative hazard quotient for the noncarcinogenic constituents is 4.5×10^{-1}. All individual carcinogen risk values for carcinogenic constituents are less than 1×10^{-6}. The carcinogenic risk associated with hexavalent chromium, the only carcinogenic constituent detected above background levels, is 5.4×10^{-7}. Therefore, the individual and total excess cancer risk limits of 1×10^{-6} and 1×10^{-5}, respectively, are met.

DATA QUALITY ASSESSMENT

A data quality assessment (DQA) was performed to compare the verification sampling designs (EPA 2010; WCH 2011a, 2012g, 2012h, 2012i, 2012j), the field logbooks (WCH 2011b, 2011c, 2011d, 2012b, 2012c, 2012d, 2012e, 2012f, 2013), and resulting analytical data with the sampling and data quality requirements specified by the project objectives and performance specifications. The DQA for the 100-C-7:1 subsite (Appendix C) established that the data are of the right type, quality, and quantity to support site verification decisions within specified error tolerances. The evaluation verified that the sample design was sufficient for the purpose of clean site verification. The cleanup verification sample analytical data are stored in the ENRE project-specific database for data evaluation prior to its archival in HEIS and are summarized in Appendix B.

SUMMARY FOR INTERIM CLOSURE

The 100-C-7:1 subsite has been evaluated in accordance with the Remaining Sites ROD (EPA 1999) and the 100 Area RDR/RAWP (DOE-RL 2009b). Verification sampling was performed, and the analytical results indicate that the residual concentrations of COCs at this site meet the remedial action objectives for direct exposure, groundwater protection, and river protection. In accordance with this evaluation, the verification sampling results support a reclassification of the 100-C-7:1 subsite to Interim Closed Out. Site contamination that extended into the deep zone soils was completely removed; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone are not required.

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APPENDIX A

PHOTOGRAPHS

Figure A-1. 183-C Water Treatment Facilities Looking from West to East with the 105-C Reactor in the Background (March 1983).

Figure A-2. 183-C Head House (March 1983).

Figure A-3. Chemical Storage Tanks on the North Side of the 183-C Head House (October 1956).

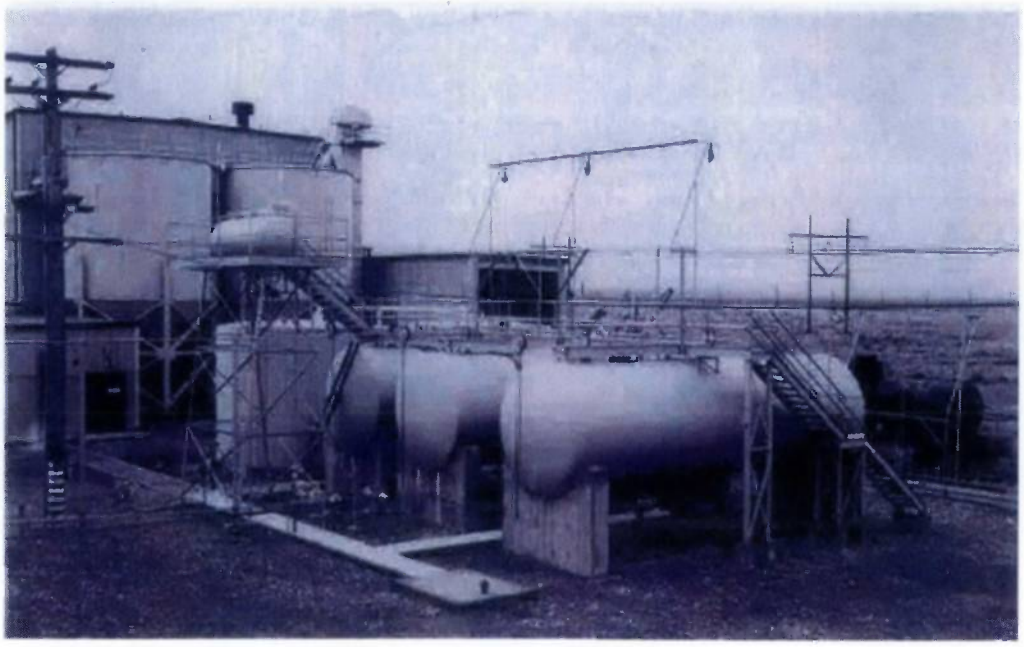

Figure A-4. Chromium-Contaminated Concrete Remaining at the 183-C Filter Building, 100-C-7 Waste Site (1996).

Figure A-5. Stained Soil Located North of the 183-C Head House (100-C-7:1) in 2002.

Figure A-6. Foundation Wall of 183-C Sedimentation Basins Showing Chromium Contamination (February 2005).

Figure A-7. Test Pothole (April 2005).

Figure A-8. Sodium Dichromate Pipeline Removal (March 17, 2005) Showing Areas Where Discolored Liquid Discharges Occurred.

Figure A-9. Photograph of 100-C-7:1 West Sidewall Chromium Staining (April 18, 2011).

Figure A-10. Photograph of 100-C-7:1Waste Site Chromium Staining (May 2011).

Figure A-11. Aerial of 100-C-7:1 Excavation, Overburden, and Staging Pile Areas View to the South (October 2011)

Figure A-12. Aerial of 100-C-7:1 Excavation (October 2011).

Figure 13. Aerial of 100-C-7:1 Excavation, Overburden, and Staging Pile Areas (April 2012).

Figure A-14. Aerial of 100-C-7:1 Excavation (April 2012).

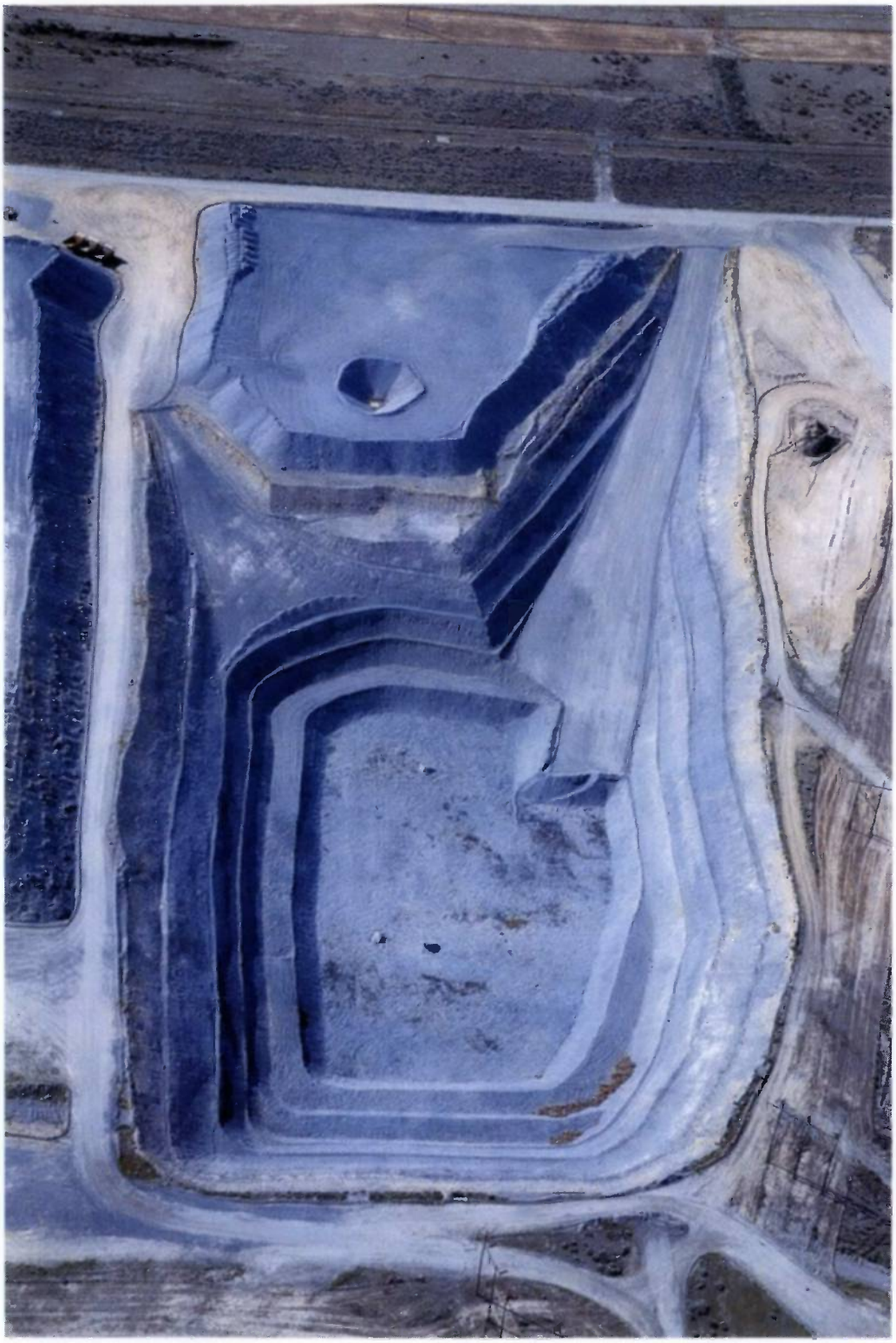

Figure A-15. Aerial of 100-C-7:1 Excavation – Groundwater Level Rising (April 13, 2012).

Figure A-16. 100-C-7:1 Excavation – PNNL Groundwater Study, June 2012.

Figure A-17. Powerline Relocation, June 2012.

Figure A-18. 100-C-7:1 West Sidewall Excavation, January 2013.

Figure A-19. 100-C-7:1 Excavation, West Sidewall Expansion (February 2013)

APPENDIX B

CALCULATIONS

APPENDIX B

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 files 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 Calculations," Washington Closure Hanford, Richland, Washington. The following calculations are provided in this appendix:

100-C-7:1 Cleanup Verification 95% UCL Calculation, Calculation No. 0100C-CA-V0044, Rev. 0, Washington Closure Hanford, Richland, Washington.

100-C-7:1 Direct Contact Hazard Quotient and Carcinogenic Risk Calculation, 0100C-CA-V0045, Rev. 0, Washington Closure Hanford, Richland, Washington.

DISCLAIMER FOR CALCULATIONS

The calculations that are provided in this appendix have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

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CALCULATION COVER SHEET

Project Title: 100-B/C Field Remediation **Job No. 14655**

Area: 100-B/C

Discipline: Environmental *Calculation No: 0100C-CA-V0044

Subject: 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculation

Computer Program: Excel Program No: Excel 2003

The attached calculations have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 47 Attm. 1 = 38 Total = 86	J. D. Skoglie	N. K. Schiffern	I. B. Berezovskiy	D. F. Obenauer	10/1/13

SUMMARY OF REVISION

WCH-DE-018 (05/08/2007) *Obtain Calc. No. from Document Control and Form from Intranet

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie	**Date** 04/11/13	**Calc. No.** 0100C-CA-V0044	**Rev. No.** 0
Project 100 B/C Field Remediation	**Job No.** 14655	**Checked** N. K. Schiffern	**Date** 04/11/13
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations			**Sheet No.** 1 of 47

Summary

Purpose:
Calculate the 95% upper confidence limit (UCL) values to evaluate compliance with cleanup standards for the subject site. Also, perform the *Washington Administrative Code* (WAC) 173-340-740(7)(e) Model Toxics Control Act (MTCA) 3-part test for nonradionuclide analytes and calculate the relative percent difference (RPD) for primary-duplicate sample pairs for each contaminant of concern (COC) and contaminant of potential concern (COPC), as necessary.

Table of Contents:
Sheets 1 to 4 - Calculation Sheet Summary
Sheet 5 to 18 - Calculation Sheet Verification Data; Upper Sidewall, Lower Sidewall, West Sidewall, SPA1, SPA2, SPA3, and SPA4
Sheet 19 to 32 - MTCA Results
Sheet 33 to 47 - Calculation Sheet Duplicate Analysis
Attachment 1 - 100-C-7:1 Subsite, Verification Sampling Results (38 sheets)

Given/References:
1) Sample Results (Attachment 1).
2) Background values and remedial action goals (RAGs) are taken from DOE-RL (2005b), DOE-RL (2001), and Ecology (1996).
3) DOE-RL, 2001, Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, DOE/RL-92-24, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) DOE-RL, 2009a, 100 Area Remedial Action Sampling and Analysis Plan (SAP), DOE/RL-96-22, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
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8) Ecology, 1996, Model Toxic Control Act Cleanup Levels and Risk Calculations (CLARC II), Publication #94-145, Washington State Department of Ecology, Olympia, Washington.
9) WAC 173-340, 1996, "Model Toxic Control Act - Cleanup," Washington Administrative Code.

Solution:
Calculation methodology is described in Ecology Pub. #92-54 (Ecology 1992, 1993), below, and in the RDR/RAWP (DOE-RL 2009b). Use data from attached worksheets to perform the 95% UCL calculation for each analyte, the WAC 173-340-740(7)(e) 3-part test for nonradionuclides, and the RPD calculations for each COC/COPC. The hazard quotient and carcinogenic risk calculations are located in a separate calculation brief as an appendix to the Remaining Sites Verification Package (RSVP).

Calculation Description:
The subject calculations were performed on statistical data from soil verification samples (Attachment 1) from the 100-C-7:1 subsite. The data were entered into an EXCEL 2003 spreadsheet and calculations performed by using the built-in spreadsheet functions and/or creating formulae within the cells. The statistical evaluation of data for use in accordance with the RDR/RAWP (DOE-RL 2009b) is documented by this calculation. Duplicate RPD results are used in evaluation of data quality within the RSVP for these sites.

Methodology:
The 100-C-7:1 subsite is comprised of thirteen decision units; upper sidewall, lower sidewall, west sidewall, SPA1, SPA2, SPA3, and SPA4 areas underwent statistical sampling. Focused or composite samples were taken at decision units; 001, 023, 024A, 030, west sidewall overburden, and COMP-1. Analytical data for all sampling locations is provided in the summary tables on sheets 3 and 4.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie	**Date** 04/08/13	**Calc. No.** 0100C-CA-V0044	**Rev. No.** 0
Project 100 B/C Field Remediation	**Job No.** 14655	**Checked** N. K. Schiffern	**Date** 04/08/13
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations			**Sheet No.** 2 of 47

Summary (continued)

Methodology (continued):

For nonradioactive analytes with ≤50% of the data below detection limits, the statistical value calculated to evaluate the effectiveness of cleanup is the 95% UCL. For nonradioactive analytes with >50% of the data below detection limits, as determined by direct inspection of the sample results (Attachment 1), the maximum detected value for the data set is used instead of the 95% UCL, and no further calculations are performed for those data sets. For convenience, these maximum detected values are included in the summary tables that follow. The 95% UCL was not calculated for data sets with no reported detections. Calculated cleanup levels are not available in Ecology (2005) under WAC 173-340-740(3) for aluminum, calcium, iron, magnesium, potassium, silicon, sodium, and zirconium. These analytes are also essential nutrients and can be eliminated from evaluation as human health concerns per EPA guidance (EPA 1989). Therefore, these constituents are not considered COPCs.

All nonradionuclide data reported as being undetected are set to ½ the detection limit value for calculation of the statistics (Ecology 1993). In cases where the laboratory does not report a value below the minimum detectable activity (MDA), half of the MDA is used in the calculation. For the statistical evaluation of duplicate sample pairs, the samples are averaged before being included in the data set, after adjustments for censored data as described above.

For nonradionuclides, the WAC 173-340 statistical guidance suggests that a test for distributional form be performed on the data and the 95% UCL calculated on the appropriate distribution using Ecology software. For nonradionuclide small data sets (n < 10), the calculations are performed assuming nonparametric distribution, so no tests for distribution are performed. For nonradionuclide data sets of ten or greater, as for the subject site, distributional testing is done using Ecology's MTCAStat software (Ecology 1993). Due to differences in addressing censored data between the RDR/RAWP (DOE-RL 2009b) and MTCAStat coding and due to a limitation in the MTCAStat coding (no direct capability to address variable quantitation limits within a data set), substitutions for censored data are performed before software input and the resulting data set treated as uncensored.

The WAC 173-340-740(7)(e) 3-part test is performed for nonradionuclide analytes only and determines if:
1) the 95% UCL exceeds the most stringent cleanup limit for each COPC/COC,
2) greater than 10% of the raw data exceed the most stringent cleanup limit for each COPC/COC,
3) the maximum value of the raw data set exceeds two times the most stringent cleanup limit for each COPC/COC.

The WAC 173-340-740(7)(e) 3-part test is not performed for COPCs where the statistical value defaults to the maximum value in the data set. Instead, direct comparison of the maximum value against site remedial action goals (RAGs) (within the RSVP) is used as the compliance basis.

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 TDLs are pre-determined values for analytical methods and constituents with cleanup levels as listed in Table 2-1 of the SAP (DOE-RL 2009a). Table 2-1 includes nominal TDLs for identified methods based organic analyses. The nominal TDLs are also used in support of the RPD calculation for the methods based analytes. TDLs not included in Table 2-1 are based on the laboratory and/or methods used. 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:

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

where, M = Main Sample Value S = Split (or duplicate) Sample Value

For quality assurance/quality control (QA/QC) split and duplicate RPD calculations, a value less than 30% indicates the data compare favorably. For regulatory splits, a threshold of 35% is used (EPA 1994). If the RPD is greater than 30% (or 35% for regulatory split data), further investigation regarding the usability of the data is performed. To assist in the identification of anomalous sample pairs, when an analyte is detected in the primary or duplicate/split sample, but was 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. Regulatory split samples were collected for cleanup verification of the subject site. Additional discussion as necessary is provided in the data quality assessment section of the applicable RSVP.

CALCULATION SHEET

Washington Closure Hanford

Originator	J. D. Skoglie	Date	04/11/13	Calc. No.	0100C-CA-V0044
Project	100 B/C Field Remediation	Job No.	14655	Checked	N. K. Schiffern
Subject	100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations				

Rev. No. 0
Date 04/11/13
Sheet No. 3 of 47

Summary (continued)

Results:

The results presented in the tables that follow include the summary of the results of the 95% UCL calculations and/or maximum results for the upper sidewall, lower sidewall, west sidewall, SPA1, SPA2, SPA3, SPA4 001, 023, 024A, 030, WSW overburden, COMP-1, the WAC 173-340-740(7)(e) 3-part test evaluation, and the RPD calculations, and are for use in risk analysis and the RSVP for these sites.

Results Summary - Statistical Samples

Analyte	Decision Unit														Units
	Upper Sidewall		Lower Sidewall		West Sidewall		SPA1		SPA2		SPA3		SPA4		
	95% UCL Result	Maximum Result	95% UCL Result	Maximum Result	95% UCL Result	Maximum Result	95% UCL Result	Maximum Result	95% UCL Result	Maximum Result	95% UCL Result	Maximum Result	95% UCL	Maximum Result	
Antimony	--	--	--	--	--	--	--	0.978	0.402	--	--	--	--	0.50	mg/kg
Arsenic	3.75	--	1.44	--	2.64	--	5.97	--	2.66	--	2.6	--	2.0	--	mg/kg
Barium	68.8	--	58.0	--	76.2	--	74.7	--	65.3	--	70.1	--	65.8	--	mg/kg
Beryllium	0.305	--	0.209	--	0.293	--	0.285	--	0.269	--	0.46	--	0.38	--	mg/kg
Boron	1.72	--	--	0.633	--	1.77	2.99	--	1.55	--	1.6	--	--	2.1	mg/kg
Cadmium	0.0873	--	0.0722	--	--	0.152	0.0947	--	0.0977	--	0.079	--	0.072	--	mg/kg
Chromium	11.2	--	3.66	--	12.6	--	11.9	--	10.4	--	11.3	--	10.3	--	mg/kg
Cobalt	8.34	--	7.17	--	9.67	--	6.66	--	6.44	--	8.7	--	9.1	--	mg/kg
Copper	15.7	--	12.7	--	18.6	--	16.3	--	13.5	--	16.2	--	14.6	--	mg/kg
Hexavalent chromium	--	--	--	0.62	--	--	--	0.45	--	--	--	0.415	--	0.367	mg/kg
Lead	5.80	--	1.86	--	3.96	--	4.77	--	3.36	--	5.1	--	4.0	--	mg/kg
Manganese	351	--	301	--	357	--	284	--	268	--	343	--	313	--	mg/kg
Mercury	--	0.0239	--	--	--	0.0117	0.0550	--	--	0.0482	--	0.031	--	0.16	mg/kg
Molybdenum	0.377	--	0.370	--	--	0.645	0.516	--	0.426	--	--	0.46	--	0.31	mg/kg
Nickel	11.0	--	5.64	--	10.3	--	11.8	--	9.88	--	11.3	--	12.5	--	mg/kg
Vanadium	62.0	--	55.0	--	82.5	--	47.4	--	53.0	--	61.1	--	64.1	--	mg/kg
Zinc	45.0	--	36.3	--	51.0	--	53.9	--	39.2	--	46.6	--	39.3	--	mg/kg

WAC 173-340-740(7)(e) Evaluation:

WAC 173-340 3-Part Test

for most stringent RAG:

95% UCL > Cleanup Limit?	NO	NO	NO	NO	NO	NO	NA
> 10% above Cleanup Limit?	NO	NO	YES	NO	NO	NO	NA
Any sample > 2x Cleanup Limit?	NO	NO	NO	NO	NO	NO	NA

[a]The 95% UCL result or maximum value, depending on data censorship, as described in the methodology section.

-- = not applicable
001 = decision unit 001
023 = decision unit 023
024A = decision unit 024A
030 = decision unit 030
B = blank
COMP1 = composite sample area 1
DE = direct exposure
GW = groundwater
J = estimate
MDA = minimum detectable activity
MTCA = *Model Toxics Control Act*
PQL = practical quantitation limit
Q = qualifier
QA/QC = quality assurance/quality control
RAG = remedial action goal
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
RPD = relative percent difference
RSVP = remaining sites verification package
SAP = sampling and analysis plan
SPA1 = Staging Pile Area 1
SPA2 = Staging Pile Area 2
SPA3 = Staging Pile Area 3
SPA4 = Staging Pile Area 4
TDL = target detection limit
U = undetected
UCL = upper confidence limit
WAC = Washington Administrative Code

CALCULATION SHEET

Washington Closure Hanford

Originator	J. D. Skoglie	Date	04/11/13	Calc. No.	0100C-CA-V0044	Rev. No.	0
Project	100 B/C Field Remediation	Job No.	14655	Checked	N. K. Schiffern	Date	04/11/13
Subject	100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations					Sheet No.	4 of 47

Summary (continued)

Results:

The results presented in the tables that follow include the summary of the results of the 95% UCL calculations and/or maximum results for the upper sidewall, lower sidewall, west sidewall, SPA1, SPA2, SPA3, SPA4, 001, 023, 024A, 030, WSW overburden, COMP-1, the WAC 173-340-740(7)(e) 3-part test evaluation, and the RPD calculations, and are for use in risk analysis and the RSVP for these sites.

Results Summary - Focused Samples

Constituent	Decision Unit						Unit
	001	023	024A	030	WSW Overburden	Comp-1	
Antimony	0.281	--	--	--	0.76	0.384	mg/kg
Arsenic	6.49	4.95	1.6	7.34	4.6	2.19	mg/kg
Barium	80.8	152	45.1	103	83.5	61.3	mg/kg
Beryllium	0.391	0.422	--	0.537	1.1	0.232	mg/kg
Boron	2.15	9.43	--	1.26	3.9	1.68	mg/kg
Cadmium	0.158	0.145	0.090	0.142	0.17	0.0939	mg/kg
Chromium	13.4	15.0	2.9	13.6	17.1	9.05	mg/kg
Cobalt	11.4	8.50	8.0	11.4	10.1	5.77	mg/kg
Copper	32.8	19.3	13.2	21.5	18.6	11.1	mg/kg
Hexavalent chromium	0.22	--	--	0.68	1.14	--	mg/kg
Lead	15.6	6.86	1.9	9.28	7.6	3.15	mg/kg
Manganese	514	410	231	488	420	250	mg/kg
Mercury	0.299	1.72		--	0.22	0.0253	mg/kg
Molybdenum	1.11	0.378	0.42	0.593	0.97	0.282	mg/kg
Nickel	14.1	15.3	4.9	14.8	11.8	7.37	mg/kg
Selenium	0.267	--	--	--	1.2	--	mg/kg
Vanadium	107	64.6	38.6	78.5	67.3	45.5	mg/kg
Zinc	58.8	55.1	31.3	63.3	50.9	36.6	mg/kg

Relative Percent Difference Results and QA/QC Analysis[a]

Analyte	Duplicate Analysis									
	Upper Sidewall	Lower Sidewall	West Sidewall	SPA1	SPA2	SPA3	SPA4	SecB - 25 ft	SW-4	S_Ramp4
Aluminum	22.1%	1.4%	19.7%	3.5%	4.3%	15.3%	2.2%	3.2%	8.6%	24.2%
Barium	5.5%	28.8%	4.8%	14.4%	4.4%	12.3%	3.9%	6.9%	2.2%	14.8%
Calcium	0.2%	2.6%	14.0%	12.1%	4.8%	14.7%	11.3%	24.1%	9.0%	26.8%
Chromium	--	--	4.7%	22.5%	1.9%	8.8%	0.9%	--	--	--
Copper	12.4%	8.4%	5.4%	11.3%	1.7%	17.9%	3.1%	8.2%	2.9%	13.1%
Iron	5.8%	19.0%	5.6%	2.9%	5.9%	13.3%	1.4%	9.5%	7.8%	2.3%
Magnesium	16.1%	21.0%	7.0%	27.4%	2.7%	11.9%	3.6%	3.3%	11.0%	2.0%
Manganese	3.2%	***35.5%***	11.9%	8.6%	9.2%	13.4%	2.6%	10.6%	12.6%	11.4%
Silicon	21.5%	2.8%	9.0%	11.9%	10.8%	15.6%	15.1%	14.8%	2.4%	17.8%
Sodium	24.0%	--	***60.1%***	6.4%	--	--	--	26.3%	3.3%	--
Vanadium	16.3%	***30.2%***	13.3%	13.5%	1.0%	8.8%	0.4%	14.5%	5.2%	2.8%
Zinc	4.8%	22.1%	11.7%	3.5%	2.1%	15.5%	2.0%	16.6%	6.2%	6.8%

[a]RPD listed where result produced, based on criteria. If RPD not required, no value is listed. The significance of the reported RPD values, including values greater than 30%, is addressed in the data quality assessment section of the CVP/RSVP.

Relative Percent Difference Results and QA/QC Analysis[a]

Analyte	Duplicate Analysis				
	001-030	001-054	001-067	001-076	001-080
Aluminum	8.5%	***55.7%***	10.5%	18.2%	16.0%
Barium	24.4%	***60.7%***	10.1%	23.3%	11.6%
Calcium	3.4%	25.2%	6.9%	20.6%	10.0%
Chromium	29.4%	--	--	--	--
Copper	10.6%	26.6%	2.1%	13.3%	3.3%
Iron	1.7%	***31.0%***	7.2%	20.1%	8.4%
Magnesium	13.6%	***43.8%***	7.6%	8.5%	10.5%
Manganese	17.1%	***51.1%***	15.8%	4.1%	***41.0%***
Silicon	3.1%	***79.4%***	24.3%	20.3%	5.6%
Sodium	7.2%	--	20.5%	--	5.2%
Vanadium	8.2%	***46.2%***	13.7%	16.0%	8.0%
Zinc	4.4%	***46.0%***	5.3%	24.6%	8.5%

[a]RPD listed where result produced, based on criteria. If RPD not required, no value is listed. The significance of the reported RPD values, including values greater than 30%, is addressed in the data quality assessment section of the CVP/RSVP.

Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

CALCULATION SHEET

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

Rev. No. 0
Date 04/08/13
Sheet No. 5 of 47

1 **100-C-7:1 Statistical Calculations**

2 **Verification Data - Upper Sidewall**

3 Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Boron mg/kg	Q	PQL	Cadmium mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL
5 SS-8	J1LHR1	10/17/11	1.92		0.773	40.8		0.387	0.206		0.155	1.55	U	1.55	0.0510	B	0.155	2.23		0.155	8.10		1.55	12.9		0.773
6 Duplicate of J1IHR1	J1LHR2	10/17/11	2.02		1.04	43.1		0.519	0.197	B	0.208	2.08	U	2.08	0.208	U	0.208	3.09		0.208	8.67		2.08	14.6		1.04
7 SS-1	J1LHR6	10/17/11	2.65		0.917	73.7		0.458	0.302		0.183	1.84		1.83	0.103	B	0.183	11.0		0.183	6.75		1.83	13.5		0.917
8 SS-2	J1LHR7	10/17/11	2.77		0.960	56.9		0.480	0.236		0.192	0.629	B	1.92	0.0687	B	0.192	5.65		0.192	7.57		1.92	13.2		0.960
9 SS-3	J1LHR5	10/17/11	2.88		1.02	77.0		0.510	0.317		0.204	2.18		2.04	0.100	B	0.204	12.2		0.204	6.87		2.04	13.7		1.02
10 SS-4	J1LHR4	10/17/11	4.24		0.953	50.0		0.476	0.289		0.191	1.05	B	1.91	0.0714	B	0.191	8.31		0.191	7.75		1.91	15.4		0.953
11 SS-5	J1LHT0	10/17/11	2.36		0.993	53.2		0.497	0.208		0.199	1.85	B	1.99	0.0785	B	0.199	7.00		0.199	4.97		1.99	10.8		0.993
12 SS-6	J1LHR3	10/17/11	4.36		1.03	70.1		0.516	0.324		0.207	0.969	B	2.07	0.0765	B	0.207	7.41		0.207	11.2		2.07	17.0		1.03
13 SS-7	J1LHR8	10/17/11	1.56		0.997	37.9		0.498	0.188	B	0.199	1.99	U	1.99	0.199	U	0.199	4.52		0.199	8.65		1.99	15.8		0.997
14 SS-9	J1LHT4	10/18/11	1.51		0.825	29.0	J	0.413	0.172		0.165	1.65	UJ	1.65	0.0528	JB	0.165	4.04		0.165	6.82		1.65	13.2	J	0.825
15 SS-10	J1LHR9	10/17/11	2.72		0.822	67.0		0.411	0.293		0.164	1.62	B	1.64	0.0777	B	0.164	9.79		0.164	7.07		1.64	14.6		0.822
16 SS-11	J1LHT3	10/18/11	1.08		0.694	21.6	J	0.347	0.139		0.139	1.39	UJ	1.39	0.0352	JB	0.139	1.48		0.139	5.89		1.39	10.5	J	0.694
17 SS-12	J1LHT1	10/17/11	1.63		0.945	35.0		0.473	0.186	B	0.189	0.500	B	1.89	0.0624	B	0.189	5.50		0.189	6.87		1.89	13.6		0.945
18 SS-13	J1LHT2	10/17/11	6.25		0.878	81.3		0.439	0.442		0.176	2.25		1.76	0.101	B	0.176	12.7		0.176	8.64		1.76	20.6		0.878

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20 **Statistical Computation Input Data**

21 Sample Area	Sample 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
23 SS-8	J1LHR1/ J1LHR2	10/17/11	1.97	42.0	0.202	0.908	0.0775	2.66	8.39	13.8
24 SS-1	J1LHR6	10/17/11	2.65	73.7	0.302	1.84	0.103	11.0	6.75	13.5
25 SS-2	J1LHR7	10/17/11	2.77	56.9	0.236	0.629	0.0687	5.65	7.57	13.2
26 SS-3	J1LHR5	10/17/11	2.88	77.0	0.317	2.18	0.100	12.2	6.87	13.7
27 SS-4	J1LHR4	10/17/11	4.24	50.0	0.289	1.05	0.0714	8.31	7.75	15.4
28 SS-5	J1LHT0	10/17/11	2.36	53.2	0.208	1.85	0.0785	7.00	4.97	10.8
29 SS-6	J1LHR3	10/17/11	4.36	70.1	0.324	0.969	0.0765	7.41	11.2	17.0
30 SS-7	J1LHR8	10/17/11	1.56	37.9	0.188	0.995	0.0995	4.52	8.65	15.8
31 SS-9	J1LHT4	10/18/11	1.51	29.0	0.172	0.825	0.0528	4.04	6.82	13.2
32 SS-10	J1LHR9	10/17/11	2.72	67.0	0.293	1.62	0.0777	9.79	7.07	14.6
33 SS-11	J1LHT3	10/18/11	1.08	21.6	0.139	0.695	0.0352	1.48	5.89	10.5
34 SS-12	J1LHT1	10/17/11	1.63	35.0	0.186	0.500	0.0624	5.50	6.87	13.6
35 SS-13	J1LHT2	10/17/11	6.25	81.3	0.442	2.25	0.101	12.7	8.64	20.6

36 **Statistical Computations**

37	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper
38 95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
39 N	13	13	13	13	13	13	13	13
40 % < Detection limit	0%	0%	0%	31%	8%	0%	0%	0%
41 mean	2.77	53.4	0.254	1.25	0.0772	7.10	7.50	14.3
42 st. dev.	1.44	19.5	0.0834	0.609	0.0203	3.57	1.53	2.60
43 95% UCL on mean	3.75	68.8	0.305	1.72	0.0873	11.2	8.34	15.7
44 max value	6.25	81.3	0.442	2.25	0.208	12.7	11.2	20.6
45 Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	320 GW Protection	0.81 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection	22.0 River Protection
46 WAC 173-340 3-PART TEST								
47 95% UCL > Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA
48 > 10% above Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA
49 Any sample > 2X Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA
50 WAC 173-340 Compliance?	Because all values are below background (6.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg) the WAC 173-340 3-part test is not required.

CALCULATION SHEET

Washington Closure Hanford
Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

Rev. No. 0
Date 04/08/13
Sheet No. 6 of 47

100-C-7:1 Statistical Calculations
Verification Data - Upper Sidewall

Sample Area	Sample Number	Sample Date	Lead mg/kg	Lead Q	Lead PQL	Manganese mg/kg	Manganese Q	Manganese PQL	Molybdenum mg/kg	Molybdenum Q	Molybdenum PQL	Nickel mg/kg	Nickel Q	Nickel PQL	Vanadium mg/kg	Vanadium Q	Vanadium PQL	Zinc mg/kg	Zinc Q	Zinc PQL
SS-8	J1LHR1	10/17/11	1.88		0.387	282		3.87	0.388	B	1.55	4.85		3.09	54.7	J	1.93	40.9	J	7.73
Duplicate of J1IHR1	J1LHR2	10/17/11	2.37		0.519	273		5.19	0.367	B	2.08	6.52		4.15	64.4	J	2.60	42.9	J	10.4
SS-1	J1LHR6	10/17/11	4.21		0.458	332		4.58	0.291	B	1.83	9.60		3.67	52.9	J	2.29	39.2	J	9.17
SS-2	J1LHR7	10/17/11	3.78		0.480	318		4.80	0.339	B	1.92	8.23		3.84	62.0	J	2.40	42.4	J	9.60
SS-3	J1LHR5	10/17/11	5.12		0.510	339		5.10	0.302	B	2.04	10.5		4.08	52.0	J	2.55	41.6	J	10.2
SS-4	J1LHR4	10/17/11	5.00		0.476	334		4.76	0.407	B	1.91	12.1		3.81	61.6	J	2.38	46.7	J	9.53
SS-5	J1LHT0	10/17/11	6.52		0.497	234		4.97	0.276	B	1.99	7.35		3.97	41.9	J	2.48	33.0	J	9.93
SS-6	J1LHR3	10/17/11	5.30		0.516	447		5.16	0.465	B	2.07	9.99		4.13	70.3	J	2.58	50.4	J	10.3
SS-7	J1LHR8	10/17/11	1.97		0.498	266		4.98	0.360	B	1.99	6.92		3.99	70.5	J	2.49	42.8	J	9.97
SS-9	J1LHT4	10/18/11	1.87	J	0.413	208		4.13	0.278	B	1.65	6.48		3.30	39.4		2.06	29.1	J	8.25
SS-10	J1LHR9	10/17/11	4.70		0.411	328		4.11	0.330	B	1.64	10.7		3.29	48.2	J	2.06	39.8	J	8.22
SS-11	J1LHT3	10/18/11	1.36	J	0.347	196		3.47	0.243	B	1.39	3.27		2.77	44.6		1.73	28.0	J	6.94
SS-12	J1LHT1	10/17/11	2.19		0.473	291		4.73	0.375	B	1.89	8.62		3.78	69.6	J	2.36	41.8	J	9.45
SS-13	J1LHT2	10/17/11	7.88		0.439	416		4.39	0.394	B	1.76	14.5		3.51	53.0	J	2.20	51.8	J	8.78

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Lead mg/kg	Manganese mg/kg	Molybdenum mg/kg	Nickel mg/kg	Vanadium mg/kg	Zinc mg/kg
SS-8	J1LHR1/ J1LHR2	10/17/11	2.13	278	0.378	5.69	59.6	41.9
SS-1	J1LHR6	10/17/11	4.21	332	0.291	9.60	52.9	39.2
SS-2	J1LHR7	10/17/11	3.78	318	0.339	8.23	62.0	42.4
SS-3	J1LHR5	10/17/11	5.12	339	0.302	10.5	52.0	41.6
SS-4	J1LHR4	10/17/11	5.00	334	0.407	12.1	61.6	46.7
SS-5	J1LHT0	10/17/11	6.52	234	0.276	7.35	41.9	33.0
SS-6	J1LHR3	10/17/11	5.30	447	0.465	10.0	70.3	50.4
SS-7	J1LHR8	10/17/11	1.97	266	0.360	6.92	70.5	42.8
SS-9	J1LHT4	10/18/11	1.87	208	0.278	6.48	39.4	29.1
SS-10	J1LHR9	10/17/11	4.70	328	0.330	10.7	48.2	39.8
SS-11	J1LHT3	10/18/11	1.36	196	0.243	3.27	44.6	28.0
SS-12	J1LHT1	10/17/11	2.19	291	0.375	8.62	69.6	41.8
SS-13	J1LHT2	10/17/11	7.88	416	0.394	14.5	53.0	51.8

Statistical Computations

	Lead	Manganese	Molybdenum	Nickel	Vanadium	Zinc
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
N	13	13	13	13	13	13
% < Detection limit	0%	0%	0%	0%	0%	0%
mean	4.00	307	0.341	8.77	55.8	40.7
st. dev.	2.01	73.4	0.0628	2.94	10.7	7.20
95% UCL on mean	5.80	351	0.377	11.0	62.0	45.0
max value	7.88	447	0.465	14.5	70.5	51.8
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	10.2 GW & River Protection	512 GW Protection	8 GW Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection
WAC 173-340 3-PART TEST						
95% UCL > Cleanup Limit?	NA	NA	NO	NA	NA	NA
> 10% above Cleanup Limit?	NA	NA	NO	NA	NA	NA
Any sample > 2X Cleanup Limit?	NA	NA	NO	NA	NA	NA
WAC 173-340 Compliance?	Because all values are below background (10.2 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

Rev. No. 0
Date 04/08/13
Sheet No. 7 of 47

1 **100-C-7:1 Statistical Calculations**
2 **Verification Data - Lower Sidewall**

3	Sample	Sample	Sample	Arsenic			Barium			Beryllium			Cadmium			Chromium			Cobalt			Copper			Lead		
4	Area	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
5	LSW-5	J1NPN7	4/24/12	1.09		0.717	36.1		0.358	0.157		0.143	0.0373	B	0.143	1.60		0.143	5.79		1.43	10.7	J	0.717	1.18	J	0.358
6	Duplicate of J1NPN7	J1NPP5	4/24/12	0.827		0.747	27.0		0.374	0.160		0.149	0.149	U	0.149	1.09		0.149	5.09		1.49	9.84	J	0.747	1.13	J	0.374
7	LSW-1	J1NPN3	4/24/12	1.12		0.727	44.6		0.364	0.191		0.145	0.0428	B	0.145	2.29		0.145	5.74		1.45	11.2	J	0.727	1.46	J	0.364
8	LSW-2	J1NPN4	4/24/12	1.09		0.839	39.9		0.419	0.198		0.168	0.0449	B	0.168	1.80		0.168	6.30		1.68	11.6	J	0.839	1.31	J	0.419
9	LSW-3	J1NPN5	4/24/12	2.16		0.890	59.1		0.445	0.316		0.178	0.0472	B	0.178	6.33		0.178	8.68		1.78	16.1	J	0.890	2.94	J	0.445
10	LSW-4	J1NPN6	4/24/12	1.38		0.879	107		0.440	0.213		0.176	0.176	U	0.176	3.33		0.176	8.59		1.76	12.8	J	0.879	1.68	J	0.440
11	LSW-6	J1NPN8	4/24/12	1.35		0.716	49.6		0.358	0.216		0.143	0.0405	B	0.143	2.69		0.143	6.99		1.43	12.1	J	0.716	1.86	J	0.358
12	LSW-7	J1NPN9	4/24/12	1.01		0.782	39.4		0.391	0.162		0.156	0.156	U	0.156	1.62		0.156	5.82		1.56	10.3	J	0.782	1.29	J	0.391
13	LSW-8	J1NPP0	4/24/12	1.30		0.696	40.8		0.348	0.168		0.139	0.139	U	0.139	2.08		0.139	6.21		1.39	11.0	J	0.696	1.46	J	0.348
14	LSW-9	J1NPP1	4/24/12	1.43		0.852	46.1		0.426	0.193		0.170	0.170	U	0.170	2.93		0.170	7.24		1.70	12.2	J	0.852	1.94	J	0.426
15	LSW-10	J1NPP2	4/24/12	0.704		0.696	20.9		0.348	0.0805	B	0.139	0.139	U	0.139	0.533		0.139	4.53		1.39	10.9	J	0.696	0.763	J	0.348
16	LSW-11	J1NPP3	4/24/12	1.21		0.803	32.9		0.402	0.156	B	0.161	0.0411	B	0.161	2.03		0.161	6.20		1.61	12.6	J	0.803	1.19	J	0.402
17	LSW-12	J1NPP4	4/24/12	0.992		0.665	24.1		0.332	0.139		0.133	0.133	U	0.133	1.80		0.133	5.75		1.33	12.0	J	0.665	1.17	J	0.332

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19 **Statistical Computation Input Data**

20	Sample	Sample	Sample	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead
21	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
22	LSW-5	J1NPN7/ J1NPP5	4/24/12	0.959	31.6	0.159	0.0559	1.35	5.44	10.3	1.16
23	LSW-1	J1NPN3	4/24/12	1.12	44.6	0.191	0.0428	2.29	5.74	11.2	1.46
24	LSW-2	J1NPN4	4/24/12	1.09	39.9	0.198	0.0449	1.80	6.30	11.6	1.31
25	LSW-3	J1NPN5	4/24/12	2.16	59.1	0.316	0.0472	6.33	8.68	16.1	2.94
26	LSW-4	J1NPN6	4/24/12	1.38	107	0.213	0.0880	3.33	8.59	12.8	1.68
27	LSW-6	J1NPN8	4/24/12	1.35	49.6	0.216	0.0405	2.69	6.99	12.1	1.86
28	LSW-7	J1NPN9	4/24/12	1.01	39.4	0.162	0.0780	1.62	5.82	10.3	1.29
29	LSW-8	J1NPP0	4/24/12	1.30	40.8	0.168	0.0695	2.08	6.21	11.0	1.46
30	LSW-9	J1NPP1	4/24/12	1.43	46.1	0.193	0.0850	2.93	7.24	12.2	1.94
31	LSW-10	J1NPP2	4/24/12	0.704	20.9	0.0805	0.0695	0.533	4.53	10.9	0.763
32	LSW-11	J1NPP3	4/24/12	1.21	32.9	0.156	0.0411	2.03	6.20	12.6	1.19
33	LSW-12	J1NPP4	4/24/12	0.992	24.1	0.139	0.0665	1.80	5.75	12.0	1.17

34 **Statistical Computations**

35		Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead
36	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
37	N	12	12	12	12	12	12	12	12
38	% < Detection limit	0%	0%	0%	50%	0%	0%	0%	0%
39	mean	1.23	44.7	0.183	0.0607	2.40	6.46	11.9	1.52
40	st. dev.	0.361	22.3	0.0560	0.0176	1.44	1.23	1.56	0.554
41	95% UCL on mean	1.44	58.0	0.209	0.0722	3.66	7.17	12.7	1.86
42	max value	2.16	107	0.316	0.176	6.33	8.68	16.1	2.94
43	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	0.81 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection	22.0 River Protection	10.2 GW & River Protection
44	**WAC 173-340 3-PART TEST**								
45	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NA
46	> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NA
47	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NA
48	**WAC 173-340 Compliance?**	Because all values are below background (6.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (10.2 mg/kg) the WAC 173-340 3-part test is not required.

CALCULATION SHEET

Washington Closure Hanford
Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

Rev. No. 0
Date 04/08/13
Sheet No. 8 of 47

1 **100-C-7:1 Statistical Calculations**
2 **Verification Data - Lower Sidewall**

3	Sample	Sample	Sample	Manganese			Molybdenum			Nickel			Vanadium			Zinc		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	LSW-5	J1NPN7	4/24/12	219		3.58	0.379	B	1.43	3.47	J	2.87	50.3	J	1.79	32.1	J	7.17
6	Duplicate of J1NPN7	J1NPP5	4/24/12	153		3.74	0.170	B	1.49	3.38	J	2.99	37.1	J	1.87	25.7	J	7.47
7	LSW-1	J1NPN3	4/24/12	256		3.64	0.277	B	1.45	4.30	J	2.91	58.7	J	1.82	34.8	J	7.27
8	LSW-2	J1NPN4	4/24/12	296		4.19	0.334	B	1.68	3.65	J	3.36	60.4	J	2.10	35.1	J	8.39
9	LSW-3	J1NPN5	4/24/12	346		4.45	0.328	B	1.78	8.81	J	3.56	61.7	J	2.22	44.7	J	8.90
10	LSW-4	J1NPN6	4/24/12	379		4.40	0.348	B	1.76	6.29	J	3.52	58.5	J	2.20	38.8	J	8.79
11	LSW-6	J1NPN8	4/24/12	287		3.58	0.271	B	1.43	4.89	J	2.86	54.0	J	1.79	36.8	J	7.16
12	LSW-7	J1NPN9	4/24/12	225		3.91	0.237	B	1.56	3.39	J	3.13	46.4	J	1.95	30.9	J	7.82
13	LSW-8	J1NPP0	4/24/12	246		3.48	0.261	B	1.39	4.20	J	2.78	52.7	J	1.74	33.8	J	6.96
14	LSW-9	J1NPP1	4/24/12	288		4.26	0.272	B	1.70	5.17	J	3.41	48.1	J	2.13	33.6	J	8.52
15	LSW-10	J1NPP2	4/24/12	152		3.48	1.39	U	1.39	1.96	JB	2.78	25.9	J	1.74	17.3	J	6.96
16	LSW-11	J1NPP3	4/24/12	238		4.02	0.231	B	1.61	4.26	J	3.21	47.0	J	2.01	32.3	J	8.03
17	LSW-12	J1NPP4	4/24/12	178		3.32	0.164	B	1.33	3.60	J	2.66	37.5	J	1.66	27.2	J	6.65

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19 **Statistical Computation Input Data**

20	Sample	Sample	Sample	Manganese	Molybdenum	Nickel	Vanadium	Zinc
21	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
22	LSW-5	J1NPN7/ J1NPP5	4/24/12	186	0.275	3.43	43.7	28.9
23	LSW-1	J1NPN3	4/24/12	256	0.277	4.30	58.7	34.8
24	LSW-2	J1NPN4	4/24/12	296	0.334	3.65	60.4	35.1
25	LSW-3	J1NPN5	4/24/12	346	0.328	8.81	61.7	44.7
26	LSW-4	J1NPN6	4/24/12	379	0.348	6.29	58.5	38.8
27	LSW-6	J1NPN8	4/24/12	287	0.271	4.89	54.0	36.8
28	LSW-7	J1NPN9	4/24/12	225	0.237	3.39	46.4	30.9
29	LSW-8	J1NPP0	4/24/12	246	0.261	4.20	52.7	33.8
30	LSW-9	J1NPP1	4/24/12	288	0.272	5.17	48.1	33.6
31	LSW-10	J1NPP2	4/24/12	152	0.695	1.96	25.9	17.3
32	LSW-11	J1NPP3	4/24/12	238	0.231	4.26	47.0	32.3
33	LSW-12	J1NPP4	4/24/12	178	0.164	3.60	37.5	27.2

34 **Statistical Computations**

35		Manganese	Molybdenum	Nickel	Vanadium	Zinc
36	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.
37	N	12	12	12	12	12
38	% < Detection limit	0%	8%	0%	0%	0%
39	mean	256	0.308	4.50	49.6	32.9
40	st. dev.	67.4	0.132	1.73	10.5	6.71
41	95% UCL on mean	301	0.370	5.64	55.0	36.3
42	max value	379	1.39	8.81	61.7	44.7
43	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	512 GW Protection	8 GW Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection
44	**WAC 173-340 3-PART TEST**					
45	95% UCL > Cleanup Limit?	NA	NO	NA	NA	NA
46	> 10% above Cleanup Limit?	NA	NO	NA	NA	NA
47	Any sample > 2X Cleanup Limit?	NA	NO	NA	NA	NA
48	**WAC 173-340 Compliance?**	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.

CALCULATION SHEET

Washington Closure Hanford
Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14555

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

Rev. No. 0
Date 04/08/13
Sheet No. 9 of 47

1 **100-C-7:1 Statistical Calculations**
2 **Verification Data - West Sidewall**

3	Sample	Sample	Sample	Arsenic			Barium			Beryllium			Chromium			Cobalt			Copper			Lead			Manganese		
4	Area	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
5	WSW-8	J1R620	12/27/12	2.99		2.67	62.4		1.34	0.307	B	0.535	10.4		0.535	7.75		5.35	17.2		2.67	4.16		1.34	307		13.4
6	Duplicate of J1R620	J1R625	12/27/12	3.01		2.79	65.5		1.40	0.317	B	0.558	10.9		0.558	8.20		5.58	16.3		2.79	4.39		1.40	346		14.0
7	WSW-1	J1R613	12/27/12	2.02	B	2.72	59.3		1.36	0.288	B	0.544	9.31		0.544	8.30		5.44	26.1		2.72	3.72		1.36	375		13.6
8	WSW-2	J1R614	1/15/13	2.49	B	2.98	68.7		1.49	0.305	B	0.595	6.82		0.595	10.0		5.95	17.3		2.98	3.59		1.49	360		14.9
9	WSW-3	J1R615	12/27/12	2.35	B	2.94	82.6		1.47	0.213	B	0.587	16.0		0.587	8.74		5.87	16.6		2.94	2.95		1.47	350		14.7
10	WSW-4	J1R616	2/11/13	1.62	B	2.65	59.1		1.32	0.230	B	0.529	4.31		0.529	10.1		5.29	16.8		2.65	2.73		1.32	353		13.2
11	WSW-5	J1R617	1/15/13	1.62	B	2.57	42.9		1.28	0.234	B	0.514	4.45		0.514	8.69		5.14	16.2		2.57	2.69		1.28	316		12.8
12	WSW-6	J1R618	2/11/13	1.68	B	2.73	49.7		1.36	0.231	B	0.546	3.94		0.546	10.5		5.46	15.4		2.73	2.46		1.36	377		13.6
13	WSW-7	J1R619	12/27/12	1.29	B	2.85	38.5		1.42	0.235	B	0.570	4.19		0.570	9.27		5.70	16.4		2.85	2.48		1.42	260		14.2
14	WSW-9	J1R621	2/11/13	1.33	B	2.77	81.2		1.39	0.210	B	0.554	2.09		0.554	10.1		5.54	14.8		2.77	2.27		1.39	353		13.9
15	WSW-10	J1R622	12/27/12	2.10	B	3.04	34.4		1.52	0.226	B	0.608	4.88		0.608	8.82		6.08	14.7		3.04	2.65		1.52	305		15.2
16	WSW-11	J1R623	1/15/13	1.59	B	2.80	54.2		1.40	0.229	B	0.559	2.95		0.559	9.68		5.59	16.2		2.80	2.11		1.40	310		14.0
17	WSW-12	J1R624	1/15/13	4.46		2.95	111		1.47	0.435	B	0.590	21.5		0.590	8.03		5.90	18.4		2.95	7.36		1.47	375		14.7

18
19 **Statistical Computation Input Data**

20	Sample	Sample	Sample	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Manganese
21	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
22	WSW-8	J1R620/ J1R625	12/27/12	3.00	64.0	0.312	10.7	7.98	16.8	4.28	327
23	WSW-1	J1R613	12/27/12	2.02	59.3	0.288	9.31	8.30	26.1	3.72	375
24	WSW-2	J1R614	1/15/13	2.49	68.7	0.305	6.82	10.0	17.3	3.59	360
25	WSW-3	J1R615	12/27/12	2.35	82.6	0.213	16.0	8.74	16.6	2.95	350
26	WSW-4	J1R616	2/11/13	1.62	59.1	0.230	4.31	10.1	16.8	2.73	353
27	WSW-5	J1R617	1/15/13	1.62	42.9	0.234	4.45	8.69	16.2	2.69	316
28	WSW-6	J1R618	2/11/13	1.68	49.7	0.231	3.94	10.5	15.4	2.46	377
29	WSW-7	J1R619	12/27/12	1.29	38.5	0.235	4.19	9.27	16.4	2.48	260
30	WSW-9	J1R621	2/11/13	1.33	81.2	0.210	2.09	10.1	14.8	2.27	353
31	WSW-10	J1R622	12/27/12	2.10	34.4	0.226	4.88	8.82	14.7	2.65	305
32	WSW-11	J1R623	1/15/13	1.59	54.2	0.229	2.95	9.68	16.2	2.11	310
33	WSW-12	J1R624	1/15/13	4.46	111	0.435	21.5	8.03	18.4	7.36	375

34 **Statistical Computations**

35		Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Manganese
36	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat normal distribution.
37	N	12	12	12	12	12	12	12	12
38	% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%
39	mean	2.13	62.1	0.262	7.59	9.18	17.1	3.27	338
40	st. dev.	0.891	21.6	0.0646	5.89	0.88	3.00	1.44	35.6
41	95% UCL on mean	2.64	76.2	0.293	12.6	9.67	18.6	3.96	357
42	max value	4.46	111	0.435	21.5	10.5	26.1	7.36	377
43	Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection	22.0 River Protection	10.2 GW & River Protection	512 GW & River Protection
44	WAC 173-340 3-PART TEST								
45	95% UCL > Cleanup Limit?	NA	NA	NA	NO	NA	NO	NA	NA
46	> 10% above Cleanup Limit?	NA	NA	NA	NO	NA	NO	NA	NA
47	Any sample > 2X Cleanup Limit?	NA	NA	NA	NO	NA	NO	NA	NA
48	WAC 173-340 Compliance?	Because all values are below background (6.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (10.2 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.

CALCULATION SHEET

Washington Closure Hanford
Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

Rev. No. 0
Date 04/08/13
Sheet No. 10 of 47

1 **100-C-7:1 Statistical Calculations**
2 **Verification Data - West Sidewall**

3	Sample	Sample	Sample	Nickel			Vanadium			Zinc		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	WSW-8	J1R620	12/27/12	11		10.7	58.3		6.68	41.8		26.7
6	Duplicate of J1R620	J1R625	12/27/12	12.2		11.2	66.6		6.98	47.0		27.9
7	WSW-1	J1R613	12/27/12	9.37	B	10.9	57.0		6.80	42.8		27.2
8	WSW-2	J1R614	1/15/13	8.29	B	11.9	74.6		7.44	51.2		29.8
9	WSW-3	J1R615	12/27/12	8.79	B	11.7	62.3		7.34	43.9		29.4
10	WSW-4	J1R616	2/11/13	6.07	B	10.6	96.1		6.61	54.4		26.5
11	WSW-5	J1R617	1/15/13	6.11	B	10.3	83.2		6.42	48.1		25.7
12	WSW-6	J1R618	2/11/13	6.47	B	10.9	95.1		6.82	53.5		27.3
13	WSW-7	J1R619	12/27/12	7.44	B	11.4	57.8		7.12	44.2		28.5
14	WSW-9	J1R621	2/11/13	4.51	B	11.1	84.8		6.93	49.0		27.7
15	WSW-10	J1R622	12/27/12	6.85	B	12.2	77.1		7.60	46.4		30.4
16	WSW-11	J1R623	1/15/13	5.22	B	11.2	79.4		6.99	50.4		28.0
17	WSW-12	J1R624	1/15/13	18.2		11.8	58.0		7.37	55.0		29.5

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19 **Statistical Computation Input Data**

20	Sample	Sample	Sample	Nickel			Vanadium			Zinc		
21	Area	Number	Date	mg/kg			mg/kg			mg/kg		
22	WSW-8	J1R620/ J1R625	12/27/12	11.6			62.5			44.4		
23	WSW-1	J1R613	12/27/12	9.37			57.0			42.8		
24	WSW-2	J1R614	1/15/13	8.29			74.6			51.2		
25	WSW-3	J1R615	12/27/12	8.79			62.3			43.9		
26	WSW-4	J1R616	2/11/13	6.07			96.1			54.4		
27	WSW-5	J1R617	1/15/13	6.11			83.2			48.1		
28	WSW-6	J1R618	2/11/13	6.47			95.1			53.5		
29	WSW-7	J1R619	12/27/12	7.44			57.8			44.2		
30	WSW-9	J1R621	2/11/13	4.51			84.8			49.0		
31	WSW-10	J1R622	12/27/12	6.85			77.1			46.4		
32	WSW-11	J1R623	1/15/13	5.22			79.4			50.4		
33	WSW-12	J1R624	1/15/13	18.2			58.0			55.0		

34 **Statistical Computations**

35		Nickel		Vanadium		Zinc	
36	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.		Large data set (n ≥ 10), use MTCAStat lognormal distribution.		Large data set (n ≥ 10), use MTCAStat lognormal distribution.	
37	N	12		12		12	
38	% < Detection limit	0%		0%		0%	
39	mean	8.24		74.0		48.6	
40	st. dev.	3.69		14.3		4.33	
41	95% UCL on mean	10.3		82.5		51.0	
42	max value	18.2		96.1		55.0	
43	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	19.1	GW Protection	85.1	GW Protection	67.8	River Protection
44	**WAC 173-340 3-PART TEST**						
45	95% UCL > Cleanup Limit?	NA		NO		NA	
46	> 10% above Cleanup Limit?	NA		YES		NA	
47	Any sample > 2X Cleanup Limit?	NA		NO		NA	
48	**WAC 173-340 Compliance?**	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.		A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.		Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.	

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

Rev. No. 0
Date 04/08/13
Sheet No. 11 of 47

1 **100-C-7:1 Statistical Calculations**

2 **Verification Data - Staging Pile Area 1**

Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Boron mg/kg	Q	PQL	Cadmium mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL
SPA1-1	J1PTJ7	7/9/12	2.06		0.975	81.2		0.487	0.268		0.195	3.30		1.95	0.122	B	0.195	9.25		1.95	5.70		1.95	13.3		0.975
Duplicate of J1PTJ7	J1PTL2	7/9/12	2.53		0.923	70.3		0.461	0.258		0.185	3.21		1.85	0.125	B	0.185	11.6		0.185	6.03		1.85	14.9		0.923
SPA1-2	J1PTJ8	7/9/12	2.69		0.941	55.6		0.470	0.280		0.188	1.74	B	1.88	0.0698	B	0.188	10.5		0.188	7.13		1.88	13.7		0.941
SPA1-3	J1PTJ9	7/9/12	2.26		1.00	65.8		0.501	0.302		0.200	1.73	B	2.00	0.0903	B	0.200	9.59		0.200	6.12		2.00	11.3		1.00
SPA1-4	J1PTK0	7/9/12	2.19		0.996	72.7		0.498	0.255		0.199	2.16		1.99	0.0959	B	0.199	8.01		0.199	6.15		1.99	14.2		0.996
SPA1-5	J1PTK1	7/9/12	2.65		0.949	67.4		0.475	0.301		0.190	1.75	B	1.90	0.0869	B	0.190	10.2		0.190	6.12		1.90	11.7		0.949
SPA1-6	J1PTK2	7/9/12	2.63		0.958	66.8		0.479	0.284		0.192	1.94		1.92	0.105	B	0.192	11.5		0.192	5.73		1.92	11.1		0.958
SPA1-7	J1PTK3	7/9/12	2.36		0.953	62.8		0.476	0.284		0.191	1.69	B	1.91	0.0824	B	0.191	9.38		0.191	6.14		1.91	13.1		0.953
SPA1-8	J1PTK4	7/9/12	2.00		0.976	64.4		0.488	0.265		0.195	1.35	B	1.95	0.0712	B	0.195	8.79		0.195	6.65		1.95	13.6		0.976
SPA1-9	J1PTK5	7/9/12	2.49		0.873	69.9		0.437	0.286		0.175	2.28		1.75	0.0957	B	0.175	12.7		0.175	5.74		1.75	11.0		0.873
SPA1-10	J1PTK6	7/9/12	2.09		0.986	58.2		0.493	0.196	B	0.197	1.64	B	1.97	0.0709	B	0.197	14.9		0.197	4.43		1.97	10.2		0.986
SPA1-11	J1PTK7	7/9/12	2.59		0.964	73.1		0.482	0.270		0.193	2.66		1.93	0.0874	B	0.193	8.33		0.193	6.62		1.93	14.0		0.964
SPA1-12	J1PTK8	7/9/12	3.83		1.00	75.5		0.500	0.313		0.200	1.26	B	2.00	0.0708	B	0.200	17.0		0.200	8.33		2.00	15.4		1.00
SPA1-13	J1PTK9	7/9/12	2.71		0.86	70.1		0.430	0.272		0.172	2.53		1.72	0.0839	B	0.172	9.47		0.172	6.61		1.72	13.6		0.860
SPA1-14	J1PTL0	7/9/12	2.62		0.997	75.4		0.498	0.281		0.199	3.16		1.99	0.0993	B	0.199	8.76		0.199	6.33		1.99	14.3		0.997
SPA1-15	J1PTL1	7/9/12	22.0		1.03	101		0.516	0.229		0.206	6.91		2.06	0.0569	B	0.206	10.9		0.206	6.61		2.06	31.2		1.03

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22 **Statistical Computation Input Data**

Sample Area	Sample 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
SPA1-1	J1PTJ7/ J1PTL2	7/9/12	2.30	75.8	0.263	3.26	0.124	10.4	5.87	14.1
SPA1-2	J1PTJ8	7/9/12	2.69	55.6	0.280	1.74	0.0698	10.5	7.13	13.7
SPA1-3	J1PTJ9	7/9/12	2.26	65.8	0.302	1.73	0.0903	9.59	6.12	11.3
SPA1-4	J1PTK0	7/9/12	2.19	72.7	0.255	2.16	0.0959	8.01	6.15	14.2
SPA1-5	J1PTK1	7/9/12	2.65	67.4	0.301	1.75	0.0869	10.2	6.12	11.7
SPA1-6	J1PTK2	7/9/12	2.63	66.8	0.284	1.94	0.105	11.5	5.73	11.1
SPA1-7	J1PTK3	7/9/12	2.36	62.8	0.284	1.69	0.0824	9.38	6.14	13.1
SPA1-8	J1PTK4	7/9/12	2.00	64.4	0.265	1.35	0.0712	8.79	6.65	13.6
SPA1-9	J1PTK5	7/9/12	2.49	69.9	0.286	2.28	0.0957	12.7	5.74	11.0
SPA1-10	J1PTK6	7/9/12	2.09	58.2	0.196	1.64	0.0709	14.9	4.43	10.2
SPA1-11	J1PTK7	7/9/12	2.59	73.1	0.270	2.66	0.0874	8.33	6.62	14.0
SPA1-12	J1PTK8	7/9/12	3.83	75.5	0.313	1.26	0.0708	17.0	8.33	15.4
SPA1-13	J1PTK9	7/9/12	2.71	70.1	0.272	2.53	0.0839	9.47	6.61	13.6
SPA1-14	J1PTL0	7/9/12	2.62	75.4	0.281	3.16	0.0993	8.76	6.33	14.3
SPA1-15	J1PTL1	7/9/12	22.0	101	0.229	6.91	0.0569	10.9	6.61	31.2

40 **Statistical Computations**

	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper
95% UCL based on	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	15	15	15	15	15	15	15	15
% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%
mean	3.83	70.3	0.272	2.40	0.0860	10.7	6.31	14.2
st. dev.	5.05	10.5	0.0294	1.38	0.0168	2.49	0.83	4.95
95% UCL on mean	5.97	74.7	0.285	2.99	0.0947	11.9	6.66	16.3
max value	22.0	101	0.313	6.91	0.125	17.0	8.33	31.2
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	320 GW Protection	0.81 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection	22.0 River Protection
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?	NO	NA	NA	NO	NA	NA	NA	NO
> 10% above Cleanup Limit?	NO	NA	NA	NO	NA	NA	NA	NO
Any sample > 2X Cleanup Limit?	NO	NA	NA	NO	NA	NA	NA	NO
WAC 173-340 Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie	Date 04/08/13	Calc. No. 0100C-CA-V0044	Rev. No. 0
Project 100 B/C Field Remediation	Job No. 14655	Checked N. K. Schiffern	Date 04/08/13
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations			Sheet No. 12 of 47

100-C-7:1 Statistical Calculations

Verification Data - Staging Pile Area 1

Sample Area	Sample Number	Sample Date	Lead mg/kg	Lead Q	Lead PQL	Manganese mg/kg	Manganese Q	Manganese PQL	Mercury mg/kg	Mercury Q	Mercury PQL	Molybdenum mg/kg	Molybdenum Q	Molybdenum PQL	Nickel mg/kg	Nickel Q	Nickel PQL	Vanadium mg/kg	Vanadium Q	Vanadium PQL	Zinc mg/kg	Zinc Q	Zinc PQL
SPA1-1	J1PTJ7	7/9/12	6.21		0.487	266		4.87	0.0477		0.0253	0.394	B	1.95	8.87		3.90	46.7		2.44	39.4		9.75
Duplicate of J1PTJ7	J1PTL2	7/9/12	5.18		0.461	244		4.61	0.0119	B	0.0261	0.376	B	1.85	14.7		3.69	40.8		2.31	40.8		9.23
SPA1-2	J1PTJ8	7/9/12	3.55		0.470	304		4.70	0.0254	U	0.0254	0.441	B	1.88	10.7		3.76	48.5		2.35	39.9		9.41
SPA1-3	J1PTJ9	7/9/12	3.32		0.501	302		5.01	0.0242	U	0.0242	0.325	B	2.00	9.13		4.01	45.0		2.50	36.9		10.0
SPA1-4	J1PTK0	7/9/12	4.81		0.498	257		4.98	0.0254	U	0.0254	0.425	B	1.99	9.03		3.98	47.8		2.49	39.1		9.96
SPA1-5	J1PTK1	7/9/12	3.39		0.475	290		4.75	0.0115	B	0.0256	0.334	B	1.90	9.19		3.80	43.3		2.37	37.2		9.49
SPA1-6	J1PTK2	7/9/12	4.65		0.479	277		4.79	0.0277	U	0.0277	0.329	B	1.92	8.65		3.83	43.4		2.39	38.7		9.58
SPA1-7	J1PTK3	7/9/12	3.26		0.476	264		4.76	0.0241	B	0.0252	0.316	B	1.91	9.37		3.81	43.4		2.38	36.9		9.53
SPA1-8	J1PTK4	7/9/12	2.89		0.488	266		4.88	0.208		0.0247	0.344	B	1.95	8.02		3.90	46.1		2.44	39.1		9.76
SPA1-9	J1PTK5	7/9/12	3.46		0.437	282		4.37	0.0290	U	0.0290	0.299	B	1.75	9.43		3.49	41.6		2.18	37.4		8.73
SPA1-10	J1PTK6	7/9/12	2.98		0.493	179		4.93	0.0245	U	0.0245	1.97	U	1.97	19.2		3.94	17.2		2.47	24.5		9.86
SPA1-11	J1PTK7	7/9/12	4.46		0.482	256		4.82	0.0171	B	0.0263	0.287	B	1.93	14.5		3.86	41.5		2.41	38.3		9.64
SPA1-12	J1PTK8	7/9/12	4.54		0.500	323		5.00	0.0213	B	0.0242	0.465	B	2.00	12.4		4.00	56.3		2.50	49.9		10.0
SPA1-13	J1PTK9	7/9/12	3.87		0.430	271		4.30	0.0825		0.0247	0.385	B	1.72	8.86		3.44	50.2		2.15	39.8		8.60
SPA1-14	J1PTL0	7/9/12	4.37		0.498	278		4.98	0.0152	B	0.0261	0.352	B	1.99	8.63		3.99	49.0		2.49	42.2		9.97
SPA1-15	J1PTL1	7/9/12	7.59		0.516	228		5.16	0.0287	U	0.0287	0.803	B	2.06	9.16		4.13	40.3		2.58	124		10.3

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Lead mg/kg	Manganese mg/kg	Mercury mg/kg	Molybdenum mg/kg	Nickel mg/kg	Vanadium mg/kg	Zinc mg/kg
SPA1-1	J1PTJ7/ J1PTL2	7/9/12	5.70	255	0.0298	0.385	11.8	43.8	40.1
SPA1-2	J1PTJ8	7/9/12	3.55	304	0.0127	0.441	10.7	48.5	39.9
SPA1-3	J1PTJ9	7/9/12	3.32	302	0.0121	0.325	9.13	45.0	36.9
SPA1-4	J1PTK0	7/9/12	4.81	257	0.0127	0.425	9.03	47.8	39.1
SPA1-5	J1PTK1	7/9/12	3.39	290	0.0115	0.334	9.19	43.3	37.2
SPA1-6	J1PTK2	7/9/12	4.65	277	0.0139	0.329	8.65	43.4	38.7
SPA1-7	J1PTK3	7/9/12	3.26	264	0.0241	0.316	9.37	43.4	36.9
SPA1-8	J1PTK4	7/9/12	2.89	266	0.208	0.344	8.02	46.1	39.1
SPA1-9	J1PTK5	7/9/12	3.46	282	0.0145	0.299	9.43	41.6	37.4
SPA1-10	J1PTK6	7/9/12	2.98	179	0.0123	0.985	19.2	17.2	24.5
SPA1-11	J1PTK7	7/9/12	4.46	256	0.0171	0.287	14.5	41.5	38.3
SPA1-12	J1PTK8	7/9/12	4.54	323	0.0213	0.465	12.4	56.3	49.9
SPA1-13	J1PTK9	7/9/12	3.87	271	0.0825	0.385	8.86	50.2	39.8
SPA1-14	J1PTL0	7/9/12	4.37	278	0.0152	0.352	8.63	49.0	42.2
SPA1-15	J1PTL1	7/9/12	7.59	228	0.0144	0.803	9.16	40.3	124

Statistical Computations

	Lead	Manganese	Mercury	Molybdenum	Nickel	Vanadium	Zinc
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	15	15	15	15	15	15	15
% < Detection limit	0%	0%	47%	7%	0%	0%	0%
mean	4.19	269	0.0335	0.432	10.5	43.8	44.3
st. dev.	1.23	34.1	0.0515	0.198	2.96	8.45	22.6
95% UCL on mean	4.77	284	0.0550	0.516	11.8	47.4	53.9
max value	7.59	323	0.208	1.97	19.2	56.3	124
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	10.2 GW & River Protection	512 GW & River Protection	0.33 GW & River Protection	8 GW Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection
WAC 173-340 3-PART TEST							
95% UCL > Cleanup Limit?	NA	NA	NA	NO	NO	NA	NO
> 10% above Cleanup Limit?	NA	NA	NA	NO	NO	NA	NO
Any sample > 2X Cleanup Limit?	NA	NA	NA	NO	NO	NA	NO
WAC 173-340 Compliance?	Because all values are below background (10.2 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.33 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

Washington Closure Hanford

CALCULATION SHEET

Originator	J. D. Skoglie	Date	04/08/13
Project	100 B/C Field Remediation	Job No.	14655
Subject	100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations	Calc. No.	0100C-CA-V0044
		Checked	N. K. Schiffern
		Rev. No.	0
		Date	04/08/13
		Sheet No.	13 of 47

1 **100-C-7:1 Statistical Calculations**

2 **Verification Data - Staging Pile Area 2**

3	Sample	Sample	Sample	Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt		
4	Area	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
5	SPA2-1	J1PTL4	7/11/12	0.302	B	0.537	2.23		0.896	61.7		0.448	0.272		0.179	1.54	B	1.79	0.0824	B	0.179	10.7		0.179	4.92		1.79
6	Duplicate of J1PTL4	J1PTM7	7/11/12	0.358	B	0.528	2.21		0.880	64.5		0.440	0.258		0.176	1.57	B	1.76	0.0959	B	0.176	10.5		0.176	5.20		1.76
7	SPA2-2	J1PTL5	7/11/12	0.364	B	0.527	2.21		0.878	60.1		0.439	0.273		0.176	1.50	B	1.76	0.0944	B	0.176	9.78		0.176	5.47		1.76
8	SPA2-3	J1PTL6	7/11/12	0.341	B	0.488	2.20		0.813	65.5		0.406	0.284		0.163	1.60	B	1.63	0.0870	B	0.163	10.6		0.163	5.15		1.63
9	SPA2-4	J1PTL7	7/11/12	0.323	B	0.466	1.87		0.776	61.4		0.388	0.250		0.155	1.57		1.55	0.0875	B	0.155	9.95		0.155	5.01		1.55
10	SPA2-5	J1PTL8	7/11/12	0.443	B	0.556	2.06		0.927	39.8		0.463	0.228		0.185	1.16	B	1.85	0.0614	B	0.185	7.53		0.185	6.46		1.85
11	SPA2-6	J1PTL9	7/11/12	0.504	B	0.540	3.16		0.901	60.6		0.450	0.231		0.180	1.61	B	1.80	0.0756	B	0.180	7.80		0.180	6.17		1.80
12	SPA2-7	J1PTM0	7/11/12	0.355	B	0.531	2.26		0.884	54.0		0.442	0.239		0.177	1.19	B	1.77	0.0691	B	0.177	6.74		0.177	6.34		1.77
13	SPA2-8	J1PTM1	7/11/12	0.369	B	0.508	1.68		0.847	38.1		0.424	0.244		0.169	1.36	B	1.69	0.0694	B	0.169	5.69		0.169	6.16		1.69
14	SPA2-9	J1PTM2	7/11/12	0.344	B	0.540	3.56		0.900	84.6		0.450	0.259		0.180	1.51	B	1.80	0.129	B	0.180	13.6		0.180	4.76		1.80
15	SPA2-10	J1PTM3	7/11/12	0.341	B	0.539	2.33		0.899	47.0		0.449	0.261		0.180	1.08	B	1.80	0.0742	B	0.180	8.31		0.180	6.39		1.80
16	SPA2-11	J1PTM4	7/11/12	0.376	B	0.583	2.80		0.971	67.9		0.486	0.298		0.194	1.65	B	1.94	0.124	B	0.194	9.51		0.194	7.62		1.94
17	SPA2-12	J1PTM5	7/11/12	0.373	B	0.446	1.76		0.743	36.7		0.371	0.211		0.149	1.02	B	1.49	0.0561	B	0.149	4.26		0.149	6.12		1.49
18	SPA2-13	J1PTM6	7/11/12	0.444	B	0.524	2.60		0.873	60.9		0.436	0.283		0.175	1.76		1.75	0.0935	B	0.175	9.63		0.175	7.01		1.75

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20 **Statistical Computation Input Data**

21	Sample	Sample	Sample	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt
22	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
23	SPA2-1	J1PTL4/ J1PTM7	7/11/12	0.330	2.22	63.1	0.265	1.56	0.0892	10.6	5.06
24	SPA2-2	J1PTL5	7/11/12	0.364	2.21	60.1	0.273	1.50	0.0944	9.78	5.47
25	SPA2-3	J1PTL6	7/11/12	0.341	2.20	65.5	0.284	1.60	0.0870	10.6	5.15
26	SPA2-4	J1PTL7	7/11/12	0.323	1.87	61.4	0.250	1.57	0.0875	9.95	5.01
27	SPA2-5	J1PTL8	7/11/12	0.443	2.06	39.8	0.228	1.16	0.0614	7.53	6.46
28	SPA2-6	J1PTL9	7/11/12	0.504	3.16	60.6	0.231	1.61	0.0756	7.80	6.17
29	SPA2-7	J1PTM0	7/11/12	0.355	2.26	54.0	0.239	1.19	0.0691	6.74	6.34
30	SPA2-8	J1PTM1	7/11/12	0.369	1.68	38.1	0.244	1.36	0.0694	5.69	6.16
31	SPA2-9	J1PTM2	7/11/12	0.344	3.56	84.6	0.259	1.51	0.129	13.6	4.76
32	SPA2-10	J1PTM3	7/11/12	0.341	2.33	47.0	0.261	1.08	0.0742	8.31	6.39
33	SPA2-11	J1PTM4	7/11/12	0.376	2.80	67.9	0.298	1.65	0.124	9.51	7.62
34	SPA2-12	J1PTM5	7/11/12	0.373	1.76	36.7	0.211	1.02	0.0561	4.26	6.12
35	SPA2-13	J1PTM6	7/11/12	0.444	2.60	60.9	0.283	1.76	0.0935	9.63	7.01

36 **Statistical Computations**

37		Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt
38	95% UCL based on	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
39	N	13	13	13	13	13	13	13	13
40	% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%
41	mean	0.377	2.36	56.9	0.256	1.43	0.0854	8.77	5.98
42	st. dev.	0.054	0.545	13.6	0.0251	0.24	0.0219	2.42	0.85
43	95% UCL on mean	0.402	2.66	65.3	0.269	1.55	0.0977	10.4	6.44
44	max value	0.504	3.56	84.6	0.298	1.76	0.129	13.6	7.62
45	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	5 GW & River Protection	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	320 GW Protection	0.81 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection
46	**WAC 173-340 3-PART TEST**								
47	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NO	NA	NA	NA
48	> 10% above Cleanup Limit?	NA	NA	NA	NA	NO	NA	NA	NA
49	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NO	NA	NA	NA
50	**WAC 173-340 Compliance?**	Because all values are below background (5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (6.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.

CALCULATION SHEET

Washington Closure Hanford
Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

Rev. No. 0
Date 04/08/13
Sheet No. 14 of 47

1 **100-C-7:1 Statistical Calculations**
2 **Verification Data - Staging Pile Area 2**

3	Sample	Sample	Sample	Copper			Lead			Manganese			Molybdenum			Nickel			Vanadium			Zinc		
4	Area	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
5	SPA2-1	J1PTL4	7/11/12	9.15		0.896	3.23		0.448	274		4.48	0.332	B	1.79	8.60		3.58	42.1		2.24	33.6		8.96
6	Duplicate of J1PTL4	J1PTM7	7/11/12	9.00		0.880	3.15		0.440	250		4.40	0.263	B	1.76	8.41		3.52	41.7		2.20	32.9		8.80
7	SPA2-2	J1PTL5	7/11/12	11.0		0.878	3.04		0.439	275		4.39	0.402	B	1.76	8.29		3.51	44.6		2.19	34.9		8.78
8	SPA2-3	J1PTL6	7/11/12	9.90		0.813	3.07		0.406	255		4.06	0.261	B	1.63	8.91		3.25	41.4		2.03	32.9		8.13
9	SPA2-4	J1PTL7	7/11/12	9.37		0.776	2.85		0.388	263		3.88	0.235	B	1.55	8.38		3.10	43.0		1.94	33.2		7.76
10	SPA2-5	J1PTL8	7/11/12	13.6		0.927	2.69		0.463	251		4.63	0.317	B	1.85	8.43		3.71	57.9		2.32	39.1		9.27
11	SPA2-6	J1PTL9	7/11/12	13.2		0.901	3.97		0.450	265		4.50	0.351	B	1.80	8.56		3.60	51.7		2.25	42.2		9.01
12	SPA2-7	J1PTM0	7/11/12	12.5		0.884	2.94		0.442	252		4.42	0.254	B	1.77	7.37		3.54	47.9		2.21	37.7		8.84
13	SPA2-8	J1PTM1	7/11/12	14.3		0.847	2.50		0.424	249		4.24	0.299	B	1.69	7.60		3.39	58.4		2.12	41.5		8.47
14	SPA2-9	J1PTM2	7/11/12	13.1		0.900	3.67		0.450	230		4.50	1.80	U	1.80	12.1		3.60	31.3		2.25	33.7		9.00
15	SPA2-10	J1PTM3	7/11/12	14.3		0.899	2.86		0.449	266		4.49	0.334	B	1.80	10.7		3.60	53.5		2.25	39.6		8.99
16	SPA2-11	J1PTM4	7/11/12	15.0		0.971	3.52		0.486	287		4.86	0.283	B	1.94	11.1		3.88	53.2		2.43	41.0		9.71
17	SPA2-12	J1PTM5	7/11/12	12.7		0.743	2.04		0.371	221		3.71	0.285	B	1.49	6.37		2.97	54.1		1.86	37.5		7.43
18	SPA2-13	J1PTM6	7/11/12	14.2		0.873	3.43		0.436	283		4.36	0.298	B	1.75	10.4		3.49	49.2		2.18	40.0		8.73

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20 **Statistical Computation Input Data**

21	Sample	Sample	Sample	Copper	Lead	Manganese	Molybdenum	Nickel	Vanadium	Zinc
22	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
23	SPA2-1	J1PTL4/ J1PTM7	7/11/12	9.08	3.19	262	0.298	8.51	41.9	33.3
24	SPA2-2	J1PTL5	7/11/12	11.0	3.04	275	0.402	8.29	44.6	34.9
25	SPA2-3	J1PTL6	7/11/12	9.9	3.07	255	0.261	8.91	41.4	32.9
26	SPA2-4	J1PTL7	7/11/12	9.37	2.85	263	0.235	8.38	43.0	33.2
27	SPA2-5	J1PTL8	7/11/12	13.6	2.69	251	0.317	8.43	57.9	39.1
28	SPA2-6	J1PTL9	7/11/12	13.2	3.97	265	0.351	8.56	51.7	42.2
29	SPA2-7	J1PTM0	7/11/12	12.5	2.94	252	0.254	7.37	47.9	37.7
30	SPA2-8	J1PTM1	7/11/12	14.3	2.50	249	0.299	7.60	58.4	41.5
31	SPA2-9	J1PTM2	7/11/12	13.1	3.67	230	0.900	12.1	31.3	33.7
32	SPA2-10	J1PTM3	7/11/12	14.3	2.86	266	0.334	10.7	53.5	39.6
33	SPA2-11	J1PTM4	7/11/12	15.0	3.52	287	0.283	11.1	53.2	41.0
34	SPA2-12	J1PTM5	7/11/12	12.7	2.04	221	0.285	6.37	54.1	37.5
35	SPA2-13	J1PTM6	7/11/12	14.2	3.43	283	0.298	10.4	49.2	40.0

36 **Statistical Computations**

37		Copper	Lead	Manganese	Molybdenum	Nickel	Vanadium	Zinc
38	95% UCL based on	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
39	N	13	13	13	13	13	13	13
40	% < Detection limit	0%	0%	0%	8%	0%	0%	0%
41	mean	12.5	3.06	258	0.347	8.98	48.3	37.4
42	st. dev.	2.01	0.513	18.8	0.172	1.63	7.70	3.45
43	95% UCL on mean	13.5	3.36	268	0.426	9.88	53.0	39.2
44	max value	15.0	3.97	287	1.80	12.1	58.4	42.2
45	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	22.0 River Protection	10.2 GW & River Protection	512 GW & River Protection	8 GW Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection
46	**WAC 173-340 3-PART TEST**							
47	95% UCL > Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA
48	> 10% above Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA
49	Any sample > 2X Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA
50	**WAC 173-340 Compliance?**	Because all values are below background (22.0 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (10.2 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.

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CALCULATION SHEET

Washington Closure Hanford
Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/12/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

Rev. No. 0
Date 04/12/13
Sheet No. 15 of 47

1 **100-C-7:1 Statistical Calculations**
2 **Verification Data - Staging Pile Area 3**

3	Sample	Sample	Sample	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper		
4	Area	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
5	SPA3-1	J1RDP5	2/7/13	2.7		0.58	61.0		0.067	0.39		0.029	1.3	B	0.87	0.047	B	0.036	10.8		0.051	8.2		0.088	14.2		0.19
6	Duplicate of J1RDP5	J1RDR7	2/7/13	2.8		0.69	69.0		0.079	0.45		0.034	1.2	B	1.0	0.063	B	0.043	11.8		0.061	9.2		0.10	17.0		0.23
7	SPA3-2	J1RDP6	2/7/13	3.1		0.62	61.8		0.072	0.30		0.031	1.6	B	0.93	0.060	B	0.039	11.0		0.055	5.7		0.094	12.4		0.20
8	SPA3-3	J1RDP7	2/7/13	2.1		0.69	54.6		0.079	0.31		0.034	1.1	B	1.0	0.078	B	0.043	8.7		0.060	8.0		0.10	17.5		0.23
9	SPA3-4	J1RDP8	3/21/13	2.2		0.68	66.9	X	0.079	0.49		0.034	1.3	B	1.0	0.11	B	0.042	15.7	X	0.060	8.7	X	0.10	14.9	X	0.22
10	SPA3-5	J1RDP9	3/21/13	1.3		0.65	38.3	X	0.074	0.48		0.032	0.96	U	0.96	0.054	B	0.040	6.2	X	0.057	9.5	X	0.098	15.4	X	0.21
11	SPA3-6	J1RDR0	3/21/13	3.1		0.63	63.4	X	0.072	0.52		0.031	1.2	B	0.93	0.052	B	0.039	8.9	X	0.055	9.3	X	0.095	16.5	X	0.21
12	SPA3-7	J1RDR1	2/7/13	2.5		0.70	79.1		0.080	0.40		0.035	2.6		1.0	0.096	B	0.043	10.1		0.061	8.5		0.11	16.2		0.23
13	SPA3-8	J1RDR2	3/21/13	1.2		0.57	36.2	X	0.066	0.44		0.029	0.85	U	0.85	0.035	U	0.035	4.9	X	0.050	8.7	X	0.086	14.2	X	0.19
14	SPA3-9	J1RDR3	3/21/13	1.3		0.61	45.5	X	0.070	0.43		0.030	0.90	U	0.90	0.049	B	0.038	6.1	X	0.053	7.9	X	0.092	15.4	X	0.20
15	SPA3-10	J1RDR4	2/7/13	2.0		0.69	57.6		0.080	0.30		0.035	1.3	B	1.0	0.084	B	0.043	8.5		0.061	7.9		0.11	16.7		0.23
16	SPA3-11	J1RDR5	3/21/13	2.8		0.65	70.9	X	0.075	0.47		0.032	1.2	B	0.96	0.053	B	0.040	11.3	X	0.057	8.6	X	0.098	15.8	X	0.21
17	SPA3-12	J1RDR6	2/7/13	2.4		0.68	81.6		0.078	0.37		0.034	2.0	B	1.0	0.084	B	0.042	9.2		0.059	7.8		0.10	14.0		0.22

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19 **Statistical Computation Input Data**

20	Sample	Sample	Sample	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper
21	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
22	SPA3-1	J1RDP5/ J1RDR7	2/7/13	2.8	65.0	0.42	1.3	0.055	11.3	8.7	15.6
23	SPA3-2	J1RDP6	2/7/13	3.1	61.8	0.30	1.6	0.060	11.0	5.7	12.4
24	SPA3-3	J1RDP7	2/7/13	2.1	54.6	0.31	1.1	0.078	8.7	8.0	17.5
25	SPA3-4	J1RDP8	3/21/13	2.2	66.9	0.49	1.3	0.11	15.7	8.7	14.9
26	SPA3-5	J1RDP9	3/21/13	1.3	38.3	0.48	0.48	0.054	6.2	9.5	15.4
27	SPA3-6	J1RDR0	3/21/13	3.1	63.4	0.52	1.2	0.052	8.9	9.3	16.5
28	SPA3-7	J1RDR1	2/7/13	2.5	79.1	0.40	2.6	0.096	10.1	8.5	16.2
29	SPA3-8	J1RDR2	3/21/13	1.2	36.2	0.44	0.43	0.018	4.9	8.7	14.2
30	SPA3-9	J1RDR3	3/21/13	1.3	45.5	0.43	0.45	0.049	6.1	7.9	15.4
31	SPA3-10	J1RDR4	2/7/13	2.0	57.6	0.30	1.3	0.084	8.5	7.9	16.7
32	SPA3-11	J1RDR5	3/21/13	2.8	70.9	0.47	1.2	0.053	11.3	8.6	15.8
33	SPA3-12	J1RDR6	2/7/13	2.4	81.6	0.37	2.0	0.084	9.2	7.8	14.0

34 **Statistical Computations**

35		Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper
36	95% UCL based on	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
37	N	12	12	12	12	12	12	12	12
38	% < Detection limit	0%	0%	0%	25%	8%	0%	0%	0%
39	mean	2.2	60.1	0.41	1.2	0.066	9.3	8.3	15.4
40	st. dev.	0.68	14.5	0.076	0.64	0.025	2.9	0.98	1.37
41	95% UCL on mean	2.6	70.1	0.46	1.6	0.079	11.3	8.7	16.2
42	max value	3.1	81.6	0.52	2.6	0.11	15.7	9.5	17.5
43	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	320 GW Protection	0.81 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection	22.0 River Protection
44	**WAC 173-340 3-PART TEST**								
45	95% UCL > Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA
46	> 10% above Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA
47	Any sample > 2X Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA
48	**WAC 173-340 Compliance?**	Because all values are below background (6.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg) the WAC 173-340 3-part test is not required.

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CALCULATION SHEET

Washington Closure Hanford
Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/12/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

Rev. No. 0
Date 04/12/13
Sheet No. 16 of 47

1 **100-C-7:1 Statistical Calculations**
2 **Verification Data - Staging Pile Area 3**

3	Sample	Sample	Sample	Lead			Manganese			Nickel			Vanadium			Zinc		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	SPA3-1	J1RDP5	2/7/13	4.3		0.24	347		0.088	10.8	X	0.11	59.8		0.083	44.5	X	0.35
6	Duplicate of J1RDP5	J1RDR7	2/7/13	5.1		0.28	397		0.10	11.6	X	0.13	65.3		0.098	52.0	X	0.42
7	SPA3-2	J1RDP6	2/7/13	3.6		0.26	267		0.094	10.2	X	0.12	42.5		0.089	37.0	X	0.38
8	SPA3-3	J1RDP7	2/7/13	3.5		0.28	332		0.10	8.5	X	0.13	59.0		0.098	44.0	X	0.41
9	SPA3-4	J1RDP8	3/21/13	4.6		0.28	355	X	0.10	11.6	X	0.13	52.2	X	0.097	42.9	X	0.41
10	SPA3-5	J1RDP9	3/21/13	2.7		0.26	307	X	0.098	12.7	X	0.12	70.5	X	0.092	45.6	X	0.39
11	SPA3-6	J1RDR0	3/21/13	4.8		0.26	329	X	0.095	10.4	X	0.12	56.6	X	0.089	44.8	X	0.38
12	SPA3-7	J1RDR1	2/7/13	6.0		0.29	358		0.11	11.7	X	0.13	61.2		0.099	51.1	X	0.42
13	SPA3-8	J1RDR2	3/21/13	2.4		0.23	289	X	0.086	7.8	X	0.11	62.1	X	0.081	42.0	X	0.34
14	SPA3-9	J1RDR3	3/21/13	2.6		0.25	300	X	0.092	7.9	X	0.11	58.9	X	0.086	38.8	X	0.37
15	SPA3-10	J1RDR4	2/7/13	3.7		0.28	270		0.11	9.9	X	0.13	43.6		0.099	41.6	X	0.42
16	SPA3-11	J1RDR5	3/21/13	4.8		0.27	340	X	0.098	11.9	X	0.12	50.2	X	0.092	44.4	X	0.39
17	SPA3-12	J1RDR6	2/7/13	6.8		0.28	351		0.10	9.8	X	0.13	56.2		0.096	50.5	X	0.41

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19 **Statistical Computation Input Data**

20	Sample	Sample	Sample	Lead	Manganese	Nickel	Vanadium	Zinc
21	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
22	SPA3-1	J1RDP5/ J1RDR7	2/7/13	4.7	372	11.2	62.6	48.3
23	SPA3-2	J1RDP6	2/7/13	3.6	267	10.2	42.5	37.0
24	SPA3-3	J1RDP7	2/7/13	3.5	332	8.5	59.0	44.0
25	SPA3-4	J1RDP8	3/21/13	4.6	355	11.6	52.2	42.9
26	SPA3-5	J1RDP9	3/21/13	2.7	307	12.7	70.5	45.6
27	SPA3-6	J1RDR0	3/21/13	4.8	329	10.4	56.6	44.8
28	SPA3-7	J1RDR1	2/7/13	6.0	358	11.7	61.2	51.1
29	SPA3-8	J1RDR2	3/21/13	2.4	289	7.8	62.1	42.0
30	SPA3-9	J1RDR3	3/21/13	2.6	300	7.9	58.9	38.8
31	SPA3-10	J1RDR4	2/7/13	3.7	270	9.9	43.6	41.6
32	SPA3-11	J1RDR5	3/21/13	4.8	340	11.9	50.2	44.4
33	SPA3-12	J1RDR6	2/7/13	6.8	351	9.8	56.2	50.5

34 **Statistical Computations**

35		Lead	Manganese	Nickel	Vanadium	Zinc
36	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
37	N	12	12	12	12	12
38	% < Detection limit	0%	0%	0%	0%	0%
39	mean	4.2	323	10.3	56.3	44.2
40	st. dev.	1.4	35.3	1.6	8.1	4.3
41	95% UCL on mean	5.1	343	11.3	61.1	46.6
42	max value	6.8	397	12.7	70.5	52.0
43	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	10.2 GW & River Protection	512 GW & River Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection
44	**WAC 173-340 3-PART TEST**					
45	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA
46	> 10% above Cleanup Limit?	NA	NA	NA	NA	NA
47	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA
48	**WAC 173-340 Compliance?**	Because all values are below background (10.2 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.

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Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

CALCULATION SHEET

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

Rev. No. 0
Date 04/08/13
Sheet No. 17 of 47

100-C-7:1 Statistical Calculations

Verification Data - Staging Pile Area 4

Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Cadmium mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL	Lead mg/kg	Q	PQL
SPA4-12	J1RDT9	2/4/13	2.2		0.62	79.1		0.071	0.41		0.031	0.066	B	0.039	10.7		0.054	8.3	X	0.094	13.0	X	0.20	4.8		0.25
Duplicate of J1RDT9	J1RDV0	2/4/13	2.4		0.65	76.1		0.075	0.39		0.032	0.074	B	0.040	10.6		0.057	8.2	X	0.098	12.6	X	0.21	4.6		0.27
SPA4-1	J1RDR8	2/4/13	2.4		0.59	66.6		0.068	0.34		0.030	0.042	BM	0.037	13.4		0.052	7.3	X	0.09	11.4	X	0.20	3.9		0.24
SPA4-2	J1RDR9	2/4/13	1.8		0.66	52.9		0.076	0.36		0.033	0.041	U	0.041	6.6		0.058	8.9	X	0.10	14.2	X	0.22	4.1		0.27
SPA4-3	J1RDT0	2/4/13	2.2		0.62	73.4		0.072	0.38		0.031	0.076	B	0.039	9.4		0.055	7.8	X	0.094	12.5	X	0.20	4.3		0.25
SPA4-4	J1RDT1	2/4/13	1.8		0.62	36.4		0.071	0.33		0.031	0.038	U	0.038	4.9		0.054	8.8	X	0.093	12.3	X	0.20	2.5		0.25
SPA4-5	J1RDT2	2/4/13	1.4		0.63	42.0		0.073	0.34		0.032	0.039	U	0.039	7.3		0.056	9.6	X	0.096	13.6	X	0.21	2.8		0.26
SPA4-6	J1RDT3	2/4/13	2.4		0.68	71.3		0.078	0.41		0.034	0.10	B	0.042	11.2		0.060	8.2	X	0.10	14.2	X	0.22	4.5		0.28
SPA4-7	J1RDT4	2/4/13	1.7		0.63	59.9		0.072	0.39		0.031	0.043	B	0.039	8.7		0.055	8.2	X	0.095	13.2	X	0.21	3.4		0.26
SPA4-8	J1RDT5	2/4/13	2.0		0.62	65.3		0.071	0.32		0.031	0.063	B	0.038	11.5		0.054	6.3	X	0.093	9.8	X	0.20	3.5		0.25
SPA4-9	J1RDT6	2/4/13	0.84	B	0.58	38.6		0.067	0.33	B	0.15	0.036	U	0.036	5.0		0.051	8.8	X	0.44	16.6	X	0.96	3.1		1.2
SPA4-10	J1RDT7	2/4/13	1.5		0.63	48.0		0.072	0.38	B	0.16	0.046	B	0.039	5.6		0.055	10.3	X	0.47	18.1	X	1.0	3.2		1.3
SPA4-11	J1RDT8	2/4/13	0.9	B	0.64	43.7		0.074	0.30		0.032	0.045	B	0.040	5.7		0.056	9.3	X	0.097	11.8	X	0.21	2.5		0.26

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg
SPA4-12	J1RDT9/ J1RDV0	2/4/13	2.3	77.6	0.40	0.070	10.7	8.3	12.8	4.7
SPA4-1	J1RDR8	2/4/13	2.4	66.6	0.34	0.042	13.4	7.3	11.4	3.9
SPA4-2	J1RDR9	2/4/13	1.8	52.9	0.36	0.021	6.6	8.9	14.2	4.1
SPA4-3	J1RDT0	2/4/13	2.2	73.4	0.38	0.076	9.4	7.8	12.5	4.3
SPA4-4	J1RDT1	2/4/13	1.8	36.4	0.33	0.019	4.9	8.8	12.3	2.5
SPA4-5	J1RDT2	2/4/13	1.4	42.0	0.34	0.020	7.3	9.6	13.6	2.8
SPA4-6	J1RDT3	2/4/13	2.4	71.3	0.41	0.10	11.2	8.2	14.2	4.5
SPA4-7	J1RDT4	2/4/13	1.7	59.9	0.39	0.043	8.7	8.2	13.2	3.4
SPA4-8	J1RDT5	2/4/13	2.0	65.3	0.32	0.063	11.5	6.3	9.8	3.5
SPA4-9	J1RDT6	2/4/13	0.84	38.6	0.33	0.018	5.0	8.8	16.6	3.1
SPA4-10	J1RDT7	2/4/13	1.5	48.0	0.38	0.046	5.6	10.3	18.1	3.2
SPA4-11	J1RDT8	2/4/13	0.90	43.7	0.30	0.045	5.7	9.3	11.8	2.5

Statistical Computations

	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead
95% UCL based on	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
N	12	12	12	12	12	12	12	12
% < Detection limit	0%	0%	0%	33%	0%	0%	0%	0%
mean	1.8	56.3	0.36	0.047	8.3	8.5	13.4	3.5
st. dev.	0.54	14.5	0.035	0.026	2.9	1.1	2.2	0.76
95% UCL on mean	2.0	65.8	0.38	0.072	10.3	9.1	14.6	4.0
max value	2.4	79.1	0.41	0.10	13.4	10.3	18.1	4.8
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	0.81 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection	22.0 River Protection	10.2 GW & River Protection
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NA
> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NA
Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NA
WAC 173-340 Compliance?	Because all values are below background (6.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (10.2 mg/kg) the WAC 173-340 3-part test is not required.

CALCULATION SHEET

Washington Closure Hanford
Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

Rev. No. 0
Date 04/08/13
Sheet No. 18 of 47

1 **100-C-7:1 Statistical Calculations**
2 **Verification Data - Staging Pile Area 4**

3 Sample Area	Sample Number	Sample Date	Manganese mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL
5 SPA4-12	J1RDT9	2/4/13	348		0.094	12.2		0.12	48.2	X	0.088	39.5	X	0.37
6 Duplicate of J1RDT9	J1RDV0	2/4/13	339		0.098	12.8		0.12	48.0	X	0.092	38.7	X	0.39
7 SPA4-1	J1RDR8	2/4/13	285		0.09	13.1		0.11	42.3	X	0.085	33.5	X	0.36
8 SPA4-2	J1RDR9	2/4/13	306		0.10	10.2		0.12	54.1	X	0.094	39.6	X	0.40
9 SPA4-3	J1RDT0	2/4/13	311		0.094	12.8		0.12	44.9	X	0.089	38.6	X	0.38
10 SPA4-4	J1RDT1	2/4/13	274		0.093	12.2		0.11	62.7	X	0.088	38.2	X	0.37
11 SPA4-5	J1RDT2	2/4/13	310		0.096	12.4		0.12	62.6	X	0.090	40.0	X	0.38
12 SPA4-6	J1RDT3	2/4/13	322		0.10	12.7		0.13	46.6	X	0.097	37.1	X	0.41
13 SPA4-7	J1RDT4	2/4/13	289		0.095	12.3		0.12	53.9	X	0.089	37.1	X	0.38
14 SPA4-8	J1RDT5	2/4/13	268		0.093	12.7		0.11	39.2	X	0.088	31.2	X	0.37
15 SPA4-9	J1RDT6	2/4/13	266		0.088	9.2		0.11	75.3	X	0.41	38.5	X	0.35
16 SPA4-10	J1RDT7	2/4/13	332		0.095	11.0		0.12	82.6	X	0.45	42.3	X	0.38
17 SPA4-11	J1RDT8	2/4/13	287		0.097	11.6		0.12	62.3	X	0.091	39.4	X	0.39

18
19 **Statistical Computation Input Data**

20 Sample Area	Sample Number	Sample Date	Manganese mg/kg	Nickel mg/kg	Vanadium mg/kg	Zinc mg/kg
22 SPA4-12	J1RDT9/ J1RDV0	2/4/13	344	12.5	48.1	39.1
23 SPA4-1	J1RDR8	2/4/13	285	13.1	42.3	33.5
24 SPA4-2	J1RDR9	2/4/13	306	10.2	54.1	39.6
25 SPA4-3	J1RDT0	2/4/13	311	12.8	44.9	38.6
26 SPA4-4	J1RDT1	2/4/13	274	12.2	62.7	38.2
27 SPA4-5	J1RDT2	2/4/13	310	12.4	62.6	40.0
28 SPA4-6	J1RDT3	2/4/13	322	12.7	46.6	37.1
29 SPA4-7	J1RDT4	2/4/13	289	12.3	53.9	37.1
30 SPA4-8	J1RDT5	2/4/13	268	12.7	39.2	31.2
31 SPA4-9	J1RDT6	2/4/13	266	9.2	75.3	38.5
32 SPA4-10	J1RDT7	2/4/13	332	11.0	82.6	42.3
33 SPA4-11	J1RDT8	2/4/13	287	11.6	62.3	39.4

34 **Statistical Computations**

35	Manganese	Nickel	Vanadium	Zinc
36 95% UCL based on	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
37 N	12	12	12	12
38 % < Detection limit	0%	0%	0%	0%
39 mean	299	11.9	56.2	37.9
40 st. dev.	25	1.2	13.3	3.0
41 95% UCL on mean	313	12.5	64.1	39.3
42 max value	348	13.1	82.6	42.3
43 **Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	512 GW & River Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection
44 **WAC 173-340 3-PART TEST**				
45 95% UCL > Cleanup Limit?	NA	NA	NA	NA
46 > 10% above Cleanup Limit?	NA	NA	NA	NA
47 Any sample > 2X Cleanup Limit?	NA	NA	NA	NA
48 **WAC 173-340 Compliance?**	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

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Date 04/08/13
Sheet No. 19 of 47

Ecology Software (MTCAStat) Results, 100-C-7:1 Subsite Upper Sidewall

Arsenic 95% UCL Calculation

DATA	ID
1.97	J1LHR1/ J1LHR2
2.65	J1LHR6
2.77	J1LHR7
2.88	J1LHR5
4.24	J1LHR4
2.36	J1LHT0
4.36	J1LHR3
1.56	J1LHR8
1.51	J1LHT4
2.72	J1LHR9
1.08	J1LHT3
1.63	J1LHT1
6.25	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	2.77
Censored		Lognormal mean	2.79
Detection limit or PQL		Std. devn.	1.44
Method detection limit		Median	2.65
TOTAL	13	Min.	1.08
		Max.	6.25

Lognormal distribution? r-squared is: 0.972
Normal distribution? r-squared is: 0.877
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 3.75

Barium 95% UCL Calculation

DATA	ID
42.0	J1LHR1/ J1LHR2
73.7	J1LHR6
56.9	J1LHR7
77.0	J1LHR5
50.0	J1LHR4
53.2	J1LHT0
70.1	J1LHR3
37.9	J1LHR8
29.0	J1LHT4
67.0	J1LHR9
21.6	J1LHT3
35.0	J1LHT1
81.3	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	53.4
Censored		Lognormal mean	54.1
Detection limit or PQL		Std. devn.	19.5
Method detection limit		Median	53.2
TOTAL	13	Min.	21.6
		Max.	81.3

Lognormal distribution? r-squared is: 0.946
Normal distribution? r-squared is: 0.972
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 68.8

Beryllium 95% UCL Calculation

DATA	ID
0.202	J1LHR1/ J1LHR2
0.302	J1LHR6
0.236	J1LHR7
0.317	J1LHR5
0.289	J1LHR4
0.208	J1LHT0
0.324	J1LHR3
0.188	J1LHR8
0.172	J1LHT4
0.293	J1LHR9
0.139	J1LHT3
0.186	J1LHT1
0.442	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	0.254
Censored		Lognormal mean	0.255
Detection limit or PQL		Std. devn.	0.0834
Method detection limit		Median	0.236
TOTAL	13	Min.	0.139
		Max.	0.442

Lognormal distribution? r-squared is: 0.964
Normal distribution? r-squared is: 0.925
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.305

Boron 95% UCL Calculation

DATA	ID
0.908	J1LHR1/ J1LHR2
1.84	J1LHR6
0.629	J1LHR7
2.18	J1LHR5
1.05	J1LHR4
1.85	J1LHT0
0.969	J1LHR3
0.995	J1LHR8
0.825	J1LHT4
1.62	J1LHR9
0.695	J1LHT3
0.500	J1LHT1
2.25	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	1.25
Censored		Lognormal mean	1.27
Detection limit or PQL		Std. devn.	0.609
Method detection limit		Median	0.995
TOTAL	13	Min.	0.500
		Max.	2.25

Lognormal distribution? r-squared is: 0.950
Normal distribution? r-squared is: 0.907
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1.72

Cadmium 95% UCL Calculation

DATA	ID
0.0775	J1LHR1/ J1LHR2
0.103	J1LHR6
0.0687	J1LHR7
0.100	J1LHR5
0.0714	J1LHR4
0.0785	J1LHT0
0.0765	J1LHR3
0.0995	J1LHR8
0.0528	J1LHT4
0.0777	J1LHR9
0.0352	J1LHT3
0.0624	J1LHT1
0.101	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	0.0772
Censored		Lognormal mean	0.0778
Detection limit or PQL		Std. devn.	0.0203
Method detection limit		Median	0.0775
TOTAL	13	Min.	0.0352
		Max.	0.103

Lognormal distribution? r-squared is: 0.870
Normal distribution? r-squared is: 0.929
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.0873

Chromium 95% UCL Calculation

DATA	ID
2.66	J1LHR1/ J1LHR2
11.0	J1LHR6
5.65	J1LHR7
12.2	J1LHR5
8.31	J1LHR4
7.00	J1LHT0
7.41	J1LHR3
4.52	J1LHR8
4.04	J1LHT4
9.79	J1LHR9
1.48	J1LHT3
5.50	J1LHT1
12.7	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	7.10
Censored		Lognormal mean	7.42
Detection limit or PQL		Std. devn.	3.57
Method detection limit		Median	7.00
TOTAL	13	Min.	1.48
		Max.	12.7

Lognormal distribution? r-squared is: 0.930
Normal distribution? r-squared is: 0.980
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 11.2

Cobalt 95% UCL Calculation

DATA	ID
8.39	J1LHR1/ J1LHR2
6.75	J1LHR6
7.57	J1LHR7
6.87	J1LHR5
7.75	J1LHR4
4.97	J1LHT0
11.2	J1LHR3
8.65	J1LHR8
6.82	J1LHT4
7.07	J1LHR9
5.89	J1LHT3
6.87	J1LHT1
8.64	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	7.50
Censored		Lognormal mean	7.51
Detection limit or PQL		Std. devn.	1.53
Method detection limit		Median	7.07
TOTAL	13	Min.	4.97
		Max.	11.2

Lognormal distribution? r-squared is: 0.941
Normal distribution? r-squared is: 0.909
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 8.34

Copper 95% UCL Calculation

DATA	ID
13.8	J1LHR1/ J1LHR2
13.5	J1LHR6
13.2	J1LHR7
13.7	J1LHR5
15.4	J1LHR4
10.8	J1LHT0
17.0	J1LHR3
15.8	J1LHR8
13.2	J1LHT4
14.6	J1LHR9
10.5	J1LHT3
13.6	J1LHT1
20.6	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	14.3
Censored		Lognormal mean	14.3
Detection limit or PQL		Std. devn.	2.60
Method detection limit		Median	13.7
TOTAL	13	Min.	10.5
		Max.	20.6

Lognormal distribution? r-squared is: 0.926
Normal distribution? r-squared is: 0.894
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 15.7

Lead 95% UCL Calculation

DATA	ID
2.13	J1LHR1/ J1LHR2
4.21	J1LHR6
3.78	J1LHR7
5.12	J1LHR5
5.00	J1LHR4
6.52	J1LHT0
5.30	J1LHR3
1.97	J1LHR8
1.87	J1LHT4
4.70	J1LHR9
1.36	J1LHT3
2.19	J1LHT1
7.88	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	4.00
Censored		Lognormal mean	4.09
Detection limit or PQL		Std. devn.	2.01
Method detection limit		Median	4.21
TOTAL	13	Min.	1.36
		Max.	7.88

Lognormal distribution? r-squared is: 0.934
Normal distribution? r-squared is: 0.941
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 5.80

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

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Date 04/08/13
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Ecology Software (MTCAStat) Results, 100-C-7:1 Subsite Upper Sidewall

Manganese 95% UCL Calculation

DATA	ID
278	J1LHR1/ J1LHR2
332	J1LHR6
318	J1LHR7
339	J1LHR5
334	J1LHR4
234	J1LHT0
447	J1LHR3
266	J1LHR8
208	J1LHT4
328	J1LHR9
196	J1LHT3
291	J1LHT1
416	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	307
Censored		Lognormal mean	307
Detection limit or PQL		Std. devn.	73.4
Method detection limit		Median	318
TOTAL	13	Min.	196
		Max.	447

Lognormal distribution? r-squared is: 0.965
Normal distribution? r-squared is: 0.959
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 351

Molybdenum 95% UCL Calculation

DATA	ID
0.378	J1LHR1/ J1LHR2
0.291	J1LHR6
0.339	J1LHR7
0.302	J1LHR5
0.407	J1LHR4
0.276	J1LHT0
0.465	J1LHR3
0.360	J1LHR8
0.278	J1LHT4
0.330	J1LHR9
0.243	J1LHT3
0.375	J1LHT1
0.394	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	0.341
Censored		Lognormal mean	0.342
Detection limit or PQL		Std. devn.	0.0628
Method detection limit		Median	0.339
TOTAL	13	Min.	0.243
		Max.	0.465

Lognormal distribution? r-squared is: 0.983
Normal distribution? r-squared is: 0.978
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.377

Nickel 95% UCL Calculation

DATA	ID
5.69	J1LHR1/ J1LHR2
9.60	J1LHR6
8.23	J1LHR7
10.5	J1LHR5
12.1	J1LHR4
7.35	J1LHT0
9.99	J1LHR3
6.92	J1LHR8
6.48	J1LHT4
10.7	J1LHR9
3.27	J1LHT3
8.62	J1LHT1
14.5	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	8.77
Censored		Lognormal mean	8.88
Detection limit or PQL		Std. devn.	2.94
Method detection limit		Median	8.62
TOTAL	13	Min.	3.27
		Max.	14.5

Lognormal distribution? r-squared is: 0.928
Normal distribution? r-squared is: 0.986
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 11.0

Vanadium 95% UCL Calculation

DATA	ID
59.6	J1LHR1/ J1LHR2
52.9	J1LHR6
62.0	J1LHR7
52.0	J1LHR5
61.6	J1LHR4
41.9	J1LHT0
70.3	J1LHR3
70.5	J1LHR8
39.4	J1LHT4
48.2	J1LHR9
44.6	J1LHT3
69.6	J1LHT1
53.0	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	55.8
Censored		Lognormal mean	55.9
Detection limit or PQL		Std. devn.	10.7
Method detection limit		Median	53.0
TOTAL	13	Min.	39.4
		Max.	70.5

Lognormal distribution? r-squared is: 0.957
Normal distribution? r-squared is: 0.956
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 62.0

Zinc 95% UCL Calculation

DATA	ID
41.9	J1LHR1/ J1LHR2
39.2	J1LHR6
42.4	J1LHR7
41.6	J1LHR5
46.7	J1LHR4
33.0	J1LHT0
50.4	J1LHR3
42.8	J1LHR8
29.1	J1LHT4
39.8	J1LHR9
28.0	J1LHT3
41.8	J1LHT1
51.8	J1LHT2

Number of samples		Uncensored values	
Uncensored	13	Mean	40.7
Censored		Lognormal mean	40.7
Detection limit or PQL		Std. devn.	7.20
Method detection limit		Median	41.8
TOTAL	13	Min.	28.0
		Max.	51.8

Lognormal distribution? r-squared is: 0.907
Normal distribution? r-squared is: 0.936
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 45.0

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
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Ecology Software (MTCAStat) Results, 100-C-7:1 Subsite Lower Sidewall

Arsenic 95% UCL Calculation

DATA	ID
0.959	J1NPN7/ J1NPP5
1.12	J1NPN3
1.09	J1NPN4
2.16	J1NPN5
1.38	J1NPN6
1.35	J1NPN8
1.01	J1NPN9
1.30	J1NPP0
1.43	J1NPP1
0.704	J1NPP2
1.21	J1NPP3
0.992	J1NPP4

Number of samples		Uncensored values	
Uncensored	12	Mean	1.23
Censored		Lognormal mean	1.23
Detection limit or PQL		Std. devn.	0.361
Method detection limit		Median	1.17
TOTAL	12	Min.	0.704
		Max.	2.16

Lognormal distribution? r-squared is: 0.930
Normal distribution? r-squared is: 0.851
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1.44

Barium 95% UCL Calculation

DATA	ID
31.6	J1NPN7/ J1NPP5
44.6	J1NPN3
39.9	J1NPN4
59.1	J1NPN5
107	J1NPN6
49.6	J1NPN8
39.4	J1NPN9
40.8	J1NPP0
46.1	J1NPP1
20.9	J1NPP2
32.9	J1NPP3
24.1	J1NPP4

Number of samples		Uncensored values	
Uncensored	12	Mean	44.7
Censored		Lognormal mean	44.7
Detection limit or PQL		Std. devn.	22.3
Method detection limit		Median	40.4
TOTAL	12	Min.	20.9
		Max.	107

Lognormal distribution? r-squared is: 0.930
Normal distribution? r-squared is: 0.760
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 58.0

Beryllium 95% UCL Calculation

DATA	ID
0.159	J1NPN7/ J1NPP5
0.191	J1NPN3
0.198	J1NPN4
0.316	J1NPN5
0.213	J1NPN6
0.216	J1NPN8
0.162	J1NPN9
0.168	J1NPP0
0.193	J1NPP1
0.0805	J1NPP2
0.156	J1NPP3
0.139	J1NPP4

Number of samples		Uncensored values	
Uncensored	12	Mean	0.183
Censored		Lognormal mean	0.184
Detection limit or PQL		Std. devn.	0.0560
Method detection limit		Median	0.180
TOTAL	12	Min.	0.0805
		Max.	0.316

Lognormal distribution? r-squared is: 0.879
Normal distribution? r-squared is: 0.885
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.209

Cadmium 95% UCL Calculation

DATA	ID
0.0559	J1NPN7/ J1NPP5
0.0428	J1NPN3
0.0449	J1NPN4
0.0472	J1NPN5
0.0880	J1NPN6
0.0405	J1NPN8
0.0780	J1NPN9
0.0695	J1NPP0
0.0850	J1NPP1
0.0695	J1NPP2
0.0411	J1NPP3
0.0665	J1NPP4

Number of samples		Uncensored values	
Uncensored	12	Mean	0.0607
Censored		Lognormal mean	0.0610
Detection limit or PQL		Std. devn.	0.0176
Method detection limit		Median	0.0612
TOTAL	12	Min.	0.0405
		Max.	0.0880

Lognormal distribution? r-squared is: 0.922
Normal distribution? r-squared is: 0.922
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.0722

Chromium 95% UCL Calculation

DATA	ID
1.35	J1NPN7/ J1NPP5
2.29	J1NPN3
1.80	J1NPN4
6.33	J1NPN5
3.33	J1NPN6
2.69	J1NPN8
1.62	J1NPN9
2.08	J1NPP0
2.93	J1NPP1
0.533	J1NPP2
2.03	J1NPP3
1.80	J1NPP4

Number of samples		Uncensored values	
Uncensored	12	Mean	2.40
Censored		Lognormal mean	2.46
Detection limit or PQL		Std. devn.	1.44
Method detection limit		Median	2.06
TOTAL	12	Min.	0.533
		Max.	6.33

Lognormal distribution? r-squared is: 0.902
Normal distribution? r-squared is: 0.791
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 3.66

Cobalt 95% UCL Calculation

DATA	ID
5.44	J1NPN7/ J1NPP5
5.74	J1NPN3
6.30	J1NPN4
8.68	J1NPN5
8.59	J1NPN6
6.99	J1NPN8
5.82	J1NPN9
6.21	J1NPP0
7.24	J1NPP1
4.53	J1NPP2
6.20	J1NPP3
5.75	J1NPP4

Number of samples		Uncensored values	
Uncensored	12	Mean	6.46
Censored		Lognormal mean	6.47
Detection limit or PQL		Std. devn.	1.23
Method detection limit		Median	6.21
TOTAL	12	Min.	4.53
		Max.	8.68

Lognormal distribution? r-squared is: 0.942
Normal distribution? r-squared is: 0.917
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 7.17

Copper 95% UCL Calculation

DATA	ID
10.3	J1NPN7/ J1NPP5
11.2	J1NPN3
11.6	J1NPN4
16.1	J1NPN5
12.8	J1NPN6
12.1	J1NPN8
10.3	J1NPN9
11.0	J1NPP0
12.2	J1NPP1
10.9	J1NPP2
12.6	J1NPP3
12.0	J1NPP4

Number of samples		Uncensored values	
Uncensored	12	Mean	11.9
Censored		Lognormal mean	11.9
Detection limit or PQL		Std. devn.	1.56
Method detection limit		Median	11.8
TOTAL	12	Min.	10.3
		Max.	16.1

Lognormal distribution? r-squared is: 0.867
Normal distribution? r-squared is: 0.812
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 12.7

Lead 95% UCL Calculation

DATA	ID
1.16	J1NPN7/ J1NPP5
1.46	J1NPN3
1.31	J1NPN4
2.94	J1NPN5
1.68	J1NPN6
1.86	J1NPN8
1.29	J1NPN9
1.46	J1NPP0
1.94	J1NPP1
0.763	J1NPP2
1.19	J1NPP3
1.17	J1NPP4

Number of samples		Uncensored values	
Uncensored	12	Mean	1.52
Censored		Lognormal mean	1.52
Detection limit or PQL		Std. devn.	0.554
Method detection limit		Median	1.39
TOTAL	12	Min.	0.763
		Max.	2.94

Lognormal distribution? r-squared is: 0.936
Normal distribution? r-squared is: 0.846
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1.86

Manganese 95% UCL Calculation

DATA	ID
186	J1NPN7/ J1NPP5
256	J1NPN3
296	J1NPN4
346	J1NPN5
379	J1NPN6
287	J1NPN8
225	J1NPN9
246	J1NPP0
288	J1NPP1
152	J1NPP2
238	J1NPP3
178	J1NPP4

Number of samples		Uncensored values	
Uncensored	12	Mean	256
Censored		Lognormal mean	257
Detection limit or PQL		Std. devn.	67.4
Method detection limit		Median	251
TOTAL	12	Min.	152
		Max.	379

Lognormal distribution? r-squared is: 0.978
Normal distribution? r-squared is: 0.980
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 301

Washington Closure Hanford

CALCULATION SHEET

Originator	J. D. Skoglie	Date	04/08/13
Project	100 B/C Field Remediation	Job No.	14655
Subject	100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations		

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Checked N. K. Schiffern

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Ecology Software (MTCAStat) Results, 100-C-7:1 Subsite Lower Sidewall

Molybdenum 95% UCL Calculation

DATA	ID
0.275	J1NPN7/ J1NPP5
0.277	J1NPN3
0.334	J1NPN4
0.328	J1NPN5
0.348	J1NPN6
0.271	J1NPN8
0.237	J1NPN9
0.261	J1NPP0
0.272	J1NPP1
0.695	J1NPP2
0.231	J1NPP3
0.164	J1NPP4

Number of samples		Uncensored values	
Uncensored	12	Mean	0.308
Censored		Lognormal mean	0.307
Detection limit or PQL		Std. devn.	0.132
Method detection limit		Median	0.273
TOTAL	12	Min.	0.164
		Max.	0.695

Lognormal distribution? r-squared is: 0.824
Normal distribution? r-squared is: 0.657
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.370

Nickel 95% UCL Calculation

DATA	ID
3.43	J1NPN7/ J1NPP5
4.30	J1NPN3
3.65	J1NPN4
8.81	J1NPN5
6.29	J1NPN6
4.89	J1NPN8
3.39	J1NPN9
4.20	J1NPP0
5.17	J1NPP1
1.96	J1NPP2
4.26	J1NPP3
3.60	J1NPP4

Number of samples		Uncensored values	
Uncensored	12	Mean	4.50
Censored		Lognormal mean	4.52
Detection limit or PQL		Std. devn.	1.73
Method detection limit		Median	4.23
TOTAL	12	Min.	1.96
		Max.	8.81

Lognormal distribution? r-squared is: 0.925
Normal distribution? r-squared is: 0.859
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 5.64

Vanadium 95% UCL Calculation

DATA	ID
43.7	J1NPN7/ J1NPP5
58.7	J1NPN3
60.4	J1NPN4
61.7	J1NPN5
58.5	J1NPN6
54.0	J1NPN8
46.4	J1NPN9
52.7	J1NPP0
48.1	J1NPP1
25.9	J1NPP2
47.0	J1NPP3
37.5	J1NPP4

Number of samples		Uncensored values	
Uncensored	12	Mean	49.6
Censored		Lognormal mean	49.8
Detection limit or PQL		Std. devn.	10.5
Method detection limit		Median	50.4
TOTAL	12	Min.	25.9
		Max.	61.7

Lognormal distribution? r-squared is: 0.843
Normal distribution? r-squared is: 0.919
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 55.0

Zinc 95% UCL Calculation

DATA	ID
28.9	J1NPN7/ J1NPP5
34.8	J1NPN3
35.1	J1NPN4
44.7	J1NPN5
38.8	J1NPN6
36.8	J1NPN8
30.9	J1NPN9
33.8	J1NPP0
33.6	J1NPP1
17.3	J1NPP2
32.3	J1NPP3
27.2	J1NPP4

Number of samples		Uncensored values	
Uncensored	12	Mean	32.9
Censored		Lognormal mean	33.0
Detection limit or PQL		Std. devn.	6.71
Method detection limit		Median	33.7
TOTAL	12	Min.	17.3
		Max.	44.7

Lognormal distribution? r-squared is: 0.833
Normal distribution? r-squared is: 0.919
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 36.3

CALCULATION SHEET

Washington Closure Hanford
Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
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Calc. No. 0100C-CA-V0044
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Ecology Software (MTCAStat) Results, 100-C-7:1 Subsite West Sidewall

Arsenic 95% UCL Calculation

DATA	ID
3.00	J1R620/ J1R625
2.02	J1R613
2.49	J1R614
2.35	J1R615
1.62	J1R616
1.62	J1R617
1.68	J1R618
1.29	J1R619
1.33	J1R621
2.10	J1R622
1.59	J1R623
4.46	J1R624

Number of samples		Uncensored values	
Uncensored	12	Mean	2.13
Censored		Lognormal mean	2.13
Detection limit or PQL		Std. devn.	0.89
Method detection limit		Median	1.85
TOTAL	12	Min.	1.29
		Max.	4.46

Lognormal distribution? r-squared is: 0.922
Normal distribution? r-squared is: 0.805
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 2.64

Barium 95% UCL Calculation

DATA	ID
64.0	J1R620/ J1R625
59.3	J1R613
68.7	J1R614
82.6	J1R615
59.1	J1R616
42.9	J1R617
49.7	J1R618
38.5	J1R619
81.2	J1R621
34.4	J1R622
54.2	J1R623
111	J1R624

Number of samples		Uncensored values	
Uncensored	12	Mean	62.1
Censored		Lognormal mean	62.4
Detection limit or PQL		Std. devn.	21.6
Method detection limit		Median	59.2
TOTAL	12	Min.	34.4
		Max.	111

Lognormal distribution? r-squared is: 0.986
Normal distribution? r-squared is: 0.934
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 76.2

Beryllium 95% UCL Calculation

DATA	ID
0.312	J1R620/ J1R625
0.288	J1R613
0.305	J1R614
0.213	J1R615
0.230	J1R616
0.234	J1R617
0.231	J1R618
0.235	J1R619
0.210	J1R621
0.226	J1R622
0.229	J1R623
0.435	J1R624

Number of samples		Uncensored values	
Uncensored	12	Mean	0.262
Censored		Lognormal mean	0.262
Detection limit or PQL		Std. devn.	0.065
Method detection limit		Median	0.233
TOTAL	12	Min.	0.210
		Max.	0.435

Lognormal distribution? r-squared is: 0.793
Normal distribution? r-squared is: 0.727
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.293

Chromium 95% UCL Calculation

DATA	ID
10.7	J1R620/ J1R625
9.31	J1R613
6.82	J1R614
16.0	J1R615
4.31	J1R616
4.45	J1R617
3.94	J1R618
4.19	J1R619
2.09	J1R621
4.88	J1R622
2.95	J1R623
21.5	J1R624

Number of samples		Uncensored values	
Uncensored	12	Mean	7.59
Censored		Lognormal mean	7.64
Detection limit or PQL		Std. devn.	5.89
Method detection limit		Median	4.67
TOTAL	12	Min.	2.09
		Max.	21.5

Lognormal distribution? r-squared is: 0.954
Normal distribution? r-squared is: 0.807
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 12.6

Cobalt 95% UCL Calculation

DATA	ID
7.98	J1R620/ J1R625
8.30	J1R613
10.0	J1R614
8.74	J1R615
10.1	J1R616
8.69	J1R617
10.5	J1R618
9.27	J1R619
10.1	J1R621
8.82	J1R622
9.68	J1R623
8.03	J1R624

Number of samples		Uncensored values	
Uncensored	12	Mean	9.18
Censored		Lognormal mean	9.19
Detection limit or PQL		Std. devn.	0.88
Method detection limit		Median	9.05
TOTAL	12	Min.	7.98
		Max.	10.5

Lognormal distribution? r-squared is: 0.947
Normal distribution? r-squared is: 0.947
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 9.67

Copper 95% UCL Calculation

DATA	ID
16.8	J1R620/ J1R625
26.1	J1R613
17.3	J1R614
16.6	J1R615
16.8	J1R616
16.2	J1R617
15.4	J1R618
16.4	J1R619
14.8	J1R621
14.7	J1R622
16.2	J1R623
18.4	J1R624

Number of samples		Uncensored values	
Uncensored	12	Mean	17.1
Censored		Lognormal mean	17.1
Detection limit or PQL		Std. devn.	3.0
Method detection limit		Median	16.5
TOTAL	12	Min.	14.7
		Max.	26.1

Lognormal distribution? r-squared is: 0.697
Normal distribution? r-squared is: 0.621
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 18.6

Lead 95% UCL Calculation

DATA	ID
4.28	J1R620/ J1R625
3.72	J1R613
3.59	J1R614
2.95	J1R615
2.73	J1R616
2.69	J1R617
2.46	J1R618
2.48	J1R619
2.27	J1R621
2.65	J1R622
2.11	J1R623
7.36	J1R624

Number of samples		Uncensored values	
Uncensored	12	Mean	3.27
Censored		Lognormal mean	3.26
Detection limit or PQL		Std. devn.	1.44
Method detection limit		Median	2.71
TOTAL	12	Min.	2.11
		Max.	7.36

Lognormal distribution? r-squared is: 0.842
Normal distribution? r-squared is: 0.696
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 3.96

Manganese 95% UCL Calculation

DATA	ID
327	J1R620/ J1R625
375	J1R613
360	J1R614
350	J1R615
353	J1R616
316	J1R617
377	J1R618
260	J1R619
353	J1R621
305	J1R622
310	J1R623
375	J1R624

Number of samples		Uncensored values	
Uncensored	12	Mean	338
Censored		Lognormal mean	339
Detection limit or PQL		Std. devn.	36
Method detection limit		Median	352
TOTAL	12	Min.	260
		Max.	377

Lognormal distribution? r-squared is: 0.882
Normal distribution? r-squared is: 0.907
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 357

Nickel 95% UCL Calculation

DATA	ID
11.6	J1R620/ J1R625
9.37	J1R613
8.29	J1R614
8.79	J1R615
6.07	J1R616
6.11	J1R617
6.47	J1R618
7.44	J1R619
4.51	J1R621
6.85	J1R622
5.22	J1R623
18.2	J1R624

Number of samples		Uncensored values	
Uncensored	12	Mean	8.24
Censored		Lognormal mean	8.24
Detection limit or PQL		Std. devn.	3.69
Method detection limit		Median	7.15
TOTAL	12	Min.	4.51
		Max.	18.2

Lognormal distribution? r-squared is: 0.934
Normal distribution? r-squared is: 0.788
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 10.3

CALCULATION SHEET

Washington Closure Hanford

Originator	J. D. Skoglie	Date	04/08/13	Calc. No.	0100C-CA-V0044
Project	100 B/C Field Remediation	Job No.	14655	Checked	N. K. Schiffern
Subject	100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations				

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Ecology Software (MTCAStat) Results, 100-C-7:1 Subsite West Sidewall

	DATA	ID	Vanadium 95% UCL Calculation				DATA	ID	Zinc 95% UCL Calculation			
1												
2	62.5	J1R620/ J1R625					44.4	J1R620/ J1R625				
3	57.0	J1R613					42.8	J1R613				
4	74.6	J1R614	Number of samples		Uncensored values		51.2	J1R614	Number of samples		Uncensored values	
5	62.3	J1R615	Uncensored	12	Mean	74.0	43.9	J1R615	Uncensored	12	Mean	48.6
6	96.1	J1R616	Censored		Lognormal mean	74.1	54.4	J1R616	Censored		Lognormal mean	48.6
7	83.2	J1R617	Detection limit or PQL		Std. devn.	14.3	48.1	J1R617	Detection limit or PQL		Std. devn.	4.33
8	95.1	J1R618	Method detection limit		Median	75.9	53.5	J1R618	Method detection limit		Median	48.6
9	57.8	J1R619	TOTAL	12	Min.	57.0	44.2	J1R619	TOTAL	12	Min.	42.8
10	84.8	J1R621			Max.	96.1	49.0	J1R621			Max.	55.0
11	77.1	J1R622					46.4	J1R622				
12	79.4	J1R623					50.4	J1R623				
13	58.0	J1R624					55.0	J1R624				
14												
15												
16												
17			Lognormal distribution?		Normal distribution?				Lognormal distribution?		Normal distribution?	
18			r-squared is: 0.925		r-squared is: 0.926				r-squared is: 0.951		r-squared is: 0.949	
19			Recommendations:						Recommendations:			
20			Use lognormal distribution.						Use lognormal distribution.			
21												
22			UCL (Land's method) is		82.5				UCL (Land's method) is		51.0	
23												
24												

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
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Ecology Software (MTCAStat) Results, 100-C-7:1 Subsite Staging Pile Area 1

Arsenic 95% UCL Calculation

DATA	ID
2.30	J1PTJ7/ J1PTL2
2.69	J1PTJ8
2.26	J1PTJ9
2.19	J1PTK0
2.65	J1PTK1
2.63	J1PTK2
2.36	J1PTK3
2.00	J1PTK4
2.49	J1PTK5
2.09	J1PTK6
2.59	J1PTK7
3.83	J1PTK8
2.71	J1PTK9
2.62	J1PTL0
22.0	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	3.83
Censored		Lognormal mean	3.42
Detection limit or PQL		Std. devn.	5.05
Method detection limit		Median	2.59
TOTAL	15	Min.	2.00
		Max.	22.0

Lognormal distribution? r-squared is: 0.476
Normal distribution? r-squared is: 0.318
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 5.97

Barium 95% UCL Calculation

DATA	ID
75.8	J1PTJ7/ J1PTL2
55.6	J1PTJ8
65.8	J1PTJ9
72.7	J1PTK0
67.4	J1PTK1
66.8	J1PTK2
62.8	J1PTK3
64.4	J1PTK4
69.9	J1PTK5
58.2	J1PTK6
73.1	J1PTK7
75.5	J1PTK8
70.1	J1PTK9
75.4	J1PTL0
101	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	70.3
Censored		Lognormal mean	70.3
Detection limit or PQL		Std. devn.	10.5
Method detection limit		Median	69.9
TOTAL	15	Min.	55.6
		Max.	101

Lognormal distribution? r-squared is: 0.887
Normal distribution? r-squared is: 0.822
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 74.7

Beryllium 95% UCL Calculation

DATA	ID
0.263	J1PTJ7/ J1PTL2
0.280	J1PTJ8
0.302	J1PTJ9
0.255	J1PTK0
0.301	J1PTK1
0.284	J1PTK2
0.284	J1PTK3
0.265	J1PTK4
0.286	J1PTK5
0.196	J1PTK6
0.270	J1PTK7
0.313	J1PTK8
0.272	J1PTK9
0.281	J1PTL0
0.229	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	0.272
Censored		Lognormal mean	0.272
Detection limit or PQL		Std. devn.	0.029
Method detection limit		Median	0.280
TOTAL	15	Min.	0.196
		Max.	0.313

Lognormal distribution? r-squared is: 0.840
Normal distribution? r-squared is: 0.888
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.285

Boron 95% UCL Calculation

DATA	ID
3.26	J1PTJ7/ J1PTL2
1.74	J1PTJ8
1.73	J1PTJ9
2.16	J1PTK0
1.75	J1PTK1
1.94	J1PTK2
1.69	J1PTK3
1.35	J1PTK4
2.28	J1PTK5
1.64	J1PTK6
2.66	J1PTK7
1.26	J1PTK8
2.53	J1PTK9
3.16	J1PTL0
6.91	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	2.40
Censored		Lognormal mean	2.38
Detection limit or PQL		Std. devn.	1.38
Method detection limit		Median	1.94
TOTAL	15	Min.	1.26
		Max.	6.91

Lognormal distribution? r-squared is: 0.875
Normal distribution? r-squared is: 0.656
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 2.99

Cadmium 95% UCL Calculation

DATA	ID
0.124	J1PTJ7/ J1PTL2
0.0698	J1PTJ8
0.0903	J1PTJ9
0.0959	J1PTK0
0.0869	J1PTK1
0.105	J1PTK2
0.0824	J1PTK3
0.0712	J1PTK4
0.0957	J1PTK5
0.0709	J1PTK6
0.0874	J1PTK7
0.0708	J1PTK8
0.0839	J1PTK9
0.0993	J1PTL0
0.0569	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	0.0860
Censored		Lognormal mean	0.0861
Detection limit or PQL		Std. devn.	0.0168
Method detection limit		Median	0.0869
TOTAL	15	Min.	0.0569
		Max.	0.124

Lognormal distribution? r-squared is: 0.966
Normal distribution? r-squared is: 0.959
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.0947

Chromium 95% UCL Calculation

DATA	ID
10.4	J1PTJ7/ J1PTL2
10.5	J1PTJ8
9.59	J1PTJ9
8.01	J1PTK0
10.2	J1PTK1
11.5	J1PTK2
9.38	J1PTK3
8.79	J1PTK4
12.7	J1PTK5
14.9	J1PTK6
8.33	J1PTK7
17.0	J1PTK8
9.47	J1PTK9
8.76	J1PTL0
10.9	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	10.7
Censored		Lognormal mean	10.7
Detection limit or PQL		Std. devn.	2.49
Method detection limit		Median	10.2
TOTAL	15	Min.	8.01
		Max.	17.0

Lognormal distribution? r-squared is: 0.916
Normal distribution? r-squared is: 0.850
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 11.9

Cobalt 95% UCL Calculation

DATA	ID
5.87	J1PTJ7/ J1PTL2
7.13	J1PTJ8
6.12	J1PTJ9
6.15	J1PTK0
6.12	J1PTK1
5.73	J1PTK2
6.14	J1PTK3
6.65	J1PTK4
5.74	J1PTK5
4.43	J1PTK6
6.62	J1PTK7
8.33	J1PTK8
6.61	J1PTK9
6.33	J1PTL0
6.61	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	6.31
Censored		Lognormal mean	6.31
Detection limit or PQL		Std. devn.	0.83
Method detection limit		Median	6.15
TOTAL	15	Min.	4.43
		Max.	8.33

Lognormal distribution? r-squared is: 0.862
Normal distribution? r-squared is: 0.872
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 6.66

Copper 95% UCL Calculation

DATA	ID
14.1	J1PTJ7/ J1PTL2
13.7	J1PTJ8
11.3	J1PTJ9
14.2	J1PTK0
11.7	J1PTK1
11.1	J1PTK2
13.1	J1PTK3
13.6	J1PTK4
11.0	J1PTK5
10.2	J1PTK6
14.0	J1PTK7
15.4	J1PTK8
13.6	J1PTK9
14.3	J1PTL0
31.2	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	14.2
Censored		Lognormal mean	14.1
Detection limit or PQL		Std. devn.	4.95
Method detection limit		Median	13.6
TOTAL	15	Min.	10.2
		Max.	31.2

Lognormal distribution? r-squared is: 0.695
Normal distribution? r-squared is: 0.540
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 16.3

Lead 95% UCL Calculation

DATA	ID
5.70	J1PTJ7/ J1PTL2
3.55	J1PTJ8
3.32	J1PTJ9
4.81	J1PTK0
3.39	J1PTK1
4.65	J1PTK2
3.26	J1PTK3
2.89	J1PTK4
3.46	J1PTK5
2.98	J1PTK6
4.46	J1PTK7
4.54	J1PTK8
3.87	J1PTK9
4.37	J1PTL0
7.59	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	4.19
Censored		Lognormal mean	4.19
Detection limit or PQL		Std. devn.	1.23
Method detection limit		Median	3.87
TOTAL	15	Min.	2.89
		Max.	7.59

Lognormal distribution? r-squared is: 0.925
Normal distribution? r-squared is: 0.838
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 4.77

Washington Closure Hanford

CALCULATION SHEET

Originator	J. D. Skoglie	Date	04/08/13
Project	100 B/C Field Remediation	Job No.	14655
Subject	100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations	Calc. No.	0100C-CA-V0044
		Checked	N. K. Schiffern

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Ecology Software (MTCAStat) Results, 100-C-7:1 Subsite Staging Pile Area 1

Manganese 95% UCL Calculation

DATA	ID
255	J1PTJ7/ J1PTL2
304	J1PTJ8
302	J1PTJ9
257	J1PTK0
290	J1PTK1
277	J1PTK2
264	J1PTK3
266	J1PTK4
282	J1PTK5
179	J1PTK6
256	J1PTK7
323	J1PTK8
271	J1PTK9
278	J1PTL0
228	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	269
Censored		Lognormal mean	269
Detection limit or PQL		Std. devn.	34.1
Method detection limit		Median	271
TOTAL	15	Min.	179
		Max.	323

Lognormal distribution? r-squared is: 0.839
Normal distribution? r-squared is: 0.901
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 284

Mercury 95% UCL Calculation

DATA	ID
0.0298	J1PTJ7/ J1PTL2
0.0127	J1PTJ8
0.0121	J1PTJ9
0.0127	J1PTK0
0.0115	J1PTK1
0.0139	J1PTK2
0.0241	J1PTK3
0.208	J1PTK4
0.0145	J1PTK5
0.0123	J1PTK6
0.0171	J1PTK7
0.0213	J1PTK8
0.0825	J1PTK9
0.0152	J1PTL0
0.0144	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	0.0335
Censored		Lognormal mean	0.0289
Detection limit or PQL		Std. devn.	0.0515
Method detection limit		Median	0.0145
TOTAL	15	Min.	0.0115
		Max.	0.208

Lognormal distribution? r-squared is: 0.690
Normal distribution? r-squared is: 0.447
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.0550

Molybdenum 95% UCL Calculation

DATA	ID
0.385	J1PTJ7/ J1PTL2
0.441	J1PTJ8
0.325	J1PTJ9
0.425	J1PTK0
0.334	J1PTK1
0.329	J1PTK2
0.316	J1PTK3
0.344	J1PTK4
0.299	J1PTK5
0.985	J1PTK6
0.287	J1PTK7
0.465	J1PTK8
0.385	J1PTK9
0.352	J1PTL0
0.803	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	0.432
Censored		Lognormal mean	0.429
Detection limit or PQL		Std. devn.	0.198
Method detection limit		Median	0.352
TOTAL	15	Min.	0.287
		Max.	0.985

Lognormal distribution? r-squared is: 0.778
Normal distribution? r-squared is: 0.655
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.516

Nickel 95% UCL Calculation

DATA	ID
11.8	J1PTJ7/ J1PTL2
10.7	J1PTJ8
9.13	J1PTJ9
9.03	J1PTK0
9.19	J1PTK1
8.65	J1PTK2
9.37	J1PTK3
8.02	J1PTK4
9.43	J1PTK5
19.2	J1PTK6
14.5	J1PTK7
12.4	J1PTK8
8.86	J1PTK9
8.63	J1PTL0
9.16	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	10.5
Censored		Lognormal mean	10.5
Detection limit or PQL		Std. devn.	2.96
Method detection limit		Median	9.19
TOTAL	15	Min.	8.02
		Max.	19.2

Lognormal distribution? r-squared is: 0.793
Normal distribution? r-squared is: 0.711
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 11.8

Vanadium 95% UCL Calculation

DATA	ID
43.8	J1PTJ7/ J1PTL2
48.5	J1PTJ8
45.0	J1PTJ9
47.8	J1PTK0
43.3	J1PTK1
43.4	J1PTK2
43.4	J1PTK3
46.1	J1PTK4
41.6	J1PTK5
17.2	J1PTK6
41.5	J1PTK7
56.3	J1PTK8
50.2	J1PTK9
49.0	J1PTL0
40.3	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	43.8
Censored		Lognormal mean	44.2
Detection limit or PQL		Std. devn.	8.45
Method detection limit		Median	43.8
TOTAL	15	Min.	17.2
		Max.	56.3

Lognormal distribution? r-squared is: 0.567
Normal distribution? r-squared is: 0.720
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 47.4

Zinc 95% UCL Calculation

DATA	ID
40.1	J1PTJ7/ J1PTL2
39.9	J1PTJ8
36.9	J1PTJ9
39.1	J1PTK0
37.2	J1PTK1
38.7	J1PTK2
36.9	J1PTK3
39.1	J1PTK4
37.4	J1PTK5
24.5	J1PTK6
38.3	J1PTK7
49.9	J1PTK8
39.8	J1PTK9
42.2	J1PTL0
124	J1PTL1

Number of samples		Uncensored values	
Uncensored	15	Mean	44.3
Censored		Lognormal mean	43.7
Detection limit or PQL		Std. devn.	22.6
Method detection limit		Median	39.1
TOTAL	15	Min.	24.5
		Max.	124

Lognormal distribution? r-squared is: 0.580
Normal distribution? r-squared is: 0.429
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 53.9

CALCULATION SHEET

Washington Closure Hanford
Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

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Ecology Software (MTCAStat) Results, 100-C-7:1 Subsite Staging Pile Area 2

Antimony 95% UCL Calculation

DATA	ID
0.330	J1PTL4/ J1PTM7
0.364	J1PTL5
0.341	J1PTL6
0.323	J1PTL7
0.443	J1PTL8
0.504	J1PTL9
0.355	J1PTM0
0.369	J1PTM1
0.344	J1PTM2
0.341	J1PTM3
0.376	J1PTM4
0.373	J1PTM5
0.444	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	0.377
Censored		Lognormal mean	0.378
Detection limit or PQL		Std. devn.	0.054
Method detection limit		Median	0.364
TOTAL	13	Min.	0.323
		Max.	0.504

Lognormal distribution? r-squared is: 0.864
Normal distribution? r-squared is: 0.829
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.402

Arsenic 95% UCL Calculation

DATA	ID
2.22	J1PTL4/ J1PTM7
2.21	J1PTL5
2.20	J1PTL6
1.87	J1PTL7
2.06	J1PTL8
3.16	J1PTL9
2.26	J1PTM0
1.68	J1PTM1
3.56	J1PTM2
2.33	J1PTM3
2.80	J1PTM4
1.76	J1PTM5
2.60	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	2.36
Censored		Lognormal mean	2.37
Detection limit or PQL		Std. devn.	0.545
Method detection limit		Median	2.22
TOTAL	13	Min.	1.68
		Max.	3.56

Lognormal distribution? r-squared is: 0.959
Normal distribution? r-squared is: 0.916
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 2.66

Barium 95% UCL Calculation

DATA	ID
63.1	J1PTL4/ J1PTM7
60.1	J1PTL5
65.5	J1PTL6
61.4	J1PTL7
39.8	J1PTL8
60.6	J1PTL9
54.0	J1PTM0
38.1	J1PTM1
84.6	J1PTM2
47.0	J1PTM3
67.9	J1PTM4
36.7	J1PTM5
60.9	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	56.9
Censored		Lognormal mean	57.1
Detection limit or PQL		Std. devn.	13.6
Method detection limit		Median	60.6
TOTAL	13	Min.	36.7
		Max.	84.6

Lognormal distribution? r-squared is: 0.915
Normal distribution? r-squared is: 0.926
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 65.3

Beryllium 95% UCL Calculation

DATA	ID
0.265	J1PTL4/ J1PTM7
0.273	J1PTL5
0.284	J1PTL6
0.250	J1PTL7
0.228	J1PTL8
0.231	J1PTL9
0.239	J1PTM0
0.244	J1PTM1
0.259	J1PTM2
0.261	J1PTM3
0.298	J1PTM4
0.211	J1PTM5
0.283	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	0.256
Censored		Lognormal mean	0.256
Detection limit or PQL		Std. devn.	0.025
Method detection limit		Median	0.259
TOTAL	13	Min.	0.211
		Max.	0.298

Lognormal distribution? r-squared is: 0.988
Normal distribution? r-squared is: 0.992
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.269

Boron 95% UCL Calculation

DATA	ID
1.56	J1PTL4/ J1PTM7
1.50	J1PTL5
1.60	J1PTL6
1.57	J1PTL7
1.16	J1PTL8
1.61	J1PTL9
1.19	J1PTM0
1.36	J1PTM1
1.51	J1PTM2
1.08	J1PTM3
1.65	J1PTM4
1.02	J1PTM5
1.76	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	1.43
Censored		Lognormal mean	1.43
Detection limit or PQL		Std. devn.	0.24
Method detection limit		Median	1.51
TOTAL	13	Min.	1.02
		Max.	1.76

Lognormal distribution? r-squared is: 0.896
Normal distribution? r-squared is: 0.917
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 1.55

Cadmium 95% UCL Calculation

DATA	ID
0.0892	J1PTL4/ J1PTM7
0.0944	J1PTL5
0.0870	J1PTL6
0.0875	J1PTL7
0.0614	J1PTL8
0.0756	J1PTL9
0.0691	J1PTM0
0.0694	J1PTM1
0.129	J1PTM2
0.0742	J1PTM3
0.124	J1PTM4
0.0561	J1PTM5
0.0935	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	0.0854
Censored		Lognormal mean	0.0856
Detection limit or PQL		Std. devn.	0.0219
Method detection limit		Median	0.0870
TOTAL	13	Min.	0.0561
		Max.	0.129

Lognormal distribution? r-squared is: 0.961
Normal distribution? r-squared is: 0.917
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.0977

Chromium 95% UCL Calculation

DATA	ID
10.6	J1PTL4/ J1PTM7
9.78	J1PTL5
10.6	J1PTL6
9.95	J1PTL7
7.53	J1PTL8
7.80	J1PTL9
6.74	J1PTM0
5.69	J1PTM1
13.6	J1PTM2
8.31	J1PTM3
9.51	J1PTM4
4.26	J1PTM5
9.63	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	8.77
Censored		Lognormal mean	8.83
Detection limit or PQL		Std. devn.	2.42
Method detection limit		Median	9.51
TOTAL	13	Min.	4.26
		Max.	13.6

Lognormal distribution? r-squared is: 0.928
Normal distribution? r-squared is: 0.962
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 10.4

Cobalt 95% UCL Calculation

DATA	ID
5.06	J1PTL4/ J1PTM7
5.47	J1PTL5
5.15	J1PTL6
5.01	J1PTL7
6.46	J1PTL8
6.17	J1PTL9
6.34	J1PTM0
6.16	J1PTM1
4.76	J1PTM2
6.39	J1PTM3
7.62	J1PTM4
6.12	J1PTM5
7.01	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	5.98
Censored		Lognormal mean	5.98
Detection limit or PQL		Std. devn.	0.85
Method detection limit		Median	6.16
TOTAL	13	Min.	4.76
		Max.	7.62

Lognormal distribution? r-squared is: 0.950
Normal distribution? r-squared is: 0.947
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 6.44

Copper 95% UCL Calculation

DATA	ID
9.08	J1PTL4/ J1PTM7
11.0	J1PTL5
9.90	J1PTL6
9.37	J1PTL7
13.6	J1PTL8
13.2	J1PTL9
12.5	J1PTM0
14.3	J1PTM1
13.1	J1PTM2
14.3	J1PTM3
15.0	J1PTM4
12.7	J1PTM5
14.2	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	12.5
Censored		Lognormal mean	12.5
Detection limit or PQL		Std. devn.	2.01
Method detection limit		Median	13.1
TOTAL	13	Min.	9.08
		Max.	15.0

Lognormal distribution? r-squared is: 0.886
Normal distribution? r-squared is: 0.911
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 13.5

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
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Ecology Software (MTCAStat) Results, 100-C-7:1 Subsite Staging Pile Area 2

Lead 95% UCL Calculation

DATA	ID
3.19	J1PTL4/ J1PTM7
3.04	J1PTL5
3.07	J1PTL6
2.85	J1PTL7
2.69	J1PTL8
3.97	J1PTL9
2.94	J1PTM0
2.50	J1PTM1
3.67	J1PTM2
2.86	J1PTM3
3.52	J1PTM4
2.04	J1PTM5
3.43	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	3.06
Censored		Lognormal mean	3.06
Detection limit or PQL		Std. devn.	0.51
Method detection limit		Median	3.04
TOTAL	13	Min.	2.04
		Max.	3.97

Lognormal distribution? r-squared is: 0.959
Normal distribution? r-squared is: 0.982
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 3.36

Manganese 95% UCL Calculation

DATA	ID
262	J1PTL4/ J1PTM7
275	J1PTL5
255	J1PTL6
263	J1PTL7
251	J1PTL8
265	J1PTL9
252	J1PTM0
249	J1PTM1
230	J1PTM2
266	J1PTM3
287	J1PTM4
221	J1PTM5
283	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	258
Censored		Lognormal mean	258
Detection limit or PQL		Std. devn.	18.8
Method detection limit		Median	262
TOTAL	13	Min.	221
		Max.	287

Lognormal distribution? r-squared is: 0.945
Normal distribution? r-squared is: 0.958
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 268

Molybdenum 95% UCL Calculation

DATA	ID
0.298	J1PTL4/ J1PTM7
0.402	J1PTL5
0.261	J1PTL6
0.235	J1PTL7
0.317	J1PTL8
0.351	J1PTL9
0.254	J1PTM0
0.299	J1PTM1
0.900	J1PTM2
0.334	J1PTM3
0.283	J1PTM4
0.285	J1PTM5
0.298	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	0.347
Censored		Lognormal mean	0.344
Detection limit or PQL		Std. devn.	0.172
Method detection limit		Median	0.298
TOTAL	13	Min.	0.235
		Max.	0.900

Lognormal distribution? r-squared is: 0.682
Normal distribution? r-squared is: 0.515
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.426

Nickel 95% UCL Calculation

DATA	ID
8.51	J1PTL4/ J1PTM7
8.29	J1PTL5
8.91	J1PTL6
8.38	J1PTL7
8.43	J1PTL8
8.56	J1PTL9
7.37	J1PTM0
7.60	J1PTM1
12.1	J1PTM2
10.7	J1PTM3
11.1	J1PTM4
6.37	J1PTM5
10.4	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	8.98
Censored		Lognormal mean	8.99
Detection limit or PQL		Std. devn.	1.63
Method detection limit		Median	8.51
TOTAL	13	Min.	6.37
		Max.	12.1

Lognormal distribution? r-squared is: 0.953
Normal distribution? r-squared is: 0.938
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 9.88

Vanadium 95% UCL Calculation

DATA	ID
41.9	J1PTL4/ J1PTM7
44.6	J1PTL5
41.4	J1PTL6
43.0	J1PTL7
57.9	J1PTL8
51.7	J1PTL9
47.9	J1PTM0
58.4	J1PTM1
31.3	J1PTM2
53.5	J1PTM3
53.2	J1PTM4
54.1	J1PTM5
49.2	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	48.3
Censored		Lognormal mean	48.4
Detection limit or PQL		Std. devn.	7.70
Method detection limit		Median	49.2
TOTAL	13	Min.	31.3
		Max.	58.4

Lognormal distribution? r-squared is: 0.900
Normal distribution? r-squared is: 0.943
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 53.0

Zinc 95% UCL Calculation

DATA	ID
33.3	J1PTL4/ J1PTM7
34.9	J1PTL5
32.9	J1PTL6
33.2	J1PTL7
39.1	J1PTL8
42.2	J1PTL9
37.7	J1PTM0
41.5	J1PTM1
33.7	J1PTM2
39.6	J1PTM3
41.0	J1PTM4
37.5	J1PTM5
40.0	J1PTM6

Number of samples		Uncensored values	
Uncensored	13	Mean	37.4
Censored		Lognormal mean	37.4
Detection limit or PQL		Std. devn.	3.45
Method detection limit		Median	37.7
TOTAL	13	Min.	32.9
		Max.	42.2

Lognormal distribution? r-squared is: 0.915
Normal distribution? r-squared is: 0.921
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 39.2

CALCULATION SHEET

Washington Closure Hanford
Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/12/13
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Ecology Software (MTCAStat) Results, 100-C-7:1 Subsite Staging Pile Area 3

Arsenic 95% UCL Calculation

DATA	ID
2.8	J1RDP5/ J1RDR7
3.1	J1RDP6
2.1	J1RDP7
2.2	J1RDP8
1.3	J1RDP9
3.1	J1RDR0
2.5	J1RDR1
1.2	J1RDR2
1.3	J1RDR3
2.0	J1RDR4
2.8	J1RDR5
2.4	J1RDR6

Number of samples		Uncensored values	
Uncensored	12	Mean	2.2
Censored		Lognormal mean	2.2
Detection limit or PQL		Std. devn.	0.68
Method detection limit		Median	2.3
TOTAL	12	Min.	1.2
		Max.	3.1

Lognormal distribution? r-squared is: 0.892
Normal distribution? r-squared is: 0.936
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 2.6

Barium 95% UCL Calculation

DATA	ID
65.0	J1RDP5/ J1RDR7
61.8	J1RDP6
54.6	J1RDP7
66.9	J1RDP8
38.3	J1RDP9
63.4	J1RDR0
79.1	J1RDR1
36.2	J1RDR2
45.5	J1RDR3
57.6	J1RDR4
70.9	J1RDR5
81.6	J1RDR6

Number of samples		Uncensored values	
Uncensored	12	Mean	60.1
Censored		Lognormal mean	60.4
Detection limit or PQL		Std. devn.	14.5
Method detection limit		Median	62.6
TOTAL	12	Min.	36.2
		Max.	81.6

Lognormal distribution? r-squared is: 0.933
Normal distribution? r-squared is: 0.967
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 70.1

Beryllium 95% UCL Calculation

DATA	ID
0.42	J1RDP5/ J1RDR7
0.30	J1RDP6
0.31	J1RDP7
0.49	J1RDP8
0.48	J1RDP9
0.52	J1RDR0
0.40	J1RDR1
0.44	J1RDR2
0.43	J1RDR3
0.30	J1RDR4
0.47	J1RDR5
0.37	J1RDR6

Number of samples		Uncensored values	
Uncensored	12	Mean	0.41
Censored		Lognormal mean	0.41
Detection limit or PQL		Std. devn.	0.076
Method detection limit		Median	0.43
TOTAL	12	Min.	0.30
		Max.	0.52

Lognormal distribution? r-squared is: 0.916
Normal distribution? r-squared is: 0.942
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.46

Boron 95% UCL Calculation

DATA	ID
1.3	J1RDP5/ J1RDR7
1.6	J1RDP6
1.1	J1RDP7
1.3	J1RDP8
0.48	J1RDP9
1.2	J1RDR0
2.6	J1RDR1
0.43	J1RDR2
0.45	J1RDR3
1.3	J1RDR4
1.2	J1RDR5
2.0	J1RDR6

Number of samples		Uncensored values	
Uncensored	12	Mean	1.2
Censored		Lognormal mean	1.3
Detection limit or PQL		Std. devn.	0.64
Method detection limit		Median	1.2
TOTAL	12	Min.	0.43
		Max.	2.6

Lognormal distribution? r-squared is: 0.885
Normal distribution? r-squared is: 0.907
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 1.6

Cadmium 95% UCL Calculation

DATA	ID
0.055	J1RDP5/ J1RDR7
0.060	J1RDP6
0.078	J1RDP7
0.11	J1RDP8
0.054	J1RDP9
0.052	J1RDR0
0.096	J1RDR1
0.018	J1RDR2
0.049	J1RDR3
0.084	J1RDR4
0.053	J1RDR5
0.084	J1RDR6

Number of samples		Uncensored values	
Uncensored	12	Mean	0.066
Censored		Lognormal mean	0.068
Detection limit or PQL		Std. devn.	0.025
Method detection limit		Median	0.058
TOTAL	12	Min.	0.018
		Max.	0.11

Lognormal distribution? r-squared is: 0.824
Normal distribution? r-squared is: 0.939
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.079

Chromium 95% UCL Calculation

DATA	ID
11.3	J1RDP5/ J1RDR7
11.0	J1RDP6
8.7	J1RDP7
15.7	J1RDP8
6.2	J1RDP9
8.9	J1RDR0
10.1	J1RDR1
4.9	J1RDR2
6.1	J1RDR3
8.5	J1RDR4
11.3	J1RDR5
9.2	J1RDR6

Number of samples		Uncensored values	
Uncensored	12	Mean	9.3
Censored		Lognormal mean	9.4
Detection limit or PQL		Std. devn.	2.9
Method detection limit		Median	9.1
TOTAL	12	Min.	4.9
		Max.	15.7

Lognormal distribution? r-squared is: 0.949
Normal distribution? r-squared is: 0.936
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 11.3

Cobalt 95% UCL Calculation

DATA	ID
8.7	J1RDP5/ J1RDR7
5.7	J1RDP6
8.0	J1RDP7
8.7	J1RDP8
9.5	J1RDP9
9.3	J1RDR0
8.5	J1RDR1
8.7	J1RDR2
7.9	J1RDR3
7.9	J1RDR4
8.6	J1RDR5
7.8	J1RDR6

Number of samples		Uncensored values	
Uncensored	12	Mean	8.3
Censored		Lognormal mean	8.3
Detection limit or PQL		Std. devn.	0.98
Method detection limit		Median	8.6
TOTAL	12	Min.	5.7
		Max.	9.5

Lognormal distribution? r-squared is: 0.752
Normal distribution? r-squared is: 0.815
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 8.7

Copper 95% UCL Calculation

DATA	ID
15.6	J1RDP5/ J1RDR7
12.4	J1RDP6
17.5	J1RDP7
14.9	J1RDP8
15.4	J1RDP9
16.5	J1RDR0
16.2	J1RDR1
14.2	J1RDR2
15.4	J1RDR3
16.7	J1RDR4
15.8	J1RDR5
14.0	J1RDR6

Number of samples		Uncensored values	
Uncensored	12	Mean	15.4
Censored		Lognormal mean	15.4
Detection limit or PQL		Std. devn.	1.4
Method detection limit		Median	15.5
TOTAL	12	Min.	12.4
		Max.	17.5

Lognormal distribution? r-squared is: 0.933
Normal distribution? r-squared is: 0.956
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 16.2

Lead 95% UCL Calculation

DATA	ID
4.7	J1RDP5/ J1RDR7
3.6	J1RDP6
3.5	J1RDP7
4.6	J1RDP8
2.7	J1RDP9
4.8	J1RDR0
6.0	J1RDR1
2.4	J1RDR2
2.6	J1RDR3
3.7	J1RDR4
4.8	J1RDR5
6.8	J1RDR6

Number of samples		Uncensored values	
Uncensored	12	Mean	4.2
Censored		Lognormal mean	4.2
Detection limit or PQL		Std. devn.	1.4
Method detection limit		Median	4.2
TOTAL	12	Min.	2.4
		Max.	6.8

Lognormal distribution? r-squared is: 0.961
Normal distribution? r-squared is: 0.948
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 5.1

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Washington Closure Hanford
Originator J. D. Skoglie
Project 100 B/C Field Remediation
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Job No. 14655

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Checked N. K. Schiffern

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Ecology Software (MTCAStat) Results, 100-C-7:1 Subsite Staging Pile Area 3

Manganese 95% UCL Calculation

DATA	ID
372	J1RDP5/ J1RDR7
267	J1RDP6
332	J1RDP7
355	J1RDP8
307	J1RDP9
329	J1RDR0
358	J1RDR1
289	J1RDR2
300	J1RDR3
270	J1RDR4
340	J1RDR5
351	J1RDR6

Number of samples		Uncensored values	
Uncensored	12	Mean	323
Censored		Lognormal mean	323
Detection limit or PQL		Std. devn.	35
Method detection limit		Median	331
TOTAL	12	Min.	267
		Max.	372

Lognormal distribution?
r-squared is: 0.946
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.956

UCL (Land's method) is 343

Nickel 95% UCL Calculation

DATA	ID
11.2	J1RDP5/ J1RDR7
10.2	J1RDP6
8.5	J1RDP7
11.6	J1RDP8
12.7	J1RDP9
10.4	J1RDR0
11.7	J1RDR1
7.8	J1RDR2
7.9	J1RDR3
9.9	J1RDR4
11.9	J1RDR5
9.8	J1RDR6

Number of samples		Uncensored values	
Uncensored	12	Mean	10.3
Censored		Lognormal mean	10.3
Detection limit or PQL		Std. devn.	1.6
Method detection limit		Median	10.3
TOTAL	12	Min.	7.8
		Max.	12.7

Lognormal distribution?
r-squared is: 0.939
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.956

UCL (Land's method) is 11.3

Vanadium 95% UCL Calculation

DATA	ID
62.6	J1RDP5/ J1RDR7
42.5	J1RDP6
59.0	J1RDP7
52.2	J1RDP8
70.5	J1RDP9
56.6	J1RDR0
61.2	J1RDR1
62.1	J1RDR2
58.9	J1RDR3
43.6	J1RDR4
50.2	J1RDR5
56.2	J1RDR6

Number of samples		Uncensored values	
Uncensored	12	Mean	56.3
Censored		Lognormal mean	56.4
Detection limit or PQL		Std. devn.	8.1
Method detection limit		Median	57.8
TOTAL	12	Min.	42.5
		Max.	70.5

Lognormal distribution?
r-squared is: 0.935
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.954

UCL (Land's method) is 61.1

Zinc 95% UCL Calculation

DATA	ID
48.3	J1RDP5/ J1RDR7
37.0	J1RDP6
44.0	J1RDP7
42.9	J1RDP8
45.6	J1RDP9
44.8	J1RDR0
51.1	J1RDR1
42.0	J1RDR2
38.8	J1RDR3
41.6	J1RDR4
44.4	J1RDR5
50.5	J1RDR6

Number of samples		Uncensored values	
Uncensored	12	Mean	44.2
Censored		Lognormal mean	44.3
Detection limit or PQL		Std. devn.	4.3
Method detection limit		Median	44.2
TOTAL	12	Min.	37.0
		Max.	51.1

Lognormal distribution?
r-squared is: 0.975
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.975

UCL (Land's method) is 46.6

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Washington Closure Hanford
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Arsenic 95% UCL Calculation

DATA	ID
2.3	J1RDT9/ J1RDV0
2.4	J1RDR8
1.8	J1RDR9
2.2	J1RDT0
1.8	J1RDT1
1.4	J1RDT2
2.4	J1RDT3
1.7	J1RDT4
2.0	J1RDT5
0.84	J1RDT6
1.5	J1RDT7
0.90	J1RDT8

Number of samples		Uncensored values	
Uncensored	12	Mean	1.8
Censored		Lognormal mean	1.8
Detection limit or PQL		Std. devn.	0.54
Method detection limit		Median	1.8
TOTAL	12	Min.	0.84
		Max.	2.4

Lognormal distribution? r-squared is: 0.877
Normal distribution? r-squared is: 0.938
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 2.0

Barium 95% UCL Calculation

DATA	ID
77.6	J1RDT9/ J1RDV0
66.6	J1RDR8
52.9	J1RDR9
73.4	J1RDT0
36.4	J1RDT1
42.0	J1RDT2
71.3	J1RDT3
59.9	J1RDT4
65.3	J1RDT5
38.6	J1RDT6
48.0	J1RDT7
43.7	J1RDT8

Number of samples		Uncensored values	
Uncensored	12	Mean	56.3
Censored		Lognormal mean	56.5
Detection limit or PQL		Std. devn.	14.5
Method detection limit		Median	56.4
TOTAL	12	Min.	36.4
		Max.	77.6

Lognormal distribution? r-squared is: 0.948
Normal distribution? r-squared is: 0.951
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 65.8

Beryllium 95% UCL Calculation

DATA	ID
0.40	J1RDT9/ J1RDV0
0.34	J1RDR8
0.36	J1RDR9
0.38	J1RDT0
0.33	J1RDT1
0.34	J1RDT2
0.41	J1RDT3
0.39	J1RDT4
0.32	J1RDT5
0.33	J1RDT6
0.38	J1RDT7
0.30	J1RDT8

Number of samples		Uncensored values	
Uncensored	12	Mean	0.36
Censored		Lognormal mean	0.36
Detection limit or PQL		Std. devn.	0.035
Method detection limit		Median	0.35
TOTAL	12	Min.	0.30
		Max.	0.41

Lognormal distribution? r-squared is: 0.963
Normal distribution? r-squared is: 0.963
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.38

Cadmium 95% UCL Calculation

DATA	ID
0.070	J1RDT9/ J1RDV0
0.042	J1RDR8
0.021	J1RDR9
0.076	J1RDT0
0.019	J1RDT1
0.020	J1RDT2
0.10	J1RDT3
0.043	J1RDT4
0.063	J1RDT5
0.018	J1RDT6
0.046	J1RDT7
0.045	J1RDT8

Number of samples		Uncensored values	
Uncensored	12	Mean	0.047
Censored		Lognormal mean	0.048
Detection limit or PQL		Std. devn.	0.026
Method detection limit		Median	0.044
TOTAL	12	Min.	0.018
		Max.	0.10

Lognormal distribution? r-squared is: 0.918
Normal distribution? r-squared is: 0.918
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.072

Chromium 95% UCL Calculation

DATA	ID
10.7	J1RDT9/ J1RDV0
13.4	J1RDR8
6.6	J1RDR9
9.4	J1RDT0
4.9	J1RDT1
7.3	J1RDT2
11.2	J1RDT3
8.7	J1RDT4
11.5	J1RDT5
5.0	J1RDT6
5.6	J1RDT7
5.7	J1RDT8

Number of samples		Uncensored values	
Uncensored	12	Mean	8.3
Censored		Lognormal mean	8.4
Detection limit or PQL		Std. devn.	2.9
Method detection limit		Median	8.0
TOTAL	12	Min.	4.9
		Max.	13.4

Lognormal distribution? r-squared is: 0.949
Normal distribution? r-squared is: 0.942
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 10.3

Cobalt 95% UCL Calculation

DATA	ID
8.3	J1RDT9/ J1RDV0
7.3	J1RDR8
8.9	J1RDR9
7.8	J1RDT0
8.8	J1RDT1
9.6	J1RDT2
8.2	J1RDT3
8.2	J1RDT4
6.3	J1RDT5
8.8	J1RDT6
10.3	J1RDT7
9.3	J1RDT8

Number of samples		Uncensored values	
Uncensored	12	Mean	8.5
Censored		Lognormal mean	8.5
Detection limit or PQL		Std. devn.	1.1
Method detection limit		Median	8.5
TOTAL	12	Min.	6.3
		Max.	10.3

Lognormal distribution? r-squared is: 0.946
Normal distribution? r-squared is: 0.969
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 9.1

Copper 95% UCL Calculation

DATA	ID
12.8	J1RDT9/ J1RDV0
11.4	J1RDR8
14.2	J1RDR9
12.5	J1RDT0
12.3	J1RDT1
13.6	J1RDT2
14.2	J1RDT3
13.2	J1RDT4
9.8	J1RDT5
16.6	J1RDT6
18.1	J1RDT7
11.8	J1RDT8

Number of samples		Uncensored values	
Uncensored	12	Mean	13.4
Censored		Lognormal mean	13.4
Detection limit or PQL		Std. devn.	2.2
Method detection limit		Median	13.0
TOTAL	12	Min.	9.8
		Max.	18.1

Lognormal distribution? r-squared is: 0.962
Normal distribution? r-squared is: 0.936
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 14.6

Lead 95% UCL Calculation

DATA	ID
4.7	J1RDT9/ J1RDV0
3.9	J1RDR8
4.1	J1RDR9
4.3	J1RDT0
2.5	J1RDT1
2.8	J1RDT2
4.5	J1RDT3
3.4	J1RDT4
3.5	J1RDT5
3.1	J1RDT6
3.2	J1RDT7
2.5	J1RDT8

Number of samples		Uncensored values	
Uncensored	12	Mean	3.5
Censored		Lognormal mean	3.6
Detection limit or PQL		Std. devn.	0.76
Method detection limit		Median	3.5
TOTAL	12	Min.	2.5
		Max.	4.7

Lognormal distribution? r-squared is: 0.964
Normal distribution? r-squared is: 0.968
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 4.0

Manganese 95% UCL Calculation

DATA	ID
344	J1RDT9/ J1RDV0
285	J1RDR8
306	J1RDR9
311	J1RDT0
274	J1RDT1
310	J1RDT2
322	J1RDT3
289	J1RDT4
268	J1RDT5
266	J1RDT6
332	J1RDT7
287	J1RDT8

Number of samples		Uncensored values	
Uncensored	12	Mean	299
Censored		Lognormal mean	300
Detection limit or PQL		Std. devn.	25.3
Method detection limit		Median	298
TOTAL	12	Min.	266
		Max.	344

Lognormal distribution? r-squared is: 0.970
Normal distribution? r-squared is: 0.966
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 313

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Nickel 95% UCL Calculation

DATA	ID
12.5	J1RDT9/ J1RDV0
13.1	J1RDR8
10.2	J1RDR9
12.8	J1RDT0
12.2	J1RDT1
12.4	J1RDT2
12.7	J1RDT3
12.3	J1RDT4
12.7	J1RDT5
9.2	J1RDT6
11.0	J1RDT7
11.6	J1RDT8

Number of samples		Uncensored values	
Uncensored	12	Mean	11.9
Censored		Lognormal mean	11.9
Detection limit or PQL		Std. devn.	1.2
Method detection limit		Median	12.4
TOTAL	12	Min.	9.2
		Max.	13.1

Lognormal distribution? r-squared is: 0.811
Normal distribution? r-squared is: 0.838
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 12.5

Vanadium 95% UCL Calculation

DATA	ID
48.1	J1RDT9/ J1RDV0
42.3	J1RDR8
54.1	J1RDR9
44.9	J1RDT0
62.7	J1RDT1
62.6	J1RDT2
46.6	J1RDT3
53.9	J1RDT4
39.2	J1RDT5
75.3	J1RDT6
82.6	J1RDT7
62.3	J1RDT8

Number of samples		Uncensored values	
Uncensored	12	Mean	56.2
Censored		Lognormal mean	56.3
Detection limit or PQL		Std. devn.	13.3
Method detection limit		Median	54.0
TOTAL	12	Min.	39.2
		Max.	82.6

Lognormal distribution? r-squared is: 0.969
Normal distribution? r-squared is: 0.940
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 64.1

Zinc 95% UCL Calculation

DATA	ID
39.1	J1RDT9/ J1RDV0
33.5	J1RDR8
39.6	J1RDR9
38.6	J1RDT0
38.2	J1RDT1
40.0	J1RDT2
37.1	J1RDT3
37.1	J1RDT4
31.2	J1RDT5
38.5	J1RDT6
42.3	J1RDT7
39.4	J1RDT8

Number of samples		Uncensored values	
Uncensored	12	Mean	37.9
Censored		Lognormal mean	37.9
Detection limit or PQL		Std. devn.	3.0
Method detection limit		Median	38.6
TOTAL	12	Min.	31.2
		Max.	42.3

Lognormal distribution? r-squared is: 0.849
Normal distribution? r-squared is: 0.873
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 39.3

CALCULATION SHEET

Washington Closure Hanford

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Duplicate Analysis - 100-C-7:1 Upper Sidewall Samples

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Calcium			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
SS-8	J1LHR1	10/17/11	3740	J	3.87	1.92		0.773	40.8		0.387	0.206		0.155	5570	J	77.3	2.23		0.155	8.10		1.55	12.9		0.773
Duplicate of J1IHR1	J1LHR2	10/17/11	4670	J	5.19	2.02		1.04	43.1		0.519	0.197	B	0.208	5560	J	104	3.09		0.208	8.67		2.08	14.6		1.04

Analysis:

	TDL	5	10	2	0.2	100	1	2	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)		Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	22.1%		5.5%		0.2%			12.4%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Upper Sidewall Samples

Sampling Area	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Molybdenum			Nickel			Potassium			Silicon		
			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
SS-8	J1LHR1	10/17/11	23600		15.5	1.88		0.387	3710	J	58.0	282		3.87	0.388	B	1.55	4.85		3.09	636		309	208		1.55
Duplicate of J1IHR1	J1LHR2	10/17/11	25000		20.8	2.37		0.519	4360	J	77.9	273		5.19	0.367	B	2.08	6.52		4.15	639		415	258		2.08

Analysis:

	TDL	5	5	75	5	2	4	400	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)		No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	5.8%		16.1%	3.2%				21.5%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Yes - assess further

Duplicate Analysis - 100-C-7:1 Upper Sidewall Samples

Sampling Area	HEIS Number	Sample Date	Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SS-8	J1LHR1	10/17/11	282		38.7	54.7	J	1.93	40.9	J	7.73
Duplicate of J1IHR1	J1LHR2	10/17/11	359		51.9	64.4	J	2.60	42.9	J	10.4

Analysis:

	TDL	50	2.5	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD	24.0%	16.3%	4.8%
	Difference > 2 TDL?	No - acceptable	Yes - assess further	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
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Duplicate Analysis - 100-C-7:1 Lower Sidewall Samples

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Calcium			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
LSW-5	J1NPN7	4/24/12	2950		3.58	1.09		0.717	36.1		0.358	0.157		0.143	3830	J	71.7	1.60		0.143	5.79		1.43	10.7	J	0.717
Duplicate of J1NPN7	J1NPP5	4/24/12	2910		3.74	0.827		0.747	27.0		0.374	0.160		0.149	3730	J	74.7	1.09		0.149	5.09		1.49	9.84	J	0.747

Analysis:

	TDL	5	10	2	0.2	100	1	2	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**
	RPD	1.4%		28.8%		2.6%			8.4%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Lower Sidewall Samples

Sampling Area	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Molybdenum			Nickel			Potassium			Silicon		
			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
LSW-5	J1NPN7	4/24/12	18400		14.3	1.18	J	0.358	2950	J	53.7	219		3.58	0.379	B	1.43	3.47	J	2.87	334	J	287	140	J	1.43
Duplicate of J1NPN7	J1NPP5	4/24/12	15200		14.9	1.13	J	0.374	2390	J	56.0	153		3.74	0.170	B	1.49	3.38	J	2.99	396	J	299	144	J	1.49

Analysis:

	TDL	5	5	75	5	2	4	400	2
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**		No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**
	RPD	19.0%		21.0%	*35.5%*				2.8%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Lower Sidewall Samples

Sampling Area	HEIS Number	Sample Date	Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
LSW-5	J1NPN7	4/24/12	209		35.8	50.3	J	1.79	32.1	J	7.17
Duplicate of J1NPN7	J1NPP5	4/24/12	224		37.4	37.1	J	1.87	25.7	J	7.47

Analysis:

	TDL	50	2.5	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD		*30.2%*	22.1%
	Difference > 2 TDL?	No - acceptable	Yes - assess further	Yes - assess further

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Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
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Duplicate Analysis - 100-C-7:1 West Sidewall Samples

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Calcium			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
WSW-8	J1R620	12/27/12	10100		13.4	2.99		2.67	62.4		1.34	0.307	B	0.535	8570		267	10.4		0.535	7.75		5.35	17.2		2.67
Duplicate of J1R620	J1R625	12/27/12	8290		14.0	3.01		2.79	65.5		1.40	0.317	B	0.558	7450		279	10.9		0.558	8.20		5.58	16.3		2.79

Analysis:

TDL		5	10	2	0.2	100	1	2	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**		**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**
	RPD	19.7%		4.8%		14.0%	4.7%		5.4%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 West Sidewall Samples

Sampling Area	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Mercury			Nickel			Potassium			Silicon		
			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
WSW-8	J1R620	12/27/12	22600		53.5	4.16		1.34	4830		200	307		13.4	0.0117	B	0.0257	11.0		10.7	1250		1070	908		5.35
Duplicate of J1R620	J1R625	12/27/12	23900		55.8	4.39		1.40	5180		209	346		14.0	0.0108	B	0.0260	12.2		11.2	1250		1120	994		5.58

Analysis:

TDL		5	5	75	5	0.2	4	400	2
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**		No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**
	RPD	5.6%		7.0%	11.9%				9.0%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	Yes - assess further

Duplicate Analysis - 100-C-7:1 West Sidewall Samples

Sampling Area	HEIS Number	Sample Date	Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
WSW-8	J1R620	12/27/12	749		134	58.3		6.68	41.8		26.7
Duplicate of J1R620	J1R625	12/27/12	403		140	66.6		6.98	47.0		27.9

Analysis:

TDL		50	2.5	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD	*60.1%*	13.3%	11.7%
	Difference > 2 TDL?	Yes - assess further	Yes - assess further	Yes - assess further

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Washington Closure Hanford

Originator J. D. Skoglie

Project 100 B/C Field Remediation

Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13

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Duplicate Analysis - 100-C-7:1 Subsite SPA1

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			Chromium		
			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
SPA1-1	J1PTJ7	7/9/12	6770		4.87	2.06		0.975	81.2		0.487	0.268		0.195	3.30		1.95	0.122	B	0.195	5200		97.5	9.25		0.195
Duplicate of J1PTJ7	J1PTL2	7/9/12	6540		4.61	2.53		0.923	70.3		0.461	0.258		0.185	3.21		1.85	0.125	B	0.185	5870		92.3	11.6		0.185

Analysis:

	TDL	5	10	2	0.2	2	0.2	100	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)		Yes (calc RPD)	Yes (calc RPD)
	RPD	3.5%		14.4%				12.1%	22.5%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	Yes - assess further	Yes - assess further

Duplicate Analysis - 100-C-7:1 Subsite SPA1

Sampling Area	HEIS Number	Sample Date	Cobalt			Copper			Iron			Lead			Magnesium			Manganese			Mercury			Molybdenum		
			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
SPA1-1	J1PTJ7	7/9/12	5.70		1.95	13.3		0.975	17300		19.5	6.21		0.487	3900		73.1	266		4.87	0.0477		0.0253	0.394	B	1.95
Duplicate of J1PTJ7	J1PTL2	7/9/12	6.03		1.85	14.9		0.923	16800		18.5	5.18		0.461	5140		69.2	244		4.61	0.0119	B	0.0261	0.376	B	1.85

Analysis:

	TDL	2	1	5	5	75	5	0.2	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)		
	RPD		11.3%	2.9%		27.4%	8.6%		
	Difference > 2 TDL?	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	Yes - assess further	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite SPA1

Sampling Area	HEIS Number	Sample Date	Nickel			Potassium			Silicon			Sodium			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
SPA1-1	J1PTJ7	7/9/12	8.87		3.90	1430		390	232		1.95	289		48.7	46.7		2.44	39.4		9.75
Duplicate of J1PTJ7	J1PTL2	7/9/12	14.7		3.69	1230		369	206		1.85	271		46.1	40.8		2.31	40.8		9.23

Analysis:

	TDL	4	400	2	50	2.5	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD			11.9%	6.4%	13.5%	3.5%
	Difference > 2 TDL?	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable

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Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

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Duplicate Analysis - 100-C-7:1 Subsite SPA2

Sampling Area	Sample Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium		
			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
SPA2-1	J1PTL4	7/11/12	7850		4.48	0.302	B	0.537	2.23		0.896	61.7		0.448	0.272		0.179	1.54	B	1.79	0.0824	B	0.179	3030		89.6
Duplicate of J1PTL4	J1PTM7	7/11/12	7520		4.40	0.358	B	0.528	2.21		0.880	64.5		0.440	0.258		0.176	1.57	B	1.76	0.0959	B	0.176	3180		88.0

Analysis:

	TDL	5	0.6	10	2	0.2	2	0.2	100
Duplicate Analysis	Both > PQL?	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)		No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)			Yes (calc RPD)
	RPD	4.3%			4.4%				4.8%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite SPA2

Sampling Area	HEIS Number	Sample Date	Chromium			Cobalt			Copper			Iron			Lead			Magnesium			Manganese			Molybdenum		
			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
SPA2-1	J1PTL4	7/11/12	10.7		0.179	4.92		1.79	9.15		0.896	17400		17.9	3.23		0.448	3350		67.2	274		4.48	0.332	B	1.79
Duplicate of J1PTL4	J1PTM7	7/11/12	10.5		0.176	5.20		1.76	9.00		0.880	16400		17.6	3.15		0.440	3440		66.0	250		4.40	0.263	B	1.76

Analysis:

	TDL	1	2	1	5	5	75	5	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	
	RPD	1.9%		1.7%	5.9%		2.7%	9.2%	
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	Yes - assess further	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite SPA2

Sampling Area	HEIS Number	Sample Date	Nickel			Potassium			Silicon			Sodium			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
SPA2-1	J1PTL4	7/11/12	8.60		3.58	1400		358	729		1.79	170		44.8	42.1		2.24	33.6		8.96
Duplicate of J1PTL4	J1PTM7	7/11/12	8.41		3.52	1400		352	654		1.76	168		44.0	41.7		2.20	32.9		8.80

Analysis:

	TDL	4	400	2	50	2.5	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD			10.8%		1.0%	2.1%
	Difference > 2 TDL?	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable

Washington Closure Hanford

CALCULATION SHEET

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

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Duplicate Analysis - 100-C-7:1 Subsite SPA3

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			Chromium		
			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
SPA3-1	J1RDP5	2/7/13	7860		1.4	2.7		0.58	61.0		0.067	0.39		0.029	1.3	B	0.87	0.047	B	0.036	3840	X	12.5	10.8		0.051
Duplicate of J1RDP5	J1RDR7	2/7/13	9160		1.6	2.8		0.69	69.0		0.079	0.45		0.034	1.2	B	1.0	0.063	B	0.043	4450	X	14.7	11.8		0.061

Analysis:

	TDL	5	10	2	0.2	2	0.2	100	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD	15.3%		12.3%				14.7%	8.8%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	Yes - assess further	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite SPA3

Sampling Area	HEIS Number	Sample Date	Cobalt			Copper			Hexavalent Chromium			Iron			Lead			Magnesium			Manganese			Nickel		
			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
SPA3-1	J1RDP5	2/7/13	8.2		0.088	14.2		0.19	0.265		0.155	22500	X	3.4	4.3		0.24	4730		3.3	347		0.088	10.8	X	0.11
Duplicate of J1RDP5	J1RDR7	2/7/13	9.2		0.10	17.0		0.23	0.415		0.155	25700	X	4.0	5.1		0.28	5330		3.9	397		0.10	11.6	X	0.13

Analysis:

	TDL	2	1	0.5	5	5	75	5	4
Duplicate Analysis	Both > PQL?	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)	Yes (calc RPD)	No-Stop (acceptable)
	RPD		17.9%		13.3%		11.9%	13.4%	
	Difference > 2 TDL?	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	Yes - assess further	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite SPA3

Sampling Area	HEIS Number	Sample Date	Potassium			Silicon			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA3-1	J1RDP5	2/7/13	1630		36.3	326	X	5.0	204		52.2	59.8		0.083	44.5	X	0.35
Duplicate of J1RDP5	J1RDR7	2/7/13	1910		42.8	381	X	5.9	247		61.6	65.3		0.098	52.0	X	0.42

Analysis:

	TDL	400	2	50	2.5	1
Duplicate Analysis	Both > PQL?	Yes (continue)	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)
	RPD		15.6%		8.8%	15.5%
	Difference > 2 TDL?	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	Yes - assess further

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Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

Calc. No. 0100C-CA-V0044
Checked N. K. Schiffern

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Duplicate Analysis - 100-C-7:1 Subsite SPA4

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			Chromium		
			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
SPA4-12	J1RDT9	2/4/13	8680		1.5	2.2		0.62	79.1		0.071	0.41		0.031	1.6	B	0.92	0.066	B	0.039	4470		13.2	10.7		0.054
Duplicate of J1RDT9	J1RDV0	2/4/13	8490		1.5	2.4		0.65	76.1		0.075	0.39		0.032	1.5	B	0.96	0.074	B	0.040	3990		13.9	10.6		0.057

Analysis:

	TDL	5	10	2	0.2	2	0.2	100	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD	2.2%		3.9%				11.3%	0.9%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Yes - assess further	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite SPA4

Sampling Area	HEIS Number	Sample Date	Cobalt			Copper			Iron			Lead			Magnesium			Manganese			Nickel			Potassium		
			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
SPA4-12	J1RDT9	2/4/13	8.3	X	0.094	13.0	X	0.20	21900	X	3.6	4.8		0.25	3920		3.5	348		0.094	12.2		0.12	1770		38.5
Duplicate of J1RDT9	J1RDV0	2/4/13	8.2	X	0.098	12.6	X	0.21	21600	X	3.7	4.6		0.27	3780		3.6	339		0.098	12.8		0.12	1730		40.3

Analysis:

	TDL	2	1	5	5	75	5	4	400
Duplicate Analysis	Both > PQL?	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)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD		3.1%	1.4%		3.6%	2.6%		
	Difference > 2 TDL?	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite SPA4

Sampling Area	HEIS Number	Sample Date	Silicon			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA4-12	J1RDT9	2/4/13	242		5.3	257		55.4	48.2	X	0.088	39.5	X	0.37
Duplicate of J1RDT9	J1RDV0	2/4/13	208		5.6	247		58.0	48.0	X	0.092	38.7	X	0.39

Analysis:

	TDL	2	50	2.5	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD	15.1%		0.4%	2.0%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	No - acceptable	No - acceptable

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Originator J. D. Skoglie
Project 100 B/C Field Remediation
Subject 100-C-7:1 Subsite Cleanup Verification 95% UCL Calculations

Date 04/08/13
Job No. 14655

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Checked N. K. Schiffern

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Duplicate Analysis - 100-C-7:1 Subsite SecB - 25 ft

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Cadmium			Calcium			Chromium			Cobalt		
			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
SecB - 25 ft	J1R6N7	12/3/12	4900	X	1.6	1.4		0.67	55.6	X	0.077	0.060	BM	0.033	0.091	B	0.041	5370	X	14.2	3.2	X	0.059	9.0	X	0.10
Duplicate of J1R6N7	J1R6N8	12/3/12	5060	X	1.5	1.7		0.66	51.9	X	0.076	0.077	B	0.033	0.071	B	0.041	6840	X	14.1	2.7	X	0.058	9.1	X	0.10

Analysis:

	TDL	5	10	2	0.2	0.2	100	1	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	3.2%		6.9%			24.1%		
	Difference > 2 TDL?	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite SecB - 25 ft

Sampling Area	HEIS Number	Sample Date	Copper			Iron			Lead			Magnesium			Manganese			Nickel			Potassium			Silicon		
			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
SecB - 25 ft	J1R6N7	12/3/12	14.0	X	0.22	25400	X	3.8	2.5		0.27	3660	X	3.7	278	X	0.10	6.7	X	0.12	695		41.4	152		5.7
Duplicate of J1R6N7	J1R6N8	12/3/12	15.2	X	0.22	23100	X	3.8	2.4		0.27	3540	X	3.7	250	X	0.10	6.2	X	0.12	648		40.9	131		5.6

Analysis:

	TDL	1	5	5	75	5	4	400	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	8.2%	9.5%		3.3%	10.6%			14.8%
	Difference > 2 TDL?	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	Yes - assess further

Duplicate Analysis - 100-C-7:1 Subsite SecB - 25 ft

Sampling Area	HEIS Number	Sample Date	Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SecB - 25 ft	J1R6N7	12/3/12	301	B	298	62.3	X	0.095	41.2	X	0.40
Duplicate of J1R6N7	J1R6N8	12/3/12	392		58.8	53.9	X	0.094	34.9	X	0.40

Analysis:

	TDL	50	2.5	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD	26.3%	14.5%	16.6%
	Difference > 2 TDL?	No - acceptable	Yes - assess further	Yes - assess further

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Washington Closure Hanford

Originator J. D. Skoglie **Date** 04/08/13 **Calc. No.** 0100C-CA-V0044 **Rev. No.** 0

Project 100 B/C Field Remediation **Job No.** 14655 **Checked** N. K. Schiffern **Date** 04/08/13

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Duplicate Analysis - 100-C-7:1 Subsite SW-4

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Cadmium			Calcium			Chromium			Cobalt		
			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
SW-4	J1R503	10/31/12	4850	X	1.5	1.1		0.65	44.0	X	0.075	0.49		0.032	0.10	B	0.040	4690	X	13.9	2.9		0.057	7.9	X	0.098
Duplicate of J1R503	J1R504	10/31/12	4450	X	1.5	0.93	B	0.62	45.0	X	0.072	0.48		0.031	0.092	B	0.039	5130	X	13.3	3.1		0.055	9.3	X	0.094

Analysis:

TDL			5			10			2			0.2			0.2			100			1			2		
Duplicate Analysis	Both > PQL?		**Yes (continue)**			**Yes (continue)**			**Yes (continue)**			**Yes (continue)**			**Yes (continue)**			**Yes (continue)**			**Yes (continue)**			**Yes (continue)**		
	Both >5xTDL?		**Yes (calc RPD)**			No-Stop (acceptable)			**Yes (calc RPD)**			No-Stop (acceptable)			No-Stop (acceptable)			**Yes (calc RPD)**			No-Stop (acceptable)			No-Stop (acceptable)		
	RPD		8.6%						2.2%									9.0%								
	Difference > 2 TDL?		Yes - assess further			No - acceptable			No - acceptable			No - acceptable			No - acceptable			Yes - assess further			No - acceptable			No - acceptable		

Duplicate Analysis - 100-C-7:1 Subsite SW-4

Sampling Area	HEIS Number	Sample Date	Copper			Iron			Lead			Magnesium			Manganese			Nickel			Potassium			Silicon		
			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
SW-4	J1R503	10/31/12	14.1	X	0.21	22300	X	3.7	2.4		0.27	3340	X	3.6	246	X	0.098	6.6		0.12	790		40.4	164		5.6
Duplicate of J1R503	J1R504	10/31/12	13.7	X	0.20	24100	X	3.6	2.1		0.25	3730	X	3.5	279	X	0.094	6.9		0.12	666		38.6	168		5.3

Analysis:

TDL			1			5			5			75			5			4			400			2		
Duplicate Analysis	Both > PQL?		**Yes (continue)**			**Yes (continue)**			**Yes (continue)**			**Yes (continue)**			**Yes (continue)**			**Yes (continue)**			**Yes (continue)**			**Yes (continue)**		
	Both >5xTDL?		**Yes (calc RPD)**			**Yes (calc RPD)**			No-Stop (acceptable)			**Yes (calc RPD)**			**Yes (calc RPD)**			No-Stop (acceptable)			No-Stop (acceptable)			**Yes (calc RPD)**		
	RPD		2.9%			7.8%						11.0%			12.6%									2.4%		
	Difference > 2 TDL?		No - acceptable			Yes - assess further			No - acceptable			Yes - assess further			Yes - assess further			No - acceptable			No - acceptable			No - acceptable		

Duplicate Analysis - 100-C-7:1 Subsite SW-4

Sampling Area	HEIS Number	Sample Date	Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SW-4	J1R503	10/31/12	366		58.1	48.8	X	0.093	35.7	X	0.39
Duplicate of J1R503	J1R504	10/31/12	354		55.5	51.4	X	0.088	38.0	X	0.37

Analysis:

TDL			50			2.5			1																	
Duplicate Analysis	Both > PQL?		**Yes (continue)**			**Yes (continue)**			**Yes (continue)**																	
	Both >5xTDL?		**Yes (calc RPD)**			**Yes (calc RPD)**			**Yes (calc RPD)**																	
	RPD		3.3%			5.2%			6.2%																	
	Difference > 2 TDL?		No - acceptable			No - acceptable			Yes - assess further																	

Washington Closure Hanford

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Originator J. D. Skoglie
Project 100 B/C Field Remediation
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Date 04/08/13
Job No. 14655

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Duplicate Analysis - 100-C-7:1 Subsite S_Ramp4

Sampling Area	Sample Number	Sample Date	Aluminum			Antimony			Barium			Beryllium			Calcium			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
S_Ramp4	J1RDP0	2/4/13	3890	X	1.5	0.44	B	0.36	38.5	X	0.071	0.24		0.031	5580	X	13.2	2.1		0.054	8.6	X	0.094	13.0		0.20
Duplicate of J1RDP0	J1RDP1	2/4/13	3050	X	1.4	0.38	B	0.34	33.2	X	0.068	0.22		0.030	4260	X	12.7	2.5		0.052	8.1	X	0.090	11.4		0.20

Analysis:

	TDL	5	0.6	2	0.2	100	1	2	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	24.2%		14.8%		26.8%			13.1%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite S_Ramp4

Sampling Area	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Molybdenum			Nickel			Potassium			Silicon		
			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
S_Ramp4	J1RDP0	2/4/13	21900	X	3.6	2.3		0.25	3430	X	3.5	239	X	0.094	0.38	B	0.24	5.1		0.12	541		38.5	141	N	5.3
Duplicate of J1RDP0	J1RDP1	2/4/13	22400	X	3.4	2.3		0.24	3500	X	3.3	268	X	0.090	0.26	B	0.23	4.3		0.11	497		36.8	118	N	5.1

Analysis:

	TDL	5	5	75	5	2	4	400	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	2.3%		2.0%	11.4%				17.8%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	Yes - assess further

Duplicate Analysis - 100-C-7:1 Subsite S_Ramp4

Sampling Area	HEIS Number	Sample Date	Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
S_Ramp4	J1RDP0	2/4/13	310		55.3	51.2	X	0.088	38.2	X	0.37
Duplicate of J1RDP0	J1RDP1	2/4/13	207		53.0	49.8	X	0.084	35.7	X	0.36

Analysis:

	TDL	50	2.5	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD		2.8%	6.8%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further

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Washington Closure Hanford

Originator J. D. Skoglie
Project 100 B/C Field Remediation
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Duplicate Analysis - 100-C-7:1 Subsite 001-030

Sampling Area	Sample Number	Sample Date	Aluminum mg/kg	Aluminum Q	Aluminum PQL	Arsenic mg/kg	Arsenic Q	Arsenic PQL	Barium mg/kg	Barium Q	Barium PQL	Beryllium mg/kg	Beryllium Q	Beryllium PQL	Boron mg/kg	Boron Q	Boron PQL	Cadmium mg/kg	Cadmium Q	Cadmium PQL	Calcium mg/kg	Calcium Q	Calcium PQL	Chromium mg/kg	Chromium Q	Chromium PQL
001-030	J1KP04	8/16/11	8140		3.71	4.37		0.742	80.8		0.371	0.331		0.148	1.04	B	1.48	0.0874	B	0.148	7780		74.2	9.51		0.148
Duplicate of J1KP04	J1KP05	8/16/11	7480		3.97	4.14		0.795	63.2		0.397	0.316		0.159	0.920	B	1.59	0.0954	B	0.159	7520		79.5	7.07		0.159

Analysis:

TDL		5	10	2	0.2	2	0.2	100	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)			Yes (calc RPD)	Yes (calc RPD)
	RPD	8.5%		24.4%				3.4%	29.4%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	Yes - assess further	Yes - assess further

Duplicate Analysis - 100-C-7:1 Subsite 001-030

Sampling Area	HEIS Number	Sample Date	Cobalt mg/kg	Cobalt Q	Cobalt PQL	Copper mg/kg	Copper Q	Copper PQL	Iron mg/kg	Iron Q	Iron PQL	Lead mg/kg	Lead Q	Lead PQL	Magnesium mg/kg	Magnesium Q	Magnesium PQL	Manganese mg/kg	Manganese Q	Manganese PQL	Molybdenum mg/kg	Molybdenum Q	Molybdenum PQL	Nickel mg/kg	Nickel Q	Nickel PQL
001-030	J1KP04	8/16/11	9.42		1.48	18.8		0.742	23600		14.8	4.72		0.371	5720		55.7	437		3.71	0.436	B	1.48	11.7		2.97
Duplicate of J1KP04	J1KP05	8/16/11	9.24		1.59	16.9		0.795	24000		15.9	4.38		0.397	4990		59.6	368		3.97	0.414	B	1.59	10.8		3.18

Analysis:

TDL		2	1	5	5	75	5	2	4
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)		No-Stop (acceptable)
	RPD		10.6%	1.7%		13.6%	17.1%		
	Difference > 2 TDL?	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	Yes - assess further	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite 001-030

Sampling Area	HEIS Number	Sample Date	Potassium mg/kg	Potassium Q	Potassium PQL	Silicon mg/kg	Silicon Q	Silicon PQL	Sodium mg/kg	Sodium Q	Sodium PQL	Vanadium mg/kg	Vanadium Q	Vanadium PQL	Zinc mg/kg	Zinc Q	Zinc PQL
001-030	J1KP04	8/16/11	1300		297	398		1.48	433		37.1	64.5		1.86	51.0		7.42
Duplicate of J1KP04	J1KP05	8/16/11	1220		318	386		1.59	403		39.7	59.4		1.99	48.8		7.95

Analysis:

TDL		400	2	50	2.5	1
Duplicate Analysis	Both > PQL?	Yes (continue)	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)
	RPD		3.1%	7.2%	8.2%	4.4%
	Difference > 2 TDL?	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	Yes - assess further

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Originator J. D. Skoglie
Project 100 B/C Field Remediation
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Duplicate Analysis - 100-C-7:1 Subsite 001-054

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Cadmium			Calcium			Chromium			Cobalt		
			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
001-054	J1KT30	10/13/11	3110		4.36	1.23		0.872	29.8		0.436	0.188		0.174	0.0795	B	0.174	4300		87.2	1.63		0.174	6.69		1.74
Duplicate of J1KT30	J1KT31	10/13/11	5510		4.46	1.99		0.892	55.8		0.446	0.262		0.178	0.113	B	0.178	5540		89.2	4.72		0.178	9.38		1.78

Analysis:

	TDL	5	10	2	0.2	0.2	100	1	2
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)		**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	*55.7%*		*60.7%*			25.2%		
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	Yes - assess further	Yes - assess further	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite 001-054

Sampling Area	HEIS Number	Sample Date	Copper			Iron			Lead			Magnesium			Manganese			Molybdenum			Nickel			Potassium		
			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
001-054	J1KT30	10/13/11	12.4		0.872	19600		17.4	1.68		0.436	2640		65.4	198		4.36	0.242	B	1.74	3.90		3.49	452		349
Duplicate of J1KT30	J1KT31	10/13/11	16.2		0.892	26800		17.8	2.76		0.446	4120		66.9	334		4.46	0.435	B	1.78	7.11		3.57	820		357

Analysis:

	TDL	1	5	5	75	5	2	4	400
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**		No-Stop (acceptable)	No-Stop (acceptable)
	RPD	26.6%	*31.0%*		*43.8%*	*51.1%*			
	Difference > 2 TDL?	Yes - assess further	Yes - assess further	No - acceptable	Yes - assess further	Yes - assess further	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite 001-054

Sampling Area	HEIS Number	Sample Date	Silicon			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-054	J1KT30	10/13/11	263		1.74	217		43.6	47.8		2.18	32.5		8.72
Duplicate of J1KT30	J1KT31	10/13/11	609		1.78	353		44.6	76.5		2.23	51.9		8.92

Analysis:

	TDL	2	50	2.5	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD	*79.4%*		*46.2%*	*46.0%*
	Difference > 2 TDL?	Yes - assess further	Yes - assess further	Yes - assess further	Yes - assess further

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Duplicate Analysis - 100-C-7:1 Subsite 001-067

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Cadmium			Calcium			Chromium			Cobalt		
			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
001-067	J1M5W3	11/28/11	4610		4.59	1.56		0.919	44.7		0.459	0.239		0.184	0.0865	B	0.184	5350		91.9	3.79		0.184	8.30		1.84
Duplicate of J1M5W3	J1M5W4	11/28/11	5120		3.88	2.00		0.776	40.4		0.388	0.262		0.155	0.0953	B	0.155	5730		77.6	3.05		0.155	7.88		1.55

Analysis:

	TDL	5	10	2	0.2	0.2	100	1	2
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)		**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	10.5%		10.1%			6.9%		
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite 001-067

Sampling Area	HEIS Number	Sample Date	Copper			Iron			Lead			Magnesium			Manganese			Molybdenum			Nickel			Potassium		
			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
001-067	J1M5W3	11/28/11	14.3		0.919	26000		18.4	2.29		0.459	3550		68.9	301		4.59	0.427	B	1.84	5.31		3.67	635		367
Duplicate of J1M5W3	J1M5W4	11/28/11	14.0		0.776	24200		15.5	2.43		0.388	3290		58.2	257		3.88	0.428	B	1.55	5.46		3.10	830		310

Analysis:

	TDL	1	5	5	75	5	2	4	400
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**		No-Stop (acceptable)	No-Stop (acceptable)
	RPD	2.1%	7.2%		7.6%	15.8%			
	Difference > 2 TDL?	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	Yes - assess further	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite 001-067

Sampling Area	HEIS Number	Sample Date	Silicon			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-067	J1M5W3	11/28/11	424		1.84	386		45.9	78.6		2.30	46.2		9.19
Duplicate of J1M5W3	J1M5W4	11/28/11	332		1.55	474		38.8	68.5		1.94	43.8		7.76

Analysis:

	TDL	2	50	2.5	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD	24.3%	20.5%	13.7%	5.3%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	Yes - assess further

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Duplicate Analysis - 100-C-7:1 Subsite 001-076

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Calcium			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
001-076	J1MXV5	1/11/12	3840		4.42	1.88		0.885	48.0		0.442	0.276		0.177	4930		88.5	2.25		0.177	7.05		1.77	12.0		0.885
Duplicate of J1MXV5	J1MXV6	1/11/12	3200		3.75	1.65		0.750	38.0		0.375	0.203		0.150	4010		75.0	2.71		0.150	6.35		1.50	10.5		0.750

Analysis:

TDL		5	10	2	0.2	100	1	2	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	18.2%		23.3%		20.6%			13.3%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite 001-076

Sampling Area	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Molybdenum			Nickel			Potassium			Silicon		
			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
001-076	J1MXV5	1/11/12	21900		17.7	2.29		0.442	3050		66.3	224		4.42	0.341	B	1.77	4.23		3.54	560		354	195		1.77
Duplicate of J1MXV5	J1MXV6	1/11/12	17900		15.0	1.82		0.375	2800		56.2	215		3.75	0.328	B	1.50	4.28		3.00	457		300	159		1.50

Analysis:

TDL		5	5	75	5	2	4	400	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)		No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	20.1%		8.5%	4.1%				20.3%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Yes - assess further

Duplicate Analysis - 100-C-7:1 Subsite 001-076

Sampling Area	HEIS Number	Sample Date	Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-076	J1MXV5	1/11/12	202		44.2	56.8		2.21	40.2		8.85
Duplicate of J1MXV5	J1MXV6	1/11/12	170		37.5	48.4		1.87	31.4		7.50

Analysis:

TDL		50	2.5	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD		16.0%	24.6%
	Difference > 2 TDL?	No - acceptable	Yes - assess further	Yes - assess further

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Duplicate Analysis - 100-C-7:1 Subsite 001-080

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Cadmium			Calcium			Chromium			Cobalt		
			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
001-080	J1MXW0	2/13/12	5210		5.10	1.88		1.02	74.9		0.510	0.300		0.204	0.0693	B	0.204	6070		102	3.76		0.204	11.9		2.04
Duplicate of J1MXW0	J1MXW1	2/13/12	4440		4.90	1.76		0.980	66.7		0.490	0.268		0.196	0.0818	B	0.196	5490		98.0	3.46		0.196	9.46		1.96

Analysis:

	TDL	5	10	2	0.2	0.2	100	1	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)		Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	16.0%		11.6%			10.0%		
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite 001-080

Sampling Area	HEIS Number	Sample Date	Copper			Iron			Lead			Magnesium			Manganese			Molybdenum			Nickel			Potassium		
			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
001-080	J1MXW0	2/13/12	14.7		1.02	27400		20.4	2.52		0.510	3920		76.5	447		5.10	0.589	B	2.04	6.55		4.08	594		408
Duplicate of J1MXW0	J1MXW1	2/13/12	15.2		0.980	25200		19.6	5.27		0.490	3530		73.5	295		4.90	0.541	B	1.96	5.52		3.92	615		392

Analysis:

	TDL	1	5	5	75	5	2	4	400
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)		No-Stop (acceptable)	No-Stop (acceptable)
	RPD	3.3%	8.4%		10.5%	*41.0%*			
	Difference > 2 TDL?	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	Yes - assess further	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 100-C-7:1 Subsite 001-080

Sampling Area	HEIS Number	Sample Date	Silicon			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-080	J1MXW0	2/13/12	278		2.04	337		51.0	70.4		2.55	46.4		10.2
Duplicate of J1MXW0	J1MXW1	2/13/12	294		1.96	320		49.0	65.0		2.45	50.5		9.80

Analysis:

	TDL	2	50	2.5	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD	5.6%	5.2%	8.0%	8.5%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	Yes - assess further

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Aluminum			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	mg/kg	Q	PQL
SS-8	J1LHR1	10/17/11	3740	J	3.87	0.464	UJ	0.464	1.92		0.773	40.8		0.387	0.206		0.155	1.55	U	1.55
Duplicate of J1LHR1	J1LHR2	10/17/11	4670	J	5.19	0.623	UJ	0.623	2.02		1.04	43.1		0.519	0.197	B	0.208	2.08	U	2.08
SS-1	J1LHR6	10/17/11	9700	J	4.58	0.550	UJ	0.550	2.65		0.917	73.7		0.458	0.302		0.183	1.84		1.83
SS-2	J1LHR7	10/17/11	6290	J	4.80	0.576	UJ	0.576	2.77		0.960	56.9		0.480	0.236		0.192	0.629	B	1.92
SS-3	J1LHR5	10/17/11	9920	J	5.10	0.612	UJ	0.612	2.88		1.02	77.0		0.510	0.317		0.204	2.18		2.04
SS-4	J1LHR4	10/17/11	7650	J	4.76	0.572	UJ	0.572	4.24		0.953	50.0		0.476	0.289		0.191	1.05	B	1.91
SS-5	J1LHT0	10/17/11	5880	J	4.97	0.596	UJ	0.596	2.36		0.993	53.2		0.497	0.208		0.199	1.85	B	1.99
SS-6	J1LHR3	10/17/11	7690	J	5.16	0.620	UJ	0.620	4.36		1.03	70.1		0.516	0.324		0.207	0.969	B	2.07
SS-7	J1LHR8	10/17/11	4490	J	4.98	0.598	UJ	0.598	1.56		0.997	37.9		0.498	0.188	B	0.199	1.99	U	1.99
SS-9	J1LHT4	10/18/11	3860	J	4.13	0.495	UJ	0.495	1.51		0.825	29.0	J	0.413	0.172		0.165	1.65	UJ	1.65
SS-10	J1LHR9	10/17/11	8600	J	4.11	0.493	UJ	0.493	2.72		0.822	67.0		0.411	0.293		0.164	1.62	B	1.64
SS-11	J1LHT3	10/18/11	2500	J	3.47	0.416	UJ	0.416	1.08		0.694	21.6	J	0.347	0.139		0.139	1.39	UJ	1.39
SS-12	J1LHT1	10/17/11	4880	J	4.73	0.567	UJ	0.567	1.63		0.945	35.0		0.473	0.186	B	0.189	0.500	B	1.89
SS-13	J1LHT2	10/17/11	11700	J	4.39	0.527	UJ	0.527	6.25		0.878	81.3		0.439	0.442		0.176	2.25		1.76
Equipment Blank	J1LHR0	10/17/11	187	J	3.74	0.449	UJ	0.449	0.748	U	0.748	1.83		0.374	0.150	U	0.150	1.50	U	1.50

LOCATION	HEIS Number	Sample Date	Cadmium			Calcium			Chromium			Cobalt			Copper			Hexavalent Chromium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SS-8	J1LHR1	10/17/11	0.0510	B	0.155	5570	J	77.3	2.23		0.155	8.10		1.55	12.9		0.773	0.52	U	0.52
Duplicate of J1LHR1	J1LHR2	10/17/11	0.208	U	0.208	5560	J	104	3.09		0.208	8.67		2.08	14.6		1.04	0.52	U	0.52
SS-1	J1LHR6	10/17/11	0.103	B	0.183	4470	J	91.7	11.0		0.183	6.75		1.83	13.5		0.917	0.52	U	0.52
SS-2	J1LHR7	10/17/11	0.0687	B	0.192	6290	J	96.0	5.65		0.192	7.57		1.92	13.2		0.960	0.52	U	0.52
SS-3	J1LHR5	10/17/11	0.100	B	0.204	4070	J	102	12.2		0.204	6.87		2.04	13.7		1.02	0.52	U	0.52
SS-4	J1LHR4	10/17/11	0.0714	B	0.191	9680	J	95.3	8.31		0.191	7.75		1.91	15.4		0.953	0.54	U	0.54
SS-5	J1LHT0	10/17/11	0.0785	B	0.199	3970	J	99.3	7.00		0.199	4.97		1.99	10.8		0.993	0.52	U	0.52
SS-6	J1LHR3	10/17/11	0.0765	B	0.207	10100	J	103	7.41		0.207	11.2		2.07	17.0		1.03	0.54	U	0.54
SS-7	J1LHR8	10/17/11	0.199	U	0.199	5790	J	99.7	4.52		0.199	8.65		1.99	15.8		0.997	0.52	U	0.52
SS-9	J1LHT4	10/18/11	0.0528	JB	0.165	4520		82.5	4.04		0.165	6.82		1.65	13.2	J	0.825	0.53	U	0.53
SS-10	J1LHR9	10/17/11	0.0777	B	0.164	4380	J	82.2	9.79		0.164	7.07		1.64	14.6		0.822	0.52	U	0.52
SS-11	J1LHT3	10/18/11	0.0352	JB	0.139	3890		69.4	1.48		0.139	5.89		1.39	10.5	J	0.694	0.52	U	0.52
SS-12	J1LHT1	10/17/11	0.0624	B	0.189	4970	J	94.5	5.50		0.189	6.87		1.89	13.6		0.945	0.51	U	0.51
SS-13	J1LHT2	10/17/11	0.101	B	0.176	12500	J	87.8	12.7		0.176	8.64		1.76	20.6		0.878	0.53	U	0.53
Equipment Blank	J1LHR0	10/17/11	0.150	U	0.150	46.2	JB	74.8	0.225		0.150	1.50	U	1.50	0.748	U	0.748			

Acronyms and notes apply to all of the tables in this attachment.
Note: Data qualified with B, C, and/or J are considered acceptable values.
001 = decision unit 001
023 = decision unit 023
024A = decision unit 024A
030 = decision unit 030
B = blank contamination (organic constituents) = Estimated (inorganic)
BCL = below contamination limit
COMP-1 = composite sample area 1
COMP-2 = composite sample area 2
HEIS = Hanford Environmental Information System
J = estimate
LSW = lower sidewall samples
PQL = practical quantitation limit
Q = qualifier
SPA1 = staging pile area 1
SPA2 = staging pile area 2
SPA3 = staging pile area 3
SS = upper sidewall sample
U = undetected
WSW = west sidewall

Attachment	1	Sheet No.	1 of 38
Originator	J. D. Skoglie	Date	4/11/13
Checked	N. K. Schiffern	Date	4/11/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Mercury			Molybdenum		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SS-8	J1LHR1	10/17/11	23600		15.5	1.88		0.387	3710	J	58.0	282		3.87	0.0266	U	0.0266	0.388	B	1.55
Duplicate of J1LHR1	J1LHR2	10/17/11	25000		20.8	2.37		0.519	4360	J	77.9	273		5.19	0.0240	U	0.0240	0.367	B	2.08
SS-1	J1LHR6	10/17/11	20000		18.3	4.21		0.458	3660	J	68.8	332		4.58	0.0294	U	0.0294	0.291	B	1.83
SS-2	J1LHR7	10/17/11	21600		19.2	3.78		0.480	4610	J	72.0	318		4.80	0.0301	U	0.0301	0.339	B	1.92
SS-3	J1LHR5	10/17/11	20700		20.4	5.12		0.510	3980	J	76.6	339		5.10	0.0260	U	0.0260	0.302	B	2.04
SS-4	J1LHR4	10/17/11	22100		19.1	5.00		0.476	5660	J	71.4	334		4.76	0.0279	U	0.0279	0.407	B	1.91
SS-5	J1LHT0	10/17/11	15900		19.9	6.52		0.497	2930	J	74.5	234		4.97	0.0134	B	0.0238	0.276	B	1.99
SS-6	J1LHR3	10/17/11	25200		20.7	5.30		0.516	5800	J	77.4	447		5.16	0.0239	B	0.0276	0.465	B	2.07
SS-7	J1LHR8	10/17/11	23400		19.9	1.97		0.498	3550	J	74.8	266		4.98	0.0252	U	0.0252	0.360	B	1.99
SS-9	J1LHT4	10/18/11	16200		16.5	1.87	J	0.413	3240	J	61.9	208		4.13	0.0288	U	0.0288	0.278	B	1.65
SS-10	J1LHR9	10/17/11	19600		16.4	4.70		0.411	4370	J	61.7	328		4.11	0.0274	U	0.0274	0.330	B	1.64
SS-11	J1LHT3	10/18/11	16400		13.9	1.36	J	0.347	2790	J	52.0	196		3.47	0.0260	U	0.0260	0.243	B	1.39
SS-12	J1LHT1	10/17/11	21900		18.9	2.19		0.473	4080	J	70.9	291		4.73	0.0278	U	0.0278	0.375	B	1.89
SS-13	J1LHT2	10/17/11	22600		17.6	7.88		0.439	6720	J	65.9	416		4.39	0.0127	B	0.0243	0.394	B	1.76
Equipment Blank	J1LHR0	10/17/11	231		15.0	0.381		0.374	20.2	JB	56.1	4.09		3.74	0.0238	U	0.0238	1.50	U	1.50

LOCATION	HEIS Number	Sample Date	Nickel			Potassium			Selenium			Silicon			Silver			Sodium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SS-8	J1LHR1	10/17/11	4.85		3.09	636		309	0.232	U	0.232	208		1.55	0.155	U	0.155	282		38.7
Duplicate of J1LHR1	J1LHR2	10/17/11	6.52		4.15	639		415	0.312	U	0.312	258		2.08	0.208	U	0.208	359		51.9
SS-1	J1LHR6	10/17/11	9.60		3.67	1760		367	0.275	U	0.275	455		1.83	0.183	U	0.183	313		45.8
SS-2	J1LHR7	10/17/11	8.23		3.84	1150		384	0.288	U	0.288	386		1.92	0.192	U	0.192	361		48.0
SS-3	J1LHR5	10/17/11	10.5		4.08	1700		408	0.349	UJ	0.306	579		2.04	0.204	U	0.204	288		51.0
SS-4	J1LHR4	10/17/11	12.1		3.81	1260		381	0.286	U	0.286	613		1.91	0.191	U	0.191	371		47.6
SS-5	J1LHT0	10/17/11	7.35		3.97	1200		397	0.298	U	0.298	402		1.99	0.199	U	0.199	153		49.7
SS-6	J1LHR3	10/17/11	9.99		4.13	1380		413	0.310	U	0.310	415		2.07	0.207	U	0.207	416		51.6
SS-7	J1LHR8	10/17/11	6.92		3.99	570		399	0.299	U	0.299	244		1.99	0.199	U	0.199	412		49.8
SS-9	J1LHT4	10/18/11	6.48		3.30	560		330	0.248	UJ	0.248	145	J	1.65	0.165	UJ	0.165	253		41.3
SS-10	J1LHR9	10/17/11	10.7		3.29	1490		329	0.252	UJ	0.252	505		1.64	0.164	U	0.164	261		41.1
SS-11	J1LHT3	10/18/11	3.27		2.77	392		277	0.208	UJ	0.208	112	J	1.39	0.139	UJ	0.139	180		34.7
SS-12	J1LHT1	10/17/11	8.62		3.78	673		378	0.320	UJ	0.280	244		1.89	0.189	U	0.189	265		47.3
SS-13	J1LHT2	10/17/11	14.5		3.51	2180		351	0.264	U	0.264	626		1.76	0.176	U	0.176	427		43.9
Equipment Blank	J1LHR0	10/17/11	2.99	U	2.99	43.3	B	299	0.225	U	0.225	128		1.50	0.150	U	0.150	37.4	U	37.4

LOCATION	HEIS Number	Sample Date	Vanadium			Zinc			Percent Solids		
			mg/kg	Q	PQL	mg/kg	Q	PQL	%	Q	PQL
SS-8	J1LHR1	10/17/11	54.7	J	1.93	40.9	J	7.73	96.5		0.10
Duplicate of J1LHR1	J1LHR2	10/17/11	64.4	J	2.60	42.9	J	10.4	96.3		0.10
SS-1	J1LHR6	10/17/11	52.9	J	2.29	39.2	J	9.17	95.7		0.10
SS-2	J1LHR7	10/17/11	62.0	J	2.40	42.4	J	9.60	96.4		0.10
SS-3	J1LHR5	10/17/11	52.0	J	2.55	41.6	J	10.2	96.0		0.10
SS-4	J1LHR4	10/17/11	61.6	J	2.38	46.7	J	9.53	92.1		0.10
SS-5	J1LHT0	10/17/11	41.9	J	2.48	33.0	J	9.93	96.8		0.10
SS-6	J1LHR3	10/17/11	70.3	J	2.58	50.4	J	10.3	93.1		0.10
SS-7	J1LHR8	10/17/11	70.5	J	2.49	42.8	J	9.97	96.5		0.10
SS-9	J1LHT4	10/18/11	39.4		2.06	29.1	J	8.25	94.7		0.10
SS-10	J1LHR9	10/17/11	48.2	J	2.06	39.8	J	8.22	96.5		0.10
SS-11	J1LHT3	10/18/11	44.6		1.73	28.0	J	6.94	96.1		0.10
SS-12	J1LHT1	10/17/11	69.6	J	2.36	41.8	J	9.45	98.0		0.10
SS-13	J1LHT2	10/17/11	53.0	J	2.20	51.8	J	8.78	94.9		0.10
Equipment Blank	J1LHR0	10/17/11	0.256	JB	1.87	0.914	JB	7.48	99.7		0.10

Attachment	1	Sheet No.	2 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Aluminum			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	mg/kg	Q	PQL
LSW-5	J1NPN7	4/24/12	2950		3.58	0.430	UJ	0.430	1.09		0.717	36.1		0.358	0.157		0.143	1.43	UJ	1.43
Duplicate of J1NPN7	J1NPP5	4/24/12	2910		3.74	0.448	UJ	0.448	0.827		0.747	27.0		0.374	0.160		0.149	1.49	UJ	1.49
LSW-1	J1NPN3	4/24/12	3710		3.64	0.436	UJ	0.436	1.12		0.727	44.6		0.364	0.191		0.145	1.45	UJ	1.45
LSW-2	J1NPN4	4/24/12	3440		4.19	0.503	UJ	0.503	1.09		0.839	39.9		0.419	0.198		0.168	1.68	UJ	1.68
LSW-3	J1NPN5	4/24/12	7820		4.45	0.534	UJ	0.534	2.16		0.890	59.1		0.445	0.316		0.178	0.633	JB	1.78
LSW-4	J1NPN6	4/24/12	4930		4.40	0.528	UJ	0.528	1.38		0.879	107		0.440	0.213		0.176	1.76	UJ	1.76
LSW-6	J1NPN8	4/24/12	4240		3.58	0.429	UJ	0.429	1.35		0.716	49.6		0.358	0.216		0.143	1.43	UJ	1.43
LSW-7	J1NPN9	4/24/12	2690		3.91	0.469	UJ	0.469	1.01		0.782	39.4		0.391	0.162		0.156	1.56	UJ	1.56
LSW-8	J1NPP0	4/24/12	3610		3.48	0.418	UJ	0.418	1.30		0.696	40.8		0.348	0.168		0.139	1.39	UJ	1.39
LSW-9	J1NPP1	4/24/12	3880		4.26	0.511	UJ	0.511	1.43		0.852	46.1		0.426	0.193		0.170	1.70	UJ	1.70
LSW-10	J1NPP2	4/24/12	1300		3.48	0.417	UJ	0.417	0.704		0.696	20.9		0.348	0.0805	B	0.139	1.39	UJ	1.39
LSW-11	J1NPP3	4/24/12	3470		4.02	0.482	UJ	0.482	1.21		0.803	32.9		0.402	0.156	B	0.161	1.61	UJ	1.61
LSW-12	J1NPP4	4/24/12	2640		3.32	0.399	UJ	0.399	0.992		0.665	24.1		0.332	0.139		0.133	1.33	UJ	1.33
Equipment Blank	J1NPP6	4/24/12	216		4.24	0.509	UJ	0.509	0.848	U	0.848	2.21		0.424	0.170	U	0.170	1.70	UJ	1.70

LOCATION	HEIS Number	Sample Date	Cadmium			Calcium			Chromium			Cobalt			Copper			Hexavalent Chromium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
LSW-5	J1NPN7	4/24/12	0.0373	B	0.143	3830	J	71.7	1.60		0.143	5.79		1.43	10.7	J	0.717	0.20	U	0.20
Duplicate of J1NPN7	J1NPP5	4/24/12	0.149	U	0.149	3730	J	74.7	1.09		0.149	5.09		1.49	9.84	J	0.747	0.20	U	0.20
LSW-1	J1NPN3	4/24/12	0.0428	B	0.145	4070	J	72.7	2.29		0.145	5.74		1.45	11.2	J	0.727	0.20	U	0.20
LSW-2	J1NPN4	4/24/12	0.0449	B	0.168	4900	J	83.9	1.80		0.168	6.30		1.68	11.6	J	0.839	0.62		0.20
LSW-3	J1NPN5	4/24/12	0.0472	B	0.178	4920	J	89.0	6.33		0.178	8.68		1.78	16.1	J	0.890	0.20	U	0.20
LSW-4	J1NPN6	4/24/12	0.176	U	0.176	5760	J	87.9	3.33		0.176	8.59		1.76	12.8	J	0.879	0.20	U	0.20
LSW-6	J1NPN8	4/24/12	0.0405	B	0.143	4200	J	71.6	2.69		0.143	6.99		1.43	12.1	J	0.716	0.21	U	0.21
LSW-7	J1NPN9	4/24/12	0.156	U	0.156	3720	J	78.2	1.62		0.156	5.82		1.56	10.3	J	0.782	0.20	U	0.20
LSW-8	J1NPP0	4/24/12	0.139	U	0.139	4340	J	69.6	2.08		0.139	6.21		1.39	11.0	J	0.696	0.20	U	0.20
LSW-9	J1NPP1	4/24/12	0.170	U	0.170	4360	J	85.2	2.93		0.170	7.24		1.70	12.2	J	0.852	0.20	U	0.20
LSW-10	J1NPP2	4/24/12	0.139	U	0.139	2960	J	69.6	0.533		0.139	4.53		1.39	10.9	J	0.696	0.58		0.20
LSW-11	J1NPP3	4/24/12	0.0411	B	0.161	4170	J	80.3	2.03		0.161	6.20		1.61	12.6	J	0.803	0.21	U	0.21
LSW-12	J1NPP4	4/24/12	0.133	U	0.133	4120	J	66.5	1.80		0.133	5.75		1.33	12.0	J	0.665	0.20	U	0.20
Equipment Blank	J1NPP6	4/24/12	0.170	U	0.170	37.2	JB	84.8	0.170	U	0.170	1.70	U	1.70	0.848	UJ	0.848			

LOCATION	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Mercury			Molybdenum		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
LSW-5	J1NPN7	4/24/12	18400		14.3	1.18	J	0.358	2950	J	53.7	219		3.58	0.0262	U	0.0262	0.379	B	1.43
Duplicate of J1NPN7	J1NPP5	4/24/12	15200		14.9	1.13	J	0.374	2390	J	56.0	153		3.74	0.0254	U	0.0254	0.170	B	1.49
LSW-1	J1NPN3	4/24/12	19600		14.5	1.46	J	0.364	3140	J	54.6	256		3.64	0.0241	U	0.0241	0.277	B	1.45
LSW-2	J1NPN4	4/24/12	19900		16.8	1.31	J	0.419	2930	J	62.9	296		4.19	0.0249	U	0.0249	0.334	B	1.68
LSW-3	J1NPN5	4/24/12	22800		17.8	2.94	J	0.445	4580	J	66.7	346		4.45	0.0240	U	0.0240	0.328	B	1.78
LSW-4	J1NPN6	4/24/12	22000		17.6	1.68	J	0.440	4450	J	66.0	379		4.40	0.0262	U	0.0262	0.348	B	1.76
LSW-6	J1NPN8	4/24/12	20000		14.3	1.86	J	0.358	3840	J	53.7	287		3.58	0.0258	U	0.0258	0.271	B	1.43
LSW-7	J1NPN9	4/24/12	18600		15.6	1.29	J	0.391	2850	J	58.6	225		3.91	0.0254	U	0.0254	0.237	B	1.56
LSW-8	J1NPP0	4/24/12	18300		13.9	1.46	J	0.348	3130	J	52.2	246		3.48	0.0241	U	0.0241	0.261	B	1.39
LSW-9	J1NPP1	4/24/12	20000		17.0	1.94	J	0.426	3430	J	63.9	288		4.26	0.0242	U	0.0242	0.272	B	1.70
LSW-10	J1NPP2	4/24/12	12000		13.9	0.763	J	0.348	1510	J	52.2	152		3.48	0.0240	U	0.0240	1.39	U	1.39
LSW-11	J1NPP3	4/24/12	18500		16.1	1.19	J	0.402	3100	J	60.3	238		4.02	0.0237	U	0.0237	0.231	B	1.61
LSW-12	J1NPP4	4/24/12	15600		13.3	1.17	J	0.332	2680	J	49.8	178		3.32	0.0242	U	0.0242	0.164	B	1.33
Equipment Blank	J1NPP6	4/24/12	306		17.0	0.449	J	0.424	21.7	JB	63.6	6.37		4.24	0.0250	U	0.0250	1.70	U	1.70

Attachment	1	Sheet No.	3 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Nickel			Potassium			Selenium			Silicon			Silver			Sodium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
LSW-5	J1NPN7	4/24/12	3.47	J	2.87	334	J	287	0.215	U	0.215	140	J	1.43	0.143	U	0.143	209		35.8
Duplicate of J1NPN7	J1NPP5	4/24/12	3.38	J	2.99	396	J	299	0.224	U	0.224	144	J	1.49	0.149	U	0.149	224		37.4
LSW-1	J1NPN3	4/24/12	4.30	J	2.91	500	J	291	0.218	U	0.218	165	J	1.45	0.145	U	0.145	216		36.4
LSW-2	J1NPN4	4/24/12	3.65	J	3.36	434	J	336	0.252	U	0.252	208	J	1.68	0.168	U	0.168	219		41.9
LSW-3	J1NPN5	4/24/12	8.81	J	3.56	1190	J	356	0.267	U	0.267	234	J	1.78	0.178	U	0.178	335		44.5
LSW-4	J1NPN6	4/24/12	6.29	J	3.52	642	J	352	0.264	U	0.264	195	J	1.76	0.176	U	0.176	259		44.0
LSW-6	J1NPN8	4/24/12	4.89	J	2.86	591	J	286	0.215	U	0.215	150	J	1.43	0.143	U	0.143	261		35.8
LSW-7	J1NPN9	4/24/12	3.39	J	3.13	421	J	313	0.235	U	0.235	162	J	1.56	0.156	U	0.156	194		39.1
LSW-8	J1NPP0	4/24/12	4.20	J	2.78	453	J	278	0.209	U	0.209	139	J	1.39	0.139	U	0.139	268		34.8
LSW-9	J1NPP1	4/24/12	5.17	J	3.41	537	J	341	0.256	U	0.256	167	J	1.70	0.170	U	0.170	219		42.6
LSW-10	J1NPP2	4/24/12	1.96	JB	2.78	222	JB	278	0.209	U	0.209	121	J	1.39	0.139	U	0.139	130		34.8
LSW-11	J1NPP3	4/24/12	4.26	J	3.21	485	J	321	0.241	U	0.241	163	J	1.61	0.161	U	0.161	272		40.2
LSW-12	J1NPP4	4/24/12	3.60	J	2.66	359	J	266	0.199	U	0.199	140	J	1.33	0.133	U	0.133	190		33.2
Equipment Blank	J1NPP6	4/24/12	3.39	UJ	3.39	50.9	JB	339	0.254	U	0.254	142	J	1.70	0.170	U	0.170	42.4	U	42.4

LOCATION	HEIS Number	Sample Date	Vanadium			Zinc			Percent Solids		
			mg/kg	Q	PQL	mg/kg	Q	PQL	%	Q	PQL
LSW-5	J1NPN7	4/24/12	50.3	J	1.79	32.1	J	7.17	98.3		0.10
Duplicate of J1NPN7	J1NPP5	4/24/12	37.1	J	1.87	25.7	J	7.47	98.4		0.10
LSW-1	J1NPN3	4/24/12	58.7	J	1.82	34.8	J	7.27	98.2		0.10
LSW-2	J1NPN4	4/24/12	60.4	J	2.10	35.1	J	8.39	97.7		0.10
LSW-3	J1NPN5	4/24/12	61.7	J	2.22	44.7	J	8.90	98.6		0.10
LSW-4	J1NPN6	4/24/12	58.5	J	2.20	38.8	J	8.79	98.0		0.10
LSW-6	J1NPN8	4/24/12	54.0	J	1.79	36.8	J	7.16	97.0		0.10
LSW-7	J1NPN9	4/24/12	46.4	J	1.95	30.9	J	7.82	98.4		0.10
LSW-8	J1NPP0	4/24/12	52.7	J	1.74	33.8	J	6.96	98.4		0.10
LSW-9	J1NPP1	4/24/12	48.1	J	2.13	33.6	J	8.52	97.8		0.10
LSW-10	J1NPP2	4/24/12	25.9	J	1.74	17.3	J	6.96	98.5		0.10
LSW-11	J1NPP3	4/24/12	47.0	J	2.01	32.3	J	8.03	97.2		0.10
LSW-12	J1NPP4	4/24/12	37.5	J	1.66	27.2	J	6.65	97.7		0.10
Equipment Blank	J1NPP6	4/24/12	0.328	JB	2.12	8.48	UJ	8.48	100		0.10

Attachment	1	Sheet No.	4 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
WSW-8	J1R620	12/27/12	10100		13.4	1.60	U	1.60	2.99		2.67	62.4		1.34	0.307	B	0.535
Duplicate of J1R620	J1R625	12/27/12	8290		14.0	1.68	U	1.68	3.01		2.79	65.5		1.40	0.317	B	0.558
WSW-1	J1R613	12/27/12	7540		13.6	1.63	U	1.63	2.02	B	2.72	59.3		1.36	0.288	B	0.544
WSW-2	J1R614	1/15/13	7550		14.9	1.79	U	1.79	2.49	B	2.98	68.7		1.49	0.305	B	0.595
WSW-3	J1R615	12/27/12	6460		14.7	1.76	U	1.76	2.35	B	2.94	82.6		1.47	0.213	B	0.587
WSW-4	J1R616	2/11/13	5590		13.2	1.59	U	1.59	1.62	B	2.65	59.1		1.32	0.230	B	0.529
WSW-5	J1R617	1/15/13	5170		12.8	1.54	U	1.54	1.62	B	2.57	42.9		1.28	0.234	B	0.514
WSW-6	J1R618	2/11/13	5030		13.6	1.64	U	1.64	1.68	B	2.73	49.7		1.36	0.231	B	0.546
WSW-7	J1R619	12/27/12	5330		14.2	1.71	U	1.71	1.29	B	2.85	38.5		1.42	0.235	B	0.570
WSW-9	J1R621	2/11/13	4430		13.9	1.66	U	1.66	1.33	B	2.77	81.2		1.39	0.210	B	0.554
WSW-10	J1R622	12/27/12	5220		15.2	1.82	U	1.82	2.1	B	3.04	34.4		1.52	0.226	B	0.608
WSW-11	J1R623	1/15/13	4410		14.0	1.68	U	1.68	1.59	B	2.8	54.2		1.40	0.229	B	0.559
WSW-12	J1R624	1/15/13	12100		14.7	1.77	U	1.77	4.46		2.95	111		1.47	0.435	B	0.590
Equipment Blank	J1R626	12/27/12	257		4.39	0.526	U	0.526	0.877	U	0.877	2.1		0.439	0.175	U	0.175

LOCATION	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
WSW-8	J1R620	12/27/12	5.35	U	5.35	0.535	U	0.535	8570		267	10.4		0.535	7.75		5.35
Duplicate of J1R620	J1R625	12/27/12	5.58	U	5.58	0.558	U	0.558	7450		279	10.9		0.558	8.20		5.58
WSW-1	J1R613	12/27/12	5.44	U	5.44	0.544	U	0.544	4650		272	9.31		0.544	8.30		5.44
WSW-2	J1R614	1/15/13	5.95	U	5.95	0.595	U	0.595	6100		298	6.82		0.595	10.0		5.95
WSW-3	J1R615	12/27/12	5.87	U	5.87	0.587	U	0.587	5620		294	16.0		0.587	8.74		5.87
WSW-4	J1R616	2/11/13	5.29	U	5.29	0.529	U	0.529	6490		265	4.31		0.529	10.1		5.29
WSW-5	J1R617	1/15/13	5.14	U	5.14	0.514	U	0.514	6300		257	4.45		0.514	8.69		5.14
WSW-6	J1R618	2/11/13	5.46	U	5.46	0.546	U	0.546	6710		273	3.94		0.546	10.5		5.46
WSW-7	J1R619	12/27/12	5.70	U	5.70	0.570	U	0.570	5200		285	4.19		0.570	9.27		5.70
WSW-9	J1R621	2/11/13	5.54	U	5.54	0.554	U	0.554	6110		277	2.09		0.554	10.1		5.54
WSW-10	J1R622	12/27/12	6.08	U	6.08	0.608	U	0.608	7280		304	4.88		0.608	8.82		6.08
WSW-11	J1R623	1/15/13	5.59	U	5.59	0.559	U	0.559	5650		280	2.95		0.559	9.68		5.59
WSW-12	J1R624	1/15/13	1.77	B	5.90	0.152	B	0.590	6230		295	21.5		0.590	8.03		5.90
Equipment Blank	J1R626	12/27/12	1.75	U	1.75	0.175	U	0.175	35	B	87.7	0.175	U	0.175	1.75	U	1.75

LOCATION	HEIS Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
WSW-8	J1R620	12/27/12	17.2		2.67	0.22	U	0.22	22600		53.5	4.16		1.34	4830		200
Duplicate of J1R620	J1R625	12/27/12	16.3		2.79	0.22	U	0.22	23900		55.8	4.39		1.40	5180		209
WSW-1	J1R613	12/27/12	26.1		2.72	0.22	U	0.22	26300		54.4	3.72		1.36	4930		204
WSW-2	J1R614	1/15/13	17.3		2.98	0.21	U	0.21	28100		59.5	3.59		1.49	4950		223
WSW-3	J1R615	12/27/12	16.6		2.94	0.22	U	0.22	24200		58.7	2.95		1.47	4710		220
WSW-4	J1R616	2/11/13	16.8		2.65	0.21	U	0.21	29900		52.9	2.73		1.32	4070		198
WSW-5	J1R617	1/15/13	16.2		2.57	0.21	U	0.21	27400		51.4	2.69		1.28	3920		193
WSW-6	J1R618	2/11/13	15.4		2.73	0.21	U	0.21	32400		54.6	2.46		1.36	4940		205
WSW-7	J1R619	12/27/12	16.4		2.85	0.21	U	0.21	23600		57.0	2.48		1.42	4140		214
WSW-9	J1R621	2/11/13	14.8		2.77	0.20	U	0.20	27900		55.4	2.27		1.39	3630		208
WSW-10	J1R622	12/27/12	14.7		3.04	0.21	U	0.21	27200		60.8	2.65		1.52	4320		228
WSW-11	J1R623	1/15/13	16.2		2.80	0.21	U	0.21	28800		55.9	2.11		1.40	4220		210
WSW-12	J1R624	1/15/13	18.4		2.95	0.23	U	0.23	23500		59.0	7.36		1.47	5910		221
Equipment Blank	J1R626	12/27/12	0.877	U	0.877				311		17.5	0.476		0.439	24.8	B	65.8

Attachment	1	Sheet No.	5 of 38
Originator	J. D. Skoglie	Date	4/11/13
Checked	N. K. Schiffern	Date	4/11/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
WSW-8	J1R620	12/27/12	307		13.4	0.0117	B	0.0257	5.35	U	5.35	11.0		10.7	1250		1070
Duplicate of J1R620	J1R625	12/27/12	346		14.0	0.0108	B	0.0260	5.58	U	5.58	12.2		11.2	1250		1120
WSW-1	J1R613	12/27/12	375		13.6	0.0259	U	0.0259	5.44	U	5.44	9.37	B	10.9	1320		1090
WSW-2	J1R614	1/15/13	360		14.9	0.0270	U	0.0270	5.95	U	5.95	8.29	B	11.9	1160	B	1190
WSW-3	J1R615	12/27/12	350		14.7	0.00953	B	0.0277	5.87	U	5.87	8.79	B	11.7	1540		1170
WSW-4	J1R616	2/11/13	353		13.2	0.0246	U	0.0246	0.645	B	5.29	6.07	B	10.6	720	B	1060
WSW-5	J1R617	1/15/13	316		12.8	0.0269	U	0.0269	5.14	U	5.14	6.11	B	10.3	690	B	1030
WSW-6	J1R618	2/11/13	377		13.6	0.0246	U	0.0246	5.46	U	5.46	6.47	B	10.9	595	B	1090
WSW-7	J1R619	12/27/12	260		14.2	0.0266	U	0.0266	5.70	U	5.70	7.44	B	11.4	712	B	1140
WSW-9	J1R621	2/11/13	353		13.9	0.0277	U	0.0277	5.54	U	5.54	4.51	B	11.1	432	B	1110
WSW-10	J1R622	12/27/12	305		15.2	0.0115	B	0.0284	6.08	U	6.08	6.85	B	12.2	831	B	1220
WSW-11	J1R623	1/15/13	310		14.0	0.0264	U	0.0264	5.59	U	5.59	5.22	B	11.2	628	B	1120
WSW-12	J1R624	1/15/13	375		14.7	0.0277	U	0.0277	5.90	U	5.90	18.2		11.8	1510		1180
Equipment Blank	J1R626	12/27/12	5.87		4.39	0.0237	U	0.0237	1.75	U	1.75	3.51	U	3.51	54.2	B	351

LOCATION	HEIS Number	Sample Date	Selenium			Silicon			Silver			Sodium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
WSW-8	J1R620	12/27/12	0.802	U	0.802	908		5.35	0.535	U	0.535	749		134	58.3		6.68
Duplicate of J1R620	J1R625	12/27/12	0.838	U	0.838	994		5.58	0.558	U	0.558	403		140	66.6		6.98
WSW-1	J1R613	12/27/12	0.816	U	0.816	539		5.44	0.544	U	0.544	229		136	57.0		6.80
WSW-2	J1R614	1/15/13	0.893	U	0.893	362		5.95	0.595	U	0.595	510		149	74.6		7.44
WSW-3	J1R615	12/27/12	0.881	U	0.881	379		5.87	0.587	U	0.587	343		147	62.3		7.34
WSW-4	J1R616	2/11/13	0.794	U	0.794	897		5.29	0.529	U	0.529	546		132	96.1		6.61
WSW-5	J1R617	1/15/13	0.771	U	0.771	222		5.14	0.514	U	0.514	384		128	83.2		6.42
WSW-6	J1R618	2/11/13	0.819	U	0.819	783		5.46	0.546	U	0.546	402		136	95.1		6.82
WSW-7	J1R619	12/27/12	0.855	U	0.855	253		5.70	0.570	U	0.570	383		142	57.8		7.12
WSW-9	J1R621	2/11/13	0.831	U	0.831	655		5.54	0.554	U	0.554	380		139	84.8		6.93
WSW-10	J1R622	12/27/12	0.912	U	0.912	433		6.08	0.608	U	0.608	431		152	77.1		7.60
WSW-11	J1R623	1/15/13	0.839	U	0.839	192		5.59	0.559	U	0.559	359		140	79.4		6.99
WSW-12	J1R624	1/15/13	0.885	U	0.885	933		5.90	0.590	U	0.590	327		147	58.0		7.37
Equipment Blank	J1R626	12/27/12	0.263	U	0.263	178		1.75	0.175	U	0.175	43.9	U	43.9	0.329	B	2.19

LOCATION	HEIS Number	Sample Date	Zinc			Percent Solids		
			mg/kg	Q	PQL	%	Q	PQL
WSW-8	J1R620	12/27/12	41.8		26.7	92.0		0.1
Duplicate of J1R620	J1R625	12/27/12	47.0		27.9	91.1		0.1
WSW-1	J1R613	12/27/12	42.8		27.2	89.0		0.1
WSW-2	J1R614	1/15/13	51.2		29.8	95.1		0.1
WSW-3	J1R615	12/27/12	43.9		29.4	92.9		0.1
WSW-4	J1R616	2/11/13	54.4		26.5	96.1		0.1
WSW-5	J1R617	1/15/13	48.1		25.7	95.7		0.1
WSW-6	J1R618	2/11/13	53.5		27.3	96.4		0.1
WSW-7	J1R619	12/27/12	44.2		28.5	94.0		0.1
WSW-9	J1R621	2/11/13	49.0		27.7	98.4		0.1
WSW-10	J1R622	12/27/12	46.4		30.4	93.1		0.1
WSW-11	J1R623	1/15/13	50.4		28.0	97.5		0.1
WSW-12	J1R624	1/15/13	55.0		29.5	87.7		0.1
Equipment Blank	J1R626	12/27/12	1.13	B	8.77	100		0.1

Attachment	1	Sheet No.	6 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA1-1	J1PTJ7	7/9/12	6770		4.87	0.585	U	0.585	2.06		0.975	81.2		0.487	0.268		0.195
Duplicate of J1PTJ7	J1PTL2	7/9/12	6540		4.61	0.554	U	0.554	2.53		0.923	70.3		0.461	0.258		0.185
SPA1-2	J1PTJ8	7/9/12	7450		4.70	0.565	U	0.565	2.69		0.941	55.6		0.470	0.280		0.188
SPA1-3	J1PTJ9	7/9/12	8730		5.01	0.601	U	0.601	2.26		1.00	65.8		0.501	0.302		0.200
SPA1-4	J1PTK0	7/9/12	6370		4.98	0.597	U	0.597	2.19		0.996	72.7		0.498	0.255		0.199
SPA1-5	J1PTK1	7/9/12	8440		4.75	0.570	U	0.570	2.65		0.949	67.4		0.475	0.301		0.190
SPA1-6	J1PTK2	7/9/12	8030		4.79	0.575	U	0.575	2.63		0.958	66.8		0.479	0.284		0.192
SPA1-7	J1PTK3	7/9/12	7840		4.76	0.572	U	0.572	2.36		0.953	62.8		0.476	0.284		0.191
SPA1-8	J1PTK4	7/9/12	7330		4.88	0.585	U	0.585	2.00		0.976	64.4		0.488	0.265		0.195
SPA1-9	J1PTK5	7/9/12	8200		4.37	0.524	U	0.524	2.49		0.873	69.9		0.437	0.286		0.175
SPA1-10	J1PTK6	7/9/12	6080		4.93	0.592	U	0.592	2.09		0.986	58.2		0.493	0.196	B	0.197
SPA1-11	J1PTK7	7/9/12	6870		4.82	0.578	U	0.578	2.59		0.964	73.1		0.482	0.270		0.193
SPA1-12	J1PTK8	7/9/12	7530		5.00	0.600	U	0.600	3.83		1.00	75.5		0.500	0.313		0.200
SPA1-13	J1PTK9	7/9/12	6750		4.30	0.516	U	0.516	2.71		0.860	70.1		0.430	0.272		0.172
SPA1-14	J1PTL0	7/9/12	7060		4.98	0.598	U	0.598	2.62		0.997	75.4		0.498	0.281		0.199
SPA1-15	J1PTL1	7/9/12	8810		5.16	0.978		0.619	22.0		1.03	101		0.516	0.229		0.206
SPA2-1	J1PTL4	7/11/12	7850		4.48	0.302	B	0.537	2.23		0.896	61.7		0.448	0.272		0.179
Duplicate of J1PTL4	J1PTM7	7/11/12	7520		4.40	0.358	B	0.528	2.21		0.880	64.5		0.440	0.258		0.176
SPA2-2	J1PTL5	7/11/12	6950		4.39	0.364	B	0.527	2.21		0.878	60.1		0.439	0.273		0.176
SPA2-3	J1PTL6	7/11/12	8180		4.06	0.341	B	0.488	2.20		0.813	65.5		0.406	0.284		0.163
SPA2-4	J1PTL7	7/11/12	7300		3.88	0.323	B	0.466	1.87		0.776	61.4		0.388	0.250		0.155
SPA2-5	J1PTL8	7/11/12	5630		4.63	0.443	B	0.556	2.06		0.927	39.8		0.463	0.228		0.185
SPA2-6	J1PTL9	7/11/12	6140		4.50	0.504	B	0.540	3.16		0.901	60.6		0.450	0.231		0.180
SPA2-7	J1PTM0	7/11/12	5590		4.42	0.355	B	0.531	2.26		0.884	54.0		0.442	0.239		0.177
SPA2-8	J1PTM1	7/11/12	5570		4.24	0.369	B	0.508	1.68		0.847	38.1		0.424	0.244		0.169
SPA2-9	J1PTM2	7/11/12	8690		4.50	0.344	B	0.540	3.56		0.900	84.6		0.450	0.259		0.180
SPA2-10	J1PTM3	7/11/12	6340		4.49	0.341	B	0.539	2.33		0.899	47.0		0.449	0.261		0.180
SPA2-11	J1PTM4	7/11/12	7540		4.86	0.376	B	0.583	2.80		0.971	67.9		0.486	0.298		0.194
SPA2-12	J1PTM5	7/11/12	4490		3.71	0.373	B	0.446	1.76		0.743	36.7		0.371	0.211		0.149
SPA2-13	J1PTM6	7/11/12	7510		4.36	0.444	B	0.524	2.60		0.873	60.9		0.436	0.283		0.175
COMP-1	J1PTN8	7/11/12	6220		4.20	0.384	B	0.503	2.19		0.839	61.3		0.420	0.232		0.168
Equipment Blank	J1PTL3	7/9/12	193		4.24	0.509	U	0.509	0.848	U	0.848	1.64		0.424	0.170	U	0.170

Attachment	1	Sheet No.	7 of 38
Originator	J. D. Skoglie	Date	4/12/13
Checked	N. K. Schiffern	Date	4/12/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA1-1	J1PTJ7	7/9/12	3.30		1.95	0.122	B	0.195	5200		97.5	9.25		0.195	5.70		1.95
Duplicate of J1PTJ7	J1PTL2	7/9/12	3.21		1.85	0.125	B	0.185	5870		92.3	11.6		0.185	6.03		1.85
SPA1-2	J1PTJ8	7/9/12	1.74	B	1.88	0.0698	B	0.188	6260		94.1	10.5		0.188	7.13		1.88
SPA1-3	J1PTJ9	7/9/12	1.73	B	2.00	0.0903	B	0.200	3890		100	9.59		0.200	6.12		2.00
SPA1-4	J1PTK0	7/9/12	2.16		1.99	0.0959	B	0.199	5390		99.6	8.01		0.199	6.15		1.99
SPA1-5	J1PTK1	7/9/12	1.75	B	1.90	0.0869	B	0.190	3810		94.9	10.2		0.190	6.12		1.90
SPA1-6	J1PTK2	7/9/12	1.94		1.92	0.105	B	0.192	3970		95.8	11.5		0.192	5.73		1.92
SPA1-7	J1PTK3	7/9/12	1.69	B	1.91	0.0824	B	0.191	4340		95.3	9.38		0.191	6.14		1.91
SPA1-8	J1PTK4	7/9/12	1.35	B	1.95	0.0712	B	0.195	4970		97.6	8.79		0.195	6.65		1.95
SPA1-9	J1PTK5	7/9/12	2.28		1.75	0.0957	B	0.175	3810		87.3	12.7		0.175	5.74		1.75
SPA1-10	J1PTK6	7/9/12	1.64	B	1.97	0.0709	B	0.197	2360		98.6	14.9		0.197	4.43		1.97
SPA1-11	J1PTK7	7/9/12	2.66		1.93	0.0874	B	0.193	5730		96.4	8.33		0.193	6.62		1.93
SPA1-12	J1PTK8	7/9/12	1.26	B	2.00	0.0708	B	0.200	8260		100	17.0		0.200	8.33		2.00
SPA1-13	J1PTK9	7/9/12	2.53		1.72	0.0839	B	0.172	6440		86.0	9.47		0.172	6.61		1.72
SPA1-14	J1PTL0	7/9/12	3.16		1.99	0.0993	B	0.199	6610		99.7	8.76		0.199	6.33		1.99
SPA1-15	J1PTL1	7/9/12	6.91		2.06	0.0569	B	0.206	89600		1240	10.9		0.206	6.61		2.06
SPA2-1	J1PTL4	7/11/12	1.54	B	1.79	0.0824	B	0.179	3030		89.6	10.7		0.179	4.92		1.79
Duplicate of J1PTL4	J1PTM7	7/11/12	1.57	B	1.76	0.0959	B	0.176	3180		88.0	10.5		0.176	5.20		1.76
SPA2-2	J1PTL5	7/11/12	1.50	B	1.76	0.0944	B	0.176	4370		87.8	9.78		0.176	5.47		1.76
SPA2-3	J1PTL6	7/11/12	1.60	B	1.63	0.0870	B	0.163	3270		81.3	10.6		0.163	5.15		1.63
SPA2-4	J1PTL7	7/11/12	1.57		1.55	0.0875	B	0.155	3180		77.6	9.95		0.155	5.01		1.55
SPA2-5	J1PTL8	7/11/12	1.16	B	1.85	0.0614	B	0.185	4890		92.7	7.53		0.185	6.46		1.85
SPA2-6	J1PTL9	7/11/12	1.61	B	1.80	0.0756	B	0.180	7090		90.1	7.80		0.180	6.17		1.80
SPA2-7	J1PTM0	7/11/12	1.19	B	1.77	0.0691	B	0.177	5210		88.4	6.74		0.177	6.34		1.77
SPA2-8	J1PTM1	7/11/12	1.36	B	1.69	0.0694	B	0.169	5020		84.7	5.69		0.169	6.16		1.69
SPA2-9	J1PTM2	7/11/12	1.51	B	1.80	0.129	B	0.180	12000		90.0	13.6		0.180	4.76		1.80
SPA2-10	J1PTM3	7/11/12	1.08	B	1.80	0.0742	B	0.180	5200		89.9	8.31		0.180	6.39		1.80
SPA2-11	J1PTM4	7/11/12	1.65	B	1.94	0.124	B	0.194	4310		97.1	9.51		0.194	7.62		1.94
SPA2-12	J1PTM5	7/11/12	1.02	B	1.49	0.0561	B	0.149	5900		74.3	4.26		0.149	6.12		1.49
SPA2-13	J1PTM6	7/11/12	1.76		1.75	0.0935	B	0.175	5260		87.3	9.63		0.175	7.01		1.75
COMP-1	J1PTN8	7/11/12	1.68		1.68	0.0939	B	0.168	4250		83.9	9.05		0.168	5.77		1.68
Equipment Blank	J1PTL3	7/9/12	1.19	B	1.70	0.170	U	0.170	56.7	B	84.8	0.170	U	0.170	1.70	U	1.70

Attachment	1	Sheet No.	8 of 38
Originator	J. D. Skoglie	Date	4/12/13
Checked	N. K. Schiffern	Date	4/12/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA1-1	J1PTJ7	7/9/12	13.3		0.975	0.20	U	0.20	17300		19.5	6.21		0.487	3900		73.1
Duplicate of J1PTJ7	J1PTL2	7/9/12	14.9		0.923	0.37	B	0.20	16800		18.5	5.18		0.461	5140		69.2
SPA1-2	J1PTJ8	7/9/12	13.7		0.941	0.20	U	0.20	19500		18.8	3.55		0.470	4890		70.6
SPA1-3	J1PTJ9	7/9/12	11.3		1.00	0.20	U	0.20	17900		20.0	3.32		0.501	3820		75.1
SPA1-4	J1PTK0	7/9/12	14.2		0.996	0.20	U	0.20	17200		19.9	4.81		0.498	4100		74.7
SPA1-5	J1PTK1	7/9/12	11.7		0.949	0.20	U	0.20	17400		19.0	3.39		0.475	3920		71.2
SPA1-6	J1PTK2	7/9/12	11.1		0.958	0.20	U	0.20	16700		19.2	4.65		0.479	3850		71.8
SPA1-7	J1PTK3	7/9/12	13.1		0.953	0.20	U	0.50	17000		19.1	3.26		0.476	4160		71.5
SPA1-8	J1PTK4	7/9/12	13.6		0.976	0.20	U	0.20	18500		19.5	2.89		0.488	4140		73.2
SPA1-9	J1PTK5	7/9/12	11.0		0.873	0.20	U	0.20	16300		17.5	3.46		0.437	4020		65.5
SPA1-10	J1PTK6	7/9/12	10.2		0.986	0.20	U	0.20	9580		19.7	2.98		0.493	4680		74.0
SPA1-11	J1PTK7	7/9/12	14.0		0.964	0.20	U	0.20	16500		19.3	4.46		0.482	4920		72.3
SPA1-12	J1PTK8	7/9/12	15.4		1.00	0.45		0.20	20500		20.0	4.54		0.500	5900		75.0
SPA1-13	J1PTK9	7/9/12	13.6		0.860	0.20	U	0.20	17500		17.2	3.87		0.430	4440		64.5
SPA1-14	J1PTL0	7/9/12	14.3		0.997	0.20	U	0.20	18000		19.9	4.37		0.498	4220		74.8
SPA1-15	J1PTL1	7/9/12	31.2		1.03	0.26	B	0.20	14600		20.6	7.59		0.516	5060		77.4
SPA2-1	J1PTL4	7/11/12	9.15		0.896	0.20	U	0.20	17400		17.9	3.23		0.448	3350		67.2
Duplicate of J1PTL4	J1PTM7	7/11/12	9.00		0.880	0.20	U	0.20	16400		17.6	3.15		0.440	3440		66.0
SPA2-2	J1PTL5	7/11/12	11.0		0.878	0.20	U	0.20	17800		17.6	3.04		0.439	3750		65.8
SPA2-3	J1PTL6	7/11/12	9.90		0.813	0.20	U	0.20	16500		16.3	3.07		0.406	3510		61.0
SPA2-4	J1PTL7	7/11/12	9.37		0.776	0.20	U	0.20	16500		15.5	2.85		0.388	3500		58.2
SPA2-5	J1PTL8	7/11/12	13.6		0.927	0.20	U	0.20	19600		18.5	2.69		0.463	4240		69.5
SPA2-6	J1PTL9	7/11/12	13.2		0.901	0.20	U	0.20	18200		18.0	3.97		0.450	3960		67.6
SPA2-7	J1PTM0	7/11/12	12.5		0.884	0.20	U	0.20	18100		17.7	2.94		0.442	4080		66.3
SPA2-8	J1PTM1	7/11/12	14.3		0.847	0.20	U	0.20	19300		16.9	2.50		0.424	4320		63.5
SPA2-9	J1PTM2	7/11/12	13.1		0.900	0.20	U	0.20	13600		18.0	3.67		0.450	4490		67.5
SPA2-10	J1PTM3	7/11/12	14.3		0.899	0.20	U	0.20	18900		18.0	2.86		0.449	4650		67.4
SPA2-11	J1PTM4	7/11/12	15.0		0.971	0.20	U	0.20	19000		19.4	3.52		0.486	4460		72.8
SPA2-12	J1PTM5	7/11/12	12.7		0.743	0.20	U	0.20	17600		14.9	2.04		0.371	3630		55.7
SPA2-13	J1PTM6	7/11/12	14.2		0.873	0.20	U	0.20	18400		17.5	3.43		0.436	4350		65.4
COMP-1	J1PTN8	7/11/12	11.1		0.839	0.20	U	0.20	17200		16.8	3.15		0.420	3520		62.9
Equipment Blank	J1PTL3	7/9/12	0.848	U	0.848				266		17.0	0.387	B	0.424	20.2	B	63.6

Attachment	1	Sheet No.	9 of 38
Originator	J. D. Skoglie	Date	4/12/13
Checked	N. K. Schiffern	Date	4/12/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA1-1	J1PTJ7	7/9/12	266		4.87	0.0477		0.0253	0.394	B	1.95	8.87		3.90	1430		390
Duplicate of J1PTJ7	J1PTL2	7/9/12	244		4.61	0.0119	B	0.0261	0.376	B	1.85	14.7		3.69	1230		369
SPA1-2	J1PTJ8	7/9/12	304		4.70	0.0254	U	0.0254	0.441	B	1.88	10.7		3.76	1140		376
SPA1-3	J1PTJ9	7/9/12	302		5.01	0.0242	U	0.0242	0.325	B	2.00	9.13		4.01	1580		401
SPA1-4	J1PTK0	7/9/12	257		4.98	0.0254	U	0.0254	0.425	B	1.99	9.03		3.98	1060		398
SPA1-5	J1PTK1	7/9/12	290		4.75	0.0115	B	0.0256	0.334	B	1.90	9.19		3.80	1690		380
SPA1-6	J1PTK2	7/9/12	277		4.79	0.0277	U	0.0277	0.329	B	1.92	8.65		3.83	1570		383
SPA1-7	J1PTK3	7/9/12	264		4.76	0.0241	B	0.0252	0.316	B	1.91	9.37		3.81	1290		381
SPA1-8	J1PTK4	7/9/12	266		4.88	0.208		0.0247	0.344	B	1.95	8.02		3.90	1150		390
SPA1-9	J1PTK5	7/9/12	282		4.37	0.0290	U	0.0290	0.299	B	1.75	9.43		3.49	1540		349
SPA1-10	J1PTK6	7/9/12	179		4.93	0.0245	U	0.0245	1.97	U	1.97	19.2		3.94	1450		394
SPA1-11	J1PTK7	7/9/12	256		4.82	0.0171	B	0.0263	0.287	B	1.93	14.5		3.86	1320		386
SPA1-12	J1PTK8	7/9/12	323		5.00	0.0213	B	0.0242	0.465	B	2.00	12.4		4.00	1350		400
SPA1-13	J1PTK9	7/9/12	271		4.30	0.0825		0.0247	0.385	B	1.72	8.86		3.44	1150		344
SPA1-14	J1PTL0	7/9/12	278		4.98	0.0152	B	0.0261	0.352	B	1.99	8.63		3.99	1510		399
SPA1-15	J1PTL1	7/9/12	228		5.16	0.0287	U	0.0287	0.803	B	2.06	9.16		4.13	1700		413
SPA2-1	J1PTL4	7/11/12	274		4.48	0.0258	U	0.0258	0.332	B	1.79	8.60		3.58	1400		358
Duplicate of J1PTL4	J1PTM7	7/11/12	250		4.40	0.0258	U	0.0258	0.263	B	1.76	8.41		3.52	1400		352
SPA2-2	J1PTL5	7/11/12	275		4.39	0.0248	U	0.0248	0.402	B	1.76	8.29		3.51	1180		351
SPA2-3	J1PTL6	7/11/12	255		4.06	0.0252	U	0.0252	0.261	B	1.63	8.91		3.25	1400		325
SPA2-4	J1PTL7	7/11/12	263		3.88	0.0245	U	0.0245	0.235	B	1.55	8.38		3.10	1290		310
SPA2-5	J1PTL8	7/11/12	251		4.63	0.0270	U	0.0270	0.317	B	1.85	8.43		3.71	733		371
SPA2-6	J1PTL9	7/11/12	265		4.50	0.0267	U	0.0267	0.351	B	1.80	8.56		3.60	1010		360
SPA2-7	J1PTM0	7/11/12	252		4.42	0.0482		0.0233	0.254	B	1.77	7.37		3.54	888		354
SPA2-8	J1PTM1	7/11/12	249		4.24	0.0269	U	0.0269	0.299	B	1.69	7.60		3.39	553		339
SPA2-9	J1PTM2	7/11/12	230		4.50	0.0275	U	0.0275	1.80	U	1.80	12.1		3.60	1150		360
SPA2-10	J1PTM3	7/11/12	266		4.49	0.0245	U	0.0245	0.334	B	1.80	10.7		3.60	761		360
SPA2-11	J1PTM4	7/11/12	287		4.86	0.0252	U	0.0252	0.283	B	1.94	11.1		3.88	916		388
SPA2-12	J1PTM5	7/11/12	221		3.71	0.0239	U	0.0239	0.285	B	1.49	6.37		2.97	407		297
SPA2-13	J1PTM6	7/11/12	283		4.36	0.0276	U	0.0276	0.298	B	1.75	10.4		3.49	1070		349
COMP-1	J1PTN8	7/11/12	250		4.20	0.0253	B	0.0267	0.282	B	1.68	7.37		3.36	1120		336
Equipment Blank	J1PTL3	7/9/12	4.67		4.24	0.0257	U	0.0257	1.70	U	1.70	3.39	U	3.39	38.2	B	339

Attachment	1	Sheet No.	10 of 38
Originator	J. D. Skoglie	Date	4/12/13
Checked	N. K. Schiffern	Date	4/12/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Selenium			Silicon			Silver			Sodium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA1-1	J1PTJ7	7/9/12	0.292	U	0.292	232		1.95	0.195	U	0.195	289		48.7	46.7		2.44
Duplicate of J1PTJ7	J1PTL2	7/9/12	0.277	U	0.277	206		1.85	0.185	U	0.185	271		46.1	40.8		2.31
SPA1-2	J1PTJ8	7/9/12	0.282	U	0.282	234		1.88	0.188	U	0.188	293		47.0	48.5		2.35
SPA1-3	J1PTJ9	7/9/12	0.300	U	0.300	329		2.00	0.200	U	0.200	220		50.1	45.0		2.50
SPA1-4	J1PTK0	7/9/12	0.299	U	0.299	260		1.99	0.199	U	0.199	261		49.8	47.8		2.49
SPA1-5	J1PTK1	7/9/12	0.285	U	0.285	293		1.90	0.190	U	0.190	226		47.5	43.3		2.37
SPA1-6	J1PTK2	7/9/12	0.287	U	0.287	1060		1.92	0.192	U	0.192	226		47.9	43.4		2.39
SPA1-7	J1PTK3	7/9/12	0.286	U	0.286	259		1.91	0.191	U	0.191	252		47.6	43.4		2.38
SPA1-8	J1PTK4	7/9/12	0.293	U	0.293	199		1.95	0.195	U	0.195	374		48.8	46.1		2.44
SPA1-9	J1PTK5	7/9/12	0.262	U	0.262	298		1.75	0.175	U	0.175	213		43.7	41.6		2.18
SPA1-10	J1PTK6	7/9/12	0.296	U	0.296	264		1.97	0.197	U	0.197	127		49.3	17.2		2.47
SPA1-11	J1PTK7	7/9/12	0.289	U	0.289	157		1.93	0.193	U	0.193	312		48.2	41.5		2.41
SPA1-12	J1PTK8	7/9/12	0.300	U	0.300	230		2.00	0.200	U	0.200	439		50.0	56.3		2.50
SPA1-13	J1PTK9	7/9/12	0.258	U	0.258	213		1.72	0.172	U	0.172	278		43.0	50.2		2.15
SPA1-14	J1PTL0	7/9/12	0.299	U	0.299	264		1.99	0.199	U	0.199	290		49.8	49.0		2.49
SPA1-15	J1PTL1	7/9/12	0.310	U	0.310	342		2.06	0.206	U	0.206	323		51.6	40.3		2.58
SPA2-1	J1PTL4	7/11/12	0.269	U	0.269	729		1.79	0.179	U	0.179	170		44.8	42.1		2.24
Duplicate of J1PTL4	J1PTM7	7/11/12	0.264	U	0.264	654		1.76	0.176	U	0.176	168		44.0	41.7		2.20
SPA2-2	J1PTL5	7/11/12	0.263	U	0.263	691		1.76	0.176	U	0.176	244		43.9	44.6		2.19
SPA2-3	J1PTL6	7/11/12	0.244	U	0.244	662		1.63	0.163	U	0.163	178		40.6	41.4		2.03
SPA2-4	J1PTL7	7/11/12	0.233	U	0.233	618		1.55	0.155	U	0.155	174		38.8	43.0		1.94
SPA2-5	J1PTL8	7/11/12	0.278	U	0.278	288		1.85	0.185	U	0.185	254		46.3	57.9		2.32
SPA2-6	J1PTL9	7/11/12	0.270	U	0.270	609		1.80	0.180	U	0.180	232		45.0	51.7		2.25
SPA2-7	J1PTM0	7/11/12	0.265	U	0.265	434		1.77	0.177	U	0.177	212		44.2	47.9		2.21
SPA2-8	J1PTM1	7/11/12	0.254	U	0.254	488		1.69	0.169	U	0.169	241		42.4	58.4		2.12
SPA2-9	J1PTM2	7/11/12	0.270	U	0.270	759		1.80	0.180	U	0.180	394		45.0	31.3		2.25
SPA2-10	J1PTM3	7/11/12	0.270	U	0.270	319		1.80	0.180	U	0.180	207		44.9	53.5		2.25
SPA2-11	J1PTM4	7/11/12	0.291	U	0.291	673		1.94	0.194	U	0.194	234		48.6	53.2		2.43
SPA2-12	J1PTM5	7/11/12	0.223	U	0.223	282		1.49	0.149	U	0.149	227		37.1	54.1		1.86
SPA2-13	J1PTM6	7/11/12	0.262	U	0.262	620		1.75	0.175	U	0.175	253		43.6	49.2		2.18
COMP-1	J1PTN8	7/11/12	0.252	U	0.252	551		1.68	0.168	U	0.168	257		42.0	45.5		2.10
Equipment Blank	J1PTL3	7/9/12	0.254	U	0.254	70.0		1.70	0.170	U	0.170	11.0	B	42.4	0.273	B	2.12

Attachment	1	Sheet No.	11 of 38
Originator	J. D. Skoglie	Date	4/12/13
Checked	N. K. Schiffern	Date	4/12/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Zinc			Percent Solids		
			mg/kg	Q	PQL	%	Q	PQL
SPA1-1	J1PTJ7	7/9/12	39.4		9.75	98.6		0.1
Duplicate of J1PTJ7	J1PTL2	7/9/12	40.8		9.23	98.5		0.1
SPA1-2	J1PTJ8	7/9/12	39.9		9.41	98.4		0.1
SPA1-3	J1PTJ9	7/9/12	36.9		10.0	97.9		0.1
SPA1-4	J1PTK0	7/9/12	39.1		9.96	98.5		0.1
SPA1-5	J1PTK1	7/9/12	37.2		9.49	97.5		0.1
SPA1-6	J1PTK2	7/9/12	38.7		9.58	98.5		0.1
SPA1-7	J1PTK3	7/9/12	36.9		9.53	99.0		0.1
SPA1-8	J1PTK4	7/9/12	39.1		9.76	98.6		0.1
SPA1-9	J1PTK5	7/9/12	37.4		8.73	97.0		0.1
SPA1-10	J1PTK6	7/9/12	24.5		9.86	99.4		0.1
SPA1-11	J1PTK7	7/9/12	38.3		9.64	97.9		0.1
SPA1-12	J1PTK8	7/9/12	49.9		10.0	98.0		0.1
SPA1-13	J1PTK9	7/9/12	39.8		8.60	98.5		0.1
SPA1-14	J1PTL0	7/9/12	42.2		9.97	98.4		0.1
SPA1-15	J1PTL1	7/9/12	124		10.3	95.0		0.1
SPA2-1	J1PTL4	7/11/12	33.6		8.96	99.7		0.1
Duplicate of J1PTL4	J1PTM7	7/11/12	32.9		8.80	99.7		0.1
SPA2-2	J1PTL5	7/11/12	34.9		8.78	98.2		0.1
SPA2-3	J1PTL6	7/11/12	32.9		8.13	99.2		0.1
SPA2-4	J1PTL7	7/11/12	33.2		7.76	99.1		0.1
SPA2-5	J1PTL8	7/11/12	39.1		9.27	98.1		0.1
SPA2-6	J1PTL9	7/11/12	42.2		9.01	99.1		0.1
SPA2-7	J1PTM0	7/11/12	37.7		8.84	99.2		0.1
SPA2-8	J1PTM1	7/11/12	41.5		8.47	98.3		0.1
SPA2-9	J1PTM2	7/11/12	33.7		9.00	99.2		0.1
SPA2-10	J1PTM3	7/11/12	39.6		8.99	99.3		0.1
SPA2-11	J1PTM4	7/11/12	41.0		9.71	99.0		0.1
SPA2-12	J1PTM5	7/11/12	37.5		7.43	99.0		0.1
SPA2-13	J1PTM6	7/11/12	40.0		8.73	98.8		0.1
COMP-1	J1PTN8	7/11/12	36.6		8.39	99.3		0.1
Equipment Blank	J1PTL3	7/9/12	1.69	B	8.48	100		0.1

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Asbestos).

Sample Location	HEIS Number	Sample Date	Chrysotile	Amosite	Crocidolite	Tremolite	Actinolite	Anthophyllite
			%	%	%	%	%	%
Comp-2	J1PTN9	7/11/12	ND	ND	ND	ND	ND	ND

Sample Location	HEIS Number	Sample Date	Chrysotile	Amosite	Crocidolite	Tremolite	Actinolite	Anthophyllite
			%	%	%	%	%	%
Comp-3	J1RJ63	3/14/13	ND	ND	ND	ND	ND	ND

[a] The required detection limit for asbestos is 1%.

Attachment	1	Sheet No.	12 of 38
Originator	J. D. Skoglie	Date	4/12/13
Checked	N. K. Schiffern	Date	4/12/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals and Physical).

Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA3-1	J1RDP5	2/7/13	7860		1.4	0.34	U	0.34	2.7		0.58	61.0		0.067	0.39		0.029
Duplicate of J1RDP5	J1RDR7	2/7/13	9160		1.6	0.40	U	0.40	2.8		0.69	69.0		0.079	0.45		0.034
SPA3-2	J1RDP6	2/7/13	7320		1.5	0.36	U	0.36	3.1		0.62	61.8		0.072	0.30		0.031
SPA3-3	J1RDP7	2/7/13	5880		1.6	0.40	U	0.40	2.1		0.69	54.6		0.079	0.31		0.034
SPA3-4	J1RDP8	3/21/13	8110	X	1.6	0.39	U	0.39	2.2		0.68	66.9	X	0.079	0.49		0.034
SPA3-5	J1RDP9	3/21/13	4890	X	1.5	0.37	U	0.37	1.3		0.65	38.3	X	0.074	0.48		0.032
SPA3-6	J1RDR0	3/21/13	7550	X	1.5	0.36	U	0.36	3.1		0.63	63.4	X	0.072	0.52		0.031
SPA3-7	J1RDR1	2/7/13	7700		1.6	0.40	U	0.40	2.5		0.70	79.1		0.080	0.40		0.035
SPA3-8	J1RDR2	3/21/13	4130	X	1.3	0.33	U	0.33	1.2		0.57	36.2	X	0.066	0.44		0.029
SPA3-9	J1RDR3	3/21/13	4550	X	1.4	0.35	U	0.35	1.3		0.61	45.5	X	0.070	0.43		0.030
SPA3-10	J1RDR4	2/7/13	7620		1.6	0.40	U	0.40	2.0		0.69	57.6		0.080	0.30		0.035
SPA3-11	J1RDR5	3/21/13	8260	X	1.5	0.37	U	0.37	2.8		0.65	70.9	X	0.075	0.47		0.032
SPA3-12	J1RDR6	2/7/13	7760		1.6	0.39	U	0.39	2.4		0.68	81.6		0.078	0.37		0.034

Location	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA3-1	J1RDP5	2/7/13	1.3	B	0.87	0.047	B	0.036	3840	X	12.5	10.8		0.051	8.2		0.088
Duplicate of J1RDP5	J1RDR7	2/7/13	1.2	B	1.0	0.063	B	0.043	4450	X	14.7	11.8		0.061	9.2		0.10
SPA3-2	J1RDP6	2/7/13	1.6	B	0.93	0.060	B	0.039	10000	X	13.3	11.0		0.055	5.7		0.094
SPA3-3	J1RDP7	2/7/13	1.1	B	1.0	0.078	B	0.043	7260	X	14.7	8.7		0.060	8.0		0.10
SPA3-4	J1RDP8	3/21/13	1.3	B	1.0	0.11	B	0.042	5150	X	14.6	15.7	X	0.060	8.7	X	0.10
SPA3-5	J1RDP9	3/21/13	0.96	U	0.96	0.054	B	0.040	5230	X	13.8	6.2	X	0.057	9.5	X	0.098
SPA3-6	J1RDR0	3/21/13	1.2	B	0.93	0.052	B	0.039	6310	X	13.4	8.9	X	0.055	9.3	X	0.095
SPA3-7	J1RDR1	2/7/13	2.6		1.0	0.096	B	0.043	6280	X	14.9	10.1		0.061	8.5		0.11
SPA3-8	J1RDR2	3/21/13	0.85	U	0.85	0.035	U	0.035	4800	X	12.2	4.9	X	0.050	8.7	X	0.086
SPA3-9	J1RDR3	3/21/13	0.90	U	0.90	0.049	B	0.038	4780	X	13.0	6.1	X	0.053	7.9	X	0.092
SPA3-10	J1RDR4	2/7/13	1.3	B	1.0	0.084	B	0.043	6690	X	14.8	8.5		0.061	7.9		0.11
SPA3-11	J1RDR5	3/21/13	1.2	B	0.96	0.053	B	0.040	5670	X	13.9	11.3	X	0.057	8.6	X	0.098
SPA3-12	J1RDR6	2/7/13	2.0	B	1.0	0.084	B	0.042	5340	X	14.5	9.2		0.059	7.8		0.10

Location	HEIS Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA3-1	J1RDP5	2/7/13	14.2		0.19	0.265		0.155	22500	X	3.4	4.3		0.24	4730		3.3
Duplicate of J1RDP5	J1RDR7	2/7/13	17.0		0.23	0.415		0.155	25700	X	4.0	5.1		0.28	5330		3.9
SPA3-2	J1RDP6	2/7/13	12.4		0.20	0.233		0.155	16600	X	3.6	3.6		0.26	4320		3.5
SPA3-3	J1RDP7	2/7/13	17.5		0.23	0.155	U	0.155	20600	X	4.0	3.5		0.28	4440		3.9
SPA3-4	J1RDP8	3/21/13	14.9	X	0.22	2.16		0.155	20800	X	3.9	4.6		0.28	4270	X	3.8
SPA3-5	J1RDP9	3/21/13	15.4	X	0.21	0.155	U	0.155	25600	X	3.7	2.7		0.26	5190	X	3.6
SPA3-6	J1RDR0	3/21/13	16.5	X	0.21	0.155	U	0.155	22600	X	3.6	4.8		0.26	4930	X	3.5
SPA3-7	J1RDR1	2/7/13	16.2		0.23	0.155	U	0.155	23200	X	4.0	6.0		0.29	5300		3.9
SPA3-8	J1RDR2	3/21/13	14.2	X	0.19	0.307		0.155	23200	X	3.3	2.4		0.23	4160	X	3.2
SPA3-9	J1RDR3	3/21/13	15.4	X	0.20	0.413		0.155	20600	X	3.5	2.6		0.25	3840	X	3.4
SPA3-10	J1RDR4	2/7/13	16.7		0.23	0.155	U	0.155	19300	X	4.0	3.7		0.28	4790		3.9
SPA3-11	J1RDR5	3/21/13	15.8	X	0.21	0.155	U	0.155	21900	X	3.7	4.8		0.27	5010	X	3.6
SPA3-12	J1RDR6	2/7/13	14.0		0.22	0.155	U	0.155	22300	X	3.9	6.8		0.28	4550		3.8
SPA3-4 Re-Sample	J1RJT2	3/28/13				0.349		0.155									

Attachment	1	Sheet No.	13 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals and Physical).

Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA3-1	J1RDP5	2/7/13	347		0.088	0.0054	U	0.0054	0.25	B	0.23	10.8	X	0.11	1630		36.3
Duplicate of J1RDP5	J1RDR7	2/7/13	397		0.10	0.0054	U	0.0054	0.27	U	0.27	11.6	X	0.13	1910		42.8
SPA3-2	J1RDP6	2/7/13	267		0.094	0.0053	U	0.0053	0.25	U	0.25	10.2	X	0.12	1070		38.7
SPA3-3	J1RDP7	2/7/13	332		0.10	0.0064	U	0.0064	0.27	U	0.27	8.5	X	0.13	1140		42.7
SPA3-4	J1RDP8	3/21/13	355	X	0.10	0.0073	B	0.0053	0.27	U	0.27	11.6	X	0.13	1460		42.4
SPA3-5	J1RDP9	3/21/13	307	X	0.098	0.0053	U	0.0053	0.25	U	0.25	12.7	X	0.12	577		40.2
SPA3-6	J1RDR0	3/21/13	329	X	0.095	0.031		0.0049	0.46	B	0.25	10.4	X	0.12	1290		39.0
SPA3-7	J1RDR1	2/7/13	358		0.11	0.0069	B	0.0049	0.28	U	0.28	11.7	X	0.13	1840		43.4
SPA3-8	J1RDR2	3/21/13	289	X	0.086	0.0075	B	0.0049	0.22	U	0.22	7.8	X	0.11	505		35.4
SPA3-9	J1RDR3	3/21/13	300	X	0.092	0.0052	U	0.0052	0.24	U	0.24	7.9	X	0.11	543		37.7
SPA3-10	J1RDR4	2/7/13	270		0.11	0.0056	U	0.0056	0.27	U	0.27	9.9	X	0.13	1340		43.2
SPA3-11	J1RDR5	3/21/13	340	X	0.098	0.0079	B	0.0057	0.26	U	0.26	11.9	X	0.12	1450		40.3
SPA3-12	J1RDR6	2/7/13	351		0.10	0.0055	U	0.0055	0.27	U	0.27	9.8	X	0.13	1610		42.0

Location	HEIS Number	Sample Date	Selenium			Silicon			Silver			Sodium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA3-1	J1RDP5	2/7/13	0.76	U	0.76	326	X	5.0	0.14	U	0.14	204		52.2	59.8		0.083
Duplicate of J1RDP5	J1RDR7	2/7/13	0.90	U	0.90	381	X	5.9	0.17	U	0.17	247		61.6	65.3		0.098
SPA3-2	J1RDP6	2/7/13	0.81	U	0.81	442	X	5.3	0.15	U	0.15	224		55.7	42.5		0.089
SPA3-3	J1RDP7	2/7/13	0.90	U	0.90	495	X	5.9	0.17	U	0.17	261		61.4	59.0		0.098
SPA3-4	J1RDP8	3/21/13	0.89	U	0.89	203	N	5.8	0.17	U	0.17	281		61.0	52.2	X	0.097
SPA3-5	J1RDP9	3/21/13	0.84	U	0.84	143	N	5.5	0.16	U	0.16	285		57.8	70.5	X	0.092
SPA3-6	J1RDR0	3/21/13	0.82	U	0.82	183	N	5.4	0.15	U	0.15	363		56.1	56.6	X	0.089
SPA3-7	J1RDR1	2/7/13	0.91	U	0.91	453	X	6.0	0.17	U	0.17	313		62.4	61.2		0.099
SPA3-8	J1RDR2	3/21/13	0.74	U	0.74	100	N	4.9	0.14	U	0.14	222		51.0	62.1	X	0.081
SPA3-9	J1RDR3	3/21/13	0.79	U	0.79	134	N	5.2	0.15	U	0.15	224		54.2	58.9	X	0.086
SPA3-10	J1RDR4	2/7/13	0.91	U	0.91	430	X	6.0	0.17	U	0.17	566		62.1	43.6		0.099
SPA3-11	J1RDR5	3/21/13	0.84	U	0.84	184	N	5.6	0.16	U	0.16	321		58.0	50.2	X	0.092
SPA3-12	J1RDR6	2/7/13	0.88	U	0.88	412	X	5.8	0.16	U	0.16	262		60.5	56.2		0.096

Location	HEIS Number	Sample Date	Zinc			Percent moisture (wet sample)		
			mg/kg	Q	PQL	%	Q	PQL
SPA3-1	J1RDP5	2/7/13	44.5	X	0.35	5.8		0.10
Duplicate of J1RDP5	J1RDR7	2/7/13	52.0	X	0.42	6.1		0.10
SPA3-2	J1RDP6	2/7/13	37.0	X	0.38	8.7		0.10
SPA3-3	J1RDP7	2/7/13	44.0	X	0.41	3.9		0.10
SPA3-4	J1RDP8	3/21/13	42.9	X	0.41	4.2		0.10
SPA3-5	J1RDP9	3/21/13	45.6	X	0.39	2.8		0.10
SPA3-6	J1RDR0	3/21/13	44.8	X	0.38	3.5		0.10
SPA3-7	J1RDR1	2/7/13	51.1	X	0.42	5.5		0.10
SPA3-8	J1RDR2	3/21/13	42.0	X	0.34	2.7		0.10
SPA3-9	J1RDR3	3/21/13	38.8	X	0.37	3.7		0.10
SPA3-10	J1RDR4	2/7/13	41.6	X	0.42	5.0		0.10
SPA3-11	J1RDR5	3/21/13	44.4	X	0.39	5.8		0.10
SPA3-12	J1RDR6	2/7/13	50.5	X	0.41	5.3		0.10

Attachment	1	Sheet No.	14 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA4-12	J1RDT9	2/4/13	8680		1.5	0.36	U	0.36	2.2		0.62	79.1		0.071	0.41		0.031
Duplicate of J1RDT9	J1RDV0	2/4/13	8490		1.5	0.37	U	0.37	2.4		0.65	76.1		0.075	0.39		0.032
SPA4-1	J1RDR8	2/4/13	7600		1.4	0.34	U	0.34	2.4		0.59	66.6		0.068	0.34		0.030
SPA4-2	J1RDR9	2/4/13	5900		1.5	0.38	U	0.38	1.8		0.66	52.9		0.076	0.36		0.033
SPA4-3	J1RDT0	2/4/13	7580		1.5	0.36	U	0.36	2.2		0.62	73.4		0.072	0.38		0.031
SPA4-4	J1RDT1	2/4/13	4380		1.4	0.44	B	0.35	1.8		0.62	36.4		0.071	0.33		0.031
SPA4-5	J1RDT2	2/4/13	5070		1.5	0.36	U	0.36	1.4		0.63	42.0		0.073	0.34		0.032
SPA4-6	J1RDT3	2/4/13	8240		1.6	0.39	U	0.39	2.4		0.68	71.3		0.078	0.41		0.034
SPA4-7	J1RDT4	2/4/13	6110		1.5	0.36	U	0.36	1.7		0.63	59.9		0.072	0.39		0.031
SPA4-8	J1RDT5	2/4/13	7290		1.4	0.35	U	0.35	2.0		0.62	65.3		0.071	0.32		0.031
SPA4-9	J1RDT6	2/4/13	4110		1.4	0.39	B	0.34	0.84	B	0.58	38.6		0.067	0.33	B	0.15
SPA4-10	J1RDT7	2/4/13	5320		1.5	0.40	B	0.36	1.5		0.63	48.0		0.072	0.38	B	0.16
SPA4-11	J1RDT8	2/4/13	4220		1.5	0.50	B	0.37	0.90	B	0.64	43.7		0.074	0.30		0.032
Equipment Blank	J1RDV1	2/4/13	189		1.5	0.37	U	0.37	0.64	U	0.64	2.1		0.074	0.032	B	0.032

LOCATION	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA4-12	J1RDT9	2/4/13	1.6	B	0.92	0.066	B	0.039	4470		13.2	10.7		0.054	8.3	X	0.094
Duplicate of J1RDT9	J1RDV0	2/4/13	1.5	B	0.96	0.074	B	0.040	3990		13.9	10.6		0.057	8.2	X	0.098
SPA4-1	J1RDR8	2/4/13	1.0	B	0.88	0.042	BM	0.037	3450		12.7	13.4		0.052	7.3	X	0.090
SPA4-2	J1RDR9	2/4/13	0.98	U	0.98	0.041	U	0.041	6190		14.1	6.6		0.058	8.9	X	0.10
SPA4-3	J1RDT0	2/4/13	2.1		0.93	0.076	B	0.039	5460		13.3	9.4		0.055	7.8	X	0.094
SPA4-4	J1RDT1	2/4/13	0.91	U	0.91	0.038	U	0.038	5200		13.1	4.9		0.054	8.8	X	0.093
SPA4-5	J1RDT2	2/4/13	0.94	U	0.94	0.039	U	0.039	4790		13.5	7.3		0.056	9.6	X	0.096
SPA4-6	J1RDT3	2/4/13	1.2	B	1.0	0.10	B	0.042	3810		14.5	11.2		0.060	8.2	X	0.10
SPA4-7	J1RDT4	2/4/13	0.93	U	0.93	0.043	B	0.039	3770		13.4	8.7		0.055	8.2	X	0.095
SPA4-8	J1RDT5	2/4/13	0.92	U	0.92	0.063	B	0.038	3030		13.2	11.5		0.054	6.3	X	0.093
SPA4-9	J1RDT6	2/4/13	0.87	U	0.87	0.036	U	0.036	5090		12.4	5.0		0.051	8.8	X	0.44
SPA4-10	J1RDT7	2/4/13	0.93	U	0.93	0.046	B	0.039	4470		13.4	5.6		0.055	10.3	X	0.47
SPA4-11	J1RDT8	2/4/13	0.95	U	0.95	0.045	B	0.040	4430		13.7	5.7		0.056	9.3	X	0.097
Equipment Blank	J1RDV1	2/4/13	0.95	U	0.95	0.040	U	0.040	45.2	B	13.7	1.1		0.056	0.15	BX	0.097

LOCATION	HEIS Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA4-12	J1RDT9	2/4/13	13.0	X	0.20	0.155	U	0.155	21900	X	3.6	4.8		0.25	3920		3.5
Duplicate of J1RDT9	J1RDV0	2/4/13	12.6	X	0.21	0.155	U	0.155	21600	X	3.7	4.6		0.27	3780		3.6
SPA4-1	J1RDR8	2/4/13	11.4	X	0.20	0.367		0.155	18700	X	3.4	3.9		0.24	3960		3.3
SPA4-2	J1RDR9	2/4/13	14.2	X	0.22	0.155	U	0.155	24000	X	3.8	4.1		0.27	4170		3.7
SPA4-3	J1RDT0	2/4/13	12.5	X	0.20	0.155	U	0.155	21400	X	3.6	4.3		0.25	4160		3.5
SPA4-4	J1RDT1	2/4/13	12.3	X	0.20	0.155	U	0.155	24700	X	3.5	2.5		0.25	4150		3.5
SPA4-5	J1RDT2	2/4/13	13.6	X	0.21	0.155	U	0.155	25200	X	3.6	2.8		0.26	4540		3.5
SPA4-6	J1RDT3	2/4/13	14.2	X	0.22	0.155	U	0.155	22500	X	3.9	4.5		0.28	4020		3.8
SPA4-7	J1RDT4	2/4/13	13.2	X	0.21	0.248		0.155	22900	X	3.6	3.4		0.26	4050		3.5
SPA4-8	J1RDT5	2/4/13	9.8	X	0.20	0.214		0.155	18200	X	3.5	3.5		0.25	3760		3.5
SPA4-9	J1RDT6	2/4/13	16.6	X	0.96	0.155	U	0.155	26600	X	16.8	3.1		1.2	3800		3.3
SPA4-10	J1RDT7	2/4/13	18.1	X	1.0	0.170		0.155	28700	X	18.0	3.2		1.3	4130		3.5
SPA4-11	J1RDT8	2/4/13	11.8	X	0.21	0.246		0.155	25100	X	3.7	2.5		0.26	3950		3.6
Equipment Blank	J1RDV1	2/4/13	0.56	BXC	0.21				283	X	3.7	0.33	B	0.26	21.1		3.6

Attachment	1	Sheet No.	15 of 38
Originator	J. D. Skoglie	Date	4/11/13
Checked	N. K. Schiffern	Date	4/11/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals).

LOCATION	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA4-12	J1RDT9	2/4/13	348		0.094	0.0058	U	0.0058	0.24	U	0.24	12.2		0.12	1770		38.5
Duplicate of J1RDT9	J1RDV0	2/4/13	339		0.098	0.0059	U	0.0059	0.26	U	0.26	12.8		0.12	1730		40.3
SPA4-1	J1RDR8	2/4/13	285		0.09	0.0054	U	0.0054	0.25	B	0.23	13.1		0.11	1400		36.9
SPA4-2	J1RDR9	2/4/13	306		0.10	0.0055	U	0.0055	0.31	B	0.26	10.2		0.12	1030		40.9
SPA4-3	J1RDT0	2/4/13	311		0.094	0.16		0.0052	0.25	U	0.25	12.8		0.12	1570		38.7
SPA4-4	J1RDT1	2/4/13	274		0.093	0.0059	U	0.0059	0.24	U	0.24	12.2		0.11	797		38.2
SPA4-5	J1RDT2	2/4/13	310		0.096	0.0051	U	0.0051	0.25	U	0.25	12.4		0.12	692		39.2
SPA4-6	J1RDT3	2/4/13	322		0.10	0.0057	U	0.0057	0.27	U	0.27	12.7		0.13	1630		42.2
SPA4-7	J1RDT4	2/4/13	289		0.095	0.0061	U	0.0061	0.25	U	0.25	12.3		0.12	1130		38.8
SPA4-8	J1RDT5	2/4/13	268		0.093	0.0058	U	0.0058	0.24	U	0.24	12.7		0.11	1610		38.3
SPA4-9	J1RDT6	2/4/13	266		0.088	0.0054	U	0.0054	0.23	U	0.23	9.2		0.11	828	B	181
SPA4-10	J1RDT7	2/4/13	332		0.095	0.0059	U	0.0059	0.25	U	0.25	11.0		0.12	837	B	194
SPA4-11	J1RDT8	2/4/13	287		0.097	0.0058	U	0.0058	0.25	U	0.25	11.6		0.12	575		39.8
Equipment Blank	J1RDV1	2/4/13	6.9		0.097	0.0059	U	0.0059	0.25	U	0.25	0.18	B	0.12	58.0	B	39.8

LOCATION	HEIS Number	Sample Date	Selenium			Silicon			Silver			Sodium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA4-12	J1RDT9	2/4/13	0.81	U	0.81	242		5.3	0.15	U	0.15	257		55.4	48.2	X	0.088
Duplicate of J1RDT9	J1RDV0	2/4/13	0.85	U	0.85	208		5.6	0.16	U	0.16	247		58.0	48.0	X	0.092
SPA4-1	J1RDR8	2/4/13	0.77	U	0.77	233		5.1	0.14	U	0.14	240		53.2	42.3	X	0.085
SPA4-2	J1RDR9	2/4/13	0.86	U	0.86	184		5.6	0.16	U	0.16	273		58.9	54.1	X	0.094
SPA4-3	J1RDT0	2/4/13	0.81	U	0.81	195		5.3	0.15	U	0.15	312		55.7	44.9	X	0.089
SPA4-4	J1RDT1	2/4/13	0.80	U	0.80	142		5.3	0.15	U	0.15	255		55.0	62.7	X	0.088
SPA4-5	J1RDT2	2/4/13	0.82	U	0.82	163		5.4	0.15	U	0.15	269		56.5	62.6	X	0.090
SPA4-6	J1RDT3	2/4/13	0.88	U	0.88	214		5.8	0.16	U	0.16	249		60.7	46.6	X	0.097
SPA4-7	J1RDT4	2/4/13	0.81	U	0.81	185		5.4	0.15	U	0.15	226		55.9	53.9	X	0.089
SPA4-8	J1RDT5	2/4/13	0.80	U	0.80	185		5.3	0.15	U	0.15	173		55.1	39.2	X	0.088
SPA4-9	J1RDT6	2/4/13	0.76	U	0.76	150		5.0	0.14	U	0.14	253		52.1	75.3	X	0.41
SPA4-10	J1RDT7	2/4/13	0.81	U	0.81	158		5.4	0.15	U	0.15	226		55.9	82.6	X	0.45
SPA4-11	J1RDT8	2/4/13	0.84	U	0.84	142		5.5	0.16	U	0.16	261		57.3	62.3	X	0.091
Equipment Blank	J1RDV1	2/4/13	0.83	U	0.83	132		5.5	0.16	U	0.16	57.3	U	57.3	0.26	BX	0.091

LOCATION	HEIS Number	Sample Date	Zinc			Percent moisture (wet sample)		
			mg/kg	Q	PQL	%	Q	PQL
SPA4-12	J1RDT9	2/4/13	39.5	X	0.37	7.4		0.1
Duplicate of J1RDT9	J1RDV0	2/4/13	38.7	X	0.39	6.7		0.1
SPA4-1	J1RDR8	2/4/13	33.5	X	0.36	6.0		0.1
SPA4-2	J1RDR9	2/4/13	39.6	X	0.40	6.4		0.1
SPA4-3	J1RDT0	2/4/13	38.6	X	0.38	6.3		0.1
SPA4-4	J1RDT1	2/4/13	38.2	X	0.37	3.4		0.1
SPA4-5	J1RDT2	2/4/13	40.0	X	0.38	3.2		0.1
SPA4-6	J1RDT3	2/4/13	37.1	X	0.41	6.5		0.1
SPA4-7	J1RDT4	2/4/13	37.1	X	0.38	4.0		0.1
SPA4-8	J1RDT5	2/4/13	31.2	X	0.37	6.9		0.1
SPA4-9	J1RDT6	2/4/13	38.5	X	0.35	3.2		0.1
SPA4-10	J1RDT7	2/4/13	42.3	X	0.38	4.0		0.1
SPA4-11	J1RDT8	2/4/13	39.4	X	0.39	2.9		0.1
Equipment Blank	J1RDV1	2/4/13	1.4	X	0.39	0.1	U	0.1

Attachment	1	Sheet No.	16 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 001).

Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-001	J1C2T8	9/14/10	7730		3.65	0.438	U	0.438	3.86		0.730	69.5		0.365	0.292		0.146
001-002	J1C2T9	9/14/10	7560		4.20	0.504	U	0.504	4.08		0.840	55.8		0.420	0.295		0.168
001-003	J1C2V0	9/14/10	6720		3.23	0.387	U	0.387	3.56		0.645	53.6		0.323	0.254		0.129
001-004	J1C2V1	9/14/10	6910		3.24	0.388	U	0.388	3.55		0.647	59.0		0.324	0.258		0.129
001-005	J1F1K4	2/17/11	7720		4.95	0.594	U	0.594	3.27		0.990	60.3		0.495	0.309		0.198
001-006	J1F1K5	2/17/11	8050		5.51	0.661	U	0.661	3.54		1.10	75.8		0.551	0.316		0.220
001-007	J1F1K6	2/17/11	7620		4.37	0.524	U	0.524	3.47		0.874	55.9		0.437	0.300		0.175
001-008	J1F1K7	2/17/11	6680		3.67	0.440	U	0.440	3.01		0.734	48.1		0.367	0.263		0.147
001-009	J1F1K8	2/17/11	7200		3.96	0.475	U	0.475	2.34		0.791	38.3		0.396	0.251		0.158
001-010	J1FFW6	3/2/11	5370		3.77	0.452	U	0.452	2.52		0.754	41.2		0.377	0.217		0.151
001-011	J1FFW7	3/2/11	7030		4.52	0.543	U	0.543	2.90		0.904	55.4		0.452	0.266		0.181
001-012	J1FKX2	3/17/11	8560		4.82	0.578	U	0.578	3.77		0.963	62.0		0.482	0.313		0.193
001-013	J1FKX3	3/17/11	8430		4.06	0.487	U	0.487	3.51		0.812	61.3		0.406	0.318		0.162
001-014	J1HHM1	4/20/11	6200		3.56	0.427	U	0.427	2.46		0.712	63.3		0.356	0.289		0.142
001-015	J1HJ14	4/20/11	4610		5.27	0.632	U	0.632	1.71		1.05	58.5		0.527	0.229		0.211
001-016	J1HJ24	4/26/11	3900		4.04	0.485	U	0.485	2.94		0.808	50.0		0.404	0.187		0.162
001-017	J1HJ25	4/26/11	4820		3.38	0.405	U	0.405	2.73		0.675	63.4		0.338	0.245		0.135
001-018	J1K4V1	7/14/11	5620		3.92	0.470	U	0.470	2.54		0.783	47.1		0.392	0.260		0.157
001-019	J1K4V2	7/14/11	5820		4.07	0.488	U	0.488	2.89		0.813	57.6		0.407	0.271		0.163
001-020	J1K4V3	7/14/11	5180		4.18	0.501	U	0.501	2.33		0.836	47.8		0.418	0.244		0.167
001-021	J1K4V4	7/14/11	6010		4.35	0.522	U	0.522	2.91		0.870	53.3		0.435	0.253		0.174
001-022	J1K7D9	7/18/11	8400		3.68	0.441	U	0.441	3.82		0.736	80.0		0.368	0.361		0.147
001-023	J1K7F0	7/18/11	5820		4.37	0.524	U	0.524	2.41		0.874	74.7		0.437	0.288		0.175
001-024	J1KN96	8/11/11	7240		3.92	0.470	U	0.470	2.87		0.783	69.8		0.392	0.274		0.157
001-025	J1KN97	8/11/11	7410		3.70	0.443	U	0.443	3.52		0.739	56.4		0.370	0.302		0.148
001-026	J1KN98	8/11/11	6810		4.54	0.545	U	0.545	3.48		0.908	55.0		0.454	0.287		0.182
001-027	J1KNX4	8/11/11	8230		5.06	0.608	U	0.608	4.63		1.01	67.6		0.506	0.351		0.203
001-028	J1KNX5	8/11/11	9360		4.43	0.532	U	0.532	6.49		0.887	69.6		0.443	0.391		0.177
001-029	J1KNX6	8/11/11	8690		4.75	0.569	U	0.569	4.70		0.949	64.2		0.475	0.347		0.190
001-030	J1KP04	8/16/11	8140		3.71	0.445	U	0.445	4.37		0.742	80.8		0.371	0.331		0.148
Duplicate of J1KP04	J1KP05	8/16/11	7480		3.97	0.477	U	0.477	4.14		0.795	63.2		0.397	0.316		0.159
001-031	J1KP06	8/16/11	7190		5.30	0.636	U	0.636	3.91		1.06	64.6		0.530	0.306		0.212
001-032	J1KP07	8/16/11	8350		4.55	0.281	B	0.550	4.86		0.910	70.2		0.455	0.316		0.182
001-033	J1KP08	8/16/11	7180		3.68	0.442	U	0.442	3.95		0.737	56.7		0.368	0.299		0.147
001-034	J1KR79	8/18/11	6500		4.40	0.528	U	0.528	3.27		0.879	67.3		0.440	0.288		0.176
001-035	J1KR80	8/18/11	5900		4.26	0.512	U	0.512	2.64		0.853	58.5		0.426	0.263		0.171
001-036	J1KR81	8/18/11	7830		3.43	0.412	U	0.412	3.15		0.687	65.7		0.343	0.295		0.137
001-037	J1KR82	8/18/11	6400		3.63	0.436	U	0.436	2.77		0.727	67.6		0.363	0.275		0.145
001-038	J1KR87	8/23/11	5460		4.19	0.503	U	0.503	2.07		0.838	61.5		0.419	0.254		0.168
001-039	J1KR88	8/23/11	5510		4.62	0.555	U	0.555	1.96		0.924	51.6		0.462	0.243		0.185
001-040	J1KR89	8/23/11	5780		3.97	0.476	U	0.476	2.96		0.793	53.0		0.397	0.244		0.159
001-041	J1KT24	8/23/11	4730		4.26	0.512	U	0.512	1.80		0.853	55.7		0.426	0.217		0.171
001-042	J1KPL8	8/30/11	4050		3.81	0.457	U	0.457	1.48		0.761	38.1		0.381	0.177		0.152
001-043	J1KPL9	8/30/11	5950		4.76	0.571	U	0.571	1.74		0.952	54.8		0.476	0.218		0.190

Attachment	1	Sheet No.	17 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 001).

Location	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-001	J1C2T8	9/14/10	2.04		1.46	0.153		0.146	5450		73.0	11.4		0.146	6.84		1.46
001-002	J1C2T9	9/14/10	1.38	B	1.68	0.153	B	0.168	6690		84.0	10.7		0.168	7.21		1.68
001-003	J1C2V0	9/14/10	1.20	B	1.29	0.140		0.129	6060		64.5	8.31		0.129	6.92		1.29
001-004	J1C2V1	9/14/10	1.94		1.29	0.143		0.129	5360		64.7	13.4		0.129	6.84		1.29
001-005	J1F1K4	2/17/11	1.32	B	1.98	0.0776	B	0.198	6330		99.0	9.70		0.198	7.26		1.98
001-006	J1F1K5	2/17/11	1.42	B	2.20	0.0641	B	0.220	7260		110	9.76		0.220	7.95		2.20
001-007	J1F1K6	2/17/11	1.22	B	1.75	0.0770	B	0.175	6620		87.4	13.3		0.175	7.21		1.75
001-008	J1F1K7	2/17/11	1.10	B	1.47	0.0705	B	0.147	5900		73.4	8.83		0.147	6.58		1.47
001-009	J1F1K8	2/17/11	0.859	B	1.58	0.0613	B	0.158	6280		79.1	6.26		0.158	6.30		1.58
001-010	J1FFW6	3/2/11	0.793	B	1.51	0.0678	B	0.151	5570		75.4	5.97		0.151	6.18		1.51
001-011	J1FFW7	3/2/11	1.33	B	1.81	0.132	B	0.181	5110		90.4	8.74		0.181	6.86		1.81
001-012	J1FKX2	3/17/11	1.83	B	1.93	0.0776	B	0.193	7300		96.3	11.8		0.193	8.12		1.93
001-013	J1FKX3	3/17/11	1.80		1.62	0.122	B	0.162	7520		81.2	10.5		0.162	8.12		1.62
001-014	J1HHM1	4/20/11	0.568	B	1.42	0.128	B	0.142	9750		71.2	5.81		0.142	10.7		1.42
001-015	J1HJ14	4/20/11	0.528	B	2.11	0.113	B	0.211	7300		105	4.12		0.211	8.98		2.11
001-016	J1HJ24	4/26/11	1.62	U	1.62	0.0791	B	0.162	5320		80.8	3.18		0.162	9.18		1.62
001-017	J1HJ25	4/26/11	1.35	U	1.35	0.100	B	0.135	5690		67.5	4.00		0.135	8.91		1.35
001-018	J1K4V1	7/14/11	0.702	B	1.57	0.0967	B	0.157	5200		78.3	6.09		0.157	5.91		1.57
001-019	J1K4V2	7/14/11	0.606	B	1.63	0.105	B	0.163	6750		81.3	5.76		0.163	7.61		1.63
001-020	J1K4V3	7/14/11	0.652	B	1.67	0.0956	B	0.167	6000		83.6	4.78		0.167	6.41		1.67
001-021	J1K4V4	7/14/11	1.07	B	1.74	0.109	B	0.174	6150		87.0	6.76		0.174	6.85		1.74
001-022	J1K7D9	7/18/11	1.47	U	1.47	0.110	B	0.147	9280		73.6	7.99		0.147	11.4		1.47
001-023	J1K7F0	7/18/11	1.75	U	1.75	0.125	B	0.175	7070		87.4	4.30		0.175	9.60		1.75
001-024	J1KN96	8/11/11	1.19	B	1.57	0.131	B	0.157	6430		78.3	10.1		0.157	8.58		1.57
001-025	J1KN97	8/11/11	1.34	B	1.48	0.0904	B	0.148	6990		73.9	8.18		0.148	8.29		1.48
001-026	J1KN98	8/11/11	1.02	B	1.82	0.0871	B	0.182	7590		90.8	8.79		0.182	8.61		1.82
001-027	J1KNX4	8/11/11	1.36	B	2.03	0.107	B	0.203	8190		101	9.39		0.203	8.30		2.03
001-028	J1KNX5	8/11/11	1.33	B	1.77	0.0943	B	0.177	13200		88.7	9.93		0.177	8.91		1.77
001-029	J1KNX6	8/11/11	1.28	B	1.90	0.0859	B	0.190	8940		94.9	8.21		0.190	8.50		1.90
001-030	J1KP04	8/16/11	1.04	B	1.48	0.0874	B	0.148	7780		74.2	9.51		0.148	9.42		1.48
Duplicate of J1KP04	J1KP05	8/16/11	0.920	B	1.59	0.0954	B	0.159	7520		79.5	7.07		0.159	9.24		1.59
001-031	J1KP06	8/16/11	0.992	B	2.12	0.0935	B	0.212	6880		106	6.56		0.212	8.68		2.12
001-032	J1KP07	8/16/11	2.15		1.82	0.121	B	0.182	7940		91.0	11.1		0.182	8.03		1.82
001-033	J1KP08	8/16/11	0.912	B	1.47	0.0959	B	0.147	6720		73.7	6.05		0.147	7.53		1.47
001-034	J1KR79	8/18/11	0.683	B	1.76	0.136	B	0.176	6470		87.9	5.56		0.176	10.2		1.76
001-035	J1KR80	8/18/11	0.764	B	1.71	0.131	B	0.171	5560		85.3	5.08		0.171	8.83		1.71
001-036	J1KR81	8/18/11	2.03		1.37	0.111	B	0.137	6390		68.7	6.11		0.137	8.67		1.37
001-037	J1KR82	8/18/11	0.610	B	1.45	0.119	B	0.145	5570		72.7	5.31		0.145	9.15		1.45
001-038	J1KR87	8/23/11	0.527	B	1.68	0.145	B	0.168	5940		83.8	4.17		0.168	8.23		1.68
001-039	J1KR88	8/23/11	0.558	B	1.85	0.158	B	0.185	5760		92.4	3.95		0.185	8.29		1.85
001-040	J1KR89	8/23/11	0.604	B	1.59	0.132	B	0.159	6500		79.3	4.95		0.159	9.62		1.59
001-041	J1KT24	8/23/11	0.465	B	1.71	0.136	B	0.171	6150		85.3	3.42		0.171	9.02		1.71
001-042	J1KPL8	8/30/11	1.52	U	1.52	0.100	B	0.152	5820		76.1	2.25		0.152	8.89		1.52
001-043	J1KPL9	8/30/11	1.90	U	1.90	0.115	B	0.190	5160		95.2	3.46		0.190	8.66		1.90

Attachment	1	Sheet No.	18 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 001).

Location	HEIS Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-001	J1C2T8	9/14/10	15.5		0.730	0.21	U	0.21	20500		14.6	6.62		0.365	4200		54.8
001-002	J1C2T9	9/14/10	18.4		0.840	0.21	U	0.21	22400		16.8	5.53		0.420	4540		63.0
001-003	J1C2V0	9/14/10	14.6		0.645	0.21	U	0.21	19800		12.9	4.60		0.323	4200		48.4
001-004	J1C2V1	9/14/10	15.6		0.647	0.21	U	0.21	19500		12.9	15.6		0.324	3990		48.6
001-005	J1F1K4	2/17/11	15.2		0.990	0.21	U	0.21	23700		19.8	5.27		0.495	4580		74.3
001-006	J1F1K5	2/17/11	15.2		1.10	0.21	U	0.21	23200		22.0	5.38		0.551	4750		82.6
001-007	J1F1K6	2/17/11	14.2		0.874	0.21	U	0.21	22800		17.5	5.20		0.437	4600		65.5
001-008	J1F1K7	2/17/11	12.5		0.734	0.21	U	0.21	20000		14.7	4.84		0.367	4030		55.0
001-009	J1F1K8	2/17/11	14.0		0.791	0.21	U	0.21	17400		15.8	3.77		0.396	4020		59.4
001-010	J1FFW6	3/2/11	13.5		0.754	0.21	U	0.21	19100		15.1	5.46		0.377	3970		56.5
001-011	J1FFW7	3/2/11	12.7		0.904	0.21	U	0.21	20700		18.1	4.17		0.452	4170		67.8
001-012	J1FKX2	3/17/11	15.0		0.963	0.21	U	0.21	22600		19.3	6.10		0.482	5250		72.3
001-013	J1FKX3	3/17/11	15.7		0.812	0.21	U	0.21	22500		16.2	7.10		0.406	4860		60.9
001-014	J1HHM1	4/20/11	16.8		0.712	0.21	U	0.21	29700		14.2	3.36		0.356	5360		53.4
001-015	J1HJ14	4/20/11	14.5		1.05	0.21	U	0.21	26200		21.1	2.23		0.527	4170		79.0
001-016	J1HJ24	4/26/11	13.8		0.808	0.21	U	0.21	23200		16.2	1.92		0.404	3300		60.6
001-017	J1HJ25	4/26/11	13.3		0.675	0.21	U	0.21	24800		13.5	2.03		0.338	3730		50.7
001-018	J1K4V1	7/14/11	11.3		0.783	0.21	U	0.21	17900		15.7	3.87		0.392	3490		58.7
001-019	J1K4V2	7/14/11	13.8		0.813	0.21	U	0.21	21700		16.3	3.68		0.407	3970		61.0
001-020	J1K4V3	7/14/11	12.5		0.836	0.21	U	0.21	18800		16.7	3.15		0.418	3340		62.7
001-021	J1K4V4	7/14/11	12.5		0.870	0.21	U	0.21	19400		17.4	4.27		0.435	3750		65.2
001-022	J1K7D9	7/18/11	16.7		0.736	0.21	U	0.21	28300		14.7	4.46		0.368	6090		55.2
001-023	J1K7F0	7/18/11	15.7		0.874	0.21	U	0.21	25600		17.5	2.65		0.437	4880		65.5
001-024	J1KN96	8/11/11	15.4		0.783	0.21	U	0.21	23100		15.7	4.27		0.392	5090		58.8
001-025	J1KN97	8/11/11	15.5		0.739	0.21	U	0.21	23900		14.8	4.21		0.370	5060		55.4
001-026	J1KN98	8/11/11	17.1		0.908	0.21	U	0.21	24700		18.2	4.28		0.454	5140		68.1
001-027	J1KNX4	8/11/11	18.3		1.01	0.22	U	0.22	25100		20.3	5.70		0.506	5280		76.0
001-028	J1KNX5	8/11/11	18.1		0.887	0.23	U	0.23	24500		17.7	6.99		0.443	6340		66.5
001-029	J1KNX6	8/11/11	18.9		0.949	0.21	U	0.21	24300		19.0	6.18		0.475	5460		71.2
001-030	J1KP04	8/16/11	18.8		0.742	0.22	U	0.22	23600		14.8	4.72		0.371	5720		55.7
Duplicate of J1KP04	J1KP05	8/16/11	16.9		0.795	0.22	U	0.22	24000		15.9	4.38		0.397	4990		59.6
001-031	J1KP06	8/16/11	15.9		1.06	0.22	U	0.22	25400		21.2	4.62		0.530	4820		79.6
001-032	J1KP07	8/16/11	32.8		0.910	0.21	U	0.21	25700		18.2	6.19		0.455	4510		68.3
001-033	J1KP08	8/16/11	16.5		0.737	0.22	U	0.22	21700		14.7	4.46		0.368	4530		55.3
001-034	J1KR79	8/18/11	17.8		0.879	0.21	U	0.21	26000		17.6	3.54		0.440	4600		65.9
001-035	J1KR80	8/18/11	15.8		0.853	0.21	U	0.21	23000		17.1	3.40		0.426	4100		63.9
001-036	J1KR81	8/18/11	18.0		0.687	0.21	U	0.21	21900		13.7	3.46		0.343	4390		51.5
001-037	J1KR82	8/18/11	15.8		0.727	0.21	U	0.21	24700		14.5	3.10		0.363	4270		54.5
001-038	J1KR87	8/23/11	15.7		0.838	0.21	U	0.21	27200		16.8	2.58		0.419	4170		62.9
001-039	J1KR88	8/23/11	15.8		0.924	0.21	U	0.21	26600		18.5	2.47		0.462	4420		69.3
001-040	J1KR89	8/23/11	18.8		0.793	0.21	U	0.21	26600		15.9	2.40		0.397	4750		59.5
001-041	J1KT24	8/23/11	15.9		0.853	0.21	U	0.21	27500		17.1	2.11		0.426	4010		64.0
001-042	J1KPL8	8/30/11	17.0		0.761	0.21	U	0.21	23900		15.2	1.68		0.381	3580		57.1
001-043	J1KPL9	8/30/11	15.8		0.952	0.21	U	0.21	22100		19.0	2.09		0.476	3120		71.4

Attachment	1	Sheet No.	19 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 001).

Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-001	J1C2T8	9/14/10	312		3.65	0.106		0.0275	0.382	B	1.46	10.5		2.92	1320		292
001-002	J1C2T9	9/14/10	336		4.20	0.0279	U	0.0279	0.580	B	1.68	11.3		3.36	1270		336
001-003	J1C2V0	9/14/10	350		3.23	0.0337		0.0266	0.368	B	1.29	10.0		2.58	1170		258
001-004	J1C2V1	9/14/10	301		3.24	0.299		0.0233	0.367	B	1.29	9.85		2.59	1290		259
001-005	J1F1K4	2/17/11	324		4.95	0.0136	B	0.0272	0.349	B	1.98	10.9		3.96	1230		396
001-006	J1F1K5	2/17/11	335		5.51	0.0283	U	0.0283	0.321	B	2.20	10.4		4.41	1300		441
001-007	J1F1K6	2/17/11	332		4.37	0.0150	B	0.0300	0.326	B	1.75	9.53		3.49	1240		349
001-008	J1F1K7	2/17/11	283		3.67	0.0476		0.0279	0.276	B	1.47	8.94		2.93	1090		293
001-009	J1F1K8	2/17/11	235		3.96	0.0314	B	0.0317	0.233	B	1.58	6.89		3.17	898		317
001-010	J1FFW6	3/2/11	242		3.77	0.0773		0.0283	0.341	B	1.51	7.70		3.01	866		301
001-011	J1FFW7	3/2/11	312		4.52	0.0297	U	0.0297	0.388	B	1.81	9.36		3.62	1230		362
001-012	J1FKX2	3/17/11	337		4.82	0.0281	U	0.0281	0.355	B	1.93	11.5		3.85	1380		385
001-013	J1FKX3	3/17/11	340		4.06	0.0174	B	0.0288	0.350	B	1.62	11.3		3.25	1340		325
001-014	J1HHM1	4/20/11	405		3.56	0.0250	U	0.0250	0.462	B	1.42	9.60		2.85	992		285
001-015	J1HJ14	4/20/11	353		5.27	0.0250	U	0.0250	0.529	B	2.11	6.15		4.22	831		422
001-016	J1HJ24	4/26/11	317		4.04	0.0259	U	0.0259	0.418	B	1.62	5.77		3.23	695		323
001-017	J1HJ25	4/26/11	389		3.38	0.0253	U	0.0253	0.422	B	1.35	8.03		2.70	808		270
001-018	J1K4V1	7/14/11	259		3.92	0.0282	U	0.0282	0.259	B	1.57	7.14		3.13	844		313
001-019	J1K4V2	7/14/11	306		4.07	0.0317	U	0.0317	0.307	B	1.63	7.60		3.25	953		325
001-020	J1K4V3	7/14/11	263		4.18	0.0263	U	0.0263	0.253	B	1.67	5.64		3.34	836		334
001-021	J1K4V4	7/14/11	277		4.35	0.0183	B	0.0261	0.307	B	1.74	7.59		3.48	978		348
001-022	J1K7D9	7/18/11	443		3.68	0.0238	U	0.0238	0.551	B	1.47	11.6		2.94	1190		294
001-023	J1K7F0	7/18/11	310		4.37	0.0270	U	0.0270	0.432	B	1.75	7.32		3.49	822		349
001-024	J1KN96	8/11/11	380		3.92	0.0270	U	0.0270	0.410	B	1.57	9.64		3.13	1190		313
001-025	J1KN97	8/11/11	342		3.70	0.0282	U	0.0282	0.405	B	1.48	9.45		2.96	1210		296
001-026	J1KN98	8/11/11	356		4.54	0.0258	U	0.0258	0.446	B	1.82	11.5		3.63	1090		363
001-027	J1KNX4	8/11/11	365		5.06	0.0266	U	0.0266	0.421	B	2.03	10.9		4.05	1390		405
001-028	J1KNX5	8/11/11	386		4.43	0.0284	U	0.0284	0.459	B	1.77	11.6		3.55	1620		355
001-029	J1KNX6	8/11/11	361		4.75	0.0281	U	0.0281	0.462	B	1.90	10.1		3.80	1490		380
001-030	J1KP04	8/16/11	437		3.71	0.0300	U	0.0300	0.436	B	1.48	11.7		2.97	1300		297
Duplicate of J1KP04	J1KP05	8/16/11	368		3.97	0.0282	U	0.0282	0.414	B	1.59	10.8		3.18	1220		318
001-031	J1KP06	8/16/11	344		5.30	0.0295	U	0.0295	0.474	B	2.12	9.11		4.24	1170		424
001-032	J1KP07	8/16/11	343		4.55	0.0109	B	0.0264	1.11	B	1.82	14.1		3.64	1300		364
001-033	J1KP08	8/16/11	329		3.68	0.0297	U	0.0297	0.361	B	1.47	8.27		2.95	1180		295
001-034	J1KR79	8/18/11	375		4.40	0.0268	U	0.0268	0.415	B	1.76	9.06		3.52	1030		352
001-035	J1KR80	8/18/11	327		4.26	0.0257	U	0.0257	0.342	B	1.71	8.69		3.41	926		341
001-036	J1KR81	8/18/11	333		3.43	0.0254	U	0.0254	0.334	B	1.37	10.0		2.75	1050		275
001-037	J1KR82	8/18/11	375		3.63	0.0303	U	0.0303	0.360	B	1.45	9.53		2.91	965		291
001-038	J1KR87	8/23/11	313		4.19	0.0261	U	0.0261	0.376	B	1.68	6.34		3.35	823		335
001-039	J1KR88	8/23/11	316		4.62	0.0284	U	0.0284	0.381	B	1.85	7.43		3.70	744		370
001-040	J1KR89	8/23/11	361		3.97	0.0259	U	0.0259	0.417	B	1.59	7.92		3.17	755		317
001-041	J1KT24	8/23/11	335		4.26	0.0250	U	0.0250	0.394	B	1.71	6.43		3.41	681		341
001-042	J1KPL8	8/30/11	303		3.81	0.0245	U	0.0245	0.378	B	1.52	5.88		3.05	489		305
001-043	J1KPL9	8/30/11	291		4.76	0.0267	U	0.0267	0.313	B	1.90	6.15		3.81	1620		381

Attachment	1	Sheet No.	20 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 001).

Location	HEIS Number	Sample Date	Selenium			Silicon			Silver			Sodium			Thallium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-001	J1C2T8	9/14/10	0.219	U	0.219	594		1.46	0.146	U	0.146	239		36.5	0.365	U	0.365
001-002	J1C2T9	9/14/10	0.252	U	0.252	560		1.68	0.168	U	0.168	326		42.0	0.420	U	0.420
001-003	J1C2V0	9/14/10	0.194	U	0.194	514		1.29	0.129	U	0.129	246		32.3	0.323	U	0.323
001-004	J1C2V1	9/14/10	0.194	U	0.194	467		1.29	0.129	U	0.129	236		32.4	0.324	U	0.324
001-005	J1F1K4	2/17/11	0.297	U	0.297	588		1.98	0.198	U	0.198	256		49.5			
001-006	J1F1K5	2/17/11	0.331	U	0.331	682		2.20	0.220	U	0.220	289		55.1			
001-007	J1F1K6	2/17/11	0.262	U	0.262	609		1.75	0.175	U	0.175	265		43.7			
001-008	J1F1K7	2/17/11	0.220	U	0.220	453		1.47	0.147	U	0.147	219		36.7			
001-009	J1F1K8	2/17/11	0.237	U	0.237	370		1.58	0.158	U	0.158	547		39.6			
001-010	J1FFW6	3/2/11	0.226	U	0.226	453		1.51	0.151	U	0.151	170		37.7			
001-011	J1FFW7	3/2/11	0.271	U	0.271	666		1.81	0.181	U	0.181	202		45.2			
001-012	J1FKX2	3/17/11	0.289	U	0.289	898		1.93	0.193	U	0.193	376		48.2			
001-013	J1FKX3	3/17/11	0.243	U	0.243	798		1.62	0.162	U	0.162	342		40.6			
001-014	J1HHM1	4/20/11	0.214	U	0.214	434		1.42	0.142	U	0.142	338		35.6			
001-015	J1HJ14	4/20/11	0.316	U	0.316	528		2.11	0.211	U	0.211	334		52.7			
001-016	J1HJ24	4/26/11	0.242	U	0.242	315		1.62	0.162	U	0.162	311		40.4			
001-017	J1HJ25	4/26/11	0.203	U	0.203	313		1.35	0.135	U	0.135	380		33.8			
001-018	J1K4V1	7/14/11	0.235	U	0.235	315		1.57	0.157	U	0.157	234		39.2			
001-019	J1K4V2	7/14/11	0.244	U	0.244	279		1.63	0.163	U	0.163	311		40.7			
001-020	J1K4V3	7/14/11	0.251	U	0.251	275		1.67	0.167	U	0.167	284		41.8			
001-021	J1K4V4	7/14/11	0.261	U	0.261	336		1.74	0.174	U	0.174	276		43.5			
001-022	J1K7D9	7/18/11	0.221	U	0.221	1080		1.47	0.147	U	0.147	459		36.8			
001-023	J1K7F0	7/18/11	0.262	U	0.262	523		1.75	0.175	U	0.175	439		43.7			
001-024	J1KN96	8/11/11	0.235	U	0.235	388		1.57	0.157	U	0.157	354		39.2			
001-025	J1KN97	8/11/11	0.222	U	0.222	380		1.48	0.148	U	0.148	342		37.0			
001-026	J1KN98	8/11/11	0.273	U	0.273	424		1.82	0.182	U	0.182	356		45.4			
001-027	J1KNX4	8/11/11	0.304	U	0.304	485		2.03	0.203	U	0.203	352		50.6			
001-028	J1KNX5	8/11/11	0.267		0.266	594		1.77	0.177	U	0.177	471		44.3			
001-029	J1KNX6	8/11/11	0.285	U	0.285	538		1.90	0.190	U	0.190	514		47.5			
001-030	J1KP04	8/16/11	0.223	U	0.223	398		1.48	0.148	U	0.148	433		37.1			
Duplicate of J1KP04	J1KP05	8/16/11	0.238	U	0.238	386		1.59	0.159	U	0.159	403		39.7			
001-031	J1KP06	8/16/11	0.318	U	0.318	427		2.12	0.212	U	0.212	382		53.0			
001-032	J1KP07	8/16/11	0.273	U	0.273	457		1.82	0.182	U	0.182	400		45.5			
001-033	J1KP08	8/16/11	0.243		0.220	340		1.47	0.147	U	0.147	383		36.8			
001-034	J1KR79	8/18/11	0.264	U	0.264	401		1.76	0.176	U	0.176	366		44.0			
001-035	J1KR80	8/18/11	0.256	U	0.256	381		1.71	0.171	U	0.171	330		42.6			
001-036	J1KR81	8/18/11	0.206	U	0.206	344		1.37	0.137	U	0.137	499		34.3			
001-037	J1KR82	8/18/11	0.218	U	0.218	310		1.45	0.145	U	0.145	331		36.3			
001-038	J1KR87	8/23/11	0.251	U	0.251	775		1.68	0.168	U	0.168	388		41.9			
001-039	J1KR88	8/23/11	0.277	U	0.277	782		1.85	0.185	U	0.185	355		46.2			
001-040	J1KR89	8/23/11	0.238	U	0.238	554		1.59	0.159	U	0.159	357		39.7			
001-041	J1KT24	8/23/11	0.256	U	0.256	570		1.71	0.171	U	0.171	355		42.6			
001-042	J1KPL8	8/30/11	0.228	U	0.228	387		1.52	0.152	U	0.152	425		38.1			
001-043	J1KPL9	8/30/11	0.285	U	0.285	719		1.90	0.190	U	0.190	399		47.6			

Attachment	1	Sheet No.	21 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 001).

Location	HEIS Number	Sample Date	Vanadium			Zinc			Percent Solids		
			mg/kg	Q	PQL	mg/kg	Q	PQL	%	Q	PQL
001-001	J1C2T8	9/14/10	53.3		1.83	45.5		7.30	99.3		0.1
001-002	J1C2T9	9/14/10	57.6		2.10	47.1		8.40	97.6		0.1
001-003	J1C2V0	9/14/10	53.7		1.61	50.6		6.45	99.4		0.1
001-004	J1C2V1	9/14/10	50.0		1.62	44.9		6.47	99.0		0.1
001-005	J1F1K4	2/17/11	58.3		2.48	41.5		9.90	91.8		0.1
001-006	J1F1K5	2/17/11	59.6		2.75	43.0		11.0	90.8		0.1
001-007	J1F1K6	2/17/11	57.7		2.18	42.6		8.74	92.3		0.1
001-008	J1F1K7	2/17/11	52.5		1.83	38.7		7.34	92.1		0.1
001-009	J1F1K8	2/17/11	40.5		1.98	33.6		7.91	91.6		0.1
001-010	J1FFW6	3/2/11	44.2		1.88	40.2		7.54	90.9		0.1
001-011	J1FFW7	3/2/11	53.3		2.26	39.4		9.04	89.2		0.1
001-012	J1FKX2	3/17/11	58.6		2.41	44.0		9.63	94.4		0.1
001-013	J1FKX3	3/17/11	59.1		2.03	44.1		8.12	94.8		0.1
001-014	J1HHM1	4/20/11	69.3		1.78	50.9		7.12	94.9		0.1
001-015	J1HJ14	4/20/11	72.3		2.63	42.6		10.5	94.9		0.1
001-016	J1HJ24	4/26/11	61.9		2.02	41.8		8.08	96.7		0.1
001-017	J1HJ25	4/26/11	64.6		1.69	43.8		6.75	96.1		0.1
001-018	J1K4V1	7/14/11	50.8		1.96	35.9		7.83	93.9		0.1
001-019	J1K4V2	7/14/11	58.6		2.03	43.1		8.13	94.6		0.1
001-020	J1K4V3	7/14/11	51.6		2.09	38.8		8.36	95.0		0.1
001-021	J1K4V4	7/14/11	54.8		2.17	41.6		8.70	95.8		0.1
001-022	J1K7D9	7/18/11	74.5		1.84	56.3		7.36	94.4		0.1
001-023	J1K7F0	7/18/11	78.4		2.18	52.0		8.74	95.4		0.1
001-024	J1KN96	8/11/11	63.7		1.96	46.8		7.83	95.2		0.1
001-025	J1KN97	8/11/11	64.9		1.85	47.7		7.39	94.0		0.1
001-026	J1KN98	8/11/11	70.1		2.27	47.2		9.08	91.7		0.1
001-027	J1KNX4	8/11/11	62.9		2.53	48.4		10.1	91.4		0.1
001-028	J1KNX5	8/11/11	62.2		2.22	51.5		8.87	88.1		0.1
001-029	J1KNX6	8/11/11	61.6		2.37	49.3		9.49	94.1		0.1
001-030	J1KP04	8/16/11	64.5		1.86	51.0		7.42	91.0		0.1
Duplicate of J1KP04	J1KP05	8/16/11	59.4		1.99	48.8		7.95	91.2		0.1
001-031	J1KP06	8/16/11	70.8		2.65	50.2		10.6	92.4		0.1
001-032	J1KP07	8/16/11	59.0		2.28	47.5		9.10	94.7		0.1
001-033	J1KP08	8/16/11	55.1		1.84	45.4		7.37	91.7		0.1
001-034	J1KR79	8/18/11	69.2		2.20	51.7		8.79	93.2		0.1
001-035	J1KR80	8/18/11	63.2		2.13	45.6		8.53	94.6		0.1
001-036	J1KR81	8/18/11	56.3		1.72	43.7		6.87	93.3		0.1
001-037	J1KR82	8/18/11	67.2		1.82	48.7		7.27	93.0		0.1
001-038	J1KR87	8/23/11	73.7		2.10	48.7		8.38	93.2		0.1
001-039	J1KR88	8/23/11	72.1		2.31	48.2		9.24	93.3		0.1
001-040	J1KR89	8/23/11	74.1		1.98	48.9		7.93	94.1		0.1
001-041	J1KT24	8/23/11	69.1		2.13	48.0		8.53	94.6		0.1
001-042	J1KPL8	8/30/11	64.3		1.90	47.4		7.61	99.5		0.1
001-043	J1KPL9	8/30/11	59.8		2.38	53.6		9.52	99.1		0.1

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Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 001).

Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-044	J1KPM0	8/30/11	4760		4.20	0.504	U	0.504	2.84		0.840	41.4		0.420	0.220		0.168
001-045	J1KPM1	8/30/11	7270		4.86	0.583	U	0.583	2.67		0.971	77.3		0.486	0.309		0.194
001-046	J1L898	10/4/11	4830		3.60	0.433	U	0.433	1.16		0.721	49.2		0.360	0.192		0.144
001-047	J1L899	10/4/11	3670		4.02	0.482	U	0.482	1.59		0.804	40.8		0.402	0.192		0.161
001-048	J1L8C0	10/4/11	4440		3.39	0.406	U	0.406	0.993		0.677	46.6		0.339	0.197		0.135
001-049	J1L8C1	10/4/11	3210		4.94	0.593	U	0.593	1.37		0.988	47.4		0.494	0.203		0.198
001-050	J1LHV0	10/10/11	3420		3.59	0.431	U	0.431	1.42		0.718	37.9		0.359	0.171		0.144
001-051	J1LHV1	10/10/11	3540		4.62	0.554	U	0.554	1.30		0.923	42.5		0.462	0.167	B	0.185
001-052	J1LHV2	10/10/11	3800		4.19	0.503	U	0.503	1.34		0.838	46.6		0.419	0.181		0.168
001-053	J1LHV3	10/10/11	3380		4.28	0.513	U	0.513	1.32		0.855	33.4		0.428	0.196		0.171
001-054	J1KT30	10/13/11	3110		4.36	0.523	U	0.523	1.23		0.872	29.8		0.436	0.188		0.174
Duplicate of J1KT30	J1KT31	10/13/11	5510		4.46	0.535	U	0.535	1.99		0.892	55.8		0.446	0.262		0.178
001-055	J1KT32	10/13/11	3000		5.10	0.612	U	0.612	1.13		1.02	31.9		0.510	0.152	B	0.204
001-056	J1KT33	10/13/11	3050		4.98	0.598	U	0.598	1.44		1.00	40.7		0.498	0.187	B	0.199
001-057	J1LHT5	10/13/11	3510		5.26	0.632	U	0.632	1.39		1.05	39.5		0.526	0.178	B	0.211
001-058	J1LHT6	10/13/11	3240		4.19	0.503	U	0.503	1.95		0.838	52.5		0.419	0.203		0.168
001-059	J1LHV5	10/18/11	3860		3.70	0.444	U	0.444	1.24		0.740	37.9		0.370	0.194		0.148
001-060	J1LHV6	10/18/11	2380		3.87	0.465	U	0.465	0.750	B	0.774	23.7		0.387	0.136	B	0.155
001-061	J1LHV7	10/18/11	3380		4.41	0.529	U	0.529	1.23		0.882	36.9		0.441	0.157	B	0.176
001-062	J1LHV8	10/18/11	2760		4.18	0.502	U	0.502	1.27		0.837	31.5		0.418	0.148	B	0.167
001-063	J1LHV9	10/24/11	4260		3.67	0.441	U	0.441	1.52		0.735	45.8		0.367	0.211		0.147
001-064	J1M008	10/24/11	4220		5.16	0.619	U	0.619	1.65		1.030	38.4		0.516	0.222		0.206
001-065	J1M009	10/24/11	4240		4.76	0.571	U	0.571	1.75		0.952	48.3		0.476	0.224		0.190
001-066	J1M010	10/24/11	2930		4.46	0.535	U	0.535	1.49		0.891	47.7		0.446	0.158	B	0.178
001-067	J1M5W3	11/28/11	4610		4.59	0.551	U	0.551	1.56		0.919	44.7		0.459	0.239		0.184
Duplicate of J1M5W3	J1M5W4	11/28/11	5120		3.88	0.465	U	0.465	2.00		0.776	40.4		0.388	0.262		0.155
001-068	J1M5W5	11/28/11	4910		4.54	0.545	U	0.545	2.00		0.908	50.6		0.454	0.233		0.182
001-069	J1M5W6	11/28/11	4920		4.39	0.527	U	0.527	1.77		0.878	38.4		0.439	0.291		0.176
001-070	J1M5W7	11/28/11	4190		3.85	0.462	U	0.462	1.93		0.770	46.4		0.385	0.231		0.154
001-071	J1M018	12/8/11	5600		3.75	0.450	U	0.450	1.68		0.749	76.8		0.375	0.343		0.150
001-072	J1M019	12/8/11	5790		3.97	0.476	U	0.476	1.78		0.793	73.5		0.397	0.335		0.159
001-073	J1M020	12/8/11	7040		4.42	0.530	U	0.530	1.56		0.884	49.6		0.442	0.298		0.177
001-074	J1M021	12/8/11	4960		3.96	0.475	U	0.475	1.91		0.791	54.3		0.396	0.310		0.158
001-075	J1M022	12/8/11	4600		4.46	0.535	U	0.535	1.36		0.892	49.8		0.446	0.260		0.178
001-076	J1MXV5	1/11/12	3840		4.42	0.531	U	0.531	1.88		0.885	48.0		0.442	0.276		0.177
Duplicate of J1MXV5	J1MXV6	1/11/12	3200		3.75	0.450	U	0.450	1.65		0.750	38.0		0.375	0.203		0.150
001-077	J1MXV7	1/11/12	2360		4.30	0.516	U	0.516	1.32		0.859	32.2		0.430	0.159	B	0.172
001-078	J1MXV8	1/11/12	3760		4.60	0.552	U	0.552	1.55		0.920	39.3		0.460	0.238		0.184
001-079	J1MXV9	1/11/12	2500		3.40	0.408	U	0.408	1.6		0.680	33.9		0.340	0.180		0.136
001-080	J1MXW0	2/13/12	5210		5.10	0.612	U	0.612	1.88		1.02	74.9		0.510	0.300		0.204
Duplicate of J1MXW0	J1MXW1	2/13/12	4440		4.90	0.588	U	0.588	1.76		0.980	66.7		0.490	0.268		0.196
001-081	J1NJX6	2/13/12	3890		3.69	0.442	U	0.442	1.57		0.737	51.6		0.369	0.260		0.147
001-082	J1NJX7	2/13/12	4150		4.75	0.570	U	0.570	2.04		0.951	51.7		0.475	0.281		0.190
001-083	J1NJX8	2/13/12	5540		5.11	0.614	U	0.614	2.83		1.02	64.6		0.511	0.321		0.205
001-084	J1NJX9	2/13/12	4490		4.40	0.528	U	0.528	1.53		0.880	46.2		0.440	0.239		0.176
001-085	J1NK00	2/13/12	3910		3.69	0.442	U	0.442	1.62		0.737	44.7		0.369	0.234		0.147

Attachment	1	Sheet No.	23 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 001).

Location	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-044	J1KPM0	8/30/11	1.68	U	1.68	0.104	B	0.168	4960		84.0	3.29		0.168	10.6		1.68
001-045	J1KPM1	8/30/11	0.665	B	1.94	0.145	B	0.194	5740		97.1	6.47		0.194	9.80		1.94
001-046	J1L898	10/4/11	1.44	U	1.44	0.0541	B	0.144	5290		72.1	2.86		0.144	7.78		1.44
001-047	J1L899	10/4/11	1.61	U	1.61	0.161	U	0.161	4940		80.4	3.29		0.161	7.59		1.61
001-048	J1L8C0	10/4/11	1.35	U	1.35	0.0452	B	0.135	5250		67.7	2.59		0.135	8.32		1.35
001-049	J1L8C1	10/4/11	1.98	U	1.98	0.198	U	0.198	5430		98.8	2.09		0.198	8.49		1.98
001-050	J1LHV0	10/10/11	1.44	U	1.44	0.0710	B	0.144	4980		71.8	2.12		0.144	6.84		1.44
001-051	J1LHV1	10/10/11	1.85	U	1.85	0.0818	B	0.185	4350		92.3	2.02		0.185	6.77		1.85
001-052	J1LHV2	10/10/11	1.68	U	1.68	0.105	B	0.168	5020		83.8	1.64		0.168	7.25		1.68
001-053	J1LHV3	10/10/11	1.71	U	1.71	0.0622	B	0.171	4700		85.5	1.71		0.171	7.55		1.71
001-054	J1KT30	10/13/11	1.74	U	1.74	0.0795	B	0.174	4300		87.2	1.63		0.174	6.69		1.74
Duplicate of J1KT30	J1KT31	10/13/11	1.78	U	1.78	0.113	B	0.178	5540		89.2	4.72		0.178	9.38		1.78
001-055	J1KT32	10/13/11	2.04	U	2.04	0.0834	B	0.204	4010		102	2.18		0.204	6.38		2.04
001-056	J1KT33	10/13/11	1.99	U	1.99	0.0848	B	0.199	4380		99.6	1.86		0.199	7.74		1.99
001-057	J1LHT5	10/13/11	2.11	U	2.11	0.0886	B	0.211	3880		105	2.13		0.211	7.24		2.11
001-058	J1LHT6	10/13/11	1.68	U	1.68	0.0749	B	0.168	4450		83.8	1.68		0.168	8.78		1.68
001-059	J1LHV5	10/18/11	1.48	U	1.48	0.0826	B	0.148	5100		74.0	2.29		0.148	7.86		1.48
001-060	J1LHV6	10/18/11	1.55	U	1.55	0.0607	B	0.155	2890		77.4	1.99		0.155	5.12		1.55
001-061	J1LHV7	10/18/11	1.76	U	1.76	0.0769	B	0.176	4390		88.2	1.62		0.176	7.10		1.76
001-062	J1LHV8	10/18/11	1.67	U	1.67	0.0782	B	0.167	4390		83.7	1.47		0.167	7.42		1.67
001-063	J1LHV9	10/24/11	1.47	U	1.47	0.0612	B	0.147	5490		73.5	2.74		0.147	8.35		1.47
001-064	J1M008	10/24/11	2.06	U	2.06	0.0537	B	0.206	5740		103	2.80		0.206	8.21		2.06
001-065	J1M009	10/24/11	1.90	U	1.90	0.0687	B	0.190	5050		95.2	2.38		0.190	8.89		1.90
001-066	J1M010	10/24/11	1.78	U	1.78	0.0508	B	0.178	4020		89.1	1.92		0.178	7.26		1.78
001-067	J1M5W3	11/28/11	1.84	U	1.84	0.0865	B	0.184	5350		91.9	3.79		0.184	8.30		1.84
Duplicate of J1M5W3	J1M5W4	11/28/11	1.55	U	1.55	0.0953	B	0.155	5730		77.6	3.05		0.155	7.88		1.55
001-068	J1M5W5	11/28/11	1.82	U	1.82	0.113	B	0.182	4890		90.8	2.88		0.182	8.13		1.82
001-069	J1M5W6	11/28/11	1.76	U	1.76	0.0849	B	0.176	6080		87.8	3.01		0.176	8.41		1.76
001-070	J1M5W7	11/28/11	1.54	U	1.54	0.0801	B	0.154	5400		77.0	2.90		0.154	9.26		1.54
001-071	J1M018	12/8/11	1.50	U	1.50	0.0907	B	0.150	7540		74.9	3.13		0.150	9.31		1.50
001-072	J1M019	12/8/11	1.59	U	1.59	0.0887	B	0.159	7080		79.3	3.27		0.159	9.85		1.59
001-073	J1M020	12/8/11	1.77	U	1.77	0.0764	B	0.177	7170		88.4	2.90		0.177	8.08		1.77
001-074	J1M021	12/8/11	1.58	U	1.58	0.0952	B	0.158	6920		79.2	2.95		0.158	9.03		1.58
001-075	J1M022	12/8/11	1.78	U	1.78	0.0853	B	0.178	5770		89.2	2.39		0.178	8.01		1.78
001-076	J1MXV5	1/11/12	1.77	U	1.77	0.0529	B	0.177	4930		88.5	2.25		0.177	7.05		1.77
Duplicate of J1MXV5	J1MXV6	1/11/12	1.50	U	1.50	0.150	U	0.150	4010		75.0	2.71		0.150	6.35		1.50
001-077	J1MXV7	1/11/12	1.72	U	1.72	0.0510	B	0.172	3550		85.9	1.37		0.172	6.08		1.72
001-078	J1MXV8	1/11/12	1.84	U	1.84	0.0520	B	0.184	4360		92.0	2.22		0.184	7.39		1.84
001-079	J1MXV9	1/11/12	1.36	U	1.36	0.0415	B	0.136	4240		68.0	1.77		0.136	8.02		1.36
001-080	J1MXW0	2/13/12	2.04	U	2.04	0.0693	B	0.204	6070		102	3.76		0.204	11.9		2.04
Duplicate of J1MXW0	J1MXW1	2/13/12	1.96	U	1.96	0.0818	B	0.196	5490		98.0	3.46		0.196	9.46		1.96
001-081	J1NJX6	2/13/12	1.47	U	1.47	0.0741	B	0.147	5270		73.7	3.15		0.147	7.74		1.47
001-082	J1NJX7	2/13/12	1.90	U	1.90	0.0759	B	0.190	5560		95.1	3.05		0.190	8.86		1.90
001-083	J1NJX8	2/13/12	2.05	U	2.05	0.0948	B	0.205	6400		102	5.17		0.205	9.84		2.05
001-084	J1NJX9	2/13/12	1.76	U	1.76	0.0607	B	0.176	5440		88.0	2.80		0.176	8.20		1.76
001-085	J1NK00	2/13/12	1.47	U	1.47	0.0586	B	0.147	4850		73.7	2.72		0.147	7.84		1.47

Attachment	1	Sheet No.	24 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 001).

Location	HEIS Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-044	J1KPM0	8/30/11	19.1		0.840	0.21	U	0.21	22900		16.8	2.07		0.420	3090		63.0
001-045	J1KPM1	8/30/11	16.7		0.971	0.21	U	0.21	28900		19.4	2.68		0.486	4620		72.8
001-046	J1L898	10/4/11	13.9		0.721	0.21	U	0.21	21900		14.4	1.90		0.360	3310		54.1
001-047	J1L899	10/4/11	14.2		0.804	0.21	U	0.21	22000		16.1	1.91		0.402	2690		60.3
001-048	J1L8C0	10/4/11	13.5		0.677	0.21	U	0.21	23200		13.5	1.98		0.339	4010		50.8
001-049	J1L8C1	10/4/11	15.2		0.988	0.21	U	0.21	24800		19.8	1.90		0.494	3390		74.1
001-050	J1LHV0	10/10/11	14.0		0.718	0.21	U	0.21	19300		14.4	1.65		0.359	2780		53.9
001-051	J1LHV1	10/10/11	15.6		0.923	0.21	U	0.21	18400		18.5	2.00		0.462	3100		69.2
001-052	J1LHV2	10/10/11	17.7		0.838	0.21	U	0.21	21100		16.8	1.98		0.419	3170		62.9
001-053	J1LHV3	10/10/11	15.0		0.855	0.21	U	0.21	19000		17.1	1.89		0.428	3010		64.1
001-054	J1KT30	10/13/11	12.4		0.872	0.21	U	0.21	19600		17.4	1.68		0.436	2640		65.4
Duplicate of J1KT30	J1KT31	10/13/11	16.2		0.892	0.21	U	0.21	26800		17.8	2.76		0.446	4120		66.9
001-055	J1KT32	10/13/11	12.4		1.02	0.21	U	0.21	17800		20.4	1.68		0.510	2700		76.5
001-056	J1KT33	10/13/11	16.7		1.00	0.21	U	0.21	20500		19.9	1.87		0.498	2850		74.7
001-057	J1LHT5	10/13/11	13.4		1.05	0.21	U	0.21	20600		21.1	1.98		0.526	2910		79.0
001-058	J1LHT6	10/13/11	14.3		0.838	0.22	B	0.52	22300		16.8	1.74		0.419	2780		62.8
001-059	J1LHV5	10/18/11	13.6		0.740	0.21	U	0.21	21400		14.8	1.92		0.370	3800		55.5
001-060	J1LHV6	10/18/11	9.77		0.774	0.21	U	0.21	15300		15.5	1.37		0.387	2180		58.1
001-061	J1LHV7	10/18/11	12.3		0.882	0.21	U	0.21	20600		17.6	2.04		0.441	2890		66.2
001-062	J1LHV8	10/18/11	12.3		0.837	0.21	U	0.21	21100		16.7	1.70		0.418	2870		62.8
001-063	J1LHV9	10/24/11	13.4		0.735	0.21	U	0.21	23700		14.7	2.06		0.367	3620		55.1
001-064	J1M008	10/24/11	15.3		1.03	0.21	U	0.21	25300		20.6	2.25		0.516	3870		77.4
001-065	J1M009	10/24/11	17.4		0.952	0.21	U	0.21	23900		19.0	2.44		0.476	4090		71.4
001-066	J1M010	10/24/11	13.4		0.891	0.21	U	0.21	19200		17.8	2.01		0.446	2620		66.8
001-067	J1M5W3	11/28/11	14.3		0.919	0.21	U	0.21	26000		18.4	2.29		0.459	3550		68.9
Duplicate of J1M5W3	J1M5W4	11/28/11	14.0		0.776	0.21	U	0.21	24200		15.5	2.43		0.388	3290		58.2
001-068	J1M5W5	11/28/11	13.7		0.908	0.21	U	0.21	24600		18.2	2.51		0.454	4020		68.1
001-069	J1M5W6	11/28/11	15.6		0.878	0.21	U	0.21	26400		17.6	2.24		0.439	3690		65.8
001-070	J1M5W7	11/28/11	14.8		0.770	0.21	U	0.21	25700		15.4	2.04		0.385	3700		57.7
001-071	J1M018	12/8/11	15.7		0.749	0.21	U	0.21	33200		15.0	2.05		0.375	4990		56.2
001-072	J1M019	12/8/11	16.1		0.793	0.21	U	0.21	33300		15.9	2.02		0.397	5090		59.5
001-073	J1M020	12/8/11	17.6		0.884	0.21	U	0.21	28400		17.7	1.98		0.442	4660		66.3
001-074	J1M021	12/8/11	14.7		0.791	0.21	U	0.21	29400		15.8	2.09		0.396	4470		59.4
001-075	J1M022	12/8/11	15.6		0.892	0.21	U	0.21	26200		17.8	1.77		0.446	4380		66.9
001-076	J1MXV5	1/11/12	12.0		0.885	0.21	U	0.21	21900		17.7	2.29		0.442	3050		66.3
Duplicate of J1MXV5	J1MXV6	1/11/12	10.5		0.750	0.21	U	0.21	17900		15.0	1.82		0.375	2800		56.2
001-077	J1MXV7	1/11/12	12.0		0.859	0.21	U	0.21	14800		17.2	1.53		0.430	2090		64.5
001-078	J1MXV8	1/11/12	14.4		0.920	0.21	U	0.21	21200		18.4	2.07		0.460	3530		69.0
001-079	J1MXV9	1/11/12	10.6		0.680	0.21	U	0.21	19300		13.6	1.47		0.340	2980		51.0
001-080	J1MXW0	2/13/12	14.7		1.02	0.21	U	0.21	27400		20.4	2.52		0.510	3920		76.5
Duplicate of J1MXW0	J1MXW1	2/13/12	15.2		0.980	0.21	U	0.21	25200		19.6	5.27		0.490	3530		73.5
001-081	J1NJX6	2/13/12	15.3		0.737	0.21	U	0.21	24600		14.7	1.96		0.369	3400		55.3
001-082	J1NJX7	2/13/12	16.1		0.951	0.21	U	0.21	27100		19.0	2.21		0.475	3610		71.3
001-083	J1NJX8	2/13/12	15.3		1.02	0.21	U	0.21	27100		20.5	3.51		0.511	4290		76.7
001-084	J1NJX9	2/13/12	16.5		0.880	0.21	U	0.21	23900		17.6	1.86		0.440	3720		66.0
001-085	J1NK00	2/13/12	14.1		0.737	0.21	U	0.21	24600		14.7	1.68		0.369	3330		55.3

Attachment	1	Sheet No.	25 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 001).

Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-044	J1KPM0	8/30/11	252		4.20	0.0259	U	0.0259	0.356	B	1.68	5.53		3.36	629		336
001-045	J1KPM1	8/30/11	429		4.86	0.0246	U	0.0246	0.418	B	1.94	10.5		3.88	964		388
001-046	J1L898	10/4/11	414		3.60	0.0243	U	0.0243	0.477	B	1.44	8.18		2.88	558		288
001-047	J1L899	10/4/11	227		4.02	0.0247	U	0.0247	0.350	B	1.61	4.31		3.22	509		322
001-048	J1L8C0	10/4/11	292		3.39	0.0250	U	0.0250	0.350	B	1.35	5.52		2.71	617		271
001-049	J1L8C1	10/4/11	301		4.94	0.0242	U	0.0242	0.402	B	1.98	4.91		3.95	549		395
001-050	J1LHV0	10/10/11	241		3.59	0.0273	U	0.0273	0.318	B	1.44	4.36		2.87	483		287
001-051	J1LHV1	10/10/11	216		4.62	0.0268	U	0.0268	0.275	B	1.85	4.34		3.69	509		369
001-052	J1LHV2	10/10/11	246		4.19	0.0264	U	0.0264	0.356	B	1.68	5.13		3.35	502		335
001-053	J1LHV3	10/10/11	188		4.28	0.0281	U	0.0281	0.289	B	1.71	4.44		3.42	515		342
001-054	J1KT30	10/13/11	198		4.36	0.0266	U	0.0266	0.242	B	1.74	3.90		3.49	452		349
Duplicate of J1KT30	J1KT31	10/13/11	334		4.46	0.0283	U	0.0283	0.435	B	1.78	7.11		3.57	820		357
001-055	J1KT32	10/13/11	192		5.10	0.0258	U	0.0258	0.229	B	2.04	4.39		4.08	500		408
001-056	J1KT33	10/13/11	243		4.98	0.0250	U	0.0250	0.314	B	1.99	4.05		3.98	479		398
001-057	J1LHT5	10/13/11	238		5.26	0.0263	U	0.0263	0.290	B	2.11	4.82		4.21	529		421
001-058	J1LHT6	10/13/11	261		4.19	0.0253	U	0.0253	0.333	B	1.68	4.95		3.35	533		335
001-059	J1LHV5	10/18/11	287		3.70	0.0263	U	0.0263	0.344	B	1.48	4.64		2.96	530		296
001-060	J1LHV6	10/18/11	167		3.87	0.0267	U	0.0267	0.245	B	1.55	2.93	B	3.10	354		310
001-061	J1LHV7	10/18/11	235		4.41	0.0251	U	0.0251	0.340	B	1.76	4.62		3.53	455		353
001-062	J1LHV8	10/18/11	254		4.18	0.0256	U	0.0256	0.338	B	1.67	4.34		3.35	404		335
001-063	J1LHV9	10/24/11	307		3.67	0.0247	U	0.0247	0.376	B	1.47	5.23		2.94	606		294
001-064	J1M008	10/24/11	286		5.16	0.0279	U	0.0279	0.397	B	2.06	4.76		4.13	601		413
001-065	J1M009	10/24/11	392		4.76	0.0255	U	0.0255	0.431	B	1.90	6.75		3.81	573		381
001-066	J1M010	10/24/11	260		4.46	0.0278	U	0.0278	0.347	B	1.78	4.32		3.56	472		356
001-067	J1M5W3	11/28/11	301		4.59	0.0286	U	0.0286	0.427	B	1.84	5.31		3.67	635		367
Duplicate of J1M5W3	J1M5W4	11/28/11	257		3.88	0.0264	U	0.0264	0.428	B	1.55	5.46		3.10	830		310
001-068	J1M5W5	11/28/11	323		4.54	0.0263	U	0.0263	0.360	B	1.82	5.95		3.63	695		363
001-069	J1M5W6	11/28/11	293		4.39	0.0249	U	0.0249	0.390	B	1.76	6.04		3.51	634		351
001-070	J1M5W7	11/28/11	318		3.85	0.0269	U	0.0269	0.436	B	1.54	5.70		3.08	612		308
001-071	J1M018	12/8/11	413		3.75	0.0258	U	0.0258	0.577	B	1.50	5.87		3.00	679		300
001-072	J1M019	12/8/11	514		3.97	0.0260	U	0.0258	0.616	B	1.59	6.86		3.17	723		317
001-073	J1M020	12/8/11	312		4.42	0.0268	U	0.0268	0.440	B	1.77	6.63		3.54	760		354
001-074	J1M021	12/8/11	356		3.96	0.0261	U	0.0260	0.457	B	1.58	6.16		3.17	709		317
001-075	J1M022	12/8/11	290		4.46	0.0252	U	0.0250	0.384	B	1.78	5.12		3.57	629		357
001-076	J1MXV5	1/11/12	224		4.42	0.0241	U	0.0241	0.341	B	1.77	4.23		3.54	560		354
Duplicate of J1MXV5	J1MXV6	1/11/12	215		3.75	0.0239	U	0.0239	0.328	B	1.50	4.28		3.00	457		300
001-077	J1MXV7	1/11/12	158		4.30	0.0265	U	0.0265	0.251	B	1.72	3.24	B	3.44	363		344
001-078	J1MXV8	1/11/12	234		4.60	0.0251	U	0.0251	0.354	B	1.84	4.56		3.68	483		368
001-079	J1MXV9	1/11/12	275		3.40	0.0248	U	0.0248	0.245	B	1.36	4.77		2.72	338		272
001-080	J1MXW0	2/13/12	447		5.10	0.0275	U	0.0275	0.589	B	2.04	6.55		4.08	594		408
Duplicate of J1MXW0	J1MXW1	2/13/12	295		4.90	0.0267	U	0.0267	0.541	B	1.96	5.52		3.92	615		392
001-081	J1NJX6	2/13/12	270		3.69	0.0269	U	0.0269	0.408	B	1.47	4.58		2.95	534		295
001-082	J1NJX7	2/13/12	284		4.75	0.0261	U	0.0261	0.623	B	1.90	5.23		3.80	590		380
001-083	J1NJX8	2/13/12	394		5.11	0.0261	U	0.0261	0.481	B	2.05	6.91		4.09	906		409
001-084	J1NJX9	2/13/12	267		4.40	0.0260	U	0.0260	0.406	B	1.76	6.04		3.52	579		352
001-085	J1NK00	2/13/12	264		3.69	0.0255	U	0.0255	0.405	B	1.47	5.21		2.95	518		295

Attachment	1	Sheet No.	26 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 001).

Location	HEIS Number	Sample Date	Selenium			Silicon			Silver			Sodium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
001-044	J1KPM0	8/30/11	0.252	U	0.252	527		1.68	0.168	U	0.168	371		42.0	64.5		2.10
001-045	J1KPM1	8/30/11	0.291	U	0.291	1020		1.94	0.194	U	0.194	414		48.6	78.0		2.43
001-046	J1L898	10/4/11	0.216	U	0.216	403		1.44	0.144	U	0.144	538		36.0	59.3		1.80
001-047	J1L899	10/4/11	0.241	U	0.241	475		1.61	0.161	U	0.161	412		40.2	62.7		2.01
001-048	J1L8C0	10/4/11	0.203	U	0.203	410		1.35	0.135	U	0.135	426		33.9	57.5		1.69
001-049	J1L8C1	10/4/11	0.296	U	0.296	467		1.98	0.198	U	0.198	355		49.4	52.7		2.47
001-050	J1LHV0	10/10/11	0.215	U	0.215	273		1.44	0.144	U	0.144	319		35.9	47.9		1.80
001-051	J1LHV1	10/10/11	0.277	U	0.277	333		1.85	0.185	U	0.185	272		46.2	46.1		2.31
001-052	J1LHV2	10/10/11	0.252	U	0.252	466		1.68	0.168	U	0.168	346		41.9	56.1		2.10
001-053	J1LHV3	10/10/11	0.257	U	0.257	302		1.71	0.171	U	0.171	229		42.8	43.3		2.14
001-054	J1KT30	10/13/11	0.262	U	0.262	263		1.74	0.174	U	0.174	217		43.6	47.8		2.18
Duplicate of J1KT30	J1KT31	10/13/11	0.268	U	0.268	609		1.78	0.178	U	0.178	353		44.6	76.5		2.23
001-055	J1KT32	10/13/11	0.306	U	0.306	302		2.04	0.204	U	0.204	210		51.0	43.4		2.55
001-056	J1KT33	10/13/11	0.299	U	0.299	403		1.99	0.199	U	0.199	212		49.8	53.7		2.49
001-057	J1LHT5	10/13/11	0.316	U	0.316	280		2.11	0.211	U	0.211	250		52.6	55.0		2.63
001-058	J1LHT6	10/13/11	0.251	U	0.251	194		1.68	0.168	U	0.168	298		41.9	47.3		2.09
001-059	J1LHV5	10/18/11	0.222	U	0.222	257		1.48	0.148	U	0.148	325		37.0	59.0		1.85
001-060	J1LHV6	10/18/11	0.232	U	0.232	235		1.55	0.155	U	0.155	197		38.7	42.1		1.94
001-061	J1LHV7	10/18/11	0.265	U	0.265	329		1.76	0.176	U	0.176	296		44.1	48.5		2.21
001-062	J1LHV8	10/18/11	0.251	U	0.251	278		1.67	0.167	U	0.167	249		41.8	51.5		2.09
001-063	J1LHV9	10/24/11	0.220	U	0.220	183		1.47	0.147	U	0.147	270		36.7	65.5		1.84
001-064	J1M008	10/24/11	0.310	U	0.310	251		2.06	0.206	U	0.206	370		51.6	65.0		2.58
001-065	J1M009	10/24/11	0.286	U	0.286	300		1.90	0.190	U	0.190	353		47.6	60.2		2.38
001-066	J1M010	10/24/11	0.267	U	0.267	200		1.78	0.178	U	0.178	241		44.6	49.7		2.23
001-067	J1M5W3	11/28/11	0.276	U	0.276	424		1.84	0.184	U	0.184	386		45.9	78.6		2.30
Duplicate of J1M5W3	J1M5W4	11/28/11	0.233	U	0.233	332		1.55	0.155	U	0.155	474		38.8	68.5		1.94
001-068	J1M5W5	11/28/11	0.272	U	0.272	403		1.82	0.182	U	0.182	334		45.4	57.7		2.27
001-069	J1M5W6	11/28/11	0.263	U	0.263	349		1.76	0.176	U	0.176	411		43.9	67.6		2.19
001-070	J1M5W7	11/28/11	0.231	U	0.231	312		1.54	0.154	U	0.154	369		38.5	67.7		1.92
001-071	J1M018	12/8/11	0.225	U	0.225	131		1.50	0.150	U	0.150	442		37.5	106		1.87
001-072	J1M019	12/8/11	0.238	U	0.238	132		1.59	0.159	U	0.159	495		39.7	107		1.98
001-073	J1M020	12/8/11	0.265	U	0.265	127		1.77	0.177	U	0.177	768		44.2	76.8		2.21
001-074	J1M021	12/8/11	0.238	U	0.238	129		1.58	0.158	U	0.158	373		39.6	82.1		1.98
001-075	J1M022	12/8/11	0.268	U	0.268	139		1.78	0.178	U	0.178	406		44.6	66.4		2.23
001-076	J1MXV5	1/11/12	0.265	U	0.265	195		1.77	0.177	U	0.177	202		44.2	56.8		2.21
Duplicate of J1MXV5	J1MXV6	1/11/12	0.225	U	0.225	159		1.50	0.150	U	0.150	170		37.5	48.4		1.87
001-077	J1MXV7	1/11/12	0.258	U	0.258	153		1.72	0.172	U	0.172	160		43.0	38.1		2.15
001-078	J1MXV8	1/11/12	0.276	U	0.276	210		1.84	0.184	U	0.184	251		46.0	57.6		2.30
001-079	J1MXV9	1/11/12	0.204	U	0.204	140		1.36	0.136	U	0.136	160		34.0	44.7		1.70
001-080	J1MXW0	2/13/12	0.306	U	0.306	278		2.04	0.204	U	0.204	337		51.0	70.4		2.55
Duplicate of J1MXW0	J1MXW1	2/13/12	0.294	U	0.294	294		1.96	0.196	U	0.196	320		49.0	65.0		2.45
001-081	J1NJX6	2/13/12	0.221	U	0.221	190		1.47	0.147	U	0.147	277		36.9	67.4		1.84
001-082	J1NJX7	2/13/12	0.285	U	0.285	147		1.90	0.190	U	0.190	290		47.5	68.6		2.38
001-083	J1NJX8	2/13/12	0.307	U	0.307	270		2.05	0.205	U	0.205	339		51.1	75.6		2.56
001-084	J1NJX9	2/13/12	0.264	U	0.264	134		1.76	0.176	U	0.176	405		44.0	63.9		2.20
001-085	J1NK00	2/13/12	0.221	U	0.221	239		1.47	0.147	U	0.147	297		36.9	68.0		1.84

Attachment	1	Sheet No.	27 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 001).

Location	HEIS Number	Sample Date	Zinc			Percent Solids		
			mg/kg	Q	PQL	%	Q	PQL
001-044	J1KPM0	8/30/11	42.5		8.40	99.2		0.1
001-045	J1KPM1	8/30/11	49.8		9.71	99.0		0.1
001-046	J1L898	10/4/11	44.1		7.21	95.0		0.1
001-047	J1L899	10/4/11	42.3		8.04	95.7		0.1
001-048	J1L8C0	10/4/11	46.4		6.77	94.7		0.1
001-049	J1L8C1	10/4/11	42.1		9.88	95.5		0.1
001-050	J1LHV0	10/10/11	36.3		7.18	94.1		0.1
001-051	J1LHV1	10/10/11	34.4		9.23	93.4		0.1
001-052	J1LHV2	10/10/11	42.5		8.38	94.7		0.1
001-053	J1LHV3	10/10/11	36.4		8.55	94.3		0.1
001-054	J1KT30	10/13/11	32.5		8.72	94.0		0.1
Duplicate of J1KT30	J1KT31	10/13/11	51.9		8.92	93.4		0.1
001-055	J1KT32	10/13/11	31.4		10.2	94.3		0.1
001-056	J1KT33	10/13/11	37.6		9.96	94.7		0.1
001-057	J1LHT5	10/13/11	38.5		10.5	95.0		0.1
001-058	J1LHT6	10/13/11	34.6		8.38	96.3		0.1
001-059	J1LHV5	10/18/11	42.8		7.40	95.2		0.1
001-060	J1LHV6	10/18/11	26.9		7.74	93.6		0.1
001-061	J1LHV7	10/18/11	38.9		8.82	94.5		0.1
001-062	J1LHV8	10/18/11	37.1		8.37	94.8		0.1
001-063	J1LHV9	10/24/11	44.3		7.35	95.8		0.1
001-064	J1M008	10/24/11	42.2		10.3	95.0		0.1
001-065	J1M009	10/24/11	42.8		9.52	95.5		0.1
001-066	J1M010	10/24/11	32.1		8.91	95.1		0.1
001-067	J1M5W3	11/28/11	46.2		9.19	95.5		0.1
Duplicate of J1M5W3	J1M5W4	11/28/11	43.8		7.76	94.8		0.1
001-068	J1M5W5	11/28/11	39.3		9.08	94.9		0.1
001-069	J1M5W6	11/28/11	46.9		8.78	94.9		0.1
001-070	J1M5W7	11/28/11	44.8		7.70	95.5		0.1
001-071	J1M018	12/8/11	58.8		7.49	96.7		0.1
001-072	J1M019	12/8/11	58.7		7.93	96.9		0.1
001-073	J1M020	12/8/11	47.2		8.84	95.9		0.1
001-074	J1M021	12/8/11	52.3		7.92	95.7		0.1
001-075	J1M022	12/8/11	47.1		8.92	96.6		0.1
001-076	J1MXV5	1/11/12	40.2		8.85	95.8		0.1
Duplicate of J1MXV5	J1MXV6	1/11/12	31.4		7.50	96.7		0.1
001-077	J1MXV7	1/11/12	28.4		8.59	97.0		0.1
001-078	J1MXV8	1/11/12	37.5		9.20	97.0		0.1
001-079	J1MXV9	1/11/12	33.4		6.80	95.5		0.1
001-080	J1MXW0	2/13/12	46.4		10.2	96.1		0.1
Duplicate of J1MXW0	J1MXW1	2/13/12	50.5		9.80	96.3		0.1
001-081	J1NJX6	2/13/12	44.4		7.37	95.5		0.1
001-082	J1NJX7	2/13/12	45.0		9.51	95.6		0.1
001-083	J1NJX8	2/13/12	50.9		10.2	95.8		0.1
001-084	J1NJX9	2/13/12	42.3		8.80	96.3		0.1
001-085	J1NK00	2/13/12	43.2		7.37	95.5		0.1

Attachment	1	Sheet No.	28 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 023).

Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
023-001	J1HKL4	5/2/11	8050		5.28	0.634	U	0.634	3.27		1.06	65.5		0.528	0.305		0.211
023-002	J1HKL5	5/2/11	7540		4.02	0.483	U	0.483	2.56		0.804	66.4		0.402	0.262		0.161
023-003	J1HKL7	5/2/11	8830		3.76	0.452	U	0.452	3.73		0.753	64.5		0.376	0.329		0.151
023-004	J1HKL8	5/2/11	7720		3.59	0.431	U	0.431	3.23		0.718	66.8		0.359	0.282		0.144
023-005	J1HKL9	5/2/11	8060		3.63	0.435	U	0.435	3.41		0.725	64.8		0.363	0.292		0.145
023-006	J1HKM0	5/3/11	9960		4.44	0.532	U	0.532	4.60		0.887	80.6		0.444	0.369		0.177
023-007	J1HKM1	5/3/11	9760		3.77	0.452	U	0.452	4.79		0.753	80.9		0.377	0.361		0.151
023-008	J1HKM2	5/3/11	11100		4.77	0.573	U	0.573	4.95		0.954	109		0.477	0.422		0.191
023-009	J1HKM3	5/3/11	9300		3.84	0.461	U	0.461	3.90		0.768	152		0.384	0.384		0.154

Location	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Hexavalent Chromium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
023-001	J1HKL4	5/2/11	1.59	B	2.11	0.133	B	0.211	5630		106	13.4		0.211	0.22	U	0.22
023-002	J1HKL5	5/2/11	2.14		1.61	0.129	B	0.161	4510		80.4	10.6		0.161	0.22	U	0.22
023-003	J1HKL7	5/2/11	1.37	B	1.51	0.116	B	0.151	6120		75.3	11.0		0.151	0.22	U	0.22
023-004	J1HKL8	5/2/11	1.31	B	1.44	0.105	B	0.144	6150		71.8	10.2		0.144	0.21	U	0.21
023-005	J1HKL9	5/2/11	1.37	B	1.45	0.110	B	0.145	6500		72.5	10.8		0.145	0.21	U	0.21
023-006	J1HKM0	5/3/11	1.68	B	1.77	0.140	B	0.177	7580		88.7	14.8		0.177	0.21	U	0.21
023-007	J1HKM1	5/3/11	1.95		1.51	0.120	B	0.151	8540		75.3	12.5		0.151	0.21	U	0.21
023-008	J1HKM2	5/3/11	5.09		1.91	0.145	B	0.191	10200		95.4	15.0		0.191	0.25	U	0.25
023-009	J1HKM3	5/3/11	9.43		1.54	0.126	B	0.154	8360		76.8	11.9		0.154	0.22	U	0.22

Location	HEIS Number	Sample Date	Cobalt			Copper			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
023-001	J1HKL4	5/2/11	6.15		2.11	14.9		1.06	20400		21.1	4.60		0.528	4600		79.2
023-002	J1HKL5	5/2/11	5.58		1.61	11.8		0.804	18800		16.1	4.09		0.402	4260		60.3
023-003	J1HKL7	5/2/11	6.65		1.51	15.5		0.753	21300		15.1	5.69		0.376	4670		56.5
023-004	J1HKL8	5/2/11	6.19		1.44	14.2		0.718	19900		14.4	4.95		0.359	4380		53.9
023-005	J1HKL9	5/2/11	6.53		1.45	15.1		0.725	21700		14.5	4.25		0.363	4650		54.4
023-006	J1HKM0	5/3/11	6.75		1.77	16.0		0.887	22100		17.7	6.06		0.444	5590		66.5
023-007	J1HKM1	5/3/11	7.04		1.51	16.3		0.753	22700		15.1	6.86		0.377	5690		56.5
023-008	J1HKM2	5/3/11	8.50		1.91	19.3		0.954	26100		19.1	6.09		0.477	6460		71.6
023-009	J1HKM3	5/3/11	6.77		1.54	16.1		0.768	21700		15.4	4.63		0.384	5150		57.6

Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
023-001	J1HKL4	5/2/11	307		5.28	0.106		0.0291	0.273	B	2.11	11.6		4.23	1330		423
023-002	J1HKL5	5/2/11	286		4.02	0.721		0.0255	0.283	B	1.61	11.2		3.22	1520		322
023-003	J1HKL7	5/2/11	340		3.76	0.0260	U	0.0260	0.251	B	1.51	11.8		3.01	1370		301
023-004	J1HKL8	5/2/11	323		3.59	0.0151	B	0.0266	0.230	B	1.44	10.6		2.87	1250		287
023-005	J1HKL9	5/2/11	331		3.63	0.0350		0.0277	0.334	B	1.45	11.3		2.90	1270		290
023-006	J1HKM0	5/3/11	361		4.44	0.269		0.0274	0.264	B	1.77	13.7		3.55	1540		355
023-007	J1HKM1	5/3/11	398		3.77	0.0156	B	0.0283	0.254	B	1.51	12.6		3.01	1500		301
023-008	J1HKM2	5/3/11	410		4.77	1.25		0.0310	0.351	B	1.91	15.3		3.82	1700		382
023-009	J1HKM3	5/3/11	329		3.84	1.72		0.0807	0.378	B	1.54	12.9		3.07	1340		307

Location	HEIS Number	Sample Date	Selenium			Silicon			Silver			Sodium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
023-001	J1HKL4	5/2/11	0.317	U	0.317	558		2.11	0.211	U	0.211	267		52.8	51.3		2.64
023-002	J1HKL5	5/2/11	0.241	U	0.241	458		1.61	0.161	U	0.161	240		40.2	47.2		2.01
023-003	J1HKL7	5/2/11	0.226	U	0.226	500		1.51	0.151	U	0.151	286		37.6	54.4		1.88
023-004	J1HKL8	5/2/11	0.216	U	0.216	358		1.44	0.144	U	0.144	255		35.9	49.3		1.80
023-005	J1HKL9	5/2/11	0.218	U	0.218	490		1.45	0.145	U	0.145	307		36.3	54.0		1.81
023-006	J1HKM0	5/3/11	0.266	U	0.266	464		1.77	0.177	U	0.177	314		44.4	50.5		2.22
023-007	J1HKM1	5/3/11	0.226	U	0.226	630		1.51	0.151	U	0.151	348		37.7	57.9		1.88
023-008	J1HKM2	5/3/11	0.286	U	0.286	529		1.91	0.191	U	0.191	515		47.7	64.6		2.39
023-009	J1HKM3	5/3/11	0.230	U	0.230	445		1.54	0.154	U	0.154	518		38.4	55.0		1.92

Location	HEIS Number	Sample Date	Zinc			Percent Solids		
			mg/kg	Q	PQL	%	Q	PQL
023-001	J1HKL4	5/2/11	43.6		10.6	91.0		0.1
023-002	J1HKL5	5/2/11	41.3		8.04	92.8		0.1
023-003	J1HKL7	5/2/11	45.1		7.53	91.0		0.1
023-004	J1HKL8	5/2/11	43.0		7.18	94.0		0.1
023-005	J1HKL9	5/2/11	45.3		7.25	95.7		0.1
023-006	J1HKM0	5/3/11	53.1		8.87	93.9		0.1
023-007	J1HKM1	5/3/11	54.7		7.53	93.5		0.1
023-008	J1HKM2	5/3/11	55.1		9.54	80.6		0.1
023-009	J1HKM3	5/3/11	45.1		7.68	93.0		0.1

Attachment	1	Sheet No.	29 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 024A).

Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
A-1	J1R7T0	1/3/13	3060	XM	1.5	0.37	U	0.37	1.6		0.64	29.4	X	0.074	0.032	U	0.032
A-2	J1R7T1	1/3/13	3580	X	1.6	0.39	U	0.39	1.5		0.67	45.1	X	0.077	0.034	U	0.034
A-3	J1R7T2	1/3/13	3200	X	1.5	0.36	U	0.36	1.2		0.62	33.8	X	0.072	0.031	U	0.031

Location	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
A-1	J1R7T0	1/3/13	0.95	U	0.95	0.090	B	0.040	4010	X	13.7	1.9		0.056	8.0	X	0.097
A-2	J1R7T1	1/3/13	1.0	U	1.0	0.085	B	0.042	3830	X	14.4	2.9		0.059	6.2	X	0.10
A-3	J1R7T2	1/3/13	0.93	U	0.93	0.084	B	0.039	3430	X	13.3	1.4		0.055	5.0	X	0.095

Location	HEIS Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
A-1	J1R7T0	1/3/13	13.2		0.21	0.155	U	0.155	18300	X	3.7	1.6		0.26	3760	X	3.6
A-2	J1R7T1	1/3/13	12.8		0.22	0.155	U	0.155	17200	X	3.9	1.9		0.28	2840	X	3.8
A-3	J1R7T2	1/3/13	10.4		0.21	0.155	U	0.155	14800	X	3.6	1.6		0.26	1990	X	3.5

Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
A-1	J1R7T0	1/3/13	231	X	0.097	0.0057	U	0.0057	0.25	U	0.25	4.9	M	0.12	479		39.7
A-2	J1R7T1	1/3/13	176	X	0.10	0.0065	U	0.0065	0.27	U	0.27	4.1		0.13	532		41.8
A-3	J1R7T2	1/3/13	133	X	0.095	0.0057	U	0.0057	0.42	B	0.25	3.1	B	0.12	544		38.8

Location	HEIS Number	Sample Date	Selenium			Silicon			Silver			Sodium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
A-1	J1R7T0	1/3/13	0.83	U	0.83	111		5.5	0.15	U	0.15	254	M	57.1	38.6	X	0.091
A-2	J1R7T1	1/3/13	0.88	U	0.88	107		5.8	0.16	U	0.16	259		60.2	33.2	X	0.096
A-3	J1R7T2	1/3/13	0.81	U	0.81	106		5.4	0.15	U	0.15	246		55.8	30.7	X	0.089

Location	HEIS Number	Sample Date	Zinc			Percent moisture (wet sample)		
			mg/kg	Q	PQL	%	Q	PQL
A-1	J1R7T0	1/3/13	31.3	X	0.39	4.4		0.1
A-2	J1R7T1	1/3/13	28.0	X	0.41	4.8		0.1
A-3	J1R7T2	1/3/13	25.6	X	0.38	4.7		0.1

Attachment	1	Sheet No.	30 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 030).

Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
030-001	J1K3K6	6/30/11	9550		4.77	0.572	U	0.572	4.89		0.954	80.0		0.477
030-002	J1K3K7	6/30/11	9870		4.70	0.565	U	0.565	4.84		0.941	103		0.470
030-003	J1K3K8	6/30/11	7900		4.22	0.506	U	0.506	3.92		0.844	80.9		0.422
030-004	J1K3K9	6/30/11	7500		4.24	0.508	U	0.508	3.62		0.847	76.8		0.424
030-005	J1K3M0	7/6/11	12600		4.19	0.503	U	0.503	7.34		0.838	84.7		0.419
030-006	J1K3M1	7/6/11	13000		4.55	0.546	U	0.546	6.03		0.909	97.9		0.455
030-007	J1K479	7/11/11	10200		3.97	0.477	U	0.477	4.61		0.794	66.3		0.397
030-008	J1K480	7/11/11	11500		4.74	0.568	U	0.568	6.98		0.947	91.8		0.474
030-009	J1K7F9	7/20/11	6480		4.69	0.563	U	0.563	3.16		0.938	79.3		0.469
030-010	J1K7H0	7/20/11	12000		4.75	0.571	U	0.571	5.36		0.951	75.7		0.475

Location	HEIS Number	Sample Date	Beryllium			Boron			Cadmium			Calcium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
030-001	J1K3K6	6/30/11	0.425		0.191	1.15	B	1.91	0.133	B	0.191	8140		95.4
030-002	J1K3K7	6/30/11	0.439		0.188	0.964	B	1.88	0.136	B	0.188	8540		94.1
030-003	J1K3K8	6/30/11	0.362		0.169	0.750	B	1.69	0.116	B	0.169	7870		84.4
030-004	J1K3K9	6/30/11	0.339		0.169	0.652	B	1.69	0.114	B	0.169	8420		84.7
030-005	J1K3M0	7/6/11	0.522		0.168	1.22	B	1.68	0.142	B	0.168	10900		83.8
030-006	J1K3M1	7/6/11	0.537		0.182	1.26	B	1.82	0.134	B	0.182	9620		90.9
030-007	J1K479	7/11/11	0.445		0.159	0.698	B	1.59	0.111	B	0.159	10200		79.4
030-008	J1K480	7/11/11	0.483		0.189	1.05	B	1.89	0.141	B	0.189	10700		94.7
030-009	J1K7F9	7/20/11	0.311		0.188	1.88	U	1.88	0.108	B	0.188	8320		93.8
030-010	J1K7H0	7/20/11	0.470		0.190	1.90	U	1.90	0.127	B	0.190	11300		95.1

Location	HEIS Number	Sample Date	Chromium			Cobalt			Copper			Hexavalent Chromium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
030-001	J1K3K6	6/30/11	9.36		0.191	9.30		1.91	17.2		0.954	0.22	U	0.22
030-002	J1K3K7	6/30/11	8.93		0.188	10.8		1.88	18.3		0.941	0.22	U	0.22
030-003	J1K3K8	6/30/11	7.15		0.169	9.73		1.69	15.9		0.844	0.21	U	0.21
030-004	J1K3K9	6/30/11	5.90		0.169	8.80		1.69	15.7		0.847	0.21	U	0.21
030-005	J1K3M0	7/6/11	13.6		0.168	9.33		1.68	19.3		0.838	0.21	U	0.21
030-006	J1K3M1	7/6/11	12.9		0.182	10.4		1.82	19.5		0.909	0.21	U	0.21
030-007	J1K479	7/11/11	11.2		0.159	10.7		1.59	19.6		0.794	0.68		0.21
030-008	J1K480	7/11/11	11.6		0.189	10.0		1.89	19.5		0.947	0.21	U	0.21
030-009	J1K7F9	7/20/11	4.60		0.188	11.4		1.88	17.9		0.938	0.21	U	0.21
030-010	J1K7H0	7/20/11	9.62		0.190	11.2		1.90	21.5		0.951	0.21	U	0.21

Location	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
030-001	J1K3K6	6/30/11	26600		19.1	5.89		0.477	5320		71.6	377		4.77
030-002	J1K3K7	6/30/11	30100		18.8	5.62		0.470	5900		70.6	468		4.70
030-003	J1K3K8	6/30/11	28300		16.9	4.40		0.422	5060		63.3	443		4.22
030-004	J1K3K9	6/30/11	27100		16.9	4.00		0.424	4660		63.6	367		4.24
030-005	J1K3M0	7/6/11	24700		16.8	9.28		0.419	7440		62.9	459		4.19
030-006	J1K3M1	7/6/11	28900		18.2	7.95		0.455	7310		68.2	488		4.55
030-007	J1K479	7/11/11	25200		15.9	5.99		0.397	6880		59.6	364		3.97
030-008	J1K480	7/11/11	25600		18.9	7.94		0.474	6800		71.0	471		4.74
030-009	J1K7F9	7/20/11	29800		18.8	2.93		0.469	5210		70.4	379		4.69
030-010	J1K7H0	7/20/11	28700		19.0	6.07		0.475	7220		71.3	377		4.75

Attachment	1	Sheet No.	31 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - Decision Unit 030).

Location	HEIS Number	Sample Date	Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
030-001	J1K3K6	6/30/11	0.0297	U	0.0297	0.402	B	1.91	9.90		3.82	1690		382
030-002	J1K3K7	6/30/11	0.0302	U	0.0302	0.428	B	1.88	11.3		3.76	1610		376
030-003	J1K3K8	6/30/11	0.0259	U	0.0259	0.434	B	1.69	9.74		3.37	1240		337
030-004	J1K3K9	6/30/11	0.0253	U	0.0253	0.475	B	1.69	9.07		3.39	1160		339
030-005	J1K3M0	7/6/11	0.0272	U	0.0272	0.363	B	1.68	13.7		3.35	2350		335
030-006	J1K3M1	7/6/11	0.0252	U	0.0252	0.419	B	1.82	14.8		3.64	2270		364
030-007	J1K479	7/11/11	0.0251	U	0.0251	0.375	B	1.59	12.4		3.18	1740		318
030-008	J1K480	7/11/11	0.0293	U	0.0293	0.466	B	1.89	13.3		3.79	2100		379
030-009	J1K7F9	7/20/11	0.0301	U	0.0301	0.498	B	1.88	7.84		3.75	914		375
030-010	J1K7H0	7/20/11	0.0300	U	0.0300	0.593	B	1.90	13.0		3.80	1660		380

Location	HEIS Number	Sample Date	Selenium			Silicon			Silver			Sodium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
030-001	J1K3K6	6/30/11	0.286	U	0.286	437		1.91	0.191	U	0.191	600		47.7
030-002	J1K3K7	6/30/11	0.282	U	0.282	864		1.88	0.188	U	0.188	594		47.0
030-003	J1K3K8	6/30/11	0.253	U	0.253	350		1.69	0.169	U	0.169	459		42.2
030-004	J1K3K9	6/30/11	0.254	U	0.254	333		1.69	0.169	U	0.169	545		42.4
030-005	J1K3M0	7/6/11	0.252	U	0.252	374		1.68	0.168	U	0.168	559		41.9
030-006	J1K3M1	7/6/11	0.273	U	0.273	1100		1.82	0.182	U	0.182	634		45.5
030-007	J1K479	7/11/11	0.238	U	0.238	860		1.59	0.159	U	0.159	629		39.7
030-008	J1K480	7/11/11	0.284	U	0.284	890		1.89	0.189	U	0.189	566		47.4
030-009	J1K7F9	7/20/11	0.282	U	0.282	899		1.88	0.188	U	0.188	564		46.9
030-010	J1K7H0	7/20/11	0.285	U	0.285	1580		1.90	0.190	U	0.190	798		47.5

Location	HEIS Number	Sample Date	Vanadium			Zinc			Percent Solids		
			mg/kg	Q	PQL	mg/kg	Q	PQL	%	Q	PQL
030-001	J1K3K6	6/30/11	70.0		2.39	55.9		9.54	91.9		0.1
030-002	J1K3K7	6/30/11	78.5		2.35	56.7		9.41	93.2		0.1
030-003	J1K3K8	6/30/11	74.6		2.11	52.5		8.44	94.1		0.1
030-004	J1K3K9	6/30/11	70.8		2.12	51.0		8.47	93.7		0.1
030-005	J1K3M0	7/6/11	57.0		2.10	59.4		8.38	94.7		0.1
030-006	J1K3M1	7/6/11	75.1		2.27	60.8		9.09	96.5		0.1
030-007	J1K479	7/11/11	68.8		1.99	55.5		7.94	96.8		0.1
030-008	J1K480	7/11/11	57.9		2.37	58.2		9.47	96.0		0.1
030-009	J1K7F9	7/20/11	73.9		2.35	55.1		9.38	93.5		0.1
030-010	J1K7H0	7/20/11	73.1		2.38	63.3		9.51	93.9		0.1

Attachment	1	Sheet No.	32 of 38
Originator	J. D. Skoglie	Date	4/11/13
Checked	N. K. Schiffern	Date	4/11/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

WSW Overburden apply to all)

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - ~~BCL/Layback~~).

Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SecA - 0 ft	J1R215	9/13/12	5960		1.4	0.35	U	0.35	1.7		0.60	54.5		0.069	0.12	B	0.030
SecB - 0 ft	J1R214	9/12/12	8410		1.4	0.46	B	0.34	3.0		0.60	76.1		0.069	0.19		0.030
SecC - 0 ft	J1R213	9/12/12	8600		1.5	0.37	U	0.37	2.9		0.64	83.5		0.074	0.22		0.032
SecA - 5 ft	J1R2X6	10/10/12	4710	M	1.6	0.38	U	0.38	2.3		0.66	33.6	M	0.076	0.033	U	0.033
SecB - 5 ft	J1R3H6	10/15/12	7540		1.6	0.40	U	0.40	2.6		0.70	59.0		0.080	0.35		0.035
SecC - 5 ft	J1R3H5	10/15/12	8020		1.5	0.76		0.38	2.7	N	0.65	64.3		0.075	0.38		0.033
SecA - 10 ft	J1R460	10/17/12	8000	X	1.7	0.41	U	0.41	3.8	N	0.71	59.2	X	0.081	0.71		0.035
SecB - 10ft	J1R482	10/22/12	7500		1.7	0.71		0.41	4.5		0.72	55.4		0.082	1.1		0.036
SecC - 10 ft	J1R4T5	10/23/12	6040	X	1.4	0.35	U	0.35	1.6		0.61	43.8	X	0.071	0.033	BM	0.031
SecA - 15 ft	J1R4W8	10/29/12	7820		1.7	0.41	U	0.41	4.1	N	0.71	66.5		0.081	0.37		0.035
SecB - 15 ft	J1R4W9	10/29/12	7710		1.5	0.36	U	0.36	4.4		0.63	61.4		0.073	0.38		0.031
SecA - 20 ft	J1R5D5	11/6/12	5080	X	1.6	0.40	U	0.40	2.5		0.69	65.8	X	0.079	0.30		0.034
SecB - 20 ft	J1R5D6	11/6/12	5570	X	1.6	0.38	U	0.38	2.7		0.66	68.9	X	0.076	0.30		0.033
SecC - 20 ft	J1R5D7	11/6/12	7320	X	1.5	0.36	U	0.36	4.6		0.63	70.4	X	0.072	0.35		0.031
SecC - 20 ft	J1R5L7	11/12/12	5760		1.5	0.64		0.36	1.7		0.63	46.1		0.073	0.47		0.032
SecA - 20 ft	J1R5L8	11/12/12	3920		1.4	0.76		0.35	1.4		0.61	40.5		0.070	0.52		0.031
SecB - 25 ft	J1R6N7	12/3/12	4900	X	1.6	0.38	U	0.38	1.4		0.67	55.6	X	0.077	0.060	BM	0.033
Duplicate of J1R6N7	J1R6N8	12/3/12	5060	X	1.5	0.38	U	0.38	1.7		0.66	51.9	X	0.076	0.077	B	0.033
SecC - 25 ft	J1R6N9	12/3/12	5930	X	1.6	0.38	U	0.38	2.1		0.66	58.5	X	0.076	0.13	B	0.033
SecA - 30 ft	J1R6P0	12/3/12	4410	X	1.5	0.37	U	0.37	1.3		0.64	35.2	X	0.073	0.069	B	0.032
SecB - 30 ft	J1R6P1	12/3/12	3510	X	1.4	0.35	U	0.35	1.1		0.60	42.4	X	0.069	0.083	B	0.030
SecC - 30 ft	J1R785	12/13/12	4430	X	1.6	0.38	U	0.38	2.5		0.67	53.4	X	0.077	0.033	U	0.033
SecA - 35 ft	J1R7R4	12/26/12	5710	X	1.5	0.38	U	0.38	1.7		0.66	49.5	X	0.076	0.033	U	0.033
SecB - 35 ft	J1R786	12/13/12	4140	X	1.4	0.35	U	0.35	1.9		0.61	35.1	X	0.070	0.031	U	0.031
SecB - 35 ft	J1R7R5	12/26/12	5050	X	1.4	0.35	U	0.35	1.6		0.61	45.0	X	0.071	0.031	U	0.031
SecA - 40 ft	J1R7R8	12/26/12	3820	X	1.5	0.38	U	0.38	1.8		0.65	35.5	X	0.075	0.033	U	0.033
SecB - 40 ft	J1R7R7	12/26/12	4090	X	1.4	0.34	U	0.34	2.0		0.60	48.1	X	0.069	0.030	U	0.030
SecC - 40 ft	J1R7R6	12/26/12	4210	X	1.6	0.39	U	0.39	1.8		0.68	57.2	X	0.078	0.034	U	0.034
SecA - 45 ft	J1R8T2	1/7/13	3020	X	1.4	0.34	U	0.34	1.7	N	0.58	37.2	X	0.067	0.029	UN	0.029
SecB - 45 ft	J1R815	1/2/13	4190	X	1.5	0.37	U	0.37	1.8		0.65	49.9	X	0.075	0.032	U	0.032
SecC - 45 ft	J1R814	1/2/13	3620	X	1.4	0.34	U	0.34	1.7		0.58	48.5	X	0.067	0.029	U	0.029
SecB - 50 ft	J1R8P5	1/7/13	4560	X	1.6	0.40	U	0.40	1.6		0.70	51.2	X	0.080	0.035	U	0.035
SecC - 50 ft	J1R8P4	1/7/13	3760	X	1.4	0.33	U	0.33	2.1		0.58	41.9	X	0.067	0.029	U	0.029
SecA - 50 ft	J1R8X1	1/10/13	4770	X	1.5	0.36	U	0.36	2.3		0.63	55.0	X	0.072	0.22		0.031
SecA - 55 ft	J1R8X4	1/10/13	4150	X	1.6	0.39	U	0.39	1.9		0.68	52.8	X	0.079	0.18	B	0.034
SecB - 55 ft	J1R8X3	1/10/13	3580	X	1.4	0.35	U	0.35	2.0		0.62	45.4	X	0.071	0.20		0.031
SecC - 55 ft	J1R8X2	1/10/13	4290	X	1.5	0.37	U	0.37	1.8		0.64	46.1	X	0.074	0.20		0.032
SecA - 60 ft	J1R9T6	1/16/13	3760	X	1.4	0.36	U	0.36	2.1		0.62	36.7	X	0.071	0.031	U	0.031
SecB - 60 ft	J1R9T9	1/16/13	3660	X	1.6	0.38	U	0.38	1.9		0.66	79.5	X	0.076	0.033	U	0.033
SecC - 60 ft	J1R9T7	1/16/13	3280	X	1.5	0.38	U	0.38	1.9		0.66	48.3	X	0.076	0.033	U	0.033
SecA - 55 ft	J1R9T8	1/16/13	3930	X	1.6	0.39	U	0.39	2.1		0.67	55.3	X	0.077	0.034	U	0.034
SecA - 65 ft	J1RD48	1/22/13	3190	X	1.6	0.39	U	0.39	0.97	B	0.68	47.1	X	0.079	0.034	U	0.034
SecB - 65 ft	J1RD47	1/22/13	3860	X	1.5	0.37	U	0.37	1.0		0.64	35.8	X	0.074	0.032	U	0.032
SecC - 65 ft	J1RD49	1/22/13	3260	X	1.6	0.39	U	0.39	1.3		0.68	42.5	X	0.078	0.034	U	0.034
SecB - 70 ft	J1RDP2	2/4/13	2710	X	1.6	0.38	B	0.38	1.2		0.67	48.0	X	0.077	0.21		0.033
SecA - 75 ft	J1RDP4	2/4/13	3210	X	1.5	0.48	B	0.37	0.65	U	0.65	42.4	X	0.075	0.23		0.033
SecB - 75 ft	J1RDP3	2/4/13	3430	X	1.5	0.36	U	0.36	0.72	B	0.63	55.3	X	0.072	0.26		0.031
SW-4	J1R503	10/31/12	4850	X	1.5	0.37	U	0.37	1.1		0.65	44.0	X	0.075	0.49		0.032
Duplicate of J1R503	J1R504	10/31/12	4450	X	1.5	0.36	U	0.36	0.93	B	0.62	45.0	X	0.072	0.48		0.031
SW-1	J1R500	10/31/12	3200	X	1.4	0.33	U	0.33	0.92		0.58	32.6	X	0.066	0.39		0.029
SW-2	J1R501	10/31/12	4390	X	1.4	0.35	U	0.35	0.93		0.61	39.3	X	0.07	0.40		0.031
SW-3	J1R502	10/31/12	4900	X	1.5	0.38	U	0.38	0.76	B	0.65	36.0	X	0.075	0.43		0.033
S_Ramp - 35 ft	J1R7R9	12/26/12	3920	X	1.5	0.36	U	0.36	1.4		0.63	31.7	X	0.072	0.031	U	0.031
S_Ramp1	J1R8W6	1/10/13	3170	X	1.4	0.35	U	0.35	1.8		0.62	39.3	X	0.071	0.15	B	0.031
S_Ramp2	J1R8W7	1/10/13	4180	X	1.3	0.33	U	0.33	2.2		0.57	48.4	X	0.065	0.19		0.028
S_Ramp3	J1RD46	1/22/13	3090	X	1.4	0.35	U	0.35	1.4		0.62	37.3	X	0.071	0.031	U	0.031
S_Ramp4	J1RDP0	2/4/13	3890	X	1.5	0.44	B	0.36	1.0		0.62	38.5	X	0.071	0.24		0.031
Duplicate of J1RDP0	J1RDP1	2/4/13	3050	X	1.4	0.38	B	0.34	0.59	U	0.59	33.2	X	0.068	0.22		0.030
Northern Half	J1R8W9	1/22/13	4650		7.3	0.36	U	0.36	1.6		0.62	57.4		0.36	0.15	U	0.15
Southern Half	J1R8X0	1/22/13	4080		1.5	0.37	U	0.37	1.6		0.64	46.4		0.073	0.032	U	0.032
ACL Removal	J1RDC3	1/28/13	4840	X	1.6	0.39	U	0.39	0.68	U	0.68	52.6	XM	0.079	0.034	U	0.034
SR-1	J1RDW4	2/4/13	4150	X	1.4	0.58		0.35	0.83	BM	0.61	43.2	X	0.071	0.30		0.031

Attachment	1	Sheet No.	33 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - BCL/Layback).

Location	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SecA - 0 ft	J1R215	9/13/12	1.8		0.90	0.080	B	0.037	2910		12.9	8.6		0.053	5.8	X	0.091
SecB - 0 ft	J1R214	9/12/12	3.1		0.89	0.086	B	0.037	4600		12.8	17.1		0.053	7.8	X	0.091
SecC - 0 ft	J1R213	9/12/12	3.9		0.95	0.077	B	0.040	5390		13.7	12.2		0.056	7.9	X	0.097
SecA - 5 ft	J1R2X6	10/10/12	0.98	U	0.98	0.061	BM	0.041	9280	M	14.2	4.9	XM	0.058	8.3	X	0.10
SecB - 5 ft	J1R3H6	10/15/12	1.1	B	1.0	0.11	B	0.043	5810	X	14.9	9.0	X	0.061	8.2	X	0.11
SecC - 5 ft	J1R3H5	10/15/12	1.4	BN	0.97	0.10	B	0.041	4930	X	14.0	9.6	X	0.058	8.4	X	0.099
SecA - 10 ft	J1R460	10/17/12	1.0	U	1.0	0.044	U	0.044	9720		15.1	7.4		0.062	9.5	X	0.11
SecB - 10ft	J1R482	10/22/12	1.9	BC	1.1	0.13	B	0.045	8100	X	15.3	8.0	X	0.063	8.5	X	0.11
SecC - 10 ft	J1R4T5	10/23/12	0.97	B	0.91	0.14	B	0.038	6160	X	13.1	6.7	X	0.054	9.3	X	0.093
SecA - 15 ft	J1R4W8	10/29/12	1.1	UN	1.1	0.12	B	0.044	8600	X	15.1	6.9	X	0.062	8.7	X	0.11
SecB - 15 ft	J1R4W9	10/29/12	0.94	U	0.94	0.11	B	0.039	10400	X	13.5	7.0	X	0.055	8.2	X	0.095
SecA - 20 ft	J1R5D5	11/6/12	1.0	U	1.0	0.17	B	0.043	5740	X	14.7	2.7		0.061	8.6	X	0.10
SecB - 20 ft	J1R5D6	11/6/12	0.99	U	0.99	0.16	B	0.041	6190	X	14.2	4.1		0.058	8.8	X	0.10
SecC - 20 ft	J1R5D7	11/6/12	0.93	U	0.93	0.16	B	0.039	8000	X	13.4	7.1		0.055	8.9	X	0.095
SecC - 20 ft	J1R5L7	11/12/12	0.94	U	0.94	0.10	B	0.039	5330		13.5	11	NM	0.056	8.0	X	0.096
SecA - 20 ft	J1R5L8	11/12/12	0.91	U	0.91	0.081	B	0.038	4750		13.1	3.4		0.054	8.5	X	0.093
SecB - 25 ft	J1R6N7	12/3/12	0.99	U	0.99	0.091	B	0.041	5370	X	14.2	3.2	X	0.059	9.0	X	0.10
Duplicate of J1R6N7	J1R6N8	12/3/12	0.98	U	0.98	0.071	B	0.041	6840	X	14.1	2.7	X	0.058	9.1	X	0.10
SecC - 25 ft	J1R6N9	12/3/12	0.98	U	0.98	0.10	B	0.041	5820	X	14.1	4.6	X	0.058	9.1	X	0.10
SecA - 30 ft	J1R6P0	12/3/12	0.94	U	0.94	0.054	B	0.040	5360	X	13.6	2.8	X	0.056	8.4	X	0.096
SecB - 30 ft	J1R6P1	12/3/12	0.90	U	0.90	0.077	B	0.037	4990	X	12.9	2.2	X	0.053	8.4	X	0.091
SecC - 30 ft	J1R785	12/13/12	0.99	U	0.99	0.041	U	0.041	6210	X	14.2	3.6	X	0.059	9.6	X	0.10
SecA - 35 ft	J1R7R4	12/26/12	0.98	U	0.98	0.041	U	0.041	7210	X	14.1	3.3	X	0.058	9.4	X	0.10
SecB - 35 ft	J1R786	12/13/12	0.91	U	0.91	0.038	U	0.038	6330	X	13.1	2.6	X	0.054	8.2	X	0.093
SecB - 35 ft	J1R7R5	12/26/12	0.91	U	0.91	0.038	U	0.038	5070	X	13.1	2.7	X	0.054	7.4	X	0.093
SecA - 40 ft	J1R7R8	12/26/12	0.97	U	0.97	0.041	U	0.041	5130	X	14.0	2.4	X	0.058	8.3	X	0.099
SecB - 40 ft	J1R7R7	12/26/12	0.89	U	0.89	0.037	U	0.037	5830	X	12.8	2.6	X	0.052	7.0	X	0.090
SecC - 40 ft	J1R7R6	12/26/12	1.0	U	1.0	0.042	U	0.042	5050	X	14.6	2.3	X	0.060	8.0	X	0.10
SecA - 45 ft	J1R8T2	1/7/13	0.87	UN	0.87	0.098	B	0.036	4280	X	12.5	1.9		0.051	6.9	XN	0.089
SecB - 45 ft	J1R815	1/2/13	0.96	U	0.96	0.11	B	0.040	4880	X	13.9	2.5	X	0.057	8.5	X	0.098
SecC - 45 ft	J1R814	1/2/13	0.87	U	0.87	0.088	B	0.036	4930	X	12.5	3.7	X	0.051	7.7	X	0.089
SecB - 50 ft	J1R8P5	1/7/13	1.0	U	1.0	0.16	B	0.043	5990	X	14.9	3.0		0.061	8.4	X	0.11
SecC - 50 ft	J1R8P4	1/7/13	0.86	U	0.86	0.11	B	0.036	4720	X	12.4	2.7		0.051	7.5	X	0.088
SecA - 50 ft	J1R8X1	1/10/13	0.93	U	0.93	0.14	B	0.039	5160	X	13.4	3.7		0.055	9.4	X	0.095
SecA - 55 ft	J1R8X4	1/10/13	1.0	U	1.0	0.15	B	0.042	5180	X	14.6	4.1		0.060	10.1	X	0.10
SecB - 55 ft	J1R8X3	1/10/13	0.92	U	0.92	0.15	B	0.038	5100	X	13.2	2.3		0.054	10	X	0.093
SecC - 55 ft	J1R8X2	1/10/13	0.95	U	0.95	0.12	B	0.040	5310	X	13.7	2.5		0.056	8.0	X	0.097
SecA - 60 ft	J1R9T6	1/16/13	0.92	U	0.92	0.12	B	0.038	5170	X	13.2	2.2		0.054	8.9	X	0.094
SecB - 60 ft	J1R9T9	1/16/13	0.99	U	0.99	0.12	B	0.041	4430	X	14.2	2.8		0.058	8.7	X	0.10
SecC - 60 ft	J1R9T7	1/16/13	0.98	U	0.98	0.13	B	0.041	6080	X	14.1	2.3		0.058	8.7	X	0.10
SecA - 55 ft	J1R9T8	1/16/13	1.0	U	1.0	0.13	B	0.042	4660	X	14.4	2.6		0.059	8.4	X	0.10
SecA - 65 ft	J1RD48	1/22/13	1.0	U	1.0	0.10	B	0.042	3600	X	14.6	2.1		0.060	6.1	X	0.10
SecB - 65 ft	J1RD47	1/22/13	0.95	U	0.95	0.12	B	0.040	4750	X	13.7	2.1		0.056	8.7	X	0.097
SecC - 65 ft	J1RD49	1/22/13	1.0	U	1.0	0.11	B	0.042	4780	X	14.5	1.3		0.059	5.9	X	0.10
SecB - 70 ft	J1RDP2	2/4/13	0.99	U	0.99	0.041	U	0.041	4670	X	14.3	1.7		0.059	7.0	X	0.10
SecA - 75 ft	J1RDP4	2/4/13	0.97	U	0.97	0.040	U	0.040	4850	X	13.9	1.9		0.057	9.1	X	0.099
SecB - 75 ft	J1RDP3	2/4/13	0.93	U	0.93	0.039	U	0.039	4690	X	13.4	4.3		0.055	9.7	X	0.095
SW-4	J1R503	10/31/12	0.96	U	0.96	0.10	B	0.040	4690	X	13.9	2.9		0.057	7.9	X	0.098
Duplicate of J1R503	J1R504	10/31/12	0.92	U	0.92	0.092	B	0.039	5130	X	13.3	3.1		0.055	9.3	X	0.094
SW-1	J1R500	10/31/12	0.86	U	0.86	0.066	B	0.036	3970	X	12.3	2.0		0.051	6.6	X	0.087
SW-2	J1R501	10/31/12	0.91	U	0.91	0.058	B	0.038	5880	X	13.1	3.2		0.054	6.9	X	0.093
SW-3	J1R502	10/31/12	0.97	U	0.97	0.066	B	0.041	4760	X	14.0	3.1		0.058	9.0	X	0.099
S_Ramp - 35 ft	J1R7R9	12/26/12	0.93	U	0.93	0.039	U	0.039	4180	X	13.4	2.6	X	0.055	6.7	X	0.095
S_Ramp1	J1R8W6	1/10/13	0.91	UN	0.91	0.12	B	0.038	4390	X	13.2	2.1		0.054	7.8	X	0.093
S_Ramp2	J1R8W7	1/10/13	0.84	U	0.84	0.13	B	0.035	5480	X	12.1	2.8		0.050	9.1	X	0.086
S_Ramp3	J1RD46	1/22/13	0.91	U	0.91	0.10	B	0.038	4140	X	13.1	1.7	M	0.054	6.4	X	0.093
S_Ramp4	J1RDP0	2/4/13	0.92	U	0.92	0.038	U	0.038	5580	X	13.2	2.1		0.054	8.6	X	0.094
Duplicate of J1RDP0	J1RDP1	2/4/13	0.88	U	0.88	0.037	U	0.037	4260	X	12.7	2.5		0.052	8.1	X	0.090
Northern Half	J1R8W9	1/22/13	0.92	U	0.92	0.14	B	0.039	6250		66.2	2.4		0.054	8.3	X	0.094
Southern Half	J1R8X0	1/22/13	0.95	U	0.95	0.14	B	0.040	5630		13.6	3.4		0.056	8.3	X	0.097
ACL Removal	J1RDC3	1/28/13	1.0	U	1.0	0.16	B	0.042	5240	X	14.6	3.4	XM	0.060	9.6	X	0.10
SR-1	J1RDW4	2/4/13	0.91	U	0.91	0.038	U	0.038	5410	X	13.1	3.0		0.054	10.0	X	0.093

Attachment	1	Sheet No.	34 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - BCL/Layback).

Location	HEIS Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SecA - 0 ft	J1R215	9/13/12	10.4		0.20				14400		3.5	4.7		0.25	2900		3.4
SecB - 0 ft	J1R214	9/12/12	16.5		0.20				20300		3.4	7.3		0.24	4040		3.4
SecC - 0 ft	J1R213	9/12/12	17.1		0.21				20100		3.7	7.6		0.26	4510		3.6
SecA - 5 ft	J1R2X6	10/10/12	13.8	M	0.22				17700		3.8	3.0		0.27	3240	XM	3.7
SecB - 5 ft	J1R3H6	10/15/12	16.5		0.23				23200	X	4.0	3.8		0.29	5060	X	3.9
SecC - 5 ft	J1R3H5	10/15/12	16.5		0.22				23800	X	3.8	4.0		0.27	5020	X	3.7
SecA - 10 ft	J1R460	10/17/12	17.9		0.23				25900	X	4.1	5.8		0.29	5960	X	4.0
SecB - 10ft	J1R482	10/22/12	16.8		0.24				25800	X	4.1	4.6		0.29	5540	X	4.0
SecC - 10 ft	J1R4T5	10/23/12	16.3		0.20				23100	X	3.5	3.6		0.25	4430	X	3.4
SecA - 15 ft	J1R4W8	10/29/12	16.6		0.23				26400	X	4.1	5.1		0.29	5390	X	4.0
SecB - 15 ft	J1R4W9	10/29/12	16.6		0.21				25000	X	3.6	5.4		0.26	5610	X	3.5
SecA - 20 ft	J1R5D5	11/6/12	17.6	X	0.23				23700	X	4.0	2.7		0.28	3960	X	3.9
SecB - 20 ft	J1R5D6	11/6/12	15.3	X	0.22				24800	X	3.8	3.0		0.27	4420	X	3.7
SecC - 20 ft	J1R5D7	11/6/12	18.1	X	0.21				25700	X	3.6	5.1		0.26	5460	X	3.5
SecC - 20 ft	J1R5L7	11/12/12	16.6		0.21				19500		3.6	3.0		0.26	4610		3.5
SecA - 20 ft	J1R5L8	11/12/12	15.2		0.20				22400		3.5	2.0		0.25	3570		3.4
SecB - 25 ft	J1R6N7	12/3/12	14.0	X	0.22				25400	X	3.8	2.5		0.27	3660	X	3.7
Duplicate of J1R6N7	J1R6N8	12/3/12	15.2	X	0.22				23100	X	3.8	2.4		0.27	3540	X	3.7
SecC - 25 ft	J1R6N9	12/3/12	12.7	X	0.22				26000	X	3.8	3.4		0.27	4060	X	3.7
SecA - 30 ft	J1R6P0	12/3/12	11.6	X	0.21				24000	X	3.7	2.0		0.26	3150	X	3.6
SecB - 30 ft	J1R6P1	12/3/12	13.1	X	0.20				24600	X	3.5	1.8		0.25	3300	X	3.4
SecC - 30 ft	J1R785	12/13/12	15.3	X	0.22				24100	X	3.8	2.7		0.27	4070	X	3.7
SecA - 35 ft	J1R7R4	12/26/12	18.4	X	0.22				24500	X	3.8	2.7		0.27	4380	X	3.7
SecB - 35 ft	J1R786	12/13/12	16.7	X	0.20				22700	X	3.5	1.9		0.25	3320	X	3.4
SecB - 35 ft	J1R7R5	12/26/12	14.4	X	0.20				19600	X	3.5	2.1		0.25	3870	X	3.4
SecA - 40 ft	J1R7R8	12/26/12	17.5	X	0.22				19100	X	3.8	2.0		0.27	2620	X	3.7
SecB - 40 ft	J1R7R7	12/26/12	13.1	X	0.20				21400	X	3.4	2.0		0.24	3080	X	3.3
SecC - 40 ft	J1R7R6	12/26/12	15.5	X	0.22				21300	X	3.9	2.7		0.28	3080	X	3.8
SecA - 45 ft	J1R8T2	1/7/13	12.9	X	0.19				17900	X	3.4	1.5		0.24	2870	X	3.3
SecB - 45 ft	J1R815	1/2/13	15.2	X	0.21				21200	X	3.7	1.8		0.27	4390	X	3.6
SecC - 45 ft	J1R814	1/2/13	12.8	X	0.19				20400	X	3.4	1.9		0.24	3310	X	3.3
SecB - 50 ft	J1R8P5	1/7/13	15.1	X	0.23				22700	X	4.0	2.0		0.28	4320	X	3.9
SecC - 50 ft	J1R8P4	1/7/13	13.9	X	0.19				19300	X	3.3	1.8		0.24	3150	X	3.2
SecA - 50 ft	J1R8X1	1/10/13	16.8		0.21				24300	X	3.6	2.0		0.26	4630	X	3.5
SecA - 55 ft	J1R8X4	1/10/13	15.7		0.22				25200	X	3.9	1.9		0.28	4150	X	3.8
SecB - 55 ft	J1R8X3	1/10/13	13.1		0.20				23800	X	3.5	1.8		0.25	4090	X	3.5
SecC - 55 ft	J1R8X2	1/10/13	15.5		0.21				22000	X	3.7	2.0		0.26	3680	X	3.6
SecA - 60 ft	J1R9T6	1/16/13	13.7	X	0.20				24100	X	3.6	1.7		0.25	3970	X	3.5
SecB - 60 ft	J1R9T9	1/16/13	12.2	X	0.22				23100	X	3.8	1.7		0.27	3550	X	3.7
SecC - 60 ft	J1R9T7	1/16/13	15.5	X	0.22				23700	X	3.8	1.4		0.27	3800	X	3.7
SecA - 55 ft	J1R9T8	1/16/13	16.4	X	0.22				21600	X	3.9	2.0		0.27	2990	X	3.8
SecA - 65 ft	J1RD48	1/22/13	11.9		0.22				17600	X	3.9	1.6		0.28	2640	X	3.8
SecB - 65 ft	J1RD47	1/22/13	14.2		0.21				21600	X	3.7	1.8		0.26	3310	X	3.6
SecC - 65 ft	J1RD49	1/22/13	10.2		0.22				17200	X	3.9	1.6		0.28	2680	X	3.8
SecB - 70 ft	J1RDP2	2/4/13	11.0		0.22				18000	X	3.8	1.5		0.27	2280	X	3.7
SecA - 75 ft	J1RDP4	2/4/13	12.0		0.21				23200	X	3.7	2.1		0.27	3450	X	3.6
SecB - 75 ft	J1RDP3	2/4/13	13.0		0.21				25200	X	3.6	2.1		0.26	3840	X	3.5
OB-1	J1R4T3	10/23/12				0.359		0.155									
OB-2	J1R4T4	10/23/12				0.155	U	0.155									
SW-4	J1R503	10/31/12	14.1	X	0.21	0.155	U	0.155	22300	X	3.7	2.4		0.27	3340	X	3.6
Duplicate of J1R503	J1R504	10/31/12	13.7	X	0.20	0.155	U	0.155	24100	X	3.6	2.1		0.25	3730	X	3.5
SW-1	J1R500	10/31/12	14.1	X	0.19	0.155	U	0.155	17100	X	3.3	1.5		0.24	2520	X	3.2
SW-2	J1R501	10/31/12	13.0	X	0.20	0.155	U	0.155	18500	X	3.5	1.9		0.25	2590	X	3.4
SW-3	J1R502	10/31/12	13.6	X	0.22	0.155	U	0.155	19700	X	3.8	1.8		0.27	3430	X	3.7
S_Ramp - 35 ft	J1R7R9	12/26/12	12.0	X	0.21				15900	X	3.6	1.9		0.26	3090	X	3.5
S_Ramp1	J1R8W6	1/10/13	14.3		0.20	0.155	U	0.155	21200	X	3.5	1.5		0.25	2790	X	3.5
S_Ramp2	J1R8W7	1/10/13	16.6		0.19	0.155	U	0.155	24400	X	3.3	2.0		0.23	3680	X	3.2
S_Ramp3	J1RD46	1/22/13	14.6	M	0.20				17000	X	3.5	1.9		0.25	2440	X	3.5
S_Ramp4	J1RDP0	2/4/13	13.0		0.20				21900	X	3.6	2.3		0.25	3430	X	3.5
Duplicate of J1RDP0	J1RDP1	2/4/13	11.4		0.20				22400	X	3.4	2.3		0.24	3500	X	3.3
Northern Half	J1R8W9	1/22/13	18.6	X	0.20	0.155	U	0.155	26200		17.8	2.7		0.25	3730	X	3.5
Southern Half	J1R8X0	1/22/13	14.8	X	0.21	0.155	U	0.155	22100		3.7	2.4		0.26	3480	X	3.6
ACL Removal	J1RDC3	1/28/13	16.6	X	0.22				23800	X	3.9	2.0		0.28	3900	X	3.8
SR-1	J1RDW4	2/4/13	13.0		0.20	1.14		0.155	25900	X	3.5	2.4		0.25	4200	X	3.4

Attachment	1	Sheet No.	35 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - BCL/Layback).

Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SecA - 0 ft	J1R215	9/13/12	225		0.091	0.22		0.0055	0.24	U	0.24	8.5		0.11	1230		37.5
SecB - 0 ft	J1R214	9/12/12	315		0.091	0.038		0.0059	0.97	B	0.24	10.5		0.11	1760		37.1
SecC - 0 ft	J1R213	9/12/12	313		0.097	0.032	M	0.0059	0.47	BM	0.25	11.4		0.12	1660		39.7
SecA - 5 ft	J1R2X6	10/10/12	213	M	0.10	0.0056	BM	0.0051	0.26	B	0.26	7.2	XM	0.12	796		41.2
SecB - 5 ft	J1R3H6	10/15/12	326	X	0.11	0.0054	U	0.0054	0.46	B	0.27	11.3	X	0.13	1050		43.3
SecC - 5 ft	J1R3H5	10/15/12	369	X	0.099	0.0048	UN	0.0048	0.45	BM	0.26	11.8	X	0.12	1160		40.7
SecA - 10 ft	J1R460	10/17/12	420	X	0.11	0.0070	B	0.0056	0.34	B	0.28	11.4	X	0.13	1350		43.9
SecB - 10ft	J1R482	10/22/12	338	X	0.11	0.0066	B	0.0034	0.54	B	0.28	11.2	X	0.13	1210		44.5
SecC - 10 ft	J1R4T5	10/23/12	313	X	0.093	0.0036	B	0.0031	0.30	B	0.24	8.8	X	0.11	938		38.1
SecA - 15 ft	J1R4W8	10/29/12	367	X	0.11	0.0066	U	0.0066	0.35	BM	0.28	9.3	X	0.13	1250		44.0
SecB - 15 ft	J1R4W9	10/29/12	357	X	0.095	0.0058	U	0.0058	0.27	B	0.25	9.1	X	0.12	1360		39.1
SecA - 20 ft	J1R5D5	11/6/12	289	X	0.10	0.0060	UN	0.0060	0.68	BM	0.27	6.1		0.13	955		42.8
SecB - 20 ft	J1R5D6	11/6/12	312	X	0.10	0.0055	U	0.0055	0.29	B	0.26	7.1		0.12	859		41.2
SecC - 20 ft	J1R5D7	11/6/12	358	X	0.095	0.0067	B	0.0057	0.30	B	0.25	9.6		0.12	1300		39.1
SecC - 20 ft	J1R5L7	11/12/12	261		0.096	0.0062	U	0.0062	0.27	B	0.25	6.8	X	0.12	783		39.3
SecA - 20 ft	J1R5L8	11/12/12	249		0.093	0.0056	U	0.0056	0.26	B	0.24	5.6	X	0.11	631		38.0
SecB - 25 ft	J1R6N7	12/3/12	278	X	0.10	0.0059	U	0.0059	0.26	U	0.26	6.7	X	0.12	695		41.4
Duplicate of J1R6N7	J1R6N8	12/3/12	250	X	0.10	0.0067	U	0.0067	0.26	U	0.26	6.2	X	0.12	648		40.9
SecC - 25 ft	J1R6N9	12/3/12	307	X	0.10	0.0066	U	0.0066	0.26	U	0.26	7.2	X	0.12	882		41.1
SecA - 30 ft	J1R6P0	12/3/12	256	X	0.096	0.0063	U	0.0063	0.26	B	0.25	5.7	X	0.12	535		39.5
SecB - 30 ft	J1R6P1	12/3/12	259	X	0.091	0.0066	U	0.0066	0.24	U	0.24	5.4	X	0.11	529		37.4
SecC - 30 ft	J1R785	12/13/12	292	X	0.10	0.0058	U	0.0058	0.27	B	0.26	6.5		0.12	716		41.4
SecA - 35 ft	J1R7R4	12/26/12	284	X	0.10	0.0053	U	0.0053	0.29	B	0.26	6.0		0.12	780		40.9
SecB - 35 ft	J1R786	12/13/12	248	X	0.093	0.0064	U	0.0064	0.24	U	0.24	5.5		0.11	566		38.0
SecB - 35 ft	J1R7R5	12/26/12	192	X	0.093	0.0054	U	0.0054	0.24	U	0.24	5.2		0.11	659		38.1
SecA - 40 ft	J1R7R8	12/26/12	270	X	0.099	0.0065	U	0.0065	0.26	U	0.26	5.9		0.12	627		40.7
SecB - 40 ft	J1R7R7	12/26/12	250	X	0.090	0.0062	U	0.0062	0.24	U	0.24	5.0		0.11	630		37.1
SecC - 40 ft	J1R7R6	12/26/12	249	X	0.10	0.0058	U	0.0058	0.27	U	0.27	4.8		0.13	832		42.3
SecA - 45 ft	J1R8T2	1/7/13	201	X	0.089	0.0063	U	0.0063	0.26	BN	0.23	4.2		0.11	471		36.3
SecB - 45 ft	J1R815	1/2/13	257	X	0.098	0.0062	U	0.0062	0.26	U	0.26	5.9		0.12	572		40.4
SecC - 45 ft	J1R814	1/2/13	230	X	0.089	0.0050	U	0.0050	0.23	U	0.23	5.1		0.11	509		36.3
SecB - 50 ft	J1R8P5	1/7/13	255	X	0.11	0.0049	U	0.0049	0.27	U	0.27	5.2		0.13	604		43.2
SecC - 50 ft	J1R8P4	1/7/13	225	X	0.088	0.0054	U	0.0054	0.27	B	0.23	4.9		0.11	525		35.9
SecA - 50 ft	J1R8X1	1/10/13	231	X	0.095	0.0058	U	0.0058	0.25	U	0.25	5.5		0.12	602		38.9
SecA - 55 ft	J1R8X4	1/10/13	297	X	0.10	0.0061	U	0.0061	0.27	U	0.27	6.5		0.13	592		42.4
SecB - 55 ft	J1R8X3	1/10/13	299	X	0.093	0.0049	U	0.0049	0.24	U	0.24	5.8		0.11	494		38.3
SecC - 55 ft	J1R8X2	1/10/13	241	X	0.097	0.0054	U	0.0054	0.25	U	0.25	5.1		0.12	571		39.7
SecA - 60 ft	J1R9T6	1/16/13	282	X	0.094	0.0064	U	0.0064	0.25	B	0.24	5.1		0.12	472		38.4
SecB - 60 ft	J1R9T9	1/16/13	280	X	0.10	0.0052	U	0.0052	0.26	U	0.26	5.2		0.12	491		41.2
SecC - 60 ft	J1R9T7	1/16/13	296	X	0.10	0.0058	U	0.0058	0.26	U	0.26	4.9		0.12	465		41.0
SecA - 55 ft	J1R9T8	1/16/13	249	X	0.10	0.0054	U	0.0054	0.26	U	0.26	5.0		0.13	581		41.7
SecA - 65 ft	J1RD48	1/22/13	198	X	0.10	0.0059	U	0.0059	0.27	U	0.27	3.8	B	0.13	424		42.5
SecB - 65 ft	J1RD47	1/22/13	235	X	0.097	0.0055	U	0.0055	0.25	U	0.25	5.7		0.12	436		39.8
SecC - 65 ft	J1RD49	1/22/13	180	X	0.10	0.0052	U	0.0052	0.27	U	0.27	4.0	B	0.13	546		42.1
SecB - 70 ft	J1RDP2	2/4/13	210	X	0.10	0.0063	U	0.0063	0.26	U	0.26	3.6	B	0.12	349		41.5
SecA - 75 ft	J1RDP4	2/4/13	248	X	0.099	0.0064	U	0.0064	0.26	U	0.26	4.6		0.12	391		40.4
SecB - 75 ft	J1RDP3	2/4/13	278	X	0.095	0.0051	U	0.0051	0.78	B	0.25	6.0		0.12	447		39.0
SW-4	J1R503	10/31/12	246	X	0.098	0.0070	U	0.0070	0.26	U	0.26	6.6		0.12	790		40.4
Duplicate of J1R503	J1R504	10/31/12	279	X	0.094	0.0069	U	0.0069	0.24	U	0.24	6.9		0.12	666		38.6
SW-1	J1R500	10/31/12	201	XN	0.087	0.0049	U	0.0049	0.23	B	0.23	4.1	M	0.11	430		35.9
SW-2	J1R501	10/31/12	184	X	0.093	0.0067	U	0.0067	0.24	U	0.24	5.2		0.11	481		38.0
SW-3	J1R502	10/31/12	233	X	0.099	0.0060	U	0.0060	0.26	U	0.26	6.8		0.12	504		40.7
S_Ramp - 35 ft	J1R7R9	12/26/12	198	X	0.095	0.0057	U	0.0057	0.25	U	0.25	5.9		0.12	565		39.0
S_Ramp1	J1R8W6	1/10/13	218	X	0.093	0.0051	U	0.0051	0.24	U	0.24	4.3		0.11	504		38.3
S_Ramp2	J1R8W7	1/10/13	256	X	0.086	0.0058	U	0.0058	0.25	B	0.22	6.0		0.11	557		35.3
S_Ramp3	J1RD46	1/22/13	192	XN	0.093	0.0060	U	0.0060	0.24	U	0.24	4.6		0.11	523		38.2
S_Ramp4	J1RDP0	2/4/13	239	X	0.094	0.0057	U	0.0057	0.38	B	0.24	5.1		0.12	541		38.5
Duplicate of J1RDP0	J1RDP1	2/4/13	268	X	0.090	0.0057	U	0.0057	0.26	B	0.23	4.3		0.11	497		36.8
Northern Half	J1R8W9	1/22/13	263	X	0.094	0.0056	U	0.0056	0.24	U	0.24	5.5		0.12	681	B	193
Southern Half	J1R8X0	1/22/13	271	X	0.097	0.0058	U	0.0058	0.25	U	0.25	4.7		0.12	595		39.6
ACL Removal	J1RDC3	1/28/13	271	X	0.10	0.0057	U	0.0057	0.40	B	0.27	6.2		0.13	609		42.4
SR-1	J1RDW4	2/4/13	297	X	0.093	0.0063	U	0.0063	0.24	B	0.24	5.7	X	0.11	610		38.1

Attachment	1	Sheet No.	36 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - BCL/Layback).

Location	HEIS Number	Sample Date	Selenium			Silicon			Silver			Sodium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SecA - 0 ft	J1R215	9/13/12	0.79	U	0.79	331	X	5.2	0.15	U	0.15	194		53.9	37.6		0.086
SecB - 0 ft	J1R214	9/12/12	0.78	U	0.78	419	X	5.1	0.14	U	0.14	293		53.4	50.1		0.085
SecC - 0 ft	J1R213	9/12/12	0.83	U	0.83	390	X	5.5	0.15	U	0.15	336		57.1	49.5		0.091
SecA - 5 ft	J1R2X6	10/10/12	0.86	U	0.86	473	N	5.7	0.16	U	0.16	205		59.3	45.2	M	0.094
SecB - 5 ft	J1R3H6	10/15/12	0.91	U	0.91	310	N	6.0	0.17	U	0.17	309		62.3	60.2		0.099
SecC - 5 ft	J1R3H5	10/15/12	0.85	UN	0.85	271	N	5.6	0.16	U	0.16	268		58.5	60.1		0.093
SecA - 10 ft	J1R460	10/17/12	1.2		0.92	230	N	6.1	0.17	U	0.17	464		63.1	57.4		0.10
SecB - 10ft	J1R482	10/22/12	0.93	U	0.93	387	X	6.1	0.17	U	0.17	418		64.0	67.3		0.10
SecC - 10 ft	J1R4T5	10/23/12	1.2		0.80	197		5.3	0.15	U	0.15	320		54.8	62.9	X	0.087
SecA - 15 ft	J1R4W8	10/29/12	0.92	U	0.92	187	N	6.1	0.17	U	0.17	426		63.3	55.4		0.10
SecB - 15 ft	J1R4W9	10/29/12	0.82	U	0.82	202	N	5.4	0.15	U	0.15	461		56.3	48.0		0.090
SecA - 20 ft	J1R5D5	11/6/12	0.90	U	0.90	167		5.9	0.17	UN	0.17	429		61.6	56.7	X	0.098
SecB - 20 ft	J1R5D6	11/6/12	0.87	U	0.87	204		5.7	0.16	U	0.16	404		59.4	54.3	X	0.095
SecC - 20 ft	J1R5D7	11/6/12	0.82	U	0.82	236		5.4	0.15	U	0.15	477		56.2	53.7	X	0.090
SecC - 20 ft	J1R5L7	11/12/12	0.83	U	0.83	214		5.4	0.15	U	0.15	349		56.6	51.8		0.090
SecA - 20 ft	J1R5L8	11/12/12	0.80	U	0.80	171		5.2	0.15	U	0.15	285		54.6	61.6		0.087
SecB - 25 ft	J1R6N7	12/3/12	0.87	U	0.87	152		5.7	0.16	U	0.16	301	B	298	62.3	X	0.095
Duplicate of J1R6N7	J1R6N8	12/3/12	0.86	U	0.86	131		5.6	0.16	U	0.16	392		58.8	53.9	X	0.094
SecC - 25 ft	J1R6N9	12/3/12	0.86	U	0.86	139		5.7	0.16	U	0.16	346		59.2	61.9	X	0.094
SecA - 30 ft	J1R6P0	12/3/12	0.83	U	0.83	126		5.5	0.15	U	0.15	284	U	284	56.8	X	0.091
SecB - 30 ft	J1R6P1	12/3/12	0.79	U	0.79	121		5.2	0.15	U	0.15	269	U	269	50.6	X	0.086
SecC - 30 ft	J1R785	12/13/12	0.87	U	0.87	133		5.7	0.16	U	0.16	302		59.6	62.5	X	0.095
SecA - 35 ft	J1R7R4	12/26/12	0.86	U	0.86	138	N	5.6	0.16	U	0.16	483	M	58.9	58.4	X	0.094
SecB - 35 ft	J1R786	12/13/12	0.80	U	0.80	104		5.2	0.15	U	0.15	370		54.7	66.0	X	0.087
SecB - 35 ft	J1R7R5	12/26/12	0.80	U	0.80	115		5.3	0.15	U	0.15	442		54.8	40.2	X	0.087
SecA - 40 ft	J1R7R8	12/26/12	0.85	U	0.85	113		5.6	0.16	U	0.16	310		58.5	46.9	X	0.093
SecB - 40 ft	J1R7R7	12/26/12	0.78	U	0.78	95.9		5.1	0.14	U	0.14	284		53.4	46.0	X	0.085
SecC - 40 ft	J1R7R6	12/26/12	0.89	U	0.89	125		5.8	0.17	U	0.17	354		60.9	53.8	X	0.097
SecA - 45 ft	J1R8T2	1/7/13	0.76	UN	0.76	130	N	5.0	0.14	UN	0.14	272		52.3	45.4	X	0.083
SecB - 45 ft	J1R815	1/2/13	0.85	U	0.85	94.7	N	5.6	0.16	U	0.16	364		58.1	43.1	X	0.093
SecC - 45 ft	J1R814	1/2/13	0.76	U	0.76	90.4	N	5.0	0.14	U	0.14	276		52.2	47.1	X	0.083
SecB - 50 ft	J1R8P5	1/7/13	0.91	U	0.91	133		6.0	0.17	U	0.17	339		62.2	54.9	X	0.099
SecC - 50 ft	J1R8P4	1/7/13	0.75	U	0.75	135		5.0	0.14	U	0.14	300		51.7	49.9	X	0.082
SecA - 50 ft	J1R8X1	1/10/13	0.82	U	0.82	155	N	5.4	0.15	U	0.15	377		56.0	60.6	X	0.089
SecA - 55 ft	J1R8X4	1/10/13	0.89	U	0.89	197	N	5.9	0.17	U	0.17	337		61.0	62.0	X	0.097
SecB - 55 ft	J1R8X3	1/10/13	0.80	U	0.80	161	N	5.3	0.15	U	0.15	255		55.1	55.0	X	0.088
SecC - 55 ft	J1R8X2	1/10/13	0.83	U	0.83	204	N	5.5	0.16	U	0.16	337		57.2	53.5	X	0.091
SecA - 60 ft	J1R9T6	1/16/13	0.80	U	0.80	128	N	5.3	0.15	UN	0.15	299		55.2	62.6	X	0.088
SecB - 60 ft	J1R9T9	1/16/13	0.86	U	0.86	118		5.7	0.16	U	0.16	230		59.3	62.1	X	0.094
SecC - 60 ft	J1R9T7	1/16/13	0.86	U	0.86	113		5.7	0.16	U	0.16	278		59.0	53.1	X	0.094
SecA - 55 ft	J1R9T8	1/16/13	0.88	U	0.88	162		5.8	0.16	U	0.16	309		60.1	57.0	X	0.096
SecA - 65 ft	J1RD48	1/22/13	0.89	U	0.89	133		5.9	0.17	U	0.17	238		61.1	46.8	X	0.097
SecB - 65 ft	J1RD47	1/22/13	0.83	U	0.83	107		5.5	0.16	U	0.16	373		57.3	49.1	X	0.091
SecC - 65 ft	J1RD49	1/22/13	0.88	U	0.88	103		5.8	0.16	U	0.16	225		60.5	37.5	X	0.096
SecB - 70 ft	J1RDP2	2/4/13	0.87	U	0.87	96.2	N	5.7	0.16	U	0.16	245		59.7	45.8	X	0.095
SecA - 75 ft	J1RDP4	2/4/13	0.85	U	0.85	98.8	N	5.6	0.16	U	0.16	201		58.2	53.8	X	0.093
SecB - 75 ft	J1RDP3	2/4/13	0.82	U	0.82	87.1	N	5.4	0.15	U	0.15	257		56.1	53.5	X	0.089
SW-4	J1R503	10/31/12	0.85	U	0.85	164		5.6	0.16	U	0.16	366		58.1	48.8	X	0.093
Duplicate of J1R503	J1R504	10/31/12	0.81	U	0.81	168		5.3	0.15	U	0.15	354		55.5	51.4	X	0.088
SW-1	J1R500	10/31/12	0.75	U	0.75	118		5.0	0.14	UN	0.14	315		51.6	45.2	X	0.082
SW-2	J1R501	10/31/12	0.80	U	0.80	122		5.2	0.15	U	0.15	485		54.6	43.7	X	0.087
SW-3	J1R502	10/31/12	0.85	U	0.85	177		5.6	0.16	U	0.16	441		58.5	42.8	X	0.093
S_Ramp - 35 ft	J1R7R9	12/26/12	0.82	U	0.82	123		5.4	0.15	U	0.15	284		56.1	38.0	X	0.089
S_Ramp1	J1R8W6	1/10/13	0.80	U	0.80	133	N	5.3	0.15	UN	0.15	285		55.1	54.7	X	0.088
S_Ramp2	J1R8W7	1/10/13	0.74	U	0.74	132	N	4.9	0.14	U	0.14	329		50.8	58.3	X	0.081
S_Ramp3	J1RD46	1/22/13	0.80	U	0.80	104		5.3	0.15	U	0.15	243		55.0	41.9	X	0.088
S_Ramp4	J1RDP0	2/4/13	0.81	U	0.81	141	N	5.3	0.15	U	0.15	310		55.3	51.2	X	0.088
Duplicate of J1RDP0	J1RDP1	2/4/13	0.77	U	0.77	118	N	5.1	0.14	U	0.14	207		53.0	49.8	X	0.084
Northern Half	J1R8W9	1/22/13	0.81	U	0.81	119		26.6	0.15	UN	0.15	353	B	277	47.2	X	0.088
Southern Half	J1R8X0	1/22/13	0.83	U	0.83	153		5.5	0.15	U	0.15	340		57.0	58.9	X	0.091
ACL Removal	J1RDC3	1/28/13	0.89	U	0.89	137		5.9	0.17	U	0.17	336	M	61.1	65.3	XM	0.097
SR-1	J1RDW4	2/4/13	0.80	U	0.80	123		5.3	0.15	U	0.15	270		54.8	65.0	X	0.087

Attachment	1	Sheet No.	37 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Attachment 1. 100-C-7:1 Subsite Verification Sample Results (Metals - BCL/Layback).

Location	HEIS Number	Sample Date	Zinc			Percent moisture (wet sample)		
			mg/kg	Q	PQL	%	Q	PQL
SecA - 0 ft	J1R215	9/13/12	34.7		0.36	0.55		0.1
SecB - 0 ft	J1R214	9/12/12	48.4		0.36	0.51		0.1
SecC - 0 ft	J1R213	9/12/12	50.9		0.39	0.72		0.1
SecA - 5 ft	J1R2X6	10/10/12	30.7	X	0.40	8.7		0.1
SecB - 5 ft	J1R3H6	10/15/12	45.4	X	0.42	5.3		0.1
SecC - 5 ft	J1R3H5	10/15/12	46.7	X	0.39	4.9		0.1
SecA - 10 ft	J1R460	10/17/12	48.6	X	0.43	11		0.1
SecB - 10ft	J1R482	10/22/12	45.7	X	0.43	8.8		0.1
SecC - 10 ft	J1R4T5	10/23/12	40.8	X	0.37	5.5		0.1
SecA - 15 ft	J1R4W8	10/29/12	50.7	X	0.43	10.3		0.1
SecB - 15 ft	J1R4W9	10/29/12	47.9	X	0.38	7.3		0.1
SecA - 20 ft	J1R5D5	11/6/12	43.5	X	0.42	6.1		0.1
SecB - 20 ft	J1R5D6	11/6/12	41.9	X	0.40	5.3		0.1
SecC - 20 ft	J1R5D7	11/6/12	46.1	X	0.38	8.7		0.1
SecC - 20 ft	J1R5L7	11/12/12	36.4	X	0.38	6.1		0.1
SecA - 20 ft	J1R5L8	11/12/12	36.3	X	0.37	4.4		0.1
SecB - 25 ft	J1R6N7	12/3/12	41.2	X	0.40	4.7		0.1
Duplicate of J1R6N7	J1R6N8	12/3/12	34.9	X	0.40	4.5		0.1
SecC - 25 ft	J1R6N9	12/3/12	39.9	X	0.40	5.1		0.1
SecA - 30 ft	J1R6P0	12/3/12	35.6	X	0.38	4.0		0.1
SecB - 30 ft	J1R6P1	12/3/12	33.9	X	0.36	4.8		0.1
SecC - 30 ft	J1R785	12/13/12	46.1	X	0.40	3.9		0.1
SecA - 35 ft	J1R7R4	12/26/12	43.1	X	0.40	5.4		0.1
SecB - 35 ft	J1R786	12/13/12	41.1	X	0.37	4.5		0.1
SecB - 35 ft	J1R7R5	12/26/12	34.4	X	0.37	4.8		0.1
SecA - 40 ft	J1R7R8	12/26/12	33.6	X	0.39	4.9		0.1
SecB - 40 ft	J1R7R7	12/26/12	36.9	X	0.36	5.6		0.1
SecC - 40 ft	J1R7R6	12/26/12	38.8	X	0.41	5.1		0.1
SecA - 45 ft	J1R8T2	1/7/13	29.8	X	0.35	4.3		0.1
SecB - 45 ft	J1R815	1/2/13	36.5	X	0.39	5.0		0.1
SecC - 45 ft	J1R814	1/2/13	33.9	X	0.35	5.1		0.1
SecB - 50 ft	J1R8P5	1/7/13	38.8	X	0.42	5.2		0.1
SecC - 50 ft	J1R8P4	1/7/13	33.4	X	0.35	4.9		0.1
SecA - 50 ft	J1R8X1	1/10/13	40.0	X	0.38	6.0		0.1
SecA - 55 ft	J1R8X4	1/10/13	39.6	X	0.41	4.3		0.1
SecB - 55 ft	J1R8X3	1/10/13	38.5	X	0.37	4.4		0.1
SecC - 55 ft	J1R8X2	1/10/13	35.9	X	0.39	6.2		0.1
SecA - 60 ft	J1R9T6	1/16/13	41.3	X	0.37	5.4		0.1
SecB - 60 ft	J1R9T9	1/16/13	37.6	X	0.40	4.4		0.1
SecC - 60 ft	J1R9T7	1/16/13	37.0	X	0.40	3.8		0.1
SecA - 55 ft	J1R9T8	1/16/13	40.6	X	0.41	5.5		0.1
SecA - 65 ft	J1RD48	1/22/13	31.5	X	0.41	4.4		0.1
SecB - 65 ft	J1RD47	1/22/13	33.7	X	0.39	3.7		0.1
SecC - 65 ft	J1RD49	1/22/13	28.5	X	0.41	3.5		0.1
SecB - 70 ft	J1RDP2	2/4/13	30.6	X	0.40	3.0		0.1
SecA - 75 ft	J1RDP4	2/4/13	40.0	X	0.39	3.4		0.1
SecB - 75 ft	J1RDP3	2/4/13	37.8	X	0.38	3.5		0.1
SW-4	J1R503	10/31/12	35.7	X	0.39	5.1		0.1
Duplicate of J1R503	J1R504	10/31/12	38.0	X	0.37	5.1		0.1
SW-1	J1R500	10/31/12	27.5	X	0.35	4.8		0.1
SW-2	J1R501	10/31/12	30.1	X	0.37	4.4		0.1
SW-3	J1R502	10/31/12	32.9	X	0.39	4.0		0.1
S_Ramp - 35 ft	J1R7R9	12/26/12	31.9	X	0.38	6.1		0.1
S_Ramp1	J1R8W6	1/10/13	33.0	X	0.37	3.5		0.1
S_Ramp2	J1R8W7	1/10/13	40.6	X	0.34	3.3		0.1
S_Ramp3	J1RD46	1/22/13	29.6	X	0.37	4.3		0.1
S_Ramp4	J1RDP0	2/4/13	38.2	X	0.37	4.8		0.1
Duplicate of J1RDP0	J1RDP1	2/4/13	35.7	X	0.36	5.7		0.1
Northern Half	J1R8W9	1/22/13	35.2	X	0.37	4.9		0.1
Southern Half	J1R8X0	1/22/13	38.6	X	0.38	5.0		0.1
ACL Removal	J1RDC3	1/28/13	43.8	NX	0.41	3.4		0.1
SR-1	J1RDW4	2/4/13	44.6	X	0.37	3.9		0.1

Attachment	1	Sheet No.	38 of 38
Originator	J. D. Skoglie	Date	4/8/13
Checked	N. K. Schiffern	Date	4/8/13
Calc. No.	0100C-CA-V0044	Rev. No.	0

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 100-B/C Field Remediation **Job No. 14655**

Area: 100-B/C

Discipline: Environmental *Calculation No: 0100C-CA-V0045

Subject: 100-C-7:1 Subsite Direct Contact Hazard Quotient and Carcinogenic Risk Calculations

Computer Program: Excel Program No: Excel 2003

The attached calculations have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 3 Total = 4	J. D. Skoglie	N. K. Schiffern	I. B. Berezovskiy	D. F. Obenauer	10/1/13

SUMMARY OF REVISION

WCH-DE-018 (05/08/2007) *Obtain Calc. No. from Document Control and Form from Intranet

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	03/11/13	Calc. No.:	0100C-CA-V0045	Rev.:	0
Project:	100-B/C Area Field Remediation	Job No:	14655	Checked:	N. K. Schiffern	Date:	03/11/13
Subject:	100-C-7:1 Subsite Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	1 of 3

PURPOSE:

Provide documentation to support the calculation of the direct contact hazard quotient (HQ) and excess carcinogenic risk for the 100-C-7:1 subsite statistical and focused samples. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2009b), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens
4) A cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.

GIVEN/REFERENCES:

1) DOE-RL, 2009a, *100 Area Remedial Action Sampling and Analysis Plan*, DOE/RL-96-22, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

2) DOE-RL, 2009b, *Remedial Design Report/Remedial Action Work Plan for the 100 Areas*, DOE/RL-96-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

3) WAC 173-340, "Model Toxics Control Act – Cleanup," *Washington Administrative Code*, 1996.

4) WCH, 2013, *100-C-7:1 Subsite Cleanup Verification 95% UCL Calculation, 0100C-CA-V0044*, Washington Closure Hanford, Inc., Richland, Washington.

SOLUTION:

1) Generate an HQ for each noncarcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the individual HQ of <1.0 (DOE-RL 2009b).

2) Sum the HQs and compare this value to the cumulative HQ of <1.0.

3) Generate an excess cancer risk value for each carcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the excess cancer risk of $<1 \times 10^{-6}$ (DOE-RL 2009b).

4) Sum the excess cancer risk value(s) and compare it to the cumulative cancer risk of $<1 \times 10^{-5}$.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	04/25/13	Calc. No.:	0100C-CA-V0045	Rev.:	0
Project:	100-B/C Area Field Remediation	Job No:	14655	Checked:	N. K. Schiffern	Date:	04/25/13
Subject:	100-C-7:1 Subsite Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	2 of 3

METHODOLOGY:

The 100-C-7:1 subsite is comprised of thirteen decision units for verification sampling including; the upper sidewall, lower sidewall, west sidewall, staging pile area 1, staging pile area 2, staging pile area 3, staging pile area 4, 001, 023, 024A, 030, west sidewall overburden, and the composite 1 area. The direct contact hazard quotient and carcinogenic risk calculations for the 100-C-7:1 subsite were conservatively calculated using the greater of the statistical or maximum value for each analyte in all decision units from WCH (2013). Of the contaminants of potential concern (COPCs) for this site barium, copper, manganese, mercury, selenium, and vanadium require HQ and risk calculations because they were detected above a Washington State or Hanford Site background. Boron, hexavalent chromium, and molybdenum require HQ and risk calculations because these analytes were detected and a Washington State or Hanford Site background value is not available. Lead was detected above background; however, lead does not have a reference dose for calculation of a hazard quotient because toxic effects of lead are correlated with blood-lead levels rather than exposure levels or daily intake. Additionally, arsenic was detected above background; however, the arsenic standard is not toxicity based. All other site nonradionuclide COPCs were not detected or were quantified below background levels. The entire data set was evaluated against the residential HQ and risk standard. An example of the HQ and risk calculations is presented below:

1) For example, the maximum value for boron is 9.43 mg/kg, divided by the noncarcinogenic RAG value of 7,200 mg/kg (calculated in accordance with the noncarcinogenic toxics effects formula in WAC 173-340-740[3]), is 1.3×10^{-3}. Comparing this value, and all other individual values, to the requirement of <1.0, this criterion is met.

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ can be obtained by summing the individual values. To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation. The sum of the HQ values is 4.5×10^{-1}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, and then multiplied by 1.0×10^{-6}. For example, the maximum value for hexavalent chromium is 1.14 mg/kg, divided by 2.1 mg/kg, and multiplied as indicated, is 5.4×10^{-7}. Since the 100-C-7:1 subsite has only one constituent detected for the carcinogen risk, the requirement of $<1 \times 10^{-6}$, this criterion is met.

4) After these calculations are completed for the carcinogenic analytes, the cumulative excess cancer risk can be obtained by summing the individual values. To avoid errors due to intermediate rounding, the individual cancer risk values prior to rounding are used for this calculation. Since the 100-C-7:1 subsite has only one constituent detected for the carcinogen risk, the sum of the excess cancer risk values is equal to the excess cancer risk of hexavalent chromium in 3), or 5.4×10^{-7}. Comparing these values to the requirement of $<1 \times 10^{-5}$, this criterion is met.

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	03/11/13	Calc. No.:	0100C-CA-V0045	Rev.:	0
Project:	100-B/C Area Field Remediation	Job No:	14655	Checked:	N. K. Schiffern	Date:	03/11/13
Subject:	100-C-7:1 Subsite Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	3 of 3

4) List the cumulative excess cancer risk for carcinogens >1 x 10^{-5}: None

Table 1 shows the results of the calculations.

Table 1. Residential Direct Contact Hazard Quotient and Excess Cancer Risk Results for the 100-C-7:1 Subsite.

Contaminants of Potential Concern	Statistical or Maximum Value [a] (mg/kg)	Noncarcinogen RAG [b] (mg/kg)	Hazard Quotient	Carcinogen RAG [b] (mg/kg)	Carcinogen Risk
Metals					
Arsenic [c]	7.34	20	--	--	--
Barium	152	5,600	2.7E-02	--	--
Boron	9.43	7,200	1.3E-03	--	--
Chromium, hexavalent [d]	1.14	240	4.8E-03	2.1	5.4E-07
Copper	32.8	2,960	1.1E-02	--	--
Lead [e]	15.6	353	--	--	--
Manganese	514	3,760	1.4E-01	--	--
Mercury	1.72	24	7.2E-02	--	--
Molybdenum	1.11	400	2.8E-03	--	--
Selenium	1.20	400	3.0E-03	--	--
Vanadium	107	560	1.9E-01	--	--
Totals					
Cumulative Hazard Quotient:			**4.5E-01**		
Cumulative Excess Cancer Risk:					**5.4E-07**

Notes:

[a] = From WCH (2013).

[b] = Value obtained from the RDR/RAWP (DOE-RL 2009b) or *Washington Administrative Code* (WAC) 173-340-740(3), Method B, 1996, unless otherwise noted.

[c] = The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement Project Managers as discussed in Section 2.1.2.1 of the RDR/RAWP (DOE-RL 2009b).

[d] = Value for the carcinogen RAG calculated based on the inhalation exposure pathway (WAC) 173-340-750(3), 1996.

[e] = Value for the noncarcinogenic RAG calculated using Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children, EPA/540/R 93/081, Publication No. 9285.7, U.S. Environmental Protection Agency, Washington, D.C.

-- = not applicable

RAG = remedial action goal

CONCLUSION:

The calculations in Table 1 demonstrate that the 100-C-7:1 subsite meets the requirements for the direct contact hazard quotients and carcinogenic (excess cancer) risk, respectively, as identified in the RDR/RAWP (DOE-RL 2009b) and SAP (DOE-RL 2009a). The direct contact hazard quotients and carcinogenic (excess cancer) risk calculations are for use in the RSVP for this site.

APPENDIX C

DATA QUALITY ASSESSMENT

APPENDIX C

DATA QUALITY ASSESSMENT

VERIFICATION SAMPLING

A data quality assessment (DQA) was performed to compare the verification sampling approach and resulting analytical data with the sampling and data requirements specified in the site-specific sample designs (EPA 2010; WCH 2011a, 2012f, 2012g, 2012h, 2012i). This DQA was performed in accordance with site specific data quality objectives found in the *100 Area Remedial Action Sampling and Analysis Plan* (SAP) (DOE-RL 2009).

A review of the sample designs (EPA 2010; WCH 2011a, 2012f, 2012g, 2012h, 2012i), the field logbooks (WCH 2010, 2011b, 2011c, 2011d, 2012a, 2012b, 2012c, 2012d, 2012e, 2013), and applicable analytical data packages has been performed as part of this DQA. All samples were collected and analyzed per the sample design. To ensure quality data, the SAP data assurance requirements and the data validation procedures for chemical analysis (BHI 2000) 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., closeout decisions). The DQA completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data quality objectives process (EPA 2006).

Verification sample data collected at the 100-C-7:1 subsite included results for overburden stockpiles 100-C-001, 100-C-023, 100-C-024A, and 100-C-030. The stockpile 100-C-001 results were provided by the laboratories in 21 sample delivery groups (SDGs): SDG K2368, SDG K3205, SDG K3240, SDG K3274, SDG K3336, SDG K3344, SDG K3489, SDG K3491, SDG K3577, SDG K3584, SDG K3604, SDG K3643, SDG K3708, SDG K3715, SDG K3727, SDG K3738, SDG K3749, SDG K3764, SDG K3772, SDG K3800, and SDG K3815. The stockpile 100-C-023 results were provided by the laboratories in two SDGs: SDG K3363 and SDG K 3364. The stockpile 100-C-024A results were provided by the laboratories in SDG JP0435. The stockpile 100-C-030 results were provided by the laboratories in four SDGs: SDG K3452, SDG K3459, SDG K3474, and SDG K3496.

The statistical results for the excavation upper sidewall were provided by the laboratories in SDGK3732 and SDG K3737 and for the lower sidewall were provided by the laboratories in SDG K3880. The statistical results for the west sidewall excavation were provided by the laboratories in three SDGs: SDG K4041, SDG K4047, and SDG KP0190.

The statistical staging pile area (SPA1 and SPA2) results were provided by the laboratories in three SDGs: SDG K3949, SDG K3950, and SDG MA05300. The statistical staging pile area (SPA3 and SPA4) results were provided by the laboratories in five SDGs: SDG J01693, SDG J01699, SDG J01761, SDG J01770, and SDG MA06177.

The composite verification sampling results for the overburden material of the west sidewall were provided by the laboratories in 22 SDGs: SDG J01608, SDG JP0413, SDG JP0415, SDG JP0416, SDG JP0417, SDG JP0419, SDG JP0420, SDG JP0421, SDG JP0422, SDG JP0423, SDG JP0424, SDG JP0426, SDG JP0432, SDG JP0434, SDG JP0436, SDG JP0438, SDG JP0442, SDG JP0443, SDG JP0444, SDG JP0447, SDG JP0450, and SDG J01696.

SDG K3577, SDG K3732, SDG K3737, SDG K3764, and SDG K3880 were submitted for third-party validation. Minor deficiencies are discussed for the 100-C-7:1 data set, as follows below. If no comments are made about a specific analysis, it should be assumed that no deficiencies affecting the quality of the data were found.

SDG J01608

This SDG comprises two composited, focused soil samples (J1R4T3, J1R4T4) collected from the 100-C-7:1 overburden material. Both samples were analyzed only for hexavalent chromium. Minor deficiencies are as follows.

In the hexavalent chromium analysis, the matrix spike (MS) recovery for hexavalent chromium (54%) was below the project quality control (QC) limits. A post-digestive matrix spike recovery (89%) and insoluble matrix spike recovery (90%) were within the QC limits. Acceptable laboratory control sample (LCS) recovery confirms the analytical system was operating within acceptable parameters. Hexavalent chromium is a reactive species. It is possible that the sample matrix was slightly reductive and reacted with the spiked hexavalent chromium. Although not qualified for MS recovery outside of QC limits, all hexavalent chromium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG J01693

This SDG comprises 13 soil samples (J1RDR8 through J1RDR9, J1RDT0 through J1RDT9, and J1RDV0) from the Staging Pile Area 4 (SPA4). These samples were analyzed for inductively coupled plasma (ICP) metals, mercury, and hexavalent chromium. This SDG includes a field duplicate pair (J1RDT9/J1RDV0). In addition, one equipment blank (J1RDV1) was collected and analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, copper (0.610 mg/kg) was detected in the method blank (MB) at very low levels. Copper was detected in all field samples at 9.8 mg/kg or higher. Although not qualified for the detection in the MB, all copper results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (11%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [1,236%], antimony [59%], iron [2,050%], manganese [168%], and silicon [21%]). For aluminum and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, manganese, and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the relative percent difference (RPD) calculation for cadmium (41%) from the laboratory duplicate analysis was above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all cadmium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG J01696

This SDG comprises five composite, focused soil samples (J1RDP0 through J1RDR4) from the 100-C-7:1 west sidewall expansion overburden material, Sections A, B, and south ramp at 21 to 23 m (70 to 75 ft) below ground surface (bgs). All samples were analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, iron and zinc were detected in the MB. Iron and zinc were detected at very low levels, less than 1/25th of the most stringent cleanup limit. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (4%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [634%], antimony [59%], iron [-946%], manganese [164%], and silicon [24%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculation for chromium (40%) from the laboratory duplicate analyses were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all chromium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG J01699

This SDG comprises seven statistical soil samples (J1RDP5 through J1RDP7, J1RDR1, J1RDR4, J1RDR6, J1RDR7) from the 100-C-7:1 staging pile area (SPA3). All samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows.

In the ICP metals analysis, chromium and zinc were detected in the MB. Chromium and zinc were detected at very low levels, less than 1/25th of the most stringent cleanup limit. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (19%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [1,019%], antimony [55%], iron [1,556%], manganese [141%], and silicon [24%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG J01761

This SDG comprises six statistical soil samples (J1RDR0, J1RDR2, J1RDR3, J1RDR5, J1RDP8, and J1RDP9) from the 100-C-7:1 staging pile area (SPA3). All samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows.

In the ICP metals analysis, barium and zinc were detected in the MB. Barium and zinc were detected at very low levels, less than 1/25th of the most stringent cleanup limit. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (8%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for six analytes (aluminum [1,450%], antimony [38%], calcium [137%], iron [4,782%], manganese [219%], and silicon [26%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, calcium, and silicon did not have mismatched spike and native concentrations in the original MS.

Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG J01770

This SDG comprises one statistical soil sample (J1RJT2) from the 100-C-7:1 staging pile area (SPA3), a resample for sample location SPA3-4. This sample was analyzed for hexavalent chromium only. No major or minor deficiencies were noted.

SDG JP0413

This SDG comprises three composited focused soil samples (J1R213, J1R214, and J1R215) from the west sidewall expansion, overburden material at grade surface. All samples were analyzed for ICP metals, mercury. Minor deficiencies are as follows.

In the ICP metals analysis, the LCS recovery for silicon (13%) is outside of the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon data may be considered estimate. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [1,490%], antimony [49%], iron [2,347%], manganese [186%], and silicon [20%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0415

This SDG comprises one composited, focused soil sample (J1R2X6) from the west sidewall expansion, Section A, at 1.5 m (5 ft) bgs. This sample was analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, barium was detected in the MB at very low levels (0.126 mg/kg). Barium result was significantly higher in field sample (33.6 mg/kg); therefore, there is not an impact to the data. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (11%) is outside of the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for seven analytes (aluminum [2,432%], antimony [54%], calcium [48%], iron [6,503%], manganese [338%], silicon [19%], and vanadium [131%]). For aluminum, iron, and manganese, the spiking

concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, silicon and vanadium did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for aluminum (55%), barium (48%), cadmium (33%), calcium (54%), chromium (45%), copper (31%), iron (32%), lead (30%), magnesium (48%), manganese (42%), nickel (31%), potassium (37%), vanadium (35%), and zinc (37%) from the laboratory duplicate analyses were above QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0416

This SDG comprises two composite, focused soil samples (J1R3H5, J1R3H6) from the 100-C-7:1 west sidewall expansion overburden material, Sections B and C, at 1.5 m (5 ft) bgs. These samples were analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, barium was detected at very low levels (0.106 mg/kg), less than 1/25th of the most stringent cleanup limit, in the MB. Barium in field samples was detected at significantly higher levels, than in the MB. There is not an impact to the data. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (6%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [1,380%], antimony [39%], iron [-210%], manganese [148%] and silicon [11%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0417

This SDG comprises one composited, focused soil sample (J1R460) from the 100-C-7:1 west sidewall expansion overburden material, Section A, at 3 m (10 ft) bgs. This sample was analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, barium and zinc were detected at very low levels, less than 1/25th of the most stringent cleanup limit, in the MB. Barium and zinc in field samples were detected at significantly higher levels, than in the MB. There is not a significant impact to the data. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (6%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for four analytes (aluminum [2,029%], antimony [39%], iron [455%], and silicon [17%]). For aluminum and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0419

This SDG comprises one composite, focused soil sample (J1R482) from the 100-C-7:1 west sidewall expansion overburden material, Section B, at 3 m (10 ft) bgs. This sample was analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, boron was detected at very low levels, less than 1/25th of the most stringent cleanup limit, in the MB. Boron in field samples was detected at significantly higher levels, than in the MB. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (21%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [1,373%], antimony [58%], iron [3,717%], manganese [186%] and silicon [31%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0420

This SDG comprises one composite, focused soil sample (J1R4T5) from the 100-C-7:1 west sidewall expansion overburden material, Section C, at 3 m (10 ft) bgs. This sample was analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, the LCS recovery for silicon (16%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [1,233%], antimony [51%], iron [2,161%], manganese [145%] and silicon [23%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for beryllium (101%) and silicon (32%) from the laboratory duplicate analyses were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all beryllium and silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0421

This SDG comprises two composite, focused soil samples (J1R4W8, J1R4W9) from the 100-C-7:1 west sidewall expansion overburden material, Sections A and B, at 4.6 m (15 ft) bgs. Both samples were analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, the LCS recovery for silicon (8%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for four analytes (aluminum [1,592%], antimony [32%], iron [1,171%], and silicon 20%]). For aluminum and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculation for molybdenum (43%) from the laboratory duplicate analyses is above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all molybdenum results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0422

This SDG comprises four composite, focused soil samples (J1R500 through J1R503) from the 100-C-7:1 west sidewall expansion overburden material, below the south ramp. This SDG contains one field duplicate pair (J1R503/J1R504). All samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows.

In the ICP metals analysis, barium and calcium were detected in the MB. Barium was detected at very low levels, less than 1/25th of the most stringent cleanup limit. Calcium is not a regulated compound. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (12%) is below the QC limits. Although not qualified for LCS recovery outside of QC limit, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for six analytes (aluminum [1,491%], antimony [63%], calcium [150%] iron [8,237%], manganese [295%], and silicon [29%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, calcium, and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculation for nickel (32%) from the laboratory duplicate analyses is above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all nickel results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0423

This SDG comprises three composite, focused soil samples (J1R5D5, J1R5D6, and J1R5D7) from the 100-C-7:1 west sidewall expansion overburden material, Sections A, B, and C, at 6 m (20 ft) bgs. All samples were analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, the LCS recovery for silicon (15%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for six analytes (aluminum [797%], antimony [58%], iron [2,721%], manganese [157%], silicon [37%], and silver [69%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, silicon and silver did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for beryllium (26%) and molybdenum (44%) from the laboratory duplicate analyses were above the QC limit. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all beryllium and molybdenum results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0424

This SDG comprises two composite, focused soil samples (J1R5l7 and J1R5L8) from the west sidewall expansion overburden material, Section A and C, at 6 m (20 ft) bgs. Both samples were analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, zinc was detected in the MB. Zinc was detected at very low levels, less than 1/25th of the most stringent cleanup limit. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (15%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for seven analytes (aluminum [927%], antimony [67%], calcium [64%], chromium [64%] iron [5,294%], manganese [239%], and silicon [31%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, calcium, chromium, and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculation for chromium (86%) from the laboratory duplicate analyses is above the QC limits. Elevated RPDs in environmental samples are

generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all chromium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0426

This SDG comprises four composite, focused soil samples (J1R6N7 through J1R6N9, J1R6P0 through J1R6P1) from the west sidewall expansion overburden material, Section A, B, and C, from 7.6 to 9 m (25 to 30 ft) bgs. This SDG includes one field duplicate pair (J1R6N7/J1R6N8). Minor deficiencies are as follows.

In the ICP metals analysis, the LCS recovery for silicon (10%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for six analytes (aluminum [6,835%], antimony [52%], calcium [136%], iron [3,454%], manganese [254%], and silicon [24%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, calcium, and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculation for beryllium (44%) from the laboratory duplicate analysis is above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all beryllium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0432

This SDG comprises eight composite, focused soil samples (J1R7R4 through J1R7R9, J1R785 through J1R786) from the west sidewall expansion overburden material, Sections A, B, C, and south ramp, at 10.7 to 12 m (35 to 40 ft) bgs. All samples were analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, zinc was detected in the MB. Zinc was detected at very low levels, less than 1/25th of the most stringent cleanup limit. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (13%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [439%], antimony [62%], iron [-2498%], manganese [14%], and silicon [17%)]. For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculation for sodium (43%) from the laboratory duplicate analyses is above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all sodium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0434

This SDG comprises two composite, focused soil samples (J1R814, J1R815) from the west sidewall expansion overburden material, Sections B and C, at 13.7 m (45 ft) bgs. Both samples were analyzed for ICP metals and mercury. Minor deficiencies are as follows:

In the ICP metals analysis, silicon and zinc were detected in the MB. Zinc was detected at very low levels, less than 1/25th of the most stringent cleanup limit. Silicon is not a regulated compound. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (9%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [1,564%], antimony [57%], iron [-901%], manganese [133%], and silicon [23%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculation for chromium (33%) from the laboratory duplicate analyses was above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all chromium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0435

This SDG comprises three composite, focused soil samples (J1R7T0 through J1R7T2) from the 100-C-7:1 stockpile 100-C-024A. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows.

In the ICP metals analysis, zinc (0.568 mg/kg) was detected in the MB, at very low levels. All field samples detected zinc at 25.6 mg/kg and higher. Data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for four analytes (aluminum [744%], antimony [63%], iron [260%], and silicon [26%]). For aluminum, and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for aluminum (59%), nickel (33%), and sodium (87%) from the laboratory duplicate analyses were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all aluminum, nickel, and sodium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0436

This SDG comprises three composite, focused soil samples (J1R8T2, J1R8P4, and J1R8P5) from west sidewall expansion overburden material, Sections A, B, and C, at 13.7 to 15 m (45 to 50 ft). All samples were analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, silicon and zinc were detected in the MB. Zinc was detected at very low levels, less than 1/25th of the most stringent cleanup limit. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (12%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for ten analytes (aluminum [386%], antimony [57%], arsenic [69%], beryllium [65%], boron [67%], iron [342%], molybdenum [69%], selenium [69%], silicon [14%], and vanadium [64%]). For aluminum and iron the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, arsenic, beryllium, boron, molybdenum, selenium, silicon, and vanadium did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0438

This SDG comprises six composite, focused soil samples (J1R8W6 through J1R8W7, J1R8X1 through J1R8X4) from 100-C-7:1 west sidewall expansion overburden material, Sections A, B, C, and stockpiled south ramp material. All samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows.

In the ICP metals analysis, aluminum, barium and zinc were detected in the MB. Barium and zinc were detected at very low levels, less than 1/25th of the most stringent cleanup limit. Aluminum is not a regulated compound. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (8%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for seven analytes (aluminum [1,287%], antimony [61%], calcium [130%], iron [5,567%], manganese [253%], silicon [23%], and silver [69%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, calcium, silicon and silver did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0442

This SDG comprises four composite, focused soil samples (J1R9T6 through J1R9T9) from 100-C-7:1 west sidewall expansion overburden material, Sections A, B, and C, at 16.8 to 18 m (55 to 60 ft). All samples were analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, chromium and zinc were detected in the MB. Chromium and zinc were detected at very low levels, less than 1/25th of the most stringent cleanup limit. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (11%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for seven analytes (aluminum [1,894%], antimony [55%], calcium [138%], iron [6,181%], manganese [274%], silicon [19%], and silver [67%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, calcium, silicon, and silver did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0443

This SDG comprises two composite, focused soil samples (J1R8W9 and J1R8X0) from the 100-C-7:1 west sidewall expansion overburden material, south ramp stockpile within the excavation. Both samples were analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, the LCS recovery for silicon (16%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [727%], antimony [65%], iron [3,416%], manganese [164%], and silicon [29%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0444

This SDG comprises four composite, focused soil samples (J1R9T6 through J1R9T9) from the 100-C-7:1 west sidewall expansion overburden material, Sections A, B, and C at 16.8 to 18 m (55 to 60 ft) bgs. All samples were analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, chromium was detected in the MB. Chromium was detected at very low levels, less than 1/25th of the most stringent cleanup limit. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (13%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [934%], antimony [64%], iron [5,606%], manganese [255%], and silicon [22%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for chromium (94%), and copper (58%) from the laboratory duplicate analyses were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all chromium and copper results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0447

This SDG comprises one composite, focused soil sample (J1RDC3) from the 100-C-7:1 footprint within the excavation, where material containing concentrations of hexavalent chromium was erroneously placed. All samples were analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, chromium and copper were detected in the MB. Chromium and copper were detected at very low levels, less than 1/25th of the most stringent cleanup limit. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon (14%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for six analytes (antimony [65%], iron [-5,102%], manganese [0.08%], silicon [21%], vanadium [59%], and zinc [695]). For iron and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, silicon, vanadium, and zinc did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for aluminum (39%), barium (32%), chromium (42%), lead (33%), potassium (31%), sodium (35%), and vanadium (34%) from the laboratory duplicate analyses were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all aluminum, barium, chromium, lead, potassium, sodium, and

vanadium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0450

This SDG comprises one composite, focused soil sample (J1RDW4) from the south ramp material stockpiled within the 100-C-7:1 excavation. All samples were analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, the LCS recovery for silicon (11%) is below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [456%], antimony [54%], iron [30%], manganese [153%], and silicon [28%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculation for arsenic (37%) from the laboratory duplicate analyses were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all arsenic results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K2368

This SDG comprises four soil samples (J1C2T8, J1C2T9, J1C2V0, and J1C2V1) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, calcium and zinc were detected in the MB. Calcium is not a regulated compound and zinc was detected at low levels, less than 1/25th of the most stringent cleanup limit. The data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for four analytes (aluminum, antimony, iron, and silicon). For aluminum, iron, and silicon the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony and calcium were 42% and 135%, respectively. Although not qualified

for MS recovery outside of QC limits all antimony and calcium data for SDG K2348 may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, all mercury results may be considered estimated due to an RPD above QC limits at 108%. In addition, MS recovery for mercury was below project acceptance criteria at 53.6%. A post-digestion MS was prepared for mercury and the recovery (114.0%) was within the acceptable project QC limits. Although not qualified for RPD above QC limits, all mercury results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3205

This SDG includes five soil samples (J1F1K4 through J1F1K8) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for eight analytes (aluminum, chromium, copper, iron, manganese, mercury, antimony, and vanadium). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, chromium, copper, mercury, and vanadium did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony, chromium, copper, mercury, and vanadium were 43%, 68%, 68%, 200%, and 66%, respectively. Although not qualified for MS recovery outside of QC limits, all antimony, chromium, copper, mercury, and vanadium data for SDG K3205 may be considered estimated. Estimated data are usable for decision-making purposes.

In the mercury analysis, the RPD calculation from the laboratory duplicate analysis was above QC limits at 74.4%. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all mercury results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3240

This SDG includes two soil samples (J1FFW6 and J1FFW7) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum, iron, manganese, antimony, and silicon). For aluminum, iron, manganese, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony did not have mismatched spike and native concentrations in the original MS. The original MS recovery for antimony was 43%. All antimony data for SDG K3240 may be

considered estimated due to the MS recoveries outside the QC limits. Estimated data are usable for decision-making purposes.

In the ICP metals and mercury analysis, the RPDs for chromium (36%), mercury (32.2%), silicon (36%), sodium (42%), and vanadium (32%) are above the QC criteria of 30%. Although not qualified for RPDs outside of QC limits all chromium, mercury, silicon, sodium and vanadium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3274

This SDG includes two soil samples (J1FKX2 and J1FKX3) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for 12 analytes (aluminum [-1,110%], antimony [42%], barium [64%], cadmium [69%], calcium [44%], iron [2,350%], lead [68%], manganese [193%], selenium [68%], silicon [-106%], silver [68%], and sodium [65%]). For aluminum, iron, manganese, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, barium, cadmium, calcium, lead, selenium, silver, and sodium did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for cadmium (36%) and sodium (49%) from the laboratory duplicate analysis was above QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all cadmium and sodium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3336

This SDG comprises two soil samples (J1HHM1 and J1HJ14) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for six analytes (aluminum, iron, magnesium, antimony, silicon, and vanadium). For aluminum and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, magnesium, silicon, and vanadium did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony, magnesium,

silicon, and vanadium were 63%, 58%, 159%, and 64%. Although not qualified for MS recovery outside of QC limit, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for barium (39%), cadmium (37%), and silicon (37%) from the laboratory duplicate analyses were above QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all barium, cadmium and silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3344

This SDG includes two soil samples (J1HJ24 and J1HJ25) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum, iron, manganese, antimony, and silicon). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony and silicon were 54% and 253%. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculation for molybdenum (35%) from the laboratory duplicate analyses were above QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPD outside of QC limits, all molybdenum results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3363

This SDG includes four soil samples (J1HKM0 through J1HKM3) from the 100-C-7:1 stockpile 100-C-023. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, calcium and chromium were detected in the MB. Calcium is not a regulated compound and chromium (0.392 mg/kg) was detected at low levels, less than 1/25th of the most stringent cleanup limit. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for aluminum (131%) was outside the QC limits. Although not qualified for LCS outside of QC limits, all aluminum results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [-11%], antimony [33%], calcium [66%], iron [248%], mercury [146%], manganese [5%] and zinc [68%]). For aluminum, calcium, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, mercury and zinc did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results for these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals and mercury analysis, the RPD calculations for mercury (48.0%), and lead (31%) from the laboratory duplicate analyses were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all mercury and lead results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3364

This SDG includes five soil samples (J1HKL4 through J1HKL9) from the 100-C-7:1 stockpile 100-C-023. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, calcium and chromium were detected in the MB. Calcium is not a regulated compound and chromium was detected at low levels, less than 1/25th of the most stringent cleanup limit. The data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [839%], antimony [31%], iron [160%], mercury [137%], and silicon [2%]). For aluminum, iron, and silicon the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and mercury did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3452

This SDG includes four soil samples (J1K3K6 through J1K3K9) from the 100-C-7:1 stockpile 100-C-030. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, calcium and chromium were detected in the method blank (MB). Calcium is not a regulated compound and chromium (0.392 mg/kg) was detected at low levels, less than 1/25th of the most stringent cleanup limit. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recoveries for aluminum (189%) and silicon (186%) were above the QC criteria. Although not qualified for LCS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [313%], antimony [34.2%], iron [603%], manganese [143%], and silicon [158%]). For aluminum, iron, manganese, and silicon the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, antimony results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3459

This SDG includes two soil samples (J1K3M0 and J1K3M1) from the 100-C-7:1 stockpile 100-C-030. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the LCS recovery for aluminum (189%) and silicon (186%) was above the QC limit. Although not qualified for LCS recovery outside of QC limits, all aluminum and silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for six analytes (aluminum, calcium, iron, manganese, antimony, and silicon). For aluminum, iron, manganese, and silicon the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and calcium did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony and calcium were 33.8% and 138%, respectively. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3474

This SDG includes two soil samples (J1K479 and J1K480) from the 100-C-7:1 stockpile 100-C-030. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, calcium and silicon were detected in the MB. Calcium and silicon are not regulated compounds. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for aluminum (136%) was above the QC limits. Although not qualified for LCS recovery outside of QC limits, all associated results for aluminum may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for seven analytes (aluminum [1,790%], antimony [28.6%], calcium [147%], iron [-416%], manganese [236%], silicon [40.6%], and vanadium [53.6%]). For aluminum, calcium, iron, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, manganese, and vanadium did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for cobalt (30.5%), sodium (30.2%), and vanadium (30.6%) from the laboratory duplicate analyses were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all cobalt, sodium, and vanadium results may be considered estimated. Estimated data are usable for decision-making purposes.

In the hexavalent chromium analysis, the RPD calculation from the laboratory duplicate analysis was above the QC limits at 68%. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all hexavalent chromium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3489

This SDG includes four soil samples (J1K4V1 through J1K4V4) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the LCS recovery for silicon (53.6%) was below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum, calcium, iron, antimony, and silicon). For aluminum and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, calcium, and silicon did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony, calcium, and silicon were 46.9%, 134%, and 297%, respectively. Although not qualified for MS recovery outside of QC limits, all associated results

of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3491

This SDG includes two soil samples (J1K7D9 and J1K7F0) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the LCS recoveries for aluminum (158%), antimony (60.5%), and silicon (182%) were outside the QC criteria. Although not qualified for LCS recoveries outside QC limits, all aluminum, antimony and silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for six analytes (aluminum, iron, magnesium, manganese, antimony, and silicon). For aluminum, iron, manganese, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and magnesium did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony and magnesium were 37% and 65.6%, respectively. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculation for barium (33.4%) from the laboratory duplicate analysis was above the QC limits at 60%. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPD outside of QC limits, all barium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3496

This SDG includes two soil samples (J1K7F0, J1K7H0) from the 100-C-7:1 stockpile 100-C-030. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the LCS recoveries for aluminum (158%), antimony (60.5%), and silicon (182%) were outside the QC limits. Although not qualified for LCS recoveries outside of QC limits, all aluminum, antimony, and silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for seven analytes (aluminum, iron, magnesium, manganese, antimony, silicon, and vanadium). For aluminum, iron, manganese, and silicon the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, magnesium, and vanadium did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony, magnesium, and vanadium were 37.8%, 51.1%, and 45.6%, respectively. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculation for silicon (33.6%) from the laboratory duplicate analyses were above QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3577

This SDG comprises 11 soil samples (J1KN96 through J1KN98, J1KNX4 through J1KNX6, J1KP04 through J1KP08) from the 100-C-7:1 stockpile 100-C-001. This SDG includes a field duplicate pair (J1KP04/J1KP05). These samples were analyzed for ICP metals, mercury, and hexavalent chromium. SDG K3577 was submitted for third-party validation. Minor deficiencies are as follows:

In the ICP metals analysis, all aluminum results were considered estimated and flagged "J" by third-party validation due to an LCS above QC limits at 154%. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for 10 analytes (aluminum, calcium, chromium, iron, magnesium, manganese, antimony, silicon, vanadium, and zinc). For aluminum, calcium, iron, manganese, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, chromium, magnesium, vanadium, and zinc did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony, chromium, magnesium, vanadium, and zinc were 36.8%, 67.5%, 34.3%, 58.8%, and 66.3%, respectively. All antimony, chromium, magnesium, vanadium, and zinc data for SDG K3577 were considered estimated and flagged "J" by third-party validation due to the MS recoveries outside the QC limits. Estimated data are usable for decision-making purposes.

SDG K3584

This SDG comprises four soil samples (J1KR79 through J1KR82) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum, iron, magnesium, antimony, and silicon). For aluminum and iron, the

spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, magnesium, and silicon did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony, magnesium, and silicon were 43.8%, 68.9%, and 270%, respectively. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3604

This SDG includes four soil samples (J1KR87 through J1KR89, J1KT24) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the LCS recovery for aluminum (136%) was outside the QC criteria. Although not qualified for LCS recovery outside of QC limits, all aluminum results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for 13 analytes (aluminum, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, antimony, silicon, and zinc). For aluminum, calcium, iron, manganese, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, chromium, copper, lead, magnesium, nickel, potassium, and zinc did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony, chromium, copper, lead, magnesium, nickel, potassium, and zinc were 27.0%, 63.3%, 57.3%, 66.8%, 15.3%, 68.8%, 63.7%, and 65.4%, respectively. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3643

This SDG comprises four soil samples (J1KPL8 through J1KPL9, J1KPM0 through J1KPM1) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the LCS recovery for aluminum (136%) was outside the QC criteria. Although not qualified for LCS recovery outside of QC limits, all aluminum results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for seven analytes (aluminum, iron, lead, magnesium, manganese, antimony, and silicon). For aluminum, iron, manganese, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, lead, and magnesium did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony, lead, and magnesium were 34.0%, 69.7%, and 52.2%, respectively. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3708

This SDG includes four soil samples (J1L898, J1L899, J1L8C0, and J1L8C1) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the LCS recovery for aluminum (139%) was outside the QC criteria. Although not qualified for LCS recovery outside of QC limits, all aluminum results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for six analytes (aluminum [491%], antimony [48.5%], calcium [480%], iron [-1680%], manganese [-345%] and silicon [271%]). For aluminum, calcium, iron, manganese, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all antimony results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for copper (42.7%) and manganese (35.4%) from the laboratory duplicate analyses were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all copper and manganese results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3715

This SDG includes four soil samples (J1LHV0 through J1LHV3) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the LCS recoveries for aluminum (134%) and silicon (185%) were above the QC limits. Although not qualified for LCS recovery outside of QC limits, all aluminum and silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for 14 analytes (aluminum, barium, calcium, chromium, cobalt, copper, iron, magnesium,

manganese, nickel, potassium, antimony, vanadium, and zinc). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, barium, calcium, chromium, cobalt, copper, magnesium, nickel, potassium, vanadium, and zinc did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony, barium, calcium, chromium, cobalt, copper, magnesium, nickel, potassium, vanadium, and zinc were 52.6%, 64.1%, -68.3%, 67.2%, 69.2%, 60.7%, -9.05%, 68.4%, 66.1%, 44.9%, and 53.6%, respectively. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for calcium (40.8%), copper (30.6%), molybdenum (48.3%), and sodium (30.7%) were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all calcium, copper, molybdenum, and sodium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3727

This SDG comprises six soil samples (J1KT30 through J1KT33, J1LHT5, and J1LHT6) from the 100-C-7:1 stockpile 100-C-001. This SDG includes a field duplicate pair (J1KT30/J1KT31). These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for nine analytes (aluminum, calcium, chromium, iron, manganese, antimony, silicon, vanadium, and zinc). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, calcium, chromium, silicon, vanadium, and zinc did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony, calcium, chromium, silicon, vanadium, and zinc were 51.2%, 64.7%, 67.7%, 69.1%, 45.0%, and 59.0% respectively. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculation for barium (32.8%) and chromium (46.0%) from the laboratory duplicate analyses were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all barium and chromium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3732

This SDG comprises 13 statistical soil samples (J1LHT0 through J1LHT3, J1LHR1 through J1LHR9) from the upper 100-C-7:1 excavation sidewalls. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. This SDG includes a field duplicate pair (J1LHR1/J1LHR2). In addition, one equipment blank J1LHR0 was collected and analyzed for ICP metals and mercury. SDG K3732 was submitted for third-party validation. Minor deficiencies are as follows:

In the ICP metals analysis, due to MB contamination, third-party validation qualified all selenium results in samples J1LHT1, J1LHR5, and J1LHR9 as undetected with "UJ" flags. The data are usable for decision-making purposes.

In the ICP metals analysis, due to LSC recoveries outside the QC limits, third-party validation qualified all aluminum (139%) and antimony (50.4%) results as estimates with "J" flags. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for eight analytes (aluminum [34.7%], antimony [44.1%], calcium [65.1%], iron [-2,970%], magnesium [56.5%], manganese [-12.7%], vanadium [59.7%], and zinc [66.7%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, calcium, magnesium, vanadium, and zinc did not have mismatched spike and native concentrations in the original MS. All antimony, calcium, magnesium, vanadium, and zinc data for SDG K3732 were qualified as estimates with "J" flags by third-party validation. Estimated data are usable for decision-making purposes.

SDG K3737

This SDG comprises two statistical soil samples (J1LHT3 and J1LHT4) from the upper 100-C-7:1 excavation sidewalls. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. SDG K3737 was submitted for third-party validation. Minor deficiencies are as follows:

In the ICP metals analysis, due to LSC recovery outside the QC limits, third-party validation qualified all silicon (64.9%) results as estimates with "J" flags. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for 10 analytes (aluminum [266%], antimony [49.6%], boron [65.9%], cadmium [68.1%], calcium [68.1%], iron [1,120%], lead [66.0%], magnesium [64.6%], selenium [65.9%], and silver [68.5%]). For aluminum and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, boron, cadmium, lead, magnesium, selenium, and silver

did not have mismatched spike and native concentrations in the original MS. All antimony, boron, cadmium, lead, magnesium, selenium, and silver data for SDG K3732 were qualified as estimates with "J" flags by third-party validation. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, third-party validation qualified all aluminum (31.1%), barium (36.6%), copper (44.1%), and zinc (33%) results as estimates with "J" flags due to RPDs above QC limits. Estimated data are usable for decision-making purposes.

SDG K3738

This SDG comprises four soil samples (J1LHV5 through J1LHV8) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for 11 analytes (cadmium, chromium, iron, lead, magnesium, manganese, nickel, antimony, silicon, silver, and vanadium). For iron and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, cadmium, chromium, lead, magnesium, nickel, silicon, silver and vanadium did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony, cadmium, chromium, lead, magnesium, nickel, silicon, silver, and vanadium were 46.6%, 69.2%, 60.9%, 67.4%, 47.8%, 68.3%, 42.2%, 69.3%, and 60.0%, respectively. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for chromium (54.8%) and sodium (40.2%) from the laboratory duplicate analyses were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all chromium and sodium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3749

This SDG comprises four soil samples (J1LHV9 and J1M008 through J1M010) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for nine analytes (antimony [45.6%], calcium [10.9%], chromium [69.4%], iron [-5,690%], magnesium [57.0%], manganese [-75.1%], silicon [-8.10%], vanadium [45.5%], and zinc [67.0%]). For calcium, iron, magnesium, manganese, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, chromium, vanadium, and zinc did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for magnesium (38.4%), manganese (31.8%), silicon (40.1%), and sodium (40.5%) were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all magnesium, manganese, silicon and sodium results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3764

This SDG comprises five soil samples (J1M5W3 through J1M5W7) from the 100-C-7:1 stockpile 100-C-001. This SDG includes a field duplicate pair (J1M5W3/J1M5W4). These samples were analyzed for ICP metals, mercury, and hexavalent chromium. SDG K3764 was submitted for third-party validation. Minor deficiencies are as follows:

In the ICP metals analysis, due to the MB contamination, third-party validation qualified all cadmium results in SDG K3764, as undetected with "UJ" flags. Data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [374%], antimony [46.2%], iron [-400%], manganese [29.4%], and silicon [-40.3%]). For aluminum, iron, manganese, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony did not have mismatched spike and native concentrations in the original MS. All antimony data for SDG K3764 were qualified by third-party validation as estimates with "J" flags. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, third-party validation qualified all aluminum (34.2%) and sodium (30.1%) data results as estimates with "J' flags due to RPDs above QC limits of 30%. In addition, the RPDs for beryllium (33.7%) and potassium (41.9%) are above the project QC limits and may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3772

This SDG comprises five soil samples (J1M018 through J1M022) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the LCS recoveries for aluminum (164%) and silicon (60.3%) were outside the project QC limits. Although not qualified for LCS recovery outside of QC limits, all

aluminum and silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [1,030%], antimony [28.1%], calcium [140%], iron [4,170%], and manganese [159%]). For aluminum, calcium, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3800

This SDG comprises five soil samples (J1MXV5 through J1MXV9) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows:

In the ICP metals analysis, the LCS recovery for silicon (48%) was below the QC limits. Although not qualified for LCS recovery outside of QC limits, all silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for six analytes (aluminum [-266%], antimony [53%], calcium [50%], iron [-3,820%], vanadium [57%], and zinc [65%]). For aluminum and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, calcium, vanadium, and zinc did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3815

This SDG comprises seven soil samples (J1MXW0, J1MXW1, J1NJX6 through J1NJX9, J1NK00) from the 100-C-7:1 stockpile 100-C-001. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. This SDG includes a field duplicate pair (J1MXW0/J1MXW1). Minor deficiencies are as follows:

In the ICP metals analysis, the LCS recovery for aluminum (135%), and silicon (37%) were outside of the QC limits. Although not qualified for LCS recovery outside of QC limits, all aluminum and silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for four analytes (aluminum [146%], antimony [42%], iron [566%], and silicon [36%]). For aluminum, iron, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for cobalt (41%), lead (35%), manganese (47%), molybdenum (39%), and silicon (33%) from the laboratory duplicate analyses were above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all cobalt, lead, manganese, molybdenum, and silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K3880

This SDG comprises 13 statistical soil samples (J1NPN3 through J1NPN9, J1PP0 through J1NPP5) from the 100-C-7:1 excavation lower sidewalls. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. This SDG includes a field duplicate pair (J1NPN7/J1NPP5). In addition, one equipment blank J1NPP6 was collected and analyzed for ICP metals and mercury. SDG K3880 was submitted for third-party validation. Minor deficiencies are as follows.

In the ICP metals analysis, third-party validation qualified all antimony (58%) and silicon (39%) data as estimates with "J" flags due to LCS recoveries outside QC limits. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for fourteen analytes (aluminum [-41%], antimony [44%], boron [69%], calcium [47%], copper [57%], iron [-5,730%], lead [68%], magnesium [27%], manganese [-122%], nickel [69%], potassium [68%], silicon [168%], vanadium [36%], and zinc [50%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony did not have mismatched spike and native concentrations in the original MS. All antimony, boron, calcium, copper, lead, magnesium, nickel, potassium, silicon, vanadium, and zinc data for SDG K3880 were qualified by third-party validation as estimates with "J" flags. Estimated data are usable for decision-making purposes.

SDG K3949

This SDG comprises 16 statistical soil samples (J1PTJ7 through J1PTJ9, J1PTK0 through J1PTK9, J1PTL0 through J1PTL2) from the 100-C-7:1 Staging Pile Area 1 (SPA1).

These samples were analyzed for ICP metals, mercury, and hexavalent chromium. This SDG includes a field duplicate pair (J1PTJ7/J1PTL2). In addition, one equipment blank J1PTL3 was collected and analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the mercury analysis, the RPD calculation from the laboratory duplicate analysis was above the QC limits at 115%. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all mercury results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, calcium was detected in the MB. Calcium is not a regulated compound. The data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for nine analytes (aluminum [592%], antimony [22%], boron [68%], cadmium [67%], iron [-559%], lead [68%], manganese [69%], silicon [30%], and vanadium [69%]). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony, boron, cadmium, lead, silicon and vanadium did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recoveries for aluminum (144%), antimony (53%), and silicon (26%) were outside of the QC limits. Although not qualified for LCS recovery outside of QC limits, all aluminum, antimony and silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the hexavalent chromium analysis, the MS recovery for insoluble hexavalent chromium was within the project control limits. However, the MS for soluble hexavalent chromium was slightly below the QC limits, at 63%. Acceptable LCS recovery confirms the analytical system was operating within acceptable parameters. Hexavalent chromium is a reactive species. It is possible that the sample matrix was slightly reductive and reacted with the spiked hexavalent chromium. Although not qualified for MS recovery outside of QC limits, all hexavalent chromium results may be considered estimated. Estimated data are usable for decision making purposes.

SDG K3950

This SDG comprises 14 statistical soil samples (J1PTL4 through J1PTL9, J1PTM0 through J1PTM7, J1PTN8) from the 100-C-7:1 Staging Pile Area 2 (SPA2) and composite sample location Comp-1. These samples were analyzed for ICP metals, mercury, and hexavalent chromium. This SDG includes a field duplicate pair (J1PTL4/J1PTM7). Minor deficiencies are as follows.

In the ICP metals analysis, the RPD calculation for antimony (32%) from the laboratory duplicate analysis was above the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPDs outside of QC limits, all antimony results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for six analytes (aluminum [431%], antimony [32%], calcium [131%], iron [-588%], manganese [41%], and silicon [182%]). For aluminum, iron, manganese, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and calcium did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for aluminum (131%) was outside of the QC limit. Although not qualified for LCS recovery outside of QC limits, all aluminum results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K4041

This SDG comprises six statistical soil samples (J1R613, J1R615, J1R619, J1R620, J1R622, J1R625, J1R626) from the west sidewall expansion verification sample locations (WSW-1, WSW-3, WSW-7, WSW-8, WSW-10). This SDG includes a field duplicate pair (J1R620/J1R625). All samples were analyzed for ICP metals, mercury, and hexavalent chromium. In addition, one equipment blank (J1R626) was collected and analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, magnesium was detected in the MB. Magnesium was detected as significantly higher levels in all field samples and it is not a regulated compound. The data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [1,540%], antimony [34%], copper [40%], iron [-2,350%], and silicon [295%]). A post-digestion spike (PDS) was performed for all five analytes. All PDS recoveries were within the QC limits, except for copper (60%), which had a PDS result below the project QC limits. For aluminum, iron, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and copper did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recoveries for aluminum (184%) and silicon (217%) were outside of the QC limits. Although not qualified for LCS recovery outside of QC limits, all aluminum and silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG K4047

This SDG comprises four statistical soil samples (J1R614, J1R617, J1R623, and J1R624) from the west sidewall expansion, verification sample locations (WSW-2, WSW-5, WSW-11, and WSW-12). All samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for six analytes (aluminum [1,120%], antimony [30%], calcium [156%], iron [1,960%], manganese [142%], and silicon [182%]). A PDS was performed for all six analytes. All PDS recoveries were within the project QC limits. For aluminum, calcium, iron, manganese, and silicon, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for aluminum (155%) was outside of the QC limits. Although not qualified for LCS recovery outside of QC limits, all aluminum results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG KP0190

This SDG comprises three statistical soil samples (J1R616, J1R618, and J1R621) from the 100-C-7:1 west sidewall excavation, sample locations WSW-4, WSW-6, and WSW-9. All samples were analyzed for ICP metals, mercury, and hexavalent chromium. Minor deficiencies are as follows.

In the ICP metals analysis, aluminum, calcium, and magnesium were detected in the MB. Aluminum, calcium, and magnesium are not regulated compounds. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recoveries for aluminum (166%), antimony (59%), and silicon (156%) is outside the QC limits. Although not qualified for LCS recovery outside of QC limits, all aluminum, antimony and silicon results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum [1,510%], antimony [25%], calcium [224%], iron [460%], and silicon [49%]). For aluminum, calcium, iron, and silicon, the spiking concentration was insignificant

compared to the native concentration in the sample from which the MS was prepared. 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. Antimony did not have mismatched spike and native concentrations in the original MS. Although not qualified for MS recovery outside of QC limits, antimony results may be considered estimated. Estimated data are usable for decision-making purposes.

SDG MA05300

This SDG comprises one verification soil sample (J1PTN9) from the 100-C-7:1 staging pile area (Comp-2). This sample was analyzed for asbestos. No major or minor deficiencies were noted.

SDG MA06177

This SDG comprises one verification soil sample (J1RJ63) from the 100-C-7:1 staging pile area (Comp-3). This sample was analyzed for asbestos. No major or minor deficiencies were noted.

FIELD QUALITY ASSURANCE/QUALITY CONTROL

Relative percent difference evaluations of main sample(s) versus the laboratory duplicate(s) are routinely 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, listed in the field logbooks (WCH 2010, 2011b, 2011c, 2011d, 2012a, 2012b, 2012c, 2012d, 2012e, 2013), are shown in Table C-1. The main and QA/QC sample results are presented in Appendix C.

Table C-1. Field Quality Assurance/Quality Control Samples.

Sample Area	Main Sample	Duplicate Sample
Upper sidewall	J1LHR1	J1LHR2
Lower sidewall	J1NPN7	J1NPP5
West sidewall	J1R620	J1R625
SPA1	J1PTJ7	J1PTL2
SPA2	J1PTL4	J1PTM7
SPA3	J1RDP5	J1RDR7
SPA4	J1RDT9	J1RDV0
SecB-25 ft	J1R6N7	J1R6N8
SW-4	J1R503	J1R504
S_Ramp4	J1RDP0	J1RDP1
Overburden 001-030	J1KP04	J1KP05
Overburden 001-054	J1KT30	J1KT31
Overburden 001-067	J1M5W3	J1M5W4
Overburden 001-076	J1MXV5	J1MXV6
Overburden 001-080	J1MXW0	J1MXW1

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 concern (COC). 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 (TDL). 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 C provides details on duplicate pair evaluation and RPD calculation.

The RPDs for manganese (35.5%) and vanadium (30.2%) in the lower sidewall duplicate sample are above the acceptance criteria of 30 %. The RPD for sodium (60.1%) in the west sidewall duplicate sample is above the acceptance criteria of 30%. The RPDs for the following analytes in the overburden stockpile 001-054 are above the acceptance criteria: aluminum (55.7%), barium (60.7%), iron (31.0%), magnesium (43.8%), manganese (51.1%), silicon (79.4%), vanadium (46.2%), and zinc (46.0%). The RPD for manganese (41.0%) in the overburden stockpile 001-080 is above the acceptance criteria of 30%. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. There is no indication that the analytical system was operating out of control. 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 C) to indicate that a visual check of the data is required by the reviewer. For the upper sidewall duplicate sample, aluminum, iron, silicon, and vanadium required this check. For lower sidewall duplicate sample, aluminum, barium, iron, magnesium, manganese, vanadium, and zinc required this check. For the west sidewall duplicate sample, aluminum, calcium, iron, magnesium, manganese, silicon, sodium, vanadium, and zinc required this check. For the SPA1 duplicate sample, aluminum, barium, calcium, chromium, iron, magnesium, manganese, silicon, and vanadium required this check. For the SPA2 duplicate sample, aluminum, iron, manganese, and silicon required this check. For the SPA3 duplicate sample, aluminum, barium, calcium, copper, iron, magnesium, manganese, silicon, vanadium, and zinc required this check. For the SPA4 duplicate sample, aluminum, calcium, iron, and silicon required this check. For the SecB-25 ft west sidewall overburden material duplicate sample, aluminum, calcium, iron, manganese, silicon, vanadium, and zinc required this check. For the SW-4 duplicate sample, aluminum, iron, magnesium, manganese, and zinc required this check. For the south ramp overburden (S_Ramp4) duplicate sample, aluminum, barium, calcium, iron, manganese, silicon, sodium, and zinc required this check. For the 001-030 stockpile overburden material duplicate sample, aluminum, barium, calcium, chromium, iron, magnesium, manganese, silicon, vanadium, and zinc required this check. For the 001-054 stockpile overburden material duplicate sample, aluminum, barium, calcium, chromium, copper, iron, magnesium, manganese, silicon, sodium, vanadium, and zinc required this check. For the 001-067 stockpile overburden material duplicate sample, aluminum, barium, calcium, iron, manganese, silicon, vanadium, and zinc required this check. For the 001-076 stockpile overburden material duplicate sample, aluminum, barium, calcium, iron, magnesium, silicon, vanadium, and zinc required this check. For the 001-080 stockpile

overburden material duplicate sample, aluminum, barium, calcium, iron, magnesium, manganese, silicon, vanadium, and zinc 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.

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 100-C-7:1 subsite verification sampling data found that the analytical results are accurate within the standard errors associated with the analytical methods, sampling, and sample handling. The DQA review for 100-C-7:1 subsite 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.

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