CVP-2015-00015
Rev. 0

Cleanup Verification Package for the 300-263, 324 Building Diversion Tank, and 316-3, 307 Disposal Trenches, Process Water Trenches Waste Sites

Prepared for the U.S. Department of Energy by Washington Closure Hanford

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EXECUTIVE SUMMARY

This cleanup verification package documents completion of remedial action for the 300-263, 324 Building Diversion Tank and 316-3, 307 Disposal Trenches, Process Water Trenches waste sites. The 300-263 and 316-3 waste sites are located in the 300-FF-2 Operable Unit in the 300 Area of the Hanford Site in southeastern Washington State. They were identified as waste sites requiring remediation in the *Hanford Site 300 Area, Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1, Hanford Site, Benton County, Washington* (300 Area ROD) (EPA 2013).

The 300-263 waste site is located within the 316-3 waste site boundaries. During the 300-263 waste site remediation, contamination associated with the 316-3 waste site was discovered. The 316-3 waste site was previously reclassified as "Interim No Action" based on site characterization data results. This reclassification was rendered void when 316-3 waste site contamination was discovered during remediation of the 300-263 waste site.

The 300-263 waste site was an inactive underground cylindrical tank. The tank was intended to hold contaminated process solutions from the 324 Building that were too radiologically contaminated to send directly to the 316-3 crib without additional treatment. After the tank was installed, it was not used for its purpose.

The 316-3 waste site consisted of two parallel infiltration ditches that received liquid effluent from early 300 Area Laboratory expansion facilities, including the 329, 327, 324, 326, and 329 Buildings. Process effluent first went through the 307 Retention Basins where it was sampled. Effluent below discharge limits was released to the trenches from 1953 to 1963. Effluent above discharge limits was transported to the 200 Area for disposal.

Remediation of the 300-263 waste site began on September 24, 2014. During the 300-263 waste site remediation staining and elevated radiological activity were observed on the west sidewall of the excavation. In-process field measurements and samples attributed the contamination to the encompassing 316-3 waste site. Remediation of the 316-3 waste site was preformed from December 17, 2014, to April 30, 2015. Approximately 69,834 bank cubic meters (91,339 bank cubic yards) of excavated materials were removed from the 300-263 and 316-3 waste sites and direct loaded for disposal at the Environmental Restoration Disposal Facility. The maximum depth of the 300-263 and 316-3 waste sites combined excavation was approximately 11.3 m (37 ft) below ground surface (bgs) on the west end, and approximately 9.8 m (32 ft) bgs at the center and east end of the excavation. Excavated materials consisted of radiologically contaminated soil, gravel, coal ash, and limited debris associated with deactivated underground utilities. No overburden soil was salvaged from the waste site excavation and no staging pile areas were utilized.

Verification sampling within the 300-263 and 316-3 waste site excavation was performed on May 14, 2015. An evaluation of the resulting data found that the waste site remedial action achieved compliance with the industrial scenario remedial action objectives and cleanup levels (CULs) for the 300-262 and 316-3 waste sites. The results of verification sampling show that residual contaminant concentrations meet human health direct exposure CULs for industrial land use and applicable standards for groundwater and river protection in the shallow zone (i.e., surface to 4.6 m [15 ft] deep). A summary of the cleanup evaluation for the soil sampling results against the applicable criteria is presented in Table ES-1.

Table ES-1. Summary of Cleanup Verification Results for the 300-263 and 316-3 Waste Sites. (2 Pages)

Regulatory Requirement	Cleanup Levels	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain individual radionuclide CULs and attain radionuclide total excess cancer risk of <1 x 10^{-4} over 1,000 years or an excess dose of <15 mrem/yr, whichever is lower.	Residual radionuclide activities were all below individual CULs. The total radionuclide excess cancer risk calculated using a sum-of-fractions evaluation is 5.12 x 10^{-6} and excess dose of 2.19 mrem/yr, which is <15 mrem/yr.	Yes
Direct Exposure – Nonradionuclides	Attain individual COC direct exposure CULs.	All individual COC concentrations are below the industrial direct exposure CULs.	Yes
Nonradionuclide Risk Requirements	Attain a hazard quotient of <1 for all individual noncarcinogenic COCs.	The hazard quotients for individual nonradionuclide COCs are <1.	Yes
	Attain a cumulative hazard quotient of <1 for noncarcinogenic COCs.	The cumulative hazard quotient (1.38 x 10^{-3}) is <1.	
	Attain an excess cancer risk of <1 x 10^{-5} (industrial land use) for individual carcinogenic COCs.	The excess cancer risk values for individual carcinogenic COCs are <1 x 10^{-5} (industrial land use).	
	Attain a total excess cancer risk of <1 x 10^{-5} for carcinogenic COCs.	The total excess cancer risk (4.73 x 10^{-7}) is <1 x 10^{-5}.	
Groundwater/River Protection – Radionuclides	Attain single radionuclide COC groundwater and river protection CULs.	No radionuclide COCs were quantified above groundwater/river protection CULs.	Yes
	Attain National Primary Drinking Water Standards: 4 mrem/yr (beta/gamma) dose rate to target receptors/organs [a].	No radionuclide COCs were quantified above groundwater/river protection CULs.	
	Meet drinking water MCL for alpha emitters.	No alpha-emitting radionuclide COCs were quantified above groundwater/river protection CULs.	
	Meet total uranium drinking water standard of 21.2 pCi/L [b].	Uranium was quantified below groundwater protection CULs.	

Table ES-1. Summary of Cleanup Verification Results for the 300-263 and 316-3 Waste Sites. (2 Pages)

Regulatory Requirement	Cleanup Levels	Results	Remedial Action Objectives Attained?
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and river cleanup requirements.	All individual COC concentrations are below soil CULs for the protection of groundwater and the Columbia River.	Yes

[a] "National Primary Drinking Water Regulations" (40 CFR 141).
[b] Based on the isotopic distribution of uranium in the Hanford Site background, the 30 µg/L uranium MCL (40 CFR 141.66) 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).

CFR = *Code of Federal Regulations*
COC = contaminant of concern
CUL = cleanup level
DOE = U.S. Department of Energy
MCL = maximum contaminant level (drinking water standard)

The results of the verification sampling were used to make reclassification decisions for the 300-263 and 316-3 waste sites in accordance with TPA-MP-14, *Tri-Party Agreement Handbook Management Procedures* (DOE-RL 2011).

The current site conditions have been evaluated in accordance with the *Remedial Design Report/Remedial Action Work Plan for the 300 Area* (DOE-RL 2015b) to demonstrate attainment of the remedial action objectives and the corresponding CULs for industrial land use established in the 300 Area ROD (EPA 2013). The 300-263 and 316-3 waste sites meet the industrial land use CULs for direct exposure, groundwater protection, and river protection. Verification sampling results for aroclor-1260 exceed the residential direct exposure CUL. Due to this exceedance, the residual contaminant concentrations do not meet human health direct exposure CULs for residential land use in the shallow zone soils (i.e., surface to 4.6 m [15 ft.] deep); therefore, institutional controls to maintain industrial land use are required for these waste sites.

The 300-263 and 316-3 waste sites meet cleanup standards and have been reclassified as Final Closed Out in accordance with the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989) and the Waste Site Reclassification Guideline TPA-MP-14 (DOE-RL 2011). A copy of the reclassification form is included for each waste site as part of the Executive Summary of this document.

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 300-FF-2 **Control No.:** 2015-050

Waste Site Code(s)/Subsite Code(s): 300-263

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 300-263, 324 Building Diversion Tank, located on the east side of the 300 Area, part of the 300-FF-2 Operable Unit, was identified as a waste site requiring remediation in the *Hanford Site 300 Area, Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1, Hanford Site, Benton County, Washington* (300 Area ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 2013).

Remediation of the 300-263 waste site was performed between September 24, 2014, and April 30, 2015. Approximately 1,814 bank cubic meters (2,372 bank cubic yards) of excavated materials were removed and direct loaded for disposal at the Environmental Restoration Disposal Facility (ERDF). The 300-263 waste site was excavated to a depth of 9.8 m (32 ft) below ground surface. Excavated materials consisted of soil, gravel, concrete, piping, and other demolition debris. No overburden soil was salvaged from the waste site excavation and no staging pile areas were utilized.

Verification sampling within the 300-263 excavation was performed on May 14, 2015. An evaluation of the resulting data found that the waste removal action achieved compliance with the industrial scenario remedial action objectives (RAOs) for the 300-263 waste site.

The selected remedy involved (1) excavating the site to the extent required to meet specified soil cleanup levels (CULs), (2) disposing of contaminated excavation materials at ERDF in the 200 Area of the Hanford Site, (3) demonstrating through verification sampling that cleanup goals have been achieved, and (4) proposing the site for reclassification as Final Closed Out.

Basis for reclassification:

The verification sampling results were evaluated in comparison to the CULs and RAOs from the 300 Area ROD (EPA 2013), as described in the *Remedial Design Report/Remedial Action Work Plan for the 300-FF-2 Soils*, DOE/RL-2014-13-ADD1, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington (DOE-RL 2015a). In accordance with this evaluation, the verification sampling results support a reclassification of the 300-263 waste site to Final Closed Out. The current site conditions achieve the industrial land use CULs and RAOs established by the 300 Area ROD (EPA 2013). The results of verification sampling show that residual contaminant concentrations do not meet human health direct exposure CULs for residential land use in the shallow zone soils (i.e., surface to 4.6 m [15 ft] deep); therefore, institutional controls to maintain industrial land use are required for the 300-263 waste site. The basis for reclassification is described in detail in the *Cleanup Verification Package for the 300-263, 324 Building Diversion Tank, and 316-3, 307 Disposal Trenches, Process Water Trenches Waste Sites.*

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 300-FF-2 **Control No.:** 2015-050

Waste Site Code(s)/Subsite Code(s): 300-263

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:

The 300-263 waste site does not meet CULs for unlimited use and unrestricted exposure for aroclor-1260. Therefore, institutional controls to maintain industrial land use are required as established in the 300 Area ROD (EPA 2013).

M. French	M S French	9/16/15
DOE Federal Project Director (printed)	Signature	Date
NA		
Ecology Project Manager (printed)	Signature	Date
B. Simes		9/17/15
EPA Project Manager (printed)	Signature	Date

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 300-FF-2 **Control No.:** 2015-049

Waste Site Code(s)/Subsite Code(s): 316-3

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 316-3, 307 Disposal Trenches, Process Water Trenches, located on the east side of the 300 Area, north of the 324 Building, part of the 300-FF-2 Operable Unit, was identified as a waste site requiring remediation in the *Hanford Site 300 Area, Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1, Hanford Site, Benton County, Washington* (300 Area ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 2013). The selected remedy for the site was remove, treat, and dispose (RTD) to industrial cleanup levels (CULs). The site is also associated with the enhanced attenuation remedy, but is physically separate from the target treatment area.

Excavation of the 316-3 waste site was performed between December 17, 2014, and April 30, 2015. Approximately 68,020 bank cubic meters (88,987 bank cubic yards) of excavated materials were removed and direct loaded for disposal at the Environmental Restoration Disposal Facility (ERDF). The maximum depth of the 300-263 and 316-3 waste sites excavation was approximately 11.3 m (37 ft) below ground surface on the west end. Excavated materials consisted of soil, gravel, concrete, piping, and other demolition debris. No overburden soil was salvaged from the waste site excavation and no staging pile areas were utilized.

Verification sampling within the 316-3 excavation was performed on May 14, 2015. An evaluation of the resulting data found that the waste removal action achieved compliance with the industrial scenario remedial action objectives (RAOs) for the 316-3 waste site.

Implementation of the selected RTD remedy involved (1) excavating the site to the extent required to meet specified soil CULs, (2) disposing of contaminated excavation materials at ERDF in the 200 Area of the Hanford Site, and (3) demonstrating through verification sampling that cleanup goals have been achieved in accordance with the *Remedial Design Report/Remedial Action Work Plan for 300-FF-2 Soils*, DOE/RL-2014-13-ADD1, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington (300-FF-2 RDR/RAWP) (DOE-RL 2015a). Implementation of the broader enhanced attenuation remedy for the 300 Area will be implemented separately in accordance with the *Remedial Design Report/Remedial Action Work Plan Addendum for the 300 Area Groundwater*, DOE/RL-2014-13-ADD2, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington (DOE-RL 2015b).

Basis for reclassification:

The verification sampling results were evaluated in comparison to the CULs and RAOs from the 300 Area ROD (EPA 2013), as described in the 300-FF-2 RDR/RAWP (DOE-RL 2015a). In accordance with this evaluation, the verification sampling results support a reclassification of the 316-3 waste site to Final Closed Out. The current site conditions achieve the industrial land use CULs established by the 300 Area ROD (EPA 2013). The results of verification sampling show that residual contaminant concentrations do not meet human health direct exposure CULs for residential land use in the shallow zone soils (i.e., surface to 4.6 m [15 ft.] deep); therefore, institutional controls to maintain industrial land use are required for the 316-3 waste site. The basis for reclassification is described in detail in the *Cleanup Verification Package for the 300-263, 324 Building Diversion Tank, and 316-3, 307 Disposal Trenches, Process Water Trenches Waste Sites.*

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 300-FF-2 **Control No.:** 2015-049

Waste Site Code(s)/Subsite Code(s): 316-3

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:

The 316-3 waste site does not meet CULs for unlimited use and unrestricted exposure for aroclor-1260, sample J1V779 (location SZ-11). Therefore, institutional controls to maintain industrial land use are required as established in the 300 Area ROD (EPA 2013).

M. French	M. French	9/16/15
DOE Federal Project Director (printed)	Signature	Date
NA		
Ecology Project Manager (printed)	Signature	Date
B. Simes		9/17/15
EPA Project Manager (printed)	Signature	Date

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ACRONYMS AND ABBREVIATIONS

BCM	bank cubic meter
BCY	bank cubic yard
bgs	below ground surface
COC	contaminant of concern
CUL	cleanup level
CVP	cleanup verification package
DQA	data quality assessment
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
HEIS	Hanford Environmental Information System
ICP	inductively coupled plasma
PCB	polychlorinated biphenyl
RAO	remedial action objective
RDR/RAWP	remedial design report/remedial action work plan
UCL	upper confidence limit
WAC	*Washington Administrative Code*

1.0 INTRODUCTION

This cleanup verification package (CVP) documents that the 300-263, 324 Building Diversion Tank, and 316-3, 307 Disposal Trenches, Process Water Trenches waste sites were remediated in accordance with the *Remedial Design Report/Remedial Action Work Plan for the 300 Area* (300 Area RDR/RAWP) (DOE-RL 2009). Remedial action objectives (RAOs) and associated cleanup levels (CULs) for this site are established in the *Hanford Site 300 Area, Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1, Hanford Site, Benton County, Washington* (300 Area ROD) (EPA 2013). The 300 Area ROD provides the U.S. Department of Energy, Richland Operations Office with the authority, guidance, and objectives to conduct this remedial action.

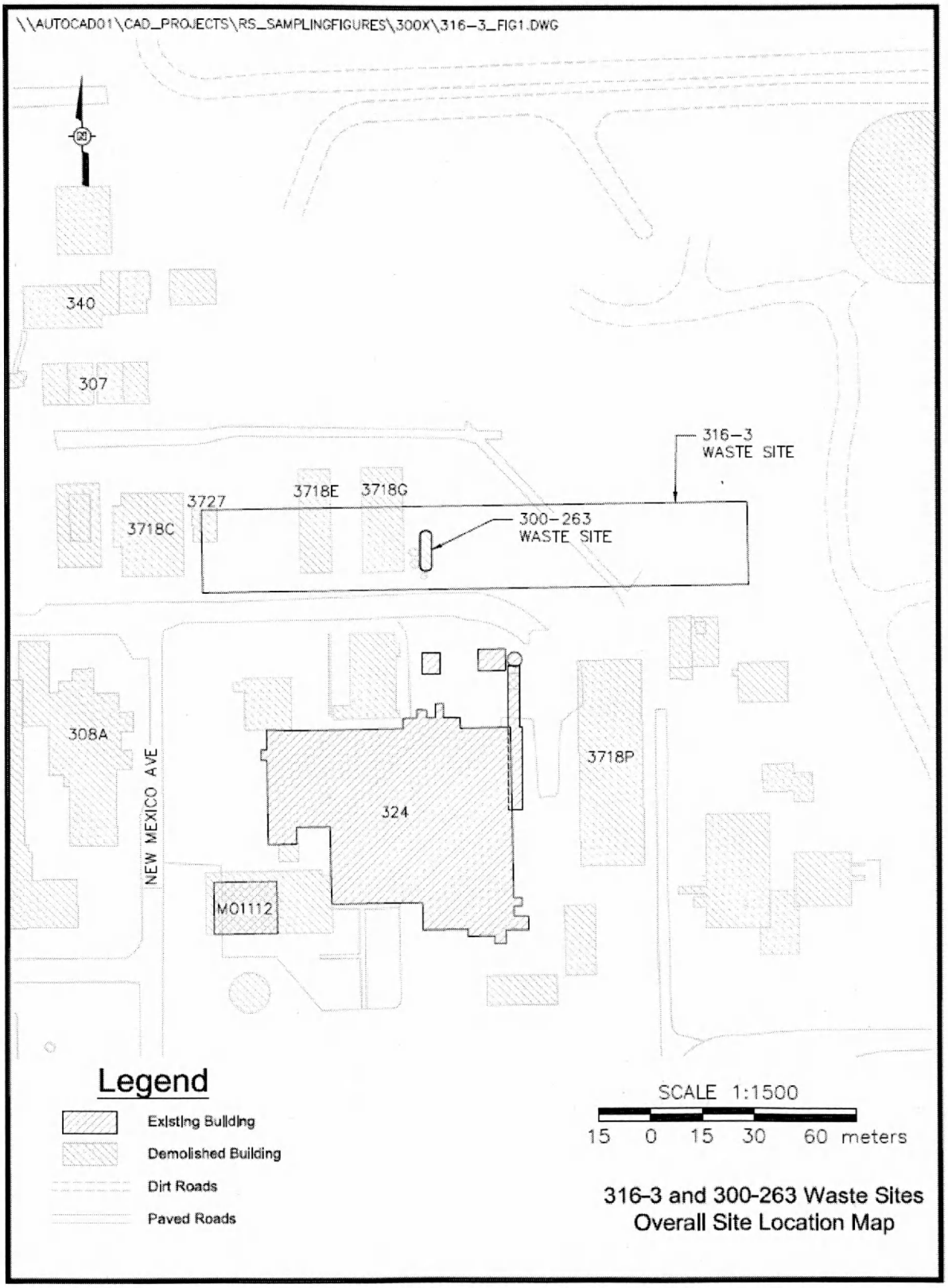
The remedy specified in the 300 Area ROD (EPA 2013) and conducted for the 300-263 and 316-3 waste sites included excavating the site to the extent required to meet industrial land-use CULs and disposing of contaminated excavated materials at the Environmental Restoration Disposal Facility (ERDF) in the 200 Area of the Hanford Site. Excavation was driven by RAOs for direct exposure, protection of groundwater, and protection of the Columbia River. The final action 300 Area ROD for the 300-263 and 316-3 waste sites established RAOs based on an industrial land use. Because the 300-263 and 316-3 waste sites did not achieve CULs for residential land use, institutional controls to maintain industrial land use are required for the sites.

2.0 SITE DESCRIPTION AND SUPPORTING INFORMATION

2.1 SITE DESCRIPTION

The 300-263 and 316-3 waste sites are located north of the 324 Building, on the east side of the 300 Area in the 300-FF-2 Operable Unit (Figure 1). The 300-263 waste site was an underground 77,071-L (20,360-gal) cylindrical tank, approximately 11 m (36 ft) long and 3 m (10 ft) deep. The top of the tank was approximately 152.4 cm (60 in.) below ground surface (bgs). The 300-263 waste site was located within the 316-3 waste site boundary. The 316-3 waste site consisted of two parallel trenches, each 180 m (600 ft) long, 9.1 m (30 ft) wide at the east end, tapering to 3 m (10 ft) wide at the west end. The depth of the trenches varied from 3.7 m (12 ft) to 8.2 m (27 ft). The trenches ran in an east and west direction, approximately 6.1 m (20 ft) apart. Construction drawing indicate each contained a 12.7-cm (5-in.) vitrified clay pipe that ran the entire length of the unit.

Figure 1. The 300-263 and 316-3 Waste Sites Location Map.



2.2 SITE HISTORY

2.2.1 300-263 Waste Site

The 300-263 waste site was an inactive catch tank originally intended to receive process solutions that were too radiologically contaminated to send directly for ground disposal in the 307 Trenches (316-3 waste site) without additional treatment.

Shortly after the tank was installed, the 340 Complex came online. At that time, the piping system to the diversion tank in the 324 yard was bypassed and capped. Since that time the 324 Building effluent was transferred to the 340 Complex. Three supporting caissons (valving, pump, and ion exchange) were ancillary to the catch tank.

2.2.2 316-3 Waste Site

The 316-3 trenches were constructed in 1952. From 1953 to 1963, process sewer effluent with contamination levels below discharge limits was released from the 307 Retention Basins and discharged to the two west-east-trending parallel trenches. Effluent above discharge limits was transported to the 200 Area for disposal. The 316-3 waste site received process effluent from the early 300 Area Laboratory expansion facilities including the 329 Biophysics Laboratory, 327 Radiometallurgy Building, 324 Radiochemistry Building, 326 Pile Technology Building, and 329 Mechanical Development Building.

The 316-3 waste site trenches were taken out of service in 1963 and the contaminated sediments were excavated and transported to the 618-10 Burial Ground. In 1965, the unit was backfilled with approximately 7,600 m^3 (10,000 yd^3) of uranium-contaminated material scraped from the bottom of the South Process Pond (316-1) and covered in fly ash from the 300 Area Ash Pits. Several 300 Area buildings were built on top of the backfilled trenches including the 3727, 3719E, and 3718G Buildings.

In 1987, the west end of the 316-3 waste site was used to test a grout liquid waste solidification process. A 15.2- by 6.1- by 3.0-m (50- by 20- by 9-ft) trench was excavated immediately west of the former 3718E Building and contaminated material was encountered. The Geiger/Mueller radiological detector measured maximum radiological activities of 378 picocuries per gram (pCi/g) beta and 234 pCi/g alpha.

In 1987, five samples (003A001, 003A002, 003B001, 003B002, and 003C001) were collected for a test pit located in the western end of the 307 trenches, adjacent to the east side of the 3727 Building. The 15-m (50-ft) long, 6-m (20-ft) wide, 2.7-m (9-ft) deep trench was dug for a waste grout-testing project. Four soil samples were collected near the bottom of the excavation in what appeared to be contaminated backfill. Field readings with Geiger/Mueller detector found maximum radioactivity readings of 500 counts per minute. One sample was collected near the top of the excavation, within backfill material, and had no detectable radioactivity. The samples were analyzed for inductively coupled plasma (ICP) metals, metals, volatile organics, hydrogen ion

concentration (pH), polychlorinated biphenyls (PCBs), gross alpha, and gross beta activity. The analytical results indicated that metals and PCB concentrations did not exceed the current industrial direct exposure soil CULs. However, barium, beryllium, cadmium, copper, mercury, nickel, silver, zinc, and aroclor-1248 exceeded groundwater and/or Columbia River soil CULs. Gross alpha data results ranged from 87.3 to 234 pCi/g and gross beta levels ranged from 151 to 378 pCi/g.

In December 1991 and January 1992, three boreholes were drilled within the 316-3 waste site in support of the Draft *Remedial Investigation Work Plan for the 316-3 Waste Disposal Trenches* (PNL 1987). According to the *Summary of Drilling and Test Pit Activities for the 300-FF-1 Operable Unit* (WHC 1992) report, the total depth of borings ranged from 18.3 to 20.7 m (60 to 68 ft). The trench backfill material depth ranged from 6 to 8 m (20 to 27 ft). Soil below the 316-3 backfill material was observed to be sand, silt, and gravel of the Hanford formation. A thin layer of asphalt was observed to cover the western portions of the trenches, and coal fly ash covered the eastern portions. The *Summary of Remedial Investigations at the 307 Retention Basins and 307 Trenches* (WHC 1994) summarized analytical data results for the three boreholes (399-3-15, 399-3-16, and 399-3-17). Soil samples collected from these three boreholes were analyzed for organics, inorganics (metals and cyanide), general chemistry, and radionuclides. Field instruments detected beta-gamma radiation up to 650 counts per minute in borehole 399-3-17 and up to 150 counts per minute in borehole 399-3-16. In borehole 399-3-15, a hard, gray material was encountered between 7.62 and 8.23 m (25 and 27 ft) bgs. This material was concluded to be cement grout that may have been poured into the trench prior to backfilling.

Analytical data for the three boreholes presented in the *Summary of Remedial Investigations at the 307 Retention Basins and 307 Trenches (316-3)* (DOE 1994) found that no analytes exceed the current 300 Area Industrial direct exposure soil CULs.

Subsurface investigation sampling for the 316-3 waste site was conducted between August 13 and September 11, 2012. Samples were collected from seven test pits. The results for test pit sampling indicated that the 316-3 waste site achieved compliance with the remedial action objectives and remedial action goals for industrial land use. The site was reclassified as No Action on January 17, 2013.

During excavation of the 300-263 waste site in fall 2014, isolated locations of discolored soil were observed that were emitting elevated levels of radiation based on hand-held instrument readings. This contamination, determined to be uranium, has been attributed to 316-3. Consequently, the reclassification status for the site was rendered void, which required remediation of the site.

2.3 GEOPHYSICAL SURVEY RESULTS

A geophysical survey was performed at the 316-3 and 300-263 waste sites in May 2012 to locate and map subsurface features prior to waste site remediation. Data were

collected using ground-penetrating radar and electromagnetic induction. Interpreted results are provided in Figures 2 and 3.

3.0 REMEDIAL ACTION FIELD ACTIVITIES

3.1 EXCAVATION AND DISPOSAL

Remediation of the 300-263 waste site began on September 24, 2014. During remediation of the 300-263 waste site and adjacent Radioactive Liquid Waste Sewer pipeline, stained soil and elevated radiological readings were observed on the west sidewall inside the 300-263 waste site excavation. In-process radiological sample data indicated that elevated uranium concentrations were associated with the stained soil. Based on the process knowledge, uranium contamination was attributed to the collocated 316-3 waste site. A 300-263 waste site topographical excavation civil survey, Drawing number 0300X-DD-C0752, record number H-3-317384 (WCH 2014), was performed following 316-3 waste site remediation.

Remediation of the 316-3 waste site was performed from December 17, 2014, to April 30, 2015. Six rounds of in-process sampling, routine radiological screening, and field observations were used to guide waste site remediation. In-process sampling results are provided in Appendix A. A photograph of the remediated 300-263 and 316-3 waste sites is shown in Figure 4.

Approximately 1,814 bank cubic meters (BCM) (2,372 bank cubic yards [BCY]) of excavated materials were removed from the 300-263 waste site and direct loaded for disposal at the ERDF. Approximately 68,020 BCM (88,967 BCY) of excavated materials were removed from the 316-3 waste site. The maximum depth of the 300-263 and 316-3 waste sites excavation was approximately 11.3 m (37 ft) bgs on the west end, and approximately 9.8 m (32 ft) bgs at the center and east end of the excavation. Excavated materials consisted of radiologically contaminated soil, gravel, coal ash, and limited debris associated with deactivated underground utilities.

No overburden materials were salvaged from the 300-263 and 316-3 waste sites excavation; therefore, there is no overburden pile associated with the 300-263 and 316-3 waste sites. All excavated soils were direct loaded, therefore, staging pile areas were not utilized during 300-263 and 316-3 waste sites remediation.

Figure 2. The 300-263 Waste Site Geophysical Interpretation Map.

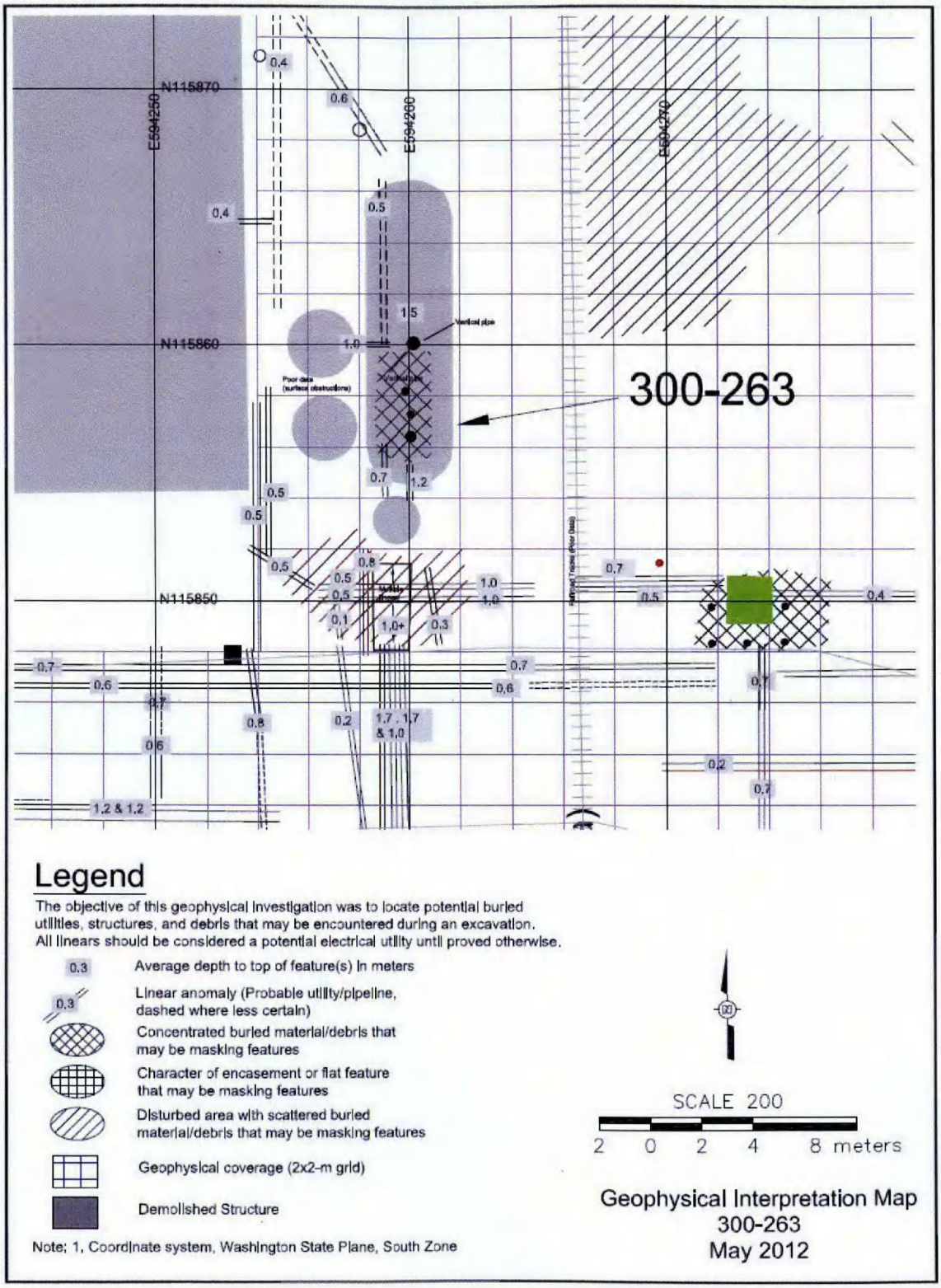


Figure 3. The 316-3 Waste Site Geophysical Interpretation Map.

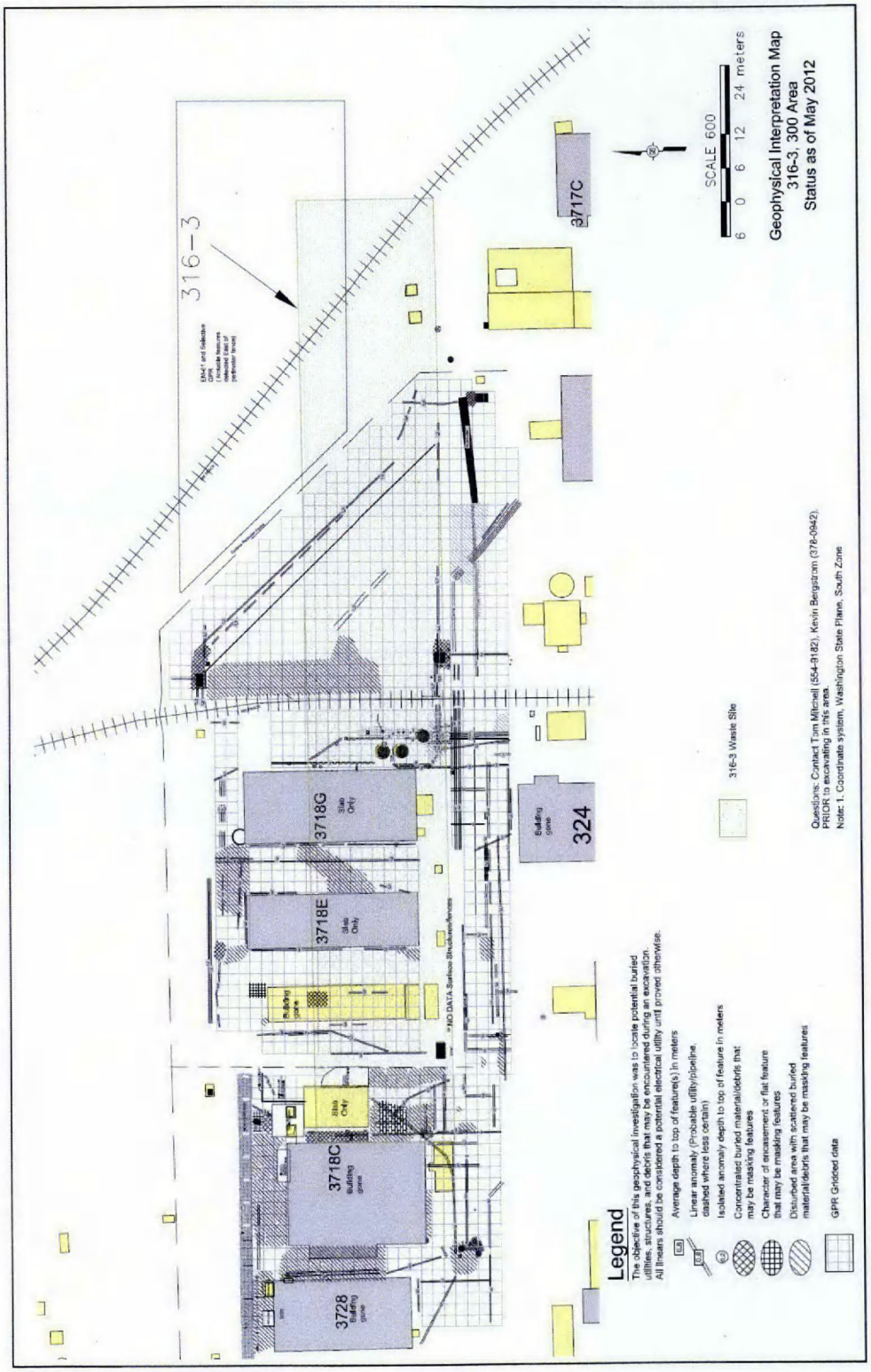


Figure 4. Photograph of the Remediated 300-263 and 316-3 Waste Sites – View to the West (May 4, 2015).

3.2 POST-EXCAVATION TOPOGRAPHIC SURVEY

A post-excavation civil survey was performed on the 300-263 and 316-3 waste sites following remediation and is included in Figure 5. Due to project schedule constraints, the excavation walk-around boundary was used to delineate the excavation boundaries, including an estimated boundary that subdivided the shallow zone and deep zone decision units. The excavation is approximately 11 m (36 ft) deep; therefore, the waste site was divided into shallow zone (0 to 4.6 m [0 to 15 ft] bgs) and deep zone (greater than 0 to 4.6 m [0 to 15 ft] bgs) decision units for verification sampling. The post-excavation civil survey results were very similar to the walk-around boundary and the estimated deep zone boundary that was used for verification sampling design. A post-excavation civil survey is compared to sample design boundaries in Figure 6.

3.3 RADIOLOGICAL SURVEY

Extensive radiological monitoring was performed during the duration of the 300-263 and 316-3 waste sites excavation to aid in identification of areas requiring additional remediation. Following waste site remediation, a Global Positioning Environmental Radiological Surveyor survey was performed on the sidewalls of the excavation area (Figures 7 and 8). Elevated radiological readings (above background) were detected on the south side slope of the excavation. This location was investigated with in-process sampling and results indicated that residual radiological contamination is below industrial CULs. No radiological contamination above background was detected elsewhere within the 300-263 and 316-3 waste sites excavation.

Figure 5. The 300-263 and 316-3 Waste Sites Post-Excavation Civil Survey.

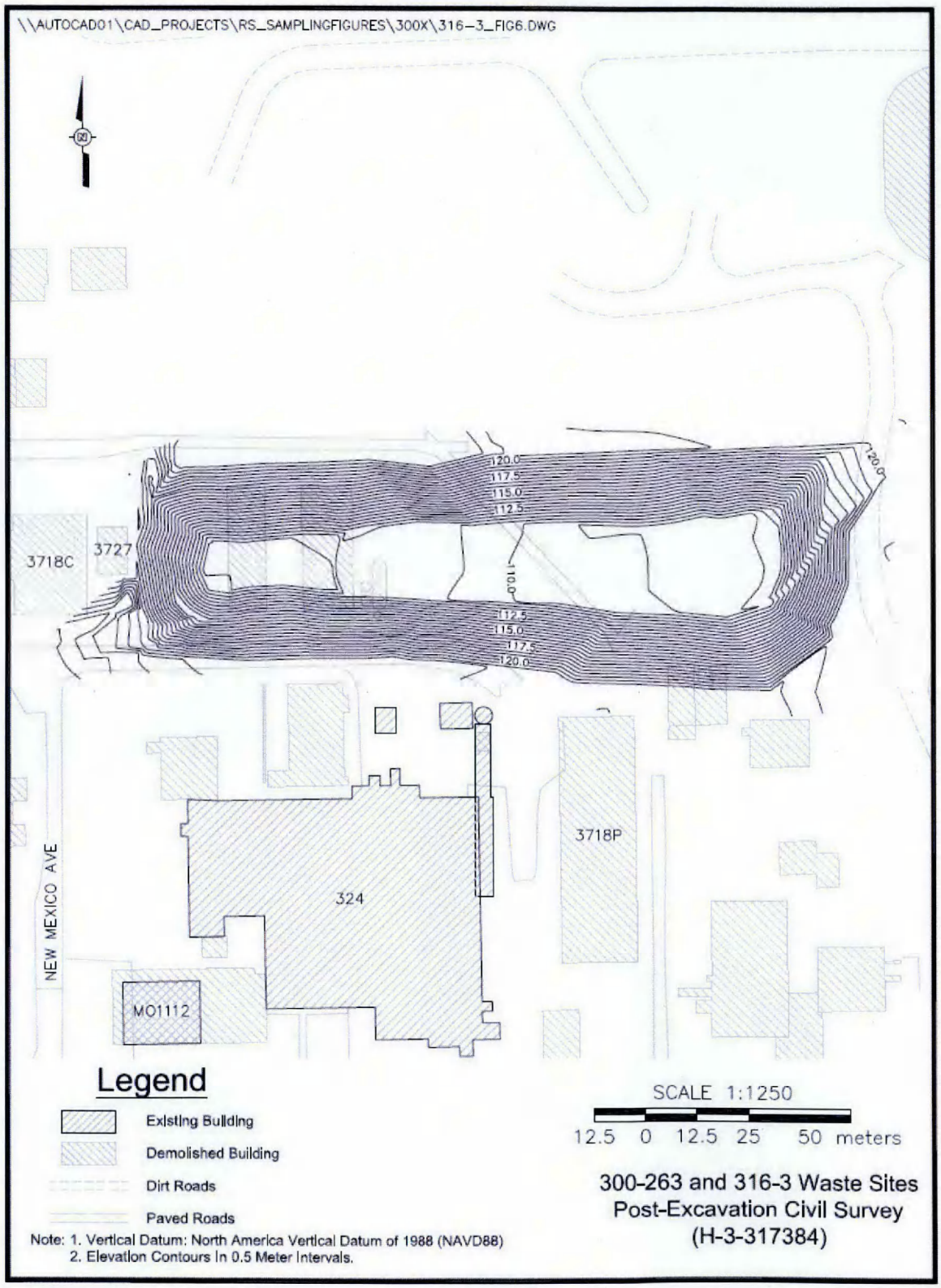


Figure 6. The 300-263 and 316-3 Waste Sites Post-Excavation Civil Survey and Sample Design Boundaries.

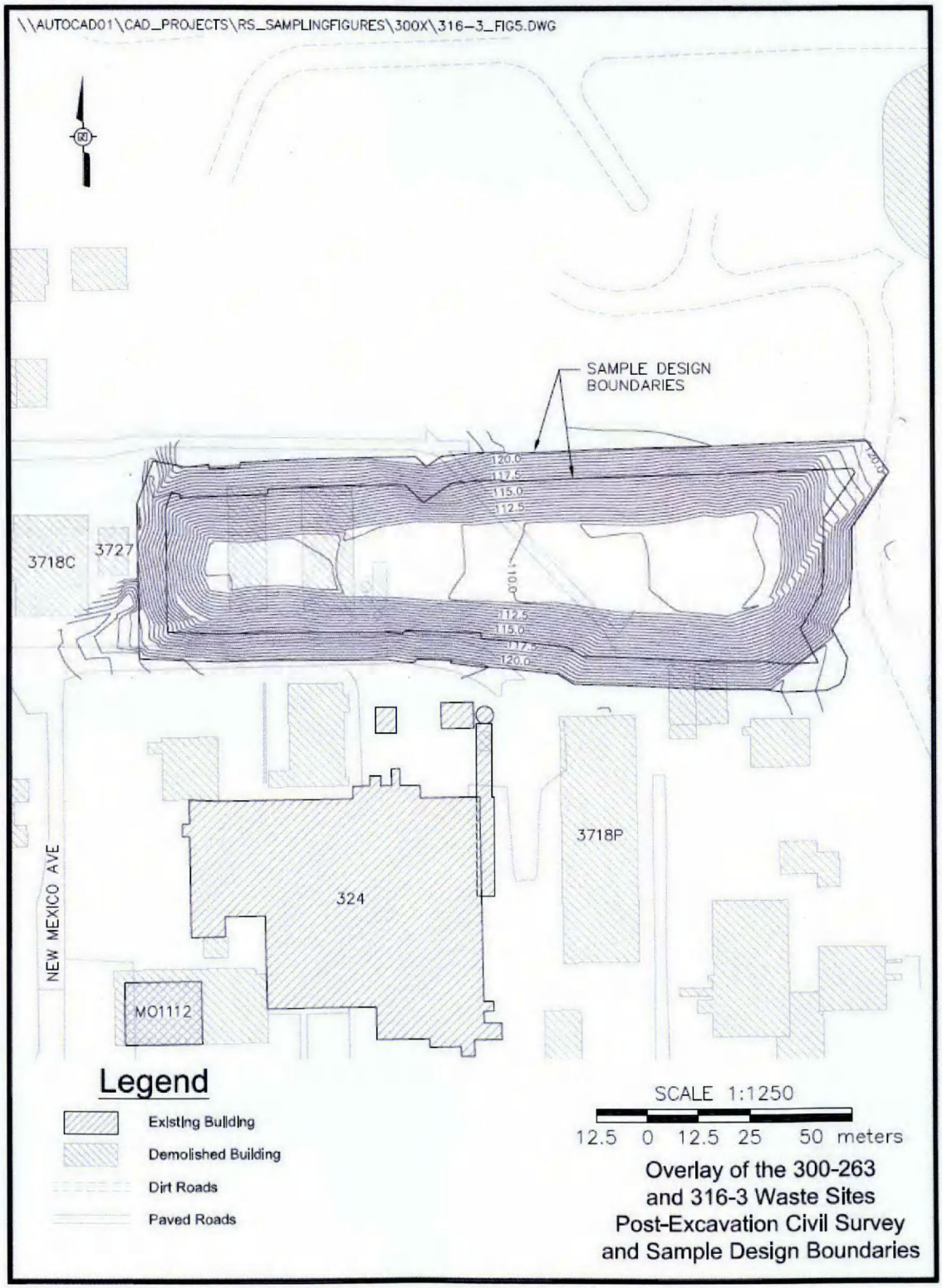


Figure 7. The 300-263 and 316-3 Waste Site Post-Excavation Beta Radiological Survey.

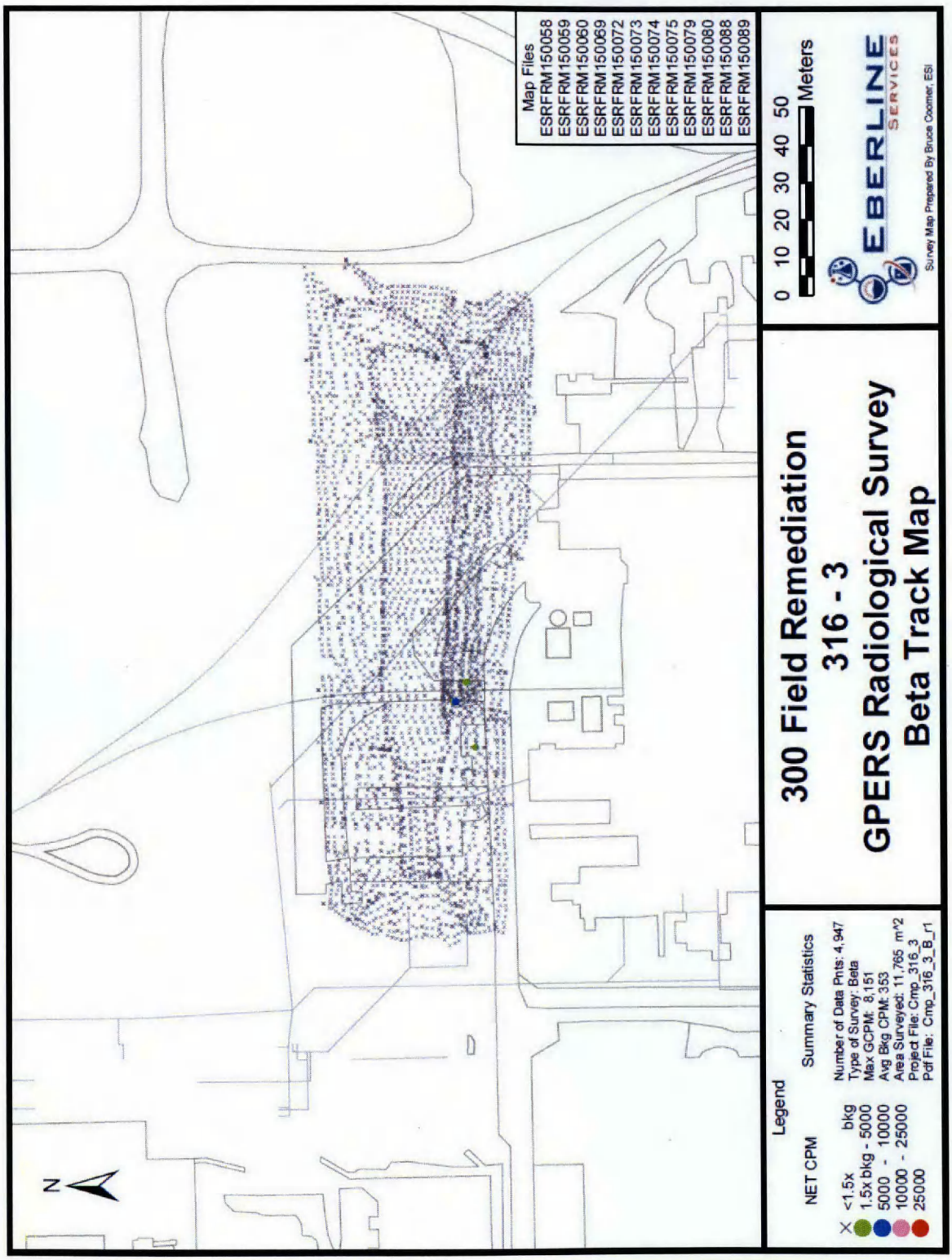
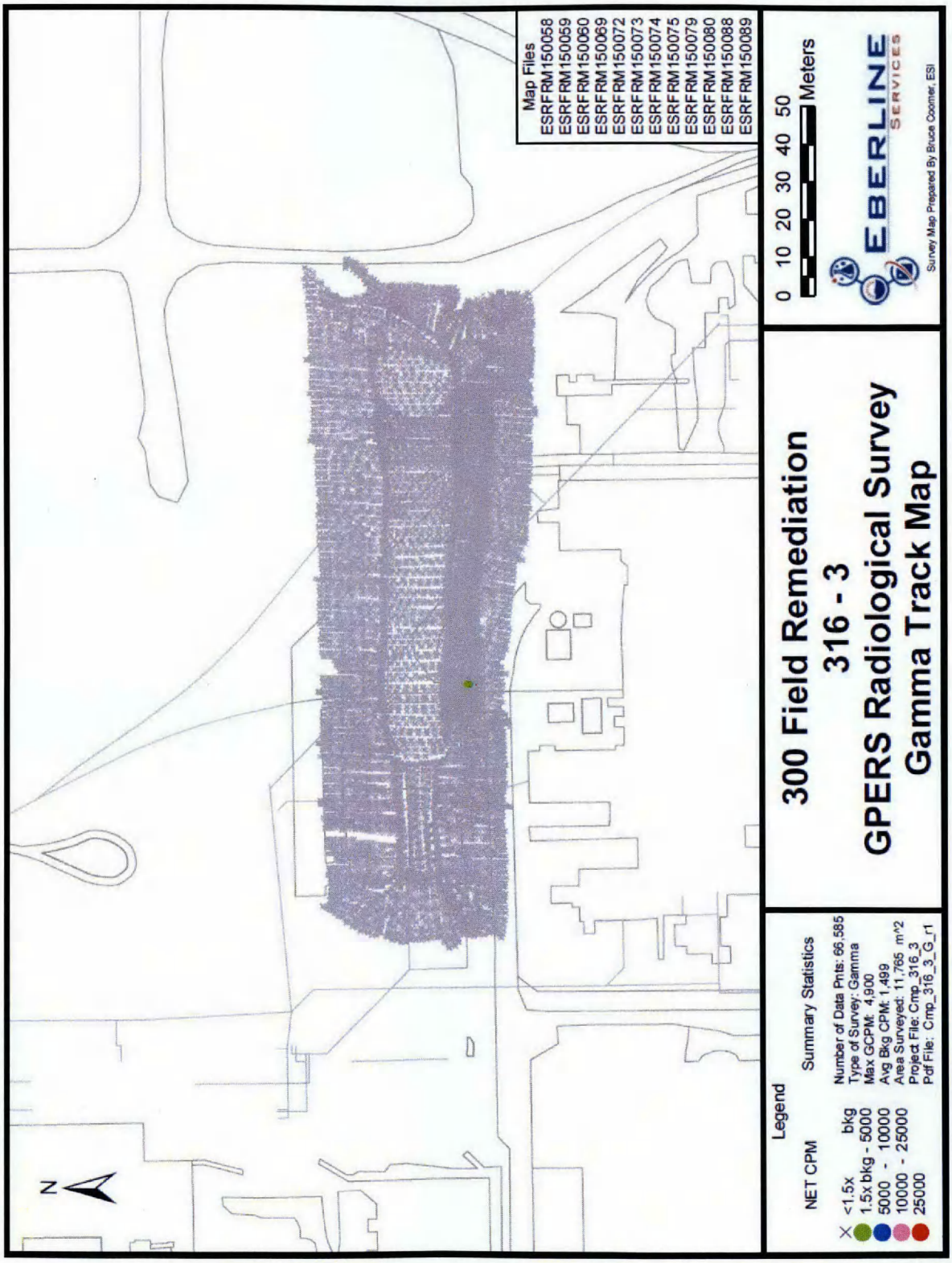


Figure 8. The 340 Complex Post-Excavation Gamma Radiological Survey.



4.0 VERIFICATION SAMPLING ACTIVITIES

Verification sampling for the 300-263 and 316-3 waste site was performed on May 14, 2015, per the *Work Instruction for Verification Sampling of the 316-3, 307 Disposal Trenches, Process Water Trenches and 300-263, 324 Building Diversion Tank Waste Sites* (WCH 2015). Verification sampling was conducted to support a determination that residual contaminant concentrations at this site meet the cleanup criteria specified in the *Remedial Design Report/Remedial Action Work Plan for 300-FF-2 Soils* (300-FF-2 RDR/RAWP) (DOE-RL 2015a) and the 300 Area ROD (EPA 2013). The 95% upper confidence limit (UCL) calculations for the verification sample results are provided in Appendix B. These indicate that the remedial action achieved compliance with the applicable RAOs and CULs for the 300-263 and 316-3 waste sites. The following subsections provide additional discussion of the information used to develop the verification sampling design.

4.1 CONTAMINANTS OF CONCERN FOR VERIFICATION SAMPLING

The contaminants of concern (COCs) for the 316-3 and 300-263 waste sites were identified based on the process knowledge, subsurface investigation, and in-process sampling results. Based on the available information, the 316-3 and 300-263 waste site COCs included ICP metals, mercury, hexavalent chromium, nitrate, PCBs, semivolatile organic compounds, total petroleum hydrocarbons, strontium-90, isotopic uranium, americium-241, isotopic plutonium, and cesium-137.

4.2 VERIFICATION SAMPLING DESIGN SELECTION AND BASIS

This section describes the basis for selection of an appropriate sample design and determination of the number of verification samples that were collected. Two decision units were identified for the 300-263 and 316-3 waste sites: the deep zone excavation footprint and the shallow zone excavation footprint. Twelve statistical verification soil samples were collected from each of these decision units.

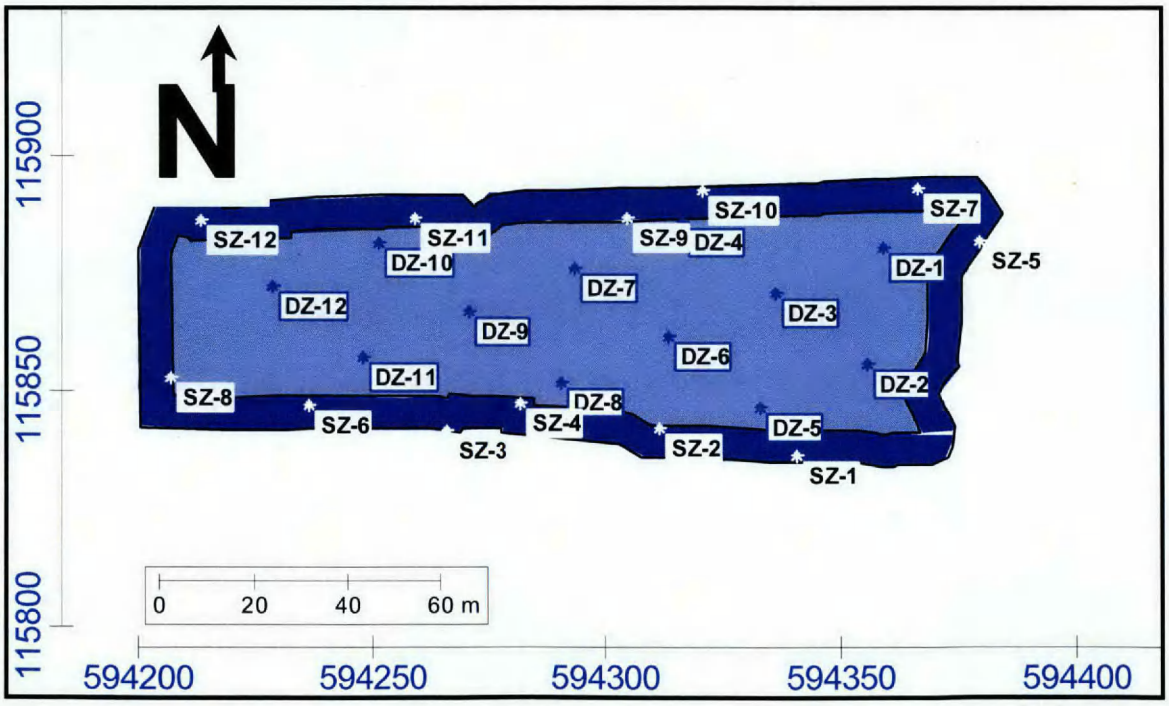
4.2.1 Statistical Verification Sampling Design

The decision rule for demonstrating compliance with the cleanup criteria requires comparison of the true population mean, as estimated by the 95% UCL on the sample mean, with the CULs. Therefore, a statistical sampling design is the preferred verification sampling approach for this site because the distribution of potential residual soil contamination over the site is uncertain. The Washington State Department of Ecology (Ecology) publication *Guidance on Sampling and Data Analysis Methods* (Ecology 1995) recommends that systematic sampling with sample locations distributed over the entire study area be used. This sampling approach is referred to by Ecology as "area-wide sampling." Therefore, sampling locations were distributed over the

footprint of the excavation area using a random-start systematic grid in an effort to determine the potential presence of residual contamination. Statistical parameters (i.e., standard deviation within the populations) for residual contaminant levels following remediation at the 300-263 and 316-3 waste sites were estimated based on assumptions of residual contamination after remediation. These assumptions were verified using the resulting verification sampling data and considered in the data quality assessment (DQA) for the data set.

The deep zone and shallow zone footprints of the 300-263 and 316-3 waste sites were delineated in the Visual Sample Plan[1] and used as the basis for the location of a random-start systematic grid for verification soil sampling. A triangular grid was selected for this investigation based on studies that indicate triangular grids are superior to square grids (Gilbert 1987). Twelve statistical soil sample locations were identified in each decision unit (Figure 9).

Figure 9. Verification Sample Locations for the 300-263 and 316-3 Waste Sites Excavation.



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

4.2.2 Verification Sampling

The soil sample locations were global positional surveyed and staked prior to sample collection using the coordinate pairs provided in Table 1. A discrete soil grab sample was collected at each designated sample point (0 to 0.15 m [0 to 6 in.] below the surface of the excavated waste site). Field quality control samples were also collected and consisted of one equipment blank, one duplicate, and one split sample for each decision unit.

Table 1. Sample Summary Table for the 316-3 and 300-263 Waste Sites. (2 Pages)

Sample Location	HEIS Sample Number	Washington State Plane Coordinate Locations (m)		Sample Analysis
		Northing	Easting	
SZ-1	J1V769	115836.5	594340.9	ICP metals [a], mercury, hexavalent chromium, nitrate, PCBs, SVOA, TPH, GEA, total beta radiostrontium, total uranium, isotopic uranium, isotopic plutonium, americium
SZ-2	J1V770	115842.0	594311.5	
SZ-3	J1V771	115841.8	594265.8	
SZ-4	J1V772	115847.5	594282.1	
SZ-5	J1V773	115882.0	594379.9	
SZ-6	J1V774	115847.3	594236.3	
SZ-7	J1V775	115893.3	594366.7	
SZ-8	J1V776	115852.7	594206.9	
SZ-9	J1V777	115887.3	594304.7	
SZ-10	J1V778	115893.0	594321.0	
SZ-11	J1V779	115887.0	594259.0	
SZ-12	J1V780	115886.7	594213.3	
Duplicate of J1V770	J1V781	115842.0	594311.5	
Split of J1V770	J1V782	115842.0	594311.5	
DZ-1	J1V783	115880.7	594359.2	ICP metals [a], mercury, hexavalent chromium, nitrate, PCBs, SVOA, TPH, GEA, total beta radiostrontium, total uranium, isotopic uranium, isotopic plutonium, americium
DZ-2	J1V784	115856.1	594356.0	
DZ-3	J1V785	115871.1	594336.3	
DZ-4	J1V786	115886.1	594316.5	
DZ-5	J1V787	115846.5	594333.2	
DZ-6	J1V788	115861.5	594313.4	
DZ-7	J1V790	115876.5	594293.7	
DZ-8	J1V791	115851.9	594290.5	
DZ-9	J1V792	115866.9	594270.8	
DZ-10	J1V793	115881.9	594251.0	
DZ-11	J1V794	115857.3	594247.9	
DZ-12	J1V790	115872.3	594228.1	
Duplicate of J1V788	J1V795	115861.5	594313.4	
Split of J1V788	J1V797	115861.5	594313.4	

Table 1. Sample Summary Table for the 316-3 and 300-263 Waste Sites. (2 Pages)

Sample Location	HEIS Sample Number	Washington State Plane Coordinate Locations (m)		Sample Analysis
		Northing	Easting	
Equipment blank	J1V796	NA	NA	ICP metals [a], mercury

[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.

GEA = gamma energy analysis
HEIS = Hanford Environmental Information System
ICP = inductively coupled plasma
NA = not applicable
PCB = polychlorinated biphenyl
SVOA = semivolatile organic analysis
TPH = total petroleum hydrocarbons

All sampling was performed in accordance with ENV-1, *Environmental Monitoring & Management*, to fulfill the requirements of the *300 Area Remedial Action Sampling and Analysis Plan* (300 Area SAP) (DOE-RL 2014). All samples were submitted to offsite laboratories for full protocol laboratory analysis using approved U.S. Environmental Protection Agency (EPA) analytical methods as required per the 300 Area SAP. The analytical methods are provided in Table 2.

Table 2. Laboratory Analytical Methods.

Analytical Method	COCs
ICP metals [a] – EPA Method 6010	Metals
Mercury – EPA Method 7471	Mercury
Hexavalent chromium – EPA Method 7196	Hexavalent chromium
Nitrite/nitrate – EPA Method 353.2	Nitrate
SVOA – EPA Method 8270	Semivolatile organic compounds
PCB – EPA Method 8082	Polychlorinated biphenyls
TPH – NWTPH-Dx	Petroleum hydrocarbons
GEA – gamma spectroscopy	Cesium-137
Total beta radiostrontium	Strontium-90
Total uranium – KPA	Total uranium
Isotopic uranium	Uranium-233/234, uranium-235, uranium-238
Isotopic plutonium	Plutonium-238, plutonium-239/240
Americium	Americium-241

[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
EPA = U.S. Environmental Protection Agency
GEA = gamma energy analysis
ICP = inductively coupled plasma
KPA = kinetic phosphorescence analysis
NWTPH-Dx = Northwest total petroleum hydrocarbons-diesel range organics
PCB = polychlorinated biphenyls
SVOA = semivolatile organic analysis
TPH = total petroleum hydrocarbons

5.0 SAMPLING RESULTS

This section presents the evaluation of the verification sample results for comparison with the data quality criteria and CULs.

5.1 STATISTICAL SAMPLE RESULTS

The laboratory-reported verification sample results for all constituents are stored in a Washington Closure Hanford project-specific database prior to archival in the Hanford Environmental Information System (HEIS), and are presented as an attachment to the 95% UCL calculation (Appendix B).

Two decision units were identified for the 300-263 and 316-3 waste sites for verification sampling and consisted of the deep zone and shallow zone excavation footprints. Twelve statistical soil samples were collected from each decision unit and submitted to offsite laboratories for analysis. The verification data from the excavation footprint were evaluated using ProUCL to calculate a 95% UCL on the true population mean for residual concentrations of COCs as specified by the 300-FF-2 RDR/RAWP (DOE-RL 2015a). These calculations are provided in Appendix B. If there are five or more detections of a given COC, and the COC is detected in 25% or more of the total samples, a UCL is calculated. If there are less than five detections of a given COC within a data set, a UCL is not calculated and the maximum concentration is used. If no detections for a given COC were reported in the data set, then no statistical or maximum concentrations were reported for that COC.

Comparisons of the statistical results for COCs against the industrial site CULs for the 300-263 and 316-3 waste sites shallow zone and deep zone excavation footprints are summarized in Tables 3 and 4, respectively. Contaminants that were not detected by laboratory analysis are excluded from these tables but are reported in Appendix B.

Table 3. Comparison of Contaminant Concentrations to Industrial Cleanup Levels for the 300-263 and 316-3 Waste Sites Shallow Zone Verification Sampling. (2 Pages)

COC	Statistical or Maximum Result [a, b] (pCi/g)	Radionuclide Direct Exposure Industrial CULs [c] (pCi/g)	Radionuclide Groundwater and River Protection Industrial CULs [c] (pCi/g)	Does the Result Exceed CULs?
Plutonium-239/240	0.372	245	--	No
Strontium-90	1.72	1,970	--	No
Uranium-234	1.40	167	--	No
Uranium-235	0.114	16	--	No
Uranium-238	1.58	167	--	No

Table 3. Comparison of Contaminant Concentrations to Industrial Cleanup Levels for the 300-263 and 316-3 Waste Sites Shallow Zone Verification Sampling. (2 Pages)

COC	Statistical or Maximum Result [a, b] (mg/kg)	Nonradionuclide Direct Exposure Industrial CULs [c] (mg/kg)	Nonradionuclide Groundwater and River Protection Industrial CULs [c] (mg/kg)	Does the Result Exceed CULs?
Arsenic	2.8 (<BG)	20	--	No
Barium	325	700,000	--	No
Beryllium	0.36 (<BG)	7,000	--	No
Cadmium	0.15 (<BG)	3,500	--	No
Chromium (total)	8.6 (<BG)	>1,000,000	--	No
Cobalt	5.2 (<BG)	1,050	--	No
Copper	15.6 (<BG)	140,000	--	No
Hexavalent chromium	0.247	10,500	2.0	No
Lead	6.3 (<BG)	1,000	--	No
Lithium	7.0 (<BG)	7,000	--	No
Manganese	258 (<BG)	490,000	--	No
Mercury	0.27	1,050	--	No
Nickel	9.5 (<BG)	70,000	--	No
Selenium	1.5	17,500	912	No
Silver	0.45	17,500	--	No
Strontium	122	>1,000,000	--	No
Tin	1.6	>1,000,000	--	No
Uranium (total)	3.80	505	157	No
Vanadium	40.1 (<BG)	17,500	--	No
Zinc	34.2 (<BG)	>1,000,000	--	No
Nitrogen in nitrite and nitrate	192	>1,000,000[d]	4,740[d]	No
TPH – diesel range	4.4	2,000	2,000	No
TPH – diesel range EXT	7.6	2,000	2,000	No
Benzo(a)pyrene TEC [e]	0.00035	18	--	No
Phenanthrene	0.031	--	--	--
Aroclor-1254	0.0050	66	--	No
Aroclor-1260 [f]	3.1	66	--	No

[a] 95% upper confidence limit or maximum value, as described in Appendix B.
[b] Background values from DOE-RL 2015b.
[c] CULs obtained from Table 4 of the 300 Area ROD (EPA 2013)
[d] The CULs presented in 300 Area ROD (EPA 2013), are expressed in terms of nitrate, to make the reported results and CULs comparable, the CULs were converted to nitrate as nitrogen by dividing the CULs by 4.4.
[e] Evaluation of the compliance of benzo(a)pyrene with CULs includes the toxic equivalent concentrations of the carcinogenic polycyclic aromatic hydrocarbons, as described in Appendix B.
[f] The residential direct exposure CUL of 0.5 mg/kg was exceeded for aroclor-1260 (sample J1V779, location SZ-11).

-- = not applicable
BG = background
COC = contaminant of concern
CUL = cleanup level
EXT = extended
ROD = record of decision
TEC = toxic equivalent concentration
TPH = total petroleum hydrocarbons

Table 4. Comparison of Contaminant Concentrations to Industrial Cleanup Levels for the 300-263 and 316-3 Waste Sites Deep Zone Verification Sampling. (2 Pages)

COC	Statistical or Maximum Result [a, b] (pCi/g)	Radionuclide Direct Exposure Industrial CULs [c] (pCi/g)	Radionuclide Groundwater and River Protection Industrial CULs [c] (pCi/g)	Does the Result Exceed CULs?
Plutonium-239/240	0.105	245	--	No
Strontium-90	0.748	1,970	--	No
Uranium-234	7.49	167	--	No
Uranium-235	0.879	16	--	No
Uranium-238	10.7	167	--	No
COC	**Statistical or Maximum Result [a, b] (mg/kg)**	**Nonradionuclide Direct Exposure Industrial CULs [c] (mg/kg)**	**Nonradionuclide Groundwater and River Protection Industrial CULs [c] (mg/kg)**	**Does the Result Exceed CULs?**
Arsenic	3.2 (<BG)	20	--	No
Barium	83.8 (<BG)	700,000	--	No
Beryllium	0.25 (<BG)	7,000	--	No
Cadmium	0.067 (<BG)	3,500	--	No
Chromium (total)	9.7 (<BG)	>1,000,000	--	No
Cobalt	8.6 (<BG)	1,050	--	No
Copper	16.3 (<BG)	140,000	--	No
Hexavalent Chromium	0.230	10,500	2.0	No
Lead	4.3 (<BG)	1,000	--	No
Lithium	7.5 (<BG)	7,000	--	No
Manganese	355 (<BG)	490,000	--	No
Mercury	0.13	1,050	--	No
Nickel	11.2 (<BG)	70,000	--	No
Silver	0.23	17,500	--	No
Strontium	27.1	>1,000,000	--	No
Tin	2.0	>1,000,000	--	No
Uranium (total)	28.8	505	157	No
Vanadium	61.8 (<BG)	17,500	--	No
Zinc	42.9 (<BG)	>1,000,000	--	No
Nitrogen in nitrite and nitrate	2.6 (<BG)	>1,000,000[d]	4,740[d]	No
TPH – diesel range	2.0	2,000	2,000	No
TPH – diesel range EXT	2.6	2,000	2,000	No

Table 4. Comparison of Contaminant Concentrations to Industrial Cleanup Levels for the 300-263 and 316-3 Waste Sites Deep Zone Verification Sampling. (2 Pages)

COC	Statistical or Maximum Result [a, b] (mg/kg)	Nonradionuclide Direct Exposure Industrial CULs [c] (mg/kg)	Nonradionuclide Groundwater and River Protection Industrial CULs [c] (mg/kg)	Does the Result Exceed CULs?
Aroclor-1254	0.0065	66	--	No

Grey cells indicate CUL not applicable. Direct exposure CULs do not apply for the deep zone decision unit.
[a] 95% upper confidence limit or maximum value, as described in Appendix B.
[b] Background values from DOE-RL 2015b.
[c] CULs obtained from Table 4 of the 300 Area ROD (EPA 2013).
[d] The CULs presented in 300 Area ROD (EPA 2013), are expressed in terms of nitrate, to make the reported results and CULs comparable, the CULs were converted to nitrate as nitrogen by dividing the CULs by 4.4.

-- = not applicable
BG = background
COC = contaminant of concern
CUL = cleanup level
EXT = extended
ROD = record of decision
TPH = total petroleum hydrocarbons

Contaminants of concern for the 300 Area were selected in the 300 Area ROD (EPA 2013). In the event that contaminants are discovered during remediation for which CULs were not established in the 300 Area ROD, the information will be presented to the U.S. Department of Energy and EPA project managers for determination of a path forward. While not identified as COCs, molybdenum, zirconium, benzo(ghi)perylene, and pyrene were detected in the 300-263 and 316-3 waste sites cleanup verification samples. These detections were below risk-based CULs calculated during development of the 300 Area ROD (EPA 2013). Therefore, the detected molybdenum, zirconium, benzo(ghi)perylene, and pyrene concentrations do not require further discussion.

5.2 DATA QUALITY ASSESSMENT PROCESS

A DQA was performed to compare the verification sampling approach and resulting analytical data with the sampling and data quality requirements specified by the project objectives and performance specifications.

The DQA for the 300-263 and 316-3 waste sites determined that the data are of the right type, quality, and quantity to support site verification decisions within specified error tolerances. All analytical data were found to be acceptable for decision-making purposes. The evaluation also verified that the sample design was sufficient to support clean site verification. The cleanup verification sample analytical data are stored in a Washington Closure Hanford project-specific database prior to archiving in HEIS and are presented as an attachment to the 95% UCL calculations in Appendix C. The detailed DQA is presented in Appendix C.

6.0 CLEANUP VERIFICATION DATA EVALUATION

This section describes the evaluation of the sampling data in terms of comparison to the CULs, the radionuclide risk requirements, and the nonradionuclide risk requirements.

6.1 COMPARISON OF SAMPLE DATA TO THE CULS

Evaluation of the results listed in Tables 3 and 4 from the verification sampling at the 300-263 and 316-3 waste sites indicates that all radionuclide and nonradionuclide COCs were quantified below the industrial direct exposure, groundwater protection, and river protection CULs. Residential and industrial soil CULs to be protective of groundwater and the river were calculated based on federal drinking water standards as described in Section 8.2 of the 300 Area ROD (EPA 2013). Verification sampling results for aroclor-1260, sample J1V779 (location SZ-11), exceed the residential direct exposure CUL as noted in Table 3; therefore, the residual contaminant concentrations do not meet human health direct exposure CULs for residential land use in the shallow zone soils. The SZ-11 sample location is shown in Figure 9.

6.2 EVALUATION OF ATTAINMENT OF RADIONUCLIDE AND NONRADIONUCLIDE RISK REQUIREMENTS

This section discusses how the verification sampling data are used in demonstrating attainment of radionuclide and nonradionuclide risk requirements.

6.2.1 Radionuclide Evaluation of Risk and Dose

The CULs for soil radionuclide COCs in the 300 Area ROD (EPA 2013) were set at a 1×10^{-4} risk limit or 15 mrem/yr dose limit, whichever is more conservative for residential and industrial land use. In addition to meeting these individual CULs, a comparison of the radionuclide verification sample results for the statistical data set to the cumulative direct exposure radionuclide excess cancer risk limit of 1×10^{-4} and the radiological dose limit of 15 mrem/yr was conducted using sum of fractions calculations (Appendix A). The sum of fractions were conservatively calculated for the 300-263 and 316-3 waste sites data set using the maximum value for each radionuclide COC detected above background. The calculations were performed using the soil concentrations corresponding to a 1×10^{-4} risk and a 15 mrem/yr dose for industrial land use from Table 8-3 of the *Remedial Investigation/Feasibility Study for the 300-FF-1, 300-FF-2, and 300-FF-5 Operable Units* (DOE-RL 2013).

The sum of fractions shown in the *300-263 and 316-3 Waste Site Radionuclide Sum of Fractions Calculation* in Appendix B determined that the cumulative excess cancer risk value for radionuclides is 5.12×10^{-6} and the total radiological dose is 2.19 mrem/yr.

Comparing these values to the risk and dose limits of <1 x 10^{-4} and <15 mrem/yr, the risk and dose requirements are met.

6.2.2 Attainment of Nonradionuclide Noncarcinogenic and Carcinogenic Risk Standards

For COCs with noncarcinogenic effects, the *Washington Administrative Code* (WAC) 173-340, "Model Toxics Control Act – Cleanup," specified the evaluation of the hazard quotient, which is given as daily intake divided by a reference dose (WAC 173-340-200). The solutions and details of the hazard quotient calculations for 300-263 and 316-3 waste sites are provided in Appendix B.

Nonradionuclide risk requirements for the industrial scenario 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 x 10^{-5}, and a cumulative carcinogenic risk of less than 1 x 10^{-5}. Hazard quotient and excess carcinogenic risk calculations were performed for the 300-263 and 316-3 waste sites using the statistical or maximum values from the cleanup verification samples as described in Appendix B. Risk values were not calculated for constituents that were not detected or were detected at concentrations below Hanford Site or Washington State background values. All individual hazard quotients are below 1.0, and all individual excess carcinogenic risk values are below 1 x 10^{-5}. The cumulative hazard quotient for the 300-263 and 316-3 waste sites is 1.38 x 10^{-3}, satisfying the criteria of less than 1.0. The cumulative excess cancer risk for the 300-263 and 316-3 waste sites is 4.73 x 10^{-7}, satisfying the criteria of less than 1 x 10^{-5}.

7.0 STATEMENT OF PROTECTIVENESS

This CVP demonstrates that remedial action at the 300-263 and 316-3 waste sites achieved the RAOs and corresponding CULs established for the industrial land-use scenario in the 300 Area ROD (EPA 2013) and meet the requirements of the 300-FF-2 RDR/RAWP (DOE-RL 2015a). The contaminated materials from these waste sites have been excavated and disposed of at ERDF. The remaining soil at the 300-263 and 316-3 waste sites has been sampled, analyzed, and evaluated. Results indicate that the site supports future land uses that can be represented (or bounded) by the industrial land use scenario and poses no threat to groundwater or the Columbia River. Verification sampling results for aroclor-1260, sample J1V779 (location SZ-11), exceed the residential direct exposure CULs. Due to this exceedance, the residual contaminant concentrations do not meet human health direct exposure CULs for residential land use in the shallow zone soils. Because these waste sites were remediated to achieve CULs for industrial land use, institutional controls to maintain industrial land use are required. The 300-263 and 316-3 waste sites are verified to be remediated in accordance with the 300 Area ROD and have been reclassified to a status of Final Closed Out.

8.0 REFERENCES

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APPENDIX A

IN-PROCESS SAMPLING RESULTS

Abbreviations

Acronyms and notes apply to all tables in this attachment.
Gray cells indicate not applicable.
Note: Data qualified with B, D, N, M, and/or J, are considered acceptable values.
*Duplicate analysis not within control limits
B = organics: method blank contamination; inorganics: estimated result, result is less than the reporting limit but greater than the MDL
D = analyte was reported from a dilution
HEIS = Hanford Environmental Information System
J = organics: estimated result, result is less than the RL; inorganics: method blank contamination
M = sample duplicate precision not met
MDA = minimum detectable activity
MDL = method detection limit
N = MS/MSD or LCS recovery is outside control limits
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
PQL = practical quantitation limit
Q = qualifier
QC = quality control
TCLP = toxicity characteristic leaching procedure
TPH = total petroleum hydrocarbons
U = undetected
X = more than 40% difference between the primary and confirmation detector results. The lower of the two results is reported.

Table 06-1. 316-3 Waste Site In-process Sampling Results - Radionuclides (AEA).

Sample Location	HEIS Number	Sample Date	Uranium-234			Uranium-235			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J1V1D0	10/30/14	192		0.51	16.9		0.63	190		0.51
2	J1V1D1	10/30/14	169		0.89	12.9		0.82	179		0.95
3	J1V1D2	10/30/14	138		3.00	10.6		5.32	148		4.29
4	J1V1D3	10/30/14	57.5		0.73	5.25		0.79	55.4		0.91
5	J1V1D4	10/30/14	488		0.93	52.4		1.65	496		1.33
6	J1V1D5	10/30/14	63.2		1.01	4.29		0.87	69.9		1.28
7	J1V1D6	10/30/14	2.94		0.75	0.549	U	0.81	3.08		0.75
8	J1V1D7	10/30/14	4.09		1.46	-0.157	U	1.54	3.17		1.22
1	J1V408	2/2/15									
2	J1V409	2/2/15									
3	J1V410	2/2/15									
4	J1V411	2/2/15									
5	J1V412	2/2/15									
6	J1V413	2/2/15									
7	J1V414	2/2/15									
8	J1V415	2/2/15									
9	J1V416	2/2/15									
1	J1V4T4	3/9/15	8.01		0.0634	0.291		0.0376	7.68		0.0558
2	J1V4T5	3/9/15	9.22		0.0654	0.373		0.0591	9.24		0.0591
3	J1V4T6	3/9/15	6.17		0.0675	0.266		0.040	6.64		0.0594
4	J1V4T7	3/9/15	180		0.724	6.20		0.724	185		0.869
5	J1V4T8	3/9/15	6.05		0.0369	0.299		0.0496	6.53		0.0496
6	J1V4T9	3/9/15	13.4		0.0636	0.677		0.0399	12.5		0.0536
7	J1V4V0	3/9/15	92.5		0.575	2.54		0.791	82.7		0.791
8	J1V4V1	3/9/15	15.9		0.060	0.447		0.0404	15.3		0.0975
9	J1V4V2	3/9/15	392		0.933	13.8		0.565	415		0.777
10	J1V4V3	3/9/15	11.9		0.0641	0.371		0.0402	11.9		0.0597
South wall stained soil	J1V538	3/11/15	138		0.0873	16.0		0.0873	128		0.0873
South wall stained soil	J1V539	3/11/15	87.0		0.0896	3.37		0.0507	85.2		0.0808
1, @ -10'	J1V5J9	3/25/15	1.74		0.0626	0.0863		0.0527	2.04		0.0583
1A, @ -5'	J1V5K0	3/25/15	2.05		0.0624	0.0139	U	0.0526	1.91		0.0526
2, @ -5'	J1V5K1	3/25/15	1.86		0.0400	0.0732		0.0537	1.46		0.040
2A, @ -10'	J1V5K2	3/25/15	1.59		0.0649	0.0638		0.0587	1.82		0.0649
3, @ -5'	J1V5K3	3/25/15	0.873		0.0376	0.0832		0.0376	0.776		0.0376
3A, @ -10'	J1V5K4	3/25/15	1.26		0.0393	0.0581		0.0393	1.31		0.0393
4, @ -5'	J1V5K5	3/25/15	3.84		0.0573	0.0854		0.0386	3.64		0.0573
4A, @ -10'	J1V5K6	3/25/15	4.49		0.0654	0.166		0.041	4.69		0.0609
5, @ -5'	J1V5K7	3/25/15	10.2		0.0963	0.273		0.0767	9.88		0.0571
5A, @ -10'	J1V5K8	3/25/15	15.8		0.0637	0.488		0.0378	16.2		0.0561
6, @ -5'	J1V5K9	3/25/15	15.9		0.0591	0.556		0.0471	16.4		0.0351
6A, @ -10'	J1V5L0	3/25/15	9.32		0.0621	0.359		0.0523	9.89		0.0523
7, @ -5'	J1V5L1	3/25/15	10.5		0.0574	0.638		0.0360	11.7		0.0484
7A, @ -10'	J1V5L2	3/25/15	6.43		0.0731	0.270		0.0616	6.51		0.0616
8, @ -5'	J1V5L3	3/25/15	0.596		0.0529	0.0431	U	0.0529	0.683		0.0529
8A, @ -10'	J1V5L4	3/25/15	0.992		0.0828	0.0305	U	0.0758	0.862		0.0604
4B, @ -15'	J1V5L5	3/25/15	2.16		0.0725	0.0636		0.0467	1.92		0.0517
7B, @ -15'	J1V5L6	3/25/15	9.52		0.0693	0.401		0.0539	9.96		0.0579
location 1	J1V614	4/16/15									
location 2	J1V615	4/16/15									
location 3	J1V616	4/16/15									
locatin 4	J1V617	4/16/15									
location 5	J1V618	4/15/15									
location 6	J1V619	4/16/15									
location 7	J1V620	4/16/15									
location 8	J1V621	4/16/15									
location 9	J1V622	4/16/15									
location 10	J1V623	4/16/15									
sidewall, west; 11	J1V624	4/16/15									
sidewall, east; 12	J1V625	4/16/15									

Table 06-1. 316-3 Waste Site In-process Sampling Results - GPC, LEPS LSC, KPA.

Sample Location	HEIS Number	Sample Date	Gross alpha			Gross beta			Total beta radiostrontium			Iodine-129			Uranium			Technetium-99		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	ug/g	Q	MDA	pCi/g	Q	MDA
1	J1V1D0	10/30/14							31.4		0.32				446		0.050			
2	J1V1D1	10/30/14							40.1		0.34				342		0.050			
3	J1V1D2	10/30/14							52.1		0.31				285		0.050			
4	J1V1D3	10/30/14							17.0		0.28				122		0.050			
5	J1V1D4	10/30/14							102		0.36				825		0.050			
6	J1V1D5	10/30/14							15.5		0.33				149		0.050			
7	J1V1D6	10/30/14													7.30		0.050			
8	J1V1D7	10/30/14													8.96		0.050			
1	J1V408	2/2/15													59.9		0.090			
2	J1V409	2/2/15													40.8		0.100			
3	J1V410	2/2/15													20.8		0.080			
4	J1V411	2/2/15													0.809		0.100			
5	J1V412	2/2/15													0.924		0.090			
6	J1V413	2/2/15													0.641		0.090			
7	J1V414	2/2/15													61.5		0.090			
8	J1V415	2/2/15													245		0.100			
9	J1V416	2/2/15													21.5		0.090			
1	J1V4T4	3/9/15							0.053	U	0.253				21.0		0.136			
2	J1V4T5	3/9/15							0.046	U	0.240				20.7		0.135			
3	J1V4T6	3/9/15							-0.00937	U	0.259				19.2		0.135			
4	J1V4T7	3/9/15							2.69		0.346				520		0.138			
5	J1V4T8	3/9/15							0.186	U	0.286				18.2		0.135			
6	J1V4T9	3/9/15							-0.0175	U	0.244				32.6		0.136			
7	J1V4V0	3/9/15							9.35		0.283				247		0.134			
8	J1V4V1	3/9/15							0.023	U	0.304				20.7		0.138			
9	J1V4V2	3/9/15							0.245	U	0.261				991		0.135			
10	J1V4V3	3/9/15							0.0204	U	0.256				26.2		0.138			
South wall stained soil	J1V538	3/11/15	123		8.09	199		2.19	7.8		0.423				348		0.135			
South wall stained soil	J1V539	3/11/15	64.2		8.70	122		2.31	0.510		0.394				177		0.135			
1.@ -10'	J1V5J9	3/25/15							0.039	U	0.394				5.75		0.135			
1A. @ -5'	J1V5K0	3/25/15							0.0255	U	0.391				4.91		0.138			
2. @ -5'	J1V5K1	3/25/15							0.0303	U	0.405				4.76		0.134			
2A. @ -10'	J1V5K2	3/25/15							0.0135	U	0.392				3.14		0.132			
3. @ -5'	J1V5K3	3/25/15							-0.0243	U	0.406				2.70		0.135			
3A. @ -10'	J1V5K4	3/25/15							0.078	U	0.375				4.12		0.134			
4. @ -5'	J1V5K5	3/25/15							0.138	U	0.409				9.81		0.138			
4A. @ -10'	J1V5K6	3/25/15							-0.0161	U	0.361				11.3		0.132			
5. @ -5'	J1V5K7	3/25/15							-0.0595	U	0.373				28.3		0.134			
5A. @ -10'	J1V5K8	3/25/15							-0.122	U	0.375				43.5		0.134			
6. @ -5'	J1V5K9	3/25/15							0.163	U	0.39				47.4		0.132			
6A. @ -10'	J1V5L0	3/25/15							0.0629	U	0.403				24.3		0.138			
7. @ -5'	J1V5L1	3/25/15							-0.0345	U	0.375				31.4		0.135			
7A. @ -10'	J1V5L2	3/25/15							0.146	U	0.401				17.9		0.136			
8. @ -5'	J1V5L3	3/25/15							0.214	U	0.365				4.02		0.138			
8A. @ -10'	J1V5L4	3/25/15							0.247	U	0.382				3.29		0.131			
4B. @ -15'	J1V5L5	3/25/15							-0.0179	U	0.370				5.56		0.132			
7B. @ -15'	J1V5L6	3/25/15							0.128	U	0.410				26.6		0.132			
location 1	J1V614	4/16/15										-0.0198	U	0.0957	16.2		0.265	0.265	U	0.582
location 2	J1V615	4/16/15										0.0601	U	0.104	6.48		0.275	-0.028	U	0.579
location 3	J1V616	4/16/15										0.0438	U	0.119	8.14		0.260	0.126	U	0.586
locatin 4	J1V617	4/16/15										0.0442	U	0.114	5.2		0.260	0.111	U	0.588
location 5	J1V618	4/15/15										-0.0315	U	0.0948	4.48		0.265	0.314	U	0.576
location 6	J1V619	4/16/15										-0.0109	U	0.0916	9.95		0.265	0.434	U	0.594
location 7	J1V620	4/16/15										0.0136	U	0.085	2.12		0.270	0.255	U	0.579
location 8	J1V621	4/16/15										0.00946	U	0.104	3.10		0.270	0.0747	U	0.583
location 9	J1V622	4/16/15										0.0228	U	0.0921	3.04		0.270	0.208	U	0.582
location 10	J1V623	4/16/15										-0.0346	U	0.0877	15.7		0.260	0.218	U	0.575
sidewall, west; 11	J1V624	4/16/15										-0.00187	U	0.15	20.3		0.265	0.510	U	0.60
sidewall, east; 12	J1V625	4/16/15										-0.00175	U	0.14	55.8		0.270	0.383	U	0.585

Table 06-1. 316-3 Waste Site In-process Sampling Results - GPC, LEPS LSC, KPA.

Sample Location	HEIS Number	Sample Date	Tritium		
			pCi/g	Q	MDA
1	J1V1D0	10/30/14			
2	J1V1D1	10/30/14			
3	J1V1D2	10/30/14			
4	J1V1D3	10/30/14			
5	J1V1D4	10/30/14			
6	J1V1D5	10/30/14			
7	J1V1D6	10/30/14			
8	J1V1D7	10/30/14			
1	J1V408	2/2/15			
2	J1V409	2/2/15			
3	J1V410	2/2/15			
4	J1V411	2/2/15			
5	J1V412	2/2/15			
6	J1V413	2/2/15			
7	J1V414	2/2/15			
8	J1V415	2/2/15			
9	J1V416	2/2/15			
1	J1V4T4	3/9/15			
2	J1V4T5	3/9/15			
3	J1V4T6	3/9/15			
4	J1V4T7	3/9/15			
5	J1V4T8	3/9/15			
6	J1V4T9	3/9/15			
7	J1V4V0	3/9/15			
8	J1V4V1	3/9/15			
9	J1V4V2	3/9/15			
10	J1V4V3	3/9/15			
South wall stained soil	J1V538	3/11/15			
South wall stained soil	J1V539	3/11/15			
1,@ -10'	J1V5J9	3/25/15			
1A, @ -5'	J1V5K0	3/25/15			
2, @ -5'	J1V5K1	3/25/15			
2A, @ -10'	J1V5K2	3/25/15			
3, @ -5'	J1V5K3	3/25/15			
3A, @ -10'	J1V5K4	3/25/15			
4, @ -5'	J1V5K5	3/25/15			
4A, @ -10'	J1V5K6	3/25/15			
5, @ -5'	J1V5K7	3/25/15			
5A, @ -10'	J1V5K8	3/25/15			
6, @ -5'	J1V5K9	3/25/15			
6A, @ -10'	J1V5L0	3/25/15			
7, @ -5'	J1V5L1	3/25/15			
7A, @ -10'	J1V5L2	3/25/15			
8, @ -5'	J1V5L3	3/25/15			
8A, @ -10'	J1V5L4	3/25/15			
4B, @ -15'	J1V5L5	3/25/15			
7B, @ -15'	J1V5L6	3/25/15			
location 1	J1V614	4/16/15	0.197		0.153
location 2	J1V615	4/16/15	0.0608	U	0.142
location 3	J1V616	4/16/15	0.00394	U	0.107
locatin 4	J1V617	4/16/15	0.0203	U	0.103
location 5	J1V618	4/15/15	0.0510	U	0.099
location 6	J1V619	4/16/15	0.0324	U	0.110
location 7	J1V620	4/16/15	0.0668	U	0.160
location 8	J1V621	4/16/15	-0.0107	U	0.107
location 9	J1V622	4/16/15	0.100	U	0.116
location 10	J1V623	4/16/15	0.0556	U	0.140
sidewall, west; 11	J1V624	4/16/15	0.0270	U	0.128
sidewall, east; 12	J1V625	4/16/15	0.0608	U	0.143

Table 06-1. 316-3 Waste Site In-process Sampling Results -GEA.

Sample Location	HEIS Number	Sample Date	Americium-241			Antimony-125			Cerium-144			Cesium-134			Cesium-137			Cobalt-60		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J1V1D0	10/30/14	-20.5	U	0.69	0.118	U	0.30	0.156	U	1.10	-0.001	U	0.10	0.187		0.11	0.015	U	0.070
2	J1V1D1	10/30/14	9.05		0.68	-0.050	U	0.47	-0.007	U	1.33	-0.17	U	0.17	0.145	U	0.28	0.085	U	0.12
3	J1V1D2	10/30/14	-33.9	U	0.75	0.113	U	0.41	0.501	U	1.27	0.068	U	0.14	0.166	U	0.22	-0.023	U	0.11
4	J1V1D3	10/30/14	-9.53	U	0.44	-0.127	U	0.25	0.143	U	0.79	-0.446	U	0.10	0.061	U	0.13	0.021	U	0.10
5	J1V1D4	10/30/14	-1.54	U	1.15	0.185	U	0.61	-0.322	U	2.16	0.058	U	0.25	0.593		0.43	0.059	U	0.14
6	J1V1D5	10/30/14	4.83		0.53	-0.193	U	0.40	0.001	U	1.09	-0.013	U	0.16	0.08	U	0.19	-0.093	U	0.13
7	J1V1D6	10/30/14	-0.651	U	0.19	-0.032	U	0.17	0.040	U	0.41	-0.004	U	0.06	0.021	U	0.070	0.030	U	0.060
8	J1V1D7	10/30/14	0.003	U	0.16	-0.023	U	0.18	-0.042	U	0.43	-0.005	U	0.07	-0.003	U	0.090	-0.025	U	0.070
1	J1V408	2/2/15																		
2	J1V409	2/2/15																		
3	J1V410	2/2/15																		
4	J1V411	2/2/15																		
5	J1V412	2/2/15																		
6	J1V413	2/2/15																		
7	J1V414	2/2/15																		
8	J1V415	2/2/15																		
9	J1V416	2/2/15																		
1	J1V4T4	3/9/15	-0.00974	U	0.044	0.0233	U	0.062	-0.0561	U	0.11	0.0455	U	0.04	0.00052	U	0.028	0.00818	U	0.034
2	J1V4T5	3/9/15	-0.00896	U	0.224	0.0178	U	0.071	0.0333	U	0.154	0.0218	U	0.036	-0.0113	U	0.028	-0.00112	U	0.032
3	J1V4T6	3/9/15	-0.0112	U	0.031	0.0112	U	0.053	-0.0043	U	0.087	0.0139	U	0.025	0.953		0.022	-0.0147	U	0.022
4	J1V4T7	3/9/15	6.34		0.486	-0.0013	U	0.281	-0.146	U	0.552	0.537	U	0.126	17.5		0.101	-0.0108	U	0.062
5	J1V4T8	3/9/15	-0.00211	U	0.032	0.0254	U	0.048	0.0253	U	0.09	0.0317	U	0.029	0.0712		0.022	0.00558	U	0.025
6	J1V4T9	3/9/15	-0.0121	U	0.05	-0.0143	U	0.068	0.0188	U	0.125	0.084	U	0.051	0.00132	U	0.036	-0.00642	U	0.033
7	J1V4V0	3/9/15	2.45		0.341	-0.0293	U	0.134	-0.452	U	0.392	0.149	U	0.056	2.94		0.046	-0.00612	U	0.033
8	J1V4V1	3/9/15	0.0697	U	0.145	-0.045	U	0.1	-0.00997	U	0.199	0.0634	U	0.054	0.00326	U	0.047	-0.00051	U	0.047
9	J1V4V2	3/9/15	0.0637	U	0.11	-0.0223	U	0.079	0.00259	U	0.206	0.0459	U	0.046	0.134		0.036	0.00647	U	0.031
10	J1V4V3	3/9/15	-0.0004	U	0.035	0.00018	U	0.047	-0.0118	U	0.089	0.0432	U	0.031	0.0275	U	0.027	0.00314	U	0.025
South wall stained soil	J1V538	3/11/15	2.98		0.166	-0.0089	U	0.293	0.291	U	0.449	0.164	U	0.161	9.5		0.12	-0.00378	U	0.107
South wall stained soil	J1V539	3/11/15	1.28		0.092	-0.0288	U	0.204	0.167	U	0.269	0.0756	U	0.099	9		0.085	0.00172	U	0.072
1. @ -10'	J1V5J9	3/25/15	-0.0173	U	0.091	0.0222	U	0.078	-0.0234	U	0.139	0.0347	U	0.04	0.00405	U	0.032	-0.00518	U	0.033
1A. @ -5'	J1V5K0	3/25/15	-0.0455	U	0.123	-0.0045	U	0.064	0.0291	U	0.168	0.0137	U	0.03	0.00684	U	0.026	-0.00649	U	0.024
2. @ -5'	J1V5K1	3/25/15	0.00069	U	0.026	-0.0016	U	0.067	0.0132	U	0.104	-0.0103	U	0.038	-0.00735	U	0.03	-0.0081	U	0.035
2A. @ -10'	J1V5K2	3/25/15	0.022	U	0.037	0.0109	U	0.054	-0.045	U	0.106	0.0208	U	0.029	-0.00249	U	0.023	0.00651	U	0.025
3. @ -5'	J1V5K3	3/25/15	-0.0053	U	0.023	0.0273	U	0.059	0.0107	U	0.08	0.0089	U	0.035	0.000539	U	0.028	0.000296	U	0.034
3A. @ -10'	J1V5K4	3/25/15	-0.00868	U	0.022	0.00992	U	0.064	0.087	U	0.093	0.0155	U	0.036	0.00788	U	0.03	-0.00294	U	0.038
4. @ -5'	J1V5K5	3/25/15	-0.00117	U	0.025	-0.0249	U	0.057	0.0218	U	0.09	0.0167	U	0.038	0.00569	U	0.031	-0.00886	U	0.035
4A. @ -10'	J1V5K6	3/25/15	0.000111	U	0.135	-0.0382	U	0.093	-0.109	U	0.186	-0.00753	U	0.039	0.0031	U	0.04	-0.0139	U	0.04
5. @ -5'	J1V5K7	3/25/15	-0.0646	U	0.158	-0.005	U	0.105	-0.0583	U	0.202	0.00447	U	0.044	-0.0161	U	0.043	0.0102	U	0.046
5A. @ -10'	J1V5K8	3/25/15	0.0268	U	0.123	-0.0189	U	0.123	-0.107	U	0.18	0.0145	U	0.065	-0.0223	U	0.053	0.00484	U	0.061
6. @ -5'	J1V5K9	3/25/15	0.36	U	0.193	0.073	U	0.124	-0.0989	U	0.231	0.00406	U	0.055	-0.0104	U	0.048	-0.0138	U	0.045
6A. @ -10'	J1V5L0	3/25/15	-0.0417	U	0.12	-0.0392	U	0.116	-0.0802	U	0.185	-0.00108	U	0.068	0.00684	U	0.054	0.024	U	0.074
7. @ -5'	J1V5L1	3/25/15	0.0115	U	0.049	-0.0206	U	0.057	-0.0851	U	0.125	0.0105	U	0.032	0.00479	U	0.026	-0.00373	U	0.026
7A. @ -10'	J1V5L2	3/25/15	0.0261	U	0.04	0.0246	U	0.058	0.0432	U	0.115	0.0203	U	0.03	-0.00386	U	0.023	0.0102	U	0.026
8. @ -5'	J1V5L3	3/25/15	0.0284	U	0.037	-0.0281	U	0.075	0.0485	U	0.118	0.0267	U	0.054	0.0368	U	0.052	-0.0057	U	0.047
8A. @ -10'	J1V5L4	3/25/15	0.033		0.025	-0.0189	U	0.073	0.0224	U	0.105	0.0252	U	0.042	0.188		0.034	0.0124	U	0.047
4B. @ -15'	J1V5L5	3/25/15	0.00365	U	0.024	0.0172	U	0.04	-0.0403	U	0.069	0.041	U	0.025	-0.0145	U	0.016	-0.00206	U	0.019
7B. @ -15'	J1V5L6	3/25/15	0.0145	U	0.028	0.00775	U	0.041	0.00274	U	0.079	0.0167	U	0.025	-0.00388	U	0.018	-0.00595	U	0.019
location 1	J1V614	4/16/15																		
location 2	J1V615	4/16/15																		
location 3	J1V616	4/16/15																		
locatin 4	J1V617	4/16/15																		
location 5	J1V618	4/15/15																		
location 6	J1V619	4/16/15																		
location 7	J1V620	4/16/15																		
location 8	J1V621	4/16/15																		
location 9	J1V622	4/16/15																		
location 10	J1V623	4/16/15																		
sidewall, west, 11	J1V624	4/16/15																		
sidewall, east: 12	J1V625	4/16/15																		

Table 06-1. 316-3 Waste Site In-process Sampling Results -GEA.

Sample	HEIS	Sample	Europium-152			Europium-154			Europium-155			Lead-212			Lead-214			Potassium-40		
Location	Number	Date	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J1V1D0	10/30/14	-0.018	U	0.38	0.137	U	0.24	0.021	U	0.67	1.71		0.3	0.571		0.26	15.989		0.9
2	J1V1D1	10/30/14	-0.024	U	0.63	0.053	U	0.35	0.033	U	0.74	1.694		0.45	0.612		0.46	13.055		1.86
3	J1V1D2	10/30/14	0.028	U	0.59	0.036	U	0.35	0.669	U	0.75	1.925		0.35	0.597		0.46	13.691		1.78
4	J1V1D3	10/30/14	-0.249	U	0.41	0.245		0.21	0.042	U	0.45	1.425		0.28	0.73		0.3	16.225		1.13
5	J1V1D4	10/30/14	-0.285	U	0.89	0.025	U	0.43	0.982	U	1.33	6.905		0.65	0.771		0.63	10.609		2.06
6	J1V1D5	10/30/14	-0.011	U	0.55	-0.101	U	0.29	-0.052	U	0.57	1.897		0.32	0.763		0.45	18.541		1.78
7	J1V1D6	10/30/14	0.123	U	0.21	-0.072	U	0.11	0.006	U	0.2	1.014		0.21	0.766		0.22	19.237		0.76
8	J1V1D7	10/30/14	-0.075	U	0.23	0.063	U	0.12	0.147	U	0.19	0.975		0.29	0.61		0.22	17.451		1.11
1	J1V408	2/2/15																		
2	J1V409	2/2/15																		
3	J1V410	2/2/15																		
4	J1V411	2/2/15																		
5	J1V412	2/2/15																		
6	J1V413	2/2/15																		
7	J1V414	2/2/15																		
8	J1V415	2/2/15																		
9	J1V416	2/2/15																		
1	J1V4T4	3/9/15	-0.00313	U	0.061	0.0153	U	0.1	0.0577	U	0.061							15.6		0.361
2	J1V4T5	3/9/15	-0.0155	U	0.072	-0.0053	U	0.107	0.0546	U	0.093							13.8		0.218
3	J1V4T6	3/9/15	-0.00174	U	0.05	0.0117	U	0.079	0.0145	U	0.044							11.2		0.186
4	J1V4T7	3/9/15	0.1	U	0.282	0.0369	U	0.203	0.912		0.3							13.2		0.581
5	J1V4T8	3/9/15	0.0109	U	0.049	0.0191	U	0.085	0.0259	U	0.046							13.3		0.195
6	J1V4T9	3/9/15	-0.0118	U	0.073	-0.0026	U	0.118	0.124		0.062							18.7		0.323
7	J1V4V0	3/9/15	0.0974	U	0.143	0.00039	U	0.106	-0.327	U	0.229							13.5		0.292
8	J1V4V1	3/9/15	-0.0271	U	0.101	0.0497	U	0.146	0.104	U	0.107							15.7		0.356
9	J1V4V2	3/9/15	0.0071	U	0.079	-0.0457	U	0.088	0.566		0.113							14.4		0.287
10	J1V4V3	3/9/15	-0.027	U	0.046	-0.0231	U	0.076	0.0603	U	0.05							13.7		0.233
South wall stained soil	J1V538	3/11/15	-0.0824	U	0.255	-0.115	U	0.305	0.605		0.22							14.8		1.04
South wall stained soil	J1V539	3/11/15	-0.00613	U	0.187	0.102	U	0.272	0.264		0.126							14.9		0.567
1, @ -10'	J1V5J9	3/25/15	-0.0107	U	0.079	-0.0023	U	0.1	0.0388	U	0.071							8.96		0.293
1A, @ -5'	J1V5K0	3/25/15	0.0393	U	0.068	-0.0375	U	0.076	-0.0194	U	0.088							9.25		0.186
2, @ -5'	J1V5K1	3/25/15	-0.021	U	0.062	-0.0432	U	0.106	0.00339	U	0.047							7.4		0.371
2A, @ -10'	J1V5K2	3/25/15	-0.0219	U	0.054	0.0234	U	0.077	0.0529	U	0.057							8.54		0.186
3, @ -5'	J1V5K3	3/25/15	-0.0107	U	0.057	0.0201	U	0.105	0.0306	U	0.039							7.13		0.301
3A, @ -10'	J1V5K4	3/25/15	0.015	U	0.062	-0.0104	U	0.11	0.0214	U	0.039							8.02		0.274
4, @ -5'	J1V5K5	3/25/15	0.00398	U	0.059	-0.0114	U	0.113	0.0239	U	0.044							6.72		0.281
4A, @ -10'	J1V5K6	3/25/15	-0.235	U	0.099	-0.0041	U	0.125	-0.0224	U	0.098							6.21		0.389
5, @ -5'	J1V5K7	3/25/15	-0.326	U	0.112	-0.0103	U	0.136	0.0063	U	0.112							6.81		0.335
5A, @ -10'	J1V5K8	3/25/15	-0.0112	U	0.13	0.00274	U	0.185	0.0347	U	0.103							6.58		0.634
6, @ -5'	J1V5K9	3/25/15	-0.252	U	0.123	-0.0604	U	0.147	-0.134	U	0.116							7.18		0.508
6A, @ -10'	J1V5L0	3/25/15	-0.0109	U	0.134	-0.0269	U	0.221	-0.0046	U	0.095							6.18		0.407
7, @ -5'	J1V5L1	3/25/15	0.00569	U	0.06	0.0128	U	0.087	0.0243	U	0.068							10.6		0.207
7A, @ -10'	J1V5L2	3/25/15	0.00481	U	0.058	0.013	U	0.075	0.0237	U	0.057							7.99		0.193
8, @ -5'	J1V5L3	3/25/15	-0.0554	U	0.075	-0.0117	U	0.147	0.0576	U	0.062							7.73		0.508
8A, @ -10'	J1V5L4	3/25/15	-0.028	U	0.068	0.00057	U	0.134	0.0307	U	0.053							7.07		0.342
4B, @ -15'	J1V5L5	3/25/15	0.0141	U	0.04	0.0199	U	0.063	0.0472	U	0.038							8.22		0.167
7B, @ -15'	J1V5L6	3/25/15	0.0117	U	0.045	-0.0019	U	0.072	0.0276	U	0.042							8.18		0.181
location 1	J1V614	4/16/15																		
location 2	J1V615	4/16/15																		
location 3	J1V616	4/16/15																		
locatin 4	J1V617	4/16/15																		
location 5	J1V618	4/15/15																		
location 6	J1V619	4/16/15																		
location 7	J1V620	4/16/15																		
location 8	J1V621	4/16/15																		
location 9	J1V622	4/16/15																		
location 10	J1V623	4/16/15																		
sidewall, west; 11	J1V624	4/16/15																		
sidewall, east; 12	J1V625	4/16/15																		

Table 06-1. 316-3 Waste Site In-process Sampling Results -GEA.

Sample Location	HEIS Number	Sample Date	Protactinium-234m			Radium-226			Radium-228			Ruthenium-106			Thallium-208			Thorium-228		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J1V1D0	10/30/14	303.433		13.77	0.823		0.3	1.675		0.5	-0.006	U	0.94	1.363		0.1			
2	J1V1D1	10/30/14	173.058		32.21	0.766		0.51	1.729		0.82	-0.423	U	1.57	1.324		0.32			
3	J1V1D2	10/30/14	324.549		16.81	0.83		0.38	2.182		0.47	-0.391	U	1.34	1.821		0.23			
4	J1V1D3	10/30/14	100.946		16.42	0.733		0.37	1.616		0.48	0.06	U	1	1.129		0.04			
5	J1V1D4	10/30/14	759.595		24.37	0.644	U	0.75	7.829		1.25	-1.362	U	2.36	4.51		0.21			
6	J1V1D5	10/30/14	113.738		23.78	0.589		0.4	1.622		0.64	-0.675	U	1.38	1.597		0.18			
7	J1V1D6	10/30/14	5.952	U	7.71	0.671		0.14	1.184		0.37	-0.06	U	0.54	0.868		0.09			
8	J1V1D7	10/30/14	8.481	U	12.13	0.81		0.27	0.993		0.41	0.133	U	0.7	0.82		0.12			
1	J1V408	2/2/15																		
2	J1V409	2/2/15																		
3	J1V410	2/2/15																		
4	J1V411	2/2/15																		
5	J1V412	2/2/15																		
6	J1V413	2/2/15																		
7	J1V414	2/2/15																		
8	J1V415	2/2/15																		
9	J1V416	2/2/15																		
1	J1V4T4	3/9/15				0.543		0.045	0.784		0.113	0.0456	U	0.238						
2	J1V4T5	3/9/15				0.519		0.051	0.811		0.099	-0.106	U	0.223						
3	J1V4T6	3/9/15				0.293		0.038	0.539		0.076	0.104	U	0.18						
4	J1V4T7	3/9/15				0.489	U	0.212	9.06		0.244	-0.236	U	0.782						
5	J1V4T8	3/9/15				0.331		0.036	0.447		0.083	0.0486	U	0.184						
6	J1V4T9	3/9/15				0.426		0.061	1.67		0.126	0.157	U	0.273						
7	J1V4V0	3/9/15				0.436	U	0.12	3.47		0.137	-0.0474	U	0.386						
8	J1V4V1	3/9/15				0.486	U	0.154	1.07		0.185	0.0548	U	0.365						
9	J1V4V2	3/9/15				0.361		0.065	0.744		0.126	0.0607	U	0.311						
10	J1V4V3	3/9/15				0.406		0.037	0.707		0.087	0.0169	U	0.176						
South wall stained soil	J1V538	3/11/15				0.546		0.213	5.23		0.412	-0.201	U	0.954				3.23		0.306
South wall stained soil	J1V539	3/11/15				0.18		0.134	2.42		0.29	-0.141	U	0.611				1.88		0.207
1.@ -10'	J1V5J9	3/25/15				0.346		0.061	0.494	U	0.224	-0.00068	U	0.255						
1A. @ -5'	J1V5K0	3/25/15				0.313		0.049	0.507		0.11	0.123	U	0.232						
2. @ -5'	J1V5K1	3/25/15				0.193		0.058	0.459		0.115	0.0151	U	0.247						
2A. @ -10'	J1V5K2	3/25/15				0.346		0.038	0.435		0.086	-0.0418	U	0.182						
3. @ -5'	J1V5K3	3/25/15				0.278	U	0.11	0.414		0.123	-0.112	U	0.206						
3A. @ -10'	J1V5K4	3/25/15				0.307		0.051	0.304		0.104	-0.0848	U	0.219						
4. @ -5'	J1V5K5	3/25/15				0.212	U	0.102	0.356		0.126	-0.0503	U	0.243						
4A. @ -10'	J1V5K6	3/25/15				0.142	U	0.12	0.308	U	0.214	0.211	U	0.358						
5. @ -5'	J1V5K7	3/25/15				0.175	U	0.129	0.479	U	0.262	-0.0784	U	0.39						
5A. @ -10'	J1V5K8	3/25/15				0.189		0.105	0.314	U	0.328	0.0729	U	0.447						
6. @ -5'	J1V5K9	3/25/15				0.153	U	0.134	0.514	U	0.286	-0.0463	U	0.384						
6A. @ -10'	J1V5L0	3/25/15				0.222	U	0.171	0.426		0.215	0.0211	U	0.452						
7. @ -5'	J1V5L1	3/25/15				0.429		0.045	0.526		0.095	-0.0382	U	0.196						
7A. @ -10'	J1V5L2	3/25/15				0.329		0.038	0.434		0.076	-0.039	U	0.187						
8. @ -5'	J1V5L3	3/25/15				0.344	U	0.144	0.666	U	0.319	0.113	U	0.34						
8A. @ -10'	J1V5L4	3/25/15				0.258		0.057	0.312		0.134	0.112	U	0.267						
4B. @ -15'	J1V5L5	3/25/15				0.298		0.032	0.457		0.067	0.0395	U	0.148						
7B. @ -15'	J1V5L6	3/25/15				0.328		0.036	0.43		0.074	0.0362	U	0.172						
location 1	J1V614	4/16/15																		
location 2	J1V615	4/16/15																		
location 3	J1V616	4/16/15																		
locatin 4	J1V617	4/16/15																		
location 5	J1V618	4/15/15																		
location 6	J1V619	4/16/15																		
location 7	J1V620	4/16/15																		
location 8	J1V621	4/16/15																		
location 9	J1V622	4/16/15																		
location 10	J1V623	4/16/15																		
sidewall, west, 11	J1V624	4/16/15																		
sidewall, east, 12	J1V625	4/16/15																		

Table 06-1. 316-3 Waste Site In-process Sampling Results -GEA.

Sample Location	HEIS Number	Sample Date	Thorium-232			Thorium-234			Uranium-235			Uranium-238			Zinc-65		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J1V1D0	10/30/14				269.802		8.79	16.471		1.8	269.802		8.79	0.019	U	0.17
2	J1V1D1	10/30/14				114.245		6.58	10.061		1.81	114.245		6.58	-0.056	U	0.28
3	J1V1D2	10/30/14				295.763		10.16	16.97		2.23	295.763		10.16	-0.006	U	0.21
4	J1V1D3	10/30/14				96.892		5.64	5.54		1.31	96.892		5.64	-0.01	U	0.18
5	J1V1D4	10/30/14				824.665		16.15	43.142		2.57	824.665		16.15	-0.228	U	0.33
6	J1V1D5	10/30/14				63.156		5.28	6.065		1.73	63.156		5.28	0.027	U	0.31
7	J1V1D6	10/30/14				7.726		2.76	0.384	U	0.46	7.726		2.76	0.008	U	0.15
8	J1V1D7	10/30/14				7.083		2.85	0.702		0.5	7.083		2.85	0.033	U	0.16
1	J1V408	2/2/15															
2	J1V409	2/2/15															
3	J1V410	2/2/15															
4	J1V411	2/2/15															
5	J1V412	2/2/15															
6	J1V413	2/2/15															
7	J1V414	2/2/15															
8	J1V415	2/2/15															
9	J1V416	2/2/15															
1	J1V4T4	3/9/15							0.432		0.109	5.99		0.414	0.0223	U	0.068
2	J1V4T5	3/9/15							0.397		0.161	6.15		1.63	0.0294	U	0.072
3	J1V4T6	3/9/15							0.129		0.091	1.71		0.303	-0.0247	U	0.049
4	J1V4T7	3/9/15							7.66		0.562	143		4.33	-0.226	U	0.125
5	J1V4T8	3/9/15							0.183		0.09	1.95		0.306	-0.0435	U	0.05
6	J1V4T9	3/9/15							0.633		0.135	11.9		0.474	-0.0585	U	0.068
7	J1V4V0	3/9/15							2.29		0.38	32.7		2.91	-0.103	U	0.076
8	J1V4V1	3/9/15							0.209	U	0.223	3.49		1.18	-0.158	U	0.099
9	J1V4V2	3/9/15							8.1		0.207	150		0.959	0.0493	U	0.072
10	J1V4V3	3/9/15							0.236		0.092	3.97		0.328	-0.00479	U	0.05
South wall stained soil	J1V538	3/11/15	4.78		0.649	122		13.9	6.52		0.455	115		1.48	-0.0821	U	0.24
South wall stained soil	J1V539	3/11/15	2.27		0.415	52.6		7.23	2.17		0.274	41.9		0.826	-0.148	U	0.148
1,@ -10'	J1V5J9	3/25/15							0.0353	U	0.149	1.48		0.821	-0.0361	U	0.065
1A, @ -5'	J1V5K0	3/25/15							0.0813	U	0.172	0.98	U	1.1	-0.054	U	0.066
2, @ -5'	J1V5K1	3/25/15							0.00552	U	0.113	0.505		0.26	0.0127	U	0.083
2A, @ -10'	J1V5K2	3/25/15							0.0796	U	0.118	0.589		0.342	-0.00349	U	0.054
3, @ -5'	J1V5K3	3/25/15							0.00366	U	0.087	0.333		0.234	-0.0491	U	0.072
3A, @ -10'	J1V5K4	3/25/15							0.0506	U	0.106	0.562		0.231	-0.0131	U	0.076
4, @ -5'	J1V5K5	3/25/15							0.0596	U	0.108	0.91		0.243	-0.0457	U	0.083
4A, @ -10'	J1V5K6	3/25/15							0.0879	U	0.198	0.851	U	1.21	-0.0744	U	0.092
5, @ -5'	J1V5K7	3/25/15							0.0586	U	0.216	2.36	U	1.48	0.0211	U	0.12
5A, @ -10'	J1V5K8	3/25/15							0.139	U	0.225	4.26		1.04	0.0135	U	0.132
6, @ -5'	J1V5K9	3/25/15							0.165	U	0.25	3.94		1.45	-0.0826	U	0.111
6A, @ -10'	J1V5L0	3/25/15							0.117	U	0.227	2.48		1.08	-0.106	U	0.145
7, @ -5'	J1V5L1	3/25/15							0.299		0.134	4.83		0.467	-0.00307	U	0.058
7A, @ -10'	J1V5L2	3/25/15							0.19	U	0.132	2.07		0.385	-0.00031	U	0.054
8, @ -5'	J1V5L3	3/25/15							0.0898	U	0.127	0.561		0.314	-0.161	U	0.103
8A, @ -10'	J1V5L4	3/25/15							0.0227	U	0.117	0.404		0.261	0.017	U	0.08
4B, @ -15'	J1V5L5	3/25/15							0.0975		0.074	0.963		0.236	0.00119	U	0.043
7B, @ -15'	J1V5L6	3/25/15							0.108		0.08	2.99		0.263	-0.00611	U	0.045
location 1	J1V614	4/16/15															
location 2	J1V615	4/16/15															
location 3	J1V616	4/16/15															
locatin 4	J1V617	4/16/15															
location 5	J1V618	4/15/15															
location 6	J1V619	4/16/15															
location 7	J1V620	4/16/15															
location 8	J1V621	4/16/15															
location 9	J1V622	4/16/15															
location 10	J1V623	4/16/15															
sidewall, west: 11	J1V624	4/16/15															
sidewall, east: 12	J1V625	4/16/15															

Table 06-1. 316-3 Waste Site In-process Sampling Results - Metals.

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Bismuth		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J1V1D0	10/30/14	23900	*	7.19	1.74	DU	1.74	0.529		0.529	162	*	0.106	1.10		0.106			
2	J1V1D1	10/30/14	20600	*	7.12	1.73	DU	1.73	0.523		0.523	120	*	0.105	1.09		0.105			
3	J1V1D2	10/30/14	23500	*	7.19	1.74	DU	1.74	0.529		0.529	137	*	0.106	1.31		0.106			
4	J1V1D3	10/30/14	13100	*	6.92	1.68	DU	1.68	0.509		0.509	112	*	0.102	1.02		0.102			
5	J1V1D4	10/30/14	58800	*	10.1	2.47	BD	2.45	0.744		0.744	340	*	0.149	1.37		0.149			
6	J1V1D5	10/30/14	13700	*	6.97	1.69	DU	1.69	2.89	B	0.513	115	*	0.103	0.978		0.103			
7	J1V1D6	10/30/14	7390	*	6.78	1.65	DU	1.65	4.31		0.499	88.2	*	0.0997	1.00		0.0997			
8	J1V1D7	10/30/14	7500	*	7.24	1.76	DU	1.76	3.37		0.532	87.7	*	0.106	1.08		0.106			
1	J1V408	2/2/15																		
2	J1V409	2/2/15																		
3	J1V410	2/2/15																		
4	J1V411	2/2/15																		
5	J1V412	2/2/15																		
6	J1V413	2/2/15																		
7	J1V414	2/2/15																		
8	J1V415	2/2/15																		
9	J1V416	2/2/15																		
Bottle	J1V467	2/10/15	3850		6.5	0.433	B	0.315	6.13		0.478	131	*	0.0956	0.309	B	0.0956	0.0962	DU	0.0962
1	J1V4T4	3/9/15																		
2	J1V4T5	3/9/15																		
3	J1V4T6	3/9/15																		
4	J1V4T7	3/9/15																		
5	J1V4T8	3/9/15																		
6	J1V4T9	3/9/15																		
7	J1V4V0	3/9/15																		
8	J1V4V1	3/9/15																		
9	J1V4V2	3/9/15																		
10	J1V4V3	3/9/15																		
1.@ -10'	J1V5J9	3/25/15																		
1A. @ -5'	J1V5K0	3/25/15																		
2. @ -5'	J1V5K1	3/25/15																		
2A. @ -10'	J1V5K2	3/25/15																		
3. @ -5'	J1V5K3	3/25/15																		
3A. @ -10'	J1V5K4	3/25/15																		
4. @ -5'	J1V5K5	3/25/15																		
4A. @ -10'	J1V5K6	3/25/15																		
5. @ -5'	J1V5K7	3/25/15																		
5A. @ -10'	J1V5K8	3/25/15																		
6. @ -5'	J1V5K9	3/25/15																		
6A. @ -10'	J1V5L0	3/25/15																		
7. @ -5'	J1V5L1	3/25/15																		
7A. @ -10'	J1V5L2	3/25/15																		
8. @ -5'	J1V5L3	3/25/15																		
8A. @ -10'	J1V5L4	3/25/15																		
4B. @ -15'	J1V5L5	3/25/15																		
7B. @ -15'	J1V5L6	3/25/15																		
location 1	J1V614	4/16/15	4210	X	1.6	0.39	U	0.39	1.7		0.68	48.7	X	0.078	0.13	B	0.034			
location 2	J1V615	4/16/15	4120	X	1.5	0.37	U	0.37	1.0	M	0.64	68.9	X	0.074	0.099	B	0.032			
location 3	J1V616	4/16/15	5190	X	1.4	0.35	U	0.35	1.9		0.61	50.4	X	0.070	0.16	B	0.030			
locatm 4	J1V617	4/16/15	4480	X	1.5	0.37	U	0.37	1.5		0.64	53.8	X	0.073	0.15	B	0.032			
location 5	J1V618	4/15/15	3860	X	1.4	0.33	U	0.33	1.6		0.58	50.8	X	0.067	0.12	B	0.029			
location 6	J1V619	4/16/15	3660	X	1.4	0.34	U	0.34	1.7		0.60	57.7	X	0.069	0.16	B	0.030			
location 7	J1V620	4/16/15	10300	X	1.5	0.36	U	0.36	3.2		0.63	81.1	X	0.073	0.41		0.032			
location 8	J1V621	4/16/15	3780	X	1.4	0.34	U	0.34	1.7		0.59	59.8	X	0.068	0.22	B	0.150			
location 9	J1V622	4/16/15	4190	X	1.5	0.36	U	0.36	1.0		0.62	55.2	X	0.071	0.17	B	0.031			
location 10	J1V623	4/16/15	2630	X	1.4	0.34	U	0.34	0.98		0.59	43.8	X	0.068	0.10	B	0.029			
sidewall, west; 11	J1V624	4/16/15	4250	X	1.4	0.35	U	0.35	2.2		0.61	70.2	X	0.071	0.15	B	0.031			
sidewall, east; 12	J1V625	4/16/15	6610	X	1.7	0.41	U	0.41	3.5		0.71	138	X	0.082	0.21	B	0.036			

Table 06-1. 316-3 Waste Site In-process Sampling Results - Metals.

Sample Location	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt			Copper		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J1V1D0	10/30/14	6.98		1.06	0.106		0.106	15200	*	8.46	300	*	0.159	7.57	D	0.793	2690	*	0.317
2	J1V1D1	10/30/14	1.50	B	1.05	0.105		0.105	11700	*	8.37	295	*	0.157	8.44	D	0.785	2660	*	0.314
3	J1V1D2	10/30/14	1.59	B	1.06	0.106		0.106	13900	*	8.46	399	*	0.159	9.26	D	0.793	2680	*	0.317
4	J1V1D3	10/30/14	1.02	U	1.02	0.102		0.102	8060	*	8.14	125	*	0.153	8.2	D	0.763	913	*	0.305
5	J1V1D4	10/30/14	5.81	B	1.49	0.149		0.149	33700	*	11.9	932	*	0.223	6.37	D	1.12	10800	*	0.446
6	J1V1D5	10/30/14	1.03	U	1.03	0.103		0.103	9820	*	8.20	151	*	0.154	7.49	D	0.769	1660	*	0.308
7	J1V1D6	10/30/14	0.997	U	0.997	0.527		0.0997	5260	*	7.98	17.2	*	0.150	8.66	D	0.748	58.1	*	0.299
8	J1V1D7	10/30/14	1.06	U	1.06	0.520	B	0.106	5850	*	8.51	18.5	*	0.160	9.63	D	0.798	106	*	0.319
1	J1V408	2/2/15																		
2	J1V409	2/2/15																		
3	J1V410	2/2/15																		
4	J1V411	2/2/15																		
5	J1V412	2/2/15																		
6	J1V413	2/2/15																		
7	J1V414	2/2/15																		
8	J1V415	2/2/15																		
9	J1V416	2/2/15																		
Bottle	J1V467	2/10/15	31.8		0.956	1.55		0.0956	14200		7.65	15.8	N	0.143	3.19	*	0.143	11.5		0.287
1	J1V4T4	3/9/15																		
2	J1V4T5	3/9/15																		
3	J1V4T6	3/9/15																		
4	J1V4T7	3/9/15																		
5	J1V4T8	3/9/15																		
6	J1V4T9	3/9/15																		
7	J1V4V0	3/9/15																		
8	J1V4V1	3/9/15																		
9	J1V4V2	3/9/15																		
10	J1V4V3	3/9/15																		
1, @ -10'	J1V5J9	3/25/15																		
1A, @ -5'	J1V5K0	3/25/15																		
2, @ -5'	J1V5K1	3/25/15																		
2A, @ -10'	J1V5K2	3/25/15																		
3, @ -5'	J1V5K3	3/25/15																		
3A, @ -10'	J1V5K4	3/25/15																		
4, @ -5'	J1V5K5	3/25/15																		
4A, @ -10'	J1V5K6	3/25/15																		
5, @ -5'	J1V5K7	3/25/15																		
5A, @ -10'	J1V5K8	3/25/15																		
6, @ -5'	J1V5K9	3/25/15																		
6A, @ -10'	J1V5L0	3/25/15																		
7, @ -5'	J1V5L1	3/25/15																		
7A, @ -10'	J1V5L2	3/25/15																		
8, @ -5'	J1V5L3	3/25/15																		
8A, @ -10'	J1V5L4	3/25/15																		
4B, @ -15'	J1V5L5	3/25/15																		
7B, @ -15'	J1V5L6	3/25/15																		
location 1	J1V614	4/16/15	1.0	U	1.0	0.042	U	0.042	2860	X	14.5	5.0	X	0.060	6.4	X	0.10	10.4	X	0.22
location 2	J1V615	4/16/15	0.95	UN	0.95	0.04	U	0.04	5320	X	13.7	3.7	XM	0.056	10.2	X	0.097	13.4	X	0.21
location 3	J1V616	4/16/15	0.91	U	0.91	0.038	U	0.038	4570	X	13.0	3.8	X	0.054	8.7	X	0.092	14.8	X	0.20
locatin 4	J1V617	4/16/15	0.95	U	0.95	0.040	U	0.040	4850	X	13.6	3.4	X	0.056	9.4	X	0.097	14.1	X	0.21
location 5	J1V618	4/15/15	0.86	U	0.86	0.043	B	0.036	4690	X	12.4	3.5	X	0.051	8.9	X	0.088	13.4	X	0.19
location 6	J1V619	4/16/15	0.89	U	0.89	0.037	U	0.037	3690	X	12.8	3.1	X	0.053	8.5	X	0.091	11.6	X	0.20
location 7	J1V620	4/16/15	0.97	B	0.94	0.039	U	0.039	5290	X	13.5	8.7	X	0.056	8.3	X	0.096	16.1	X	0.21
location 8	J1V621	4/16/15	3.0		0.88	0.037	U	0.037	5160	X	12.7	3.1	X	0.052	10.6	X	0.45	16.6	X	0.98
location 9	J1V622	4/16/15	0.92	U	0.92	0.038	U	0.038	4130	X	13.2	4.6	X	0.054	8.8	X	0.094	12.2	X	0.20
location 10	J1V623	4/16/15	1.9		0.87	0.037	U	0.037	2190	X	12.6	3.3	X	0.052	5.7	X	0.089	11.8	X	0.19
sidewall, west, 11	J1V624	4/16/15	1.7	B	0.91	1.1		0.038	3840	X	13.1	14.4	X	0.054	7.3	X	0.093	30.0	X	0.20
sidewall, east, 12	J1V625	4/16/15	5.5		1.1	1.3		0.044	4480	X	15.3	43.3	X	0.063	9.8	X	0.11	98.1	X	0.23

Table 06-1. 316-3 Waste Site In-process Sampling Results - Metals.

Sample Location	HEIS Number	Sample Date	Iron			Lead			Lithium			Magnesium			Manganese			Molybdenum		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J1V1D0	10/30/14	19100		8.46	90.6	*DN	1.74	11.3	D	0.432	6150		8.99	286		0.211	1.28		0.211
2	J1V1D1	10/30/14	20100		8.37	66.2	*DN	1.73	11.2	D	0.401	6830		8.9	316		0.209	1.03	B	0.209
3	J1V1D2	10/30/14	22800		8.46	80.6	*DN	1.74	13.3	D	0.437	7800		8.99	337		0.211	1.20		0.211
4	J1V1D3	10/30/14	20800		8.14	25.2	*DN	1.68	10.4	D	0.43	5330		8.65	314		0.203	0.454	B	0.203
5	J1V1D4	10/30/14	13500		11.9	152	*DN	2.45	6.84	D	0.615	13400		12.6	308		0.297	4.11		0.297
6	J1V1D5	10/30/14	18300		8.20	28.3	*DN	1.69	7.96	D	0.409	4820		8.72	298		0.205	0.829	B	0.205
7	J1V1D6	10/30/14	22300		7.98	6.51	*DN	1.65	10.5	D	0.413	4350		8.48	333		0.199	0.209	B	0.199
8	J1V1D7	10/30/14	23300		8.51	5.03	*BDN	1.76	9.77	D	0.387	4480		9.05	352		0.213	0.221	B	0.213
1	J1V408	2/2/15																		
2	J1V409	2/2/15																		
3	J1V410	2/2/15																		
4	J1V411	2/2/15																		
5	J1V412	2/2/15																		
6	J1V413	2/2/15																		
7	J1V414	2/2/15																		
8	J1V415	2/2/15																		
9	J1V416	2/2/15																		
Bottle	J1V467	2/10/15	7440		7.65	1.16		0.315	6.76	DN	0.385	4250		8.13	69.3	*N	0.191	9.66		0.191
1	J1V4T4	3/9/15																		
2	J1V4T5	3/9/15																		
3	J1V4T6	3/9/15																		
4	J1V4T7	3/9/15																		
5	J1V4T8	3/9/15																		
6	J1V4T9	3/9/15																		
7	J1V4V0	3/9/15																		
8	J1V4V1	3/9/15																		
9	J1V4V2	3/9/15																		
10	J1V4V3	3/9/15																		
1, @ -10'	J1V5J9	3/25/15																		
1A, @ -5'	J1V5K0	3/25/15																		
2, @ -5'	J1V5K1	3/25/15																		
2A, @ -10'	J1V5K2	3/25/15																		
3, @ -5'	J1V5K3	3/25/15																		
3A, @ -10'	J1V5K4	3/25/15																		
4, @ -5'	J1V5K5	3/25/15																		
4A, @ -10'	J1V5K6	3/25/15																		
5, @ -5'	J1V5K7	3/25/15																		
5A, @ -10'	J1V5K8	3/25/15																		
6, @ -5'	J1V5K9	3/25/15																		
6A, @ -10'	J1V5L0	3/25/15																		
7, @ -5'	J1V5L1	3/25/15																		
7A, @ -10'	J1V5L2	3/25/15																		
8, @ -5'	J1V5L3	3/25/15																		
8A, @ -10'	J1V5L4	3/25/15																		
4B, @ -15'	J1V5L5	3/25/15																		
7B, @ -15'	J1V5L6	3/25/15																		
location 1	J1V614	4/16/15	15200	X	3.9	5.0		0.28	4.3		0.31	2700	X	3.8	209	X	0.10	0.27	U	0.27
location 2	J1V615	4/16/15	23400	X	3.7	2.1		0.26	3.0		0.29	3400	X	3.6	325	X	0.097	0.25	B	0.25
location 3	J1V616	4/16/15	20000	X	3.5	2.9		0.25	3.7		0.28	3790	X	3.4	250	X	0.092	0.28	B	0.24
locann 4	J1V617	4/16/15	22400	X	3.7	2.4		0.26	3.3		0.29	3370	X	3.6	250	X	0.097	0.25	U	0.25
location 5	J1V618	4/15/15	22100	X	3.3	2.2		0.24	3.1		0.26	3180	X	3.3	241	X	0.088	0.23	U	0.23
location 6	J1V619	4/16/15	17100	X	3.4	2.4		0.24	2.7		0.27	3020	X	3.4	217	X	0.091	0.24	U	0.24
location 7	J1V620	4/16/15	22100	X	3.6	4.5		0.26	6.5		0.29	4240	X	3.6	275	X	0.096	0.25	U	0.25
location 8	J1V621	4/16/15	26100	X	3.4	1.7	B	1.2	2.3		0.27	3680	X	3.3	292	X	0.090	0.23	U	0.23
location 9	J1V622	4/16/15	20900	X	3.6	2.3		0.25	3.4		0.28	3340	X	3.5	231	X	0.094	0.24	U	0.24
location 10	J1V623	4/16/15	13100	X	3.4	1.5		0.24	2.1	B	0.27	2400	X	3.3	146	X	0.089	0.23	U	0.23
sidewall, west; 11	J1V624	4/16/15	17100	X	3.5	9.7		0.25	4.2		0.28	3100	X	3.4	262	X	0.093	0.24	U	0.24
sidewall, east; 12	J1V625	4/16/15	17100	X	4.1	42.3		0.29	11		0.32	3620	X	4.0	314	X	0.11	1.0	B	0.28

Table 06-1. 316-3 Waste Site In-process Sampling Results - Metals.

Sample Location	HEIS Number	Sample Date	Nickel			Potassium			Selenium			Silicon			Silver			Sodium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J1V1D0	10/30/14	475	*	0.159	1020	N	6.77	0.356	DU	0.356	2480		1.59	42.0	*	0.106	237		7.40
2	J1V1D1	10/30/14	338	*	0.157	992	N	6.70	0.330	DU	0.330	2840		1.57	39.4	*	0.105	303		7.33
3	J1V1D2	10/30/14	401	*	0.159	935	N	6.77	0.361	DU	0.361	2780		1.59	40.8	*	0.106	627		7.40
4	J1V1D3	10/30/14	99.1	*	0.153	1320	N	6.51	0.354	DU	0.354	1500		1.53	19.2	*	0.102	291		7.12
5	J1V1D4	10/30/14	532	*	0.223	756	N	9.52	0.508	DU	0.508	11200	D	11.2	206	*D	0.744	662		10.4
6	J1V1D5	10/30/14	90.3	*	0.154	981	N	6.56	0.338	DU	0.338	3340		1.54	35.3	*	0.103	251		7.18
7	J1V1D6	10/30/14	14.2	*	0.15	1290	N	6.38	0.341	DU	0.341	581		1.5	1.2	*	0.0997	177		6.98
8	J1V1D7	10/30/14	17.2	*	0.16	1190	N	6.81	0.319	DU	0.319	603		1.6	1.82	*	0.106	196		7.45
1	J1V408	2/2/15																		
2	J1V409	2/2/15																		
3	J1V410	2/2/15																		
4	J1V411	2/2/15																		
5	J1V412	2/2/15																		
6	J1V413	2/2/15																		
7	J1V414	2/2/15																		
8	J1V415	2/2/15																		
9	J1V416	2/2/15																		
Bottle	J1V467	2/10/15	29.3		0.143	2130		6.12	2.88	DN	0.317	1790	DN	14.3	0.0956	U	0.0956	2760		6.69
1	J1V4T4	3/9/15																		
2	J1V4T5	3/9/15																		
3	J1V4T6	3/9/15																		
4	J1V4T7	3/9/15																		
5	J1V4T8	3/9/15																		
6	J1V4T9	3/9/15																		
7	J1V4V0	3/9/15																		
8	J1V4V1	3/9/15																		
9	J1V4V2	3/9/15																		
10	J1V4V3	3/9/15																		
1.@ -10'	J1V5J9	3/25/15																		
1A. @ -5'	J1V5K0	3/25/15																		
2. @ -5'	J1V5K1	3/25/15																		
2A. @ -10'	J1V5K2	3/25/15																		
3. @ -5'	J1V5K3	3/25/15																		
3A. @ -10'	J1V5K4	3/25/15																		
4. @ -5'	J1V5K5	3/25/15																		
4A. @ -10'	J1V5K6	3/25/15																		
5. @ -5'	J1V5K7	3/25/15																		
5A. @ -10'	J1V5K8	3/25/15																		
6. @ -5'	J1V5K9	3/25/15																		
6A. @ -10'	J1V5L0	3/25/15																		
7. @ -5'	J1V5L1	3/25/15																		
7A. @ -10'	J1V5L2	3/25/15																		
8. @ -5'	J1V5L3	3/25/15																		
8A. @ -10'	J1V5L4	3/25/15																		
4B. @ -15'	J1V5L5	3/25/15																		
7B. @ -15'	J1V5L6	3/25/15																		
location 1	J1V614	4/16/15	6.4	X	0.13	570		42.1	0.88	U	0.88	156	N	5.8	0.16	U	0.16	192		60.6
location 2	J1V615	4/16/15	6.5	X	0.12	464		39.7	0.83	UN	0.83	136	N	5.5	0.16	U	0.16	245	M	57.2
location 3	J1V616	4/16/15	7.4	X	0.11	669		37.9	0.79	U	0.79	136	N	5.2	0.15	U	0.15	401		54.5
locatin 4	J1V617	4/16/15	6.5	X	0.12	632		39.6	0.83	U	0.83	150	N	5.5	0.15	U	0.15	319		57.0
location 5	J1V618	4/15/15	6.0	X	0.11	479		36.0	0.76	U	0.76	123	N	5.0	0.14	U	0.14	202		51.8
location 6	J1V619	4/16/15	6.4	X	0.11	622		37.2	0.78	U	0.78	128	N	5.1	0.14	U	0.14	269		53.5
location 7	J1V620	4/16/15	9.0	X	0.12	1910		39.4	0.83	U	0.83	217	N	5.4	0.15	U	0.15	240		56.7
location 8	J1V621	4/16/15	6.7	X	0.11	384		36.9	0.77	U	0.77	104	N	5.1	0.14	U	0.14	306		53.1
location 9	J1V622	4/16/15	6.0	X	0.12	534		38.4	0.80	U	0.80	148	N	5.3	0.15	U	0.15	197		55.2
location 10	J1V623	4/16/15	7.4	X	0.11	335		36.5	0.77	U	0.77	121	N	5.0	0.14	U	0.14	169		52.6
sidewall, west: 11	J1V624	4/16/15	11.1	X	0.11	804		38.2	0.80	U	0.80	174	N	5.3	23.8		0.15	175		55.0
sidewall, east: 12	J1V625	4/16/15	15.8	X	0.13	1340		44.4	0.93	U	0.93	238	N	6.1	128		0.17	226		63.9

Table 06-1. 316-3 Waste Site In-process Sampling Results - Metals.

Sample Location	HEIS Number	Sample Date	Strontium			Tin			Uranium			Vanadium			Zinc			Zirconium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J1V1D0	10/30/14				12.5	D	1.59	826	D	0.0143	62.9	D	0.529	106	D	2.11	159	D	0.54
2	J1V1D1	10/30/14				14.3	D	1.57	789	D	0.0132	58.5	D	0.523	96.6	D	2.09	85.1	D	0.10
3	J1V1D2	10/30/14				9.29	D	1.59	986	D	0.0144	75.5	D	0.529	113	D	2.11	89.6	D	0.109
4	J1V1D3	10/30/14				4.21	BD	1.53	299	D	0.0142	61.9	D	0.509	66.6	D	2.03	169	D	0.269
5	J1V1D4	10/30/14				37.4	D	2.23	1990	D	0.0508	43.5	D	0.744	226	D	2.97	83.2	D	0.154
6	J1V1D5	10/30/14				5.83	D	1.54	328	D	0.0135	59.4	D	0.513	78.8	D	2.05	125	D	0.256
7	J1V1D6	10/30/14				1.5	DU	1.5	17.6	D	0.0136	66.2	D	0.499	65.0	D	1.99	40.8	D	0.103
8	J1V1D7	10/30/14				1.6	DU	1.6	13.4	D	0.0128	67.2	D	0.532	51.3	D	2.13	45.7	D	0.0968
1	J1V408	2/2/15																		
2	J1V409	2/2/15																		
3	J1V410	2/2/15																		
4	J1V411	2/2/15																		
5	J1V412	2/2/15																		
6	J1V413	2/2/15																		
7	J1V414	2/2/15																		
8	J1V415	2/2/15																		
9	J1V416	2/2/15																		
Bottle	J1V467	2/10/15	64.1		0.096	2.87	DU	2.87	4.84	D	0.0127	26.6	N	0.0956	40.7		0.382	5.27	D	0.0962
1	J1V4T4	3/9/15																		
2	J1V4T5	3/9/15																		
3	J1V4T6	3/9/15																		
4	J1V4T7	3/9/15																		
5	J1V4T8	3/9/15																		
6	J1V4T9	3/9/15																		
7	J1V4V0	3/9/15																		
8	J1V4V1	3/9/15																		
9	J1V4V2	3/9/15																		
10	J1V4V3	3/9/15																		
1. @ -10'	J1V5J9	3/25/15																		
1A. @ -5'	J1V5K0	3/25/15																		
2. @ -5'	J1V5K1	3/25/15																		
2A. @ -10'	J1V5K2	3/25/15																		
3. @ -5'	J1V5K3	3/25/15																		
3A. @ -10'	J1V5K4	3/25/15																		
4. @ -5'	J1V5K5	3/25/15																		
4A. @ -10'	J1V5K6	3/25/15																		
5. @ -5'	J1V5K7	3/25/15																		
5A. @ -10'	J1V5K8	3/25/15																		
6. @ -5'	J1V5K9	3/25/15																		
6A. @ -10'	J1V5L0	3/25/15																		
7. @ -5'	J1V5L1	3/25/15																		
7A. @ -10'	J1V5L2	3/25/15																		
8. @ -5'	J1V5L3	3/25/15																		
8A. @ -10'	J1V5L4	3/25/15																		
4B. @ -15'	J1V5L5	3/25/15																		
7B. @ -15'	J1V5L6	3/25/15																		
location 1	J1V614	4/16/15	14.1	X	0.037	1.3	B	0.94	4.4		0.0015	34.2	X	0.097	28.3	X	0.41	15.3	X	0.36
location 2	J1V615	4/16/15	18.8	X	0.035	1.2	BN	0.88	2.6		0.0015	62.7	X	0.091	42.1	X	0.39	23.9	X	0.34
location 3	J1V616	4/16/15	18.5	X	0.033	1.2	B	0.84	4.1		0.0015	46.5	X	0.087	35.7	X	0.37	18.7	X	0.33
locatin 4	J1V617	4/16/15	23.8	X	0.035	1.1	B	0.88	1.5		0.0014	57.7	X	0.091	41.3	X	0.38	22.1	X	0.34
location 5	J1V618	4/15/15	23.2	X	0.032	1.2	B	0.80	0.85		0.0015	60.9	X	0.083	39.3	X	0.35	20.7	X	0.31
location 6	J1V619	4/16/15	16.1	X	0.033	0.91	B	0.83	1.5		0.0015	40.2	X	0.085	31.8	X	0.36	18.2	X	0.32
location 7	J1V620	4/16/15	24.8	X	0.035	1.5	B	0.88	0.95		0.0016	49.9	X	0.090	41.9	X	0.38	27.1	X	0.34
location 8	J1V621	4/16/15	19.3	X	0.032	4.1	U	4.1	2.7		0.0016	82.4	X	0.42	44.5	X	0.36	26.9	X	0.32
location 9	J1V622	4/16/15	16.6	X	0.034	1.1	B	0.85	1.2		0.0015	49.3	X	0.088	36.4	X	0.37	25.1	X	0.33
location 10	J1V623	4/16/15	10.0	X	0.032	1.0	B	0.81	5.3		0.0015	29.5	X	0.084	20.8	X	0.35	15.1	X	0.32
sidewall, west; 11	J1V624	4/16/15	17.0	X	0.034	3.8	B	0.85	11.7		0.0015	38.3	X	0.088	76.0	X	0.37	104	X	0.33
sidewall, east; 12	J1V625	4/16/15	29.2	X	0.039	16.6		0.99	14.1		0.0017	41.9	X	0.10	129	X	0.43	315	X	0.38

Table 06-1. 316-3 Waste Site In-process Sampling Results - Metals.

Sample Location	HEIS Number	Sample Date	Hexavalent Chromium			Mercury		
			mg/kg	Q	PQL	mg/kg	Q	PQL
1	J1V1D0	10/30/14	4.55		0.133	2.82	*D	0.0884
2	J1V1D1	10/30/14	5.26		0.133	5.23	*D	0.0861
3	J1V1D2	10/30/14	0.123	U	0.123	3.75	*D	0.0845
4	J1V1D3	10/30/14	7.98		0.125	1.54	*D	0.0864
5	J1V1D4	10/30/14	5.20		0.191	12.2	*D	0.323
6	J1V1D5	10/30/14	0.516		0.128	1.23	*D	0.040
7	J1V1D6	10/30/14	0.341	B	0.122	0.244	*	0.0042
8	J1V1D7	10/30/14	0.352	B	0.126	0.302	*	0.0041
1	J1V408	2/2/15	1.07		0.129			
2	J1V409	2/2/15	0.414	B	0.132			
3	J1V410	2/2/15	0.811		0.129			
4	J1V411	2/2/15	0.309	B	0.132			
5	J1V412	2/2/15	0.205	B	0.131			
6	J1V413	2/2/15	0.202	B	0.129			
7	J1V414	2/2/15	0.994		0.133			
8	J1V415	2/2/15	7.21		0.153			
9	J1V416	2/2/15	0.775		0.141			
Bottle	J1V467	2/10/15						
1	J1V4T4	3/9/15	0.648		0.155			
2	J1V4T5	3/9/15	0.498		0.155			
3	J1V4T6	3/9/15	0.745		0.155			
4	J1V4T7	3/9/15	3.30		0.155			
5	J1V4T8	3/9/15	0.465		0.155			
6	J1V4T9	3/9/15	0.642		0.155			
7	J1V4V0	3/9/15	1.67		0.155			
8	J1V4V1	3/9/15	0.838		0.155			
9	J1V4V2	3/9/15	0.155	U	0.155			
10	J1V4V3	3/9/15	0.731		0.155			
1, @ -10'	J1V5J9	3/25/15	0.214		0.155			
1A, @ -5'	J1V5K0	3/25/15	0.282		0.155			
2, @ -5'	J1V5K1	3/25/15	0.358		0.155			
2A, @ -10'	J1V5K2	3/25/15	0.155	U	0.155			
3, @ -5'	J1V5K3	3/25/15	0.335		0.155			
3A, @ -10'	J1V5K4	3/25/15	0.308		0.155			
4, @ -5'	J1V5K5	3/25/15	0.191		0.155			
4A, @ -10'	J1V5K6	3/25/15	0.168		0.155			
5, @ -5'	J1V5K7	3/25/15	0.264		0.155			
5A, @ -10'	J1V5K8	3/25/15	0.482		0.155			
6, @ -5'	J1V5K9	3/25/15	0.457		0.155			
6A, @ -10'	J1V5L0	3/25/15	0.197		0.155			
7, @ -5'	J1V5L1	3/25/15	0.167		0.155			
7A, @ -10'	J1V5L2	3/25/15	0.155	U	0.155			
8, @ -5'	J1V5L3	3/25/15	0.507		0.155			
8A, @ -10'	J1V5L4	3/25/15	0.417		0.155			
4B, @ -15'	J1V5L5	3/25/15	0.155	U	0.155			
7B, @ -15'	J1V5L6	3/25/15	0.235		0.155			
location 1	J1V614	4/16/15				0.10		0.0061
location 2	J1V615	4/16/15				0.029		0.0064
location 3	J1V616	4/16/15				0.094		0.0059
locatin 4	J1V617	4/16/15				0.0058	U	0.0058
location 5	J1V618	4/15/15				0.062		0.006
location 6	J1V619	4/16/15				0.0062	U	0.0062
location 7	J1V620	4/16/15				0.048		0.0062
location 8	J1V621	4/16/15				0.011	B	0.0064
location 9	J1V622	4/16/15				0.041		0.0059
location 10	J1V623	4/16/15				0.063		0.006
sidewall, west; 11	J1V624	4/16/15				1.4		0.032
sidewall, east; 12	J1V625	4/16/15				3.5		0.065

Table 06-1. 316-3 Waste Site In-process Sampling Results -TCLP Metals.

Location	HEIS Number	Sample Date	Arsenic			Barium			Cadmium			Chromium		
			TCLP			TCLP			TCLP			TCLP		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
1	J1V1D0	10/30/14	0.05	U	0.05	1.31		0.01	0.01	U	0.01	0.0613		0.01
2	J1V1D1	10/30/14	0.05	U	0.05	1.05		0.01	0.01	U	0.01	0.0909		0.01
3	J1V1D2	10/30/14	0.05	U	0.05	1.04		0.01	0.01	U	0.01	0.101		0.01
4	J1V1D3	10/30/14	0.05	U	0.05	0.809		0.01	0.01	U	0.01	0.085		0.01
5	J1V1D4	10/30/14	0.05	U	0.05	1.21		0.01	0.01	U	0.01	0.038	B	0.01
6	J1V1D5	10/30/14	0.00444	U	0.05	0.926		0.01	0.01	U	0.01	0.108		0.01

Location	HEIS Number	Sample Date	Lead			Mercury			Selenium			Silver		
			TCLP			TCLP			TCLP			TCLP		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
1	J1V1D0	10/30/14	0.033	U	0.03	7E-04	U	0.00067	0.06	U	0.06	0.00299	U	0.01
2	J1V1D1	10/30/14	0.033	U	0.03	7E-04	U	0.00067	0.06	U	0.06	0.0051	U	0.01
3	J1V1D2	10/30/14	0.033	U	0.03	7E-04	U	0.00067	0.06	U	0.06	0.00367	U	0.01
4	J1V1D3	10/30/14	0.0108	U	0.03	7E-04	U	0.00067	0.06	U	0.06	0.00254	U	0.01
5	J1V1D4	10/30/14	0.033	U	0.03	7E-04	U	0.00067	0.07	B	0.06	0.00308	U	0.01
6	J1V1D5	10/30/14	0.00714	U	0.03	7E-04	U	0.00067	0.06	U	0.06	0.00224	U	0.01

Table 06-1. 316-3 Waste Site In-rocess Sampling Results - Genchem, TPH, Physical.

Sample Location	HEIS Number	Sample Date	Cyanide			Sulfide			TPH-Diesel Ext.			TPH-Diesel			Percent moisture		
			mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	%	Q	PQL
1	J1V1D0	10/30/14															
2	J1V1D1	10/30/14															
3	J1V1D2	10/30/14															
4	J1V1D3	10/30/14															
5	J1V1D4	10/30/14															
6	J1V1D5	10/30/14															
7	J1V1D6	10/30/14															
8	J1V1D7	10/30/14															
1	J1V408	2/2/15															
2	J1V409	2/2/15															
3	J1V410	2/2/15															
4	J1V411	2/2/15															
5	J1V412	2/2/15															
6	J1V413	2/2/15															
7	J1V414	2/2/15															
8	J1V415	2/2/15															
9	J1V416	2/2/15															
Bottle	J1V467	2/10/15	0.0549	U	0.0549	8.35	U	8.35									
1	J1V4T4	3/9/15															
2	J1V4T5	3/9/15															
3	J1V4T6	3/9/15															
4	J1V4T7	3/9/15															
5	J1V4T8	3/9/15															
6	J1V4T9	3/9/15															
7	J1V4V0	3/9/15															
8	J1V4V1	3/9/15															
9	J1V4V2	3/9/15															
10	J1V4V3	3/9/15															
1,@ -10'	J1V5J9	3/25/15															
1A, @ -5'	J1V5K0	3/25/15															
2, @ -5'	J1V5K1	3/25/15															
2A, @ -10'	J1V5K2	3/25/15															
3, @ -5'	J1V5K3	3/25/15															
3A, @ -10'	J1V5K4	3/25/15															
4, @ -5'	J1V5K5	3/25/15															
4A, @ -10'	J1V5K6	3/25/15															
5, @ -5'	J1V5K7	3/25/15															
5A, @ -10'	J1V5K8	3/25/15															
6, @ -5'	J1V5K9	3/25/15															
6A, @ -10'	J1V5L0	3/25/15															
7, @ -5'	J1V5L1	3/25/15															
7A, @ -10'	J1V5L2	3/25/15															
8, @ -5'	J1V5L3	3/25/15															
8A, @ -10'	J1V5L4	3/25/15															
4B, @ -15'	J1V5L5	3/25/15															
7B, @ -15'	J1V5L6	3/25/15															
location 1	J1V614	4/16/15							1000	U	1000	1700	J	700	7.3		0.10
location 2	J1V615	4/16/15							1000	U	1000	1000	J	700	5.3		0.10
location 3	J1V616	4/16/15							990	U	990	1200	J	680	4.2		0.10
locatin 4	J1V617	4/16/15							1000	U	1000	1400	J	680	2.3		0.10
location 5	J1V618	4/15/15							980	U	980	1300	J	670	3.6		0.10
location 6	J1V619	4/16/15							990	U	990	1100	J	670	4.9		0.10
location 7	J1V620	4/16/15							1100	U	1100	1500	J	760	9.4		0.10
location 8	J1V621	4/16/15							990	U	990	1300	J	680	5.8		0.10
location 9	J1V622	4/16/15							1000	U	1000	1300	J	700	4.6		0.10
location 10	J1V623	4/16/15							1100	U	1100	1200	J	720	5.7		0.10
sidewall, west; 11	J1V624	4/16/15							26000		1100	13000		730	7.5		0.10
sidewall, east; 12	J1V625	4/16/15							97000		1100	44000		760	12	M	0.10

Table 06-1. 316-3 Waste Site In-process Sampling Results - Organics.

LOCATION		J1V467, Bottle		
CONSTITUENT	CLASS	02/10/15		
		ug/kg	Q	PQL
Acenaphthene	PAH			
Acenaphthylene	PAH			
Anthracene	PAH			
Benzo(a)anthracene	PAH			
Benzo(a)pyrene	PAH			
Benzo(b)fluoranthene	PAH			
Benzo(ghi)perylene	PAH			
Benzo(k)fluoranthene	PAH			
Chrysene	PAH			
Dibenz[a,h]anthracene	PAH			
Fluoranthene	PAH			
Fluorene	PAH			
Indeno(1,2,3-cd)pyrene	PAH			
Naphthalene	PAH			
Phenanthrene	PAH			
Pyrene	PAH			
Aroclor-1016	PCB	5.54	DU	5.54
Aroclor-1221	PCB	5.54	DU	5.54
Aroclor-1232	PCB	5.54	DU	5.54
Aroclor-1242	PCB	5.54	DU	5.54
Aroclor-1248	PCB	5.54	DU	5.54
Aroclor-1254	PCB	5.54	DU	5.54
Aroclor-1260	PCB	5.54	DU	5.54
Aroclor-1262	PCB	5.54	DU	5.54
Aroclor-1268	PCB	5.54	DU	5.54
1,2,4-Trichlorobenzene	SVOA	99.6	U	99.6
1,2-Dichlorobenzene	SVOA	99.6	U	99.6
1,3-Dichlorobenzene	SVOA	99.6	U	99.6
1,4-Dichlorobenzene	SVOA	99.6	U	99.6
2,4,5-Trichlorophenol	SVOA	99.6	U	99.6
2,4,6-Trichlorophenol	SVOA	99.6	U	99.6
2,4-Dichlorophenol	SVOA	99.6	U	99.6
2,4-Dimethylphenol	SVOA	99.6	U	99.6
2,4-Dinitrophenol	SVOA	99.6	U	99.6
2,4-Dinitrotoluene	SVOA	99.6	U	99.6
2,6-Dinitrotoluene	SVOA	99.6	U	99.6
2-Chloronaphthalene	SVOA	9.96	U	9.96
2-Chlorophenol	SVOA	99.6	U	99.6
2-Methylnaphthalene	SVOA	9.96	U	9.96
2-Methylphenol (cresol, o-)	SVOA	99.6	U	99.6
2-Nitroaniline	SVOA	110	U	110
2-Nitrophenol	SVOA	99.6	U	99.6
3,3'-Dichlorobenzidine	SVOA	99.6	U	99.6
3+4 Methylphenol (cresol, m+p)	SVOA	99.6	U	99.6
3-Nitroaniline	SVOA	99.6	U	99.6
4,6-Dinitro-2-methylphenol	SVOA	99.6	U	99.6
4-Bromophenylphenyl ether	SVOA	99.6	U	99.6
4-Chloro-3-methylphenol	SVOA	133	U	133
4-Chloroaniline	SVOA	99.6	U	99.6
4-Chlorophenylphenyl ether	SVOA	99.6	U	99.6
4-Nitroaniline	SVOA	99.6	U	99.6
4-Nitrophenol	SVOA	99.6	U	99.6
Acenaphthene	SVOA	9.96	U	9.96
Acenaphthylene	SVOA	9.96	U	9.96
Anthracene	SVOA	9.96	U	9.96
Benzo(a)anthracene	SVOA	9.96	U	9.96
Benzo(a)pyrene	SVOA	9.96	U	9.96
Benzo(b)fluoranthene	SVOA	9.96	U	9.96
Benzo(ghi)perylene	SVOA	9.96	U	9.96
Benzo(k)fluoranthene	SVOA	9.96	U	9.96
Bis(2-chloro-1-methylethyl)ether	SVOA	99.6	U	99.6
Bis(2-Chloroethoxy)methane	SVOA	99.6	U	99.6
Bis(2-chloroethyl) ether	SVOA	99.6	U	99.6

LOCATION		J1V467, Bottle		
CONSTITUENT	CLASS	02/10/15		
		ug/kg	Q	PQL
Bis(2-ethylhexyl) phthalate	SVOA	99.6	U	99.6
Butylbenzylphthalate	SVOA	99.6	U	99.6
Carbazole	SVOA	9.96	U	9.96
Chrysene	SVOA	9.96	U	9.96
Dibenz[a,h]anthracene	SVOA	9.96	U	9.96
Dibenzofuran	SVOA	99.6	U	99.6
Diethyl phthalate	SVOA	99.6	U	99.6
Dimethyl phthalate	SVOA	99.6	U	99.6
Di-n-butylphthalate	SVOA	99.6	U	99.6
Di-n-octylphthalate	SVOA	99.6	U	99.6
Diphenylamine	SVOA	99.6	U	99.6
Fluoranthene	SVOA	9.96	U	9.96
Fluorene	SVOA	9.96	U	9.96
Hexachlorobenzene	SVOA	99.6	U	99.6
Hexachlorobutadiene	SVOA	99.6	U	99.6
Hexachlorocyclopentadiene	SVOA	99.6	U	99.6
Hexachloroethane	SVOA	99.6	U	99.6
Indeno(1,2,3-cd)pyrene	SVOA	9.96	U	9.96
Isophorone	SVOA	99.6	U	99.6
Naphthalene	SVOA	9.96	U	9.96
Nitrobenzene	SVOA	99.6	U	99.6
N-Nitroso-di-n-dipropylamine	SVOA	99.6	U	99.6
Pentachlorophenol	SVOA	99.6	U	99.6
Phenanthrene	SVOA	9.96	U	9.96
Phenol	SVOA	99.6	U	99.6
Pyrene	SVOA	9.96	U	9.96
Tributyl phosphate	SVOA	99.6	U	99.6
1,1,1-Trichloroethane	VOA	0.30	U	0.30
1,1,2,2-Tetrachloroethane	VOA	0.30	U	0.30
1,1,2-Trichloroethane	VOA	0.30	U	0.30
1,1-Dichloroethane	VOA	0.30	U	0.30
1,1-Dichloroethene	VOA	0.30	U	0.30
1,2-Dichloroethane	VOA	0.30	U	0.30
1,2-Dichloroethene(Total)	VOA	0.30	U	0.30
1,2-Dichloropropane	VOA	0.30	U	0.30
2-Butanone	VOA	40.1		3.0
2-Hexanone	VOA	3.0	U	3.0
4-Methyl-2-Pentanone	VOA	4.51	J	3.0
Acetone	VOA	126		3.0
Benzene	VOA	0.30	U	0.30
Bromodichloromethane	VOA	0.30	U	0.30
Bromoform	VOA	0.30	U	0.30
Bromomethane	VOA	0.30	U	0.30
Carbon disulfide	VOA	1.6	U	1.6
Carbon tetrachloride	VOA	0.30	U	0.30
Chlorobenzene	VOA	0.30	U	0.30
Chloroethane	VOA	0.30	U	0.30
Chloroform	VOA	0.30	U	0.30
Chloromethane	VOA	0.30	U	0.30
cis-1,2-Dichloroethylene	VOA	0.30	U	0.30
cis-1,3-Dichloropropene	VOA	0.30	U	0.30
Dibromochloromethane	VOA	0.30	U	0.30
Ethylbenzene	VOA	0.30	U	0.30
Methylenechloride	VOA	1.6	U	1.6
Styrene	VOA	0.43	J	0.30
Tetrachloroethene	VOA	0.77	J	0.30
Toluene	VOA	0.66	J	0.30
trans-1,2-Dichloroethylene	VOA	0.30	U	0.30
trans-1,3-Dichloropropene	VOA	0.30	U	0.30
Trichloroethene	VOA	0.30	U	0.30
Vinyl chloride	VOA	0.30	U	0.30
Xylenes (total)	VOA	0.37	J	0.30

Table 06-1. 316-3 Waste Site In-process Sampling Results - Organics.

LOCATION		J1V614			J1V615			J1V616			J1V617			J1V618			J1V619		
CONSTITUENT	CLASS	04/16/15			04/16/15			04/16/15			04/16/15			04/15/15			04/16/15		
		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	10	U	10	10	U	10	10	U	10	9.6	U	9.6
Acenaphthylene	PAH	9.5	U	9.5	9.4	U	9.4	9.2	U	9.2	9.1	U	9.1	9.3	U	9.3	8.7	U	8.7
Anthracene	PAH	3.2	U	3.2	3.2	U	3.2	3.1	U	3.1	3.1	U	3.1	3.1	U	3.1	2.9	U	2.9
Benzo(a)anthracene	PAH	3.4	U	3.4	3.3	U	3.3	3.2	U	3.2	3.2	U	3.2	3.3	U	3.3	3.1	U	3.1
Benzo(a)pyrene	PAH	6.8	U	6.8	6.7	U	6.7	6.5	U	6.5	6.5	U	6.5	6.6	U	6.6	6.2	U	6.2
Benzo(b)fluoranthene	PAH	4.4	U	4.4	4.4	U	4.4	4.3	U	4.3	4.2	U	4.2	4.3	U	4.3	4.1	U	4.1
Benzo(ghi)perylene	PAH	7.6	U	7.6	7.5	U	7.5	7.3	U	7.3	7.3	U	7.3	7.4	U	7.4	6.9	U	6.9
Benzo(k)fluoranthene	PAH	4.2	U	4.2	4.1	U	4.1	4.0	U	4.0	4.0	U	4.0	4.1	U	4.1	3.8	U	3.8
Chrysene	PAH	5.1	U	5.1	5	U	5	4.9	U	4.9	4.9	U	4.9	5.0	U	5.0	4.7	U	4.7
Dibenz[a,h]anthracene	PAH	12	U	12	11	U	11	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	13	U	13
Fluorene	PAH	5.6	U	5.6	5.5	U	5.5	5.4	U	5.4	5.3	U	5.3	5.4	U	5.4	5.1	U	5.1
Indeno(1,2,3-cd)pyrene	PAH	13	U	13	13	U	13	12	U	12	12	U	12	12	U	12	12	U	12
Naphthalene	PAH	13	U	13	13	U	13	12	U	12	12	U	12	12	U	12	12	U	12
Phenanthrene	PAH	13	U	13	13	U	13	12	U	12	12	U	12	12	U	12	12	U	12
Pyrene	PAH	13	U	13	13	U	13	12	U	12	12	U	12	12	U	12	12	U	12
Aroclor-1016	PCB	2.9	U	2.9	2.8	U	2.8	2.8	U	2.8	2.7	U	2.7	2.8	U	2.8	2.7	U	2.7
Aroclor-1221	PCB	8.5	U	8.5	8.0	U	8.0	8.1	U	8.1	7.9	U	7.9	8.0	U	8.0	7.8	U	7.8
Aroclor-1232	PCB	2.1	U	2.1	2.0	U	2.0	2.0	U	2.0	2.0	U	2.0	2.0	U	2.0	1.9	U	1.9
Aroclor-1242	PCB	5.0	U	5.0	4.6	U	4.6	4.7	U	4.7	4.6	U	4.6	4.7	U	4.7	4.5	U	4.5
Aroclor-1248	PCB	5.0	U	5.0	4.6	U	4.6	4.7	U	4.7	4.6	U	4.6	4.7	U	4.7	4.5	U	4.5
Aroclor-1254	PCB	2.8	U	2.8	2.6	U	2.6	6.3	J	2.6	2.6	U	2.6	2.6	U	2.6	2.5	U	2.5
Aroclor-1260	PCB	2.8	U	2.8	2.6	U	2.6	2.6	U	2.6	2.6	U	2.6	2.6	U	2.6	2.5	U	2.5

LOCATION		J1V620			J1V621			J1V622			J1V623			J1V624			J1V625		
CONSTITUENT	CLASS	04/16/15			04/16/15			04/16/15			04/16/15			04/16/15			04/16/15		
		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	10	U	10	10	U	10	11	U	11	11	U	11
Acenaphthylene	PAH	9.5	U	9.5	9	U	9	9.2	U	9.2	9.3	U	9.3	9.6	U	9.6	9.7	U	9.7
Anthracene	PAH	3.2	U	3.2	3	U	3	3.1	U	3.1	3.1	U	3.1	3.2	U	3.2	3.3	U	3.3
Benzo(a)anthracene	PAH	3.4	U	3.4	3.2	U	3.2	3.2	U	3.2	3.3	U	3.3	3.4	U	3.4	3.4	U	3.4
Benzo(a)pyrene	PAH	6.7	U	6.7	6.4	U	6.4	6.5	U	6.5	6.6	U	6.6	6.8	U	6.8	6.9	U	6.9
Benzo(b)fluoranthene	PAH	4.4	U	4.4	4.2	U	4.2	4.3	U	4.3	4.3	U	4.3	11	JX	4.5	18	X	4.5
Benzo(ghi)perylene	PAH	7.6	U	7.6	7.2	U	7.2	7.3	U	7.3	7.4	U	7.4	7.7	U	7.7	7.7	U	7.7
Benzo(k)fluoranthene	PAH	4.1	U	4.1	3.9	U	3.9	4.0	U	4.0	4.1	U	4.1	4.2	U	4.2	4.2	U	4.2
Chrysene	PAH	5.1	U	5.1	4.8	U	4.8	4.9	U	4.9	5.0	U	5.0	5.1	U	5.1	5.2	U	5.2
Dibenz[a,h]anthracene	PAH	12	U	12	11	U	11	11	U	11	11	U	11	12	U	12	12	U	12
Fluoranthene	PAH	14	U	14	13	U	13	13	U	13	13	U	13	14	U	14	14	U	14
Fluorene	PAH	5.6	U	5.6	5.3	U	5.3	5.4	U	5.4	5.4	U	5.4	5.6	U	5.6	5.7	U	5.7
Indeno(1,2,3-cd)pyrene	PAH	13	U	13	12	U	12	12	U	12	12	U	12	13	U	13	13	U	13
Naphthalene	PAH	13	U	13	12	U	12	12	U	12	12	U	12	13	U	13	13	U	13
Phenanthrene	PAH	13	U	13	12	U	12	12	U	12	12	U	12	13	U	13	13	U	13
Pyrene	PAH	13	U	13	12	U	12	12	U	12	12	U	12	13	U	13	13	UN	13
Aroclor-1016	PCB	2.9	U	2.9	2.7	U	2.7	2.7	U	2.7	2.8	U	2.8	300	UD	300	1200	UD	1200
Aroclor-1221	PCB	8.5	U	8.5	7.9	U	7.9	7.8	U	7.8	8.0	U	8.0	860	UD	860	3500	UD	3500
Aroclor-1232	PCB	2.1	U	2.1	2.0	U	2.0	2.0	U	2.0	2.0	U	2.0	210	UD	210	860	UD	860
Aroclor-1242	PCB	4.9	U	4.9	4.6	U	4.6	4.5	U	4.5	4.6	U	4.6	500	UD	500	2000	UD	2000
Aroclor-1248	PCB	4.9	U	4.9	4.6	U	4.6	4.5	U	4.5	4.6	U	4.6	5000	D	500	11000	D	2000
Aroclor-1254	PCB	2.8	U	2.8	2.6	U	2.6	2.5	U	2.5	2.6	U	2.6	280	UD	280	1100	UD	1100
Aroclor-1260	PCB	2.8	U	2.8	2.6	U	2.6	2.5	U	2.5	2.6	U	2.6	280	UD	280	1100	UD	1100

APPENDIX B

CALCULATIONS

APPENDIX B

CALCULATIONS

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

300-263 and 316-3 Waste Site Cleanup Verification 95% UCL Calculations, 0300X-CA-V0230, Rev. 0, Washington Closure Hanford, Richland, Washington B-3

300-263 and 316-3 Complex Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculations, 0300X-CA-V0231, Rev. 0, Washington Closure Hanford, Richland, Washington B-41

300-263 and 316-3 Complex Waste Site Radionuclide Sum of Fractions Calculations, 0300X-CA-V0232, Rev. 0, Washington Closure Hanford, Richland, Washington B-47

DISCLAIMER FOR CALCULATIONS

The calculations 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.

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 300 Area Closure Operations **Job No. 14655**

Area: 300

Discipline: Environmental *Calculation No: 0300X-CA-V0230

Subject: 300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL 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 = 16 Attm. 1 = 19 Total = 36	J. D. Skoglie	T. Q. Howell	R. J. Nielson	S. G. Wilkinson	9/2/15

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 J. D. Skoglie	**Date** 06/24/15	**Calc. No.** 0300X-CA-V0230	**Rev. No.** 0
Project 300 Area Closure Operations	**Job No.** 14655	**Checked** T. Q. Howell	**Date** 06/24/15
Subject 300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations			**Sheet No.** 1 of 16

Summary

Purpose:
The calculation provides documentation to support the calculation of the 95% upper confidence limit (UCL) values to evaluate compliance with cleanup standards for waste sites included in the 300 Area Final ROD (EPA 2013a). ProUCL 5.0 (EPA 2013b) software was used for all calculations.

Table of Contents:
Sheets 1 to 5 - Calculation Sheet Summary
Sheets 6 to 11- Calculation Sheet Verification Data - SZ and DZ
Sheet 12 - Calculation Sheet -Benzo(a)pyrene Toxic Equivalent Concentration
Sheets 13 to 16 - Calculation Sheet Split and Duplicate Analysis SZ and DZ
Attachment 1 - 300-263 and 316-3 Waste Sites Verification Sampling Results (19 sheets)

Given/References:
1) Sample Results (Attachment 1).
2) DOE-RL, 2014, *300 Area Remedial Action Sampling and Analysis Plan*, DOE/RL-2001-48, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
3) DOE-RL, 2015, *Remedial Design Report/Remedial Action Work Plan for 300-FF-2 Soils*, DOE/RL-2014-13-ADD1, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) Ecology, 2007, WAC 173-340-708 (8), *"Model Toxic Control Act - Cleanup"* Washington Administrative Code, November 2007 Revision.
5) Ecology, 2011, *Cleanup Levels and Risk Calculations (CLARC) Database*, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
6) EPA, 1989, *Risk Assessment Guidance for Superfund: Volume 1*, Human Health Evaluation Manual, Part A; Interim Final, EPA/540/1-89/002, U.S. Environmental Protection Agency, Washington, D.C.
7) EPA, 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, EPA 540/R-94/013. U.S. Environmental Protection Agency, Washington, D. C.
8) EPA, 2013a, *Hanford Site 300 Area, Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1, Hanford Site, Benton County, Washington*, November 2013, U. S. Environmental Protection Agency, Region 10, Seattle Washington.
9) EPA, 2013b, ProUCL, Version 5.0, U.S. Environmental Protection Agency, Washington, D.C. <http://www.epa.gov/osp/hstl/tsc/software.htm>.
10) WCH, 2015, *300-263 and 316-3 ProUCL Output*, ProUCL Calculation Details, CCN 179800, Washington Closure Hanford, Richland, Washington.

Solution:
The subject calculations were performed on statistical verification sample data. Calculations were performed using ProUCL 5.0 (EPA 2013b) software with the data presented on each calculation worksheet. The hazard quotient and carcinogenic risk calculations are located in a separate calculation brief as an appendix to the Cleanup Verification Package (CVP).

Calculation Description:
The subject calculations were performed on statistical data from soil verification samples (Attachment 1) from the 300-263 and 316-3 waste sites. 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 2015) is documented by this calculation. Duplicate/Split RPD results are used in evaluation of data quality within the CVP for these sites.

Methodology:
The 300-263 and 316-3 waste sites underwent statistical sampling at 2 decision units including the shallow zone and deep zone. One split and one duplicate were also collected for each decision unit. Analytical data for all sampling locations are provided in the summary tables on sheets 4 and 5.

Per Ecology, 2007, compliance with cleanup levels for mixtures of carcinogenic polycyclic aromatic hydrocarbons (PAHs) Method 8310 is determined by considering mixtures of carcinogenic PAHs as a single hazardous substance and using the cleanup levels established for benzo(a)pyrene (BaP) as the cleanup level for mixtures of carcinogenic PAHs. Statistical values representing the PAH concentrations for each decision unit are determined, or the maximum detected value is selected for focused samples. The selected value for each PAH is multiplied by the corresponding toxicity equivalency concentration (TEC) as shown on sheet 12 to obtain the BAP TEC for that carcinogenic PAH. The TECs of all the carcinogenic PAHs are summed to obtain the total BaP TEC for the subject decision unit.

The primary statistical calculation to support cleanup verification is the 95% upper confidence limit (UCL) on the arithmetic mean of the data. In accordance with the RDR/RAWP (DOE-RL 2015), the 95% UCL values for detected COCs in statistical data sets are calculated for each decision unit according to the following:

If there are 5 or more detections of a given COC, and the COC is detected in 25% or more of the total samples, a UCL is calculated. A detection in either or both of the primary/duplicate sample pair is considered a single detection.

Summary (continued)

Methodology (continued):

If there are less than 5 detections of a given COC within a data set, a UCL is not calculated and the maximum concentration is used. A detection in either or both of the primary/duplicate sample pair is considered a single detection. Direct comparison of the maximum value against site cleanup levels (CULs) is used as the compliance basis. For convenience, these maximum detected values are included in the summary tables that follow.

If a given COC is detected in 5 or more samples, but is detected in 25% or less of the total samples, a UCL is not calculated and the maximum concentration is used. A detection in either or both of the primary/duplicate sample pair is considered a single detection.

If there are no detections of a COC, then there is no calculation or further evaluation performed for the COC.

For the statistical evaluation of primary/duplicate sample pairs, the following is applied to determine the value to be used in the UCL calculation:

- If detections are reported for both the primary and duplicate, the maximum concentration is used.
- If one detection and one nondetection are reported, the detected concentration is used.
- If both the primary and duplicate are reported as nondetects, the higher detection limit is used.

For sample results that are non-detects (e.g., "U" or "UJ" flagged), the full reported minimum detectable activity (radionuclides) or practical quantitation limit (nonradionuclides) value is used as the concentration. Data are then identified as detected (1) or non-detected (0) in the ProUCL data input file. The 95% UCL is computed by ProUCL using the identified detection status and all available data distributions. In cases that ProUCL output identifies more than one potential UCL for a given data set, the UCL with the highest value is chosen.

For focused sampling, no statistical evaluation is performed and the maximum detected value is used for comparison with the CULs. For convenience, these maximum detected values are included with the 95% UCL results in the summary tables that follow.

Calculated cleanup levels are not available in Ecology (2011) for calcium, magnesium, potassium, silicon, and sodium. The EPA's Risk Assessment Guidance for Superfund (EPA 1989) recommends that aluminum and iron not be considered in site risk evaluations. Therefore, aluminum, calcium, iron, magnesium, potassium, silicon, and sodium are not considered site COCs and are also not included in these calculations. The 95% UCL values were not calculated for potassium-40, radium-226, radium-228, thorium-228, and thorium-232 based on natural occurrence at the Hanford Site.

ProUCL output from UCL analysis is presented in the *300-263 and 316-3 ProUCL Output* (WCH 2015). In addition to identifying the 95% UCL for each data set, the ProUCL output includes additional statistical information.

ProUCL analysis may result in a potential UCL with a confidence limit greater than 95% (e.g., 97.5%, 99%). In such cases, the identified potential UCL is used and reported with the associated confidence limit. In cases that ProUCL output recommends more than one potential UCL for a given data set, the UCL with the highest value is chosen. Arrangement of the ProUCL data output into formatted tables was performed to optimize data presentation in Attachment 1 for each sample set.

The RPD is calculated when both the primary value and the duplicate/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 II-1 of the SAP (DOE-RL 2014) for certain constituents with cleanup levels or shown in laboratory-specific documents; 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/split 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. For QA/QC split RPD calculations, a threshold of 35% is used (EPA 1994). If the RPD is greater than 30% (or 35% for split data), further investigation regarding the usability of the data is performed. To assist in the identification of anomalous sample pairs, when an analyte is detected in the primary or duplicate/split sample, but was quantified at less than 5 times the TDL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate/split results exceeds a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed.

Summary (continued)

Qualifiers

B = Estimated result. Result is less than the RL, but greater than MDL.
C = The analyte was detected in both the sample and the associated QC blank, and the sample concentration was ≤5x the blank concentration.
D = dilution
J = estimate
M = sample duplicate precision not met.
N = recovery is outside the control limits
U = undetected
X (metals) = serila dilution in the analytical batch indicates that physical and chemical interferences are present.

Acronyms

AEA = alpha energy analysis
BaP = Benzo(a)pyrene
CUL = cleanup limit
CVP = cleanup verification package
DE = direct exposure
DZ = deep zone
DS = detected sample
GEA = gamma energy analysis
GW = groundwater
KPA = kinetic phosphorescence analyzer
MDA = minimum detectable activity
MDL = method detection limit
PQL = practical quantitation limit
Q = qualifier
QA/QC = quality assurance/quality control
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
RPD = relative percent difference
SAP = sampling and analysis plan
SZ = shallow zone
TDL = target detection limit
TEC = toxic equivalent concentration
TPH = total petroleum hydrocarbons

UCL = upper confidence limit
WAC = Washington Administrative Code

Washington Closure Hanford — **CALCULATION SHEET**

Originator	J. D. Skoglie	**Date**	06/23/15	**Calc. No.**	0300X-CA-V0230	**Rev. No.**	0
Project	300 Area Closure Operations	**Job No.**	14655	**Checked**	T. Q. Howell	**Date**	06/23/15
Subject	300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations					**Sheet No.**	4 of 16

Summary (continued)

Results:
The results presented in the tables that follow include the summary of the results of the maximum and 95% UCL calculations for the SZ, DZ, the WAC 173-340-740(7)(e) 3-part test evaluation, and the RPD calculations, and are for use in risk analysis and the CVP for these waste sites.

Results Summary

Analyte	SZ		DZ		Units
	95% UCL Result	Maximum Result	95% UCL Result	Maximum Result	
Plutonium-239/240	--	0.372	--	0.105	pCi/g
Total beta radiostrontium	--	1.72	--	0.748	pCi/g
Uranium-234	1.40	--	7.49	--	pCi/g
Uranium-235 (AEA)	--	0.0791	0.279	--	pCi/g
Uranium-235 (GEA)	--	0.114	--	0.879	pCi/g
Uranium-238 (AEA)	1.58	--	7.41	--	pCi/g
Uranium-238 (GEA)	1.03	--	10.7	--	pCi/g
Arsenic	2.8	--	3.2	--	mg/kg
Barium	325	--	83.8	--	mg/kg
Beryllium	0.36	--	0.25	--	mg/kg
Cadmium	--	0.15	--	0.067	mg/kg
Chromium	8.6	--	9.7	--	mg/kg
Cobalt	5.2	--	8.6	--	mg/kg
Copper	15.6	--	16.3	--	mg/kg
Hexavalent chromium	0.247	--	--	0.230	mg/kg
Lead	6.3	--	4.3	--	mg/kg
Lithium	7.0	--	7.5	--	mg/kg
Manganese	258	--	355	--	mg/kg
Mercury	0.27	--	0.13	--	mg/kg
Nickel	9.5	--	11.2	--	mg/kg
Selenium	--	1.5	--	--	mg/kg
Silver	--	0.45	--	0.23	mg/kg
Strontium	122	--	27.1	--	mg/kg
Tin	1.6	--	2.0	--	mg/kg
Uranium	1.8	--	22.4	--	mg/kg
Uranium-KPA	3.80	--	28.8	--	mg/kg
Vanadium	40.1	--	61.8	--	mg/kg
Zinc	34.2	--	42.9	--	mg/kg
Nitrogen in nitrate and ntirite	192	--	2.6	--	mg/kg
TPH - Diesel Range	4.4	--	--	2.0	mg/kg
TPH - Diesel Range EXT	7.6	--	--	2.6	mg/kg
Aroclor-1254	--	0.0050	--	0.0065	mg/kg
Aroclor-1260	--	3.1	--	--	mg/kg
Chrysene	--	0.035	--	--	mg/kg
Fluoranthene	--	0.15	--	--	mg/kg
Phenanthrene	--	0.031	--	--	mg/kg
Pyrene	--	0.12	--	--	mg/kg
BaP TEC	0.00035		--		mg/kg

Washington Closure Hanford **CALCULATION SHEET**

Originator	J. D. Skoglie	**Date**	06/23/15	**Calc. No.**	0300X-CA-V0230	**Rev. No.**	0
Project	300 Area Closure Operations	**Job No.**	14655	**Checked**	T. Q. Howell	**Date**	06/23/15
Subject	300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations					**Sheet No.**	5 of 16

Summary (continued)

Results:
The results presented in the tables that follow include the summary of the results of the maximum and 95% UCL calculations for the SZ, DZ, the WAC 173-340-740(7)(e) 3-part test evaluation, and the RPD calculations, and are for use in risk analysis and the CVP for these waste sites.

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

Analyte	SZ		DZ	
	Duplicate Analysis	Split Analysis	Duplicate Analysis	Split Analysis
Potassium-40	2.8%	29.6%	2.2%	15.8%
Aluminum	6.0%	17.4%	2.7%	22.0%
Barium	***40.7%***	***38.9%***	0.9%	26.4%
Calcium	1.8%	0.8%	1.6%	11.6%
Chromium	7.4%	11.4%	--	--
Cobalt	--	--	1.8%	7.4%
Copper	1.3%	7.8%	2.4%	5.1%
Iron	1.4%	6.3%	5.4%	6.9%
Magnesium	0.9%	1.3%	1.7%	13.8%
Manganese	7.0%	10.0%	5.1%	12.3%
Silicon	5.9%	***91.0%***	13.1%	***83.9%***
Sodium	--	--	12.8%	--
Strontium	13.4%	7.8%	8.0%	30.2%
Uranium	***125.4%***	19.3%	14.5%	16.4%
Vanadium	2.9%	5.7%	0.9%	1.0%
Zinc	4.0%	6.8%	6.0%	12.8%
Zirconium	--	--	7.0%	3.8%

[a]RPD listed where result produced, based on criteria. If RPD not required, no value is listed. The significance of the reported RPD values, including values greater than 30% (35% for split data), is addressed in the data quality assessment section of the CVP.

Washington Closure Hanford

CALCULATION SHEET

Originator J. D. Skoglie
Project 300 Area Closure Operations
Subject 300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations

Date 06/23/15
Job No. 14655

Calc. No. 0300X-CA-V0230
Checked T. Q. Howell

Rev. No. 0
Date 06/23/15
Sheet No. 6 of 16

300-263 and 316-3 Waste Sites Statistical Calculations
Verification Data - Shallow Zone (SZ)

Sample Area	Sample Number	Sample Date	Uranium-234			Uranium-238 (AEA)			Uranium-238 (GEA)			Arsenic			Barium			Beryllium			Chromium			Cobalt			Copper		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	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-2	J1V770	5/14/15	0.296		0.185	0.350		0.167	0.417		0.289	2.1		0.61	58.3		0.070	0.062	B	0.030	6.5		0.053	4.4		0.092	7.6		0.20
Duplicate of J1V770	J1V781	5/14/15	0.350		0.0583	0.458		0.0650	0.574		0.287	1.6		0.66	38.6		0.076	0.053	B	0.033	7.0		0.058	4.4		0.10	7.5		0.22
SZ-1	J1V769	5/14/15	1.56		0.0804	1.69		0.0913	0.715		0.283	2.7		0.69	63.2		0.080	0.071	B	0.035	7.0		0.061	4.9		0.11	8.5		0.23
SZ-3	J1V771	5/14/15	0.256		0.0868	0.217		0.0837	0.137	U	0.913	2.6		0.68	58.8		0.078	0.082	B	0.034	8.2		0.059	5.8		0.10	10.3		0.22
SZ-4	J1V772	5/14/15	1.44		0.0690	1.05		0.0690	0.572		0.282	2.0		0.63	50.5		0.073	0.071	B	0.032	6.2		0.056	4.6		0.096	7.3		0.21
SZ-5	J1V773	5/14/15	1.52		0.0511	1.36		0.0511	1.87		1.07	3.9		0.80	654		0.092	0.71		0.040	11.4		0.070	4.2		0.12	22.1		0.26
SZ-6	J1V774	5/14/15	0.650		0.0562	0.614		0.0495	0.770	U	1.14	2.5		0.61	62.5		0.071	0.083	B	0.031	7.4		0.054	5.1		0.093	8.9		0.20
SZ-7	J1V775	5/14/15	0.382		0.118	0.322		0.120	0.481		0.283	2.2		0.64	48.4		0.073	0.071	B	0.032	8.3		0.056	5.0		0.096	8.4		0.21
SZ-8	J1V776	5/14/15	1.68		0.0427	2.06		0.0427	0.922		0.285	2.4		0.68	63.5		0.079	0.080	B	0.034	8.3		0.060	5.3		0.10	13.5		0.22
SZ-9	J1V777	5/14/15	0.229		0.0487	0.214		0.0647	0.353		0.290	2.5		0.58	55.0		0.067	0.043	B	0.029	5.4		0.051	5.6		0.089	10.5		0.19
SZ-10	J1V778	5/14/15	0.206		0.0941	0.164		0.0838	1.18	U	1.23	2.3		0.61	71.7		0.071	0.11	B	0.031	7.7		0.054	5.4		0.093	8.3		0.20
SZ-11	J1V779	5/14/15	2.74		0.0853	3.61		0.0988	1.52		0.297	2.9		0.64	73.4		0.074	0.083	B	0.032	8.2		0.056	4.9		0.097	23.7		0.21
SZ-12	J1V780	5/14/15	0.796		0.0697	0.820		0.0732	0.664		0.282	2.9		0.70	52.8		0.081	0.079	B	0.035	8.8		0.062	4.7		0.11	14.1		0.23

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Uranium-234			Uranium-238 (AEA)			Uranium-238 (GEA)			Arsenic			Barium			Beryllium			Chromium			Cobalt			Copper		
			pCi/g	DS		pCi/g	DS		pCi/g	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS	
SZ-2	J1V770/ J1V781	5/14/15	0.350	1		0.458	1		0.574	1		2.1	1		58.3	1		0.062	1		7.0	1		4.4	1		7.6	1	
SZ-1	J1V769	5/14/15	1.56	1		1.69	1		0.715	1		2.7	1		63.2	1		0.071	1		7.0	1		4.9	1		8.5	1	
SZ-3	J1V771	5/14/15	0.256	1		0.217	1		0.913	0		2.6	1		58.8	1		0.082	1		8.2	1		5.8	1		10.3	1	
SZ-4	J1V772	5/14/15	1.44	1		1.05	1		0.572	1		2.0	1		50.5	1		0.071	1		6.2	1		4.6	1		7.3	1	
SZ-5	J1V773	5/14/15	1.52	1		1.36	1		1.87	1		3.9	1		654	1		0.71	1		11.4	1		4.2	1		22.1	1	
SZ-6	J1V774	5/14/15	0.650	1		0.614	1		1.14	0		2.5	1		62.5	1		0.083	1		7.4	1		5.1	1		8.9	1	
SZ-7	J1V775	5/14/15	0.382	1		0.322	1		0.481	1		2.2	1		48.4	1		0.071	1		8.3	1		5.0	1		8.4	1	
SZ-8	J1V776	5/14/15	1.68	1		2.06	1		0.922	1		2.4	1		63.5	1		0.080	1		8.3	1		5.3	1		13.5	1	
SZ-9	J1V777	5/14/15	0.229	1		0.214	1		0.353	1		2.5	1		55.0	1		0.043	1		5.4	1		5.6	1		10.5	1	
SZ-10	J1V778	5/14/15	0.206	1		0.164	1		1.23	0		2.3	1		71.7	1		0.11	1		7.7	1		5.4	1		8.3	1	
SZ-11	J1V779	5/14/15	2.74	1		3.61	1		1.52	1		2.9	1		73.4	1		0.083	1		8.2	1		4.9	1		23.7	1	
SZ-12	J1V780	5/14/15	0.796	1		0.820	1		0.664	1		2.9	1		52.8	1		0.079	1		8.8	1		4.7	1		14.1	1	

Statistical Computations

	Uranium-234	Uranium-238 (AEA)	Uranium-238 (GEA)	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper
95% UCL based on	Use 95% Student's-t UCL	Use 95% Student's-t UCL	Use 95% KM (t) UCL	Use 95% Student's-t UCL	Use 95% Chebyshev (Mean, Sd) UCL	Use 95% Chebyshev (Mean, Sd) UCL	Use 95% Student's-t UCL	Use 95% Student's-t UCL	Use Adjusted Gamma UCL
N	12	12	12	12	12	12	12	12	12
% < Detection limit	0%	0%	25%	0%	0%	0%	0%	0%	0%
Mean	0.984	1.05	0.852	2.6	109	0.13	7.8	5.0	11.9
Standard deviation	0.798	1.02	0.510	0.50	172	0.184	1.5	0.48	5.57
95% UCL on mean	1.40	1.58	1.03	2.8	325	0.36	8.6	5.2	15.6
Maximum value	2.74	3.61	1.87	3.9	654	0.71	11.4	5.8	23.7

Washington Closure Hanford

CALCULATION SHEET

Originator J. D. Skoglie
Project 300 Area Closure Operations
Subject 300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations

Date 06/23/15
Job No. 14655

Calc. No. 0300X-CA-V0230
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Rev. No. 0
Date 06/23/15
Sheet No. 7 of 16

300-263 and 316-3 Waste Sites Statistical Calculations
Verification Data - Shallow Zone (SZ)

Sample Area	Sample Number	Sample Date	Hexavalent Chromium			Lead			Lithium			Manganese			Mercury			Nickel			Strontium			Tin			Uranium		
			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
SZ-2	J1V770	5/14/15	0.172		0.155	3.4		0.25	5.5		0.28	221		0.092	0.0060	U	0.0060	8.0		0.11	19.9		0.033	1.4	B	0.84	0.55		0.0015
Duplicate of J1V770	J1V781	5/14/15	0.155	U	0.155	2.3		0.27	5.3		0.30	206		0.10	0.0065	U	0.0065	7.6		0.12	17.4		0.036	1.3	B	0.92	2.4		0.0015
SZ-1	J1V769	5/14/15	0.173		0.155	2.6		0.28	6.1		0.32	246		0.11	0.0066	U	0.0066	8.6		0.13	16.8		0.038	1.5	B	0.96	1.5		0.0018
SZ-3	J1V771	5/14/15	0.264		0.155	3.9		0.28	6.1		0.31	272		0.10	0.0079	B	0.0071	9.7		0.13	24.1		0.037	1.5	B	0.93	0.51		0.0016
SZ-4	J1V772	5/14/15	0.258		0.155	3.2		0.26	5.1		0.29	232		0.096	0.0066	B	0.0066	8.8		0.12	14.6		0.035	1.4	B	0.88	2.0		0.0016
SZ-5	J1V773	5/14/15	0.155	U	0.155	15.5		0.33	10.5		0.36	227		0.12	0.42		0.0075	11.3		0.15	247		0.043	1.9	B	1.1	2.7		0.0019
SZ-6	J1V774	5/14/15	0.265		0.155	3.0		0.25	6.1		0.28	244		0.093	0.0079	B	0.0072	8.6		0.11	22.3		0.033	1.4	B	0.85	0.95		0.0014
SZ-7	J1V775	5/14/15	0.173		0.155	2.9		0.26	5.7		0.29	246		0.096	0.0063	B	0.0061	9.0		0.12	15.1		0.035	1.4	B	0.88	0.35		0.0015
SZ-8	J1V776	5/14/15	0.243		0.155	4.7		0.28	6.4		0.31	254		0.10	0.064		0.0071	10.0		0.13	19.6		0.037	1.8	B	0.94	1.9		0.0015
SZ-9	J1V777	5/14/15	0.173		0.155	2.2		0.24	5.0		0.27	235		0.089	0.0068	U	0.0068	7.1		0.11	22.9		0.032	1.4	B	0.81	0.43		0.0015
SZ-10	J1V778	5/14/15	0.199		0.155	3.2		0.25	6.1		0.28	304		0.093	0.0072	B	0.0067	8.4		0.11	17.5		0.034	1.5	B	0.85	0.45		0.0014
SZ-11	J1V779	5/14/15	0.351		0.155	3.4		0.26	5.8		0.29	229		0.097	0.047		0.0068	8.4		0.12	27.0		0.035	1.3	B	0.89	0.50		0.0015
SZ-12	J1V780	5/14/15	0.155	U	0.155	3.4		0.29	5.9		0.32	249		0.11	0.020	B	0.0072	9.7		0.13	21.1		0.038	1.3	B	0.97	2.6		0.0015

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Hexavalent Chromium			Lead			Lithium			Manganese			Mercury			Nickel			Strontium			Tin			Uranium		
			mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS	
SZ-2	J1V770/ J1V781	5/14/15	0.172	1		3.4	1		5.5	1		221	1		0.0065	0		8.0	1		19.9	1		1.4	1		2.4	1	
SZ-1	J1V769	5/14/15	0.173	1		2.6	1		6.1	1		246	1		0.0066	0		8.6	1		16.8	1		1.5	1		1.5	1	
SZ-3	J1V771	5/14/15	0.264	1		3.9	1		6.1	1		272	1		0.0079	1		9.7	1		24.1	1		1.5	1		0.51	1	
SZ-4	J1V772	5/14/15	0.258	1		3.2	1		5.1	1		232	1		0.0066	1		8.8	1		14.6	1		1.4	1		2.0	1	
SZ-5	J1V773	5/14/15	0.155	0		15.5	1		10.5	1		227	1		0.42	1		11.3	1		247	1		1.9	1		2.7	1	
SZ-6	J1V774	5/14/15	0.265	1		3.0	1		6.1	1		244	1		0.0079	1		8.6	1		22.3	1		1.4	1		1.0	1	
SZ-7	J1V775	5/14/15	0.173	1		2.9	1		5.7	1		246	1		0.0063	1		9.0	1		15.1	1		1.4	1		0.35	1	
SZ-8	J1V776	5/14/15	0.243	1		4.7	1		6.4	1		254	1		0.064	1		10.0	1		19.6	1		1.8	1		1.9	1	
SZ-9	J1V777	5/14/15	0.173	1		2.2	1		5.0	1		235	1		0.0068	0		7.1	1		22.9	1		1.4	1		0.43	1	
SZ-10	J1V778	5/14/15	0.199	1		3.2	1		6.1	1		304	1		0.0072	1		8.4	1		17.5	1		1.5	1		0.45	1	
SZ-11	J1V779	5/14/15	0.351	1		3.4	1		5.8	1		229	1		0.0470	1		8.4	1		27.0	1		1.3	1		0.50	1	
SZ-12	J1V780	5/14/15	0.155	0		3.4	1		5.9	1		249	1		0.0200	1		9.7	1		21.1	1		1.3	1		2.6	1	

Statistical Computations

	Hexavalent Chromium	Lead	Lithium	Manganese	Mercury	Nickel	Strontium	Tin	Uranium
95% UCL based on	Use 95% KM (t) UCL	Use 95% Modified-t UCL	Use 95% Modified-t UCL	Use 95% Student's-t UCL	Use 97.5% KM (Chebyshev) UCL	Use 95% Student's-t UCL	Use 95% Chebyshev (Mean, Sd) UCL	Use 95% Modified-t UCL	Use 95% Student's-t UCL
N	12	12	12	12	12	12	12	12	12
% < Detection limit	17%	0%	0%	0%	25%	0%	0%	0%	0%
Mean	0.227	4.3	6.2	247	0.065	9.0	39.0	1.5	1.4
Standard deviation	0.0596	3.6	1.42	22.8	0.14	1.1	65.6	0.19	0.93
95% UCL on mean	0.247	6.3	7.0	258	0.27	9.5	122	1.6	1.8
Maximum value	0.351	15.5	10.5	304	0.42	11.3	247	1.9	2.7

Washington Closure Hanford

CALCULATION SHEET

Originator J. D. Skoglie
Project 300 Area Closure Operations
Subject 300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations

Date 06/23/15
Job No. 14655

Calc. No. 0300X-CA-V0230
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Rev. No. 0
Date 06/23/15
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300-263 and 316-3 Waste Sites Statistical Calculations
Verification Data - Shallow Zone (SZ)

Sample Area	Sample Number	Sample Date	Uranium (KPA)			Vanadium			Zinc			Nitrogen in Nitrate and Nitrite			TPH - Diesel Range			TPH - Diesel Range EXT		
			ug/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
SZ-2	J1V770	5/14/15	0.781		0.131	34.1		0.086	28.2		0.36	0.78		0.36	690	U	690	1000	U	1000
Duplicate of J1V770	J1V781	5/14/15	0.741		0.139	35.1		0.094	27.1		0.40	0.87		0.35	690	U	690	1000	U	1000
SZ-1	J1V769	5/14/15	3.50		0.134	35.8		0.099	29.8		0.42	6.2	M	0.39	750	U	750	1100	U	1100
SZ-3	J1V771	5/14/15	0.522		0.136	43.6		0.096	33.5		0.41	0.37	U	0.37	6300		700	11000		1000
SZ-4	J1V772	5/14/15	3.86		0.131	34.1		0.090	27.6		0.38	0.35	U	0.35	680	U	680	1000	U	1000
SZ-5	J1V773	5/14/15	3.80		0.138	35.8		0.11	36.4		0.48	161	D	2.2	8600		820	17000		1200
SZ-6	J1V774	5/14/15	1.91		0.135	39.9		0.087	31.8		0.37	0.37	U	0.37	710	U	710	1000	U	1000
SZ-7	J1V775	5/14/15	0.415		0.134	41.7		0.091	30.5		0.38	0.35	U	0.35	700	U	700	1000	U	1000
SZ-8	J1V776	5/14/15	4.93		0.136	40.1		0.097	41.1		0.41	0.36	U	0.36	3800	J	730	6600		1100
SZ-9	J1V777	5/14/15	0.702		0.131	42.9		0.083	31.8		0.35	0.36	U	0.36	700	U	700	1000	U	1000
SZ-10	J1V778	5/14/15	0.544		0.140	37.8		0.088	34.7		0.37	7.0		0.36	1200	J	710	2400	J	1100
SZ-11	J1V779	5/14/15	7.60		0.134	38.3		0.091	31.7		0.39	0.54	BN	0.34	7800		660	11000		980
SZ-12	J1V780	5/14/15	3.08		0.136	36.2		0.10	29.3		0.42	0.36	U	0.36	720	U	720	1100	U	1100

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Uranium (KPA)		Vanadium		Zinc		Nitrogen in Nitrate and Nitrite		TPH - Diesel Range		TPH - Diesel Range EXT	
			ug/g	DS	mg/kg	DS	mg/kg	DS	mg/kg	DS	ug/kg	DS	ug/kg	DS
SZ-2	J1V770/ J1V781	5/14/15	0.781	1	35.1	1	28.2	1	0.87	1	690	0	1000	0
SZ-1	J1V769	5/14/15	3.50	1	35.8	1	29.8	1	6.2	1	750	0	1100	0
SZ-3	J1V771	5/14/15	0.522	1	43.6	1	33.5	1	0.37	0	6300	1	11000	1
SZ-4	J1V772	5/14/15	3.86	1	34.1	1	27.6	1	0.35	0	680	0	1000	0
SZ-5	J1V773	5/14/15	3.80	1	35.8	1	36.4	1	161	1	8600	1	17000	1
SZ-6	J1V774	5/14/15	1.91	1	39.9	1	31.8	1	0.37	0	710	0	1000	0
SZ-7	J1V775	5/14/15	0.415	1	41.7	1	30.5	1	0.35	0	700	0	1000	0
SZ-8	J1V776	5/14/15	4.93	1	40.1	1	41.1	1	0.36	0	3800	1	6600	1
SZ-9	J1V777	5/14/15	0.702	1	42.9	1	31.8	1	0.36	0	700	0	1000	0
SZ-10	J1V778	5/14/15	0.544	1	37.8	1	34.7	1	7.0	1	1200	1	2400	1
SZ-11	J1V779	5/14/15	7.60	1	38.3	1	31.7	1	0.54	1	7800	1	11000	1
SZ-12	J1V780	5/14/15	3.08	1	36.2	1	29.3	1	0.36	0	720	0	1100	0

Statistical Computations

	Uranium (KPA)	Vanadium	Zinc	Nitrogen in Nitrate and Nitrite	TPH - Diesel Range	TPH - Diesel Range EXT
95% UCL based on	Use 95% Student's-t UCL	Use 95% Student's-t UCL	Use 95% Student's-t UCL	Use 95% Adjusted Gamma KM UCL	Use 95% KM (t) UCL	Use 95% KM (t) UCL
N	12	12	12	12	12	12
% < Detection limit	0%	0%	0%	58%	58%	58%
Mean	2.64	38.4	32.2	35.1	5540	9600
Standard deviation	2.24	3.2	3.8	70.4	3038	5466
95% UCL on mean	3.80	40.1	34.2	192	4426	7647
Maximum value	7.60	43.6	41.1	161	8600	17000

Washington Closure Hanford

CALCULATION SHEET

Originator J. D. Skoglie
Project 300 Area Closure Operations
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Rev. No. 0
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300-263 and 316-3 Waste Sites Statistical Calculations

Verification Data - Deep Zone (DZ)

Sample Area	Sample Number	Sample Date	Uranium-234			Uranium-235 (AEA)			Uranium-238 (AEA)			Uranium-238 (GEA)			Arsenic			Barium			Beryllium			Chromium			Cobalt		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
DZ-6	J1V788	5/14/15	1.41		0.0537	0.0935		0.0428	1.29		0.0537	1.09		0.251	1.5		0.66	67.8		0.076	0.17	U	0.17	3.6	X	0.058	11.2	X	0.50
Duplicate of J1V788	J1V795	5/14/15	2.28		0.0661	0.115		0.0527	2.33		0.0693	0.376	U	1.18	1.7		0.64	67.2		0.074	0.16	U	0.16	3.4	X	0.057	11.4	X	0.49
DZ-1	J1V783	5/14/15	0.180		0.0561	0.0273	U	0.0508	0.221		0.0637	1.26	U	1.30	2.5		0.68	88.5		0.078	0.12	B	0.034	7.6	X	0.060	6.0	X	0.10
DZ-2	J1V784	5/14/15	0.685		0.271	0.0406	U	0.201	0.614		0.226	0.499		0.268	1.9		0.67	49.5		0.077	0.034	U	0.034	3.0	X	0.059	7.9	X	0.10
DZ-3	J1V785	5/14/15	1.93		0.0935	0.109		0.0700	1.93		0.0919	0.856	U	0.908	1.7		0.65	77.7		0.075	0.032	U	0.032	5.1	X	0.057	7.9	X	0.098
DZ-4	J1V786	5/14/15	1.98		0.0680	0.0943		0.0550	2.15		0.0697	2.02	U	1.40	3.7		0.71	91.0		0.082	0.14	B	0.035	10.9	X	0.062	8.3	X	0.11
DZ-5	J1V787	5/14/15	0.948		0.0562	0.0134	U	0.0508	0.766		0.0603	0.869	U	1.29	2.9		0.69	71.3		0.080	0.054	B	0.035	5.5	X	0.061	8.1	X	0.10
DZ-7	J1V789	5/14/15	1.35		0.194	0.0711	U	0.0989	1.66		0.181	2.06		0.294	2.1		0.66	63.8		0.076	0.048	B	0.033	5.4	X	0.058	7.1	X	0.10
DZ-8	J1V790	5/14/15	1.00		0.0536	0.0476	U	0.0566	0.917		0.0451	0.533		0.266	2.0		0.63	45.0		0.073	0.061	B	0.032	7.2	X	0.056	4.5	X	0.096
DZ-9	J1V791	5/14/15	18.5		0.0510	0.868		0.0510	18.0		0.0671	16.5		0.528	5.6		0.72	126		0.083	0.85		0.036	19.7	X	0.063	9.0	X	0.11
DZ-10	J1V792	5/14/15	2.55		0.0539	0.0735		0.0539	2.96		0.0401	1.08		0.947	3.4		0.71	73.6		0.082	0.076	B	0.035	11.2	X	0.062	7.2	X	0.11
DZ-11	J1V793	5/14/15	7.55		0.0799	0.227		0.0582	7.31		0.0925	3.22	U	1.38	2.4		0.64	57.9		0.073	0.044	B	0.032	4.9	X	0.056	8.0	X	0.097
DZ-12	J1V794	5/14/15	2.92		0.0840	0.0868		0.0545	3.00		0.0781	1.21		0.274	1.8		0.64	55.9		0.073	0.032	U	0.032	3.4	X	0.056	7.4	X	0.096

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Uranium-234			Uranium-235 (AEA)			Uranium-238 (AEA)			Uranium-238 (GEA)			Arsenic			Barium			Beryllium			Chromium			Cobalt		
			pCi/g	DS		pCi/g	DS		pCi/g	DS		pCi/g	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS	
DZ-6	J1V788/ J1V795	5/14/15	2.28	1		0.115	1		2.33	1		1.09	1		1.7	1		67.8	1		0.17	0		3.6	1		11.4	1	
DZ-1	J1V783	5/14/15	0.180	1		0.0508	0		0.221	1		1.30	0		2.5	1		88.5	1		0.12	1		7.6	1		6.0	1	
DZ-2	J1V784	5/14/15	0.685	1		0.201	0		0.614	1		0.499	1		1.9	1		49.5	1		0.034	0		3.0	1		7.9	1	
DZ-3	J1V785	5/14/15	1.93	1		0.109	1		1.93	1		0.908	0		1.7	1		77.7	1		0.032	0		5.1	1		7.9	1	
DZ-4	J1V786	5/14/15	1.98	1		0.0943	1		2.15	1		1.40	0		3.7	1		91.0	1		0.14	1		10.9	1		8.3	1	
DZ-5	J1V787	5/14/15	0.948	1		0.0508	0		0.766	1		1.29	0		2.9	1		71.3	1		0.054	1		5.5	1		8.1	1	
DZ-7	J1V789	5/14/15	1.35	1		0.0989	0		1.66	1		2.06	1		2.1	1		63.8	1		0.048	1		5.4	1		7.1	1	
DZ-8	J1V790	5/14/15	1.00	1		0.0566	0		0.917	1		0.533	1		2.0	1		45.0	1		0.061	1		7.2	1		4.5	1	
DZ-9	J1V791	5/14/15	18.5	1		0.868	1		18.0	1		16.5	1		5.6	1		126	1		0.85	1		19.7	1		9.0	1	
DZ-10	J1V792	5/14/15	2.55	1		0.0735	1		2.96	1		1.08	1		3.4	1		73.6	1		0.076	1		11.2	1		7.2	1	
DZ-11	J1V793	5/14/15	7.55	1		0.227	1		7.31	1		1.38	0		2.4	1		57.9	1		0.044	1		4.9	1		8.0	1	
DZ-12	J1V794	5/14/15	2.92	1		0.0868	1		3.00	1		1.21	1		1.8	1		55.9	1		0.032	0		3.4	1		7.4	1	

Statistical Computations

	Uranium-234	Uranium-235 (AEA)	Uranium-238 (AEA)	Uranium-238 (GEA)	Arsenic	Barium	Beryllium	Chromium	Cobalt
95% UCL based on	Use 95% Adjusted Gamma UCL	Use 95% KM (t) UCL	Use 95% Adjusted Gamma UCL	Use 97.5% KM (Chebyshev) UCL	Use 95% Student's-t UCL	Use 95% Student's-t UCL	Use 95% KM (BCA) UCL	Use 95% Student's-t UCL	Use 95% Student's-t UCL
N	12	12	12	12	12	12	12	12	12
% < Detection limit	0%	42%	0%	42%	0%	0%	33%	0%	0%
Mean	3.49	0.225	3.49	3.28	2.6	72.3	0.17	7.3	7.7
Standard deviation	5.09	0.288	4.93	5.85	1.1	22.1	0.28	4.7	1.6
95% UCL on mean	7.49	0.279	7.41	10.7	3.2	83.8	0.25	9.7	8.6
Maximum value	18.5	0.868	18.0	16.5	5.6	126	0.85	19.7	11.4

Washington Closure Hanford

CALCULATION SHEET

Originator J. D. Skoglie
Project 300 Area Closure Operations
Subject 300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations

Date 06/23/15
Job No. 14655

Calc. No. 0300X-CA-V0230
Checked T. Q. Howell

Rev. No. 0
Date 06/23/15
Sheet No. 10 of 16

300-263 and 316-3 Waste Sites Statistical Calculations

Verification Data - Deep Zone (DZ)

Sample Area	Sample Number	Sample Date	Copper			Lead			Lithium			Manganese			Mercury			Nickel			Strontium			Tin			Uranium		
			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-6	J1V788	5/14/15	16.2		1.1	2.4	B	1.4	3.1		0.30	319		0.10	0.0063	U	0.0063	7.7	X	0.12	22.1	X	0.036	4.6	U	4.6	3.7		0.0014
Duplicate of J1V788	J1V795	5/14/15	16.6		1.1	2.1	B	1.3	3.1		0.29	303		0.098	0.0061	U	0.0061	11.7	X	0.12	20.4	X	0.035	4.4	U	4.4	3.2		0.0016
DZ-1	J1V783	5/14/15	12.0		0.22	3.2		0.28	7.4		0.31	272		0.10	0.019	BM	0.0064	8.6	X	0.13	28.8	X	0.037	1.9	BC	0.94	0.77		0.0016
DZ-2	J1V784	5/14/15	13.7		0.22	2.1		0.27	3.2		0.31	254		0.10	0.042		0.0069	6.3	X	0.13	16.5	X	0.037	1.9	BC	0.93	0.74		0.0015
DZ-3	J1V785	5/14/15	14.6		0.21	2.2		0.27	3.4		0.29	346		0.098	0.036		0.0062	8.3	X	0.12	18.4	X	0.035	2.1	BC	0.90	3.2		0.0014
DZ-4	J1V786	5/14/15	15.4		0.23	4.5		0.29	9.2		0.32	409		0.11	0.25		0.0069	12.7	X	0.13	25.1	X	0.039	2.0	BC	0.98	5.3		0.0017
DZ-5	J1V787	5/14/15	17.6		0.23	4.2		0.28	6.3		0.31	293		0.10	0.0093	B	0.0065	9.2	X	0.13	19.9	X	0.038	2.1	BC	0.96	1.2		0.0017
DZ-7	J1V789	5/14/15	16.4		0.22	2.8		0.27	4.4		0.30	234		0.10	0.0071	B	0.0061	9.9	X	0.12	15.7	X	0.036	2.0	BC	0.91	6.1		0.0016
DZ-8	J1V790	5/14/15	8.5		0.21	2.5		0.26	6.5		0.29	216		0.096	0.0068	U	0.0068	8.6	X	0.12	16.8	X	0.035	1.7	BC	0.88	1.7		0.0016
DZ-9	J1V791	5/14/15	19.5		0.24	7.8		0.29	12		0.33	501		0.11	0.033		0.0078	14.8	X	0.13	46.9	X	0.039	1.9	BC	0.99	45.5		0.0019
DZ-10	J1V792	5/14/15	13.5		0.23	3.7		0.29	8.4		0.32	370		0.11	0.0074	U	0.0074	13.0	X	0.13	22.6	X	0.039	2.0	BC	0.98	2.7		0.0017
DZ-11	J1V793	5/14/15	16.7		0.21	4.0		0.26	5.5		0.29	272		0.097	0.088		0.0063	8.8	X	0.12	21.4	X	0.035	2.1	BC	0.88	7.2		0.0016
DZ-12	J1V794	5/14/15	12.9		0.21	2.3		0.26	3.3		0.29	255		0.096	0.033		0.0066	6.1	X	0.12	17.0	X	0.035	1.6	BC	0.88	4.2		0.0015

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Copper			Lead			Lithium			Manganese			Mercury			Nickel			Strontium			Tin			Uranium		
			mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS		mg/kg	DS	
DZ-6	J1V788/ J1V795	5/14/15	16.6	1		2.4	1		3.1	1		319	1		0.0063	0		11.7	1		22.1	1		4.6	0		3.7	1	
DZ-1	J1V783	5/14/15	12.0	1		3.2	1		7.4	1		272	1		0.019	1		8.6	1		28.8	1		1.9	1		0.77	1	
DZ-2	J1V784	5/14/15	13.7	1		2.1	1		3.2	1		254	1		0.042	1		6.3	1		16.5	1		1.9	1		0.74	1	
DZ-3	J1V785	5/14/15	14.6	1		2.2	1		3.4	1		346	1		0.036	1		8.3	1		18.4	1		2.1	1		3.2	1	
DZ-4	J1V786	5/14/15	15.4	1		4.5	1		9.2	1		409	1		0.25	1		12.7	1		25.1	1		2.0	1		5.3	1	
DZ-5	J1V787	5/14/15	17.6	1		4.2	1		6.3	1		293	1		0.0093	1		9.2	1		19.9	1		2.1	1		1.2	1	
DZ-7	J1V789	5/14/15	16.4	1		2.8	1		4.4	1		234	1		0.0071	1		9.9	1		15.7	1		2.0	1		6.1	1	
DZ-8	J1V790	5/14/15	8.5	1		2.5	1		6.5	1		216	1		0.0068	0		8.6	1		16.8	1		1.7	1		1.7	1	
DZ-9	J1V791	5/14/15	19.5	1		7.8	1		12	1		501	1		0.033	1		14.8	1		46.9	1		1.9	1		45.5	1	
DZ-10	J1V792	5/14/15	13.5	1		3.7	1		8.4	1		370	1		0.0074	0		13.0	1		22.6	1		2.0	1		2.7	1	
DZ-11	J1V793	5/14/15	16.7	1		4.0	1		5.5	1		272	1		0.088	1		8.8	1		21.4	1		2.1	1		7.2	1	
DZ-12	J1V794	5/14/15	12.9	1		2.3	1		3.3	1		255	1		0.033	1		6.1	1		17.0	1		1.6	1		4.2	1	

Statistical Computations

	Copper	Lead	Lithium	Manganese	Mercury	Nickel	Strontium	Tin	Uranium
95% UCL based on	Use 95% Student's-t UCL	Use 95% Student's-t UCL	Use 95% Student's-t UCL	Use 95% Student's-t UCL	Use 95% KM (Chebyshev)UCL	Use 95% Student's-t UCL	Use 95% Student's-t UCL	Use 95% KM (t) UCL	Use 95% Chebyshev (Mean, Sd) UCL
N	12	12	12	12	12	12	12	12	12
% < Detection limit	0%	0%	0%	0%	25%	0%	0%	8%	0%
Mean	14.8	3.5	6.1	312	0.058	9.8	22.6	1.9	6.9
Standard deviation	2.9	1.6	2.8	82.7	0.076	2.7	8.59	0.16	12.4
95% UCL on mean	16.3	4.3	7.5	355	0.13	11.2	27.1	2.0	22.4
Maximum value	19.5	7.8	12.0	501	0.25	14.8	46.9	2.1	45.5

Washington Closure Hanford

CALCULATION SHEET

Originator J. D. Skoglie
Project 300 Area Closure Operations
Subject 300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations

Date 06/23/15
Job No. 14655

Calc. No. 0300X-CA-V0230
Checked T. Q. Howell

Rev. No. 0
Date 06/23/15
Sheet No. 11 of 16

300-263 and 316-3 Waste Sites Statistical Calculations
Verification Data - Deep Zone (DZ)

Sample Area	Sample Number	Sample Date	Uranium (KPA) ug/g	Q	MDA	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL	Nitrogen in Nitrate and Nitrite mg/kg	Q	PQL
DZ-6	J1V788	5/14/15	5.99		0.265	86.9		0.47	46.1	X	0.40	0.34	U	0.34
Duplicate of J1V788	J1V795	5/14/15	3.69		0.275	87.7		0.46	43.4	X	0.39	0.35	U	0.35
DZ-1	J1V783	5/14/15	0.595		0.275	46.0		0.097	34.3	X	0.41	0.66	BM	0.37
DZ-2	J1V784	5/14/15	1.69		0.270	48.9		0.096	33.0	X	0.41	0.36	U	0.36
DZ-3	J1V785	5/14/15	7.01		0.270	67.3		0.092	40.0	X	0.39	2.5		0.36
DZ-4	J1V786	5/14/15	5.93		0.270	54.9		0.10	41.8	X	0.43	1.7		0.39
DZ-5	J1V787	5/14/15	1.90		0.265	57.7		0.099	42.2	X	0.42	0.38	U	0.38
DZ-7	J1V789	5/14/15	7.92		0.275	51.9		0.094	34.9	X	0.40	1.6		0.35
DZ-8	J1V790	5/14/15	47.1		0.260	38.8		0.090	29.5	X	0.38	0.35	U	0.35
DZ-9	J1V791	5/14/15	48.0		0.275	46.2		0.10	54.7	X	0.43	7.0		0.41
DZ-10	J1V792	5/14/15	4.48		0.265	56.1		0.10	39.5	X	0.43	0.40	U	0.40
DZ-11	J1V793	5/14/15	17.6		0.265	56.9		0.091	42.1	X	0.38	2.7	M	0.36
DZ-12	J1V794	5/14/15	7.41		0.260	52.1		0.090	34.6	X	0.38	0.680	B	0.350

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Uranium (KPA) ug/g	DS	Vanadium mg/kg	DS	Zinc mg/kg	DS	Nitrogen in Nitrate and Nitrite mg/kg	DS
DZ-6	J1V788/ J1V795	5/14/15	5.99	1	87.7	1	46.1	1	0.35	0
DZ-1	J1V783	5/14/15	0.595	1	46.0	1	34.3	1	0.66	1
DZ-2	J1V784	5/14/15	1.69	1	48.9	1	33.0	1	0.36	0
DZ-3	J1V785	5/14/15	7.01	1	67.3	1	40.0	1	2.5	1
DZ-4	J1V786	5/14/15	5.93	1	54.9	1	41.8	1	1.7	1
DZ-5	J1V787	5/14/15	1.90	1	57.7	1	42.2	1	0.38	0
DZ-7	J1V789	5/14/15	7.92	1	51.9	1	34.9	1	1.6	1
DZ-8	J1V790	5/14/15	47.1	1	38.8	1	29.5	1	0.35	0
DZ-9	J1V791	5/14/15	48.0	1	46.2	1	54.7	1	7.0	1
DZ-10	J1V792	5/14/15	4.48	1	56.1	1	39.5	1	0.40	0
DZ-11	J1V793	5/14/15	17.6	1	56.9	1	42.1	1	2.7	1
DZ-12	J1V794	5/14/15	7.41	1	52.1	1	34.6	1	0.68	1

Statistical Computations

	Uranium (KPA)	Vanadium	Zinc	Nitrogen in Nitrate and Nitrite
95% UCL based on	Use 95% Adjusted Gamma UCL	Use 95% Student's-t UCL	Use 95% Student's-t UCL	Use 95% KM (t) UCL
N	12	12	12	12
% < Detection limit	0%	0%	0%	42%
Mean	13.0	55.4	39.4	2.4
Standard deviation	16.7	12.5	6.8	2.2
95% UCL on mean	28.8	61.8	42.9	2.6
Maximum value	48.0	87.7	54.7	7.0

CALCULATION SHEET

Washington Closure Hanford

Originator	J. D. Skoglie	**Date**	06/24/15	**Calc. No.**	0300X-CA-V0230	**Rev. No.**	0
Project	300 Area Closure Operations	**Job No.**	14655	**Checked**	T. Q. Howell	**Date**	06/24/15
Subject	300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations					**Sheet No.**	12 of 16

300-263 and 316-3 Waste Sites BaP TEC Calculations
Verification Data - SZ

SZ			
300-263 and 316-3 Waste Sites Toxic Equivalent Concentrations of Benzo(a)pyrene. [a]			
Carcinogenic Polyaromatic Hydrocarbons	**Maximum Result (mg/kg)** [b]	**Toxic Equivalency Factor (Unitless)**	**Toxic Equivalent BAP Concentration (mg/kg)**
Chrysene	0.035	0.01	0.00035
Total Toxic Equivalent Concentration of Benzo(a)pyrene			0.00035

[a] From WAC 173-340-708(8)(e), Table 708-2 (Ecology 2007).
[b] From Sheet 4 Results Summary.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 06/23/15 **Calc. No.** 0300X-CA-V0230 **Rev. No.** 0
Project 300 Area Closure Operations **Job No.** 14655 **Checked** T. Q. Howell **Date** 06/23/15
Subject 300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 13 of 16

Duplicate/Split Analysis - 300-263 and 316-3 Waste Sites Shallow Zone (SZ)

Sampling Area	Sample Number	Sample Date	Potassium-40			Radium-226			Radium-228			Uranium (KPA)			Uranium-234			Uranium-238 (AEA)			Uranium-238 (GEA)			Aluminum			Arsenic		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	ug/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL
SZ-2	J1V770	5/14/15	14.4		0.165	0.351		0.0357	0.510		0.0801	0.781		0.131	0.296		0.185	0.350		0.167	0.417		0.289	4800		1.4	2.1		0.61
Duplicate of J1V770	J1V781	5/14/15	14.0		0.206	0.309		0.0369	0.471		0.0933	0.741		0.139	0.350		0.0583	0.458		0.0650	0.574		0.287	4520		1.6	1.6		0.66
Split of J1V770	J1V782	5/14/15	19.407		0.69	0.474		0.16	0.686		0.30	0.777		0.09	0.737		0.38	0.589		0.49	2.026		1.38	4030		7.02	3.03	B	0.517

Analysis:

TDL		0.5	0.1	0.2	1	1	1	1	5	10
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)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	2.8%							6.0%	
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Yes - assess further	No - acceptable
Split 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)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	29.6%							17.4%	
	Difference > 2 TDL?	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Yes - assess further	No - acceptable

Duplicate/Split Analysis - 300-263 and 316-3 Waste Sites Shallow Zone (SZ)

Sampling Area	Sample Number	Sample Date	Barium			Beryllium			Boron			Calcium			Chromium			Cobalt			Copper			Iron			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SZ-2	J1V770	5/14/15	58.3		0.070	0.062	B	0.030	2.0		0.90	5140		12.9	6.5		0.053	4.4		0.092	7.6		0.20	13800		3.5	3.4		0.25
Duplicate of J1V770	J1V781	5/14/15	38.6		0.076	0.053	B	0.033	1.4	B	0.98	5050		14.2	7.0		0.058	4.4		0.10	7.5		0.22	14000		3.8	2.3		0.27
Split of J1V770	J1V782	5/14/15	39.3		0.103	0.638		0.103	9.18		1.03	5100		8.26	5.8		0.155	5.11	BD	1.55	8.22		0.31	14700		8.26	3.46		0.341

Analysis:

TDL		2	0.5	2	100	1	2	1	5	5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	*40.7%*			1.8%	7.4%		1.3%	1.4%	
	Difference > 2 TDL?	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Yes - assess further	No - acceptable
Split 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)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	*38.9%*			0.8%	11.4%		7.8%	6.3%	
	Difference > 2 TDL?	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Yes - assess further	No - acceptable

Duplicate/Split Analysis - 300-263 and 316-3 Waste Sites Shallow Zone (SZ)

Sampling Area	Sample Number	Sample Date	Lithium			Magnesium			Manganese			Nickel			Potassium			Silicon			Sodium			Strontium			Tin		
			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
SZ-2	J1V770	5/14/15	5.5		0.28	3210		3.4	221		0.092	8.0		0.11	752		37.6	175		5.2	154		54.1	19.9		0.033	1.4	B	0.84
Duplicate of J1V770	J1V781	5/14/15	5.3		0.30	3240		3.7	206		0.10	7.6		0.12	710		41.2	165		5.7	138		59.2	17.4		0.036	1.3	B	0.92
Split of J1V770	J1V782	5/14/15	6.46	D	0.404	3170		8.78	200		0.207	8.32		0.155	657		6.61	467	N	1.55	105	C	7.23	18.4		0.103	3.1	DU	3.1

Analysis:

TDL		2.5	75	5	4	400	2	50	1	10
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD		0.9%	7.0%			5.9%		13.4%	
	Difference > 2 TDL?	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable
Split Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	
	RPD		1.3%	10.0%			*91.0%*		7.8%	
	Difference > 2 TDL?	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	Yes - assess further	No - acceptable	No - acceptable	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 06/23/15 **Calc. No.** 0300X-CA-V0230 **Rev. No.** 0
Project 300 Area Closure Operations **Job No.** 14655 **Checked** T. Q. Howell **Date** 06/23/15
Subject 300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 14 of 16

1 **Duplicate/Split Analysis - 300-263 and 316-3 Waste Sites Shallow Zone (SZ)**

2	Sampling	Sample	Sample	Uranium			Vanadium			Zinc			Zirconium			Nitrogen in Nitrate and Nitrite		
3	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
4	SZ-2	J1V770	5/14/15	0.55		0.0015	34.1		0.086	28.2		0.36	9.8		0.32	0.78		0.36
5	Duplicate of J1V770	J1V781	5/14/15	2.4		0.0015	35.1		0.094	27.1		0.40	10.3		0.36	0.87		0.35
6	Split of J1V770	J1V782	5/14/15	0.453	D	0.0133	36.1	D	1.03	30.2	D	4.13	10.4	D	0.101	0.583		0.169

7 **Analysis:**

8	TDL		0.002	1	1.0	2.5	2.5
9	Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
10		Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)
11		RPD	*125.4%*	2.9%	4.0%		
12		Difference > 2 TDL?	**Yes - assess further**	No - acceptable	No - acceptable	No - acceptable	No - acceptable
13							
14		Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
15	Split Analysis	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)
16		RPD	19.3%	5.7%	6.8%		
17		Difference > 2 TDL?	**Yes - assess further**	No - acceptable	No - acceptable	No - acceptable	No - acceptable

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 06/23/15 **Calc. No.** 0300X-CA-V0230 **Rev. No.** 0
Project 300 Area Closure Operations **Job No.** 14655 **Checked** T. Q. Howell **Date** 06/23/15
Subject 300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 15 of 16

Duplicate/Split Analysis - 300-263 and 316-3 Waste Sites Deep Zone (DZ)

Sampling Area	Sample Number	Sample Date	Potassium-40			Radium-226			Radium-228			Total beta radiostrontium			Uranium (KPA)			Uranium-234			Uranium-235 (AEA)			Uranium-238 (AEA)			Uranium-238 (GEA)		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	ug/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
DZ-6	J1V788	5/14/15	9.02		0.217	0.337		0.0348	0.510		0.0867	0.748		0.361	5.99		0.265	1.41		0.0537	0.0935		0.0428	1.29		0.0537	1.09		0.251
Duplicate of J1V788	J1V795	5/14/15	9.22		0.184	0.281		0.0380	0.438		0.0914	0.415		0.316	3.69		0.275	2.28		0.0661	0.115		0.0527	2.33		0.0693	0.376	U	1.18
Split of J1V788	J1V797	5/14/15	10.569		0.56	0.486		0.14	0.509		0.24	0.568	U	0.74	1.49		0.08	1.310		0.42	-0.035	U	0.53	1.448		0.43	1.796		1.69

Analysis:

TDL			0.5			0.1			0.2			1			1			1			1			1			1		
Duplicate Analysis	Both > PQL?		Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			No-Stop (acceptable)		
	Both >5xTDL?		Yes (calc RPD)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)					
	RPD		2.2%																										
	Difference > 2 TDL?		No - acceptable			No - acceptable			No - acceptable			No - acceptable			**Yes - assess further**			No - acceptable			No - acceptable			No - acceptable			No - acceptable		
Split Analysis	Both > PQL?		Yes (continue)			Yes (continue)			Yes (continue)			No-Stop (acceptable)			Yes (continue)			Yes (continue)			No-Stop (acceptable)			Yes (continue)			Yes (continue)		
	Both >5xTDL?		Yes (calc RPD)			No-Stop (acceptable)			No-Stop (acceptable)						No-Stop (acceptable)			No-Stop (acceptable)						No-Stop (acceptable)			No-Stop (acceptable)		
	RPD		15.8%																										
	Difference > 2 TDL?		**Yes - assess further**			No - acceptable			No - acceptable			No - acceptable			**Yes - assess further**			No - acceptable			No - acceptable			No - acceptable			No - acceptable		

Duplicate/Split Analysis - 300-263 and 316-3 Waste Sites Deep Zone (DZ)

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Calcium			Chromium			Cobalt			Copper			Iron			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
DZ-6	J1V788	5/14/15	4340		1.6	1.5		0.66	67.8		0.076	5570		14.2	3.6	X	0.058	11.2	X	0.50	16.2		1.1	28400		3.8	2.4	B	1.4
Duplicate of J1V788	J1V795	5/14/15	4460		1.5	1.7		0.64	67.2		0.074	5660		13.7	3.4	X	0.057	11.4	X	0.49	16.6		1.1	26900		3.7	2.1	B	1.3
Split of J1V788	J1V797	5/14/15	3480		6.7	1.82	B	0.493	52.0		0.0985	4960		7.88	2.82		0.148	10.4	D	1.48	15.4		0.296	26500		7.88	4.46		0.325

Analysis:

TDL			5			10			2			100			1			2			1			5			5		
Duplicate Analysis	Both > PQL?		Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)		
	Both >5xTDL?		Yes (calc RPD)			No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)			No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)			Yes (calc RPD)			No-Stop (acceptable)		
	RPD		2.7%						0.9%			1.6%						1.8%			2.4%			5.4%					
	Difference > 2 TDL?		**Yes - assess further**			No - acceptable			No - acceptable			No - acceptable			No - acceptable			No - acceptable			No - acceptable			**Yes - assess further**			No - acceptable		
Split 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)			Yes (calc RPD)			No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)			Yes (calc RPD)			No-Stop (acceptable)		
	RPD		22.0%						26.4%			11.6%						7.4%			5.1%			6.9%					
	Difference > 2 TDL?		**Yes - assess further**			No - acceptable			**Yes - assess further**			**Yes - assess further**			No - acceptable			No - acceptable			No - acceptable			**Yes - assess further**			No - acceptable		

Duplicate/Split Analysis - 300-263 and 316-3 Waste Sites Deep Zone (DZ)

Sampling Area	Sample Number	Sample Date	Lithium			Magnesium			Manganese			Nickel			Potassium			Silicon			Sodium			Strontium			Uranium		
			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-6	J1V788	5/14/15	3.1		0.30	4110	X	3.7	319		0.10	7.7	X	0.12	487		41.2	146		5.7	271		59.3	22.1	X	0.036	3.7		0.0014
Duplicate of J1V788	J1V795	5/14/15	3.1		0.29	4040	X	3.6	303		0.098	11.7	X	0.12	470		40.0	128		5.5	308		57.5	20.4	X	0.035	3.2		0.0016
Split of J1V788	J1V797	5/14/15	3.85	D	0.402	3580		8.38	282		0.197	6.01		0.148	419		6.31	357	N	1.48	178	C	6.9	16.3		0.0985	3.14	D	0.0133

Analysis:

TDL			2.5			75			5			4			400			2			50			1			0.002		
Duplicate Analysis	Both > PQL?		Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)		
	Both >5xTDL?		No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)			No-Stop (acceptable)			No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)			Yes (calc RPD)			Yes (calc RPD)		
	RPD					1.7%			5.1%									13.1%			12.8%			8.0%			14.5%		
	Difference > 2 TDL?		No - acceptable			No - acceptable			**Yes - assess further**			No - acceptable			No - acceptable			**Yes - assess further**			No - acceptable			No - acceptable			**Yes - assess further**		
Split Analysis	Both > PQL?		Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)		
	Both >5xTDL?		No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)			No-Stop (acceptable)			No-Stop (acceptable)			Yes (calc RPD)			No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)		
	RPD					13.8%			12.3%									*83.9%*						30.2%			16.4%		
	Difference > 2 TDL?		No - acceptable			**Yes - assess further**			**Yes - assess further**			No - acceptable			No - acceptable			**Yes - assess further**			No - acceptable			**Yes - assess further**			**Yes - assess further**		

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 06/23/15 **Calc. No.** 0300X-CA-V0230 **Rev. No.** 0
Project 300 Area Closure Operations **Job No.** 14655 **Checked** T. Q. Howell **Date** 06/23/15
Subject 300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 16 of 16

Duplicate/Split Analysis - 300-263 and 316-3 Waste Sites Deep Zone (DZ)

Sampling Area	Sample Number	Sample Date	Vanadium			Zinc			Zirconium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
DZ-6	J1V788	5/14/15	86.9		0.47	46.1	X	0.40	31.0		0.36
Duplicate of J1V788	J1V795	5/14/15	87.7		0.46	43.4	X	0.39	28.9		0.35
Split of J1V788	J1V797	5/14/15	86.0	D	0.985	52.4	D	3.94	32.2	D	0.101

Analysis:

TDL		1	1.0	2.5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD	0.9%	6.0%	7.0%
	Difference > 2 TDL?	No - acceptable	Yes - assess further	No - acceptable
Split Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD	1.0%	12.8%	3.8%
	Difference > 2 TDL?	No - acceptable	Yes - assess further	No - acceptable

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Radionuclides).

Sample Location	HEIS Number	Sample Date	Americium-241 (GEA)			Americium-241 (AEA)			Antimony-125			Cerium-144		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SZ-2	J1V770	5/14/15	0.0123	U	0.0299	0.00871	U	0.0820	0.0140	U	0.0485	-0.000805	U	0.0827
Duplicate of J1V770	J1V781	5/14/15	0.00247	U	0.0301	-0.000588	U	0.0535	0.0154	U	0.0510	-0.0190	U	0.0881
SZ-1	J1V769	5/14/15	-0.00334	U	0.0300	0.0201	U	0.0907	-0.0129	U	0.0472	-0.0158	U	0.0843
SZ-3	J1V771	5/14/15	-0.0559	U	0.0938	-0.00352	U	0.0731	-0.0226	U	0.0705	-0.0970	U	0.137
SZ-4	J1V772	5/14/15	0.00388	U	0.0292	-0.00425	U	0.0785	-0.0000680	U	0.0472	-0.0391	U	0.0848
SZ-5	J1V773	5/14/15	-0.00412	U	0.120	-0.00559	U	0.0789	-0.00735	U	0.0929	-0.0390	U	0.181
SZ-6	J1V774	5/14/15	-0.0678	U	0.129	0.0117	U	0.0698	0.0131	U	0.0671	-0.159	U	0.168
SZ-7	J1V775	5/14/15	-0.00348	U	0.0288	-0.00963	U	0.0968	-0.0110	U	0.0444	-0.0479	U	0.0798
SZ-8	J1V776	5/14/15	0.00398	U	0.0296	0.0246	U	0.0783	0.0130	U	0.0447	-0.0270	U	0.0828
SZ-9	J1V777	5/14/15	-0.0156	U	0.0280	0.0110	U	0.0719	0.0113	U	0.0468	-0.0187	U	0.0865
SZ-10	J1V778	5/14/15	0.0216	U	0.156	0.0251	U	0.0796	0.00936	U	0.0516	-0.00680	U	0.114
SZ-11	J1V779	5/14/15	-0.0125	U	0.0301	0.0116	U	0.0630	-0.0190	U	0.0465	0.00590	U	0.0877
SZ-12	J1V780	5/14/15	0.00549	U	0.0303	0.0290	U	0.0609	0.0169	U	0.0481	-0.0216	U	0.0836
DZ-6	J1V788	5/14/15	0.00458	U	0.0261	-0.00831	U	0.0875	0.00746	U	0.0432	0.00801	U	0.0763
Duplicate of J1V788	J1V795	5/14/15	-0.0311	U	0.152	0.00585	U	0.0922	0.00541	U	0.0542	-0.0564	U	0.111
DZ-1	J1V783	5/14/15	0.00322	U	0.164	0.0166	U	0.0450	-0.00968	U	0.0533	-0.0233	U	0.114
DZ-2	J1V784	5/14/15	0.0143	U	0.0278	0.0133	U	0.0584	0.00274	U	0.0451	0.00222	U	0.0846
DZ-3	J1V785	5/14/15	-0.0241	U	0.0869	-0.000634	U	0.0577	0.0406	U	0.0747	0.0282	U	0.142
DZ-4	J1V786	5/14/15	-0.158	U	0.151	-0.00264	U	0.0632	-0.00791	U	0.0743	-0.181	U	0.199
DZ-5	J1V787	5/14/15	-0.0504	U	0.154	0.0156	U	0.0593	-0.0150	U	0.0585	0.0642	U	0.129
DZ-7	J1V789	5/14/15	-0.00747	U	0.0289	-0.00694	U	0.0857	-0.00207	U	0.0426	-0.0253	U	0.0864
DZ-8	J1V790	5/14/15	0.00500	U	0.0282	-0.00481	U	0.0803	-0.0105	U	0.0421	0.0176	U	0.0784
DZ-9	J1V791	5/14/15	-0.0273	U	0.0592	0.0101	U	0.0794	0.00460	U	0.0669	-0.0152	U	0.140
DZ-10	J1V792	5/14/15	0.0585	U	0.107	-0.00399	U	0.0737	0.0198	U	0.0846	-0.0480	U	0.151
DZ-11	J1V793	5/14/15	-0.118	U	0.148	0.00859	U	0.0809	-0.0224	U	0.0691	-0.0644	U	0.186
DZ-12	J1V794	5/14/15	0.0201	U	0.0288	-0.00294	U	0.0705	0.00388	U	0.0450	-0.00886	U	0.0848
Split of J1V770	J1V782	5/14/15	-0.024	U	0.13	0.020	U	0.09	-0.002	U	0.16	-0.171	U	0.33
Split of J1V788	J1V797	5/14/15	-0.001	U	0.09	0.022	U	0.06	-0.038	U	0.12	-0.232	U	0.29

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

Gray cells indicate not applicable.

Note: Data qualified with B, C, D, J, N and/or X are considered acceptable

AEA = alpha energy analysis

B = Estimated result. Result is less than the RL, but greater than MDL.

C = Target analyte was detected in the sample and the associated blank.

D = dilution

DZ = deep zone

GEA = gamma energy analysis

HEIS = Hanford Environmental Information System

J = estimate

M = sample duplicate precision not met.

MDA = minimal detectable activity

MDL = method detection limit

N = recovery is outside the control limits

PCB = polychlorinated biphenyls

PQL = practical quantitation limit

Q = qualifier

R = rejected

SVOA = semivolatile organic analysis

SZ = shallow zone

U = undetected

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

Attachment	1	Sheet No.	1 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Radionuclides).

Sample Location	HEIS Number	Sample Date	Cesium-134			Cesium-137			Cobalt-60			Curium-244		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SZ-2	J1V770	5/14/15	0.0290	U	0.0282	-0.0107	U	0.0200	0.0113	U	0.0259	0.0122	U	0.0664
Duplicate of J1V770	J1V781	5/14/15	0.0122	U	0.0272	-0.00126	U	0.0218	0.00213	U	0.0235	-0.00118	U	0.0592
SZ-1	J1V769	5/14/15	0.0281	U	0.0323	-0.00055	U	0.0224	0.00846	U	0.0267	0.00748	U	0.0853
SZ-3	J1V771	5/14/15	0.0126	U	0.0370	-0.00293	U	0.0330	-0.0119	U	0.0321	-0.00352	U	0.0731
SZ-4	J1V772	5/14/15	0.0189	U	0.0285	0.00445	U	0.0211	-0.00332	U	0.0240	-0.00243	U	0.0694
SZ-5	J1V773	5/14/15	0.0333	U	0.0484	0.0289	U	0.0483	0.00255	U	0.0411	0.0112	U	0.0669
SZ-6	J1V774	5/14/15	0.0206	U	0.0322	0.0147	U	0.0284	-0.0116	U	0.0246	0.0134	U	0.0587
SZ-7	J1V775	5/14/15	0.0271	U	0.0293	-0.00656	U	0.0208	0.00254	U	0.0272	-0.00843	U	0.0932
SZ-8	J1V776	5/14/15	0.0306	U	0.0304	-0.00875	U	0.0193	-0.0123	U	0.0225	0.00763	U	0.0871
SZ-9	J1V777	5/14/15	0.0489	U	0.0293	-0.00515	U	0.0213	-0.00166	U	0.0224	-0.00173	U	0.0624
SZ-10	J1V778	5/14/15	0.0175	U	0.0282	-0.000818	U	0.0220	0.00547	U	0.0261	-0.00239	U	0.0682
SZ-11	J1V779	5/14/15	0.0286	U	0.0316	0.00721	U	0.0245	0.00618	U	0.0274	-0.00276	U	0.0661
SZ-12	J1V780	5/14/15	0.0235	U	0.0276	-0.0121	U	0.0196	0.00953	U	0.0241	-0.00121	U	0.0609
DZ-6	J1V788	5/14/15	0.0190	U	0.0273	-0.0000162	U	0.0201	0.00229	U	0.0247	0.00721	U	0.0823
Duplicate of J1V788	J1V795	5/14/15	0.0168	U	0.0278	0.0101	U	0.0238	-0.000501	U	0.0243	-0.00819	U	0.0905
DZ-1	J1V783	5/14/15	0.0272	U	0.0279	0.000286	U	0.0231	-0.0026	U	0.0229	-0.000665	U	0.0605
DZ-2	J1V784	5/14/15	0.0110	U	0.0275	0.000556	U	0.0201	-0.00351	U	0.0223	-0.00174	U	0.0627
DZ-3	J1V785	5/14/15	0.0194	U	0.0383	-0.0189	U	0.0294	0.0016	U	0.0341	-0.000635	U	0.0577
DZ-4	J1V786	5/14/15	0.0385	U	0.0378	-0.0176	U	0.0286	0.00355	U	0.0311	-0.000529	U	0.0481
DZ-5	J1V787	5/14/15	0.0259	U	0.0313	-0.00949	U	0.0228	0.00726	U	0.0279	0	U	0.0442
DZ-7	J1V789	5/14/15	0.0336	U	0.0287	-0.00366	U	0.0221	0.00175	U	0.0240	-0.00637	U	0.0838
DZ-8	J1V790	5/14/15	0.0160	U	0.0262	0.00964	U	0.0219	0.000412	U	0.0256	-0.00241	U	0.0687
DZ-9	J1V791	5/14/15	0.0587	U	0.0451	0.00532	U	0.0326	-0.0122	U	0.0321	-0.00357	U	0.0742
DZ-10	J1V792	5/14/15	0.0204	U	0.0400	-0.00219	U	0.0367	0.0120	U	0.0407	0.0120	U	0.0652
DZ-11	J1V793	5/14/15	0.00860	U	0.0332	0.0419	U	0.0351	0.00971	U	0.0295	0.0115	U	0.0687
DZ-12	J1V794	5/14/15	0.0419	U	0.0296	-0.00316	U	0.0200	-0.00642	U	0.0214	-0.00118	U	0.0593
Split of J1V770	J1V782	5/14/15	-0.007	U	0.05	-0.019	U	0.05	0.032	U	0.07	0.066	U	0.07
Split of J1V788	J1V797	5/14/15	-0.007	U	0.05	0.009	U	0.05	0.027	U	0.06	-0.009	U	0.07

Sample Location	HEIS Number	Sample Date	Europium-152			Europium-154			Europium-155			Lead-212		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SZ-2	J1V770	5/14/15	-0.0152	U	0.0456	0.0146	U	0.0797	0.0363	U	0.0440			
Duplicate of J1V770	J1V781	5/14/15	0.00925	U	0.0496	0.0333	U	0.0837	0.00921	U	0.0439			
SZ-1	J1V769	5/14/15	-0.00688	U	0.0465	-0.00814	U	0.0900	0.0364	U	0.0435			
SZ-3	J1V771	5/14/15	0.00089	U	0.0797	0.0263	U	0.119	0.0440	U	0.0799			
SZ-4	J1V772	5/14/15	0.00153	U	0.0463	-0.00377	U	0.0759	0.0443	U	0.0452			
SZ-5	J1V773	5/14/15	-0.0145	U	0.103	0.0106	U	0.136	0.0877	U	0.0994			
SZ-6	J1V774	5/14/15	-0.0271	U	0.0769	-0.0157	U	0.0849	-0.0380	U	0.0898			
SZ-7	J1V775	5/14/15	-0.0107	U	0.0458	0.0182	U	0.0884	0.0378	U	0.0426			
SZ-8	J1V776	5/14/15	-0.00365	U	0.0434	-0.00753	U	0.0765	0.0293	U	0.0433			
SZ-9	J1V777	5/14/15	0.00190	U	0.0449	0.0113	U	0.0785	0.0393	U	0.0452			
SZ-10	J1V778	5/14/15	0.0119	U	0.0557	-0.00351	U	0.0831	-0.00750	U	0.0619			
SZ-11	J1V779	5/14/15	-0.0305	U	0.0439	0.00390	U	0.0770	0.0254	U	0.0444			
SZ-12	J1V780	5/14/15	-0.0115	U	0.0437	0.0184	U	0.0845	0.0432	U	0.0437			
DZ-6	J1V788	5/14/15	0.00525	U	0.0434	0.0114	U	0.0747	0.0346	U	0.0400			
Duplicate of J1V788	J1V795	5/14/15	0.0150	U	0.0571	0.0191	U	0.0784	0.0273	U	0.0653			
DZ-1	J1V783	5/14/15	0.0204	U	0.0574	0.0158	U	0.0822	0.0584	U	0.0713			
DZ-2	J1V784	5/14/15	-0.0243	U	0.0433	0.00718	U	0.0757	0.0347	U	0.0422			
DZ-3	J1V785	5/14/15	0.00342	U	0.0776	0.0151	U	0.110	0.0228	U	0.072			
DZ-4	J1V786	5/14/15	-0.0711	U	0.0814	-0.0117	U	0.0936	0.0274	U	0.109			
DZ-5	J1V787	5/14/15	-0.0234	U	0.0597	-0.00263	U	0.082	0.00906	U	0.0709			
DZ-7	J1V789	5/14/15	0.0150	U	0.0468	0.0395	U	0.0854	0.0201	U	0.0449			
DZ-8	J1V790	5/14/15	-0.00460	U	0.0405	-0.0114	U	0.0834	0.0281	U	0.0396			
DZ-9	J1V791	5/14/15	-0.0223	U	0.0653	0.00373	U	0.103	0.122	U	0.0805			
DZ-10	J1V792	5/14/15	0.0264	U	0.0872	-0.0675	U	0.110	0.0342	U	0.0834			
DZ-11	J1V793	5/14/15	0.0954	U	0.0806	-0.00347	U	0.0888	0.00202	U	0.102			
DZ-12	J1V794	5/14/15	-0.00704	U	0.0451	0.0183	U	0.0741	0.0369	U	0.0439			
Split of J1V770	J1V782	5/14/15	0.069	U	0.16	0.013	U	0.09	-0.093	U	0.15	0.626		0.18
Split of J1V788	J1V797	5/14/15	0.047	U	0.14	-0.003	U	0.07	-0.078	U	0.12	0.580		0.13

Attachment	1	Sheet No.	2 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Radionuclides).

Sample Location	HEIS Number	Sample Date	Lead-214			Plutonium-238			Plutonium-239/240			Potassium-40		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SZ-2	J1V770	5/14/15				0.0250	U	0.0750	0.0110	U	0.0724	14.4		0.165
Duplicate of J1V770	J1V781	5/14/15				0.0152	U	0.0667	-0.000662	U	0.0603	14.0		0.206
SZ-1	J1V769	5/14/15				-0.00537	U	0.0896	-0.00470	U	0.0867	14.6		0.274
SZ-3	J1V771	5/14/15				0.0347	U	0.101	-0.00243	U	0.0695	13.0		0.240
SZ-4	J1V772	5/14/15				0.0242	U	0.0769	0.0259	U	0.0689	13.7		0.189
SZ-5	J1V773	5/14/15				0.0203	U	0.101	0.0763		0.0560	7.95		0.389
SZ-6	J1V774	5/14/15				0.0280	U	0.0643	0.0268	U	0.0713	13.8		0.192
SZ-7	J1V775	5/14/15				0.0253	U	0.0718	0.0138	U	0.0524	14.2		0.250
SZ-8	J1V776	5/14/15				0.0260	U	0.0737	0.0130	U	0.0638	14.0		0.180
SZ-9	J1V777	5/14/15				-0.00235	U	0.0672	0.0123	U	0.0672	13.7		0.192
SZ-10	J1V778	5/14/15				0.0157	U	0.0688	0.0342	U	0.0463	14.0		0.218
SZ-11	J1V779	5/14/15				-0.000649	U	0.0590	0.372		0.0653	13.6		0.251
SZ-12	J1V780	5/14/15				0.0321	U	0.0597	0.0492		0.0444	14.4		0.191
DZ-6	J1V788	5/14/15				0.0242	U	0.0769	0.0259	U	0.0689	9.02		0.217
Duplicate of J1V788	J1V795	5/14/15				-0.000595	U	0.0542	-0.00119	U	0.0599	9.22		0.184
DZ-1	J1V783	5/14/15				0.0100	U	0.104	0.105		0.0819	13.2		0.238
DZ-2	J1V784	5/14/15				0.0322	U	0.102	0	U	0.0519	10.3		0.167
DZ-3	J1V785	5/14/15				0.0242	U	0.0856	0.0449	U	0.0552	9.46		0.250
DZ-4	J1V786	5/14/15				-0.00426	U	0.0787	0.0268	U	0.0759	14.5		0.192
DZ-5	J1V787	5/14/15				0.0189	U	0.0982	0.102		0.0594	11.6		0.236
DZ-7	J1V789	5/14/15				0.00490	U	0.100	-0.000612	U	0.0557	9.81		0.200
DZ-8	J1V790	5/14/15				-0.00296	U	0.0844	-0.00369	U	0.0884	13.8		0.266
DZ-9	J1V791	5/14/15				-0.00364	U	0.0757	0.0297	U	0.0552	16.2		0.238
DZ-10	J1V792	5/14/15				0.0105	U	0.0821	-0.00184	U	0.0664	12.9		0.328
DZ-11	J1V793	5/14/15				0.0123	U	0.0668	0.0561	U	0.0668	11.8		0.215
DZ-12	J1V794	5/14/15				0.0147	U	0.0642	0.0160	U	0.0432	9.64		0.157
Split of J1V770	J1V782	5/14/15	0.496		0.14	0.029	U	0.10	0.137		0.12	19.407		0.69
Split of J1V788	J1V797	5/14/15	0.386		0.16	0.103		0.07	0.059	U	0.06	10.569		0.56

Sample Location	HEIS Number	Sample Date	Protactinium-234m			Radium-226			Radium-228			Ruthenium-106		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SZ-2	J1V770	5/14/15				0.351		0.0357	0.510		0.0801	-0.0214	U	0.167
Duplicate of J1V770	J1V781	5/14/15				0.309		0.0369	0.471		0.0933	0.0324	U	0.186
SZ-1	J1V769	5/14/15				0.336	U	0.0887	0.617		0.0876	-0.0246	U	0.183
SZ-3	J1V771	5/14/15				0.361		0.0632	0.531		0.122	-0.0765	U	0.243
SZ-4	J1V772	5/14/15				0.293		0.0364	0.433		0.0732	-0.0697	U	0.160
SZ-5	J1V773	5/14/15				0.715		0.0698	0.707		0.140	-0.0157	U	0.329
SZ-6	J1V774	5/14/15				0.374		0.0507	0.494	U	0.175	0.0793	U	0.239
SZ-7	J1V775	5/14/15				0.419		0.0358	0.676		0.0844	0.0100	U	0.174
SZ-8	J1V776	5/14/15				0.424		0.0353	0.711		0.0759	-0.0192	U	0.160
SZ-9	J1V777	5/14/15				0.315		0.0336	0.637		0.0869	-0.0201	U	0.175
SZ-10	J1V778	5/14/15				0.355		0.0385	0.507		0.0866	-0.0430	U	0.174
SZ-11	J1V779	5/14/15				0.442	U	0.0933	0.641		0.0861	0.100	U	0.186
SZ-12	J1V780	5/14/15				0.335		0.0374	0.533		0.0898	-0.0107	U	0.166
DZ-6	J1V788	5/14/15				0.337		0.0348	0.510		0.0867	0.0939	U	0.175
Duplicate of J1V788	J1V795	5/14/15				0.281		0.0380	0.438		0.0914	-0.00603	U	0.174
DZ-1	J1V783	5/14/15				0.372		0.0434	0.661		0.0868	-0.0809	U	0.174
DZ-2	J1V784	5/14/15				0.297		0.0374	0.509		0.0785	0.0695	U	0.172
DZ-3	J1V785	5/14/15				0.298		0.0532	0.394		0.109	0.159	U	0.280
DZ-4	J1V786	5/14/15				0.508		0.0564	0.951		0.113	-0.0701	U	0.247
DZ-5	J1V787	5/14/15				0.349		0.0409	0.617		0.0924	0.00405	U	0.196
DZ-7	J1V789	5/14/15				0.377		0.0345	0.490		0.0817	-0.0735	U	0.167
DZ-8	J1V790	5/14/15				0.311		0.0375	0.665		0.0835	0.0528	U	0.171
DZ-9	J1V791	5/14/15				0.517		0.0552	1.19		0.118	-0.0333	U	0.262
DZ-10	J1V792	5/14/15				0.438		0.0601	0.714		0.125	-0.00314	U	0.278
DZ-11	J1V793	5/14/15				0.356		0.0576	0.826		0.101	-0.128	U	0.238
DZ-12	J1V794	5/14/15				0.348		0.0339	0.524		0.0784	-0.0301	U	0.155
Split of J1V770	J1V782	5/14/15	2.321	U	6.69	0.474		0.16	0.686		0.30	0.068	U	0.47
Split of J1V788	J1V797	5/14/15	1.209	U	5.94	0.486		0.14	0.509		0.24	0.062	U	0.44

Attachment	1	Sheet No.	3 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Radionuclides).

Sample Location	HEIS Number	Sample Date	Thallium-208			Thorium-234			Total beta radiostrontium			Uranium (KPA)		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	ug/g	Q	MDA
SZ-2	J1V770	5/14/15							0.333	U	0.403	0.781		0.131
Duplicate of J1V770	J1V781	5/14/15							0.401	U	0.472	0.741		0.139
SZ-1	J1V769	5/14/15							0	U	0.436	3.50		0.134
SZ-3	J1V771	5/14/15							0.340	U	0.395	0.522		0.136
SZ-4	J1V772	5/14/15							-0.175	U	0.425	3.86		0.131
SZ-5	J1V773	5/14/15							0.274	U	0.450	3.80		0.138
SZ-6	J1V774	5/14/15							0.287	U	0.451	1.91		0.135
SZ-7	J1V775	5/14/15							0.264	U	0.470	0.415		0.134
SZ-8	J1V776	5/14/15							0.0337	U	0.415	4.93		0.136
SZ-9	J1V777	5/14/15							0.00751	U	0.445	0.702		0.131
SZ-10	J1V778	5/14/15							-0.0436	U	0.407	0.544		0.140
SZ-11	J1V779	5/14/15							0.0269	U	0.428	7.60		0.134
SZ-12	J1V780	5/14/15							1.72		0.464	3.08		0.136
DZ-6	J1V788	5/14/15							0.748		0.361	5.99		0.265
Duplicate of J1V788	J1V795	5/14/15							0.415		0.316	3.69		0.275
DZ-1	J1V783	5/14/15							0.0266	U	0.353	0.595		0.275
DZ-2	J1V784	5/14/15							-0.0333	U	0.389	1.69		0.270
DZ-3	J1V785	5/14/15							0.115	U	0.354	7.01		0.270
DZ-4	J1V786	5/14/15							-0.0494	U	0.336	5.93		0.270
DZ-5	J1V787	5/14/15							0.0657	U	0.388	1.90		0.265
DZ-7	J1V789	5/14/15							0.528		0.391	7.92		0.275
DZ-8	J1V790	5/14/15							0.111	U	0.369	47.1		0.260
DZ-9	J1V791	5/14/15							0.00669	U	0.338	48.0		0.275
DZ-10	J1V792	5/14/15							0.211	U	0.281	4.48		0.265
DZ-11	J1V793	5/14/15							0.0377	U	0.313	17.6		0.265
DZ-12	J1V794	5/14/15							0.185	U	0.32	7.41		0.260
Split of J1V770	J1V782	5/14/15	0.530		0.16	2.026		1.38	1.247		0.67	0.777		0.09
Split of J1V788	J1V797	5/14/15	0.476		0.11	1.796		1.69	0.568	U	0.74	1.49		0.08

Sample Location	HEIS Number	Sample Date	Uranium-234			Uranium-235 (AEA)			Uranium-235 (GEA)			Uranium-238 (AEA)		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SZ-2	J1V770	5/14/15	0.296		0.185	-0.0121	U	0.141	0.0566	U	0.0917	0.350		0.167
Duplicate of J1V770	J1V781	5/14/15	0.350		0.0583	0.0238	U	0.0443	-0.00685	U	0.0938	0.458		0.0650
SZ-1	J1V769	5/14/15	1.56		0.0804	0.0791		0.0727	0.0549	U	0.0911	1.69		0.0913
SZ-3	J1V771	5/14/15	0.256		0.0868	-0.00212	U	0.0606	0.00949	U	0.155	0.217		0.0837
SZ-4	J1V772	5/14/15	1.44		0.0690	0.0479	U	0.0492	0.0315	U	0.0921	1.05		0.0690
SZ-5	J1V773	5/14/15	1.52		0.0511	0.0757		0.0462	0.115	U	0.202	1.36		0.0511
SZ-6	J1V774	5/14/15	0.65		0.0562	0.0241	U	0.0448	-0.0356	U	0.171	0.614		0.0495
SZ-7	J1V775	5/14/15	0.382		0.118	0.0202	U	0.0608	0.0417	U	0.0868	0.322		0.120
SZ-8	J1V776	5/14/15	1.68		0.0427	0.045	U	0.0536	0.0639	U	0.0917	2.06		0.0427
SZ-9	J1V777	5/14/15	0.229		0.0487	0.0116	U	0.0441	0.0161	U	0.0908	0.214		0.0647
SZ-10	J1V778	5/14/15	0.206		0.0941	0.00607	U	0.0693	-0.00836	U	0.115	0.164		0.0838
SZ-11	J1V779	5/14/15	2.74		0.0853	0.0541	U	0.0717	0.114		0.0894	3.61		0.0988
SZ-12	J1V780	5/14/15	0.796		0.0697	0.0365	U	0.0449	0.0797	U	0.0920	0.820		0.0732
DZ-6	J1V788	5/14/15	1.41		0.0537	0.0935		0.0428	0.0865		0.0788	1.29		0.0537
Duplicate of J1V788	J1V795	5/14/15	2.28		0.0661	0.115		0.0527	0.0461	U	0.121	2.33		0.0693
DZ-1	J1V783	5/14/15	0.18		0.0561	0.0273	U	0.0508	0.00104	U	0.124	0.221		0.0637
DZ-2	J1V784	5/14/15	0.685		0.271	0.0406	U	0.201	0.0299	U	0.0900	0.614		0.226
DZ-3	J1V785	5/14/15	1.93		0.0935	0.109		0.0700	0.0382	U	0.149	1.93		0.0919
DZ-4	J1V786	5/14/15	1.98		0.0680	0.0943		0.0550	0.155	U	0.209	2.15		0.0697
DZ-5	J1V787	5/14/15	0.948		0.0562	0.0134	U	0.0508	0.0206	U	0.124	0.766		0.0603
DZ-7	J1V789	5/14/15	1.35		0.194	0.0711	U	0.0989	0.186		0.0897	1.66		0.181
DZ-8	J1V790	5/14/15	1		0.0536	0.0476	U	0.0566	0.0250	U	0.0832	0.917		0.0451
DZ-9	J1V791	5/14/15	18.5		0.0510	0.868		0.0510	0.879		0.139	18.0		0.0671
DZ-10	J1V792	5/14/15	2.55		0.0539	0.0735		0.0539	0.156	U	0.176	2.96		0.0401
DZ-11	J1V793	5/14/15	7.55		0.0799	0.227		0.0582	0.264	U	0.198	7.31		0.0925
DZ-12	J1V794	5/14/15	2.92		0.0840	0.0868		0.0545	0.0979	U	0.0932	3.00		0.0781
Split of J1V770	J1V782	5/14/15	0.737		0.38	-0.024	U	0.34	0.229	U	0.35	0.589		0.49
Split of J1V788	J1V797	5/14/15	1.310		0.42	-0.035	U	0.53	-0.081	U	0.32	1.448		0.43

Attachment	1	Sheet No.	4 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Radionuclides).

Sample Location	HEIS Number	Sample Date	Uranium-238 (GEA)			Zinc-65		
			pCi/g	Q	MDA	pCi/g	Q	MDA
SZ-2	J1V770	5/14/15	0.417		0.289	-0.0158	U	0.0538
Duplicate of J1V770	J1V781	5/14/15	0.574		0.287	-0.00216	U	0.0553
SZ-1	J1V769	5/14/15	0.715		0.283	-0.0655	U	0.0622
SZ-3	J1V771	5/14/15	0.137	U	0.913	0.0209	U	0.0769
SZ-4	J1V772	5/14/15	0.572		0.282	-0.00584	U	0.0540
SZ-5	J1V773	5/14/15	1.87		1.07	-0.0279	U	0.0955
SZ-6	J1V774	5/14/15	0.770	U	1.14	0.00676	U	0.0624
SZ-7	J1V775	5/14/15	0.481		0.283	-0.0177	U	0.0528
SZ-8	J1V776	5/14/15	0.922		0.285	-0.0147	U	0.0518
SZ-9	J1V777	5/14/15	0.353		0.290	0.0114	U	0.0548
SZ-10	J1V778	5/14/15	1.18	U	1.23	0.0136	U	0.0564
SZ-11	J1V779	5/14/15	1.52		0.297	-0.133	U	0.0569
SZ-12	J1V780	5/14/15	0.664		0.282	-0.0281	U	0.0504
DZ-6	J1V788	5/14/15	1.09		0.251	-0.00332	U	0.0534
Duplicate of J1V788	J1V795	5/14/15	0.376	U	1.18	0.0184	U	0.0502
DZ-1	J1V783	5/14/15	1.26	U	1.30	0.00452	U	0.0538
DZ-2	J1V784	5/14/15	0.499		0.268	-0.0144	U	0.0439
DZ-3	J1V785	5/14/15	0.856	U	0.908	-0.0241	U	0.0658
DZ-4	J1V786	5/14/15	2.02	U	1.40	0.0555	U	0.0781
DZ-5	J1V787	5/14/15	0.869	U	1.29	-0.00833	U	0.0579
DZ-7	J1V789	5/14/15	2.06		0.294	0.00873	U	0.0465
DZ-8	J1V790	5/14/15	0.533		0.266	-0.00379	U	0.0562
DZ-9	J1V791	5/14/15	16.5		0.528	-0.0236	U	0.0681
DZ-10	J1V792	5/14/15	1.08		0.947	0.0092	U	0.0843
DZ-11	J1V793	5/14/15	3.22	U	1.38	-0.0158	U	0.0723
DZ-12	J1V794	5/14/15	1.21		0.274	-0.00162	U	0.0497
Split of J1V770	J1V782	5/14/15	2.026		1.38	0.005	U	0.13
Split of J1V788	J1V797	5/14/15	1.796		1.69	-0.032	U	0.09

Attachment	1	Sheet No.	5 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Metals, Anions, TPH, and Physical).

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SZ-2	J1V770	5/14/15	4800		1.4	0.35	U	0.35	2.1		0.61	58.3		0.070
Duplicate of J1V770	J1V781	5/14/15	4520		1.6	0.38	U	0.38	1.6		0.66	38.6		0.076
SZ-1	J1V769	5/14/15	5350		1.6	0.40	U	0.40	2.7		0.69	63.2		0.080
SZ-3	J1V771	5/14/15	6150		1.6	0.39	U	0.39	2.6		0.68	58.8		0.078
SZ-4	J1V772	5/14/15	4880		1.5	0.37	U	0.37	2.0		0.63	50.5		0.073
SZ-5	J1V773	5/14/15	10500		1.9	0.46	U	0.46	3.9		0.80	654		0.092
SZ-6	J1V774	5/14/15	5920		1.4	0.35	U	0.35	2.5		0.61	62.5		0.071
SZ-7	J1V775	5/14/15	5290		1.5	0.37	U	0.37	2.2		0.64	48.4		0.073
SZ-8	J1V776	5/14/15	5720		1.6	0.39	U	0.39	2.4		0.68	63.5		0.079
SZ-9	J1V777	5/14/15	4870		1.4	0.34	U	0.34	2.5		0.58	55.0		0.067
SZ-10	J1V778	5/14/15	6610		1.4	0.35	U	0.35	2.3		0.61	71.7		0.071
SZ-11	J1V779	5/14/15	5130		1.5	0.37	U	0.37	2.9		0.64	73.4		0.074
SZ-12	J1V780	5/14/15	5120		1.7	0.41	U	0.41	2.9		0.70	52.8		0.081
DZ-6	J1V788	5/14/15	4340		1.6	1.9	U	1.9	1.5		0.66	67.8		0.076
Duplicate of J1V788	J1V795	5/14/15	4460		1.5	1.9	U	1.9	1.7		0.64	67.2		0.074
DZ-1	J1V783	5/14/15	6440		1.6	0.39	U	0.39	2.5		0.68	88.5		0.078
DZ-2	J1V784	5/14/15	3720		1.6	0.39	U	0.39	1.9		0.67	49.5		0.077
DZ-3	J1V785	5/14/15	4890		1.5	0.37	U	0.37	1.7		0.65	77.7		0.075
DZ-4	J1V786	5/14/15	7890		1.7	0.41	U	0.41	3.7		0.71	91.0		0.082
DZ-5	J1V787	5/14/15	6370		1.6	0.40	U	0.40	2.9		0.69	71.3		0.080
DZ-7	J1V789	5/14/15	4360		1.5	0.38	U	0.38	2.1		0.66	63.8		0.076
DZ-8	J1V790	5/14/15	5300		1.5	0.37	U	0.37	2.0		0.63	45.0		0.073
DZ-9	J1V791	5/14/15	16000		1.7	0.41	U	0.41	5.6		0.72	126		0.083
DZ-10	J1V792	5/14/15	6890		1.7	0.41	U	0.41	3.4		0.71	73.6		0.082
DZ-11	J1V793	5/14/15	5550		1.5	0.37	U	0.37	2.4		0.64	57.9		0.073
DZ-12	J1V794	5/14/15	3930		1.5	0.37	U	0.37	1.8		0.64	55.9		0.073
Split of J1V770	J1V782	5/14/15	4030		7.02	7.21	BD	3.41	3.03	B	0.517	39.3		0.103
Split of J1V788	J1V797	5/14/15	3480		6.7	16.3	D	3.25	1.82	B	0.493	52.0		0.0985
Equipment Blank	J1V796	5/14/15	87.3		1.4	0.34	U	0.34	0.59	U	0.59	1.1		0.068

Sample Location	HEIS Number	Sample Date	Beryllium			Boron			Cadmium			Calcium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SZ-2	J1V770	5/14/15	0.062	B	0.030	2.0		0.90	0.038	U	0.038	5140		12.9
Duplicate of J1V770	J1V781	5/14/15	0.053	B	0.033	1.4	B	0.98	0.041	U	0.041	5050		14.2
SZ-1	J1V769	5/14/15	0.071	B	0.035	1.0	U	1.0	0.043	U	0.043	3060		14.8
SZ-3	J1V771	5/14/15	0.082	B	0.034	1.6	B	1.0	0.046	B	0.042	4950		14.4
SZ-4	J1V772	5/14/15	0.071	B	0.032	0.94	U	0.94	0.039	U	0.039	3070		13.6
SZ-5	J1V773	5/14/15	0.71		0.040	135		1.2	0.15	B	0.049	28500		17.0
SZ-6	J1V774	5/14/15	0.083	B	0.031	1.1	B	0.91	0.038	U	0.038	3770		13.1
SZ-7	J1V775	5/14/15	0.071	B	0.032	0.94	U	0.94	0.040	U	0.040	3600		13.6
SZ-8	J1V776	5/14/15	0.080	B	0.034	1.0	B	1.0	0.042	U	0.042	4720		14.6
SZ-9	J1V777	5/14/15	0.043	B	0.029	1.4	B	0.87	0.036	U	0.036	4790		12.5
SZ-10	J1V778	5/14/15	0.11	B	0.031	1.2	B	0.91	0.070	B	0.038	2660		13.1
SZ-11	J1V779	5/14/15	0.083	B	0.032	2.5		0.95	0.040	U	0.040	5680		13.7
SZ-12	J1V780	5/14/15	0.079	B	0.035	1.0	U	1.0	0.056	B	0.044	6020		15.1
DZ-6	J1V788	5/14/15	0.17	U	0.17	0.98	U	0.98	0.041	U	0.041	5570		14.2
Duplicate of J1V788	J1V795	5/14/15	0.16	U	0.16	0.96	U	0.96	0.040	U	0.040	5660		13.7
DZ-1	J1V783	5/14/15	0.12	B	0.034	4.2	M	1.0	0.067	B	0.042	5940		14.5
DZ-2	J1V784	5/14/15	0.034	U	0.034	1.0	U	1.0	0.042	U	0.042	3600		14.4
DZ-3	J1V785	5/14/15	0.032	U	0.032	0.96	U	0.96	0.040	U	0.040	5350		13.8
DZ-4	J1V786	5/14/15	0.14	B	0.035	6.3		1.1	0.044	U	0.044	6830		15.1
DZ-5	J1V787	5/14/15	0.054	B	0.035	1.0	U	1.0	0.043	U	0.043	5650		14.8
DZ-7	J1V789	5/14/15	0.048	B	0.033	0.98	U	0.98	0.041	U	0.041	3980		14.0
DZ-8	J1V790	5/14/15	0.061	B	0.032	0.94	U	0.94	0.039	U	0.039	4010		13.6
DZ-9	J1V791	5/14/15	0.85		0.036	1.4	B	1.1	0.045	U	0.045	6420		15.3
DZ-10	J1V792	5/14/15	0.076	B	0.035	1.1	U	1.1	0.064	B	0.044	5580		15.1
DZ-11	J1V793	5/14/15	0.044	B	0.032	0.95	U	0.95	0.048	B	0.04	5440		13.6
DZ-12	J1V794	5/14/15	0.032	U	0.032	0.94	U	0.94	0.039	U	0.039	4600		13.6
Split of J1V770	J1V782	5/14/15	0.638		0.103	9.18		1.03	0.103	U	0.103	5100		8.26
Split of J1V788	J1V797	5/14/15	1.32		0.0985	11.2		0.985	0.289	B	0.0985	4960		7.88
Equipment Blank	J1V796	5/14/15	0.029	U	0.029	0.87	U	0.87	0.036	U	0.036	32.7	BC	12.6

Attachment	1	Sheet No.	6 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Metals, Anions, TPH, and Physical).

Sample Location	HEIS Number	Sample Date	Chromium			Cobalt			Copper			Hexavalent Chromium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SZ-2	J1V770	5/14/15	6.5		0.053	4.4		0.092	7.6		0.20	0.172		0.155
Duplicate of J1V770	J1V781	5/14/15	7.0		0.058	4.4		0.10	7.5		0.22	0.155	U	0.155
SZ-1	J1V769	5/14/15	7.0		0.061	4.9		0.11	8.5		0.23	0.173		0.155
SZ-3	J1V771	5/14/15	8.2		0.059	5.8		0.10	10.3		0.22	0.264		0.155
SZ-4	J1V772	5/14/15	6.2		0.056	4.6		0.096	7.3		0.21	0.258		0.155
SZ-5	J1V773	5/14/15	11.4		0.070	4.2		0.12	22.1		0.26	0.155	U	0.155
SZ-6	J1V774	5/14/15	7.4		0.054	5.1		0.093	8.9		0.20	0.265		0.155
SZ-7	J1V775	5/14/15	8.3		0.056	5.0		0.096	8.4		0.21	0.173		0.155
SZ-8	J1V776	5/14/15	8.3		0.060	5.3		0.10	13.5		0.22	0.243		0.155
SZ-9	J1V777	5/14/15	5.4		0.051	5.6		0.089	10.5		0.19	0.173		0.155
SZ-10	J1V778	5/14/15	7.7		0.054	5.4		0.093	8.3		0.20	0.199		0.155
SZ-11	J1V779	5/14/15	8.2		0.056	4.9		0.097	23.7		0.21	0.351		0.155
SZ-12	J1V780	5/14/15	8.8		0.062	4.7		0.11	14.1		0.23	0.155	U	0.155
DZ-6	J1V788	5/14/15	3.6	X	0.058	11.2	X	0.50	16.2		1.1	0.155	U	0.155
Duplicate of J1V788	J1V795	5/14/15	3.4	X	0.057	11.4	X	0.49	16.6		1.1	0.155	U	0.155
DZ-1	J1V783	5/14/15	7.6	X	0.060	6.0	X	0.10	12.0		0.22	0.194		0.155
DZ-2	J1V784	5/14/15	3.0	X	0.059	7.9	X	0.10	13.7		0.22	0.155	U	0.155
DZ-3	J1V785	5/14/15	5.1	X	0.057	7.9	X	0.098	14.6		0.21	0.155	U	0.155
DZ-4	J1V786	5/14/15	10.9	X	0.062	8.3	X	0.11	15.4		0.23	0.155	U	0.155
DZ-5	J1V787	5/14/15	5.5	X	0.061	8.1	X	0.10	17.6		0.23	0.230		0.155
DZ-7	J1V789	5/14/15	5.4	X	0.058	7.1	X	0.10	16.4		0.22	0.155	U	0.155
DZ-8	J1V790	5/14/15	7.2	X	0.056	4.5	X	0.096	8.5		0.21	0.182		0.155
DZ-9	J1V791	5/14/15	19.7	X	0.063	9.0	X	0.11	19.5		0.24	0.155	U	0.155
DZ-10	J1V792	5/14/15	11.2	X	0.062	7.2	X	0.11	13.5		0.23	0.155	U	0.155
DZ-11	J1V793	5/14/15	4.9	X	0.056	8.0	X	0.097	16.7		0.21	0.155	U	0.155
DZ-12	J1V794	5/14/15	3.4	X	0.056	7.4	X	0.096	12.9		0.21	0.155	U	0.155
Split of J1V770	J1V782	5/14/15	5.8		0.155	5.11	BD	1.55	8.22		0.31	0.127	U	0.127
Split of J1V788	J1V797	5/14/15	2.82		0.148	10.4	D	1.48	15.4		0.296	0.125	U	0.125
Equipment Blank	J1V796	5/14/15	0.13	BX	0.052	0.089	UX	0.089	0.36	B	0.19			

Sample Location	HEIS Number	Sample Date	Iron			Lead			Lithium			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SZ-2	J1V770	5/14/15	13800		3.5	3.4		0.25	5.5		0.28	3210		3.4
Duplicate of J1V770	J1V781	5/14/15	14000		3.8	2.3		0.27	5.3		0.30	3240		3.7
SZ-1	J1V769	5/14/15	15200		4.0	2.6		0.28	6.1		0.32	3410		3.9
SZ-3	J1V771	5/14/15	17400		3.9	3.9		0.28	6.1		0.31	3760		3.8
SZ-4	J1V772	5/14/15	14300		3.7	3.2		0.26	5.1		0.29	2980		3.6
SZ-5	J1V773	5/14/15	16300		4.6	15.5		0.33	10.5		0.36	8610		4.5
SZ-6	J1V774	5/14/15	16600		3.5	3.0		0.25	6.1		0.28	3440		3.4
SZ-7	J1V775	5/14/15	16500		3.7	2.9		0.26	5.7		0.29	3460		3.6
SZ-8	J1V776	5/14/15	16900		3.9	4.7		0.28	6.4		0.31	3650		3.8
SZ-9	J1V777	5/14/15	17300		3.4	2.2		0.24	5.0		0.27	3470		3.3
SZ-10	J1V778	5/14/15	16500		3.5	3.2		0.25	6.1		0.28	3230		3.4
SZ-11	J1V779	5/14/15	15000		3.7	3.4		0.26	5.8		0.29	3330		3.6
SZ-12	J1V780	5/14/15	14900		4.1	3.4		0.29	5.9		0.32	3690		4.0
DZ-6	J1V788	5/14/15	28400		3.8	2.4	B	1.4	3.1		0.30	4110	X	3.7
Duplicate of J1V788	J1V795	5/14/15	26900		3.7	2.1	B	1.3	3.1		0.29	4040	X	3.6
DZ-1	J1V783	5/14/15	18000		3.9	3.2		0.28	7.4		0.31	3780	X	3.8
DZ-2	J1V784	5/14/15	19400		3.9	2.1		0.27	3.2		0.31	3000	X	3.8
DZ-3	J1V785	5/14/15	24500		3.7	2.2		0.27	3.4		0.29	3680	X	3.6
DZ-4	J1V786	5/14/15	23300		4.1	4.5		0.29	9.2		0.32	5080	X	4.0
DZ-5	J1V787	5/14/15	23500		4.0	4.2		0.28	6.3		0.31	3850	X	3.9
DZ-7	J1V789	5/14/15	20400		3.8	2.8		0.27	4.4		0.30	3540	X	3.7
DZ-8	J1V790	5/14/15	16000		3.7	2.5		0.26	6.5		0.29	3480	X	3.6
DZ-9	J1V791	5/14/15	24700		4.1	7.8		0.29	12		0.33	5710	X	4.0
DZ-10	J1V792	5/14/15	22400		4.1	3.7		0.29	8.4		0.32	4830	X	4.0
DZ-11	J1V793	5/14/15	23500		3.7	4.0		0.26	5.5		0.29	4080	X	3.6
DZ-12	J1V794	5/14/15	20600		3.7	2.3		0.26	3.3		0.29	3100	X	3.6
Split of J1V770	J1V782	5/14/15	14700		8.26	3.46		0.341	6.46	D	0.404	3170		8.78
Split of J1V788	J1V797	5/14/15	26500		7.88	4.46		0.325	3.85	D	0.402	3580		8.38
Equipment Blank	J1V796	5/14/15	142		3.4	0.24	U	0.24	0.36	BC	0.27	15.5	BCX	3.3

Attachment	1	Sheet No.	7 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Metals, Anions, TPH, and Physical).

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SZ-2	J1V770	5/14/15	221		0.092	0.0060	U	0.0060	0.24	U	0.24	8.0		0.11
Duplicate of J1V770	J1V781	5/14/15	206		0.10	0.0065	U	0.0065	0.26	U	0.26	7.6		0.12
SZ-1	J1V769	5/14/15	246		0.11	0.0066	U	0.0066	0.27	U	0.27	8.6		0.13
SZ-3	J1V771	5/14/15	272		0.10	0.0079	B	0.0071	0.27	U	0.27	9.7		0.13
SZ-4	J1V772	5/14/15	232		0.096	0.0066	B	0.0066	0.25	U	0.25	8.8		0.12
SZ-5	J1V773	5/14/15	227		0.12	0.42		0.0075	0.37	B	0.31	11.3		0.15
SZ-6	J1V774	5/14/15	244		0.093	0.0079	B	0.0072	0.24	U	0.24	8.6		0.11
SZ-7	J1V775	5/14/15	246		0.096	0.0063	B	0.0061	0.25	U	0.25	9.0		0.12
SZ-8	J1V776	5/14/15	254		0.10	0.064		0.0071	0.27	U	0.27	10.0		0.13
SZ-9	J1V777	5/14/15	235		0.089	0.0068	U	0.0068	0.23	U	0.23	7.1		0.11
SZ-10	J1V778	5/14/15	304		0.093	0.0072	B	0.0067	0.24	U	0.24	8.4		0.11
SZ-11	J1V779	5/14/15	229		0.097	0.047		0.0068	0.25	U	0.25	8.4		0.12
SZ-12	J1V780	5/14/15	249		0.11	0.020	B	0.0072	0.28	U	0.28	9.7		0.13
DZ-6	J1V788	5/14/15	319		0.10	0.0063	U	0.0063	0.26	U	0.26	7.7	X	0.12
Duplicate of J1V788	J1V795	5/14/15	303		0.098	0.0061	U	0.0061	0.25	U	0.25	11.7	X	0.12
DZ-1	J1V783	5/14/15	272		0.10	0.019	BM	0.0064	0.27	U	0.27	8.6	X	0.13
DZ-2	J1V784	5/14/15	254		0.10	0.042		0.0069	0.26	U	0.26	6.3	X	0.13
DZ-3	J1V785	5/14/15	346		0.098	0.036		0.0062	0.26	U	0.26	8.3	X	0.12
DZ-4	J1V786	5/14/15	409		0.11	0.25		0.0069	0.28	U	0.28	12.7	X	0.13
DZ-5	J1V787	5/14/15	293		0.10	0.0093	B	0.0065	0.27	U	0.27	9.2	X	0.13
DZ-7	J1V789	5/14/15	234		0.10	0.0071	B	0.0061	0.26	U	0.26	9.9	X	0.12
DZ-8	J1V790	5/14/15	216		0.096	0.0068	U	0.0068	0.25	U	0.25	8.6	X	0.12
DZ-9	J1V791	5/14/15	501		0.11	0.033		0.0078	0.28	U	0.28	14.8	X	0.13
DZ-10	J1V792	5/14/15	370		0.11	0.0074	U	0.0074	0.28	U	0.28	13.0	X	0.13
DZ-11	J1V793	5/14/15	272		0.097	0.088		0.0063	0.25	U	0.25	8.8	X	0.12
DZ-12	J1V794	5/14/15	255		0.096	0.033		0.0066	0.25	U	0.25	6.1	X	0.12
Split of J1V770	J1V782	5/14/15	200		0.207	0.00369	U	0.00369	0.349	B	0.207	8.32		0.155
Split of J1V788	J1V797	5/14/15	282		0.197	0.00416	U	0.00416	0.552	B	0.197	6.01		0.148
Equipment Blank	J1V796	5/14/15	2.3		0.089	0.0065	U	0.0065	0.23	U	0.23	0.11	UX	0.11

Sample Location	HEIS Number	Sample Date	Potassium			Selenium			Silicon			Silver		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SZ-2	J1V770	5/14/15	752		37.6	0.79	U	0.79	175		5.2	0.15	U	0.15
Duplicate of J1V770	J1V781	5/14/15	710		41.2	0.86	U	0.86	165		5.7	0.16	U	0.16
SZ-1	J1V769	5/14/15	1060		43.2	0.91	U	0.91	229		6.0	0.17	U	0.17
SZ-3	J1V771	5/14/15	995		41.9	0.88	U	0.88	297		5.8	0.16	U	0.16
SZ-4	J1V772	5/14/15	917		39.4	0.83	U	0.83	229		5.4	0.15	U	0.15
SZ-5	J1V773	5/14/15	802		49.4	1.5		1.0	544		6.8	0.28		0.19
SZ-6	J1V774	5/14/15	1060		38.1	0.80	U	0.80	235		5.3	0.15	U	0.15
SZ-7	J1V775	5/14/15	921		39.5	0.83	U	0.83	208		5.5	0.15	U	0.15
SZ-8	J1V776	5/14/15	993		42.4	0.89	U	0.89	214		5.8	0.35		0.17
SZ-9	J1V777	5/14/15	731		36.3	0.76	U	0.76	209		5.0	0.14	U	0.14
SZ-10	J1V778	5/14/15	1320		38.2	0.80	U	0.80	297		5.3	0.15	U	0.15
SZ-11	J1V779	5/14/15	799		39.9	0.84	U	0.84	242		5.5	0.45		0.16
SZ-12	J1V780	5/14/15	751		43.8	0.92	U	0.92	218		6.0	0.27		0.17
DZ-6	J1V788	5/14/15	487		41.2	0.86	U	0.86	146		5.7	0.16	U	0.16
Duplicate of J1V788	J1V795	5/14/15	470		40.0	0.84	U	0.84	128		5.5	0.16	U	0.16
DZ-1	J1V783	5/14/15	1090		42.2	0.88	U	0.88	308		5.8	0.16	U	0.16
DZ-2	J1V784	5/14/15	504		41.7	0.88	U	0.88	166		5.8	0.16	U	0.16
DZ-3	J1V785	5/14/15	588		40.2	0.84	U	0.84	181		5.6	0.16	U	0.16
DZ-4	J1V786	5/14/15	1680		44.0	0.92	U	0.92	399		6.1	0.23		0.17
DZ-5	J1V787	5/14/15	851		43.0	0.90	U	0.90	242		5.9	0.17	U	0.17
DZ-7	J1V789	5/14/15	665		40.8	0.86	U	0.86	176		5.6	0.16	U	0.16
DZ-8	J1V790	5/14/15	868		39.4	0.83	U	0.83	240		5.4	0.15	U	0.15
DZ-9	J1V791	5/14/15	1540		44.6	0.94	U	0.94	276		6.2	0.17	U	0.17
DZ-10	J1V792	5/14/15	1150		44.0	0.92	U	0.92	317		6.1	0.17	U	0.17
DZ-11	J1V793	5/14/15	835		39.6	0.83	U	0.83	199		5.5	0.20		0.15
DZ-12	J1V794	5/14/15	516		39.5	0.83	U	0.83	171		5.4	0.15	U	0.15
Split of J1V770	J1V782	5/14/15	657		6.61	0.481	BD	0.333	467	N	1.55	0.552		0.103
Split of J1V788	J1V797	5/14/15	419		6.31	1.2	D	0.332	357	N	1.48	0.976		0.0985
Equipment Blank	J1V796	5/14/15	36.5	U	36.5	0.77	U	0.77	80.3		5	0.14	U	0.14

Attachment	1	Sheet No.	8 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Metals, Anions, TPH, and Physical).

Sample Location	HEIS Number	Sample Date	Sodium			Strontium			Tin			Uranium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SZ-2	J1V770	5/14/15	154		54.1	19.9		0.033	1.4	B	0.84	0.55		0.0015
Duplicate of J1V770	J1V781	5/14/15	138		59.2	17.4		0.036	1.3	B	0.92	2.4		0.0015
SZ-1	J1V769	5/14/15	150		62.1	16.8		0.038	1.5	B	0.96	1.5		0.0018
SZ-3	J1V771	5/14/15	340		60.4	24.1		0.037	1.5	B	0.93	0.51		0.0016
SZ-4	J1V772	5/14/15	126		56.7	14.6		0.035	1.4	B	0.88	2.0		0.0016
SZ-5	J1V773	5/14/15	905		71.1	247		0.043	1.9	B	1.1	2.7		0.0019
SZ-6	J1V774	5/14/15	188		54.8	22.3		0.033	1.4	B	0.85	0.95		0.0014
SZ-7	J1V775	5/14/15	143		56.9	15.1		0.035	1.4	B	0.88	0.35		0.0015
SZ-8	J1V776	5/14/15	139		61.0	19.6		0.037	1.8	B	0.94	1.9		0.0015
SZ-9	J1V777	5/14/15	180		52.3	22.9		0.032	1.4	B	0.81	0.43		0.0015
SZ-10	J1V778	5/14/15	140		55.0	17.5		0.034	1.5	B	0.85	0.45		0.0014
SZ-11	J1V779	5/14/15	154		57.4	27.0		0.035	1.3	B	0.89	0.50		0.0015
SZ-12	J1V780	5/14/15	145		63.0	21.1		0.038	1.3	B	0.97	2.6		0.0015
DZ-6	J1V788	5/14/15	271		59.3	22.1	X	0.036	4.6	U	4.6	3.7		0.0014
Duplicate of J1V788	J1V795	5/14/15	308		57.5	20.4	X	0.035	4.4	U	4.4	3.2		0.0016
DZ-1	J1V783	5/14/15	254		60.7	28.8	X	0.037	1.9	BC	0.94	0.77		0.0016
DZ-2	J1V784	5/14/15	220		60.1	16.5	X	0.037	1.9	BC	0.93	0.74		0.0015
DZ-3	J1V785	5/14/15	265		57.9	18.4	X	0.035	2.1	BC	0.90	3.2		0.0014
DZ-4	J1V786	5/14/15	257		63.3	25.1	X	0.039	2.0	BC	0.98	5.3		0.0017
DZ-5	J1V787	5/14/15	256		61.9	19.9	X	0.038	2.1	BC	0.96	1.2		0.0017
DZ-7	J1V789	5/14/15	280		58.8	15.7	X	0.036	2.0	BC	0.91	6.1		0.0016
DZ-8	J1V790	5/14/15	160		56.7	16.8	X	0.035	1.7	BC	0.88	1.7		0.0016
DZ-9	J1V791	5/14/15	206		64.2	46.9	X	0.039	1.9	BC	0.99	45.5		0.0019
DZ-10	J1V792	5/14/15	233		63.4	22.6	X	0.039	2.0	BC	0.98	2.7		0.0017
DZ-11	J1V793	5/14/15	315		57.0	21.4	X	0.035	2.1	BC	0.88	7.2		0.0016
DZ-12	J1V794	5/14/15	289		56.8	17.0	X	0.035	1.6	BC	0.88	4.2		0.0015
Split of J1V770	J1V782	5/14/15	105	C	7.23	18.4		0.103	3.1	DU	3.1	0.453	D	0.0133
Split of J1V788	J1V797	5/14/15	178	C	6.9	16.3		0.0985	2.96	DU	2.96	3.14	D	0.0133
Equipment Blank	J1V796	5/14/15	52.5	U	52.5	0.65	BX	0.032	0.91	BC	0.81	0.094	B	0.0015

Sample Location	HEIS Number	Sample Date	Vanadium			Zinc			Zirconium			Nitrogen in Nitrate and Nitrite		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SZ-2	J1V770	5/14/15	34.1		0.086	28.2		0.36	9.8		0.32	0.78		0.36
Duplicate of J1V770	J1V781	5/14/15	35.1		0.094	27.1		0.40	10.3		0.36	0.87		0.35
SZ-1	J1V769	5/14/15	35.8		0.099	29.8		0.42	11.4		0.37	6.2	M	0.39
SZ-3	J1V771	5/14/15	43.6		0.096	33.5		0.41	14.9		0.36	0.37	U	0.37
SZ-4	J1V772	5/14/15	34.1		0.090	27.6		0.38	11.4		0.34	0.35	U	0.35
SZ-5	J1V773	5/14/15	35.8		0.11	36.4		0.48	27.8		0.43	161	D	2.2
SZ-6	J1V774	5/14/15	39.9		0.087	31.8		0.37	13.0		0.33	0.37	U	0.37
SZ-7	J1V775	5/14/15	41.7		0.091	30.5		0.38	11.6		0.34	0.35	U	0.35
SZ-8	J1V776	5/14/15	40.1		0.097	41.1		0.41	12.4		0.37	0.36	U	0.36
SZ-9	J1V777	5/14/15	42.9		0.083	31.8		0.35	14.4		0.31	0.36	U	0.36
SZ-10	J1V778	5/14/15	37.8		0.088	34.7		0.37	15.1		0.33	7.0		0.36
SZ-11	J1V779	5/14/15	38.3		0.091	31.7		0.39	14.8		0.34	0.54	BN	0.34
SZ-12	J1V780	5/14/15	36.2		0.10	29.3		0.42	11.6		0.38	0.36	U	0.36
DZ-6	J1V788	5/14/15	86.9		0.47	46.1	X	0.40	31.0		0.36	0.34	U	0.34
Duplicate of J1V788	J1V795	5/14/15	87.7		0.46	43.4	X	0.39	28.9		0.35	0.35	U	0.35
DZ-1	J1V783	5/14/15	46.0		0.097	34.3	X	0.41	17.9		0.36	0.66	BM	0.37
DZ-2	J1V784	5/14/15	48.9		0.096	33.0	X	0.41	20.4		0.36	0.36	U	0.36
DZ-3	J1V785	5/14/15	67.3		0.092	40.0	X	0.39	28.5		0.35	2.5		0.36
DZ-4	J1V786	5/14/15	54.9		0.10	41.8	X	0.43	18.3		0.38	1.7		0.39
DZ-5	J1V787	5/14/15	57.7		0.099	42.2	X	0.42	30.4		0.37	0.38	U	0.38
DZ-7	J1V789	5/14/15	51.9		0.094	34.9	X	0.40	20.7		0.35	1.6		0.35
DZ-8	J1V790	5/14/15	38.8		0.090	29.5	X	0.38	12.2		0.34	0.35	U	0.35
DZ-9	J1V791	5/14/15	46.2		0.10	54.7	X	0.43	21.4		0.38	7.0		0.41
DZ-10	J1V792	5/14/15	56.1		0.10	39.5	X	0.43	18.4		0.38	0.40	U	0.40
DZ-11	J1V793	5/14/15	56.9		0.091	42.1	X	0.38	23.9		0.34	2.7	M	0.36
DZ-12	J1V794	5/14/15	52.1		0.090	34.6	X	0.38	20.4		0.34	0.680	B	0.350
Split of J1V770	J1V782	5/14/15	36.1	D	1.03	30.2	D	4.13	10.4	D	0.101	0.583		0.169
Split of J1V788	J1V797	5/14/15	86.0	D	0.985	52.4	D	3.94	32.2	D	0.101	0.349	B	0.176
Equipment Blank	J1V796	5/14/15	0.18	B	0.084	0.54	BX	0.35	0.38	B	0.32			

Attachment	1	Sheet No.	9 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Metals, Anions, TPH, and Physical).

Sample Location	HEIS Number	Sample Date	TPH - Diesel Range			TPH - Diesel Range EXT			TPH - Motor Oil (high boiling)			Percent moisture (wet sample)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	%	Q	PQL
SZ-2	J1V770	5/14/15	690	U	690	1000	U	1000				4.3		0.10
Duplicate of J1V770	J1V781	5/14/15	690	U	690	1000	U	1000				5.1		0.10
SZ-1	J1V769	5/14/15	750	U	750	1100	U	1100				10.4	M	0.10
SZ-3	J1V771	5/14/15	6300		700	11000		1000				7.8		0.10
SZ-4	J1V772	5/14/15	680	U	680	1000	U	1000				4.5		0.10
SZ-5	J1V773	5/14/15	8600		820	17000		1200				19.4		0.10
SZ-6	J1V774	5/14/15	710	U	710	1000	U	1000				7.9		0.10
SZ-7	J1V775	5/14/15	700	U	700	1000	U	1000				4.9		0.10
SZ-8	J1V776	5/14/15	3800	J	730	6600		1100				7.8		0.10
SZ-9	J1V777	5/14/15	700	U	700	1000	U	1000				4.3		0.10
SZ-10	J1V778	5/14/15	1200	J	710	2400	J	1100				6.6		0.10
SZ-11	J1V779	5/14/15	7800		660	11000		980				2.1		0.10
SZ-12	J1V780	5/14/15	720	U	720	1100	U	1100				9.1		0.10
DZ-6	J1V788	5/14/15	700	U	700	1000	U	1000				5.2		0.10
Duplicate of J1V788	J1V795	5/14/15	700	U	700	1000	U	1000				5.9		0.10
DZ-1	J1V783	5/14/15	700	U	700	1000	U	1000				9.1		0.10
DZ-2	J1V784	5/14/15	690	U	690	1000	U	1000				5.5		0.10
DZ-3	J1V785	5/14/15	700	U	700	1000	U	1000				3.9		0.10
DZ-4	J1V786	5/14/15	760	U	760	1100	U	1100				11.3		0.10
DZ-5	J1V787	5/14/15	690	U	690	1000	U	1000				6.6		0.10
DZ-7	J1V789	5/14/15	660	U	660	970	U	970				5.3		0.10
DZ-8	J1V790	5/14/15	690	U	690	1000	U	1000				4.6		0.10
DZ-9	J1V791	5/14/15	800	U	800	1200	U	1200				16.4		0.10
DZ-10	J1V792	5/14/15	2000	J	770	2600	J	1100				12.2		0.10
DZ-11	J1V793	5/14/15	710	U	710	1000	U	1000				6.7		0.10
DZ-12	J1V794	5/14/15	690	U	690	1000	U	1000				4.7		0.10
Split of J1V770	J1V782	5/14/15	2260	U	2260				2460	J	2260			
Split of J1V788	J1V797	5/14/15	2270	U	2270				2310	J	2270			
Equipment Blank	J1V796	5/14/15										1.4		0.10

Attachment	1	Sheet No.	10 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	SZ-2 - J1V770			Duplicate of J1V770 - J1V781			SZ-1 - J1V769			SZ-3 - J1V771		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.8	U	2.8	2.7	U	2.7	3.0	U	3.0	3.0	U	3.0
Aroclor-1221	PCB	8.1	U	8.1	7.9	U	7.9	8.7	U	8.7	8.6	U	8.6
Aroclor-1232	PCB	2.0	U	2.0	2.0	U	2.0	2.2	U	2.2	2.1	U	2.1
Aroclor-1242	PCB	4.7	U	4.7	4.6	U	4.6	5.1	U	5.1	5.0	U	5.0
Aroclor-1248	PCB	4.7	U	4.7	4.6	U	4.6	5.1	U	5.1	5.0	U	5.0
Aroclor-1254	PCB	2.6	U	2.6	2.6	U	2.6	2.8	U	2.8	5.0	J	2.8
Aroclor-1260	PCB	2.6	U	2.6	2.6	U	2.6	2.8	U	2.8	2.8	U	2.8

CONSTITUENT	CLASS	SZ-4 - J1V772			SZ-5 - J1V773			SZ-6 - J1V774			SZ-7 - J1V775		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.8	U	2.8	3.4	U	3.4	2.9	U	2.9	2.9	U	2.9
Aroclor-1221	PCB	8.2	U	8.2	9.8	U	9.8	8.3	U	8.3	8.3	U	8.3
Aroclor-1232	PCB	2.1	U	2.1	2.4	U	2.4	2.1	U	2.1	2.1	U	2.1
Aroclor-1242	PCB	4.8	U	4.8	5.7	U	5.7	4.8	U	4.8	4.8	U	4.8
Aroclor-1248	PCB	4.8	U	4.8	5.7	U	5.7	4.8	U	4.8	4.8	U	4.8
Aroclor-1254	PCB	2.7	U	2.7	3.2	U	3.2	2.7	U	2.7	2.7	U	2.7
Aroclor-1260	PCB	2.7	U	2.7	3.2	U	3.2	2.7	U	2.7	2.7	U	2.7

CONSTITUENT	CLASS	SZ-8 - J1V776			SZ-9 - J1V777			SZ-10 - J1V778			SZ-11 - J1V779		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.9	U	2.9	2.8	U	2.8	2.8	U	2.8	110	UD	110
Aroclor-1221	PCB	8.5	U	8.5	8.0	U	8.0	8.0	U	8.0	320	UD	320
Aroclor-1232	PCB	2.1	U	2.1	2.0	U	2.0	2.0	U	2.0	81	UD	81
Aroclor-1242	PCB	4.9	U	4.9	4.6	U	4.6	4.7	U	4.7	190	UD	190
Aroclor-1248	PCB	4.9	U	4.9	4.6	U	4.6	4.7	U	4.7	190	UD	190
Aroclor-1254	PCB	2.7	U	2.7	2.6	U	2.6	2.6	U	2.6	110	UD	110
Aroclor-1260	PCB	2.7	U	2.7	2.6	U	2.6	2.6	U	2.6	3100	D	110

CONSTITUENT	CLASS	SZ-12 - J1V780			DZ-6 - J1V788			Duplicate of J1V788 - J1V795			DZ-1 - J1V783		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.9	U	2.9	2.8	U	2.8	2.9	U	2.9	2.8	U	2.8
Aroclor-1221	PCB	8.5	U	8.5	8.1	U	8.1	8.4	U	8.4	8.2	U	8.2
Aroclor-1232	PCB	2.1	U	2.1	2.0	U	2.0	2.1	U	2.1	2.0	U	2.0
Aroclor-1242	PCB	4.9	U	4.9	4.7	U	4.7	4.9	U	4.9	4.8	U	4.8
Aroclor-1248	PCB	4.9	U	4.9	4.7	U	4.7	4.9	U	4.9	4.8	U	4.8
Aroclor-1254	PCB	3.1	J	2.7	2.6	U	2.6	2.7	U	2.7	2.7	U	2.7
Aroclor-1260	PCB	2.7	U	2.7	2.6	U	2.6	2.7	U	2.7	2.7	U	2.7

Attachment	1	Sheet No.	11 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	DZ-2 - J1V784			DZ-3 - J1V785			DZ-4 - J1V786			DZ-5 - J1V787		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.7	U	2.7	2.7	U	2.7	2.9	U	2.9	2.9	U	2.9
Aroclor-1221	PCB	7.7	U	7.7	7.9	U	7.9	8.5	U	8.5	8.3	U	8.3
Aroclor-1232	PCB	1.9	U	1.9	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Aroclor-1242	PCB	4.5	U	4.5	4.6	U	4.6	4.9	U	4.9	4.8	U	4.8
Aroclor-1248	PCB	4.5	U	4.5	4.6	U	4.6	4.9	U	4.9	4.8	U	4.8
Aroclor-1254	PCB	2.5	U	2.5	2.6	U	2.6	2.7	U	2.7	2.7	U	2.7
Aroclor-1260	PCB	2.5	U	2.5	2.6	U	2.6	2.7	U	2.7	2.7	U	2.7

CONSTITUENT	CLASS	DZ-7 - J1V789			DZ-8 - J1V790			DZ-9 - J1V791			DZ-10 - J1V792		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.9	U	2.9	2.7	U	2.7	3.2	U	3.2	3.1	U	3.1
Aroclor-1221	PCB	8.4	U	8.4	7.8	U	7.8	9.4	U	9.4	9.0	U	9.0
Aroclor-1232	PCB	2.1	U	2.1	1.9	U	1.9	2.3	U	2.3	2.2	U	2.2
Aroclor-1242	PCB	4.9	U	4.9	4.5	U	4.5	5.4	U	5.4	5.2	U	5.2
Aroclor-1248	PCB	4.9	U	4.9	4.5	U	4.5	5.4	U	5.4	5.2	U	5.2
Aroclor-1254	PCB	2.7	U	2.7	2.5	U	2.5	3.0	U	3.0	2.9	U	2.9
Aroclor-1260	PCB	2.7	U	2.7	2.5	U	2.5	3.0	U	3.0	2.9	U	2.9

CONSTITUENT	CLASS	DZ-11 - J1V793			DZ-12 - J1V794			Split of J1V770 - J1V782			Split of J1V788 - J1V797		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.8	U	2.8	2.8	U	2.8	1.16	U	1.16	1.17	U	1.17
Aroclor-1221	PCB	8.2	U	8.2	8.2	U	8.2	1.16	U	1.16	1.17	U	1.17
Aroclor-1232	PCB	2.0	U	2.0	2.0	U	2.0	1.16	U	1.16	1.17	U	1.17
Aroclor-1242	PCB	4.8	U	4.8	4.8	U	4.8	1.16	U	1.16	1.17	U	1.17
Aroclor-1248	PCB	4.8	U	4.8	4.8	U	4.8	1.16	U	1.16	1.17	U	1.17
Aroclor-1254	PCB	6.5	J	2.7	2.7	U	2.7	1.16	U	1.16	1.17	U	1.17
Aroclor-1260	PCB	2.7	U	2.7	2.7	U	2.7	1.16	U	1.16	1.17	U	1.17
Aroclor-1262	PCB							1.16	U	1.16	1.17	U	1.17
Aroclor-1268	PCB							1.16	U	1.16	1.17	U	1.17

Attachment	1	Sheet No.	12 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	SZ-2 - J1V770			Duplicate of J1V770 - J1V781			SZ-1 - J1V769			SZ-3 - J1V771		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	29	U	29	27	U	27	31	U	31	29	U	29
1,2-Dichlorobenzene	SVOA	23	U	23	21	U	21	24	U	24	23	U	23
1,3-Dichlorobenzene	SVOA	13	U	13	12	U	12	13	U	13	13	U	13
1,4-Dichlorobenzene	SVOA	14	U	14	13	U	13	15	U	15	14	U	14
2,4,5-Trichlorophenol	SVOA	10	U	10	9.7	U	9.7	11	U	11	10	U	10
2,4,6-Trichlorophenol	SVOA	10	U	10	9.7	U	9.7	11	U	11	10	U	10
2,4-Dichlorophenol	SVOA	10	U	10	9.7	U	9.7	11	U	11	10	U	10
2,4-Dimethylphenol	SVOA	69	U	69	64	U	64	73	U	73	69	U	69
2,4-Dinitrophenol	SVOA	350	U	350	320	U	320	370	U	370	350	U	350
2,4-Dinitrotoluene	SVOA	69	U	69	64	U	64	73	U	73	69	U	69
2,6-Dinitrotoluene	SVOA	29	U	29	27	U	27	31	U	31	29	U	29
2-Chloronaphthalene	SVOA	10	U	10	9.7	U	9.7	11	U	11	10	U	10
2-Chlorophenol	SVOA	22	U	22	20	U	20	23	U	23	22	U	22
2-Methylnaphthalene	SVOA	20	U	20	18	U	18	21	U	21	20	U	20
2-Methylphenol (cresol, o-)	SVOA	14	U	14	13	U	13	14	U	14	14	U	14
2-Nitroaniline	SVOA	52	U	52	48	U	48	56	U	56	52	U	52
2-Nitrophenol	SVOA	10	U	10	9.7	U	9.7	11	U	11	10	U	10
3,3'-Dichlorobenzidine	SVOA	94	U	94	87	U	87	100	U	100	94	U	94
3+4 Methylphenol (cresol, m+p)	SVOA	34	U	34	32	U	32	37	U	37	35	U	35
3-Nitroaniline	SVOA	76	U	76	71	U	71	81	U	81	76	U	76
4,6-Dinitro-2-methylphenol	SVOA	340	U	340	320	U	320	370	U	370	350	U	350
4-Bromophenylphenyl ether	SVOA	20	U	20	18	U	18	21	U	21	20	U	20
4-Chloro-3-methylphenol	SVOA	69	U	69	64	U	64	73	U	73	69	U	69
4-Chloroaniline	SVOA	86	U	86	79	U	79	91	U	91	86	U	86
4-Chlorophenylphenyl ether	SVOA	22	U	22	20	U	20	23	U	23	22	U	22
4-Nitroaniline	SVOA	76	U	76	70	U	70	81	U	81	76	U	76
4-Nitrophenol	SVOA	100	U	100	94	U	94	110	U	110	100	U	100
Acenaphthene	SVOA	11	U	11	10	U	10	11	U	11	11	U	11
Acenaphthylene	SVOA	18	U	18	16	U	16	19	U	19	18	U	18
Anthracene	SVOA	18	U	18	16	U	16	19	U	19	18	U	18
Benzo(a)anthracene	SVOA	21	U	21	19	U	19	22	U	22	21	U	21
Benzo(a)pyrene	SVOA	21	U	21	19	U	19	22	U	22	21	U	21
Benzo(b)fluoranthene	SVOA	27	U	27	25	U	25	29	U	29	27	U	27
Benzo(ghi)perylene	SVOA	17	U	17	15	U	15	18	U	18	17	U	17
Benzo(k)fluoranthene	SVOA	42	U	42	39	U	39	44	U	44	42	U	42
Bis(2-chloro-1-methylethyl)ether	SVOA	24	U	24	22	U	22	26	U	26	24	U	24
Bis(2-Chloroethoxy)methane	SVOA	24	U	24	22	U	22	26	U	26	24	U	24
Bis(2-chloroethyl) ether	SVOA	17	U	17	16	U	16	18	U	18	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	48	U	48	44	U	44	51	U	51	48	U	48
Butylbenzylphthalate	SVOA	45	U	45	42	U	42	48	U	48	45	U	45
Carbazole	SVOA	38	U	38	35	U	35	40	U	40	38	U	38
Chrysene	SVOA	28	U	28	26	U	26	30	U	30	35	J	28
Dibenz[a,h]anthracene	SVOA	20	U	20	18	U	18	21	U	21	20	U	20
Dibenzofuran	SVOA	21	U	21	19	U	19	22	U	22	21	U	21
Diethyl phthalate	SVOA	27	U	27	25	U	25	29	U	29	27	U	27
Dimethyl phthalate	SVOA	24	U	24	22	U	22	26	U	26	24	U	24
Di-n-butylphthalate	SVOA	30	U	30	28	U	28	32	U	32	30	U	30
Di-n-octylphthalate	SVOA	15	U	15	14	U	14	16	U	16	15	U	15
Fluoranthene	SVOA	38	U	38	35	U	35	40	U	40	150	J	38
Fluorene	SVOA	19	U	19	17	U	17	20	U	20	19	U	19
Hexachlorobenzene	SVOA	30	U	30	28	U	28	32	U	32	30	U	30
Hexachlorobutadiene	SVOA	10	U	10	9.7	U	9.7	11	U	11	10	U	10
Hexachlorocyclopentadiene	SVOA	52	U	52	48	U	48	56	U	56	52	U	52
Hexachloroethane	SVOA	22	U	22	21	U	21	24	U	24	22	U	22
Indeno(1,2,3-cd)pyrene	SVOA	23	U	23	21	U	21	24	U	24	23	U	23
Isophorone	SVOA	18	U	18	16	U	16	19	U	19	18	U	18
Naphthalene	SVOA	32	U	32	30	U	30	34	U	34	32	U	32
Nitrobenzene	SVOA	23	U	23	21	U	21	24	U	24	23	U	23
N-Nitroso-di-n-dipropylamine	SVOA	32	U	32	30	U	30	34	U	34	32	U	32
N-Nitrosodiphenylamine	SVOA	22	U	22	20	U	20	23	U	23	22	U	22
Pentachlorophenol	SVOA	340	U	340	320	U	320	370	U	370	350	U	350
Phenanthrene	SVOA	18	U	18	16	U	16	19	U	19	31	J	18
Phenol	SVOA	19	U	19	17	U	17	20	U	20	19	U	19
Pyrene	SVOA	13	U	13	12	U	12	13	U	13	120	J	13
Tributyl phosphate	SVOA	60	U	60	56	U	56	64	U	64	60	U	60

Attachment	1	Sheet No.	13 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	SZ-4 - J1V772			SZ-5 - J1V773			SZ-6 - J1V774			SZ-7 - J1V775		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	29	U	29	34	U	34	30	U	30	29	U	29
1,2-Dichlorobenzene	SVOA	23	U	23	27	U	27	24	U	24	22	U	22
1,3-Dichlorobenzene	SVOA	12	U	12	15	U	15	13	U	13	12	U	12
1,4-Dichlorobenzene	SVOA	14	U	14	17	U	17	15	U	15	14	U	14
2,4,5-Trichlorophenol	SVOA	10	U	10	12	U	12	11	U	11	10	U	10
2,4,6-Trichlorophenol	SVOA	10	U	10	12	U	12	11	U	11	10	U	10
2,4-Dichlorophenol	SVOA	10	U	10	12	U	12	11	U	11	10	U	10
2,4-Dimethylphenol	SVOA	68	U	68	81	U	81	71	U	71	67	U	67
2,4-Dinitrophenol	SVOA	340	U	340	410	U	410	360	U	360	340	U	340
2,4-Dinitrotoluene	SVOA	68	U	68	81	U	81	71	U	71	67	U	67
2,6-Dinitrotoluene	SVOA	29	U	29	34	U	34	30	U	30	29	U	29
2-Chloronaphthalene	SVOA	10	U	10	12	U	12	11	U	11	10	U	10
2-Chlorophenol	SVOA	21	U	21	26	U	26	23	U	23	21	U	21
2-Methylnaphthalene	SVOA	19	U	19	23	U	23	20	U	20	19	U	19
2-Methylphenol (cresol, o-)	SVOA	13	U	13	16	U	16	14	U	14	13	U	13
2-Nitroaniline	SVOA	51	U	51	61	U	61	54	U	54	51	U	51
2-Nitrophenol	SVOA	10	U	10	12	U	12	11	U	11	10	U	10
3,3'-Dichlorobenzidine	SVOA	92	U	92	110	U	110	97	U	97	92	U	92
3+4 Methylphenol (cresol, m+p)	SVOA	34	U	34	40	U	40	36	U	36	34	U	34
3-Nitroaniline	SVOA	75	U	75	89	U	89	79	U	79	74	U	74
4,6-Dinitro-2-methylphenol	SVOA	340	U	340	400	U	400	360	U	360	340	U	340
4-Bromophenylphenyl ether	SVOA	19	U	19	23	U	23	20	U	20	19	U	19
4-Chloro-3-methylphenol	SVOA	68	U	68	81	U	81	71	U	71	67	U	67
4-Chloroaniline	SVOA	84	U	84	100	U	100	88	U	88	84	U	84
4-Chlorophenylphenyl ether	SVOA	21	U	21	26	U	26	23	U	23	21	U	21
4-Nitroaniline	SVOA	74	U	74	89	U	89	78	U	78	74	U	74
4-Nitrophenol	SVOA	99	U	99	120	U	120	100	U	100	99	U	99
Acenaphthene	SVOA	11	U	11	13	U	13	11	U	11	11	U	11
Acenaphthylene	SVOA	17	U	17	21	U	21	18	U	18	17	U	17
Anthracene	SVOA	17	U	17	21	U	21	18	U	18	17	U	17
Benzo(a)anthracene	SVOA	20	U	20	24	U	24	22	U	22	20	U	20
Benzo(a)pyrene	SVOA	20	U	20	24	U	24	22	U	22	20	U	20
Benzo(b)fluoranthene	SVOA	27	U	27	32	U	32	28	U	28	27	U	27
Benzo(ghi)perylene	SVOA	16	U	16	20	U	20	17	U	17	16	U	16
Benzo(k)fluoranthene	SVOA	41	U	41	49	U	49	43	U	43	41	U	41
Bis(2-chloro-1-methylethyl)ether	SVOA	24	U	24	28	U	28	25	U	25	23	U	23
Bis(2-Chloroethoxy)methane	SVOA	24	U	24	28	U	28	25	U	25	23	U	23
Bis(2-chloroethyl) ether	SVOA	17	U	17	20	U	20	18	U	18	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	47	U	47	56	U	56	50	U	50	47	U	47
Butylbenzylphthalate	SVOA	44	U	44	53	U	53	46	U	46	44	U	44
Carbazole	SVOA	37	U	37	44	U	44	39	U	39	37	U	37
Chrysene	SVOA	28	U	28	33	U	33	29	U	29	28	U	28
Dibenz[a,h]anthracene	SVOA	19	U	19	23	U	23	20	U	20	19	U	19
Dibenzofuran	SVOA	20	U	20	24	U	24	22	U	22	20	U	20
Diethyl phthalate	SVOA	27	U	27	32	U	32	28	U	28	27	U	27
Dimethyl phthalate	SVOA	24	U	24	28	U	28	25	U	25	23	U	23
Di-n-butylphthalate	SVOA	30	U	30	36	U	36	31	U	31	30	U	30
Di-n-octylphthalate	SVOA	15	U	15	18	U	18	16	U	16	15	U	15
Fluoranthene	SVOA	37	U	37	44	U	44	39	U	39	37	U	37
Fluorene	SVOA	18	U	18	22	U	22	19	U	19	18	U	18
Hexachlorobenzene	SVOA	30	U	30	36	U	36	31	U	31	30	U	30
Hexachlorobutadiene	SVOA	10	U	10	12	U	12	11	U	11	10	U	10
Hexachlorocyclopentadiene	SVOA	51	U	51	61	U	61	54	U	54	51	U	51
Hexachloroethane	SVOA	22	U	22	26	U	26	23	U	23	22	U	22
Indeno(1,2,3-cd)pyrene	SVOA	23	U	23	27	U	27	24	U	24	22	U	22
Isophorone	SVOA	17	U	17	21	U	21	18	U	18	17	U	17
Naphthalene	SVOA	32	U	32	38	U	38	33	U	33	32	U	32
Nitrobenzene	SVOA	23	U	23	27	U	27	24	U	24	22	U	22
N-Nitroso-di-n-dipropylamine	SVOA	32	U	32	38	U	38	33	U	33	32	U	32
N-Nitrosodiphenylamine	SVOA	21	U	21	26	U	26	23	U	23	21	U	21
Pentachlorophenol	SVOA	340	U	340	400	U	400	360	U	360	340	U	340
Phenanthrene	SVOA	17	U	17	21	U	21	18	U	18	17	U	17
Phenol	SVOA	18	U	18	22	U	22	19	U	19	18	U	18
Pyrene	SVOA	12	U	12	15	U	15	13	U	13	12	U	12
Tributyl phosphate	SVOA	59	U	59	71	U	71	62	U	62	59	U	59

Attachment	1	Sheet No.	14 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	SZ-8 - J1V776			SZ-9 - J1V777			SZ-10 - J1V778			SZ-11 - J1V779		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	30	U	30	28	U	28	29	U	29	28	U	28
1,2-Dichlorobenzene	SVOA	24	U	24	22	U	22	23	U	23	22	U	22
1,3-Dichlorobenzene	SVOA	13	U	13	12	U	12	12	U	12	12	U	12
1,4-Dichlorobenzene	SVOA	15	U	15	14	U	14	14	U	14	14	U	14
2,4,5-Trichlorophenol	SVOA	11	U	11	10	U	10	10	U	10	10	U	10
2,4,6-Trichlorophenol	SVOA	11	U	11	10	U	10	10	U	10	10	U	10
2,4-Dichlorophenol	SVOA	11	U	11	10	U	10	10	U	10	10	U	10
2,4-Dimethylphenol	SVOA	71	U	71	67	U	67	68	U	68	66	U	66
2,4-Dinitrophenol	SVOA	360	U	360	340	U	340	340	U	340	330	U	330
2,4-Dinitrotoluene	SVOA	71	U	71	67	U	67	68	U	68	66	U	66
2,6-Dinitrotoluene	SVOA	30	U	30	28	U	28	29	U	29	28	U	28
2-Chloronaphthalene	SVOA	11	U	11	10	U	10	10	U	10	10	U	10
2-Chlorophenol	SVOA	23	U	23	21	U	21	21	U	21	21	U	21
2-Methylnaphthalene	SVOA	21	U	21	19	U	19	19	U	19	19	U	19
2-Methylphenol (cresol, o-)	SVOA	14	U	14	13	U	13	13	U	13	13	U	13
2-Nitroaniline	SVOA	54	U	54	50	U	50	51	U	51	50	U	50
2-Nitrophenol	SVOA	11	U	11	10	U	10	10	U	10	10	U	10
3,3'-Dichlorobenzidine	SVOA	97	U	97	91	U	91	92	U	92	90	U	90
3+4 Methylphenol (cresol, m+p)	SVOA	36	U	36	33	U	33	34	U	34	33	U	33
3-Nitroaniline	SVOA	79	U	79	74	U	74	75	U	75	73	U	73
4,6-Dinitro-2-methylphenol	SVOA	360	U	360	330	U	330	340	U	340	330	U	330
4-Bromophenylphenyl ether	SVOA	21	U	21	19	U	19	19	U	19	19	U	19
4-Chloro-3-methylphenol	SVOA	71	U	71	67	U	67	68	U	68	66	U	66
4-Chloroaniline	SVOA	89	U	89	83	U	83	84	U	84	82	U	82
4-Chlorophenylphenyl ether	SVOA	23	U	23	21	U	21	21	U	21	21	U	21
4-Nitroaniline	SVOA	78	U	78	73	U	73	74	U	74	73	U	73
4-Nitrophenol	SVOA	100	U	100	98	U	98	99	U	99	97	U	97
Acenaphthene	SVOA	11	U	11	10	U	10	11	U	11	10	U	10
Acenaphthylene	SVOA	18	U	18	17	U	17	17	U	17	17	U	17
Anthracene	SVOA	18	U	18	17	U	17	17	U	17	17	U	17
Benzo(a)anthracene	SVOA	22	U	22	20	U	20	20	U	20	20	U	20
Benzo(a)pyrene	SVOA	22	U	22	20	U	20	20	U	20	20	U	20
Benzo(b)fluoranthene	SVOA	28	U	28	26	U	26	27	U	27	26	U	26
Benzo(ghi)perylene	SVOA	17	U	17	16	U	16	16	U	16	16	U	16
Benzo(k)fluoranthene	SVOA	43	U	43	40	U	40	41	U	41	40	U	40
Bis(2-chloro-1-methylethyl)ether	SVOA	25	U	25	23	U	23	24	U	24	23	U	23
Bis(2-Chloroethoxy)methane	SVOA	25	U	25	23	U	23	24	U	24	23	U	23
Bis(2-chloroethyl) ether	SVOA	18	U	18	17	U	17	17	U	17	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	50	U	50	46	U	46	47	U	47	46	U	46
Butylbenzylphthalate	SVOA	46	U	46	43	U	43	44	U	44	43	U	43
Carbazole	SVOA	39	U	39	36	U	36	37	U	37	36	U	36
Chrysene	SVOA	29	U	29	27	U	27	28	U	28	27	U	27
Dibenz[a,h]anthracene	SVOA	21	U	21	19	U	19	19	U	19	19	U	19
Dibenzofuran	SVOA	22	U	22	20	U	20	20	U	20	20	U	20
Diethyl phthalate	SVOA	28	U	28	26	U	26	27	U	27	26	U	26
Dimethyl phthalate	SVOA	25	U	25	23	U	23	24	U	24	23	U	23
Di-n-butylphthalate	SVOA	31	U	31	29	U	29	30	U	30	29	U	29
Di-n-octylphthalate	SVOA	16	U	16	15	U	15	15	U	15	14	U	14
Fluoranthene	SVOA	39	U	39	36	U	36	37	U	37	36	U	36
Fluorene	SVOA	19	U	19	18	U	18	18	U	18	18	U	18
Hexachlorobenzene	SVOA	31	U	31	29	U	29	30	U	30	29	U	29
Hexachlorobutadiene	SVOA	11	U	11	10	U	10	10	U	10	10	U	10
Hexachlorocyclopentadiene	SVOA	54	U	54	50	U	50	51	U	51	50	U	50
Hexachloroethane	SVOA	23	U	23	21	U	21	22	U	22	21	U	21
Indeno(1,2,3-cd)pyrene	SVOA	24	U	24	22	U	22	23	U	23	22	U	22
Isophorone	SVOA	18	U	18	17	U	17	17	U	17	17	U	17
Naphthalene	SVOA	34	U	34	31	U	31	32	U	32	31	U	31
Nitrobenzene	SVOA	24	U	24	22	U	22	23	U	23	22	U	22
N-Nitroso-di-n-dipropylamine	SVOA	34	U	34	31	U	31	32	U	32	31	U	31
N-Nitrosodiphenylamine	SVOA	23	U	23	21	U	21	21	U	21	21	U	21
Pentachlorophenol	SVOA	360	U	360	330	U	330	340	U	340	330	U	330
Phenanthrene	SVOA	18	U	18	17	U	17	17	U	17	17	U	17
Phenol	SVOA	19	U	19	18	U	18	18	U	18	18	U	18
Pyrene	SVOA	13	U	13	12	U	12	12	U	12	12	U	12
Tributyl phosphate	SVOA	62	U	62	58	U	58	59	U	59	58	U	58

Attachment	1	Sheet No.	15 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	SZ-12 - J1V780			DZ-6 - J1V788			Duplicate of J1V788 - J1V795			DZ-1 - J1V783		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	29	U	29	27	U	27	28	U	28	29	U	29
1,2-Dichlorobenzene	SVOA	23	U	23	21	U	21	22	U	22	23	U	23
1,3-Dichlorobenzene	SVOA	13	U	13	12	U	12	12	U	12	12	U	12
1,4-Dichlorobenzene	SVOA	14	U	14	13	U	13	14	U	14	14	U	14
2,4,5-Trichlorophenol	SVOA	10	U	10	9.7	U	9.7	9.9	U	9.9	10	U	10
2,4,6-Trichlorophenol	SVOA	10	U	10	9.7	U	9.7	9.9	U	9.9	10	U	10
2,4-Dichlorophenol	SVOA	10	U	10	9.7	U	9.7	9.9	U	9.9	10	U	10
2,4-Dimethylphenol	SVOA	69	U	69	64	U	64	66	U	66	68	U	68
2,4-Dinitrophenol	SVOA	350	U	350	320	U	320	330	U	330	340	U	340
2,4-Dinitrotoluene	SVOA	69	U	69	64	U	64	66	U	66	68	U	68
2,6-Dinitrotoluene	SVOA	29	U	29	27	U	27	28	U	28	29	U	29
2-Chloronaphthalene	SVOA	10	U	10	9.7	U	9.7	9.9	U	9.9	10	U	10
2-Chlorophenol	SVOA	22	U	22	20	U	20	21	U	21	22	U	22
2-Methylnaphthalene	SVOA	20	U	20	18	U	18	19	U	19	19	U	19
2-Methylphenol (cresol, o-)	SVOA	14	U	14	13	U	13	13	U	13	13	U	13
2-Nitroaniline	SVOA	52	U	52	49	U	49	50	U	50	51	U	51
2-Nitrophenol	SVOA	10	U	10	9.7	U	9.7	9.9	U	9.9	10	U	10
3,3'-Dichlorobenzidine	SVOA	94	U	94	87	U	87	89	U	89	92	U	92
3+4 Methylphenol (cresol, m+p)	SVOA	35	U	35	32	U	32	33	U	33	34	U	34
3-Nitroaniline	SVOA	76	U	76	71	U	71	73	U	73	75	U	75
4,6-Dinitro-2-methylphenol	SVOA	350	U	350	320	U	320	330	U	330	340	U	340
4-Bromophenylphenyl ether	SVOA	20	U	20	18	U	18	19	U	19	19	U	19
4-Chloro-3-methylphenol	SVOA	69	U	69	64	U	64	66	U	66	68	U	68
4-Chloroaniline	SVOA	86	U	86	80	U	80	81	U	81	84	U	84
4-Chlorophenylphenyl ether	SVOA	22	U	22	20	U	20	21	U	21	22	U	22
4-Nitroaniline	SVOA	76	U	76	70	U	70	72	U	72	74	U	74
4-Nitrophenol	SVOA	100	U	100	94	U	94	96	U	96	99	U	99
Acenaphthene	SVOA	11	U	11	10	U	10	10	U	10	11	U	11
Acenaphthylene	SVOA	18	U	18	17	U	17	17	U	17	17	U	17
Anthracene	SVOA	18	U	18	17	U	17	17	U	17	17	U	17
Benzo(a)anthracene	SVOA	21	U	21	19	U	19	20	U	20	21	U	21
Benzo(a)pyrene	SVOA	21	U	21	19	U	19	20	U	20	21	U	21
Benzo(b)fluoranthene	SVOA	27	U	27	25	U	25	26	U	26	27	U	27
Benzo(ghi)perylene	SVOA	17	U	17	16	U	16	16	U	16	16	U	16
Benzo(k)fluoranthene	SVOA	42	U	42	39	U	39	40	U	40	41	U	41
Bis(2-chloro-1-methylethyl)ether	SVOA	24	U	24	22	U	22	23	U	23	24	U	24
Bis(2-Chloroethoxy)methane	SVOA	24	U	24	22	U	22	23	U	23	24	U	24
Bis(2-chloroethyl) ether	SVOA	17	U	17	16	U	16	16	U	16	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	48	U	48	45	U	45	46	U	46	47	U	47
Butylbenzylphthalate	SVOA	45	U	45	42	U	42	43	U	43	44	U	44
Carbazole	SVOA	38	U	38	35	U	35	36	U	36	37	U	37
Chrysene	SVOA	28	U	28	26	U	26	27	U	27	28	U	28
Dibenz[a,h]anthracene	SVOA	20	U	20	18	U	18	19	U	19	19	U	19
Dibenzofuran	SVOA	21	U	21	19	U	19	20	U	20	21	U	21
Diethyl phthalate	SVOA	27	U	27	25	U	25	26	U	26	27	U	27
Dimethyl phthalate	SVOA	24	U	24	22	U	22	23	U	23	24	U	24
Di-n-butylphthalate	SVOA	30	U	30	28	U	28	29	U	29	30	U	30
Di-n-octylphthalate	SVOA	15	U	15	14	U	14	14	U	14	15	U	15
Fluoranthene	SVOA	38	U	38	35	U	35	36	U	36	37	U	37
Fluorene	SVOA	19	U	19	17	U	17	18	U	18	18	U	18
Hexachlorobenzene	SVOA	30	U	30	28	U	28	29	U	29	30	U	30
Hexachlorobutadiene	SVOA	10	U	10	9.7	U	9.7	9.9	U	9.9	10	U	10
Hexachlorocyclopentadiene	SVOA	52	U	52	49	U	49	50	U	50	51	U	51
Hexachloroethane	SVOA	22	U	22	21	U	21	21	U	21	22	U	22
Indeno(1,2,3-cd)pyrene	SVOA	23	U	23	21	U	21	22	U	22	23	U	23
Isophorone	SVOA	18	U	18	17	U	17	17	U	17	17	U	17
Naphthalene	SVOA	32	U	32	30	U	30	31	U	31	32	U	32
Nitrobenzene	SVOA	23	U	23	21	U	21	22	U	22	23	U	23
N-Nitroso-di-n-dipropylamine	SVOA	32	U	32	30	U	30	31	U	31	32	U	32
N-Nitrosodiphenylamine	SVOA	22	U	22	20	U	20	21	U	21	22	U	22
Pentachlorophenol	SVOA	350	U	350	320	U	320	330	U	330	340	U	340
Phenanthrene	SVOA	18	U	18	17	U	17	17	U	17	17	U	17
Phenol	SVOA	19	U	19	17	U	17	18	U	18	18	U	18
Pyrene	SVOA	13	U	13	12	U	12	12	U	12	12	U	12
Tributyl phosphate	SVOA	60	U	60	56	U	56	57	U	57	59	U	59

Attachment	1	Sheet No.	16 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	DZ-2 - J1V784			DZ-3 - J1V785			DZ-4 - J1V786			DZ-5 - J1V787		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	28	U	28	27	U	27	30	U	30	29	U	29
1,2-Dichlorobenzene	SVOA	22	U	22	22	U	22	23	U	23	23	U	23
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	13	U	13	12	U	12
1,4-Dichlorobenzene	SVOA	14	U	14	13	U	13	15	U	15	14	U	14
2,4,5-Trichlorophenol	SVOA	10	U	10	9.8	U	9.8	11	U	11	10	U	10
2,4,6-Trichlorophenol	SVOA	10	U	10	9.8	U	9.8	11	U	11	10	U	10
2,4-Dichlorophenol	SVOA	10	U	10	9.8	U	9.8	11	U	11	10	U	10
2,4-Dimethylphenol	SVOA	66	U	66	65	U	65	70	U	70	68	U	68
2,4-Dinitrophenol	SVOA	330	U	330	330	U	330	360	U	360	340	U	340
2,4-Dinitrotoluene	SVOA	66	U	66	65	U	65	70	U	70	68	U	68
2,6-Dinitrotoluene	SVOA	28	U	28	27	U	27	30	U	30	29	U	29
2-Chloronaphthalene	SVOA	10	U	10	9.8	U	9.8	11	U	11	10	U	10
2-Chlorophenol	SVOA	21	U	21	21	U	21	22	U	22	22	U	22
2-Methylnaphthalene	SVOA	19	U	19	19	U	19	20	U	20	20	U	20
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	14	U	14	13	U	13
2-Nitroaniline	SVOA	50	U	50	49	U	49	53	U	53	51	U	51
2-Nitrophenol	SVOA	10	U	10	9.8	U	9.8	11	U	11	10	U	10
3,3'-Dichlorobenzidine	SVOA	90	U	90	88	U	88	96	U	96	93	U	93
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	32	U	32	35	U	35	34	U	34
3-Nitroaniline	SVOA	73	U	73	72	U	72	78	U	78	75	U	75
4,6-Dinitro-2-methylphenol	SVOA	330	U	330	320	U	320	350	U	350	340	U	340
4-Bromophenylphenyl ether	SVOA	19	U	19	19	U	19	20	U	20	20	U	20
4-Chloro-3-methylphenol	SVOA	66	U	66	65	U	65	70	U	70	68	U	68
4-Chloroaniline	SVOA	82	U	82	80	U	80	87	U	87	84	U	84
4-Chlorophenylphenyl ether	SVOA	21	U	21	21	U	21	22	U	22	22	U	22
4-Nitroaniline	SVOA	73	U	73	71	U	71	77	U	77	75	U	75
4-Nitrophenol	SVOA	97	U	97	95	U	95	100	U	100	100	U	100
Acenaphthene	SVOA	10	U	10	10	U	10	11	U	11	11	U	11
Acenaphthylene	SVOA	17	U	17	17	U	17	18	U	18	18	U	18
Anthracene	SVOA	17	U	17	17	U	17	18	U	18	18	U	18
Benzo(a)anthracene	SVOA	20	U	20	20	U	20	21	U	21	21	U	21
Benzo(a)pyrene	SVOA	20	U	20	20	U	20	21	U	21	21	U	21
Benzo(b)fluoranthene	SVOA	26	U	26	26	U	26	28	U	28	27	U	27
Benzo(ghi)perylene	SVOA	16	U	16	16	U	16	17	U	17	16	U	16
Benzo(k)fluoranthene	SVOA	40	U	40	39	U	39	43	U	43	41	U	41
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	23	U	23	25	U	25	24	U	24
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	23	U	23	25	U	25	24	U	24
Bis(2-chloroethyl) ether	SVOA	17	U	17	16	U	16	18	U	18	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	46	U	46	45	U	45	49	U	49	47	U	47
Butylbenzylphthalate	SVOA	43	U	43	42	U	42	46	U	46	44	U	44
Carbazole	SVOA	36	U	36	35	U	35	38	U	38	37	U	37
Chrysene	SVOA	27	U	27	27	U	27	29	U	29	28	U	28
Dibenz[a,h]anthracene	SVOA	19	U	19	19	U	19	20	U	20	20	U	20
Dibenzofuran	SVOA	20	U	20	20	U	20	21	U	21	21	U	21
Diethyl phthalate	SVOA	26	U	26	26	U	26	28	U	28	27	U	27
Dimethyl phthalate	SVOA	23	U	23	23	U	23	25	U	25	24	U	24
Di-n-butylphthalate	SVOA	29	U	29	28	U	28	31	U	31	30	U	30
Di-n-octylphthalate	SVOA	14	U	14	14	U	14	15	U	15	15	U	15
Fluoranthene	SVOA	36	U	36	35	U	35	38	U	38	37	U	37
Fluorene	SVOA	18	U	18	18	U	18	19	U	19	19	U	19
Hexachlorobenzene	SVOA	29	U	29	28	U	28	31	U	31	30	U	30
Hexachlorobutadiene	SVOA	10	U	10	9.8	U	9.8	11	U	11	10	U	10
Hexachlorocyclopentadiene	SVOA	50	U	50	49	U	49	53	U	53	51	U	51
Hexachloroethane	SVOA	21	U	21	21	U	21	23	U	23	22	U	22
Indeno(1,2,3-cd)pyrene	SVOA	22	U	22	22	U	22	23	U	23	23	U	23
Isophorone	SVOA	17	U	17	17	U	17	18	U	18	18	U	18
Naphthalene	SVOA	31	U	31	30	U	30	33	U	33	32	U	32
Nitrobenzene	SVOA	22	U	22	22	U	22	23	U	23	23	U	23
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	30	U	30	33	U	33	32	U	32
N-Nitrosodiphenylamine	SVOA	21	U	21	21	U	21	22	U	22	22	U	22
Pentachlorophenol	SVOA	330	U	330	320	U	320	350	U	350	340	U	340
Phenanthrene	SVOA	17	U	17	17	U	17	18	U	18	18	U	18
Phenol	SVOA	18	U	18	18	U	18	19	U	19	19	U	19
Pyrene	SVOA	12	U	12	12	U	12	13	U	13	12	U	12
Tributyl phosphate	SVOA	58	U	58	57	U	57	62	U	62	59	U	59

Attachment	1	Sheet No.	17 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	DZ-7 - J1V789			DZ-8 - J1V790			DZ-9 - J1V791			DZ-10 - J1V792		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	28	U	28	29	U	29	31	U	31	31	U	31
1,2-Dichlorobenzene	SVOA	22	U	22	23	U	23	25	U	25	25	U	25
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	13	U	13	13	U	13
1,4-Dichlorobenzene	SVOA	14	U	14	14	U	14	15	U	15	15	U	15
2,4,5-Trichlorophenol	SVOA	10	U	10	10	U	10	11	U	11	11	U	11
2,4,6-Trichlorophenol	SVOA	10	U	10	10	U	10	11	U	11	11	U	11
2,4-Dichlorophenol	SVOA	10	U	10	10	U	10	11	U	11	11	U	11
2,4-Dimethylphenol	SVOA	66	U	66	68	U	68	74	U	74	74	U	74
2,4-Dinitrophenol	SVOA	330	U	330	340	U	340	370	U	370	370	U	370
2,4-Dinitrotoluene	SVOA	66	U	66	68	U	68	74	U	74	74	U	74
2,6-Dinitrotoluene	SVOA	28	U	28	29	U	29	31	U	31	31	U	31
2-Chloronaphthalene	SVOA	10	U	10	10	U	10	11	U	11	11	U	11
2-Chlorophenol	SVOA	21	U	21	22	U	22	23	U	23	23	U	23
2-Methylnaphthalene	SVOA	19	U	19	20	U	20	21	U	21	21	U	21
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	15	U	15	15	U	15
2-Nitroaniline	SVOA	50	U	50	52	U	52	56	U	56	56	U	56
2-Nitrophenol	SVOA	10	U	10	10	U	10	11	U	11	11	U	11
3,3'-Dichlorobenzidine	SVOA	90	U	90	93	U	93	100	U	100	100	U	100
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	34	U	34	37	U	37	37	U	37
3-Nitroaniline	SVOA	73	U	73	75	U	75	82	U	82	81	U	81
4,6-Dinitro-2-methylphenol	SVOA	330	U	330	340	U	340	370	U	370	370	U	370
4-Bromophenylphenyl ether	SVOA	19	U	19	20	U	20	21	U	21	21	U	21
4-Chloro-3-methylphenol	SVOA	66	U	66	68	U	68	74	U	74	74	U	74
4-Chloroaniline	SVOA	82	U	82	84	U	84	92	U	92	91	U	91
4-Chlorophenylphenyl ether	SVOA	21	U	21	22	U	22	23	U	23	23	U	23
4-Nitroaniline	SVOA	72	U	72	75	U	75	81	U	81	81	U	81
4-Nitrophenol	SVOA	97	U	97	100	U	100	110	U	110	110	U	110
Acenaphthene	SVOA	10	U	10	11	U	11	12	U	12	11	U	11
Acenaphthylene	SVOA	17	U	17	18	U	18	19	U	19	19	U	19
Anthracene	SVOA	17	U	17	18	U	18	19	U	19	19	U	19
Benzo(a)anthracene	SVOA	20	U	20	21	U	21	22	U	22	22	U	22
Benzo(a)pyrene	SVOA	20	U	20	21	U	21	22	U	22	22	U	22
Benzo(b)fluoranthene	SVOA	26	U	26	27	U	27	29	U	29	29	U	29
Benzo(ghi)perylene	SVOA	16	U	16	16	U	16	18	U	18	18	U	18
Benzo(k)fluoranthene	SVOA	40	U	40	41	U	41	45	U	45	45	U	45
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	24	U	24	26	U	26	26	U	26
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	24	U	24	26	U	26	26	U	26
Bis(2-chloroethyl) ether	SVOA	17	U	17	17	U	17	19	U	19	19	U	19
Bis(2-ethylhexyl) phthalate	SVOA	46	U	46	47	U	47	51	U	51	51	U	51
Butylbenzylphthalate	SVOA	43	U	43	44	U	44	48	U	48	48	U	48
Carbazole	SVOA	36	U	36	37	U	37	40	U	40	40	U	40
Chrysene	SVOA	27	U	27	28	U	28	30	U	30	30	U	30
Dibenz[a,h]anthracene	SVOA	19	U	19	20	U	20	21	U	21	21	U	21
Dibenzofuran	SVOA	20	U	20	21	U	21	22	U	22	22	U	22
Diethyl phthalate	SVOA	26	U	26	27	U	27	29	U	29	29	U	29
Dimethyl phthalate	SVOA	23	U	23	24	U	24	26	U	26	26	U	26
Di-n-butylphthalate	SVOA	29	U	29	30	U	30	32	U	32	32	U	32
Di-n-octylphthalate	SVOA	14	U	14	15	U	15	16	U	16	16	U	16
Fluoranthene	SVOA	36	U	36	37	U	37	40	U	40	40	U	40
Fluorene	SVOA	18	U	18	19	U	19	20	U	20	20	U	20
Hexachlorobenzene	SVOA	29	U	29	30	U	30	32	U	32	32	U	32
Hexachlorobutadiene	SVOA	10	U	10	10	U	10	11	U	11	11	U	11
Hexachlorocyclopentadiene	SVOA	50	U	50	52	U	52	56	U	56	56	U	56
Hexachloroethane	SVOA	21	U	21	22	U	22	24	U	24	24	U	24
Indeno(1,2,3-cd)pyrene	SVOA	22	U	22	23	U	23	25	U	25	25	U	25
Isophorone	SVOA	17	U	17	18	U	18	19	U	19	19	U	19
Naphthalene	SVOA	31	U	31	32	U	32	35	U	35	35	U	35
Nitrobenzene	SVOA	22	U	22	23	U	23	25	U	25	25	U	25
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	32	U	32	35	U	35	35	U	35
N-Nitrosodiphenylamine	SVOA	21	U	21	22	U	22	23	U	23	23	U	23
Pentachlorophenol	SVOA	330	U	330	340	U	340	370	U	370	370	U	370
Phenanthrene	SVOA	17	U	17	18	U	18	19	U	19	19	U	19
Phenol	SVOA	18	U	18	19	U	19	20	U	20	20	U	20
Pyrene	SVOA	12	U	12	12	U	12	14	U	14	14	U	14
Tributyl phosphate	SVOA	58	U	58	59	U	59	65	U	65	64	U	64

Attachment	1	Sheet No.	18 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Attachment 1. 300-263 and 316-3 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	DZ-11 - J1V793			DZ-12 - J1V794			Split of J1V770 - J1V782			Split of J1V788 - J1V797		
		5/14/15			5/14/15			5/14/15			5/14/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	28	U	28	27	U	27	104	U	104	105	U	105
1,2-Dichlorobenzene	SVOA	22	U	22	22	U	22	104	U	104	105	U	105
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	104	U	104	105	U	105
1,4-Dichlorobenzene	SVOA	14	U	14	13	U	13	104	U	104	105	U	105
2,4,5-Trichlorophenol	SVOA	10	U	10	9.8	U	9.8	104	U	104	105	U	105
2,4,6-Trichlorophenol	SVOA	10	U	10	9.8	U	9.8	104	U	104	105	U	105
2,4-Dichlorophenol	SVOA	10	U	10	9.8	U	9.8	104	U	104	105	U	105
2,4-Dimethylphenol	SVOA	66	U	66	65	U	65	104	U	104	105	U	105
2,4-Dinitrophenol	SVOA	330	U	330	330	U	330	104	U	104	105	U	105
2,4-Dinitrotoluene	SVOA	66	U	66	65	U	65	104	U	104	105	U	105
2,6-Dinitrotoluene	SVOA	28	U	28	27	U	27	104	U	104	105	U	105
2-Chloronaphthalene	SVOA	10	U	10	9.8	U	9.8	10.4	U	10.4	10.5	U	10.5
2-Chlorophenol	SVOA	21	U	21	21	U	21	104	U	104	105	U	105
2-Methylnaphthalene	SVOA	19	U	19	19	U	19	10.4	U	10.4	10.5	U	10.5
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	104	U	104	105	U	105
2-Nitroaniline	SVOA	50	U	50	49	U	49	115	U	115	116	U	116
2-Nitrophenol	SVOA	10	U	10	9.8	U	9.8	104	U	104	105	U	105
3,3'-Dichlorobenzidine	SVOA	90	U	90	88	U	88	104	U	104	105	U	105
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	32	U	32	104	U	104	105	U	105
3-Nitroaniline	SVOA	73	U	73	72	U	72	104	U	104	105	U	105
4,6-Dinitro-2-methylphenol	SVOA	330	U	330	320	U	320	104	U	104	105	U	105
4-Bromophenylphenyl ether	SVOA	19	U	19	19	U	19	104	U	104	105	U	105
4-Chloro-3-methylphenol	SVOA	66	U	66	65	U	65	139	U	139	140	U	140
4-Chloroaniline	SVOA	82	U	82	80	U	80	104	U	104	105	U	105
4-Chlorophenylphenyl ether	SVOA	21	U	21	21	U	21	104	U	104	105	U	105
4-Nitroaniline	SVOA	73	U	73	71	U	71	104	U	104	105	U	105
4-Nitrophenol	SVOA	97	U	97	95	U	95	104	U	104	105	U	105
Acenaphthene	SVOA	10	U	10	10	U	10	10.4	U	10.4	10.5	U	10.5
Acenaphthylene	SVOA	17	U	17	17	U	17	10.4	U	10.4	10.5	U	10.5
Anthracene	SVOA	17	U	17	17	U	17	10.4	U	10.4	10.5	U	10.5
Benzo(a)anthracene	SVOA	20	U	20	20	U	20	10.4	U	10.4	10.5	U	10.5
Benzo(a)pyrene	SVOA	20	U	20	20	U	20	10.4	U	10.4	10.5	U	10.5
Benzo(b)fluoranthene	SVOA	26	U	26	26	U	26	10.4	U	10.4	10.5	U	10.5
Benzo(ghi)perylene	SVOA	16	U	16	16	U	16	10.4	U	10.4	10.5	U	10.5
Benzo(k)fluoranthene	SVOA	40	U	40	39	U	39	10.4	U	10.4	10.5	U	10.5
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	23	U	23	104	U	104	105	U	105
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	23	U	23	104	U	104	105	U	105
Bis(2-chloroethyl) ether	SVOA	17	U	17	16	U	16	104	U	104	105	U	105
Bis(2-ethylhexyl) phthalate	SVOA	46	U	46	45	U	45	104	U	104	105	U	105
Butylbenzylphthalate	SVOA	43	U	43	42	U	42	104	U	104	105	U	105
Carbazole	SVOA	36	U	36	35	U	35	10.4	U	10.4	10.5	U	10.5
Chrysene	SVOA	27	U	27	26	U	26	10.4	U	10.4	10.5	U	10.5
Dibenz[a,h]anthracene	SVOA	19	U	19	19	U	19	10.4	U	10.4	10.5	U	10.5
Dibenzofuran	SVOA	20	U	20	20	U	20	104	U	104	105	U	105
Diethyl phthalate	SVOA	26	U	26	25	U	25	104	U	104	105	U	105
Dimethyl phthalate	SVOA	23	U	23	23	U	23	104	U	104	105	U	105
Di-n-butylphthalate	SVOA	29	U	29	28	U	28	104	U	104	105	U	105
Di-n-octylphthalate	SVOA	14	U	14	14	U	14	104	U	104	105	U	105
Diphenylamine	SVOA							104	U	104	105	U	105
Fluoranthene	SVOA	36	U	36	35	U	35	10.4	U	10.4	10.5	U	10.5
Fluorene	SVOA	18	U	18	18	U	18	10.4	U	10.4	10.5	U	10.5
Hexachlorobenzene	SVOA	29	U	29	28	U	28	104	U	104	105	U	105
Hexachlorobutadiene	SVOA	10	U	10	9.8	U	9.8	104	U	104	105	U	105
Hexachlorocyclopentadiene	SVOA	50	U	50	49	U	49	104	U	104	105	U	105
Hexachloroethane	SVOA	21	U	21	21	U	21	104	U	104	105	U	105
Indeno(1,2,3-cd)pyrene	SVOA	22	U	22	22	U	22	10.4	U	10.4	10.5	U	10.5
Isophorone	SVOA	17	U	17	17	U	17	104	U	104	105	U	105
Naphthalene	SVOA	31	U	31	30	U	30	10.4	U	10.4	10.5	U	10.5
Nitrobenzene	SVOA	22	U	22	22	U	22	104	U	104	105	U	105
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	30	U	30	104	U	104	105	U	105
N-Nitrosodiphenylamine	SVOA	21	U	21	21	U	21						
Pentachlorophenol	SVOA	330	U	330	320	U	320	104	U	104	105	U	105
Phenanthrene	SVOA	17	U	17	17	U	17	10.4	U	10.4	10.5	U	10.5
Phenol	SVOA	18	U	18	18	U	18	104	U	104	105	U	105
Pyrene	SVOA	12	U	12	12	U	12	10.4	U	10.4	10.5	U	10.5
Tributyl phosphate	SVOA	58	U	58	57	U	57	104	U	104	105	U	105

Attachment	1	Sheet No.	19 of 19
Originator	J. D. Skoglie	Date	6/23/15
Checked	T. Q. Howell	Job No.	14655
Calc. No.	0300X-CA-V0230	Rev. No.	0

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 300 Area Closure Operations **Job No. 14655**

Area: 300

Discipline: Environmental *Calculation No: 0300X-CA-V0231

Subject: 300-263 and 316-3 Waste Sites 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 Summary = 4 Total = 5	J. D. Skoglie	I. B. Berezovskiy	R. J. Nielson	S. G. Wilkinson	9/2/15

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:	J. D. Skoglie	Date:	07/14/15	Calc. No.:	0300X-CA-V0231	Rev.:	0
Project:	300 Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	07/14/15
Subject:	300-263 and 316-3 Waste Sites Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	1 of 4

PURPOSE:

Provide documentation to support the calculation of the direct contact hazard quotient (HQ) and excess carcinogenic risk of contaminants of concern (COCs) for waste sites identified as requiring remove, treat, and dispose in Table 1 of the 300 Area Final ROD (EPA 2013). In accordance with the nonradionuclides evaluation of risk standards in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2015), 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 $<1 \times 10^{-6}$ (residential) or $<1 \times 10^{-5}$ (industrial) for individual carcinogens
4) A cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.

GIVEN/REFERENCES:

1) DOE-RL, 2015, *Remedial Design Report/Remedial Action Work Plan for 300-FF-2 Soils,* DOE/RL-2014-13-ADD1, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

2) EPA, 2013, *Record of Decision for the 300-FF-2 Operable Unit and 300-FF-5, and Record of Decision Amendment for 300-FF-1, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

3) WCH, 2015a, *300-263 and 316-3 Waste Sites 95% UCL Calculations*, 0300X-CA-V0230, Rev. 0, Washington Closure Hanford, Richland, Washington.

4) WCH, 2015b, *Cleanup Verification Package for the 300-263, 324 Building Diversion Tank and 316-3, 307 Disposal Trenches, Process Water Trenches Waste Sites,* Attachment to Waste Site Reclassification Forms 2015-050 and 2015-049, Rev. 0, Washington Closure Hanford, Richland, Washington.

SOLUTION:

Hazard Quotient and Excess Carcinogenic Risk Calculations

The 300-263 and 316-3 waste sites are located in the industrial portion of the 300 Area, therefore, the calculations are performed for industrial land use. The industrial hazard quotient and cancer risk values are calculated by substituting the appropriate industrial daily intake factors, calculated as described in Appendix C of the RDR/RAWP (DOE-RL 2015), into the Appendix C equations for the hazard quotient and cancer risk. Values of the reference doses (RfDs) and cancer potency factors (CPFs) for use in calculating the hazard quotient and cancer risk are also provided in Appendix C of the RDR/RAWP (DOE-RL 2015).

Washington Closure Hanford CALCULATION SHEET

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Project:	300 Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	07/14/15
Subject:	300-263 and 316-3 Waste Sites Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	2 of 4

1) Generate an HQ for each constituent with noncarcinogenic effects detected above background and compare it to the individual HQ of <1.0. The calculation is performed as necessary for industrial land use as described in the RDR/RAWP (DOE-RL 2015) and presented in Table 1.

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 and compare it to the excess cancer risk of $<1 \times 10^{-6}$ for residential land use calculation or $<1 \times 10^{-5}$ for industrial land use calculation (DOE-RL 2015). The 300-263 and 316-3 waste sites calculation is performed for industrial use as described in the RDR/RAWP (DOE-RL 2015) and presented in Table 1.

4) Sum the excess cancer risk value(s) and compare it to the cumulative cancer risk of $<1 \times 10^{-5}$.

METHODOLOGY:

Hazard Quotient and Excess Carcinogenic Risk Calculations

The 300-263 and 316-3 waste sites underwent statistical sampling within the shallow zone and deep zone decision units. One duplicate sample and one split sample were also collected from each decision unit. The direct contact hazard quotient and carcinogenic risk calculations for the 300-263 and 316-3 waste sites were performed for the shallow zone decision unit only using the statistical or maximum value for each COC detected above background, as described in the referenced cleanup verification package document (WCH 2015b), and/or the 95% upper confidence limit (UCL) calculation (WCH 2015a). Of the COCs for this site, barium, mercury, selenium, silver, uranium, and nitrogen in nitrate and nitrite were detected above Hanford Site background levels and required direct contact hazard quotient and carcinogenic risk calculations. Hexavalent chromium, strontium, tin, phenanthrene, the detected polychlorinated biphenyls (PCBs), and total benzo(a)pyrene (BAP) toxic equivalency concentration (TEC) are included because they were detected and a Hanford Site background value is not available. All other site nonradionuclide COCs were not detected or were quantified below background levels.

The 300-263 and 316-3 waste sites data set was evaluated against the industrial cumulative direct contact hazard quotient standards (Table 1).

Calculations for the 300-263 and 316-3 waste sites were performed using parameters and equations for industrial land use from the RDR/RAWP (DOE-RL 2015). An example of the HQ and risk calculations of COCs for industrial land use using data for the 300-263 and 316-3 waste sites is presented below:

1) To calculate the HQ, the statistical value for tin is 1.6 mg/kg, multiplied by the daily intake factor (2.86×10^{-7}) and divided by the reference dose (RfD) of 0.6 mg/kg-day, resulting in an HQ of 7.63×10^{-7}. Comparing this value, and all other individual values for the 300-263 and 316-3 waste sites calculation, to the requirement of <1.0, this criterion is met.

2) After the HQ calculation is completed for the appropriate COCs, the cumulative HQ is obtained by summing the individual values. To avoid errors due to intermediate rounding, the individual HQ

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values prior to rounding are used for this calculation. The sum of the HQ values is 1.38×10^{-3} for the 300-263 and 316-3 waste sites COCs only calculation. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the statistical value for aroclor-1260, 3.1 mg/kg, is multiplied by the daily intake factor (7.62×10^{-8}) and the cancer potency factor of 2.0 mg/kg-day, with a resulting value of 4.72×10^{-7}. Comparing this value, and all other individual values for the 300-263 and 316-3 waste sites calculation, to the threshold 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 sum of the cumulative cancer risk values is 4.73×10^{-7} for the 300-263 and 316-3 waste sites calculation. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

RESULTS:

Hazard Quotient and Excess Carcinogenic Risk Calculations – 300-263 and 316-3 Waste Sites COCs

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 industrial direct contact calculations.

Washington Closure Hanford CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	07/14/15	Calc. No.:	0300X-CA-V0231	Rev.:	0
Project:	300 Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	07/14/15
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Table 1. Industrial Direct Contact Hazard Quotient and Excess Cancer Risk Results for the 300-263 and 316-3 Waste Sites.

COCs	Statistical or Maximum Value[a] (mg/kg)	Oral Reference Dose (RfD)[b] (mg/kg-day)	Hazard Quotient	Cancer Potency (Slope) Factor[b] (mg/kg-day) -1	Cancer Risk
Metals					
Barium	325	2.00E-01	4.65E-04	--	--
Chromium (Hexavalent)	0.247	3.00E-03	2.35E-05	--	--
Mercury	0.27	3.00E-04	2.57E-04	--	--
Selenium	1.5	5.00E-03	8.58E-05	--	--
Silver	0.45	5.00E-03	2.57E-05	--	--
Strontium	122	6.00E-01	5.82E-05	--	--
Tin	1.6	6.00E-01	7.63E-07	--	--
Uranium	3.8	3.00E-03	3.62E-04	--	--
Inorganics and TPH					
Nitrogen in Nitrite and Nitrate	192	1.60E+00	3.43E-05	--	--
Semivolatiles and Polycyclic Aromatic Hydrocarbons					
BAP TEC[c]	0.00035	--	--	7.30E+00	1.95E-10
Phenanthrene	0.031	--	--	--	--
Polychlorinated Biphenyls					
PCB Aroclor 1254	0.0050	2.00E-05	7.15E-05	2.00E+00	7.62E-10
PCB Aroclor 1260	3.1	--	--	2.00E+00	4.72E-07
COCs Cumulative Hazard Quotient:			**1.38E-03**		
COCs Cumulative Excess Cancer Risk:					**4.73E-07**

[a] = From WCH (2015).

[b] = Value obtained from the RDR/RAWP (DOE-RL 2015).

[c] = Evaluation of the compliance of benzo(a)pyrene with cleanup levels includes the toxic equivalency concentrations of the carcinogenic PAHs.

-- = not applicable

BAP = benzo(a)pyrene

COC = contaminant of concern

CONCLUSION:

The calculations for industrial land use summarized in Table 1 demonstrate that the 300-263 and 316-3 waste sites identified as requiring remove, treat, and dispose in Table 1 of the 300 Area Final ROD (EPA 2013) meets the requirements for the industrial direct contact hazard quotient and excess carcinogenic risk, as identified in the RDR/RAWP (DOE-RL 2015). The hazard quotient and carcinogenic (excess cancer) risk calculations are for use in the CVP for these sites.

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CALCULATION COVER SHEET

Project Title: 300 Area Closure Operations **Job No. 14655**

Area: 300 Area

Discipline: Environmental *Calculation No: 0300X-CA-V0232

Subject: 300-263 and 316-3 Waste Sites Radionuclide Sum-of-Fractions 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	J. D. Stoglie	T. Q. Howell	R. J. Nielson	S. G. Wilkinson	9/2/15

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:	J. D. Skoglie	Date:	06/24/15	Calc. No.:	0300X-CA-V0232	Rev.:	0
Project:	300 Area Closure Operations	Job No:	14655	Checked:	T. Q. Howell	Date:	06/24/15
Subject:	300-263 and 316-3 Waste Sites Radionuclide Sum-of-Fractions Calculations					Sheet No.	1 of 3

PURPOSE:

Provide documentation to support the calculation of the sum-of-fractions evaluation for radionuclide direct exposure excess cancer risk and radiological dose for waste sites identified as requiring remove, treat, and dispose in Table 1 of the 300 Area Final Action ROD (EPA 2013). This calculation is prepared for the waste site data set with applicable radiological contaminants of concern (COCs) in accordance with Section B4 of the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2015).

GIVEN/REFERENCES:

1) DOE-RL, 1996, *Hanford Site Background: Part 2, Soil Background for Radioactive Analytes,* DOE/RL-96-12, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
2) DOE-RL, 2013, *Remedial Investigation/Feasibility Study for the 300-FF-1, 300-FF-2, and 300-FF-5 Operable Units,* DOE/RL-2010-99, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
3) DOE-RL, 2015, *Remedial Design Report/Remedial Action Work Plan for 300-FF-2 Soils,* DOE/RL-2014-13-ADD1, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) EPA, 2013, *Record of Decision for the 300-FF-2 Operable Unit and 300-FF-5, and Record of Decision Amendment for 300-FF-1, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.
5) WCH, 2015, *300-263 and 316-3 Waste Sites Cleanup Verification 95% UCL Calculations*, 0300X-CA-V0230, Rev. 0, Washington Closure Hanford, Richland, Washington.

SOLUTION:

As discussed in section B4 of the RDR/RAWP (DOE-RL 2015), the cleanup levels (CULs) for soil radionuclide COCs in the 300 Area Final Action ROD (EPA 2013) were set at a 1 x 10^{-4} risk limit or 15 mrem/yr dose limit for isotopes, whichever is more conservative. Soil radionuclide CULs must also meet the multi-contaminant total cancer risk limit of 1 x 10^{-4} and the total dose limit of 15 mrem/yr. These soil risk limits are applied to both the industrial and residential scenarios.

For waste sites with few radionuclide COCs at concentrations well below the individual radionuclide cleanup levels (CULs) provided in the 300 Area Final Action ROD (EPA 2013), a sum-of-fractions evaluation is performed for direct exposure single radionuclide 1 x 10^{-4} cancer risk and 15 mrem/yr dose values as shown in Table 1. The first column of Table 1 presents the COCs and the second column presents the maximum values. Where applicable, background values (DOE-RL 1996) are presented in the third column. Uranium background is subtracted from the analyses for all soil samples; however, background for other radionuclides is only subtracted from the overburden soil analysis. This accounts for anthropogenic and naturally occurring radionuclide background in surface soils. Only uranium background concentrations are accounted for in shallow and deep zone soils by subtracting uranium isotope concentrations from the maximum values. The fourth column presents the background subtracted value. The fifth column presents the single radionuclide 1 x 10^{-4} cancer risk equivalence

activity, and the sixth column presents the maximum value divided by the cancer risk equivalence activity.

The values in the sixth column are summed and presented as the sum-of-fractions. This value is multiplied by 0.0001 to determine the 1×10^{-4} cancer risk value of 5.12×10^{-6}. A cancer risk value of more than 1×10^{-4} indicates additional evaluation is required.

The seventh column presents the single radionuclide 15 mrem/yr dose equivalence activity, and the last column presents the maximum value divided by the dose equivalence activity. The values in the last column are summed and presented as the sum-of-fractions. This value is multiplied by 15 mrem/yr to determine the total radiological dose of 2.19 mrem/yr. A total dose of more than 15 mrem/yr indicates additional evaluation is required.

METHODOLOGY:

The 300-263 and 316-3 waste sites underwent statistical verification sampling at two decision units. Two duplicates and two split samples were also collected. The sum-of-fractions were conservatively calculated for the 300-263 and 316-3 waste sites data set, using the greatest of the maximum values for each COC detected above background from amongst all applicable decision units, as described in the associated calculation (WCH 2015).

Calculations for the 300-263 and 316-3 waste sites were performed using CULs for industrial land use. An example of the sum-of-fractions calculation is presented below.

1) To calculate the fraction for uranium-238, the background value of 1.1 pCi/g is subtracted from the maximum value from the data set of 10.7 pCi/g, resulting in a corrected maximum value of 9.60 pCi/g for uranium-238. The background corrected value is divided by the activity equivalent to 1×10^{-4} cancer risk of 283 pCi/g, resulting in a fraction of 0.0339 for uranium-238.

2) The fractions for the remaining COCs are determined and summed. The sum of these fractions equals 0.0512. The sum-of-fractions is then multiplied by 1×10^{-4} to determine the final cancer risk value of 5.12×10^{-6} for the 300-263 and 316-3 waste sites. Comparing this value to the cancer risk limit of $<1 \times 10^{-4}$, the requirement is met.

3) To calculate the radiological dose fraction for uranium-235, the background corrected maximum value of 0.769 pCi/g is divided by the activity equivalent to a 15 mrem/yr dose of 16 pCi/g, resulting in a fraction of 0.0481 for uranium-235.

4) The radiological dose fractions for the remaining COCs are determined and summed. The sum of these fractions equals 0.146. The sum-of-fractions is then multiplied by 15 mrem/yr to determine the total radiological dose of 2.19 mrem/yr for the waste site. Comparing this value to the radiological dose limit of 15 mrem/yr, the requirement is met.

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Originator:	J. D. Skoglie	Date:	06/25/15	Calc. No.:	0300X-CA-V0232	Rev.:	0
Project:	300 Area Closure Operations	Job No:	14655	Checked:	T. Q. Howell	Date:	06/25/15
Subject:	300-263 and 316-3 Waste Sites Radionuclide Sum-of-Fractions Calculations					Sheet No.	3 of 3

RESULTS:

Table 1 presents the results of the direct contact sum-of-fractions calculations for 300-263 and 316-3 waste sites for industrial land use.

Table 1. 300-263 and 316-3 Waste Sites Industrial Sum-of-Fractions Evaluation of Radionuclide Direct Exposure Excess Cancer Risk and Dose.

COC	Maximum Activity [a] (pCi/g)	Background (pCi/g)	Background Corrected Activity [b] (pCi/g)	Activity Equivalent to Residential 10^{-4} Cancer Risk [c] (pCi/g)	Fraction for 10^{-4} Cancer Risk [b]	Activity Equivalent to Residential 15 mrem/yr Dose [d] (pCi/g)	Fraction for 15 mrem/yr Dose [b]
Plutonium-239/240	0.372	0.025	0.372	2,906	0.000128	245	0.00152
Strontium-90	1.72	0.18	1.72	1,968	0.000874	1,970	0.000873
Uranium-234	7.49	1.1	6.39	1,757	0.00364	167	0.0383
Uranium-235	0.879	0.11	0.769	61	0.0126	16	0.0481
Uranium-238	10.7	1.1	9.60	283	0.0339	167	0.0575
				Sum of Fractions	**0.0512**	**Sum of Fractions**	**0.146**
				Residential Excess Cancer Risk	**5.12E-06**	**Dose, mrem/yr**	**2.19**

[a] From (WCH 2015).
[b] Correct decimal places and correct all negative values to be zero. Except for uranium isotopes background subtraction only applies to overburden.
[c] From Table 6-12 of the 300 Area RI/FS, DOE/RL-2010-99, Rev. 0 (DOE-RL 2013).
[d] From Table C-1 of the RDR/RAWP for the 300-FF-2 Soils, DOE/RL-2014-13-ADD1, Rev. 0 (DOE-RL 2015).
COC = Contaminant of Concern.

CONCLUSION:

The calculations summarized in Table 1 provide the sum-of-fraction calculations for the 300-263 and 316-3 waste sites with industrial land use radionuclide COCs that were identified as requiring remove, treat, and dispose in Table 1 of the 300 Area Final Action ROD (EPA 2013). The direct contact sum-of-fractions calculations are for use in the CVP for these waste sites.

APPENDIX C

DATA QUALITY ASSESSMENT

APPENDIX C

DATA QUALITY ASSESSMENT

VERIFICATION SAMPLING

A data quality assessment (DQA) was performed to compare the verification sampling approach and resulting analytical data with the sampling and data requirements specified in the site-specific sample designs (WCH 2015a). This DQA was performed in accordance with site-specific data quality objectives found in the *300 Area Remedial Action Sampling and Analysis Plan* (300 Area SAP) (DOE-RL 2014).

A review of the sample design (WCH 2015a), the field logbook (WCH 2015b), and applicable analytical data packages has been performed as part of this DQA. All samples were collected and analyzed per the sample design. To ensure quality data, the 300 Area SAP (DOE-RL 2014) 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 from samples collected at the 316-3 and 200-263 waste sites were provided by the laboratories in four sample delivery groups (SDGs): JP0966, JP0967, XP0214, and XP0215. SDG JP0966 was submitted for third-party validation. No major deficiencies were identified in the analytical data set. Minor deficiencies are discussed for the 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 JP0966

This SDG comprises 13 soil samples (J1V769, J1V770 through J1V779, J1V780, JiV781) collected from the shallow zone of the excavation. Sample J1V781 is a field duplicate of sample J1V770. The split sample (J1V782) associated with this field duplicate pair is in SDG XP0214 below. The field samples were analyzed by gamma energy analysis (GEA) and for total beta radiostrontium, total uranium, isotopic uranium, isotopic plutonium, americium, inductively coupled plasma (ICP) metals, mercury, nitrate (by method 353.2), hexavalent chromium, polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs), and Northwest total petroleum hydrocarbons – diesel range organics (NWTPH-Dx). SDG JP0966 was submitted for third-party validation. Minor deficiencies are as follows.

In the PCB analysis, sample J1V779 required dilution during the analytical process due to elevated concentrations of target analytes. The laboratory has qualified the associated data with "D" flags due to the dilution. The data are usable for decision-making purposes.

In the PCB analysis, the surrogate recovery for sample J1V779 is outside the quality control (QC) limits due to sample dilution during the analytical process. Third-party validation qualified all PCB results in for sample J1V779 as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, low levels of magnesium, nickel, strontium, and uranium were detected in the method blank (MB). These detections are less than half of the reporting limit and there is no significant impact on the field sample data. No qualifiers were applied to the data. The data are usable for decision-making purposes.

In the ICP metals analysis, the matrix spike (MS) recoveries for antimony (62%) and silicon (35%) are outside the QC limits. Third-party validation qualified the associated data as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the laboratory control sample (LCS) recovery for silicon (11%) is outside the QC limits. Third-party validation qualified the associated data as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the radiological analyses, an LCS sample was not prepared for uranium-235, plutonium-238, or curium-243/244. Third-party validation qualified the associated data as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the radiological analyses, the radiochemical yields for uranium-234 and uranium-238 in samples J1V778 and J1V781 are outside the QC limits. Third-party validation qualified the associated data as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the nitrate/nitrite analysis by Method 353.2, sample J1V779 required dilution during the analytical process due to elevated concentrations of target analytes. The laboratory has qualified the associated data with "D" flags due to the dilution. The data are usable for decision-making purposes.

In the nitrate/nitrite analysis by Method 353.2, the MS recovery is outside the QC limits. An acceptable LCS result indicates the analytical system was operating within control. Third-party validation qualified the associated data as estimated. Estimated data are usable for decision-making purposes.

In the nitrate/nitrite analysis by Method 353.2, the relative percent difference (RPD) calculated for the laboratory duplicate is outside the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the

sample matrix. The laboratory has qualified the associated data with "M" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the nitrate/nitrite analysis by Method 353.2, The MS recovery is outside QC limits. Acceptable LCS recovery indicates the analytical system was operating within control. The laboratory has qualified the associated data with "M" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the general chemistry characterization the analysis for percent moisture is routinely performed. The RPD calculated for the percent moisture data is outside the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. The laboratory has qualified the percent moisture measurement with an "M" flag. This result may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0967

This SDG comprises 13 soil samples (J1V783 through J1V789, J1V790 through J1V795) collected from the deep zone of the excavation. Additionally, an equipment blank (J1V796) is included in this SDG. Sample J1V795 is a field duplicate of sample J1V788. The split sample (J1V797) associated with this field duplicate pair is part of SDG XP0215 below. The field samples for SDG JP0967 were analyzed by GEA and for total beta radiostrontium, total uranium, isotopic uranium, isotopic plutonium, americium, ICP metals, mercury, nitrate (by Method 353.2), hexavalent chromium, PCBs, SVOCs, and NWTPH-Dx. The equipment blank was analyzed for ICP metals and mercury. Minor deficiencies are as follows.

In the ICP metals analysis, serial dilutions of a digestate indicate that physical and chemical interferences are present for chromium, cobalt, magnesium, nickel, strontium, and zinc. The laboratory has qualified the associated data with "X" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, elevated concentrations of titanium in samples J1V788 and J1V795 required those samples to be diluted in order to minimize the impact on the analysis of antimony, beryllium, cobalt, copper, lead, tin, and vanadium. The laboratory has qualified the associated data with "D" flags. The data are usable for decision-making purposes.

In the ICP metals analysis, low levels of barium, calcium, lithium, magnesium, strontium, tin, and uranium were detected in the MB. These detections are less than half of the reporting limit and there is minimal impact on the field sample data. The laboratory has qualified the associated data with "B" flags. The data are usable for decision-making purposes.

In the ICP metals analysis, the RPDs calculated for boron and mercury are outside the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Acceptable LCS recoveries indicate that the analytical system was operating within control. The laboratory has qualified the associated data with "M" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the nitrate/nitrite analysis by Method 353.2, the RPD calculated for the method blank is outside the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. These data may be considered estimated. Estimated data are usable for decision-making purposes.

SDG XP0214

This SDG comprises one soil split sample (J1V782) collected from the shallow zone of the excavation. The field duplicate (J1V770, J1V781) pair that this split sample is associated with are in SDG JP0966 above. This sample was analyzed by GEA and for total beta radiostrontium, total uranium, isotopic uranium, isotopic plutonium, americium, ICP metals, mercury, nitrate (by Method 353.2), hexavalent chromium, PCBs, SVOCs, and NWTPH-Dx. Minor deficiencies are as follows.

In the ICP metals analysis, low levels of sodium, tin, and uranium were detected in the MB. These detections were below the reporting limit and there is minimal impact on the field sample data. The laboratory has qualified the associated data with "B" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recovery for silicon (59.2%) is outside the QC limits. Acceptable matrix spike duplicate (MSD) and LCS recoveries indicate that the analytical system was operating within control. The MS recovery is likely due to natural heterogeneities in the sample matrix. The laboratory has qualified the associated data with "N" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, an elevated concentration of titanium required the sample to be diluted in order to minimize the impact on the analysis of antimony, cobalt, lithium, selenium, tin, uranium, vanadium, zinc, and zirconium. The laboratory has qualified the associated data with "D" flags. The data are usable for decision-making purposes.

SDG XP0215

This SDG comprises one soil split sample (J1V797) collected from the deep zone of the excavation. The field duplicate (J1V788, J1V795) pair that this split sample is associated with are in SDG JP0967 above. This sample was analyzed by GEA and for total beta radiostrontium, total uranium, isotopic uranium, isotopic plutonium, americium,

ICP metals, mercury, nitrate (by Method 353.2), hexavalent chromium, PCBs, SVOCs, and NWTPH-Dx. Minor deficiencies are as follows.

In the NWTPH-Dx analysis, the MS recovery (65.2%) is outside the QC limits. The MSD returned a similar recovery that was within QC limits and produced an RPD that was also within QC limits. An acceptable LCS recovery indicates that the analytical system was operating within control. The laboratory has qualified the associated data with a "T" flag. This data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recovery for silicon (52.5%) is outside the QC limits. Acceptable MSD and LCS recoveries indicate that the analytical system was operating within control. The MS recovery is likely due to natural heterogeneities in the sample matrix. The laboratory has qualified the associated data with "N" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, an elevated concentration of titanium required the sample to be diluted in order to minimize the impact on the analysis of antimony, cobalt, lithium, selenium, tin, uranium, vanadium, zinc, and zirconium. The laboratory has qualified the associated data with "D" flags. The data are usable for decision-making purposes.

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) measurements 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	Split Sample
Shallow zone (SZ)	J1V770	J1V781	J1V782
Deep zone (DZ)	J1V788	J1V795	J1V797

Field duplicate samples are collected to provide a relative measure of the degree of local heterogeneity in the sampling medium, unlike laboratory duplicates that are used to evaluate precision in the analytical process. The field duplicates are evaluated by computing the RPD of the sample/duplicate pair(s) for each contaminant of potential

concern. 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.

Field split samples are used to determine systematic differences (bias) between laboratories. A statistical determination of systematic differences would require larger data sets than are presented here. Such a determination is complicated by variability introduced by the natural heterogeneities inherent in field soil samples and the analytical variability that each individual laboratory experiences. Therefore, when evaluating limited field split data, relatively large RPDs are expected.

No major deficiencies in the RPD calculations were found for the duplicate or split samples. Minor deficiencies for the field duplicates and split samples are as follows.

Table C-2. Field Duplicate Relative Percent Differences.

Decision Unit	Duplicate Analyses Over 30%	Split Analyses Over 35%
Shallow Zone (SZ)	Barium (40.7%) Uranium (125.4%)	Barium (38.9%) Silicon (91.0%)
Deep Zone (DZ)	None	Silicon (83.9%)

Elevated RPDs in environmental samples are generally attributed to natural heterogeneity in the sample matrix. The data are usable for decision-making purposes.

A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) is less than five times the 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. In the duplicate and split analyses multiple analytes were flagged for this evaluation. 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 316-3 and 300-263 waste site 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 these sites 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 Washington Closure Hanford 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.

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