WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-BC-2 **Control No.:** 2015-015

Waste Site Code(s)/Subsite Code(s): 100-B-35:1

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-B-35:1, 151-B Primary Substation subsite, part of the 100-BC-2 Operable Unit, consisted of a fenced gravel-bed yard, the 151-B Switch House, and concrete pads used to support a variety of electrical equipment. The site was included in 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) as a candidate site for confirmatory sampling by a Tri-Party Agreement Administrative Record Fact Sheet for the 100 Area per the *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington* (100 Area ESD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 2009). Per the 100 Area ESD (EPA 2009), plug-in and candidate sites are documented in the Administrative Record and annual fact sheets are published by the U.S. Department of Energy identifying sites that have been added to the Remaining Sites ROD (EPA 1999). Subsequently, the 100-B-35:1 subsite was identified for remove, treat, and dispose when residual oil-stained areas were discovered during demolition of the substation.

Remediation of the 100-B-35:1 subsite was performed between July 30, 2014, and February 18, 2015. Approximately 42,550 bank cubic meters (55,653 bank cubic yards) of contaminated soil and debris, along with 19,300 bank cubic meters (25,243 bank cubic yards) of padding material that was used to support site remediation processes, were removed and staged for disposal at the Environmental Restoration Disposal Facility (ERDF). Remediation, verification sampling, and comparison of residual contaminant concentrations against cleanup levels have been performed in accordance with remedial action objectives (RAOs) and remedial action goals (RAGs) established by the Remaining Sites ROD (EPA 1999). The selected remedy involved (1) excavating the subsite to the extent required to meet specified soil cleanup levels, (2) disposing of contaminated excavation materials at the ERDF at the 200 Area of the Hanford Site, (3) demonstrating through verification sampling that cleanup goals have been achieved, and (4) proposing the subsite for reclassification as Interim Closed Out.

Basis for reclassification:

Cleanup verification sampling results were evaluated in comparison to the RAGs. In accordance with this evaluation, the verification sampling results support a reclassification of this subsite to Interim Closed Out. The current site conditions achieve the RAOs and corresponding RAGs established in the Remaining Sites ROD (EPA 1999). The evaluation (which may include fate-and-transport modeling) of all verification sample data collected from the 100-B-35:1 subsite resulted in a determination 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 basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 100-B-35:1, 151-B Primary Substation Subsite* (attached). After remediation, residual contamination above direct exposure levels was not observed in the shallow or deep zone soils; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone are not required.

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-BC-2 **Control No.:** 2015-015

Waste Site Code(s)/Subsite Code(s): 100-B-35:1

Regulator comments:

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		6/15/15
DOE Federal Project Director (printed)	Signature	Date
N/A		
Ecology Project Manager (printed)	Signature	Date
L. Buelow		6/15/15
EPA Project Manager (printed)	Signature	Date

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-B-35:1, 151-B PRIMARY SUBSTATION SUBSITE

Attachment to Waste Site Reclassification Form 2015-015

June 2015

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-B-35:1, 151-B PRIMARY SUBSTATION SUBSITE

EXECUTIVE SUMMARY

The 100-B-35:1, 151-B Primary Substation subsite, part of the 100-BC-2 Operable Unit, consisted of a fenced gravel bed yard, and concrete pads of various sizes that supported a variety of electrical equipment. The site was included in the *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington* (EPA 2009) as a candidate site for confirmatory sampling. Subsequently, the 100-B-35:1 subsite was identified for remove, treat, and dispose based on the results of confirmatory sampling (WCH 2014b). The 100-B-35:1 subsite is located approximately 210 m (689 ft) southwest of the 105-B Reactor Building.

The 151-B Primary Electrical Substation facilities were demolished in place by the Deactivation, Decontamination, Decommissioning, and Demolition project from October 2013 to March 2014 (WCH 2014a). Remediation of the remaining soil and debris at the 100-B-35:1 subsite was performed by Field Remediation between July 30, 2014, and February 18, 2015. Approximately 42,550 bank cubic meters (55,653 bank cubic yards) of contaminated soil and debris, along with 19,300 bank cubic meters (25,243 bank cubic yards) of padding material that was used to support site remediation processes, were removed and staged for disposal at the Environmental Restoration Disposal Facility. The excavated materials were stockpiled west of the excavation in the approved staging pile area. The staged materials were loaded out on October 30, 2014. Materials excavated after this date were direct loaded for disposal at the Environmental Restoration Disposal Facility. The depth of the excavation varied between 1 to 6 m (3.3 to 19.7 ft) across the subsite. Significant staining was encountered on the northeast corner of the 100-B-35:1 subsite. To remove the stained soil at this location the excavation was extended into the deep zone (greater than 4.6 m [15 ft] deep). No overburden material was associated with this subsite.

Verification sampling was conducted at the 100-B-35:1 subsite on March 30, 2015, per the *Work Instruction for Verification Sampling of the 100-B-35:1, 151-B Primary Substation Subsite* (WCH 2015b). The results indicate that the waste removal action achieved compliance with the remedial action objectives and remedial action goals of 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* (Remaining Sites ROD) (EPA 1999). 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-B-35:1 subsite in accordance with the TPA-MP-14 procedure in the *Tri-Party Agreement Handbook Management Procedures* (DOE-RL 2011).

Table ES-1. Summary of Remedial Action Goals for the 100-B-35:1 Subsite. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain a dose rate of <15 mrem/yr above background for 1,000 years.	Radionuclides were not COPCs for the 100-B-35:1 subsite.	NA
Direct Exposure – Nonradionuclides	Attain individual direct exposure COPC RAGs.	All individual COPC concentrations are below the direct exposure criteria.	Yes
Risk Requirements – Nonradionuclides	Attain a hazard quotient of <1 for all individual noncarcinogens.	The hazard quotients for individual nonradionuclide COPCs are <1.	Yes
	Attain a cumulative hazard quotient of <1 for noncarcinogens.	The cumulative hazard quotient for shallow zone and staging pile area (7.9×10^{-3}) is <1.	
	Attain an excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	The excess cancer risk for individual carcinogens is $<1 \times 10^{-6}$.	
	Attain a cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	The cumulative cancer risk for the shallow zone and staging pile area is 3.3×10^{-7}, which is $<1 \times 10^{-5}$.	
Groundwater/River Protection – Radionuclides	Attain single-COPC groundwater and river protection RAGs.	Radionuclides were not COPCs for the 100-B-35:1 subsite.	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].		

Table ES-1. Summary of Remedial Action Goals for the 100-B-35:1 Subsite. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and river cleanup requirements.	Residual concentrations of copper, lead, aroclor-1260, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene, within the site excavation area are above the soil RAGs for groundwater and/or river protection. However, RESRAD modeling predicts that these constituents will not reach groundwater (and, therefore, the Columbia River) within 1,000 years [d].	Yes

[a] "National Primary Drinking Water Regulations" (40 *Code of Federal Regulations* 141).
[b] *Radiation Protection of the Public and the Environment* (DOE Order 5400.5).
[c] Based on the isotopic distribution of uranium in the 100 Area, 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, aroclor-1260, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene are not predicted to migrate more than 2.6 m (8.5 ft) vertically within 1,000 years (based on the lowest distribution coefficient of the contaminants exceeding the RAGs, copper, with a distribution coefficient value of 22 mL/g). The distance to groundwater from the bottom of the excavation area is 17.5 m (57.4 ft). Therefore, residual concentrations of these constituents are predicted to be protective of groundwater and the Columbia River.

COPC = contaminant of potential concern
DOE = U.S. Department of Energy
MCL = maximum contaminant level
NA = not applicable
RAG = remedial action goal
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)

In accordance with this evaluation, the verification sampling results support a reclassification of this subsite to Interim Closed Out. The current site conditions achieve the remedial action objectives and the corresponding remedial action goals established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE-RL 2009b) and the 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. After remediation, residual contamination above direct exposure levels was not observed in the shallow or deep zone soils (i.e., below 4.6 m [15 ft]); 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 Remaining Sites ROD, a comparison against ecological risk screening levels has been made for the site contaminants of potential concern and other constituents. Those constituents exceeding the ecological screening level in the *Washington Administrative Code* 173-340, "Model Toxics Control Act – Cleanup," Table 749-3 were boron, selenium, and vanadium. The U.S. Environmental Protection Agency ecological soil screening levels were exceeded for antimony, manganese, selenium, vanadium, and zinc. Exceeding screening values does not necessarily indicate the existence of risk to ecological receptors. Because concentrations of antimony, manganese, vanadium, 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 this waste site.

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-B-35:1, 151-B PRIMARY SUBSTATION SUBSITE

STATEMENT OF PROTECTIVENESS

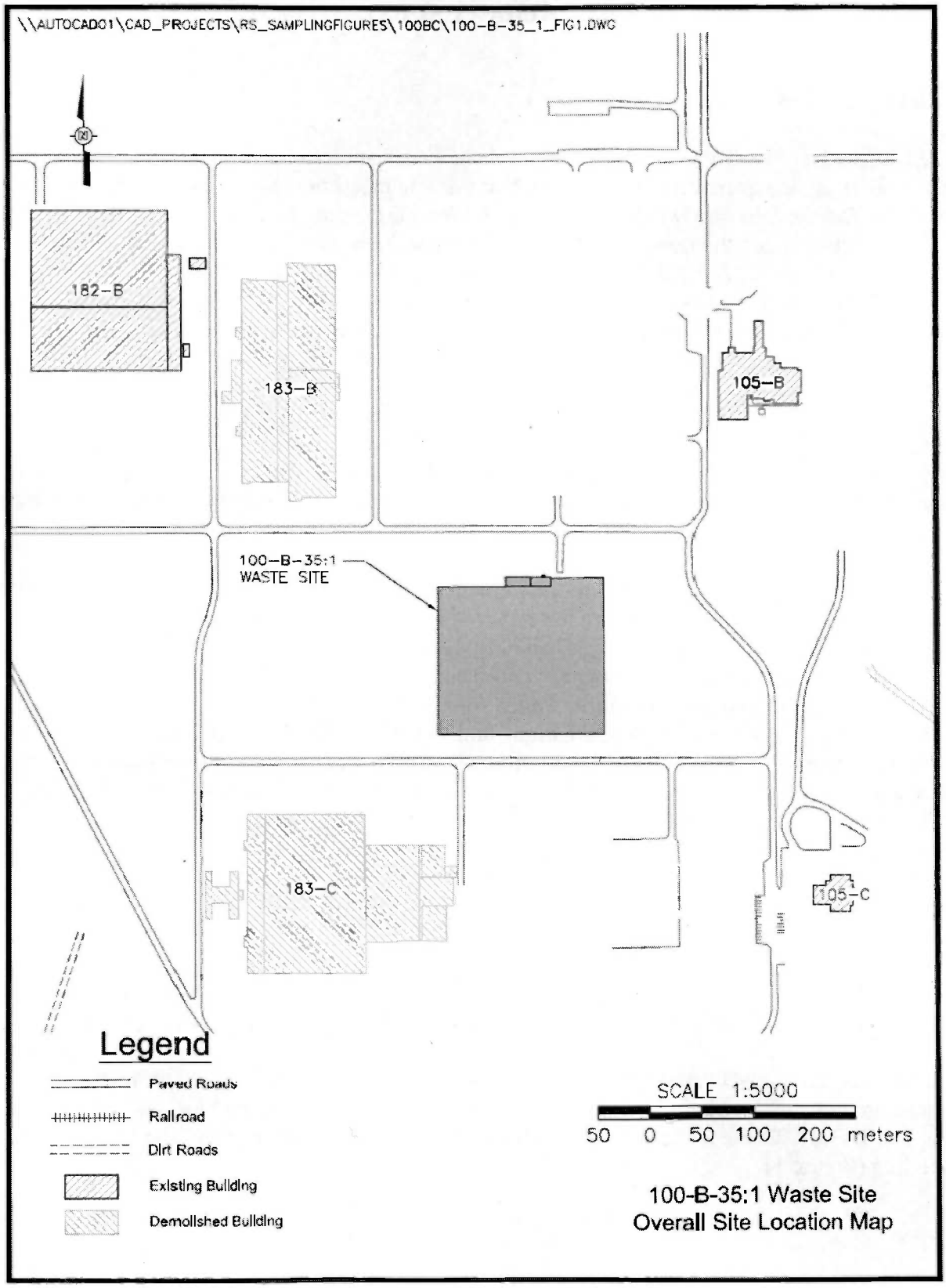
The 100-B-35:1, 151-B Primary Substation subsite verification sampling data, site evaluations, and supporting documentation demonstrate that this site meets the objectives established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (100 Area RDR/RAWP) (DOE-RL 2009b) and the *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. After remediation, residual contamination above direct exposure levels was not observed in the shallow or deep zone soils; 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 Remaining Sites ROD, a comparison against ecological risk screening levels has been made for the site contaminants of potential concern (COPCs) and other constituents. Those constituents exceeding the ecological screening level in the *Washington Administrative Code* (WAC) 173-340, "Model Toxics Control Act – Cleanup," Table 749-3 were boron, selenium, and vanadium. The U.S. Environmental Protection Agency (EPA) ecological soil screening levels were exceeded for antimony, manganese, selenium, vanadium, and zinc. Exceeding screening values does not necessarily indicate the existence of risk to ecological receptors. Because concentrations of antimony, manganese, vanadium, 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 this waste site.

GENERAL SITE INFORMATION AND BACKGROUND

The 100-B-35:1, 151-B Primary Substation, part of the 100-BC-2 Operable Unit, included a fenced, gravel-surfaced switch yard area, as well as a reinforced concrete block switch house. The 100-B-35:1 subsite is located approximately 210 m (689 ft) southwest of the 105-B Reactor Building (Figure 1).

Figure 1. Location of the 100-B-35:1 Subsite.



The 151-B Switch House was a one-story concrete block building with a sub-level cable pit equipped with a sump pump. All underground electrical ducts in the substation yard terminated at the switch house. It was expanded in 1952 to support the new 105-C Reactor. The switch house addition was a 9 by 19 m (30 by 62 ft) concrete block structure added to the east side of the original building. The first floor addition was used primarily for switch gear while the basement provided access to the electrical ducts. The 151-B Switch House is cold and dark. The 13.8 kV and 230 kV power, switch, and cables have been isolated and/or removed from the facility (WCH 2012).

The 151-B Switch Yard, south of the Switch House, measured 152.4 by 161.5 m (500 by 530 ft). More than 150 concrete pads of various sizes protruded from the crushed gravel bed throughout the yard, supporting a variety of electrical equipment including transformers, oil circuit breakers, and power line towers and stands. Oil transfer lines, air transfer lines, and power cables encased in concrete ducts were buried beneath the surface of the yard. Arrangement and locations of major surface systems and equipment can be found in drawings H-1-5126 (GE 1967), and H-1-15900 (BPA 1993). Arrangement and locations of subsurface systems can be found in drawing P-5604 (GE 1951). Drawing P-5604 shows a 5.1-cm (2-in.) oil transfer line that interconnected the northeast transformer with the two oil circuit breakers located on the south side of the yard.

The 151-B Primary Substation was shut down and deactivated in 1998. However, until 2012, a 230 kV power line remained routed overhead across the substation yard, connecting the Midway Station with the 100-K Area. This powerline was rerouted in 2012 to support the 100-C-7:1 excavation activities. The new power line now runs in an east-west direction, at least 350 m (1,148 ft) south of the 151-B south fence line.

Electrical substations were identified as candidate sites for confirmatory sampling because, historically, leaks and spills of polychlorinated biphenyls (PCBs) from the electrical transformers, circuit breakers, and transfer systems during the early years of operation went unreported.

The 151-B Switch Yard included a fenced, gravel-surfaced area originally 131 by 92.4 m (430 by 303 ft) and contained a wood-framed bus structure, two main 15,000 kVA transformers, three oil circuit breakers (OCBs), and electrical terminal structures. The area was served by a rail spur and contained underground ducts, which connected to the switch house with the OCBs, transformers, and terminal structures. The following two types of foundations were used for outside equipment: reinforced concrete slabs and reinforced concrete piers with spread footings. The switch yard was expanded in 1952 to support the new facilities associated with the 105-C Reactor. The expansion included the installation of a new 18,750 kVA transformer, OCBs, disconnect switches, bus, additional south rail spur, and conductor. Below-grade oil transfer lines were installed within the switch yard to fill the OCBs.

The Midway Station fed 230 kV power to as many as three 18,750/31,250 kVA transformers located at the 151-B Switch Yard (GE 1963). From these transformers, power was transmitted via overhead and underground cables to 10 substations located throughout the 100-BC Area. Up to five oil circuit breakers were also in service to support the switch yard operations.

Polychlorinated biphenyl-containing oil was transferred, as needed, from a rail tanker on the northern railroad spur through more than 150 m (492 ft) of 5.1-cm (2-in.) steel underground piping to transformers and oil circuit breakers in the yard. An underground high-pressure air transfer system was also installed. No failures of the underground oil transfer system have been recorded, although relatively small leaks from the system would likely be difficult to detect. Also, no record has been found that the oil transfer lines were purged with air during the deactivation activities on the site, so some oil residue may remain in the lines.

Oil seepage was recorded from one of the large transformers in 1990, and a 378-L (100-gal) spill from another transformer was noted in 1992. This may not have been the extent of transformer leaks and spills because such events were not consistently recorded before 1985. A soil sample was collected from the soil around the concrete transformer pad on December 9, 1991. No PCBs were detected in this single sample.

Beneath the switch yard there was an extensive subsurface "highway" of electrical conduits, which may have contained lead and/or asbestos-wrapped cable inside "Korduct" lining, all surrounded by reinforced concrete. Korduct is believed to be a transite-like material. Oil containing PCBs was transferred, as needed, from a rail tanker on the railroad spur through over-ground hoses and piping to transformers and oil circuit breakers in the yard. The smaller transformers at the secondary and distribution substations were also filled via over-ground hoses from oil trucks.

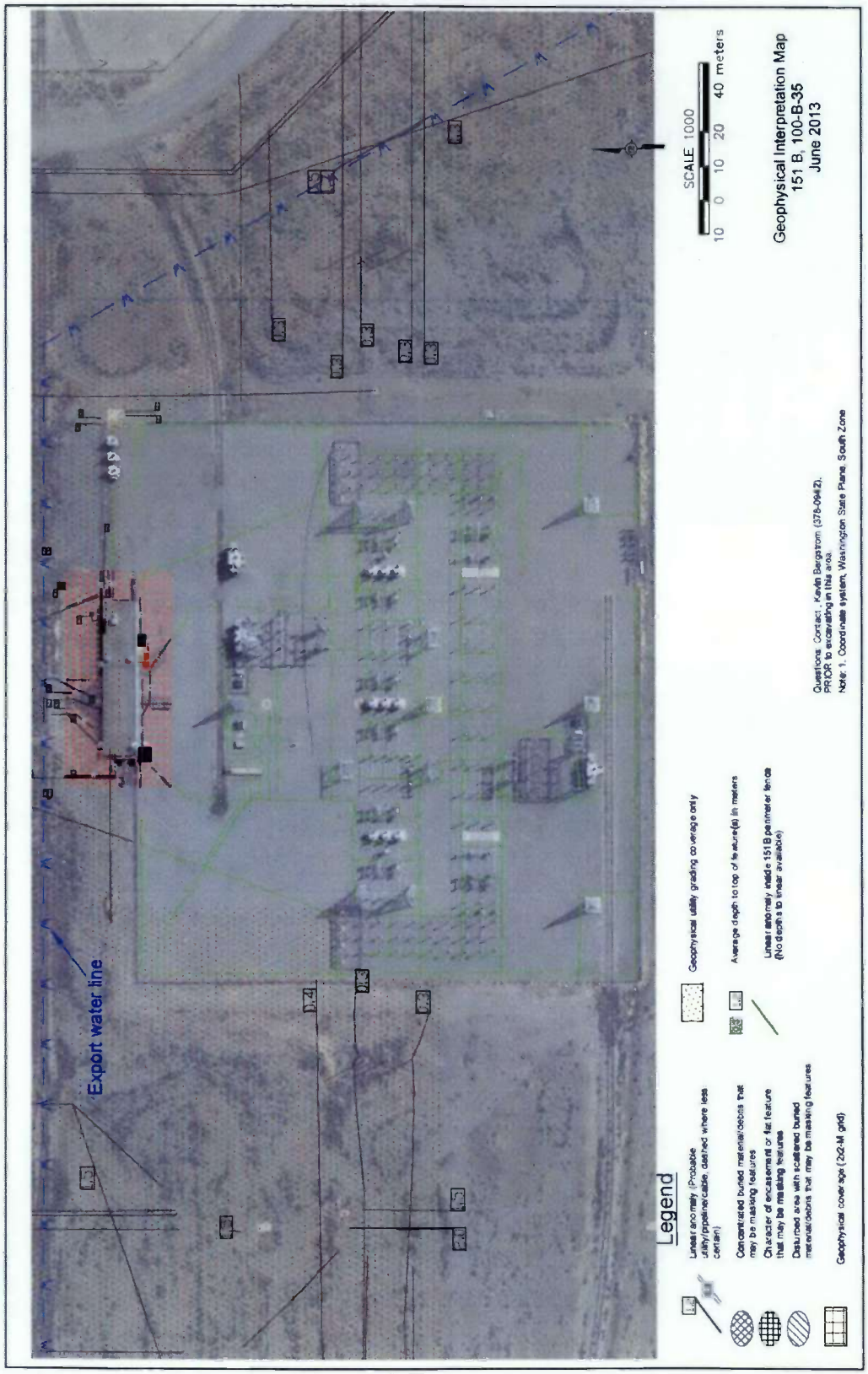
A geophysical survey was performed in June 2013 to support excavation of the subsite (Figure 2). Linear anomalies detected with a utility detector were identified as inactive utilities within the 151-B Switch Yard.

REMEDIAL ACTION SUMMARY

The 100-B-35:1 151-B Primary Substation was shut down and deactivated in 1998. However, until 2012, the 230 kV power line connecting the Midway Station with the 100-K Area remained routed overhead across the 151-B substation yard. This power line was re-routed in 2012 to support the 100-C-7:1 subsite excavation activities. The new power line now runs in an east-west direction, at least 350 m (1,148 ft) south of the 151-B south fence line.

The 13.8 kV and 230 kV power lines, switchgear, and cables have been isolated and/or removed from the 151-B Switch House facility (WCH 2012). The 151-B Switch House and the above grade electrical components and concrete pads protruding from the ground surface at the 151-B Switch Yard were removed by the Deactivation, Decontamination, Decommissioning, and Demolition project between October 2013 and March 2014 (WCH 2014a).

Figure 2. Geophysical Interpretation Map of the 100-B-35:1 Subsite.



One of the objectives of the D4 Project was to support recycling and waste minimization. Being a radiologically clean facility, metals, oils, and electrical equipment from the 151-B Switch Yard were recycled at offsite facilities (WCH 2014b). The Washington Closure Hanford (WCH) subcontractor Transformer Technologies recycled 250,608 kg (552,000 lbs) of transformers, transformer bushings, and metal and 3,028 L (800 gal) of transformer oil. Mission Support Alliance recycled 154,178 kg (339,600 lbs) of metal, beams, components, and wire. The remaining 7,593.4 metric tons (6,890.6 tons) of demolition debris was removed and disposed at the Environmental Restoration Disposal Facility (ERDF).

Remediation of remaining contaminated soil and debris at the 100-B-35:1 subsite was performed by Field Remediation between July 30, 2014, and February 18, 2015. Approximately 42,550 bank cubic meters (55,653 bank cubic yards) of contaminated soil and debris, along with 19,300 bank cubic meters (25,243 bank cubic yards) of padding material that was used to support site remediation processes, were removed and staged for disposal at ERDF. This volume also includes some padding material that was used to support site remediation processes. Excavated materials consisted of concrete, rebar, asbestos, conduit, steel pipe, wire, and stained soil. The depth of the excavation varied between 1 to 6 m (3.3 to 19.7 ft) across the subsite. Significant staining was encountered on the northeast corner of the 100-B-35:1 subsite. To remove the stained soil at this location the excavation was extended into the deep zone (greater than 4.6 m [15 ft] deep).

During the 100-B-35:1 subsite remedial activities, stained soils were discovered at several locations within the footprint of the 100-B-35:1 subsite. Over 90 in-process samples were collected from this subsite during the course of remediation (Appendix A). In-process sampling was performed when oil stained soils were encountered and following removal of the stained soils to confirm removal of contaminated materials.

Concrete duct banks were encountered in the shallow zone of the 100-B-35:1 excavation. These duct banks contain electrical conduits made of asbestos piping with no other hazardous materials. The field sampling personnel examined the concrete duct banks for staining; no staining on these concrete structures was identified. Per discussion with the EPA, documented in CCN 178739, *Concrete Duct at 100-B-35 (Regulatory Agreement)* (WCH 2015c), it was agreed that the concrete duct banks could be left in place if the concrete was free of staining.

The excavated materials were stockpiled west of the excavation in the approved staging pile area (Figure 3). The staged materials were loaded out on October 30, 2014. Materials excavated after this date were either stockpiled with the adjacent excavation or direct loaded for disposal at ERDF.

No overburden materials were salvaged from the 100-B-35:1 waste site excavation; therefore, there is no overburden pile associated with the 100-B-35:1 waste site. Radiological field screening was performed during confirmatory sampling. No radiological activity was detected within the 100-B-35:1 excavation area. The post remediation topography of the site is shown in Figure 4.

Figure 3. The 100-B-35:1 Subsite Excavation and Staging Pile Area Location Map.

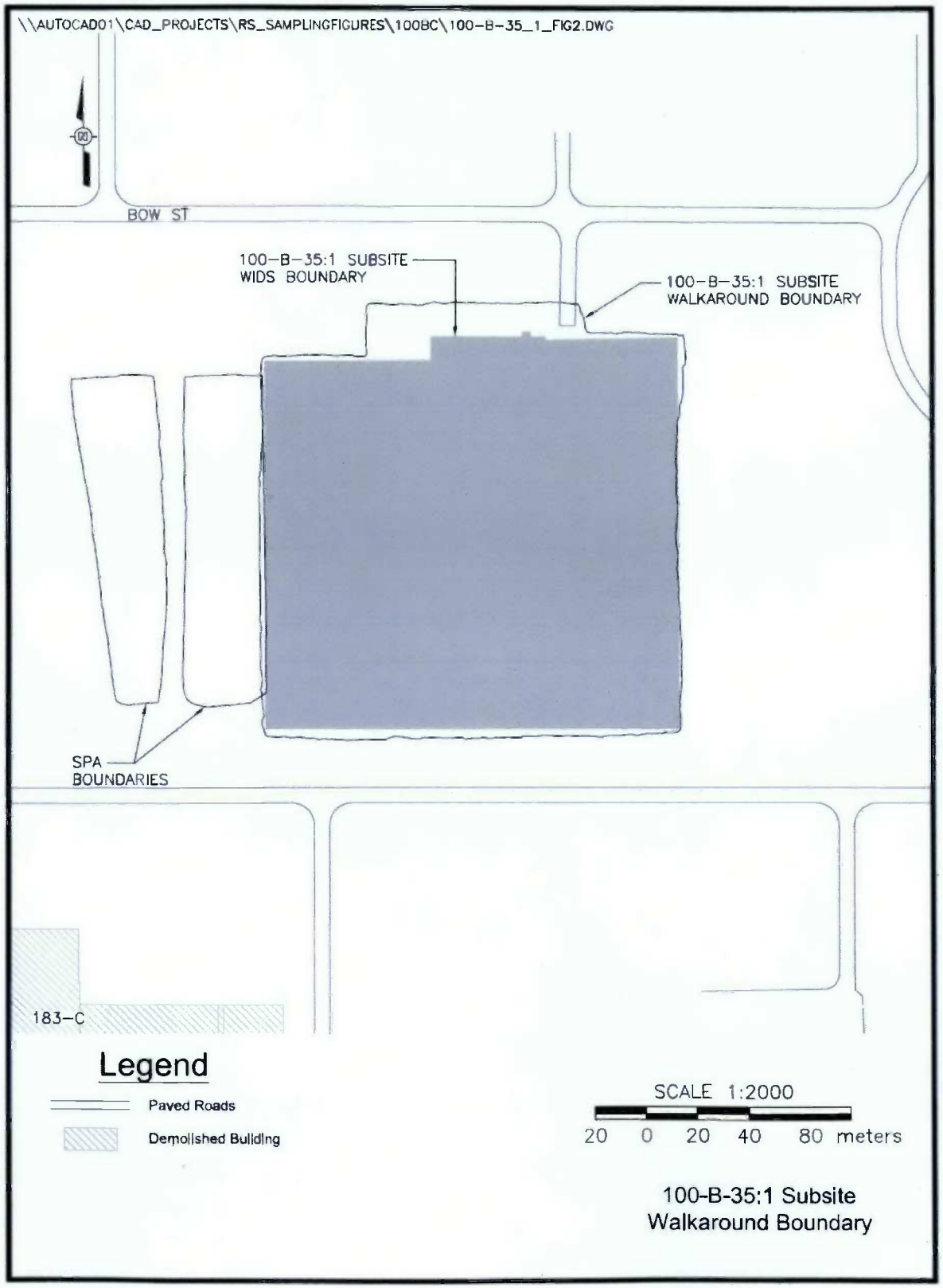
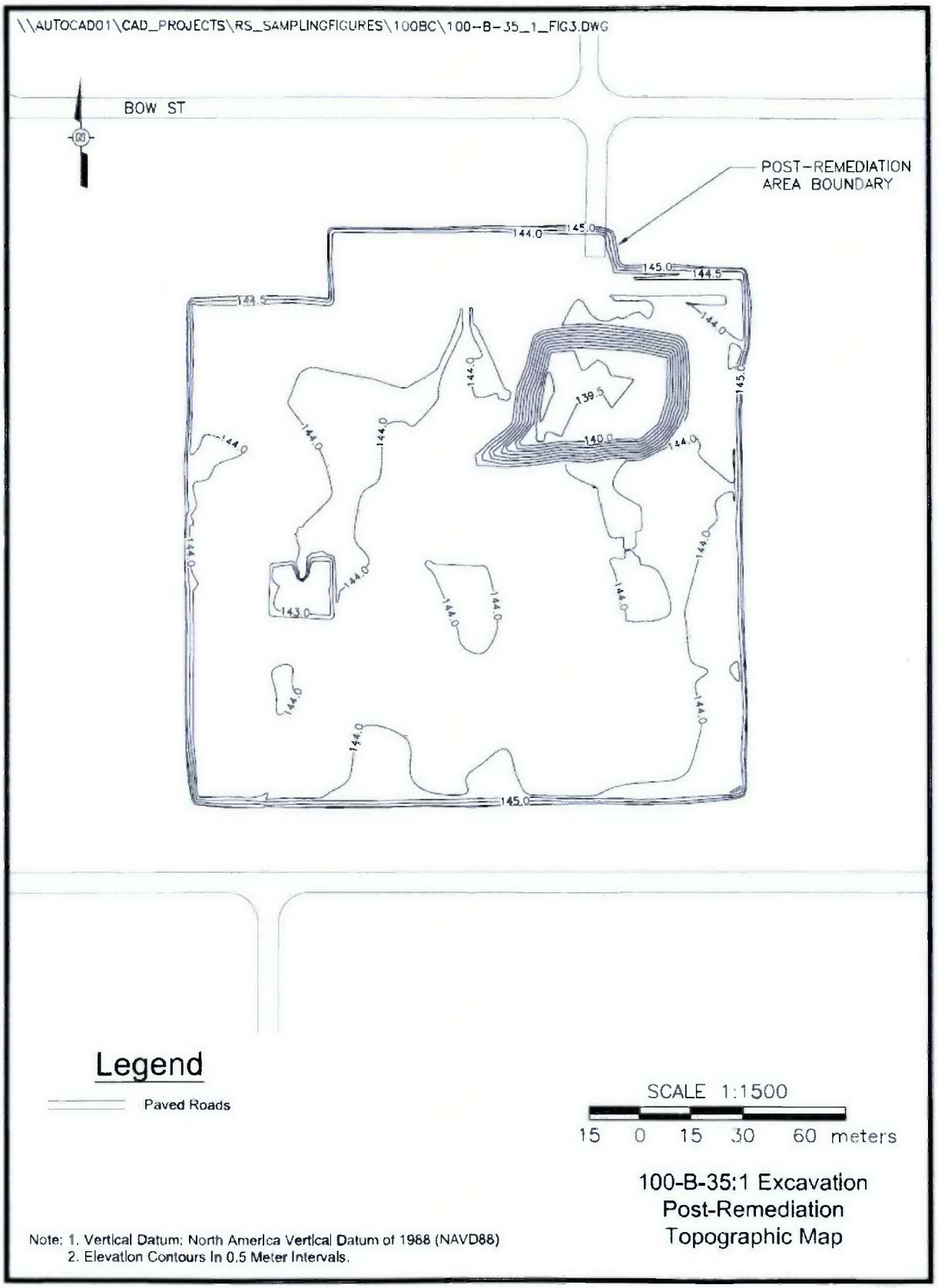


Figure 4. The 100-B-35:1 Excavation Post-Remediation Topographic Map.



VERIFICATION SAMPLING ACTIVITIES

This section describes the basis for selection of a verification sampling design for the 100-B-35:1 subsite. Statistical sampling was the method chosen for selecting the sampling locations. The areas identified for the purpose of statistical verification sampling for the 100-B-35:1 subsite consisted of two decision units, the shallow zone excavation area and the staging pile area. In addition, four focused samples were collected from the excavation deep zone.

Verification sampling of the excavation areas and staging pile area was performed on March 30, 2015, per the *Work Instruction for Verification Sampling of the 100-B-35:1, 151-B Primary Substation Subsite* (WCH 2015b). Verification sampling at the 100-B-35:1 subsite was conducted 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). Separate statistical sampling designs were used to collect verification soil samples from the 100-B-35:1 shallow zone excavated area and the staging pile area. The following subsections provide additional discussion of the information used to develop the verification sampling design. The results of verification sampling are also summarized to support interim closure of the subsite.

Contaminants of Potential Concern for Verification Sampling

The COPCs for the 100-B-35:1 subsite were determined based on potential hazardous constituents associated with leaks and spills from the electrical transformers, circuit breakers, and transfer systems and from the confirmatory sampling results. As such, the identified COPCs are the expanded list of inductively coupled plasma metals (antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc), mercury, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, and PCBs.

In addition to unplanned oil releases to the soil, this subsite contained underground electrical cable, generally housed in fiber or transite conduit. Therefore, asbestos was included as a COPC for the 100-B-35:1 subsite.

Radiological activity was undetected during confirmatory and remediation activities; therefore, radionuclides are not COPCs for the 100-B-35:1 subsite.

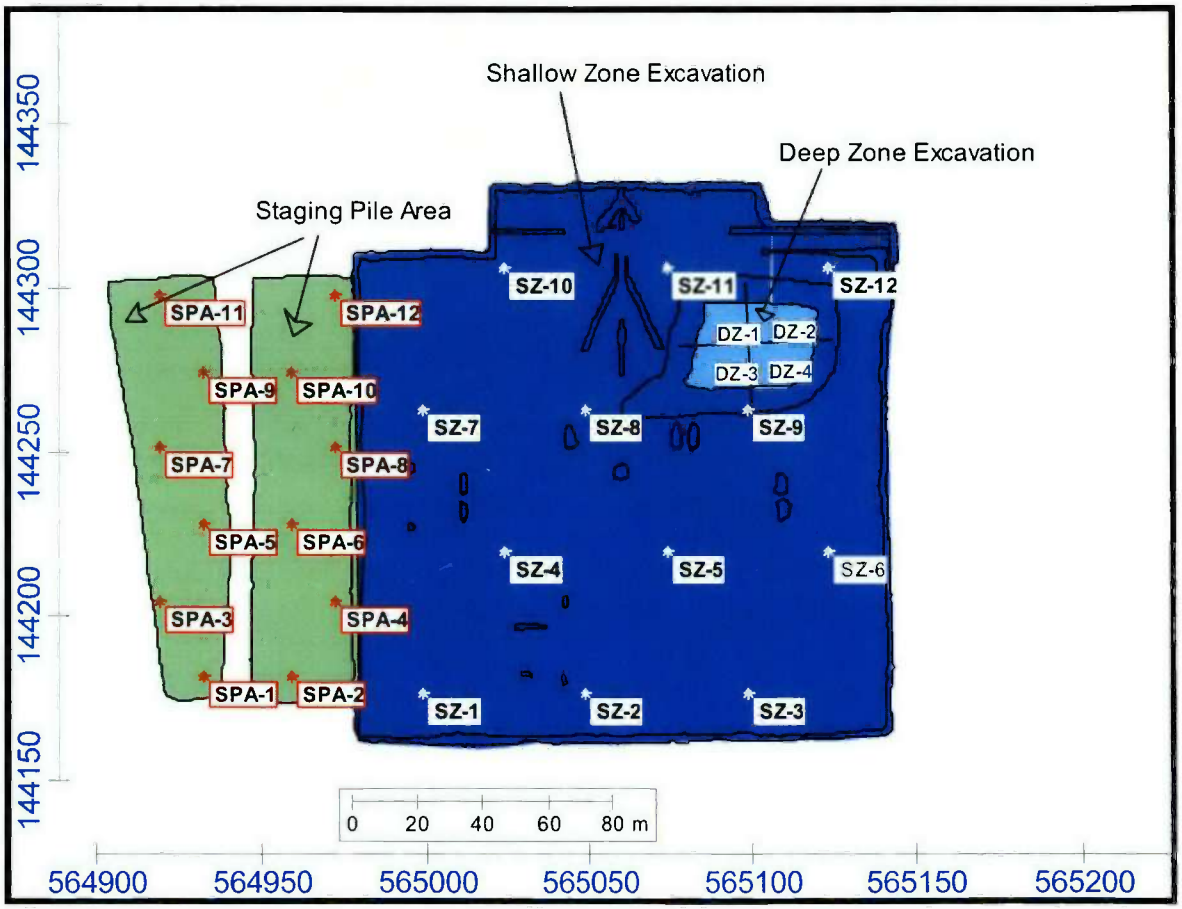
Verification Sampling Design

Three decision units were identified for the 100-B-35:1 subsite and include the waste staging pile area and the shallow zone and deep zone excavation areas. The statistical sampling design for the staging pile area and shallow zone decision units was developed using Visual Sample Plan[1] (VSP). The staging pile area and the shallow zone excavation areas were delineated in VSP and used as the basis for a random-start systematic grid for verification soil sample collection at

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

the site. Twelve statistical discrete soil samples were collected on the grid within each of the two decision units at the 100-B-35:1 subsite. A triangular grid was used 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 are discussed in the verification work instruction (WCH 2015b) and in regulatory agreements (WCH 2014b). The deep zone decision unit was divided into quadrants for verification sampling. One discrete grab soil sample was collected from each quadrant. The 100-B-35:1 subsite sample locations are shown in Figure 5.

Figure 5. The 100-B-35:1 Subsite Verification Sample Locations.



A summary of the verification samples collected and laboratory analyses performed is provided in Table 1. 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). Table 2 identifies the EPA-approved methods for the analyses performed for verification sampling. Additional information related to verification sampling can be found in the field sampling logbook (WCH 2015a).

Table 1. 100-B-35:1 Subsite Sample Summary.

Sample Location	HEIS Sample Number	WSP Coordinates		Sample Analysis
		Northing (m)	Easting (m)	
SZ-1	J1V4X9/J1V5D2	144176.2	564998.8	ICP metals [a], mercury, PCB, TPH, PAH, asbestos
SZ-2	J1V500/J1V5D3	144176.2	565048.8	
SZ-3	J1V501/J1V5D4	144176.2	565098.8	
SZ-4	J1V502/J1V5D5	144219.5	565023.8	
SZ-5	J1V503/J1V5D6	144219.5	565073.8	
SZ-6	J1V504/J1V5D7	144219.5	565123.8	
SZ-7	J1V505/J1V5D8	144262.8	564998.8	
SZ-8	J1V506/J1V5D9	144262.8	565048.8	
SZ-9	J1V507/J1V5F0	144262.8	565098.8	
SZ-10	J1V508/J1V5F1	144306.1	565023.8	
SZ-11	J1V509/J1V5F2	144306.1	565073.8	
SZ-12	J1V510/J1V5F3	144306.1	565123.8	
DZ-1 [b]	J1V511/J1V5F4	144287.0	565091.9	
DZ-2 [b]	J1V512/J1V5F5	144286.7	565109.3	
DZ-3 [b]	J1V513/J1V5F6	144274.6	565091.8	
DZ-4 [b]	J1V514/J1V5F7	144276.8	565107.9	
Duplicate of J1V511/ J1V5F4	J1V515/J1V5F8	144287.0	565091.9	
SPA-1	J1V598/J1V5F9	144181.6	564932.0	ICP metals [a], mercury, PCB, TPH, PAH, asbestos
SPA-2	J1V599/J1V5H0	144181.6	564958.9	
SPA-3	J1V5C0/J1V5H1	144204.8	564918.6	
SPA-4	J1V5C1/J1V5H2	144204.8	564972.3	
SPA-5	J1V5C2/J1V5H3	144228.1	564932.0	
SPA-6	J1V5C3/J1V5H4	144228.1	564958.9	
SPA-7	J1V5C4/J1V5H5	144251.4	564918.6	
SPA-8	J1V5C5/J1V5H6	144251.4	564972.3	
SPA-9	J1V5C6/J1V5H7	144274.6	564932.0	
SPA-10	J1V5C7/J1V5H8	144274.6	564958.9	
SPA-11	J1V5C8/J1V5H9	144297.9	564918.6	
SPA-12	J1V5C9/J1V5J0	144297.9	564972.3	
Duplicate of J1V5C9/J1V5J0	J1V5D0/J1V5J1	144297.9	564972.3	
Equipment blank	J1V5D1	NA	NA	ICP metals [a], mercury

[a] Analysis was performed for the expanded list of ICP metals and included antimony, arsenic, barium, beryllium, boron, cadmium, chromium(total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc.

[b] Focused samples collected from the excavation deep zone.

HEIS = Hanford Environmental Information System
ICP = inductively coupled plasma
NA = not applicable
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
TPH = total petroleum hydrocarbons
WSP = Washington State Plane

Table 2. Laboratory Analytical Methods for the 100-B-35:1 Subsite.

Analytical Method	COC/COPC
ICP metals – EPA Method 6010	ICP metals [a]
Mercury – EPA Method 7471	Mercury
PCB – EPA Method 8082	Polychlorinated biphenyls
TPH – NWTPH-Dx	Total petroleum hydrocarbons
PAH – EPA Method 8310	PAH
Bulk asbestos – NIOSH Method 7400	Asbestos

[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 in the analytical results package.

COC = contaminant of concern
COPC = contaminant of potential concern
EPA = U.S. Environmental Protection Agency
ICP = inductively coupled plasma
NIOSH = National Institute for Occupational Safety and Health
NWTPH-Dx = Northwest total petroleum hydrocarbons-diesel range organics
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
TPH = total petroleum hydrocarbons

Verification Sampling Results

All verification samples were analyzed using analytical methods approved by EPA (DOE-RL 2009b). Evaluation of the verification data from the 100-B-35:1 subsite was performed by direct comparison of the statistical or maximum sample results for each COPC 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 COPC are computed for each of the 100-B-35:1 decision units as specified by the 100 Area RDR/RAWP (DOE-RL 2009b). The calculations are provided in Appendix B. When a nonradionuclide COPC was detected in fewer than 50% of the verification samples collected for a decision unit, the maximum detected value was used for comparison to remedial action goals (RAGs). If no detections for a given COPC were reported in the data set, then no statistical calculation or evaluation was performed for that COPC.

Comparisons of the results for site COPCs with the RAGs for each of the 100-B-35:1 decision units are listed in Tables 3, 4, and 5. Contaminants that were not detected by laboratory analysis are excluded from these tables. Calculated cleanup levels are not presented in the Cleanup Levels and Risk Calculations Database (Ecology 2015) 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 COPCs and are also not included in these tables.

Table 3. Comparison of Contaminant Concentrations to Action Levels for the 100-B-35:1 Shallow Zone Statistical Verification Samples. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Antimony	1.1 (<BG)	32	5 [c]	5 [c]	No	--
Arsenic	5.2 (<BG)	20 [c]	20 [c]	20 [c]	No	--
Barium	65.9 (<BG)	5,600	200	400	No	--
Beryllium	0.19 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	1.4	7,200	320	-- [f]	No	--
Cadmium [g]	0.15 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium	9.0 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	9.3 (<BG)	24	15.7 [c]	-- [f]	No	--
Copper	19.6 (<BG)	2,960	59.2	22.0 [c]	No	--
Lead	6.7 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	371 (<BG)	3,760	512 [c]	512 [c]	No	--
Mercury	0.016 (<BG)	24	0.33 [c]	0.33 [c]	No	--
Molybdenum [e]	0.37	400	8	-- [f]	No	--
Nickel	12.9 (<BG)	1,600	19.1 [c]	27.4	No	--
Vanadium	61.5 (<BG)	560	85.1 [c]	-- [f]	No	--
Zinc	61.1 (<BG)	24,000	480	67.8 [c]	No	--
TPH – diesel	8.8	200	200	200	No	--
TPH – diesel EXT	11	200	200	200	No	--
Aroclor-1254	0.0074	0.5	0.017 [h]	0.017 [h]	No	--
Aroclor-1260	0.0030	0.5	0.017 [h]	0.017 [h]	No	--
Benzo(a)anthracene	0.017	1.37	0.015 [h]	0.015 [h]	Yes	Yes [i]
Benzo(a)pyrene	0.017	0.137	0.015 [h]	0.015 [h]	Yes	Yes [i]
Benzo(b)fluoranthene	0.065	1.37	0.015 [h]	0.015 [h]	Yes	Yes [i]
Benzo(ghi)perylene [j]	0.055	2,400	48	192	No	--
Benzo(k)fluoranthene	0.010	1.37	0.015 [h]	0.015 [h]	No	--
Chrysene	0.019	13.7	0.12	0.1 [h]	No	--
Fluoranthene	0.017	3,200	64	18.0	No	--
Indeno(1,2,3-cd) pyrene	0.051	1.37	0.33 [h]	0.33 [h]	No	--

Table 3. Comparison of Contaminant Concentrations to Action Levels for the 100-B-35:1 Shallow Zone Statistical Verification Samples. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Pyrene	0.023	2,400	48	192	No	--

[a] RAGs obtained from the 100 Area RDR/RAWP (DOE-RL 2009b).

[b] Maximum or 95% UCL, depending on data censorship, as described in the *100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations* (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 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL 2009b).

[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.

[f] No parameters (bioconcentration factors or ambient water quality criteria values) are available from the Washington State Department of Ecology Cleanup Levels and Risk Calculations database (Ecology 2015) or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], Ecology 1996 [Method B for surface waters]).

[g] Hanford Site-specific background value is not available; it was not evaluated during background study. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).

[h] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996). The cited RDLs are based on EPA-approved analytical methods that may not be available for rapid turnaround analyses. Prior notification and concurrence with the laboratory may be necessary to analyze to meet this RDL. Actual detection limits may differ from any RDL.

[i] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of benzo(a)anthracene, benzo(a)pyrene and benzo(b)fluoranthene are not predicted to migrate vertically within 1,000 years (based on the lowest distribution coefficient of the contaminant exceeding RAGs, benzo(a)anthracene, with a distribution coefficient value of 360 mL/g). A contaminant with a distribution coefficient of 80 mL/g or greater is not predicted to migrate vertically through the soil. The distance to groundwater from the bottom of the excavation area is 17.5 m (57.4 ft). Therefore, residual concentrations of these constituents are predicted to be protective of groundwater and the Columbia River.

[j] Toxicity data for this chemical are not available. Cleanup levels are based on the following surrogate chemicals: benzo(g,h,i)perylene, surrogate: pyrene.

-- = not applicable
BG = background
COPC = contaminant of potential concern
EPA = U.S. Environmental Protection Agency
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
TPH = total petroleum hydrocarbons
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Table 4. Comparison of Contaminant Concentrations to Action Levels for the 100-B-35:1 Staging Pile Area Statistical Verification Samples. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Arsenic	3.5 (<BG)	20 [c]	20 [c]	20 [c]	No	--
Barium	71.1 (<BG)	5,600	200	400	No	--
Beryllium	0.33 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	1.4	7,200	320	-- [f]	No	--
Cadmium [g]	0.12 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium	11.9 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	8.5 (<BG)	24	15.7 [c]	-- [f]	No	--
Copper	18.0 (<BG)	2,960	59.2	22.0 [c]	No	--
Lead	5.8 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	370 (<BG)	3,760	512 [c]	512 [c]	No	--
Mercury	0.010 (<BG)	24	0.33 [c]	0.33 [c]	No	--
Nickel	12.4 (<BG)	1,600	19.1 [c]	27.4	No	--
Selenium [g]	0.84	400	5	1	No	--
Silver	0.15 (<BG)	400	8	0.73 [c]	No	--
Vanadium	63.2 (<BG)	560	85.1 [c]	-- [f]	No	--
Zinc	47.0 (<BG)	24,000	480	67.8 [c]	No	--
TPH – diesel range	3.0	200	200	200	No	--
TPH – diesel range EXT	4.4	200	200	200	No	--
Benzo(a)anthracene	0.032	1.37	0.015 [h]	0.015 [h]	Yes	Yes [i]
Benzo(a)pyrene	0.026	0.137	0.015 [h]	0.015 [h]	Yes	Yes [i]
Benzo(b)fluoranthene	0.033	1.37	0.015 [h]	0.015 [h]	Yes	Yes [i]
Benzo(ghi)perylene [j]	0.024	2,400	48	192	No	--
Benzo(k)fluoranthene	0.014	1.37	0.015 [h]	0.015 [h]	No	--
Chrysene	0.037	13.7	0.12	0.1 [h]	No	--
Fluoranthene	0.060	3,200	64	18.0	No	--
Indeno(1,2,3-cd) pyrene	0.021	1.37	0.33 [h]	0.33 [h]	No	--
Phenanthrene [j]	0.044	24,000	240	1,920	No	--

Table 4. Comparison of Contaminant Concentrations to Action Levels for the 100-B-35:1 Staging Pile Area Statistical Verification Samples. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Pyrene	0.077	2,400	48	192	No	--

[a] RAGs obtained from the 100 Area RDR/RAWP (DOE-RL 2009b).

[b] Maximum or 95% UCL, depending on data censorship, as described in the *100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations* (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 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL 2009b).

[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.

[f] No parameters (bioconcentration factors or ambient water quality criteria values) are available from the Washington State Department of Ecology Cleanup Levels and Risk Calculations database (Ecology 2015) or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], Ecology 1996 [Method B for surface waters]).

[g] Hanford Site-specific background value is not available; it was not evaluated during background study. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).

[h] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996). The cited RDLs are based on EPA-approved analytical methods that may not be available for rapid turnaround analyses. Prior notification and concurrence with the laboratory may be necessary to analyze to meet this RDL. Actual detection limits may differ from any RDL.

[i] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene are not predicted to migrate vertically within 1,000 years (based on the lowest distribution coefficient of the contaminant exceeding RAGs, benzo(a)anthracene, with a distribution coefficient value of 360 mL/g). A contaminant with a distribution coefficient of 80 mL/g or greater is not predicted to migrate vertically through the soil. The distance to groundwater from the bottom of the excavation area is 17.5 m (57.4 ft). Therefore, residual concentrations of these constituents are predicted to be protective of groundwater and the Columbia River.

[j] Toxicity data for this chemical are not available. Cleanup levels are based on surrogate chemicals:
benzo(g,h,i)perylene, surrogate: pyrene.
phenanthrene; surrogate: anthracene

-- = not applicable
BG = background
COPC = contaminant of potential concern
EPA = U.S. Environmental Protection Agency
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
TPH = total petroleum hydrocarbons
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Table 5. Comparison of Contaminant Concentrations to Action Levels for the 100-B-35:1 Deep Zone Excavation Focused Verification Samples.

COPC	Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]		Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Antimony	1.3 (<BG)	5 [c]	5 [c]	No	--
Arsenic	9.6	20 [c]	20 [c]	No	--
Barium	81.6 (<BG)	200	400	No	--
Beryllium	0.28 (<BG)	1.51 [c]	1.51 [c]	No	--
Boron [d]	1.5	320	-- [e]	No	--
Cadmium [f]	0.22 (<BG)	0.81 [c]	0.81 [c]	No	--
Chromium	15.3 (<BG)	18.5 [c]	18.5 [c]	No	--
Cobalt	11.9 (<BG)	15.7 [c]	-- [e]	No	--
Copper	23.2	59.2	22.0 [c]	Yes	Yes [g]
Lead	12.2	10.2 [c]	10.2 [c]	Yes	Yes [g]
Manganese	502 (<BG)	512 [c]	512 [c]	No	--
Nickel	17.5 (<BG)	19.1 [c]	27.4	No	--
Vanadium	72.2 (<BG)	85.1 [c]	-- [e]	No	--
Zinc	59.9 (<BG)	480	67.8 [c]	No	--
TPH – diesel	55	200	200	No	--
TPH – diesel EXT	58	200	200	No	--
Aroclor-1260	0.026	0.017 [h]	0.017 [h]	Yes	Yes [g]

[a] RAGs obtained from the 100 Area RDR/RAWP (DOE-RL 2009b).
[b] Maximum as described in the *100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations* (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 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL 2009b).
[d] No Hanford Site-specific or Washington State background value available.
[e] No parameters (bioconcentration factors or ambient water quality criteria values) are available from the Washington State Department of Ecology Cleanup Levels and Risk Calculations database (Ecology 2015) or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], Ecology 1996 [Method B for surface waters]).
[f] Hanford Site-specific background value is not available; it was not evaluated during background study. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).
[g] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of copper, lead and aroclor-1260 are not predicted to migrate more than 2.6 m (8.5 ft) vertically within 1,000 years (based on the lowest distribution coefficient of the contaminants exceeding the RAGs, copper, with a distribution coefficient value of 22 mL/g). The distance to groundwater from the bottom of the excavation area is 17.5 m (57.4 ft). Therefore, residual concentrations of these constituents are predicted to be protective of groundwater and the Columbia River.
[h] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996). The cited RDLs are based on EPA-approved analytical methods that may not be available for rapid turnaround analyses. Prior notification and concurrence with the laboratory may be necessary to analyze to meet this RDL. Actual detection limits may differ from any RDL.

-- = not applicable
BG = background
COPC = contaminant of potential concern
EPA = U.S. Environmental Protection Agency
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
TPH = total petroleum hydrocarbons
WAC = *Washington Administrative Code*

The complete laboratory results are stored in a WCH project-specific database prior to submitting to the Hanford Environmental Information System for archiving and are provided in Appendix B.

DATA EVALUATION

This section demonstrates that remedial actions at the 100-B-35:1 subsite have achieved the applicable RAGs developed to support unrestricted land use at the 100 Area as established in the Remaining Sites ROD (EPA 1999) and documented in the 100 Area RDR/RAWP (DOE-RL 2009b).

Nonradionuclide Soil RAGs for Direct Exposure and Groundwater and River Protection Attained

All COPCs for all sampling areas were quantified below their respective soil RAGs or lookup values with the exception of lead, copper, aroclor-1260, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene in comparison against the soil RAGs for groundwater and/or river protection in the site excavation and staging pile area decision units. However, given the lowest soil-partitioning coefficient of these contaminants (copper) of 22 mL/g, none would be expected to migrate more than 2.6 m (8.5 ft) vertically in 1,000 years based on RESidual RADioactivity modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b). The vadose zone beneath the 100-B-35:1 subsite excavation is approximately 17.5 m (57.4 ft) thick. Therefore, residual concentrations of lead, copper, aroclor-1260, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene are predicted to be protective of groundwater and, thus, the Columbia River.

Three-Part Test for Nonradionuclides

A RAG requirement for nonradionuclides is the WAC 173-340-740(7)(e) three-part test, which consists of the following criteria: (1) the cleanup verification 95% UCL value must be less than the cleanup level, (2) no single detection shall exceed two times the cleanup criteria, and (3) the percentage of samples exceeding the cleanup criteria must be less than 10% of the data set.

The application of the three-part test for the 100-B-35:1 subsite is included in the statistical calculations, where half or more of the data set analyses were detected (Appendix B). The results of this evaluation indicate that all residual COPC concentrations pass the three-part test in comparison against applicable RAGs.

Nonradionuclide Direct Contact Hazard Quotient and Carcinogenic Risk RAGs Attained

Nonradionuclide risk 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}. Hazard quotient and excess carcinogenic risk calculations for direct contact were conservatively performed for the shallow zone excavation area and staging pile area in Appendix B using the highest of the statistical values. For the 100-B-35:1 subsite, these risk values were not calculated for

constituents that were either not detected or were detected at concentrations below Hanford Site or Washington State background. All individual hazard quotients are below 1.0, and all individual excess carcinogenic risk values are below 1×10^{-6}. The direct contact cumulative hazard quotient for the 100-B-35:1 subsite is 7.9×10^{-3}, and the cumulative excess carcinogenic risk value is 3.3×10^{-7}, satisfying the criteria to be less than 1.0 and less than 1×10^{-5}, respectively. Therefore, the 100-B-35:1 subsite meets the requirements for the direct contact hazard quotient and excess carcinogenic risk as identified in the 100 Area RDR/RAWP (DOE-RL 2009b).

DATA QUALITY ASSESSMENT

A data quality assessment (DQA) was performed to compare the verification sampling approach, the field logbook (WCH 2015a), and resulting analytical data with the sampling and data quality requirements specified by the project objectives and performance specifications. The DQA for the 100-B-35:1 subsite 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 WCH project-specific database for data evaluation prior to its archival in Hanford Environmental Information System and are summarized in Appendix B. The detailed DQA is presented in Appendix C.

SUMMARY FOR INTERIM CLOSURE

The 100-B-35:1 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 COPCs at this subsite 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-B-35:1 subsite to Interim Closed Out. After remediation, residual contamination above direct exposure levels was not observed in the shallow or deep zone soils; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone are not required.

REFERENCES

40 CFR 141, "National Primary Drinking Water Regulations," *Code of Federal Regulations*, as amended.

BHI, 2001, *Calculation of Total Uranium Activity Corresponding to a Maximum Contaminant Level for Total Uranium of 30 Micrograms per Liter in Groundwater*, 0100X-CA-V0038, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

BPA, 1993, *151 B Substation Bus Layout Elevations*, H-1-15900, Sheet 4, Rev.0, Bonneville Power Administration, Portland, Oregon.

DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, as amended, U.S. Department of Energy, Washington, D.C.

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.

DOE-RL, 2009b, *Remedial Design Report/Remedial Action Work Plan for the 100 Area,* DOE/RL-96-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 2011, *Tri-Party Agreement Handbook Management Procedures,* RL-TPA-90-0001, Rev. 2, Guideline Number TPA-MP-14, "Maintenance of the Waste Information Data System (WIDS)," U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, 1994, *Natural Background Soil Metals Concentrations in Washington State*, Publication 94-115, Washington State Department of Ecology, Olympia, Washington.

Ecology, 1996, "Model Toxics Control Act Cleanup," *Washington Administrative Code* (WAC) 173-340, Washington State Department of Ecology, Olympia, Washington.

Ecology, 2015, Cleanup Levels and Risk Calculations (CLARC) Database, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

ENV-1, *Environmental Monitoring & Management*, Washington Closure Hanford, Richland, Washington.

EPA, 1989, *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A),* Interim Final, EPA/540/1-89/002, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1999, *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*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

EPA, 2009, *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

GE, 1951, *Enlarged 151-B Substation Underground Arrangement*, P-5604, Sheet 1, Rev.8, General Electric Company, Richland, Washington.

GE, 1963, *Description of the 100-B, 100-C, 100-D, 100-DR, 100-F and 100-H Production Reactor Plants*, HW-74094, Vol. 3, General Electric Company, Richland, Washington.

GE, 1967, *100-B Area Electrical Distribution Map,* H-1-5126, Sheet 3, Rev. 7, General Electric Company, Richland, Washington.

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

WAC 173-340, "Model Toxics Control Act—Cleanup," *Washington Administrative Code.*

WCH, 2012, 151B DEM 100BArea *Cold and Dark Original,* CCN 0638867, Washington Closure Hanford, Richland, Washington.

WCH, 2014a, *Facility Status Change Form, 100B, 151B Primary Electrical Substation, General Hanford Site Decommissioning Activities*, D4-100B-004, Washington Closure Hanford, Richland, Washington.

WCH, 2014b, *100-B-35:1, 100-B Primary Substation for Remedial Action*, CCN 175652 to D. F. Obenauer from T. Q. Howell, Washington Closure Hanford, Richland, Washington, April 24.

WCH, 2015a, *IU-2/6 and Segment 4 Miscellaneous Restoration Sites*, Logbook EL-1667-03, pp. 9-12, Washington Closure Hanford, Richland, Washington.

WCH, 2015b, *Work Instruction for Verification Sampling of the 100-B-35:1, 151-B Primary Substation Subsite,* 0100B-WI-G0040, Rev. 0, Washington Closure Hanford, Richland, Washington.

WCH, 2015c, "Concrete Duct at 100-B-35 (Regulatory Agreement)," CCN 178737 to D. G. Saueressig, Washington Closure Hanford, from L. Buelow, U.S. Environmental Protection Agency, Richland, Washington, March 4.

WDOH, 1997, *Hanford Guidance for Radiological Cleanup*, WDOH/320-015, Rev. 1, Washington State Department of Health, Olympia, Washington.

APPENDIX A

IN-PROCESS SAMPLING RESULTS

Table 1. 100-B-35:1 Subsite In-process Sampling Results -TPH (Page 1 of 10).								
Sample Location	HEIS Number	Sample Date	TPH - diesel range			TPH - motor oil (high boiling)		
			ug/kg	Q	PQL	ug/kg	Q	PQL
A-7	J1TXF4	8/7/2014	7960	X	2310	15400	BX	2310
A-20 west	J1TXH7	8/19/2014	1050000	D	45100	638000	BD	45100
A-11	J1TXJ1	8/11/2014	13400	X	2270	18900	BX	2270
A-13	J1TXJ3	8/11/2014	5360	JX	2250	23700	BX	2250
A-14	J1TXJ5	8/12/2014	2280	UX	2280	6220	JX	2280
A-17	J1TXJ8	8/12/2014	5260	JX	2280	46000	X	2280
A-24	J1TXK3	8/20/2014	2250	UX	2250	6400	BJX	2250
A-25	J1TXK4	8/20/2014	97300	X	2250	77300	BX	2250
A-51	J1TXW8	9/16/2014	2200	U	2200	3300	J	2200
A-52	J1TXW9	9/16/2014	2200	U	2200	7230		2200
A-53	J1TXX0	9/16/2014	2220	U	2220	4200	J	2220
A-54	J1TXX1	9/16/2014	2190	U	2190	3100	J	2190
A-55	J1TXX2	9/16/2014	2210	U	2210	7260		2210
A-56	J1TXX3	9/16/2014	2270	U	2270	5930	J	2270
A-57	J1TXX4	9/16/2014	169000	D	4480	105000	D	4480
A-58	J1TXX5	9/16/2014	10200		2270	18200		2270
A-59	J1TXX6	9/16/2014	6310	J	2240	9180		2240
A-60	J1TXX7	9/16/2014	2260	U	2260	4410	J	2260
A-46	J1TXX8	9/3/2014	2260	UX	2260	4830	BJX	2260
A-47	J1TXX9	9/3/2014	64700	X	10700	58100	BX	10700
A-48	J1V000	9/3/2014	5580	JX	2280	12000	BX	2280
A-49	J1V001	9/3/2014	37200	X	2290	14300	BX	2290
A-50	J1V002	9/3/2014	18100	X	2260	3850	BJX	2260
A-61	J1V0H5	9/22/2014	2280	U	2280	8150		2280
A-62	J1V0H6	9/22/2014	2210	U	2210	3880	BJ	2210
A-63	J1V0H7	9/22/2014	2180	U	2180	5880	BJ	2180
A-64	J1V0H8	9/22/2014	2180	U	2180	20100	B	2180
A-65	J1V0H9	9/22/2014	2190	U	2190	9770	B	2190
A-66	J1V0J0	9/22/2014	2180	U	2180	7750	B	2180
A-67	J1V0J1	9/22/2014	2180	U	2180	16200		2180
A-68	J1V0J2	9/22/2014	2180	U	2180	20300	B	2180
A-69	J1V0J3	9/22/2014	2180	U	2180	10300	B	2180
A-70	J1V0J4	9/22/2014	2180	U	2180	9960	B	2180
A-71	J1V0J5	9/22/2014	2180	U	2180	12900		2180
stained area	J1V0J6	9/22/2014	2330	J	2230	10900		2230
A-72	J1V0L3	10/1/2014	2270	U	2270	46700		2270
A-73	J1V0L4	10/1/2014	2240	U	2240	11500		2240
A-74	J1V0L5	10/1/2014	2230	U	2230	8580		2230
A-75	J1V0L6	10/1/2014	2230	U	2230	3600	J	2230
A-76	J1V0L7	10/1/2014	2210	U	2210	3540	J	2210
A-77	J1V0L8	10/1/2014	2200	U	2200	3410	J	2200
FS-1	J1V0L9	10/9/2014	2850	J	2240	8810		2240
FS-2	J1V0M0	10/9/2014	2250	U	2250	5550	J	2250
SPA-1	J1V102	10/8/2014	2230	U	2230	4210	J	2230
SPA-2	J1V103	10/8/2014	2190	U	2190	4790	J	2190
SPA-3	J1V104	10/8/2014	2210	U	2210	7050		2210
SPA-4	J1V105	10/8/2014	2260	U	2260	3510	J	2260
SPA-5	J1V106	10/8/2014	2230	U	2230	4840	J	2230
SPA-6	J1V107	10/8/2014	2280	U	2280	7360		2280
A-78	J1V156	10/13/2014	2270	U	2270	17100		2270

Table 1. 100-B-35:1 Subsite In-process Sampling Results -TPH (Page 2 of 10).								
Sample Location	HEIS Number	Sample Date	TPH - diesel range			TPH - motor oil (high boiling)		
			ug/kg	Q	PQL	ug/kg	Q	PQL
A-79	J1V157	10/13/2014	2220	U	2220	19900		2220
A-80	J1V158	10/13/2014	2300	U	2300	8400		2300
A-81	J1V159	10/13/2014	3480	J	2270	16300		2270
A-57 resample	J1V160	10/13/2014	3940	J	2280	11800		2280
A-20 resample	J1V161	10/13/2014	197000	D	11700	177000	D	11700
A-20	J1V175	10/23/2014	511000	D	24200	291000	D	24200
A-20	J1V176	10/23/2014	2310	U	2310	26700		2310
Resample A-20 E.S.W.	J1V1C8	11/3/2014	2290	U	2290	2290	U	2290
FS-3 E.S.W.	J1V1C9	11/3/2014	36400		2350	27600		2350
Resample A-20 E.	J1V1D8	11/3/2014	152000	D	5150	135000	D	5150
A-20 W.	J1V1D9	11/3/2014	168000	D	4820	111000	D	4820
A-20 N. Side Wall	J1V1F0	11/3/2014	2270	U	2270	2370	J	2270
FS-1	J1V1F1	11/3/2014	1900000	D	130000	1450000	D	130000
FS-2	J1V1F2	11/3/2014	6570000	D	278000	3440000	D	278000
Resample A-20 S.S.W.	J1V1N7	11/3/2014	2470	J	2300	6040	J	2300
FS-4 W.S.W.	J1V1N8	11/3/2014	20000		2410	14400		2410
FS-5 S.S.W.	J1V1N9	11/3/2014	183000	D	11700	191000	D	11700
N1	J1V216	1/19/2015	2330	U	2330	3180	J	2330
N2	J1V217	1/19/2015	2350	U	2350	2540	J	2350
N3	J1V218	1/19/2015	2430	U	2430	3030	J	2430
N4	J1V219	1/19/2015	2440	U	2440	2440	U	2440
E1	J1V220	1/19/2015	2420	U	2420	2420	U	2420
E2	J1V221	1/19/2015	2340	U	2340	2780	J	2340
E3	J1V222	1/19/2015	2410	U	2410	2410	U	2410
E4	J1V223	1/19/2015	2400	U	2400	2400	U	2400
S1	J1V224	1/19/2015	2390	U	2390	3140	J	2390
S2	J1V225	1/19/2015	2440	U	2440	3620	J	2440
S3	J1V229	1/19/2015	2320	U	2320	2540	J	2320
S4	J1V230	1/19/2015	2320	U	2320	2650	J	2320
W1	J1V231	1/19/2015	1020000	D	59700	508000	D	59700
W2	J1V232	1/19/2015	2360	U	2360	3030	J	2360
W3	J1V233	1/19/2015	472000	D	47500	213000	D	47500
W4	J1V234	1/19/2015	2370	U	2370	3570	J	2370
F1	J1V2X6	1/14/2015	258000	D	12500	136000	D	12500
F2	J1V2X7	1/15/2015	1120000	D	52200	539000	D	52200
F3	J1V2X8	1/14/2015	604000	D	27000	331000	D	27000
F4	J1V2X9	1/14/2015	2710	U	2710	4810	J	2710
F5	J1V300	1/14/2015	4590	J	2380	6960	J	2380
F6	J1V301	1/14/2015	2420	U	2420	5070	J	2420
A1	J1V4H4	2/11/2015	64600		2330	39500		2330
A2	J1V4H5	2/11/2015	51300		2310	27600		2310
A3	J1V4H6	2/11/2015	18200		2440	12000		2440
A4	J1V4H7	2/11/2015	3830	J	2410	3270	J	2410

Table 1. 100-B-35:1 Subsite In-process Sampling Results - PCBs (Page 3 of 10).

Sample Location	HEIS Number	Sample Date	Aroclor-1016			Aroclor-1221			Aroclor-1232			Aroclor-1242			Aroclor-1248			Aroclor-1254		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
A-1 south	J1TXD8	8/5/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-2 mid	J1TXD9	8/5/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-3 north	J1TXF0	8/5/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.48	J	1.14
A-4 north	J1TXF1	8/6/2014	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15
A-5 south	J1TXF2	8/6/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-6	J1TXF3	8/7/2014	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	3.89		1.15
A-7	J1TXF4	8/7/2014	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19	31.3		1.19
A-8	J1TXF5	8/7/2014	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18
A-9	J1TXF6	8/7/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
A-18 east	J1TXH5	8/19/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	5.60		1.16
A-19 middle	J1TXH6	8/19/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-20 west	J1TXH7	8/19/2014	23.1	DU	23.1	23.1	DU	23.1	23.1	DU	23.1	23.1	DU	23.1	23.1	DU	23.1	23.1	DU	23.1
A-10	J1TXJ0	8/11/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	2.08	J	1.13
A-11	J1TXJ1	8/11/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	29.7		1.17
A-12	J1TXJ2	8/11/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
A-13	J1TXJ3	8/11/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16
A-14	J1TXJ5	8/12/2014	5.82	DU	5.82	5.82	DU	5.82	5.82	DU	5.82	5.82	DU	5.82	5.82	DU	5.82	165	D	5.82
A-15	J1TXJ6	8/12/2014	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	5.50		1.18
A-16	J1TXJ7	8/12/2014	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	2.96	J	1.18
A-17	J1TXJ8	8/12/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	4.61		1.17
FS-stained soil	J1TXJ9	8/12/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	5.70		1.17
A-21	J1TXK0	8/20/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16
A-22	J1TXK1	8/20/2014	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18
A-23	J1TXK2	8/20/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.84	J	1.16
A-24	J1TXK3	8/20/2014	2.32	DU	2.32	2.32	DU	2.32	2.32	DU	2.32	2.32	DU	2.32	2.32	DU	2.32	128	D	2.32
A-25	J1TXK4	8/20/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	4.86		1.16
A-26	J1TXK5	8/25/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-27	J1TXK6	8/25/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-28	J1TXK7	8/25/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-29	J1TXK8	8/25/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-30	J1TXK9	8/25/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-31	J1TXT7	8/25/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-32	J1TXT8	8/25/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-33	J1TXT9	8/25/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-34	J1TXV2	8/27/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-35	J1TXV3	8/27/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-36	J1TXV4	8/27/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14

Table 1. 100-B-35:1 Subsite In-process Sampling Results - PCBs (Page 4 of 10).

Sample Location	HEIS Number	Sample Date	Aroclor-1016			Aroclor-1221			Aroclor-1232			Aroclor-1242			Aroclor-1248			Aroclor-1254		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
A-37	J1TXV5	8/27/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-38	J1TXV6	8/27/2014	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	5.31		1.15
A-39	J1TXV7	8/27/2014	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15
A-40	J1TXV8	8/27/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-41	J1TXW3	8/28/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	15.4		1.14
A-42	J1TXW4	8/28/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	2.78	J	1.14
A-43	J1TXW5	8/28/2014	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19
A-44	J1TXW6	8/28/2014	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15
A-45	J1TXW7	8/28/2014	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15
A-51	J1TXW8	9/16/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-52	J1TXW9	9/16/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-53	J1TXX0	9/16/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-54	J1TXX1	9/16/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-55	J1TXX2	9/16/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-56	J1TXX3	9/16/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
A-57	J1TXX4	9/16/2014	5.74	DU	5.74	5.74	DU	5.74	5.74	DU	5.74	5.74	DU	5.74	5.74	DU	5.74	141	D	5.74
A-58	J1TXX5	9/16/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16
A-59	J1TXX6	9/16/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	15.4		1.14
A-60	J1TXX7	9/16/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16
A-46	J1TXX8	9/3/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
A-47	J1TXX9	9/3/2014	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15
A-48	J1V000	9/3/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	2.51	J	1.17
A-49	J1V001	9/3/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
A-50	J1V002	9/3/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16
A-61	J1V0H5	9/22/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.78	J	1.17
A-62	J1V0H6	9/22/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-63	J1V0H7	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-64	J1V0H8	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-65	J1V0H9	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-66	J1V0J0	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-67	J1V0J1	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-68	J1V0J2	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-69	J1V0J3	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-70	J1V0J4	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-71	J1V0J5	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
stained area	J1V0J6	9/22/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-72	J1V0L3	10/1/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	3.04	J	1.16
A-73	J1V0L4	10/1/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	2.56	J	1.14
A-74	J1V0L5	10/1/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.88	JP	1.14

Table 1. 100-B-35:1 Subsite In-process Sampling Results - PCBs (Page 5 of 10).

Sample Location	HEIS Number	Sample Date	Aroclor-1016			Aroclor-1221			Aroclor-1232			Aroclor-1242			Aroclor-1248			Aroclor-1254		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
A-75	J1V0L6	10/1/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.48	J	1.14
A-76	J1V0L7	10/1/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-77	J1V0L8	10/1/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
FS-1	J1V0L9	10/9/2014	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	13.4	P	1.15
FS-2	J1V0M0	10/9/2014	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15
SPA-1	J1V102	10/8/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
SPA-2	J1V103	10/8/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
SPA-3	J1V104	10/8/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
SPA-4	J1V105	10/8/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16
SPA-5	J1V106	10/8/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
SPA-6	J1V107	10/8/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
A-78	J1V156	10/13/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	2.85	J	1.16
A-79	J1V157	10/13/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14	2.50	J	1.14
A-80	J1V158	10/13/2014	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	2.10	J	1.18
A-81	J1V159	10/13/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	2.34	J	1.16
A-57 resample	J1V160	10/13/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16
A-20 resample	J1V161	10/13/2014	24.1	DU	24.1	24.1	DU	24.1	24.1	DU	24.1	24.1	DU	24.1	24.1	DU	24.1	24.1	DU	24.1
A-20	J1V175	10/23/2014	6.18	DU	6.18	6.18	DU	6.18	6.18	DU	6.18	6.18	DU	6.18	6.18	DU	6.18	6.18	DU	6.18
A-20	J1V176	10/23/2014	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	8.16	P	1.18
Resample A-20 E.S.W.	J1V1C8	11/3/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
FS-3 E.S.W.	J1V1C9	11/3/2014	1.21	U	1.21	1.21	U	1.21	1.21	U	1.21	1.21	U	1.21	1.21	U	1.21	1.21	U	1.21
Resample A-20 E.	J1V1D8	11/3/2014	13.2	DU	13.2	13.2	DU	13.2	13.2	DU	13.2	13.2	DU	13.2	13.2	DU	13.2	13.2	DU	13.2
A-20 W.	J1V1D9	11/3/2014	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24
A-20 N. Side Wall	J1V1F0	11/3/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	6.02		1.17	1.17	U	1.17	1.17	U	1.17
FS-1	J1V1F1	11/3/2014	13.3	DU	13.3	13.3	DU	13.3	13.3	DU	13.3	13.3	DU	13.3	13.3	DU	13.3	13.3	DU	13.3
FS-2	J1V1F2	11/3/2014	14.3	DU	14.3	14.3	DU	14.3	14.3	DU	14.3	14.3	DU	14.3	14.3	DU	14.3	14.3	DU	14.3
Resample A-20 S.S.W.	J1V1N7	11/3/2014	5.88	DU	5.88	5.88	DU	5.88	5.88	DU	5.88	5.88	DU	5.88	5.88	DU	5.88	5.88	DU	5.88
FS-4 W.S.W.	J1V1N8	11/3/2014	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24
FS-5 S.S.W.	J1V1N9	11/3/2014	119	DU	119	119	DU	119	119	DU	119	119	DU	119	119	DU	119	119	DU	119
N1	J1V216	1/19/2015	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19
N2	J1V217	1/19/2015	1.21	U	1.21	1.21	U	1.21	1.21	U	1.21	1.21	U	1.21	1.21	U	1.21	1.21	U	1.21
N3	J1V218	1/19/2015	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24
N4	J1V219	1/19/2015	1.25	U	1.25	1.25	U	1.25	1.25	U	1.25	1.25	U	1.25	1.25	U	1.25	1.25	U	1.25
E1	J1V220	1/19/2015	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24
E2	J1V221	1/19/2015	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20
E3	J1V222	1/19/2015	1.23	U	1.23	1.23	U	1.23	1.23	U	1.23	1.23	U	1.23	1.23	U	1.23	1.23	U	1.23
E4	J1V223	1/19/2015	1.23	U	1.23	1.23	U	1.23	1.23	U	1.23	1.23	U	1.23	1.23	U	1.23	1.23	U	1.23
S1	J1V224	1/19/2015	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22
S2	J1V225	1/19/2015	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24

Table 1. 100-B-35:1 Subsite In-process Sampling Results - PCBs (Page 6 of 10).

Sample Location	HEIS Number	Sample Date	Aroclor-1016			Aroclor-1221			Aroclor-1232			Aroclor-1242			Aroclor-1248			Aroclor-1254		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
S3	J1V229	1/19/2015	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18
S4	J1V230	1/19/2015	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18
W1	J1V231	1/19/2015	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22
W2	J1V232	1/19/2015	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20
W3	J1V233	1/19/2015	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22
W4	J1V234	1/19/2015	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20
F1	J1V2X6	1/14/2015	1.28	U	1.28	1.28	U	1.28	1.28	U	1.28	1.28	U	1.28	1.28	U	1.28	1.28	U	1.28
F2	J1V2X7	1/15/2015	2.67	DU	2.67	2.67	DU	2.67	2.67	DU	2.67	2.67	DU	2.67	2.67	DU	2.67	2.67	DU	2.67
F3	J1V2X8	1/14/2015	13.8	DU	13.8	13.8	DU	13.8	13.8	DU	13.8	13.8	DU	13.8	13.8	DU	13.8	13.8	DU	13.8
F4	J1V2X9	1/14/2015	1.38	U	1.38	1.38	U	1.38	1.38	U	1.38	1.38	U	1.38	1.38	U	1.38	1.38	U	1.38
F5	J1V300	1/14/2015	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22
F6	J1V301	1/14/2015	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24
A1	J1V4H4	2/11/2015	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19
A2	J1V4H5	2/11/2015	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
A3	J1V4H6	2/11/2015	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24
A4	J1V4H7	2/11/2015	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22

Table 1. 100-B-35:1 Subsite In-process Sampling Results - PCBs (Page 7 of 10).

Sample Location	HEIS Number	Sample Date	Aroclor-1260			Aroclor-1262			Aroclor-1268		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
A-1 south	J1TXD8	8/5/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-2 mid	J1TXD9	8/5/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-3 north	J1TXF0	8/5/2014	1.67	J	1.14	1.14	U	1.14	1.14	U	1.14
A-4 north	J1TXF1	8/6/2014	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15
A-5 south	J1TXF2	8/6/2014	1.60	J	1.13	1.13	U	1.13	1.13	U	1.13
A-6	J1TXF3	8/7/2014	4.41		1.15	1.15	U	1.15	1.15	U	1.15
A-7	J1TXF4	8/7/2014	15.1		1.19	1.19	U	1.19	1.19	U	1.19
A-8	J1TXF5	8/7/2014	1.23	J	1.18	1.18	U	1.18	1.18	U	1.18
A-9	J1TXF6	8/7/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
A-18 east	J1TXH5	8/19/2014	4.69		1.16	1.16	U	1.16	1.16	U	1.16
A-19 middle	J1TXH6	8/19/2014	9.79		1.14	1.14	U	1.14	1.14	U	1.14
A-20 west	J1TXH7	8/19/2014	676	D	23.1	23.1	DU	23.1	23.1	DU	23.1
A-10	J1TXJ0	8/11/2014	2.71	J	1.13	1.13	U	1.13	1.13	U	1.13
A-11	J1TXJ1	8/11/2014	21.5		1.17	1.17	U	1.17	1.17	U	1.17
A-12	J1TXJ2	8/11/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
A-13	J1TXJ3	8/11/2014	28.6		1.16	1.16	U	1.16	1.16	U	1.16
A-14	J1TXJ5	8/12/2014	119	D	5.82	5.82	DU	5.82	5.82	DU	5.82
A-15	J1TXJ6	8/12/2014	4.45		1.18	1.18	U	1.18	1.18	U	1.18
A-16	J1TXJ7	8/12/2014	9.98	P	1.18	1.18	U	1.18	1.18	U	1.18
A-17	J1TXJ8	8/12/2014	9.36		1.17	1.17	U	1.17	1.17	U	1.17
	J1TXJ9	8/12/2014	5.08		1.17	1.17	U	1.17	1.17	U	1.17
A-21	J1TXK0	8/20/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16
A-22	J1TXK1	8/20/2014	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18
A-23	J1TXK2	8/20/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16
A-24	J1TXK3	8/20/2014	95.5	D	2.32	2.32	DU	2.32	2.32	DU	2.32
A-25	J1TXK4	8/20/2014	16.2		1.16	1.16	U	1.16	1.16	U	1.16
A-26	J1TXK5	8/25/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-27	J1TXK6	8/25/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-28	J1TXK7	8/25/2014	1.14	U	1.14	3.41	J	1.14	1.14	U	1.14
A-29	J1TXK8	8/25/2014	1.90	J	1.13	1.13	U	1.13	1.13	U	1.13
A-30	J1TXK9	8/25/2014	2.58	J	1.13	1.13	U	1.13	1.13	U	1.13
A-31	J1TXT7	8/25/2014	7.33		1.14	1.14	U	1.14	1.14	U	1.14
A-32	J1TXT8	8/25/2014	6.92		1.13	1.13	U	1.13	1.13	U	1.13
A-33	J1TXT9	8/25/2014	1.43	J	1.14	1.14	U	1.14	1.14	U	1.14
A-34	J1TXV2	8/27/2014	6.43		1.14	1.14	U	1.14	1.14	U	1.14
A-35	J1TXV3	8/27/2014	5.45		1.14	1.14	U	1.14	1.14	U	1.14
A-36	J1TXV4	8/27/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14

Table 1. 100-B-35:1 Subsite In-process Sampling Results - PCBs (Page 8 of 10).											
	HEIS	Sample	Aroclor-1260			Aroclor-1262			Aroclor-1268		
Sample Location	Number	Date	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
A-37	J1TXV5	8/27/2014	2.27	J	1.14	1.14	U	1.14	1.29	J	1.14
A-38	J1TXV6	8/27/2014	3.90		1.15	1.15	U	1.15	1.15	U	1.15
A-39	J1TXV7	8/27/2014	22.4		1.15	1.15	U	1.15	1.15	U	1.15
A-40	J1TXV8	8/27/2014	25.4		1.14	1.14	U	1.14	1.14	U	1.14
A-41	J1TXW3	8/28/2014	7.71		1.14	1.14	U	1.14	1.14	U	1.14
A-42	J1TXW4	8/28/2014	10.3		1.14	1.14	U	1.14	1.14	U	1.14
A-43	J1TXW5	8/28/2014	2.59	J	1.19	1.19	U	1.19	1.19	U	1.19
A-44	J1TXW6	8/28/2014	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15
A-45	J1TXW7	8/28/2014	1.96	J	1.15	1.15	U	1.15	1.15	U	1.15
A-51	J1TXW8	9/16/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-52	J1TXW9	9/16/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-53	J1TXX0	9/16/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-54	J1TXX1	9/16/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-55	J1TXX2	9/16/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-56	J1TXX3	9/16/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
A-57	J1TXX4	9/16/2014	77.5	D	5.74	5.74	DU	5.74	5.74	DU	5.74
A-58	J1TXX5	9/16/2014	1.45	J	1.16	1.16	U	1.16	1.16	U	1.16
A-59	J1TXX6	9/16/2014	9.86		1.14	1.14	U	1.14	1.14	U	1.14
A-60	J1TXX7	9/16/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16
A-46	J1TXX8	9/3/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
A-47	J1TXX9	9/3/2014	1.67	J	1.15	1.15	U	1.15	1.15	U	1.15
A-48	J1V000	9/3/2014	2.42	J	1.17	1.17	U	1.17	1.17	U	1.17
A-49	J1V001	9/3/2014	2.48	J	1.17	1.17	U	1.17	1.17	U	1.17
A-50	J1V002	9/3/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16
A-61	J1V0H5	9/22/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
A-62	J1V0H6	9/22/2014	2.79	J	1.14	1.14	U	1.14	1.14	U	1.14
A-63	J1V0H7	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-64	J1V0H8	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-65	J1V0H9	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-66	J1V0J0	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
A-67	J1V0J1	9/22/2014	2.49	J	1.12	1.12	U	1.12	1.12	U	1.12
A-68	J1V0J2	9/22/2014	6.63		1.12	1.12	U	1.12	1.12	U	1.12
A-69	J1V0J3	9/22/2014	3.53		1.12	1.12	U	1.12	1.12	U	1.12
A-70	J1V0J4	9/22/2014	2.66	J	1.12	1.12	U	1.12	1.12	U	1.12
A-71	J1V0J5	9/22/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
stained area	J1V0J6	9/22/2014	3.98		1.14	1.14	U	1.14	1.14	U	1.14
A-72	J1V0L3	10/1/2014	1.58	J	1.16	1.16	U	1.16	1.16	U	1.16
A-73	J1V0L4	10/1/2014	1.28	J	1.14	1.14	U	1.14	1.14	U	1.14
A-74	J1V0L5	10/1/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14

Table 1. 100-B-35:1 Subsite In-process Sampling Results - PCBs (Page 9 of 10).

Sample Location	HEIS Number	Sample Date	Aroclor-1260			Aroclor-1262			Aroclor-1268		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
A-75	J1V0L6	10/1/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
A-76	J1V0L7	10/1/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
A-77	J1V0L8	10/1/2014	1.13	U	1.13	1.13	U	1.13	1.13	U	1.13
FS-1	J1V0L9	10/9/2014	9.67		1.15	1.15	U	1.15	1.15	U	1.15
FS-2	J1V0M0	10/9/2014	1.15	U	1.15	1.15	U	1.15	1.15	U	1.15
SPA-1	J1V102	10/8/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
SPA-2	J1V103	10/8/2014	1.12	U	1.12	1.12	U	1.12	1.12	U	1.12
SPA-3	J1V104	10/8/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
SPA-4	J1V105	10/8/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16
SPA-5	J1V106	10/8/2014	1.14	U	1.14	1.14	U	1.14	1.14	U	1.14
SPA-6	J1V107	10/8/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
A-78	J1V156	10/13/2014	2.08	JP	1.16	1.16	U	1.16	1.16	U	1.16
A-79	J1V157	10/13/2014	2.00	J	1.14	1.14	U	1.14	1.14	U	1.14
A-80	J1V158	10/13/2014	1.45	J	1.18	1.18	U	1.18	1.18	U	1.18
A-81	J1V159	10/13/2014	1.37	J	1.16	1.16	U	1.16	1.16	U	1.16
A-57 resample	J1V160	10/13/2014	1.16	U	1.16	1.16	U	1.16	1.16	U	1.16
A-20 resample	J1V161	10/13/2014	304	D	24.1	24.1	DU	24.1	24.1	DU	24.1
A-20	J1V175	10/23/2014	76.2	D	6.18	6.18	DU	6.18	6.18	DU	6.18
A-20	J1V176	10/23/2014	4.72	P	1.18	1.18	U	1.18	1.18	U	1.18
Resample A-20 E.S.W.	J1V1C8	11/3/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
FS-3 E.S.W.	J1V1C9	11/3/2014	21.2		1.21	1.21	U	1.21	1.21	U	1.21
Resample A-20 E.	J1V1D8	11/3/2014	194	D	13.2	13.2	DU	13.2	13.2	DU	13.2
A-20 W.	J1V1D9	11/3/2014	2.07	J	1.24	1.24	U	1.24	1.24	U	1.24
A-20 N. Side Wall	J1V1F0	11/3/2014	1.17	U	1.17	1.17	U	1.17	1.17	U	1.17
FS-1	J1V1F1	11/3/2014	353	D	13.3	13.3	DU	13.3	13.3	DU	13.3
FS-2	J1V1F2	11/3/2014	29.8	DJ	14.3	14.3	DU	14.3	14.3	DU	14.3
Resample A-20 S.S.W.	J1V1N7	11/3/2014	100	D	5.88	5.88	DU	5.88	5.88	DU	5.88
FS-4 W.S.W.	J1V1N8	11/3/2014	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24
FS-5 S.S.W.	J1V1N9	11/3/2014	2050	D	119	119	DU	119	119	DU	119
N1	J1V216	1/19/2015	1.19	U	1.19	1.19	U	1.19	1.19	U	1.19
N2	J1V217	1/19/2015	1.21	U	1.21	1.21	U	1.21	1.21	U	1.21
N3	J1V218	1/19/2015	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24
N4	J1V219	1/19/2015	1.25	U	1.25	1.25	U	1.25	1.25	U	1.25
E1	J1V220	1/19/2015	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24
E2	J1V221	1/19/2015	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20
E3	J1V222	1/19/2015	1.23	U	1.23	1.23	U	1.23	1.23	U	1.23
E4	J1V223	1/19/2015	1.23	U	1.23	1.23	U	1.23	1.23	U	1.23
S1	J1V224	1/19/2015	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22
S2	J1V225	1/19/2015	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24

Table 1. 100-B-35:1 Subsite In-process Sampling Results - PCBs (Page 10 of 10).

Sample Location	HEIS Number	Sample Date	Aroclor-1260			Aroclor-1262			Aroclor-1268		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
S3	J1V229	1/19/2015	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18
S4	J1V230	1/19/2015	1.18	U	1.18	1.18	U	1.18	1.18	U	1.18
W1	J1V231	1/19/2015	52.7		1.22	1.22	U	1.22	1.22	U	1.22
W2	J1V232	1/19/2015	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20
W3	J1V233	1/19/2015	15.4		1.22	1.22	U	1.22	1.22	U	1.22
W4	J1V234	1/19/2015	1.20	U	1.20	1.20	U	1.20	1.20	U	1.20
F1	J1V2X6	1/14/2015	2.54	J	1.28	1.28	U	1.28	1.28	U	1.28
F2	J1V2X7	1/15/2015	43.1	D	2.67	2.67	DU	2.67	2.67	DU	2.67
F3	J1V2X8	1/14/2015	184	D	13.8	13.8	DU	13.8	13.8	DU	13.8
F4	J1V2X9	1/14/2015	3.10	J	1.38	1.38	U	1.38	1.38	U	1.38
F5	J1V300	1/14/2015	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22
F6	J1V301	1/14/2015	1.24	U	1.24	1.24	U	1.24	1.24	U	1.24
A1	J1V4H4	2/11/2015	6.20		1.19	1.19	U	1.19	1.19	U	1.19
A2	J1V4H5	2/11/2015	3.84		1.17	1.17	U	1.17	1.17	U	1.17
A3	J1V4H6	2/11/2015	2.18	J	1.24	1.24	U	1.24	1.24	U	1.24
A4	J1V4H7	2/11/2015	1.22	U	1.22	1.22	U	1.22	1.22	U	1.22

APPENDIX B

CALCULATIONS

APPENDIX B

CALCULATION BRIEFS

The calculations provided in this appendix are copies of the originals that 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 calculations provided in this appendix include the following:

100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations, 0100B-CA-V0346, Rev. 0, Washington Closure Hanford, Richland, Washington.

100-B-35:1 Subsite Direct Contact Hazard Quotient and Carcinogenic Risk Calculation, 0100B-CA-V0347, 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 Area Closure Operations **Job No. 14655**

Area: 100-B

Discipline: Environmental *Calculation No: 0100B-CA-V0346

Subject: 100-B-35:1 Subsite Cleanup Verification 95% UCL Calculation

Computer Program: Excel Program No: Excel 2010

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 = 15 Attm. 1 = 11 Total = 27	I. B. Berezovskiy	J. D. Skoglie	T. Q. Howell	S. G. Wilkinson	5/26/15

SUMMARY OF REVISION

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

Washington Closure Hanford **CALCULATION SHEET**

Originator	I. B. Berezovskiy	**Date** 05/19/15	**Calc. No.** 0100B-CA-V0346	**Rev. No.**	0
Project	100-B Area Closure Operations	**Job No.** 14655	**Checked** J. D. Skoglie	**Date**	05/19/15
Subject	100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations			**Sheet No.**	1 of 15

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 5 - Calculation Sheet Summary
Sheets 6 to 9- Calculation Sheet Verification Data - Excavation and Staging Pile Area.
Sheets 10 to 13 - Ecology Software (MTCAStat) Results
Sheets 14 to 15 - Calculation Sheet Duplicate Analysis
Attachment 1 - 100-B-35:1 Subsite Verification Sampling Results (11 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.
5) DOE-RL, 2009b, *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP), DOE/RL-96-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
6) Ecology, 1992, *Statistical Guidance for Ecology Site Managers*, Publication #92-54, Washington Department of Ecology, Olympia, Washington.
7) Ecology, 1993, *Statistical Guidance for Ecology Site Managers, Supplement S-6, Analyzing Site or Background Data with Below-detection Limit or Below-PQL Values (Censored Data Sets)*, Publication #92-64, Washington Department of Ecology, Olympia, Washington.
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) Ecology, 2014, Cleanup Levels and Risk Calculations (CLARC) Database, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
10) WAC 173-340, 1996, "Model Toxic Control Act - Cleanup," *Washington Administrative Code*.

Solution:
Calculation methodology is described in 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-B-35:1 subsite. The data were entered into an EXCEL 2010 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 this site.

Methodology:
The 100-B-35:1 subsite underwent statistical sampling at two decision units for verification sampling that included excavation and staging pile area. In adddition, four focused samples were collected from the deep zone decision unit.

Analytical results for all sampling locations are summarized in the tables provided on sheets 4 and 5. Further information of the sample data quality is presented in the data quality assessment section of the associated RSVP.

Washington Closure Hanford **CALCULATION SHEET**

Originator I. B. Berezovskiy		**Date** 05/19/15	**Calc. No.** 0100B-CA-V0346	**Rev. No.** 0	
Project 100-B Area Closure Operations		**Job No.** 14655	**Checked** J. D. Skoglie	**Date** 05/19/15	
Subject 100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations				**Sheet No.** 2 of 15	

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 (which includes primary and duplicate samples) 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 (2014) under WAC 173-340-740(3) for aluminum, calcium, iron, magnesium, potassium, silicon, and sodium; therefore, these constituents are not considered site COCs/COPCs and are also not included in these calculations. The 95% UCL values were not calculated for potassium-40, radium-226, radium-228, thorium-228, and thorium-232 based on natural occurence at the Hanford Site.

All nonradionuclide data reported as being undetected are set to ½ the detection limit value for calculation of the statistics (Ecology 1993). 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 radionuclide data, calculation of the statistics is done using the reported value. 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 RPD is calculated when both the primary value and either the duplicate or split value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The TDL is a laboratory detection limit pre-determined for each analytical method and is listed in Table 2-1 of the SAP (DOE-RL 2009a) for certain constituents. All other constituents will have their own pre-determined TDL's based on the laboratory and method 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) duplicate RPD calculations, a value less than 30% indicates the data compare favorably. If the RPD is greater than 30%, further investigation regarding the usability of the data is performed. 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 result exceeds a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed. Additional discussion as necessary is provided in the data quality assessment section of the applicable RSVP.

Washington Closure Hanford **CALCULATION SHEET**

Originator I. B. Berezovskiy	**Date** 05/19/15	**Calc. No.** 0100B-CA-V0346	**Rev. No.** 0
Project 100-H Area Closure Operations	**Job No.** 14655	**Checked** J. D. Skoglie	**Date** 05/19/15
Subject 100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations			**Sheet No.** 3 of 15

Summary (continued)

QUALIFIER LIST

* = matrix spike exceeded the control limit.
B = estimated result. Result is less than the RL but greater than the MDL
C = the analyte was detected in both the sample and the associated QC blank, and the sample concentrations was ≤5X the blank concentration.
D = results are reported from a dilution
J = estimate
M = sample duplicate precision not met.
N = recovery exceeds upper or lower control limits
U = undetected
X = serial dilution in the analytical batch indicates that physical and chemical interferences are present

ACRONYM LIST

-- = not applicable
DE = direct exposure
DZ = deep zone
EXC = excavation
GW = groundwater
MDL = method detection limit
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)
RL = reporting limit
RPD = relative percent difference
RSVP = remaining sites verification package
SAP = sampling and analysis plan
SPA = staging pile area
TDL = target detection limit
UCL = upper confidence limit
WAC = Washington Administrative Code

Washington Closure Hanford **CALCULATION SHEET**

Originator I. B. Berezovskiy	**Date** 05/19/15	**Calc. No.** 0100B-CA-V0346	**Rev. No.** 0
Project 100-B Area Closure Operations	**Job No.** 14655	**Checked** ~~I. B. Berezovskiy~~ J.D. Skoglie 5/19	**Date** 05/19/15
Subject 100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations			**Sheet No.** 4 of 15

Summary (continued)

Results:
The results presented in the tables that follow include the summary of the results of the 95% UCL calculations for the excavation, staging pile area, 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 this site.

Results Summary [a]

Analyte	SZ 95% UCL Result	SZ Maximum Result	SPA 95% UCL Result	SPA Maximum Result	DZ Maximum Result	Units
Antimony	1.1	--	--	--	1.3	mg/kg
Arsenic	5.2	--	3.5	--	9.6	mg/kg
Barium	65.9	--	71.1	--	81.6	mg/kg
Beryllium	--	0.19	0.33	--	0.28	mg/kg
Boron	1.4	--	--	1.4	1.5	mg/kg
Cadmium	0.15	--	0.12	--	0.22	mg/kg
Chromium	9.0	--	11.9	--	15.3	mg/kg
Cobalt	9.3	--	8.5	--	11.9	mg/kg
Copper	19.6	--	18.0	--	23.2	mg/kg
Lead	6.7	--	5.8	--	12.2	mg/kg
Manganese	371	--	370	--	502	mg/kg
Mercury	0.016	--	--	0.010	--	mg/kg
Molybdenum	--	0.37	--	--	--	mg/kg
Nickel	12.9	--	12.4	--	17.5	mg/kg
Selenium	--	--	0.84	--	--	mg/kg
Silver	--	--	--	0.15	--	mg/kg
Vanadium	61.5	--	63.2	--	72.2	mg/kg
Zinc	61.1	--	47.0	--	59.9	mg/kg
TPH - Diesel	8.8	--	3.0	--	55	mg/kg
TPH - Diesel Ext.	11	--	4.4	--	58	mg/kg
Aroclor-1254	--	0.0074	--	--	--	mg/kg
Aroclor-1260	--	0.0030	--	--	0.026	mg/kg
Benzo(a)anthracene (Method 8310)	--	0.017	--	0.032	--	mg/kg
Benzo(a)pyrene (Method 8310)	--	0.017	--	0.026	--	mg/kg
Benzo(b)fluoranthene (Method 8310)	--	0.065	--	0.033	--	mg/kg
Benzo(ghi)perylene (Method 8310)	--	0.055	--	0.024	--	mg/kg
Benzo(k)fluoranthene (Method 8310)	--	0.010	--	0.014	--	mg/kg
Chrysene (Method 8310)	--	0.019	--	0.037	--	mg/kg
Fluoranthene (Method 8310)	--	0.017	--	0.060	--	mg/kg
Indeno(1,2,3-cd)pyrene (Method 8310)	--	0.051	--	0.021	--	mg/kg
Phenanthrene (Method 8310)	--	--	--	0.044	--	mg/kg
Pyrene (Method 8310)	--	0.023	--	0.077	--	mg/kg
3 Part Test Evaluation:						
95% UCL or Maximum[a] > Cleanup Limit?	NO		NO			
> 10% above Cleanup Limit?	NO		NO			
Any sample > 2x Cleanup Limit?	NO		NO			

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

Washington Closure Hanford **CALCULATION SHEET**

Originator I. B. Berezovskiy **Date** 05/19/15 **Calc. No.** 0100B-CA-V0346 **Rev. No.** 0
Project 100-B Area Closure Operations **Job No.** 14655 **Checked** ~~I. B. Berezovskiy~~ **Date** 05/19/15
Subject 100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations J.D. Skoglie 5/19 **Sheet No.** 5 of 15

Summary (continued)

Results:
The results presented in the tables that follow include the summary of the results of the 95% UCL calculations for the excavation, staging pile area, 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 this site.

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

Analyte	SPA	DZ
	Duplicate Analysis	Duplicate Analysis
Aluminum	6.0%	17.4%
Barium	0.8%	8.8%
Calcium	4.4%	17.6%
Chromium	4.0%	18.8%
Copper	6.1%	9.9%
Iron	3.8%	12.0%
Magnesium	2.3%	15.0%
Manganese	0.9%	13.8%
Silicon	12.9%	5.3%
Sodium	13.0%	7.3%
Vanadium	0.2%	12.0%
Zinc	8.7%	13.2%

[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 RSVP.

CALCULATION SHEET

Washington Closure Hanford

Originator I. B. Berezovskiy
Project 100-B Area Closure Operations
Subject 100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations

Date 05/19/15
Job No. 14655

Calc. No. 0100B-CA-V0346
Checked J. D. Skoglie

Rev. No. 0
Date 05/19/15
Sheet No. 6 of 15

1 **100-B-35:1 Subsite Statistical Calculations**
2 **Verification Data - SZ**

3	Sample	Sample	Sample	Antimony			Arsenic			Barium			Boron			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	mg/kg	Q	PQL
5	SZ-1	J1V4X9	3/30/2015	1.3		0.40	4.5		0.70	86.0	XMJ	0.081	2.0	BM	1.0	0.18	B	0.043	8.4	X	0.061	9.6	X	0.11	19.9		0.23	6.8		0.29
6	SZ-2	J1V500	3/30/2015	0.50	BJ	0.36	5.2		0.62	39.8	XJ	0.071	0.92	U	0.92	0.15	B	0.039	6.7	X	0.055	8.5	X	0.094	16.7		0.20	4.9		0.25
7	SZ-3	J1V501	3/30/2015	1.2		0.36	3.8		0.62	59.6	XJ	0.072	0.93	U	0.93	0.13	B	0.039	7.4	X	0.055	9.3	X	0.094	16.7		0.20	5.1		0.25
8	SZ-4	J1V502	3/30/2015	0.79		0.37	7.1		0.65	57.4	XJ	0.075	1.4	B	0.96	0.15	B	0.040	11.2	X	0.057	9.4	X	0.098	20.8		0.21	8.7		0.26
9	SZ-5	J1V503	3/30/2015	1.0		0.37	5.3		0.65	59.8	XJ	0.075	1.3	B	0.97	0.14	B	0.040	8.9	X	0.057	9.6	X	0.099	18.7		0.21	6.0		0.27
10	SZ-6	J1V504	3/30/2015	0.85		0.32	3.5		0.56	40.4	XJ	0.064	0.83	U	0.83	0.10	B	0.035	6.8	X	0.049	8.8	X	0.085	16.2		0.18	4.3		0.23
11	SZ-7	J1V505	3/30/2015	0.92		0.39	5.0		0.67	73.1	XJ	0.077	1.1	B	1.0	0.14	B	0.042	8.5	X	0.059	9.2	X	0.10	20.2		0.22	6.7		0.27
12	SZ-8	J1V506	3/30/2015	1.1		0.37	3.7		0.64	68.7	XJ	0.073	1.4	B	0.94	0.16	B	0.040	7.9	X	0.056	9.3	X	0.096	18.5		0.21	5.7		0.26
13	SZ-9	J1V507	3/30/2015	1.1		0.38	4.1		0.66	55.2	XJ	0.076	1.2	B	0.98	0.14	B	0.041	8.4	X	0.058	9.3	X	0.10	18.3		0.22	5.2		0.27
14	SZ-10	J1V508	3/30/2015	1.0		0.35	5.6		0.61	55.6	XJ	0.070	1.7	B	0.90	0.15	B	0.038	10.1	X	0.053	9.2	X	0.092	21.7		0.20	7.9		0.25
15	SZ-11	J1V509	3/30/2015	0.77		0.36	3.7		0.62	52.6	XJ	0.071	1.0	B	0.92	0.13	B	0.038	7.9	X	0.054	8.8	X	0.094	16.9		0.20	5.5		0.25
16	SZ-12	J1V510	3/30/2015	0.85		0.34	3.4		0.60	45.9	XJ	0.069	0.97	B	0.89	0.11	B	0.037	6.4	X	0.052	8.2	X	0.090	18.4		0.20	4.7		0.24

17 **Statistical Computation Input Data**

18	Sample	Sample	Sample	Antimony	Arsenic	Barium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead
19	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
20	SZ-1	J1V4X9	3/30/2015	1.3	4.5	86.0	2.0	0.18	8.4	9.6	19.9	6.8
21	SZ-2	J1V500	3/30/2015	0.50	5.2	39.8	0.46	0.15	6.7	8.5	16.7	4.9
22	SZ-3	J1V501	3/30/2015	1.2	3.8	59.6	0.47	0.13	7.4	9.3	16.7	5.1
23	SZ-4	J1V502	3/30/2015	0.79	7.1	57.4	1.4	0.15	11.2	9.4	20.8	8.7
24	SZ-5	J1V503	3/30/2015	1.0	5.3	59.8	1.3	0.14	8.9	9.6	18.7	6.0
25	SZ-6	J1V504	3/30/2015	0.85	3.5	40.4	0.42	0.10	6.8	8.8	16.2	4.3
26	SZ-7	J1V505	3/30/2015	0.92	5.0	73.1	1.1	0.14	8.5	9.2	20.2	6.7
27	SZ-8	J1V506	3/30/2015	1.1	3.7	68.7	1.4	0.16	7.9	9.3	18.5	5.7
28	SZ-9	J1V507	3/30/2015	1.1	4.1	55.2	1.2	0.14	8.4	9.3	18.3	5.2
29	SZ-10	J1V508	3/30/2015	1.0	5.6	55.6	1.7	0.15	10.1	9.2	21.7	7.9
30	SZ-11	J1V509	3/30/2015	0.77	3.7	52.6	1.0	0.13	7.9	8.8	16.9	5.5
31	SZ-12	J1V510	3/30/2015	0.85	3.4	45.9	0.97	0.11	6.4	8.2	18.4	4.7

32 **Statistical Computations**

33		Antimony	Arsenic	Barium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead
34	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 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 lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
35	N	12	12	12	12	12	12	12	12	12
36	% < Detection limit	0%	0%	0%	25%	0%	0%	0%	0%	0%
37	Mean	0.95	4.6	57.8	1.1	0.14	8.2	9.1	18.6	6.0
38	Standard deviation	0.22	1.1	13.4	0.50	0.021	1.4	0.43	1.8	1.3
39	95% UCL on mean	1.1	5.2	65.9	1.4	0.15	9.0	9.3	19.6	6.7
40	Maximum value	1.3	7.1	86.0	2.0	0.18	11.2	9.6	21.7	8.7
41	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	5 GW & River Protection	20 DE, GW & River Protection	200 GW Protection	320 GW Protection	0.81 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection	22.0 River Protection	10.2 GW & River Protection
42	**WAC 173-340 3-PART TEST**									
43	95% UCL > Cleanup Limit?	NA	NO	NA	NO	NA	NA	NA	NA	NA
44	> 10% above Cleanup Limit?	NA	NO	NA	NO	NA	NA	NA	NA	NA
45	Any sample > 2X Cleanup Limit?	NA	NO	NA	NO	NA	NA	NA	NA	NA
46	**WAC 173-340 Compliance?**	Because all values are below background (5 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 (132 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.	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 I. B. Berezovskiy
Project 100-B Area Closure Operations
Subject 100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations

Date 05/19/15
Job No. 14655

Calc. No. 0100B-CA-V0346
Checked J. D. Skoglie

Rev. No. 0
Date 05/19/15
Sheet No. 7 of 15

1 **100-B-35:1 Subsite Statistical Calculations**
2 **Verification Data - SZ**

3	Sample	Sample	Sample	Manganese			Mercury			Nickel			Vanadium			Zinc			TPH - Diesel Ext.			TPH - Diesel		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
5	SZ-1	J1V4X9	3/30/2015	349	X	0.11	0.015	BM	0.0068	11.9	X	0.13	59.4		0.10	112	X	0.42	11000		1100	6300		730
6	SZ-2	J1V500	3/30/2015	283	X	0.094	0.0069	U	0.0069	10.1	X	0.12	49.3		0.088	42.3	X	0.37	5100		1000	4100	J	710
7	SZ-3	J1V501	3/30/2015	386	X	0.094	0.0067	U	0.0067	12.3	X	0.12	65.7		0.089	48.3	X	0.38	3700	J	1100	2900	J	710
8	SZ-4	J1V502	3/30/2015	410	X	0.098	0.0065	U	0.0065	14.9	X	0.12	47.8		0.092	50.4	X	0.39	12000		1100	11000		740
9	SZ-5	J1V503	3/30/2015	371	X	0.099	0.0069	U	0.0069	12.1	X	0.12	60.9		0.093	49.7	X	0.39	6600		1100	5100		730
10	SZ-6	J1V504	3/30/2015	317	X	0.085	0.0058	U	0.0058	11.9	X	0.10	55.6		0.080	43.9	X	0.34	4100		1000	2800	J	700
11	SZ-7	J1V505	3/30/2015	352	X	0.10	0.010	B	0.0071	11.9	X	0.12	59.4		0.096	47.1	X	0.40	13000		1100	11000		720
12	SZ-8	J1V506	3/30/2015	371	X	0.096	0.025		0.0060	11.5	X	0.12	67.0		0.091	51.4	X	0.38	25000		1000	20000		700
13	SZ-9	J1V507	3/30/2015	349	X	0.10	0.0073	B	0.0060	12.8	X	0.12	63.3		0.094	46.3	X	0.40	3600	J	1000	2700	J	710
14	SZ-10	J1V508	3/30/2015	376	X	0.092	0.013	B	0.0065	14.2	X	0.11	51.9		0.086	47.5	X	0.37	4200	J	1100	3000	J	740
15	SZ-11	J1V509	3/30/2015	336	X	0.094	0.0070	B	0.0067	12.2	X	0.12	60.0		0.088	44.2	X	0.37	5000		1000	3300	J	700
16	SZ-12	J1V510	3/30/2015	293	X	0.090	0.012	B	0.0061	9.8	X	0.11	55.3		0.085	41.3	X	0.36	5600		1100	3100	J	720

17 **Statistical Computation Input Data**

18	Sample	Sample	Sample	Manganese	Mercury	Nickel	Vanadium	Zinc	TPH - Diesel Ext.	TPH - Diesel
19	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg
20	SZ-1	J1V4X9	3/30/2015	349	0.015	11.9	59.4	112	11000	6300
21	SZ-2	J1V500	3/30/2015	283	0.0035	10.1	49.3	42.3	5100	4100
22	SZ-3	J1V501	3/30/2015	386	0.0034	12.3	65.7	48.3	3700	2900
23	SZ-4	J1V502	3/30/2015	410	0.0033	14.9	47.8	50.4	12000	11000
24	SZ-5	J1V503	3/30/2015	371	0.0035	12.1	60.9	49.7	6600	5100
25	SZ-6	J1V504	3/30/2015	317	0.0029	11.9	55.6	43.9	4100	2800
26	SZ-7	J1V505	3/30/2015	352	0.010	11.9	59.4	47.1	13000	11000
27	SZ-8	J1V506	3/30/2015	371	0.025	11.5	67.0	51.4	25000	20000
28	SZ-9	J1V507	3/30/2015	349	0.0073	12.8	63.3	46.3	3600	2700
29	SZ-10	J1V508	3/30/2015	376	0.013	14.2	51.9	47.5	4200	3000
30	SZ-11	J1V509	3/30/2015	336	0.0070	12.2	60.0	44.2	5000	3300
31	SZ-12	J1V510	3/30/2015	293	0.012	9.8	55.3	41.3	5600	3100

32 **Statistical Computations**

33		Manganese	Mercury	Nickel	Vanadium	Zinc	TPH - Diesel Ext.	TPH - Diesel
34	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), 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.
35	N	12	12	12	12	12	12	12
36	% < Detection limit	0%	42%	0%	0%	0%	0%	0%
37	Mean	349	0.0088	12.1	58.0	52.0	8242	6275
38	Standard deviation	37.5	0.0067	1.4	6.14	19.1	6259	5266
39	95% UCL on mean	371	0.016	12.9	61.5	61.1	11214	8776
40	Maximum value	410	0.025	14.9	67.0	112	25000	20000
41	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise**	512 GW & River Protection	0.33 GW & River Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	200000 ug/kg DE, GW & River Protection	200000 ug/kg DE, GW & River Protection
42	**WAC 173-340 3-PART TEST**							
43	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NO	NO	NO
44	> 10% above Cleanup Limit?	NA	NA	NA	NA	NO	NO	NO
45	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NO	NO	NO
46	**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 (0.33 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.	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.	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 I. B. Berezovskiy
Project 100-B Area Closure Operations
Subject 100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations

Date 05/19/15
Job No. 14655

Calc. No. 0100B-CA-V0346
Checked J. D. Skoglie

Rev. No. 0
Date 05/19/15
Sheet No. 8 of 15

100-B-35:1 Subsite Statistical Calculations

Verification Data - SPA

Sample Area	Sample Number	Sample Date	Arsenic			Barium			Beryllium			Cadmium			Chromium			Cobalt			Copper			Lead			Manganese		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA-12	J1V5C9	3/30/2015	2.2		0.68	71.0	X	0.071	0.30		0.031	0.13	B	0.038	12.4		0.054	6.9		0.093	13.5		0.20	4.3		0.28	335	X	0.093
Duplicate of J1V5C9	J1V5D0	3/30/2015	2.4		0.64	71.6	X	0.078	0.28		0.034	0.13	B	0.042	12.9		0.060	6.8		0.10	12.7		0.22	5.2		0.26	332	X	0.10
SPA-1	J1V598	3/30/2015	2.9		0.61	75.2	X	0.080	0.30		0.035	0.094	BM	0.043	10.8		0.061	8.0		0.10	16.1		0.23	4.9		0.25	363	X	0.10
SPA-2	J1V599	3/30/2015	3.7		0.66	85.0	X	0.075	0.36		0.032	0.12	B	0.040	13.2		0.057	8.5		0.10	17.7		0.21	5.8		0.27	410	X	0.098
SPA-3	J1V5C0	3/30/2015	2.6		0.63	44.3	X	0.077	0.25		0.033	0.10	B	0.041	6.6		0.058	8.9		0.10	17.0		0.22	4.1		0.26	353	X	0.10
SPA-4	J1V5C1	3/30/2015	4.8		0.62	57.4	X	0.076	0.36		0.033	0.12	B	0.041	10.8		0.058	8.5		0.10	17.8		0.22	6.6		0.25	371	X	0.10
SPA-5	J1V5C2	3/30/2015	2.8		0.65	59.6	X	0.077	0.33		0.033	0.12	B	0.041	10.6		0.058	8.9		0.10	19.8		0.22	5.1		0.27	355	X	0.10
SPA-6	J1V5C3	3/30/2015	4.7		0.70	58.9	X	0.079	0.35		0.034	0.12	B	0.043	10.4		0.060	8.5		0.10	19.2		0.23	7.5		0.29	371	X	0.10
SPA-7	J1V5C4	3/30/2015	2.5		0.62	61.8	X	0.073	0.26		0.032	0.12	B	0.040	11.2		0.056	7.8		0.10	16.0		0.21	4.1		0.25	344	X	0.097
SPA-8	J1V5C5	3/30/2015	3.0		0.66	57.2	X	0.079	0.29		0.034	0.098	B	0.043	9.1		0.061	8.9		0.10	19.4		0.23	5.4		0.27	358	X	0.10
SPA-9	J1V5C6	3/30/2015	3.3		0.62	59.0	X	0.077	0.28		0.033	0.10	B	0.041	10.9		0.059	8.0		0.10	16.0		0.22	5.3		0.25	367	X	0.10
SPA-10	J1V5C7	3/30/2015	2.5		0.65	72.7	X	0.078	0.30		0.034	0.10	B	0.042	12.4		0.060	7.1		0.10	13.0		0.22	4.3		0.26	349	X	0.10
SPA-11	J1V5C8	3/30/2015	2.4		0.56	72.3	X	0.064	0.31		0.028	0.12	B	0.035	13.4		0.049	7.4		0.085	13.8		0.18	4.4		0.23	352	X	0.085

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	Manganese mg/kg
SPA-12	J1V5C9/ J1V4D0	3/30/2015	2.3	71.3	0.29	0.13	12.7	6.9	13.1	4.8	334
SPA-1	J1V598	3/30/2015	2.9	75.2	0.30	0.094	10.8	8.0	16.1	4.9	363
SPA-2	J1V599	3/30/2015	3.7	85.0	0.36	0.12	13.2	8.5	17.7	5.8	410
SPA-3	J1V5C0	3/30/2015	2.6	44.3	0.25	0.10	6.6	8.9	17.0	4.1	353
SPA-4	J1V5C1	3/30/2015	4.8	57.4	0.36	0.12	10.8	8.5	17.8	6.6	371
SPA-5	J1V5C2	3/30/2015	2.8	59.6	0.33	0.12	10.6	8.9	19.8	5.1	355
SPA-6	J1V5C3	3/30/2015	4.7	58.9	0.35	0.12	10.4	8.5	19.2	7.5	371
SPA-7	J1V5C4	3/30/2015	2.5	61.8	0.26	0.12	11.2	7.8	16.0	4.1	344
SPA-8	J1V5C5	3/30/2015	3.0	57.2	0.29	0.098	9.1	8.9	19.4	5.4	358
SPA-9	J1V5C6	3/30/2015	3.3	59.0	0.28	0.10	10.9	8.0	16.0	5.3	367
SPA-10	J1V5C7	3/30/2015	2.5	72.7	0.30	0.10	12.4	7.1	13.0	4.3	349
SPA-11	J1V5C8	3/30/2015	2.4	72.3	0.31	0.12	13.4	7.4	13.8	4.4	352

Statistical Computations

	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese
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), 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), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	12	12	12	12	12	12	12	12	12
% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mean	3.1	64.6	0.31	0.11	11.0	8.1	16.6	5.2	361
Standard deviation	0.86	10.9	0.037	0.012	1.9	0.71	2.4	1.0	19.1
95% UCL on mean	3.5	71.1	0.33	0.12	11.9	8.5	18.0	5.8	370
Maximum value	4.8	85.0	0.36	0.13	13.4	8.9	19.8	7.5	410
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	512 GW & River Protection
WAC 173-340 3-PART TEST									
95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NA	NA
> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NA	NA
Any sample > 2X Cleanup Limit?	NA	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.	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 I. B. Berezovskiy
Project 100-B Area Closure Operations
Subject 100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations

Date 05/19/15
Job No. 14655

Calc. No. 0100B-CA-V0346
Checked J. D. Skoglie

Rev. No. 0
Date 05/19/15
Sheet No. 9 of 15

1 **100-B-35:1 Subsite Statistical Calculations**
2 **Verification Data - SPA**

3	Sample	Sample	Sample	Nickel			Selenium			Vanadium			Zinc			TPH - Diesel Ext.			TPH - Diesel		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
5	SPA-12	J1V5C9	3/30/2015	11.1	X	0.11	0.88	U	0.88	49.6	X	0.087	40.6	X	0.37	5200		1000	4300		700
6	Duplicate of J1V5C9	J1V5D0	3/30/2015	11.2	X	0.13	0.95	B	0.83	49.7	X	0.097	44.3	X	0.41	2400	J	1000	2200	J	710
7	SPA-1	J1V598	3/30/2015	11.6	X	0.13	0.80	U	0.80	56.4	X	0.098	45.1	X	0.42	4100	J	1000	2300	J	710
8	SPA-2	J1V599	3/30/2015	13.2	X	0.12	0.85	U	0.85	57.6	X	0.092	46.2	X	0.39	3800	J	1000	2500	J	690
9	SPA-3	J1V5C0	3/30/2015	11.9	X	0.12	0.83	U	0.83	74.1	X	0.095	48.9	X	0.40	2600	J	1000	2200	J	690
10	SPA-4	J1V5C1	3/30/2015	13.1	X	0.12	0.81	U	0.81	58.7	X	0.095	47.1	X	0.40	3500	J	980	2800	J	670
11	SPA-5	J1V5C2	3/30/2015	13.2	X	0.12	0.93	B	0.85	68.4	X	0.095	47.9	X	0.40	1900	J	980	1900	J	670
12	SPA-6	J1V5C3	3/30/2015	12.1	X	0.13	1.1		0.91	53.1	X	0.098	49.1	X	0.41	6900		1100	4900	0	740
13	SPA-7	J1V5C4	3/30/2015	11.8	X	0.12	0.92	B	0.81	60.5	X	0.091	45.4	X	0.38	4500		1000	2800	J	680
14	SPA-8	J1V5C5	3/30/2015	11.1	X	0.13	0.95	B	0.86	64.5	X	0.098	47.1	X	0.42	3500	J	1000	2800	J	690
15	SPA-9	J1V5C6	3/30/2015	11.7	X	0.12	0.86	B	0.81	63.8	X	0.095	47.3	X	0.40	3300	J	1000	2400	J	700
16	SPA-10	J1V5C7	3/30/2015	11.5	X	0.13	0.84	U	0.84	50.6	X	0.097	39.9	X	0.41	2200	J	1000	2000	J	690
17	SPA-11	J1V5C8	3/30/2015	11.9	X	0.10	0.97		0.73	47.8	X	0.079	40.1	X	0.34	2300	J	970	2100	J	660

18 **Statistical Computation Input Data**

19	Sample	Sample	Sample	Nickel	Selenium	Vanadium	Zinc	TPH - Diesel Ext.	TPH - Diesel
20	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg
21	SPA-12	J1V5C9/ J1V4D0	3/30/2015	11.2	0.70	49.7	42.5	3800	3250
22	SPA-1	J1V598	3/30/2015	11.6	0.40	56.4	45.1	4100	2300
23	SPA-2	J1V599	3/30/2015	13.2	0.43	57.6	46.2	3800	2500
24	SPA-3	J1V5C0	3/30/2015	11.9	0.42	74.1	48.9	2600	2200
25	SPA-4	J1V5C1	3/30/2015	13.1	0.41	58.7	47.1	3500	2800
26	SPA-5	J1V5C2	3/30/2015	13.2	0.93	68.4	47.9	1900	1900
27	SPA-6	J1V5C3	3/30/2015	12.1	1.1	53.1	49.1	6900	4900
28	SPA-7	J1V5C4	3/30/2015	11.8	0.92	60.5	45.4	4500	2800
29	SPA-8	J1V5C5	3/30/2015	11.1	0.95	64.5	47.1	3500	2800
30	SPA-9	J1V5C6	3/30/2015	11.7	0.86	63.8	47.3	3300	2400
31	SPA-10	J1V5C7	3/30/2015	11.5	0.42	50.6	39.9	2200	2000
32	SPA-11	J1V5C8	3/30/2015	11.9	0.97	47.8	40.1	2300	2100

33 **Statistical Computations**

34		Nickel	Selenium	Vanadium	Zinc	TPH - Diesel Ext.	TPH - Diesel
35	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), 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), lognormal and normal distribution rejected, use z-statistic.
36	N	12	12	12	12	12	12
37	% < Detection limit	0%	42%	0%	0%	0%	0%
38	Mean	12.0	0.71	58.8	45.5	3533	2663
39	Standard deviation	0.75	0.28	8.0	3.1	1336	808
40	95% UCL on mean	12.4	0.84	63.2	47.0	4386	3046
41	Maximum value	13.2	1.1	74.1	49.1	6900	4900
42	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise**	19.1 GW Protection	1 River Protection	85.1 GW Protection	67.8 River Protection	200000 ug/kg DE, GW & River Protection	200000 ug/kg DE, GW & River Protection
43	**WAC 173-340 3-PART TEST**						
44	95% UCL > Cleanup Limit?	NA	NO	NA	NA	NO	NO
45	> 10% above Cleanup Limit?	NA	NO	NA	NA	NO	NO
46	Any sample > 2X Cleanup Limit?	NA	NO	NA	NA	NO	NO
47	**WAC 173-340 Compliance?**	Because all values are below background (19.1 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.	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.	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.

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CALCULATION SHEET

Washington Closure Hanford

Originator I. B. Berezovskiy
Project 100-B Area Closure Operations
Subject 100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations

Date 05/19/15
Job No. 14655

Calc. No. 0100B-CA-V0346
Checked J. D. Skoglie

Rev. No. 0
Date 05/19/15
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Ecology Software (MTCAStat) Results, 100-B-35:1 Subsite - SZ

DATA	ID
1.3	J1V4X9
0.50	J1V500
1.2	J1V501
0.79	J1V502
1.0	J1V503
0.85	J1V504
0.92	J1V505
1.1	J1V506
1.1	J1V507
1.0	J1V508
0.77	J1V509
0.85	J1V510

Antimony 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	0.95
Censored		Lognormal mean	0.95
Detection limit or PQL		Std. devn.	0.22
Method detection limit		Median	0.96
TOTAL	12	Min.	0.50
		Max.	1.3

Lognormal distribution? r-squared is: 0.907
Normal distribution? r-squared is: 0.968
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1.1

DATA	ID
4.5	J1V4X9
5.2	J1V500
3.8	J1V501
7.1	J1V502
5.3	J1V503
3.5	J1V504
5.0	J1V505
3.7	J1V506
4.1	J1V507
5.6	J1V508
3.7	J1V509
3.4	J1V510

Arsenic 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	4.6
Censored		Lognormal mean	4.6
Detection limit or PQL		Std. devn.	1.1
Method detection limit		Median	4.3
TOTAL	12	Min.	3.4
		Max.	7.1

Lognormal distribution? r-squared is: 0.933
Normal distribution? r-squared is: 0.893
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 5.2

DATA	ID
86.0	J1V4X9
39.8	J1V500
59.6	J1V501
57.4	J1V502
59.8	J1V503
40.4	J1V504
73.1	J1V505
68.7	J1V506
55.2	J1V507
55.6	J1V508
52.6	J1V509
45.9	J1V510

Barium 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	57.84
Censored		Lognormal mean	57.96
Detection limit or PQL		Std. devn.	13.35709
Method detection limit		Median	56.5
TOTAL	12	Min.	39.8
		Max.	86

Lognormal distribution? r-squared is: 0.966
Normal distribution? r-squared is: 0.947
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 65.9

DATA	ID
2.0	J1V4X9
0.46	J1V500
0.47	J1V501
1.4	J1V502
1.3	J1V503
0.42	J1V504
1.1	J1V505
1.4	J1V506
1.2	J1V507
1.7	J1V508
1.0	J1V509
1.0	J1V510

Boron 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	1.1
Censored		Lognormal mean	1.2
Detection limit or PQL		Std. devn.	0.50
Method detection limit		Median	1.2
TOTAL	12	Min.	0.42
		Max.	2.0

Lognormal distribution? r-squared is: 0.890
Normal distribution? r-squared is: 0.954
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 1.4

DATA	ID
0.18	J1V4X9
0.15	J1V500
0.13	J1V501
0.15	J1V502
0.14	J1V503
0.10	J1V504
0.14	J1V505
0.16	J1V506
0.14	J1V507
0.15	J1V508
0.13	J1V509
0.11	J1V510

Cadmium 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	0.14
Censored		Lognormal mean	0.14
Detection limit or PQL		Std. devn.	0.021
Method detection limit		Median	0.14
TOTAL	12	Min.	0.10
		Max.	0.18

Lognormal distribution? r-squared is: 0.927
Normal distribution? r-squared is: 0.947
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.15

DATA	ID
8.4	J1V4X9
6.7	J1V500
7.4	J1V501
11.2	J1V502
8.9	J1V503
6.8	J1V504
8.5	J1V505
7.9	J1V506
8.4	J1V507
10.1	J1V508
7.9	J1V509
6.4	J1V510

Chromium 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	8.2
Censored		Lognormal mean	8.2
Detection limit or PQL		Std. devn.	1.4
Method detection limit		Median	8.2
TOTAL	12	Min.	6.4
		Max.	11.2

Lognormal distribution? r-squared is: 0.962
Normal distribution? r-squared is: 0.934
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 9.0

DATA	ID
9.6	J1V4X9
8.5	J1V500
9.3	J1V501
9.4	J1V502
9.6	J1V503
8.8	J1V504
9.2	J1V505
9.3	J1V506
9.3	J1V507
9.2	J1V508
8.8	J1V509
8.2	J1V510

Cobalt 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	9.1
Censored		Lognormal mean	9.1
Detection limit or PQL		Std. devn.	0.43
Method detection limit		Median	9.3
TOTAL	12	Min.	8.2
		Max.	9.6

Lognormal distribution? r-squared is: 0.891
Normal distribution? r-squared is: 0.900
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 9.3

DATA	ID
19.9	J1V4X9
16.7	J1V500
16.7	J1V501
20.8	J1V502
18.7	J1V503
16.2	J1V504
20.2	J1V505
18.5	J1V506
18.3	J1V507
21.7	J1V508
16.9	J1V509
18.4	J1V510

Copper 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	18.6
Censored		Lognormal mean	18.6
Detection limit or PQL		Std. devn.	1.8
Method detection limit		Median	18.5
TOTAL	12	Min.	16.2
		Max.	21.7

Lognormal distribution? r-squared is: 0.956
Normal distribution? r-squared is: 0.953
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 19.6

DATA	ID
6.8	J1V4X9
4.9	J1V500
5.1	J1V501
8.7	J1V502
6.0	J1V503
4.3	J1V504
6.7	J1V505
5.7	J1V506
5.2	J1V507
7.9	J1V508
5.5	J1V509
4.7	J1V510

Lead 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	6.0
Censored		Lognormal mean	6.0
Detection limit or PQL		Std. devn.	1.3
Method detection limit		Median	5.6
TOTAL	12	Min.	4.3
		Max.	8.7

Lognormal distribution? r-squared is: 0.966
Normal distribution? r-squared is: 0.927
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 6.7

CALCULATION SHEET

Washington Closure Hanford

Originator I. B. Berezovskiy
Project 100-B Area Closure Operations
Subject 100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations

Date 05/19/15
Job No. 14655

Calc. No. 0100B-CA-V0346
Checked J. D. Skoglie

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Ecology Software (MTCAStat) Results, 100-B-35:1 Subsite - SZ

Manganese 95% UCL Calculation

DATA	ID
349	J1V4X9
283	J1V500
386	J1V501
410	J1V502
371	J1V503
317	J1V504
352	J1V505
371	J1V506
349	J1V507
376	J1V508
336	J1V509
293	J1V510

Number of samples		Uncensored values	
Uncensored	12	Mean	349
Censored		Lognormal mean	350
Detection limit or PQL		Std. devn.	37.5
Method detection limit		Median	351
TOTAL	12	Min.	283
		Max.	410

Lognormal distribution? r-squared is: 0.949
Normal distribution? r-squared is: 0.964
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 371

Mercury 95% UCL Calculation

DATA	ID
0.015	J1V4X9
0.0035	J1V500
0.0034	J1V501
0.0033	J1V502
0.0035	J1V503
0.0029	J1V504
0.010	J1V505
0.025	J1V506
0.0073	J1V507
0.013	J1V508
0.007	J1V509
0.012	J1V510

Number of samples		Uncensored values	
Uncensored	12	Mean	0.010
Censored		Lognormal mean	0.010
Detection limit or PQL		Std. devn.	0.0067
Method detection limit		Median	0.0072
TOTAL	12	Min.	0.0029
		Max.	0.025

Lognormal distribution? r-squared is: 0.914
Normal distribution? r-squared is: 0.837
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.016

Nickel 95% UCL Calculation

DATA	ID
11.9	J1V4X9
10.1	J1V500
12.3	J1V501
14.9	J1V502
12.1	J1V503
11.9	J1V504
11.9	J1V505
11.5	J1V506
12.8	J1V507
14.2	J1V508
12.2	J1V509
9.8	J1V510

Number of samples		Uncensored values	
Uncensored	12	Mean	12.1
Censored		Lognormal mean	12.1
Detection limit or PQL		Std. devn.	1.4
Method detection limit		Median	12.0
TOTAL	12	Min.	9.8
		Max.	14.9

Lognormal distribution? r-squared is: 0.918
Normal distribution? r-squared is: 0.914
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 12.9

Vanadium 95% UCL Calculation

DATA	ID
59.4	J1V4X9
49.3	J1V500
65.7	J1V501
47.8	J1V502
60.9	J1V503
55.6	J1V504
59.4	J1V505
67.0	J1V506
63.3	J1V507
51.9	J1V508
60.0	J1V509
55.3	J1V510

Number of samples		Uncensored values	
Uncensored	12	Mean	58.0
Censored		Lognormal mean	58.0
Detection limit or PQL		Std. devn.	6.1
Method detection limit		Median	59.4
TOTAL	12	Min.	47.8
		Max.	67.0

Lognormal distribution? r-squared is: 0.962
Normal distribution? r-squared is: 0.971
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 61.5

Zinc 95% UCL Calculation

DATA	ID
112	J1V4X9
42.3	J1V500
48.3	J1V501
50.4	J1V502
49.7	J1V503
43.9	J1V504
47.1	J1V505
51.4	J1V506
46.3	J1V507
47.5	J1V508
44.2	J1V509
41.3	J1V510

Number of samples		Uncensored values	
Uncensored	12	Mean	52.0
Censored		Lognormal mean	51.8
Detection limit or PQL		Std. devn.	19.1
Method detection limit		Median	47.3
TOTAL	12	Min.	41.3
		Max.	112

Lognormal distribution? r-squared is: 0.551
Normal distribution? r-squared is: 0.454
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 61.1

TPH - Diesel Ext. 95% UCL Calculation

DATA	ID
11000	J1V4X9
5100	J1V500
3700	J1V501
12000	J1V502
6600	J1V503
4100	J1V504
13000	J1V505
25000	J1V506
3600	J1V507
4200	J1V508
5000	J1V509
5600	J1V510

Number of samples		Uncensored values	
Uncensored	12	Mean	8242
Censored		Lognormal mean	8175
Detection limit or PQL		Std. devn.	6259
Method detection limit		Median	5350
TOTAL	12	Min.	3600
		Max.	25000

Lognormal distribution? r-squared is: 0.888
Normal distribution? r-squared is: 0.732
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 11214

TPH Diesel 95% UCL Calculation

DATA	ID
6300	J1V4X9
4100	J1V500
2900	J1V501
11000	J1V502
5100	J1V503
2800	J1V504
11000	J1V505
20000	J1V506
2700	J1V507
3000	J1V508
3300	J1V509
3100	J1V510

Number of samples		Uncensored values	
Uncensored	12	Mean	6275
Censored		Lognormal mean	6189
Detection limit or PQL		Std. devn.	5266
Method detection limit		Median	3700
TOTAL	12	Min.	2700
		Max.	20000

Lognormal distribution? r-squared is: 0.849
Normal distribution? r-squared is: 0.712
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 8776

CALCULATION SHEET

Washington Closure Hanford

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Project 100-B Area Closure Operations
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Date 05/19/15
Job No. 14655

Calc. No. 0100B-CA-V0346
Checked J. D. Skoglie

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Ecology Software (MTCAStat) Results, 100-B-35:1 Subsite - SPA

DATA	ID
2.3	J1V5C9/ J1V4D0
2.9	J1V598
3.7	J1V599
2.6	J1V5C0
4.8	J1V5C1
2.8	J1V5C2
4.7	J1V5C3
2.5	J1V5C4
3.0	J1V5C5
3.3	J1V5C6
2.5	J1V5C7
2.4	J1V5C8

Arsenic 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	3.1
Censored		Lognormal mean	3.1
Detection limit or PQL		Std. devn.	0.86
Method detection limit		Median	2.9
TOTAL	12	Min.	2.3
		Max.	4.8

Lognormal distribution? r-squared is: 0.891
Normal distribution? r-squared is: 0.835
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 3.5

DATA	ID
71.3	J1V5C9/ J1V4D0
75.2	J1V598
85.0	J1V599
44.3	J1V5C0
57.4	J1V5C1
59.6	J1V5C2
58.9	J1V5C3
61.8	J1V5C4
57.2	J1V5C5
59.0	J1V5C6
72.7	J1V5C7
72.3	J1V5C8

Barium 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	64.6
Censored		Lognormal mean	64.7
Detection limit or PQL		Std. devn.	10.9
Method detection limit		Median	60.7
TOTAL	12	Min.	44.3
		Max.	85.0

Lognormal distribution? r-squared is: 0.922
Normal distribution? r-squared is: 0.932
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 71.1

DATA	ID
0.29	J1V5C9/ J1V4D0
0.30	J1V598
0.36	J1V599
0.25	J1V5C0
0.36	J1V5C1
0.33	J1V5C2
0.35	J1V5C3
0.26	J1V5C4
0.29	J1V5C5
0.28	J1V5C6
0.30	J1V5C7
0.31	J1V5C8

Beryllium 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	0.31
Censored		Lognormal mean	0.31
Detection limit or PQL		Std. devn.	0.037
Method detection limit		Median	0.30
TOTAL	12	Min.	0.25
		Max.	0.36

Lognormal distribution? r-squared is: 0.961
Normal distribution? r-squared is: 0.955
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.33

DATA	ID
0.13	J1V5C9/ J1V4D0
0.094	J1V598
0.12	J1V599
0.10	J1V5C0
0.12	J1V5C1
0.12	J1V5C2
0.12	J1V5C3
0.12	J1V5C4
0.098	J1V5C5
0.10	J1V5C6
0.10	J1V5C7
0.12	J1V5C8

Cadmium 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	0.11
Censored		Lognormal mean	0.11
Detection limit or PQL		Std. devn.	0.012
Method detection limit		Median	0.12
TOTAL	12	Min.	0.094
		Max.	0.13

Lognormal distribution? r-squared is: 0.821
Normal distribution? r-squared is: 0.824
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.12

DATA	ID
12.7	J1V5C9/ J1V4D0
10.8	J1V598
13.2	J1V599
6.6	J1V5C0
10.8	J1V5C1
10.6	J1V5C2
10.4	J1V5C3
11.2	J1V5C4
9.1	J1V5C5
10.9	J1V5C6
12.4	J1V5C7
13.4	J1V5C8

Chromium 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	11.0
Censored		Lognormal mean	11.0
Detection limit or PQL		Std. devn.	1.88
Method detection limit		Median	10.9
TOTAL	12	Min.	6.6
		Max.	13.4

Lognormal distribution? r-squared is: 0.830
Normal distribution? r-squared is: 0.898
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 11.9

DATA	ID
6.9	J1V5C9/ J1V4D0
8.0	J1V598
8.5	J1V599
8.9	J1V5C0
8.5	J1V5C1
8.9	J1V5C2
8.5	J1V5C3
7.8	J1V5C4
8.9	J1V5C5
8.0	J1V5C6
7.1	J1V5C7
7.4	J1V5C8

Cobalt 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	8.1
Censored		Lognormal mean	8.1
Detection limit or PQL		Std. devn.	0.71
Method detection limit		Median	8.3
TOTAL	12	Min.	6.9
		Max.	8.9

Lognormal distribution? r-squared is: 0.917
Normal distribution? r-squared is: 0.925
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 8.5

DATA	ID
13.1	J1V5C9/ J1V4D0
16.1	J1V598
17.7	J1V599
17.0	J1V5C0
17.8	J1V5C1
19.8	J1V5C2
19.2	J1V5C3
16.0	J1V5C4
19.4	J1V5C5
16.0	J1V5C6
13.0	J1V5C7
13.8	J1V5C8

Copper 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	16.6
Censored		Lognormal mean	16.6
Detection limit or PQL		Std. devn.	2.4
Method detection limit		Median	16.6
TOTAL	12	Min.	13.0
		Max.	19.8

Lognormal distribution? r-squared is: 0.933
Normal distribution? r-squared is: 0.946
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 18.0

DATA	ID
4.8	J1V5C9/ J1V4D0
4.9	J1V598
5.8	J1V599
4.1	J1V5C0
6.6	J1V5C1
5.1	J1V5C2
7.5	J1V5C3
4.1	J1V5C4
5.4	J1V5C5
5.3	J1V5C6
4.3	J1V5C7
4.4	J1V5C8

Lead 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	5.2
Censored		Lognormal mean	5.2
Detection limit or PQL		Std. devn.	1.0
Method detection limit		Median	5.0
TOTAL	12	Min.	4.1
		Max.	7.5

Lognormal distribution? r-squared is: 0.942
Normal distribution? r-squared is: 0.901
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 5.8

DATA	ID
334	J1V5C9/ J1V4D0
363	J1V598
410	J1V599
353	J1V5C0
371	J1V5C1
355	J1V5C2
371	J1V5C3
344	J1V5C4
358	J1V5C5
367	J1V5C6
349	J1V5C7
352	J1V5C8

Manganese 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	361
Censored		Lognormal mean	361
Detection limit or PQL		Std. devn.	19.1
Method detection limit		Median	357
TOTAL	12	Min.	334
		Max.	410

Lognormal distribution? r-squared is: 0.876
Normal distribution? r-squared is: 0.854
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 370

CALCULATION SHEET

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Date 05/19/15
Job No. 14655

Calc. No. 0100B-CA-V0346
Checked J. D. Skoglie

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Ecology Software (MTCAStat) Results, 100-B-35:1 Subsite - SPA

Nickel 95% UCL Calculation

DATA	ID
11.2	J1V5C9/ J1V4D0
11.6	J1V598
13.2	J1V599
11.9	J1V5C0
13.1	J1V5C1
13.2	J1V5C2
12.1	J1V5C3
11.8	J1V5C4
11.1	J1V5C5
11.7	J1V5C6
11.5	J1V5C7
11.9	J1V5C8

Number of samples		Uncensored values	
Uncensored	12	Mean	12.0
Censored		Lognormal mean	12.0
Detection limit or PQL		Std. devn.	0.75
Method detection limit		Median	11.9
TOTAL	12	Min.	11.1
		Max.	13.2

Lognormal distribution? r-squared is: 0.890
Normal distribution? r-squared is: 0.878
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 12.4

Selenium 95% UCL Calculation

DATA	ID
0.70	J1V5C9/ J1V4D0
0.40	J1V598
0.43	J1V599
0.42	J1V5C0
0.41	J1V5C1
0.93	J1V5C2
1.1	J1V5C3
0.92	J1V5C4
0.95	J1V5C5
0.86	J1V5C6
0.42	J1V5C7
0.97	J1V5C8

Number of samples		Uncensored values	
Uncensored	12	Mean	0.71
Censored		Lognormal mean	0.72
Detection limit or PQL		Std. devn.	0.28
Method detection limit		Median	0.78
TOTAL	12	Min.	0.40
		Max.	1.1

Lognormal distribution? r-squared is: 0.822
Normal distribution? r-squared is: 0.848
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.84

Vanadium 95% UCL Calculation

DATA	ID
49.7	J1V5C9/ J1V4D0
56.4	J1V598
57.6	J1V599
74.1	J1V5C0
58.7	J1V5C1
68.4	J1V5C2
53.1	J1V5C3
60.5	J1V5C4
64.5	J1V5C5
63.8	J1V5C6
50.6	J1V5C7
47.8	J1V5C8

Number of samples		Uncensored values	
Uncensored	12	Mean	58.8
Censored		Lognormal mean	58.8
Detection limit or PQL		Std. devn.	8.0
Method detection limit		Median	58.2
TOTAL	12	Min.	47.8
		Max.	74.1

Lognormal distribution? r-squared is: 0.985
Normal distribution? r-squared is: 0.976
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 63.2

Zinc 95% UCL Calculation

DATA	ID
42.5	J1V5C9/ J1V4D0
45.1	J1V598
46.2	J1V599
48.9	J1V5C0
47.1	J1V5C1
47.9	J1V5C2
49.1	J1V5C3
45.4	J1V5C4
47.1	J1V5C5
47.3	J1V5C6
39.9	J1V5C7
40.1	J1V5C8

Number of samples		Uncensored values	
Uncensored	12	Mean	45.6
Censored		Lognormal mean	45.6
Detection limit or PQL		Std. devn.	3.1
Method detection limit		Median	46.7
TOTAL	12	Min.	39.9
		Max.	49.1

Lognormal distribution? r-squared is: 0.876
Normal distribution? r-squared is: 0.890
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 47.0

TPH - Diesel Ext. 95% UCL Calculation

DATA	ID
3800	J1V5C9/ J1V4D0
4100	J1V598
3800	J1V599
2600	J1V5C0
3500	J1V5C1
1900	J1V5C2
6900	J1V5C3
4500	J1V5C4
3500	J1V5C5
3300	J1V5C6
2200	J1V5C7
2300	J1V5C8

Number of samples		Uncensored values	
Uncensored	12	Mean	3533
Censored		Lognormal mean	3547
Detection limit or PQL		Std. devn.	1336
Method detection limit		Median	3500
TOTAL	12	Min.	1900
		Max.	6900

Lognormal distribution? r-squared is: 0.951
Normal distribution? r-squared is: 0.867
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 4386

TPH - Diesel 95% UCL Calculation

DATA	ID
3250	J1V5C9/ J1V4D0
2300	J1V598
2500	J1V599
2200	J1V5C0
2800	J1V5C1
1900	J1V5C2
4900	J1V5C3
2800	J1V5C4
2800	J1V5C5
2400	J1V5C6
2000	J1V5C7
2100	J1V5C8

Number of samples		Uncensored values	
Uncensored	12	Mean	2663
Censored		Lognormal mean	2661
Detection limit or PQL		Std. devn.	808
Method detection limit		Median	2450
TOTAL	12	Min.	1900
		Max.	4900

Lognormal distribution? r-squared is: 0.875
Normal distribution? r-squared is: 0.759
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 3046

CALCULATION SHEET

Washington Closure Hanford

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Project 100-B Area Closure Operations
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Calc. No. 0100B-CA-V0346
Checked J. D. Skoglie

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Duplicate Analysis - 100-B-35:1 Subsite - SPA

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			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	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA-12	J1V5C9	3/30/2015	9650	X	1.4	2.2		0.68	71.0	X	0.071	0.30		0.031	1.4	B	0.91	0.13	B	0.038	3940	X	13.1	12.4		0.054	6.9		0.093
Duplicate of J1V5C9	J1V5D0	3/30/2015	9090	X	1.6	2.4		0.64	71.6	X	0.078	0.28		0.034	1.4	B	1.0	0.13	B	0.042	3770	X	14.6	12.9		0.060	6.8		0.10

Analysis:

TDL		5	10	2	0.5	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)**	**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)**	No-Stop (acceptable)
	RPD	6.0%		0.8%				4.4%	4.0%	
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable

Duplicate Analysis - 100-B-35:1 Subsite - SPA

Sampling Area	HEIS Number	Sample Date	Copper			Iron			Lead			Magnesium			Manganese			Nickel			Potassium			Silicon			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	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA-12	J1V5C9	3/30/2015	13.5		0.20	21300	X	3.9	4.3		0.28	4020		3.4	335	X	0.093	11.1	X	0.11	1590		38.2	677	X	5.8	327		54.9
Duplicate of J1V5C9	J1V5D0	3/30/2015	12.7		0.22	20500	X	3.7	5.2		0.26	3930		3.8	332	X	0.10	11.2	X	0.13	1560		42.3	595	X	5.5	287		60.9

Analysis:

TDL		1	5	5	75	5	4	400	2	50
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD	6.1%	3.8%		2.3%	0.9%			12.9%	13.0%
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable

Duplicate Analysis - 100-B-35:1 Subsite - SPA

Sampling Area	HEIS Number	Sample Date	Vanadium			Zinc			TPH-Diesel - Ext.			TPH-Diesel		
			mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
SPA-12	J1V5C9	3/30/2015	49.6	X	0.087	40.6	X	0.37	5200		1000	4300		700
Duplicate of J1V5C9	J1V5D0	3/30/2015	49.7	X	0.097	44.3	X	0.41	2400	J	1000	2200	J	710

Analysis:

TDL		2.5	1	5000	5000
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	0.2%	8.7%		
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator I. B. Berezovskiy
Project 100-B Area Closure Operations
Subject 100-B-35:1 Subsite Cleanup Verification 95% UCL Calculations

Date 05/19/15
Job No. 14655

Calc. No. 0100B-CA-V0346
Checked J. D. Skoglie

Rev. No. 0
Date 05/19/15
Sheet No. 15 of 15

Duplicate Analysis - 100-B-35:1 Subsite - DZ

Sampling Area	Sample Number	Sample Date	Aluminum			Antimony			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	mg/kg	Q	PQL
DZ-1	J1V511	3/30/2015	13100	X	1.7	1.0		0.42	6.4		0.73	79.2	X	0.084	0.16	BM	0.036	0.18	B	0.045	11700	X	15.5	13.4	X	0.064	11.0	X	0.11
Duplicate of J1V511	J1V515	3/30/2015	11000	X	1.7	1.0		0.41	5.6		0.70	72.5	X	0.081	0.12	B	0.035	0.16	B	0.044	9810	X	15.0	11.1	X	0.062	9.9	X	0.11

Analysis:

TDL		Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
		5	0.6	10	2	0.5	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)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)
	RPD	17.4%			8.8%			17.6%	18.8%	
	Difference > 2 TDL?	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable

Duplicate Analysis - 100-B-35:1 Subsite - DZ

Sampling Area	HEIS Number	Sample Date	Copper			Iron			Lead			Magnesium			Manganese			Nickel			Potassium			Silicon			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	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
DZ-1	J1V511	3/30/2015	21.2		0.24	29100	X	4.2	10.4		0.30	7950	X	4.1	473	X	0.11	16.2	X	0.14	2360	X	45.1	532		6.2	469		64.9
Duplicate of J1V511	J1V515	3/30/2015	19.2		0.23	25800	X	4.1	8.3		0.29	6840	X	3.9	412	X	0.11	14.1	X	0.13	2000	X	43.7	561		6.0	436		62.9

Analysis:

TDL		Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Silicon	Sodium
		1	5	5	75	5	4	400	2	50
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD	9.9%	12.0%		15.0%	13.8%			5.3%	7.3%
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable

Duplicate Analysis - 100-B-35:1 Subsite - DZ

Sampling Area	HEIS Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
DZ-1	J1V511	3/30/2015	59.3		0.10	59.0	X	0.44
Duplicate of J1V511	J1V515	3/30/2015	52.6		0.10	51.7	X	0.42

Analysis:

TDL		Vanadium	Zinc
		2.5	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD	12.0%	13.2%
	Difference > 2 TDL?	Not applicable	Not applicable

Attachment 1. 100-B-35:1 Subsite Verification Sample Results (Metals).

Sample 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
SZ-1	J1V4X9	3/30/2015	7630	X	1.6	1.3	J	0.40	4.5		0.70	86.0	XMJ	0.081	0.035	U	0.035	2.0	BM	1.0
SZ-2	J1V500	3/30/2015	6600	X	1.5	0.50	BJ	0.36	5.2		0.62	39.8	XJ	0.071	0.031	U	0.031	0.92	U	0.92
SZ-3	J1V501	3/30/2015	7270	X	1.5	1.2	J	0.36	3.8		0.62	59.6	XJ	0.072	0.031	U	0.031	0.93	U	0.93
SZ-4	J1V502	3/30/2015	10900	X	1.5	0.79	J	0.37	7.1		0.65	57.4	XJ	0.075	0.19	B	0.032	1.4	B	0.96
SZ-5	J1V503	3/30/2015	8480	X	1.5	1.0	J	0.37	5.3		0.65	59.8	XJ	0.075	0.033	U	0.033	1.3	B	0.97
SZ-6	J1V504	3/30/2015	6290	X	1.3	0.85	J	0.32	3.5		0.56	40.4	XJ	0.064	0.028	U	0.028	0.83	U	0.83
SZ-7	J1V505	3/30/2015	8360	X	1.6	0.92	J	0.39	5.0		0.67	73.1	XJ	0.077	0.034	U	0.034	1.1	B	1.0
SZ-8	J1V506	3/30/2015	7800	X	1.5	1.1	J	0.37	3.7		0.64	68.7	XJ	0.073	0.032	U	0.032	1.4	B	0.94
SZ-9	J1V507	3/30/2015	7700	X	1.6	1.1	J	0.38	4.1		0.66	55.2	XJ	0.076	0.033	U	0.033	1.2	B	0.98
SZ-10	J1V508	3/30/2015	9620	X	1.4	1.0	J	0.35	5.6		0.61	55.6	XJ	0.070	0.10	B	0.030	1.7	B	0.90
SZ-11	J1V509	3/30/2015	7490	X	1.5	0.77	J	0.36	3.7		0.62	52.6	XJ	0.071	0.031	U	0.031	1.0	B	0.92
SZ-12	J1V510	3/30/2015	6230	X	1.4	0.85	J	0.34	3.4		0.60	45.9	XJ	0.069	0.030	U	0.030	0.97	B	0.89
SPA-12	J1V5C9	3/30/2015	9650	X	1.4	0.39	U	0.39	2.2		0.68	71.0	X	0.071	0.30		0.031	1.4	B	0.91
Duplicate of J1V5C9	J1V5D0	3/30/2015	9090	X	1.6	0.37	U	0.37	2.4		0.64	71.6	X	0.078	0.28		0.034	1.4	B	1.0
SPA-1	J1V598	3/30/2015	8070	X	1.6	0.35	U	0.35	2.9		0.61	75.2	X	0.080	0.30		0.035	1.0	U	1.0
SPA-2	J1V599	3/30/2015	9970	X	1.5	0.38	U	0.38	3.7		0.66	85.0	X	0.075	0.36		0.032	0.96	U	0.96
SPA-3	J1V5C0	3/30/2015	6280	X	1.6	0.37	U	0.37	2.6		0.63	44.3	X	0.077	0.25		0.033	0.99	U	0.99
SPA-4	J1V5C1	3/30/2015	8870	X	1.6	0.36	U	0.36	4.8		0.62	57.4	X	0.076	0.36		0.033	0.99	U	0.99
SPA-5	J1V5C2	3/30/2015	8620	X	1.6	0.38	U	0.38	2.8		0.65	59.6	X	0.077	0.33		0.033	0.99	U	0.99
SPA-6	J1V5C3	3/30/2015	8860	X	1.6	0.40	U	0.40	4.7		0.70	58.9	X	0.079	0.35		0.034	1.0	U	1.0
SPA-7	J1V5C4	3/30/2015	8030	X	1.5	0.36	U	0.36	2.5		0.62	61.8	X	0.073	0.26		0.032	0.95	U	0.95
SPA-8	J1V5C5	3/30/2015	7990	X	1.6	0.38	U	0.38	3.0		0.66	57.2	X	0.079	0.29		0.034	1.0	U	1.0
SPA-9	J1V5C6	3/30/2015	8210	X	1.6	0.36	U	0.36	3.3		0.62	59.0	X	0.077	0.28		0.033	0.99	U	0.99
SPA-10	J1V5C7	3/30/2015	9450	X	1.6	0.37	U	0.37	2.5		0.65	72.7	X	0.078	0.30		0.034	1.1	B	1.0
SPA-11	J1V5C8	3/30/2015	9690	X	1.3	0.32	U	0.32	2.4		0.56	72.3	X	0.064	0.31		0.028	1.2	B	0.83
DZ-1	J1V511	3/30/2015	13100	X	1.7	1.0		0.42	6.4		0.73	79.2	X	0.084	0.16	BM	0.036	1.3	B	1.1
Duplicate of J1V511	J1V515	3/30/2015	11000	X	1.7	1.0		0.41	5.6		0.70	72.5	X	0.081	0.12	B	0.035	1.0	U	1.0
DZ-2	J1V512	3/30/2015	13900	X	1.7	1.3		0.41	9.6		0.72	81.6	X	0.083	0.27		0.036	1.5	B	1.1
DZ-3	J1V513	3/30/2015	11600	X	1.7	1.2		0.43	5.5		0.74	79.2	X	0.085	0.037	U	0.037	1.4	B	1.1
DZ-4	J1V514	3/30/2015	13500	X	1.7	1.0		0.42	9.4		0.74	80.4	X	0.085	0.28		0.037	1.3	B	1.1
Equipment blank	J1V5D1	3/30/2015	217	X	1.3	0.33	U	0.33	0.65	U	0.65	1.5	X	0.066	0.098	B	0.029	0.85	U	0.85

Acronyms and notes apply to all of the tables in this attachment.

Note: Data qualified with B, C, J, and/or M are considered acceptable values.

* = MS/MSD RPD exceeded the control limit.

B = blank contamination (inorganic constituents)

C = the analyte was detected in both the sample and the associated QC blank, and the sample concentration was ≤5x the blank concentration.

DZ = deep zone

HEIS = Hanford Environmental Information System

J = estimate

M = sample duplicate precision not met.

MDA = minimum dection allowed

ND = non-detected

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated byphenyl

PQL = practical quantitation limit

Q = qualifier

SPA = staging pile area

SZ = shallow zone

TPH = total petroleum hydrocarbons

U = undetected

X (metals) = serial dilution in the analytical batch indicates physical and chemical interferences are present.

X (organics) = more than 40% difference between columns, lower result reported.

Attachment	1	Sheet No.	1 of 11
Originator	I. B. Berezovskiy	Date	5/19/15
Checked	J. D. Skoglie	Job No.	14655
Calc. No.	0100B-CA-V0346	Rev. No.	0

Attachment 1. 100-B-35:1 Subsite Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Cadmium			Calcium			Chromium			Cobalt			Copper			Iron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SZ-1	J1V4X9	3/30/2015	0.18	B	0.043	9830	XJ	14.9	8.4	X	0.061	9.6	X	0.11	19.9		0.23	24300	X	4.0
SZ-2	J1V500	3/30/2015	0.15	B	0.039	12000	XJ	13.3	6.7	X	0.055	8.5	X	0.094	16.7		0.20	22300	X	3.6
SZ-3	J1V501	3/30/2015	0.13	B	0.039	7150	XJ	13.3	7.4	X	0.055	9.3	X	0.094	16.7		0.20	26000	X	3.6
SZ-4	J1V502	3/30/2015	0.15	B	0.040	11400	XJ	13.8	11.2	X	0.057	9.4	X	0.098	20.8		0.21	24000	X	3.7
SZ-5	J1V503	3/30/2015	0.14	B	0.040	10900	XJ	13.9	8.9	X	0.057	9.6	X	0.099	18.7		0.21	25800	X	3.7
SZ-6	J1V504	3/30/2015	0.10	B	0.035	9550	XJ	11.9	6.8	X	0.049	8.8	X	0.085	16.2		0.18	24000	X	3.2
SZ-7	J1V505	3/30/2015	0.14	B	0.042	9240	XJ	14.3	8.5	X	0.059	9.2	X	0.10	20.2		0.22	24800	X	3.9
SZ-8	J1V506	3/30/2015	0.16	B	0.040	10200	XJ	13.6	7.9	X	0.056	9.3	X	0.096	18.5		0.21	25600	X	3.7
SZ-9	J1V507	3/30/2015	0.14	B	0.041	15000	XJ	14.1	8.4	X	0.058	9.3	X	0.10	18.3		0.22	24600	X	3.8
SZ-10	J1V508	3/30/2015	0.15	B	0.038	16600	XJ	12.9	10.1	X	0.053	9.2	X	0.092	21.7		0.20	23200	X	3.5
SZ-11	J1V509	3/30/2015	0.13	B	0.038	9930	XJ	13.2	7.9	X	0.054	8.8	X	0.094	16.9		0.20	24300	X	3.6
SZ-12	J1V510	3/30/2015	0.11	B	0.037	16800	XJ	12.8	6.4	X	0.052	8.2	X	0.09	18.4		0.20	22600	X	3.4
SPA-12	J1V5C9	3/30/2015	0.13	B	0.038	3940	X	13.1	12.4		0.054	6.9		0.093	13.5		0.20	21300	X	3.9
Duplicate of J1V5C9	J1V5D0	3/30/2015	0.13	B	0.042	3770	X	14.6	12.9		0.060	6.8		0.10	12.7		0.22	20500	X	3.7
SPA-1	J1V598	3/30/2015	0.094	BM	0.043	5500	X	14.8	10.8		0.061	8.0		0.10	16.1		0.23	24100	X	3.5
SPA-2	J1V599	3/30/2015	0.12	B	0.040	7020	X	13.9	13.2		0.057	8.5		0.098	17.7		0.21	25100	X	3.8
SPA-3	J1V5C0	3/30/2015	0.10	B	0.041	7130	X	14.2	6.6		0.058	8.9		0.10	17.0		0.22	27100	X	3.7
SPA-4	J1V5C1	3/30/2015	0.12	B	0.041	8670	X	14.2	10.8		0.058	8.5		0.10	17.8		0.22	24800	X	3.6
SPA-5	J1V5C2	3/30/2015	0.12	B	0.041	4520	X	14.2	10.6		0.058	8.9		0.10	19.8		0.22	27400	X	3.8
SPA-6	J1V5C3	3/30/2015	0.12	B	0.043	16300	X	14.6	10.4		0.060	8.5		0.10	19.2		0.23	24200	X	4.0
SPA-7	J1V5C4	3/30/2015	0.12	B	0.040	5060	X	13.6	11.2		0.056	7.8		0.097	16.0		0.21	22500	X	3.6
SPA-8	J1V5C5	3/30/2015	0.098	B	0.043	5400	X	14.7	9.1		0.061	8.9		0.10	19.4		0.23	26700	X	3.8
SPA-9	J1V5C6	3/30/2015	0.10	B	0.041	7160	X	14.2	10.9		0.059	8.0		0.10	16.0		0.22	24600	X	3.6
SPA-10	J1V5C7	3/30/2015	0.10	B	0.042	3630	X	14.5	12.4		0.060	7.1		0.10	13.0		0.22	21800	X	3.7
SPA-11	J1V5C8	3/30/2015	0.12	B	0.035	3480	X	11.9	13.4		0.049	7.4		0.085	13.8		0.18	22700	X	3.2
DZ-1	J1V511	3/30/2015	0.18	B	0.045	11700	X	15.5	13.4	X	0.064	11.0	X	0.11	21.2		0.24	29100	X	4.2
Duplicate of J1V511	J1V515	3/30/2015	0.16	B	0.044	9810	X	15.0	11.1	X	0.062	9.9	X	0.11	19.2		0.23	25800	X	4.1
DZ-2	J1V512	3/30/2015	0.21	B	0.045	14300	X	15.4	15.2	X	0.063	10.3	X	0.11	22.3		0.24	27200	X	4.1
DZ-3	J1V513	3/30/2015	0.17	B	0.046	11200	X	15.8	10.9	X	0.065	11.9	X	0.11	21.1		0.24	31900	X	4.3
DZ-4	J1V514	3/30/2015	0.22		0.046	13300	X	15.7	15.3	X	0.065	10.2	X	0.11	23.2		0.24	27000	X	4.2
Equipment blank	J1V5D1	3/30/2015	0.036	U	0.036	40.6	BX	12.3	0.52		0.050	0.31	B	0.087	1.0		0.19	166	X	3.7

Attachment	1	Sheet No.	2 of 11
Originator	I. B. Berezovskiy	Date	5/19/15
Checked	J. D. Skoglie	Job No.	14655
Calc. No.	0100B-CA-V0346	Rev. No.	0

Attachment 1. 100-B-35:1 Subsite Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Lead			Magnesium			Manganese			Mercury			Molybdenum			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
SZ-1	J1V4X9	3/30/2015	6.8		0.29	4920	X	3.9	349	X	0.11	0.015	BM	0.0068	0.37	B	0.28	11.9	X	0.13
SZ-2	J1V500	3/30/2015	4.9		0.25	5590	X	3.5	283	X	0.094	0.0069	U	0.0069	0.24	B	0.24	10.1	X	0.12
SZ-3	J1V501	3/30/2015	5.1		0.25	5660	X	3.5	386	X	0.094	0.0067	U	0.0067	0.25	U	0.25	12.3	X	0.12
SZ-4	J1V502	3/30/2015	8.7		0.26	7210	X	3.6	410	X	0.098	0.0065	U	0.0065	0.26	U	0.26	14.9	X	0.12
SZ-5	J1V503	3/30/2015	6.0		0.27	5960	X	3.6	371	X	0.099	0.0069	U	0.0069	0.29	B	0.26	12.1	X	0.12
SZ-6	J1V504	3/30/2015	4.3		0.23	5650	X	3.1	317	X	0.085	0.0058	U	0.0058	0.22	U	0.22	11.9	X	0.10
SZ-7	J1V505	3/30/2015	6.7		0.27	5570	X	3.8	352	X	0.10	0.010	B	0.0071	0.26	U	0.26	11.9	X	0.12
SZ-8	J1V506	3/30/2015	5.7		0.26	5290	X	3.6	371	X	0.096	0.025		0.0060	0.25	U	0.25	11.5	X	0.12
SZ-9	J1V507	3/30/2015	5.2		0.27	6550	X	3.7	349	X	0.10	0.0073	B	0.0060	0.26	U	0.26	12.8	X	0.12
SZ-10	J1V508	3/30/2015	7.9		0.25	6460	X	3.4	376	X	0.092	0.013	B	0.0065	0.24	U	0.24	14.2	X	0.11
SZ-11	J1V509	3/30/2015	5.5		0.25	5410	X	3.5	336	X	0.094	0.0070	B	0.0067	0.24	U	0.24	12.2	X	0.12
SZ-12	J1V510	3/30/2015	4.7		0.24	4560	X	3.3	293	X	0.09	0.012	B	0.0061	0.24	U	0.24	9.8	X	0.11
SPA-12	J1V5C9	3/30/2015	4.3		0.28	4020		3.4	335	X	0.093	0.0066	U	0.0066	0.24	U	0.24	11.1	X	0.11
Duplicate of J1V5C9	J1V5D0	3/30/2015	5.2		0.26	3930		3.8	332	X	0.10	0.0069	U	0.0069	0.27	U	0.27	11.2	X	0.13
SPA-1	J1V598	3/30/2015	4.9		0.25	4620		3.9	363	X	0.10	0.0068	U	0.0068	0.27	U	0.27	11.6	X	0.13
SPA-2	J1V599	3/30/2015	5.8		0.27	5020		3.6	410	X	0.098	0.0069	U	0.0069	0.26	U	0.26	13.2	X	0.12
SPA-3	J1V5C0	3/30/2015	4.1		0.26	5260		3.7	353	X	0.10	0.0057	U	0.0057	0.26	U	0.26	11.9	X	0.12
SPA-4	J1V5C1	3/30/2015	6.6		0.25	6160		3.7	371	X	0.10	0.0076	B	0.0064	0.26	U	0.26	13.1	X	0.12
SPA-5	J1V5C2	3/30/2015	5.1		0.27	5120		3.7	355	X	0.10	0.0063	U	0.0063	0.26	U	0.26	13.2	X	0.12
SPA-6	J1V5C3	3/30/2015	7.5		0.29	5810		3.8	371	X	0.10	0.010	B	0.0062	0.27	U	0.27	12.1	X	0.13
SPA-7	J1V5C4	3/30/2015	4.1		0.25	4760		3.6	344	X	0.097	0.0058	U	0.0058	0.25	U	0.25	11.8	X	0.12
SPA-8	J1V5C5	3/30/2015	5.4		0.27	4990		3.9	358	X	0.10	0.0067	U	0.0067	0.27	U	0.27	11.1	X	0.13
SPA-9	J1V5C6	3/30/2015	5.3		0.25	4830		3.7	367	X	0.10	0.0060	U	0.0060	0.26	U	0.26	11.7	X	0.12
SPA-10	J1V5C7	3/30/2015	4.3		0.26	4090		3.8	349	X	0.10	0.0060	U	0.0060	0.27	U	0.27	11.5	X	0.13
SPA-11	J1V5C8	3/30/2015	4.4		0.23	4050		3.1	352	X	0.085	0.0061	U	0.0061	0.22	U	0.22	11.9	X	0.10
DZ-1	J1V511	3/30/2015	10.4		0.30	7950	X	4.1	473	X	0.11	0.0070	U	0.0070	0.29	U	0.29	16.2	X	0.14
Duplicate of J1V511	J1V515	3/30/2015	8.3		0.29	6840	X	3.9	412	X	0.11	0.0071	U	0.0071	0.28	U	0.28	14.1	X	0.13
DZ-2	J1V512	3/30/2015	12.2		0.29	8650	X	4.0	489	X	0.11	0.0069	U	0.0069	0.28	U	0.28	17.2	X	0.13
DZ-3	J1V513	3/30/2015	8.0		0.30	7260	X	4.2	502	X	0.11	0.0068	U	0.0068	0.29	U	0.29	14.9	X	0.14
DZ-4	J1V514	3/30/2015	11.8		0.30	8460	X	4.1	476	X	0.11	0.0076	U	0.0076	0.29	U	0.29	17.5	X	0.14
Equipment blank	J1V5D1	3/30/2015	0.37	B	0.26	33.3		3.2	4.9	X	0.087	0.0064	U	0.0064	0.23	U	0.23	0.70	BXC	0.11

Attachment	1	Sheet No.	3 of 11
Originator	I. B. Berezovskiy	Date	5/19/15
Checked	J. D. Skoglie	Job No.	14655
Calc. No.	0100B-CA-V0346	Rev. No.	0

Attachment 1. 100-B-35:1 Subsite Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Potassium			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	mg/kg	Q	PQL
SZ-1	J1V4X9	3/30/2015	1240		43.4	0.91	U	0.91	517	J	6.0	0.17	U	0.17	299		62.5	59.4		0.10
SZ-2	J1V500	3/30/2015	1280		38.6	0.81	U	0.81	385	J	5.3	0.15	U	0.15	262		55.5	49.3		0.088
SZ-3	J1V501	3/30/2015	1180		38.7	0.81	U	0.81	503	J	5.3	0.15	U	0.15	297		55.7	65.7		0.089
SZ-4	J1V502	3/30/2015	1920		40.2	0.84	U	0.84	772	J	5.6	0.16	U	0.16	305		57.9	47.8		0.092
SZ-5	J1V503	3/30/2015	1510		40.4	0.85	U	0.85	418	J	5.6	0.16	U	0.16	400		58.2	60.9		0.093
SZ-6	J1V504	3/30/2015	1120		34.7	0.73	U	0.73	418	J	4.8	0.14	U	0.14	258		50.0	55.6		0.080
SZ-7	J1V505	3/30/2015	1190		41.7	0.87	U	0.87	570	J	5.8	0.16	U	0.16	303		59.9	59.4		0.096
SZ-8	J1V506	3/30/2015	1240		39.5	0.83	U	0.83	464	J	5.5	0.15	U	0.15	387		56.9	67.0		0.091
SZ-9	J1V507	3/30/2015	1310		41.1	0.86	U	0.86	604	J	5.7	0.16	U	0.16	363		59.1	63.3		0.094
SZ-10	J1V508	3/30/2015	1400		37.6	0.79	U	0.79	381	J	5.2	0.15	U	0.15	303		54.1	51.9		0.086
SZ-11	J1V509	3/30/2015	1180		38.4	0.81	U	0.81	556	J	5.3	0.15	U	0.15	334		55.3	60.0		0.088
SZ-12	J1V510	3/30/2015	963		37.1	0.78	U	0.78	375	J	5.1	0.14	U	0.14	250		53.4	55.3		0.085
SPA-12	J1V5C9	3/30/2015	1590		38.2	0.88	U	0.88	677	X	5.8	0.16	U	0.16	327		54.9	49.6	X	0.087
Duplicate of J1V5C9	J1V5D0	3/30/2015	1560		42.3	0.95	B	0.83	595	X	5.5	0.15	U	0.15	287		60.9	49.7	X	0.097
SPA-1	J1V598	3/30/2015	1300		42.9	0.80	U	0.80	433	X	5.2	0.15	BC	0.15	254		61.8	56.4	X	0.098
SPA-2	J1V599	3/30/2015	1360		40.3	0.85	U	0.85	508	X	5.6	0.16	U	0.16	320		58.0	57.6	X	0.092
SPA-3	J1V5C0	3/30/2015	833		41.3	0.83	U	0.83	370	X	5.4	0.15	U	0.15	260		59.5	74.1	X	0.095
SPA-4	J1V5C1	3/30/2015	1310		41.2	0.81	U	0.81	431	X	5.3	0.15	U	0.15	244		59.3	58.7	X	0.095
SPA-5	J1V5C2	3/30/2015	1220		41.3	0.93	B	0.85	479	X	5.6	0.16	U	0.16	255		59.4	68.4	X	0.095
SPA-6	J1V5C3	3/30/2015	1320		42.5	1.1		0.91	520	X	6.0	0.17	U	0.17	281		61.2	53.1	X	0.098
SPA-7	J1V5C4	3/30/2015	1190		39.6	0.92	B	0.81	447	X	5.3	0.15	U	0.15	249		56.9	60.5	X	0.091
SPA-8	J1V5C5	3/30/2015	1090		42.8	0.95	B	0.86	542	X	5.7	0.16	U	0.16	275		61.6	64.5	X	0.098
SPA-9	J1V5C6	3/30/2015	1310		41.4	0.86	B	0.81	432	X	5.3	0.15	U	0.15	263		59.5	63.8	X	0.095
SPA-10	J1V5C7	3/30/2015	1560		42.2	0.84	U	0.84	516	X	5.6	0.16	U	0.16	247		60.7	50.6	X	0.097
SPA-11	J1V5C8	3/30/2015	1710		34.7	0.97		0.73	526	X	4.8	0.14	U	0.14	242		49.9	47.8	X	0.079
DZ-1	J1V511	3/30/2015	2360	X	45.1	0.95	U	0.95	532		6.2	0.18	U	0.18	469		64.9	59.3		0.10
Duplicate of J1V511	J1V515	3/30/2015	2000	X	43.7	0.92	U	0.92	561		6.0	0.17	U	0.17	436		62.9	52.6		0.10
DZ-2	J1V512	3/30/2015	2660	X	44.6	0.94	U	0.94	616		6.2	0.17	U	0.17	705		64.2	49.9		0.10
DZ-3	J1V513	3/30/2015	2000	X	46.0	0.97	U	0.97	475		6.4	0.18	U	0.18	493		66.2	72.2		0.11
DZ-4	J1V514	3/30/2015	2600	X	45.8	0.96	U	0.96	565		6.3	0.18	U	0.18	553		65.9	48.7		0.10
Equipment blank	J1V5D1	3/30/2015	66.6	B	35.7	0.84	U	0.84	149	X	5.6	0.16	U	0.16	51.3	U	51.3	0.97	BX	0.082

Attachment	1	Sheet No.	4 of 11
Originator	I. B. Berezovskiy	Date	5/19/15
Checked	J. D. Skoglie	Job No.	14655
Calc. No.	0100B-CA-V0346	Rev. No.	0

Attachment 1. 100-B-35:1 Subsite Verification Sample Results (Metals and TPH).

Sample Location	HEIS Number	Sample Date	Zinc			TPH-Diesel Ext.			TPH-Diesel			Percent moisture (wet sample)		
			mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	%	Q	PQL
SZ-1	J1V4X9	3/30/2015	112	X	0.42	11000		1100	6300		730	7.5		0.10
SZ-2	J1V500	3/30/2015	42.3	X	0.37	5100		1000	4100	J	710	4.2		0.10
SZ-3	J1V501	3/30/2015	48.3	X	0.38	3700	J	1100	2900	J	710	5.4		0.10
SZ-4	J1V502	3/30/2015	50.4	X	0.39	12000		1100	11000		740	9.8		0.10
SZ-5	J1V503	3/30/2015	49.7	X	0.39	6600		1100	5100		730	7.0		0.10
SZ-6	J1V504	3/30/2015	43.9	X	0.34	4100		1000	2800	J	700	4.8		0.10
SZ-7	J1V505	3/30/2015	47.1	X	0.40	13000		1100	11000		720	7.2		0.10
SZ-8	J1V506	3/30/2015	51.4	X	0.38	25000		1000	20000		700	3.9		0.10
SZ-9	J1V507	3/30/2015	46.3	X	0.40	3600	J	1000	2700	J	710	4.9		0.10
SZ-10	J1V508	3/30/2015	47.5	X	0.37	4200	J	1100	3000	J	740	9.2		0.10
SZ-11	J1V509	3/30/2015	44.2	X	0.37	5000		1000	3300	J	700	4.7		0.10
SZ-12	J1V510	3/30/2015	41.3	X	0.36	5600		1100	3100	J	720	6.3		0.10
SPA-12	J1V5C9	3/30/2015	40.6	X	0.37	5200		1000	4300		700	8.2		0.10
Duplicate of J1V5C9	J1V5D0	3/30/2015	44.3	X	0.41	2400	J	1000	2200	J	710	7.8		0.10
SPA-1	J1V598	3/30/2015	45.1	X	0.42	4100	J	1000	2300	J	710	4.5		0.10
SPA-2	J1V599	3/30/2015	46.2	X	0.39	3800	J	1000	2500	J	690	4.1		0.10
SPA-3	J1V5C0	3/30/2015	48.9	X	0.40	2600	J	1000	2200	J	690	3.7		0.10
SPA-4	J1V5C1	3/30/2015	47.1	X	0.40	3500	J	980	2800	J	670	6.2		0.10
SPA-5	J1V5C2	3/30/2015	47.9	X	0.40	1900	J	980	1900	J	670	4.5		0.10
SPA-6	J1V5C3	3/30/2015	49.1	X	0.41	6900		1100	4900		740	9.1		0.10
SPA-7	J1V5C4	3/30/2015	45.4	X	0.38	4500		1000	2800	J	680	4.1		0.10
SPA-8	J1V5C5	3/30/2015	47.1	X	0.42	3500	J	1000	2800	J	690	5.1		0.10
SPA-9	J1V5C6	3/30/2015	47.3	X	0.40	3300	J	1000	2400	J	700	5.6		0.10
SPA-10	J1V5C7	3/30/2015	39.9	X	0.41	2200	J	1000	2000	J	690	4.7		0.10
SPA-11	J1V5C8	3/30/2015	40.1	X	0.34	2300	J	970	2100	J	660	4.6		0.10
DZ-1	J1V511	3/30/2015	59.0	X	0.44	1100	U	1100	750	U	750	12.6		0.10
Duplicate of J1V511	J1V515	3/30/2015	51.7	X	0.42	1300	J	1100	2000	J	730	10.7		0.10
DZ-2	J1V512	3/30/2015	59.4	X	0.43	58000		1200	55000		780	16.5		0.10
DZ-3	J1V513	3/30/2015	59.9	X	0.45	5400		1100	5000		760	11.8		0.10
DZ-4	J1V514	3/30/2015	58.6	X	0.44	9500		1100	9300		780	14.7		0.10
Equipment Blank	J1V5D1	3/30/2015	1.5	X	0.35							0.10	U	0.10

Attachment	1	Sheet No.	5 of 11
Originator	I. B. Berezovskiy	Date	5/19/15
Checked	J. D. Skoglie	Job No.	14655
Calc. No.	0100B-CA-V0346	Rev. No.	0

Attachment 1. 100-B-35:1 Subsite Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1V4X9, SZ-1			J1V500, SZ-2			J1V501, SZ-3			J1V502, SZ-4			J1V503, SZ-5			J1V504, SZ-6		
		03/30/15			03/30/15			03/30/15			03/30/15			03/30/15			03/30/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	11	U	11	10	U	10	9.9	U	9.9	11	U	11	10	U	10	9.8	U	9.8
Acenaphthylene	PAH	9.6	U	9.6	9.1	U	9.1	8.9	U	8.9	9.5	U	9.5	9.1	U	9.1	8.8	U	8.8
Anthracene	PAH	3.3	U	3.3	3.1	U	3.1	3.0	U	3.0	3.2	U	3.2	3.1	U	3.1	3.0	U	3.0
Benzo(a)anthracene	PAH	9.1	JX	3.4	3.2	U	3.2	3.4	JX	3.2	15	JX	3.4	3.2	U	3.2	3.1	U	3.1
Benzo(a)pyrene	PAH	17		6.9	6.5	U	6.5	6.4	U	6.4	6.8	U	6.8	6.5	U	6.5	6.3	U	6.3
Benzo(b)fluoranthene	PAH	65		4.5	4.2	U	4.2	4.2	U	4.2	9.2	J	4.4	4.3	U	4.3	4.1	U	4.1
Benzo(ghi)perylene	PAH	55		7.7	7.2	U	7.2	7.1	U	7.1	7.6	U	7.6	7.3	U	7.3	7.0	U	7.0
Benzo(k)fluoranthene	PAH	10	J	4.2	4.0	U	4.0	3.9	U	3.9	4.2	U	4.2	4.0	U	4.0	3.8	U	3.8
Chrysene	PAH	14	J	5.2	4.9	U	4.9	4.8	U	4.8	10	J	5.1	4.9	U	4.9	4.7	U	4.7
Dibenz[a,h]anthracene	PAH	12	U	12	11	U	11	11	U	11	12	U	12	11	U	11	11	U	11
Fluoranthene	PAH	17	J	14	13	U	13	13	U	13	17	J	14	13	U	13	13	U	13
Fluorene	PAH	5.6	U	5.6	5.3	U	5.3	5.2	U	5.2	5.6	U	5.6	5.4	U	5.4	5.1	U	5.1
Indeno(1,2,3-cd)pyrene	PAH	51		13	12	U	12	12	U	12	13	U	13	12	U	12	12	U	12
Naphthalene	PAH	13	U	13	12	U	12	12	U	12	13	U	13	12	U	12	12	U	12
Phenanthrene	PAH	13	U	13	12	U	12	12	U	12	13	U	13	12	U	12	12	U	12
Pyrene	PAH	23	J	13	12	U	12	12	U	12	14	J	13	12	U	12	12	U	12
Aroclor-1016	PCB	3.0	U	3.0	2.8	U	2.8	2.9	U	2.9	3.0	U	3.0	2.9	U	2.9	2.9	U	2.9
Aroclor-1221	PCB	8.6	U	8.6	8.1	U	8.1	8.3	U	8.3	8.6	U	8.6	8.5	U	8.5	8.3	U	8.3
Aroclor-1232	PCB	2.1	U	2.1	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1
Aroclor-1242	PCB	5.0	U	5.0	4.7	U	4.7	4.8	U	4.8	5.0	U	5.0	4.9	U	4.9	4.8	U	4.8
Aroclor-1248	PCB	5.0	U	5.0	4.7	U	4.7	4.8	U	4.8	5.0	U	5.0	4.9	U	4.9	4.8	U	4.8
Aroclor-1254	PCB	2.8	U	2.8	2.6	U	2.6	2.7	U	2.7	2.8	U	2.8	2.7	U	2.7	2.7	U	2.7
Aroclor-1260	PCB	2.8	U	2.8	2.6	U	2.6	2.7	U	2.7	2.8	U	2.8	2.7	U	2.7	2.7	U	2.7

Attachment	1	Sheet No.	6 of 11
Originator	I. B. Berezovskiy	Date	5/19/15
Checked	J. D. Skoglie	Job No.	14655
Calc. No.	0100B-CA-V0346	Rev. No.	0

Attachment 1. 100-B-35:1 Subsite Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1V505, SZ-7			J1V506, SZ-8			J1V507, SZ-9			J1V508, SZ-10			J1V509, SZ-11			J1V510, SZ-12		
		03/30/15			03/30/15			03/30/15			03/30/15			03/30/15			03/30/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	10	U	10	10	U	10	10	U	10	11	U	11	10	U	10	10	U	10
Acenaphthylene	PAH	9.1	U	9.1	9.2	U	9.2	9.0	U	9.0	9.9	U	9.9	9.2	U	9.2	9.4	U	9.4
Anthracene	PAH	3.1	U	3.1	3.1	U	3.1	3.1	U	3.1	3.3	U	3.3	3.1	U	3.1	3.2	U	3.2
Benzo(a)anthracene	PAH	3.2	U	3.2	17	X	3.3	3.2	U	3.2	3.5	U	3.5	3.3	U	3.3	3.3	U	3.3
Benzo(a)pyrene	PAH	6.5	U	6.5	13	J	6.6	6.4	U	6.4	7.0	U	7.0	6.6	U	6.6	6.7	U	6.7
Benzo(b)fluoranthene	PAH	4.2	U	4.2	18		4.3	4.2	U	4.2	4.6	U	4.6	4.3	U	4.3	4.4	U	4.4
Benzo(ghi)perylene	PAH	7.2	U	7.2	7.4	U	7.4	7.2	U	7.2	7.9	U	7.9	7.4	U	7.4	7.5	U	7.5
Benzo(k)fluoranthene	PAH	4.0	U	4.0	6.2	J	4.0	4.0	U	4.0	4.3	U	4.3	4.0	U	4.0	4.1	U	4.1
Chrysene	PAH	4.9	U	4.9	19	J	5.0	4.9	U	4.9	5.3	U	5.3	4.9	U	4.9	5.1	U	5.1
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	11	U	11	12	U	12	11	U	11	12	U	12
Fluoranthene	PAH	13	U	13	13	U	13	13	U	13	14	U	14	13	U	13	14	U	14
Fluorene	PAH	5.3	U	5.3	5.4	U	5.4	5.3	U	5.3	5.8	U	5.8	5.4	U	5.4	5.5	U	5.5
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	16	J	12	12	U	12	13	U	13	12	U	12	13	U	13
Naphthalene	PAH	12	U	12	12	U	12	12	U	12	13	U	13	12	U	12	13	U	13
Phenanthrene	PAH	12	U	12	12	U	12	12	U	12	13	U	13	12	U	12	13	U	13
Pyrene	PAH	12	U	12	12	J	12	12	U	12	13	U	13	12	U	12	13	U	13
Aroclor-1016	PCB	3.0	U	3.0	2.8	U	2.8	2.8	U	2.8	3.0	U	3.0	2.7	U	2.7	2.8	U	2.8
Aroclor-1221	PCB	8.6	U	8.6	8.1	U	8.1	8.1	U	8.1	8.7	U	8.7	7.7	U	7.7	8.2	U	8.2
Aroclor-1232	PCB	2.1	U	2.1	2.0	U	2.0	2.0	U	2.0	2.2	U	2.2	1.9	U	1.9	2.0	U	2.0
Aroclor-1242	PCB	5.0	U	5.0	4.7	U	4.7	4.7	U	4.7	5.0	U	5.0	4.5	U	4.5	4.8	U	4.8
Aroclor-1248	PCB	5.0	U	5.0	4.7	U	4.7	4.7	U	4.7	5.0	U	5.0	4.5	U	4.5	4.8	U	4.8
Aroclor-1254	PCB	2.8	U	2.8	7.4	J	2.6	2.6	U	2.6	2.8	U	2.8	2.5	U	2.5	2.7	U	2.7
Aroclor-1260	PCB	3.0	J	2.8	2.6	U	2.6	2.6	U	2.6	2.8	U	2.8	2.5	U	2.5	2.7	U	2.7

Attachment	1	Sheet No.	7 of 11
Originator	I. B. Berezovskiy	Date	5/19/15
Checked	J. D. Skoglie	Job No.	14655
Calc. No.	0100B-CA-V0346	Rev. No.	0

Attachment 1. 100-B-35:1 Subsite Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1V5C9, SPA-12			J1V5D0, Duplicate of J1V5C9			J1V598, SPA-1			J1V599, SPA-2			J1V5C0, SPA-3			J1V5C1, SPA-4		
		03/30/15			03/30/15			03/30/15			03/30/15			03/30/15			03/30/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	11	U	11	11	U	11	10	U	10	10	U	10	10	U	10	10	U	10
Acenaphthylene	PAH	9.8	U	9.8	9.5	U	9.5	9.1	U	9.1	9.0	U	9.0	9.2	U	9.2	9.4	U	9.4
Anthracene	PAH	3.3	U	3.3	3.2	U	3.2	3.1	U	3.1	3.0	U	3.0	3.1	U	3.1	3.2	U	3.2
Benzo(a)anthracene	PAH	3.5	U	3.5	3.4	U	3.4	3.2	U	3.2	3.2	U	3.2	3.3	U	3.3	3.3	U	3.3
Benzo(a)pyrene	PAH	7.0	U	7.0	6.7	U	6.7	6.5	U	6.5	6.4	U	6.4	6.5	U	6.5	6.7	U	6.7
Benzo(b)fluoranthene	PAH	4.6	U	4.6	4.4	U	4.4	4.2	U	4.2	4.2	U	4.2	4.3	U	4.3	4.4	U	4.4
Benzo(ghi)perylene	PAH	7.8	U	7.8	7.6	U	7.6	7.2	U	7.2	7.2	U	7.2	7.4	U	7.4	7.5	U	7.5
Benzo(k)fluoranthene	PAH	4.3	U	4.3	4.1	U	4.1	4.0	U	4.0	3.9	U	3.9	4.0	U	4.0	4.1	U	4.1
Chrysene	PAH	5.3	U	5.3	5.1	U	5.1	4.9	U	4.9	4.8	U	4.8	4.9	U	4.9	5.1	U	5.1
Dibenz[a,h]anthracene	PAH	12	U	12	12	U	12	11	U	11	11	U	11	11	U	11	11	U	11
Fluoranthene	PAH	14	U	14	14	U	14	13	U	13	13	U	13	13	U	13	14	U	14
Fluorene	PAH	5.7	U	5.7	5.6	U	5.6	5.3	U	5.3	5.3	U	5.3	5.4	U	5.4	5.5	U	5.5
Indeno(1,2,3-cd)pyrene	PAH	13	U	13	13	U	13	12	U	12	12	U	12	12	U	12	13	U	13
Naphthalene	PAH	13	U	13	13	U	13	12	U	12	12	U	12	12	U	12	13	U	13
Phenanthrene	PAH	13	U	13	13	U	13	12	U	12	12	U	12	12	U	12	13	U	13
Pyrene	PAH	13	U	13	13	U	13	12	U	12	12	U	12	12	U	12	13	U	13
Aroclor-1016	PCB	2.9	U	2.9	2.8	U	2.8	2.7	U	2.7	2.9	U	2.9	2.8	U	2.8	2.9	U	2.9
Aroclor-1221	PCB	8.4	U	8.4	8.1	U	8.1	7.8	U	7.8	8.3	U	8.3	8.2	U	8.2	8.4	U	8.4
Aroclor-1232	PCB	2.1	U	2.1	2.0	U	2.0	1.9	U	1.9	2.1	U	2.1	2.0	U	2.0	2.1	U	2.1
Aroclor-1242	PCB	4.9	U	4.9	4.7	U	4.7	4.5	U	4.5	4.8	U	4.8	4.8	U	4.8	4.9	U	4.9
Aroclor-1248	PCB	4.9	U	4.9	4.7	U	4.7	4.5	U	4.5	4.8	U	4.8	4.8	U	4.8	4.9	U	4.9
Aroclor-1254	PCB	2.7	U	2.7	2.6	U	2.6	2.5	U	2.5	2.7	U	2.7	2.7	U	2.7	2.7	U	2.7
Aroclor-1260	PCB	2.7	U	2.7	2.6	U	2.6	2.5	U	2.5	2.7	U	2.7	2.7	U	2.7	2.7	U	2.7

Attachment	1	Sheet No.	8 of 11
Originator	I. B. Berezovskiy	Date	5/19/15
Checked	J. D. Skoglie	Job No.	14655
Calc. No.	0100B-CA-V0346	Rev. No.	0

Attachment 1. 100-B-35:1 Subsite Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1V5C2, SPA-5			J1V5C3, SPA-6			J1V5C4, SPA-7			J1V5C5, SPA-8			J1V5C6, SPA-9			J1V5C7, SPA-10		
		03/30/15			03/30/15			03/30/15			03/30/15			03/30/15			03/30/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	10	U	10	11	U	11	9.8	U	9.8	10	U	10	10	U	10	10	U	10
Acenaphthylene	PAH	9.2	U	9.2	9.7	U	9.7	8.8	U	8.8	9.4	U	9.4	9.3	U	9.3	9.0	U	9.0
Anthracene	PAH	3.1	U	3.1	3.3	U	3.3	3.0	U	3.0	3.2	U	3.2	3.2	U	3.2	3.0	U	3.0
Benzo(a)anthracene	PAH	3.3	U	3.3	32	X	3.4	3.1	JX	3.1	3.3	U	3.3	3.3	U	3.3	3.2	U	3.2
Benzo(a)pyrene	PAH	6.6	U	6.6	26		6.9	6.3	U	6.3	6.7	U	6.7	6.6	U	6.6	6.4	U	6.4
Benzo(b)fluoranthene	PAH	4.3	U	4.3	33		4.5	16		4.1	4.4	U	4.4	4.3	U	4.3	4.2	U	4.2
Benzo(ghi)perylene	PAH	7.4	U	7.4	24	J	7.8	7.0	U	7.0	7.5	U	7.5	7.5	U	7.5	7.2	U	7.2
Benzo(k)fluoranthene	PAH	4.0	U	4.0	14	J	4.2	5.8	J	3.9	4.1	U	4.1	4.1	U	4.1	3.9	U	3.9
Chrysene	PAH	5.0	U	5.0	37	J	5.2	9.5	J	4.7	5.1	U	5.1	5.0	U	5.0	4.8	U	4.8
Dibenz[a,h]anthracene	PAH	11	U	11	12	U	12	11	U	11	12	U	12	11	U	11	11	U	11
Fluoranthene	PAH	13	U	13	60		14	13	U	13	14	U	14	13	U	13	13	U	13
Fluorene	PAH	5.4	U	5.4	5.7	U	5.7	5.2	U	5.2	5.5	U	5.5	5.5	U	5.5	5.3	U	5.3
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	21	J	13	12	U	12	13	U	13	12	U	12	12	U	12
Naphthalene	PAH	12	U	12	13	U	13	12	U	12	13	U	13	12	U	12	12	U	12
Phenanthrene	PAH	12	U	12	44		13	12	U	12	13	U	13	12	U	12	12	U	12
Pyrene	PAH	12	U	12	77		13	12	U	12	13	U	13	12	U	12	12	U	12
Aroclor-1016	PCB	2.8	U	2.8	2.8	U	2.8	2.8	U	2.8	2.9	U	2.9	2.9	U	2.9	2.8	U	2.8
Aroclor-1221	PCB	8.0	U	8.0	8.1	U	8.1	8.2	U	8.2	8.3	U	8.3	8.5	U	8.5	8.0	U	8.0
Aroclor-1232	PCB	2.0	U	2.0	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Aroclor-1242	PCB	4.7	U	4.7	4.7	U	4.7	4.8	U	4.8	4.8	U	4.8	4.9	U	4.9	4.7	U	4.7
Aroclor-1248	PCB	4.7	U	4.7	4.7	U	4.7	4.8	U	4.8	4.8	U	4.8	4.9	U	4.9	4.7	U	4.7
Aroclor-1254	PCB	2.6	U	2.6	2.6	U	2.6	2.7	U	2.7	2.7	U	2.7	2.7	U	2.7	2.6	U	2.6
Aroclor-1260	PCB	2.6	U	2.6	2.6	U	2.6	2.7	U	2.7	2.7	U	2.7	2.7	U	2.7	2.6	U	2.6

Attachment	1	Sheet No.	9 of 11
Originator	I. B. Berezovskiy	Date	5/19/15
Checked	J. D. Skoglie	Job No.	14655
Calc. No.	0100B-CA-V0346	Rev. No.	0

Attachment 1. 100-B-35:1 Subsite Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1V5C8, SPA-11			J1V511, DZ-1			J1V515, Duplicate of J1V511			J1V512, DZ-2			J1V513, DZ-3			J1V514, DZ-4		
		03/30/15			03/30/15			03/30/15			03/30/15			03/30/15			03/30/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	10	U	10	11	U	11	11	U	11	11	U	11	11	U	11	12	U	12
Acenaphthylene	PAH	9.2	U	9.2	10	U	10	10	U	10	10	U	10	10	U	10	11	U	11
Anthracene	PAH	3.1	U	3.1	3.5	U	3.5	3.4	U	3.4	3.5	U	3.5	3.4	U	3.4	3.6	U	3.6
Benzo(a)anthracene	PAH	3.3	U	3.3	3.6	U	3.6	3.6	U	3.6	3.6	U	3.6	3.6	U	3.6	3.7	U	3.7
Benzo(a)pyrene	PAH	6.5	U	6.5	7.3	U	7.3	7.2	U	7.2	7.3	U	7.3	7.2	U	7.2	7.5	U	7.5
Benzo(b)fluoranthene	PAH	4.3	U	4.3	4.8	U	4.8	4.7	U	4.7	4.8	U	4.8	4.7	U	4.7	4.9	U	4.9
Benzo(ghi)perylene	PAH	7.4	U	7.4	8.2	U	8.2	8.1	U	8.1	8.2	U	8.2	8.1	U	8.1	8.4	U	8.4
Benzo(k)fluoranthene	PAH	4.0	U	4.0	4.5	U	4.5	4.4	U	4.4	4.5	U	4.5	4.4	U	4.4	4.6	U	4.6
Chrysene	PAH	4.9	U	4.9	5.5	U	5.5	5.4	U	5.4	5.5	U	5.5	5.4	U	5.4	5.7	U	5.7
Dibenz[a,h]anthracene	PAH	11	U	11	13	U	13	12	U	12	13	U	13	12	U	12	13	U	13
Fluoranthene	PAH	13	U	13	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15
Fluorene	PAH	5.4	U	5.4	6.0	U	6.0	5.9	U	5.9	6.0	U	6.0	5.9	U	5.9	6.2	U	6.2
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	14	U	14	13	U	13	14	U	14	13	U	13	14	U	14
Naphthalene	PAH	12	U	12	14	U	14	13	U	13	14	U	14	13	U	13	14	U	14
Phenanthrene	PAH	12	U	12	14	U	14	13	U	13	14	U	14	13	U	13	14	U	14
Pyrene	PAH	12	U	12	14	U	14	13	U	13	14	U	14	13	U	13	14	U	14
Aroclor-1016	PCB	2.7	U	2.7	3.1	U	3.1	3.1	U	3.1	3.3	U	3.3	2.9	U	2.9	3.0	U	3.0
Aroclor-1221	PCB	7.8	U	7.8	9.1	U	9.1	8.9	U	8.9	9.6	U	9.6	8.5	U	8.5	8.8	U	8.8
Aroclor-1232	PCB	1.9	U	1.9	2.3	U	2.3	2.2	U	2.2	2.4	U	2.4	2.1	U	2.1	2.2	U	2.2
Aroclor-1242	PCB	4.5	U	4.5	5.3	U	5.3	5.2	U	5.2	5.6	U	5.6	4.9	U	4.9	5.1	U	5.1
Aroclor-1248	PCB	4.5	U	4.5	5.3	U	5.3	5.2	U	5.2	5.6	U	5.6	4.9	U	4.9	5.1	U	5.1
Aroclor-1254	PCB	2.5	U	2.5	3.0	U	3.0	2.9	U	2.9	3.1	U	3.1	2.7	U	2.7	2.8	U	2.8
Aroclor-1260	PCB	2.5	U	2.5	3.0	U	3.0	2.9	U	2.9	26		3.1	2.7	U	2.7	2.8	U	2.8

Attachment	1	Sheet No.	10 of 11
Originator	I. B. Berezovskiy	Date	5/19/15
Checked	J. D. Skoglie	Job No.	14655
Calc. No.	0100B-CA-V0346	Rev. No.	0

Attachment 1. 100-B-35:1 Subsite Verification Sample Results (Asbestos).

Sample Location	HEIS Number	Sample Date	Chrysotyle			Amosite			Crocidolite			Tremolite			Actinolite			Anthophyllite		
			%	Q	RDL	%	Q	RDL	%	Q	RDL	%	Q	RDL	%	Q	RDL	%	Q	RDL
SZ-1	J1V5D2	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SZ-2	J1V5D3	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SZ-3	J1V5D4	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SZ-4	J1V5D5	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SZ-5	J1V5D6	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SZ-6	J1V5D7	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SZ-7	J1V5D8	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SZ-8	J1V5D9	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SZ-9	J1V5F0	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SZ-10	J1V5F1	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SZ-11	J1V5F2	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SZ-12	J1V5F3	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SPA-12	J1V5J0	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
Duplicate of J1V5J0	J1V5J1	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SPA-1	J1V5F9	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SPA-2	J1V5H0	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SPA-3	J1V5H1	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SPA-4	J1V5H2	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SPA-5	J1V5H3	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SPA-6	J1V5H4	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SPA-7	J1V5H5	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SPA-8	J1V5H6	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SPA-9	J1V5H7	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SPA-10	J1V5H8	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
SPA-11	J1V5H9	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
DZ-1	J1V5F4	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
Duplicate of J1V5F4	J1V5F8	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
DZ-2	J1V5F5	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
DZ-3	J1V5F6	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND
DZ-4	J1V5F7	3/30/2015	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND	ND	U	ND

Attachment	1	Sheet No.	11 of 11
Originator	I. B. Berezovskiy	Date	05/20/15
Checked	J. D. Skoglie	Job No.	14655
Calc. No.	0100B-CA-V0346	Rev. No.	0

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 100-B Area Closure Operations **Job No. 14655**

Area: 100-B

Discipline: Environmental *Calculation No: 0100B-CA-V0347

Subject: 100-B-35:1 Subsite Direct Contact Hazard Quotient and Carcinogenic Risk Calculations

Computer Program: Excel Program No: Excel 2010

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	I. B. Berezovskiy	J. D. Skoglie	R. J. Nielson	S. G. Wilkinson	5/26/15

SUMMARY OF REVISION

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

Washington Closure Hanford CALCULATION SHEET

Originator:	I. B. Berezovskiy	Date:	05/21/15	Calc. No.:	0100B-CA-V0347	Rev.:	0
Project:	100-B Area Closure Operations	Job No:	14655	Checked:	J. D. Skoglie	Date:	05/21/15
Subject:	100-B-35:1 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-B-35:1 subsite. 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, 2015, *100-B-35:1 Subsite Cleanup Verification 95% UCL Calculation*, 0100B-CA-V0346, Rev. 0, Washington Closure Hanford, 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 CALCULATION SHEET

Originator:	I. B. Berezovskiy	Date:	05/21/15	Calc. No.:	0100B-CA-V0347	Rev.:	0
Project:	100-B Area Closure Operations	Job No:	14655	Checked:	J. D. Skoglie	Date:	05/21/15
Subject:	100-B-35:1 Subsite Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	2 of 3

METHODOLOGY:

The 100-B-35:1 subsite is comprised of three decision units for verification sampling; shallow zone, deep zone, and staging pile area. The direct contact hazard quotient and carcinogenic risk calculations for the 100-B-35:1 subsite were conservatively calculated for the shallow zone and staging pile area using the greater of the statistical or maximum value for each analyte from WCH (2015). Of the contaminants of potential concern (COPCs) for this site, boron, molybdenum, aroclor-1254, aroclor-1260, and the detected polycyclic aromatic hydrocarbons (PAHs) require HQ and risk calculations because these analytes were detected and a Washington State or Hanford Site background value is not available. Selenium requires HQ and risk calculations because this constituent was detected above a Washington State or Hanford Site background value. Total petroleum hydrocarbons (diesel range extended) were detected; however, the risk associated with total petroleum hydrocarbons do not contribute to the cumulative toxicity calculation. All other site nonradionuclide COPCs were not detected or were quantified below background levels. An example of the HQ and risk calculations is presented below:

1) For example, the statistical value for boron is 1.4 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 1.9×10^{-4}. 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 7.9×10^{-3}. 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, then multiplied by 1.0×10^{-6}. For example, the statistical value for aroclor-1260 is 0.0030 mg/kg; divided by 0.5 mg/kg, and multiplied as indicated, is 6.0×10^{-9}. Comparing this value to 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 is obtained by summing the individual values. The excess cancer risk for the carcinogenic constituents detected is 3.3×10^{-7}. Comparing this value 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
3) List individual carcinogens and corresponding excess cancer risk $>1 \times 10^{-6}$: None
4) List the cumulative excess cancer risk for carcinogens $>1 \times 10^{-5}$: None

Table 1 shows the results of the calculations.

Washington Closure Hanford CALCULATION SHEET

Originator:	I. B. Berezovskiy	Date:	05/21/15	Calc. No.:	0100B-CA-V0347	Rev.:	0
Project:	100-B Area Closure Operations	Job No:	14655	Checked:	J. D. Skoglie	Date:	05/21/15
Subject:	100-B-35:1 Subsite Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	3 of 3

Table 1. Direct Contact Hazard Quotient and Excess Cancer Risk Results for the 100-B-35:1 Subsite.

Contaminants of Potential Concern	Maximum or Statistical Value [a] (mg/kg)	Noncarcinogen RAG [b] (mg/kg)	Hazard Quotient	Carcinogen RAG [b] (mg/kg)	Carcinogen Risk
Metals					
Boron	1.4	7200	1.9E-04	--	--
Molybdenum	0.37	400	9.3E-04	--	--
Selenium	0.84	400	2.1E-03	--	--
Polycyclic Aromatic Hydrocarbons					
Benzo(a)anthracene	0.032	--	--	1.37	2.3E-08
Benzo(a)pyrene	0.026	--	--	0.137	1.9E-07
Benzo(b)fluoranthene	0.065	--	--	1.37	4.7E-08
Benzo(ghi)perylene [c]	0.055	2400	2.3E-05	--	--
Benzo(k)fluoranthene	0.014	--	--	1.37	1.0E-08
Chrysene	0.037	--	--	13.7	2.7E-09
Fluoranthene	0.060	3200	1.9E-05	--	--
Indeno(1,2,3-cd)pyrene	0.051	--	--	1.37	3.7E-08
Phenanthrene [c]	0.044	24000	1.8E-06	--	--
Pyrene	0.077	2400	3.2E-05	--	--
Polychlorinated Biphenyls					
Aroclor-1254	0.0074	1.6	4.6E-03	0.5	1.5E-08
Aroclor-1260	0.0030	--	--	0.5	6.0E-09
Total Petroleum Hydrocarbons					
TPH - diesel range extended [d]	11	200	--	--	--
Totals					
Cumulative Hazard Quotient:			**7.9E-03**		
Cumulative Excess Cancer Risk:					**3.3E-07**

Notes:

[a] = From WCH (2015).

[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] = Toxicity data for this chemical are not available. Cleanup levels are based on surrogate chemicals.

benzo(g,h,i)perylene surrogate: pyrene

phenanthrene surrogate: anthracene

[d] = The risk associated with total petroleum hydrocarbons do not contribute to the cumulative toxicity calculation.

-- = not applicable

RAG = remedial action goal

CONCLUSION:

The calculations in Table 1 demonstrate that the 100-B-35:1 subsite meets the requirements for the direct contact hazard quotient and carcinogenic (excess cancer) risk, respectively, as identified in the RDR/RAWP (DOE-RL 2009b) and SAP (DOE-RL 2009a). The direct contact hazard quotient 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 design (WCH 2015b). This DQA was performed in accordance with site-specific data quality objectives found in the *100 Area Remedial Action Sampling and Analysis Plan* (100 Area SAP) (DOE-RL 2009).

A review of the sample design (WCH 2015b), the field logbook (WCH 2015a), and applicable analytical data packages has been performed as part of this DQA. To ensure quality data, the 100 Area SAP (DOE-RL 2009) 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-B-35:1 subsite were provided by the laboratory in six sample delivery groups (SDGs): SDG JP0933, SDG JP0934, SDG JP0910, SDG MA10908, SDG MA10909, and SDG MA10910. The SDG JP0934 was submitted for third-party validation. No major deficiencies were identified in the analytical data set. Minor deficiencies are discussed for the 100-B-35:1 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.

MINOR DEFICIENCIES

SDG JP0933

This SDG comprises four focused soil samples (J1V511 through J1V514) from the 100-B-35:1 subsite deep zone excavation area. This SDG includes one field duplicate pair (J1V511/J1V515). These samples were analyzed for inductively coupled plasma (ICP) metals, mercury, polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), and polycyclic aromatic hydrocarbons (PAH). Minor deficiencies are as follows.

In the ICP metals analysis, aluminum, iron, magnesium, and manganese were detected in the method blank (MB) at very low levels, less than 1/20th of the associated field sample result. Although not qualified for the MB contamination, aluminum, iron, magnesium, and manganese data for SDG JP0933 may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the laboratory control sample (LCS) recovery for silicon was below the project recovery limit at 17%. Silicon is not a contaminant of potential concern (COPC) for the 100-B-35:1 subsite nor is it a regulated compound under the Washington Administrative Code (WAC) 173-340, "Model Toxics Control Act-Cleanup." Although not qualified for LCS recovery outside the quality control (QC) limits, all silicon results in SDG JP0933 may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the matrix spike (MS) recoveries are out of project acceptance criteria for five analytes (aluminum [2,093%], antimony [36%], iron [1,267%], manganese [199%], and silicon [38%]). For aluminum, manganese, and iron analytes, 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 variability of the native concentrations rather than a measure of the recovery from the sample. Antimony and silicon did not have mismatched spike and native concentrations in the MS. Although not qualified for MS results outside the QC limits, all antimony and silicon results for SDG JP0933 may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the laboratory duplicate relative percent difference (RPD) for beryllium (34%) is above the acceptance criteria of 30%. Elevated RPDs in environmental soil samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for the RPD above the QC limits, all beryllium data results in SDG JP0933 may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0934

This SDG comprises 12 statistical soil samples (J1V4X9, J1V500 through J1V510) from the 100-B-35:1 subsite shallow zone excavation area. These samples were analyzed for ICP metals, mercury, PCBs, TPH, and PAH. SDG JP0934 was submitted for third-party validation. Minor deficiencies are as follows.

In the ICP metals analysis, the MS recoveries are out of project acceptance criteria for five analytes (aluminum [1,147%], antimony [48%], calcium (68%), iron [942%], and silicon [28%]). 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 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 MS. All antimony, calcium, and silicon results for SDG JP0934 were qualified as estimated with "J" flags by third-party validation. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon was below the project recovery limit at 11%. All silicon results in SDG JP0934 were qualified as estimated with "J" flags by third-party validation. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the laboratory duplicate RPD for barium (42%) is above the acceptance criteria of 30%. Elevated RPDs in environmental soil samples are generally

attributed to natural heterogeneities in the sample matrix. However, all barium results for SDG JP0934 were qualified as estimated with "J" flags by third-party validation. Estimated data are usable for decision-making purposes.

SDG JP0935

This SDG comprises 12 statistical soil samples (J1V598 through J1V599, J1V5C0 through J1V5C9) from the 100-B-35:1 subsite staging pile area. This SDG includes one field duplicate pair (J1V5C9/J1V5D0). These samples were analyzed for ICP metals, mercury, PCBs, TPH, and PAH. In addition, one field equipment blank (J1V5D0) was collected and analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, nickel and silver were detected in the MB at very low levels, less than 1/20th of the associated field sample result. Although not qualified for the MB contamination, all nickel and silver data for SDG JP0935 may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon was below the project recovery limit, at 57%. Silicon is not a COPC for the 100-B-35:1 subsite nor is it a regulated compound under the WAC 173-340, "Model Toxics Control Act-Cleanup." Although not qualified for LCS recovery outside the QC limits, all silicon results in SDG JP0935 may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries are out of project acceptance criteria for four analytes (aluminum [1,497%], antimony [45%], iron [3,387%], and silicon [45%]). For aluminum and iron analytes, 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 variability of the native concentrations rather than a measure of the recovery from the sample. Antimony and silicon did not have mismatched spike and native concentrations in the MS. Although not qualified for MS results outside the QC limits, all antimony and silicon results for SDG JP0933 may be considered estimated. Estimated data are usable for decision-making purposes.

SDG MA10908

This SDG comprises 12 statistical verification soil samples (J1V5F9, J1V5H0 through J1V5H9, J1V5J0) from the 100-B-35:1 subsite staging pile area. This SDG includes one field duplicate pair (J1V5J0/J1V5J1). These samples were analyzed for asbestos. No major or minor deficiencies were noted.

SDG MA10909

This SDG comprises 12 statistical verification soil samples (J1V5D2 through J1V5D9, J1V5F0 through J1V5F3) from the 100-B-35:1 subsite shallow zone excavation area. These samples were analyzed for asbestos. No major or minor deficiencies were noted.

SDG MA10910

This SDG comprises four deep zone verification soil samples (J1V5F4 through J1V5F7) from the 100-B-35:1 subsite shallow zone excavation area. This SDG includes one field duplicate pair (J1V5F4/J1V5F8). These samples were 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 logbook (WCH 2015) are shown in Table C-1. The main and QA/QC sample results are presented in Appendix B.

Table C-1. Field Quality Assurance/Quality Control Samples.

Sample Area	Main Sample	Duplicate Sample
Deep zone	J1V511	J1V515
Deep zone (asbestos)	J1V5F4	J1V5F8
Staging pile area	J1V5C9	J1V5D0
Staging pile area (asbestos)	J1V5J0	J1V5J1

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

None of the duplicate RPDs calculated for 100-B-35:1 data set are above the duplicate acceptance criteria of 30%.

A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) is less than five times the target detection limit. In these cases, a control limit of ±2 times the target detection limit is used (Appendix B) to indicate that a visual check of the data is required by the reviewer. None of the data required this check. A visual

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

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-B-35:1 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-B-35:1 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 B.

REFERENCES

BHI, 2000, *Data Validation Procedure for Chemical Analysis*, BHI-01435, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

DOE-RL, 2009, *100 Area Remedial Action Sampling and Analysis Plan,* DOE/RL-96-22, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

EPA, 2006, *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4, EPA/240/B-06/001, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C.

WAC 173-340, 1996, "Model Toxics Control Act – Cleanup," *Washington Administrative Code.*

WCH, 2015a, *IU-2/6 and Segment 4 Miscellaneous Restoration Sites*, Logbook EL-1667-03, pp. 9-12, Washington Closure Hanford, Richland, Washington.

WCH, 2015b, *Work Instruction for Verification Sampling of the 100-B-35:1, 151-B Primary Substation Subsite,* 0100B-WI-G0040, Rev. 0, Washington Closure Hanford, Richland, Washington.