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

15-AMRP-0278

AUG 0 6 2015

Ms. J. A. Hedges, Program Manager
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port of Benton Boulevard
Richland, Washington 99354

Dear Ms. Hedges:

TRANSMITTAL OF APPROVED WASTE SITE RECLASSIFICATION FORM AND SUPPORTING DOCUMENTATION FOR THE 100-H-28:3, 100-H-28:5, AND 100-H-44 WASTE SITES, AND THE 100-H-28:2, 100-H-28:3, 100-H-28:4, AND 100-H-28:5 OVERBURDEN PILES, REVISION 0

Attached for your use are the approved Waste Site Reclassification Forms No. 2015-027, 2015-028, and 2015-029, and supporting, "Remaining Sites Verification Package for the 100-H-28:3, and 100-H-28:5, and 100-H-44 Waste Sites, and the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 Overburden Piles," Rev. 0. If you have questions, please contact me or your staff may contact John Neath of my staff, at (509) 376-0649.

Sincerely,

Mark S. French, Director
River Corridor Division

AMRP:JPN

Attachments

cc w/attachs:
N. M. Menard, Ecology
Administrative Record, H6-08

cc w/o attach:
R. D. Cantwell, WCH
A. L. Espinoza, MSA
S. L. Feaster, WCH
T. Q. Howell, WCH

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-HR-1 **Control No.:** 2015-028

Waste Site Code(s)/Subsite Code(s): 100-H-28:3

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 100-H-28:3, North Process Sewers subsite is part of the 100-H-28, 100-H Water Treatment Facilities Underground Pipelines waste site. The 100-H-28 waste site, part of the 100-HR-1 Operable Unit, was added to the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units* (Remaining Sites ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 1999), as a candidate site for confirmatory sampling via the *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 2009). Subsequently, the 100-H-28 waste site was divided into eight subsites and the 100-H-28:3, North Process Sewers subsite was recommended for remedial action.

Remedial action at the 100-H-28:3 subsite was conducted concurrently with remedial action at the 100-H-28:5 subsite and the 100-H-44 waste site, and began on July 17, 2013, with overburden removal. Remediation continued through September 9, 2014, to a maximum depth of 10 m (33 ft) below ground surface, resulting in a total of approximately 39,730 bank cubic meters (BCM) (51,965 bank cubic yards [BCY]) of contaminated soil and debris being removed and staged in a staging pile area for loadout and disposal at the Environmental Restoration Disposal Facility (ERDF). Approximately 13,850 BCM (18,115 BCY) of the total volume of soil and debris was removed from the 100-H-28:3 subsite. Waste loadout with disposal at ERDF was completed in September 2014. No anomalies were encountered during remediation of the 100-H-28:3 subsite.

Verification samples from the combined 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site were collected on August 13 and December 12, 2013; November 5, 12, 13, and 20, 2014; and February 5 and March 5, 16, and 18, 2015. The sampling was performed to determine if the site decision units met the remedial action objectives and remedial action goals established by the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (100 Area RDR/RAWP), DOE/RL-97-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington (DOE-RL 2009b), and the Remaining Sites ROD (EPA 1999). The selected remedy involved (1) excavating the site to the extent required to meet specified soil cleanup levels, (2) disposing of contaminated excavation materials at ERDF, (3) demonstrating through verification sampling that cleanup goals have been achieved, and (4) proposing the site for reclassification to Interim Closed Out.

Basis for reclassification:

The verification sampling and modeling results for the 100-H-28:3 subsite demonstrate that the site meets the remedial action objectives and corresponding remedial action goals established in the 100 Area RDR/RAWP (DOE-RL 2009b) and the Remaining Sites ROD (EPA 1999) to support a reclassification to Interim Closed Out. These sampling and modeling results established that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. Contamination above direct exposure levels was not observed in shallow zone soils and is concluded to not exist in deep zone soils; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone soil are not required. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites, and the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 Overburden Piles (attached).*

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-HR-1 **Control No.:** 2015-028

Waste Site Code(s)/Subsite Code(s): 100-H-28:3

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:

J. P. Neath	J P Neath	7/8/15
DOE Federal Project Director (printed)	Signature	Date
N. Menard	Nina M. Menard	7/9/15
Ecology Project Manager (printed)	Signature	Date
NA		
EPA Project Manager (printed)	Signature	Date

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-HR-1 **Control No.:** 2015-027

Waste Site Code(s)/Subsite Code(s): 100-H-28:5

Reclassification Category: Interim ☒ Final ☐

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

Approvals Needed: DOE ☒ Ecology ☒ EPA ☐

Description of current waste site condition:

The 100-H-28:5, 1607-H2 Sanitary Sewer Pipelines subsite is part of the 100-H-28, 100-H Water Treatment Facilities Underground Pipelines waste site. The 100-H-28 waste site, part of the 100-HR-1 Operable Unit, was added to the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units* (Remaining Sites ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 1999), as a candidate site for confirmatory sampling via the *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 2009). Subsequently, the 100-H-28 waste site was divided into eight subsites and the 100-H-28:5, 1607-H2 Sanitary Sewer Pipelines subsite was recommended for remedial action.

Remedial action at the 100-H-28:5 subsite was conducted concurrently with remedial action at the 100-H-28:3 subsite and the 100-H-44 waste site, and began on July 17, 2013, with overburden removal. Remediation continued through September 9, 2014, to a maximum depth of 10 m (33 ft) below ground surface, resulting in approximately 39,730 bank cubic meters (BCM) (51,965 bank cubic yards [BCY]) total of contaminated soil and debris being removed and staged in a staging pile area for loadout and disposal at the Environmental Restoration Disposal Facility (ERDF). Approximately 18,123 BCM (23,704 BCY) of the total volume of soil and debris was removed from the 100-H-28:5 subsite. Waste loadout with disposal at ERDF was completed in March 2015. No anomalies were encountered during remediation of the 100-H-28:5 subsite.

Verification samples from the combined 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site were collected on August 13 and December 12, 2013; November 5, 12, 13, and 20, 2014; and February 5 and March 5, 16, and 18, 2015. The sampling was performed to determine if the site decision units met the remedial action objectives and remedial action goals established by the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (100 Area RDR/RAWP), DOE/RL-97-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington (DOE-RL 2009b), and the Remaining Sites ROD (EPA 1999). The selected remedy involved (1) excavating the site to the extent required to meet specified soil cleanup levels, (2) disposing of contaminated excavation materials at ERDF, (3) demonstrating through verification sampling that cleanup goals have been achieved, and (4) proposing the site for reclassification to Interim Closed Out.

Basis for reclassification:

The verification sampling and modeling results for the 100-H-28:5 subsite demonstrate that the site meets the remedial action objectives and corresponding remedial action goals established in the 100 Area RDR/RAWP (DOE-RL 2009b) and the Remaining Sites ROD (EPA 1999) to support a reclassification to Interim Closed Out. These sampling and modeling results established that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. Contamination above direct exposure levels was not observed in shallow zone soils and is concluded to not exist in deep zone soils; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone soil are not required. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites, and the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 Overburden Piles (attached).*

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-HR-1 **Control No.:** 2015-027

Waste Site Code(s)/Subsite Code(s): 100-H-28:5

Regulator comments:

Waste Site Controls:

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

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

J. P. Neath	J P Neath	7/8/15
DOE Federal Project Director (printed)	Signature	Date
N. Menard	Nina M. Menard	7/9/15
Ecology Project Manager (printed)	Signature	Date
NA		
EPA Project Manager (printed)	Signature	Date

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-HR-1 **Control No.:** 2015-029

Waste Site Code(s)/Subsite Code(s): 100-H-44

Reclassification Category: Interim ☒ Final ☐

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

Approvals Needed: DOE ☒ Ecology ☒ EPA ☐

Description of current waste site condition:

The 100-H-44, 183-H Neutralization Pit waste site, part of the 100-HR-1 Operable Unit, was added to the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units* (Remaining Sites ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 1999), as a candidate site for confirmatory sampling via the *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 2009). Subsequently, the 100-H-44 waste site was recommended for remedial action.

Remedial action at the 100-H-44 waste site was conducted concurrently with remedial action at the 100-H-28:3 and 100-H-28:5 subsites, and began on July 17, 2013, with overburden removal. Remediation continued through September 9, 2014, to a maximum depth of 10 m (33 ft) below ground surface, resulting in approximately 39,730 bank cubic meters (BCM) (51,965 bank cubic yards [BCY]) total of contaminated soil and debris being removed and staged in a staging pile area for loadout and disposal at the Environmental Restoration Disposal Facility (ERDF). Approximately 7,760 BCM (10,150 BCY) of the total volume of soil and debris was removed from the 100-H-44 waste site. Waste loadout with disposal at ERDF was completed in September 2014. No anomalies were encountered during remediation of the 100-H-44 waste site.

Verification samples from the combined 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site were collected on August 13 and December 12, 2013; November 5, 12, 13, and 20, 2014; and February 5 and March 5, 16, and 18, 2015. The sampling was performed to determine if the site decision units met the remedial action objectives and remedial action goals established by the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (100 Area RDR/RAWP), DOE/RL-97-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington (DOE-RL 2009b), and the Remaining Sites ROD (EPA 1999). The selected remedy involved (1) excavating the site to the extent required to meet specified soil cleanup levels, (2) disposing of contaminated excavation materials at ERDF, (3) demonstrating through verification sampling that cleanup goals have been achieved, and (4) proposing the site for reclassification to Interim Closed Out.

Basis for reclassification:

The verification sampling and modeling results for the 100-H-44 waste site demonstrate that the site meets the remedial action objectives and corresponding remedial action goals established in the 100 Area RDR/RAWP (DOE-RL 2009b) and the Remaining Sites ROD (EPA 1999) to support a reclassification to Interim Closed Out. These sampling and modeling results established that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. Contamination above direct exposure levels was not observed in shallow zone soils and is concluded to not exist in deep zone soils; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone soil are not required. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites, and the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 Overburden Piles (attached).*

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-HR-1 **Control No.:** 2015-029

Waste Site Code(s)/Subsite Code(s): 100-H-44

Regulator comments:

Waste Site Controls:

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

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

J. P. Neath	J P Neath	7/8/15
DOE Federal Project Director (printed)	Signature	Date
N. Menard	Nina M. Menard	7/9/15
Ecology Project Manager (printed)	Signature	Date
NA		
EPA Project Manager (printed)	Signature	Date

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-H-28:3, 100-H-28:5, AND 100-H-44 WASTE SITES, AND THE 100-H-28:2, 100-H-28:3, 100-H-28:4, AND 100-H-28:5 OVERBURDEN PILES

Attachment to Waste Site Reclassification Forms
2015-027, 2015-028, and 2015-029

July 2015

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-H-28:3, 100-H-28:5, AND 100-H-44 WASTE SITES, AND THE 100-H-28:2, 100-H-28:3, 100-H-28:4, AND 100-H-28:5 OVERBURDEN PILES

EXECUTIVE SUMMARY

The 100-H-28:5 and 100-H-44 waste sites were co-located with the 100-H-28:3 waste site so remedial actions were conducted concurrently. The 100-H-28:3 North Process Sewers subsite consisted of process sewers formerly servicing the 183-H Filter Plant, 182-H Reservoir, and the 184-H Boiler House/Alternative Power House. The mainline of the 100-H-28:3 sewer consisted of various sizes of reinforced concrete pipe leading up to the confluence with the 100-H-28:2 South Process Sewer, which carried the combined flow to the 1906-H Lift Station. Effluent from the process sewers was ultimately discharged to the Columbia River at the 1904-H Outfall. The operational history of the 100-H-28:3 pipelines is linked to the operation of the 100-H Area reactor, from 1949 to 1965.

The 100-H-28:5, 1607-H2 Sanitary Sewer Pipelines were designed to receive sanitary waste from the 182-H, 183-H, and 190-H water treatment facilities, the 184-H Boiler House, and 1700-series support buildings. The pipelines discharged to the 1607-H2 Septic System.

The 100-H-44, 183-H Neutralization Pit waste site received sulfuric acid from two storage tanks and one acid head tank, and lime slurry from the 183-H Head House. The neutralization pit served as a structure to treat spilled chemicals and excess concentrated sulfuric acid (from acid tank cleanouts) prior to disposal through the 100-H-28:3 pipelines.

Remedial action at the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site began on July 17, 2013, with overburden removal. Remediation continued through September 9, 2014, to a maximum depth of 10 m (33 ft) below ground surface, resulting in a total of approximately 29,435 bank cubic meters (BCM) (38,500 bank cubic yards [BCY]) of contaminated soil and debris being removed and staged in a staging pile area for loadout and disposal at the Environmental Restoration Disposal Facility (ERDF). Waste loadout with disposal at ERDF was completed in September 2014. No anomalies were encountered during remediation of the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site.

Verification sampling began on August 13 and December 12, 2013, with focused samples being collected at each end of the 100-H-28:3 and 100-H-28:5 pipeline segments that remain in place where they are crossed by the export water line. Following the completion of field remediation, verification sampling continued in November 2014. Due to samples exceeding direct exposure remedial action goals (RAGs) for arsenic, hexavalent chromium, and polycyclic aromatic hydrocarbons, additional remediation was conducted at 100-H-28:5 to remove the residual contamination (WCH 2013a). This resulted in approximately 10,295 BCM (13,465 BCY) of additional contaminated material disposed at ERDF. Replacement verification samples were collected in February and March 2015. The verification sampling results indicate that the waste removal action achieved compliance with the remedial action objectives and RAGs established

in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (100 Area RDR/RAWP) (DOE-RL 2009b) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD) (EPA 1999).

A summary of the cleanup evaluation for the results from verification sampling compared to applicable criteria is presented in Table ES-1. The results of verification sampling are used to make reclassification decisions for the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site in accordance with the TPA-MP-14 procedure in the *Tri-Party Agreement Handbook Management Procedures* (DOE-RL 2011).

In accordance with this evaluation, the verification sampling results support a reclassification of the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site to Interim Closed Out. The current site conditions achieve the remedial action objectives and the corresponding RAGs of the 100 Area RDR/RAWP (DOE-RL 2009b) and the Remaining Sites ROD (EPA 1999). The results also demonstrate that residual contaminant concentrations support unrestricted future use of shallow zone soil (surface to 4.6 m [15 ft] below ground surface), and that contaminant levels remaining in the soil are protective of groundwater and the Columbia River. Contamination above direct exposure levels was not observed in shallow zone soils and is concluded to not exist in deep zone soils; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone soil are not required.

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based in part on a limited ecological risk assessment. Although not required by the Remaining Sites ROD, a comparison against ecological risk screening levels has been made for the 100-H-28:3 and 100-H-28:5 subsites and 100-H-44 waste site contaminants of potential concern and other constituents (Appendix A). Ecological screening levels from the *Washington Administrative Code* (WAC) 173-340, "Model Toxics Control Act – Cleanup," were exceeded for arsenic, barium, boron, mercury, selenium, silver, and vanadium. The U.S. Environmental Protection Agency's ecological soil screening levels were exceeded for antimony, cadmium, lead, manganese, selenium, vanadium, zinc, and high molecular weight polycyclic aromatic hydrocarbons including benzo(a)anthracene, benzo(a)pyrene, benzo(ghi)perylene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and pyrene. Exceedance of screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because concentrations of antimony, barium, cadmium, manganese, vanadium, and zinc are below Hanford Site or Washington State background values, it is believed that the presence of these constituents does not pose a risk to ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for risk to ecological receptors as part of the final closeout decision for these sites.

Table ES-1. Summary of Remedial Action Goals for the 100-H-28:3 and 100-H-28:5 Subsites and the 100-H-44 Waste Site. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain dose rate of <15 mrem/yr above background for 1,000 years.	Radionuclides were not COPCs for the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site; however radionuclides were identified as COPCs for the overburden piles that are included in this RSVP. The cumulative radionuclide activity for the overburden piles, based on a sum-of-fractions calculation (1.39 mrem/yr), is below the 15 mrem/yr dose limitation.	Yes
Direct Exposure – Nonradionuclides	Attain individual COPC direct exposure RAGs.	All individual COPC concentrations are below the direct exposure RAGs.	Yes
Risk Requirements – Nonradionuclides	Attain a hazard quotient of <1 for all individual noncarcinogens.	The hazard quotients for individual nonradionuclide COPCs are <1.	Yes
	Attain a cumulative hazard quotient of <1 for noncarcinogens.	The cumulative hazard quotient (2.6×10^{-1}) is <1.	
	Attain an excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	The excess cancer risk for individual carcinogens is $<1 \times 10^{-6}$.	
	Attain a cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	The cumulative excess (1.5×10^{-6}) is $<1 \times 10^{-5}$.	
Groundwater/River Protection – Radionuclides	Attain single-COPC groundwater and river protection RAGs.	Radionuclides were not COPCs for the 100-H-28:3 and 100-H-28:5 subsites or 100-H-44 waste site; however, radionuclides were identified as COPCs for the overburden soil stockpiles. All radionuclide COPCs were below the groundwater and river protection RAGs.	Yes
	Attain national primary drinking water standards [a]: 4 mrem/yr (beta/gamma) dose rate to target receptor/organs.		
	Meet drinking water standards for alpha emitters: the most stringent of 15 pCi/L MCL or 1/25th of the derived concentration guides from DOE Order 5400.5 [b].		
	Meet total uranium standard of 30 µg/L (21.2 pCi/L) [c].		

Table ES-1. Summary of Remedial Action Goals for the 100-H-28:3 and 100-H-28:5 Subsites and the 100-H-44 Waste Site. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and river cleanup requirements.	Chromium (total), lead, mercury, silver, aroclor-1254, 4-4'-DDE, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene exceeded soil RAGs for groundwater and river protection in the 100-H-28:5 excavation (EXC 13-24), NOB, and/or SOB decision units. Copper, lead, mercury, silver, and aroclor-1254 exceed soil RAGs for groundwater and river protection in the 100-H-28:3 and 100-H-44 excavation (EXC 1-12) decision unit. However, based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), it is predicted that the residual concentrations of these constituents will not reach groundwater (and thus the Columbia River) within 1,000 years [d]. Selenium exceeded the river protection RAG; however, selenium is not a site COPC and it is not a product of any known process related to reactor operations. The selenium concentration is due to the natural mineralogy found in the sample matrix and not to any type of waste disposal or man-made contamination. Therefore, it is concluded that the selenium concentration meets the remedial action objectives established in the 100 Area RDR/RAWP (DOE-RL 2009b).	Yes

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

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

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

[d] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of chromium (total), lead, mercury, silver, aroclor-1254, 4-4'-DDE, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene within the 100-H-28:5 excavation (EXC 13-24), the NOB, and the SOB stockpile decision units are not predicted to migrate more than 1.8 m (5.9 ft) vertically within 1,000 years (based on the contaminant with the lowest K_d [lead with a K_d of 30 mL/g]). The vadose zone underlying the 100-H-28:5 excavation is approximately 2 m (6.6 ft) thick. The residual concentrations of copper, lead, mercury, silver, and aroclor-1254 within the 100-H-28:3 and 100-H-44 excavation (EXC 1-12) decision unit are not predicted to migrate more than 2.6 m (8.5 ft) vertically within 1,000 years (based on the contaminant with the lowest K_d [copper with a K_d of 22 mL/g]). The vadose zone underlying the 100-H-28:3 and 100-H-44 excavation is approximately 3 m (9.8 ft) thick. Therefore, the residual concentrations of chromium (total), copper, lead, mercury, silver, aroclor-1254, 4-4'-DDE, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene are predicted to be protective of groundwater and the Columbia River.

COPC = contaminant of potential concern
DDE = dichlorodiphenyldichloroethylene
DOE = U.S. Department of Energy
EXC = excavation
K_d = distribution coefficient
MCL = maximum contaminant level
NOB = north overburden
RAG = remedial action goal
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
RSVP = remaining sites verification package
SOB = south overburden

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-H-28:3, 100-H-28:5, AND 100-H-44 WASTE SITES, AND THE 100-H-28:2, 100-H-28:3, 100-H-28:4, AND 100-H-28:5 OVERBURDEN PILES

STATEMENT OF PROTECTIVENESS

The 100-H-28:3 and 100-H-28:4 subsites and the 100-H-44 waste site verification sampling data, site evaluations, and supporting documentation demonstrate that these sites meet the objectives established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (100 Area RDR/RAWP) (DOE-RL 2009b) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD) (EPA 1999). These results show that residual soil concentrations support future land uses that can be represented (or bounded) by a rural-residential scenario. The results also demonstrate that residual contaminant concentrations support unrestricted future use of shallow zone soil (i.e., surface to 4.6 m [15 ft]), and that contaminant levels remaining in the soil are protective of groundwater and the Columbia River. Although the maximum depth of the excavation extended into the deep zone (i.e., greater than 4.6 [15 m]) below ground surface, the waste sites were evaluated against the shallow zone criteria. Contamination above direct exposure levels was not observed in shallow zone soils and is concluded to not exist in deep zone soils; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone soil are not required.

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based in part on a limited ecological risk assessment. Although not required by the Remaining Sites ROD, a comparison against ecological risk screening levels has been made for the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site contaminants of potential concern (COPCs) and other constituents (Appendix A). Ecological screening levels from the *Washington Administrative Code* (WAC) 173-340, "Model Toxics Control Act – Cleanup," were exceeded for arsenic, barium, boron, mercury, selenium, silver, and vanadium. The U.S. Environmental Protection Agency's (EPA) ecological soil screening levels were exceeded for antimony, cadmium, lead, manganese, selenium, vanadium, zinc, and high molecular weight polycyclic aromatic hydrocarbons (PAH) including benzo(a)anthracene, benzo(a)pyrene, benzo(ghi)perylene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and pyrene. Exceedance of screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because concentrations of antimony, barium, cadmium, manganese, vanadium, and zinc are below Hanford Site or Washington State background values, it is believed that the presence of these constituents does not pose a risk to ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for risk to ecological receptors as part of the final closeout decision for these sites.

GENERAL SITE INFORMATION AND BACKGROUND

The overall site location map for the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site is provided in Figure 1.

100-H-28:3 Waste Site History

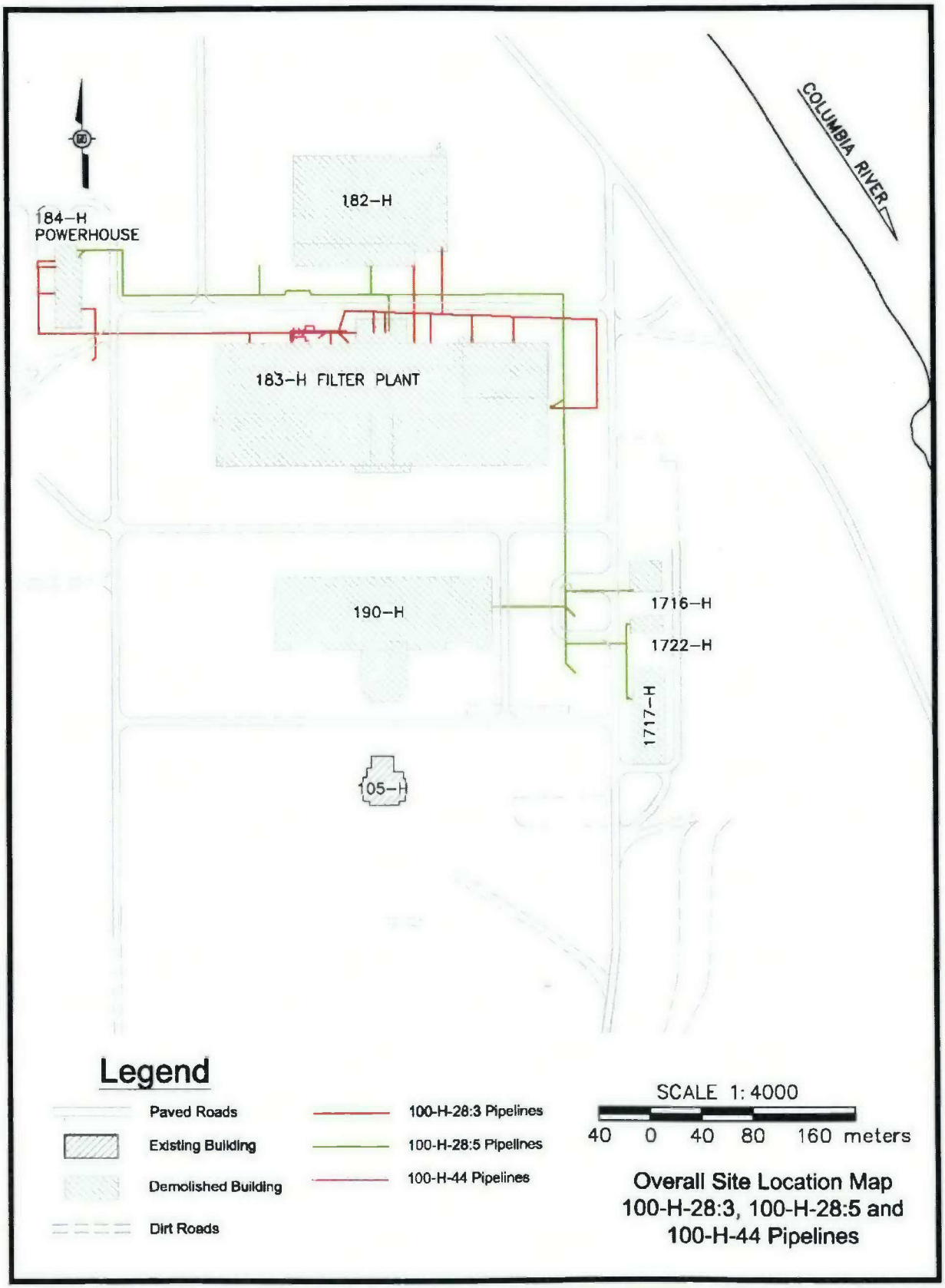
The 100-H-28:3, North Process Sewers subsite consisted of process sewers formerly servicing the 183-H Filter Plant, 182-H Reservoir, and the 184-H Boiler House/Alternative Power House. The mainline of the 100-H-28:3 sewer consisted of various sizes of reinforced concrete pipe leading up to the confluence with the 100-H-28:2 South Process Sewer, which carried the combined flow to the 1906-H Lift Station. Effluent from the process sewers was ultimately discharged to the Columbia River at the 1904-H Outfall. The operational history of the 100-H-28:3 pipelines is linked to the operation of the 100-H Area reactor from 1949 to 1965.

The 182-H Reservoir was used for the storage of raw water from the Columbia River. Prior to 1957, all river intake went through the 182-H Reservoir. After 1957, the primary intake was supplied directly to the 183-H Filter Plant and the 182-H Reservoir was used as a backup water supply. The 182-H Reservoir and pumphouse were demolished in 1974 and backfilled to grade. The process sewers formerly serving this facility received discharges of settled solids from reservoir underflow drains and miscellaneous spillage dumped to pumphouse floor drains. No documentation of anomalous discharges to these sewers is known to have occurred.

The 183-H Filter Plant was used for the physical and chemical treatment of river water for use in reactor cooling and other 100-H Area operations. Chemical treatment included hydrogen ion concentration (pH) modification (with sulfuric acid), chlorination for algae control, and the addition of coagulants (primarily alum prepared at the facility with bauxite and sulfuric acid) and a commercial organic polymer flocculation/filtration aid. In 1973, a portion of the former flocculation and settling basins was converted for use in the volume reduction of liquids, chemicals, and mixed wastes from 300 Area fuel fabrication facilities and became known as the 116-H-6 solar evaporation basins.

The solar evaporation basins were used until 1988 when the last of the sludge was removed (DOE-RL 1995). The 183-H Head House, sedimentation basins, and filter buildings were demolished and backfilled to grade in 1974, except for those basins converted for use as solar evaporation basins. The clearwells were administratively designated as the 126-H-2 waste site. The eastern 183-H clearwell was used for disposal of inert remediation debris (WCH 2012) and the western clearwell remained intact. The 100-H-28:3 process sewer feeder lines associated with the 183-H facility primarily serviced the northern portion of the facility where the coagulation/flocculation/settling basins existed and where the solar evaporation basins were later operated. The exact design use or nature of historic discharges to this sewer is unknown but are presumed to be related to underflow drains for the basins and sumps related to process supply lines and filter backwash. Based on the design use of the solar evaporation ponds, associated wastes would not have been discharged to the process sewer system.

Figure 1. The 100-H-28:3, 100-H-28:5, and 100-H-44 Overall Site Location Map.



The 184-H Boiler House was used as an alternative coal-fueled steam power generation facility. The discharge feeder lines servicing this facility were connected to overflow drains at reserve water tanks and facility features such as floor and process drains. The boiler house was demolished in 1969 and the site was graded to match surrounding terrain in 1974.

100-H-28:5 Waste Site History

The 100-H-28:5, 1607-H2 Sanitary Sewer Pipelines were designed to receive sanitary waste from the 182-H, 183-H, and 190-H water treatment facilities; the 184-H Boiler House; and 1700-series support buildings. The pipelines discharged to the 1607-H2 Septic System. Process history for the 182-H, 183-H, and 184-H Buildings are described with the 100-H-28:3 history.

The 190-H Pumphouse contained additional clearwell storage and the pumps used to provide the head to drive cooling water through the 105-H Reactor. Sodium dichromate was also added at the clearwell inlets as a reducing agent/corrosion inhibitor. The 190-H Building was demolished to grade in 1978. The sanitary sewer feeder line formerly servicing the 190-H Building is related to sanitary facilities. The former 1700-series buildings serviced by the 100-H-28:5 sanitary sewers included a fueling station (1716-H), paint shop (1722-H), machine shop (1717-H, 100-H-4 waste site), first aid station (1719-H), and administrative building (1704-H).

No documentation of anomalous discharges to the sanitary sewers at these facilities has been located, but nonsanitary wastes may have been discharged to the sewers. Former Hanford personnel have stated that it should be assumed that any materials used in the 100-H Area (e.g., chemicals, oils) were discharged to the septic system. Additionally, sanitary facilities that formerly discharged to the 100-H-28:5 pipelines are stated to have been used for personnel decontamination (WHC 1994).

The 1607-H2 septic system was remediated in 1999 by removing approximately 12,207 metric tons (13,456 US tons) of material, including piping, the septic tank, drain field, and suspect impacted soils (BHI 2001b). Analysis of samples collected from sludge within the septic tank detected several radionuclides (cesium-137, plutonium-239/240, uranium-233/234, uranium-235, and uranium-238) and metals (barium, cadmium, chromium, copper, lead, mercury, silver, and zinc) above soil background levels.

100-H-44 Waste Site History

The 100-H-44, 183-H Neutralization Pit waste site included a concrete pit and trench, acid-resistant brick, the acid pump foundation, piping, two french drains, and a steam trap. The neutralization pit received sulfuric acid from two storage tanks and one acid head tank, and lime slurry from the 183-H Head House. The neutralization pit served as a structure to treat spilled chemicals and excess concentrated sulfuric acid (from acid tank cleanouts) prior to disposal through the 100-H-28:3 pipelines. The pipelines were contained in a concrete trench extending from the acid head tank to the neutralization pit and then to the west wall of the 183-H Head House. One 30.5-cm (12-in.) french drain was located adjacent to the covered car spot and a second french drain received steam condensate. A steam trap was located between the silica tank

and the 183-H Head House and was the termination point for a silica tank condensate pipeline. The french drain and steam trap both supported the silica tank.

In 1974, the 183-H Filter Plant and other facilities in the vicinity of the 100-H-44 site were demolished and backfilled to grade. The neutralization pit and above-ground features were likely removed during the 1974 demolition while below grade features (french drains, piping, trench, and acid pump foundation) remained at the site.

CONFIRMATORY SAMPLING

100-H-28:3

Confirmatory sampling at the 100-H-28:3 subsite was performed in accordance with the *Work Instruction for Confirmatory Sampling of the 100-H-28:3 North Process Sewer* (WCH 2006a). The COPCs identified for confirmatory sampling included cobalt-60, cesium-137, europium-152, europium-154, strontium-90, arsenic, barium, cadmium, total chromium, lead, selenium, silver, mercury, hexavalent chromium, semivolatile organic compounds (SVOCs), sulfate, polychlorinated biphenyls (PCBs), and kinetic phosphorescence analysis. Although not considered COPCs, antimony, beryllium, boron, cobalt, copper, manganese, molybdenum, nickel, vanadium, and zinc were also included in the expanded list of inductively coupled plasma (ICP) metals. Field screening for volatile organic compounds (VOCs) was performed during confirmatory sampling and no VOCs were detected; therefore, volatile organic analysis was not requested. No oily soil or evidence of burning and/or suspected asbestos were observed; therefore, total petroleum hydrocarbons (TPHs) and asbestos analyses were not requested.

Summary of Confirmatory Sampling Activities

Confirmatory sampling of the 100-H-28:3 subsite was developed using a phased approach. Phase I consisted of the collection of a representative sample of accessible sediments within a selected manhole structure. The purpose of Phase I was to make an initial determination if residual pipeline contents fail remedial action goals (RAGs) and if the pipelines should be recommended for remedial action. Since the Phase I results indicate site remediation was needed, the Phase II portion of the confirmatory sampling design was not conducted.

Confirmatory sampling was conducted at the 100-H-28:3 pipeline subsite on June 2, 2008, as described in the *Miscellaneous Sampling* logbook (WCH 2009a). Sampling activities consisted of opening three selected manholes at the positions indicated in Figure 2 with the intent of retrieving a sample of the sewer contents. A sample was collected from one (H-12) of the three manholes opened. A liquid/slurry sample was collected from within manhole H-12 (Figure 3). Insufficient material was available to sample at manholes H-10 and H-11. A summary of confirmatory samples taken is provided in Table 1.

Figure 2. The 100-H-28:3 Confirmatory Sampling Location.

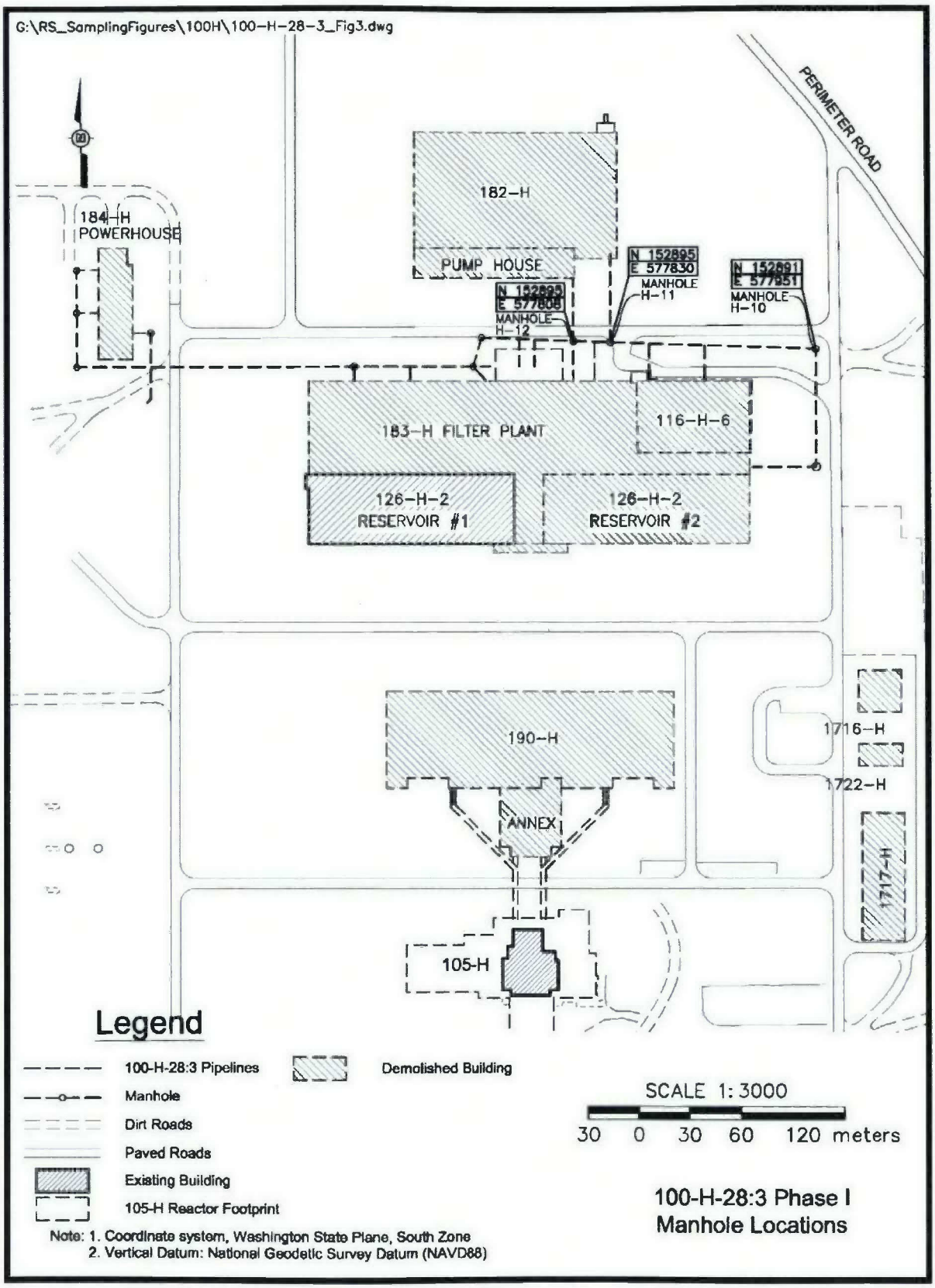


Figure 3. Liquid/Slurry Sample Collected from Manhole H-12.

Table 1. 100-H-28:3 Confirmatory Phase I Sample Summary Table.

Sample Location	Sample Media	Sample Number	Coordinate Location	Depth	Sample Analysis
Manhole H-12 (solid fraction)	Manhole contents	J16W68	N 152895 E 577808	Invert is approximately 8.5 m bgs	ICP metals [a], mercury, GEA, gross alpha, gross beta, KPA, PCB, IC anions, SVOA, pH
Manhole H-12 (liquid fraction)		J16W68-A			
Manhole H-12 (solid fraction)	Manhole contents	J16VH6	N 152895 E 577808	Invert is approximately 8.5 m bgs	Hexavalent chromium
Manhole H-12 (liquid fraction)		J16VH6-A			

[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.

bgs = below ground surface
GEA = gamma energy analysis
IC = ion chromatography
ICP = inductively coupled plasma
KPA = kinetic phosphorescence analysis
PCB = polychlorinated biphenyl
pH = hydrogen ion concentration
SVOA = semivolatile organic analysis

Confirmatory Sample Results

The confirmatory sampling results indicate that the 100-H-28:3 subsite exceeded the direct exposure RAG for arsenic. Groundwater and river protection RAGs were exceeded for mercury and aroclor-1260. Based on the confirmatory sampling results and in discussion with the Washington State Department of Ecology (Ecology) and the U.S. Department of Energy, Richland Operations Office, the 100-H-28:3 subsite was recommended for remedial action (WCH 2008a). The confirmatory sampling results are provided in Appendix B.

100-H-28:5

Confirmatory sampling at the 100-H-28:5 subsite was performed in accordance with the *Work Instruction for Confirmatory Sampling of the 100-H-28:5, 1607-H2 Sanitary Sewer Pipelines* (WCH 2006b). The COPCs identified for confirmatory sampling included cobalt-60, cesium-137, europium-152, europium-154, strontium-90, uranium-233/234, uranium-235, uranium-238, arsenic, barium, cadmium, total chromium, lead, selenium, silver, mercury, hexavalent chromium, fluoride, nitrate, SVOCs, VOCs, PCBs, and chlorinated pesticides. Although not considered COPCs, antimony, beryllium, boron, cobalt, copper, manganese, molybdenum, nickel, vanadium, and zinc were also included in the expanded list of ICP metals.

Field activities did not detect oily soil or evidence of burning; therefore, TPH analysis was not requested. Suspect asbestos-containing material was not identified during field activities; therefore, asbestos analysis was not requested.

Summary of Confirmatory Sampling Activities

Confirmatory sampling of the 100-H-28:5 subsite was developed using a phased approach. Phase I consisted of the collection of representative samples of sediments within manhole structures to determination if residual contents fail RAGs and if the pipelines should be recommended for remedial action. Since the Phase I results indicate site remediation was needed, the Phase II portion of the confirmatory sampling design was not conducted.

Confirmatory sampling was conducted at the 100-H-28:5 subsite on June 2 and 3, 2008, as described in the *Miscellaneous Sampling* logbook (WCH 2009a). The sampling locations are provided in Figure 4. At Sample Location 1, a sample of gray, powdery solid was taken at a depth of about 3 m (9.8 ft). No elevated VOC readings or radiological contamination were detected during sampling activities. At Sample Location 2, a sample of gray, sandy material was taken at a depth of about 1.2 m (4 ft). When the manhole was opened, the initial alpha count from a smear of the underside of the manhole cover was elevated; however, rate of decay indicated the probable source as radon decay products. A summary of the confirmatory samples is provided in Table 2. Photographs of the opened manholes taken during a site walkdown in 2006 are provided in Figures 5 and 6.

Figure 4. Location of the 100-H-28:5 Pipeline.

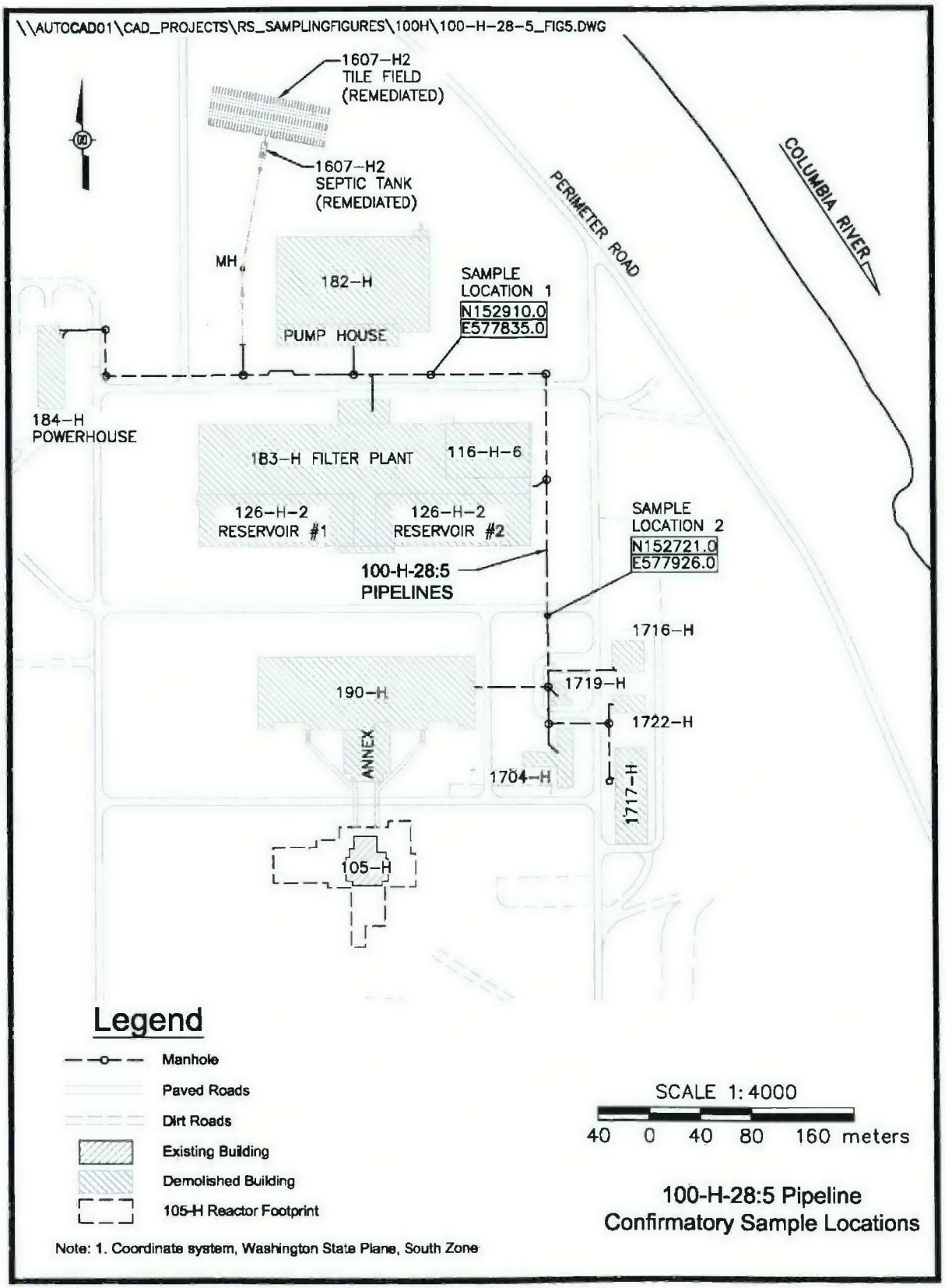


Table 2. Phase I Confirmatory Sampling Summary for the 100-H-28:5 Waste Site.

Sample Location	Sample Media	Sample Number	Coordinate Location	Depth	Sample Analysis
Sample Location 1	Manhole contents	J16VF5	N 152910 E 577835	Sample location is approximately 3 m (9.8 ft) bgs	ICP metals [a], mercury, IC anions, nitrate/nitrite, GEA, gross alpha, gross beta, isotopic uranium, PCB, SVOA, VOA, and pesticides
		J16VH5			Hexavalent chromium
Field blank associated with J16VF5	Deionized water	J16W94	NA	NA	VOA
Sample Location 2	Manhole contents	J16VF6	N 152721 E 577926	Sample location is approximately 1.2 m (4 ft) bgs	ICP metals [a], mercury, IC anions, nitrate/nitrite, GEA, gross alpha, gross beta, isotopic uranium, PCB, SVOA, VOA, and pesticides
		J16VH7			Hexavalent chromium
Field blank associated with J16VF6	Deionized water	J16WB7	NA	NA	VOA

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

bgs = below ground surface
GEA = gamma energy analysis
IC = ion chromatography
ICP = inductively coupled plasma
NA = not applicable
PCB = polychlorinated biphenyl
SVOA = semivolatile organic analysis
VOA = volatile organic analysis

Figure 5. Manhole at Sample Location 1 (March 2006).

Figure 6. Manhole at Sample Location 2 (March 2006).

Confirmatory Sample Results

Analytical results from confirmatory sampling indicate that the 100-H-28:5 subsite fails the direct exposure RAGs for dieldrin and benzo(a)pyrene. Additionally, barium, cadmium, chromium (total), copper, lead, mercury, nickel, silver, zinc, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, aldrin, dichlorodiphenyldichloroethylene (DDE), dichlorodiphenyldichloroethane (DDT), endrin, endrin ketone, aroclor-1254, and aroclor-1260 were detected at concentrations exceeding groundwater and/or river protection soil RAG values. Based on the confirmatory sampling results, the 100-H-28:5 subsite was recommended for remedial action (WCH 2008b). The confirmatory sampling results are provided in Appendix B.

100-H-44

Confirmatory sampling at the 100-H-44 waste site was performed in accordance with the *Work Instruction for Confirmatory Sampling of the 100-H-44, 183-H Neutralization Pit* (WCH 2009c). The COPCs identified for confirmatory sampling included sulfate, chromium (total), lead, mercury, and hexavalent chromium. Although not COPCs, bromide, fluoride, chlorine, nitrate, nitrite, and phosphate were also evaluated by requesting the ion chromatography (IC) anions analytical list, and antimony, arsenic, barium, beryllium, boron, cadmium, cobalt, copper, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc were also included in the expanded list of ICP metals.

Radionuclides were not COPCs for the 100-H-44; however, the possible presence of radiological contamination was evaluated using field radiological survey instrumentation during confirmatory sampling activities. No radiological activity was detected; therefore, radionuclide analyses were not requested. Field screening for VOCs was performed during confirmatory sampling and no VOCs were detected; therefore, volatile organic analysis was not requested. Additionally, no oil-stained soil, evidence of burning, or evidence of asbestos or asbestos-containing material was observed; therefore, TPH, PAH, and asbestos analyses were not requested.

Summary of Confirmatory Sampling Activities

A focused sampling approach was used to assess the 100-H-44 waste site. The focused sampling locations were identified based on the potential worst case locations that have the highest potential for the presence of environmental contaminants.

Confirmatory sampling was conducted at the 100-H-44 waste site on November 4 and 5, 2009, as described in the *Miscellaneous Sampling* logbook (WCH 2009b). Four test pits were excavated at the locations shown on Figure 7. Photographs taken during the confirmatory sampling activities are shown in Figures 8 through 11. A summary of the confirmatory samples collected is provided in Table 3.

Confirmatory Sample Results

Analytical results from confirmatory sampling indicate that the 100-H-44 waste site exceeded the direct exposure RAGs for lead at Test Pit 3 and mercury at Test Pit 1. Based on these results, the 100-H-44 waste site was recommended for remediation (WCH 2010). The confirmatory sampling results are provided in Appendix B.

Figure 7. The 100-H-44 Waste Site Confirmatory Test Pit Locations.

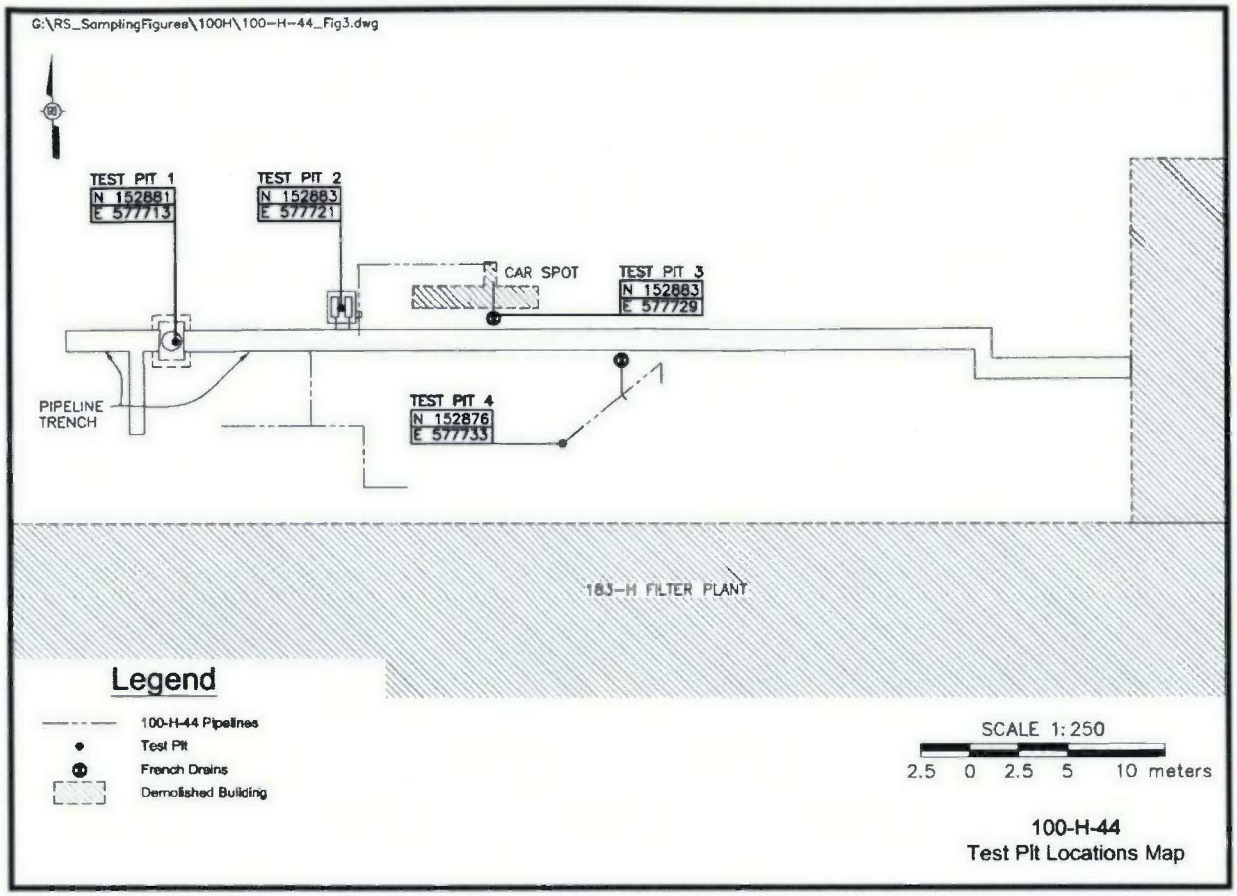


Figure 8. The 100-H-44 Test Pit 1 Excavation.

Figure 9. The 100-H-44 Test Pit 1 White Crystalline Material.

Figure 10. The 100-H-44 Test Pit 3 French Drain.

Figure 11. The 100-H-44 Test Pit 4 Steam Trap Location.

Table 3. The 100-H-44 Confirmatory Sampling Summary Table.

Sample Location	Sample Location Description	HEIS Sample Number	Washington State Plane Coordinates		Sample Analysis
			Northing (m)	Easting (m)	
Test Pit 1	Acid neutralization pit contents	J19C46	152881.48	577712.58	ICP metals [a], mercury, hexavalent chromium, IC anions [b], nitrate/nitrite, pH
	Soils underlying pit	J19C48			
Test Pit 1	Duplicate of J19C46	J19C47	152881.48	577712.58	
Test Pit 2	Soils underlying foundation	J19C52	152883.2	577721.0	
Test Pit 3	Soils underlying french drain	J19C53	152882.85	577728.89	
Test Pit 4	Soils underlying steam trap	J19C54	152876.2	577732.5	
Test Pit 1	White crystalline material	J19C51	152881.48	577712.58	ICP metals [a], mercury, IC anions [b], nitrate/nitrite, pH
		J19C57			Hexavalent chromium
NA	Equipment blank (silica sand)	J19C45	NA	NA	ICP metals [a]

[a] Sample analysis for ICP metals included antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc.

[b] Sample analysis for IC anions included fluoride, chlorine, nitrate, phosphate, nitrite, and sulfate.

HEIS= Hanford Environmental Information System
IC = ion chromatography
ICP = inductively coupled plasma
NA = not applicable
pH = hydrogen ion concentration

REMEDIAL ACTION SUMMARY

Remedial actions at the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site were conducted concurrently and began on July 17, 2013, with removal of overburden material. The overburden was combined with material from the 100-H-28:2 and 100-H-28:4 pipeline subsites. In total, the combined overburden from these four subsites is approximately 117, 000 bank cubic meters (BCM) (153,030 bank cubic yards [BCY]). No overburden material was retained from the 100-H-44 waste site remediation.

Remediation at the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site continued through September 9, 2014, to a maximum depth of 10 m (33 ft) below ground surface. The remediation resulted in a total of approximately 29,435 BCM (38,500 BCY) of contaminated soil and debris being removed and staged at staging pile areas (SPAs) pending loadout and disposal at the Environmental Restoration Disposal Facility (ERDF). Approximately 13,850 BCM (18,115 BCY) was removed from 100-H-28:3, 7,828 BCM (10,239 BCY) was removed from 100-H-28:5, and 7,760 BCM (10,150 BCY) was removed from 100-H-44. Waste loadout with disposal at ERDF was completed in September 2014. Due to samples exceeding direct exposure RAGs for arsenic, hexavalent chromium, and polycyclic aromatic hydrocarbons, additional remediation was conducted at 100-H-28:5 to remove the residual contamination (WCH 2013a). This resulted in approximately 10,295 BCM (13,465 BCY) of additional contaminated material disposed at ERDF. The waste SPA footprints, which received waste from the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site, are included in the 100-H-28:2/100-H-42 closure document.

The waste from the 100-H-28:3 and 100-H-28:5 subsites included soil; concrete, steel, and vitrified clay pipe debris; and brick manhole debris. Waste materials associated with the 100-H-44 waste site included acid-stained soils, concrete sump debris, and small diameter steel pipe debris. Additional wastes included interfering concrete building foundations, surface asphalt, interfering clean water pipelines, interfering steam lines, coal ash, railroad ties, and miscellaneous building demolition debris (e.g., concrete and steel rebar adjacent to previously demolished buildings). A waste characterization sample was collected from the waste SPA on July 29, 2013, and analyzed for toxicity characteristic leaching procedure metals only. The waste characterization sample data are provided in Appendix B.

Several in-process soil samples were collected from the 100-H-44 waste site. Hexavalent chromium was detected above the direct exposure RAG in sample J1RW14 collected on July 31, 2013, from the north sidewall of the excavation. Remediation activities continued. Additional in-process samples were collected along the north sidewall of the excavation in September and December 2013. The hexavalent chromium results were below the direct exposure, groundwater, and river protection RAGs. The resulting data for all in-process samples collected are presented in Appendix B. No anomalies were discovered.

The 100-H-35, 100 Area export water line crossed portions of the northwest sections of the 100-H-28:3 and 100-H-28:5 pipelines. Due to the necessity of the export water line and complications associated with relocation or modification, approximately 18 m (60 ft) of the 100-H-28:3 and 12 m (40 ft) of the 100-H-28:5 pipelines were left in place with concurrence from Ecology (WCH 2013). Per this agreement, verification soil samples were collected at each end of the pipeline to support leaving the pipeline segment in place. The verification sample results are provided in Appendix C. Arsenic was detected above background and chromium (total) was detected (19.0 mg/kg) slightly above groundwater/river protection RAGs. Selenium was detected (1.4 mg/kg) above the river protection RAG. Dimethyl phthalate (a common laboratory contaminant) and 4,4'-DDE were detected below RAGs.

Coal ash is present on the soil surface in the remediation areas. Coal ash is most prevalent in the northwest portion of the excavations (100-H-28:3 and 100-H-28:5) in the vicinity of the former 184-H Power House.

The post-excavation civil survey of the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site remediation areas is provided in Figure 12. A May 2014 aerial photograph of the 100-H Area is provided in Figure 13. Figure 14 shows the 100-H-28:3, 100-H-28:5, and 100-H-44 pipelines overlain on the aerial photograph.

VERIFICATION SAMPLING ACTIVITIES

Verification samples from the combined 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site were collected on August 13 and December 12, 2013; November 5, 12, 13, and 20, 2014; and February 5 and March 5, 16, and 18, 2015. Verification soil sampling was conducted per the *Work Instruction for Verification Sampling of the 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites and the 100-H-28:2, 100-H-23:3, 100-H-28:4, and 100-H-28:5 Overburden Piles* (WCH 2014). Sampling was conducted to support a determination that residual contaminant concentrations in the soil meet cleanup criteria specified in the 100 Area RDR/RAWP (DOE-RL 2009b) and the Remaining Sites ROD (EPA 1999).

The verification sample results are provided in Appendix C and indicate that the waste removal action achieved compliance with the remedial action objectives (RAOs) and RAGs for the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site. The following subsections provide additional discussion of the information used to develop the verification sampling design. The results of verification sampling are also summarized to support interim closure of the sites.

Figure 12. The 100-H-28:3, 100-H-28:5, and |100-H-44 Post-Excavation Topography Survey.

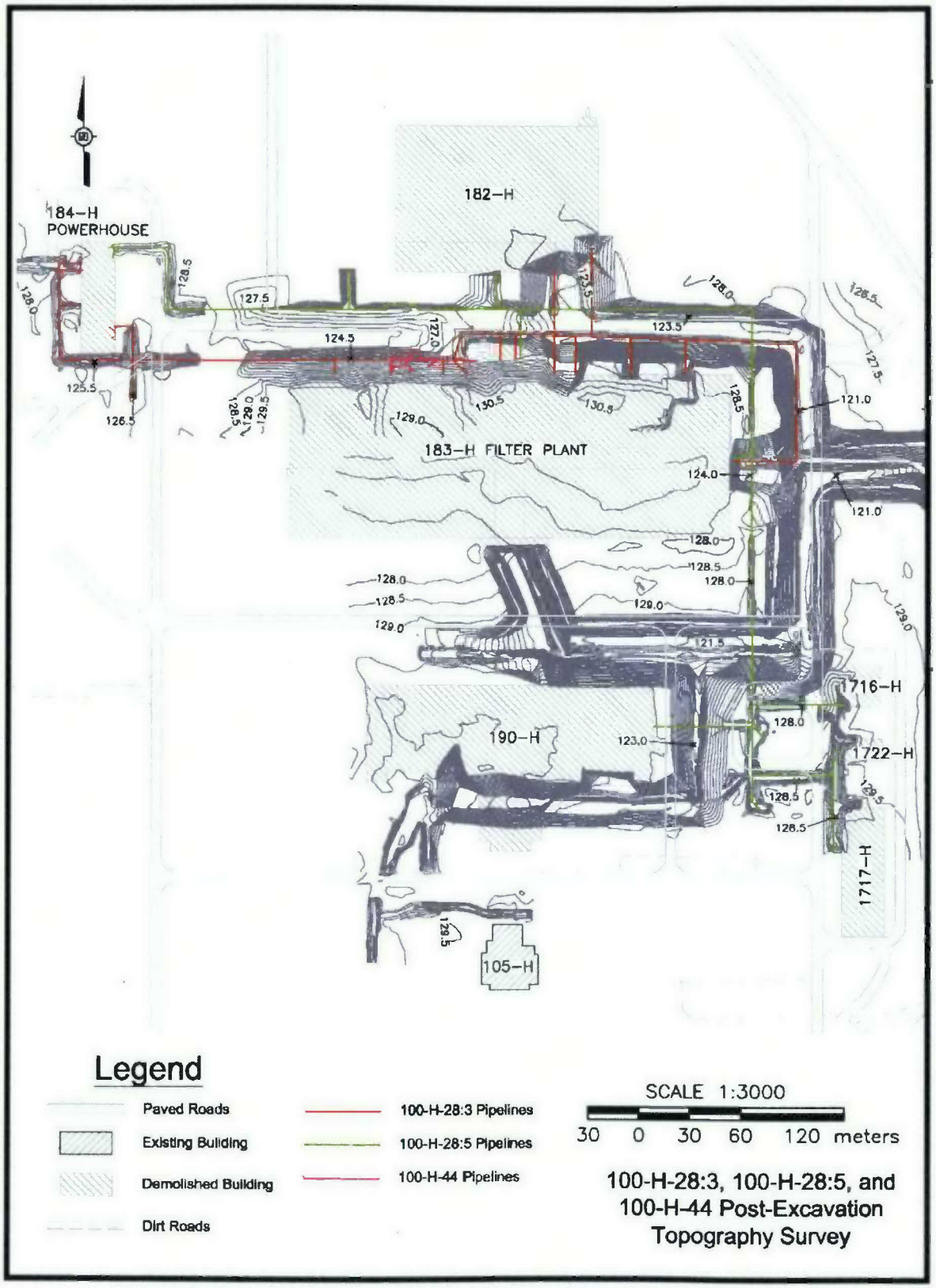


Figure 13. Aerial Photograph of the 100-H Area, May 2014.

Figure 14. Annotated Aerial Photograph of the 100-H Area, May 2014.

Contaminants of Potential Concern for Verification Sampling

100-H-28:3

The COPCs for verification sampling at the 100-H-28:3 subsite were determined based on the confirmatory sampling results (Appendix B). Arsenic was detected above the direct exposure RAG, and mercury and aroclor-1260 were detected above groundwater and river protection RAGs in the confirmatory samples; therefore, they were retained as site COPCs for verification sampling. While not considered COPCs, antimony, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc were included in the expanded list of ICP metals. Although hexavalent chromium was undetected in the confirmatory samples, it was retained as a COPC. Sulfate and nitrate were also retained as COPCs.

All SVOCs were undetected in the confirmatory samples with the exception of bis(2-ethylhexyl)phthalate and di-n-butylphthalate, which were detected well below the lowest RAG. Bis(2-ethylhexyl)phthalate was detected at 0.080 mg/kg and the lowest RAG is 0.36 mg/kg, and di-n-butylphthalate was detected at 0.004 mg/kg and the lowest RAG is 160 mg/kg; therefore, SVOCs were eliminated as site COPCs for verification sampling.

Radionuclides were either undetected or detected below background or the lowest RAG if no background is available. Because radiological contamination was not present in the confirmatory samples and the process history indicated that the 100-H-28:3 pipelines serviced nonradiological facilities, radionuclides and total uranium were eliminated as site COPCs for verification sampling.

The final list of COPCs for the 100-H-28:3 subsite verification sampling included arsenic, mercury, hexavalent chromium, aroclor-1260, nitrate, and sulfate.

100-H-28:5

The COPCs for verification sampling at the 100-H-28:5 subsite were determined based on the confirmatory sampling results (Appendix B). Benzo(a)pyrene and dieldrin were detected above the direct exposure RAGs in the confirmatory sampling; therefore, they were retained as site COPCs for verification sampling. Barium, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, aroclor-1254, aroclor-1260, aldrin, DDE, DDT, endrin, endrin ketone, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene were detected above a groundwater and/or river protection RAG in the confirmatory samples; therefore, they were retained as COPCs. Nitrate was detected above the background value; therefore, it was retained as a COPC. Although hexavalent chromium was not detected above the RAG, it was retained as a COPC for verification sampling. While not considered site COPCs, antimony, arsenic, beryllium, boron, cobalt, manganese, molybdenum, selenium, and vanadium were included in the expanded ICP metals list.

Several SVOCs were detected in the semivolatile organic analysis (SVOA) EPA Method 8270; however, only two compounds (di-n-butyl phthalate and bis(2-ethylhexyl)phthalate) were not

PAH specific. Because di-n-butyl phthalate and bis(2-ethylhexyl)phthalate are common laboratory contaminants, and they were detected well below the most stringent RAG, they were excluded as site COPCs for verification sampling. Therefore, SVOA Method 8270 was not requested for verification sampling. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene, which are PAH-specific compounds, were evaluated using EPA Method 8310.

Radionuclides were either undetected or detected below background in the confirmatory samples. Based on the lack of significant radiological contamination present in the confirmatory samples, radionuclides were eliminated as site COPCs for verification sampling. Additionally, no analytes in the VOC analysis were detected in the confirmatory samples with the exception of acetone and methylene chloride, which are common laboratory contaminants. Therefore, VOCs were eliminated as COPCs for verification sampling.

The final list of COPCs for the 100-H-28:5 subsite verification sampling included barium, cadmium, chromium (total), copper, lead, mercury, nickel, silver, zinc, hexavalent chromium, nitrate, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, aldrin, DDE, DDT, dieldrin, endrin, endrin ketone, aroclor-1254, and aroclor-1260.

100-H-44

The COPCs for verification sampling at the 100-H-44 waste site were determined based on the confirmatory sampling results (Appendix B). Lead and mercury were detected above the direct exposure RAGs in the confirmatory sampling; therefore, they were retained as site COPCs for verification sampling. Because nitrate and sulfate were detected above background values in the confirmatory samples, they were retained as site COPCs. Although hexavalent chromium was not detected above the RAG, it was retained as a COPC. While not considered site COPCs, antimony, arsenic, barium, beryllium, boron, cadmium, cobalt, copper, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc were included in the expanded ICP metals list. Because low pH levels were measured in some material sampled at the site, analysis for soil pH was requested.

The final list of COPCs for the 100-H-44 waste site included lead, mercury, hexavalent chromium, nitrate, and sulfate. The analysis for soil pH was also requested.

100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 Overburden Piles COPCs

Overburden soil from the 100-H-28:3 and 100-H-28:5 pipeline subsites was combined with overburden from the 100-H-28:2, South Process Sewers and stockpiled in one large pile for use as clean backfill material. Therefore, the COPCs for the large overburden pile included all COPCs identified for the 100-H-28:2, 100-H-28:3, and 100-H-28:5 pipeline subsites. Additionally, several smaller overburden piles were generated of soil from the 100-H-28:2 and the 100-H-28:4 subsites; therefore, the smaller piles included the COPCs identified for the 100-H-28:2 and 100-H-28:4 pipeline subsites.

The COPCs identified for the 100-H-28:2 pipeline subsite included antimony, cadmium, chromium, copper, lead, mercury, nickel, zinc, hexavalent chromium, nitrate, sulfate, PCBs, pesticides, PAH (benzo(a)anthracene and benzo(a)pyrene), SVOCs, TPH, cesium-137, nickel-63, and carbon-14.

The COPCs identified for the 100-H-28:4 pipeline subsite included antimony, barium, cadmium, chromium (total), copper, lead, mercury, molybdenum, selenium, silver, zinc, hexavalent chromium, DDE, DDT, dieldrin, endosulfan (sulfate), heptachlor, aroclor-1254, and aroclor-1260.

The final list of COPCs for the 100-H-28:2, 100-H-28:3, and 100-H-28:5 combined overburden verification sampling included ICP metals, mercury, hexavalent chromium, nitrate, sulfate, PAH, PCBs, pesticides, SVOCs, TPH, cesium-137, nickel-63, and carbon-14.

The analytical methods that were performed to evaluate the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site COPCs are provided in Table 4. The table also includes the analytical methods that were performed to evaluate the COPCs identified for the 100-H-28:2 and 100-H-28:4 overburden piles. The COPCs provided in the table are a cumulative list for all sites and are not necessarily COPCs at all waste sites discussed in this closure document.

Table 4. Laboratory Analytical Methods for the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 Subsites and/or the 100-H-44 Waste Site. (2 Pages)

Analytical Method	Contaminant of Potential Concern
ICP metals [a] – EPA Method 6010	Antimony, arsenic, barium, cadmium, chromium, copper, lead, molybdenum, nickel, selenium, silver, zinc
Mercury – EPA Method 7471	Mercury
Hexavalent chromium – EPA Method 7196	Hexavalent chromium
IC anions [b] – EPA Method 300.0 [c]	Nitrate, sulfate
NO_2/NO_3 – EPA Method 353.2	Nitrate
PAH – EPA Method 8310	Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene
PCB – EPA Method 8082	Aroclor-1254, aroclor-1260
pH – EPA Method 9045	pH
Pesticides – EPA Method 8081	Aldrin, dieldrin, DDE, DDT, endosulfan sulfate, endrin, endrin ketone, heptachlor
SVOA [d] – EPA Method 8270	Semivolatile organic compounds
TPH – NWTPH – Dx	Diesel range total petroleum hydrocarbons
GEA – gamma spectroscopy	Cesium-137, cobalt-60, europium-152, europium-154, europium-155
Carbon-14 – liquid scintillation	Carbon-14

Table 4. Laboratory Analytical Methods for the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 Subsites and/or the 100-H-44 Waste Site. (2 Pages)

Analytical Method	Contaminant of Potential Concern
Nickel-63 – liquid scintillation	Nickel-63

[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 final data package.
[b] To preclude holding time issues associated with EPA Method 300.0 for nitrates, EPA Method 353 was performed.
[c] IC anion Method 300.0 and IC anion Method 9056M are based on the same analytical procedure and for the purposes of the project are interchangeable.
[d] Because Method 8310 is specifically meant to analyze for PAH, data from this method was used preferentially over the method 8270 data for evaluation of PAH analyses

DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrihloroethane
EPA = U.S. Environmental Protection Agency
GEA = gamma energy analysis
IC = ion chromatography
ICP = inductively coupled plasma
NO_2/NO_3 = nitrite/nitrate
NWTPH = northwest total petroleum hydrocarbons-diesel range organics
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
pH = hydrogen ion concentration
SVOA = semivolatile organic analysis
TPH = total petroleum hydrocarbons

Verification Sampling Design

The 100-H-28:3 pipeline subsite and the 100-H-44 pipeline were combined into one decision unit for verification sampling, and a second decision unit was identified for the 100-H-28:5 pipeline subsite. Additionally, two decision units were identified for the overburden soil stockpiles; specifically, the north overburden (NOB) stockpiles that include material from the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 pipeline subsites, and the south overburden (SOB) soil stockpiles that include material from the 100-H-28:2 and 100-H-28:4 pipeline subsites. A combination statistical and focused sampling design was used to evaluate the pipeline subsites excavations and a statistical sampling design was used to evaluate the overburden soil stockpiles. Twelve statistical verification soil samples plus one duplicate were collected from each of the excavation decision units and the overburden soil stockpile decision units. One equipment blank sample was also collected.

All sampling was performed in accordance with ENV-1, *Environmental Monitoring & Management*, to fulfill the requirements of the *100 Area Remedial Action Sampling and Analysis Plan* (DOE-RL 2009a). All samples were grab samples collected at the predetermined coordinates identified in Table 5. The verification sample locations are shown in Figures 15 through 17.

Table 5. Verification Sample Summary Table for the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 Overburden Stockpiles, and the 100-H-28:3, 100-H-28:5, and 100-H-44 Excavations. (2 Pages)

Sample Location	HEIS Sample Number	WSP Northing (m)	WSP Easting (m)	Sample Analysis
NOB-1	J1V1L0	152802.0	577675.0	ICP metals [a], mercury, hexavalent chromium, IC anions [b], NO_2/NO_3 [b], PAH [c], PCB, pesticides, pH, SVOA [c], TPH, GEA, carbon-14, nickel-63
NOB-2	J1V596	152787.7	577724.2	
NOB-3	J1V1L2	152759.2	577822.7	
NOB-4	J1V1L3	152851.7	577662.7	
NOB-5	J1V597	152837.5	577711.9	
NOB-6	J1V1L5	152823.2	577761.2	
NOB-7	J1V1L6	152808.9	577810.4	
NOB-8	J1V1L7	152794.7	577859.6	
NOB-9	J1V1L8	152780.4	577908.9	
NOB-10	J1V1L9	152858.7	577798.1	
NOB-11	J1V1M0	152844.4	577847.4	
NOB-12	J1V1M1	152830.2	577896.6	
Duplicate of NOB-9	J1V1M2	152780.4	577908.9	
SOB-1	J1V1M3	152401.5	577559.3	ICP metals [a], mercury, hexavalent chromium, IC anions [b], NO_2/NO_3 [b], PAH [c], PCB, pesticides, pH, SVOA [c], TPH, GEA, carbon-14, nickel-63
SOB-2	J1V1M4	152420.9	577562.5	
SOB-3	J1V1M5	152505.1	577593.5	
SOB-4	J1V1M6	152487.3	577642.1	
SOB-5	J1V1M7	152506.6	577645.3	
SOB-6	J1V1M8	152481.8	577675.6	
SOB-7	J1V1M9	152513.5	577663.6	
SOB-8	J1V1N0	152539.8	577685.1	
SOB-9	J1V1N1	152515	577715.4	
SOB-10	J1V1N2	152559.1	577688.3	
SOB-11	J1V1N3	152534.3	577718.6	
SOB-12	J1V1N4	152548.2	577755.2	
Duplicate of SOB-3	J1V1N5	152505.1	577593.5	
EB	J1V1N6	NA	NA	ICP metals [a], mercury
EXC-1	J1V1H3	152879.7	577522.4	ICP metals [a], mercury, hexavalent chromium, IC anions [b], NO_2/NO_3 [b], PCBs, pH
EXC-2	J1V1H4	152876.8	577557.3	
EXC-3	J1V1H5	152895.5	577514.9	
EXC-4	J1V1H6	152881.1	577689.3	
EXC-5	J1V1H7	152879.7	577706.7	
EXC-6	J1V1H8	152876.8	577741.6	

Table 5. Verification Sample Summary Table for the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 Overburden Stockpiles, and the 100-H-28:3, 100-H-28:5, and 100-H-44 Excavations. (2 Pages)

Sample Location	HEIS Sample Number	WSP Northing (m)	WSP Easting (m)	Sample Analysis
EXC-7	J1V1H9	152859.6	577950.7	ICP metals [a], mercury, hexavalent chromium, NO_2/NO_3, PAH, PCB, pesticides
EXC-8	J1V1J0	152891.2	577751.5	
EXC-9	J1V1J1	152885.4	577821.2	
EXC-10	J1V1J2	152899.8	577831.2	
EXC-11	J1V1J3	152892.6	577918.4	
EXC-12	J1V1J4	152891.2	577935.8	
Duplicate of EXC-3	J1V1J5	152895.5	577514.9	
EXC-13	J1V459	152634.1	577925.8	
EXC-14	J1V1J7	152636.3	577950.2	
EXC-15	J1V460	152678.5	577946.4	
EXC-16	J1V1J9/J1V7C8 [d]	152928.9	577579.7	
EXC-17	J1V1K0	152768.8	577925.9	
EXC-18	J1V461	152942.9	577578.4	
EXC-19	J1V1K2	152782.9	577924.6	
EXC-20	J1V1K3/J1V7C9 [d]	152909.6	577679.7	
EXC-21	J1V462	152825.1	577920.8	
EXC-22	J1V463	152910.3	577765.7	
EXC-23	J1V1K6/J1V7D0 [d]	152911.0	577851.6	
EXC-24	J1V1K7/J1V7D1 [d]	152903.6	577925.9	
Duplicate of EXC-13	J1V464	152634.1	577925.8	
EB	J1V1K9	NA	NA	ICP metals [a], mercury
FS-1 [e]	J1RWF8	152879.0	577630.0	ICP metals [a], mercury, hexavalent chromium, IC anions [b], NO_2/NO_3 [b], PAH [c], PCB, pesticides, SVOA [c]
FS-2 [f]	J1RXJ6	152914.2	577620.8	
FS-3 [f]	J1RXJ7	152909.5	577598.7	
FS-4 [e]	J1RXJ8	152881.1	577593.8	

[a] Analysis for the expanded list of ICP metals was performed to include antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc.
[b] To preclude holding time issues associated with EPA Method 300.0 (or Method 9056M, depending on the laboratory performing the analysis) for nitrates, EPA Method 353 was performed.
[c] Because Method 8310 (PAH) is specifically meant to analyze for PAH, data from this method was used preferentially over Method 8270 (SVOA) data for evaluation of PAH analyses.
[d] Replacement sample submitted for pesticides analysis only.
[e] The focused verification soil samples were collected from the 100-H-28:5 pipeline excavation.
[f] The focused verification soil samples were collected from the 100-H-28:3/100-H-44 pipeline excavation.

EB = equipment blank
EPA = U.S. Environmental Protection Agency
EXC = excavation
FS = focused sample
GEA = gamma energy analysis
HEIS = Hanford Environmental Information System
IC = ion chromatography
ICP = inductively coupled plasma
NOB = north overburden
NO_2/NO_3 = nitrate/nitrite
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
pH = hydrogen ion concentration
SOB = south overburden
SVOA = semivolatile organic analysis
TPH = total petroleum hydrocarbons
WSP = Washington State Plane

Figure 15. The 100-H-28:3, 100-H-28:5, and 100-H-44 Excavations Verification Sample Locations.

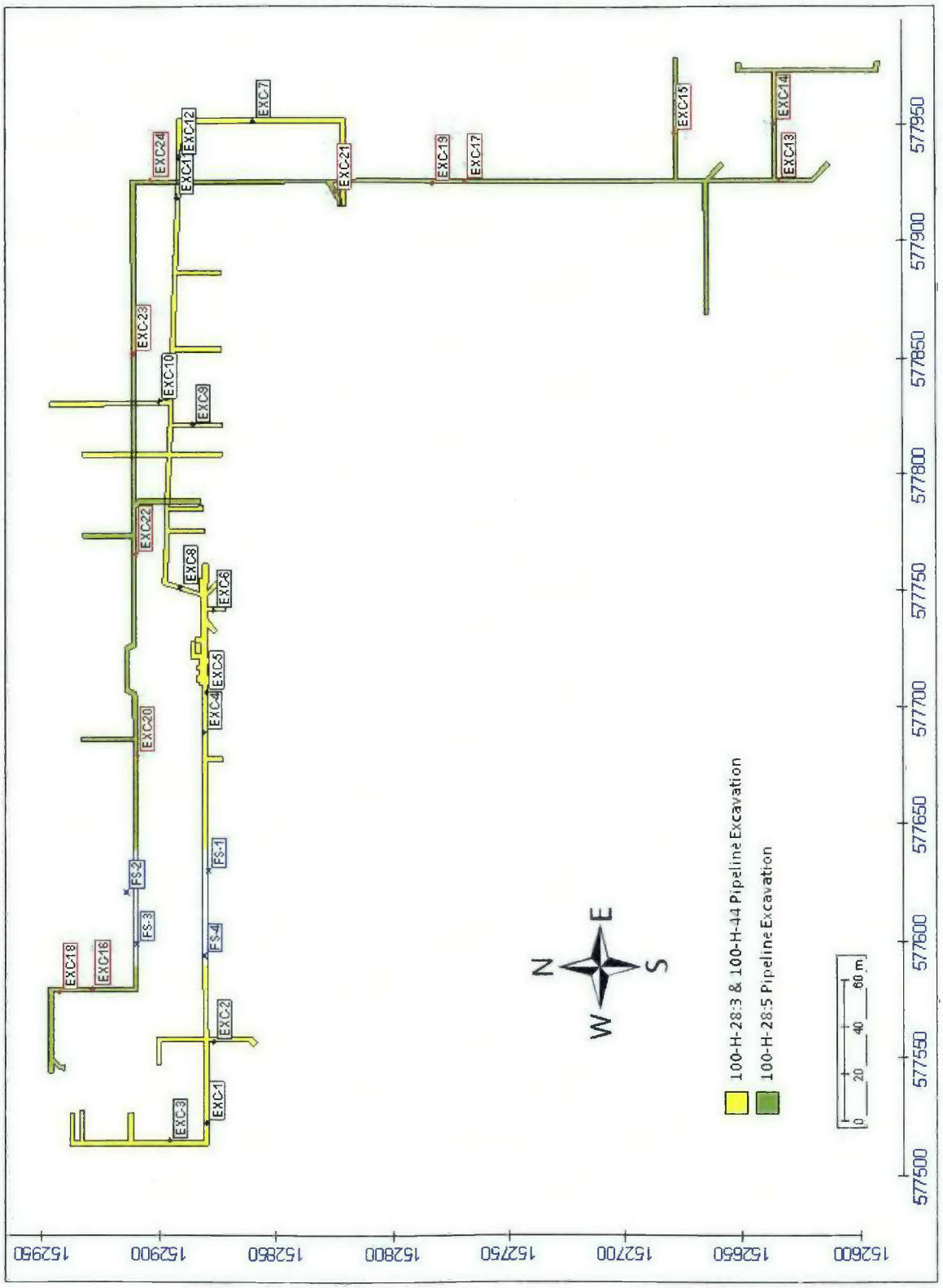


Figure 16. The 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 Combined North Overburden Pile Verification Sample Locations.

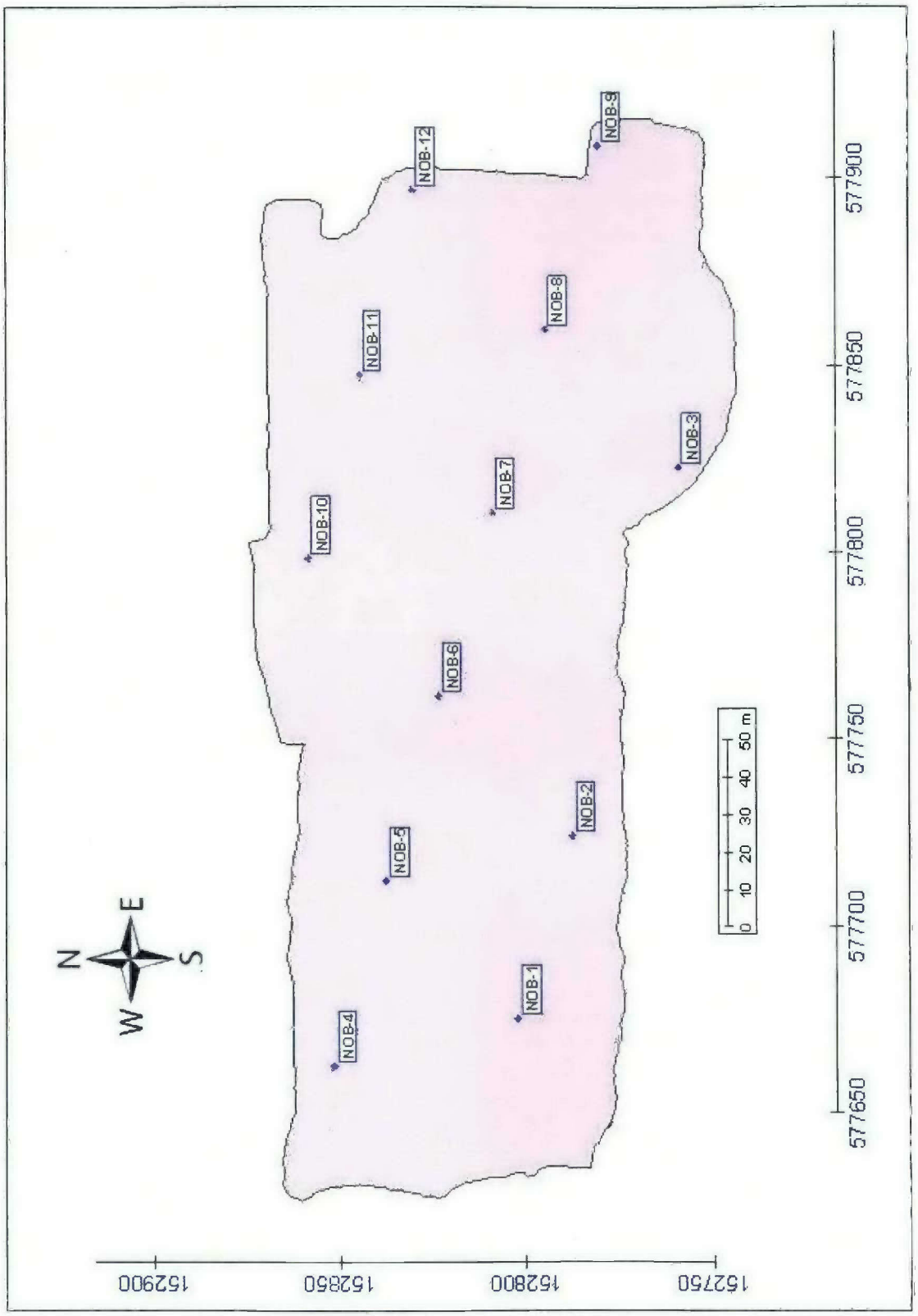
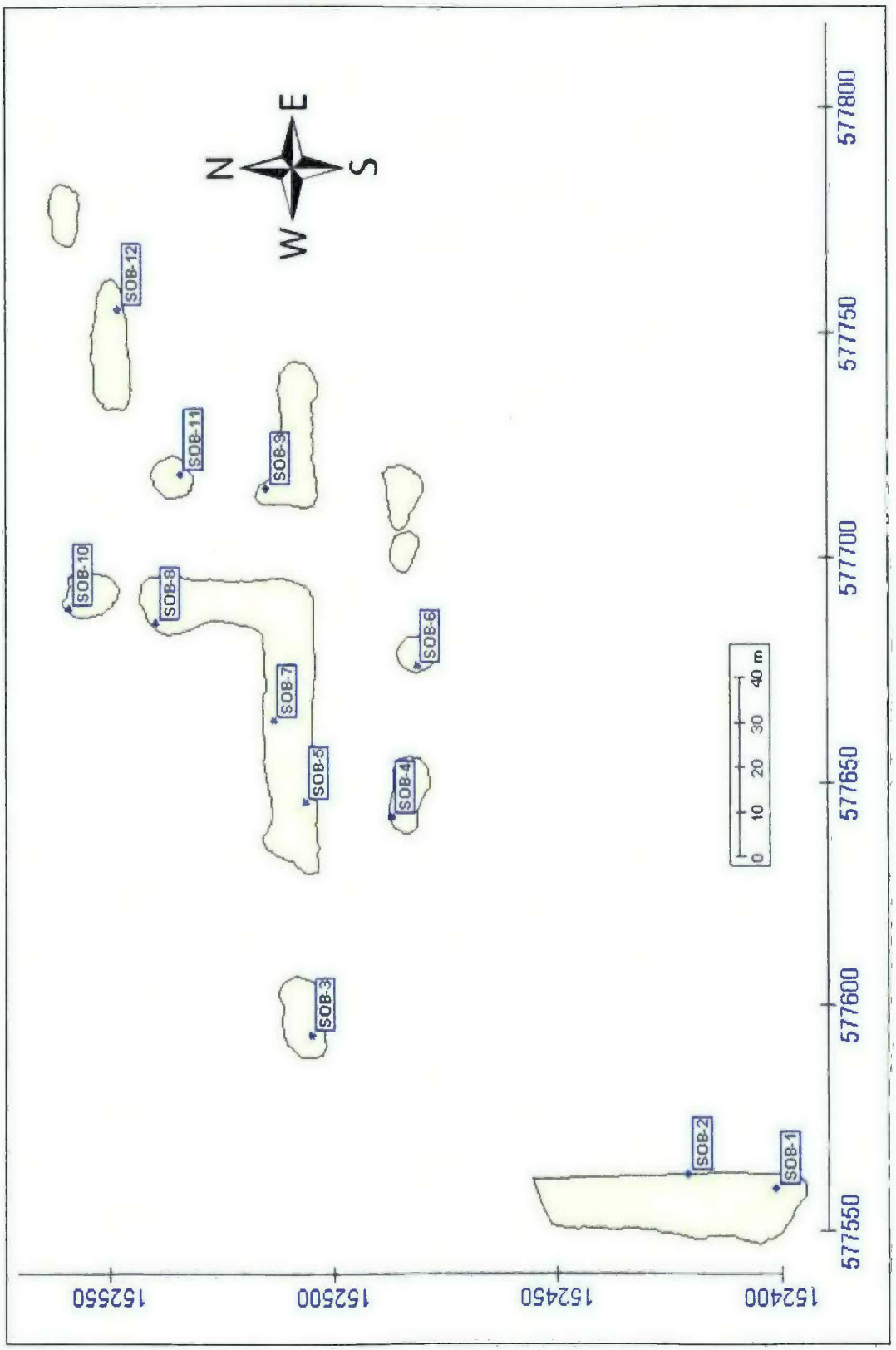


Figure 17. The 100-H-28:2 and 100-H-28:4 Combined South Overburden Piles Verification Sample Locations.



Verification Sampling Results

All verification samples were collected for full protocol laboratory analysis and analyzed using EPA-approved analytical methods. Evaluation of the verification data was performed by direct comparison of the statistical or maximum sample results for each COPC against the cleanup criteria.

Comparisons of the results for site COPCs against the RAGs are summarized in Tables 6 through 10. Contaminants that were not detected by laboratory analysis are excluded from these tables. Calculated cleanup levels are not presented in the Cleanup Levels and Risk Calculations Database (Ecology 2014) under WAC 173-340-740(3) for calcium, magnesium, potassium, silicon, and sodium. The EPA's *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual* (EPA 1989) recommends that aluminum and iron not be considered in site risk evaluations. Therefore, aluminum, calcium, iron, magnesium, potassium, silicon, and sodium are not considered site COPCs and are also not included in the tables. Because EPA Method 8310 (PAH) is specifically meant to analyze for PAH, data from this method is used preferentially over the EPA Method 8270 (SVOA). Therefore, PAH data from Method 8270 are excluded from the tables.

The complete laboratory results for all constituents are stored in a Washington Closure Hanford project-specific database prior to archival in the Hanford Environmental Information System and are presented in Attachment 1 of the *100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations* (Appendix C).

Table 6. Comparison of Contaminant Concentrations to Action Levels for the 100-H-28:3 and 100-H-44 Excavation (EXC 1-12) Verification Samples. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals [a]			Do the Results Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Antimony [c]	0.508 (<BG)	32	5 [d]	5 [d]	No	--
Arsenic	6.16 (<BG)	20 [d]	20 [d]	20 [d]	No	--
Barium	109 (<BG)	5,600	200	400	No	--
Beryllium	0.646 (<BG)	10.4 [e]	1.51 [d]	1.51 [d]	No	--
Boron [f]	17.6	7,200	320	-- [g]	No	--
Cadmium [c]	0.348 (<BG)	13.9 [e]	0.81 [d]	0.81 [d]	No	--
Chromium (total)	15.8 (<BG)	80,000	18.5 [d]	18.5 [d]	No	--
Cobalt	6.58 (<BG)	24	15.7 [d]	-- [g]	No	--
Copper	24.9	2,960	59.2	22.0 [d]	Yes	Yes [h]
Hexavalent chromium [f]	0.421	2.1 [e]	4.8	2	No	--
Lead	27.2	353	10.2 [d]	10.2 [d]	Yes	Yes [h]
Manganese	274 (<BG)	3,760	512 [d]	512 [d]	No	--
Mercury	4.85	24	0.33 [d]	0.33 [d]	Yes	Yes [h]
Molybdenum [f]	1.66	400	8	-- [g]	No	--
Nickel	14.9 (<BG)	1,600	19.1 [d]	27.4	No	--

Table 6. Comparison of Contaminant Concentrations to Action Levels for the 100-H-28:3 and 100-H-44 Excavation (EXC 1-12) Verification Samples. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals [a]			Do the Results Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Selenium [c]	0.691 (<BG)	400	5	1	No	--
Silver	3.14	400	8	0.73 [d]	Yes	Yes [h]
Vanadium	42.8 (<BG)	560	85.1 [d]	-- [g]	No	--
Zinc	51.1 (<BG)	24,000	480	67.8 [d]	No	--
Chloride	9.40 (<BG)	--	25,000	-- [g]	No	--
Fluoride	0.669 (<BG)	4,800	96	400	No	--
Nitrogen in nitrate (Method 300.0)	6.46 (<BG)	128,000	1,000	2,000	No	--
Nitrogen in nitrate and nitrite (Method 353)	4.52 (<BG)	128,000	1,000	2,000	No	--
Nitrogen in nitrite [f] (Method 300.0)	0.956	8,000	100	200	No	--
Sulfate	426	--	25,000	-- [g]	No	--
Aroclor-1254	0.0393	0.5	0.017 [i]	0.017 [i]	Yes	Yes [h]
Aroclor-1260	0.0115	0.5	0.017 [i]	0.017 [i]	No	--

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

[b] Maximum or 95% UCL result, depending on data censorship, as described in the *100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations* (Appendix C).

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

[d] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL 2009b).

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

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

[g] No parameters (bioconcentration factors or AWQC values) are available from the Cleanup Levels and Risk Calculations Database (Ecology 2014) or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], [Method B for surface waters]).

[h] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of copper, lead, mercury, silver, and aroclor-1254 are not expected to migrate more than 2.6 m (8.5 ft) vertically in 1,000 years (based on the lowest K_d of the contaminants [copper with a K_d of 22 mL/g]). The vadose zone underlying the 100-H-28:3 and 100-H-44 excavation is 3 m (9.8 ft) thick.

[i] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2).

-- = not applicable
AWQC = ambient water quality criteria
BG = background
COPC = contaminant of potential concern
K_d = distribution coefficient
RAG = remedial action goal
RDL = required detection limits
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Table 7. Comparison of Contaminant Concentrations to Action Levels for the 100-H-28:5 Excavation (EXC 13-24) Verification Samples. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals [a]			Do the Results Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Antimony [c]	1.69 (<BG)	32	5 [d]	5 [d]	No	--
Arsenic	8.16	20 [d]	20 [d]	20 [d]	No	--
Barium	72.1 (<BG)	5,600	200	400	No	--
Beryllium	0.524 (<BG)	10.4 [e]	1.51 [d]	1.51 [d]	No	--
Boron [f]	2.40	7,200	320	-- [g]	No	--
Cadmium [c]	0.214 (<BG)	13.9 [e]	0.81 [d]	0.81 [d]	No	--
Chromium (total)	14.2 (<BG)	80,000	18.5 [d]	18.5 [d]	No	--
Cobalt	6.47 (<BG)	24	15.7 [d]	-- [g]	No	--
Copper	14.7 (<BG)	2,960	59.2	22.0 [d]	No	--
Hexavalent chromium [f]	0.313	2.1 [e]	4.8	2	No	--
Lead	24.0	353	10.2 [d]	10.2 [d]	Yes	Yes [h]
Manganese	289 (<BG)	3,760	512 [d]	512 [d]	No	--
Mercury	0.00726 (<BG)	24	0.33 [d]	0.33 [d]	No	--
Molybdenum [f]	0.286	400	8	-- [g]	No	--
Nickel	13.7 (<BG)	1,600	19.1 [d]	27.4	No	--
Selenium [c]	0.781	400	5	1	No	--
Vanadium	43.9 (<BG)	560	85.1 [d]	-- [g]	No	--
Zinc	41.2 (<BG)	24,000	480	67.8 [d]	No	--
Nitrogen in nitrate and nitrite (Method 353)	1.12 (<BG)	128,000	1,000	2,000	No	--
Aroclor-1260	0.00877	0.5	0.017 [i]	0.017 [i]	No	--
4-4'-DDE	0.00435	2.94	0.0257	0.0033 [i]	Yes	Yes [h]
4-4'-DDT	0.000447	2.94	0.0257	0.0033 [i]	No	--
Acenaphthene	0.0220	4,800	96	129	No	--
Anthracene	0.0197	24,000	240	1,920	No	--
Benzo(a)anthracene	0.0534	1.37	0.015 [i]	0.015 [i]	Yes	Yes [h]
Benzo(a)pyrene	0.0472	0.137	0.015 [i]	0.015 [i]	Yes	Yes [h]
Benzo(b)fluoranthene	0.0518	1.37	0.015 [i]	0.015 [i]	Yes	Yes [h]
Benzo(ghi)perylene [j]	0.0987	2,400	48	192	No	--
Benzo(k)fluoranthene	0.620	1.37	0.015 [i]	0.015 [i]	Yes	Yes [h]
Chrysene	0.187	13.7	0.12	0.1 [i]	Yes	Yes [h]
Dibenz(a,h)anthracene	0.0180	1.37	0.03 [i]	0.03 [i]	No	--
Fluoranthene	0.0730	3,200	64	18.0	No	--
Fluorene	0.0190	3,200	64	260	No	--
Indeno(1,2,3-cd)pyrene	0.0260	1.37	0.33 [i]	0.33 [i]	No	--

Table 7. Comparison of Contaminant Concentrations to Action Levels for the 100-H-28:5 Excavation (EXC 13-24) Verification Samples. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals [a]			Do the Results Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Phenanthrene [j]	0.120	24,000	240	1,920	No	--
Pyrene	0.331	2,400	48	192	No	--

[a] RAGs obtained from the 100 Area RDR/RAWP (DOE-RL 2009b).
[b] Maximum or 95% UCL result, depending on data censorship, as described in the *100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations* (Appendix C).
[c] Hanford Site-specific background value is not available. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).
[d] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL 2009b).
[e] Carcinogenic cleanup level calculated based on the inhalation exposure pathway per WAC 173-340-750(3), (Method B for air quality) and an airborne particulate mass loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[f] No Hanford Site-specific or Washington State background value available.
[g] No parameters (bioconcentration factors or AWQC values) are available from the Cleanup Levels and Risk Calculations Database (Ecology 2014) or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], [Method B for surface waters]).
[h] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of lead, 4-4'-DDE, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene are not expected to migrate more than 1.8 m (5.9 ft) vertically in 1,000 years (based on the lowest K_d of the contaminants [lead with a K_d of 30 mL/g]). The vadose zone underlying the 100-H-28:5 excavation is 2 m (6.6 ft) thick.
[i] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2).
[j] Toxicity data for this chemical are not available. Cleanup levels are based on surrogate chemicals.
Contaminant: benzo(ghi)perylene; surrogate: pyrene
Contaminant: phenanthrene; surrogate: anthracene

-- = not applicable
AWQC = ambient water quality criteria
BG = background
COPC = contaminant of potential concern
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
K_d = distribution coefficient
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Table 8. Comparison of Contaminant Concentrations to Action Levels for the North Overburden Stockpile Verification Samples. (2 Pages)

COPC	Statistical Result [b] (pCi/g)	Site Lookup Values [a]			Do the Results Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Shallow Zone Lookup Value	Groundwater Protection Lookup Value	River Protection Lookup Value		
Europium-152	0.0921	3.3	-- [c]	-- [c]	No	--
Europium-154	0.0448	3.0	-- [c]	-- [c]	No	--
Europium-155	0.0770	125	-- [c]	-- [c]	No	--
Nickel-63	1.99	4,013	83	166	No	--
COPC	**Statistical Result [b] (mg/kg)**	**Remedial Action Goals [a]**			**Do the Results Exceed RAGs?**	**Do the Results Pass RESRAD Modeling?**
		Direct Exposure	**Soil Cleanup Level for Groundwater Protection**	**Soil Cleanup Level for River Protection**		
Antimony [d]	4.16 (<BG)	32	5 [e]	5 [e]	No	--
Arsenic	8.47	20 [e]	20 [e]	20 [e]	No	--
Barium	62.9 (<BG)	5,600	200	400	No	--
Beryllium	1.05 (<BG)	10.4 [f]	1.51 [e]	1.51 [e]	No	--
Boron [g]	2.30	7,200	320	-- [h]	No	--
Cadmium [d]	0.257 (<BG)	13.9 [f]	0.81 [e]	0.81 [e]	No	--
Chromium (total)	12.8 (<BG)	80,000	18.5 [e]	18.5 [e]	No	--
Cobalt	8.38 (<BG)	24	15.7 [e]	-- [h]	No	--
Copper	13.4 (<BG)	2,960	59.2	22.0 [e]	No	--
Hexavalent chromium [g]	0.322	2.1 [f]	4.8	2	No	--
Lead	28.2	353	10.2 [e]	10.2 [e]	Yes	Yes [i]
Manganese	266 (<BG)	3,760	512 [e]	512 [e]	No	--
Mercury	0.0220 (<BG)	24	0.33 [e]	0.33 [e]	No	--
Nickel	13.6 (<BG)	1,600	19.1 [e]	27.4	No	--
Selenium [d]	0.448 (<BG)	400	5	1	No	--
Silver	0.288 (<BG)	400	8	0.73 [e]	No	--
Vanadium	45.4 (<BG)	560	85.1 [e]	-- [h]	No	--
Zinc	48.0 (<BG)	24,000	480	67.8 [e]	No	--
Chloride	11.2 (<BG)	--	25,000	-- [h]	No	--
Fluoride	1.42 (<BG)	4,800	96	400	No	--
Nitrogen in nitrate (Method 300.0)	3.50 (<BG)	128,000	1,000	2,000	No	--
Nitrogen in nitrate and nitrite (Method 353)	2.84 (<BG)	128,000	1,000	2,000	No	--
Sulfate	40.5 (<BG)	--	25,000	-- [h]	No	--
TPH – diesel range	3.8	200	200	200	No	--
TPH – diesel range ext	6.1	200	200	200	No	--
TPH – motor oil (high boiling)	4.1	200	200	200	No	--
Aroclor-1260	0.0132	0.5	0.017 [j]	0.017 [j]	No	--
4-4'-DDT	0.00078	2.94	0.0257	0.0033 [j]	No	--
Acenaphthene	0.0144	4,800	96	129	No	--

Table 8. Comparison of Contaminant Concentrations to Action Levels for the North Overburden Stockpile Verification Samples. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals [a]			Do the Results Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Anthracene	0.0233	24,000	240	1,920	No	--
Benzo(a)anthracene	0.0338	1.37	0.015[j]	0.015[j]	Yes	Yes[i]
Benzo(a)pyrene	0.0325	0.137	0.015[j]	0.015[j]	Yes	Yes[i]
Benzo(b)fluoranthene	0.0413	1.37	0.015[j]	0.015[j]	Yes	Yes[i]
Benzo(ghi)perylene[k]	0.0221	2,400	48	192	No	--
Benzo(k)fluoranthene	0.0120	1.37	0.015[j]	0.015[j]	No	--
Chrysene	0.0269	13.7	0.12	0.1[j]	No	--
Fluoranthene	0.0585	3,200	64	18.0	No	--
Fluorene	0.0112	3,200	64	260	No	--
Indeno(1,2,3-cd)pyrene	0.0210	1.37	0.33[j]	0.33[j]	No	--
Phenanthrene[k]	0.0516	24,000	240	1,920	No	--
Pyrene	0.0650	2,400	48	192	No	--

[a] Lookup values and RAGs obtained from the 100 Area RDR/RAWP (DOE-RL 2009b).
[b] Maximum or 95% UCL result, depending on data censorship, as described in the *100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations* (Appendix C).
[c] No value; because the K_d value for this contaminant is greater than 80 mL/g, RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b) predicts that the contaminant will show no migration within the 100 Area vadose zone, and no impact on groundwater or the Columbia River.
[d] Hanford Site-specific background value is not available. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).
[e] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL 2009b).
[f] Carcinogenic cleanup level calculated based on the inhalation exposure pathway per WAC 173-340-750(3), (Method B for air quality) and an airborne particulate mass loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[g] No Hanford Site-specific or Washington State background value available.
[h] No parameters (bioconcentration factors or AWQC values) are available from the Cleanup Levels and Risk Calculations Database (Ecology 2014) or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], [Method B for surface waters]).
[i] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of lead, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene are not expected to migrate more than 1.8 m (5.9 ft) vertically in 1,000 years (based on the lowest K_d of the contaminants [lead with a K_d of 30 mL/g]). The vadose zone underlying the 100-H-28:5 excavation is 2 m (6.6 ft) thick.
[j] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2).
[k] Toxicity data for this chemical are not available. Cleanup levels are based on surrogate chemicals.
Contaminant: benzo(ghi)perylene; surrogate: pyrene
Contaminant: phenanthrene; surrogate: anthracene

-- = not applicable
AWQC = ambient water quality criteria
BG = background
COPC = contaminant of potential concern
DDT = dichlorodiphenyltrichloroethane
K_d = distribution coefficient
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
TPH = total petroleum hydrocarbons
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Table 9. Comparison of Contaminant Concentrations to Action Levels for the South Overburden Stockpile Verification Samples. (2 Pages)

COPC	Statistical Result [b] (pCi/g)	Site Lookup Values [a]			Do the Results Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Shallow Zone Lookup Value	Groundwater Protection Lookup Value	River Protection Lookup Value		
Cesium-137	0.027 (<BG)	6.2	1,465	2,930	No	--
Cobalt-60	0.038	1.4	13,900	27,800	No	--
Europium-152	0.102	3.3	--[c]	--[c]	No	--
Europium-154	0.038	3.0	--[c]	--[c]	No	--
Europium-155	0.087	125	--[c]	--[c]	No	--
Nickel-63	3.802	4,013	83	166	No	--
Strontium-90	0.337	4.5	27.6	55.2	No	--
COPC	**Statistical Result [b] (mg/kg)**	**Remedial Action Goals [a]**			**Do the Results Exceed RAGs?**	**Do the Results Pass RESRAD Modeling?**
		Direct Exposure	**Soil Cleanup Level for Groundwater Protection**	**Soil Cleanup Level for River Protection**		
Antimony [d]	1.72 (<BG)	32	5[e]	5[e]	No	--
Arsenic	8.52	20[e]	20[e]	20[e]	No	--
Barium	67.8 (<BG)	5,600	200	400	No	--
Beryllium	0.769 (<BG)	10.4[f]	1.51[e]	1.51[e]	No	--
Boron [g]	2.75	7,200	320	--[h]	No	--
Cadmium [d]	0.370 (<BG)	13.9[f]	0.81[e]	0.81[e]	No	--
Chromium (total)	11.6 (<BG)	80,000	18.5[e]	18.5[e]	No	--
Cobalt	8.28 (<BG)	24	15.7[e]	--[h]	No	--
Copper	15.9 (<BG)	2,960	59.2	22.0[e]	No	--
Hexavalent chromium [g]	0.465	2.1[f]	4.8	2	No	--
Lead	24.2	353	10.2[e]	10.2[e]	Yes	Yes[i]
Manganese	297 (<BG)	3,760	512[e]	512[e]	No	--
Mercury	0.0060 (<BG)	24	0.33[e]	0.33[e]	No	--
Molybdenum [g]	0.520	400	8	--[h]	No	--
Nickel	12.0 (<BG)	1,600	19.1[e]	27.4	No	--
Vanadium	60.6 (<BG)	560	85.1[e]	--[h]	No	--
Zinc	44.5 (<BG)	24,000	480	67.8[e]	No	--
Chloride	5.73 (<BG)	--	25,000	--[h]	No	--
Fluoride	1.68 (<BG)	4,800	96	400	No	--
Nitrogen in nitrate (Method 300.0)	14.8	128,000	1,000	2,000	No	--
Nitrogen in nitrate and nitrite (Method 353)	10.2 (<BG)	128,000	1,000	2,000	No	--
Nitrogen in nitrite [g] (Method 330.0)	4.50	8,000	100	200	No	--
Sulfate	16.0 (<BG)	--	25,000	--[h]	No	--
TPH – motor oil (high boiling)	10	200	200	200	No	--
Aroclor-1254	0.0058	0.5	0.017[j]	0.017[j]	No	--
Aroclor-1260	0.00415	0.5	0.017[j]	0.017[j]	No	--
Acenaphthene	0.0678	4,800	96	129	No	--
Anthracene	0.0294	24,000	240	1,920	No	--
Benzo(a)anthracene	0.0220	1.37	0.015[j]	0.015[j]	Yes	Yes[i]
Benzo(a)pyrene	0.0800	0.137	0.015[j]	0.015[j]	Yes	Yes[i]

Table 9. Comparison of Contaminant Concentrations to Action Levels for the South Overburden Stockpile Verification Samples. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals [a]			Do the Results Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Benzo(b)fluoranthene	0.0200	1.37	0.015[j]	0.015[j]	Yes	Yes[i]
Benzo(ghi)perylene[k]	0.00946	2,400	48	192	No	--
Benzo(k)fluoranthene	0.0474	1.37	0.015[j]	0.015[j]	Yes	Yes[i]
Chrysene	0.0182	13.7	0.12	0.1[j]	No	--
Fluoranthene	0.0318	3,200	64	18.0	No	--
Fluorene	0.0196	3,200	64	260	No	--
Phenanthrene[k]	0.105	24,000	240	1,920	No	--
Pyrene	0.357	2,400	48	192	No	--
Dieldrin	0.000489	0.0625	0.0033[j]	0.0033[j]	No	--

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

[b] Maximum or 95% UCL result, depending on data censorship, as described in the *100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations* (Appendix C).

[c] No value; because the K_d value for this contaminant is greater than 80 mL/g, RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b) predicts that the contaminant will show no migration within the 100 Area vadose zone, and no impact on groundwater or the Columbia River.

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

[e] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL 2009b).

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

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

[h] No parameters (bioconcentration factors or AWQC values) are available from the Cleanup Levels and Risk Calculations Database (Ecology 2014) or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], [Method B for surface waters]).

[i] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of lead, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene are not expected to migrate more than 1.8 m (5.9 ft) vertically in 1,000 years (based on the lowest K_d of the contaminants [lead with a K_d of 30 mL/g]). The vadose zone underlying the 100-H-28:5 excavation is approximately 2 m (6.6 ft) thick.

[j] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2).

[k] Toxicity data for this chemical are not available. Cleanup levels are based on surrogate chemicals.
Contaminant: benzo(ghi)perylene; surrogate: pyrene
Contaminant: phenanthrene; surrogate: anthracene

-- = not applicable
AWQC = ambient water quality criteria
BG = background
COPC = contaminant of potential concern
K_d = distribution coefficient
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
TPH = total petroleum hydrocarbons
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Table 10. Comparison of Contaminant Concentrations to Action Levels for the 100-H-28:3, 100-H-28:5, and 100-H-44 Focused Verification Samples. (2 Pages)

COPC	Maximum Result [b] (mg/kg)	Remedial Action Goals [a]			Do the Results Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Arsenic	7.80	20 [c]	20 [c]	20 [c]	No	--
Barium	72.6 (<BG)	5,600	200	400	No	--
Beryllium	0.260 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	1.70	7,200	320	-- [f]	No	--
Cadmium [g]	0.240 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium (total)	19.0	80,000	18.5 [c]	18.5 [c]	Yes	Yes [h]
Cobalt	7.0 (<BG)	24	15.7 [c]	-- [f]	No	--
Copper	17.2 (<BG)	2,960	59.2	22.0 [c]	No	--
Hexavalent chromium [e]	0.278	2.1 [d]	4.8	2	No	--
Lead	9.70 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	282 (<BG)	3,760	512 [c]	512 [c]	No	--
Mercury	0.0071 (<BG)	24	0.33 [c]	0.33 [c]	No	--
Molybdenum [e]	0.320	400	8	-- [f]	No	--
Nickel	17.5 (<BG)	1,600	19.1 [c]	27.4	No	--
Selenium [g]	1.40	400	5	1	Yes	Yes [i]
Vanadium	43.1 (<BG)	560	85.1 [c]	-- [f]	No	--
Zinc	40.8 (<BG)	24,000	480	67.8 [c]	No	--
Chloride	5.40 (<BG)	--	25,000	-- [f]	No	--
Fluoride	1.30 (<BG)	4,800	96	400	No	--
Nitrogen in nitrate (Method 300.0)	1.20 (<BG)	128,000	1,000	2,000	No	--
Nitrogen in nitrate and nitrite (Method 353)	0.75 (<BG)	128,000	1,000	2,000	No	--
Sulfate	39.4 (<BG)	--	25,000	-- [f]	No	--
4-4'-DDE	0.00037	2.94	0.0257	0.0033 [j]	No	--

Table 10. Comparison of Contaminant Concentrations to Action Levels for the 100-H-28:3, 100-H-28:5, and 100-H-44 Focused Verification Samples. (2 Pages)

COPC	Maximum Result [b] (mg/kg)	Remedial Action Goals [a]			Do the Results Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Dimethyl phthalate	0.095	80,000	1,600	14,400	No	--

[a] RAGs obtained from the 100 Area RDR/RAWP (DOE-RL 2009b).
[b] Maximum result as described in the *100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations* (Appendix C).
[c] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL 2009b).
[d] Carcinogenic cleanup level calculated based on the inhalation exposure pathway per WAC 173-340-750(3), (Method B for air quality) and an airborne particulate mass loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[e] No Hanford Site-specific or Washington State background value available.
[f] No parameters (bioconcentration factors or AWQC values) are available from the Cleanup Levels and Risk Calculations Database (Ecology 2014) or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], [Method B for surface waters]).
[g] Hanford Site-specific background value is not available. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).
[h] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentration of chromium (total) is not predicted to migrate vertically within 1,000 years (based on the K_d of total chromium of 200 mL/g). A contaminant with a soil-partitioning coefficient of 80 mL/g or greater is not predicted to migrate vertically through the soil. Therefore, the residual concentration of total chromium is predicted to be protective of groundwater and the Columbia River. The thinnest vadose zone underlying the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site is 2 m (6.6 ft) thick.
[i] Selenium is not a contaminant of potential concern at the 100-H-28:3 and 100-H-28:5 subsites or the 100-H-44 waste site, and it is not a product of any known process related to reactor operations. Examination of the data has concluded that the selenium concentration is due to the natural mineralogy found in the sample matrix and not to any type of waste disposal or man-made contamination. Therefore, it is concluded that the selenium concentrations meets the remedial action objectives established in the 100 Area RDR/RAWP (DOE-RL 2009b).
[j] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2).

-- = not applicable
AWQC = ambient water quality criteria
BG = background
COPC = contaminant of potential concern
DDE = dichlorodiphenyldichloroethylene
K_d = distribution coefficient
RAG = remedial action goal
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
WAC = *Washington Administrative Code*

DATA EVALUATION

This section demonstrates that contaminant concentrations at the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site, and the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 overburden stockpiles achieve the applicable RAGs developed to support unrestricted land use at the 100 Area as established in the Remaining Sites ROD (EPA 1999) and documented in the 100 Area RDR/RAWP (DOE-RL 2009b). Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), contaminants that exceeded a groundwater/river RAG, as shown in Tables 6 through 10, are predicted to be protective of groundwater and the Columbia River.

Attainment of Radionuclide Direct Exposure RAGs

Evaluation of RAG attainment for radionuclides was performed using the single-radionuclide dose equivalence lookup values. The model used to develop these dose equivalence lookup values is presented in the 100 Area RDR/RAWP (DOE-RL 2009b). A comparison of the radionuclide verification sample results for the statistical data set to the cumulative direct exposure radiological dose limit of 15 mrem/yr was conducted using sum of fractions calculations (Appendix C). The sum of fractions were conservatively calculated for the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 overburden soil stockpiles decision units using the greater of the statistical or maximum value for each COPC. Radionuclides were not COPCs for the 100-H-28:3 and 100-H-28:4 subsites and the 100-H-44 waste site.

The sum of fractions shown in the *100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Direct Contact Hazard Quotient, Carcinogenic Risk, and Sum of Fractions Calculations* (Appendix C) determined that the maximum predicted total radiological dose is 1.39 mrem/yr. Comparing this to the dose limit of <15 mrem/yr, the requirement is met.

Attainment of Nonradionuclide RAGs

Table 6 compares the cleanup verification sample values for the 100-H-28:3 and 100-H-44 excavation (EXC 1-12) decision unit to the applicable soil RAGs for direct exposure, protection of groundwater, and protection of the Columbia River. All COPCs were quantified below direct exposure RAGs. All COPCs were quantified below groundwater and/or river protection soil RAGs with the exception of copper, lead, mercury, silver, and aroclor-1254. However, based on the contaminant with the lowest distribution coefficient (K_d) (copper with a K_d of 22 mL/g), copper, lead, mercury, silver, and aroclor-1254 are not expected to migrate more than 2.6 m (8.5 ft) vertically in 1,000 years based on RESidual RADioactivity (RESRAD) modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b). The vadose zone beneath the 100-H-28:3 and 100-H-44 excavation is approximately 3 m (9.8 ft) thick. Therefore, the residual concentrations of copper, lead, mercury, silver, and aroclor-1254 are predicted to be protective of groundwater and the Columbia River.

Tables 7 through 10 compare the cleanup verification sample values for the 100-H-28:5 excavation (EXC 13-24), NOB stockpile, SOB stockpile, and the focused soil samples to the applicable soil RAGs for direct exposure, protection of groundwater, and protection of the Columbia River. All COPCs were quantified below direct exposure RAGs. All COPCs were quantified below groundwater and/or river protection soil RAGs with the exception of chromium (total), lead, selenium, 4-4'-DDE, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene. However, with the exception of selenium, based on the contaminant with the lowest K_d, (lead with a K_d of 30 mL/g), these contaminants are not expected to migrate more than 1.8 m (5.9 ft) vertically in 1,000 years based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b). The vadose zone beneath the 100-H-28:5 excavation is approximately 2 m (6.6 ft) thick. Therefore, the residual concentrations of chromium (total), lead, 4-4'-DDE, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene are predicted to be protective of groundwater and the Columbia River.

Selenium was detected in a focused sample above the river protection RAG; however, selenium is not a COPC for the 100-H-28:3 and 100-H-28:5 subsites or the 100-H-44 waste site and it is not a product of any known process related to reactor operations. Examination of the data has concluded that the selenium concentration is due to the natural mineralogy found in the sample matrix and not to any type of waste disposal or man-made contamination. Therefore, it is concluded that the selenium concentration meets the RAOs established in the 100 Area RDR/RAWP (DOE-RL 2009b).

Three-Part Test for Nonradionuclides

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

The application of the three-part test for the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site, the NOB stockpile, and the SOB stockpile is included in the *100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations* in Appendix C of this remaining sites verification package, where half or more of the data set were detected.

The results of this evaluation indicate that residual COPC concentrations at the 100-H-28:3 and 100-H-44 excavation (EXC 1-12) decision unit pass the three-part test in comparison against applicable RAGs with the exception of chromium (total), copper, lead, mercury, and aroclor-1260, which fails one or more parts of the three-part test to be protective of groundwater and the Columbia River. However, based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of these contaminants are not predicted to migrate more than 2.6 m (8.5 ft) vertically within 1,000 years (based on the lowest K_d of the contaminants [copper with a K_d of 22 mL/g]). The vadose zone beneath the 100-H-28:3 and 100-H-44 excavation is approximately 3 m (9.8 ft) thick; therefore, the residual concentrations of chromium (total), copper, lead, mercury, and aroclor-1260 are predicted to be protective of groundwater and the Columbia River.

The results of the evaluation for the 100-H-28:5 excavation (EXC 13-24), NOB stockpile, and the SOB stockpile decision units indicate that residual COPC concentrations pass the three-part test in comparison against the applicable RAGs with the exception of lead, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene, which fails one or more parts of the three-part test. However, based on RESRAD modeling, the residual concentrations of these contaminants are not predicted to migrate more than 1.8 m (5.9 ft) vertically within 1,000 years (based on the lowest K_d of the contaminants [lead with a K_d of 30 mL/g]). The vadose zone beneath the 100-H-28:5 excavation is approximately 2 m (6.6 ft) thick. Therefore, the residual concentrations of lead, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene are predicted to be protective of groundwater and the Columbia River.

An additional application of the three-part test is included for the statistical data sets that default to the maximum value because less than half of the data set was detected. The results of this evaluation indicate that residual COPC concentrations pass the three-part test in comparison against applicable RAGs with the exception of silver, aroclor-1254, 4-4'-DDE, and benzo(k)fluoranthene, which fails one or more parts of the three-part test. However, based on RESRAD modeling, the residual concentrations of these contaminants are not predicted to migrate vertically within 1,000 years (based on the lowest K_d of the contaminants [4-4'-DDE with a K_d of 86.4 mL/g]). A contaminant with a soil-partitioning coefficient of 80 mL/g or greater is not predicted to migrate vertically through the soil. Therefore, the residual concentrations of silver, aroclor-1254, 4-4'-DDE, and benzo(k)fluoranthene are predicted to be protective of groundwater and the Columbia River. The thinnest vadose zone underlying the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site is 2 m (6.6 ft) thick. Therefore, the residual concentrations of silver, aroclor-1254, 4-4'-DDT, and benzo(k)fluoranthene are predicted to be protective of groundwater and the Columbia River.

Nonradionuclide Direct Contact Hazard Quotient and Carcinogenic Risk RAGs Attained

Nonradionuclide risk requirements include an individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual contaminant carcinogenic risk of less than 1×10^{-6}, and a cumulative carcinogenic risk of less than 1×10^{-5}. For the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site and the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 overburden soil stockpiles, these risk values were not calculated for constituents that were either not detected or were detected at concentrations below Hanford Site or Washington State background levels. All individual hazard quotients for noncarcinogenic constituents were less than 1.0. The cumulative hazard quotient for those noncarcinogenic constituents above background or detected levels is 2.6×10^{-1}, which is less than 1.0. The individual carcinogenic risk values for the carcinogenic constituents detected above background are less than 1×10^{-6}, and the cumulative carcinogenic risk value is 1.5×10^{-6}, which is less than 1×10^{-5}. The 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site, and the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 overburden soil stockpiles meets the requirements for the direct contact hazard quotient and excess carcinogenic risk as identified in the 100 Area RDR/RAWP (DOE-RL 2009b).

Nonradionuclide Groundwater Hazard Quotient and Carcinogenic Risk RAGs Attained

Assessment of the risk requirements for the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site decision units, and the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 overburden soil stockpiles decision units included a calculation of the hazard quotient and carcinogenic (excess cancer) risk values for groundwater protection for nonradionuclides. The requirements include an individual and cumulative hazard quotient of less than 1.0, an individual excess carcinogenic risk of less than 1×10^{-6}, and a cumulative excess carcinogenic risk of less than 1×10^{-5}. Risk values were calculated for constituents that were detected at concentrations above Hanford Site or Washington State background values or for which there is no background value. In addition, the soil-partitioning coefficients for these contaminants must be less than that necessary to show no migration to groundwater in 1,000 years based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP

(DOE-RL 2009b). Based on this model and a vadose zone of approximately 2 m (6.6 ft) in thickness, a K_d of 27 or greater is required to show no predicted migration to groundwater in 1,000 years.

The hazard quotient for individual nonradionuclides for the 100-H-28:3 and 100-H-44 excavation (EXC-12) decision unit are less than 1. The cumulative hazard quotient, 7.8×10^{-1}, is less than 1. No carcinogenic constituents met the criteria for groundwater protection evaluation for the 100-H-28:3 and 100-H-44 excavation (EXC-12) decision unit; therefore, no calculations of excess carcinogenic risk were performed.

The hazard quotient for individual nonradionuclides for the 100-H-28:5 excavation (EXC 13-24) NOB, SOB, and focused samples decision units are less than 1. The cumulative hazard quotient, 5.1×10^{-1}, is less than 1. The excess cancer risk for dieldrin, the only constituent subject to the excess cancer risk calculation, is 1.5×10^{-1}, which is less than the individual excess carcinogenic risk criteria of less than 1×10^{-6} and the cumulative excess carcinogenic risk criteria of less than 1×10^{-5}. Therefore, the nonradionuclide risk requirements related to groundwater are met.

DATA QUALITY ASSESSMENT

A data quality assessment (DQA) was performed to compare the verification sampling approach (WCH 2014), the field logbooks (WCH 2013a, 2013b, 2015a, 2015b), and resulting analytical data with the sampling and data quality requirements specified by the project objectives and performance specifications.

The DQA for the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site, and the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 overburden stockpiles established that the data are of the right type, quality, and quantity to support site closeout decisions within specified error tolerances. The evaluation verified that the sample design was sufficient for the purpose of clean site verification. The cleanup verification sample analytical data are stored in a Washington Closure Hanford project-specific database for data evaluation prior to archival in Hanford Environmental Information System and are summarized in Appendix C. The detailed DQA is presented in Appendix D.

SUMMARY FOR INTERIM CLOSURE

The 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site and the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 overburden soil stockpiles have been evaluated in accordance with the Remaining Sites ROD (EPA 1999) and the 100 Area RDR/RAWP (DOE-RL 2009b). Verification sampling was performed and the analytical results indicate that the residual concentrations of COPCs at the site meet the RAOs for direct exposure, groundwater protection, and river protection.

In accordance with this evaluation, the verification sampling results support a reclassification of the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site to Interim Closed Out.

Although the maximum depth of the excavation extended into the deep zone (i.e., greater than 4.6 m [15 ft]), the entire sites were closed out using the more restrictive shallow zone requirements. Contamination above direct exposure levels was not observed in the shallow zone soils and is concluded to not exist in deep zone soils; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the sites are not required.

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APPENDIX A

ECOLOGICAL RISK COMPARISON TABLE

Table A-1. Maximum Contaminant Concentrations that Exceed Ecological Screening Levels for the 100-H-28:3 and 100-H-28:5 Subsites and the 100-H-44 Waste Site [a].

Hazardous Substance		2007 WAC 173-340 Table 749-3			EPA Ecological Soil Screening Levels [b]				Waste Site Analyses
		Plants	Soil Biota	Wildlife	Plants	Soil Biota	Avian [c]	Mammalian [c]	
	BG								
Antimony	5	5	--	--	--	78	--	0.27	4.16 (<BG)
Arsenic	6.5 [d]	--	--	7	18	--	43	46	8.52
Barium	132	500	--	102	--	330	--	2,000	109 (<BG)
Boron	--	0.5	--	--	--	--	--	--	17.6
Cadmium	0.81	4	20	14	32	140	0.77	0.36	0.370 (<BG)
Lead	10.2	50	500	118	120	1,700	11	56	28.2
Manganese	512	1,100 [e]	--	1,500	220	450	4,300	4,000	297 (<BG)
Mercury	0.33	0.3	0.1	5.5	--	--	--	--	4.85
Selenium	0.78	1	70	0.3	0.52	4.1	1.2	0.63	1.40
Silver	0.73	2	--	--	560	--	4.2	14	3.14
Vanadium	85.1	2	--	--	--	--	7.8	280	60.6 (<BG)
Zinc	67.8	86 [e]	200	360	160	120	46	79	51.1 (<BG)
High molecular weight PAH (total)	--	--	--	--	--	18	--	1.1	1.49
Benzo(a)anthracene	--	NA	NA	NA	NA	NA	NA	NA	0.0534
Benzo(a)pyrene	--	NA	NA	NA	NA	NA	NA	NA	0.0800
Benzo(g,h,i)perylene	--	NA	NA	NA	NA	NA	NA	NA	0.0987
Benzo(b)fluoranthene	--	NA	NA	NA	NA	NA	NA	NA	0.0518
Benzo(k)fluoranthene	--	NA	NA	NA	NA	NA	NA	NA	0.620
Chrysene	--	NA	NA	NA	NA	NA	NA	NA	0.187
Dibenz[a,h]anthracene	--	NA	NA	NA	NA	NA	NA	NA	0.0180
Indeno[1,2,3-cd]pyrene	--	NA	NA	NA	NA	NA	NA	NA	0.0260
Pyrene	--	NA	NA	NA	NA	NA	NA	NA	0.357

NOTE: Shaded cells indicate screening values that are exceeded.

[a] Exceedance of screening values does not necessarily indicate the existence of risk to ecological receptors. All exceedances must be evaluated in the context of additional lines of evidence for ecological effects following a baseline risk assessment for the river corridor portion of the Hanford Site, which will include a more complete quantitative ecological risk assessment.

[b] Available on the Internet at www.epa.gov/ecotox/ecossl.

[c] Wildlife.

[d] The Hanford Site background for arsenic is 6.5 mg/kg. An arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the *Remedial Design Report/Remedial Action Work Plan for the 100 Area*, DOE/RL-96-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

[e] Benchmark replaced by Washington state natural background concentration from Ecology, 1994, *Natural Background Soil Metals Concentrations in Washington State*, Publication 94-115, Washington State Department of Ecology, Olympia, Washington.

-- = not available
BG = background
EPA = U.S. Environmental Protection Agency
NA = not applicable
PAH = polycyclic aromatic hydrocarbons
WAC = *Washington Administrative Code*

APPENDIX B

CONFIRMATORY, WASTE CHARACTERIZATION, AND IN-PROCESS SAMPLING RESULTS

Table B-1. 100-H-28:3 Confirmatory Sample Results. (6 Pages).

Solid Phase

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Aluminum			Antimony			Arsenic		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:3	J16VH6	6/2/2008 13:00	Manhole H-12											
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			5790	C		1.2			59.7		

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Barium			Beryllium			Boron		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:3	J16VH6	6/2/2008 13:00	Manhole H-12											
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			16.5	C		0.14			5.7		

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Cadmium			Calcium			Chromium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:3	J16VH6	6/2/2008 13:00	Manhole H-12											
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			0.11			2760	C		14.1		

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Cobalt			Copper			Hexavalent Chromium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:3	J16VH6	6/2/2008 13:00	Manhole H-12									0.35	U	0.35
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			0.41	U		8.2					

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Iron			Lead			Mercury		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:3	J16VH6	6/2/2008 13:00	Manhole H-12											
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			6090	C		7.9			3		

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Magnesium			Manganese			Molybdenum		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:3	J16VH6	6/2/2008 13:00	Manhole H-12											
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			237	C		18.9	C		0.71		

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Nickel			Potassium			Selenium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:3	J16VH6	6/2/2008 13:00	Manhole H-12											
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			1.6			374	C		1.2	U	

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Silicon			Silver			Sodium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:3	J16VH6	6/2/2008 13:00	Manhole H-12											
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			405			0.21	U		361	C	

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Vanadium			Zinc		
						mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:3	J16VH6	6/2/2008 13:00	Manhole H-12								
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			17.4			42.1	C	

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	pH		
						pH	Q	PQL
100-H-28:3	J16VH6	6/2/2008 13:00	Manhole H-12					
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			7.7		

Table B-1. 100-H-28:3 Confirmatory Sample Results. (6 Pages).

Liquid Phase

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Aluminum			Antimony			Arsenic		
						ug/L	Q	PQL	ug/L	Q	PQL	ug/L	Q	PQL
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			45.1			19.2			17.6		
100-H-28:3	J16VH6-A	6/2/2008 13:00	Manhole H-12											

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Barium			Beryllium			Boron		
						ug/L	Q	PQL	ug/L	Q	PQL	ug/L	Q	PQL
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			53.4			0.5	U		540		
100-H-28:3	J16VH6-A	6/2/2008 13:00	Manhole H-12											

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Cadmium			Calcium			Chromium		
						ug/L	Q	PQL	ug/L	Q	PQL	ug/L	Q	PQL
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			0.5			89300			14		
100-H-28:3	J16VH6-A	6/2/2008 13:00	Manhole H-12											

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Cobalt			Copper			Hexavalent Chromium		
						ug/L	Q	PQL	ug/L	Q	PQL	ug/L	Q	PQL
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			2	U		9.6					
100-H-28:3	J16VH6-A	6/2/2008 13:00	Manhole H-12									0.000002	U	0.000002

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Iron			Lead			Mercury		
						ug/L	Q	PQL	ug/L	Q	PQL	ug/L	Q	PQL
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			55.5	C		3			0.66		
100-H-28:3	J16VH6-A	6/2/2008 13:00	Manhole H-12											

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Magnesium			Manganese			Molybdenum		
						ug/L	Q	PQL	ug/L	Q	PQL	ug/L	Q	PQL
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			22700			2			14.8		
100-H-28:3	J16VH6-A	6/2/2008 13:00	Manhole H-12											

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Nickel			Potassium			Selenium		
						ug/L	Q	PQL	ug/L	Q	PQL	ug/L	Q	PQL
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			5			49300			6	U	
100-H-28:3	J16VH6-A	6/2/2008 13:00	Manhole H-12											

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Silicon			Silver			Sodium		
						ug/L	Q	PQL	ug/L	Q	PQL	ug/L	Q	PQL
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			8460			1	U		228000		
100-H-28:3	J16VH6-A	6/2/2008 13:00	Manhole H-12											

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Vanadium			Zinc		
						ug/L	Q	PQL	ug/L	Q	PQL
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			6.6			14.4		
100-H-28:3	J16VH6-A	6/2/2008 13:00	Manhole H-12								

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	pH		
						pH	Q	PQL
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			8		

Table B-1. 100-H-28:3 Confirmatory Sample Results. (6 Pages).

Solid Phase

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Americium-241			Americium-241			Cesium-137		
						GEA			RADAEA			GEA		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			0.477	U	0.477	0.077	U	0.473	0.166	U	0.166

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Cobalt-60			Curium-242			Curium-243/244		
						GEA			RADAEA			RADAEA		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			0.156	U	0.156	0	U	0.323	0.039	U	0.516

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Europium-152			Europium-154			Europium-155		
						GEA			GEA			GEA		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			0.419	U	0.419	0.489	U	0.489	0.305	U	0.305

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Iodine-129			Neptunium-237			Nickel-63		
						GEA			RADAEA			RADLSC		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			-0.296	U	1.9	0.033	U	0.098	-1.41	U	3.32

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Plutonium-238			Plutonium-239/240			Potassium-40		
						RADAEA			RADAEA			GEA		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			-0.03	U	0.228	0.03	U	0.228	3.33	U	3.33

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Radium-226			Radium-228			Silver-108 metastable		
						GEA			GEA			GEA		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			0.289	U	0.289	0.759	U	0.759	0.118	U	0.118

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Technetium-99			Thorium-228			Thorium-232		
						RADGPC			GEA			GEA		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			0.366	U	0.7	0.49	U	0.49	0.759	U	0.759

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Total Beta Radiostrontium			Uranium-233/234			Uranium-235		
						RADGPC			RADAEA			GEA		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			-0.014	U	0.309	0.179		0.124	0.529	U	0.529

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Uranium-235			Uranium-238			Uranium-238		
						RADAEA			GEA			RADAEA		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			0	U	0.151	19.8	U	19.8	0.098	U	0.124

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Uranium			Gross alpha			Gross beta		
						RADKPA			RADGPC			RADGPC		
						ug/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:3	J16W68	6/2/2008 13:00	Manhole H-12			0.433		0.01	1.84	U	2.17	3.18	U	8.23

Table B-1. 100-H-28:3 Confirmatory Sample Results. (6 Pages).

Liquid Phase

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Americium-241			Americium-241			Cesium-137		
						GEA			RADAEA			GEA		
						pCi/mL	Q	MDA	pCi/mL	Q	MDA	pCi/mL	Q	MDA
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			0.083	U	0.083	-0.0186	U	0.0893	0.0312	U	0.0312

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Cobalt-60			Curium-242			Curium-243/244		
						GEA			RADAEA			RADAEA		
						pCi/mL	Q	MDA	pCi/mL	Q	MDA	pCi/mL	Q	MDA
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			0.0331	U	0.0331	-0.0102	U	0.0783	0.028	U	0.115

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Europium-152			Europium-154			Europium-155		
						GEA			GEA			GEA		
						pCi/mL	Q	MDA	pCi/mL	Q	MDA	pCi/mL	Q	MDA
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			0.106	U	0.106	0.083	U	0.083	0.0788	U	0.0788

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Iodine-129			Neptunium-237			Nickel-63		
						GEA			RADAEA			RADLSC		
						pCi/mL	Q	MDA	pCi/mL	Q	MDA	pCi/mL	Q	MDA
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			0.0153	U	0.436	0	U	0.02	-0.155	U	0.785

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Plutonium-238			Plutonium-239/240			Potassium-40		
						RADAEA			RADAEA			GEA		
						pCi/mL	Q	MDA	pCi/mL	Q	MDA	pCi/mL	Q	MDA
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			-0.0078	U	0.06	-0.0078	U	0.0599	0.702	U	0.702

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Radium-226			Radium-228			Silver-108 Metastable		
						GEA			GEA			GEA		
						pCi/mL	Q	MDA	pCi/mL	Q	MDA	pCi/mL	Q	MDA
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			0.123	U	0.123	0.15	U	0.15	0.0246	U	0.0246

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Technetium-99			Thorium-228			Thorium-232		
						RADGPC			GEA			GEA		
						pCi/mL	Q	MDA	pCi/mL	Q	MDA	pCi/mL	Q	MDA
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			0.196	U	0.359	0.066	U	0.066	0.15	U	0.15

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Total Beta Radiostrontium			Uranium-233/234			Uranium-235		
						RADGPC			RADAEA			GEA		
						pCi/mL	Q	MDA	pCi/mL	Q	MDA	pCi/mL	Q	MDA
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			0.00185	U	0.148	0	U	0.0375	0.149	U	0.149

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Uranium-235			Uranium-238			Uranium-238		
						RADAEA			GEA			RADAEA		
						pCi/mL	Q	MDA	pCi/mL	Q	MDA	pCi/mL	Q	MDA
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			0.0178	U	0.0454	3.67	U	3.67	0	U	0.0375

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Uranium			Gross alpha			Gross beta		
						RADKPA			RADGPC			RADGPC		
						ug/mL	Q	MDA	pCi/mL	Q	MDA	pCi/mL	Q	MDA
100-H-28:3	J16W68-A	6/2/2008 13:00	Manhole H-12			0.00996		0.0005	0.0428	U	0.15	0.0571	U	0.528

Table B-1. 100-H-28:3 Confirmatory Sample Results. (6 Pages).

Sample Number		J16W68			J16W68-A		
Location		100-H-28:3 - Solid			100-H-28:3 - Liquid		
Constituent	Class	06/02/08 01:00 PM			06/02/08 01:00 PM		
		ug/kg	Q	PQL	ug/L	Q	PQL
Aroclor-1016	PCB	16	U	16			
Aroclor-1221	PCB	16	U	16			
Aroclor-1232	PCB	16	U	16			
Aroclor-1242	PCB	16	U	16			
Aroclor-1248	PCB	16	U	16			
Aroclor-1254	PCB	16	U	16			
Aroclor-1260	PCB	33		16			
1,2,4-Trichlorobenzene	SVOA	400	U	400	17	U	17
1,2-Dichlorobenzene	SVOA	400	U	400	17	U	17
1,3-Dichlorobenzene	SVOA	400	U	400	17	U	17
1,4-Dichlorobenzene	SVOA	400	U	400	17	U	17
2,4,5-Trichlorophenol	SVOA	1000	U	1000	42	U	42
2,4,6-Trichlorophenol	SVOA	400	U	400	17	U	17
2,4-Dichlorophenol	SVOA	400	U	400	17	U	17
2,4-Dimethylphenol	SVOA	400	U	400	17	U	17
2,4-Dinitrophenol	SVOA	1000	U	1000	42	U	42
2,4-Dinitrotoluene	SVOA	400	U	400	17	U	17
2,6-Dinitrotoluene	SVOA	400	U	400	17	U	17
2-Chloronaphthalene	SVOA	400	U	400	17	U	17
2-Chlorophenol	SVOA	400	U	400	17	U	17
2-Methylnaphthalene	SVOA	400	U	400	17	U	17
2-Methylphenol (cresol, o-)	SVOA	400	U	400	17	U	17
2-Nitroaniline	SVOA	1000	U	1000	42	U	42
2-Nitrophenol	SVOA	400	U	400	17	U	17
3,3'-Dichlorobenzidine	SVOA	400	U	400	17	U	17
3+4 Methylphenol (cresol, m+p)	SVOA	400	U	400	17	U	17
3-Nitroaniline	SVOA	1000	U	1000	42	U	42
4,6-Dinitro-2-methylphenol	SVOA	1000	U	1000	42	U	42
4-Bromophenylphenyl ether	SVOA	400	U	400	17	U	17
4-Chloro-3-methylphenol	SVOA	400	U	400	17	U	17
4-Chloroaniline	SVOA	400	U	400	17	U	17
4-Chlorophenylphenyl ether	SVOA	400	U	400	17	U	17
4-Nitroaniline	SVOA	1000	U	1000	42	U	42
4-Nitrophenol	SVOA	1000	U	1000	42	U	42
Acenaphthene	SVOA	400	U	400	17	U	17
Acenaphthylene	SVOA	400	U	400	17	U	17
Anthracene	SVOA	400	U	400	17	U	17
Benzo(a)anthracene	SVOA	400	U	400	17	U	17
Benzo(a)pyrene	SVOA	400	U	400	17	U	17
Benzo(b)fluoranthene	SVOA	400	U	400	17	U	17
Benzo(ghi)perylene	SVOA	400	U	400	17	U	17
Benzo(k)fluoranthene	SVOA	400	U	400	17	U	17
Bis(2-chloro-1-methylethyl)ether	SVOA	400	U	400	17	U	17
Bis(2-Chloroethoxy)methane	SVOA	400	U	400	17	U	17
Bis(2-chloroethyl) ether	SVOA	400	U	400	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	80	JB	400	12	JB	17
Butylbenzylphthalate	SVOA	400	U	400	17	U	17
Carbazole	SVOA	400	U	400	17	U	17

Table B-1. 100-H-28:3 Confirmatory Sample Results. (6 Pages).

Sample Number		J16W68			J16W68-A		
Location		100-H-28:3 - Solid			100-H-28:3 - Liquid		
Constituent	Class	06/02/08 01:00 PM			06/02/08 01:00 PM		
		ug/kg	Q	PQL	ug/L	Q	PQL
Chrysene	SVOA	400	U	400	17	U	17
Dibenz[a,h]anthracene	SVOA	400	U	400	17	U	17
Dibenzofuran	SVOA	400	U	400	17	U	17
Diethyl phthalate	SVOA	400	U	400	17	U	17
Dimethyl phthalate	SVOA	400	U	400	17	U	17
Di-n-butylphthalate	SVOA	400	U	400	4	JB	17
Di-n-octylphthalate	SVOA	400	U	400	17	U	17
Fluoranthene	SVOA	400	U	400	17	U	17
Fluorene	SVOA	400	U	400	17	U	17
Hexachlorobenzene	SVOA	400	U	400	17	U	17
Hexachlorobutadiene	SVOA	400	U	400	17	U	17
Hexachlorocyclopentadiene	SVOA	400	U	400	17	U	17
Hexachloroethane	SVOA	400	U	400	17	U	17
Indeno(1,2,3-cd)pyrene	SVOA	400	U	400	17	U	17
Isophorone	SVOA	400	U	400	17	U	17
Naphthalene	SVOA	400	U	400	17	U	17
Nitrobenzene	SVOA	400	U	400	17	U	17
N-Nitroso-di-n-dipropylamine	SVOA	400	U	400	17	U	17
N-Nitrosodiphenylamine	SVOA	400	U	400	17	U	17
Pentachlorophenol	SVOA	1000	U	1000	42	U	42
Phenanthrene	SVOA	400	U	400	17	U	17
Phenol	SVOA	400	U	400	17	U	17
Pyrene	SVOA	400	U	400	17	U	17

Table B-2. 100-H-28:5 Confirmatory Sample Results. (7 Pages)

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Aluminum			Antimony			Arsenic		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	8320	C		0.87	U		5.6		
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	7350			0.78	U		4.7		

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Barium			Beryllium			Boron		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	147	C		0.35			12.8		
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	343			0.26			7.3		

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Cadmium			Calcium			Chromium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	0.4			7840	C		16.7		
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	1.1			10200	C		87.9		

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Cobalt			Copper			Hexavalent		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	6.7			22					
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	7.8			68.2					
100-H-28:5	J16VH5	6/2/2008 10:15	Manhole 1	152910	577835							0.35	U	0.35
100-H-28:5	J16VH7	6/3/2008 10:00	Manhole 2	152721	577926							0.35	U	0.35

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Iron			Lead			Magnesium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	18400	C		28.3			4500	C	
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	23100			172			3830		

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Manganese			Mercury			Molybdenum		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	282	C		1.8			1.6		
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	272			8.86			1.9		

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Nickel			Potassium			Selenium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	14.5			1570			1.7	U	
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	21.4			1410			1.6	U	

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Silicon			Silver			Sodium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	536			0.42			329	C	
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	449			3.6			253	C	

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Vanadium			Zinc		
						mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	40.6			83.5	C	
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	39			657		

Table B-2. 100-H-28:5 Confirmatory Sample Results. (7 Pages)

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Bromide			Chloride		
						mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	2.5	U	2.5	5.9		2.5
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	2.6	U	2.6	2.6	U	2.6

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Fluoride			Nitrate		
						mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	2.5	U	2.5	693	D	2.5
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	2.6	U	2.6	182	D	2.6

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Nitrite			Nitrogen in Nitrite and Nitrate		
						mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	2.54	U	2.5	122	D	
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	2.63	U	2.6	32.9	D	

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Phosphate			Sulfate		
						mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	58.1		2.5	148	D	2.5
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	45.5		2.6	13.7		2.6

Table B-2. 100-H-28:5 Confirmatory Sample Results. (7 Pages)

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Americium-241			Cesium-137			Cobalt-60		
						GEA			GEA			GEA		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	0.06	U	0.06	0.062		0.022	0.018	U	0.018
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	0.249	U	0.249	0.344		0.074	0.06	U	0.06

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Europium-152			Europium-154			Europium-155		
						GEA			GEA			GEA		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	0.062	U	0.062	0.055	U	0.055	0.06	U	0.06
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	0.17	U	0.17	0.18	U	0.18	0.157	U	0.157

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Potassium-40			Radium-226			Radium-228		
						GEA			GEA			GEA		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	10.8		0.203	0.467		0.045	0.603		0.086
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	7.83		0.627	0.319		0.11	0.454		0.222

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Thorium-228			Thorium-232			Uranium-233/234		
						GEA			GEA			RADAEA		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	0.586		0.028	0.603		0.086	0.531		0.034
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	0.524		0.077	0.454		0.222	0.564		0.216

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Uranium-235			Uranium-235			Uranium-238		
						GEA			RADAEA			GEA		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	0.097	U	0.097	0.049		0.038	3.74	U	3.74
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	0.265	U	0.265	0.034	U	0.261	6.33	U	6.33

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Uranium-238			Gross alpha			Gross beta		
						RADAEA			RADGPC			RADGPC		
						pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-H-28:5	J16VF5	6/2/2008 10:15	Manhole 1	152910	577835	0.604		0.034	16.7		6.29	18.7		8.7
100-H-28:5	J16VF6	6/3/2008 10:00	Manhole 2	152721	577926	0.733		0.216	20.3		5.33	21.3		5.32

Table B-2. 100-H-28:5 Confirmatory Sample Results. (7 Pages)

Sample Number		J16VF5			J16VF6		
Location		100-H-28:5, Manhole 1			100-H-28:5, Manhole 2		
Constituent	Class	06/02/08 10:15 AM			06/03/08 10:00 AM		
		ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	13	U	13	14	U	14
Aroclor-1221	PCB	13	U	13	14	U	14
Aroclor-1232	PCB	13	U	13	14	U	14
Aroclor-1242	PCB	13	U	13	14	U	14
Aroclor-1248	PCB	13	U	13	14	U	14
Aroclor-1254	PCB	73		13	110		14
Aroclor-1260	PCB	75		13	110		14
Aldrin	PEST	1.3	UD	1.3	2.4	JD	1.4
Alpha-BHC	PEST	1.3	UD	1.3	1.4	UD	1.4
alpha-Chlordane	PEST	2.4	JD	1.3	7.1	JD	1.4
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	1.3	UD	1.3	3.2	JD	1.4
Delta-BHC	PEST	1.3	UD	1.3	1.4	UD	1.4
Dichlorodiphenyldichloroethane	PEST	1.3	UD	1.3	1.4	UD	1.4
Dichlorodiphenyldichloroethylene	PEST	3.5	JXD	1.3	6.4	JD	1.4
Dichlorodiphenyltrichloroethane	PEST	9	D	1.3	17	XD	1.4
Dieldrin	PEST	15	D	1.3	270	D	1.4
Endosulfan I	PEST	1.3	UD	1.3	6.8	JD	1.4
Endosulfan II	PEST	1.3	UD	1.3	1.4	UD	1.4
Endosulfan sulfate	PEST	2.7	JXD	1.3	4	JXD	1.4
Endrin	PEST	1.3	UD	1.3	3.8	JD	1.4
Endrin aldehyde	PEST	1.3	UD	1.3	1.4	UD	1.4
Endrin ketone	PEST	1.3	UD	1.3	7.6	XD	1.4
Gamma-BHC (Lindane)	PEST	1.3	UD	1.3	1.4	UD	1.4
gamma-Chlordane	PEST	3.9	JD	1.3	7.3	D	1.4
Heptachlor	PEST	1.3	UD	1.3	1.4	UD	1.4
Heptachlor epoxide	PEST	1.3	UD	1.3	1.4	UD	1.4
Methoxychlor	PEST	1.3	UD	1.3	1.4	UD	1.4
Toxaphene	PEST	13	UD	13	14	UD	14
1,2,4-Trichlorobenzene	SVOA	2700	UD	2700	2900	UD	2900
1,2-Dichlorobenzene	SVOA	2700	UD	2700	2900	UD	2900
1,3-Dichlorobenzene	SVOA	2700	UD	2700	2900	UD	2900
1,4-Dichlorobenzene	SVOA	2700	UD	2700	2900	UD	2900
2,4,5-Trichlorophenol	SVOA	6700	UD	6700	7100	UD	7100
2,4,6-Trichlorophenol	SVOA	2700	UD	2700	2900	UD	2900
2,4-Dichlorophenol	SVOA	2700	UD	2700	2900	UD	2900
2,4-Dimethylphenol	SVOA	2700	UD	2700	2900	UD	2900
2,4-Dinitrophenol	SVOA	6700	UD	6700	7100	UD	7100
2,4-Dinitrotoluene	SVOA	2700	UD	2700	2900	UD	2900
2,6-Dinitrotoluene	SVOA	2700	UD	2700	2900	UD	2900
2-Chloronaphthalene	SVOA	2700	UD	2700	2900	UD	2900
2-Chlorophenol	SVOA	2700	UD	2700	2900	UD	2900
2-Methylnaphthalene	SVOA	2700	UD	2700	2900	UD	2900
2-Methylphenol (cresol, o-)	SVOA	2700	UD	2700	2900	UD	2900
2-Nitroaniline	SVOA	6700	UD	6700	7100	UD	7100
2-Nitrophenol	SVOA	2700	UD	2700	2900	UD	2900
3,3'-Dichlorobenzidine	SVOA	2700	UD	2700	2900	UD	2900

Table B-2. 100-H-28:5 Confirmatory Sample Results. (7 Pages)

Sample Number		J16VF5			J16VF6		
Location		100-H-28:5, Manhole 1			100-H-28:5, Manhole 2		
Constituent	Class	06/02/08 10:15 AM			06/03/08 10:00 AM		
		ug/kg	Q	PQL	ug/kg	Q	PQL
3+4 Methylphenol (cresol, m+p)	SVOA	2700	UD	2700	2900	UD	2900
3-Nitroaniline	SVOA	6700	UD	6700	7100	UD	7100
4,6-Dinitro-2-methylphenol	SVOA	6700	UD	6700	7100	UD	7100
4-Bromophenylphenyl ether	SVOA	2700	UD	2700	2900	UD	2900
4-Chloro-3-methylphenol	SVOA	2700	UD	2700	2900	UD	2900
4-Chloroaniline	SVOA	2700	UD	2700	2900	UD	2900
4-Chlorophenylphenyl ether	SVOA	2700	UD	2700	2900	UD	2900
4-Nitroaniline	SVOA	6700	UD	6700	7100	UD	7100
4-Nitrophenol	SVOA	6700	UD	6700	7100	UD	7100
Acenaphthene	SVOA	2700	UD	2700	2900	UD	2900
Acenaphthylene	SVOA	2700	UD	2700	2900	UD	2900
Anthracene	SVOA	2700	UD	2700	2900	UD	2900
Benzo(a)anthracene	SVOA	2700	UD	2700	170	JD	2900
Benzo(a)pyrene	SVOA	2700	UD	2700	170	JD	2900
Benzo(b)fluoranthene	SVOA	2700	UD	2700	180	JD	2900
Benzo(ghi)perylene	SVOA	2700	UD	2700	2900	UD	2900
Benzo(k)fluoranthene	SVOA	2700	UD	2700	190	JD	2900
Bis(2-chloro-1-methylethyl)ether	SVOA	2700	UD	2700	2900	UD	2900
Bis(2-Chloroethoxy)methane	SVOA	2700	UD	2700	2900	UD	2900
Bis(2-chloroethyl) ether	SVOA	2700	UD	2700	2900	UD	2900
Bis(2-ethylhexyl) phthalate	SVOA	340	JBD	340	2900	UD	2900
Butylbenzylphthalate	SVOA	2700	UD	2700	2900	UD	2900
Carbazole	SVOA	2700	UD	2700	2900	UD	2900
Chrysene	SVOA	2700	UD	2700	270	JD	2900
Dibenz[a,h]anthracene	SVOA	2700	UD	2700	2900	UD	2900
Dibenzofuran	SVOA	2700	UD	2700	2900	UD	2900
Diethyl phthalate	SVOA	2700	UD	2700	2900	UD	2900
Dimethyl phthalate	SVOA	2700	UD	2700	2900	UD	2900
Di-n-butylphthalate	SVOA	2700	UD	2700	210	JD	2900
Di-n-octylphthalate	SVOA	2700	UD	2700	2900	UD	2900
Fluoranthene	SVOA	2700	UD	2700	330	JD	2900
Fluorene	SVOA	2700	UD	2700	2900	UD	2900
Hexachlorobenzene	SVOA	2700	UD	2700	2900	UD	2900
Hexachlorobutadiene	SVOA	2700	UD	2700	2900	UD	2900
Hexachlorocyclopentadiene	SVOA	2700	UD	2700	2900	UD	2900
Hexachloroethane	SVOA	2700	UD	2700	2900	UD	2900
Indeno(1,2,3-cd)pyrene	SVOA	2700	UD	2700	2900	UD	2900
Isophorone	SVOA	2700	UD	2700	2900	UD	2900
Naphthalene	SVOA	2700	UD	2700	2900	UD	2900
Nitrobenzene	SVOA	2700	UD	2700	2900	UD	2900
N-Nitroso-di-n-dipropylamine	SVOA	2700	UD	2700	2900	UD	2900
N-Nitrosodiphenylamine	SVOA	2700	UD	2700	2900	UD	2900
Pentachlorophenol	SVOA	6700	UD	6700	7100	UD	7100
Phenanthrene	SVOA	2700	UD	2700	260	JD	2900
Phenol	SVOA	2700	UD	2700	2900	UD	2900
Pyrene	SVOA	2700	UD	2700	370	JD	2900

Table B-2. 100-H-28:5 Confirmatory Sample Results. (7 Pages)

Sample Number		J16VF5			J16VF6		
Location		100-H-28:5, Manhole 1			100-H-28:5, Manhole 2		
Constituent	Class	06/02/08 10:15 AM			06/03/08 10:00 AM		
		ug/kg	Q	PQL	ug/kg	Q	PQL
1,1,1-Trichloroethane	VOA	5	UD	5	6	UD	6
1,1,2,2-Tetrachloroethane	VOA	5	UD	5	6	UD	6
1,1,2-Trichloroethane	VOA	5	UD	5	6	UD	6
1,1-Dichloroethane	VOA	5	UD	5	6	UD	6
1,1-Dichloroethene	VOA	5	UD	5	6	UD	6
1,2-Dichloroethane	VOA	5	UD	5	6	UD	6
1,2-Dichloroethene(Total)	VOA	5	UD	5	6	UD	6
1,2-Dichloropropane	VOA	5	UD	5	6	UD	6
2-Butanone	VOA	10	UD	10	11	UD	11
2-Hexanone	VOA	10	UD	10	11	UD	11
4-Methyl-2-Pentanone	VOA	10	UD	10	11	UD	11
Acetone	VOA	10	D	10	14	D	11
Benzene	VOA	5	UD	5	6	UD	6
Bromodichloromethane	VOA	5	UD	5	6	UD	6
Bromoform	VOA	5	UD	5	6	UD	6
Bromomethane	VOA	10	UD	10	11	UD	11
Carbon disulfide	VOA	5	UD	5	6	UD	6
Carbon tetrachloride	VOA	5	UD	5	6	UD	6
Chlorobenzene	VOA	5	UD	5	6	UD	6
Chloroethane	VOA	10	UD	10	11	UD	11
Chloroform	VOA	5	UD	5	6	UD	6
Chloromethane	VOA	10	UD	10	11	UD	11
cis-1,2-Dichloroethylene	VOA	5	UD	5	6	UD	6
cis-1,3-Dichloropropene	VOA	5	UD	5	6	UD	6
Dibromochloromethane	VOA	5	UD	5	6	UD	6
Ethylbenzene	VOA	5	UD	5	6	UD	6
Methylenechloride	VOA	7	BD	7	9	BD	9
Styrene	VOA	5	UD	5	6	UD	6
Tetrachloroethene	VOA	5	UD	5	6	UD	6
Toluene	VOA	5	UD	5	6	UD	6
trans-1,2-Dichloroethylene	VOA	5	UD	5	6	UD	6
trans-1,3-Dichloropropene	VOA	5	UD	5	6	UD	6
Trichloroethene	VOA	5	UD	5	6	UD	6
Vinyl chloride	VOA	10	UD	10	11	UD	11
Xylenes (total)	VOA	5	UD	5	6	UD	6

Table B-2. 100-H-28:5 Confirmatory Sample Results. (7 Pages)

Sample Number		J16W94			J16WB7		
Location		100-H-28:5, Trip blank for Manhole 1			100-H-28:5, Trip blank for Manhole 2		
Constituent	Class	06/02/08 10:15 AM			06/03/08 10:00 AM		
		ug/L	Q	PQL	ug/L	Q	PQL
1,1,1-Trichloroethane	VOA	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	VOA	5	U	5	5	U	5
1,1,2-Trichloroethane	VOA	5	U	5	5	U	5
1,1-Dichloroethane	VOA	5	U	5	5	U	5
1,1-Dichloroethene	VOA	5	U	5	5	U	5
1,2-Dichloroethane	VOA	5	U	5	5	U	5
1,2-Dichloroethene(Total)	VOA	5	U	5	5	U	5
1,2-Dichloropropane	VOA	5	U	5	5	U	5
2-Butanone	VOA	10	U	10	3	J	10
2-Hexanone	VOA	10	U	10	10	U	10
4-Methyl-2-Pentanone	VOA	10	U	10	10	U	10
Acetone	VOA	10	U	10	10	U	10
Benzene	VOA	5	U	5	5	U	5
Bromodichloromethane	VOA	5	U	5	5	U	5
Bromoform	VOA	5	U	5	5	U	5
Bromomethane	VOA	10	U	10	10	U	10
Carbon disulfide	VOA	5	U	5	5	U	5
Carbon tetrachloride	VOA	5	U	5	5	U	5
Chlorobenzene	VOA	5	U	5	5	U	5
Chloroethane	VOA	10	U	10	10	U	10
Chloroform	VOA	5	U	5	5	U	5
Chloromethane	VOA	10	U	10	10	U	10
cis-1,2-Dichloroethylene	VOA	5	U	5	5	U	5
cis-1,3-Dichloropropene	VOA	5	U	5	5	U	5
Dibromochloromethane	VOA	5	U	5	5	U	5
Ethylbenzene	VOA	5	U	5	5	U	5
Methylenechloride	VOA	1	J	5	2	J	5
Styrene	VOA	5	U	5	5	U	5
Tetrachloroethene	VOA	5	U	5	5	U	5
Toluene	VOA	5	U	5	5	U	5
trans-1,2-Dichloroethylene	VOA	5	U	5	5	U	5
trans-1,3-Dichloropropene	VOA	5	U	5	5	U	5
Trichloroethene	VOA	5	U	5	5	U	5
Vinyl chloride	VOA	10	U	10	10	U	10
Xylenes (total)	VOA	5	U	5	5	U	5

Table B-3. 100-H-44 Confirmatory Sample Results. (3 Pages)

Site Code	Sample Number	Sample Date/Time	Sample Description	Northing	Easting	Aluminum			Antimony			Arsenic		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J19C45	11/4/2009 13:45	EB Tie To J19C46	NA	NA	96.3		4.72	0.567	U	0.57	0.944	U	0.94
100-H-44	J19C46	11/4/2009 14:00	Test Pit 1, acid neutralization pit contents	152881.5	577712.6	4550		5.11	0.453	B	0.61	5.12		1.02
100-H-44	J19C47	11/4/2009 14:05	Test Pit 1, duplicate of J19C46	152881.5	577712.6	4380		4.84	0.4	B	0.58	4.99		0.97
100-H-44	J19C48	11/4/2009 14:10	Test Pit 1, soils underlying pit			6430		4.15	0.498	U	0.5	3.06		0.83
100-H-44	J19C51	11/4/2009 14:15	Test Pit 1, white crystalline material	152881.5	577712.6	598		20.8	0.417	U	0.42	1.08		0.69
100-H-44	J19C52	11/5/2009 11:00	Test Pit 2, soils underlying foundation	152883.2	577721	6540		3.54	0.22	B	0.43	3.59		0.71
100-H-44	J19C53	11/5/2009 11:05	Test Pit 3, soils underlying french drain	152882.9	577728.9	6180		3.42	1.98		0.41	3.74		0.68
100-H-44	J19C54	11/5/2009 11:15	Test Pit 4, soil unerlying steam trap	152876.2	577732.5	8040		4.01	0.55		0.48	8.55		0.8

Site Code	Sample Number	Sample Date/Time	Sample Description	Northing	Easting	Barium			Beryllium			Boron		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J19C45	11/4/2009 13:45	EB Tie To J19C46	NA	NA	8.17		0.47	0.189	U	0.19	1.89	U	1.89
100-H-44	J19C46	11/4/2009 14:00	Test Pit 1, acid neutralization pit contents	152881.5	577712.6	88		0.51	0.054	B	0.21	1.74	B	2.05
100-H-44	J19C47	11/4/2009 14:05	Test Pit 1, duplicate of J19C46	152881.5	577712.6	86.1		0.48	0.057	B	0.19	1.77	B	1.94
100-H-44	J19C48	11/4/2009 14:10	Test Pit 1, soils underlying pit			56.7		0.42	0.198		0.17	0.799	B	1.66
100-H-44	J19C51	11/4/2009 14:15	Test Pit 1, white crystalline material	152881.5	577712.6	29.1		2.08	0.139	U	0.14	0.472	B	1.39
100-H-44	J19C52	11/5/2009 11:00	Test Pit 2, soils underlying foundation	152883.2	577721	61.3		0.35	0.196		0.14	1.41	B	1.42
100-H-44	J19C53	11/5/2009 11:05	Test Pit 3, soils underlying french drain	152882.9	577728.9	46.2		0.34	0.175		0.14	0.93	B	1.37
100-H-44	J19C54	11/5/2009 11:15	Test Pit 4, soil unerlying steam trap	152876.2	577732.5	70.8		0.4	0.239		0.16	1.7		1.61

Site Code	Sample Number	Sample Date/Time	Sample Description	Northing	Easting	Cadmium			Calcium			Chromium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J19C45	11/4/2009 13:45	EB Tie To J19C46	NA	NA	0.189	U	0.19	19.4	B	94.4	0.189	U	0.19
100-H-44	J19C46	11/4/2009 14:00	Test Pit 1, acid neutralization pit contents	152881.5	577712.6	0.205	U	0.21	18200		102	11.2		0.21
100-H-44	J19C47	11/4/2009 14:05	Test Pit 1, duplicate of J19C46	152881.5	577712.6	0.194	U	0.19	17500		96.8	11.2		0.19
100-H-44	J19C48	11/4/2009 14:10	Test Pit 1, soils underlying pit			0.07	B	0.17	6260		83	12.9		0.17
100-H-44	J19C51	11/4/2009 14:15	Test Pit 1, white crystalline material	152881.5	577712.6	0.108	B	0.14	145000		417	2.26		0.14
100-H-44	J19C52	11/5/2009 11:00	Test Pit 2, soils underlying foundation	152883.2	577721	0.171		0.14	5110		70.8	13.8		0.14
100-H-44	J19C53	11/5/2009 11:05	Test Pit 3, soils underlying french drain	152882.9	577728.9	0.165		0.14	4960		68.3	10.3		0.14
100-H-44	J19C54	11/5/2009 11:15	Test Pit 4, soil unerlying steam trap	152876.2	577732.5	0.1	B	0.16	12500		80.3	12.4		0.16

Site Code	Sample Number	Sample Date/Time	Sample Description	Northing	Easting	Cobalt			Copper			Hexavalent Chromium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J19C45	11/4/2009 13:45	EB Tie To J19C46	NA	NA	1.89	U	1.89	0.944	U	0.94			
100-H-44	J19C46	11/4/2009 14:00	Test Pit 1, acid neutralization pit contents	152881.5	577712.6	3.2		2.05	15.8		1.02	0.14	B	0.22
100-H-44	J19C47	11/4/2009 14:05	Test Pit 1, duplicate of J19C46	152881.5	577712.6	2.97		1.94	12.9		0.97	0.15	B	0.23
100-H-44	J19C48	11/4/2009 14:10	Test Pit 1, soils underlying pit			5.35		1.66	13.2		0.83	0.2	U	0.2
100-H-44	J19C51	11/4/2009 14:15	Test Pit 1, white crystalline material	152881.5	577712.6	1.39	U	1.39	2.68		0.69			
100-H-44	J19C52	11/5/2009 11:00	Test Pit 2, soils underlying foundation	152883.2	577721	5.56		1.42	15.8		0.71	0.2	U	0.2
100-H-44	J19C53	11/5/2009 11:05	Test Pit 3, soils underlying french drain	152882.9	577728.9	4.61		1.37	11.9		0.68	0.2	U	0.2
100-H-44	J19C54	11/5/2009 11:15	Test Pit 4, soil unerlying steam trap	152876.2	577732.5	5.47		1.61	14.6		0.8	0.21	U	0.21
100-H-44	J19C57	11/4/2009 14:15	Test Pit 1, white crystalline material	152881.5	577712.6							0.156	U	0.156

Table B-3. 100-H-44 Confirmatory Sample Results. (3 Pages)

Site Code	Sample Number	Sample Date/Time	Sample Description	Northing	Easting	Iron			Lead			Magnesium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J19C45	11/4/2009 13:45	EB Tie To J19C46	NA	NA	154		18.9	0.55		0.47	9.03	B	70.8
100-H-44	J19C46	11/4/2009 14:00	Test Pit 1, acid neutralization pit contents	152881.5	577712.6	28000		20.5	56.4		0.51	1810		76.7
100-H-44	J19C47	11/4/2009 14:05	Test Pit 1, duplicate of J19C46	152881.5	577712.6	29100		19.4	15.1		0.48	1870		72.6
100-H-44	J19C48	11/4/2009 14:10	Test Pit 1, soils underlying pit			17400		16.6	3.57		0.42	4300		62.2
100-H-44	J19C51	11/4/2009 14:15	Test Pit 1, white crystalline material	152881.5	577712.6	1690		83.3	29.2		2.08	186		52.1
100-H-44	J19C52	11/5/2009 11:00	Test Pit 2, soils underlying foundation	152883.2	577721	18500		14.2	6.84		0.35	4270		53.1
100-H-44	J19C53	11/5/2009 11:05	Test Pit 3, soils underlying french drain	152882.9	577728.9	14600		13.7	579		0.34	3610		51.3
100-H-44	J19C54	11/5/2009 11:15	Test Pit 4, soil unerlying steam trap	152876.2	577732.5	17100		16.1	31.9		0.4	4220		60.2

Site Code	Sample Number	Sample Date/Time	Sample Description	Northing	Easting	Manganese			Mercury			Molybdenum		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J19C45	11/4/2009 13:45	EB Tie To J19C46	NA	NA	26.4		4.72	0.03	U	0.03	1.89	U	1.89
100-H-44	J19C46	11/4/2009 14:00	Test Pit 1, acid neutralization pit contents	152881.5	577712.6	151		5.11	36.8		1.27	0.705	B	2.05
100-H-44	J19C47	11/4/2009 14:05	Test Pit 1, duplicate of J19C46			140		4.84	9.84		0.66	0.745	B	1.94
100-H-44	J19C48	11/4/2009 14:10	Test Pit 1, soils underlying pit			230		4.15	0.02	B	0.03	0.272	B	1.66
100-H-44	J19C51	11/4/2009 14:15	Test Pit 1, white crystalline material	152881.5	577712.6	54.9		20.8	1130		27.3	0.626	B	1.39
100-H-44	J19C52	11/5/2009 11:00	Test Pit 2, soils underlying foundation	152883.2	577721	234		3.54	0.16		0.03	0.316	B	1.42
100-H-44	J19C53	11/5/2009 11:05	Test Pit 3, soils underlying french drain	152882.9	577728.9	207		3.42	1.18		0.03	0.317	B	1.37
100-H-44	J19C54	11/5/2009 11:15	Test Pit 4, soil unerlying steam trap	152876.2	577732.5	233		4.01	0.01	B	0.03	0.345	B	1.61

Site Code	Sample Number	Sample Date/Time	Sample Description	Northing	Easting	Nickel			Potassium			Selenium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J19C45	11/4/2009 13:45	EB Tie To J19C46	NA	NA	3.78	U	3.78	39.8	B	378	0.283	U	0.28
100-H-44	J19C46	11/4/2009 14:00	Test Pit 1, acid neutralization pit contents	152881.5	577712.6	5.12		4.09	1950		409	0.307	U	0.31
100-H-44	J19C47	11/4/2009 14:05	Test Pit 1, duplicate of J19C46	152881.5	577712.6	4.84		3.87	2000		387	0.29	U	0.29
100-H-44	J19C48	11/4/2009 14:10	Test Pit 1, soils underlying pit			10.9		3.32	755		332	0.249	U	0.25
100-H-44	J19C51	11/4/2009 14:15	Test Pit 1, white crystalline material	152881.5	577712.6	1.5	B	2.78	136	B	278	0.589		0.21
100-H-44	J19C52	11/5/2009 11:00	Test Pit 2, soils underlying foundation	152883.2	577721	12.6		2.83	805		283	0.213	U	0.21
100-H-44	J19C53	11/5/2009 11:05	Test Pit 3, soils underlying french drain	152882.9	577728.9	9.17		2.73	668		273	0.205	U	0.21
100-H-44	J19C54	11/5/2009 11:15	Test Pit 4, soil unerlying steam trap	152876.2	577732.5	10.5		3.21	1210		321	0.241	U	0.24

Site Code	Sample Number	Sample Date/Time	Sample Description	Northing	Easting	Silicon			Silver			Sodium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J19C45	11/4/2009 13:45	EB Tie To J19C46	NA	NA	92		1.89	0.189	U	0.19	47.2	U	47.2
100-H-44	J19C46	11/4/2009 14:00	Test Pit 1, acid neutralization pit contents	152881.5	577712.6	547		2.05	0.205	U	0.21	1590		51.1
100-H-44	J19C47	11/4/2009 14:05	Test Pit 1, duplicate of J19C46			460		1.94	0.194	U	0.19	1480		48.4
100-H-44	J19C48	11/4/2009 14:10	Test Pit 1, soils underlying pit			350		1.66	0.166	U	0.17	211		41.5
100-H-44	J19C51	11/4/2009 14:15	Test Pit 1, white crystalline material	152881.5	577712.6	732		8.33	0.139	U	0.14	102		34.7
100-H-44	J19C52	11/5/2009 11:00	Test Pit 2, soils underlying foundation	152883.2	577721	348		1.42	0.142	U	0.14	243		35.4
100-H-44	J19C53	11/5/2009 11:05	Test Pit 3, soils underlying french drain	152882.9	577728.9	338		1.37	0.137	U	0.14	179		34.2
100-H-44	J19C54	11/5/2009 11:15	Test Pit 4, soil unerlying steam trap	152876.2	577732.5	616		1.61	0.161	U	0.16	336		40.1

Table B-3. 100-H-44 Confirmatory Sample Results. (3 Pages)

Site Code	Sample Number	Sample Date/Time	Sample Description	Northing	Easting	Vanadium			Zinc		
						mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J19C45	11/4/2009 13:45	EB Tie To J19C46	NA	NA	2.36	U	2.36	9.44	U	9.44
100-H-44	J19C46	11/4/2009 14:00	Test Pit 1, acid neutralization pit contents	152881.5	577712.6	70.3		2.56	28.1		10.2
100-H-44	J19C47	11/4/2009 14:05	Test Pit 1, duplicate of J19C46	152881.5	577712.6	72.5		2.42	28.9		9.68
100-H-44	J19C48	11/4/2009 14:10	Test Pit 1, soils underlying pit			41.7		2.07	35.4		8.3
100-H-44	J19C51	11/4/2009 14:15	Test Pit 1, white crystalline material	152881.5	577712.6	4.65	B	10.4	8.58	B	41.7
100-H-44	J19C52	11/5/2009 11:00	Test Pit 2, soils underlying foundation	152883.2	577721	44.6		1.77	41.8		7.08
100-H-44	J19C53	11/5/2009 11:05	Test Pit 3, soils underlying french drain	152882.9	577728.9	35.5		1.71	39.8		6.83
100-H-44	J19C54	11/5/2009 11:15	Test Pit 4, soil unerlying steam trap	152876.2	577732.5	36.8		2.01	45.9		8.03

Site Code	Sample Number	Sample Date/Time	Sample Description	Northing	Easting	Bromide			Chloride			Fluoride		
						GENCHEM			GENCHEM			GENCHEM		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J19C46	11/4/2009 14:00	Test Pit 1, acid neutralization pit contents	152881.5	577712.6	2.9	U	2.9	2.9	U	2.9	2.9	U	2.9
100-H-44	J19C47	11/4/2009 14:05	Test Pit 1, duplicate of J19C46	152881.5	577712.6	2.8	U	2.8	2.8	U	2.8	2.8	U	2.8
100-H-44	J19C48	11/4/2009 14:10	Test Pit 1, soils underlying pit			2.4	U	2.4	2.4	U	2.4	0.6	B	2.4
100-H-44	J19C51	11/4/2009 14:15	Test Pit 1, white crystalline material	152881.5	577712.6	2.6	U	2.6	2.6	U	2.6	2.6	U	2.6
100-H-44	J19C52	11/5/2009 11:00	Test Pit 2, soils underlying foundation	152883.2	577721	2.5	U	2.5	2.5	U	2.5	2	B	2.5
100-H-44	J19C53	11/5/2009 11:05	Test Pit 3, soils underlying french drain	152882.9	577728.9	2.6	U	2.6	2.6	U	2.6	0.4	B	2.6
100-H-44	J19C54	11/5/2009 11:15	Test Pit 4, soil unerlying steam trap	152876.2	577732.5	2.4	U	2.4	2.4	U	2.4	2.4	U	2.4

Site Code	Sample Number	Sample Date/Time	Sample Description	Northing	Easting	Nitrate			Nitrite			Nitrogen in		
						GENCHEM			GENCHEM			GENCHEM		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J19C46	11/4/2009 14:00	Test Pit 1, acid neutralization pit contents	152881.5	577712.6	10.5		2.9	13.2		2.9	1.92		0.22
100-H-44	J19C47	11/4/2009 14:05	Test Pit 1, duplicate of J19C46	152881.5	577712.6	9		2.8	13.3		2.8	1.7		0.23
100-H-44	J19C48	11/4/2009 14:10	Test Pit 1, soils underlying pit			0.9	B	2.4	2.4	U	2.4	0.2		0.2
100-H-44	J19C51	11/4/2009 14:15	Test Pit 1, white crystalline material	152881.5	577712.6	24.4		2.6	2.6	U	2.6	1.6		0.2
100-H-44	J19C52	11/5/2009 11:00	Test Pit 2, soils underlying foundation	152883.2	577721	2.5	U	2.5	2.5	U	2.5	0.15	B	0.2
100-H-44	J19C53	11/5/2009 11:05	Test Pit 3, soils underlying french drain	152882.9	577728.9	6.9		2.6	2.6	U	2.6	0.8		0.2
100-H-44	J19C54	11/5/2009 11:15	Test Pit 4, soil unerlying steam trap	152876.2	577732.5	5.2		2.4	2.4	U	2.4	0.2	B	0.21

Site Code	Sample Number	Sample Date/Time	Sample Description	Northing	Easting	Phosphate			Sulfate			pH		
						GENCHEM			GENCHEM			PHYSICAL		
						mg/kg	Q	PQL	mg/kg	Q	PQL	pH	Q	PQL
100-H-44	J19C46	11/4/2009 14:00	Test Pit 1, acid neutralization pit contents	152881.5	577712.6	14.3	U	14.3	17700	D	1430	3.34		0.1
100-H-44	J19C47	11/4/2009 14:05	Test Pit 1, duplicate of J19C46	152881.5	577712.6	13.9	U	13.9	37300	D	2770	3.29		0.1
100-H-44	J19C48	11/4/2009 14:10	Test Pit 1, soils underlying pit			10.8		2.4	43.8		2.4	8.95		0.1
100-H-44	J19C51	11/4/2009 14:15	Test Pit 1, white crystalline material	152881.5	577712.6	12.8	UD	12.8	14600	D	2560	7.29		0.1
100-H-44	J19C52	11/5/2009 11:00	Test Pit 2, soils underlying foundation	152883.2	577721	2.5	U	2.5	403		2.5	8.35		0.1
100-H-44	J19C53	11/5/2009 11:05	Test Pit 3, soils underlying french drain	152882.9	577728.9	2.6	U	2.6	6.7		2.6	9.04		0.1
100-H-44	J19C54	11/5/2009 11:15	Test Pit 4, soil unerlying steam trap	152876.2	577732.5	2.4	U	2.4	31.9		2.4	9.81		0.1

Table B-4. 100-H-44 Waste Characterization Sample Results.

Site Code	Sample Number	Sample Date/Time	Sample Description	Northing	Easting	Arsenic			Barium			Cadmium		
						TCLP			TCLP			TCLP		
						mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
100-H-44	J1RVP2	7/29/2013 9:11	Soil from waste stockpile	NA	NA	0.022	U	0.022	0.27	BX	0.002	0.002	U	0.002

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Chromium			Lead			Mercury		
						TCLP			TCLP			TCLP		
						mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
100-H-44	J1RVP2	7/29/2013 9:11	Soil from waste stockpile	NA	NA	0.004	B	0.003	0.02	B	0.013	6.3E-05	B	3E-05

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Selenium			Silver		
						TCLP			TCLP		
						mg/L	Q	PQL	mg/L	Q	PQL
100-H-44	J1RVP2	7/29/2013 9:11	Soil from waste stockpile	NA	NA	0.024	U	0.024	0	U	0.004

Table B-5. 100-H-44 In-Process Sample Results. (2 Pages)

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Aluminum			Antimony			Arsenic		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J1RW13	7/31/2013 11:10	South sidewall of excavation			7180		1.4	0.34	U	0.34	7.4		0.59
100-H-44	J1RW14	7/31/2013 11:15	North sidewall of excavation			8870		1.6	0.39	U	0.39	3.8		0.67
100-H-44	J1RWF6	8/12/2013 13:36	Stained soil in waste stockpile			11700		1.4	0.35	U	0.35	3.3		0.6
100-H-44	J1T068	9/4/2013 10:10	North sidewall of excavation, discolored pink/tan soil			7510		1.4	0.34	U	0.34	3.9		0.58
100-H-44	J1T070	12/30/2013 9:58	North sidewall of excavation, redish stained soil			7500		1.6	0.39	U	0.39	3.8		0.68

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Barium			Beryllium			Boron		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J1RW13	7/31/2013 11:10	South sidewall of excavation			54.9		0.068	0.24		0.029	1.1	B	0.87
100-H-44	J1RW14	7/31/2013 11:15	North sidewall of excavation			80.9		0.077	0.3		0.034	1.5	B	1
100-H-44	J1RWF6	8/12/2013 13:36	Stained soil in waste stockpile			115		0.069	0.32		0.03	1.3	B	0.89
100-H-44	J1T068	9/4/2013 10:10	North sidewall of excavation, discolored pink/tan soil			62.4		0.067	0.24		0.029	1	B	0.87
100-H-44	J1T070	12/30/2013 9:58	North sidewall of excavation, redish stained soil			64.4		0.079	0.28		0.034	1.6	B	1

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Cadmium			Calcium			Chromium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J1RW13	7/31/2013 11:10	South sidewall of excavation			0.24		0.037	6880		12.6	10.6		0.05
100-H-44	J1RW14	7/31/2013 11:15	North sidewall of excavation			0.22		0.042	6200		14.3	88.1		0.06
100-H-44	J1RWF6	8/12/2013 13:36	Stained soil in waste stockpile			0.063	B	0.037	6090		12.8	12		0.05
100-H-44	J1T068	9/4/2013 10:10	North sidewall of excavation, discolored pink/tan soil			0.22		0.036	6340		12.5	26.7		0.05
100-H-44	J1T070	12/30/2013 9:58	North sidewall of excavation, redish stained soil			0.17	B	0.042	6250		14.6	18.8		0.06

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Cobalt			Copper			Hexavalent		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J1RW13	7/31/2013 11:10	South sidewall of excavation			5.9	X	0.089	14.9		0.19	0.295		0.16
100-H-44	J1RW14	7/31/2013 11:15	North sidewall of excavation			5.8	X	0.1	14.3		0.22	9.18		0.16
100-H-44	J1RWF6	8/12/2013 13:36	Stained soil in waste stockpile			7.3		0.091	13.3		0.2	0.283		0.16
100-H-44	J1T068	9/4/2013 10:10	North sidewall of excavation, discolored pink/tan soil			5.5	X	0.089	14.9		0.19	1.77		0.16
100-H-44	J1T070	12/30/2013 9:58	North sidewall of excavation, redish stained soil			6	X	0.1	15		0.22	0.717		0.16

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Iron			Lead			Magnesium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J1RW13	7/31/2013 11:10	South sidewall of excavation			17200		3.4	20.4	X	0.24	4430		3.3
100-H-44	J1RW14	7/31/2013 11:15	North sidewall of excavation			17200		3.9	8.6	X	0.27	4660		3.8
100-H-44	J1RWF6	8/12/2013 13:36	Stained soil in waste stockpile			17300		3.5	10.4		0.25	4340		3.4
100-H-44	J1T068	9/4/2013 10:10	North sidewall of excavation, discolored pink/tan soil			15500	X	3.4	7.8		0.24	4220		3.3
100-H-44	J1T070	12/30/2013 9:58	North sidewall of excavation, redish stained soil			16700		3.9	6.3		0.28	5050		3.8

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Manganese			Mercury			Molybdenum		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J1RW13	7/31/2013 11:10	South sidewall of excavation			258		0.089	0.21	M	0.005	0.31	B	0.23
100-H-44	J1RW14	7/31/2013 11:15	North sidewall of excavation			264		0.1	0.75		0.027	0.31	B	0.26
100-H-44	J1RWF6	8/12/2013 13:36	Stained soil in waste stockpile			338		0.091	0.11		0.006	0.24	U	0.24
100-H-44	J1T068	9/4/2013 10:10	North sidewall of excavation, discolored pink/tan soil			235		0.089	0.25	MN	0.013	0.23	U	0.23
100-H-44	J1T070	12/30/2013 9:58	North sidewall of excavation, redish stained soil			251		0.1	0.13	M	0.006	0.27	U	0.27

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Nickel			Potassium			Selenium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J1RW13	7/31/2013 11:10	South sidewall of excavation			11.2	X	0.11	989		36.6	0.77	U	0.77
100-H-44	J1RW14	7/31/2013 11:15	North sidewall of excavation			12.4	X	0.12	1280		41.6	0.87	U	0.87
100-H-44	J1RWF6	8/12/2013 13:36	Stained soil in waste stockpile			9.7		0.11	1790		37.3	0.78	U	0.78
100-H-44	J1T068	9/4/2013 10:10	North sidewall of excavation, discolored pink/tan soil			12.1		0.11	1030		36.3	0.76	U	0.76
100-H-44	J1T070	12/30/2013 9:58	North sidewall of excavation, redish stained soil			15.6		0.13	980		42.4	0.89	U	0.89

Table B-5. 100-H-44 In-Process Sample Results. (2 Pages)

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Silicon			Silver			Sodium		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J1RW13	7/31/2013 11:10	South sidewall of excavation			262	N	5	0.14	U	0.14	302		52.6
100-H-44	J1RW14	7/31/2013 11:15	North sidewall of excavation			339		5.7	0.16	U	0.16	287		59.9
100-H-44	J1RWF6	8/12/2013 13:36	Stained soil in waste stockpile			345		5.2	0.15	U	0.15	308		53.7
100-H-44	J1T068	9/4/2013 10:10	North sidewall of excavation, discolored pink/tan soil			377	NX	5	0.14	U	0.14	247		52.2
100-H-44	J1T070	12/30/2013 9:58	North sidewall of excavation, redish stained soil			321	N	5.8	0.17	U	0.17	222		61

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Vanadium			Zinc		
						mg/kg	Q	PQL	mg/kg	Q	PQL
100-H-44	J1RW13	7/31/2013 11:10	South sidewall of excavation			43.9		0.084	40.7		0.35
100-H-44	J1RW14	7/31/2013 11:15	North sidewall of excavation			38.8		0.095	42.1		0.4
100-H-44	J1RWF6	8/12/2013 13:36	Stained soil in waste stockpile			36.5		0.086	39.2	X	0.36
100-H-44	J1T068	9/4/2013 10:10	North sidewall of excavation, discolored pink/tan soil			37.1		0.083	38.8	X	0.35
100-H-44	J1T070	12/30/2013 9:58	North sidewall of excavation, redish stained soil			38.6		0.097	40.9	X	0.41

Site Code	Sample Number	Sample Date/Time	Sample Area	Northing	Easting	Hexavalent Chromium		
						mg/kg	Q	PQL
100-H-44	J1T4W3	11/5/2013 8:37	Stockpile footprint, location A-1			0.155	U	0.155
100-H-44	J1T4W4	11/5/2013 8:43	Stockpile footprint, location A-2			0.155	U	0.155
100-H-44	J1T4W5	11/5/2013 8:45	Stockpile footprint, location A-3			0.155	U	0.155
100-H-44	J1T4W6	11/7/2013 12:21	Stockpile footprint, location A-4			0.155	U	0.155
100-H-44	J1T4W7	11/7/2013 12:24	Stockpile footprint, location A-5			0.155	U	0.155
100-H-44	J1T4W8	11/7/2013 12:30	Stockpile footprint, location A-6			0.155	U	0.155
100-H-44	J1T4W9	11/12/2013 14:32	Stockpile footprint, location A-7			0.155	U	0.155
100-H-44	J1T4X0	11/14/2013 8:31	Stockpile footprint, location A-8			0.172		0.155
100-H-44	J1T4X1	11/14/2013 8:37	Stockpile footprint, location A-9			0.21		0.155
100-H-44	J1T4X2	11/14/2013 8:42	Stockpile footprint, location A-10			0.155	U	0.155
100-H-44	J1T5T2	11/20/2013 13:57	Stockpile footprint, location A-11			0.155	U	0.155
100-H-44	J1T5T3	11/20/2013 14:02	Stockpile footprint, location A-12			0.155	U	0.155

APPENDIX C

CALCULATIONS

APPENDIX C

CALCULATION BRIEFS

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

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations, 0100H-CA-V0226, Rev. 0, Washington Closure Hanford, Richland, Washington.

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Direct Contact Hazard Quotient, Carcinogenic Risk, and Sum of Fractions Calculations, 0100H-CA-V0227, Rev. 0, Washington Closure Hanford, Richland, Washington.

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites (Excavation 1-12) Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater, 0100H-CA-V0228, Rev. 0, Washington Closure Hanford, Richland, Washington.

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites (Excavation 13-24, NOB, SOB, & FS) Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater, 0100H-CA-V0229, Rev. 0, Washington Closure Hanford, Richland, Washington.

DISCLAIMER FOR CALCULATIONS

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

Acrobat 8.0

CALCULATION COVER SHEET

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

Area: 100-H

Discipline: Environmental *Calculation No: 0100H-CA-V0226

Subject: 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculation

Computer Program: Excel Program No: Excel 2010

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

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 43 Attm. 1 = 40 Total = 84	J. D. Skoglie	I. B. Berezovskiy	R. J. Nielson	S. G. Wilkinson	6/15/15

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** 06/10/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0
Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 06/10/15
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 1 of 43

Summary

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

Table of Contents:
Sheets 1 to 5 - Calculation Sheet Summary
Sheets 6 to 26- Calculation Sheet Verification Data - Excavation 1-12, Excavation 13-24, North Overburden (NOB), and South Overburden (SOB).
Sheets 27 to 39 - Ecology Software (MTCAStat) Results
Sheets 40 to 43 - Calculation Sheet Duplicate Analysis
Attachment 1 - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sampling Results (40 sheets).

Given/References:
1) Sample Results (Attachment 1).
2) Background values and remedial action goals (RAGs) are taken from DOE-RL (2005b), DOE-RL (2001), and Ecology (1996).
3) DOE-RL, 2001, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) DOE-RL, 2009a, *100 Area Remedial Action Sampling and Analysis Plan* (SAP), DOE/RL-96-22, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
5) DOE-RL, 2009b, *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP), DOE/RL-96-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
6) Ecology, 1992, *Statistical Guidance for Ecology Site Managers*, Publication #92-54, Washington Department of Ecology, Olympia, Washington.
7) Ecology, 1993, *Statistical Guidance for Ecology Site Managers, Supplement S-6, Analyzing Site or Background Data with Below-detection Limit or Below-PQL Values (Censored Data Sets)*, Publication #92-64, Washington Department of Ecology, Olympia, Washington.
8) Ecology, 1996, *Model Toxic Control Act Cleanup Levels and Risk Calculations (CLARC II)*, Publication #94-145, Washington State Department of Ecology, Olympia, Washington.
9) Ecology, 2014, Cleanup Levels and Risk Calculations (CLARC) Database, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
10) WAC 173-340, 1996, "Model Toxic Control Act - Cleanup," *Washington Administrative Code.*

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

Calculation Description:
The subject calculations were performed on statistical data from soil verification samples (Attachment 1) from the 100-H-28:3, 100-H-28:5, and 100-H-44 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 2009b) is documented by this calculation. Duplicate RPD results are used in evaluation of data quality within the RSVP for this site.

Methodology:
The 100-H-28:3, 100-H-28:5, and 100-H-44 waste sites underwent statistical sampling at four decision unit for verification sampling that included; excavation 1-12, excavation 13-24, north overburden (NOB), and south overburden (SOB). Four focused samples were also included.

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

Summary (continued)

Methodology, continued:

For nonradioactive analytes with ≤50% of the data below detection limits, the statistical value calculated to evaluate the effectiveness of cleanup is the 95% UCL. For nonradioactive analytes with >50% of the data below detection limits, as determined by direct inspection of the sample results (Attachment 1), the maximum detected value for the data set (which includes primary and duplicate samples) is used instead of the 95% UCL, and no further calculations are performed for those data sets. For convenience, these maximum detected values are included in the summary tables that follow. The 95% UCL was not calculated for data sets with no reported detections. Calculated cleanup levels are not available in Ecology (2014) under WAC 173-340-740(3) for aluminum, calcium, iron, magnesium, potassium, silicon, and sodium; therefore, these constituents are not considered site COCs/COPCs and are also not included in these calculations. The 95% UCL values were not calculated for potassium-40, radium-226, radium-228, thorium-228, and thorium-232 based on natural occurence at the Hanford Site.

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

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

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

The RPD is calculated when both the primary value and either the duplicate or split value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The TDL is a laboratory detection limit pre-determined for each analytical method and is listed in Table 2-1 of the SAP (DOE-RL 2009a) for certain constituents. All other constituents will have their own pre-determined TDL's based on the laboratory and method used. Where direct evaluation of the attached sample data showed that a given analyte was not detected in the primary and/or duplicate sample, further evaluation of the RPD value was not performed. The RPD calculations use the following formula:

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

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

For quality assurance/quality control (QA/QC) duplicate RPD calculations, a value less than 30% indicates the data compare favorably. If the RPD is greater than 30%, further investigation regarding the usability of the data is performed. To assist in the identification of anomalous sample pairs, when an analyte is detected in the primary or duplicate/split sample, but was quantified at less than 5 times the TDL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate/split result exceeds a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed. Additional discussion as necessary is provided in the data quality assessment section of the applicable RSVP.

Washington Closure Hanford **CALCULATION SHEET**

Originator J. D. Skoglie **Date** 05/04/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0
Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/04/15
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 3 of 43

Summary (continued)

QUALIFIER LIST

* = matrix spike exceeded the control limit.
B = estimated result. Result is less than the RL but greater than the MDL
C = the analyte was detected in both the sample and the associated QC blank, and the sample concentrations was≤5X the blank concentration.
D = results are reported from a dilution
J = estimate
M = sample duplicate precision not met.
N = recovery exceeds upper or lower control limits
P = aroclor target analyte with greater than 25% difference between column analyses.
U = undetected
X = serial dilution in the analytical batch indicates that physical and chemical interferences are present

ACRONYM LIST

-- = not applicable
DE = direct exposure
EXC = excavation
GW = groundwater
MDL = method detection limit
MTCA = *Model Toxics Control Act*
NOB = north overburden
PQL = practical quantitation limit
Q = qualifier
QA/QC = quality assurance/quality control
RAG = remedial action goal
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
RL = reporting limit
RPD = relative percent difference
RSVP = remaining sites verification package
SAP = sampling and analysis plan
SOB = south overburden
TDL = target detection limit
UCL = upper confidence limit
WAC = Washington Administrative Code

Washington Closure Hanford **CALCULATION SHEET**

Originator J. D. Skoglie **Date** 05/28/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0
Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/28/15
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 4 of 43

Summary (continued)

Results:
The results presented in the tables that follow include the summary of the results of the 95% UCL calculations for the excavation 1-12, excavation 13-24, NOB, SOB, the WAC 173-340-740(7)(e) 3-part test evaluation, and the RPD calculations, and are for use in risk analysis and the RSVP for this site.

Results Summary [a]

Analyte	Excavation 1-12		Excavation 13-24		NOB		SOB		Focused Samples	Units
	95% UCL Result	Maximum Result	95% UCL Result	Maximum Result	95% UCL Result	Maximum Result	95% UCL Result	Maximum Result	Maximum Result	
Cesium-137	--	--	--	--	--	--	0.027	--	--	pCi/g
Cobalt-60	--	--	--	--	--	--	0.038	--	--	pCi/g
Europium-152	--	--	--	--	0.0921	--	0.102	--	--	pCi/g
Europium-154	--	--	--	--	0.0448	--	0.038	--	--	pCi/g
Europium-155	--	--	--	--	0.0770	--	0.087	--	--	pCi/g
Nickel-63	--	--	--	--	1.99	--	3.802	--	--	pCi/g
Total beta radiostrontium	--	--	--	--	--	--	0.337	--	--	pCi/g
Antimony	--	0.508	--	1.69	--	4.16	--	1.72	--	mg/kg
Arsenic	6.16	--	8.16	--	8.47	--	8.52	--	7.80	mg/kg
Barium	109	--	72.1	--	62.9	--	67.8	--	72.6	mg/kg
Beryllium	0.646	--	0.524	--	1.05	--	0.769	--	0.260	mg/kg
Boron	--	17.6	--	2.40	--	2.30	--	2.75	1.70	mg/kg
Cadmium	0.348	--	0.214	--	0.257	--	0.370	--	0.240	mg/kg
Chromium	15.8	--	14.2	--	12.8	--	11.6	--	19.0	mg/kg
Cobalt	6.58	--	6.47	--	8.38	--	8.28	--	7.0	mg/kg
Copper	24.9	--	14.7	--	13.4	--	15.9	--	17.2	mg/kg
Hexavalent chromium	--	0.421	--	0.313	--	0.322	--	0.465	0.278	mg/kg
Lead	27.2	--	24.0	--	28.2	--	24.2	--	9.70	mg/kg
Manganese	274	--	289	--	266	--	297	--	282	mg/kg
Mercury	4.85	--	0.00726	--	0.0220	--	0.00600	--	0.0071	mg/kg
Molybdenum	--	1.66	--	0.286	--	--	--	0.520	0.320	mg/kg
Nickel	14.9	--	13.7	--	13.6	--	12.0	--	17.5	mg/kg
Selenium	0.691	--	0.781	--	0.448	--	--	--	1.40	mg/kg
Silver	--	3.14	--	--	0.288	--	--	--	--	mg/kg
Vanadium	42.8	--	43.9	--	45.4	--	60.6	--	43.1	mg/kg
Zinc	51.1	--	41.2	--	48.0	--	44.5	--	40.8	mg/kg
Chloride	9.40	--	--	--	--	11.2	5.73	--	5.40	mg/kg
Fluoride	0.669	--	--	--	1.42	--	1.68	--	1.30	mg/kg
Nitrogen in nitrate	6.46	--	--	--	3.50	--	14.8	--	1.20	mg/kg
Nitrogen in nitrate and nitrite	4.52	--	--	1.12	2.84	--	10.2	-	0.75	mg/kg
Nitrogen in nitrite	--	0.956	--	--	--	--	--	4.50	--	mg/kg
Sulfate	426	--	--	--	40.5	--	16.0	--	39.4	mg/kg
TPH - Diesel Range	--	--	--	--	--	3.8	--	--	--	mg/kg
TPH - Diesel Range Extended	--	--	--	--	--	6.1	--	--	--	mg/kg
TPH - Motor Oil (high boiling)	--	--	--	--	4.1	--	10	--	--	mg/kg
Aroclor-1254	--	0.0393	--	--	--	--	--	0.0058	--	mg/kg
Aroclor-1260	0.0115	--	--	0.00877	--	0.0132	--	0.00415	--	mg/kg
4-4'-DDE	--	--	--	0.00435	--	--	--	--	0.00037	mg/kg
4-4'-DDT	--	--	--	0.000447	--	0.00078	--	--	--	mg/kg
Acenaphthene (Method 8310)	--	--	--	0.0220	--	0.0144	--	0.0678	--	mg/kg
Anthracene (Method 8310)	--	--	--	0.0197	--	0.0233	--	0.0294	--	mg/kg
Benzo(a)anthracene (Method 8270)	--	--	--	--	0.0173	--	--	0.0159	--	mg/kg
Benzo(a)anthracene (Method 8310)	--	--	0.0534	--	0.0338	--	0.0220	--	--	mg/kg
Benzo(a)pyrene (Method 8270)	--	--	--	--	--	0.0211	--	0.0135	--	mg/kg
Benzo(a)pyrene (Method 8310)	--	--	0.0472	--	0.0325	--	0.0800	--	--	mg/kg
Benzo(b)fluoranthene (Method 8270)	--	--	--	--	--	0.0322	--	0.0159	--	mg/kg
Benzo(b)fluoranthene (Method 8310)	--	--	0.0518	--	0.0413	--	0.0200	--	--	mg/kg
Benzo(ghi)perylene (Method 8270)	--	--	--	--	--	0.0118	--	--	--	mg/kg
Benzo(ghi)perylene (Method 8310)	--	--	0.0987	--	0.0221	--	0.00946	--	--	mg/kg
Benzo(k)fluoranthene (Method 8270)	--	--	--	--	--	0.0143	--	--	--	mg/kg
Benzo(k)fluoranthene (Method 8310)	--	--	0.620	--	--	0.0120	--	0.0474	--	mg/kg
Chrysene (Method 8270)	--	--	--	--	--	0.0219	--	0.0155	--	mg/kg
Chrysene (Method 8310)	--	--	0.187	--	0.0269	--	0.0182	--	--	mg/kg
Dibenz[a,h]anthracene (Method 8310)	--	--	--	0.0180	--	--	--	--	--	mg/kg
Dimethyl phthalate	--	--	--	--	--	--	--	--	0.095	mg/kg
Fluoranthene (Method 8270)	--	--	--	--	0.0268	--	--	0.0212	--	mg/kg
Fluoranthene (Method 8310)	--	--	0.0730	--	0.0585	--	0.0318	--	--	mg/kg
Fluorene (Method 8310)	--	--	--	0.0190	--	0.0112	--	0.0196	--	mg/kg
Indeno(1,2,3-cd)pyrene (Method 8270)	--	--	--	--	--	0.0136	--	--	--	mg/kg
Indeno(1,2,3-cd)pyrene (Method 8310)	--	--	--	0.0260	--	0.0210	--	--	--	mg/kg
Phenanthrene (Method 8270)	--	--	--	--	--	0.0299	--	--	--	mg/kg
Phenanthrene (Method 8310)	--	--	0.120	--	0.0516	--	--	0.105	--	mg/kg
Pyrene (Method 8270)	--	--	--	--	0.0240	--	--	0.0266	--	mg/kg
Pyrene (Method 8310)	--	--	0.331	--	0.0650	--	0.357	--	--	mg/kg
Dieldrin	--	--	--	--	--	--	--	0.000489	--	mg/kg
3 Part Test Evaluation:										
95% UCL or Maximum[a] > Cleanup Limit?	YES	YES	YES	YES	YES	YES	YES	YES		
> 10% above Cleanup Limit?	YES	YES	YES	NO	YES	YES	YES	NO		
Any sample > 2x Cleanup Limit?	YES	YES	YES	NO	YES	YES	YES	YES		

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

Washington Closure Hanford **CALCULATION SHEET**

Originator J. D. Skoglie **Date** 05/07/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0
Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/07/15
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 5 of 43

Summary (continued)

Results:
The results presented in the tables that follow include the summary of the results of the 95% UCL calculations for the excavation 1-12, excavation 13-24, NOB, SOB, the WAC 173-340-740(7)(e) 3-part test evaluation, and the RPD calculations, and are for use in risk analysis and the RSVP for this site.

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

Analyte	EXC 1-12	EXC 13-24	NOB	SOB
	Duplicate Analysis	Duplicate Analysis	Duplicate Analysis	Duplicate Analysis
Potassium-40	--	--	14.9%	13.2%
Aluminum	2.3%	1.7%	6.6%	2.4%
Barium	0.7%	1.4%	3.6%	3.3%
Boron	1.1%	--	--	--
Calcium	0.3%	3.5%	5.4%	1.5%
Chromium	***32.0%***	11.5%	15.0%	5.0%
Copper	***77.1%***	0.8%	4.2%	0.0%
Iron	***41.0%***	2.5%	4.1%	3.1%
Magnesium	3.7%	1.0%	8.9%	1.4%
Manganese	10.0%	1.7%	9.4%	3.5%
Silicon	1.4%	7.0%	***34.8%***	14.9%
Sodium	22.4%	--	--	--
Vanadium	6.0%	2.6%	2.9%	18.8%
Zinc	***46.5%***	1.9%	2.1%	16.7%
Chloride	***52.2%***	--	--	--
Nitrogen in nitrite	3.6%	--	--	--
Sulfate	29.2%	--	--	--

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

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/04/15
Job No. 14655

Calc. No. 0100H-CA-V0226
Checked I. B. Berezovskiy

Rev. No. 0
Date 05/04/15
Sheet No. 6 of 43

1 **100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations**

2 **Verification Data - EXC 1-12**

3	Sample	Sample	Sample	Arsenic			Barium			Beryllium			Cadmium			Chromium			Cobalt			Copper			Lead			Manganese		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	EXC-3	J1V1H5	11/12/14	7.13		0.508	135		0.102	0.750		0.102	0.340	B	0.102	21.0		0.152	7.19	D	0.762	75.8		0.305	9.79	D	1.68	284		0.203
6	Duplicate of J1V1H5	J1V1J5	11/12/14	4.59		0.534	136		0.107	0.722		0.107	0.369	B	0.107	15.2		0.160	6.58	D	0.801	33.6		0.320	12.7	D	1.76	257		0.214
7	EXC-1	J1V1H3	11/12/14	7.84		0.505	49.2		0.101	0.630		0.101	0.269	B	0.101	10.0		0.151	6.51	D	0.757	16.6		0.303	27.8	D	1.67	257		0.202
8	EXC-2	J1V1H4	11/12/14	3.84		0.491	65.5		0.0981	0.687		0.0981	0.353	B	0.0981	10.9		0.147	6.62	D	0.736	15.4		0.294	15.9	D	1.62	275		0.196
9	EXC-4	J1V1H6	11/12/14	4.31		0.521	70.7		0.104	0.575		0.104	0.272	B	0.104	13.9		0.156	5.93		0.156	14.0		0.313	5.36		0.344	251		0.208
10	EXC-5	J1V1H7	11/12/14	3.66		0.513	52.6		0.103	0.559		0.103	0.274	B	0.103	11.3		0.154	6.52	D	0.770	14.1		0.308	5.89	D	1.69	263		0.205
11	EXC-6	J1V1H8	11/12/14	5.44		0.503	84.9		0.101	0.629		0.101	0.357	B	0.101	13.0		0.151	6.35	D	0.755	23.5		0.302	20.5	D	1.66	263		0.201
12	EXC-7	J1V1H9	11/12/14	6.77		0.594	94.1		0.119	0.602		0.119	0.351	B	0.119	19.0		0.178	6.71		0.178	15.5		0.356	7.32		0.392	278		0.238
13	EXC-8	J1V1J0	11/12/14	4.92		0.479	76.6		0.0958	0.536		0.0958	0.281	B	0.0958	8.52		0.144	5.53		0.144	15.8		0.287	6.41		0.316	221		0.192
14	EXC-9	J1V1J1	11/12/14	1.56	B	0.530	27.7		0.106	0.467	B	0.106	0.250	B	0.106	7.55		0.159	4.75		0.159	10.9		0.318	1.71		0.350	197		0.212
15	EXC-10	J1V1J2	11/12/14	4.13		0.489	51.9		0.0978	0.526		0.0978	0.268	B	0.0978	8.05		0.147	5.59	D	0.733	13.1		0.293	6.99	D	1.61	218		0.196
16	EXC-11	J1V1J3	11/12/14	6.76		0.507	165		0.101	0.676		0.101	0.466	B	0.101	20.5		0.152	6.99		0.152	23.0		0.304	35.8		0.335	299		0.203
17	EXC-12	J1V1J4	11/12/14	7.41		0.491	81.1		0.0982	0.612		0.0982	0.330	B	0.0982	14.1		0.147	5.85		0.147	14.7		0.294	13.2		0.324	281		0.196

18 **Statistical Computation Input Data**

19	Sample	Sample	Sample	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese
20	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
21	EXC-3	J1V1H5/ J1V1J5	11/12/14	5.86	136	0.736	0.355	18.1	6.89	54.7	11.2	271
22	EXC-1	J1V1H3	11/12/14	7.84	49.2	0.630	0.269	10.0	6.51	16.6	27.8	257
23	EXC-2	J1V1H4	11/12/14	3.84	65.5	0.687	0.353	10.9	6.62	15.4	15.9	275
24	EXC-4	J1V1H6	11/12/14	4.31	70.7	0.575	0.272	13.9	5.93	14.0	5.36	251
25	EXC-5	J1V1H7	11/12/14	3.66	52.6	0.559	0.274	11.3	6.52	14.1	5.89	263
26	EXC-6	J1V1H8	11/12/14	5.44	84.9	0.629	0.357	13.0	6.35	23.5	20.5	263
27	EXC-7	J1V1H9	11/12/14	6.77	94.1	0.602	0.351	19.0	6.71	15.5	7.32	278
28	EXC-8	J1V1J0	11/12/14	4.92	76.6	0.536	0.281	8.52	5.53	15.8	6.41	221
29	EXC-9	J1V1J1	11/12/14	1.56	27.7	0.467	0.250	7.55	4.75	10.9	1.71	197
30	EXC-10	J1V1J2	11/12/14	4.13	51.9	0.526	0.268	8.05	5.59	13.1	6.99	218
31	EXC-11	J1V1J3	11/12/14	6.76	165	0.676	0.466	20.5	6.99	23.0	35.8	299
32	EXC-12	J1V1J4	11/12/14	7.41	81.1	0.612	0.330	14.1	5.85	14.7	13.2	281

33 **Statistical Computations**

34		Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese
35	95% UCL based on	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
36	N	12	12	12	12	12	12	12	12	12
37	% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%	0%
38	Mean	5.21	79.6	0.603	0.319	12.9	6.19	19.3	13.2	256
39	Standard deviation	1.83	38.2	0.0758	0.0619	4.38	0.67	11.8	10.2	29.9
40	95% UCL on mean	6.16	109	0.646	0.348	15.8	6.58	24.9	27.2	274
41	Maximum value	7.84	165	0.750	0.466	21.0	7.19	75.8	35.8	299
42	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	0.81 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection	22.0 River Protection	10.2 GW & River Protection	512 GW & River Protection
43	**WAC 173-340 3-PART TEST**									
44	95% UCL > Cleanup Limit?	NO	NO	NA	NA	NO	NA	YES	YES	NA
45	> 10% above Cleanup Limit?	NO	NO	NA	NA	YES	NA	YES	YES	NA
46	Any sample > 2X Cleanup Limit?	NO	NO	NA	NA	NO	NA	YES	YES	NA
47	**WAC 173-340 Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 05/04/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0
Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/04/15
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 7 of 43

1 **100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations**
2 **Verification Data - EXC 1-12**

3	Sample	Sample	Sample	Mercury			Nickel			Selenium			Vanadium			Zinc			Chloride			Fluoride			Nitrogen in Nitrate			Nitrogen in Nitrate and Nitrite		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	EXC-3	J1V1H5	11/12/14	0.0973		0.00429	23.8		0.152	0.961	BD	0.345	42.3	D	0.508	24.4		0.404	38.9		0.715	0.881	B	0.352	5.31		0.352	1.37		0.181
6	Duplicate of J1V1H5	J1V1J5	11/12/14	0.114		0.00425	14.1		0.160	1.00	D	0.320	44.9	D	0.534	39.2	D	1.99	22.8		0.716	0.786	B	0.353	3.50		0.353	1.38		0.180
7	EXC-1	J1V1H3	11/12/14	0.00401	U	0.00401	10.4		0.151	0.730	BD	0.330	45.3	D	0.505	28.1	D	2.01	2.17		0.688	0.566	B	0.339	0.915	B	0.339	0.494	B	0.170
8	EXC-2	J1V1H4	11/12/14	0.0239		0.00407	10.7		0.147	0.669	BD	0.332	46.7	D	0.491	36.5	D	2.03	1.48	B	0.707	0.884	B	0.348	0.854	B	0.348	0.571		0.175
9	EXC-4	J1V1H6	11/12/14	0.0674		0.00418	13.4		0.156	0.548	BD	0.335	39.8		0.104	36.2		0.394	2.66		0.698	0.344	U	0.344	2.73		0.344	2.13		0.177
10	EXC-5	J1V1H7	11/12/14	5.80	D	0.202	11.1		0.154	0.639	BD	0.325	42.6	D	0.513	31.4		0.399	1.35	B	0.688	0.339	U	0.339	0.581	B	0.339	0.421	B	0.175
11	EXC-6	J1V1H8	11/12/14	0.229		0.00405	13.1		0.151	0.609	BD	0.347	42.2	D	0.503	37.2		0.386	1.16	B	0.713	0.351	U	0.351	0.491	B	0.351	0.373	B	0.175
12	EXC-7	J1V1H9	11/12/14	0.335		0.00531	17.4		0.178	0.596	BD	0.426	40.1		0.119	46.4		0.480	3.47		0.885	1.04	B	0.436	2.33		0.436	2.02		0.225
13	EXC-8	J1V1J0	11/12/14	0.327		0.00440	9.92		0.144	0.561	BD	0.352	35.5		0.0958	61.7	D	2.08	1.90	B	0.748	0.369	U	0.369	0.641	B	0.369	0.370	B	0.188
14	EXC-9	J1V1J1	11/12/14	0.00372	U	0.00372	8.93		0.159	0.390	BD	0.348	35.6		0.106	24.9		0.406	1.07	B	0.732	0.361	U	0.361	0.501	B	0.361	0.308	B	0.176
15	EXC-10	J1V1J2	11/12/14	0.00396	U	0.00396	8.90		0.147	0.552	BD	0.352	39.4	D	0.489	65.5		0.420	7.60		0.760	0.374	U	0.374	1.93		0.374	1.02		0.188
16	EXC-11	J1V1J3	11/12/14	6.27	D	0.204	17.0		0.152	0.610	BD	0.353	40.0		0.101	64.2		0.399	6.66		0.721	0.862	B	0.355	9.43		0.355	7.85		0.183
17	EXC-12	J1V1J4	11/12/14	0.118		0.00421	13.6		0.147	0.615	BD	0.326	40.1		0.0982	41.2		0.385	5.18		0.701	0.762	B	0.345	5.39		0.345	3.95		0.163

18 **Statistical Computation Input Data**

19	Sample	Sample	Sample	Mercury	Nickel	Selenium	Vanadium	Zinc	Chloride	Fluoride	Nitrogen in Nitrate	Nitrogen in Nitrate and Nitrite
20	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
21	EXC-3	J1V1H5/ J1V1J5	11/12/14	0.106	19.0	0.981	43.6	31.8	30.9	0.834	4.41	1.38
22	EXC-1	J1V1H3	11/12/14	0.00201	10.4	0.730	45.3	28.1	2.17	0.566	0.915	0.494
23	EXC-2	J1V1H4	11/12/14	0.0239	10.7	0.669	46.7	36.5	1.48	0.884	0.854	0.571
24	EXC-4	J1V1H6	11/12/14	0.0674	13.4	0.548	39.8	36.2	2.66	0.172	2.73	2.13
25	EXC-5	J1V1H7	11/12/14	5.80	11.1	0.639	42.6	31.4	1.35	0.170	0.581	0.421
26	EXC-6	J1V1H8	11/12/14	0.229	13.1	0.609	42.2	37.2	1.16	0.176	0.491	0.373
27	EXC-7	J1V1H9	11/12/14	0.335	17.4	0.596	40.1	46.4	3.47	1.04	2.33	2.02
28	EXC-8	J1V1J0	11/12/14	0.327	9.92	0.561	35.5	61.7	1.90	0.185	0.641	0.370
29	EXC-9	J1V1J1	11/12/14	0.00186	8.93	0.390	35.6	24.9	1.07	0.181	0.501	0.308
30	EXC-10	J1V1J2	11/12/14	0.00198	8.90	0.552	39.4	65.5	7.60	0.187	1.93	1.02
31	EXC-11	J1V1J3	11/12/14	6.27	17.0	0.610	40.0	64.2	6.66	0.862	9.43	7.85
32	EXC-12	J1V1J4	11/12/14	0.118	13.6	0.615	40.1	41.2	5.18	0.762	5.39	3.95

33 **Statistical Computations**

34		Mercury	Nickel	Selenium	Vanadium	Zinc	Chloride	Fluoride	Nitrogen in Nitrate	Nitrogen in Nitrate and Nitrite
35	95% UCL based on	Large data set (n ≥ 10), use ProUCL Adjusted Gamma UCL distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
36	N	12	12	12	12	12	12	12	12	12
37	% < Detection limit	25%	0%	0%	0%	0%	0%	50%	0%	0%
38	Mean	1.11	12.8	0.625	40.9	42.1	5.46	0.501	2.52	1.74
39	Standard deviation	2.31	3.43	0.139	3.41	14.3	8.29	0.354	2.71	2.21
40	95% UCL on mean	4.85	14.9	0.691	42.8	51.1	9.40	0.669	6.46	4.52
41	Maximum value	6.27	23.8	1.00	46.7	65.5	38.9	1.04	9.43	7.85
42	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	0.33 GW & River Protection	19.1 GW Protection	1 River Protection	85.1 GW Protection	67.8 River Protection	25,000 River Protection	96 GW Protection	1,000 GW Protection	1,000 GW Protection
43	**WAC 173-340 3-PART TEST**									
44	95% UCL > Cleanup Limit?	YES	NO	NO	NA	NA	NA	NA	NA	NA
45	> 10% above Cleanup Limit?	YES	NO	NO	NA	NA	NA	NA	NA	NA
46	Any sample > 2X Cleanup Limit?	YES	NO	NO	NA	NA	NA	NA	NA	NA
47	**WAC 173-340 Compliance?**	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (100 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (2.81 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (11.8 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (11.8 mg/kg) the WAC 173-340 3-part test is not required.

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 05/28/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0

Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/28/15

Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 8 of 43

1 **100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations**

2 **Verification Data - EXC 1-12**

3	Sample	Sample	Sample	Sulfate			Aroclor-1260		
4	Area	Number	Date	mg/kg	Q	PQL	ug/kg	Q	PQL
5	EXC-3	J1V1H5	11/12/14	672	D	7.09	57.3	D	5.92
6	Duplicate of J1V1H5	J1V1J5	11/12/14	501	D	7.10	12.1	DJ	5.92
7	EXC-1	J1V1H3	11/12/14	133		1.37	2.11	J	1.14
8	EXC-2	J1V1H4	11/12/14	9.49		1.40	19.7		1.17
9	EXC-4	J1V1H6	11/12/14	37.8		1.39	1.16	U	1.16
10	EXC-5	J1V1H7	11/12/14	31.6		1.37	5.68	UD	5.68
11	EXC-6	J1V1H8	11/12/14	16.5		1.42	1.18	U	1.18
12	EXC-7	J1V1H9	11/12/14	49.5		1.76	5.01		1.46
13	EXC-8	J1V1J0	11/12/14	48.7		1.49	2.31	J	1.24
14	EXC-9	J1V1J1	11/12/14	2.21	B	1.45	1.20	U	1.20
15	EXC-10	J1V1J2	11/12/14	51.0		1.51	1.26	U	1.26
16	EXC-11	J1V1J3	11/12/14	72.1		1.43	8.37		1.19
17	EXC-12	J1V1J4	11/12/14	29.4		1.39	1.16	U	1.16

18 **Statistical Computation Input Data**

19	Sample	Sample	Sample	Sulfate			Aroclor-1260		
20	Area	Number	Date	mg/kg			ug/kg		
21	EXC-3	J1V1H5/ J1V1J5	11/12/14	587			34.7		
22	EXC-1	J1V1H3	11/12/14	133			2.11		
23	EXC-2	J1V1H4	11/12/14	9.49			19.7		
24	EXC-4	J1V1H6	11/12/14	37.8			0.580		
25	EXC-5	J1V1H7	11/12/14	31.6			2.84		
26	EXC-6	J1V1H8	11/12/14	16.5			0.590		
27	EXC-7	J1V1H9	11/12/14	49.5			5.01		
28	EXC-8	J1V1J0	11/12/14	48.7			2.31		
29	EXC-9	J1V1J1	11/12/14	2.21			0.600		
30	EXC-10	J1V1J2	11/12/14	51.0			0.630		
31	EXC-11	J1V1J3	11/12/14	72.1			8.37		
32	EXC-12	J1V1J4	11/12/14	29.4			0.580		

33 **Statistical Computations**

34		Sulfate			Aroclor-1260		
35	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.			Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.		
36	N	12			12		
37	% < Detection limit	0%			50%		
38	Mean	89.0			6.50		
39	Standard deviation	160			10.4		
40	95% UCL on mean	426			11.5		
41	Maximum value	672			57.3		
42	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise**	25,000	GW Protection		17 ug/kg	GW & River Protection	
43	**WAC 173-340 3-PART TEST**						
44	95% UCL > Cleanup Limit?	NO			NO		
45	> 10% above Cleanup Limit?	NO			YES		
46	Any sample > 2X Cleanup Limit?	NO			YES		
47	**WAC 173-340 Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent RAG.			A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.		

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MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

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Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 9 of 43

1 **100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Maximum Calculations**
2 **Verification Data - EXC 1-12**

3	Sample	Sample	Sample	Antimony			Boron			Hexavalent Chromium			Molybdenum			Silver			Nitrogen in Nitrite			Aroclor-1254		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL
5	EXC-3	J1V1H5	11/12/14	1.68	UD	1.68	17.6		1.02	0.124	U	0.124	1.66		0.203	0.102	U	0.102	0.532	B	0.352	39.3	D	5.92
6	Duplicate of J1V1H5	J1V1J5	11/12/14	1.76	UD	1.76	17.4		1.07	0.122	U	0.122	0.594	B	0.214	0.107	U	0.107	0.513	B	0.353	10	DJ	5.92
7	EXC-1	J1V1H3	11/12/14	1.67	UD	1.67	1.01	U	1.01	0.119	U	0.119	0.202	U	0.202	0.101	U	0.101	0.421	B	0.339	1.14	U	1.14
8	EXC-2	J1V1H4	11/12/14	1.62	UD	1.62	0.981	U	0.981	0.123	U	0.123	0.196	U	0.196	0.0981	U	0.0981	0.348	UR	0.348	1.17	U	1.17
9	EXC-4	J1V1H6	11/12/14	0.344	U	0.344	1.10	B	1.04	0.421		0.116	0.208	U	0.208	0.104	U	0.104	0.956	B	0.344	1.16	U	1.16
10	EXC-5	J1V1H7	11/12/14	1.69	UD	1.69	1.03	U	1.03	0.122	U	0.122	0.205	U	0.205	0.103	U	0.103	0.449	B	0.339	5.68	UD	5.68
11	EXC-6	J1V1H8	11/12/14	1.66	UD	1.66	1.01	U	1.01	0.125	U	0.125	0.388	B	0.201	0.101	U	0.101	0.354	UR	0.354	1.18	U	1.18
12	EXC-7	J1V1H9	11/12/14	0.392	U	0.392	1.19	U	1.19	0.158	U	0.158	0.238	U	0.238	0.119	U	0.119	0.532	B	0.436	1.46	U	1.46
13	EXC-8	J1V1J0	11/12/14	0.316	U	0.316	0.958	U	0.958	0.133	U	0.133	0.313	B	0.192	0.0958	U	0.0958	0.457	B	0.369	1.24	U	1.24
14	EXC-9	J1V1J1	11/12/14	0.350	U	0.350	1.06	U	1.06	0.124	U	0.124	0.212	U	0.212	0.106	U	0.106	0.361	UR	0.361	1.20	U	1.20
15	EXC-10	J1V1J2	11/12/14	1.61	UD	1.61	0.978	U	0.978	0.134	U	0.134	0.196	U	0.196	0.0978	U	0.0978	0.374	UR	0.374	1.26	U	1.26
16	EXC-11	J1V1J3	11/12/14	0.335	U	0.335	4.48	B	1.01	0.128	U	0.128	0.446	B	0.203	3.14		0.101	0.355	UR	0.355	5.06	P	1.19
17	EXC-12	J1V1J4	11/12/14	0.508	B	0.324	2.33	B	0.982	0.118	U	0.118	0.196	U	0.196	0.0982	U	0.0982	0.610	B	0.345	1.16	U	1.16

18 **3-Part Test Evaluations**

19		Antimony	Boron	Hexavalent Chromium	Molybdenum	Silver	Nitrogen in Nitrite	Aroclor-1254
20	% < Detection limit	92%	67%	92%	67%	92%	0%	83%
21	Maximum value	0.508	17.6	0.421	1.66	3.14	0.956	39.3
22	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise**	5 GW & River Protection	320 GW Protection	2 River Protection	8 GW Protection	0.73 River Protection	100 GW Protection	17 ug/kg GW & River Protection
23	**3-PART TEST**							
24	Maximum > Cleanup Limit?	NA	NO	NO	NO	YES	NO	YES
25	> 10% above Cleanup Limit?	NA	NO	NO	NO	NO	NO	NO
26	Any sample > 2X Cleanup Limit?	NA	NO	NO	NO	YES	NO	YES
27	**3-Part Test Compliance?**	Because all values are below background (5 mg/kg) the 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

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Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 10 of 43

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations

Verification Data - EXC 13-24

Sample Area	Sample Number	Sample Date	Arsenic			Barium			Beryllium			Cadmium			Chromium			Cobalt			Copper			Lead			Manganese		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-13 [a]	J1V459	2/5/15	3.2		0.65	34.4		0.075	0.080	B	0.033	0.061	B	0.041	11.0		0.057	5.4	X	0.099	12.7		0.21	4.0		0.27	228		0.099
Duplicate of J1V459 [a]	J1V464	2/5/15	2.4		0.59	34.9		0.068	0.076	B	0.029	0.081	B	0.037	9.8		0.052	5.5	X	0.089	12.6		0.19	3.8		0.24	232		0.089
EXC-14	J1V1J7	11/5/14	16.2		0.493	49.3	*	0.0985	0.620		0.0985	0.297	B	0.0985	11.3		0.148	6.31	D	0.739	15.5		0.296	19.3	DN	1.63	252		0.197
EXC-15 [a]	J1V460	2/5/15	5.6		0.62	37.7		0.072	0.11	B	0.031	0.074	B	0.039	9.7		0.055	5.5	X	0.094	12.7		0.20	10.8		0.26	243		0.094
EXC-16	J1V1J9	11/5/14	5.12		0.526	90.6	*	0.105	0.679		0.105	0.216	B	0.105	17.1		0.158	7.43		0.158	16.0		0.316	7.62	N	0.347	330		0.210
EXC-17	J1V1K0	11/5/14	7.49		0.510	83.5	*	0.102	0.683		0.102	0.276	B	0.102	12.8		0.153	7.24	D	0.764	15.5		0.306	30.6	DN	1.68	321		0.204
EXC-18 [a]	J1V461	3/16/15	5.0		0.64	92.6		0.074	0.31		0.032	0.19		0.040	21.5		0.056	6.7		0.097	15.8	X	0.21	5.3		0.26	314		0.097
EXC-19	J1V1K2	11/5/14	6.89		0.494	65.7	*	0.0988	0.612		0.0988	0.204	B	0.0988	12.1		0.148	6.71	D	0.741	13.8		0.296	19.9	DN	1.63	281		0.198
EXC-20	J1V1K3	11/5/14	5.55		0.541	55.6	*	0.108	0.528	B	0.108	0.204	B	0.108	11.6		0.162	5.29		0.162	12.8		0.325	14.8	N	0.357	229		0.217
EXC-21 [a]	J1V462	2/5/15	3.5		0.64	39.3		0.073	0.11	B	0.032	0.079	B	0.040	11.4		0.056	5.4	X	0.096	12.3		0.21	5.8		0.26	236		0.096
EXC-22 [a]	J1V463	3/5/15	5.1		0.66	59.7		0.076	0.18	B	0.033	0.16	B	0.041	11.4		0.058	5.7		0.100	14.2		0.22	12.3		0.27	274	X	0.10
EXC-23	J1V1K6	11/5/14	2.24	B	0.483	40.2	*	0.0966	0.477	B	0.0966	0.140	B	0.0966	12.9		0.145	5.12		0.145	13.2		0.29	2.85	CN	0.319	257		0.193
EXC-24	J1V1K7	11/5/14	2.39	B	0.485	29.4	*	0.0971	0.44	B	0.0971	0.193	B	0.0971	7.51		0.146	4.49		0.146	10.5		0.291	1.80	CN	0.320	178		0.194

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg	Manganese mg/kg
EXC-13 [a]	J1V459/ J1V464	2/5/15	2.8	34.7	0.078	0.071	10.4	5.5	12.7	3.9	230
EXC-14	J1V1J7	11/5/14	16.2	49.3	0.620	0.297	11.3	6.31	15.5	19.3	252
EXC-15 [a]	J1V460	2/5/15	5.6	37.7	0.11	0.074	9.7	5.5	12.7	10.8	243
EXC-16	J1V1J9	11/5/14	5.12	90.6	0.679	0.216	17.1	7.43	16.0	7.6	330
EXC-17	J1V1K0	11/5/14	7.49	83.5	0.683	0.276	12.8	7.24	15.5	30.6	321
EXC-18 [a]	J1V461	3/16/15	5.0	92.6	0.31	0.19	21.5	6.7	15.8	5.3	314
EXC-19	J1V1K2	11/5/14	6.89	65.7	0.612	0.204	12.1	6.71	13.8	19.9	281
EXC-20	J1V1K3	11/5/14	5.55	55.6	0.528	0.204	11.6	5.29	12.8	14.8	229
EXC-21 [a]	J1V462	2/5/15	3.5	39.3	0.11	0.079	11.4	5.4	12.3	5.8	236
EXC-22 [a]	J1V463	3/5/15	5.1	59.7	0.18	0.16	11.4	5.7	14.2	12.3	274
EXC-23	J1V1K6	11/5/14	2.24	40.2	0.477	0.140	12.9	5.12	13.2	2.9	257
EXC-24	J1V1K7	11/5/14	2.39	29.4	0.440	0.193	7.5	4.49	10.5	1.8	178

Statistical Computations

	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
N	12	12	12	12	12	12	12	12	12
% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mean	5.66	56.5	0.402	0.175	12.5	5.95	13.7	11.2	262
Standard deviation	3.72	22.3	0.234	0.074	3.62	0.914	1.70	8.63	44.4
95% UCL on mean	8.16	72.1	0.524	0.214	14.2	6.47	14.7	24.0	289
Maximum value	16.2	92.6	0.683	0.297	21.5	7.43	16.0	30.6	330
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	0.81 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection	22.0 River Protection	10.2 GW & River Protection	512 GW & River Protection
WAC 173-340 3-PART TEST									
95% UCL > Cleanup Limit?	NO	NA	NA	NA	NO	NA	NA	YES	NA
> 10% above Cleanup Limit?	NO	NA	NA	NA	NO	NA	NA	YES	NA
Any sample > 2X Cleanup Limit?	NO	NA	NA	NA	NO	NA	NA	YES	NA
WAC 173-340 Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg) the WAC 173-340 3-part test is not required.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.

[a] These sample locations were re-sampled due to exceedances at one or more location. Sample data for the original sample locations (J1V1L1, J1V1L4, J1V1J6, J1V1J8, J1V1K1, J1V1K4, J1V1K5, J1V1K8) are for information only as described in the RSVP for this site.

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1 **100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations**

2 **Verification Data - EXC 13-24**

3	Sample	Sample	Sample	Mercury			Nickel			Selenium			Vanadium			Zinc			Benzo(a)anthracene (Method 8310)			Benzo(a)pyrene (Method 8310)			Benzo(b)fluoranthene (Method 8310)			Benzo(ghi)perylene (Method 8310)		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
5	EXC-13 [a]	J1V459	2/5/15	0.0056	U	0.0056	13.3		0.12	0.85	U	0.85	45.5		0.093	32.0		0.39	3.3	U	3.3	6.7	U	6.7	4.4	U	4.4	7.5	U	7.5
6	Duplicate of J1V459 [a]	J1V464	2/5/15	0.0056	U	0.0056	11.6		0.11	0.77	U	0.77	46.7		0.084	32.6		0.35	3.2	U	3.2	6.5	U	6.5	4.3	U	4.3	7.3	U	7.3
7	EXC-14	J1V1J7	11/5/14	0.00428	B	0.00383	12.0		0.148	0.826	BD	0.337	46.0	D	0.493	42.8	D	1.97	29.1	D	1.14	21.5	D	1.14	24.3	D	1.14	13.6	D	1.14
8	EXC-15 [a]	J1V460	2/5/15	0.0055	U	0.0055	11.5		0.12	0.81	U	0.81	45.5		0.089	35.5		0.38	9.9	JX	3.3	10	J	6.7	11	J	4.4	7.5	U	7.5
9	EXC-16	J1V1J9	11/5/14	0.00559	B	0.00386	16.6		0.158	0.962	BD	0.345	42.3		0.105	46.2		0.421	2.78	X	0.572	1.42	JX	0.572	1.64	JX	0.572	2.00	X	0.572
10	EXC-17	J1V1K0	11/5/14	0.0120		0.00377	12.6		0.153	1.10	D	0.353	45.5	D	0.510	43.0	D	2.04	86.3		0.580	75.2		0.580	72.9		0.580	48.5		0.580
11	EXC-18 [a]	J1V461	3/16/15	0.0063	U	0.0063	18.9	X	0.12	0.84	U	0.84	40.6		0.092	44.0	X	0.39	3.4	U	3.4	6.8	U	6.8	4.4	U	4.4	7.6	U	7.6
12	EXC-19	J1V1K2	11/5/14	0.00483	B	0.00363	11.5		0.148	0.919	BD	0.325	43.2	D	0.494	39.5	D	1.98	128	D	1.13	107	D	1.13	119	D	1.13	78.1	D	1.13
13	EXC-20	J1V1K3	11/5/14	0.00393	U	0.00393	11.0		0.162	0.925	BD	0.342	39.8		0.108	32.8		0.433	2.09		0.585	1.94		0.585	2.78	X	0.585	1.58	J	0.585
14	EXC-21 [a]	J1V462	2/5/15	0.0056	U	0.0056	12.1		0.12	0.83	U	0.83	38.1		0.091	35.0		0.38	62.0	X	3.1	55		6.2	63		4.1	38		7.0
15	EXC-22 [a]	J1V463	3/5/15	0.011	BM	0.0059	12.1	X	0.12	0.86	U	0.86	42.3	X	0.094	37.4		0.40	3.3	U	3.3	6.6	U	6.6	4.3	U	4.3	7.4	U	7.4
16	EXC-23	J1V1K6	11/5/14	0.00466	B	0.00371	9.12		0.145	0.606	BD	0.306	36.4		0.0966	35.3		0.386	57.9		0.544	49.0		0.544	69.8		0.544	31.9		0.544
17	EXC-24	J1V1K7	11/5/14	0.00365	U	0.00365	8.69		0.146	0.400	BD	0.328	34.9		0.0971	24.7		0.388	22.2		0.551	19.8		0.551	30.1		0.551	12.7		0.551

18 **Statistical Computation Input Data**

19	Sample	Sample	Sample	Mercury	Nickel	Selenium	Vanadium	Zinc	Benzo(a)anthracene (Method 8310)	Benzo(a)pyrene (Method 8310)	Benzo(b)fluoranthene (Method 8310)	Benzo(ghi)perylene (Method 8310)
20	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg
21	EXC-13 [a]	J1V459/ J1V464	2/5/15	0.0028	12.5	0.41	46.1	32.3	1.6	3.3	2.2	3.7
22	EXC-14	J1V1J7	11/5/14	0.00428	12.0	0.826	46.0	42.8	29.1	21.5	24.3	13.6
23	EXC-15 [a]	J1V460	2/5/15	0.0028	11.5	0.41	45.5	35.5	9.9	10.0	11.0	3.8
24	EXC-16	J1V1J9	11/5/14	0.00559	16.6	0.962	42.3	46.2	2.78	1.42	1.64	2.00
25	EXC-17	J1V1K0	11/5/14	0.0120	12.6	1.10	45.5	43.0	86.3	75.2	72.9	48.5
26	EXC-18 [a]	J1V461	3/16/15	0.0032	18.9	0.42	40.6	44.0	1.7	3.4	2.2	3.8
27	EXC-19	J1V1K2	11/5/14	0.00483	11.5	0.919	43.2	39.5	128	107	119	78.1
28	EXC-20	J1V1K3	11/5/14	0.00197	11.0	0.925	39.8	32.8	2.09	1.94	2.78	1.58
29	EXC-21 [a]	J1V462	2/5/15	0.0028	12.1	0.42	38.1	35.0	62.0	55.0	63.0	38.0
30	EXC-22 [a]	J1V463	3/5/15	0.011	12.1	0.43	42.3	37.4	1.7	3.3	2.2	3.70
31	EXC-23	J1V1K6	11/5/14	0.00466	9.12	0.606	36.4	35.3	57.9	49.0	69.8	31.9
32	EXC-24	J1V1K7	11/5/14	0.00183	8.69	0.400	34.9	24.7	22.2	19.8	30.1	12.7

33 **Statistical Computations**

34		Mercury	Nickel	Selenium	Vanadium	Zinc	Benzo(a)anthracene (Method 8310)	Benzo(a)pyrene (Method 8310)	Benzo(b)fluoranthene (Method 8310)	Benzo(ghi)perylene (Method 8310)
35	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use ProUCL Student's-t.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
36	N	12	12	12	12	12	12	12	12	12
37	% < Detection limit	50%	0%	42%	0%	0%	25%	25%	25%	33%
38	Mean	0.0048	12.4	0.651	41.7	37.4	33.8	29.2	33.4	20.1
39	Standard deviation	0.0033	2.83	0.273	3.84	6.09	41.3	34.7	38.8	24.3
40	95% UCL on mean	0.00726	13.7	0.781	43.9	41.2	53.4	47.2	51.8	98.7
41	Maximum value	0.012	18.9	1.1	46.7	46.2	128	107	119	78.1
42	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise**	0.33 GW & River Protection	19.1 GW Protection	1 River Protection	85.1 GW Protection	67.8 River Protection	15 ug/kg GW and River Protection	15 ug/kg GW and River Protection	15 ug/kg GW and River Protection	48,000 ug/kg GW Protection
43	**WAC 173-340 3-PART TEST**									
44	95% UCL > Cleanup Limit?	NA	NA	NO	NA	NA	YES	YES	YES	NO
45	> 10% above Cleanup Limit?	NA	NA	NO	NA	NA	YES	YES	YES	NO
46	Any sample > 2X Cleanup Limit?	NA	NA	NO	NA	NA	YES	YES	YES	NO
47	**WAC 173-340 Compliance?**	Because all values are below background (0.33 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 05/04/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0

Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/04/15

Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 12 of 43

100-H-51:2 Subsite Statistical Calculations

Verification Data - EXC 13-24

Sample Area	Sample Number	Sample Date	Benzo(k)fluoranthene (Method 8310)			Chrysene (Method 8310)			Fluoranthene (Method 8310)			Phenanthrene (Method 8310)			Pyrene (Method 8310)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-13 [a]	J1V459	2/5/15	4.1	U	4.1	5.1	U	5.1	14	U	14	13	U	13	13	U	13
Duplicate of J1V459 [a]	J1V464	2/5/15	4.0	U	4.0	4.9	U	4.9	13	U	13	12	UN	12	12	U	12
EXC-14	J1V1J7	11/5/14	14.1	DX	0.568	19.8	D	1.14	42.6	D	1.14	26.6	DJ	10.6	36.2	D	1.14
EXC-15 [a]	J1V460	2/5/15	4.1	U	4.1	8.0	J	5.0	17	J	14	12	U	12	16	J	12
EXC-16	J1V1J9	11/5/14	0.286	U	0.286	1.94		0.572	5.09	X	0.572	5.36	U	5.36	3.39		0.572
EXC-17	J1V1K0	11/5/14	74.7	PX	0.29	57.6		0.58	119		0.580	53.4		5.44	110		0.580
EXC-18 [a]	J1V461	3/16/15	4.2	U	4.2	5.1	U	5.1	14	U	14	13	U	13	13	U	13
EXC-19	J1V1K2	11/5/14	89.6	DX	0.566	88.8	D	1.13	146	D	1.13	61.8	D	10.6	147	D	1.13
EXC-20	J1V1K3	11/5/14	2.41	PX	0.293	1.57	J	0.585	0.585	U	0.585	5.49	U	5.49	2.49		0.585
EXC-21 [a]	J1V462	2/5/15	24		3.8	57	X	4.7	110		13	81		12	120		12
EXC-22 [a]	J1V463	3/5/15	4.1	U	4.1	5.0	U	5.0	13	U	13	12	U	12	12	U	12
EXC-23	J1V1K6	11/5/14	37.9	X	0.272	36.9		0.544	85.5		0.544	59.9		5.10	74.8		0.544
EXC-24	J1V1K7	11/5/14	14.8	X	0.275	13.8		0.551	31.2		0.551	17.7		5.16	27.3		0.551

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Benzo(k)fluoranthene (Method 8310) ug/kg	Chrysene (Method 8310) ug/kg	Fluoranthene (Method 8310) ug/kg	Phenanthrene (Method 8310) ug/kg	Pyrene (Method 8310) ug/kg
EXC-13 [a]	J1V459/ J1V464	2/5/15	2.0	2.5	6.8	6.3	6.3
EXC-14	J1V1J7	11/5/14	14.1	19.8	42.6	26.6	36.2
EXC-15 [a]	J1V460	2/5/15	2.1	8.0	17.0	6.0	16
EXC-16	J1V1J9	11/5/14	0.143	1.94	5.09	2.68	3.39
EXC-17	J1V1K0	11/5/14	74.7	57.6	119	53.4	110
EXC-18 [a]	J1V461	3/16/15	2.1	2.6	7.0	6.5	6.5
EXC-19	J1V1K2	11/5/14	89.6	88.8	146	61.8	147
EXC-20	J1V1K3	11/5/14	2.41	1.57	0.293	2.75	2.49
EXC-21 [a]	J1V462	2/5/15	24.0	57.0	110	81.0	120
EXC-22 [a]	J1V463	3/5/15	2.1	2.5	6.5	6.0	6.0
EXC-23	J1V1K6	11/5/14	37.9	36.9	85.5	59.9	74.8
EXC-24	J1V1K7	11/5/14	14.8	13.8	31.2	17.7	27.3

Statistical Computations

	Benzo(k)fluoranthene (Method 8310)	Chrysene (Method 8310)	Fluoranthene (Method 8310)	Phenanthrene (Method 8310)	Pyrene (Method 8310)
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
N	12	12	12	12	12
% < Detection limit	42%	25%	33%	50%	25%
Mean	22.2	24.4	48.1	27.5	46.3
Standard deviation	30.4	29.1	52.6	28.4	52.6
95% UCL on mean	620	187	73.0	120	331
Maximum value	89.6	88.8	146	81.0	147
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise	15 ug/kg GW and River Protection	100 ug/kg River Protection	18,000 ug/kg River Protection	240,000 ug/kg GW Protection	48,000 ug/kg GW Protection
WAC 173-340 3-PART TEST					
95% UCL > Cleanup Limit?	YES	YES	NO	NO	NO
> 10% above Cleanup Limit?	YES	NO	NO	NO	NO
Any sample > 2X Cleanup Limit?	YES	NO	NO	NO	NO
WAC 173-340 Compliance?	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/07/15
Job No. 14655

Calc. No. 0100H-CA-V0226
Checked I. B. Berezovskiy

Rev. No. 0
Date 05/07/15
Sheet No. 13 of 43

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Maximum Calculations
Verification Data - EXC 13-24

Sample Area	Sample Number	Sample Date	Antimony			Boron			Hexavalent Chromium			Molybdenum			Nitrogen in Nitrite and Nitrate			Aroclor-1260			4-4'-DDE			4-4'-DDT		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-13 [a]	J1V459	2/5/15	0.38	U	0.38	0.97	U	0.97	0.155	U	0.155	0.26	U	0.26	0.37	U	0.37	2.7	U	2.7	0.24	U	0.24	0.59	U	0.59
Duplicate of J1V459 [a]	J1V464	2/5/15	0.34	U	0.34	0.87	B	0.87	0.155	U	0.155	0.23	U	0.23	0.36	U	0.36	2.7	U	2.7	0.23	U	0.23	0.58	U	0.58
EXC-14	J1V1J7	11/5/14	1.69	BD	1.63	0.985	U	0.985	0.123	U	0.123	0.197	U	0.197	0.177	U	0.177	1.36	J	1.18	0.355	UR	0.355	0.447	J	0.355
EXC-15 [a]	J1V460	2/5/15	0.36	U	0.36	0.94	B	0.93	0.155	U	0.155	0.25	U	0.25	0.38	U	0.38	2.6	U	2.6	0.24	U	0.24	0.59	U	0.59
EXC-16	J1V1J9	11/5/14	0.347	U	0.347	1.05	U	1.05	0.293	B	0.127	0.210	U	0.21	0.178	U	0.178	1.19	U	1.19	0.358	UR	0.358	0.358	UR	0.358
EXC-17	J1V1K0	11/5/14	1.68	UD	1.68	1.63	B	1.02	0.121	U	0.121	0.204	U	0.204	1.12		0.183	8.77		1.20	4.35	J	0.362	0.362	UR	0.362
EXC-18 [a]	J1V461	3/16/15	0.37	U	0.37	2.40		0.95	0.210		0.155	0.25	U	0.25	0.89	M	0.38	2.7	U	2.7	0.26	U	0.26	0.64	U	0.64
EXC-19	J1V1K2	11/5/14	1.63	UD	1.63	0.988	U	0.988	0.169	B	0.125	0.203	B	0.198	0.701		0.178	2.63	J	1.18	0.608	J	0.354	0.354	UR	0.354
EXC-20	J1V1K3	11/5/14	0.357	U	0.357	1.08	U	1.08	0.121	U	0.121	0.217	U	0.217	0.273	B	0.185	1.22	U	1.22	0.366	UR	0.366	0.366	UR	0.366
EXC-21 [a]	J1V462	2/5/15	0.37	U	0.37	0.94	U	0.94	0.155	U	0.155	0.25	U	0.25	0.36	U	0.36	2.6	U	2.6	0.25	U	0.25	0.62	U	0.62
EXC-22 [a]	J1V463	3/5/15	0.38	U	0.38	2.20	M	0.98	0.313		0.155	0.26	U	0.26	0.35	U	0.35	2.6	U	2.6	0.23	U	0.23	0.58	U	0.58
EXC-23	J1V1K6	11/5/14	0.319	U	0.319	0.966	U	0.966	0.120	U	0.120	0.286	B	0.193	0.171	U	0.171	1.13	U	1.13	0.340	UR	0.340	0.340	UR	0.340
EXC-24	J1V1K7	11/5/14	0.320	U	0.320	0.971	U	0.971	0.120	U	0.120	0.194	U	0.194	0.174	U	0.174	1.15	U	1.15	0.344	UR	0.344	0.344	UR	0.344

3-Part Test Evaluations

	Antimony	Boron	Hexavalent Chromium	Molybdenum	Nitrogen in Nitrite and Nitrate	Aroclor-1260	4-4'-DDE	4-4'-DDT
% < Detection limit	92%	58%	67%	83%	67%	75%	75%	86%
Maximum value	1.69	2.40	0.313	0.286	1.12	8.77	4.35	0.447
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise	5 GW & River Protection	320 GW Protection	2 River Protection	8 GW Protection	1,000 GW Protection	17 ug/kg GW & River Protection	3.3 ug/kg River Protection	3.3 ug/kg River Protection
3-PART TEST								
Maximum > Cleanup Limit?	NA	NO	NO	NO	NA	NO	YES	NO
> 10% above Cleanup Limit?	NA	NO	NO	NO	NA	NO	NO	NO
Any sample > 2X Cleanup Limit?	NA	NO	NO	NO	NA	NO	NO	NO
3-Part Test Compliance?	Because all values are below background (5 mg/kg) the 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (11.8 mg/kg) the 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Maximum Calculations
Verification Data - EXC 13-24

Sample Area	Sample Number	Sample Date	Acenaphthene			Anthracene			Dibenz[a,h]anthracene			Fluorene			Indeno(1,2,3-cd)pyrene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-13 [a]	J1V459	2/5/15	10	U	10	3.2	U	3.2	11	U	11	5.5	U	5.5	13	U	13
Duplicate of J1V459 [a]	J1V464	2/5/15	10	UN	10	3.1	U	3.1	11	U	11	5.4	UN	5.4	12	U	12
EXC-14	J1V1J7	11/5/14	10.6	DU	10.6	6.46	DJ	3.55	1.14	DU	1.14	10.6	DU	10.6	1.14	DU	1.14
EXC-15 [a]	J1V460	2/5/15	10	U	10	3.2	U	3.2	11	U	11	5.5	U	5.5	12	U	12
EXC-16	J1V1J9	11/5/14	5.36	U	5.36	1.79	U	1.79	0.572	U	0.572	5.36	U	5.36	0.572	U	0.572
EXC-17	J1V1K0	11/5/14	5.44	U	5.44	12.1	J	1.81	0.580	U	0.580	5.44	U	5.44	0.580	U	0.580
EXC-18 [a]	J1V461	3/16/15	11	U	11	3.2	U	3.2	12	U	12	5.6	U	5.6	13	U	13
EXC-19	J1V1K2	11/5/14	10.6	DU	10.6	15.2	DJ	3.54	1.13	DU	1.13	10.6	DU	10.6	1.13	DU	1.13
EXC-20	J1V1K3	11/5/14	5.49	U	5.49	1.83	U	1.83	0.585	U	0.585	5.49	U	5.49	0.585	U	0.585
EXC-21 [a]	J1V462	2/5/15	22	J	9.7	3.0	U	3.0	18	J	11	19	J	5.1	26	JX	12
EXC-22 [a]	J1V463	3/5/15	10	U	10	3.1	U	3.1	11	U	11	5.4	U	5.4	12	U	12
EXC-23	J1V1K6	11/5/14	5.10	U	5.10	19.7		1.70	0.544	U	0.544	8.52	JP	5.10	0.544	U	0.544
EXC-24	J1V1K7	11/5/14	5.16	U	5.16	4.37	J	1.72	0.551	U	0.551	5.16	U	5.16	0.551	U	0.551

3-Part Test Evaluations

	Acenaphthene	Anthracene	Dibenz[a,h]anthracene	Fluorene	Indeno(1,2,3-cd)pyrene
% < Detection limit	92%	58%	92%	83%	92%
Maximum value	22	19.7	18	19	26
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise	96,000 ug/kg GW Protection	240,000 ug/kg GW Protection	30 ug/kg GW & River Protection	64,000 ug/kg GW Protection	330 ug/kg GW & River Protection
3-PART TEST					
Maximum > Cleanup Limit?	NO	NO	NO	NO	NO
> 10% above Cleanup Limit?	NO	NO	NO	NO	NO
Any sample > 2X Cleanup Limit?	NO	NO	NO	NO	NO
3-Part Test Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/04/15
Job No. 14655

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Checked I. B. Berezovskiy

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Date 05/04/15
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100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations

Verification Data - NOB

Sample Area	Sample Number	Sample Date	Europium-152			Europium-154			Europium-155			Nickel-63		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
NOB-9	J1V1L8	11/20/14	-0.261	U	0.30	0.062	U	0.15	-0.198	U	0.21	0.653	U	2.26
Duplicate of J1V1L8	J1V1M2	11/20/14	0.046	U	0.15	0.088		0.08	0.127		0.12	1.716	U	2.44
NOB-1	J1V1L0	11/24/14	-0.050	U	0.20	0.070	U	0.10	0.085	U	0.16	1.156	U	2.33
NOB-2 [a]	J1V596	3/18/15	-0.0128	U	0.0488	-0.0181	U	0.0884	0.0386	U	0.0448	3.90	U	5.90
NOB-3	J1V1L2	11/20/14	0.167	U	0.20	-0.199	U	0.10	-0.002	U	0.16	0.758	U	2.29
NOB-4	J1V1L3	11/20/14	0.053	U	0.30	0.017	U	0.15	0.109	U	0.20	1.393	U	2.11
NOB-5 [a]	J1V597	3/18/15	-0.0115	U	0.0449	-0.0253	U	0.0697	0.0107	U	0.0427	0.904	U	5.52
NOB-6	J1V1L5	11/24/14	-0.021	U	0.18	0.047	U	0.09	0.010	U	0.15	0.076	U	1.84
NOB-7	J1V1L6	11/24/14	0.134	U	0.20	-0.001	U	0.10	0.129	U	0.16	0.824	U	2.49
NOB-8	J1V1L7	11/24/14	0.233		0.16	0.015	U	0.08	-0.027	U	0.13	0.372	U	2.25
NOB-10	J1V1L9	11/20/14	-0.026	U	0.16	-0.030	U	0.08	0.084	U	0.14	1.005	U	2.03
NOB-11	J1V1M0	11/24/14	0.157	U	0.19	0.095	U	0.10	0.035	U	0.17	3.939		2.33
NOB-12	J1V1M1	11/20/14	-0.009	U	0.16	0.052	U	0.08	0.143		0.14	1.390	U	2.24

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Europium-152 pCi/g	Europium-154 pCi/g	Europium-155 pCi/g	Nickel-63 pCi/g
NOB-9	J1V1L8/ J1V1M2	11/20/14	-0.108	0.075	-0.036	1.185
NOB-1	J1V1L0	11/24/14	-0.050	0.070	0.085	1.156
NOB-2 [a]	J1V596	3/18/15	-0.0128	-0.0181	0.0386	3.90
NOB-3	J1V1L2	11/20/14	0.167	-0.199	-0.002	0.758
NOB-4	J1V1L3	11/20/14	0.053	0.017	0.109	1.393
NOB-5 [a]	J1V597	3/18/15	-0.0115	-0.0253	0.0107	0.904
NOB-6	J1V1L5	11/24/14	-0.021	0.047	0.010	0.076
NOB-7	J1V1L6	11/24/14	0.134	-0.001	0.129	0.824
NOB-8	J1V1L7	11/24/14	0.233	0.015	-0.027	0.372
NOB-10	J1V1L9	11/20/14	-0.026	-0.030	0.084	1.005
NOB-11	J1V1M0	11/24/14	0.157	0.095	0.035	3.939
NOB-12	J1V1M1	11/20/14	-0.009	0.052	0.143	1.390

Statistical Computations

	Europium-152	Europium-154	Europium-155	Nickel-63
95% UCL based on	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.
N	12	12	12	12
% < Detection limit	92%	92%	83%	92%
Mean	0.042	0.008	0.048	1.41
Standard deviation	0.105	0.077	0.060	1.23
Z-statistic	1.64	1.64	1.64	1.64
95% UCL on mean	0.0921	0.0448	0.0770	1.99
Maximum value	0.233	0.088	0.143	3.94

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 05/04/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0

Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/04/15

Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 15 of 43

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations

Verification Data - NOB

Sample Area	Sample Number	Sample Date	Arsenic			Barium			Beryllium			Cadmium			Chromium			Cobalt			Copper			Lead			Manganese		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
NOB-9	J1V1L8	11/20/14	5.58		0.515	51.6		0.103	1.07		0.103	0.238	B	0.103	9.38		0.155	8.35		0.155	11.6		0.309	9.18		0.340	232		0.206
Duplicate of J1V1L8	J1V1M2	11/20/14	7.02		0.514	53.5		0.103	1.02		0.103	0.203	B	0.103	10.9		0.154	8.46		0.154	12.1		0.308	11.0		0.339	255		0.206
NOB-1	J1V1L0	11/24/14	9.32		0.529	66.2		0.106	1.13		0.106	0.262	B	0.106	11.6		0.159	9.15		0.159	12.9		0.318	21.7		0.349	284		0.212
NOB-2 [a]	J1V596	3/18/15	5.8		0.67	60.4		0.077	0.23		0.033	0.11	B	0.041	14.4		0.059	6.4	X	0.10	15.0		1.0	14.7	X	0.27	269		0.10
NOB-3	J1V1L2	11/20/14	8.42		0.493	39.4		0.0986	0.983		0.0986	0.216	B	0.0986	8.65		0.148	8.02		0.148	10.5		0.296	33.8		0.325	232		0.197
NOB-4	J1V1L3	11/20/14	4.62		0.483	32.1		0.0967	0.917		0.0967	0.267	B	0.0967	9.15		0.145	7.81		0.145	11.1		0.290	9.66		0.319	234		0.193
NOB-5 [a]	J1V597	3/18/15	8.7		0.64	80.2		0.073	0.23		0.032	0.14	B	0.040	13.5		0.056	6.8	X	0.097	15.8		1.1	24.3	X	0.26	290		0.097
NOB-6	J1V1L5	11/24/14	9.20		0.525	59.4		0.105	1.12		0.105	0.216	B	0.105	10.7		0.158	8.57		0.158	11.1		0.315	19.8		0.347	243		0.210
NOB-7	J1V1L6	11/24/14	5.26		0.507	58.3		0.101	0.984		0.101	0.214	B	0.101	12.6		0.152	8.10		0.152	13.1		0.304	8.33		0.335	259		0.203
NOB-8	J1V1L7	11/24/14	6.83		0.535	57.0		0.107	0.904		0.107	0.125	B	0.107	13.3		0.161	7.86		0.161	12.1		0.321	2.94		0.353	248		0.214
NOB-10	J1V1L9	11/20/14	6.03		0.491	65.1		0.0982	1.06		0.0982	0.342	B	0.0982	13.7		0.147	8.54		0.147	13.4		0.294	12.7		0.324	273		0.196
NOB-11	J1V1M0	11/24/14	7.60		0.498	56.7		0.0997	1.10		0.0997	0.215	B	0.0997	12.1		0.149	8.35		0.149	11.5		0.299	14.2		0.329	251		0.199
NOB-12	J1V1M1	11/20/14	9.89		0.460	50.3		0.0920	1.04		0.0920	0.198	B	0.092	9.69		0.138	8.26		0.138	11.5		0.276	28.0		0.304	237		0.184

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg	Manganese mg/kg
NOB-9	J1V1L8/ J1V1M2	11/20/14	6.30	52.6	1.05	0.221	10.1	8.41	11.9	10.1	244
NOB-1	J1V1L0	11/24/14	9.32	66.2	1.13	0.262	11.6	9.15	12.9	21.7	284
NOB-2 [a]	J1V596	3/18/15	5.8	60.4	0.23	0.11	14.4	6.4	15.0	14.7	269
NOB-3	J1V1L2	11/20/14	8.42	39.4	0.983	0.216	8.65	8.02	10.5	33.8	232
NOB-4	J1V1L3	11/20/14	4.62	32.1	0.917	0.267	9.15	7.81	11.1	9.66	234
NOB-5 [a]	J1V597	3/18/15	8.7	80.2	0.23	0.14	13.5	6.8	15.8	24.3	290
NOB-6	J1V1L5	11/24/14	9.20	59.4	1.12	0.216	10.7	8.57	11.1	19.8	243
NOB-7	J1V1L6	11/24/14	5.26	58.3	0.984	0.214	12.6	8.10	13.1	8.33	259
NOB-8	J1V1L7	11/24/14	6.83	57.0	0.904	0.125	13.3	7.86	12.1	2.94	248
NOB-10	J1V1L9	11/20/14	6.03	65.1	1.06	0.342	13.7	8.54	13.4	12.7	273
NOB-11	J1V1M0	11/24/14	7.60	56.7	1.10	0.215	12.1	8.35	11.5	14.2	251
NOB-12	J1V1M1	11/20/14	9.89	50.3	1.04	0.198	9.69	8.26	11.5	28.0	237

Statistical Computations

	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
N	12	12	12	12	12	12	12	12	12
% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mean	7.33	56.5	0.895	0.210	11.6	8.02	12.5	16.7	255
Standard deviation	1.76	12.4	0.319	0.065	1.94	0.760	1.62	9.00	19.6
95% UCL on mean	8.47	62.9	1.05	0.257	12.8	8.38	13.4	28.2	266
Maximum value	9.89	80.2	1.13	0.342	14.4	9.15	15.8	33.8	290
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	0.81 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection	22.0 River Protection	10.2 GW & River Protection	512 GW & River Protection
WAC 173-340 3-PART TEST									
95% UCL > Cleanup Limit?	NO	NA	NA	NA	NA	NA	NA	YES	NA
> 10% above Cleanup Limit?	NO	NA	NA	NA	NA	NA	NA	YES	NA
Any sample > 2X Cleanup Limit?	NO	NA	NA	NA	NA	NA	NA	YES	NA
WAC 173-340 Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg) the WAC 173-340 3-part test is not required.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 05/04/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0
Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/04/15
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 16 of 43

1 **100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations**
2 **Verification Data - NOB**

3	Sample	Sample	Sample	Mercury			Nickel			Selenium			Silver			Vanadium			Zinc			Fluoride			Nitrogen in Nitrate			Nitrogen in Nitrite and Nitrate		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	NOB-9	J1V1L8	11/20/14	0.0055	B	0.00388	10.2		0.155	0.333	BD	0.328	0.251	B	0.103	45.6		0.103	28.3	CM	0.412	1.34		0.342	0.842	JB	0.342	0.244	B	0.176
6	Duplicate of J1V1L8	J1V1M2	11/20/14	0.00668	B	0.00386	12.1		0.154	0.341	UD	0.341	0.283	B	0.103	44.3		0.103	28.9	CM	0.411	1.30		0.341	0.826	JB	0.341	0.278	B	0.174
7	NOB-1	J1V1L0	11/24/14	0.00976	B	0.00382	11.7		0.159	0.508	BD	0.339	0.347	B	0.106	45.7		0.106	35.3	CM	0.423	1.40		0.353	10.8	J	0.353	10.6	D	0.897
8	NOB-2 [a]	J1V596	3/18/15	0.011	BM	0.0059	14.6		0.12	0.87	U	0.87	0.16	U	0.16	45.2		0.095	39.4		0.40	1.6	B	0.83	1.3	B	0.32	0.37	U	0.37
9	NOB-3	J1V1L2	11/20/14	0.00417	B	0.00405	8.65		0.148	0.333	UD	0.333	0.196	B	0.0986	43.4		0.0986	29.6	CM	0.394	1.31		0.338	1.29	J	0.338	0.249	B	0.171
10	NOB-4	J1V1L3	11/20/14	0.00409	U	0.00409	9.59		0.145	0.522	BD	0.336	0.0967	U	0.0967	41.5		0.0967	25.8	CM	0.387	0.991	B	0.336	0.936	JB	0.336	0.219	B	0.169
11	NOB-5 [a]	J1V597	3/18/15	0.013	B	0.0064	16.2		0.12	0.83	U	0.83	0.15	U	0.15	48.6		0.091	104		0.38	1.6	B	0.83	2.7		0.32	1.8		0.36
12	NOB-6	J1V1L5	11/24/14	0.00505	B	0.00408	11.7		0.158	0.346	UD	0.346	0.274	B	0.105	45.2		0.105	31.3	CM	0.420	1.30		0.349	1.28	J	0.349	0.718		0.174
13	NOB-7	J1V1L6	11/24/14	0.0053	B	0.00359	13.4		0.152	0.461	BD	0.340	0.360	B	0.101	42.0		0.101	31.3	CM	0.406	1.33		0.347	0.958	JB	0.347	0.297	B	0.176
14	NOB-8	J1V1L7	11/24/14	0.00748	B	0.0040	13.0		0.161	0.568	BD	0.326	0.240	B	0.107	39.1		0.107	30.3	CM	0.428	1.30		0.360	1.09	J	0.360	0.450	B	0.170
15	NOB-10	J1V1L9	11/20/14	0.0764		0.0036	14.4		0.147	0.321	BD	0.302	0.227	B	0.0982	41.5		0.0982	40.7	CM	0.393	1.29		0.345	1.60	J	0.345	0.814		0.167
16	NOB-11	J1V1M0	11/24/14	0.00405	U	0.00405	12.3		0.149	0.376	BD	0.344	0.334	B	0.0997	44.3		0.0997	31.1	CM	0.399	1.31		0.349	2.33	J	0.349	1.46		0.170
17	NOB-12	J1V1M1	11/20/14	0.00627	B	0.00408	10.1		0.138	0.362	BD	0.339	0.318	B	0.092	46.3		0.092	26.9	CM	0.368	1.34		0.340	1.06	J	0.340	0.336	B	0.170

18 **Statistical Computation Input Data**

19	Sample	Sample	Sample	Mercury	Nickel	Selenium	Silver	Vanadium	Zinc	Fluoride	Nitrogen in Nitrate	Nitrogen in Nitrite and Nitrate
20	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
21	NOB-9	J1V1L8/ J1V1M2	11/20/14	0.00609	11.2	0.252	0.267	45.0	28.6	1.32	0.834	0.261
22	NOB-1	J1V1L0	11/24/14	0.00976	11.7	0.508	0.347	45.7	35.3	1.40	10.8	10.6
23	NOB-2 [a]	J1V596	3/18/15	0.0110	14.6	0.435	0.080	45.2	39.4	1.6	1.3	0.19
24	NOB-3	J1V1L2	11/20/14	0.00417	8.65	0.167	0.196	43.4	29.6	1.31	1.29	0.249
25	NOB-4	J1V1L3	11/20/14	0.00205	9.59	0.522	0.0484	41.5	25.8	0.991	0.936	0.219
26	NOB-5 [a]	J1V597	3/18/15	0.0130	16.2	0.415	0.075	48.6	104	1.6	2.7	1.8
27	NOB-6	J1V1L5	11/24/14	0.00505	11.7	0.173	0.274	45.2	31.3	1.30	1.28	0.718
28	NOB-7	J1V1L6	11/24/14	0.00530	13.4	0.461	0.360	42.0	31.3	1.33	0.958	0.297
29	NOB-8	J1V1L7	11/24/14	0.00748	13.0	0.568	0.240	39.1	30.3	1.30	1.09	0.450
30	NOB-10	J1V1L9	11/20/14	0.0764	14.4	0.321	0.227	41.5	40.7	1.29	1.60	0.814
31	NOB-11	J1V1M0	11/24/14	0.00203	12.3	0.376	0.334	44.3	31.1	1.31	2.33	1.46
32	NOB-12	J1V1M1	11/20/14	0.00627	10.1	0.362	0.318	46.3	26.9	1.34	1.06	0.336

33 **Statistical Computations**

34		Mercury	Nickel	Selenium	Silver	Vanadium	Zinc	Fluoride	Nitrogen in Nitrate	Nitrogen in Nitrite and Nitrate
35	95% UCL based on	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
36	N	12	12	12	12	12	12	12	12	12
37	% < Detection limit	17%	0%	33%	25%	0%	0%	0%	0%	8%
38	Mean	0.0124	12.2	0.380	0.231	44.0	37.9	1.34	2.18	1.45
39	Standard deviation	0.0204	2.22	0.132	0.110	2.60	21.3	0.156	2.77	2.93
40	95% UCL on mean	0.0220	13.6	0.448	0.288	45.4	48.0	1.42	3.50	2.84
41	Maximum value	0.0764	16.2	0.568	0.360	48.6	104	1.60	10.8	10.6
42	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	0.33 GW & River Protection	19.1 GW Protection	1 River Protection	0.73 River Protection	85.1 GW Protection	67.8 River Protection	96 GW Protection	1,000 GW Protection	1,000 GW Protection
43	**WAC 173-340 3-PART TEST**									
44	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	NO	NA	NA	NA
45	> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	NO	NA	NA	NA
46	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA	NO	NA	NA	NA
47	**WAC 173-340 Compliance?**	Because all values are below background (0.33 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.78 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.73 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (2.81 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (11.8 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (11.8 mg/kg) the WAC 173-340 3-part test is not required.

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 05/04/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0

Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/04/15

Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 17 of 43

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations

Verification Data - NOB

Sample Area	Sample Number	Sample Date	Sulfate mg/kg	Q	PQL	TPH - motor oil (high boiling) ug/kg	Q	PQL	Benzo(a)anthracene (Method 8310) ug/kg	Q	PQL	Benzo(a)pyrene (Method 8310) ug/kg	Q	PQL	Benzo(b)fluoranthene (Method 8310) ug/kg	Q	PQL	Benzo(ghi)perylene (Method 8310) ug/kg	Q	PQL	Chrysene (Method 8310) ug/kg	Q	PQL	Fluoranthene (Method 8310) ug/kg	Q	PQL	Phenanthrene (Method 8310) ug/kg	Q	PQL
NOB-9	J1V1L8	11/20/14	4.87		1.38	4880	J	2240	8.96		0.552	7.68		0.552	8.83		0.552	0.552	U	0.552	6.51		0.552	11.8		0.552	7.11	J	5.18
Duplicate of J1V1L8	J1V1M2	11/20/14	4.72		1.38	3020	J	2240	14.3		0.550	12.3		0.550	14.4		0.550	8.08		0.550	10.3		0.550	20.5		0.550	10.6	J	5.16
NOB-1	J1V1L0	11/24/14	145		1.42	6370	J	2320	58.7		0.570	50.6		0.570	56.7		0.570	30.5		0.570	41.6		0.570	87.1		0.570	75.1		5.34
NOB-2 [a]	J1V596	3/18/15	15.7		1.7				20	XN	3.1	24		6.3	31		4.1	25	J	7.1	27	JN	4.8	51	N	13	26	JN	12
NOB-3	J1V1L2	11/20/14	5.08		1.36	3220	J	2210	14.7		0.546	11.7		0.546	10.4		0.546	7.93		0.546	13.4		0.546	21.8		0.546	17.1		5.12
NOB-4	J1V1L3	11/20/14	4.87		1.35	2200	U	2200	2.63		0.541	2.14		0.541	1.92		0.541	1.53	J	0.541	3.12	P	0.541	4.25		0.541	5.08	U	5.08
NOB-5 [a]	J1V597	3/18/15	28.8		1.7				15	X	3.2	15		6.5	17		4.2	11	JX	7.3	15	JX	4.9	29	J	13	14	J	12
NOB-6	J1V1L5	11/24/14	6.07		1.41	4090	J	2280	6.13		0.562	5.48		0.562	5.13		0.562	4.62		0.562	6.05		0.562	9.28		0.562	6.15	J	5.27
NOB-7	J1V1L6	11/24/14	5.71		1.40	2830	J	2270	3.76		0.560	3.37		0.560	3.69		0.560	2.66		0.560	3.38		0.560	5.94		0.560	5.25	U	5.25
NOB-8	J1V1L7	11/24/14	8.90		1.45	2890	J	2360	5.73		0.581	4.64		0.581	5.45		0.581	3.50		0.581	4.38		0.581	7.73		0.581	5.45	U	5.45
NOB-10	J1V1L9	11/20/14	11.4		1.39	4620	J	2260	21.5		0.555	19.0		0.555	21.4		0.555	11.1		0.555	17.7		0.555	32.8		0.555	25.4		5.2
NOB-11	J1V1M0	11/24/14	14.1		1.40	2540	J	2290	22.5		0.563	19.8		0.563	24.6		0.563	13.4		0.563	15.0		0.563	30.1		0.563	16.3	J	5.28
NOB-12	J1V1M1	11/20/14	11.1		1.37	3910	J	2220	5.34		0.549	5.34		0.549	5.87		0.549	4.20		0.549	4.84		0.549	7.48		0.549	5.14	U	5.14

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Sulfate mg/kg	TPH - motor oil (high boiling) ug/kg	Benzo(a)anthracene (Method 8310) ug/kg	Benzo(a)pyrene (Method 8310) ug/kg	Benzo(b)fluoranthene (Method 8310) ug/kg	Benzo(ghi)perylene (Method 8310) ug/kg	Chrysene (Method 8310) ug/kg	Fluoranthene (Method 8310) ug/kg	Phenanthrene (Method 8310) ug/kg
NOB-9	J1V1L8/ J1V1M2	11/20/14	4.80	3950	11.6	10.0	11.6	4.18	8.4	16.2	8.86
NOB-1	J1V1L0	11/24/14	145	6370	58.7	50.6	56.7	30.5	41.6	87.1	75.1
NOB-2 [a]	J1V596	3/18/15	15.7		20	24	31	25	27	51	26
NOB-3	J1V1L2	11/20/14	5.08	3220	14.7	11.7	10.4	7.93	13.4	21.8	17.1
NOB-4	J1V1L3	11/20/14	4.87	1100	2.63	2.14	1.92	1.53	3.12	4.25	2.54
NOB-5 [a]	J1V597	3/18/15	28.8		15	15	17	11	15	29	14
NOB-6	J1V1L5	11/24/14	6.07	4090	6.13	5.48	5.13	4.62	6.05	9.28	6.15
NOB-7	J1V1L6	11/24/14	5.71	2830	3.76	3.37	3.69	2.66	3.38	5.94	2.63
NOB-8	J1V1L7	11/24/14	8.90	2890	5.73	4.64	5.45	3.50	4.38	7.73	2.73
NOB-10	J1V1L9	11/20/14	11.4	4620	21.5	19.0	21.4	11.1	17.7	32.8	25.4
NOB-11	J1V1M0	11/24/14	14.1	2540	22.5	19.8	24.6	13.4	15.0	30.1	16.3
NOB-12	J1V1M1	11/20/14	11.1	3910	5.34	5.34	5.87	4.20	4.84	7.48	2.57

Statistical Computations

	Sulfate	TPH - motor oil (high boiling)	Benzo(a)anthracene (Method 8310)	Benzo(a)pyrene (Method 8310)	Benzo(b)fluoranthene (Method 8310)	Benzo(ghi)perylene (Method 8310)	Chrysene (Method 8310)	Fluoranthene (Method 8310)	Phenanthrene (Method 8310)
95% UCL based on	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
N	12	10	12	12	12	12	12	12	12
% < Detection limit	0%	10%	0%	0%	0%	0%	0%	0%	33%
Mean	21.8	3552	15.6	14.3	16.2	10.0	13.3	25.2	16.6
Standard deviation	39.4	1405	15.3	13.5	15.7	9.18	11.5	24.1	20.3
95% UCL on mean	40.5	4093	33.8	32.5	41.3	22.1	26.9	58.5	51.6
Maximum value	145	6370	58.7	50.6	56.7	30.5	41.6	87.1	75.1
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise	25,000 GW Protection	200,000 ug/kg GW & River Protection	15 ug/kg GW and River Protection	15 ug/kg GW and River Protection	15 ug/kg GW and River Protection	48,000 ug/kg GW Protection	100 ug/kg River Protection	18,000 ug/kg River Protection	240,000 ug/kg GW Protection
WAC 173-340 3-PART TEST									
95% UCL > Cleanup Limit?	NA	NO	YES	YES	YES	NO	NO	NO	NO
> 10% above Cleanup Limit?	NA	NO	YES	YES	YES	NO	NO	NO	NO
Any sample > 2X Cleanup Limit?	NA	NO	YES	YES	YES	NO	NO	NO	NO
WAC 173-340 Compliance?	Because all values are below background (237 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 05/04/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0
Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/04/15
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 18 of 43

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations

Verification Data - NOB

Sample Area	Sample Number	Sample Date	Pyrene (Method 8310) ug/kg	Q	PQL	Benzo(a)anthracene (Method 8270) ug/kg	Q	PQL	Fluoranthene (Method 8270) ug/kg	Q	PQL	Pyrene (Method 8270) ug/kg	Q	PQL
NOB-9	J1V1L8	11/20/14	12.4		0.552	12.1	J	10.3	15.9	J	10.3	12.4	J	10.3
Duplicate of J1V1L8	J1V1M2	11/20/14	18.6		0.550	15.8	J	10.3	23.1	J	10.3	19.3	J	10.3
NOB-1	J1V1L0	11/24/14	81.5		0.57	26.8	J	10.7	46.7		10.7	33.9	J	10.7
NOB-2 [a]	J1V596	3/18/15	60		12	19	J	19	35	U	35	28	J	12
NOB-3	J1V1L2	11/20/14	29.4		0.546	10.2	U	10.2	13.6	J	10.2	13.0	J	10.2
NOB-4	J1V1L3	11/20/14	4.54		0.541	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
NOB-5 [a]	J1V597	3/18/15	36-	J	12	21	U	21	37	U	37	32	J	13
NOB-6	J1V1L5	11/24/14	10.4		0.562	10.5	U	10.5	10.5	U	10.5	10.5	U	10.5
NOB-7	J1V1L6	11/24/14	5.02		0.560	10.5	U	10.5	10.5	U	10.5	10.5	U	10.5
NOB-8	J1V1L7	11/24/14	6.59		0.581	23.2	J	10.9	35.1	J	10.9	30.4	J	10.9
NOB-10	J1V1L9	11/20/14	31.3		0.555	23.3	J	10.4	44.2		10.4	31.3	J	10.4
NOB-11	J1V1M0	11/24/14	26.7		0.563	17.2	J	10.5	20.7	J	10.5	17.2	J	10.5
NOB-12	J1V1M1	11/20/14	7.88		0.549	10.3	U	10.3	10.3	U	10.3	10.3	U	10.3

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Pyrene (Method 8310) ug/kg			Benzo(a)anthracene (Method 8270) ug/kg			Fluoranthene (Method 8270) ug/kg			Pyrene (Method 8270) ug/kg		
NOB-9	J1V1L8/ J1V1M2	11/20/14	15.5			14.0			19.5			15.9		
NOB-1	J1V1L0	11/24/14	81.5			26.8			46.7			33.9		
NOB-2 [a]	J1V596	3/18/15	60			19			18			28		
NOB-3	J1V1L2	11/20/14	29.4			5.10			13.6			13.0		
NOB-4	J1V1L3	11/20/14	4.54			5.10			5.10			5.10		
NOB-5 [a]	J1V597	3/18/15	36			11			19			32		
NOB-6	J1V1L5	11/24/14	10.4			5.25			5.25			5.25		
NOB-7	J1V1L6	11/24/14	5.02			5.25			5.25			5.25		
NOB-8	J1V1L7	11/24/14	6.59			23.2			35.1			30.4		
NOB-10	J1V1L9	11/20/14	31.3			23.3			44.2			31.3		
NOB-11	J1V1M0	11/24/14	26.7			17.2			20.7			17.2		
NOB-12	J1V1M1	11/20/14	7.88			5.15			5.15			5.15		

Statistical Computations

	Pyrene (Method 8310)	Benzo(a)anthracene (Method 8270)	Fluoranthene (Method 8270)	Pyrene (Method 8270)
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	12	12	12	12
% < Detection limit	0%	50%	50%	33%
Mean	26.2	13.3	19.7	18.5
Standard deviation	24.0	8.35	14.9	11.9
95% UCL on mean	65.4	17.3	26.8	24.2
Maximum value	81.5	26.8	46.7	33.9
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise	48,000 ug/kg GW Protection	15 ug/kg GW and River Protection	18,000 ug/kg River Protection	48,000 ug/kg GW Protection
WAC 173-340 3-PART TEST				
95% UCL > Cleanup Limit?	NO	YES	NO	NO
> 10% above Cleanup Limit?	NO	YES	NO	NO
Any sample > 2X Cleanup Limit?	NO	NO	NO	NO
WAC 173-340 Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford
Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/04/15
Job No. 14655

Calc. No. 0100H-CA-V0226
Checked I. B. Berezovskiy

Rev. No. 0
Date 05/04/15
Sheet No. 19 of 43

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Maximum Calculations
Verification Data - NOB

Sample Area	Sample Number	Sample Date	Antimony			Boron			Hexavalent Chromium			Chloride			TPH - Diesel Range EXT			TPH - Diesel Range			Aroclor-1260			4-4'-DDT			Acenaphthene (Method 8310)		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
NOB-9	J1V1L8	11/20/14	3.40	UD	3.40	1.03	U	1.03	0.122	U	0.122	1.28	UBC	0.695				2240	U	2240	1.15	U	1.15	0.345	U	0.345	5.18	U	5.18
Duplicate of J1V1L8	J1V1M2	11/20/14	3.39	UD	3.39	1.03	U	1.03	0.122	U	0.122	1.16	UBC	0.693				2240	U	2240	1.15	U	1.15	0.344	U	0.344	5.16	U	5.16
NOB-1	J1V1L0	11/24/14	3.49	UD	3.49	1.06	U	1.06	0.127	U	0.127	11.2	C	0.718				2320	U	2320	8.01		1.18	0.357	U	0.357	14.4	J	5.34
NOB-2 [a]	J1V596	3/18/15	0.38	U	0.38	1.3	B	0.99	0.303		0.155	7.3	C	2.0	6100		1000	3800	J	680	2.7	U	2.7	0.60	U	0.60	9.8	UN	9.8
NOB-3	J1V1L2	11/20/14	3.25	UD	3.25	0.986	U	0.986	0.122	U	0.122	1.58	UBC	0.687				2210	U	2210	1.14	U	1.14	0.342	U	0.342	5.12	U	5.12
NOB-4	J1V1L3	11/20/14	3.19	UD	3.19	0.967	U	0.967	0.114	U	0.114	1.56	UBC	0.681				2200	U	2200	1.13	U	1.13	0.338	U	0.338	5.08	U	5.08
NOB-5 [a]	J1V597	3/18/15	0.37	U	0.37	2.3		0.95	0.322		0.155	8.0	C	2.0	3500	J	1000	2700	J	700	2.6	U	2.6	0.61	U	0.61	10	U	10
NOB-6	J1V1L5	11/24/14	4.16	BD	3.47	1.05	U	1.05	0.126	U	0.126	2.39	UC	0.708				2280	U	2280	1.17	U	1.17	0.352	U	0.352	5.27	U	5.27
NOB-7	J1V1L6	11/24/14	1.08		0.335	1.01	U	1.01	0.117	U	0.117	2.46	UC	0.704				2270	U	2270	1.16	U	1.16	0.350	U	0.350	5.25	U	5.25
NOB-8	J1V1L7	11/24/14	0.908	B	0.353	1.07	U	1.07	0.120	U	0.120	2.85	UC	0.730				2360	U	2360	1.21	U	1.21	0.363	U	0.363	5.45	U	5.45
NOB-10	J1V1L9	11/20/14	3.24	UD	3.24	0.982	U	0.982	0.292	B	0.114	1.90	UBC	0.700				2260	U	2260	13.2		1.16	0.781	J	0.347	5.20	U	5.20
NOB-11	J1V1M0	11/24/14	3.29	UD	3.29	0.997	U	0.997	0.119	U	0.119	6.33	C	0.708				2290	U	2290	1.17	U	1.17	0.351	U	0.351	5.28	U	5.28
NOB-12	J1V1M1	11/20/14	3.04	UD	3.04	0.920	U	0.920	0.127	U	0.127	2.34	UC	0.690				2220	U	2220	1.14	U	1.14	0.343	U	0.343	5.14	U	5.14

3-Part Test Evaluations

	Antimony	Boron	Hexavalent Chromium	Chloride	TPH - Diesel Range EXT	TPH - Diesel Range	Aroclor-1260	4-4'-DDT	Acenaphthene (Method 8310)
% < Detection limit	75%	83%	75%	67%	0%	83%	83%	92%	92%
Maximum value	4.16	2.3	0.322	11.2	6100	3800	13.2	0.781	14.4
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise	5 GW Protection	320 GW Protection	2 River Protection	25,000 GW Protection	200,000 ug/kg DE, GW, & River Protection	200,000 ug/kg DE, GW, & River Protection	17 ug/kg GW & River Protection	3.3 ug/kg River Protection	96,000 ug/kg GW Protection
3-PART TEST									
Maximum > Cleanup Limit?	NA	NO	NO	NA	NO	NO	NO	NO	NO
> 10% above Cleanup Limit?	NA	NO	NO	NA	NO	NO	NO	NO	NO
Any sample > 2X Cleanup Limit?	NA	NO	NO	NA	NO	NO	NO	NO	NO
3-Part Test Compliance?	Because all values are below background (5 mg/kg) the 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (100 mg/kg) the 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Maximum Calculations
Verification Data - NOB

Sample Area	Sample Number	Sample Date	Anthracene (Method 8310)			Benzo(k)fluoranthene (Method 8310)			Fluorene (Method 8310)			Indeno(1,2,3-cd)pyrene (Method 8310)			Benzo(a)pyrene (Method 8270)			Benzo(b)fluoranthene (Method 8270)			Benzo(ghi)perylene (Method 8270)			Benzo(k)fluoranthene (Method 8270)			Chrysene (Method 8270)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
NOB-9	J1V1L8	11/20/14	1.73	U	1.73	0.276	U	0.276	5.18	U	5.18	0.552	U	0.552	10.3	U	10.3	13.4	J	10.3	10.3	U	10.3	10.3	U	10.3	10.3	U	10.3
Duplicate of J1V1L8	J1V1M2	11/20/14	2.56	J	1.72	0.275	U	0.275	5.16	U	5.16	0.550	U	0.550	10.7	J	10.3	13.4	J	10.3	10.3	U	10.3	10.3	U	10.3	11.4	J	10.3
NOB-1	J1V1L0	11/24/14	23.3		1.78	0.285	U	0.285	11.2	J	5.34	0.570	U	0.570	21.1	J	10.7	25.3	J	10.7	10.7	U	10.7	14.3	J	10.7	21.1	J	10.7
NOB-2 [a]	J1V596	3/18/15	3.0	UN	3.0	11	JN	3.9	5.2	UN	5.2	21	JXN	12	19	U	19	25	U	25	15	U	15	39	U	39	26	U	26
NOB-3	J1V1L2	11/20/14	1.71	U	1.71	0.273	U	0.273	5.12	U	5.12	0.546	U	0.546	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
NOB-4	J1V1L3	11/20/14	1.69	U	1.69	0.271	U	0.271	5.08	U	5.08	0.541	U	0.541	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
NOB-5 [a]	J1V597	3/18/15	3.1	U	3.1	5.9	J	4.0	5.3	U	5.3	15	J	12	21	U	21	27	U	27	17	U	17	42	U	42	28	U	28
NOB-6	J1V1L5	11/24/14	1.76	U	1.76	0.281	U	0.281	5.27	U	5.27	0.562	U	0.562	10.5	U	10.5	10.5	U	10.5	10.5	U	10.5	10.5	U	10.5	10.5	U	10.5
NOB-7	J1V1L6	11/24/14	1.75	U	1.75	0.280	U	0.280	5.25	U	5.25	0.560	U	0.560	10.5	U	10.5	10.5	U	10.5	10.5	U	10.5	10.5	U	10.5	10.5	U	10.5
NOB-8	J1V1L7	11/24/14	1.82	U	1.82	0.290	U	0.290	5.45	U	5.45	0.581	U	0.581	20.3	J	10.9	32.2	J	10.9	10.9	U	10.9	10.9	U	10.9	21.4	J	10.9
NOB-10	J1V1L9	11/20/14	5.36	J	1.73	12.0		0.278	5.20	U	5.20	0.555	U	0.555	20.2	J	10.4	29.2	J	10.4	11.8	J	10.4	10.4	U	10.4	21.9	J	10.4
NOB-11	J1V1M0	11/24/14	4.23	J	1.76	0.281	U	0.281	5.28	U	5.28	0.563	U	0.563	11.6	J	10.5	18.6	J	10.5	10.5	U	10.5	10.5	U	10.5	10.5	U	10.5
NOB-12	J1V1M1	11/20/14	1.71	U	1.71	0.274	U	0.274	5.14	U	5.14	0.549	U	0.549	10.3	U	10.3	10.3	U	10.3	10.3	U	10.3	10.3	U	10.3	10.3	U	10.3

3-Part Test Evaluations

	Anthracene (Method 8310)	Benzo(k)fluoranthene (Method 8310)	Fluorene (Method 8310)	Indeno(1,2,3-cd)pyrene (Method 8310)	Benzo(a)pyrene (Method 8270)	Benzo(b)fluoranthene (Method 8270)	Benzo(ghi)perylene (Method 8270)	Benzo(k)fluoranthene (Method 8270)	Chrysene (Method 8270)
% < Detection limit	67%	75%	92%	83%	58%	58%	92%	92%	67%
Maximum value	23.3	12.0	11.2	21	21.1	32.2	11.8	14.3	21.9
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise	240,000 ug/kg GW Protection	15 ug/kg GW & River Protection	64,000 ug/kg GW Protection	330 ug/kg GW & River Protection	15 ug/kg GW & River Protection	15 ug/kg GW & River Protection	48,000 ug/kg GW Protection	15 ug/kg GW & River Protection	100 ug/kg River Protection
3-PART TEST									
Maximum > Cleanup Limit?	NO	NO	NO	NO	YES	YES	NO	NO	NO
> 10% above Cleanup Limit?	NO	NO	NO	NO	YES	YES	NO	NO	NO
Any sample > 2X Cleanup Limit?	NO	NO	NO	NO	NO	YES	NO	NO	NO
3-Part Test Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/04/15
Job No. 14655

Calc. No. 0100H-CA-V0226
Checked I. B. Berezovskiy

Rev. No. 0
Date 05/04/15
Sheet No. 20 of 43

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Maximum Calculations
Verification Data - NOB

Sample Area	Sample Number	Sample Date	Indeno(1,2,3-cd)pyrene (Method 8270)			Phenanthrene (Method 8270)		
			ug/kg	Q	PQL	ug/kg	Q	PQL
NOB-9	J1V1L8	11/20/14	10.3	U	10.3	10.3	U	10.3
Duplicate of J1V1L8	J1V1M2	11/20/14	10.3	U	10.3	14.1	J	10.3
NOB-1	J1V1L0	11/24/14	11.1	J	10.7	25.7	J	10.7
NOB-2 [a]	J1V596	3/18/15	21	U	21	16	U	16
NOB-3	J1V1L2	11/20/14	10.2	U	10.2	10.2	U	10.2
NOB-4	J1V1L3	11/20/14	10.2	U	10.2	10.2	U	10.2
NOB-5 [a]	J1V597	3/18/15	23	U	23	21	J	18
NOB-6	J1V1L5	11/24/14	10.5	U	10.5	10.5	U	10.5
NOB-7	J1V1L6	11/24/14	10.5	U	10.5	10.5	U	10.5
NOB-8	J1V1L7	11/24/14	10.9	U	10.9	14.1	J	10.9
NOB-10	J1V1L9	11/20/14	13.6	J	10.4	29.9	J	10.4
NOB-11	J1V1M0	11/24/14	10.5	U	10.5	10.5	U	10.5
NOB-12	J1V1M1	11/20/14	10.3	U	10.3	10.3	U	10.3

3-Part Test Evaluations

	Indeno(1,2,3-cd)pyrene (Method 8270)			Phenanthrene (Method 8270)		
% < Detection limit	83%			58%		
Maximum value	13.6			29.9		
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise	330 ug/kg	GW & River Protection		240,000 ug/kg	DE, GW, & River Protection	
3-PART TEST						
Maximum > Cleanup Limit?	NO			NO		
> 10% above Cleanup Limit?	NO			NO		
Any sample > 2X Cleanup Limit?	NO			NO		
3-Part Test Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.		

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/04/15
Job No. 14655

Calc. No. 0100H-CA-V0226
Checked I. B. Berezovskiy

Rev. No. 0
Date 05/04/15
Sheet No. 21 of 43

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations

Verification Data - SOB

Sample Area	Sample Number	Sample Date	Cesium-137			Cobalt-60			Europium-152			Europium-154			Europium-155			Nickel-63			Total beta radiostrontium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SOB-3	J1V1M5	11/13/14	-0.009	U	0.05	0.026	U	0.06	0.106	U	0.14	0.060	U	0.07	-0.028	U	0.11	0.598	U	2.43	-0.128	U	0.53
Duplicate of J1V1M5	J1V1N5	11/13/14	-0.033	U	0.04	0.009	U	0.04	0.168		0.13	-0.060	U	0.07	0.097		0.09	1.094	U	2.42	0.382	U	0.41
SOB-1	J1V1M3	11/13/14	0.002	U	0.04	0.005	U	0.03	0.178		0.11	0.020	U	0.06	0.072	U	0.10	0.603	U	2.45	0.323	U	0.34
SOB-2	J1V1M4	11/13/14	0.043	U	0.08	0.031	U	0.04	0.016	U	0.12	-0.007	U	0.06	0.113		0.10	6.654		2.46	0.206	U	0.38
SOB-4	J1V1M6	11/13/14	-0.002	U	0.05	0.031	U	0.06	0.060	U	0.13	-0.120	U	0.07	0.172		0.13	-0.685	U	2.50	0.231	U	0.39
SOB-5	J1V1M7	11/13/14	-0.003	U	0.04	0.006	U	0.04	0.025	U	0.11	0.023	U	0.05	0.041	U	0.09	0.296	U	2.40	0.240	U	0.39
SOB-6	J1V1M8	11/13/14	0.080		0.07	0.007	U	0.04	-0.056	U	0.11	-0.016	U	0.06	0.020	U	0.09	-0.573	U	2.44	-0.043	U	0.39
SOB-7	J1V1M9	11/13/14	0.033	U	0.05	-0.001	U	0.05	0.080	U	0.12	-0.053	U	0.06	-0.042	U	0.09	2.728		2.46	0.696		0.37
SOB-8	J1V1N0	11/13/14	0.001	U	0.09	0.102		0.10	0.108	U	0.21	0.140		0.11	0.010	U	0.15	0	U	2.40	0.341	U	0.41
SOB-9	J1V1N1	11/13/14	-0.011	U	0.07	-0.017	U	0.08	0.035	U	0.19	-0.004	U	0.10	-0.018	U	0.13	0.293	U	2.50	0.332	U	0.37
SOB-10	J1V1N2	11/13/14	0.015	U	0.04	0.032	U	0.03	0.025	U	0.11	0.002	U	0.05	-0.075	U	0.09	0	U	2.53	0.174	U	0.34
SOB-11	J1V1N3	11/13/14	0.034	U	0.09	0.054	U	0.08	0.118	U	0.21	0.104	U	0.11	0.246		0.20	1.096	U	2.33	0.299	U	0.41
SOB-12	J1V1N4	11/13/14	-0.011	U	0.08	0.006	U	0.09	0.129	U	0.19	-0.011	U	0.10	-0.086	U	0.13	12.437		2.08	0.084	U	0.35

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Cesium-137 pCi/g	Cobalt-60 pCi/g	Europium-152 pCi/g	Europium-154 pCi/g	Europium-155 pCi/g	Nickel-63 pCi/g	Total beta radiostrontium pCi/g
SOB-3	J1V1M5/ J1V1N5	11/13/14	-0.021	0.018	0.137	0.000	0.035	0.846	0.127
SOB-1	J1V1M3	11/13/14	0.002	0.005	0.178	0.020	0.072	0.603	0.323
SOB-2	J1V1M4	11/13/14	0.043	0.031	0.016	-0.007	0.113	6.654	0.206
SOB-4	J1V1M6	11/13/14	-0.002	0.031	0.060	-0.120	0.172	-0.685	0.231
SOB-5	J1V1M7	11/13/14	-0.003	0.006	0.025	0.023	0.041	0.296	0.240
SOB-6	J1V1M8	11/13/14	0.080	0.007	-0.056	-0.016	0.020	-0.573	-0.043
SOB-7	J1V1M9	11/13/14	0.033	-0.001	0.080	-0.053	-0.042	2.728	0.696
SOB-8	J1V1N0	11/13/14	0.001	0.102	0.108	0.140	0.010	0	0.341
SOB-9	J1V1N1	11/13/14	-0.011	-0.017	0.035	-0.004	-0.018	0.293	0.332
SOB-10	J1V1N2	11/13/14	0.015	0.032	0.025	0.002	-0.075	0	0.174
SOB-11	J1V1N3	11/13/14	0.034	0.054	0.118	0.104	0.246	1.096	0.299
SOB-12	J1V1N4	11/13/14	-0.011	0.006	0.129	-0.011	-0.086	12.437	0.084

Statistical Computations

	Cesium-137	Cobalt-60	Europium-152	Europium-154	Europium-155	Nickel-63	Total beta radiostrontium
95% UCL based on	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric z-statistic.
N	12	12	12	12	12	12	12
% < Detection limit	92%	92%	83%	92%	67%	75%	92%
Mean	0.013	0.023	0.071	0.007	0.041	1.975	0.251
Standard deviation	0.029	0.031	0.066	0.066	0.099	3.848	0.180
Z-statistic	1.645	1.645	1.645	1.645	1.645	1.645	1.645
95% UCL on mean	0.027	0.038	0.102	0.038	0.087	3.802	0.337
Maximum value	0.080	0.102	0.178	0.140	0.246	12.437	0.696

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 05/07/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0
Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/07/15
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 22 of 43

1 **100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations**

2 **Verification Data - SOB**

3	Sample	Sample	Sample	Arsenic			Barium			Beryllium			Cadmium			Chromium			Cobalt			Copper			Lead			Manganese		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	SOB-3	J1V1M5	11/13/14	4.18		0.437	67.8		0.0873	0.722		0.0873	0.318	B	0.0873	11.6		0.131	7.23	D	0.655	15.6		0.262	7.33	D	1.44	311		0.175
6	Duplicate of J1V1M5	J1V1N5	11/13/14	3.97		0.500	70.1		0.100	0.769		0.100	0.357	B	0.100	12.2		0.150	5.93	D	0.751	15.6		0.30	7.33	D	1.65	322		0.200
7	SOB-1	J1V1M3	11/13/14	3.11		0.507	82.0		0.101	0.799		0.101	0.407	B	0.101	11.7		0.152	8.24	D	0.760	15.7		0.304	7.20	D	1.67	334		0.203
8	SOB-2	J1V1M4	11/13/14	3.88		0.504	66.8		0.101	0.747		0.101	0.354	B	0.101	12.7		0.151	7.12	D	0.757	15.1		0.303	5.90	D	1.66	316		0.202
9	SOB-4	J1V1M6	11/13/14	10.3		0.495	48.4		0.0990	0.630		0.0990	0.314	B	0.099	11.1		0.149	7.48	DN	0.743	14.8		0.297	34.6	DN	1.63	263		0.198
10	SOB-5	J1V1M7	11/13/14	9.15		0.490	52.1		0.0979	0.673		0.0979	0.349	B	0.0979	10.6		0.147	5.67	D	0.735	15.1		0.294	28.4	D	1.62	276		0.196
11	SOB-6	J1V1M8	11/13/14	6.08		0.505	60.3		0.101	0.662		0.101	0.342	B	0.101	12.3		0.151	8.26	DN	0.757	18.3		0.303	32.0	DN	1.67	276		0.202
12	SOB-7	J1V1M9	11/13/14	8.00		0.476	60.2		0.0951	0.685		0.0951	0.335	B	0.0951	11.2		0.143	6.65	D	0.713	15.5		0.285	30.6	D	1.57	274		0.190
13	SOB-8	J1V1N0	11/13/14	6.20		0.468	53.9		0.0937	0.612		0.0937	0.293	B	0.0937	9.86		0.140	6.80	D	0.702	16.1		0.281	18.5	D	1.55	252		0.187
14	SOB-9	J1V1N1	11/13/14	2.30	B	0.441	49.6		0.0883	0.814		0.0883	0.401	B	0.0883	7.95		0.132	9.23	DN	0.662	13.4		0.265	4.88	DN	1.46	273		0.177
15	SOB-10	J1V1N2	11/13/14	6.59		0.462	84.4		0.0924	0.663		0.0924	0.291	B	0.0924	10.5		0.139	7.40	DN	0.693	14.5		0.277	26.5	DN	1.52	257		0.185
16	SOB-11	J1V1N3	11/13/14	5.84		0.439	50.8		0.0877	0.624		0.0877	0.335	B	0.0877	12.5		0.132	7.58	DN	0.658	14.6		0.263	22.3	DN	1.45	259		0.175
17	SOB-12	J1V1N4	11/13/14	1.51	B	0.441	53.5		0.0882	0.946		0.0882	0.412	B	0.0882	6.56		0.132	10.1	DN	0.662	15.9		0.265	4.71	DN	1.46	297		0.176

18 **Statistical Computation Input Data**

19	Sample	Sample	Sample	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese
20	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
21	SOB-3	J1V1M5/ J1V1N5	11/13/14	4.08	69.0	0.746	0.338	11.9	6.58	15.6	7.33	317
22	SOB-1	J1V1M3	11/13/14	3.11	82.0	0.799	0.407	11.7	8.24	15.7	7.20	334
23	SOB-2	J1V1M4	11/13/14	3.88	66.8	0.747	0.354	12.7	7.12	15.1	5.90	316
24	SOB-4	J1V1M6	11/13/14	10.3	48.4	0.630	0.314	11.1	7.48	14.8	34.6	263
25	SOB-5	J1V1M7	11/13/14	9.15	52.1	0.673	0.349	10.6	5.67	15.1	28.4	276
26	SOB-6	J1V1M8	11/13/14	6.08	60.3	0.662	0.342	12.3	8.26	18.3	32.0	276
27	SOB-7	J1V1M9	11/13/14	8.00	60.2	0.685	0.335	11.2	6.65	15.5	30.6	274
28	SOB-8	J1V1N0	11/13/14	6.20	53.9	0.612	0.293	9.86	6.80	16.1	18.5	252
29	SOB-9	J1V1N1	11/13/14	2.30	49.6	0.814	0.401	7.95	9.23	13.4	4.88	273
30	SOB-10	J1V1N2	11/13/14	6.59	84.4	0.663	0.291	10.5	7.40	14.5	26.5	257
31	SOB-11	J1V1N3	11/13/14	5.84	50.8	0.624	0.335	12.5	7.58	14.6	22.3	259
32	SOB-12	J1V1N4	11/13/14	1.51	53.5	0.946	0.412	6.56	10.1	15.9	4.71	297

33 **Statistical Computations**

34		Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese
35	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
36	N	12	12	12	12	12	12	12	12	12
37	% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%	0%
38	Mean	5.59	60.9	0.717	0.348	10.7	7.59	15.4	18.6	283
39	Standard deviation	2.72	12.3	0.0984	0.0408	1.86	1.22	1.18	11.9	26.8
40	95% UCL on mean	8.52	67.8	0.769	0.370	11.6	8.28	15.9	24.2	297
41	Maximum value	10.3	84.4	0.946	0.412	12.7	10.1	18.3	34.6	334
42	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	0.81 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection	22.0 River Protection	10.2 GW & River Protection	512 GW & River Protection
43	**WAC 173-340 3-PART TEST**									
44	95% UCL > Cleanup Limit?	NO	NA	NA	NA	NA	NA	NA	YES	NA
45	> 10% above Cleanup Limit?	NO	NA	NA	NA	NA	NA	NA	YES	NA
46	Any sample > 2X Cleanup Limit?	NO	NA	NA	NA	NA	NA	NA	YES	NA
47	**WAC 173-340 Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg) the WAC 173-340 3-part test is not required.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/07/15
Job No. 14655

Calc. No. 0100H-CA-V0226
Checked I. B. Berezovskiy

Rev. No. 0
Date 05/07/15
Sheet No. 23 of 43

1 **100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations**
2 **Verification Data - SOB**

3	Sample	Sample	Sample	Mercury			Nickel			Vanadium			Zinc			Chloride			Fluoride			Nitrogen in Nitrate			Nitrogen in nitrate and nitrite			Sulfate		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	SOB-3	J1V1M5	11/13/14	0.0060	B	0.0040	11.1		0.131	47.1	D	0.437	36.3	D	1.75	3.70		0.684	2.84		0.337	2.04		0.337	0.955	C	0.169	11.4		1.36
6	Duplicate of J1V1M5	J1V1N5	11/13/14	0.00513	B	0.0040	11.2		0.150	39.0	D	0.500	30.7	D	2.00	3.65		0.685	2.75		0.338	2.05		0.338	0.808	C	0.170	13.1		1.36
7	SOB-1	J1V1M3	11/13/14	0.00513	B	0.0040	11.0		0.152	54.8	D	0.507	42.3	D	2.03	1.96	B	0.683	1.87		0.336	2.03		0.336	0.775	C	0.172	4.53		1.36
8	SOB-2	J1V1M4	11/13/14	0.00591	B	0.00373	13.6		0.151	45.7	D	0.504	35.6	D	2.02	2.23		0.689	1.45		0.340	1.40		0.340	0.666	C	0.175	4.04	B	1.37
9	SOB-4	J1V1M6	11/13/14	0.00546	B	0.0040	11.7		0.149	51.6	DMN	0.495	40.3	CDN	1.98	1.56	B	0.693	1.56		0.341	1.01	B	0.341	0.402	B	0.169	5.77		1.38
10	SOB-5	J1V1M7	11/13/14	0.00543	B	0.0040	10.2		0.147	40.5	D	0.49	30.0	D	1.96	1.34	B	0.685	1.32		0.337	0.853	B	0.337	0.197	BC	0.166	3.87	B	1.36
11	SOB-6	J1V1M8	11/13/14	0.0106	B	0.00384	11.8		0.151	58.8	DMN	0.505	49.4	CDN	2.02	4.85		0.688	0.966	B	0.339	47.0		0.339	18.5	D	0.854	26.1		1.37
12	SOB-7	J1V1M9	11/13/14	0.00607	B	0.0040	12.8		0.143	51.0	D	0.476	39.5	D	1.9	14.4		0.699	1.49		0.344	31.3		0.344	35.7	D	1.77	22.0		1.39
13	SOB-8	J1V1N0	11/13/14	0.00435	B	0.00389	10.8		0.140	43.5	D	0.468	36.1	D	1.87	1.32	B	0.688	0.826	B	0.339	1.18		0.339	0.889	C	0.175	11.1		1.37
14	SOB-9	J1V1N1	11/13/14	0.00409	U	0.00409	9.75		0.132	70.7	DMN	0.441	47.3	CDN	1.77	2.95		0.687	0.776	B	0.338	1.01	B	0.338	0.391	B	0.162	4.22		1.36
15	SOB-10	J1V1N2	11/13/14	0.00548	B	0.0040	11.2		0.139	51.2	DMN	0.462	46.8	CDN	1.85	2.01	B	0.691	1.05		0.340	1.12		0.340	0.457	B	0.165	4.92		1.37
16	SOB-11	J1V1N3	11/13/14	0.00451	B	0.0040	12.2		0.132	57.3	DMN	0.439	41.3	CDN	1.75	8.57		0.678	1.04		0.334	1.19		0.334	0.378	B	0.162	12.0		1.35
17	SOB-12	J1V1N4	11/13/14	0.0040	U	0.0040	10.5		0.132	80.5	DMN	0.441	47.7	CDN	1.76	1.65	B	0.687	0.820	B	0.338	1.05		0.338	0.299	B	0.168	7.49		1.36

18 **Statistical Computation Input Data**

19	Sample	Sample	Sample	Mercury	Nickel	Vanadium	Zinc	Chloride	Fluoride	Nitrogen in Nitrate	Nitrogen in nitrate and nitrite	Sulfate
20	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
21	SOB-3	J1V1M5/ J1V1N5	11/13/14	0.00555	11.2	43.1	33.5	3.68	2.80	2.05	0.882	12.3
22	SOB-1	J1V1M3	11/13/14	0.00513	11.0	54.8	42.3	1.96	1.87	2.03	0.775	4.53
23	SOB-2	J1V1M4	11/13/14	0.00591	13.6	45.7	35.6	2.23	1.45	1.40	0.666	4.04
24	SOB-4	J1V1M6	11/13/14	0.00546	11.7	51.6	40.3	1.56	1.56	1.01	0.402	5.77
25	SOB-5	J1V1M7	11/13/14	0.00543	10.2	40.5	30.0	1.34	1.32	0.853	0.197	3.87
26	SOB-6	J1V1M8	11/13/14	0.0106	11.8	58.8	49.4	4.85	0.966	47.0	18.5	26.1
27	SOB-7	J1V1M9	11/13/14	0.00607	12.8	51.0	39.5	14.4	1.49	31.3	35.7	22.0
28	SOB-8	J1V1N0	11/13/14	0.00435	10.8	43.5	36.1	1.32	0.826	1.18	0.889	11.1
29	SOB-9	J1V1N1	11/13/14	0.00205	9.75	70.7	47.3	2.95	0.776	1.01	0.391	4.22
30	SOB-10	J1V1N2	11/13/14	0.00548	11.2	51.2	46.8	2.01	1.05	1.12	0.457	4.92
31	SOB-11	J1V1N3	11/13/14	0.00451	12.2	57.3	41.3	8.57	1.04	1.19	0.378	12.0
32	SOB-12	J1V1N4	11/13/14	0.00198	10.5	80.5	47.7	1.65	0.820	1.05	0.299	7.49

33 **Statistical Computations**

34		Mercury	Nickel	Vanadium	Zinc	Chloride	Fluoride	Nitrogen in Nitrate	Nitrogen in nitrate and nitrite	Sulfate
35	95% UCL based on	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
36	N	12	12	12	12	12	12	12	12	12
37	% < Detection limit	17%	0%	0%	0%	0%	0%	0%	0%	0%
38	Mean	0.00521	11.4	54.1	40.8	3.88	1.33	7.60	4.96	9.86
39	Standard deviation	0.00218	1.10	11.8	6.20	3.91	0.576	15.1	11.0	7.38
40	95% UCL on mean	0.00600	12.0	60.6	44.5	5.73	1.68	14.8	10.2	16.0
41	Maximum value	0.0106	13.6	80.5	49.4	14.4	2.84	47.0	35.7	26.1
42	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	0.33 GW & River Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	25,000 GW Protection	96 GW Protection	1,000 GW Protection	1,000 GW Protection	25,000 GW Protection
43	**WAC 173-340 3-PART TEST**									
44	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	NO	NO	NO	NA
45	> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	NO	NO	NO	NA
46	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA	NO	NO	NO	NA
47	**WAC 173-340 Compliance?**	Because all values are below background (0.33 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (100 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (237 mg/kg) the WAC 173-340 3-part test is not required.

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 05/07/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0
Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/07/15
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 24 of 43

1 **100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Statistical Calculations**

2 **Verification Data - SOB**

3	Sample	Sample	Sample	TPH - motor oil (high boiling)			Benzo(a)anthracene (Method 8310)			Benzo(a)pyrene (Method 8310)			Benzo(b)fluoranthene (Method 8310)			Benzo(ghi)perylene (Method 8310)			Chrysene (Method 8310)			Fluoranthene (Method 8310)			Pyrene (Method 8310)		
4	Area	Number	Date	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
5	SOB-3	J1V1M5	11/13/14	4130	J	2210	0.543	U	0.543	0.629	J	0.543	0.543	U	0.543	0.543	U	0.543	0.543	U	0.543	0.543	U	0.543	1.03	J	0.543
6	Duplicate of J1V1M5	J1V1N5	11/13/14	3490	J	2210	0.544	U	0.544	0.544	U	0.544	0.544	U	0.544	0.544	U	0.544	0.544	U	0.544	0.544	U	0.544	0.544	U	0.544
7	SOB-1	J1V1M3	11/13/14	4940	J	2210	0.543	U	0.543	0.543	U	0.543	0.543	U	0.543	0.543	U	0.543	0.543	U	0.543	0.543	U	0.543	0.543	U	0.543
8	SOB-2	J1V1M4	11/13/14	9950		2220	0.548	U	0.548	1.55	J	0.548	2.98		0.548	4.55		0.548	1.53	J	0.548	0.548	U	0.548	1.27	J	0.548
9	SOB-4	J1V1M6	11/13/14	2460	J	2240	7.55		0.549	6.21		0.549	7.04		0.549	4.14		0.549	5.78		0.549	9.8		0.549	9.48		0.549
10	SOB-5	J1V1M7	11/13/14	3280	J	2210	0.544	U	0.544	0.706	J	0.544	0.544	U	0.544	0.544	U	0.544	0.544	U	0.544	0.544	U	0.544	0.841	J	0.544
11	SOB-6	J1V1M8	11/13/14	8250		2210	6.44		0.544	6.20		0.544	7.07		0.544	5.28		0.544	6.20		0.544	9.72		0.544	11.1		0.544
12	SOB-7	J1V1M9	11/13/14	9440		2260	5.35		0.556	5.56		0.556	6.98		0.556	5.68		0.556	5.79		0.556	9.88		0.556	10.1		0.556
13	SOB-8	J1V1N0	11/13/14	9510		2220	11.9		0.547	9.03		0.547	8.23		0.547	6.17		0.547	9.92		0.547	16.4		0.547	20.1		0.547
14	SOB-9	J1V1N1	11/13/14	2300	J	2220	0.547	U	0.547	0.547	U	0.547	0.547	U	0.547	0.547	U	0.547	0.547	U	0.547	0.547	U	0.547	0.547	U	0.547
15	SOB-10	J1V1N2	11/13/14	3570	J	2220	5.25		0.544	4.74		0.544	5.02		0.544	3.89		0.544	4.86		0.544	7.79		0.544	8.80		0.544
16	SOB-11	J1V1N3	11/13/14	9900		2190	86.7		0.539	70.5		0.539	77.6		0.539	32.2		0.539	70.4		0.539	125		0.539	149		0.539
17	SOB-12	J1V1N4	11/13/14	2210	U	2210	1.13	J	0.545	1.18	J	0.545	1.21	J	0.545	0.545	U	0.545	0.851	J	0.545	2.55		0.545	1.69	J	0.545

18 **Statistical Computation Input Data**

19	Sample	Sample	Sample	TPH - motor oil (high boiling)	Benzo(a)anthracene (Method 8310)	Benzo(a)pyrene (Method 8310)	Benzo(b)fluoranthene (Method 8310)	Benzo(ghi)perylene (Method 8310)	Chrysene (Method 8310)	Fluoranthene (Method 8310)	Pyrene (Method 8310)
20	Area	Number	Date	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
21	SOB-3	J1V1M5/ J1V1N5	11/13/14	3810	0.272	0.451	0.272	0.272	0.272	0.272	0.651
22	SOB-1	J1V1M3	11/13/14	4940	0.272	0.272	0.272	0.272	0.272	0.272	0.272
23	SOB-2	J1V1M4	11/13/14	9950	0.274	1.55	2.98	4.55	1.53	0.274	1.27
24	SOB-4	J1V1M6	11/13/14	2460	7.55	6.21	7.04	4.14	5.78	9.80	9.48
25	SOB-5	J1V1M7	11/13/14	3280	0.272	0.706	0.272	0.272	0.272	0.272	0.841
26	SOB-6	J1V1M8	11/13/14	8250	6.44	6.20	7.07	5.28	6.20	9.72	11.1
27	SOB-7	J1V1M9	11/13/14	9440	5.35	5.56	6.98	5.68	5.79	9.88	10.1
28	SOB-8	J1V1N0	11/13/14	9510	11.9	9.03	8.23	6.17	9.92	16.4	20.1
29	SOB-9	J1V1N1	11/13/14	2300	0.274	0.274	0.274	0.274	0.274	0.274	0.274
30	SOB-10	J1V1N2	11/13/14	3570	5.25	4.74	5.02	3.89	4.86	7.79	8.80
31	SOB-11	J1V1N3	11/13/14	9900	86.7	70.5	77.6	32.2	70.4	125	149
32	SOB-12	J1V1N4	11/13/14	1105	1.13	1.18	1.21	0.273	0.851	2.55	1.69

33 **Statistical Computations**

34		TPH - motor oil (high boiling)	Benzo(a)anthracene (Method 8310)	Benzo(a)pyrene (Method 8310)	Benzo(b)fluoranthene (Method 8310)	Benzo(ghi)perylene (Method 8310)	Chrysene (Method 8310)	Fluoranthene (Method 8310)	Pyrene (Method 8310)
35	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
36	N	12	12	12	12	12	12	12	12
37	% < Detection limit	8%	42%	17%	33%	42%	33%	42%	17%
38	Mean	5710	10.5	8.89	9.77	5.27	8.87	15.2	17.8
39	Standard deviation	3417	24.3	19.6	21.6	8.82	19.6	35.0	41.8
40	95% UCL on mean	10221	22.0	80.0	20.0	9.46	18.2	31.8	357
41	Maximum value	9950	86.7	70.5	77.6	32.2	70.4	125	149
42	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise**	200,000 ug/kg GW & River Protection	15 ug/kg GW and River Protection	15 ug/kg GW and River Protection	15 ug/kg GW and River Protection	48,000 ug/kg GW Protection	100 ug/kg River Protection	18,000 ug/kg River Protection	48,000 ug/kg GW Protection
43	**WAC 173-340 3-PART TEST**								
44	95% UCL > Cleanup Limit?	NO	YES	YES	YES	NO	NO	NO	NO
45	> 10% above Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO
46	Any sample > 2X Cleanup Limit?	NO	YES	YES	YES	NO	NO	NO	NO
47	**WAC 173-340 Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

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MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/28/15
Job No. 14655

Calc. No. 0100H-CA-V0226
Checked I. B. Berezovskiy

Rev. No. 0
Date 05/28/15
Sheet No. 25 of 43

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Maximum Calculations

Verification Data - SOB

Sample Area	Sample Number	Sample Date	Antimony			Boron			Hexavalent Chromium			Molybdenum			Nitrogen in Nitrite			Aroclor-1254			Aroclor-1260			Dieldrin			Acenaphthene (Method 8310)		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
SOB-3	J1V1M5	11/13/14	1.44	UD	1.44	0.873	U	0.873	0.173	B	0.114	0.197	B	0.175	[redacted]			1.13	U	1.13	1.13	U	1.13	0.340	U	0.340	5.09	U	5.09
Duplicate of J1V1M5	J1V1N5	11/13/14	1.65	UD	1.65	1.00	U	1.00	0.119	U	0.119	0.200	U	0.200	[redacted]			1.13	U	1.13	1.13	U	1.13	0.341	U	0.341	5.10	U	5.10
SOB-1	J1V1M3	11/13/14	1.67	UD	1.67	1.01	U	1.01	0.179	B	0.118	0.203	U	0.203	[redacted]			1.13	U	1.13	1.13	U	1.13	0.340	U	0.340	5.09	U	5.09
SOB-2	J1V1M4	11/13/14	1.66	UD	1.66	1.01	U	1.01	0.363	B	0.116	0.202	U	0.202	[redacted]			1.14	U	1.14	1.14	U	1.14	0.342	U	0.342	5.14	U	5.14
SOB-4	J1V1M6	11/13/14	1.63	UD	1.63	0.990	U	0.990	0.122	U	0.122	0.198	U	0.198	[redacted]			1.14	U	1.14	1.14	U	1.14	0.343	U	0.343	5.15	U	5.15
SOB-5	J1V1M7	11/13/14	1.62	UD	1.62	0.979	U	0.979	0.118	U	0.118	0.196	U	0.196	[redacted]			1.13	U	1.13	1.13	U	1.13	0.340	U	0.340	5.10	U	5.10
SOB-6	J1V1M8	11/13/14	1.72	BD	1.67	1.13	B	1.01	0.123	U	0.123	0.520	B	0.202	0.751	B	0.339	1.13	U	1.13	1.50	J	1.13	0.489	J	0.341	5.10	U	5.10
SOB-7	J1V1M9	11/13/14	1.57	UD	1.57	1.15	B	0.951	0.465		0.118	0.191	B	0.190	4.50		0.344	5.80		1.16	4.15		1.16	0.347	U	0.347	5.21	U	5.21
SOB-8	J1V1N0	11/13/14	1.55	UD	1.55	0.937	U	0.937	0.374	B	0.119	0.187	U	0.187	[redacted]			1.14	U	1.14	1.14	U	1.14	0.342	U	0.342	5.13	U	5.13
SOB-9	J1V1N1	11/13/14	1.68	BD	1.46	0.883	U	0.883	0.120	U	0.120	0.177	U	0.177	[redacted]			1.14	U	1.14	1.14	U	1.14	0.342	U	0.342	5.13	U	5.13
SOB-10	J1V1N2	11/13/14	1.52	UD	1.52	2.75	B	0.924	0.114	U	0.114	0.185	U	0.185	[redacted]			1.13	U	1.13	1.13	U	1.13	0.341	U	0.341	5.10	U	5.10
SOB-11	J1V1N3	11/13/14	1.68	BD	1.45	0.877	U	0.877	0.121	U	0.121	0.175	U	0.175	[redacted]			1.12	U	1.12	1.12	U	1.12	0.337	U	0.337	67.8	P	5.06
SOB-12	J1V1N4	11/13/14	1.46	UD	1.46	0.882	U	0.882	0.119	U	0.119	0.199	B	0.176	[redacted]			1.13	U	1.13	1.13	U	1.13	0.341	U	0.341	5.11	U	5.11

3-Part Test Evaluations

	Antimony	Boron	Hexavalent Chromium	Molybdenum	Nitrogen in Nitrite	Aroclor-1254	Aroclor-1260	Dieldrin	Acenaphthene (Method 8310)
% < Detection limit	75%	75%	58%	67%	0%	92%	83%	92%	92%
Maximum value	1.72	2.75	0.465	0.520	4.50	5.80	4.15	0.489	67.8
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise	5 GW Protection	320 GW Protection	2 River Protection	8 GW Protection	100 GW Protection	17 ug/kg GW & River Protection	17 ug/kg GW & River Protection	3.3 ug/kg GW & River Protection	96,000 ug/kg GW Protection
3-PART TEST									
Maximum > Cleanup Limit?	NA	NO	NO	NO	NO	NO	NO	NO	NO
> 10% above Cleanup Limit?	NA	NO	NO	NO	NO	NO	NO	NO	NO
Any sample > 2X Cleanup Limit?	NA	NO	NO	NO	NO	NO	NO	NO	NO
3-Part Test Compliance?	Because all values are below background (5 mg/kg) the 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Maximum Calculations

Verification Data - SOB

Sample Area	Sample Number	Sample Date	Anthracene (Method 8310)			Benzo(k)fluoranthene (Method 8310)			Fluorene (Method 8310)			Phenanthrene (Method 8310)			Benzo(a)anthracene (Method 8270)			Benzo(a)pyrene (Method 8270)			Benzo(b)fluoranthene (Method 8270)			Chrysene (Method 8270)			Fluoranthene (Method 8270)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
SOB-3	J1V1M5	11/13/14	1.70	U	1.70	0.272	U	0.272	5.09	U	5.09	5.09	U	5.09	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Duplicate of J1V1M5	J1V1N5	11/13/14	1.70	U	1.70	0.272	U	0.272	5.10	U	5.10	5.10	U	5.10	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
SOB-1	J1V1M3	11/13/14	1.70	U	1.70	0.272	U	0.272	5.09	U	5.09	5.09	U	5.09	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
SOB-2	J1V1M4	11/13/14	1.71	U	1.71	0.274	U	0.274	5.14	U	5.14	5.14	U	5.14	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
SOB-4	J1V1M6	11/13/14	1.72	U	1.72	4.63		0.275	5.15	U	5.15	5.15	U	5.15	10.3	U	10.3	10.3	U	10.3	10.3	U	10.3	10.3	U	10.3	10.3	U	10.3
SOB-5	J1V1M7	11/13/14	1.70	U	1.70	0.272	U	0.272	5.10	U	5.10	5.10	U	5.10	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
SOB-6	J1V1M8	11/13/14	1.70	U	1.70	0.272	U	0.272	5.10	U	5.10	5.10	U	5.10	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	11.2	J	10.2
SOB-7	J1V1M9	11/13/14	1.74	U	1.74	0.278	U	0.278	5.21	U	5.21	5.21	U	5.21	10.4	U	10.4	10.4	U	10.4	11.1	J	10.4	10.4	U	10.4	11.8	J	10.4
SOB-8	J1V1N0	11/13/14	1.71	U	1.71	0.274	U	0.274	5.13	U	5.13	15.0	J	5.13	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
SOB-9	J1V1N1	11/13/14	1.71	U	1.71	0.274	U	0.274	5.13	U	5.13	5.13	U	5.13	10.3	U	10.3	10.3	U	10.3	10.3	U	10.3	10.3	U	10.3	10.3	U	10.3
SOB-10	J1V1N2	11/13/14	1.70	U	1.70	0.272	U	0.272	5.10	U	5.10	5.10	U	5.10	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
SOB-11	J1V1N3	11/13/14	29.4		1.69	47.4		0.270	19.6		5.06	105		5.06	15.9	J	10.1	13.5	J	10.1	15.9	J	10.1	15.5	J	10.1	21.2	J	10.1
SOB-12	J1V1N4	11/13/14	1.70	U	1.70	0.761	J	0.272	5.11	U	5.11	5.11	U	5.11	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2

3-Part Test Evaluations

	Anthracene (Method 8310)	Benzo(k)fluoranthene (Method 8310)	Fluorene (Method 8310)	Phenanthrene (Method 8310)	Benzo(a)anthracene (Method 8270)	Benzo(a)pyrene (Method 8270)	Benzo(b)fluoranthene (Method 8270)	Chrysene (Method 8270)	Fluoranthene (Method 8270)
% < Detection limit	92%	75%	92%	83%	92%	92%	83%	92%	75%
Maximum value	29.4	47.4	19.6	105	15.9	13.5	15.9	15.5	21.2
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise	240,000 ug/kg GW Protection	15 ug/kg GW & River Protection	64,000 ug/kg GW Protection	240,000 ug/kg GW Protection	15 ug/kg GW & River Protection	15 ug/kg GW & River Protection	15 ug/kg GW & River Protection	100 ug/kg River Protection	18,000 ug/kg River Protection
3-PART TEST									
Maximum > Cleanup Limit?	NO	YES	NO	NO	YES	NO	YES	NO	NO
> 10% above Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO	NO
Any sample > 2X Cleanup Limit?	NO	YES	NO	NO	NO	NO	NO	NO	NO
3-Part Test Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/04/15
Job No. 14655

Calc. No. 0100H-CA-V0226
Checked I. B. Berezovskiy

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Date 05/04/15
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1 **100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Maximum Calculations**
2 **Verification Data - SOB**

	Sample Area	Sample Number	Sample Date	Pyrene (Method 8270) ug/kg	Q	PQL
3						
4						
5	SOB-3	J1V1M5	11/13/14	10.2	U	10.2
6	Duplicate of J1V1M5	J1V1N5	11/13/14	10.2	U	10.2
7	SOB-1	J1V1M3	11/13/14	10.2	U	10.2
8	SOB-2	J1V1M4	11/13/14	10.2	U	10.2
9	SOB-4	J1V1M6	11/13/14	10.3	U	10.3
10	SOB-5	J1V1M7	11/13/14	10.2	U	10.2
11	SOB-6	J1V1M8	11/13/14	10.5	J	10.2
12	SOB-7	J1V1M9	11/13/14	16.3	J	10.4
13	SOB-8	J1V1N0	11/13/14	11.2	J	10.2
14	SOB-9	J1V1N1	11/13/14	10.3	U	10.3
15	SOB-10	J1V1N2	11/13/14	10.2	U	10.2
16	SOB-11	J1V1N3	11/13/14	26.6	J	10.1
17	SOB-12	J1V1N4	11/13/14	10.2	U	10.2

18 **3-Part Test Evaluations**

		Pyrene (Method 8270)		
19				
20	% < Detection limit	67%		
21	Maximum value	26.6		
22	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless stated otherwise**	48,000 ug/kg	GW Protection	
23	**3-PART TEST**			
24	Maximum > Cleanup Limit?	NO		
25	> 10% above Cleanup Limit?	NO		
26	Any sample > 2X Cleanup Limit?	NO		
27	**3-Part Test Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent RAG.		

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Washington Closure Hanford

CALCULATION SHEET

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/04/15
Job No. 14655

Calc. No. 0100H-CA-V0226
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Ecology Software (MTCAStat) Results, 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites EXC 1-12

Arsenic 95% UCL Calculation

DATA	ID
5.86	J1V1H5/ J1V1J5
7.84	J1V1H3
3.84	J1V1H4
4.31	J1V1H6
3.66	J1V1H7
5.44	J1V1H8
6.77	J1V1H9
4.92	J1V1J0
1.56	J1V1J1
4.13	J1V1J2
6.76	J1V1J3
7.41	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	5.21
Censored		Lognormal mean	5.33
Detection limit or PQL		Std. devn.	1.83
Method detection limit		Median	5.18
TOTAL	12	Min.	1.56
		Max.	7.84

Lognormal distribution? r-squared is: 0.852
Normal distribution? r-squared is: 0.966
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 6.16

Barium 95% UCL Calculation

DATA	ID
136	J1V1H5/ J1V1J5
49.2	J1V1H3
65.5	J1V1H4
70.7	J1V1H6
52.6	J1V1H7
84.9	J1V1H8
94.1	J1V1H9
76.6	J1V1J0
27.7	J1V1J1
51.9	J1V1J2
165	J1V1J3
81.1	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	79.6
Censored		Lognormal mean	80.5
Detection limit or PQL		Std. devn.	38.2
Method detection limit		Median	73.7
TOTAL	12	Min.	27.7
		Max.	165

Lognormal distribution? r-squared is: 0.962
Normal distribution? r-squared is: 0.896
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 109

Beryllium 95% UCL Calculation

DATA	ID
0.736	J1V1H5/ J1V1J5
0.630	J1V1H3
0.687	J1V1H4
0.575	J1V1H6
0.559	J1V1H7
0.629	J1V1H8
0.602	J1V1H9
0.536	J1V1J0
0.467	J1V1J1
0.526	J1V1J2
0.676	J1V1J3
0.612	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	0.603
Censored		Lognormal mean	0.603
Detection limit or PQL		Std. devn.	0.076
Method detection limit		Median	0.607
TOTAL	12	Min.	0.467
		Max.	0.736

Lognormal distribution? r-squared is: 0.985
Normal distribution? r-squared is: 0.99
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.646

Cadmium 95% UCL Calculation

DATA	ID
0.355	J1V1H5/ J1V1J5
0.269	J1V1H3
0.353	J1V1H4
0.272	J1V1H6
0.274	J1V1H7
0.357	J1V1H8
0.351	J1V1H9
0.281	J1V1J0
0.250	J1V1J1
0.268	J1V1J2
0.466	J1V1J3
0.330	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	0.319
Censored		Lognormal mean	0.319
Detection limit or PQL		Std. devn.	0.062
Method detection limit		Median	0.306
TOTAL	12	Min.	0.250
		Max.	0.466

Lognormal distribution? r-squared is: 0.881
Normal distribution? r-squared is: 0.844
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.348

Chromium 95% UCL Calculation

DATA	ID
18.1	J1V1H5/ J1V1J5
10.0	J1V1H3
10.9	J1V1H4
13.9	J1V1H6
11.3	J1V1H7
13.0	J1V1H8
19.0	J1V1H9
8.52	J1V1J0
7.55	J1V1J1
8.05	J1V1J2
20.5	J1V1J3
14.1	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	12.9
Censored		Lognormal mean	13.0
Detection limit or PQL		Std. devn.	4.38
Method detection limit		Median	12.2
TOTAL	12	Min.	7.55
		Max.	20.5

Lognormal distribution? r-squared is: 0.968
Normal distribution? r-squared is: 0.942
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 15.8

Cobalt 95% UCL Calculation

DATA	ID
6.89	J1V1H5/ J1V1J5
6.51	J1V1H3
6.62	J1V1H4
5.93	J1V1H6
6.52	J1V1H7
6.35	J1V1H8
6.71	J1V1H9
5.53	J1V1J0
4.75	J1V1J1
5.59	J1V1J2
6.99	J1V1J3
5.85	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	6.19
Censored		Lognormal mean	6.19
Detection limit or PQL		Std. devn.	0.665
Method detection limit		Median	6.43
TOTAL	12	Min.	4.75
		Max.	6.99

Lognormal distribution? r-squared is: 0.901
Normal distribution? r-squared is: 0.926
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 6.58

Copper 95% UCL Calculation

DATA	ID
54.7	J1V1H5/ J1V1J5
16.6	J1V1H3
15.4	J1V1H4
14.0	J1V1H6
14.1	J1V1H7
23.5	J1V1H8
15.5	J1V1H9
15.8	J1V1J0
10.9	J1V1J1
13.1	J1V1J2
23.0	J1V1J3
14.7	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	19.3
Censored		Lognormal mean	19.0
Detection limit or PQL		Std. devn.	11.8
Method detection limit		Median	15.5
TOTAL	12	Min.	10.9
		Max.	54.7

Lognormal distribution? r-squared is: 0.751
Normal distribution? r-squared is: 0.565
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 24.9

Lead 95% UCL Calculation

DATA	ID
11.2	J1V1H5/ J1V1J5
27.8	J1V1H3
15.9	J1V1H4
5.36	J1V1H6
5.89	J1V1H7
20.5	J1V1H8
7.32	J1V1H9
6.41	J1V1J0
1.71	J1V1J1
6.99	J1V1J2
35.8	J1V1J3
13.2	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	13.2
Censored		Lognormal mean	14.0
Detection limit or PQL		Std. devn.	10.2
Method detection limit		Median	9.28
TOTAL	12	Min.	1.71
		Max.	35.8

Lognormal distribution? r-squared is: 0.955
Normal distribution? r-squared is: 0.873
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 27.2

Manganese 95% UCL Calculation

DATA	ID
271	J1V1H5/ J1V1J5
257	J1V1H3
275	J1V1H4
251	J1V1H6
263	J1V1H7
263	J1V1H8
278	J1V1H9
221	J1V1J0
197	J1V1J1
218	J1V1J2
299	J1V1J3
281	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	256
Censored		Lognormal mean	256
Detection limit or PQL		Std. devn.	29.9
Method detection limit		Median	263
TOTAL	12	Min.	197
		Max.	299

Lognormal distribution? r-squared is: 0.900
Normal distribution? r-squared is: 0.925
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 274

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

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Ecology Software (MTCAStat) Results, 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites EXC 1-12

Mercury 95% UCL Calculation

DATA	ID
0.106	J1V1H5/ J1V1J5
0.00201	J1V1H3
0.0239	J1V1H4
0.0674	J1V1H6
5.80	J1V1H7
0.229	J1V1H8
0.335	J1V1H9
0.327	J1V1J0
0.00186	J1V1J1
0.00198	J1V1J2
6.27	J1V1J3
0.118	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	1.11
Censored		Lognormal mean	4.15
Detection limit or PQL		Std. devn.	2.31
Method detection limit		Median	0.112
TOTAL	12	Min.	0.00186
		Max.	6.27

Lognormal distribution? r-squared is: 0.929
Normal distribution? r-squared is: 0.511
Recommendations:
Use ProUCL

95% Adjusted Gamma UCL is 4.85

Nickel 95% UCL Calculation

DATA	ID
19.0	J1V1H5/ J1V1J5
10.4	J1V1H3
10.7	J1V1H4
13.4	J1V1H6
11.1	J1V1H7
13.1	J1V1H8
17.4	J1V1H9
9.92	J1V1J0
8.93	J1V1J1
8.90	J1V1J2
17.0	J1V1J3
13.6	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	12.8
Censored		Lognormal mean	12.8
Detection limit or PQL		Std. devn.	3.43
Method detection limit		Median	12.1
TOTAL	12	Min.	8.90
		Max.	19.0

Lognormal distribution? r-squared is: 0.946
Normal distribution? r-squared is: 0.919
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 14.9

Selenium 95% UCL Calculation

DATA	ID
0.981	J1V1H5/ J1V1J5
0.730	J1V1H3
0.669	J1V1H4
0.548	J1V1H6
0.639	J1V1H7
0.609	J1V1H8
0.596	J1V1H9
0.561	J1V1J0
0.390	J1V1J1
0.552	J1V1J2
0.610	J1V1J3
0.615	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	0.625
Censored		Lognormal mean	0.626
Detection limit or PQL		Std. devn.	0.139
Method detection limit		Median	0.610
TOTAL	12	Min.	0.390
		Max.	0.981

Lognormal distribution? r-squared is: 0.863
Normal distribution? r-squared is: 0.82
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.691

Vanadium 95% UCL Calculation

DATA	ID
43.6	J1V1H5/ J1V1J5
45.3	J1V1H3
46.7	J1V1H4
39.8	J1V1H6
42.6	J1V1H7
42.2	J1V1H8
40.1	J1V1H9
35.5	J1V1J0
35.6	J1V1J1
39.4	J1V1J2
40.0	J1V1J3
40.1	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	40.9
Censored		Lognormal mean	40.9
Detection limit or PQL		Std. devn.	3.41
Method detection limit		Median	40.1
TOTAL	12	Min.	35.5
		Max.	46.7

Lognormal distribution? r-squared is: 0.946
Normal distribution? r-squared is: 0.951
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 42.8

Zinc 95% UCL Calculation

DATA	ID
31.8	J1V1H5/ J1V1J5
28.1	J1V1H3
36.5	J1V1H4
36.2	J1V1H6
31.4	J1V1H7
37.2	J1V1H8
46.4	J1V1H9
61.7	J1V1J0
24.9	J1V1J1
65.5	J1V1J2
64.2	J1V1J3
41.2	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	42.1
Censored		Lognormal mean	42.2
Detection limit or PQL		Std. devn.	14.3
Method detection limit		Median	36.9
TOTAL	12	Min.	24.9
		Max.	65.5

Lognormal distribution? r-squared is: 0.939
Normal distribution? r-squared is: 0.886
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 51.1

Chloride 95% UCL Calculation

DATA	ID
30.9	J1V1H5/ J1V1J5
2.17	J1V1H3
1.48	J1V1H4
2.66	J1V1H6
1.35	J1V1H7
1.16	J1V1H8
3.47	J1V1H9
1.90	J1V1J0
1.07	J1V1J1
7.60	J1V1J2
6.66	J1V1J3
5.18	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	5.46
Censored		Lognormal mean	5.02
Detection limit or PQL		Std. devn.	8.29
Method detection limit		Median	2.42
TOTAL	12	Min.	1.07
		Max.	30.9

Lognormal distribution? r-squared is: 0.899
Normal distribution? r-squared is: 0.525
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 9.40

Fluoride 95% UCL Calculation

DATA	ID
0.834	J1V1H5/ J1V1J5
0.566	J1V1H3
0.884	J1V1H4
0.172	J1V1H6
0.170	J1V1H7
0.176	J1V1H8
1.04	J1V1H9
0.185	J1V1J0
0.181	J1V1J1
0.187	J1V1J2
0.862	J1V1J3
0.762	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	0.501
Censored		Lognormal mean	0.525
Detection limit or PQL		Std. devn.	0.354
Method detection limit		Median	0.377
TOTAL	12	Min.	0.170
		Max.	1.04

Lognormal distribution? r-squared is: 0.785
Normal distribution? r-squared is: 0.816
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.669

Nitrogen in nitrate 95% UCL Calculation

DATA	ID
4.41	J1V1H5/ J1V1J5
0.915	J1V1H3
0.854	J1V1H4
2.73	J1V1H6
0.581	J1V1H7
0.491	J1V1H8
2.33	J1V1H9
0.641	J1V1J0
0.501	J1V1J1
1.93	J1V1J2
9.43	J1V1J3
5.39	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	2.52
Censored		Lognormal mean	2.61
Detection limit or PQL		Std. devn.	2.71
Method detection limit		Median	1.42
TOTAL	12	Min.	0.491
		Max.	9.43

Lognormal distribution? r-squared is: 0.932
Normal distribution? r-squared is: 0.769
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 6.46

Nitrogen in nitrate and nitrite 95% UCL Calculation

DATA	ID
1.38	J1V1H5/ J1V1J5
0.494	J1V1H3
0.571	J1V1H4
2.13	J1V1H6
0.421	J1V1H7
0.373	J1V1H8
2.02	J1V1H9
0.370	J1V1J0
0.308	J1V1J1
1.02	J1V1J2
7.85	J1V1J3
3.95	J1V1J4

Number of samples		Uncensored values	
Uncensored	12	Mean	1.74
Censored		Lognormal mean	1.73
Detection limit or PQL		Std. devn.	2.21
Method detection limit		Median	0.796
TOTAL	12	Min.	0.308
		Max.	7.85

Lognormal distribution? r-squared is: 0.920
Normal distribution? r-squared is: 0.675
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 4.52

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/28/15
Job No. 14655

Calc. No. 0100H-CA-V0226
Checked I. B. Berezovskiy

Rev. No. 0
Date 05/28/15
Sheet No. 29 of 43

Ecology Software (MTCAStat) Results, 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites EXC 1-12

	DATA	ID	Sulfate 95% UCL Calculation				DATA	ID	Aroclor-1260 95% UCL Calculation			
1	DATA	ID	Sulfate 95% UCL Calculation				DATA	ID	Aroclor-1260 95% UCL Calculation			
2	587	J1V1H5/ J1V1J5					34.7	J1V1H5/ J1V1J5				
3	133	J1V1H3					2.11	J1V1H3				
4	9.49	J1V1H4	Number of samples		Uncensored values		19.7	J1V1H4	Number of samples		Uncensored values	
5	37.8	J1V1H6	Uncensored	12	Mean	89.0	0.580	J1V1H6	Uncensored	12	Mean	6.50
6	31.6	J1V1H7	Censored		Lognormal mean	95.9	2.84	J1V1H7	Censored		Lognormal mean	6.84
7	16.5	J1V1H8	Detection limit or PQL		Std. devn.	160	0.590	J1V1H8	Detection limit or PQL		Std. devn.	10.4
8	49.5	J1V1H9	Method detection limit		Median	43.3	5.01	J1V1H9	Method detection limit		Median	2.21
9	48.7	J1V1J0	TOTAL	12	Min.	2.21	2.31	J1V1J0	TOTAL	12	Min.	0.580
10	2.21	J1V1J1			Max.	587	0.600	J1V1J1			Max.	34.7
11	51.0	J1V1J2					0.630	J1V1J2				
12	72.1	J1V1J3					8.37	J1V1J3				
13	29.4	J1V1J4					0.580	J1V1J4				
14												
15			Lognormal distribution?		Normal distribution?				Lognormal distribution?		Normal distribution?	
16			r-squared is: 0.927		r-squared is: 0.478				r-squared is: 0.888		r-squared is: 0.629	
17			Recommendations:						Recommendations:			
18			Use lognormal distribution.						Reject BOTH lognormal and normal distributions			
19												
20			UCL (Land's method) is		426				UCL (based on Z-statistic) is		11.5	
21												

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 05/04/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0

Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/04/15

Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 30 of 43

Ecology Software (MTCAStat) Results, 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites EXC 13-24

Arsenic 95% UCL Calculation

DATA	ID
2.8	J1V459/ J1V464
16.2	J1V1J7
5.6	J1V460
5.12	J1V1J9
7.49	J1V1K0
5.0	J1V461
6.89	J1V1K2
5.55	J1V1K3
3.5	J1V462
5.1	J1V463
2.24	J1V1K6
2.39	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	5.66
Censored		Lognormal mean	5.66
Detection limit or PQL		Std. devn.	3.72
Method detection limit		Median	5.11
TOTAL	12	Min.	2.24
		Max.	16.2

Lognormal distribution? r-squared is: 0.925
Normal distribution? r-squared is: 0.726
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 8.16

Barium 95% UCL Calculation

DATA	ID
34.7	J1V459/ J1V464
49.3	J1V1J7
37.7	J1V460
90.6	J1V1J9
83.5	J1V1K0
92.6	J1V461
65.7	J1V1K2
55.6	J1V1K3
39.3	J1V462
59.7	J1V463
40.2	J1V1K6
29.4	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	56.5
Censored		Lognormal mean	56.9
Detection limit or PQL		Std. devn.	22.3
Method detection limit		Median	52.5
TOTAL	12	Min.	29.4
		Max.	92.6

Lognormal distribution? r-squared is: 0.957
Normal distribution? r-squared is: 0.919
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 72.1

Beryllium 95% UCL Calculation

DATA	ID
0.078	J1V459/ J1V464
0.620	J1V1J7
0.11	J1V460
0.679	J1V1J9
0.683	J1V1K0
0.31	J1V461
0.612	J1V1K2
0.528	J1V1K3
0.11	J1V462
0.18	J1V463
0.477	J1V1K6
0.440	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	0.402
Censored		Lognormal mean	0.438
Detection limit or PQL		Std. devn.	0.234
Method detection limit		Median	0.459
TOTAL	12	Min.	0.078
		Max.	0.683

Lognormal distribution? r-squared is: 0.861
Normal distribution? r-squared is: 0.911
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.524

Cadmium 95% UCL Calculation

DATA	ID
0.071	J1V459/ J1V464
0.297	J1V1J7
0.074	J1V460
0.216	J1V1J9
0.276	J1V1K0
0.19	J1V461
0.204	J1V1K2
0.204	J1V1K3
0.079	J1V462
0.16	J1V463
0.140	J1V1K6
0.193	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	0.175
Censored		Lognormal mean	0.179
Detection limit or PQL		Std. devn.	0.074
Method detection limit		Median	0.192
TOTAL	12	Min.	0.071
		Max.	0.297

Lognormal distribution? r-squared is: 0.887
Normal distribution? r-squared is: 0.942
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.214

Chromium 95% UCL Calculation

DATA	ID
10.4	J1V459/ J1V464
11.3	J1V1J7
9.7	J1V460
17.1	J1V1J9
12.8	J1V1K0
21.5	J1V461
12.1	J1V1K2
11.6	J1V1K3
11.4	J1V462
11.4	J1V463
12.9	J1V1K6
7.51	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	12.5
Censored		Lognormal mean	12.5
Detection limit or PQL		Std. devn.	3.62
Method detection limit		Median	11.5
TOTAL	12	Min.	7.51
		Max.	21.5

Lognormal distribution? r-squared is: 0.895
Normal distribution? r-squared is: 0.818
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 14.2

Cobalt 95% UCL Calculation

DATA	ID
5.5	J1V459/ J1V464
6.31	J1V1J7
5.5	J1V460
7.43	J1V1J9
7.24	J1V1K0
6.7	J1V461
6.71	J1V1K2
5.29	J1V1K3
5.4	J1V462
5.7	J1V463
5.12	J1V1K6
4.49	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	5.95
Censored		Lognormal mean	5.95
Detection limit or PQL		Std. devn.	0.91
Method detection limit		Median	5.60
TOTAL	12	Min.	4.49
		Max.	7.43

Lognormal distribution? r-squared is: 0.955
Normal distribution? r-squared is: 0.948
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 6.47

Copper 95% UCL Calculation

DATA	ID
12.7	J1V459/ J1V464
15.5	J1V1J7
12.7	J1V460
16.0	J1V1J9
15.5	J1V1K0
15.8	J1V461
13.8	J1V1K2
12.8	J1V1K3
12.3	J1V462
14.2	J1V463
13.2	J1V1K6
10.5	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	13.7
Censored		Lognormal mean	13.8
Detection limit or PQL		Std. devn.	1.70
Method detection limit		Median	13.5
TOTAL	12	Min.	10.5
		Max.	16.0

Lognormal distribution? r-squared is: 0.929
Normal distribution? r-squared is: 0.937
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 14.7

Lead 95% UCL Calculation

DATA	ID
3.9	J1V459/ J1V464
19.3	J1V1J7
10.8	J1V460
7.6	J1V1J9
30.6	J1V1K0
5.3	J1V461
19.9	J1V1K2
14.8	J1V1K3
5.8	J1V462
12.3	J1V463
2.9	J1V1K6
1.8	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	11.2
Censored		Lognormal mean	12.0
Detection limit or PQL		Std. devn.	8.63
Method detection limit		Median	9.21
TOTAL	12	Min.	1.80
		Max.	30.6

Lognormal distribution? r-squared is: 0.984
Normal distribution? r-squared is: 0.908
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 24.0

Manganese 95% UCL Calculation

DATA	ID
230	J1V459/ J1V464
252	J1V1J7
243	J1V460
330	J1V1J9
321	J1V1K0
314	J1V461
281	J1V1K2
229	J1V1K3
236	J1V462
274	J1V463
257	J1V1K6
178	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	262
Censored		Lognormal mean	263
Detection limit or PQL		Std. devn.	44.4
Method detection limit		Median	255
TOTAL	12	Min.	178
		Max.	330

Lognormal distribution? r-squared is: 0.942
Normal distribution? r-squared is: 0.955
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 289

Washington Closure Hanford

CALCULATION SHEET

Originator J. D. Skoglie	**Date** 05/04/15	**Calc. No.** 0100H-CA-V0226	**Rev. No.** 0
Project 100-H Area Closure Operations	**Job No.** 14655	**Checked** I. B. Berezovskiy	**Date** 05/04/15
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations			**Sheet No.** 31 of 43

Ecology Software (MTCAStat) Results, 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites EXC 13-24

Mercury 95% UCL Calculation

DATA	ID
0.0028	J1V459/ J1V464
0.00428	J1V1J7
0.0028	J1V460
0.00559	J1V1J9
0.0120	J1V1K0
0.0032	J1V461
0.00483	J1V1K2
0.00197	J1V1K3
0.0028	J1V462
0.011	J1V463
0.00466	J1V1K6
0.00183	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	0.00480
Censored		Lognormal mean	0.00481
Detection limit or PQL		Std. devn.	0.00334
Method detection limit		Median	0.00372
TOTAL	12	Min.	0.00183
		Max.	0.0120

Lognormal distribution? r-squared is: 0.929
Normal distribution? r-squared is: 0.778
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.00726

Nickel 95% UCL Calculation

DATA	ID
12.5	J1V459/ J1V464
12.0	J1V1J7
11.5	J1V460
16.6	J1V1J9
12.6	J1V1K0
18.9	J1V461
11.5	J1V1K2
11.0	J1V1K3
12.1	J1V462
12.1	J1V463
9.12	J1V1K6
8.69	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	12.4
Censored		Lognormal mean	12.4
Detection limit or PQL		Std. devn.	2.83
Method detection limit		Median	12.1
TOTAL	12	Min.	8.69
		Max.	18.9

Lognormal distribution? r-squared is: 0.888
Normal distribution? r-squared is: 0.836
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 13.7

Selenium 95% UCL Calculation

DATA	ID
0.41	J1V459/ J1V464
0.826	J1V1J7
0.41	J1V460
0.962	J1V1J9
1.10	J1V1K0
0.42	J1V461
0.919	J1V1K2
0.925	J1V1K3
0.42	J1V462
0.43	J1V463
0.606	J1V1K6
0.400	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	0.651
Censored		Lognormal mean	0.655
Detection limit or PQL		Std. devn.	0.273
Method detection limit		Median	0.518
TOTAL	12	Min.	0.400
		Max.	1.10

Lognormal distribution? r-squared is: 0.825
Normal distribution? r-squared is: 0.83
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.781

Vanadium 95% UCL Calculation

DATA	ID
46.1	J1V459/ J1V464
46.0	J1V1J7
45.5	J1V460
42.3	J1V1J9
45.5	J1V1K0
40.6	J1V461
43.2	J1V1K2
39.8	J1V1K3
38.1	J1V462
42.3	J1V463
36.4	J1V1K6
34.9	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	41.7
Censored		Lognormal mean	41.7
Detection limit or PQL		Std. devn.	3.84
Method detection limit		Median	42.3
TOTAL	12	Min.	34.9
		Max.	46.1

Lognormal distribution? r-squared is: 0.931
Normal distribution? r-squared is: 0.939
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 43.9

Zinc 95% UCL Calculation

DATA	ID
32.3	J1V459/ J1V464
42.8	J1V1J7
35.5	J1V460
46.2	J1V1J9
43.0	J1V1K0
44.0	J1V461
39.5	J1V1K2
32.8	J1V1K3
35.0	J1V462
37.4	J1V463
35.3	J1V1K6
24.7	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	37.4
Censored		Lognormal mean	37.4
Detection limit or PQL		Std. devn.	6.09
Method detection limit		Median	36.5
TOTAL	12	Min.	24.7
		Max.	46.2

Lognormal distribution? r-squared is: 0.918
Normal distribution? r-squared is: 0.952
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 41.2

Benzo(a)anthracene (Method 8310) 95% UCL Calculation

DATA	ID
1.6	J1V459/ J1V464
29.1	J1V1J7
9.9	J1V460
2.78	J1V1J9
86.3	J1V1K0
1.7	J1V461
128	J1V1K2
2.09	J1V1K3
62.0	J1V462
1.7	J1V463
57.9	J1V1K6
22.2	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	33.8
Censored		Lognormal mean	52.1
Detection limit or PQL		Std. devn.	41.3
Method detection limit		Median	16.1
TOTAL	12	Min.	1.63
		Max.	128

Lognormal distribution? r-squared is: 0.891
Normal distribution? r-squared is: 0.811
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 53.4

Benzo(a)pyrene (Method 8310) 95% UCL Calculation

DATA	ID
3.3	J1V459/ J1V464
21.5	J1V1J7
10.0	J1V460
1.42	J1V1J9
75.2	J1V1K0
3.4	J1V461
107	J1V1K2
1.94	J1V1K3
55.0	J1V462
3.3	J1V463
49.0	J1V1K6
19.8	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	29.2
Censored		Lognormal mean	39.1
Detection limit or PQL		Std. devn.	34.7
Method detection limit		Median	14.9
TOTAL	12	Min.	1.42
		Max.	107

Lognormal distribution? r-squared is: 0.936
Normal distribution? r-squared is: 0.813
Recommendations:
Use ProUCL

95% Student's-t UCL is 47.2

Benzo(b)fluoranthene (Method 8310) 95% UCL Calculation

DATA	ID
2.2	J1V459/ J1V464
24.3	J1V1J7
11.0	J1V460
1.64	J1V1J9
72.9	J1V1K0
2.2	J1V461
119	J1V1K2
2.78	J1V1K3
63.0	J1V462
2.2	J1V463
69.8	J1V1K6
30.1	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	33.4
Censored		Lognormal mean	50.1
Detection limit or PQL		Std. devn.	38.8
Method detection limit		Median	17.7
TOTAL	12	Min.	1.64
		Max.	119

Lognormal distribution? r-squared is: 0.881
Normal distribution? r-squared is: 0.823
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 51.8

Benzo(ghi)perylene (Method 8310) 95% UCL Calculation

DATA	ID
3.7	J1V459/ J1V464
13.6	J1V1J7
3.8	J1V460
2.00	J1V1J9
48.5	J1V1K0
3.8	J1V461
78.1	J1V1K2
1.58	J1V1K3
38.0	J1V462
3.7	J1V463
31.9	J1V1K6
12.7	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	20.1
Censored		Lognormal mean	23.2
Detection limit or PQL		Std. devn.	24.3
Method detection limit		Median	8.25
TOTAL	12	Min.	1.58
		Max.	78.1

Lognormal distribution? r-squared is: 0.925
Normal distribution? r-squared is: 0.780
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 98.7

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/04/15
Job No. 14655

Calc. No. 0100H-CA-V0226
Checked I. B. Berezovskiy

Rev. No. 0
Date 05/04/15
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Ecology Software (MTCAStat) Results, 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites EXC 13-24

Benzo(k)fluoranthene (Method 8310) 95% UCL Calculation

DATA	ID
2.0	J1V459/ J1V464
14.1	J1V1J7
2.1	J1V460
0.143	J1V1J9
74.7	J1V1K0
2.1	J1V461
89.6	J1V1K2
2.41	J1V1K3
24.0	J1V462
2.1	J1V463
37.9	J1V1K6
14.8	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	22.2
Censored		Lognormal mean	40.7
Detection limit or PQL		Std. devn.	30.4
Method detection limit		Median	8.26
TOTAL	12	Min.	0.143
		Max.	89.6

Lognormal distribution? r-squared is: 0.916
Normal distribution? r-squared is: 0.740
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 620

Chrysene (Method 8310) 95% UCL Calculation

DATA	ID
2.5	J1V459/ J1V464
19.8	J1V1J7
8.0	J1V460
1.94	J1V1J9
57.6	J1V1K0
2.6	J1V461
88.8	J1V1K2
1.57	J1V1K3
57.0	J1V462
2.5	J1V463
36.9	J1V1K6
13.8	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	24.4
Censored		Lognormal mean	31.5
Detection limit or PQL		Std. devn.	29.1
Method detection limit		Median	10.9
TOTAL	12	Min.	1.57
		Max.	88.8

Lognormal distribution? r-squared is: 0.910
Normal distribution? r-squared is: 0.804
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 187

Fluoranthene (Method 8310) 95% UCL Calculation

DATA	ID
6.8	J1V459/ J1V464
42.6	J1V1J7
17.0	J1V460
5.09	J1V1J9
119	J1V1K0
7.0	J1V461
146	J1V1K2
0.293	J1V1K3
110	J1V462
6.5	J1V463
85.5	J1V1K6
31.2	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	48.1
Censored		Lognormal mean	96.1
Detection limit or PQL		Std. devn.	52.6
Method detection limit		Median	24.1
TOTAL	12	Min.	0.293
		Max.	146

Lognormal distribution? r-squared is: 0.897
Normal distribution? r-squared is: 0.839
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 73.0

Phenanthrene (Method 8310) 95% UCL Calculation

DATA	ID
6.3	J1V459/ J1V464
26.6	J1V1J7
6.0	J1V460
2.68	J1V1J9
53.4	J1V1K0
6.5	J1V461
61.8	J1V1K2
2.75	J1V1K3
81.0	J1V462
6.0	J1V463
59.9	J1V1K6
17.7	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	27.5
Censored		Lognormal mean	32.3
Detection limit or PQL		Std. devn.	28.4
Method detection limit		Median	12.1
TOTAL	12	Min.	2.68
		Max.	81.0

Lognormal distribution? r-squared is: 0.907
Normal distribution? r-squared is: 0.826
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 120

Pyrene (Method 8310) 95% UCL Calculation

DATA	ID
6.3	J1V459/ J1V464
36.2	J1V1J7
16.0	J1V460
3.39	J1V1J9
110	J1V1K0
6.5	J1V461
147	J1V1K2
2.49	J1V1K3
120	J1V462
6.0	J1V463
74.8	J1V1K6
27.3	J1V1K7

Number of samples		Uncensored values	
Uncensored	12	Mean	46.3
Censored		Lognormal mean	59.9
Detection limit or PQL		Std. devn.	52.6
Method detection limit		Median	21.7
TOTAL	12	Min.	2.49
		Max.	147

Lognormal distribution? r-squared is: 0.937
Normal distribution? r-squared is: 0.819
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 331

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/04/15
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Ecology Software (MTCAStat) Results, 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites NOB

Arsenic 95% UCL Calculation

DATA	ID
6.30	J1V1L8/ J1V1M2
9.32	J1V1L0
5.8	J1V596
8.42	J1V1L2
4.62	J1V1L3
8.7	J1V597
9.20	J1V1L5
5.26	J1V1L6
6.83	J1V1L7
6.03	J1V1L9
7.60	J1V1M0
9.89	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	7.33
Censored		Lognormal mean	7.36
Detection limit or PQL		Std. devn.	1.76
Method detection limit		Median	7.22
TOTAL	12	Min.	4.62
		Max.	9.89

Lognormal distribution? r-squared is: 0.959
Normal distribution? r-squared is: 0.962
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 8.47

Barium 95% UCL Calculation

DATA	ID
52.6	J1V1L8/ J1V1M2
66.2	J1V1L0
60.4	J1V596
39.4	J1V1L2
32.1	J1V1L3
80.2	J1V597
59.4	J1V1L5
58.3	J1V1L6
57.0	J1V1L7
65.1	J1V1L9
56.7	J1V1M0
50.3	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	56.5
Censored		Lognormal mean	56.7
Detection limit or PQL		Std. devn.	12.4
Method detection limit		Median	57.7
TOTAL	12	Min.	32.1
		Max.	80.2

Lognormal distribution? r-squared is: 0.894
Normal distribution? r-squared is: 0.938
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 62.9

Beryllium 95% UCL Calculation

DATA	ID
1.05	J1V1L8/ J1V1M2
1.13	J1V1L0
0.23	J1V596
0.983	J1V1L2
0.917	J1V1L3
0.23	J1V597
1.12	J1V1L5
0.984	J1V1L6
0.904	J1V1L7
1.06	J1V1L9
1.10	J1V1M0
1.04	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	0.895
Censored		Lognormal mean	0.949
Detection limit or PQL		Std. devn.	0.319
Method detection limit		Median	1.01
TOTAL	12	Min.	0.230
		Max.	1.13

Lognormal distribution? r-squared is: 0.573
Normal distribution? r-squared is: 0.669
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 1.05

Cadmium 95% UCL Calculation

DATA	ID
0.221	J1V1L8/ J1V1M2
0.262	J1V1L0
0.11	J1V596
0.216	J1V1L2
0.267	J1V1L3
0.14	J1V597
0.216	J1V1L5
0.214	J1V1L6
0.125	J1V1L7
0.342	J1V1L9
0.215	J1V1M0
0.198	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	0.210
Censored		Lognormal mean	0.212
Detection limit or PQL		Std. devn.	0.065
Method detection limit		Median	0.216
TOTAL	12	Min.	0.110
		Max.	0.342

Lognormal distribution? r-squared is: 0.910
Normal distribution? r-squared is: 0.924
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.257

Chromium 95% UCL Calculation

DATA	ID
10.1	J1V1L8/ J1V1M2
11.6	J1V1L0
14.4	J1V596
8.65	J1V1L2
9.15	J1V1L3
13.5	J1V597
10.7	J1V1L5
12.6	J1V1L6
13.3	J1V1L7
13.7	J1V1L9
12.1	J1V1M0
9.69	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	11.6
Censored		Lognormal mean	11.6
Detection limit or PQL		Std. devn.	1.94
Method detection limit		Median	11.9
TOTAL	12	Min.	8.65
		Max.	14.4

Lognormal distribution? r-squared is: 0.957
Normal distribution? r-squared is: 0.964
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 12.8

Cobalt 95% UCL Calculation

DATA	ID
8.41	J1V1L8/ J1V1M2
9.15	J1V1L0
6.4	J1V596
8.02	J1V1L2
7.81	J1V1L3
6.8	J1V597
8.57	J1V1L5
8.10	J1V1L6
7.86	J1V1L7
8.54	J1V1L9
8.35	J1V1M0
8.26	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	8.02
Censored		Lognormal mean	8.03
Detection limit or PQL		Std. devn.	0.76
Method detection limit		Median	8.18
TOTAL	12	Min.	6.40
		Max.	9.15

Lognormal distribution? r-squared is: 0.858
Normal distribution? r-squared is: 0.887
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 8.38

Copper 95% UCL Calculation

DATA	ID
11.9	J1V1L8/ J1V1M2
12.9	J1V1L0
15.0	J1V596
10.5	J1V1L2
11.1	J1V1L3
15.8	J1V597
11.1	J1V1L5
13.1	J1V1L6
12.1	J1V1L7
13.4	J1V1L9
11.5	J1V1M0
11.5	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	12.5
Censored		Lognormal mean	12.5
Detection limit or PQL		Std. devn.	1.62
Method detection limit		Median	12.0
TOTAL	12	Min.	10.5
		Max.	15.8

Lognormal distribution? r-squared is: 0.937
Normal distribution? r-squared is: 0.912
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 13.4

Lead 95% UCL Calculation

DATA	ID
10.1	J1V1L8/ J1V1M2
21.7	J1V1L0
14.7	J1V596
33.8	J1V1L2
9.66	J1V1L3
24.3	J1V597
19.8	J1V1L5
8.33	J1V1L6
2.94	J1V1L7
12.7	J1V1L9
14.2	J1V1M0
28.0	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	16.7
Censored		Lognormal mean	17.6
Detection limit or PQL		Std. devn.	9.00
Method detection limit		Median	14.5
TOTAL	12	Min.	2.94
		Max.	33.8

Lognormal distribution? r-squared is: 0.920
Normal distribution? r-squared is: 0.971
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 28.2

Manganese 95% UCL Calculation

DATA	ID
244	J1V1L8/ J1V1M2
284	J1V1L0
269	J1V596
232	J1V1L2
234	J1V1L3
290	J1V597
243	J1V1L5
259	J1V1L6
248	J1V1L7
273	J1V1L9
251	J1V1M0
237	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	255
Censored		Lognormal mean	255
Detection limit or PQL		Std. devn.	19.6
Method detection limit		Median	250
TOTAL	12	Min.	232
		Max.	290

Lognormal distribution? r-squared is: 0.947
Normal distribution? r-squared is: 0.938
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 266

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

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Ecology Software (MTCAStat) Results, 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites NOB

Mercury 95% UCL Calculation

DATA	ID
0.00609	J1V1L8/ J1V1M2
0.00976	J1V1L0
0.0110	J1V596
0.00417	J1V1L2
0.00205	J1V1L3
0.0130	J1V597
0.00505	J1V1L5
0.00530	J1V1L6
0.00748	J1V1L7
0.0764	J1V1L9
0.00203	J1V1M0
0.00627	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	0.0124
Censored		Lognormal mean	0.0110
Detection limit or PQL		Std. devn.	0.0204
Method detection limit		Median	0.00618
TOTAL	12	Min.	0.00203
		Max.	0.0764

Lognormal distribution? r-squared is: 0.867
Normal distribution? r-squared is: 0.447
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.0220

Nickel 95% UCL Calculation

DATA	ID
11.2	J1V1L8/ J1V1M2
11.7	J1V1L0
14.6	J1V596
8.65	J1V1L2
9.59	J1V1L3
16.2	J1V597
11.7	J1V1L5
13.4	J1V1L6
13.0	J1V1L7
14.4	J1V1L9
12.3	J1V1M0
10.1	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	12.2
Censored		Lognormal mean	12.3
Detection limit or PQL		Std. devn.	2.22
Method detection limit		Median	12.0
TOTAL	12	Min.	8.65
		Max.	16.2

Lognormal distribution? r-squared is: 0.988
Normal distribution? r-squared is: 0.991
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 13.6

Selenium 95% UCL Calculation

DATA	ID
0.252	J1V1L8/ J1V1M2
0.508	J1V1L0
0.435	J1V596
0.167	J1V1L2
0.522	J1V1L3
0.415	J1V597
0.173	J1V1L5
0.461	J1V1L6
0.568	J1V1L7
0.321	J1V1L9
0.376	J1V1M0
0.362	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	0.380
Censored		Lognormal mean	0.386
Detection limit or PQL		Std. devn.	0.132
Method detection limit		Median	0.396
TOTAL	12	Min.	0.167
		Max.	0.568

Lognormal distribution? r-squared is: 0.898
Normal distribution? r-squared is: 0.964
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.448

Silver 95% UCL Calculation

DATA	ID
0.267	J1V1L8/ J1V1M2
0.347	J1V1L0
0.080	J1V596
0.196	J1V1L2
0.0484	J1V1L3
0.075	J1V597
0.274	J1V1L5
0.360	J1V1L6
0.240	J1V1L7
0.227	J1V1L9
0.334	J1V1M0
0.318	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	0.231
Censored		Lognormal mean	0.247
Detection limit or PQL		Std. devn.	0.110
Method detection limit		Median	0.254
TOTAL	12	Min.	0.0484
		Max.	0.360

Lognormal distribution? r-squared is: 0.815
Normal distribution? r-squared is: 0.914
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.288

Vanadium 95% UCL Calculation

DATA	ID
45.0	J1V1L8/ J1V1M2
45.7	J1V1L0
45.2	J1V596
43.4	J1V1L2
41.5	J1V1L3
48.6	J1V597
45.2	J1V1L5
42.0	J1V1L6
39.1	J1V1L7
41.5	J1V1L9
44.3	J1V1M0
46.3	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	44.0
Censored		Lognormal mean	44.0
Detection limit or PQL		Std. devn.	2.60
Method detection limit		Median	44.6
TOTAL	12	Min.	39.1
		Max.	48.6

Lognormal distribution? r-squared is: 0.959
Normal distribution? r-squared is: 0.964
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 45.4

Zinc 95% UCL Calculation

DATA	ID
28.6	J1V1L8/ J1V1M2
35.3	J1V1L0
39.4	J1V596
29.6	J1V1L2
25.8	J1V1L3
104	J1V597
31.3	J1V1L5
31.3	J1V1L6
30.3	J1V1L7
40.7	J1V1L9
31.1	J1V1M0
26.9	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	37.9
Censored		Lognormal mean	37.3
Detection limit or PQL		Std. devn.	21.3
Method detection limit		Median	31.2
TOTAL	12	Min.	25.8
		Max.	104

Lognormal distribution? r-squared is: 0.643
Normal distribution? r-squared is: 0.488
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 48.0

Fluoride 95% UCL Calculation

DATA	ID
1.32	J1V1L8/ J1V1M2
1.40	J1V1L0
1.6	J1V596
1.31	J1V1L2
0.99	J1V1L3
1.6	J1V597
1.30	J1V1L5
1.33	J1V1L6
1.30	J1V1L7
1.29	J1V1L9
1.31	J1V1M0
1.34	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	1.34
Censored		Lognormal mean	1.34
Detection limit or PQL		Std. devn.	0.16
Method detection limit		Median	1.32
TOTAL	12	Min.	0.99
		Max.	1.60

Lognormal distribution? r-squared is: 0.771
Normal distribution? r-squared is: 0.792
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 1.42

Nitrogen in nitrate 95% UCL Calculation

DATA	ID
0.834	J1V1L8/ J1V1M2
10.8	J1V1L0
1.3	J1V596
1.29	J1V1L2
0.936	J1V1L3
2.7	J1V597
1.28	J1V1L5
0.958	J1V1L6
1.09	J1V1L7
1.60	J1V1L9
2.33	J1V1M0
1.06	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	2.18
Censored		Lognormal mean	2.00
Detection limit or PQL		Std. devn.	2.77
Method detection limit		Median	1.29
TOTAL	12	Min.	0.834
		Max.	10.8

Lognormal distribution? r-squared is: 0.744
Normal distribution? r-squared is: 0.465
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 3.50

Nitrogen in nitrate and nitrite 95% UCL Calculation

DATA	ID
0.261	J1V1L8/ J1V1M2
10.6	J1V1L0
0.19	J1V596
0.249	J1V1L2
0.219	J1V1L3
1.8	J1V597
0.718	J1V1L5
0.297	J1V1L6
0.450	J1V1L7
0.814	J1V1L9
1.46	J1V1M0
0.336	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	1.45
Censored		Lognormal mean	1.18
Detection limit or PQL		Std. devn.	2.93
Method detection limit		Median	0.393
TOTAL	12	Min.	0.185
		Max.	10.6

Lognormal distribution? r-squared is: 0.851
Normal distribution? r-squared is: 0.438
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 2.84

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/04/15
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Ecology Software (MTCAStat) Results, 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites NOB

Sulfate 95% UCL Calculation

DATA	ID
4.80	J1V1L8/ J1V1M2
145	J1V1L0
16	J1V596
5.08	J1V1L2
4.87	J1V1L3
29	J1V597
6.07	J1V1L5
5.71	J1V1L6
8.90	J1V1L7
11.4	J1V1L9
14.1	J1V1M0
11.1	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	21.8
Censored		Lognormal mean	18.2
Detection limit or PQL		Std. devn.	39.4
Method detection limit		Median	10.0
TOTAL	12	Min.	4.80
		Max.	145

Lognormal distribution? r-squared is: 0.805
Normal distribution? r-squared is: 0.435
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 40.5

TPH - Motor Oil (high boiling) 95% UCL Calculation

DATA	ID
3950	J1V1L8/ J1V1M2
6370	J1V1L0
[redacted]	J1V596
3220	J1V1L2
1100	J1V1L3
[redacted]	J1V597
4090	J1V1L5
2830	J1V1L6
2890	J1V1L7
4620	J1V1L9
2540	J1V1M0
3910	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	3552
Censored		Lognormal mean	3763
Detection limit or PQL		Std. devn.	1405
Method detection limit		Median	3565
TOTAL	12	Min.	1100
		Max.	6370

Lognormal distribution? r-squared is: NA
Normal distribution? r-squared is: 0.952
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 4093

Benzo(a)anthracene (Method 8310) 95% UCL Calculation

DATA	ID
11.6	J1V1L8/ J1V1M2
58.7	J1V1L0
20	J1V596
14.7	J1V1L2
2.63	J1V1L3
15	J1V597
6.13	J1V1L5
3.76	J1V1L6
5.73	J1V1L7
21.5	J1V1L9
22.5	J1V1M0
5.34	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	15.6
Censored		Lognormal mean	16.2
Detection limit or PQL		Std. devn.	15.3
Method detection limit		Median	13.2
TOTAL	12	Min.	2.63
		Max.	58.7

Lognormal distribution? r-squared is: 0.964
Normal distribution? r-squared is: 0.728
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 33.8

Benzo(a)pyrene (Method 8310) 95% UCL Calculation

DATA	ID
10.0	J1V1L8/ J1V1M2
50.6	J1V1L0
24	J1V596
11.7	J1V1L2
2.1	J1V1L3
15	J1V597
5.48	J1V1L5
3.37	J1V1L6
4.64	J1V1L7
19.0	J1V1L9
19.8	J1V1M0
5.34	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	14.3
Censored		Lognormal mean	15.0
Detection limit or PQL		Std. devn.	13.5
Method detection limit		Median	10.8
TOTAL	12	Min.	2.14
		Max.	50.6

Lognormal distribution? r-squared is: 0.980
Normal distribution? r-squared is: 0.784
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 32.5

Benzo(b)fluoranthene (Method 8310) 95% UCL Calculation

DATA	ID
11.6	J1V1L8/ J1V1M2
56.7	J1V1L0
31	J1V596
10.4	J1V1L2
1.92	J1V1L3
17	J1V597
5.13	J1V1L5
3.69	J1V1L6
5.45	J1V1L7
21.4	J1V1L9
24.6	J1V1M0
5.87	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	16.2
Censored		Lognormal mean	17.4
Detection limit or PQL		Std. devn.	15.7
Method detection limit		Median	11.0
TOTAL	12	Min.	1.92
		Max.	56.7

Lognormal distribution? r-squared is: 0.985
Normal distribution? r-squared is: 0.812
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 41.3

Benzo(ghi)perylene (Method 8310) 95% UCL Calculation

DATA	ID
4.18	J1V1L8/ J1V1M2
30.5	J1V1L0
25	J1V596
7.93	J1V1L2
1.53	J1V1L3
11	J1V597
4.62	J1V1L5
2.66	J1V1L6
3.50	J1V1L7
11.1	J1V1L9
13.4	J1V1M0
4.20	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	10.0
Censored		Lognormal mean	10.4
Detection limit or PQL		Std. devn.	9.18
Method detection limit		Median	6.28
TOTAL	12	Min.	1.53
		Max.	30.5

Lognormal distribution? r-squared is: 0.973
Normal distribution? r-squared is: 0.813
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 22.1

Chrysene (Method 8310) 95% UCL Calculation

DATA	ID
8.41	J1V1L8/ J1V1M2
41.6	J1V1L0
27	J1V596
13.4	J1V1L2
3.12	J1V1L3
15	J1V597
6.05	J1V1L5
3.38	J1V1L6
4.38	J1V1L7
17.7	J1V1L9
15.0	J1V1M0
4.84	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	13.3
Censored		Lognormal mean	13.8
Detection limit or PQL		Std. devn.	11.5
Method detection limit		Median	10.9
TOTAL	12	Min.	3.12
		Max.	41.6

Lognormal distribution? r-squared is: 0.962
Normal distribution? r-squared is: 0.826
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 26.9

Fluoranthene (Method 8310) 95% UCL Calculation

DATA	ID
16.2	J1V1L8/ J1V1M2
87.1	J1V1L0
51	J1V596
21.8	J1V1L2
4.25	J1V1L3
29	J1V597
9.28	J1V1L5
5.94	J1V1L6
7.73	J1V1L7
32.8	J1V1L9
30.1	J1V1M0
7.48	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	25.2
Censored		Lognormal mean	26.5
Detection limit or PQL		Std. devn.	24.1
Method detection limit		Median	19.0
TOTAL	12	Min.	4.25
		Max.	87.1

Lognormal distribution? r-squared is: 0.969
Normal distribution? r-squared is: 0.801
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 58.5

Phenanthrene (Method 8310) 95% UCL Calculation

DATA	ID
8.86	J1V1L8/ J1V1M2
75.1	J1V1L0
26	J1V596
17.1	J1V1L2
2.54	J1V1L3
14	J1V597
6.15	J1V1L5
2.63	J1V1L6
2.73	J1V1L7
25.4	J1V1L9
16.3	J1V1M0
2.57	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	16.6
Censored		Lognormal mean	17.7
Detection limit or PQL		Std. devn.	20.3
Method detection limit		Median	11.4
TOTAL	12	Min.	2.54
		Max.	75.1

Lognormal distribution? r-squared is: 0.922
Normal distribution? r-squared is: 0.676
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 51.6

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/04/15
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Ecology Software (MTCAStat) Results, 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites NOB

Pyrene (Method 8310) 95% UCL Calculation

DATA	ID
15.5	J1V1L8/ J1V1M2
81.5	J1V1L0
60	J1V596
29.4	J1V1L2
4.54	J1V1L3
36	J1V597
10.4	J1V1L5
5.02	J1V1L6
6.59	J1V1L7
31.3	J1V1L9
26.7	J1V1M0
7.88	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	26.2
Censored		Lognormal mean	28.1
Detection limit or PQL		Std. devn.	24.0
Method detection limit		Median	21.1
TOTAL	12	Min.	4.54
		Max.	81.5

Lognormal distribution? r-squared is: 0.960
Normal distribution? r-squared is: 0.846
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 65.4

Benzo(a)anthracene (Method 8270) 95% UCL Calculation

DATA	ID
14.0	J1V1L8/ J1V1M2
26.8	J1V1L0
19	J1V596
5.10	J1V1L2
5.10	J1V1L3
11	J1V597
5.25	J1V1L5
5.25	J1V1L6
23.2	J1V1L7
23.3	J1V1L9
17.2	J1V1M0
5.15	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	13.3
Censored		Lognormal mean	13.8
Detection limit or PQL		Std. devn.	8.35
Method detection limit		Median	12.2
TOTAL	12	Min.	5.10
		Max.	26.8

Lognormal distribution? r-squared is: 0.851
Normal distribution? r-squared is: 0.877
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 17.3

Fluoranthene (Method 8270) 95% UCL Calculation

DATA	ID
19.5	J1V1L8/ J1V1M2
46.7	J1V1L0
18	J1V596
13.6	J1V1L2
5.10	J1V1L3
19	J1V597
5.25	J1V1L5
5.25	J1V1L6
35.1	J1V1L7
44.2	J1V1L9
20.7	J1V1M0
5.15	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	19.7
Censored		Lognormal mean	20.9
Detection limit or PQL		Std. devn.	14.9
Method detection limit		Median	18.0
TOTAL	12	Min.	5.10
		Max.	46.7

Lognormal distribution? r-squared is: 0.895
Normal distribution? r-squared is: 0.873
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 26.8

Pyrene (Method 8270) 95% UCL Calculation

DATA	ID
15.9	J1V1L8/ J1V1M2
33.9	J1V1L0
28	J1V596
13.0	J1V1L2
5.10	J1V1L3
32	J1V597
5.25	J1V1L5
5.25	J1V1L6
30.4	J1V1L7
31.3	J1V1L9
17.2	J1V1M0
5.15	J1V1M1

Number of samples		Uncensored values	
Uncensored	12	Mean	18.5
Censored		Lognormal mean	19.9
Detection limit or PQL		Std. devn.	11.9
Method detection limit		Median	16.5
TOTAL	12	Min.	5.10
		Max.	33.9

Lognormal distribution? r-squared is: 0.842
Normal distribution? r-squared is: 0.871
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 24.2

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

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Ecology Software (MTCAStat) Results, 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites SOB

Arsenic 95% UCL Calculation

DATA	ID
4.08	J1V1M5/ J1V1N5
3.11	J1V1M3
3.88	J1V1M4
10.3	J1V1M6
9.15	J1V1M7
6.08	J1V1M8
8.00	J1V1M9
6.20	J1V1N0
2.30	J1V1N1
6.59	J1V1N2
5.84	J1V1N3
1.51	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	5.59
Censored		Lognormal mean	5.77
Detection limit or PQL		Std. devn.	2.72
Method detection limit		Median	5.96
TOTAL	12	Min.	1.51
		Max.	10.3

Lognormal distribution? r-squared is: 0.947
Normal distribution? r-squared is: 0.979
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 8.52

Barium 95% UCL Calculation

DATA	ID
69.0	J1V1M5/ J1V1N5
82.0	J1V1M3
66.8	J1V1M4
48.4	J1V1M6
52.1	J1V1M7
60.3	J1V1M8
60.2	J1V1M9
53.9	J1V1N0
49.6	J1V1N1
84.4	J1V1N2
50.8	J1V1N3
53.5	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	60.9
Censored		Lognormal mean	61.0
Detection limit or PQL		Std. devn.	12.3
Method detection limit		Median	57.1
TOTAL	12	Min.	48.4
		Max.	84.4

Lognormal distribution? r-squared is: 0.908
Normal distribution? r-squared is: 0.876
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 67.8

Beryllium 95% UCL Calculation

DATA	ID
0.746	J1V1M5/ J1V1N5
0.799	J1V1M3
0.747	J1V1M4
0.630	J1V1M6
0.673	J1V1M7
0.662	J1V1M8
0.685	J1V1M9
0.612	J1V1N0
0.814	J1V1N1
0.663	J1V1N2
0.624	J1V1N3
0.946	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	0.717
Censored		Lognormal mean	0.717
Detection limit or PQL		Std. devn.	0.098
Method detection limit		Median	0.679
TOTAL	12	Min.	0.612
		Max.	0.946

Lognormal distribution? r-squared is: 0.916
Normal distribution? r-squared is: 0.885
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.769

Cadmium 95% UCL Calculation

DATA	ID
0.338	J1V1M5/ J1V1N5
0.407	J1V1M3
0.354	J1V1M4
0.314	J1V1M6
0.349	J1V1M7
0.342	J1V1M8
0.335	J1V1M9
0.293	J1V1N0
0.401	J1V1N1
0.291	J1V1N2
0.335	J1V1N3
0.412	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	0.348
Censored		Lognormal mean	0.348
Detection limit or PQL		Std. devn.	0.041
Method detection limit		Median	0.340
TOTAL	12	Min.	0.291
		Max.	0.412

Lognormal distribution? r-squared is: 0.933
Normal distribution? r-squared is: 0.923
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.370

Chromium 95% UCL Calculation

DATA	ID
11.9	J1V1M5/ J1V1N5
11.7	J1V1M3
12.7	J1V1M4
11.1	J1V1M6
10.6	J1V1M7
12.3	J1V1M8
11.2	J1V1M9
9.86	J1V1N0
7.95	J1V1N1
10.5	J1V1N2
12.5	J1V1N3
6.56	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	10.7
Censored		Lognormal mean	10.8
Detection limit or PQL		Std. devn.	1.86
Method detection limit		Median	11.2
TOTAL	12	Min.	6.56
		Max.	12.7

Lognormal distribution? r-squared is: 0.816
Normal distribution? r-squared is: 0.875
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 11.6

Cobalt 95% UCL Calculation

DATA	ID
6.58	J1V1M5/ J1V1N5
8.24	J1V1M3
7.12	J1V1M4
7.48	J1V1M6
5.67	J1V1M7
8.26	J1V1M8
6.65	J1V1M9
6.80	J1V1N0
9.23	J1V1N1
7.40	J1V1N2
7.58	J1V1N3
10.1	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	7.59
Censored		Lognormal mean	7.60
Detection limit or PQL		Std. devn.	1.22
Method detection limit		Median	7.44
TOTAL	12	Min.	5.67
		Max.	10.1

Lognormal distribution? r-squared is: 0.972
Normal distribution? r-squared is: 0.952
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 8.28

Copper 95% UCL Calculation

DATA	ID
15.6	J1V1M5/ J1V1N5
15.7	J1V1M3
15.1	J1V1M4
14.8	J1V1M6
15.1	J1V1M7
18.3	J1V1M8
15.5	J1V1M9
16.1	J1V1N0
13.4	J1V1N1
14.5	J1V1N2
14.6	J1V1N3
15.9	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	15.4
Censored		Lognormal mean	15.4
Detection limit or PQL		Std. devn.	1.18
Method detection limit		Median	15.3
TOTAL	12	Min.	13.4
		Max.	18.3

Lognormal distribution? r-squared is: 0.899
Normal distribution? r-squared is: 0.877
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 15.9

Lead 95% UCL Calculation

DATA	ID
7.33	J1V1M5/ J1V1N5
7.20	J1V1M3
5.90	J1V1M4
34.6	J1V1M6
28.4	J1V1M7
32.0	J1V1M8
30.6	J1V1M9
18.5	J1V1N0
4.88	J1V1N1
26.5	J1V1N2
22.3	J1V1N3
4.71	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	18.6
Censored		Lognormal mean	19.9
Detection limit or PQL		Std. devn.	11.9
Method detection limit		Median	20.4
TOTAL	12	Min.	4.71
		Max.	34.6

Lognormal distribution? r-squared is: 0.857
Normal distribution? r-squared is: 0.884
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 24.2

Manganese 95% UCL Calculation

DATA	ID
317	J1V1M5/ J1V1N5
334	J1V1M3
316	J1V1M4
263	J1V1M6
276	J1V1M7
276	J1V1M8
274	J1V1M9
252	J1V1N0
273	J1V1N1
257	J1V1N2
259	J1V1N3
297	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	283
Censored		Lognormal mean	283
Detection limit or PQL		Std. devn.	26.8
Method detection limit		Median	275
TOTAL	12	Min.	252
		Max.	334

Lognormal distribution? r-squared is: 0.913
Normal distribution? r-squared is: 0.899
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 297

Washington Closure Hanford

CALCULATION SHEET

Originator J. D. Skoglie	**Date** 05/04/15	**Calc. No.** 0100H-CA-V0226	**Rev. No.** 0
Project 100-H Area Closure Operations	**Job No.** 14655	**Checked** I. B. Berezovskiy	**Date** 05/04/15
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations			**Sheet No.** 38 of 43

Ecology Software (MTCAStat) Results, 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites SOB

Mercury 95% UCL Calculation

DATA	ID
0.00555	J1V1M5/ J1V1N5
0.00513	J1V1M3
0.00591	J1V1M4
0.00546	J1V1M6
0.00543	J1V1M7
0.0106	J1V1M8
0.00607	J1V1M9
0.00435	J1V1N0
0.00205	J1V1N1
0.00548	J1V1N2
0.00451	J1V1N3
0.00198	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	0.00521
Censored		Lognormal mean	0.00530
Detection limit or PQL		Std. devn.	0.00218
Method detection limit		Median	0.00545
TOTAL	12	Min.	0.00198
		Max.	0.0106

Lognormal distribution? r-squared is: 0.816
Normal distribution? r-squared is: 0.813
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 0.00600

Nickel 95% UCL Calculation

DATA	ID
11.2	J1V1M5/ J1V1N5
11.0	J1V1M3
13.6	J1V1M4
11.7	J1V1M6
10.2	J1V1M7
11.8	J1V1M8
12.8	J1V1M9
10.8	J1V1N0
9.75	J1V1N1
11.2	J1V1N2
12.2	J1V1N3
10.5	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	11.4
Censored		Lognormal mean	11.4
Detection limit or PQL		Std. devn.	1.10
Method detection limit		Median	11.2
TOTAL	12	Min.	9.75
		Max.	13.6

Lognormal distribution? r-squared is: 0.986
Normal distribution? r-squared is: 0.973
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 12.0

Vanadium 95% UCL Calculation

DATA	ID
43.1	J1V1M5/ J1V1N5
54.8	J1V1M3
45.7	J1V1M4
51.6	J1V1M6
40.5	J1V1M7
58.8	J1V1M8
51.0	J1V1M9
43.5	J1V1N0
70.7	J1V1N1
51.2	J1V1N2
57.3	J1V1N3
80.5	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	54.1
Censored		Lognormal mean	54.1
Detection limit or PQL		Std. devn.	11.8
Method detection limit		Median	51.4
TOTAL	12	Min.	40.5
		Max.	80.5

Lognormal distribution? r-squared is: 0.942
Normal distribution? r-squared is: 0.893
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 60.6

Zinc 95% UCL Calculation

DATA	ID
33.5	J1V1M5/ J1V1N5
42.3	J1V1M3
35.6	J1V1M4
40.3	J1V1M6
30.0	J1V1M7
49.4	J1V1M8
39.5	J1V1M9
36.1	J1V1N0
47.3	J1V1N1
46.8	J1V1N2
41.3	J1V1N3
47.7	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	40.8
Censored		Lognormal mean	40.9
Detection limit or PQL		Std. devn.	6.20
Method detection limit		Median	40.8
TOTAL	12	Min.	30.0
		Max.	49.4

Lognormal distribution? r-squared is: 0.957
Normal distribution? r-squared is: 0.965
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 44.5

Chloride 95% UCL Calculation

DATA	ID
3.68	J1V1M5/ J1V1N5
1.96	J1V1M3
2.23	J1V1M4
1.56	J1V1M6
1.34	J1V1M7
4.85	J1V1M8
14.4	J1V1M9
1.32	J1V1N0
2.95	J1V1N1
2.01	J1V1N2
8.57	J1V1N3
1.65	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	3.88
Censored		Lognormal mean	3.77
Detection limit or PQL		Std. devn.	3.91
Method detection limit		Median	2.12
TOTAL	12	Min.	1.32
		Max.	14.4

Lognormal distribution? r-squared is: 0.886
Normal distribution? r-squared is: 0.676
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 5.73

Fluoride 95% UCL Calculation

DATA	ID
2.80	J1V1M5/ J1V1N5
1.87	J1V1M3
1.45	J1V1M4
1.56	J1V1M6
1.32	J1V1M7
0.966	J1V1M8
1.49	J1V1M9
0.826	J1V1N0
0.776	J1V1N1
1.05	J1V1N2
1.04	J1V1N3
0.820	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	1.33
Censored		Lognormal mean	1.33
Detection limit or PQL		Std. devn.	0.576
Method detection limit		Median	1.19
TOTAL	12	Min.	0.776
		Max.	2.80

Lognormal distribution? r-squared is: 0.939
Normal distribution? r-squared is: 0.837
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1.68

Nitrogen in nitrate 95% UCL Calculation

DATA	ID
2.05	J1V1M5/ J1V1N5
2.03	J1V1M3
1.40	J1V1M4
1.01	J1V1M6
0.853	J1V1M7
47.0	J1V1M8
31.3	J1V1M9
1.18	J1V1N0
1.01	J1V1N1
1.12	J1V1N2
1.19	J1V1N3
1.05	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	7.60
Censored		Lognormal mean	5.57
Detection limit or PQL		Std. devn.	15.1
Method detection limit		Median	1.19
TOTAL	12	Min.	0.853
		Max.	47.0

Lognormal distribution? r-squared is: 0.637
Normal distribution? r-squared is: 0.493
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 14.8

Nitrogen in nitrate and nitrite 95% UCL Calculation

DATA	ID
0.882	J1V1M5/ J1V1N5
0.775	J1V1M3
0.666	J1V1M4
0.402	J1V1M6
0.197	J1V1M7
18.5	J1V1M8
35.7	J1V1M9
0.889	J1V1N0
0.391	J1V1N1
0.457	J1V1N2
0.378	J1V1N3
0.299	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	4.96
Censored		Lognormal mean	3.46
Detection limit or PQL		Std. devn.	11.0
Method detection limit		Median	0.562
TOTAL	12	Min.	0.197
		Max.	35.7

Lognormal distribution? r-squared is: 0.733
Normal distribution? r-squared is: 0.479
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 10.2

Sulfate 95% UCL Calculation

DATA	ID
12.3	J1V1M5/ J1V1N5
4.53	J1V1M3
4.04	J1V1M4
5.77	J1V1M6
3.87	J1V1M7
26.1	J1V1M8
22.0	J1V1M9
11.1	J1V1N0
4.22	J1V1N1
4.92	J1V1N2
12.0	J1V1N3
7.49	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	9.86
Censored		Lognormal mean	9.90
Detection limit or PQL		Std. devn.	7.38
Method detection limit		Median	6.63
TOTAL	12	Min.	3.87
		Max.	26.1

Lognormal distribution? r-squared is: 0.907
Normal distribution? r-squared is: 0.8
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 16.0

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/04/15
Job No. 14655

Calc. No. 0100H-CA-V0226
Checked I. B. Berezovskiy

Rev. No. 0
Date 05/04/15
Sheet No. 39 of 43

Ecology Software (MTCAStat) Results, 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites SOB

TPH - motor oil (high boiling) 95% UCL Calculation

DATA	ID
3810	J1V1M5/ J1V1N5
4940	J1V1M3
9950	J1V1M4
2460	J1V1M6
3280	J1V1M7
8250	J1V1M8
9440	J1V1M9
9510	J1V1N0
2300	J1V1N1
3570	J1V1N2
9900	J1V1N3
1105	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	5710
Censored		Lognormal mean	6015
Detection limit or PQL		Std. devn.	3417
Method detection limit		Median	4375
TOTAL	12	Min.	1105
		Max.	9950

Lognormal distribution? r-squared is: 0.908
Normal distribution? r-squared is: 0.879
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 10221

Benzo(a)anthracene (Method 8310) 95% UCL Calculation

DATA	ID
0.272	J1V1M5/ J1V1N5
0.272	J1V1M3
0.274	J1V1M4
7.55	J1V1M6
0.272	J1V1M7
6.44	J1V1M8
5.35	J1V1M9
11.9	J1V1N0
0.274	J1V1N1
5.25	J1V1N2
86.7	J1V1N3
1.13	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	10.5
Censored		Lognormal mean	13.3
Detection limit or PQL		Std. devn.	24.3
Method detection limit		Median	3.19
TOTAL	12	Min.	0.272
		Max.	86.7

Lognormal distribution? r-squared is: 0.863
Normal distribution? r-squared is: 0.426
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 22.0

Benzo(a)pyrene (Method 8310) 95% UCL Calculation

DATA	ID
0.451	J1V1M5/ J1V1N5
0.272	J1V1M3
1.55	J1V1M4
6.21	J1V1M6
0.706	J1V1M7
6.20	J1V1M8
5.56	J1V1M9
9.03	J1V1N0
0.274	J1V1N1
4.74	J1V1N2
70.5	J1V1N3
1.18	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	8.89
Censored		Lognormal mean	9.43
Detection limit or PQL		Std. devn.	19.6
Method detection limit		Median	3.15
TOTAL	12	Min.	0.272
		Max.	70.5

Lognormal distribution? r-squared is: 0.937
Normal distribution? r-squared is: 0.428
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 80.0

Benzo(b)fluoranthene (Method 8310) 95% UCL Calculation

DATA	ID
0.272	J1V1M5/ J1V1N5
0.272	J1V1M3
2.98	J1V1M4
7.04	J1V1M6
0.272	J1V1M7
7.07	J1V1M8
6.98	J1V1M9
8.23	J1V1N0
0.274	J1V1N1
5.02	J1V1N2
77.6	J1V1N3
1.21	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	9.77
Censored		Lognormal mean	12.4
Detection limit or PQL		Std. devn.	21.6
Method detection limit		Median	4.00
TOTAL	12	Min.	0.272
		Max.	77.6

Lognormal distribution? r-squared is: 0.882
Normal distribution? r-squared is: 0.423
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 20.0

Benzo(ghi)perylene (Method 8310) 95% UCL Calculation

DATA	ID
0.272	J1V1M5/ J1V1N5
0.272	J1V1M3
4.55	J1V1M4
4.14	J1V1M6
0.272	J1V1M7
5.28	J1V1M8
5.68	J1V1M9
6.17	J1V1N0
0.274	J1V1N1
3.89	J1V1N2
32.2	J1V1N3
0.273	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	5.27
Censored		Lognormal mean	7.44
Detection limit or PQL		Std. devn.	8.82
Method detection limit		Median	4.02
TOTAL	12	Min.	0.272
		Max.	32.2

Lognormal distribution? r-squared is: 0.820
Normal distribution? r-squared is: 0.534
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 9.46

Chrysene (Method 8310) 95% UCL Calculation

DATA	ID
0.272	J1V1M5/ J1V1N5
0.272	J1V1M3
1.53	J1V1M4
5.78	J1V1M6
0.272	J1V1M7
6.20	J1V1M8
5.79	J1V1M9
9.92	J1V1N0
0.274	J1V1N1
4.86	J1V1N2
70.4	J1V1N3
0.851	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	8.87
Censored		Lognormal mean	10.6
Detection limit or PQL		Std. devn.	19.6
Method detection limit		Median	3.20
TOTAL	12	Min.	0.272
		Max.	70.4

Lognormal distribution? r-squared is: 0.897
Normal distribution? r-squared is: 0.435
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 18.2

Fluoranthene (Method 8310) 95% UCL Calculation

DATA	ID
0.272	J1V1M5/ J1V1N5
0.272	J1V1M3
0.274	J1V1M4
9.80	J1V1M6
0.272	J1V1M7
9.72	J1V1M8
9.88	J1V1M9
16.4	J1V1N0
0.274	J1V1N1
7.79	J1V1N2
125	J1V1N3
2.55	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	15.2
Censored		Lognormal mean	24.5
Detection limit or PQL		Std. devn.	35.0
Method detection limit		Median	5.17
TOTAL	12	Min.	0.272
		Max.	125

Lognormal distribution? r-squared is: 0.853
Normal distribution? r-squared is: 0.426
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 31.8

Pyrene (Method 8310) 95% UCL Calculation

DATA	ID
0.651	J1V1M5/ J1V1N5
0.272	J1V1M3
1.27	J1V1M4
9.48	J1V1M6
0.841	J1V1M7
11.1	J1V1M8
10.1	J1V1M9
20.1	J1V1N0
0.274	J1V1N1
8.80	J1V1N2
149	J1V1N3
1.69	J1V1N4

Number of samples		Uncensored values	
Uncensored	12	Mean	17.8
Censored		Lognormal mean	21.8
Detection limit or PQL		Std. devn.	41.8
Method detection limit		Median	5.25
TOTAL	12	Min.	0.272
		Max.	149

Lognormal distribution? r-squared is: 0.940
Normal distribution? r-squared is: 0.419
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 357

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 05/04/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0
Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/04/15
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 40 of 43

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Excavation 1-12

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1V1H5	11/12/14	7360		6.91	7.13		0.508	135		0.102	0.750		0.102	17.6		1.02	0.340	B	0.102	32500		8.13	21.0		0.152	7.19	D	0.762
Duplicate of J1V1H5	J1V1J5	11/12/14	7530		7.26	4.59		0.534	136		0.107	0.722		0.107	17.4		1.07	0.369	B	0.107	32400		8.55	15.2		0.160	6.58	D	0.801

Analysis:

TDL		Aluminum	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt
		5	10	2	0.5	2	0.2	100	1	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	2.3%		0.7%		1.1%		0.3%	*32.0%*	
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Excavation 1-12

Sampling Area	HEIS Number	Sample Date	Copper			Iron			Lead			Magnesium			Manganese			Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1V1H5	11/12/14	75.8		0.305	28200		8.13	9.79	D	1.68	4640		8.63	284		0.203	0.0973		0.00429	1.66		0.203	23.8		0.152	1910		6.50
Duplicate of J1V1H5	J1V1J5	11/12/14	33.6		0.320	18600		8.55	12.7	D	1.76	4470		9.08	257		0.214	0.114		0.00425	0.594	B	0.214	14.1		0.160	1770		6.84

Analysis:

TDL		Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Potassium
		1	5	5	75	5	0.2	2	4	400
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	*77.1%*	*41.0%*		3.7%	10.0%				
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Yes - assess further	No - acceptable

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Excavation 1-12

Sampling Area	HEIS Number	Sample Date	Selenium			Silicon			Sodium			Vanadium			Zinc			Chloride			Fluoride			Nitrogen in Nitrate			Nitrogen in Nitrite and Nitrate		
			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
EXC-3	J1V1H5	11/12/14	0.961	BD	0.345	1430	*N	1.52	965		7.11	42.3	D	0.508	24.4		0.404	38.9		0.715	0.881	B	0.352	5.31		0.352	1.37		0.181
Duplicate of J1V1H5	J1V1J5	11/12/14	1.00	D	0.320	1450	*N	1.60	771		7.48	44.9	D	0.534	39.2	D	1.99	22.8		0.716	0.786	B	0.353	3.50		0.353	1.38		0.180

Analysis:

TDL		Selenium	Silicon	Sodium	Vanadium	Zinc	Chloride	Fluoride	Nitrogen in Nitrate	Nitrogen in Nitrite and Nitrate
		1	2	50	2.5	1	2	5	0.75	0.75
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD		1.4%	22.4%	6.0%	*46.5%*	*52.2%*			
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	No - acceptable	Yes - assess further	No - acceptable

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Excavation 1-12

Sampling Area	Sample Number	Sample Date	Nitrogen in Nitrite			Sulfate			Aroclor-1254			Aroclor-1260		
			mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-3	J1V1H5	11/12/14	0.532	B	0.352	672	D	7.09	39.3	D	5.92	57.3	D	5.92
Duplicate of J1V1H5	J1V1J5	11/12/14	0.513	B	0.353	501	D	7.10	10	DJ	5.92	12.1	DJ	5.92

Analysis:

TDL		Nitrogen in Nitrite	Sulfate	Aroclor-1254	Aroclor-1260
			5	20	20
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	3.6%	29.2%		
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	Yes - assess further

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Excavation 1-12

Sampling Area	HEIS Number	Sample Date	Arsenic (TCLP)			Barium (TCLP)			Lead (TCLP)		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
EXC-13	J1V1J6	11/5/14	0.306		0.050	0.773		0.010	0.128		0.033
Duplicate of J1V1J6	J1V1K8	11/5/14	0.304		0.050	0.586		0.010	0.116		0.033

Analysis:

TDL		Arsenic (TCLP)	Barium (TCLP)	Lead (TCLP)
		0.5	10	0.5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD			
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 05/04/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0

Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/04/15

Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 41 of 43

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Excavation 13-24

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			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	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-13 [a]	J1V459	2/5/15	5280		1.5	3.2		0.65	34.4		0.075	0.080	B	0.033	0.061	B	0.041	5110		13.9	11.0		0.057	5.4	X	0.099	12.7		0.21
Duplicate of J1V459 [a]	J1V464	2/5/15	5370		1.4	2.4		0.59	34.9		0.068	0.076	B	0.029	0.081	B	0.037	5290		12.6	9.8		0.052	5.5	X	0.089	12.6		0.19

Analysis:

TDL		5	10	2	0.5	0.2	100	1	2	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	1.7%		1.4%			3.5%	11.5%		0.8%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Excavation 13-24

Sampling Area	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Nickel			Potassium			Silicon			Sodium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-13 [a]	J1V459	2/5/15	15700		3.8	4.0		0.27	4040		3.7	228		0.099	13.3		0.12	620		40.5	191		5.6	188		58.3	45.5		0.093
Duplicate of J1V459 [a]	J1V464	2/5/15	16100		3.4	3.8		0.24	4080		3.3	232		0.089	11.6		0.11	626		36.6	178		5.0	209		52.6	46.7		0.084

Analysis:

TDL		5	5	75	5	4	400	2	50	2.5
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)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	2.5%		1.0%	1.7%			7.0%		2.6%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Excavation 13-24

Sampling Area	HEIS Number	Sample Date	Zinc		
			mg/kg	Q	PQL
EXC-13 [a]	J1V459	2/5/15	32.0		0.39
Duplicate of J1V459 [a]	J1V464	2/5/15	32.6		0.35

Analysis:

TDL		1
Duplicate Analysis	Both > PQL?	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)
	RPD	1.9%
	Difference > 2 TDL?	Not applicable

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 05/04/15 **Calc. No.** 0100H-CA-V0226 **Rev. No.** 0

Project 100-H Area Closure Operations **Job No.** 14655 **Checked** I. B. Berezovskiy **Date** 05/04/15

Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 42 of 43

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites NOB

Sampling Area	Sample Number	Sample Date	Bismuth-214			Lead-212			Lead-214			Potassium-40			Thallium-208			Aluminum			Arsenic			Barium			Beryllium		
			pCi/g	Q	MDA	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
NOB-9	J1V1L8	11/20/14	0.625		0.56	0.641		0.32	0.740		0.28	16.031		1.43	0.671		0.07	5440		7.01	5.58		0.515	51.6		0.103	1.07		0.103
Duplicate of J1V1L8	J1V1M2	11/20/14	0.655		0.19	0.633		0.15	0.557		0.16	13.806		0.64	0.594		0.22	5810		6.99	7.02		0.514	53.5		0.103	1.02		0.103

Analysis:

TDL			0.25			0.25			0.25			0.5			0.25			5			10			2			0.5		
Duplicate Analysis	Both > PQL?		Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)		
	Both >5xTDL?		No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			Yes (calc RPD)			No-Stop (acceptable)			Yes (calc RPD)			No-Stop (acceptable)			Yes (calc RPD)			No-Stop (acceptable)		
	RPD											14.9%						6.6%						3.6%					
	Difference > 2 TDL?		No - acceptable			No - acceptable			No - acceptable			Not applicable			No - acceptable			Not applicable			No - acceptable			Not applicable			No - acceptable		

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites NOB

Sampling Area	HEIS Number	Sample Date	Cadmium			Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium			Manganese		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
NOB-9	J1V1L8	11/20/14	0.238	B	0.103	5430		8.25	9.38		0.155	8.35		0.155	11.6		0.309	16800		8.25	9.18		0.340	3950		8.76	232		0.206
Duplicate of J1V1L8	J1V1M2	11/20/14	0.203	B	0.103	5730		8.23	10.9		0.154	8.46		0.154	12.1		0.308	17500		8.23	11.0		0.339	4320		8.74	255		0.206

Analysis:

TDL			0.2			100			1			2			1			5			5			75			5		
Duplicate Analysis	Both > PQL?		Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)		
	Both >5xTDL?		No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)			No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)			No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)		
	RPD					5.4%			15.0%						4.2%			4.1%						8.9%			9.4%		
	Difference > 2 TDL?		No - acceptable			Not applicable			Not applicable			No - acceptable			Not applicable			Not applicable			No - acceptable			Not applicable			Not applicable		

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites NOB

Sampling Area	HEIS Number	Sample Date	Mercury			Nickel			Potassium			Silicon			Silver			Sodium			Vanadium			Zinc			Fluoride		
			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
NOB-9	J1V1L8	11/20/14	0.0055	B	0.00388	10.2		0.155	799		6.60	1070	JN	1.55	0.251	B	0.103	158	*	7.22	45.6		0.103	28.3	CM	0.412	1.34		0.342
Duplicate of J1V1L8	J1V1M2	11/20/14	0.00668	B	0.00386	12.1		0.154	896		6.58	753	JN	1.54	0.283	B	0.103	153	*	7.20	44.3		0.103	28.9	CM	0.411	1.30		0.341

Analysis:

TDL			0.2			4			400			2			0.2			50			2.5			1			5		
Duplicate Analysis	Both > PQL?		Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)		
	Both >5xTDL?		No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			Yes (calc RPD)			No-Stop (acceptable)			No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)			No-Stop (acceptable)		
	RPD											*34.8%*									2.9%			2.1%					
	Difference > 2 TDL?		No - acceptable			No - acceptable			No - acceptable			Not applicable			No - acceptable			No - acceptable			Not applicable			Not applicable			No - acceptable		

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites NOB

Sampling Area	Sample Number	Sample Date	Nitrogen in Nitrate			Nitrogen in Nitrite and Nitrate			Sulfate			TPH - motor oil (high boiling)			Benzo(a)anthracene (Method 8310)			Benzo(a)pyrene (Method 8310)			Benzo(b)fluoranthene (Method 8310)			Chrysene (Method 8310)			Fluoranthene (Method 8310)		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
NOB-9	J1V1L8	11/20/14	0.842	JB	0.342	0.244	B	0.176	4.87		1.38	4880	J	2240	8.96		0.552	7.68		0.552	8.83		0.552	6.51		0.552	11.8		0.552
Duplicate of J1V1L8	J1V1M2	11/20/14	0.826	JB	0.341	0.278	B	0.174	4.72		1.38	3020	J	2240	14.3		0.550	12.3		0.550	14.4		0.550	10.3		0.550	20.5		0.550

Analysis:

TDL			0.75			0.75			5			5000			15			15			15			15			15		
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)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)		
	RPD																												
	Difference > 2 TDL?		No - acceptable			No - acceptable			No - acceptable			No - acceptable			No - acceptable			No - acceptable			No - acceptable			No - acceptable			No - acceptable		

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites NOB

Sampling Area	HEIS Number	Sample Date	Phenanthrene (Method 8310)			Pyrene (Method 8310)			Benzo(a)anthracene (Method 8270)			Benzo(b)fluoranthene (Method 8270)			Fluoranthene (Method 8270)			Pyrene (Method 8270)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
NOB-9	J1V1L8	11/20/14	7.11	J	5.18	12.4		0.552	12.1	J	10.3	13.4	J	10.3	15.9	J	10.3	12.4	J	10.3
Duplicate of J1V1L8	J1V1M2	11/20/14	10.6	J	5.16	18.6		0.550	15.8	J	10.3	13.4	J	10.3	23.1	J	10.3	19.3	J	10.3

Analysis:

TDL			15			15			660			660			660			660			660			660			660		
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)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)		
	RPD																												
	Difference > 2 TDL?		No - acceptable			No - acceptable			No - acceptable			No - acceptable			No - acceptable			No - acceptable			No - acceptable			No - acceptable			No - acceptable		

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-H Area Closure Operations
Subject 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations

Date 05/04/15
Job No. 14655

Calc. No. 0100H-CA-V0226
Checked I. B. Berezovskiy

Rev. No. 0
Date 05/04/15
Sheet No. 43 of 43

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites SOB

Sampling Area	Sample Number	Sample Date	Actinium-228			Bismuth-214			Lead-212			Lead-214			Potassium-40			Thallium-208			Aluminum			Arsenic			Barium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	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
SOB-3	J1V1M5	11/13/14	0.832		0.27	0.636		0.15	0.869		0.15	0.674		0.14	14.998		0.57	0.760		0.15	6590		5.94	4.18		0.437	67.8		0.0873
Duplicate of J1V1M5	J1V1N5	11/13/14	0.718		0.21	1.055		0.12	0.813		0.14	1.103		0.12	17.112		0.57	0.762		0.18	6750		6.81	3.97		0.500	70.1		0.100

Analysis:

TDL		Actinium-228	Bismuth-214	Lead-212	Lead-214	Potassium-40	Thallium-208	Aluminum	Arsenic	Barium
		0.25	0.25	0.25	0.25	0.5	0.25	5	10	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD					13.2%		2.4%		3.3%
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites SOB

Sampling Area	HEIS Number	Sample Date	Beryllium			Cadmium			Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SOB-3	J1V1M5	11/13/14	0.722		0.0873	0.318	B	0.0873	4560		6.98	11.6		0.131	7.23	D	0.655	15.6		0.262	18900		6.98	7.33	D	1.44	4370		7.42
Duplicate of J1V1M5	J1V1N5	11/13/14	0.769		0.100	0.357	B	0.100	4490		8.01	12.2		0.150	5.93	D	0.751	15.6		0.30	19500		8.01	7.33	D	1.65	4430		8.51

Analysis:

TDL		Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium
		0.5	0.2	100	1	2	1	5	5	75
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)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD			1.5%	5.0%		0.0%	3.1%		1.4%
	Difference > 2 TDL?	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites SOB

Sampling Area	HEIS Number	Sample Date	Manganese			Mercury			Nickel			Potassium			Silicon			Sodium			Vanadium			Zinc			Chloride		
			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
SOB-3	J1V1M5	11/13/14	311		0.175	0.0060	B	0.0040	11.1		0.131	1200		5.59	659	N	1.31	222		6.11	47.1	D	0.437	36.3	D	1.75	3.70		0.684
Duplicate of J1V1M5	J1V1N5	11/13/14	322		0.200	0.00513	B	0.0040	11.2		0.150	1250		6.41	765	N	1.50	229		7.01	39.0	D	0.500	30.7	D	2.00	3.65		0.685

Analysis:

TDL		Manganese	Mercury	Nickel	Potassium	Silicon	Sodium	Vanadium	Zinc	Chloride
		5	0.2	4	400	2	50	2.5	1	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	3.5%				14.9%		18.8%	16.7%	
	Difference > 2 TDL?	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable

Duplicate Analysis - 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites SOB

Sampling Area	Sample Number	Sample Date	Fluoride			Nitrogen in Nitrate			Nitrogen in Nitrite and Nitrate			Phosphorous in phosphate			Sulfate			TPH - motor oil (high boiling)		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL
SOB-3	J1V1M5	11/13/14	2.84		0.337	2.04		0.337	0.955	C	0.169	0.942	B	0.684	11.4		1.36	4130	J	2210
Duplicate of J1V1M5	J1V1N5	11/13/14	2.75		0.338	2.05		0.338	0.808	C	0.170	0.984	B	0.685	13.1		1.36	3490	J	2210

Analysis:

TDL		Fluoride	Nitrogen in Nitrate	Nitrogen in Nitrite and Nitrate	Phosphorous in phosphate	Sulfate	TPH - motor oil (high boiling)
		5	0.75	0.75	5	5	5000
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD						
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Radionuclides).

Sample Location	HEIS Number	Sample Date	Actinium-228			Americium-241			Barium-133			Bismuth-214			Carbon-14		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
NOB-9	J1V1L8	11/20/14				0.015	U	0.14	0.004	U	0.20	0.625		0.56	0.253	U	0.93
Duplicate of J1V1L8	J1V1M2	11/20/14				-0.026	U	0.09	-0.014	U	0.06	0.655		0.19	0.401	U	1.03
NOB-1	J1V1L0	11/24/14				-0.073	U	0.14	-0.049	U	0.11	0.637		0.22	0.351	U	0.90
NOB-2 [a]	J1V596	3/18/15				0.00564	U	0.0292	-0.00420	U	0.0197				0.0736	U	0.323
NOB-3	J1V1L2	11/20/14				-0.145	U	0.15	0.001	U	0.11	0.577		0.20	0.624	U	0.94
NOB-4	J1V1L3	11/20/14				0.088	U	0.14	0.025	U	0.20	0.575		0.56	0.602	U	0.97
NOB-5 [a]	J1V597	3/18/15				-0.000882	U	0.0305	-0.00250	U	0.0193				0.0402	U	0.324
NOB-6	J1V1L5	11/24/14				0.049	U	0.11	-0.044	U	0.06	0.605		0.15	0.325	U	1.04
NOB-7	J1V1L6	11/24/14				-0.127	U	0.15	0.027	U	0.11	0.678		0.15	0.074	U	0.95
NOB-8	J1V1L7	11/24/14				0.007	U	0.10	0.004	U	0.07	0.579		0.24	0.349	U	1.00
NOB-10	J1V1L9	11/20/14				-0.112	U	0.12	0.002	U	0.05	0.645		0.04	0.239	U	1.02
NOB-11	J1V1M0	11/24/14				-0.049	U	0.16	-0.116	U	0.11	0.577		0.20	0.595	U	1.02
NOB-12	J1V1M1	11/20/14				0.018	U	0.10	-0.005	U	0.06	0.542		0.15	0.273	U	1.00
SOB-3	J1V1M5	11/13/14	0.832		0.27	-0.062	U	0.10	0.018	U	0.08	0.636		0.15	0.659	U	0.97
Duplicate of J1V1M5	J1V1N5	11/13/14	0.718		0.21	0.006	U	0.09	-0.010	U	0.04	1.055		0.12	0.235	U	1.04
SOB-1	J1V1M3	11/13/14	0.784		0.18	-0.140	U	0.09	-0.009	U	0.04	0.706		0.09	0.486	U	0.99
SOB-2	J1V1M4	11/13/14	0.760		0.18	0.021	U	0.08	0.013	U	0.04	0.596		0.11	0.700	U	1.03
SOB-4	J1V1M6	11/13/14	0.895		0.29	-0.096	U	0.10	-0.054	U	0.07	0.544		0.15	0.113	U	0.98
SOB-5	J1V1M7	11/13/14	0.741		0.22	0.007	U	0.07	0.013	U	0.04	0.484		0.10	0.854	U	1.08
SOB-6	J1V1M8	11/13/14	0.616		0.22	0.013	U	0.07	-0.092	U	0.04	0.569		0.08	0.072	U	0.93
SOB-7	J1V1M9	11/13/14	0.430		0.24	-0.083	U	0.09	0.00004	U	0.06	0.407		0.11	0.290	U	0.96
SOB-8	J1V1N0	11/13/14	0.578		0.43	0.061	U	0.10	0.316		0.13	0.624		0.21	0.078	U	1.04
SOB-9	J1V1N1	11/13/14	0.721		0.45	-0.004	U	0.09	0.274	U	0.12	0.539		0.20	0.113	U	0.97
SOB-10	J1V1N2	11/13/14	0.618		0.16	-0.152	U	0.08	0.003	U	0.04	0.494		0.11	0	U	1.01
SOB-11	J1V1N3	11/13/14	0.826		0.42	0.005	U	0.09	0.379	U	0.14	0.736		0.06	0.399	U	1.03
SOB-12	J1V1N4	11/13/14	0.516		0.40	-0.003	U	0.09	-0.010	U	0.12	0.438		0.23	-0.076	U	0.99
NOB-2	J1V1L1	11/24/14				0.049	U	0.14	-0.010	U	0.19	0.592		0.29	0.876	U	0.98
NOB-5	J1V1L4	11/24/14				-0.074	U	0.12	0.009	U	0.06	0.563		0.11	0.532	U	0.91

[a] These sample locations were re-sampled due to exceedances at one or more location. Sample data for the original sample locations (J1V1L1, J1V1L4, J1V1J6, J1V1J8, J1V1K1, J1V1K4, J1V1K5, J1V1K8) are for information only.

[b] Sample locations J1V1J9, J1V1K3, J1V1K6, and J1V1K7 were re-sampled for pesticides only due to rejected data.

Attachment	1	Sheet No.	1 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

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

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

* = MS/MSD RPD exceeded the control limit.

B = blank contamination (inorganic constituents)

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

D = diluted

FS = focused sample

HEIS = Hanford Environmental Information System

J = estimate

M = sample duplicate precision not met.

MDA = minimum dection allowed

N = recovery exceeds upper or lower control limits

NOB = north overburden

P = aroclor target analyte with greater than 25% difference between column analyses.

PQL = practical quantitation limit

Q = qualifier

R = rejected

SOB = south overburden

U = undetected

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

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

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Radionuclides).

Sample Location	HEIS Number	Sample Date	Cesium-137			Cobalt-60			Europium-152			Europium-154			Europium-155		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
NOB-9	J1V1L8	11/20/14	-0.022	U	0.13	-0.069	U	0.13	-0.261	U	0.30	0.062	U	0.15	-0.198	U	0.21
Duplicate of J1V1L8	J1V1M2	11/20/14	-0.041	U	0.05	0.038	U	0.05	0.046	U	0.15	0.088		0.08	0.127		0.12
NOB-1	J1V1L0	11/24/14	0.012	U	0.07	-0.005	U	0.08	-0.050	U	0.20	0.070	U	0.10	0.085	U	0.16
NOB-2 [a]	J1V596	3/18/15	-0.00750	U	0.0228	-0.00648	U	0.0271	-0.0128	U	0.0488	-0.0181	U	0.0884	0.0386	U	0.0448
NOB-3	J1V1L2	11/20/14	-0.009	U	0.07	0.019	U	0.09	0.167	U	0.20	-0.199	U	0.10	-0.002	U	0.16
NOB-4	J1V1L3	11/20/14	0.010	U	0.13	0.042	U	0.13	0.053	U	0.30	0.017	U	0.15	0.109	U	0.20
NOB-5 [a]	J1V597	3/18/15	-0.000805	U	0.0210	0.00262	U	0.0221	-0.0115	U	0.0449	-0.0253	U	0.0697	0.0107	U	0.0427
NOB-6	J1V1L5	11/24/14	0.014	U	0.07	0.050	U	0.05	-0.021	U	0.18	0.047	U	0.09	0.010	U	0.15
NOB-7	J1V1L6	11/24/14	-0.005	U	0.08	-0.012	U	0.07	0.134	U	0.20	-0.001	U	0.10	0.129	U	0.16
NOB-8	J1V1L7	11/24/14	0.038	U	0.06	-0.015	U	0.05	0.233		0.16	0.015	U	0.08	-0.027	U	0.13
NOB-10	J1V1L9	11/20/14	-0.001	U	0.05	0.005	U	0.05	-0.026	U	0.16	-0.030	U	0.08	0.084	U	0.14
NOB-11	J1V1M0	11/24/14	0.008	U	0.08	0.018	U	0.09	0.157	U	0.19	0.095	U	0.10	0.035	U	0.17
NOB-12	J1V1M1	11/20/14	-0.003	U	0.06	-0.030	U	0.06	-0.009	U	0.16	0.052	U	0.08	0.143		0.14
SOB-3	J1V1M5	11/13/14	-0.009	U	0.05	0.026	U	0.06	0.106	U	0.14	0.060	U	0.07	-0.028	U	0.11
Duplicate of J1V1M5	J1V1N5	11/13/14	-0.033	U	0.04	0.009	U	0.04	0.168		0.13	-0.060	U	0.07	0.097		0.09
SOB-1	J1V1M3	11/13/14	0.002	U	0.04	0.005	U	0.03	0.178		0.11	0.020	U	0.06	0.072	U	0.10
SOB-2	J1V1M4	11/13/14	0.043	U	0.08	0.031	U	0.04	0.016	U	0.12	-0.007	U	0.06	0.113		0.10
SOB-4	J1V1M6	11/13/14	-0.002	U	0.05	0.031	U	0.06	0.060	U	0.13	-0.120	U	0.07	0.172		0.13
SOB-5	J1V1M7	11/13/14	-0.003	U	0.04	0.006	U	0.04	0.025	U	0.11	0.023	U	0.05	0.041	U	0.09
SOB-6	J1V1M8	11/13/14	0.080		0.07	0.007	U	0.04	-0.056	U	0.11	-0.016	U	0.06	0.020	U	0.09
SOB-7	J1V1M9	11/13/14	0.033	U	0.05	-0.001	U	0.05	0.080	U	0.12	-0.053	U	0.06	-0.042	U	0.09
SOB-8	J1V1N0	11/13/14	0.001	U	0.09	0.102		0.10	0.108	U	0.21	0.140		0.11	0.010	U	0.15
SOB-9	J1V1N1	11/13/14	-0.011	U	0.07	-0.017	U	0.08	0.035	U	0.19	-0.004	U	0.10	-0.018	U	0.13
SOB-10	J1V1N2	11/13/14	0.015	U	0.04	0.032	U	0.03	0.025	U	0.11	0.002	U	0.05	-0.075	U	0.09
SOB-11	J1V1N3	11/13/14	0.034	U	0.09	0.054	U	0.08	0.118	U	0.21	0.104	U	0.11	0.246		0.20
SOB-12	J1V1N4	11/13/14	-0.011	U	0.08	0.006	U	0.09	0.129	U	0.19	-0.011	U	0.10	-0.086	U	0.13
NOB-2	J1V1L1	11/24/14	0.001	U	0.12	0.020	U	0.12	0.204	U	0.30	0.136	U	0.15	0.161	U	0.26
NOB-5	J1V1L4	11/24/14	-0.004	U	0.05	0.029	U	0.06	0.149	U	0.15	-0.065	U	0.08	-0.034	U	0.12

Attachment	1	Sheet No.	2 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Radionuclides).

Sample Location	HEIS Number	Sample Date	Lead-212			Lead-214			Nickel-63			Potassium-40			Protactinium-234m		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
NOB-9	J1V1L8	11/20/14	0.641		0.32	0.740		0.28	0.653	U	2.26	16.031		1.43	7.463	U	15.32
Duplicate of J1V1L8	J1V1M2	11/20/14	0.633		0.15	0.557		0.16	1.716	U	2.44	13.806		0.64	3.231	U	6.47
NOB-1	J1V1L0	11/24/14	0.805		0.19	0.644		0.31	1.156	U	2.33	16.256		0.73	17.834		12.6
NOB-2 [a]	J1V596	3/18/15							3.90	U	5.90	13.0		0.266			
NOB-3	J1V1L2	11/20/14	0.754		0.20	0.651		0.21	0.758	U	2.29	16.356		0.92	-0.768	U	8.13
NOB-4	J1V1L3	11/20/14	0.804		0.28	0.405		0.35	1.393	U	2.11	16.310		1.53	-3.907	U	15.03
NOB-5 [a]	J1V597	3/18/15							0.904	U	5.52	13.6		0.144			
NOB-6	J1V1L5	11/24/14	1.09		0.17	0.609		0.30	0.076	U	1.84	16.523		0.87	2.071	U	6.56
NOB-7	J1V1L6	11/24/14	0.901		0.21	0.648		0.16	0.824	U	2.49	14.845		0.41	3.449	U	8.61
NOB-8	J1V1L7	11/24/14	0.620		0.17	0.589		0.16	0.372	U	2.25	15.656		0.84	0.686	U	5.91
NOB-10	J1V1L9	11/20/14	0.811		0.16	0.695		0.14	1.005	U	2.03	16.626		0.67	2.268	U	6.17
NOB-11	J1V1M0	11/24/14	0.866		0.19	0.591		0.15	3.939		2.33	16.831		1.19	0.801	U	8.70
NOB-12	J1V1M1	11/20/14	0.634		0.17	0.552		0.19	1.390	U	2.24	14.427		1.46	-0.018	U	6.22
SOB-3	J1V1M5	11/13/14	0.869		0.15	0.674		0.14	0.598	U	2.43	14.998		0.57	-2.884	U	5.30
Duplicate of J1V1M5	J1V1N5	11/13/14	0.813		0.14	1.103		0.12	1.094	U	2.42	17.112		0.57	1.034	U	4.60
SOB-1	J1V1M3	11/13/14	0.808		0.13	0.612		0.12	0.603	U	2.45	14.879		0.44	3.471	U	4.34
SOB-2	J1V1M4	11/13/14	0.917		0.12	0.672		0.12	6.654		2.46	17.456		0.45	-0.752	U	4.24
SOB-4	J1V1M6	11/13/14	0.853		0.10	0.593		0.13	-0.685	U	2.50	14.630		0.62	1.13	U	5.56
SOB-5	J1V1M7	11/13/14	0.987		0.17	0.488		0.12	0.296	U	2.40	13.688		0.40	0.159	U	4.11
SOB-6	J1V1M8	11/13/14	0.907		0.12	0.620		0.12	-0.573	U	2.44	14.516		0.47	2.131	U	4.24
SOB-7	J1V1M9	11/13/14	0.454		0.12	0.310		0.12	2.728		2.46	9.648		0.54	3.141	U	5.30
SOB-8	J1V1N0	11/13/14	0.867		0.39	0.678		0.22	0	U	2.40	15.055		1.07	5.153	U	10.38
SOB-9	J1V1N1	11/13/14	0.678		0.18	0.491		0.24	0.293	U	2.50	12.299		1.15	2.948	U	9.06
SOB-10	J1V1N2	11/13/14	0.678		0.11	0.578		0.10	0	U	2.53	14.386		0.48	3.421	U	4.24
SOB-11	J1V1N3	11/13/14	0.947		0.20	0.695		0.24	1.096	U	2.33	14.102		1.03	5.403	U	9.75
SOB-12	J1V1N4	11/13/14	0.720		0.17	0.374		0.17	12.437		2.08	13.759		0.94	4.337	U	9.63
NOB-2	J1V1L1	11/24/14	1.068		0.28	0.659		0.31	1.326	U	2.47	16.506		1.00	6.234	U	8.57
NOB-5	J1V1L4	11/24/14	0.737		0.15	0.520		0.14	1.176	U	2.37	15.403		0.78	2.786	U	4.11

Attachment	1	Sheet No.	3 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Radionuclides).

Sample Location	HEIS Number	Sample Date	Silver-108 metastable			Thallium-208			Thorium-234			Total beta radiostrontium			Tritium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
NOB-9	J1V1L8	11/20/14	0.007	U	0.10	0.671		0.07	1.068	U	1.42						
Duplicate of J1V1L8	J1V1M2	11/20/14	-0.043	U	0.04	0.594		0.22	1.364	U	1.72						
NOB-1	J1V1L0	11/24/14	-0.003	U	0.06	0.778		0.18	0.940	U	1.43						
NOB-2 [a]	J1V596	3/18/15	-0.00254	U	0.0153												
NOB-3	J1V1L2	11/20/14	-0.003	U	0.05	0.739		0.10	0.709	U	1.50						
NOB-4	J1V1L3	11/20/14	0.060	U	0.09	0.813		0.07	0.972	U	1.43						
NOB-5 [a]	J1V597	3/18/15	0.000181	U	0.0140												
NOB-6	J1V1L5	11/24/14	0.002	U	0.04	0.790		0.19	0.791	U	1.02						
NOB-7	J1V1L6	11/24/14	-0.006	U	0.06	0.690		0.09	0.419	U	1.45						
NOB-8	J1V1L7	11/24/14	0.016	U	0.04	0.689		0.22	0.971	U	0.99						
NOB-10	J1V1L9	11/20/14	-0.080	U	0.04	0.681		0.19	1.079	U	1.28						
NOB-11	J1V1M0	11/24/14	-0.010	U	0.07	0.882		0.04	1.202	U	1.52						
NOB-12	J1V1M1	11/20/14	0.001	U	0.04	0.586		0.20	0.956	U	1.00						
SOB-3	J1V1M5	11/13/14	0.027	U	0.04	0.760		0.15	1.053		0.99	-0.128	U	0.53	7.358	U	18.26
Duplicate of J1V1M5	J1V1N5	11/13/14	0.011	U	0.03	0.762		0.18	0.747	U	1.28	0.382	U	0.41	5.501	U	18.21
SOB-1	J1V1M3	11/13/14	0.003	U	0.03	0.726		0.14	0.711	U	1.38	0.323	U	0.34	5.405	U	17.89
SOB-2	J1V1M4	11/13/14	0.012	U	0.03	0.696		0.17	0.885	U	1.07	0.206	U	0.38	2.695	U	17.84
SOB-4	J1V1M6	11/13/14	-0.081	U	0.04	0.663		0.14	1.175		0.98	0.231	U	0.39	3.688	U	19.07
SOB-5	J1V1M7	11/13/14	-0.062	U	0.03	0.685		0.19	0.831		0.67	0.240	U	0.39	-3.680	U	18.27
SOB-6	J1V1M8	11/13/14	0.004	U	0.03	0.557		0.16	0.813		0.68	-0.043	U	0.39	-0.916	U	18.95
SOB-7	J1V1M9	11/13/14	-0.002	U	0.04	0.296		0.12	1.037		0.87	0.696		0.37	1.818	U	18.06
SOB-8	J1V1N0	11/13/14	0.034	U	0.07	0.748		0.03	0.789	U	0.97	0.341	U	0.41	11.711	U	17.89
SOB-9	J1V1N1	11/13/14	-0.007	U	0.06	0.604		0.29	1.073		0.90	0.332	U	0.37	-7.360	U	19.03
SOB-10	J1V1N2	11/13/14	-0.001	U	0.03	0.645		0.14	1.115	U	1.41	0.174	U	0.34	-5.910	U	17.46
SOB-11	J1V1N3	11/13/14	-0.037	U	0.07	0.732		0.33	0.993		0.95	0.299	U	0.41	-3.728	U	19.28
SOB-12	J1V1N4	11/13/14	-0.003	U	0.06	0.660		0.29	0.469	U	0.89	0.084	U	0.35	2.778	U	19.15
NOB-2	J1V1L1	11/24/14	-0.023	U	0.10	0.794		0.07	0.001	U	1.42						
NOB-5	J1V1L4	11/24/14	0.096	U	0.04	0.634		0.25	1.256		1.25						

Attachment	1	Sheet No.	4 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-II-44 Waste Sites Verification Sample Results (Radionuclides).

Sample Location	HEIS Number	Sample Date	Uranium-235		
			pCi/g	Q	MDA
NOB-9	J1V1L8	11/20/14	0.235	U	0.65
Duplicate of J1V1L8	J1V1M2	11/20/14	0.075	U	0.32
NOB-1	J1V1L0	11/24/14	0.226	U	0.40
NOB-2 [a]	J1V596	3/18/15			
NOB-3	J1V1L2	11/20/14	0.216	U	0.40
NOB-4	J1V1L3	11/20/14	-0.213	U	0.63
NOB-5 [a]	J1V597	3/18/15			
NOB-6	J1V1L5	11/24/14	-0.045	U	0.36
NOB-7	J1V1L6	11/24/14	-0.056	U	0.38
NOB-8	J1V1L7	11/24/14	0.117	U	0.34
NOB-10	J1V1L9	11/20/14	0.083	U	0.34
NOB-11	J1V1M0	11/24/14	0.086	U	0.41
NOB-12	J1V1M1	11/20/14	-0.006	U	0.32
SOB-3	J1V1M5	11/13/14	0.049	U	0.27
Duplicate of J1V1M5	J1V1N5	11/13/14	-0.136	U	0.26
SOB-1	J1V1M3	11/13/14	-0.012	U	0.23
SOB-2	J1V1M4	11/13/14	0.094	U	0.26
SOB-4	J1V1M6	11/13/14	0.141	U	0.26
SOB-5	J1V1M7	11/13/14	0.194	U	0.24
SOB-6	J1V1M8	11/13/14	0.052	U	0.23
SOB-7	J1V1M9	11/13/14	0.157	U	0.24
SOB-8	J1V1N0	11/13/14	0.242	U	0.45
SOB-9	J1V1N1	11/13/14	0.155	U	0.42
SOB-10	J1V1N2	11/13/14	0.106	U	0.22
SOB-11	J1V1N3	11/13/14	0.222	U	0.46
SOB-12	J1V1N4	11/13/14	0.189	U	0.42
NOB-2	J1V1L1	11/24/14	-0.022	U	0.63
NOB-5	J1V1L4	11/24/14	-0.037	U	0.32

Attachment	1	Sheet No.	5 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Metals).

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
EXC-3	J1V1H5	11/12/14	7360		6.91	1.68	UD	1.68	7.13		0.508	135		0.102
Duplicate of J1V1H5	J1V1J5	11/12/14	7530		7.26	1.76	UD	1.76	4.59		0.534	136		0.107
EXC-1	J1V1H3	11/12/14	5130		6.86	1.67	UD	1.67	7.84		0.505	49.2		0.101
EXC-2	J1V1H4	11/12/14	6280		6.67	1.62	UD	1.62	3.84		0.491	65.5		0.0981
EXC-4	J1V1H6	11/12/14	6810		7.09	0.344	U	0.344	4.31		0.521	70.7		0.104
EXC-5	J1V1H7	11/12/14	5420		6.98	1.69	UD	1.69	3.66		0.513	52.6		0.103
EXC-6	J1V1H8	11/12/14	6490		6.84	1.66	UD	1.66	5.44		0.503	84.9		0.101
EXC-7	J1V1H9	11/12/14	8080		8.08	0.392	U	0.392	6.77		0.594	94.1		0.119
EXC-8	J1V1J0	11/12/14	5820		6.51	0.316	U	0.316	4.92		0.479	76.6		0.0958
EXC-9	J1V1J1	11/12/14	3980		7.20	0.350	U	0.350	1.56	B	0.530	27.7		0.106
EXC-10	J1V1J2	11/12/14	5100		6.65	1.61	UD	1.61	4.13		0.489	51.9		0.0978
EXC-11	J1V1J3	11/12/14	8720		6.90	0.335	U	0.335	6.76		0.507	165		0.101
EXC-12	J1V1J4	11/12/14	6950		6.68	0.508	B	0.324	7.41		0.491	81.1		0.0982
EXC-13 [a]	J1V459	2/5/15	5280		1.5	0.38	U	0.38	3.2		0.65	34.4		0.075
Duplicate of J1V459 [a]	J1V464	2/5/15	5370		1.4	0.34	U	0.34	2.4		0.59	34.9		0.068
EXC-14	J1V1J7	11/5/14	5210		6.70	1.69	BD	1.63	16.2		0.493	49.3	*	0.0985
EXC-15 [a]	J1V460	2/5/15	5810		1.5	0.36	U	0.36	5.6		0.62	37.7		0.072
EXC-16	J1V1J9	11/5/14	8440		7.15	0.347	U	0.347	5.12		0.526	90.6	*	0.105
EXC-17	J1V1K0	11/5/14	6730		6.93	1.68	UD	1.68	7.49		0.510	83.5	*	0.102
EXC-18 [a]	J1V461	3/16/15	10800		1.5	0.37	U	0.37	5.0		0.64	92.6		0.074
EXC-19	J1V1K2	11/5/14	6100		6.72	1.63	UD	1.63	6.89		0.494	65.7	*	0.0988
EXC-20	J1V1K3	11/5/14	5360		7.36	0.357	U	0.357	5.55		0.541	55.6	*	0.108
EXC-21 [a]	J1V462	2/5/15	5810		1.5	0.37	U	0.37	3.5		0.64	39.3		0.073
EXC-22 [a]	J1V463	3/5/15	6880	X	1.6	0.38	U	0.38	5.1		0.66	59.7		0.076
EXC-23	J1V1K6	11/5/14	4570		6.57	0.319	U	0.319	2.24	B	0.483	40.2	*	0.0966
EXC-24	J1V1K7	11/5/14	3680		6.60	0.320	U	0.320	2.39	B	0.485	29.4	*	0.0971
NOB-9	J1V1L8	11/20/14	5440		7.01	3.40	UD	3.40	5.58		0.515	51.6		0.103
Duplicate of J1V1L8	J1V1M2	11/20/14	5810		6.99	3.39	UD	3.39	7.02		0.514	53.5		0.103
NOB-1	J1V1L0	11/24/14	6540		7.20	3.49	UD	3.49	9.32		0.529	66.2		0.106
NOB-2 [a]	J1V596	3/18/15	7480		1.6	0.38	U	0.38	5.8		0.67	60.4		0.077
NOB-3	J1V1L2	11/20/14	5020		6.71	3.25	UD	3.25	8.42		0.493	39.4		0.0986
NOB-4	J1V1L3	11/20/14	4410		6.57	3.19	UD	3.19	4.62		0.483	32.1		0.0967
NOB-5 [a]	J1V597	3/18/15	7620		1.5	0.37	U	0.37	8.7		0.64	80.2		0.073
NOB-6	J1V1L5	11/24/14	6180		7.14	4.16	BD	3.47	9.20		0.525	59.4		0.105
NOB-7	J1V1L6	11/24/14	6570		6.90	1.08		0.335	5.26		0.507	58.3		0.101
NOB-8	J1V1L7	11/24/14	6500		7.28	0.908	B	0.353	6.83		0.535	57.0		0.107
NOB-10	J1V1L9	11/20/14	6970		6.67	3.24	UD	3.24	6.03		0.491	65.1		0.0982
NOB-11	J1V1M0	11/24/14	6320		6.78	3.29	UD	3.29	7.60		0.498	56.7		0.0997
NOB-12	J1V1M1	11/20/14	5270		6.26	3.04	UD	3.04	9.89		0.460	50.3		0.0920
SOB-3	J1V1M5	11/13/14	6590		5.94	1.44	UD	1.44	4.18		0.437	67.8		0.0873
Duplicate of J1V1M5	J1V1N5	11/13/14	6750		6.81	1.65	UD	1.65	3.97		0.500	70.1		0.100
SOB-1	J1V1M3	11/13/14	6890		6.89	1.67	UD	1.67	3.11		0.507	82.0		0.101
SOB-2	J1V1M4	11/13/14	6400		6.86	1.66	UD	1.66	3.88		0.504	66.8		0.101
SOB-4	J1V1M6	11/13/14	5420		6.73	1.63	UD	1.63	10.3		0.495	48.4		0.0990
SOB-5	J1V1M7	11/13/14	5460		6.66	1.62	UD	1.62	9.15		0.490	52.1		0.0979
SOB-6	J1V1M8	11/13/14	5930		6.87	1.72	BD	1.67	6.08		0.505	60.3		0.101
SOB-7	J1V1M9	11/13/14	5670		6.47	1.57	UD	1.57	8.00		0.476	60.2		0.0951
SOB-8	J1V1N0	11/13/14	5100		6.37	1.55	UD	1.55	6.20		0.468	53.9		0.0937
SOB-9	J1V1N1	11/13/14	4830		6.00	1.68	BD	1.46	2.30	B	0.441	49.6		0.0883
SOB-10	J1V1N2	11/13/14	5860		6.28	1.52	UD	1.52	6.59		0.462	84.4		0.0924
SOB-11	J1V1N3	11/13/14	5090		5.96	1.68	BD	1.45	5.84		0.439	50.8		0.0877
SOB-12	J1V1N4	11/13/14	4500		6.00	1.46	UD	1.46	1.51	B	0.441	53.5		0.0882
FS-1	J1RWF8	8/19/13	7920		1.50	0.370	U	0.370	7.80		0.640	65.1		0.0740
FS-2	J1RXJ6	12/12/13	7060		1.50	0.370	U	0.370	4.20		0.640	61.8		0.074
FS-3	J1RXJ7	12/12/13	8450		1.80	0.430	U	0.430	4.50		0.750	72.6		0.087
FS-4	J1RXJ8	12/12/13	6110		1.40	0.340	U	0.340	3.10		0.590	55.5		0.0680
Equipment Blank	J1V1K9	11/5/14	171		6.58	0.319	U	0.319	0.700	B	0.484	1.61	*	0.0967
Equipment Blank	J1V1N6	11/13/14	73.8		6.07	1.47	UD	1.47	0.447	U	0.447	1.08		0.0893
NOB-2	J1V1L1	11/24/14	6670		7.22	3.50	UD	3.50	4.70		0.531	62.0		0.106
NOB-5	J1V1L4	11/24/14	5970		6.67	3.24	UD	3.24	5.47		0.490	69.7		0.0980
EXC-13	J1V1J6	11/5/14	8260		7.70	0.394	B	0.374	35.0		0.566	107	*	0.113
Duplicate of J1V1J6	J1V1K8	11/5/14	7830		7.33	0.463	B	0.356	31.9		0.539	110	*	0.108
EXC-15	J1V1J8	11/5/14	5950		6.53	1.59	UD	1.59	15.8		0.481	55.7	*	0.0961
EXC-18	J1V1K1	11/5/14	6590		6.61	1.60	UD	1.60	10.2		0.486	68.1	*	0.0972
EXC-21	J1V1K4	11/5/14	6910		7.26	0.352	U	0.352	4.18		0.534	66.1	*	0.107
EXC-22	J1V1K5	11/5/14	7200		6.50	0.318	B	0.315	6.33		0.478	72.5	*	0.0955

Attachment	1	Sheet No.	6 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Metals).

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
EXC-3	J1V1H5	11/12/14	0.750		0.102	17.6		1.02	0.340	B	0.102	32500		8.13
Duplicate of J1V1H5	J1V1J5	11/12/14	0.722		0.107	17.4		1.07	0.369	B	0.107	32400		8.55
EXC-1	J1V1H3	11/12/14	0.630		0.101	1.01	U	1.01	0.269	B	0.101	5520		8.07
EXC-2	J1V1H4	11/12/14	0.687		0.0981	0.981	U	0.981	0.353	B	0.0981	6090		7.85
EXC-4	J1V1H6	11/12/14	0.575		0.104	1.10	B	1.04	0.272	B	0.104	14600		8.34
EXC-5	J1V1H7	11/12/14	0.559		0.103	1.03	U	1.03	0.274	B	0.103	10600		8.21
EXC-6	J1V1H8	11/12/14	0.629		0.101	1.01	U	1.01	0.357	B	0.101	11100		8.05
EXC-7	J1V1H9	11/12/14	0.602		0.119	1.19	U	1.19	0.351	B	0.119	17000		9.50
EXC-8	J1V1J0	11/12/14	0.536		0.0958	0.958	U	0.958	0.281	B	0.0958	25800		7.66
EXC-9	J1V1J1	11/12/14	0.467	B	0.106	1.06	U	1.06	0.250	B	0.106	5450		8.47
EXC-10	J1V1J2	11/12/14	0.526		0.0978	0.978	U	0.978	0.268	B	0.0978	12600		7.82
EXC-11	J1V1J3	11/12/14	0.676		0.101	4.48	B	1.01	0.466	B	0.101	15700		8.12
EXC-12	J1V1J4	11/12/14	0.612		0.0982	2.33	B	0.982	0.330	B	0.0982	10400		7.85
EXC-13 [a]	J1V459	2/5/15	0.080	B	0.033	0.97	U	0.97	0.061	B	0.041	5110		13.9
Duplicate of J1V459 [a]	J1V464	2/5/15	0.076	B	0.029	0.87	B	0.87	0.081	B	0.037	5290		12.6
EXC-14	J1V1J7	11/5/14	0.620		0.0985	0.985	U	0.985	0.297	B	0.0985	7710		7.88
EXC-15 [a]	J1V460	2/5/15	0.11	B	0.031	0.94	B	0.93	0.074	B	0.039	5860		13.3
EXC-16	J1V1J9	11/5/14	0.679		0.105	1.05	U	1.05	0.216	B	0.105	6460		8.42
EXC-17	J1V1K0	11/5/14	0.683		0.102	1.63	B	1.02	0.276	B	0.102	4560		8.15
EXC-18 [a]	J1V461	3/16/15	0.31		0.032	2.40		0.95	0.19		0.040	7130		13.7
EXC-19	J1V1K2	11/5/14	0.612		0.0988	0.988	U	0.988	0.204	B	0.0988	6630		7.91
EXC-20	J1V1K3	11/5/14	0.528	B	0.108	1.08	U	1.08	0.204	B	0.108	4700		8.66
EXC-21 [a]	J1V462	2/5/15	0.11	B	0.032	0.94	U	0.94	0.079	B	0.040	6050		13.6
EXC-22 [a]	J1V463	3/5/15	0.18	B	0.033	2.20	M	0.98	0.16	B	0.041	6290	X	14.1
EXC-23	J1V1K6	11/5/14	0.477	B	0.0966	0.966	U	0.966	0.140	B	0.0966	4490		7.73
EXC-24	J1V1K7	11/5/14	0.44	B	0.0971	0.971	U	0.971	0.193	B	0.0971	4900		7.77
NOB-9	J1V1L8	11/20/14	1.07		0.103	1.03	U	1.03	0.238	B	0.103	5430		8.25
Duplicate of J1V1L8	J1V1M2	11/20/14	1.02		0.103	1.03	U	1.03	0.203	B	0.103	5730		8.23
NOB-1	J1V1L0	11/24/14	1.13		0.106	1.06	U	1.06	0.262	B	0.106	7620		8.47
NOB-2 [a]	J1V596	3/18/15	0.23		0.033	1.3	B	0.99	0.11	B	0.041	6350		14.3
NOB-3	J1V1L2	11/20/14	0.983		0.0986	0.986	U	0.986	0.216	B	0.0986	4550		7.89
NOB-4	J1V1L3	11/20/14	0.917		0.0967	0.967	U	0.967	0.267	B	0.0967	5110		7.73
NOB-5 [a]	J1V597	3/18/15	0.23		0.032	2.3		0.95	0.14	B	0.040	6290		13.6
NOB-6	J1V1L5	11/24/14	1.12		0.105	1.05	U	1.05	0.216	B	0.105	5650		8.40
NOB-7	J1V1L6	11/24/14	0.984		0.101	1.01	U	1.01	0.214	B	0.101	5770		8.12
NOB-8	J1V1L7	11/24/14	0.904		0.107	1.07	U	1.07	0.125	B	0.107	5230		8.56
NOB-10	J1V1L9	11/20/14	1.06		0.0982	0.982	U	0.982	0.342	B	0.0982	5120		7.85
NOB-11	J1V1M0	11/24/14	1.10		0.0997	0.997	U	0.997	0.215	B	0.0997	5670		7.97
NOB-12	J1V1M1	11/20/14	1.04		0.0920	0.920	U	0.920	0.198	B	0.092	5280		7.36
SOB-3	J1V1M5	11/13/14	0.722		0.0873	0.873	U	0.873	0.318	B	0.0873	4560		6.98
Duplicate of J1V1M5	J1V1N5	11/13/14	0.769		0.100	1.00	U	1.00	0.357	B	0.100	4490		8.01
SOB-1	J1V1M3	11/13/14	0.799		0.101	1.01	U	1.01	0.407	B	0.101	4040		8.10
SOB-2	J1V1M4	11/13/14	0.747		0.101	1.01	U	1.01	0.354	B	0.101	4370		8.07
SOB-4	J1V1M6	11/13/14	0.630		0.0990	0.990	U	0.990	0.314	B	0.099	5280		7.92
SOB-5	J1V1M7	11/13/14	0.673		0.0979	0.979	U	0.979	0.349	B	0.0979	5350		7.84
SOB-6	J1V1M8	11/13/14	0.662		0.101	1.13	B	1.01	0.342	B	0.101	5720		8.08
SOB-7	J1V1M9	11/13/14	0.685		0.0951	1.15	B	0.951	0.335	B	0.0951	5650		7.61
SOB-8	J1V1N0	11/13/14	0.612		0.0937	0.937	U	0.937	0.293	B	0.0937	4840		7.49
SOB-9	J1V1N1	11/13/14	0.814		0.0883	0.883	U	0.883	0.401	B	0.0883	5570		7.06
SOB-10	J1V1N2	11/13/14	0.663		0.0924	2.75	B	0.924	0.291	B	0.0924	5840		7.39
SOB-11	J1V1N3	11/13/14	0.624		0.0877	0.877	U	0.877	0.335	B	0.0877	5530		7.02
SOB-12	J1V1N4	11/13/14	0.946		0.0882	0.882	U	0.882	0.412	B	0.0882	5740		7.06
FS-1	J1RWF8	8/19/13	0.260		0.0320	1.20	B	0.950	0.240		0.0400	9090		13.7
FS-2	J1RXJ6	12/12/13	0.0320	U	0.0320	1.40	B	0.950	0.150	B	0.0400	5020		13.7
FS-3	J1RXJ7	12/12/13	0.0830	B	0.0380	1.70	B	1.10	0.190	B	0.0470	5520		16.1
FS-4	J1RXJ8	12/12/13	0.0290	U	0.0290	1.70	B	0.880	0.110	B	0.0370	4940		12.6
Equipment Blank	J1V1K9	11/5/14	0.135	B	0.0967	0.967	U	0.967	0.0967	U	0.0967	34.7		7.74
Equipment Blank	J1V1N6	11/13/14	0.0893	U	0.0893	0.893	U	0.893	0.0893	U	0.0893	20.2	B	7.14
NOB-2	J1V1 1	1 24/14	1.03		0.106	1.06	U	1.06	0.204	B	0.106	6580		8.49
NOB-5	J1V1L4	11/24/14	1.11		0.0980	1.56	B	0.980	0.204	B	0.098	5960		7.84
EXC-13	J1V1J6	11/5/14	0.716		0.113	1.13	U	1.13	0.261	B	0.113	5450		9.06
Duplicate of J1V1J6	J1V1K8	11/5/14	0.698		0.108	1.08	U	1.08	0.256	B	0.108	4990		8.62
EXC-15	J1V1J8	11/5/14	0.718		0.0961	0.961	U	0.961	0.314	B	0.0961	4630		7.69
EXC-18	J1V1K1	11/5/14	0.658		0.0972	0.972	U	0.972	0.241	B	0.0972	4650		7.77
EXC-21	J1V1K4	11/5/14	0.545		0.107	1.07	U	1.07	0.242	B	0.107	5330		8.54
EXC-22	J1V1K5	11/5/14	0.605		0.0955	0.955	U	0.955	0.281	B	0.0955	6160		7.64

Attachment	1	Sheet No.	7 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Metals).

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
EXC-3	J1V1H5	11/12/14	21.0		0.152	7.19	D	0.762	75.8		0.305	0.124	U	0.124
Duplicate of J1V1H5	J1V1J5	11/12/14	15.2		0.160	6.58	D	0.801	33.6		0.320	0.122	U	0.122
EXC-1	J1V1H3	11/12/14	10.0		0.151	6.51	D	0.757	16.6		0.303	0.119	U	0.119
EXC-2	J1V1H4	11/12/14	10.9		0.147	6.62	D	0.736	15.4		0.294	0.123	U	0.123
EXC-4	J1V1H6	11/12/14	13.9		0.156	5.93		0.156	14.0		0.313	0.421		0.116
EXC-5	J1V1H7	11/12/14	11.3		0.154	6.52	D	0.770	14.1		0.308	0.122	U	0.122
EXC-6	J1V1H8	11/12/14	13.0		0.151	6.35	D	0.755	23.5		0.302	0.125	U	0.125
EXC-7	J1V1H9	11/12/14	19.0		0.178	6.71		0.178	15.5		0.356	0.158	U	0.158
EXC-8	J1V1J0	11/12/14	8.52		0.144	5.53		0.144	15.8		0.287	0.133	U	0.133
EXC-9	J1V1J1	11/12/14	7.55		0.159	4.75		0.159	10.9		0.318	0.124	U	0.124
EXC-10	J1V1J2	11/12/14	8.05		0.147	5.59	D	0.733	13.1		0.293	0.134	U	0.134
EXC-11	J1V1J3	11/12/14	20.5		0.152	6.99		0.152	23.0		0.304	0.128	U	0.128
EXC-12	J1V1J4	11/12/14	14.1		0.147	5.85		0.147	14.7		0.294	0.118	U	0.118
EXC-13 [a]	J1V459	2/5/15	11.0		0.057	5.4	X	0.099	12.7		0.21	0.155	U	0.155
Duplicate of J1V459 [a]	J1V464	2/5/15	9.8		0.052	5.5	X	0.089	12.6		0.19	0.155	U	0.155
EXC-14	J1V1J7	11/5/14	11.3		0.148	6.31	D	0.739	15.5		0.296	0.123	U	0.123
EXC-15 [a]	J1V460	2/5/15	9.7		0.055	5.5	X	0.094	12.7		0.20	0.155	U	0.155
EXC-16	J1V1J9	11/5/14	17.1		0.158	7.43		0.158	16.0		0.316	0.293	B	0.127
EXC-17	J1V1K0	11/5/14	12.8		0.153	7.24	D	0.764	15.5		0.306	0.121	U	0.121
EXC-18 [a]	J1V461	3/16/15	21.5		0.056	6.7		0.097	15.8	X	0.21	0.210		0.155
EXC-19	J1V1K2	11/5/14	12.1		0.148	6.71	D	0.741	13.8		0.296	0.169	B	0.125
EXC-20	J1V1K3	11/5/14	11.6		0.162	5.29		0.162	12.8		0.325	0.121	U	0.121
EXC-21 [a]	J1V462	2/5/15	11.4		0.056	5.4	X	0.096	12.3		0.21	0.155	U	0.155
EXC-22 [a]	J1V463	3/5/15	11.4		0.058	5.7		0.100	14.2		0.22	0.313		0.155
EXC-23	J1V1K6	11/5/14	12.9		0.145	5.12		0.145	13.2		0.29	0.120	U	0.120
EXC-24	J1V1K7	11/5/14	7.51		0.146	4.49		0.146	10.5		0.291	0.120	U	0.120
NOB-9	J1V1L8	11/20/14	9.38		0.155	8.35		0.155	11.6		0.309	0.122	U	0.122
Duplicate of J1V1L8	J1V1M2	11/20/14	10.9		0.154	8.46		0.154	12.1		0.308	0.122	U	0.122
NOB-1	J1V1L0	11/24/14	11.6		0.159	9.15		0.159	12.9		0.318	0.127	U	0.127
NOB-2 [a]	J1V596	3/18/15	14.4		0.059	6.40	X	0.10	15.0		1.0	0.303		0.155
NOB-3	J1V1L2	11/20/14	8.65		0.148	8.02		0.148	10.5		0.296	0.122	U	0.122
NOB-4	J1V1L3	11/20/14	9.15		0.145	7.81		0.145	11.1		0.290	0.114	U	0.114
NOB-5 [a]	J1V597	3/18/15	13.5		0.056	6.80	X	0.097	15.8		1.1	0.322		0.155
NOB-6	J1V1L5	11/24/14	10.7		0.158	8.57		0.158	11.1		0.315	0.126	U	0.126
NOB-7	J1V1L6	11/24/14	12.6		0.152	8.10		0.152	13.1		0.304	0.117	U	0.117
NOB-8	J1V1L7	11/24/14	13.3		0.161	7.86		0.161	12.1		0.321	0.120	U	0.120
NOB-10	J1V1L9	11/20/14	13.7		0.147	8.54		0.147	13.4		0.294	0.292	B	0.114
NOB-11	J1V1M0	11/24/14	12.1		0.149	8.35		0.149	11.5		0.299	0.119	U	0.119
NOB-12	J1V1M1	11/20/14	9.69		0.138	8.26		0.138	11.5		0.276	0.127	U	0.127
SOB-3	J1V1M5	11/13/14	11.6		0.131	7.23	D	0.655	15.6		0.262	0.173	B	0.114
Duplicate of J1V1M5	J1V1N5	11/13/14	12.2		0.150	5.93	D	0.751	15.6		0.30	0.119	U	0.119
SOB-1	J1V1M3	11/13/14	11.7		0.152	8.24	D	0.760	15.7		0.304	0.179	B	0.118
SOB-2	J1V1M4	11/13/14	12.7		0.151	7.12	D	0.757	15.1		0.303	0.363	B	0.116
SOB-4	J1V1M6	11/13/14	11.1		0.149	7.48	DN	0.743	14.8		0.297	0.122	U	0.122
SOB-5	J1V1M7	11/13/14	10.6		0.147	5.67	D	0.735	15.1		0.294	0.118	U	0.118
SOB-6	J1V1M8	11/13/14	12.3		0.151	8.26	DN	0.757	18.3		0.303	0.123	U	0.123
SOB-7	J1V1M9	11/13/14	11.2		0.143	6.65	D	0.713	15.5		0.285	0.465		0.118
SOB-8	J1V1N0	11/13/14	9.86		0.140	6.80	D	0.702	16.1		0.281	0.374	B	0.119
SOB-9	J1V1N1	11/13/14	7.95		0.132	9.23	DN	0.662	13.4		0.265	0.120	U	0.120
SOB-10	J1V1N2	11/13/14	10.5		0.139	7.40	DN	0.693	14.5		0.277	0.114	U	0.114
SOB-11	J1V1N3	11/13/14	12.5		0.132	7.58	DN	0.658	14.6		0.263	0.121	U	0.121
SOB-12	J1V1N4	11/13/14	6.56		0.132	10.1	DN	0.662	15.9		0.265	0.119	U	0.119
FS-1	J1RWF8	8/19/13	15.2		0.056	6.20	X	0.097	15.7		0.21	0.187		0.155
FS-2	J1RXJ6	12/12/13	10.9		0.056	7.0	X	0.097	17.2		0.210	0.213		0.155
FS-3	J1RXJ7	12/12/13	19.0		0.066	6.2	X	0.110	12.0		0.250	0.278		0.155
FS-4	J1RXJ8	12/12/13	9.80		0.052	6.40	X	0.089	14.2		0.190	0.155	U	0.155
Equipment Blank	J1V1K9	11/5/14	0.581		0.145	0.296	B	0.145	1.51		0.290			
Equipment Blank	J1V1N6	11/13/14	0.134	U	0.134	0.67	UD	0.670	0.268	U	0.268			
NOB-2	J1V1L1	11/24/14	12.5		0.159	8.43		0.159	11.8		0.318	0.123	U	0.123
NOB-5	J1V1L4	11/24/14	9.42		0.147	8.72		0.147	12.1		0.294	0.121	U	0.121
EXC-13	J1V1J6	11/5/14	0.170		0.170	7.79		0.170	16.0		0.340	2.04		0.139
Duplicate of J1V1J6	J1V1K8	11/5/14	0.162		0.162	7.58		0.162	15.2		0.323	0.131	U	0.131
EXC-15	J1V1J8	11/5/14	9.41		0.144	7.38	D	0.721	14.7		0.288	0.128	U	0.128
EXC-18	J1V1K1	11/5/14	13.7		0.146	6.86	D	0.729	14.6		0.292	0.119	U	0.119
EXC-21	J1V1K4	11/5/14	16.7		0.160	6.50		0.160	12.6		0.320	0.127	U	0.127
EXC-22	J1V1K5	11/5/14	17.9		0.143	7.06		0.143	16.5		0.287	0.126	U	0.12

Attachment	1	Sheet No.	8 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1V1H5	11/12/14	28200		8.13	9.79	D	1.68	4640		8.63	284		0.203
Duplicate of J1V1H5	J1V1J5	11/12/14	18600		8.55	12.7	D	1.76	4470		9.08	257		0.214
EXC-1	J1V1H3	11/12/14	18000		8.07	27.8	D	1.67	4360		8.58	257		0.202
EXC-2	J1V1H4	11/12/14	18300		7.85	15.9	D	1.62	4390		8.34	275		0.196
EXC-4	J1V1H6	11/12/14	16300		8.34	5.36		0.344	5100		8.86	251		0.208
EXC-5	J1V1H7	11/12/14	17200		8.21	5.89	D	1.69	4680		8.73	263		0.205
EXC-6	J1V1H8	11/12/14	17100		8.05	20.5	D	1.66	4160		8.55	263		0.201
EXC-7	J1V1H9	11/12/14	18000		9.50	7.32		0.392	6050		10.1	278		0.238
EXC-8	J1V1J0	11/12/14	14600		7.66	6.41		0.316	3530		8.14	221		0.192
EXC-9	J1V1J1	11/12/14	12200		8.47	1.71		0.350	3570		9.00	197		0.212
EXC-10	J1V1J2	11/12/14	13500		7.82	6.99	D	1.61	3680		8.31	218		0.196
EXC-11	J1V1J3	11/12/14	18400		8.12	35.8		0.335	6020		8.62	299		0.203
EXC-12	J1V1J4	11/12/14	15900		7.85	13.2		0.324	5180		8.34	281		0.196
EXC-13 [a]	J1V459	2/5/15	15700		3.8	4.0		0.27	4040		3.7	228		0.099
Duplicate of J1V459 [a]	J1V464	2/5/15	16100		3.4	3.8		0.24	4080		3.3	232		0.089
EXC-14	J1V1J7	11/5/14	16400		7.88	19.3	DN	1.63	3960		8.37	252		0.197
EXC-15 [a]	J1V460	2/5/15	16000		3.6	10.8		0.26	4410		3.5	243		0.094
EXC-16	J1V1J9	11/5/14	19800		8.42	7.62	N	0.347	5790		8.94	330		0.210
EXC-17	J1V1K0	11/5/14	18600		8.15	30.6	DN	1.68	4540		8.66	321		0.204
EXC-18 [a]	J1V461	3/16/15	18200	X	3.7	5.3		0.26	6770		3.6	314		0.097
EXC-19	J1V1K2	11/5/14	17600		7.91	19.9	DN	1.63	4450		8.40	281		0.198
EXC-20	J1V1K3	11/5/14	15700		8.66	14.8	N	0.357	3990		9.20	229		0.217
EXC-21 [a]	J1V462	2/5/15	14700		3.7	5.8		0.26	4220		3.6	236		0.096
EXC-22 [a]	J1V463	3/5/15	16000		3.8	12.3		0.27	4840		3.7	274	X	0.10
EXC-23	J1V1K6	11/5/14	16400		7.73	2.85	CN	0.319	3720		8.21	257		0.193
EXC-24	J1V1K7	11/5/14	11900		7.77	1.80	CN	0.320	3060		8.25	178		0.194
NOB-9	J1V1L8	11/20/14	16800		8.25	9.18		0.340	3950		8.76	232		0.206
Duplicate of J1V1L8	J1V1M2	11/20/14	17500		8.23	11.0		0.339	4320		8.74	255		0.206
NOB-1	J1V1L0	11/24/14	19000		8.47	21.7		0.349	4900		9.00	284		0.212
NOB-2 [a]	J1V596	3/18/15	17800		3.8	14.7	X	0.27	4590		3.7	269		0.10
NOB-3	J1V1L2	11/20/14	16100		7.89	33.8		0.325	3600		8.38	232		0.197
NOB-4	J1V1L3	11/20/14	15600		7.73	9.66		0.319	3770		8.22	234		0.193
NOB-5 [a]	J1V597	3/18/15	19400		3.7	24.3	X	0.26	5040		3.6	290		0.097
NOB-6	J1V1L5	11/24/14	17600		8.4	19.8		0.347	4530		8.93	243		0.210
NOB-7	J1V1L6	11/24/14	17700		8.12	8.33		0.335	4800		8.63	259		0.203
NOB-8	J1V1L7	11/24/14	17100		8.56	2.94		0.353	4800		9.10	248		0.214
NOB-10	J1V1L9	11/20/14	18500		7.85	12.7		0.324	5100		8.34	273		0.196
NOB-11	J1V1M0	11/24/14	17900		7.97	14.2		0.329	4710		8.47	251		0.199
NOB-12	J1V1M1	11/20/14	16900		7.36	28.0		0.304	3890		7.82	237		0.184
SOB-3	J1V1M5	11/13/14	18900		6.98	7.33	D	1.44	4370		7.42	311		0.175
Duplicate of J1V1M5	J1V1N5	11/13/14	19500		8.01	7.33	D	1.65	4430		8.51	322		0.200
SOB-1	J1V1M3	11/13/14	20500		8.10	7.20	D	1.67	4440		8.61	334		0.203
SOB-2	J1V1M4	11/13/14	19900		8.07	5.90	D	1.66	4460		8.57	316		0.202
SOB-4	J1V1M6	11/13/14	16900		7.92	34.6	DN	1.63	4150		8.42	263		0.198
SOB-5	J1V1M7	11/13/14	18100		7.84	28.4	D	1.62	3990		8.32	276		0.196
SOB-6	J1V1M8	11/13/14	18600		8.08	32.0	DN	1.67	4480		8.58	276		0.202
SOB-7	J1V1M9	11/13/14	18700		7.61	30.6	D	1.57	4430		8.09	274		0.190
SOB-8	J1V1N0	11/13/14	16800		7.49	18.5	D	1.55	3810		7.96	252		0.187
SOB-9	J1V1N1	11/13/14	20700		7.06	4.88	DN	1.46	4310		7.50	273		0.177
SOB-10	J1V1N2	11/13/14	17100		7.39	26.5	DN	1.52	4050		7.86	257		0.185
SOB-11	J1V1N3	11/13/14	16900		7.02	22.3	DN	1.45	4020		7.45	259		0.175
SOB-12	J1V1N4	11/13/14	23500		7.06	4.71	DN	1.46	4840		7.50	297		0.176
FS-1	J1RWF8	8/19/13	16600		3.70	9.70		0.260	5640		3.60	274		0.097
FS-2	J1RXJ6	12/12/13	16800		3.70	9.30		0.260	4040		3.60	282		0.097
FS-3	J1RXJ7	12/12/13	15100		4.30	5.60		0.310	5640		4.20	247		0.110
FS-4	J1RXJ8	12/12/13	15500		3.40	5.20		0.240	3830		3.30	251		0.089
Equipment Blank	J1V1K9	11/5/14	2130		7.74	0.450	BCN	0.319	55.8		8.22	5.17		0.193
Equipment Blank	J1V1N6	11/13/14	146		7.14	1.47	UD	1.47	11.2	B	7.59	3.29		0.179
NOB-2	J1V1L1	11/24/14	17900		8.49	6.00		0.350	4750		9.02	268		0.212
NOB-5	J1V1L4	11/24/14	17800		7.84	9.63		0.324	4160		8.33	262		0.196
EXC-13	J1V1J6	11/5/14	19800		9.06	152	N	0.374	5360		9.63	338		0.227
Duplicate of J1V1J6	J1V1K8	11/5/14	19100		8.62	137	N	0.356	4930		9.16	339		0.215
EXC-15	J1V1J8	11/5/14	19400		7.69	94.1	DN	1.59	4080		8.17	273		0.192
EXC-18	J1V1K1	11/5/14	19800		7.73	23.1	DN	1.60	4490		8.26	267		0.194
EXC-21	J1V1K4	11/5/14	16800		8.54	5.86	CN	0.352	5040		9.08	253		0.214
EXC-22	J1V1K5	11/5/14	18900		7.64	23	N	0.315	5420		8.12	286		0.191

Attachment	1	Sheet No.	9 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1V1H5	11/12/14	0.0973		0.00429	1.66		0.203	23.8		0.152	1910		6.50
Duplicate of J1V1H5	J1V1J5	11/12/14	0.114		0.00425	0.594	B	0.214	14.1		0.160	1770		6.84
EXC-1	J1V1H3	11/12/14	0.0040	U	0.0040	0.202	U	0.202	10.4		0.151	776		6.46
EXC-2	J1V1H4	11/12/14	0.0239		0.00407	0.196	U	0.196	10.7		0.147	1040		6.28
EXC-4	J1V1H6	11/12/14	0.0674		0.00418	0.208	U	0.208	13.4		0.156	1280		6.67
EXC-5	J1V1H7	11/12/14	5.80	D	0.202	0.205	U	0.205	11.1		0.154	941		6.57
EXC-6	J1V1H8	11/12/14	0.229		0.00405	0.388	B	0.201	13.1		0.151	1140		6.44
EXC-7	J1V1H9	11/12/14	0.335		0.00531	0.238	U	0.238	17.4		0.178	1140		7.60
EXC-8	J1V1J0	11/12/14	0.327		0.0044	0.313	B	0.192	9.92		0.144	1050		6.13
EXC-9	J1V1J1	11/12/14	0.00372	U	0.00372	0.212	U	0.212	8.93		0.159	474		6.78
EXC-10	J1V1J2	11/12/14	0.0040	U	0.0040	0.196	U	0.196	8.9		0.147	731		6.26
EXC-11	J1V1J3	11/12/14	6.27	D	0.204	0.446	B	0.203	17.0		0.152	1340		6.49
EXC-12	J1V1J4	11/12/14	0.118		0.00421	0.196	U	0.196	13.6		0.147	2030		6.28
EXC-13 [a]	J1V459	2/5/15	0.0056	U	0.0056	0.26	U	0.26	13.3		0.12	620		40.5
Duplicate of J1V459 [a]	J1V464	2/5/15	0.0056	U	0.0056	0.23	U	0.23	11.6		0.11	626		36.6
EXC-14	J1V1J7	11/5/14	0.00428	B	0.00383	0.197	U	0.197	12.0		0.148	792	N	6.30
EXC-15 [a]	J1V460	2/5/15	0.0055	U	0.0055	0.25	U	0.25	11.5		0.12	743		38.7
EXC-16	J1V1J9	11/5/14	0.00559	B	0.00386	0.210	U	0.21	16.6		0.158	1660	N	6.73
EXC-17	J1V1K0	11/5/14	0.012		0.00377	0.204	U	0.204	12.6		0.153	1450	N	6.52
EXC-18 [a]	J1V461	3/16/15	0.0063	U	0.0063	0.25	U	0.25	18.9	X	0.12	1400		39.9
EXC-19	J1V1K2	11/5/14	0.00483	B	0.00363	0.203	B	0.198	11.5		0.148	1050	N	6.32
EXC-20	J1V1K3	11/5/14	0.00393	U	0.00393	0.217	U	0.217	11.0		0.162	710	N	6.93
EXC-21 [a]	J1V462	2/5/15	0.0056	U	0.0056	0.25	U	0.25	12.1		0.12	820		39.5
EXC-22 [a]	J1V463	3/5/15	0.011	BM	0.0059	0.26	U	0.26	12.1	X	0.12	955		41.1
EXC-23	J1V1K6	11/5/14	0.00466	B	0.00371	0.286	B	0.193	9.12		0.145	619	N	6.18
EXC-24	J1V1K7	11/5/14	0.00365	U	0.00365	0.194	U	0.194	8.69		0.146	488	N	6.21
NOB-9	J1V1L8	11/20/14	0.0055	B	0.00388	0.206	U	0.206	10.2		0.155	799		6.60
Duplicate of J1V1L8	J1V1M2	11/20/14	0.00668	B	0.00386	0.206	U	0.206	12.1		0.154	896		6.58
NOB-1	J1V1L0	11/24/14	0.00976	B	0.00382	0.212	U	0.212	11.7		0.159	1160		6.77
NOB-2 [a]	J1V596	3/18/15	0.011	BM	0.0059	0.26	U	0.26	14.6		0.12	1100		41.5
NOB-3	J1V1L2	11/20/14	0.00417	B	0.00405	0.197	U	0.197	8.65		0.148	715		6.31
NOB-4	J1V1L3	11/20/14	0.00409	U	0.00409	0.193	U	0.193	9.59		0.145	530		6.19
NOB-5 [a]	J1V597	3/18/15	0.013	B	0.0064	0.25	U	0.25	16.2		0.12	1160		39.6
NOB-6	J1V1L5	11/24/14	0.00505	B	0.00408	0.210	U	0.210	11.7		0.158	925		6.72
NOB-7	J1V1L6	11/24/14	0.0053	B	0.00359	0.203	U	0.203	13.4		0.152	966		6.49
NOB-8	J1V1L7	11/24/14	0.00748	B	0.0040	0.214	U	0.214	13.0		0.161	850		6.85
NOB-10	J1V1L9	11/20/14	0.0764		0.0036	0.196	U	0.196	14.4		0.147	1060		6.28
NOB-11	J1V1M0	11/24/14	0.00405	U	0.00405	0.199	U	0.199	12.3		0.149	979		6.38
NOB-12	J1V1M1	11/20/14	0.00627	B	0.00408	0.184	U	0.184	10.1		0.138	899		5.89
SOB-3	J1V1M5	11/13/14	0.0060	B	0.0040	0.197	B	0.175	11.1		0.131	1200		5.59
Duplicate of J1V1M5	J1V1N5	11/13/14	0.00513	B	0.0040	0.200	U	0.200	11.2		0.150	1250		6.41
SOB-1	J1V1M3	11/13/14	0.00513	B	0.0040	0.203	U	0.203	11.0		0.152	1660		6.48
SOB-2	J1V1M4	11/13/14	0.00591	B	0.00373	0.202	U	0.202	13.6		0.151	1490		6.46
SOB-4	J1V1M6	11/13/14	0.00546	B	0.0040	0.198	U	0.198	11.7		0.149	846		6.34
SOB-5	J1V1M7	11/13/14	0.00543	B	0.0040	0.196	U	0.196	10.2		0.147	955		6.27
SOB-6	J1V1M8	11/13/14	0.0106	B	0.00384	0.520	B	0.202	11.8		0.151	1130		6.46
SOB-7	J1V1M9	11/13/14	0.00607	B	0.0040	0.191	B	0.190	12.8		0.143	1300		6.09
SOB-8	J1V1N0	11/13/14	0.00435	B	0.00389	0.187	U	0.187	10.8		0.140	917		5.99
SOB-9	J1V1N1	11/13/14	0.00409	U	0.00409	0.177	U	0.177	9.75		0.132	802		5.65
SOB-10	J1V1N2	11/13/14	0.00548	B	0.0040	0.185	U	0.185	11.2		0.139	991		5.91
SOB-11	J1V1N3	11/13/14	0.00451	B	0.0040	0.175	U	0.175	12.2		0.132	819		5.61
SOB-12	J1V1N4	11/13/14	0.0040	U	0.0040	0.199	B	0.176	10.5		0.132	730		5.64
FS-1	J1RWF8	8/19/13	0.0071	B	0.0060	0.320	B	0.250	15.7		0.120	1240		39.9
FS-2	J1RXJ6	12/12/13	0.0057	UN	0.0057	0.290	B	0.250	10.9		0.120	1120		39.8
FS-3	J1RXJ7	12/12/13	0.0060	UN	0.0060	0.300	B	0.300	17.5		0.140	1140		46.9
FS-4	J1RXJ8	12/12/13	0.0057	UN	0.0057	0.230	U	0.230	9.90		0.110	1010		36.6
Equipment Blank	J1V1K9	11/5/14	0.00387	U	0.00387	0.193	U	0.193	0.706		0.145	78.3	N	6.19
Equipment Blank	J1V1N6	11/13/14	0.00356	U	0.00356	0.179	U	0.179	0.134	U	0.134	25.1		5.72
NOB-2	J1V1L1	11/24/14	0.0127		0.00384	0.212	U	0.212	12.2		0.159	1110		6.79
NOB-5	J1V1L4	11/24/14	0.0233		0.00422	0.196	U	0.196	10.6		0.147	1040		6.27
EXC-13	J1V1J6	11/5/14	0.012	B	0.00471	0.227	U	0.227	14.0		0.170	1780	N	7.25
Duplicate of J1V1J6	J1V1K8	11/5/14	0.0102	B	0.00449	0.215	U	0.215	13.8		0.162	1620	N	6.89
EXC-15	J1V1J	11/5/14	0.00457	B	0.0040	0.192	U	0.192	10.4		0.144	985	N	6.15
EXC-18	J1V1K1	11/5/14	0.012		0.00387	0.194	U	0.194	13.3		0.146	1100	N	6.22
EXC-21	J1V1K4	11/5/14	0.00588	B	0.0039	0.214	U	0.214	15.2		0.160	1050	N	6.83
EXC-22	J1V1K5	11/5/14	0.00419	U	0.00419	0.191	U	0.191	16.1		0.143	1080	N	6.11

Attachment	1	Sheet No.	10 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Selenium			Silicon			Silver			Sodium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1V1H5	11/12/14	0.961	BD	0.345	1430	*N	1.52	0.102	U	0.102	965		7.11
Duplicate of J1V1H5	J1V1J5	11/12/14	1.00	D	0.320	1450	*N	1.60	0.107	U	0.107	771		7.48
EXC-1	J1V1H3	11/12/14	0.730	BD	0.330	1030	*N	1.51	0.101	U	0.101	143		7.06
EXC-2	J1V1H4	11/12/14	0.669	BD	0.332	1430	*N	1.47	0.0981	U	0.0981	194		6.87
EXC-4	J1V1H6	11/12/14	0.548	BD	0.335	1510	*N	1.56	0.104	U	0.104	190		7.30
EXC-5	J1V1H7	11/12/14	0.639	BD	0.325	911	*N	1.54	0.103	U	0.103	260		7.19
EXC-6	J1V1H8	11/12/14	0.609	BD	0.347	1340	*N	1.51	0.101	U	0.101	315		7.04
EXC-7	J1V1H9	11/12/14	0.596	BD	0.426	1720	*N	1.78	0.119	U	0.119	254		8.32
EXC-8	J1V1J0	11/12/14	0.561	BD	0.352	1660	*N	1.44	0.0958	U	0.0958	325		6.70
EXC-9	J1V1J1	11/12/14	0.390	BD	0.348	992	*N	1.59	0.106	U	0.106	105		7.41
EXC-10	J1V1J2	11/12/14	0.552	BD	0.352	1190	*N	1.47	0.0978	U	0.0978	226		6.84
EXC-11	J1V1J3	11/12/14	0.610	BD	0.353	1600	*N	1.52	3.14		0.101	262		7.10
EXC-12	J1V1J4	11/12/14	0.615	BD	0.326	1570	*N	1.47	0.0982	U	0.0982	170		6.87
EXC-13 [a]	J1V459	2/5/15	0.85	U	0.85	191		5.6	0.16	U	0.16	188		58.3
Duplicate of J1V459 [a]	J1V464	2/5/15	0.77	U	0.77	178		5.0	0.14	U	0.14	209		52.6
EXC-14	J1V1J7	11/5/14	0.826	BD	0.337	764	*N	1.48	0.0985	U	0.0985	235		6.90
EXC-15 [a]	J1V460	2/5/15	0.81	U	0.81	196		5.3	0.15	U	0.15	269		55.7
EXC-16	J1V1J9	11/5/14	0.962	BD	0.345	958	*N	1.58	0.105	U	0.105	161		7.37
EXC-17	J1V1K0	11/5/14	1.10	D	0.353	891	*N	1.53	0.102	U	0.102	165		7.13
EXC-18 [a]	J1V461	3/16/15	0.84	U	0.84	285	N	5.5	0.16	U	0.16	289		57.5
EXC-19	J1V1K2	11/5/14	0.919	BD	0.325	581	*N	1.48	0.0988	U	0.0988	185		6.92
EXC-20	J1V1K3	11/5/14	0.925	BD	0.342	663	*N	1.62	0.108	U	0.108	115		7.58
EXC-21 [a]	J1V462	2/5/15	0.83	U	0.83	232		5.5	0.15	U	0.15	218		56.9
EXC-22 [a]	J1V463	3/5/15	0.86	U	0.86	253	N	5.7	0.16	U	0.16	240		59.1
EXC-23	J1V1K6	11/5/14	0.606	BD	0.306	561	*N	1.45	0.0966	U	0.0966	102		6.76
EXC-24	J1V1K7	11/5/14	0.400	BD	0.328	489	*N	1.46	0.0971	U	0.0971	130		6.79
NOB-9	J1V1L8	11/20/14	0.333	BD	0.328	1070	JN	1.55	0.251	B	0.103	158	*	7.22
Duplicate of J1V1L8	J1V1M2	11/20/14	0.341	UD	0.341	753	JN	1.54	0.283	B	0.103	153	*	7.20
NOB-1	J1V1L0	11/24/14	0.508	BD	0.339	895	JN	1.59	0.347	B	0.106	196	*	7.41
NOB-2 [a]	J1V596	3/18/15	0.87	U	0.87	258	N	5.7	0.16	U	0.16	233		59.7
NOB-3	J1V1L2	11/20/14	0.333	UD	0.333	1010	JN	1.48	0.196	B	0.0986	137	*	6.90
NOB-4	J1V1L3	11/20/14	0.522	BD	0.336	756	JN	1.45	0.0967	U	0.0967	123	*	6.77
NOB-5 [a]	J1V597	3/18/15	0.83	U	0.83	263	N	5.5	0.15	U	0.15	250		57.0
NOB-6	J1V1L5	11/24/14	0.346	UD	0.346	927	JN	1.58	0.274	B	0.105	163	*	7.35
NOB-7	J1V1L6	11/24/14	0.461	BD	0.340	1020	JN	1.52	0.360	B	0.101	153	*	7.10
NOB-8	J1V1L7	11/24/14	0.568	BD	0.326	1060	JN	1.61	0.240	B	0.107	136	*	7.49
NOB-10	J1V1L9	11/20/14	0.321	BD	0.302	996	JN	1.47	0.227	B	0.0982	157	*	6.87
NOB-11	J1V1M0	11/24/14	0.376	BD	0.344	1110	JN	1.49	0.334	B	0.0997	176	*	6.98
NOB-12	J1V1M1	11/20/14	0.362	BD	0.339	728	JN	1.38	0.318	B	0.092	137	*	6.44
SOB-3	J1V1M5	11/13/14	0.306	UD	0.306	659	N	1.31	0.0873	U	0.0873	222		6.11
Duplicate of J1V1M5	J1V1N5	11/13/14	0.289	UD	0.289	765	N	1.50	0.100	U	0.100	229		7.01
SOB-1	J1V1M3	11/13/14	0.330	UD	0.330	780	N	1.52	0.101	U	0.101	115	C	7.09
SOB-2	J1V1M4	11/13/14	0.317	UD	0.317	796	N	1.51	0.101	U	0.101	103	C	7.06
SOB-4	J1V1M6	11/13/14	0.329	UD	0.329	721		1.49	0.099	U	0.099	119		6.93
SOB-5	J1V1M7	11/13/14	0.320	UD	0.320	665	N	1.47	0.0979	U	0.0979	103	C	6.86
SOB-6	J1V1M8	11/13/14	0.315	UD	0.315	741		1.51	0.101	U	0.101	152		7.07
SOB-7	J1V1M9	11/13/14	0.315	UD	0.315	666	N	1.43	0.0951	U	0.0951	132	C	6.66
SOB-8	J1V1N0	11/13/14	0.298	UD	0.298	583	N	1.40	0.0937	U	0.0937	137	C	6.56
SOB-9	J1V1N1	11/13/14	0.327	UD	0.327	573		1.32	0.0883	U	0.0883	160		6.18
SOB-10	J1V1N2	11/13/14	0.306	UD	0.306	655		1.39	0.0924	U	0.0924	136		6.47
SOB-11	J1V1N3	11/13/14	0.289	UD	0.289	565		1.32	0.0877	U	0.0877	118		6.14
SOB-12	J1V1N4	11/13/14	0.327	UD	0.327	495		1.32	0.0882	U	0.0882	184		6.17
FS-1	J1RWF8	8/19/13	0.840	U	0.840	342	N	5.50	0.160	U	0.160	246		57.4
FS-2	J1RXJ6	12/12/13	0.870	B	0.840	211	N	5.50	0.160	U	0.160	182		57.3
FS-3	J1RXJ7	12/12/13	1.40		0.980	282	N	6.50	0.180	U	0.180	192		67.5
FS-4	J1RXJ8	12/12/13	0.770	U	0.770	246	N	5.10	0.140	U	0.140	159		52.7
Equipment Blank	J1V1K9	11/5/14	0.315	UD	0.315	114	*N	1.45	0.0967	U	0.0967	6.77	U	6.77
Equipment Blank	J1V1N6	11/13/14	0.310	UD	0.310	90.3	N	1.34	0.0893	U	0.0893	6.25	U	6.25
NOB-2	J1V1L1	11/24/14	0.428	BD	0.326	1360	JN	1.59	0.311	B	0.106	230	*	7.43
NOB-5	J1V1L4	11/24/14	0.401	BD	0.333	1100	JN	1.47	0.252	B	0.098	199	*	6.86
EXC-13	J1V1J6	11/5/14	1.13	D	0.383	1340	*N	1.70	0.113	U	0.113	146		7.93
Duplicate of J1V1J6	J1V1K8	11/5/14	1.00	D	0.370	956	*N	1.62	0.108	U	0.108	143		7.54
EXC-15	J1V1J8	11/5/14	1.55	D	0.351	687	*N	1.44	0.0961	U	0.0961	186		6.73
EXC-18	J1V1K1	11/5/14	0.941	BD	0.314	671	*N	1.46	0.0972	U	0.0972	174		6.80
EXC-21	J1V1K4	11/5/14	0.886	BD	0.328	908	*N	1.60	0.107	U	0.107	188		7.48
EXC-22	J1V1K5	11/5/14	1.04	D	0.329	963	*N	1.43	0.0955	U	0.0955	198		6.69

Attachment	1	Sheet No.	11 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1V1H5	11/12/14	42.3	D	0.508	24.4		0.404
Duplicate of J1V1H5	J1V1J5	11/12/14	44.9	D	0.534	39.2	D	1.99
EXC-1	J1V1H3	11/12/14	45.3	D	0.505	28.1	D	2.01
EXC-2	J1V1H4	11/12/14	46.7	D	0.491	36.5	D	2.03
EXC-4	J1V1H6	11/12/14	39.8		0.104	36.2		0.394
EXC-5	J1V1H7	11/12/14	42.6	D	0.513	31.4		0.399
EXC-6	J1V1H8	11/12/14	42.2	D	0.503	37.2		0.386
EXC-7	J1V1H9	11/12/14	40.1		0.119	46.4		0.480
EXC-8	J1V1J0	11/12/14	35.5		0.0958	61.7	D	2.08
EXC-9	J1V1J1	11/12/14	35.6		0.106	24.9		0.406
EXC-10	J1V1J2	11/12/14	39.4	D	0.489	65.5		0.420
EXC-11	J1V1J3	11/12/14	40.0		0.101	64.2		0.399
EXC-12	J1V1J4	11/12/14	40.1		0.0982	41.2		0.385
EXC-13 [a]	J1V459	2/5/15	45.5		0.093	32.0		0.39
Duplicate of J1V459 [a]	J1V464	2/5/15	46.7		0.084	32.6		0.35
EXC-14	J1V1J7	11/5/14	46.0	D	0.493	42.8	D	1.97
EXC-15 [a]	J1V460	2/5/15	45.5		0.089	35.5		0.38
EXC-16	J1V1J9	11/5/14	42.3		0.105	46.2		0.421
EXC-17	J1V1K0	11/5/14	45.5	D	0.510	43.0	D	2.04
EXC-18 [a]	J1V461	3/16/15	40.6		0.092	44.0	X	0.39
EXC-19	J1V1K2	11/5/14	43.2	D	0.494	39.5	D	1.98
EXC-20	J1V1K3	11/5/14	39.8		0.108	32.8		0.433
EXC-21 [a]	J1V462	2/5/15	38.1		0.091	35.0		0.38
EXC-22 [a]	J1V463	3/5/15	42.3	X	0.094	37.4		0.40
EXC-23	J1V1K6	11/5/14	36.4		0.0966	35.3		0.386
EXC-24	J1V1K7	11/5/14	34.9		0.0971	24.7		0.388
NOB-9	J1V1L8	11/20/14	45.6		0.103	28.3	CM	0.412
Duplicate of J1V1L8	J1V1M2	11/20/14	44.3		0.103	28.9	CM	0.411
NOB-1	J1V1L0	11/24/14	45.7		0.106	35.3	CM	0.423
NOB-2 [a]	J1V596	3/18/15	45.2		0.095	39.4		0.40
NOB-3	J1V1L2	11/20/14	43.4		0.0986	29.6	CM	0.394
NOB-4	J1V1L3	11/20/14	41.5		0.0967	25.8	CM	0.387
NOB-5 [a]	J1V597	3/18/15	48.6		0.091	104		0.38
NOB-6	J1V1L5	11/24/14	45.2		0.105	31.3	CM	0.420
NOB-7	J1V1L6	11/24/14	42.0		0.101	31.3	CM	0.406
NOB-8	J1V1L7	11/24/14	39.1		0.107	30.3	CM	0.428
NOB-10	J1V1L9	11/20/14	41.5		0.0982	40.7	CM	0.393
NOB-11	J1V1M0	11/24/14	44.3		0.0997	31.1	CM	0.399
NOB-12	J1V1M1	11/20/14	46.3		0.092	26.9	CM	0.368
SOB-3	J1V1M5	11/13/14	47.1	D	0.437	36.3	D	1.75
Duplicate of J1V1M5	J1V1N5	11/13/14	39.0	D	0.500	30.7	D	2.00
SOB-1	J1V1M3	11/13/14	54.8	D	0.507	42.3	D	2.03
SOB-2	J1V1M4	11/13/14	45.7	D	0.504	35.6	D	2.02
SOB-4	J1V1M6	11/13/14	51.6	DMN	0.495	40.3	CDN	1.98
SOB-5	J1V1M7	11/13/14	40.5	D	0.49	30.0	D	1.96
SOB-6	J1V1M8	11/13/14	58.8	DMN	0.505	49.4	CDN	2.02
SOB-7	J1V1M9	11/13/14	51.0	D	0.476	39.5	D	1.9
SOB-8	J1V1N0	11/13/14	43.5	D	0.468	36.1	D	1.87
SOB-9	J1V1N1	11/13/14	70.7	DMN	0.441	47.3	CDN	1.77
SOB-10	J1V1N2	11/13/14	51.2	DMN	0.462	46.8	CDN	1.85
SOB-11	J1V1N3	11/13/14	57.3	DMN	0.439	41.3	CDN	1.75
SOB-12	J1V1N4	11/13/14	80.5	DMN	0.441	47.7	CDN	1.76
FS-1	J1RWF8	8/19/13	37.5		0.091	40.8	X	0.390
FS-2	J1RXJ6	12/12/13	43.1		0.091	37.9	X	0.390
FS-3	J1RXJ7	12/12/13	32.5		0.110	40.1	X	0.460
FS-4	J1RXJ8	12/12/13	38.2		0.084	33.8	X	0.360
Equipment Blank	J1V1K9	11/5/14	1.40		0.0967	1.94	C	0.387
Equipment Blank	J1V1N6	11/13/14	0.565	BD	0.447	1.79	DU	1.79
NOB-2	J1V1L1	11/24/14	41.7		0.106	33.1	CM	0.425
NOB-5	J1V1L4	11/24/14	45.6		0.098	29.9	CM	0.3
EXC-13	J1V1J6	11/5/14	40.8		0.113	46.6		0.453
Duplicate of J1V1J6	J1V1K8	11/5/14	41.2		0.108	44.7		0.431
EXC-15	J1V1J8	11/5/14	49.0	D	0.481	40.1	D	1.92
EXC-18	J1V1K1	11/5/14	45.2	D	0.486	40.3	D	1.94
EXC-21	J1V1K4	11/5/14	38.0		0.107	40.4		0.427
EXC-22	J1V1K5	11/5/14	44.3		0.0955	43.2		0.382

Attachment	1	Sheet No.	12 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Anions, TPH, and Physical).

Sample Locations	HEIS Number	Sample Date	Bromide			Chloride			Fluoride			Nitrogen in Nitrate		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1V1H5	11/12/14	0.844	B	0.715	38.9		0.715	0.881	B	0.352	5.31		0.352
Duplicate of J1V1H5	J1V1J5	11/12/14	0.716	U	0.716	22.8		0.716	0.786	B	0.353	3.50		0.353
EXC-1	J1V1H3	11/12/14	0.688	U	0.688	2.17		0.688	0.566	B	0.339	0.915	B	0.339
EXC-2	J1V1H4	11/12/14	0.707	U	0.707	1.48	B	0.707	0.884	B	0.348	0.854	B	0.348
EXC-4	J1V1H6	11/12/14	0.698	U	0.698	2.66		0.698	0.344	U	0.344	2.73		0.344
EXC-5	J1V1H7	11/12/14	0.688	U	0.688	1.35	B	0.688	0.339	U	0.339	0.581	B	0.339
EXC-6	J1V1H8	11/12/14	0.713	U	0.713	1.16	B	0.713	0.351	U	0.351	0.491	B	0.351
EXC-7	J1V1H9	11/12/14	0.885	U	0.885	3.47		0.885	1.04	B	0.436	2.33		0.436
EXC-8	J1V1J0	11/12/14	0.748	U	0.748	1.90	B	0.748	0.369	U	0.369	0.641	B	0.369
EXC-9	J1V1J1	11/12/14	0.732	U	0.732	1.07	B	0.732	0.361	U	0.361	0.501	B	0.361
EXC-10	J1V1J2	11/12/14	0.760	U	0.760	7.60		0.760	0.374	U	0.374	1.93		0.374
EXC-11	J1V1J3	11/12/14	0.721	U	0.721	6.66		0.721	0.862	B	0.355	9.43		0.355
EXC-12	J1V1J4	11/12/14	0.701	U	0.701	5.18		0.701	0.762	B	0.345	5.39		0.345
NOB-9	J1V1L8	11/20/14	0.695	U	0.695	1.28	UBC	0.695	1.34		0.342	0.842	JB	0.342
Duplicate of J1V1L8	J1V1M2	11/20/14	0.693	U	0.693	1.16	UBC	0.693	1.30		0.341	0.826	JB	0.341
NOB-1	J1V1L0	11/24/14	0.718	U	0.718	11.2	C	0.718	1.40		0.353	10.8	J	0.353
NOB-2 [a]	J1V596	3/18/15	0.40	U	0.40	7.3	C	2.0	1.6	B	0.83	1.3	B	0.32
NOB-3	J1V1L2	11/20/14	0.687	U	0.687	1.58	UBC	0.687	1.31		0.338	1.29	J	0.338
NOB-4	J1V1L3	11/20/14	0.681	U	0.681	1.56	UBC	0.681	0.991	B	0.336	0.936	JB	0.336
NOB-5 [a]	J1V597	3/18/15	0.40	U	0.40	8.0	C	2.0	1.6	B	0.83	2.7		0.32
NOB-6	J1V1L5	11/24/14	0.708	U	0.708	2.39	UC	0.708	1.30		0.349	1.28	J	0.349
NOB-7	J1V1L6	11/24/14	0.704	U	0.704	2.46	UC	0.704	1.33		0.347	0.958	JB	0.347
NOB-8	J1V1L7	11/24/14	0.730	U	0.730	2.85	UC	0.730	1.30		0.360	1.09	J	0.360
NOB-10	J1V1L9	11/20/14	0.700	U	0.700	1.90	UBC	0.700	1.29		0.345	1.60	J	0.345
NOB-11	J1V1M0	11/24/14	0.708	U	0.708	6.33	C	0.708	1.31		0.349	2.33	J	0.349
NOB-12	J1V1M1	11/20/14	0.690	U	0.690	2.34	UC	0.690	1.34		0.340	1.06	J	0.340
SOB-3	J1V1M5	11/13/14	0.684	U	0.684	3.70		0.684	2.84		0.337	2.04		0.337
Duplicate of J1V1M5	J1V1N5	11/13/14	0.685	U	0.685	3.65		0.685	2.75		0.338	2.05		0.338
SOB-1	J1V1M3	11/13/14	0.683	U	0.683	1.96	B	0.683	1.87		0.336	2.03		0.336
SOB-2	J1V1M4	11/13/14	0.689	U	0.689	2.23		0.689	1.45		0.340	1.40		0.340
SOB-4	J1V1M6	11/13/14	0.693	U	0.693	1.56	B	0.693	1.56		0.341	1.01	B	0.341
SOB-5	J1V1M7	11/13/14	0.685	U	0.685	1.34	B	0.685	1.32		0.337	0.853	B	0.337
SOB-6	J1V1M8	11/13/14	0.688	U	0.688	4.85		0.688	0.966	B	0.339	47.0		0.339
SOB-7	J1V1M9	11/13/14	0.699	U	0.699	14.4		0.699	1.49		0.344	31.3		0.344
SOB-8	J1V1N0	11/13/14	0.688	U	0.688	1.32	B	0.688	0.826	B	0.339	1.18		0.339
SOB-9	J1V1N1	11/13/14	0.687	U	0.687	2.95		0.687	0.776	B	0.338	1.01	B	0.338
SOB-10	J1V1N2	11/13/14	0.691	U	0.691	2.01	B	0.691	1.05		0.340	1.12		0.340
SOB-11	J1V1N3	11/13/14	0.678	U	0.678	8.57		0.678	1.04		0.334	1.19		0.334
SOB-12	J1V1N4	11/13/14	0.687	U	0.687	1.65	B	0.687	0.820	B	0.338	1.05		0.338
FS-1	J1RWF8	8/19/13		U	0.390	5.40		2.00	1.30	B	0.820	1.20	B	0.310
FS-2	J1RXJ6	12/12/13	0.400	U	0.400	4.30	B	2.10	1.10	B	0.860	0.330	UR	0.330
FS-3	J1RXJ7	12/12/13	0.450	U	0.450	4.20	B	2.30	0.950	B	0.940	1.00	B	0.360
FS-4	J1RXJ8	12/12/13	0.400	U	0.400	3.90	B	2.00	0.850	U	0.850	0.320	UR	0.320
NOB-2	J1V1L1	11/24/14	0.711	U	0.711	3.33	UC	0.711	1.28		0.350	1.30	J	0.350
NOB-5	J1V1L4	11/24/14	0.707	U	0.707	4.63	UC	0.707	1.29		0.348	4.16	J	0.348

Attachment	1	Sheet No.	13 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Anions, TPH, and Physical).

Sample Locations	HEIS Number	Sample Date	Nitrogen in Nitrite and Nitrate			Nitrogen in Nitrite			Phosphorous in phosphate			Sulfate		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1V1H5	11/12/14	1.37		0.181	0.532	B	0.352	0.715	UR	0.715	672	D	7.09
Duplicate of J1V1H5	J1V1J5	11/12/14	1.38		0.180	0.513	B	0.353	0.716	UR	0.716	501	D	7.10
EXC-1	J1V1H3	11/12/14	0.494	B	0.170	0.421	B	0.339	0.688	UR	0.688	133		1.37
EXC-2	J1V1H4	11/12/14	0.571		0.175	0.348	UR	0.348	0.707	UR	0.707	9.49		1.40
EXC-4	J1V1H6	11/12/14	2.13		0.177	0.956	B	0.344	1.20	B	0.698	37.8		1.39
EXC-5	J1V1H7	11/12/14	0.421	B	0.175	0.449	B	0.339	0.688	UR	0.688	31.6		1.37
EXC-6	J1V1H8	11/12/14	0.373	B	0.175	0.351	UR	0.351	0.713	UR	0.713	16.5		1.42
EXC-7	J1V1H9	11/12/14	2.02		0.225	0.532	B	0.436	0.885	UR	0.885	49.5		1.76
EXC-8	J1V1J0	11/12/14	0.370	B	0.188	0.457	B	0.369	0.748	UR	0.748	48.7		1.49
EXC-9	J1V1J1	11/12/14	0.308	B	0.176	0.361	UR	0.361	0.732	UR	0.732	2.21	B	1.45
EXC-10	J1V1J2	11/12/14	1.02		0.188	0.374	UR	0.374	0.760	UR	0.760	51.0		1.51
EXC-11	J1V1J3	11/12/14	7.85		0.183	0.355	UR	0.355	0.721	UR	0.721	72.1		1.43
EXC-12	J1V1J4	11/12/14	3.95		0.163	0.610	B	0.345	1.48	B	0.701	29.4		1.39
EXC-13 [a]	J1V459	2/5/15	0.37	U	0.37									
Duplicate of J1V459 [a]	J1V464	2/5/15	0.36	U	0.36									
EXC-14	J1V1J7	11/5/14	0.177	U	0.177									
EXC-15 [a]	J1V460	2/5/15	0.38	U	0.38									
EXC-16	J1V1J9	11/5/14	0.178	U	0.178									
EXC-17	J1V1K0	11/5/14	1.12		0.183									
EXC-18 [a]	J1V461	3/16/15	0.89	M	0.38									
EXC-19	J1V1K2	11/5/14	0.701		0.178									
EXC-20	J1V1K3	11/5/14	0.273	B	0.185									
EXC-21 [a]	J1V462	2/5/15	0.36	U	0.36									
EXC-22 [a]	J1V463	3/5/15	0.35	U	0.35									
EXC-23	J1V1K6	11/5/14	0.171	U	0.171									
EXC-24	J1V1K7	11/5/14	0.174	U	0.174									
NOB-9	J1V1L8	11/20/14	0.244	B	0.176	0.342	UR	0.342	0.695	UR	0.695	4.87		1.38
Duplicate of J1V1L8	J1V1M2	11/20/14	0.278	B	0.174	0.341	UR	0.341	0.693	UR	0.693	4.72		1.38
NOB-1	J1V1L0	11/24/14	10.6	D	0.897	0.353	UR	0.353	0.718	UR	0.718	145		1.42
NOB-2 [a]	J1V596	3/18/15	0.37	U	0.37	0.34	UR	0.34	1.3	UR	1.3	15.7		1.7
NOB-3	J1V1L2	11/20/14	0.249	B	0.171	0.338	UR	0.338	0.687	UR	0.687	5.08		1.36
NOB-4	J1V1L3	11/20/14	0.219	B	0.169	0.336	UR	0.336	0.681	UR	0.681	4.87		1.35
NOB-5 [a]	J1V597	3/18/15	1.8		0.36	0.34	UR	0.34	1.3	UR	1.3	28.8		1.7
NOB-6	J1V1L5	11/24/14	0.718		0.174	0.349	UR	0.349	0.708	UR	0.708	6.07		1.41
NOB-7	J1V1L6	11/24/14	0.297	B	0.176	0.347	UR	0.347	0.704	UR	0.704	5.71		1.40
NOB-8	J1V1L7	11/24/14	0.450	B	0.170	0.360	UR	0.360	0.730	UR	0.730	8.90		1.45
NOB-10	J1V1L9	11/20/14	0.814		0.167	0.345	UR	0.345	0.700	UR	0.700	11.4		1.39
NOB-11	J1V1M0	11/24/14	1.46		0.170	0.349	UR	0.349	0.708	UR	0.708	14.1		1.40
NOB-12	J1V1M1	11/20/14	0.336	B	0.170	0.340	UR	0.340	1.24	JB	0.690	11.1		1.37
SOB-3	J1V1M5	11/13/14	0.955	C	0.169	0.337	UR	0.337	0.942	B	0.684	11.4		1.36
Duplicate of J1V1M5	J1V1N5	11/13/14	0.808	C	0.170	0.338	UR	0.338	0.984	B	0.685	13.1		1.36
SOB-1	J1V1M3	11/13/14	0.775	C	0.172	0.336	UR	0.336	1.97	B	0.683	4.53		1.36
SOB-2	J1V1M4	11/13/14	0.666	C	0.175	0.340	UR	0.340	2.08		0.689	4.04	B	1.37
SOB-4	J1V1M6	11/13/14	0.402	B	0.169	0.341	UR	0.341	0.693	UR	0.693	5.77		1.38
SOB-5	J1V1M7	11/13/14	0.197	BC	0.166	0.337	UR	0.337	0.822	B	0.685	3.87	B	1.36
SOB-6	J1V1M8	11/13/14	18.5	D	0.854	0.751	B	0.339	1.29	B	0.688	26.1		1.37
SOB-7	J1V1M9	11/13/14	35.7	D	1.77	4.50		0.344	1.82	B	0.699	22.0		1.39
SOB-8	J1V1N0	11/13/14	0.889	C	0.175	0.339	UR	0.339	0.705	B	0.688	11.1		1.37
SOB-9	J1V1N1	11/13/14	0.391	B	0.162	0.338	UR	0.338	0.687	UR	0.687	4.22		1.36
SOB-10	J1V1N2	11/13/14	0.457	B	0.165	0.340	UR	0.340	0.883	B	0.691	4.92		1.37
SOB-11	J1V1N3	11/13/14	0.378	B	0.162	0.334	UR	0.334	0.872	B	0.678	12.0		1.35
SOB-12	J1V1N4	11/13/14	0.299	B	0.168	0.338	UR	0.338	0.687	UR	0.687	7.49		1.36
FS-1	J1RWF8	8/19/13	0.750	M	0.300	0.330	UR	0.330	1.20	URN	1.20	16.3		1.70
FS-2	J1RXJ6	12/12/13	0.370	UN	0.370	0.350	UR	0.350	1.30	UR	1.30	9.10		1.80
FS-3	J1RXJ7	12/12/13	0.410	U	0.410	0.390	UR	0.390	1.40	UR	1.40	39.4		2.00
FS-4	J1RXJ8	12/12/13	0.370	U	0.370	0.350	UR	0.350	1.30	UR	1.30	8.00		1.80
NOB-2	J1V1L1	11/24/14	0.444	B	0.180	0.350	UR	0.350	0.711	UR	0.711	16.4		1.41
NOB-5	J1V1L4	11/24/14	1.55		0.178	0.348	UR	0.348	0.807	JB	0.707	158		1.40
EXC-13	J1V1J6	11/5/14	2.59		0.197									
Duplicate of J1V1J6	J1V1K8	11/5/14	2.26		0.197									
EXC-15	J1V1J8	11/5/14	0.273	B	0.178									
EXC-18	J1V1K1	11/5/14	0.171	U	0.171									
EXC-21	J1V1K4	11/5/14	0.880		0.181									
EXC-22	J1V1K5	11/5/14	0.179	U	0.179									

Attachment	1	Sheet No.	14 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Anions, TPH, and Physical).

Sample Locations	HEIS Number	Sample Date	TPH - Diesel Range EXT			TPH - Diesel Range			TPH - motor oil (high boiling)			Percent moisture (wet sample)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	%	Q	PQL
EXC-13 [a]	J1V459	2/5/15										5.4		0.10
Duplicate of J1V459 [a]	J1V464	2/5/15										4.9		0.10
EXC-15 [a]	J1V460	2/5/15										6.3		0.10
EXC-16 [b]	J1V7C8	6/2/15										4.5		0.10
EXC-18 [a]	J1V461	3/16/15										7.5		0.10
EXC-20 [b]	J1V7C9	6/2/15										0.77		0.10
EXC-21 [a]	J1V462	2/5/15										5.7		0.10
EXC-22 [a]	J1V463	3/5/15										4.1		0.10
EXC-23 [b]	J1V7D0	6/2/15										0.58		0.10
EXC-24 [b]	J1V7D1	6/2/15										1.5		0.10
NOB-9	J1V1L8	11/20/14				2240	U	2240	4880	J	2240			
Duplicate of J1V1L8	J1V1M2	11/20/14				2240	U	2240	3020	J	2240			
NOB-1	J1V1L0	11/24/14				2320	U	2320	6370	J	2320			
NOB-2 [a]	J1V596	3/18/15	6100		1000	3800	J	680				5.0		0.10
NOB-3	J1V1L2	11/20/14				2210	U	2210	3220	J	2210			
NOB-4	J1V1L3	11/20/14				2200	U	2200	2200	U	2200			
NOB-5 [a]	J1V597	3/18/15	3500	J	1000	2700	J	700				4.1		0.10
NOB-6	J1V1L5	11/24/14				2280	U	2280	4090	J	2280			
NOB-7	J1V1L6	11/24/14				2270	U	2270	2830	J	2270			
NOB-8	J1V1L7	11/24/14				2360	U	2360	2890	J	2360			
NOB-10	J1V1L9	11/20/14				2260	U	2260	4620	J	2260			
NOB-11	J1V1M0	11/24/14				2290	U	2290	2540	J	2290			
NOB-12	J1V1M1	11/20/14				2220	U	2220	3910	J	2220			
SOB-3	J1V1M5	11/13/14				2210	U	2210	4130	J	2210			
Duplicate of J1V1M5	J1V1N5	11/13/14				2210	U	2210	3490	J	2210			
SOB-1	J1V1M3	11/13/14				2210	U	2210	4940	J	2210			
SOB-2	J1V1M4	11/13/14				2220	U	2220	9950		2220			
SOB-4	J1V1M6	11/13/14				2240	U	2240	2460	J	2240			
SOB-5	J1V1M7	11/13/14				2210	U	2210	3280	J	2210			
SOB-6	J1V1M8	11/13/14				2210	U	2210	8250		2210			
SOB-7	J1V1M9	11/13/14				2260	U	2260	9440		2260			
SOB-8	J1V1N0	11/13/14				2220	U	2220	9510		2220			
SOB-9	J1V1N1	11/13/14				2220	U	2220	2300	J	2220			
SOB-10	J1V1N2	11/13/14				2220	U	2220	3570	J	2220			
SOB-11	J1V1N3	11/13/14				2190	U	2190	9900		2190			
SOB-12	J1V1N4	11/13/14				2210	U	2210	2210	U	2210			
FS-1	J1RWF8	8/19/13										0.24	M	0.10
FS-2	J1RXJ6	12/12/13										3.8	M	0.10
FS-3	J1RXJ7	12/12/13										13.4		0.10
FS-4	J1RXJ8	12/12/13										2.7		0.10
NOB-2	J1V1L1	11/24/14				2300	U	2300	8300		2300			
NOB-5	J1V1L4	11/24/14				2280	U	2280	8580		2280			

Attachment	1	Sheet No.	15 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Anions, TPH, and Physical).

Sample Locations	HEIS Number	Sample Date	pH Measurement		
			pH	Q	PQL
EXC-3	J1V1H5	11/12/14	8.58	X	0.010
Duplicate of J1V1H5	J1V1J5	11/12/14	8.69	X	0.010
EXC-1	J1V1H3	11/12/14	8.51	X	0.010
EXC-2	J1V1H4	11/12/14	8.83	X	0.010
EXC-4	J1V1H6	11/12/14	8.31	X	0.010
EXC-5	J1V1H7	11/12/14	9.26	X	0.010
EXC-6	J1V1H8	11/12/14	9.16	X	0.010
EXC-7	J1V1H9	11/12/14	8.30	X	0.010
EXC-8	J1V1J0	11/12/14	10.1	X	0.010
EXC-9	J1V1J1	11/12/14	8.78	X	0.010
EXC-10	J1V1J2	11/12/14	8.87	X	0.010
EXC-11	J1V1J3	11/12/14	8.50	X	0.010
EXC-12	J1V1J4	11/12/14	8.58	X	0.010
NOB-9	J1V1L8	11/20/14	9.15	JX	0.010
Duplicate of J1V1L8	J1V1M2	11/20/14	9.03	JX	0.010
NOB-1	J1V1L0	11/24/14	8.66	JX	0.010
NOB-2 [a]	J1V596	3/18/15	8.91		0.10
NOB-3	J1V1L2	11/20/14	8.99	JX	0.010
NOB-4	J1V1L3	11/20/14	9.07	JX	0.010
NOB-5 [a]	J1V597	3/18/15	8.97		0.10
NOB-6	J1V1L5	11/24/14	9.11	JX	0.010
NOB-7	J1V1L6	11/24/14	9.02	JX	0.010
NOB-8	J1V1L7	11/24/14	8.86	JX	0.010
NOB-10	J1V1L9	11/20/14	8.87	JX	0.010
NOB-11	J1V1M0	11/24/14	9.07	JX	0.010
NOB-12	J1V1M1	11/20/14	9.15	JX	0.010
SOB-3	J1V1M5	11/13/14	9.37	X	0.010
Duplicate of J1V1M5	J1V1N5	11/13/14	9.40	X	0.010
SOB-1	J1V1M3	11/13/14	8.81	X	0.010
SOB-2	J1V1M4	11/13/14	8.82	X	0.010
SOB-4	J1V1M6	11/13/14	8.90	X	0.010
SOB-5	J1V1M7	11/13/14	9.11	X	0.010
SOB-6	J1V1M8	11/13/14	8.76	X	0.010
SOB-7	J1V1M9	11/13/14	8.42	X	0.010
SOB-8	J1V1N0	11/13/14	9.05	X	0.010
SOB-9	J1V1N1	11/13/14	9.22	X	0.010
SOB-10	J1V1N2	11/13/14	9.11	X	0.010
SOB-11	J1V1N3	11/13/14	9.00	X	0.010
SOB-12	J1V1N4	11/13/14	9.33	X	0.010
NOB-2	J1V1L1	11/24/14	9.18	JX	0.010
NOB-5	J1V1L4	11/24/1	8.55	JX	0.010

Attachment	1	Sheet No.	16 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
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Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (TCLP Metals).

Sample Location	HEIS Number	Sample Date	Arsenic			Barium			Cadmium			Chromium		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
EXC-13	J1V1J6	11/5/14	0.306		0.050	0.773		0.010	0.010	U	0.010	0.010	U	0.010
Duplicate of J1V1J6	J1V1K8	11/5/14	0.304		0.050	0.586		0.010	0.010	U	0.010	0.010	U	0.010
EXC-5	J1V1H7	11/12/14	0.050	U	0.050	0.397		0.010	0.010	U	0.010	0.010	U	0.010
EXC-11	J1V1J3	11/12/14	0.050	U	0.050	1.43		0.010	0.010	U	0.010	0.010	U	0.010

Sample Location	HEIS Number	Sample Date	Lead			Mercury			Selenium			Silver		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
EXC-13	J1V1J6	11/5/14	0.128		0.033	0.0007	U	0.0007	0.0939	B	0.060	0.010	U	0.010
Duplicate of J1V1J6	J1V1K8	11/5/14	0.116		0.033	0.0007	U	0.0007	0.060	U	0.060	0.010	U	0.010
EXC-5	J1V1H7	11/12/14	0.033	U	0.033	0.0019	B	0.0007	0.060	U	0.060	0.010	U	0.010
EXC-11	J1V1J3	11/12/14	0.033	U	0.033	0.0045		0.0007	0.060	U	0.060	0.010	U	0.010

Attachment	1	Sheet No.	17 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	EXC-3 - J1V1H5			Duplicate of J1V1H5 - J1V1J5			EXC-1 - J1V1H3			EXC-2 - J1V1H4		
		11/12/14			11/12/14			11/12/14			11/12/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	5.92	UD	5.92	5.92	UD	5.92	1.14	U	1.14	1.17	U	1.17
Aroclor-1221	PCB	5.92	UD	5.92	5.92	UD	5.92	1.14	U	1.14	1.17	U	1.17
Aroclor-1232	PCB	5.92	UD	5.92	5.92	UD	5.92	1.14	U	1.14	1.17	U	1.17
Aroclor-1242	PCB	5.92	UD	5.92	5.92	UD	5.92	1.14	U	1.14	1.17	U	1.17
Aroclor-1248	PCB	5.92	UD	5.92	5.92	UD	5.92	1.14	U	1.14	1.17	U	1.17
Aroclor-1254	PCB	39.3	D	5.92	10.0	DJ	5.92	1.14	U	1.14	1.17	U	1.17
Aroclor-1260	PCB	57.3	D	5.92	12.1	DJ	5.92	2.11	J	1.14	19.7		1.17
Aroclor-1262	PCB	5.92	UD	5.92	5.92	UD	5.92	1.14	U	1.14	1.17	U	1.17
Aroclor-1268	PCB	5.92	UD	5.92	5.92	UD	5.92	1.14	U	1.14	1.17	U	1.17

CONSTITUENT	CLASS	EXC-4 - J1V1H6			EXC-5 - J1V1H7			EXC-6 - J1V1H8			EXC-7 - J1V1H9		
		11/12/14			11/12/14			11/12/14			11/12/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	1.16	U	1.16	5.68	UD	5.68	1.18	U	1.18	1.46	U	1.46
Aroclor-1221	PCB	1.16	U	1.16	5.68	UD	5.68	1.18	U	1.18	1.46	U	1.46
Aroclor-1232	PCB	1.16	U	1.16	5.68	UD	5.68	1.18	U	1.18	1.46	U	1.46
Aroclor-1242	PCB	1.16	U	1.16	5.68	UD	5.68	1.18	U	1.18	1.46	U	1.46
Aroclor-1248	PCB	1.16	U	1.16	5.68	UD	5.68	1.18	U	1.18	1.46	U	1.46
Aroclor-1254	PCB	1.16	U	1.16	5.68	UD	5.68	1.18	U	1.18	1.46	U	1.46
Aroclor-1260	PCB	1.16	U	1.16	5.68	UD	5.68	1.18	U	1.18	5.01		1.46
Aroclor-1262	PCB	1.16	U	1.16	5.68	UD	5.68	1.18	U	1.18	1.46	U	1.46
Aroclor-1268	PCB	1.16	U	1.16	5.68	UD	5.68	1.18	U	1.18	1.46	U	1.46

CONSTITUENT	CLASS	EXC-8 - J1V1J0			EXC-9 - J1V1J1			EXC-10 - J1V1J2			EXC-11 - J1V1J3		
		11/12/14			11/12/14			11/12/14			11/12/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	1.24	U	1.24	1.20	U	1.20	1.26	U	1.26	1.19	U	1.19
Aroclor-1221	PCB	1.24	U	1.24	1.20	U	1.20	1.26	U	1.26	1.19	U	1.19
Aroclor-1232	PCB	1.24	U	1.24	1.20	U	1.20	1.26	U	1.26	1.19	U	1.19
Aroclor-1242	PCB	1.24	U	1.24	1.20	U	1.20	1.26	U	1.26	1.19	U	1.19
Aroclor-1248	PCB	1.24	U	1.24	1.20	U	1.20	1.26	U	1.26	1.19	U	1.19
Aroclor-1254	PCB	1.24	U	1.24	1.20	U	1.20	1.26	U	1.26	5.06	P	1.19
Aroclor-1260	PCB	2.31	J	1.24	1.20	U	1.20	1.26	U	1.26	8.37		1.19
Aroclor-1262	PCB	1.24	U	1.24	1.20	U	1.20	1.26	U	1.26	1.19	U	1.19
Aroclor-1268	PCB	1.24	U	1.24	1.20	U	1.20	1.26	U	1.26	1.19	U	1.19

Attachment	1	Sheet No.	18 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	EXC-12 - J1V1J4			EXC-13 - J1V459 [a]			Duplicate of J1V459 - J1V464 [a]			EXC-14 - J1V1J7		
		11/12/14			2/5/15			2/5/15			11/5/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	1.16	U	1.16	2.9	U	2.9	2.9	U	2.9	1.18	U	1.18
Aroclor-1221	PCB	1.16	U	1.16	8.3	U	8.3	8.3	U	8.3	1.18	U	1.18
Aroclor-1232	PCB	1.16	U	1.16	2.1	U	2.1	2.1	U	2.1	1.18	U	1.18
Aroclor-1242	PCB	1.16	U	1.16	4.8	U	4.8	4.8	U	4.8	1.18	U	1.18
Aroclor-1248	PCB	1.16	U	1.16	4.8	U	4.8	4.8	U	4.8	1.18	U	1.18
Aroclor-1254	PCB	1.16	U	1.16	2.7	U	2.7	2.7	U	2.7	1.18	U	1.18
Aroclor-1260	PCB	1.16	U	1.16	2.7	U	2.7	2.7	U	2.7	1.36	J	1.18
Aroclor-1262	PCB	1.16	U	1.16							1.18	U	1.18
Aroclor-1268	PCB	1.16	U	1.16							1.18	U	1.18
Acenaphthene	PAH				10	U	10	10	UN	10	10.6	UD	10.6
Acenaphthylene	PAH				9.4	U	9.4	9.2	U	9.2	10.6	UD	10.6
Anthracene	PAH				3.2	U	3.2	3.1	U	3.1	6.46	DJ	3.55
Benzo(a)anthracene	PAH				3.3	U	3.3	3.2	U	3.2	29.1	D	1.14
Benzo(a)pyrene	PAH				6.7	U	6.7	6.5	U	6.5	21.5	D	1.14
Benzo(b)fluoranthene	PAH				4.4	U	4.4	4.3	U	4.3	24.3	D	1.14
Benzo(ghi)perylene	PAH				7.5	U	7.5	7.3	U	7.3	13.6	D	1.14
Benzo(k)fluoranthene	PAH				4.1	U	4.1	4.0	U	4.0	14.1	DX	0.568
Chrysene	PAH				5.1	U	5.1	4.9	U	4.9	19.8	D	1.14
Dibenz[a,h]anthracene	PAH				11	U	11	11	U	11	1.14	UD	1.14
Fluoranthene	PAH				14	U	14	13	U	13	42.6	D	1.14
Fluorene	PAH				5.5	U	5.5	5.4	UN	5.4	10.6	UD	10.6
Indeno(1,2,3-cd)pyrene	PAH				13	U	13	12	U	12	1.14	UD	1.14
Naphthalene	PAH				13	U	13	12	U	12	10.6	UD	10.6
Phenanthrene	PAH				13	U	13	12	UN	12	26.6	DJ	10.6
Pyrene	PAH				13	U	13	12	U	12	36.2	D	1.14
Aldrin	PEST				0.25	U	0.25	0.25	U	0.25	0.177	UR	0.177
Alpha-BHC	PEST				0.22	U	0.22	0.21	U	0.21	0.177	UR	0.177
alpha-Chlordane	PEST				0.33	U	0.33	0.32	U	0.32	0.177	UR	0.177
beta-BHC	PEST				0.67	U	0.67	0.65	U	0.65	0.177	UR	0.177
Delta-BHC	PEST				0.40	U	0.40	0.39	U	0.39	0.177	UR	0.177
4-4'-DDD	PEST				0.55	U	0.55	0.54	U	0.54	0.355	UR	0.355
4-4'-DDE	PEST				0.24	U	0.24	0.23	U	0.23	0.355	UR	0.355
4-4'-DDT	PEST				0.59	U	0.59	0.58	U	0.58	0.447	J	0.355
Dieldrin	PEST				0.21	U	0.21	0.21	U	0.21	0.355	UR	0.355
Endosulfan I	PEST				0.18	U	0.18	0.17	U	0.17	0.177	UR	0.177
Endosulfan II	PEST				0.29	U	0.29	0.28	U	0.28	0.355	UR	0.355
Endosulfan sulfate	PEST				0.28	U	0.28	0.27	U	0.27	0.355	UR	0.355
Endrin	PEST				0.31	U	0.31	0.30	U	0.30	0.355	UR	0.355
Endrin aldehyde	PEST				0.17	U	0.17	0.17	U	0.17	0.355	UR	0.355
Endrin ketone	PEST				0.49	U	0.49	0.48	U	0.48	0.355	UR	0.355
Gamma-BHC (Lindane)	PEST				0.47	U	0.47	0.46	U	0.46	0.177	UR	0.177
gamma-Chlordane	PEST				0.27	U	0.27	0.26	U	0.26	0.177	UR	0.177
Heptachlor	PEST				0.22	U	0.22	0.21	U	0.21	0.177	UR	0.177
Heptachlor epoxide	PEST				0.43	U	0.43	0.42	U	0.42	0.177	UR	0.177
Methoxychlor	PEST				0.45	U	0.45	0.44	U	0.44	1.77	UR	1.77
Toxaphene	PEST				16	U	16	16	U	16	5.91	UR	5.91

Attachment	1	Sheet No.	19 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	EXC-15 - J1V460 [a]			EXC-16 - J1V1J9			J1V7C8 [b]			EXC-17 - J1V1K0		
		2/5/15			11/5/14			6/2/15			11/5/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.8	U	2.8	1.19	U	1.19				1.20	U	1.20
Aroclor-1221	PCB	8.1	U	8.1	1.19	U	1.19				1.20	U	1.20
Aroclor-1232	PCB	2.0	U	2.0	1.19	U	1.19				1.20	U	1.20
Aroclor-1242	PCB	4.7	U	4.7	1.19	U	1.19				1.20	U	1.20
Aroclor-1248	PCB	4.7	U	4.7	1.19	U	1.19				1.20	U	1.20
Aroclor-1254	PCB	2.6	U	2.6	1.19	U	1.19				1.20	U	1.20
Aroclor-1260	PCB	2.6	U	2.6	1.19	U	1.19				8.77		1.20
Aroclor-1262	PCB				1.19	U	1.19				1.20	U	1.20
Aroclor-1268	PCB				1.19	U	1.19				1.20	U	1.20
Acenaphthene	PAH	10	U	10	5.36	U	5.36				5.44	U	5.44
Acenaphthylene	PAH	9.4	U	9.4	5.36	U	5.36				5.44	U	5.44
Anthracene	PAH	3.2	U	3.2	1.79	U	1.79				12.1	J	1.81
Benzo(a)anthracene	PAH	9.9	JX	3.3	2.78	X	0.572				86.3		0.580
Benzo(a)pyrene	PAH	10	J	6.7	1.42	JX	0.572				75.2		0.580
Benzo(b)fluoranthene	PAH	11	J	4.4	1.64	JX	0.572				72.9		0.580
Benzo(ghi)perylene	PAH	7.5	U	7.5	2.00	X	0.572				48.5		0.580
Benzo(k)fluoranthene	PAH	4.1	U	4.1	0.286	U	0.286				74.7	PX	0.290
Chrysene	PAH	8.0	J	5.0	1.94		0.572				57.6		0.580
Dibenz[a,h]anthracene	PAH	11	U	11	0.572	U	0.572				0.580	U	0.580
Fluoranthene	PAH	17	J	14	5.09	X	0.572				119		0.580
Fluorene	PAH	5.5	U	5.5	5.36	U	5.36				5.44	U	5.44
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	0.572	U	0.572				0.580	U	0.580
Naphthalene	PAH	12	U	12	5.36	U	5.36				5.44	U	5.44
Phenanthrene	PAH	12	U	12	5.36	U	5.36				53.4		5.44
Pyrene	PAH	16	J	12	3.39		0.572				110		0.580
Aldrin	PEST	0.25	U	0.25	0.179	UR	0.179	0.24	U	0.24	0.181	UR	0.181
Alpha-BHC	PEST	0.21	U	0.21	0.179	UR	0.179	0.20	U	0.20	0.181	UR	0.181
alpha-Chlordane	PEST	0.32	U	0.32	0.179	UR	0.179	0.31	U	0.31	0.181	UR	0.181
beta-BHC	PEST	0.66	U	0.66	0.179	UR	0.179	0.63	U	0.63	0.181	UR	0.181
Delta-BHC	PEST	0.40	U	0.40	0.179	UR	0.179	0.38	U	0.38	0.181	UR	0.181
4-4'-DDD	PEST	0.54	U	0.54	0.358	UR	0.358	0.52	U	0.52	0.362	UR	0.362
4-4'-DDE	PEST	0.24	U	0.24	0.358	UR	0.358	0.23	U	0.23	4.35	J	0.362
4-4'-DDT	PEST	0.59	U	0.59	0.358	UR	0.358	0.56	U	0.56	0.362	UR	0.362
Dieldrin	PEST	0.21	U	0.21	0.358	UR	0.358	0.20	U	0.20	0.362	UR	0.362
Endosulfan I	PEST	0.18	U	0.18	0.179	UR	0.179	0.17	U	0.17	0.181	UR	0.181
Endosulfan II	PEST	0.29	U	0.29	0.358	UR	0.358	0.27	U	0.27	0.362	UR	0.362
Endosulfan sulfate	PEST	0.27	U	0.27	0.358	UR	0.358	0.26	U	0.26	0.362	UR	0.362
Endrin	PEST	0.30	U	0.30	0.358	UR	0.358	0.29	U	0.29	0.362	UR	0.362
Endrin aldehyde	PEST	0.17	U	0.17	0.358	UR	0.358	0.16	U	0.16	0.362	UR	0.362
Endrin ketone	PEST	0.49	U	0.49	0.358	UR	0.358	0.47	U	0.47	0.362	UR	0.362
Gamma-BHC (Lindane)	PEST	0.46	U	0.46	0.179	UR	0.179	0.44	U	0.44	0.181	UR	0.181
gamma-Chlordane	PEST	0.26	U	0.26	0.179	UR	0.179	0.25	U	0.25	0.181	UR	0.181
Heptachlor	PEST	0.21	U	0.21	0.179	UR	0.179	0.20	U	0.20	0.181	UR	0.181
Heptachlor epoxide	PEST	0.42	U	0.42	0.179	UR	0.179	0.41	U	0.41	0.181	UR	0.181
Methoxychlor	PEST	0.45	U	0.45	1.79	UR	1.79	0.43	U	0.43	1.81	UR	1.81
Toxaphene	PEST	16	U	16	5.95	UR	5.95	15	U	15	6.03	UR	6.03

Attachment	1	Sheet No.	20 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	EXC-18 - J1V461 [a]			EXC-19 - J1V1K2			EXC-20 - J1V1K3			J1V7C9 [b]		
		3/16/15			11/5/14			11/5/14			6/2/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.9	U	2.9	1.18	U	1.18	1.22	U	1.22			
Aroclor-1221	PCB	8.4	U	8.4	1.18	U	1.18	1.22	U	1.22			
Aroclor-1232	PCB	2.1	U	2.1	1.18	U	1.18	1.22	U	1.22			
Aroclor-1242	PCB	4.9	U	4.9	1.18	U	1.18	1.22	U	1.22			
Aroclor-1248	PCB	4.9	U	4.9	1.18	U	1.18	1.22	U	1.22			
Aroclor-1254	PCB	2.7	U	2.7	1.18	U	1.18	1.22	U	1.22			
Aroclor-1260	PCB	2.7	U	2.7	2.63	J	1.18	1.22	U	1.22			
Aroclor-1262	PCB				1.18	U	1.18	1.22	U	1.22			
Aroclor-1268	PCB				1.18	U	1.18	1.22	U	1.22			
Acenaphthene	PAH	11	U	11	10.6	UD	10.6	5.49	U	5.49			
Acenaphthylene	PAH	9.5	U	9.5	10.6	UD	10.6	5.49	U	5.49			
Anthracene	PAH	3.2	U	3.2	15.2	DJ	3.54	1.83	U	1.83			
Benzo(a)anthracene	PAH	3.4	U	3.4	128	D	1.13	2.09		0.585			
Benzo(a)pyrene	PAH	6.8	U	6.8	107	D	1.13	1.94		0.585			
Benzo(b)fluoranthene	PAH	4.4	U	4.4	119	D	1.13	2.78	X	0.585			
Benzo(ghi)perylene	PAH	7.6	U	7.6	78.1	D	1.13	1.58	J	0.585			
Benzo(k)fluoranthene	PAH	4.2	U	4.2	89.6	DX	0.566	2.41	PX	0.293			
Chrysene	PAH	5.1	U	5.1	88.8	D	1.13	1.57	J	0.585			
Dibenz[a,h]anthracene	PAH	12	U	12	1.13	UD	1.13	0.585	U	0.585			
Fluoranthene	PAH	14	U	14	146	D	1.13	0.585	U	0.585			
Fluorene	PAH	5.6	U	5.6	10.6	UD	10.6	5.49	U	5.49			
Indeno(1,2,3-cd)pyrene	PAH	13	U	13	1.13	UD	1.13	0.585	U	0.585			
Naphthalene	PAH	13	U	13	10.6	UD	10.6	5.49	U	5.49			
Phenanthrene	PAH	13	U	13	61.8	D	10.6	5.49	U	5.49			
Pyrene	PAH	13	U	13	147	D	1.13	2.49		0.585			
Aldrin	PEST	0.27	U	0.27	0.177	UR	0.177	0.183	UR	0.183	0.24	U	0.24
Alpha-BHC	PEST	0.23	U	0.23	0.177	UR	0.177	0.183	UR	0.183	0.21	U	0.21
alpha-Chlordane	PEST	0.35	U	0.35	0.177	UR	0.177	0.183	UR	0.183	0.32	U	0.32
beta-BHC	PEST	0.72	U	0.72	0.177	UR	0.177	0.183	UR	0.183	0.65	U	0.65
Delta-BHC	PEST	0.43	U	0.43	0.177	UR	0.177	0.183	UR	0.183	0.39	U	0.39
4-4'-DDD	PEST	0.59	U	0.59	0.354	UR	0.354	0.366	UR	0.366	0.53	U	0.53
4-4'-DDE	PEST	0.26	U	0.26	0.608	J	0.354	0.366	UR	0.366	0.23	U	0.23
4-4'-DDT	PEST	0.64	U	0.64	0.354	UR	0.354	0.366	UR	0.366	0.58	U	0.58
Dieldrin	PEST	0.23	U	0.23	0.354	UR	0.354	0.366	UR	0.366	0.20	U	0.20
Endosulfan I	PEST	0.19	U	0.19	0.177	UR	0.177	0.183	UR	0.183	0.17	U	0.17
Endosulfan II	PEST	0.31	U	0.31	0.354	UR	0.354	0.366	UR	0.366	0.28	U	0.28
Endosulfan sulfate	PEST	0.30	U	0.30	0.354	UR	0.354	0.366	UR	0.366	0.27	U	0.27
Endrin	PEST	0.33	U	0.33	0.354	UR	0.354	0.366	UR	0.366	0.30	U	0.30
Endrin aldehyde	PEST	0.18	U	0.18	0.354	UR	0.354	0.366	UR	0.366	0.17	U	0.17
Endrin ketone	PEST	0.53	U	0.53	0.354	UR	0.354	0.366	UR	0.366	0.48	U	0.48
Gamma-BHC (Lindane)	PEST	0.50	U	0.50	0.177	UR	0.177	0.183	UR	0.183	0.45	U	0.45
gamma-Chlordane	PEST	0.29	U	0.29	0.177	UR	0.177	0.183	UR	0.183	0.26	U	0.26
Heptachlor	PEST	0.23	U	0.23	0.177	UR	0.177	0.183	UR	0.183	0.21	U	0.21
Heptachlor epoxide	PEST	0.46	U	0.46	0.177	UR	0.177	0.183	UR	0.183	0.42	U	0.42
Methoxychlor	PEST	0.49	U	0.49	1.77	UR	1.77	1.83	UR	1.83	0.44	U	0.44
Toxaphene	PEST	17	U	17	5.89	UR	5.89	6.10	UR	6.10	15	U	15

Attachment	1	Sheet No.	21 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	EXC-21 - J1V462 [a]			EXC-22 - J1V463 [a]			EXC-23 - J1V1K6			J1V7D0 [b]		
		2/5/15			3/5/15			11/5/14			6/2/15		
		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	1.13	U	1.13			
Aroclor-1221	PCB	8.1	U	8.1	8.0	U	8.0	1.13	U	1.13			
Aroclor-1232	PCB	2.0	U	2.0	2.0	U	2.0	1.13	U	1.13			
Aroclor-1242	PCB	4.7	U	4.7	4.6	U	4.6	1.13	U	1.13			
Aroclor-1248	PCB	4.7	U	4.7	4.6	U	4.6	1.13	U	1.13			
Aroclor-1254	PCB	2.6	U	2.6	2.6	U	2.6	1.13	U	1.13			
Aroclor-1260	PCB	2.6	U	2.6	2.6	U	2.6	1.13	U	1.13			
Aroclor-1262	PCB							1.13	U	1.13			
Aroclor-1268	PCB							1.13	U	1.13			
Acenaphthene	PAH	22	J	9.7	10	U	10	5.10	U	5.10			
Acenaphthylene	PAH	8.8	U	8.8	9.3	U	9.3	5.10	U	5.10			
Anthracene	PAH	3.0	U	3.0	3.1	U	3.1	19.7		1.70			
Benzo(a)anthracene	PAH	62	X	3.1	3.3	U	3.3	57.9		0.544			
Benzo(a)pyrene	PAH	55		6.2	6.6	U	6.6	49.0		0.544			
Benzo(b)fluoranthene	PAH	63		4.1	4.3	U	4.3	69.8		0.544			
Benzo(ghi)perylene	PAH	38		7.0	7.4	U	7.4	31.9		0.544			
Benzo(k)fluoranthene	PAH	24		3.8	4.1	U	4.1	37.9	X	0.272			
Chrysene	PAH	57	X	4.7	5.0	U	5.0	36.9		0.544			
Dibenz[a,h]anthracene	PAH	18	J	11	11	U	11	0.544	U	0.544			
Fluoranthene	PAH	110		13	13	U	13	85.5		0.544			
Fluorene	PAH	19	J	5.1	5.4	U	5.4	8.52	JP	5.10			
Indeno(1,2,3-cd)pyrene	PAH	26	JX	12	12	U	12	0.544	U	0.544			
Naphthalene	PAH	12	U	12	12	U	12	5.10	U	5.10			
Phenanthrene	PAH	81		12	12	U	12	59.9		5.10			
Pyrene	PAH	120		12	12	U	12	74.8		0.544			
Aldrin	PEST	0.26	U	0.26	0.25	U	0.25	0.17	UR	0.17	0.24	U	0.24
Alpha-BHC	PEST	0.22	U	0.22	0.21	U	0.21	0.17	UR	0.17	0.20	U	0.20
alpha-Chlordane	PEST	0.34	U	0.34	0.32	U	0.32	0.17	UR	0.17	0.31	U	0.31
beta-BHC	PEST	0.69	U	0.69	0.65	U	0.65	0.17	UR	0.17	0.63	U	0.63
Delta-BHC	PEST	0.42	U	0.42	0.39	U	0.39	0.17	UR	0.17	0.38	U	0.38
4-4'-DDD	PEST	0.57	U	0.57	0.54	U	0.54	0.34	UR	0.34	0.52	U	0.52
4-4'-DDE	PEST	0.25	U	0.25	0.23	U	0.23	0.34	UR	0.34	0.23	U	0.23
4-4'-DDT	PEST	0.62	U	0.62	0.58	U	0.58	0.34	UR	0.34	0.56	U	0.56
Dieldrin	PEST	0.22	U	0.22	0.21	U	0.21	0.34	UR	0.34	0.20	U	0.20
Endosulfan I	PEST	0.18	U	0.18	0.17	U	0.17	0.17	UR	0.17	0.17	U	0.17
Endosulfan II	PEST	0.30	U	0.30	0.28	U	0.28	0.34	UR	0.34	0.27	U	0.27
Endosulfan sulfate	PEST	0.29	U	0.29	0.27	U	0.27	0.34	UR	0.34	0.26	U	0.26
Endrin	PEST	0.32	U	0.32	0.30	U	0.30	0.34	UR	0.34	0.29	U	0.29
Endrin aldehyde	PEST	0.18	U	0.18	0.17	U	0.17	0.34	UR	0.34	0.16	U	0.16
Endrin ketone	PEST	0.51	U	0.51	0.48	U	0.48	0.34	UR	0.34	0.47	U	0.47
Gamma-BHC (Lindane)	PEST	0.48	U	0.48	0.46	U	0.46	0.17	UR	0.17	0.44	U	0.44
gamma-Chlordane	PEST	0.28	U	0.28	0.26	U	0.26	0.17	UR	0.17	0.25	U	0.25
Heptachlor	PEST	0.22	U	0.22	0.21	U	0.21	0.17	UR	0.17	0.20	U	0.20
Heptachlor epoxide	PEST	0.44	U	0.44	0.42	U	0.42	0.17	UR	0.17	0.41	U	0.41
Methoxychlor	PEST	0.47	U	0.47	0.44	U	0.44	1.70	UR	1.70	0.43	U	0.43
Toxaphene	PEST	16	U	16	16	U	16	5.67	UR	5.67	15	U	15

Attachment	1	Sheet No.	22 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	EXC-24 - J1V1K7			J1V7D1[b]			NOB-9 - J1V1L8			Duplicate of J1V1L8 - J1V1M2		
		11/5/14			6/2/15			11/20/14			11/20/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	1.15	U	1.15				1.15	U	1.15	1.15	U	1.15
Aroclor-1221	PCB	1.15	U	1.15				1.15	U	1.15	1.15	U	1.15
Aroclor-1232	PCB	1.15	U	1.15				1.15	U	1.15	1.15	U	1.15
Aroclor-1242	PCB	1.15	U	1.15				1.15	U	1.15	1.15	U	1.15
Aroclor-1248	PCB	1.15	U	1.15				1.15	U	1.15	1.15	U	1.15
Aroclor-1254	PCB	1.15	U	1.15				1.15	U	1.15	1.15	U	1.15
Aroclor-1260	PCB	1.15	U	1.15				1.15	U	1.15	1.15	U	1.15
Aroclor-1262	PCB	1.15	U	1.15				1.15	U	1.15	1.15	U	1.15
Aroclor-1268	PCB	1.15	U	1.15				1.15	U	1.15	1.15	U	1.15
Acenaphthene	PAH	5.16	U	5.16				5.18	U	5.18	5.16	U	5.16
Acenaphthylene	PAH	5.16	U	5.16				5.18	U	5.18	5.16	U	5.16
Anthracene	PAH	4.37	J	1.72				1.73	U	1.73	2.56	J	1.72
Benzo(a)anthracene	PAH	22.2		0.551				8.96		0.552	14.3		0.550
Benzo(a)pyrene	PAH	19.8		0.551				7.68		0.552	12.3		0.550
Benzo(b)fluoranthene	PAH	30.1		0.551				8.83		0.552	14.4		0.550
Benzo(ghi)perylene	PAH	12.7		0.551				0.552	U	0.552	8.08		0.550
Benzo(k)fluoranthene	PAH	14.8	X	0.275				0.276	U	0.276	0.275	U	0.275
Chrysene	PAH	13.8		0.551				6.51		0.552	10.3		0.550
Dibenz[a,h]anthracene	PAH	0.551	U	0.551				0.552	U	0.552	0.550	U	0.550
Fluoranthene	PAH	31.2		0.551				11.8		0.552	20.5		0.550
Fluorene	PAH	5.16	U	5.16				5.18	U	5.18	5.16	U	5.16
Indeno(1,2,3-cd)pyrene	PAH	0.551	U	0.551				0.552	U	0.552	0.550	U	0.550
Naphthalene	PAH	5.16	U	5.16				5.18	U	5.18	5.16	U	5.16
Phenanthrene	PAH	17.7		5.16				7.11	J	5.18	10.6	J	5.16
Pyrene	PAH	27.3		0.551				12.4		0.552	18.6		0.550
Aldrin	PEST	0.172	UR	0.172	0.24	U	0.24	0.172	U	0.172	0.172	U	0.172
Alpha-BHC	PEST	0.172	UR	0.172	0.21	U	0.21	0.172	U	0.172	0.172	U	0.172
alpha-Chlordane	PEST	0.172	UR	0.172	0.31	U	0.31	0.172	U	0.172	0.172	U	0.172
beta-BHC	PEST	0.172	UR	0.172	0.65	U	0.65	0.172	U	0.172	0.172	U	0.172
Delta-BHC	PEST	0.172	UR	0.172	0.39	U	0.39	0.172	U	0.172	0.172	U	0.172
4-4'-DDD	PEST	0.344	UR	0.344	0.53	U	0.53	0.345	U	0.345	0.344	U	0.344
4-4'-DDE	PEST	0.344	UR	0.344	0.23	U	0.23	0.345	U	0.345	0.344	U	0.344
4-4'-DDT	PEST	0.344	UR	0.344	0.57	U	0.57	0.345	U	0.345	0.344	U	0.344
Dieldrin	PEST	0.344	UR	0.344	0.20	U	0.20	0.345	U	0.345	0.344	U	0.344
Endosulfan I	PEST	0.172	UR	0.172	0.17	U	0.17	0.172	U	0.172	0.172	U	0.172
Endosulfan II	PEST	0.344	UR	0.344	0.28	U	0.28	0.345	U	0.345	0.344	U	0.344
Endosulfan sulfate	PEST	0.344	UR	0.344	0.27	U	0.27	0.345	U	0.345	0.344	U	0.344
Endrin	PEST	0.344	UR	0.344	0.30	U	0.30	0.345	U	0.345	0.344	U	0.344
Endrin aldehyde	PEST	0.344	UR	0.344	0.17	U	0.17	0.345	U	0.345	0.344	U	0.344
Endrin ketone	PEST	0.344	UR	0.344	0.48	U	0.48	0.345	U	0.345	0.344	U	0.344
Gamma-BHC (Lindane)	PEST	0.172	UR	0.172	0.45	U	0.45	0.172	U	0.172	0.172	U	0.172
gamma-Chlordane	PEST	0.172	UR	0.172	0.26	U	0.26	0.172	U	0.172	0.172	U	0.172
Heptachlor	PEST	0.172	UR	0.172	0.21	U	0.21	0.172	U	0.172	0.172	U	0.172
Heptachlor epoxide	PEST	0.172	UR	0.172	0.41	U	0.41	0.172	U	0.172	0.172	U	0.172
Methoxychlor	PEST	1.72	UR	1.72	0.44	U	0.44	1.72	U	1.72	1.72	U	1.72
Toxaphene	PEST	5.73	UR	5.73	15	U	15	5.74	U	5.74	5.73	U	5.73

Attachment	1	Sheet No.	23 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	NOB-1 - J1V1L0			NOB-2 - J1V596 [a]			NOB-3 - J1V1L2			NOB-4 - J1V1L3		
		11/24/14			3/18/15			11/20/14			11/20/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	1.18	U	1.18	2.8	U	2.8	1.14	U	1.14	1.13	U	1.13
Aroclor-1221	PCB	1.18	U	1.18	8.2	U	8.2	1.14	U	1.14	1.13	U	1.13
Aroclor-1232	PCB	1.18	U	1.18	2.1	U	2.1	1.14	U	1.14	1.13	U	1.13
Aroclor-1242	PCB	1.18	U	1.18	4.8	U	4.8	1.14	U	1.14	1.13	U	1.13
Aroclor-1248	PCB	1.18	U	1.18	4.8	U	4.8	1.14	U	1.14	1.13	U	1.13
Aroclor-1254	PCB	1.18	U	1.18	2.7	U	2.7	1.14	U	1.14	1.13	U	1.13
Aroclor-1260	PCB	8.01		1.18	2.7	U	2.7	1.14	U	1.14	1.13	U	1.13
Aroclor-1262	PCB	1.18	U	1.18				1.14	U	1.14	1.13	U	1.13
Aroclor-1268	PCB	1.18	U	1.18				1.14	U	1.14	1.13	U	1.13
Acenaphthene	PAH	14.4	J	5.34	9.8	UN	9.8	5.12	U	5.12	5.08	U	5.08
Acenaphthylene	PAH	5.34	U	5.34	8.9	U	8.9	5.12	U	5.12	5.08	U	5.08
Anthracene	PAH	23.3		1.78	3.0	UN	3.0	1.71	U	1.71	1.69	U	1.69
Benzo(a)anthracene	PAH	58.7		0.570	20	XN	3.1	14.7		0.546	2.63		0.541
Benzo(a)pyrene	PAH	50.6		0.570	24		6.3	11.7		0.546	2.14		0.541
Benzo(b)fluoranthene	PAH	56.7		0.570	31		4.1	10.4		0.546	1.92		0.541
Benzo(ghi)perylene	PAH	30.5		0.570	25	J	7.1	7.93		0.546	1.53	J	0.541
Benzo(k)fluoranthene	PAH	0.285	U	0.285	11	JN	3.9	0.273	U	0.273	0.271	U	0.271
Chrysene	PAH	41.6		0.570	27	JN	4.8	13.4		0.546	3.12	P	0.541
Dibenz[a,h]anthracene	PAH	0.570	U	0.570	11	UN	11	0.546	U	0.546	0.541	U	0.541
Fluoranthene	PAH	87.1		0.570	51	N	13	21.8		0.546	4.25		0.541
Fluorene	PAH	11.2	J	5.34	5.2	UN	5.2	5.12	U	5.12	5.08	U	5.08
Indeno(1,2,3-cd)pyrene	PAH	0.57	U	0.570	21	JXN	12	0.546	U	0.546	0.541	U	0.541
Naphthalene	PAH	5.34	U	5.34	12	U	12	5.12	U	5.12	5.08	U	5.08
Phenanthrene	PAH	75.1		5.34	26	JN	12	17.1		5.12	5.08	U	5.08
Pyrene	PAH	81.5		0.570	60		12	29.4		0.546	4.54		0.541
Aldrin	PEST	0.178	U	0.178	0.26	U	0.26	0.171	U	0.171	0.169	U	0.169
Alpha-BHC	PEST	0.178	U	0.178	0.22	U	0.22	0.171	U	0.171	0.169	U	0.169
alpha-Chlordane	PEST	0.178	U	0.178	0.33	U	0.33	0.171	U	0.171	0.169	U	0.169
beta-BHC	PEST	0.178	U	0.178	0.68	U	0.68	0.171	U	0.171	0.169	U	0.169
Delta-BHC	PEST	0.178	U	0.178	0.41	U	0.41	0.171	U	0.171	0.169	U	0.169
4-4'-DDD	PEST	0.357	U	0.357	0.56	U	0.56	0.342	U	0.342	0.338	U	0.338
4-4'-DDE	PEST	0.357	U	0.357	0.24	U	0.24	0.342	U	0.342	0.338	U	0.338
4-4'-DDT	PEST	0.357	U	0.357	0.60	U	0.60	0.342	U	0.342	0.338	U	0.338
Dieldrin	PEST	0.357	U	0.357	0.21	U	0.21	0.342	U	0.342	0.338	U	0.338
Endosulfan I	PEST	0.178	U	0.178	0.18	U	0.18	0.171	U	0.171	0.169	U	0.169
Endosulfan II	PEST	0.357	U	0.357	0.29	U	0.29	0.342	U	0.342	0.338	U	0.338
Endosulfan sulfate	PEST	0.357	U	0.357	0.28	U	0.28	0.342	U	0.342	0.338	U	0.338
Endrin	PEST	0.357	U	0.357	0.31	U	0.31	0.342	U	0.342	0.338	U	0.338
Endrin aldehyde	PEST	0.357	U	0.357	0.17	U	0.17	0.342	U	0.342	0.338	U	0.338
Endrin ketone	PEST	0.357	U	0.357	0.50	U	0.50	0.342	U	0.342	0.338	U	0.338
Gamma-BHC (Lindane)	PEST	0.178	U	0.178	0.47	U	0.47	0.171	U	0.171	0.169	U	0.169
gamma-Chlordane	PEST	0.178	U	0.178	0.27	U	0.27	0.171	U	0.171	0.169	U	0.169
Heptachlor	PEST	0.178	U	0.178	0.22	U	0.22	0.171	U	0.171	0.169	U	0.169
Heptachlor epoxide	PEST	0.178	U	0.178	0.44	U	0.44	0.171	U	0.171	0.169	U	0.169
Methoxychlor	PEST	1.78	U	1.78	0.46	U	0.46	1.71	U	1.71	1.69	U	1.69
Toxaphene	PEST	5.94	U	5.94	16	U	16	5.69	U	5.69	5.63	U	5.63

Attachment	1	Sheet No.	24 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	NOB-5 - J1V597 [a]			NOB-6 - J1V1L5			NOB-7 - J1V1L6			NOB-8 - J1V1L7		
		3/18/15			11/24/14			11/24/14			11/24/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.7	U	2.7	1.17	U	1.17	1.16	U	1.16	1.21	U	1.21
Aroclor-1221	PCB	7.9	U	7.9	1.17	U	1.17	1.16	U	1.16	1.21	U	1.21
Aroclor-1232	PCB	2.0	U	2.0	1.17	U	1.17	1.16	U	1.16	1.21	U	1.21
Aroclor-1242	PCB	4.6	U	4.6	1.17	U	1.17	1.16	U	1.16	1.21	U	1.21
Aroclor-1248	PCB	4.6	U	4.6	1.17	U	1.17	1.16	U	1.16	1.21	U	1.21
Aroclor-1254	PCB	2.6	U	2.6	1.17	U	1.17	1.16	U	1.16	1.21	U	1.21
Aroclor-1260	PCB	2.6	U	2.6	1.17	U	1.17	1.16	U	1.16	1.21	U	1.21
Aroclor-1262	PCB				1.17	U	1.17	1.16	U	1.16	1.21	U	1.21
Aroclor-1268	PCB				1.17	U	1.17	1.16	U	1.16	1.21	U	1.21
Acenaphthene	PAH	10	U	10	5.27	U	5.27	5.25	U	5.25	5.45	U	5.45
Acenaphthylene	PAH	9.1	U	9.1	5.27	U	5.27	5.25	U	5.25	5.45	U	5.45
Anthracene	PAH	3.1	U	3.1	1.76	U	1.76	1.75	U	1.75	1.82	U	1.82
Benzo(a)anthracene	PAH	15	X	3.2	6.13		0.562	3.76		0.560	5.73		0.581
Benzo(a)pyrene	PAH	15		6.5	5.48		0.562	3.37		0.560	4.64		0.581
Benzo(b)fluoranthene	PAH	17		4.2	5.13		0.562	3.69		0.560	5.45		0.581
Benzo(ghi)perylene	PAH	11	JX	7.3	4.62		0.562	2.66		0.560	3.50		0.581
Benzo(k)fluoranthene	PAH	5.9	J	4.0	0.281	U	0.281	0.280	U	0.280	0.290	U	0.290
Chrysene	PAH	15	JX	4.9	6.05		0.562	3.38		0.560	4.38		0.581
Dibenz[a,h]anthracene	PAH	11	U	11	0.562	U	0.562	0.560	U	0.560	0.581	U	0.581
Fluoranthene	PAH	29	J	13	9.28		0.562	5.94		0.560	7.73		0.581
Fluorene	PAH	5.3	U	5.3	5.27	U	5.27	5.25	U	5.25	5.45	U	5.45
Indeno(1,2,3-cd)pyrene	PAH	15	J	12	0.562	U	0.562	0.560	U	0.560	0.581	U	0.581
Naphthalene	PAH	12	U	12	5.27	U	5.27	5.25	U	5.25	5.45	U	5.45
Phenanthrene	PAH	14	J	12	6.15	J	5.27	5.25	U	5.25	5.45	U	5.45
Pyrene	PAH	36	J	12	10.4		0.562	5.02		0.56	6.59		0.581
Aldrin	PEST	0.26	U	0.26	0.176	U	0.176	0.175	U	0.175	0.182	U	0.182
Alpha-BHC	PEST	0.22	U	0.22	0.176	U	0.176	0.175	U	0.175	0.182	U	0.182
alpha-Chlordane	PEST	0.33	U	0.33	0.176	U	0.176	0.175	U	0.175	0.182	U	0.182
beta-BHC	PEST	0.69	U	0.69	0.176	U	0.176	0.175	U	0.175	0.182	U	0.182
Delta-BHC	PEST	0.42	U	0.42	0.176	U	0.176	0.175	U	0.175	0.182	U	0.182
4-4'-DDD	PEST	0.57	U	0.57	0.352	U	0.352	0.350	U	0.350	0.363	U	0.363
4-4'-DDE	PEST	0.25	U	0.25	0.352	U	0.352	0.350	U	0.350	0.363	U	0.363
4-4'-DDT	PEST	0.61	U	0.61	0.352	U	0.352	0.350	U	0.350	0.363	U	0.363
Dieldrin	PEST	0.22	U	0.22	0.352	U	0.352	0.350	U	0.350	0.363	U	0.363
Endosulfan I	PEST	0.18	U	0.18	0.176	U	0.176	0.175	U	0.175	0.182	U	0.182
Endosulfan II	PEST	0.30	U	0.30	0.352	U	0.352	0.350	U	0.350	0.363	U	0.363
Endosulfan sulfate	PEST	0.29	U	0.29	0.352	U	0.352	0.350	U	0.350	0.363	U	0.363
Endrin	PEST	0.32	U	0.32	0.352	U	0.352	0.350	U	0.350	0.363	U	0.363
Endrin aldehyde	PEST	0.18	U	0.18	0.352	U	0.352	0.350	U	0.350	0.363	U	0.363
Endrin ketone	PEST	0.51	U	0.51	0.352	U	0.352	0.350	U	0.350	0.363	U	0.363
Gamma-BHC (Lindane)	PEST	0.48	U	0.48	0.176	U	0.176	0.175	U	0.175	0.182	U	0.182
gamma-Chlordane	PEST	0.28	U	0.28	0.176	U	0.176	0.175	U	0.175	0.182	U	0.182
Heptachlor	PEST	0.22	U	0.22	0.176	U	0.176	0.175	U	0.175	0.182	U	0.182
Heptachlor epoxide	PEST	0.44	U	0.44	0.176	U	0.176	0.175	U	0.175	0.182	U	0.182
Methoxychlor	PEST	0.47	U	0.47	1.76	U	1.76	1.75	U	1.75	1.82	U	1.82
Toxaphene	PEST	16	U	16	5.86	U	5.86	5.82	U	5.82	6.04	U	6.04

Attachment	1	Sheet No.	25 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	NOB-10 - J1V1L9			NOB-11 - J1V1M0			NOB-12 - J1V1M1			SOB-3 - J1V1M5		
		11/20/14			11/24/14			11/20/14			11/13/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	1.16	U	1.16	1.17	U	1.17	1.14	U	1.14	1.13	U	1.13
Aroclor-1221	PCB	1.16	U	1.16	1.17	U	1.17	1.14	U	1.14	1.13	U	1.13
Aroclor-1232	PCB	1.16	U	1.16	1.17	U	1.17	1.14	U	1.14	1.13	U	1.13
Aroclor-1242	PCB	1.16	U	1.16	1.17	U	1.17	1.14	U	1.14	1.13	U	1.13
Aroclor-1248	PCB	1.16	U	1.16	1.17	U	1.17	1.14	U	1.14	1.13	U	1.13
Aroclor-1254	PCB	1.16	U	1.16	1.17	U	1.17	1.14	U	1.14	1.13	U	1.13
Aroclor-1260	PCB	13.2		1.16	1.17	U	1.17	1.14	U	1.14	1.13	U	1.13
Aroclor-1262	PCB	1.16	U	1.16	1.17	U	1.17	1.14	U	1.14	1.13	U	1.13
Aroclor-1268	PCB	1.16	U	1.16	1.17	U	1.17	1.14	U	1.14	1.13	U	1.13
Acenaphthene	PAH	5.20	U	5.20	5.28	U	5.28	5.14	U	5.14	5.09	U	5.09
Acenaphthylene	PAH	5.20	U	5.20	5.28	U	5.28	5.14	U	5.14	5.09	U	5.09
Anthracene	PAH	5.36	J	1.73	4.23	J	1.76	1.71	U	1.71	1.70	U	1.70
Benzo(a)anthracene	PAH	21.5		0.555	22.5		0.563	5.34		0.549	0.543	U	0.543
Benzo(a)pyrene	PAH	19.0		0.555	19.8		0.563	5.34		0.549	0.629	J	0.543
Benzo(b)fluoranthene	PAH	21.4		0.555	24.6		0.563	5.87		0.549	0.543	U	0.543
Benzo(ghi)perylene	PAH	11.1		0.555	13.4		0.563	4.20		0.549	0.543	U	0.543
Benzo(k)fluoranthene	PAH	12.0		0.278	0.281	U	0.281	0.274	U	0.274	0.272	U	0.272
Chrysene	PAH	17.7		0.555	15.0		0.563	4.84		0.549	0.543	U	0.543
Dibenz[a,h]anthracene	PAH	0.555	U	0.555	0.563	U	0.563	0.549	U	0.549	0.543	U	0.543
Fluoranthene	PAH	32.8		0.555	30.1		0.563	7.48		0.549	0.543	U	0.543
Fluorene	PAH	5.20	U	5.20	5.28	U	5.28	5.14	U	5.14	5.09	U	5.09
Indeno(1,2,3-cd)pyrene	PAH	0.555	U	0.555	0.563	U	0.563	0.549	U	0.549	0.543	U	0.543
Naphthalene	PAH	5.20	U	5.20	5.28	U	5.28	5.14	U	5.14	5.09	U	5.09
Phenanthrene	PAH	25.4		5.20	16.3	J	5.28	5.14	U	5.14	5.09	U	5.09
Pyrene	PAH	31.3		0.555	26.7		0.563	7.88		0.549	1.03	J	0.543
Aldrin	PEST	0.174	U	0.174	0.176	U	0.176	0.171	U	0.171	0.170	U	0.170
Alpha-BHC	PEST	0.174	U	0.174	0.176	U	0.176	0.171	U	0.171	0.170	U	0.170
alpha-Chlordane	PEST	0.174	U	0.174	0.176	U	0.176	0.171	U	0.171	0.170	U	0.170
beta-BHC	PEST	0.174	U	0.174	0.176	U	0.176	0.171	U	0.171	0.170	U	0.170
Delta-BHC	PEST	0.174	U	0.174	0.176	U	0.176	0.171	U	0.171	0.170	U	0.170
4-4'-DDD	PEST	0.347	U	0.347	0.351	U	0.351	0.343	U	0.343	0.340	U	0.340
4-4'-DDE	PEST	0.347	U	0.347	0.351	U	0.351	0.343	U	0.343	0.340	U	0.340
4-4'-DDT	PEST	0.781	J	0.347	0.351	U	0.351	0.343	U	0.343	0.340	U	0.340
Dieldrin	PEST	0.347	U	0.347	0.351	U	0.351	0.343	U	0.343	0.340	U	0.340
Endosulfan I	PEST	0.174	U	0.174	0.176	U	0.176	0.171	U	0.171	0.170	U	0.170
Endosulfan II	PEST	0.347	U	0.347	0.351	U	0.351	0.343	U	0.343	0.340	U	0.340
Endosulfan sulfate	PEST	0.347	U	0.347	0.351	U	0.351	0.343	U	0.343	0.340	U	0.340
Endrin	PEST	0.347	U	0.347	0.351	U	0.351	0.343	U	0.343	0.340	U	0.340
Endrin aldehyde	PEST	0.347	U	0.347	0.351	U	0.351	0.343	U	0.343	0.340	U	0.340
Endrin ketone	PEST	0.347	U	0.347	0.351	U	0.351	0.343	U	0.343	0.340	U	0.340
Gamma-BHC (Lindane)	PEST	0.174	U	0.174	0.176	U	0.176	0.171	U	0.171	0.170	U	0.170
gamma-Chlordane	PEST	0.174	U	0.174	0.176	U	0.176	0.171	U	0.171	0.170	U	0.170
Heptachlor	PEST	0.174	U	0.174	0.176	U	0.176	0.171	U	0.171	0.170	U	0.170
Heptachlor epoxide	PEST	0.174	U	0.174	0.176	U	0.176	0.171	U	0.171	0.170	U	0.170
Methoxychlor	PEST	1.74	U	1.74	1.76	U	1.76	1.71	U	1.71	1.70	U	1.70
Toxaphene	PEST	5.78	U	5.78	5.85	U	5.85	5.7	U	5.7	5.67	U	5.67

Attachment	1	Sheet No.	26 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	Duplicate of J1V1M5 - J1V1N5			SOB-1 - J1V1M3			SOB-2 - J1V1M4			SOB-4 - J1V1M6		
		11/13/14			11/13/14			11/13/14			11/13/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	1.13	U	1.13	1.13	U	1.13	1.14	U	1.14	1.14	U	1.14
Aroclor-1221	PCB	1.13	U	1.13	1.13	U	1.13	1.14	U	1.14	1.14	U	1.14
Aroclor-1232	PCB	1.13	U	1.13	1.13	U	1.13	1.14	U	1.14	1.14	U	1.14
Aroclor-1242	PCB	1.13	U	1.13	1.13	U	1.13	1.14	U	1.14	1.14	U	1.14
Aroclor-1248	PCB	1.13	U	1.13	1.13	U	1.13	1.14	U	1.14	1.14	U	1.14
Aroclor-1254	PCB	1.13	U	1.13	1.13	U	1.13	1.14	U	1.14	1.14	U	1.14
Aroclor-1260	PCB	1.13	U	1.13	1.13	U	1.13	1.14	U	1.14	1.14	U	1.14
Aroclor-1262	PCB	1.13	U	1.13	1.13	U	1.13	1.14	U	1.14	1.14	U	1.14
Aroclor-1268	PCB	1.13	U	1.13	1.13	U	1.13	1.14	U	1.14	1.14	U	1.14
Acenaphthene	PAH	5.10	U	5.10	5.09	U	5.09	5.14	U	5.14	5.15	U	5.15
Acenaphthylene	PAH	5.10	U	5.10	5.09	U	5.09	5.14	U	5.14	5.15	U	5.15
Anthracene	PAH	1.70	U	1.70	1.70	U	1.70	1.71	U	1.71	1.72	U	1.72
Benzo(a)anthracene	PAH	0.544	U	0.544	0.543	U	0.543	0.548	U	0.548	7.55		0.549
Benzo(a)pyrene	PAH	0.544	U	0.544	0.543	U	0.543	1.55	J	0.548	6.21		0.549
Benzo(b)fluoranthene	PAH	0.544	U	0.544	0.543	U	0.543	2.98		0.548	7.04		0.549
Benzo(ghi)perylene	PAH	0.544	U	0.544	0.543	U	0.543	4.55		0.548	4.14		0.549
Benzo(k)fluoranthene	PAH	0.272	U	0.272	0.272	U	0.272	0.274	U	0.274	4.63		0.275
Chrysene	PAH	0.544	U	0.544	0.543	U	0.543	1.53	J	0.548	5.78		0.549
Dibenz[a,h]anthracene	PAH	0.544	U	0.544	0.543	U	0.543	0.548	U	0.548	0.549	U	0.549
Fluoranthene	PAH	0.544	U	0.544	0.543	U	0.543	0.548	U	0.548	9.80		0.549
Fluorene	PAH	5.10	U	5.10	5.09	U	5.09	5.14	U	5.14	5.15	U	5.15
Indeno(1,2,3-cd)pyrene	PAH	0.544	U	0.544	0.543	U	0.543	0.548	U	0.548	0.549	U	0.549
Naphthalene	PAH	5.10	U	5.10	5.09	U	5.09	5.14	U	5.14	5.15	U	5.15
Phenanthrene	PAH	5.10	U	5.10	5.09	U	5.09	5.14	U	5.14	5.15	U	5.15
Pyrene	PAH	0.544	U	0.544	0.543	U	0.543	1.27	J	0.548	9.48		0.549
Aldrin	PEST	0.170	U	0.170	0.170	U	0.170	0.171	U	0.171	0.171	U	0.171
Alpha-BHC	PEST	0.170	U	0.170	0.170	U	0.170	0.171	U	0.171	0.171	U	0.171
alpha-Chlordane	PEST	0.170	U	0.170	0.170	U	0.170	0.171	U	0.171	0.171	U	0.171
beta-BHC	PEST	0.170	U	0.170	0.170	U	0.170	0.171	U	0.171	0.171	U	0.171
Delta-BHC	PEST	0.170	U	0.170	0.170	U	0.170	0.171	U	0.171	0.171	U	0.171
4-4'-DDD	PEST	0.341	U	0.341	0.340	U	0.340	0.342	U	0.342	0.343	U	0.343
4-4'-DDE	PEST	0.341	U	0.341	0.340	U	0.340	0.342	U	0.342	0.343	U	0.343
4-4'-DDT	PEST	0.341	U	0.341	0.340	U	0.340	0.342	U	0.342	0.343	U	0.343
Dieldrin	PEST	0.341	U	0.341	0.340	U	0.340	0.342	U	0.342	0.343	U	0.343
Endosulfan I	PEST	0.170	U	0.170	0.170	U	0.17	0.171	U	0.171	0.171	U	0.171
Endosulfan II	PEST	0.341	U	0.341	0.340	U	0.340	0.342	U	0.342	0.343	U	0.343
Endosulfan sulfate	PEST	0.341	U	0.341	0.340	U	0.340	0.342	U	0.342	0.343	U	0.343
Endrin	PEST	0.341	U	0.341	0.340	U	0.340	0.342	U	0.342	0.343	U	0.343
Endrin aldehyde	PEST	0.341	U	0.341	0.340	U	0.340	0.342	U	0.342	0.343	U	0.343
Endrin ketone	PEST	0.341	U	0.341	0.340	U	0.340	0.342	U	0.342	0.343	U	0.343
Gamma-BHC (Lindane)	PEST	0.170	U	0.170	0.170	U	0.170	0.171	U	0.171	0.171	U	0.171
gamma-Chlordane	PEST	0.170	U	0.170	0.170	U	0.170	0.171	U	0.171	0.171	U	0.171
Heptachlor	PEST	0.170	U	0.170	0.170	U	0.170	0.171	U	0.171	0.171	U	0.171
Heptachlor epoxide	PEST	0.170	U	0.170	0.170	U	0.170	0.171	U	0.171	0.171	U	0.171
Methoxychlor	PEST	1.70	U	1.70	1.70	U	1.70	1.71	U	1.71	1.71	U	1.71
Toxaphene	PEST	5.67	U	5.67	5.66	U	5.66	5.70	U	5.70	5.71	U	5.71

Attachment	1	Sheet No.	27 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	SOB-5 - J1V1M7			SOB-6 - J1V1M8			SOB-7 - J1V1M9			SOB-8 - J1V1N0		
		11/13/14			11/13/14			11/13/14			11/13/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	1.13	U	1.13	1.13	U	1.13	1.16	U	1.16	1.14	U	1.14
Aroclor-1221	PCB	1.13	U	1.13	1.13	U	1.13	1.16	U	1.16	1.14	U	1.14
Aroclor-1232	PCB	1.13	U	1.13	1.13	U	1.13	1.16	U	1.16	1.14	U	1.14
Aroclor-1242	PCB	1.13	U	1.13	1.13	U	1.13	1.16	U	1.16	1.14	U	1.14
Aroclor-1248	PCB	1.13	U	1.13	1.13	U	1.13	1.16	U	1.16	1.14	U	1.14
Aroclor-1254	PCB	1.13	U	1.13	1.13	U	1.13	5.80		1.16	1.14	U	1.14
Aroclor-1260	PCB	1.13	U	1.13	1.50	J	1.13	4.15		1.16	1.14	U	1.14
Aroclor-1262	PCB	1.13	U	1.13	1.13	U	1.13	1.16	U	1.16	1.14	U	1.14
Aroclor-1268	PCB	1.13	U	1.13	1.13	U	1.13	1.16	U	1.16	1.14	U	1.14
Acenaphthene	PAH	5.10	U	5.10	5.10	U	5.10	5.21	U	5.21	5.13	U	5.13
Acenaphthylene	PAH	5.10	U	5.10	5.10	U	5.10	5.21	U	5.21	5.13	U	5.13
Anthracene	PAH	1.70	U	1.70	1.70	U	1.70	1.74	U	1.74	1.71	U	1.71
Benzo(a)anthracene	PAH	0.544	U	0.544	6.44		0.544	5.35		0.556	11.9		0.547
Benzo(a)pyrene	PAH	0.706	J	0.544	6.20		0.544	5.56		0.556	9.03		0.547
Benzo(b)fluoranthene	PAH	0.544	U	0.544	7.07		0.544	6.98		0.556	8.23		0.547
Benzo(ghi)perylene	PAH	0.544	U	0.544	5.28		0.544	5.68		0.556	6.17		0.547
Benzo(k)fluoranthene	PAH	0.272	U	0.272	0.272	U	0.272	0.278	U	0.278	0.274	U	0.274
Chrysene	PAH	0.544	U	0.544	6.20		0.544	5.79		0.556	9.92		0.547
Dibenz[a,h]anthracene	PAH	0.544	U	0.544	0.544	U	0.544	0.556	U	0.556	0.547	U	0.547
Fluoranthene	PAH	0.544	U	0.544	9.72		0.544	9.88		0.556	16.4		0.547
Fluorene	PAH	5.10	U	5.10	5.10	U	5.10	5.21	U	5.21	5.13	U	5.13
Indeno(1,2,3-cd)pyrene	PAH	0.544	U	0.544	0.544	U	0.544	0.556	U	0.556	0.547	U	0.547
Naphthalene	PAH	5.10	U	5.10	5.10	U	5.10	5.21	U	5.21	5.13	U	5.13
Phenanthrene	PAH	5.10	U	5.10	5.10	U	5.10	5.21	U	5.21	15.0	J	5.13
Pyrene	PAH	0.841	J	0.544	11.1		0.544	10.1		0.556	20.1		0.547
Aldrin	PEST	0.170	U	0.170	0.170	U	0.170	0.174	U	0.174	0.171	U	0.171
Alpha-BHC	PEST	0.170	U	0.170	0.170	U	0.170	0.174	U	0.174	0.171	U	0.171
alpha-Chlordane	PEST	0.170	U	0.170	0.170	U	0.170	0.174	U	0.174	0.171	U	0.171
beta-BHC	PEST	0.170	U	0.170	0.170	U	0.170	0.174	U	0.174	0.171	U	0.171
Delta-BHC	PEST	0.170	U	0.170	0.170	U	0.170	0.174	U	0.174	0.171	U	0.171
4-4'-DDD	PEST	0.340	U	0.340	0.341	U	0.341	0.347	U	0.347	0.342	U	0.342
4-4'-DDE	PEST	0.340	U	0.340	0.341	U	0.341	0.347	U	0.347	0.342	U	0.342
4-4'-DDT	PEST	0.340	U	0.340	0.341	U	0.341	0.347	U	0.347	0.342	U	0.342
Dieldrin	PEST	0.340	U	0.340	0.489	J	0.341	0.347	U	0.347	0.342	U	0.342
Endosulfan I	PEST	0.170	U	0.170	0.170	U	0.170	0.174	U	0.174	0.171	U	0.171
Endosulfan II	PEST	0.340	U	0.340	0.341	U	0.341	0.347	U	0.347	0.342	U	0.342
Endosulfan sulfate	PEST	0.340	U	0.340	0.341	U	0.341	0.347	U	0.347	0.342	U	0.342
Endrin	PEST	0.340	U	0.340	0.341	U	0.341	0.347	U	0.347	0.342	U	0.342
Endrin aldehyde	PEST	0.340	U	0.340	0.341	U	0.341	0.347	U	0.347	0.342	U	0.342
Endrin ketone	PEST	0.340	U	0.340	0.341	U	0.341	0.347	U	0.347	0.342	U	0.342
Gamma-BHC (Lindane)	PEST	0.170	U	0.170	0.170	U	0.170	0.174	U	0.174	0.171	U	0.171
gamma-Chlordane	PEST	0.170	U	0.170	0.170	U	0.170	0.174	U	0.174	0.171	U	0.171
Heptachlor	PEST	0.170	U	0.170	0.170	U	0.170	0.174	U	0.174	0.171	U	0.171
Heptachlor epoxide	PEST	0.170	U	0.170	0.170	U	0.170	0.174	U	0.174	0.171	U	0.171
Methoxychlor	PEST	1.70	U	1.70	1.70	U	1.70	1.74	U	1.74	1.71	U	1.71
Toxaphene	PEST	5.67	U	5.67	5.67	U	5.67	5.78	U	5.78	5.70	U	5.70

Attachment	1	Sheet No.	28 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	SOB-9 - J1V1N1			SOB-10 - J1V1N2			SOB-11 - J1V1N3			SOB-12 - J1V1N4		
		11/13/14			11/13/14			11/13/14			11/13/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	1.14	U	1.14	1.13	U	1.13	1.12	U	1.12	1.13	U	1.13
Aroclor-1221	PCB	1.14	U	1.14	1.13	U	1.13	1.12	U	1.12	1.13	U	1.13
Aroclor-1232	PCB	1.14	U	1.14	1.13	U	1.13	1.12	U	1.12	1.13	U	1.13
Aroclor-1242	PCB	1.14	U	1.14	1.13	U	1.13	1.12	U	1.12	1.13	U	1.13
Aroclor-1248	PCB	1.14	U	1.14	1.13	U	1.13	1.12	U	1.12	1.13	U	1.13
Aroclor-1254	PCB	1.14	U	1.14	1.13	U	1.13	1.12	U	1.12	1.13	U	1.13
Aroclor-1260	PCB	1.14	U	1.14	1.13	U	1.13	1.12	U	1.12	1.13	U	1.13
Aroclor-1262	PCB	1.14	U	1.14	1.13	U	1.13	1.12	U	1.12	1.13	U	1.13
Aroclor-1268	PCB	1.14	U	1.14	1.13	U	1.13	1.12	U	1.12	1.13	U	1.13
Acenaphthene	PAH	5.13	U	5.13	5.10	U	5.10	67.8	P	5.06	5.11	U	5.11
Acenaphthylene	PAH	5.13	U	5.13	5.10	U	5.10	5.06	U	5.06	5.11	U	5.11
Anthracene	PAH	1.71	U	1.71	1.70	U	1.70	29.4		1.69	1.70	U	1.70
Benzo(a)anthracene	PAH	0.547	U	0.547	5.25		0.544	86.7		0.539	1.13	J	0.545
Benzo(a)pyrene	PAH	0.547	U	0.547	4.74		0.544	70.5		0.539	1.18	J	0.545
Benzo(b)fluoranthene	PAH	0.547	U	0.547	5.02		0.544	77.6		0.539	1.21	J	0.545
Benzo(ghi)perylene	PAH	0.547	U	0.547	3.89		0.544	32.2		0.539	0.545	U	0.545
Benzo(k)fluoranthene	PAH	0.274	U	0.274	0.272	U	0.272	47.4		0.27	0.761	J	0.272
Chrysene	PAH	0.547	U	0.547	4.86		0.544	70.4		0.539	0.851	J	0.545
Dibenz[a,h]anthracene	PAH	0.547	U	0.547	0.544	U	0.544	0.539	U	0.539	0.545	U	0.545
Fluoranthene	PAH	0.547	U	0.547	7.79		0.544	125		0.539	2.55		0.545
Fluorene	PAH	5.13	U	5.13	5.10	U	5.10	19.6		5.06	5.11	U	5.11
Indeno(1,2,3-cd)pyrene	PAH	0.547	U	0.547	0.544	U	0.544	0.539	U	0.539	0.545	U	0.545
Naphthalene	PAH	5.13	U	5.13	5.10	U	5.10	5.06	U	5.06	5.11	U	5.11
Phenanthrene	PAH	5.13	U	5.13	5.10	U	5.10	105		5.06	5.11	U	5.11
Pyrene	PAH	0.547	U	0.547	8.8		0.544	149		0.539	1.69	J	0.545
Aldrin	PEST	0.171	U	0.171	0.170	U	0.170	0.168	U	0.168	0.170	U	0.170
Alpha-BHC	PEST	0.171	U	0.171	0.170	U	0.170	0.168	U	0.168	0.170	U	0.170
alpha-Chlordane	PEST	0.171	U	0.171	0.170	U	0.170	0.168	U	0.168	0.170	U	0.170
beta-BHC	PEST	0.171	U	0.171	0.170	U	0.170	0.168	U	0.168	0.170	U	0.170
Delta-BHC	PEST	0.171	U	0.171	0.170	U	0.170	0.168	U	0.168	0.170	U	0.170
4-4'-DDD	PEST	0.342	U	0.342	0.341	U	0.341	0.337	U	0.337	0.341	U	0.341
4-4'-DDE	PEST	0.342	U	0.342	0.341	U	0.341	0.337	U	0.337	0.341	U	0.341
4-4'-DDT	PEST	0.342	U	0.342	0.341	U	0.341	0.337	U	0.337	0.341	U	0.341
Dieldrin	PEST	0.342	U	0.342	0.341	U	0.341	0.337	U	0.337	0.341	U	0.341
Endosulfan I	PEST	0.171	U	0.171	0.17	U	0.17	0.168	U	0.168	0.170	U	0.170
Endosulfan II	PEST	0.342	U	0.342	0.341	U	0.341	0.337	U	0.337	0.341	U	0.341
Endosulfan sulfate	PEST	0.342	U	0.342	0.341	U	0.341	0.337	U	0.337	0.341	U	0.341
Endrin	PEST	0.342	U	0.342	0.341	U	0.341	0.337	U	0.337	0.341	U	0.341
Endrin aldehyde	PEST	0.342	U	0.342	0.341	U	0.341	0.337	U	0.337	0.341	U	0.341
Endrin ketone	PEST	0.342	U	0.342	0.341	U	0.341	0.337	U	0.337	0.341	U	0.341
Gamma-BHC (Lindane)	PEST	0.171	U	0.171	0.170	U	0.170	0.168	U	0.168	0.170	U	0.170
gamma-Chlordane	PEST	0.171	U	0.171	0.170	U	0.170	0.168	U	0.168	0.170	U	0.170
Heptachlor	PEST	0.171	U	0.171	0.170	U	0.170	0.168	U	0.168	0.170	U	0.170
Heptachlor epoxide	PEST	0.171	U	0.171	0.170	U	0.170	0.168	U	0.168	0.170	U	0.170
Methoxychlor	PEST	1.71	U	1.71	1.70	U	1.70	1.68	U	1.68	1.70	U	1.70
Toxaphene	PEST	5.69	U	5.69	5.68	U	5.68	5.61	U	5.61	5.68	U	5.68

Attachment	1	Sheet No.	29 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	FS-1 - J1RWF8			FS-2 - J1RXJ6			FS-3 - J1RXJ7			FS-4 - J1RXJ8		
		8/19/13			12/12/13			12/12/13			12/12/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.7	U	2.7	2.8	U	2.8	3.2	U	3.2	2.8	U	2.8
Aroclor-1221	PCB	7.8	U	7.8	8.1	U	8.1	9.2	U	9.2	8.2	U	8.2
Aroclor-1232	PCB	1.9	U	1.9	2.0	U	2.0	2.3	U	2.3	2.1	U	2.1
Aroclor-1242	PCB	4.5	U	4.5	4.7	U	4.7	5.3	U	5.3	4.8	U	4.8
Aroclor-1248	PCB	4.5	U	4.5	4.7	U	4.7	5.3	U	5.3	4.8	U	4.8
Aroclor-1254	PCB	2.5	U	2.5	2.6	U	2.6	3.0	U	3.0	2.7	U	2.7
Aroclor-1260	PCB	2.5	U	2.5	2.6	U	2.6	3.0	U	3.0	2.7	U	2.7
Aroclor-1262	PCB												
Aroclor-1268	PCB												
Acenaphthene	PAH	9.6	U	9.6	10	U	10	11	U	11	10	U	10
Acenaphthylene	PAH	8.7	U	8.7	9.3	U	9.3	9.8	U	9.8	9.1	U	9.1
Anthracene	PAH	2.9	U	2.9	3.1	U	3.1	3.3	U	3.3	3.1	U	3.1
Benzo(a)anthracene	PAH	3.1	U	3.1	3.3	U	3.3	3.5	U	3.5	3.2	U	3.2
Benzo(a)pyrene	PAH	6.2	U	6.2	6.6	U	6.6	7.0	U	7.0	6.5	U	6.5
Benzo(b)fluoranthene	PAH	4.0	U	4.0	4.3	U	4.3	4.6	U	4.6	4.2	U	4.2
Benzo(ghi)perylene	PAH	6.9	U	6.9	7.4	U	7.4	7.9	U	7.9	7.3	U	7.3
Benzo(k)fluoranthene	PAH	3.8	U	3.8	4.1	U	4.1	4.3	U	4.3	4.0	U	4.0
Chrysene	PAH	4.7	U	4.7	5.0	U	5.0	5.3	U	5.3	4.9	U	4.9
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	12	U	12	11	U	11
Fluoranthene	PAH	13	U	13	13	U	13	14	U	14	13	U	13
Fluorene	PAH	5.1	U	5.1	5.4	U	5.4	5.8	U	5.8	5.3	U	5.3
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	12	U	12	13	U	13	12	U	12
Naphthalene	PAH	12	U	12	12	U	12	13	U	13	12	U	12
Phenanthrene	PAH	12	U	12	12	U	12	13	U	13	12	U	12
Pyrene	PAH	12	U	12	12	U	12	13	U	13	12	U	12
Aldrin	PEST	0.24	U	0.24	0.26	U	0.26	0.27	U	0.27	0.25	U	0.25
Alpha-BHC	PEST	0.21	U	0.21	0.22	U	0.22	0.23	U	0.23	0.21	U	0.21
alpha-Chlordane	PEST	0.31	U	0.31	0.33	U	0.33	0.35	U	0.35	0.32	U	0.32
beta-BHC	PEST	0.65	U	0.65	0.68	U	0.68	0.72	U	0.72	0.66	U	0.66
Delta-BHC	PEST	0.39	U	0.39	0.41	U	0.41	0.43	U	0.43	0.40	U	0.40
4-4'-DDD	PEST	0.53	U	0.53	0.56	U	0.56	0.59	U	0.59	0.54	U	0.54
4-4'-DDE	PEST	0.37	J	0.23	0.24	U	0.24	0.26	U	0.26	0.24	U	0.24
4-4'-DDT	PEST	0.57	U	0.57	0.61	U	0.61	0.64	U	0.64	0.58	U	0.58
Dieldrin	PEST	0.20	U	0.20	0.22	U	0.22	0.23	U	0.23	0.21	U	0.21
Endosulfan I	PEST	0.17	U	0.17	0.18	U	0.18	0.19	U	0.19	0.17	U	0.17
Endosulfan II	PEST	0.28	UN	0.28	0.30	U	0.30	0.31	U	0.31	0.28	U	0.28
Endosulfan sulfate	PEST	0.27	U	0.27	0.28	U	0.28	0.30	U	0.30	0.27	U	0.27
Endrin	PEST	0.30	U	0.30	0.31	U	0.31	0.33	U	0.33	0.30	U	0.30
Endrin aldehyde	PEST	0.17	U	0.17	0.18	U	0.18	0.18	U	0.18	0.17	U	0.17
Endrin ketone	PEST	0.48	U	0.48	0.50	U	0.50	0.53	U	0.53	0.48	U	0.48
Gamma-BHC (Lindane)	PEST	0.45	U	0.45	0.48	U	0.48	0.50	U	0.50	0.46	U	0.46
gamma-Chlordane	PEST	0.26	U	0.26	0.27	U	0.27	0.29	U	0.29	0.26	U	0.26
Heptachlor	PEST	0.21	U	0.21	0.22	U	0.22	0.23	U	0.23	0.21	U	0.21
Heptachlor epoxide	PEST	0.41	U	0.41	0.44	U	0.44	0.46	U	0.46	0.42	U	0.42
Methoxychlor	PEST	0.44	U	0.44	0.46	U	0.46	0.49	U	0.49	0.44	U	0.44
Toxaphene	PEST	15	U	15	16	U	16	17	U	17	16	U	16

Attachment	1	Sheet No.	30 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	EXC-13 - J1V1J6			Duplicate of J1V1J6 - J1V1K8			EXC-15 - J1V1J8			EXC-18 - J1V1K1		
		11/5/14			11/5/14			11/5/14			11/5/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	6.53	UD	6.53	6.49	UD	6.49	1.18	U	1.18	1.17	U	1.17
Aroclor-1221	PCB	6.53	UD	6.53	6.49	UD	6.49	1.18	U	1.18	1.17	U	1.17
Aroclor-1232	PCB	6.53	UD	6.53	6.49	UD	6.49	1.18	U	1.18	1.17	U	1.17
Aroclor-1242	PCB	258	D	6.53	280	D	6.49	1.18	U	1.18	1.17	U	1.17
Aroclor-1248	PCB	6.53	UD	6.53	6.49	UD	6.49	1.18	U	1.18	1.17	U	1.17
Aroclor-1254	PCB	68.9	DP	6.53	75.5	DP	6.49	1.18	U	1.18	1.17	U	1.17
Aroclor-1260	PCB	9.49	DJ	6.53	11.3	DJ	6.49	1.18	U	1.18	1.17	U	1.17
Aroclor-1262	PCB	6.53	UD	6.53	6.49	UD	6.49	1.18	U	1.18	1.17	U	1.17
Aroclor-1268	PCB	6.53	UD	6.53	6.49	UD	6.49	1.18	U	1.18	1.17	U	1.17
Acenaphthene	PAH	11.8	UD	11.8	11.7	UD	11.7	21.3	UD	21.3	26.4	UD	26.4
Acenaphthylene	PAH	11.8	UD	11.8	11.7	UD	11.7	21.3	UD	21.3	26.4	UD	26.4
Anthracene	PAH	54.8		3.93	39.4	D	3.91	1340	D	7.10	8.79	UD	8.79
Benzo(a)anthracene	PAH	293	D	1.26	173	D	1.25	3070	D	11.4	2070	D	5.62
Benzo(a)pyrene	PAH	195	D	1.2	147	D	1.25	2510	D	11.4	1740	D	2.81
Benzo(b)fluoranthene	PAH	250	DP	1.26	222	D	1.25	2510	D	11.4	1980	D	5.62
Benzo(ghi)perylene	PAH	95.9	D	1.2	90.7	D	1.25	1450	D	11.4	1060	D	2.81
Benzo(k)fluoranthene	PAH	129	DX	0.628	102	DX	0.626	1820	DX	5.68	953	DX	2.81
Chrysene	PAH	228	D	1.26	110	D	1.25	1890	D	11.4	1300	D	2.81
Dibenz[a,h]anthracene	PAH	1.2	UD	1.26	1.25	UD	1.25	2.27	UD	2.27	2.81	UD	2.81
Fluoranthene	PAH	41	D	1.26	261	D	1.25	4730	D	11.4	2020	D	5.62
Fluorene	PAH	5.3	D	1.8	18.4	DJP	11.7	833	DP	21.3	26.4	UD	26.4
Indeno(1,2,3-cd)pyrene	PAH	1	UD	1.26	1.25	UD	1.25	2.27	UD	2.27	2.81	UD	2.81
Naphthalene	PAH	11.8	UD	11.8	11.7	UD	11.7	21.3	UD	21.3	26.4	UD	26.4
Phenanthrene	PAH	593	D	11.8	159	D	11.7	4600	D	21.3	763	D	26.4
Pyrene	PAH	559	D	1.26	224	D	1.25	3880	D	11.4	1760	D	5.62
Aldrin	PEST	0.197	UR	0.197	0.195	U	0.195	0.177	UR	0.177	0.176	UR	0.176
Alpha-BHC	PEST	0.197	UR	0.197	0.195	U	0.195	0.177	UR	0.177	0.176	UR	0.176
alpha-Chlordane	PEST	0.19	UR	0.197	0.19	U	0.19	0.177	UR	0.177	0.176	UR	0.176
beta-BHC	PEST	0.	UR	0.197	0.195	U	0.195	0.177	UR	0.177	0.176	UR	0.176
Delta-BHC	PEST	0.197	UR	0.197	0.195	U	0.195	0.177	UR	0.177	0.176	UR	0.176
4-4'-DDD	PEST	0.393	UR	0.393	0.391	U	0.391	0.355	UR	0.355	0.352	UR	0.352
4-4'-DDE	PEST	0.393	UR	0.393	0.391	U	0.391	0.355	UR	0.355	0.352	UR	0.352
4-4'-DDT	PEST	0.393	UR	0.393	2.61		0.391	0.355	UR	0.355	0.352	UR	0.352
Dieldrin	PEST	0.393	UR	0.393	0.391	U	0.391	0.355	UR	0.355	0.352	UR	0.352
Endosulfan I	PEST	0.197	UR	0.197	0.195	U	0.195	0.177	UR	0.177	0.176	UR	0.176
Endosulfan II	PEST	0.393	UR	0.393	0.391	U	0.391	0.355	UR	0.355	0.352	UR	0.352
Endosulfan sulfate	PEST	0.393	UR	0.3	0.391	U	0.391	0.355	UR	0.355	0.352	UR	0.352
Endrin	PEST	0.393	UR	0.393	0.391	U	0.391	0.355	UR	0.355	0.352	UR	0.352
Endrin aldehyde	PEST	0.393	UR	0.393	0.391	U	0.391	0.355	UR	0.355	0.352	UR	0.352
Endrin ketone	PEST	0.393	UR	0.393	0.391	U	0.391	0.355	UR	0.355	0.352	UR	0.352
Gamma-BHC (Lindane)	PEST	0.19	UR	0.197	0.195	U	0.195	0.177	UR	0.177	0.176	UR	0.176
gamma-Chlordane	PEST	0.19	UR	0.197	0.195	U	0.195	0.177	UR	0.177	0.176	UR	0.176
Heptachlor	PEST	0.197	UR	0.197	0.195	U	0.195	0.177	UR	0.177	0.176	UR	0.176
Heptachlor epoxide	PEST	0.197	UR	0.197	0.195	U	0.195	0.177	UR	0.177	0.176	UR	0.176
Methoxychlor	PEST	1.97	UR	1.97	1.95	U	1.95	1.77	UR	1.77	1.76	UR	1.76
Toxaphene	PEST	6.54	UR	6.54	6.5	U	6.5	5.91	UR	5.91	5.86	UR	5.86

Attachment	1	Sheet No.	31 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	EXC-21 - J1V1K4			EXC-22 - J1V1K5			NOB-2 - J1V1L1			NOB-5 - J1V1L4		
		11/5/14			11/5/14			11/24/14			11/24/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	1.19	U	1.19	1.17	U	1.17	1.18	U	1.18	1.17	U	1.17
Aroclor-1221	PCB	1.19	U	1.19	1.17	U	1.17	1.18	U	1.18	1.17	U	1.17
Aroclor-1232	PCB	1.19	U	1.19	1.17	U	1.17	1.18	U	1.18	1.17	U	1.17
Aroclor-1242	PCB	1.19	U	1.19	1.17	U	1.17	1.18	U	1.18	1.17	U	1.17
Aroclor-1248	PCB	1.19	U	1.19	1.17	U	1.17	1.18	U	1.18	1.17	U	1.17
Aroclor-1254	PCB	1.19	U	1.19	1.17	U	1.17	1.18	U	1.18	1.17	U	1.17
Aroclor-1260	PCB	1.19	U	1.19	1.17	U	1.17	1.71	J	1.18	1.42	J	1.17
Aroclor-1262	PCB	1.19	U	1.19	1.17	U	1.17	1.18	U	1.18	1.17	U	1.17
Aroclor-1268	PCB	1.19	U	1.19	1.17	U	1.17	1.18	U	1.18	1.17	U	1.17
Acenaphthene	PAH	53.6	UD	53.6	21.2	UD	21.2	85.2		5.31	57.8		5.27
Acenaphthylene	PAH	53.6	UD	53.6	21.2	UD	21.2	5.31	U	5.31	5.27	U	5.27
Anthracene	PAH	8510	D	17.9	292	D	7.07	170		1.77	57.1		1.76
Benzo(a)anthracene	PAH	19100	D	114	87	D	2	375	D	2.26	273		0.562
Benzo(a)pyrene	PAH	13800	D	114	740	D	2.26	318		0.566	286		0.562
Benzo(b)fluoranthene	PAH	14000	D	114	1120	DP	2.26	332	D	2.26	32		0.562
Benzo(ghi)perylene	PAH	6600	D	114	459	D	2.26	172		0.566	173		0.562
Benzo(k)fluoranthene	PAH	10100	DX	57.2	503	DX	1.13	166		0.283	140		0.281
Chrysene	PAH	10900	D	114	549	D	2.26	244		0.566	191		0.562
Dibenz[a,h]anthracene	PAH	5.72	UD	5.72	2.26	UD	2.26	0.566	U	0.566	0.562	U	0.562
Fluoranthene	PAH	30700	D	114	1350	D	2.26	593	D	2.26	358	D	2.25
Fluorene	PAH	4930	DP	53.6	154	DP	21.24	72.5		5.31	18.9	F	5.27
Indeno(1,2,3-cd)pyrene	PAH	5.72	UD	5.72	2	UD	2.26	0.566	U	0.566	0.56	U	0.562
Naphthalene	PAH	53.6	UD	53.6	21.2	UD	21.2	5.31	U	5.31	5.27	U	5.27
Phenanthrene	PAH	26300	D	53.6	1060	D	21.2	511		5.31	181		5.27
Pyrene	PAH	25300	D	114	1140	D	2.26	494	D	2.26	327		0.562
Aldrin	PEST	1.79	URD	1.79	0.177	UR	0.177	0.177	U	0.177	0.175	U	0.175
Alpha-BHC	PEST	1.79	URD	1.79	0.177	UR	0.177	0.177	U	0.177	0.175	U	0.175
alpha-Chlordane	PEST	1.79	URD	1.79	0.177	UR	0.177	0.177	U	0.177	0.175	U	0.175
beta-BHC	PEST	1.79	URD	1.79	0.177	UR	0.177	0.177	U	0.177	0.175	U	0.175
Delta-BHC	PEST	1.79	URD	1.79	0.177	UR	0.177	0.177	U	0.177	0.175	U	0.175
4-4'-DDD	PEST	3.58	URD	3.58	0.353	UR	0.353	0.353	U	0.353	0.351	U	0.351
4-4'-DDE	PEST	3.58	URD	3.58	0.353	UR	0.353	0.827	JP	0.353	0.351	U	0.351
4-4'-DDT	PEST	3.58	URD	3.58	0.353	UR	0.353	0.353	U	0.353	0.351	U	0.351
Dieldrin	PEST	3.58	URD	3.58	0.353	UR	0.353	0.353	U	0.353	0.351	U	0.351
Endosulfan I	PEST	1.79	URD	1.79	0.177	UR	0.177	0.177	U	0.177	0.175	U	0.175
Endosulfan II	PEST	3.58	URD	3.58	0.353	UR	0.353	0.353	U	0.353	0.351	U	0.351
Endosulfan sulfate	PEST	3.58	URD	3.58	0.353	UR	0.353	0.353	U	0.353	0.351	U	0.351
Endrin	PEST	3.58	URD	3.58	0.353	UR	0.353	0.353	U	0.353	0.351	U	0.351
Endrin aldehyde	PEST	3.58	URD	3.58	0.353	UR	0.353	0.353	U	0.353	0.351	U	0.351
Endrin ketone	PEST	3.58	URD	3.58	0.353	UR	0.353	0.353	U	0.353	0.351	U	0.351
Gamma-BHC (Lindane)	PEST	1.79	URD	1.79	0.177	UR	0.177	0.177	U	0.177	0.175	U	0.175
gamma-Chlordane	PEST	1.79	URD	1.79	0.177	UR	0.177	0.177	U	0.177	0.175	U	0.175
Heptachlor	PEST	1.79	URD	1.79	0.177	UR	0.177	0.177	U	0.177	0.175	U	0.175
Heptachlor epoxide	PEST	1.79	URD	1.79	0.177	UR	0.177	0.177	U	0.177	0.175	U	0.175
Methoxychlor	PEST	17.9	URD	17.9	1.77	UR	1.77	1.77	U	1.77	1.75	U	1.75
Toxaphene	PEST	59.5	URD	59.5	5.88	UR	5.88	5.89	U	5.89	5.84	U	5.84

Attachment	1	Sheet No.	32 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	NOB-9 - J1V1L8			Duplicate of J1V1L8 - J1V1M2			NOB-1 - J1V1L0			NOB-2 - J1V596 [a]		
		11/20/14			11/20/14			11/24/14			3/18/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	103	U	103	103	U	103	107	U	107	27	U	27
1,2-Dichlorobenzene	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	21	U	21
1,3-Dichlorobenzene	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	12	U	12
1,4-Dichlorobenzene	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	13	U	13
2,4,5-Trichlorophenol	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	9.6	U	9.6
2,4,6-Trichlorophenol	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	9.6	U	9.6
2,4-Dichlorophenol	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	9.6	U	9.6
2,4-Dimethylphenol	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	64	U	64
2,4-Dinitrophenol	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	320	U	320
2,4-Dinitrotoluene	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	64	U	64
2,6-Dinitrotoluene	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	27	U	27
2-Chloronaphthalene	SVOA	10.3	U	10.3	10.3	U	10.3	10.7	U	10.7	9.6	U	9.6
2-Chlorophenol	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	20	U	20
2-Methylnaphthalene	SVOA	10.3	UJ	10.3	10.3	UJ	10.3	10.7	UJ	10.7	18	U	18
2-Methylphenol (cresol, o-)	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	13	U	13
2-Nitroaniline	SVOA	114	UJ	114	114	UJ	114	118	UJ	118	48	U	48
2-Nitrophenol	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	9.6	U	9.6
3,3'-Dichlorobenzidine	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	87	U	87
3+4 Methylphenol (cresol, m+p)	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	32	U	32
3-Nitroaniline	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	70	U	70
4,6-Dinitro-2-methylphenol	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	320	U	320
4-Bromophenylphenyl ether	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	18	U	18
4-Chloro-3-methylphenol	SVOA	138	UJ	138	138	UJ	138	143	UJ	143	64	U	64
4-Chloroaniline	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	79	U	79
4-Chlorophenylphenyl ether	SVOA	103	U	103	103	U	103	107	U	107	20	U	20
4-Nitroaniline	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	70	U	70
4-Nitrophenol	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	93	U	93
Acenaphthene	SVOA	10.3	UJ	10.3	10.3	UJ	10.3	10.7	UJ	10.7	9.9	U	9.9
Acenaphthylene	SVOA	10.3	U	10.3	10.3	U	10.3	10.7	U	10.7	16	U	16
Anthracene	SVOA	10.3	UJ	10.3	10.3	UJ	10.3	10.7	UJ	10.7	16	U	16
Benzo(a)anthracene	SVOA	12.1	J	10.3	15.8	J	10.3	26.8	J	10.7	19	J	19
Benzo(a)pyrene	SVOA	10.3	UJ	10.3	10.7	J	10.3	21.1	J	10.7	19	U	19
Benzo(b)fluoranthene	SVOA	13.4	J	10.3	13.4	J	10.3	25.3	J	10.7	25	U	25
Benzo(ghi)perylene	SVOA	10.3	UJ	10.3	10.3	UJ	10.3	10.7	UJ	10.7	15	U	15
Benzo(k)fluoranthene	SVOA	10.3	UJ	10.3	10.3	UJ	10.3	14.3	J	10.7	39	U	39
Bis(2-chloro-1-methylethyl)ether	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	22	U	22
Bis(2-Chloroethoxy)methane	SVOA	103	U	103	103	U	103	107	U	107	22	U	22
Bis(2-chloroethyl) ether	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	16	U	16
Bis(2-ethylhexyl) phthalate	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	44	U	44
Butylbenzylphthalate	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	41	U	41
Carbazole	SVOA	10.3	UJ	10.3	10.3	UJ	10.3	10.7	UJ	10.7	35	U	35
Chrysene	SVOA	10.3	UJ	10.3	11.4	J	10.3	21.1	J	10.7	26	U	26
Dibenz[a,h]anthracene	SVOA	10.3	UJ	10.3	10.3	UJ	10.3	10.7	UJ	10.7	18	U	18
Dibenzofuran	SVOA	103	U	103	103	U	103	107	U	107	19	U	19
Diethyl phthalate	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	25	U	25
Dimethyl phthalate	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	22	U	22
Di-n-butylphthalate	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	28	U	28
Di-n-octylphthalate	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	14	U	14
Diphenylamine	SVOA	103	UJ	103	103	UJ	103	107	UJ	107			
Fluoranthene	SVOA	15.9	J	10.3	23.1	J	10.3	46.7	J	10.7	35	U	35
Fluorene	SVOA	10.3	UJ	10.3	10.3	UJ	10.3	10.7	UJ	10.7	17	U	17
Hexachlorobenzene	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	28	U	28
Hexachlorobutadiene	SVOA	103	U	103	103	U	103	107	U	107	9.6	U	9.6
Hexachlorocyclopentadiene	SVOA	103	U	103	103	U	103	107	U	107	48	U	48
Hexachloroethane	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	21	U	21
Indeno(1,2,3-cd)pyrene	SVOA	10.3	UJ	10.3	10.3	UJ	10.3	11.1	J	10.7	21	U	21
Isophorone	SVOA	103	U	103	103	U	103	107	U	107	16	U	16
Naphthalene	SVOA	10.3	UJ	10.3	10.3	UJ	10.3	10.7	UJ	10.7	30	U	30
Nitrobenzene	SVOA	103	U	103	103	U	103	107	U	107	21	U	21
N-Nitroso-di-n-dipropylamine	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	30	U	30
N-Nitrosodiphenylamine	SVOA										20	U	20
Pentachlorophenol	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	320	UX	320
Phenanthrene	SVOA	10.3	UJ	10.3	14.1	J	10.3	25.7	J	10.7	16	U	16
Phenol	SVOA	103	UJ	103	103	UJ	103	107	UJ	107	17	U	17
Pyrene	SVOA	12.4	J	10.3	19.3	J	10.3	33.9	J	10.7	28	J	12

Attachment	1	Sheet No.	33 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	NOB-3 - J1V1L2			NOB-4 - J1V1L3			NOB-5 - J1V597 [a]			NOB-6 - J1V1L5		
		11/20/14			11/20/14			3/18/15			11/24/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	102	U	102	102	U	102	29	U	29	105	U	105
1,2-Dichlorobenzene	SVOA	102	UJ	102	102	UJ	102	23	U	23	105	UJ	105
1,3-Dichlorobenzene	SVOA	102	UJ	102	102	UJ	102	12	U	12	105	UJ	105
1,4-Dichlorobenzene	SVOA	102	UJ	102	102	UJ	102	14	U	14	105	UJ	105
2,4,5-Trichlorophenol	SVOA	102	UJ	102	102	UJ	102	10	U	10	105	UJ	105
2,4,6-Trichlorophenol	SVOA	102	UJ	102	102	UJ	102	10	U	10	105	UJ	105
2,4-Dichlorophenol	SVOA	102	UJ	102	102	UJ	102	10	U	10	105	UJ	105
2,4-Dimethylphenol	SVOA	102	UJ	102	102	UJ	102	69	U	69	105	UJ	105
2,4-Dinitrophenol	SVOA	102	UJ	102	102	UJ	102	350	UX	350	105	UJ	105
2,4-Dinitrotoluene	SVOA	102	UJ	102	102	UJ	102	69	U	69	105	UJ	105
2,6-Dinitrotoluene	SVOA	102	UJ	102	102	UJ	102	29	U	29	105	UJ	105
2-Chloronaphthalene	SVOA	10.2	U	10.2	10.2	U	10.2	10	U	10	10.5	U	10.5
2-Chlorophenol	SVOA	102	UJ	102	102	UJ	102	22	U	22	105	UJ	105
2-Methylnaphthalene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	20	U	20	10.5	UJ	10.5
2-Methylphenol (cresol, o-)	SVOA	102	UJ	102	102	UJ	102	14	U	14	105	UJ	105
2-Nitroaniline	SVOA	113	UJ	113	112	UJ	112	52	U	52	116	UJ	116
2-Nitrophenol	SVOA	102	UJ	102	102	UJ	102	10	U	10	105	UJ	105
3,3'-Dichlorobenzidine	SVOA	102	UJ	102	102	UJ	102	94	U	94	105	UJ	105
3+4 Methylphenol (cresol, m+p)	SVOA	102	UJ	102	102	UJ	102	34	U	34	105	UJ	105
3-Nitroaniline	SVOA	102	UJ	102	102	UJ	102	76	U	76	105	UJ	105
4,6-Dinitro-2-methylphenol	SVOA	102	UJ	102	102	UJ	102	340	UX	340	105	UJ	105
4-Bromophenylphenyl ether	SVOA	102	UJ	102	102	UJ	102	20	U	20	105	UJ	105
4-Chloro-3-methylphenol	SVOA	136	UJ	136	135	UJ	135	69	U	69	140	UJ	140
4-Chloroaniline	SVOA	102	UJ	102	102	UJ	102	85	U	85	105	UJ	105
4-Chlorophenylphenyl ether	SVOA	102	U	102	102	U	102	22	U	22	105	U	105
4-Nitroaniline	SVOA	102	UJ	102	102	UJ	102	75	U	75	105	UJ	105
4-Nitrophenol	SVOA	102	UJ	102	102	UJ	102	100	U	100	105	UJ	105
Acenaphthene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	11	U	11	10.5	UJ	10.5
Acenaphthylene	SVOA	10.2	U	10.2	10.2	U	10.2	18	U	18	10.5	U	10.5
Anthracene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	18	U	18	10.5	UJ	10.5
Benzo(a)anthracene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	21	U	21	10.5	UJ	10.5
Benzo(a)pyrene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	21	U	21	10.5	UJ	10.5
Benzo(b)fluoranthene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	27	U	27	10.5	UJ	10.5
Benzo(ghi)perylene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	17	U	17	10.5	UJ	10.5
Benzo(k)fluoranthene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	42	U	42	10.5	UJ	10.5
Bis(2-chloro-1-methylethyl)ether	SVOA	102	UJ	102	102	UJ	102	24	U	24	105	UJ	105
Bis(2-Chloroethoxy)methane	SVOA	102	U	102	102	U	102	24	U	24	105	U	105
Bis(2-chloroethyl) ether	SVOA	102	UJ	102	102	UJ	102	17	U	17	105	UJ	105
Bis(2-ethylhexyl) phthalate	SVOA	102	UJ	102	102	UJ	102	48	U	48	105	UJ	105
Butylbenzylphthalate	SVOA	102	UJ	102	102	UJ	102	45	U	45	105	UJ	105
Carbazole	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	37	U	37	10.5	UJ	10.5
Chrysene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	28	U	28	10.5	UJ	10.5
Dibenz[a,h]anthracene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	20	U	20	10.5	UJ	10.5
Dibenzofuran	SVOA	102	U	102	102	U	102	21	U	21	105	U	105
Diethyl phthalate	SVOA	102	UJ	102	102	UJ	102	27	U	27	105	UJ	105
Dimethyl phthalate	SVOA	102	UJ	102	102	UJ	102	24	U	24	105	UJ	105
Di-n-butylphthalate	SVOA	102	UJ	102	102	UJ	102	30	U	30	105	UJ	105
Di-n-octylphthalate	SVOA	102	UJ	102	102	UJ	102	15	U	15	105	UJ	105
Diphenylamine	SVOA	102	UJ	102	102	UJ	102				105	UJ	105
Fluoranthene	SVOA	13.6	J	10.2	10.2	UJ	10.2	37	U	37	10.5	UJ	10.5
Fluorene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	19	U	19	10.5	UJ	10.5
Hexachlorobenzene	SVOA	102	UJ	102	102	UJ	102	30	U	30	105	UJ	105
Hexachlorobutadiene	SVOA	102	U	102	102	U	102	10	U	10	105	U	105
Hexachlorocyclopentadiene	SVOA	102	U	102	102	U	102	52	U	52	105	U	105
Hexachloroethane	SVOA	102	UJ	102	102	UJ	102	22	U	22	105	UJ	105
Indeno(1,2,3-cd)pyrene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	23	U	23	10.5	UJ	10.5
Isophorone	SVOA	102	U	102	102	U	102	18	U	18	105	U	105
Naphthalene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	32	U	32	10.5	UJ	10.5
Nitrobenzene	SVOA	102	U	102	102	U	102	23	U	23	105	U	105
N-Nitroso-di-n-dipropylamine	SVOA	102	UJ	102	102	UJ	102	32	U	32	105	UJ	105
N-Nitrosodiphenylamine	SVOA							22	U	22			
Pentachlorophenol	SVOA	102	UJ	102	102	UJ	102	340	UX	340	105	UJ	105
Phenanthrene	SVOA	10.2	UJ	10.2	10.2	UJ	10.2	21	J	18	10.5	UJ	10.5
Phenol	SVOA	102	UJ	102	102	UJ	102	19	U	19	105	UJ	105
Pyrene	SVOA	13	J	10.2	10.2	UJ	10.2	32	J	13	10.5	UJ	10.5

Attachment	1	Sheet No.	34 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	NOB-7 - J1V1L6			NOB-8 - J1V1L7			NOB-10 - J1V1L9			NOB-11 - J1V1M0		
		11/24/14			11/24/14			11/20/14			11/24/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	105	U	105	109	U	109	104	U	104	105	U	105
1,2-Dichlorobenzene	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
1,3-Dichlorobenzene	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
1,4-Dichlorobenzene	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
2,4,5-Trichlorophenol	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
2,4,6-Trichlorophenol	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
2,4-Dichlorophenol	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
2,4-Dimethylphenol	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
2,4-Dinitrophenol	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
2,4-Dinitrotoluene	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
2,6-Dinitrotoluene	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
2-Chloronaphthalene	SVOA	10.5	U	10.5	10.9	U	10.9	10.4	U	10.4	10.5	U	10.5
2-Chlorophenol	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
2-Methylnaphthalene	SVOA	10.5	UJ	10.5	10.9	UJ	10.9	10.4	UJ	10.4	10.5	UJ	10.5
2-Methylphenol (cresol, o-)	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
2-Nitroaniline	SVOA	116	UJ	116	120	UJ	120	115	UJ	115	116	UJ	116
2-Nitrophenol	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
3,3'-Dichlorobenzidine	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
3+4 Methylphenol (cresol, m+p)	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
3-Nitroaniline	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
4,6-Dinitro-2-methylphenol	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
4-Bromophenylphenyl ether	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
4-Chloro-3-methylphenol	SVOA	140	UJ	140	145	UJ	145	139	UJ	139	141	UJ	141
4-Chloroaniline	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
4-Chlorophenylphenyl ether	SVOA	105	U	105	109	U	109	104	U	104	105	U	105
4-Nitroaniline	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
4-Nitrophenol	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Acenaphthene	SVOA	10.5	UJ	10.5	10.9	UJ	10.9	10.4	UJ	10.4	10.5	UJ	10.5
Acenaphthylene	SVOA	10.5	U	10.5	10.9	U	10.9	10.4	U	10.4	10.5	U	10.5
Anthracene	SVOA	10.5	UJ	10.5	10.9	UJ	10.9	10.4	UJ	10.4	10.5	UJ	10.5
Benzo(a)anthracene	SVOA	10.5	UJ	10.5	23.2	J	10.9	23.3	J	10.4	17.2	J	10.5
Benzo(a)pyrene	SVOA	10.5	UJ	10.5	20.3	J	10.9	20.2	J	10.4	11.6	J	10.5
Benzo(b)fluoranthene	SVOA	10.5	UJ	10.5	32.2	J	10.9	29.2	J	10.4	18.6	J	10.5
Benzo(ghi)perylene	SVOA	10.5	UJ	10.5	10.9	UJ	10.9	11.8	J	10.4	10.5	UJ	10.5
Benzo(k)fluoranthene	SVOA	10.5	UJ	10.5	10.9	UJ	10.9	10.4	UJ	10.4	10.5	UJ	10.5
Bis(2-chloro-1-methylethyl)ether	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Bis(2-Chloroethoxy)methane	SVOA	105	U	105	109	U	109	104	U	104	105	U	105
Bis(2-chloroethyl) ether	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Bis(2-ethylhexyl) phthalate	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Butylbenzylphthalate	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Carbazole	SVOA	10.5	UJ	10.5	10.9	UJ	10.9	10.4	UJ	10.4	10.5	UJ	10.5
Chrysene	SVOA	10.5	UJ	10.5	21.4	J	10.9	21.9	J	10.4	10.5	UJ	10.5
Dibenz[a,h]anthracene	SVOA	10.5	UJ	10.5	10.9	UJ	10.9	10.4	UJ	10.4	10.5	UJ	10.5
Dibenzofuran	SVOA	105	U	105	109	U	109	104	U	104	105	U	105
Diethyl phthalate	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Dimethyl phthalate	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Di-n-butylphthalate	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Di-n-octylphthalate	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Diphenylamine	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Fluoranthene	SVOA	10.5	UJ	10.5	35.1	J	10.9	44.2	J	10.4	20.7	J	10.5
Fluorene	SVOA	10.5	UJ	10.5	10.9	UJ	10.9	10.4	UJ	10.4	10.5	UJ	10.5
Hexachlorobenzene	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Hexachlorobutadiene	SVOA	105	U	105	109	U	109	104	U	104	105	U	105
Hexachlorocyclopentadiene	SVOA	105	U	105	109	U	109	104	U	104	105	U	105
Hexachloroethane	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Indeno(1,2,3-cd)pyrene	SVOA	10.5	UJ	10.5	10.9	UJ	10.9	13.6	J	10.4	10.5	UJ	10.5
Isophorone	SVOA	105	U	105	109	U	109	104	U	104	105	U	105
Naphthalene	SVOA	10.5	UJ	10.5	10.9	UJ	10.9	10.4	UJ	10.4	10.5	UJ	10.5
Nitrobenzene	SVOA	105	U	105	109	U	109	104	U	104	105	U	105
N-Nitroso-di-n-dipropylamine	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
N-Nitrosodiphenylamine	SVOA												
Pentachlorophenol	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Phenanthrene	SVOA	10.5	UJ	10.5	14.1	J	10.9	29.9	J	10.4	10.5	UJ	10.5
Phenol	SVOA	105	UJ	105	109	UJ	109	104	UJ	104	105	UJ	105
Pyrene	SVOA	10.5	UJ	10.5	30.4	J	10.9	31.3	J	10.4	17.2	J	10.5

Attachment	1	Sheet No.	35 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	NOB-12 - J1V1M1			SOB-3 - J1V1M5			Duplicate of J1V1M5 - J1V1N5			SOB-1 - J1V1M3		
		11/20/14			11/13/14			11/13/14			11/13/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	103	U	103	102	U	102	102	U	102	102	U	102
1,2-Dichlorobenzene	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
1,3-Dichlorobenzene	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
1,4-Dichlorobenzene	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
2,4,5-Trichlorophenol	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
2,4,6-Trichlorophenol	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
2,4-Dichlorophenol	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
2,4-Dimethylphenol	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
2,4-Dinitrophenol	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
2,4-Dinitrotoluene	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
2,6-Dinitrotoluene	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
2-Chloronaphthalene	SVOA	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
2-Chlorophenol	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
2-Methylnaphthalene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
2-Methylphenol (cresol, o-)	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
2-Nitroaniline	SVOA	113	UJ	113	112	U	112	112	U	112	112	U	112
2-Nitrophenol	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
3,3'-Dichlorobenzidine	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
3+4 Methylphenol (cresol, m+p)	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
3-Nitroaniline	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
4,6-Dinitro-2-methylphenol	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
4-Bromophenylphenyl ether	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
4-Chloro-3-methylphenol	SVOA	137	UJ	137	136	U	136	136	U	136	135	U	135
4-Chloroaniline	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
4-Chlorophenylphenyl ether	SVOA	103	U	103	102	U	102	102	U	102	102	U	102
4-Nitroaniline	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
4-Nitrophenol	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Acenaphthene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Acenaphthylene	SVOA	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Anthracene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Benzo(a)anthracene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Benzo(a)pyrene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Benzo(b)fluoranthene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Benzo(ghi)perylene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Benzo(k)fluoranthene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Bis(2-chloro-1-methylethyl)ether	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Bis(2-Chloroethoxy)methane	SVOA	103	U	103	102	U	102	102	U	102	102	U	102
Bis(2-chloroethyl) ether	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Bis(2-ethylhexyl) phthalate	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Butylbenzylphthalate	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Carbazole	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Chrysene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Dibenz[a,h]anthracene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Dibenzofuran	SVOA	103	U	103	102	U	102	102	U	102	102	U	102
Diethyl phthalate	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Dimethyl phthalate	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Di-n-butylphthalate	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Di-n-octylphthalate	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Diphenylamine	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Fluoranthene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Fluorene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Hexachlorobenzene	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Hexachlorobutadiene	SVOA	103	U	103	102	U	102	102	U	102	102	U	102
Hexachlorocyclopentadiene	SVOA	103	U	103	102	U	102	102	U	102	102	U	102
Hexachloroethane	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Indeno(1,2,3-cd)pyrene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Isophorone	SVOA	103	U	103	102	U	102	102	U	102	102	U	102
Naphthalene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Nitrobenzene	SVOA	103	U	103	102	U	102	102	U	102	102	U	102
N-Nitroso-di-n-dipropylamine	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
N-Nitrosodiphenylamine	SVOA												
Pentachlorophenol	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Phenanthrene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2
Phenol	SVOA	103	UJ	103	102	U	102	102	U	102	102	U	102
Pyrene	SVOA	10.3	UJ	10.3	10.2	U	10.2	10.2	U	10.2	10.2	U	10.2

Attachment	1	Sheet No.	36 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	SOB-2 - J1V1M4			SOB-4 - J1V1M6			SOB-5 - J1V1M7			SOB-6 - J1V1M8		
		11/13/14			11/13/14			11/13/14			11/13/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
1,2-Dichlorobenzene	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
1,3-Dichlorobenzene	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
1,4-Dichlorobenzene	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
2,4,5-Trichlorophenol	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
2,4,6-Trichlorophenol	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
2,4-Dichlorophenol	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
2,4-Dimethylphenol	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
2,4-Dinitrophenol	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
2,4-Dinitrotoluene	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
2,6-Dinitrotoluene	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
2-Chloronaphthalene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
2-Chlorophenol	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
2-Methylnaphthalene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
2-Methylphenol (cresol, o-)	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
2-Nitroaniline	SVOA	113	U	113	113	U	113	112	U	112	112	U	112
2-Nitrophenol	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
3,3'-Dichlorobenzidine	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
3+4 Methylphenol (cresol, m+p)	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
3-Nitroaniline	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
4,6-Dinitro-2-methylphenol	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
4-Bromophenylphenyl ether	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
4-Chloro-3-methylphenol	SVOA	137	U	137	137	U	137	136	U	136	136	U	136
4-Chloroaniline	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
4-Chlorophenylphenyl ether	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
4-Nitroaniline	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
4-Nitrophenol	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Acenaphthene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Acenaphthylene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Anthracene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Benzo(a)anthracene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Benzo(a)pyrene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Benzo(b)fluoranthene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Benzo(ghi)perylene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Benzo(k)fluoranthene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Bis(2-chloro-1-methylethyl)ether	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Bis(2-Chloroethoxy)methane	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Bis(2-chloroethyl) ether	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Bis(2-ethylhexyl) phthalate	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Butylbenzylphthalate	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Carbazole	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Chrysene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Dibenz[a,h]anthracene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Dibenzofuran	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Diethyl phthalate	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Dimethyl phthalate	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Di-n-butylphthalate	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Di-n-octylphthalate	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Diphenylamine	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Fluoranthene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	11.2	J	10.2
Fluorene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Hexachlorobenzene	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Hexachlorobutadiene	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Hexachlorocyclopentadiene	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Hexachloroethane	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Indeno(1,2,3-cd)pyrene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Isophorone	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Naphthalene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Nitrobenzene	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
N-Nitroso-di-n-dipropylamine	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
N-Nitrosodiphenylamine	SVOA												
Pentachlorophenol	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Phenanthrene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.2	U	10.2
Phenol	SVOA	102	U	102	103	U	103	102	U	102	102	U	102
Pyrene	SVOA	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2	10.5	J	10.2

Attachment	1	Sheet No.	37 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	SOB-7 - J1V1M9			SOB-8 - J1V1N0			SOB-9 - J1V1N1			SOB-10 - J1V1N2		
		11/13/14			11/13/14			11/13/14			11/13/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
1,2-Dichlorobenzene	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
1,3-Dichlorobenzene	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
1,4-Dichlorobenzene	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
2,4,5-Trichlorophenol	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
2,4,6-Trichlorophenol	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
2,4-Dichlorophenol	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
2,4-Dimethylphenol	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
2,4-Dinitrophenol	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
2,4-Dinitrotoluene	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
2,6-Dinitrotoluene	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
2-Chloronaphthalene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
2-Chlorophenol	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
2-Methylnaphthalene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
2-Methylphenol (cresol, o-)	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
2-Nitroaniline	SVOA	114	U	114	112	U	112	113	U	113	112	U	112
2-Nitrophenol	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
3,3'-Dichlorobenzidine	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
3+4 Methylphenol (cresol, m+p)	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
3-Nitroaniline	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
4,6-Dinitro-2-methylphenol	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
4-Bromophenylphenyl ether	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
4-Chloro-3-methylphenol	SVOA	139	U	139	136	U	136	137	U	137	136	U	136
4-Chloroaniline	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
4-Chlorophenylphenyl ether	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
4-Nitroaniline	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
4-Nitrophenol	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Acenaphthene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Acenaphthylene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Anthracene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Benzo(a)anthracene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Benzo(a)pyrene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Benzo(b)fluoranthene	SVOA	11.1	J	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Benzo(ghi)perylene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Benzo(k)fluoranthene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Bis(2-chloro-1-methylethyl)ether	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Bis(2-Chloroethoxy)methane	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Bis(2-chloroethyl) ether	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Bis(2-ethylhexyl) phthalate	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Butylbenzylphthalate	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Carbazole	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Chrysene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Dibenz[a,h]anthracene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Dibenzofuran	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Diethyl phthalate	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Dimethyl phthalate	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Di-n-butylphthalate	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Di-n-octylphthalate	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Diphenylamine	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Fluoranthene	SVOA	11.8	J	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Fluorene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Hexachlorobenzene	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Hexachlorobutadiene	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Hexachlorocyclopentadiene	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Hexachloroethane	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Indeno(1,2,3-cd)pyrene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Isophorone	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Naphthalene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Nitrobenzene	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
N-Nitroso-di-n-dipropylamine	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
N-Nitrosodiphenylamine	SVOA												
Pentachlorophenol	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Phenanthrene	SVOA	10.4	U	10.4	10.2	U	10.2	10.3	U	10.3	10.2	U	10.2
Phenol	SVOA	104	U	104	102	U	102	103	U	103	102	U	102
Pyrene	SVOA	16.3	J	10.4	11.2	J	10.2	10.3	U	10.3	10.2	U	10.2

Attachment	1	Sheet No.	38 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	SOB-11 - J1V1N3			SOB-12 - J1V1N4			FS-1 - J1RWF8			FS-2 - J1RXJ6		
		11/13/14			11/13/14			8/19/13			12/12/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	101	U	101	102	U	102	26	U	26	29	U	29
1,2-Dichlorobenzene	SVOA	101	U	101	102	U	102	21	U	21	23	U	23
1,3-Dichlorobenzene	SVOA	101	U	101	102	U	102	11	U	11	12	U	12
1,4-Dichlorobenzene	SVOA	101	U	101	102	U	102	13	U	13	14	U	14
2,4,5-Trichlorophenol	SVOA	101	U	101	102	U	102	9.4	U	9.4	10	U	10
2,4,6-Trichlorophenol	SVOA	101	U	101	102	U	102	9.4	U	9.4	10	U	10
2,4-Dichlorophenol	SVOA	101	U	101	102	U	102	9.4	U	9.4	10	U	10
2,4-Dimethylphenol	SVOA	101	U	101	102	U	102	62	U	62	68	U	68
2,4-Dinitrophenol	SVOA	101	U	101	102	U	102	310	UX	310	340	U	340
2,4-Dinitrotoluene	SVOA	101	U	101	102	U	102	62	U	62	68	U	68
2,6-Dinitrotoluene	SVOA	101	U	101	102	U	102	26	U	26	29	U	29
2-Chloronaphthalene	SVOA	10.1	U	10.1	10.2	U	10.2	9.4	U	9.4	10	U	10
2-Chlorophenol	SVOA	101	U	101	102	U	102	20	U	20	22	U	22
2-Methylnaphthalene	SVOA	10.1	U	10.1	10.2	U	10.2	18	U	18	19	U	19
2-Methylphenol (cresol, o-)	SVOA	101	U	101	102	U	102	12	U	12	13	U	13
2-Nitroaniline	SVOA	111	U	111	112	U	112	47	U	47	51	U	51
2-Nitrophenol	SVOA	101	U	101	102	U	102	9.4	U	9.4	10	U	10
3,3'-Dichlorobenzidine	SVOA	101	U	101	102	U	102	85	U	85	92	U	92
3+4 Methylphenol (cresol, m+p)	SVOA	101	U	101	102	U	102	31	U	31	34	U	34
3-Nitroaniline	SVOA	101	U	101	102	U	102	69	U	69	75	U	75
4,6-Dinitro-2-methylphenol	SVOA	101	U	101	102	U	102	310	UX	310	340	U	340
4-Bromophenylphenyl ether	SVOA	101	U	101	102	U	102	18	U	18	19	U	19
4-Chloro-3-methylphenol	SVOA	135	U	135	136	U	136	62	U	62	68	U	68
4-Chloroaniline	SVOA	101	U	101	102	U	102	77	U	77	84	U	84
4-Chlorophenylphenyl ether	SVOA	101	U	101	102	U	102	20	U	20	22	U	22
4-Nitroaniline	SVOA	101	U	101	102	U	102	68	U	68	74	U	74
4-Nitrophenol	SVOA	101	U	101	102	U	102	91	U	91	99	U	99
Acenaphthene	SVOA	10.1	U	10.1	10.2	U	10.2	9.7	U	9.7	11	U	11
Acenaphthylene	SVOA	10.1	U	10.1	10.2	U	10.2	16	U	16	17	U	17
Anthracene	SVOA	10.1	U	10.1	10.2	U	10.2	16	U	16	17	U	17
Benzo(a)anthracene	SVOA	15.9	J	10.1	10.2	U	10.2	19	U	19	21	U	21
Benzo(a)pyrene	SVOA	13.5	J	10.1	10.2	U	10.2	19	U	19	21	U	21
Benzo(b)fluoranthene	SVOA	15.9	J	10.1	10.2	U	10.2	25	U	25	27	U	27
Benzo(ghi)perylene	SVOA	10.1	U	10.1	10.2	U	10.2	15	U	15	16	U	16
Benzo(k)fluoranthene	SVOA	10.1	U	10.1	10.2	U	10.2	38	U	38	41	U	41
Bis(2-chloro-1-methylethyl)ether	SVOA	101	U	101	102	U	102	22	U	22	24	U	24
Bis(2-Chloroethoxy)methane	SVOA	101	U	101	102	U	102	22	U	22	24	U	24
Bis(2-chloroethyl) ether	SVOA	101	U	101	102	U	102	16	U	16	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	101	U	101	102	U	102	43	U	43	47	U	47
Butylbenzylphthalate	SVOA	101	U	101	102	U	102	40	U	40	44	U	44
Carbazole	SVOA	10.1	U	10.1	10.2	U	10.2	34	U	34	37	U	37
Chrysene	SVOA	15.5	J	10.1	10.2	U	10.2	25	U	25	28	U	28
Dibenz[a,h]anthracene	SVOA	10.1	U	10.1	10.2	U	10.2	18	U	18	19	U	19
Dibenzofuran	SVOA	101	U	101	102	U	102	19	U	19	21	U	21
Diethyl phthalate	SVOA	101	U	101	102	U	102	24	U	24	27	U	27
Dimethyl phthalate	SVOA	101	U	101	102	U	102	45	J	22	24	U	24
Di-n-butylphthalate	SVOA	101	U	101	102	U	102	27	U	27	30	U	30
Di-n-octylphthalate	SVOA	101	U	101	102	U	102	14	U	14	15	U	15
Diphenylamine	SVOA	101	U	101	102	U	102						
Fluoranthene	SVOA	21.2	J	10.1	10.2	U	10.2	34	U	34	37	U	37
Fluorene	SVOA	10.1	U	10.1	10.2	U	10.2	17	U	17	18	U	18
Hexachlorobenzene	SVOA	101	U	101	102	U	102	27	U	27	30	U	30
Hexachlorobutadiene	SVOA	101	U	101	102	U	102	9.4	U	9.4	10	U	10
Hexachlorocyclopentadiene	SVOA	101	U	101	102	U	102	47	U	47	51	U	51
Hexachloroethane	SVOA	101	U	101	102	U	102	20	U	20	22	U	22
Indeno(1,2,3-cd)pyrene	SVOA	10.1	U	10.1	10.2	U	10.2	21	U	21	23	U	23
Isophorone	SVOA	101	U	101	102	U	102	16	U	16	17	U	17
Naphthalene	SVOA	10.1	U	10.1	10.2	U	10.2	29	U	29	32	U	32
Nitrobenzene	SVOA	101	U	101	102	U	102	21	U	21	23	U	23
N-Nitroso-di-n-dipropylamine	SVOA	101	U	101	102	U	102	29	U	29	32	U	32
N-Nitrosodiphenylamine	SVOA							20	U	20	22	U	22
Pentachlorophenol	SVOA	101	U	101	102	U	102	310	U	310	340	U	340
Phenanthrene	SVOA	10.1	U	10.1	10.2	U	10.2	16	U	16	17	U	17
Phenol	SVOA	101	U	101	102	U	102	17	U	17	18	U	18
Pyrene	SVOA	26.6	J	10.1	10.2	U	10.2	11	U	11	12	U	12

Attachment	1	Sheet No.	39 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Attachment 1. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	FS-3 - J1RXJ7			FS-4 - J1RXJ8			NOB-2 - J1V1L1			NOB-5 - J1V1L4		
		12/12/13			12/12/13			11/24/14			11/24/14		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	32	U	32	27	U	27	106	U	106	105	U	105
1,2-Dichlorobenzene	SVOA	25	U	25	22	U	22	106	UJ	106	105	UJ	105
1,3-Dichlorobenzene	SVOA	14	U	14	12	U	12	106	UJ	106	105	UJ	105
1,4-Dichlorobenzene	SVOA	15	U	15	13	U	13	106	UJ	106	105	UJ	105
2,4,5-Trichlorophenol	SVOA	11	U	11	9.8	U	9.8	106	UJ	106	105	UJ	105
2,4,6-Trichlorophenol	SVOA	11	U	11	9.8	U	9.8	106	UJ	106	105	UJ	105
2,4-Dichlorophenol	SVOA	11	U	11	9.8	U	9.8	106	UJ	106	105	UJ	105
2,4-Dimethylphenol	SVOA	75	U	75	65	U	65	106	UJ	106	105	UJ	105
2,4-Dinitrophenol	SVOA	380	U	380	330	U	330	106	UJ	106	105	UJ	105
2,4-Dinitrotoluene	SVOA	75	U	75	65	U	65	106	UJ	106	105	UJ	105
2,6-Dinitrotoluene	SVOA	32	U	32	27	U	27	106	UJ	106	105	UJ	105
2-Chloronaphthalene	SVOA	11	U	11	9.8	U	9.8	10.6	U	10.6	10.5	U	10.5
2-Chlorophenol	SVOA	24	U	24	21	U	21	106	UJ	106	105	UJ	105
2-Methylnaphthalene	SVOA	22	U	22	19	U	19	10.6	UJ	10.6	10.5	UJ	10.5
2-Methylphenol (cresol, o-)	SVOA	15	U	15	13	U	13	106	UJ	106	105	UJ	105
2-Nitroaniline	SVOA	57	U	57	49	U	49	116	UJ	116	116	UJ	116
2-Nitrophenol	SVOA	11	U	11	9.8	U	9.8	106	UJ	106	105	UJ	105
3,3'-Dichlorobenzidine	SVOA	100	U	100	88	U	88	106	UJ	106	105	UJ	105
3+4 Methylphenol (cresol, m+p)	SVOA	37	U	37	32	U	32	106	UJ	106	105	UJ	105
3-Nitroaniline	SVOA	83	U	83	72	U	72	106	UJ	106	105	UJ	105
4,6-Dinitro-2-methylphenol	SVOA	370	U	370	320	U	320	106	UJ	106	105	UJ	105
4-Bromophenylphenyl ether	SVOA	22	U	22	19	U	19	106	UJ	106	105	UJ	105
4-Chloro-3-methylphenol	SVOA	75	U	75	65	U	65	141	UJ	141	140	UJ	140
4-Chloroaniline	SVOA	93	U	93	80	U	80	106	UJ	106	105	UJ	105
4-Chlorophenylphenyl ether	SVOA	24	U	24	21	U	21	106	U	106	105	U	105
4-Nitroaniline	SVOA	82	U	82	71	U	71	106	UJ	106	105	UJ	105
4-Nitrophenol	SVOA	110	U	110	95	U	95	106	UJ	106	105	UJ	105
Acenaphthene	SVOA	12	U	12	10	U	10	16.9	J	10.6	21.8	J	10.5
Acenaphthylene	SVOA	19	U	19	17	U	17	10.6	U	10.6	10.5	U	10.5
Anthracene	SVOA	19	U	19	17	U	17	35.6	J	10.6	55.4	J	10.5
Benzo(a)anthracene	SVOA	23	U	23	20	U	20	146	J	10.6	239	J	10.5
Benzo(a)pyrene	SVOA	23	U	23	20	U	20	138	J	10.6	265	J	10.5
Benzo(b)fluoranthene	SVOA	30	U	30	26	U	26	192	J	10.6	348	J	10.5
Benzo(ghi)perylene	SVOA	18	U	18	16	U	16	67	J	10.6	138	J	10.5
Benzo(k)fluoranthene	SVOA	45	U	45	39	U	39	76.2	J	10.6	134	J	10.5
Bis(2-chloro-1-methylethyl)ether	SVOA	26	U	26	23	U	23	106	UJ	106	105	UJ	105
Bis(2-Chloroethoxy)methane	SVOA	26	U	26	23	U	23	106	U	106	105	U	105
Bis(2-chloroethyl) ether	SVOA	19	U	19	16	U	16	106	UJ	106	105	UJ	105
Bis(2-ethylhexyl) phthalate	SVOA	52	U	52	45	U	45	106	UJ	106	105	UJ	105
Butylbenzylphthalate	SVOA	49	U	49	42	U	42	106	UJ	106	105	UJ	105
Carbazole	SVOA	41	U	41	35	U	35	27.2	J	10.6	31.9	J	10.5
Chrysene	SVOA	31	U	31	26	U	26	146	J	10.6	247	J	10.5
Dibenz[a,h]anthracene	SVOA	22	U	22	19	U	19	20.5	J	10.6	34.4	J	10.5
Dibenzofuran	SVOA	23	U	23	20	U	20	106	U	106	105	U	105
Diethyl phthalate	SVOA	29	U	29	26	U	26	106	UJ	106	105	UJ	105
Dimethyl phthalate	SVOA	95	J	26	32	J	23	106	UJ	106	105	UJ	105
Di-n-butylphthalate	SVOA	33	U	33	28	U	28	106	UJ	106	105	UJ	105
Di-n-octylphthalate	SVOA	16	U	16	14	U	14	106	UJ	106	105	UJ	105
Diphenylamine	SVOA							106	UJ	106	105	UJ	105
Fluoranthene	SVOA	41	U	41	35	U	35	273	J	10.6	421	J	10.5
Fluorene	SVOA	20	U	20	18	U	18	13.8	J	10.6	16.8	J	10.5
Hexachlorobenzene	SVOA	33	U	33	28	U	28	106	UJ	106	105	UJ	105
Hexachlorobutadiene	SVOA	11	U	11	9.8	U	9.8	106	U	106	105	U	105
Hexachlorocyclopentadiene	SVOA	57	U	57	49	U	49	106	U	106	105	U	105
Hexachloroethane	SVOA	24	U	24	21	U	21	106	UJ	106	105	UJ	105
Indeno(1,2,3-cd)pyrene	SVOA	25	U	25	22	U	22	73.4	J	10.6	141	J	10.5
Isophorone	SVOA	19	U	19	17	U	17	106	U	106	105	U	105
Naphthalene	SVOA	35	U	35	30	U	30	10.6	UJ	0.	10.5	UJ	10.5
Nitrobenzene	SVOA	25	U	25	22	U	22	106	U	106	105	U	105
N-Nitroso-di-n-dipropylamine	SVOA	35	U	35	30	U	30	106	UJ	106	105	UJ	105
N-Nitrosodiphenylamine	SVOA	24	U	24	21	U	21						
Pentachlorophenol	SVOA	370	U	370	320	U	320	106	UJ	106	105	UJ	105
Phenanthrene	SVOA	19	U	19	17	U	17	148	J	10.6	200	J	10.5
Phenol	SVOA	20	U	20	18	U	18	106	UJ	106	105	UJ	105
Pyrene	SVOA	14	U	14	12	U	12	202	J	10.6	375	J	10.5

Attachment	1	Sheet No.	40 of 40
Originator	J. D. Skoglie	Date	6/10/15
Checked	I. B. Berezovskiy	Job No.	14655
Calc. No.	0100H-CA-V0226	Rev. No.	0

Acrobat 8.0

CALCULATION COVER SHEET

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

Area: 100-H

Discipline: Environmental *Calculation No: 0100H-CA-V0227

Subject: 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Direct Contact Hazard Quotient, Carcinogenic Risk, and 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 = 6 Total = 7	J. D. Skoglie	I. B. Berezovskiy	T. Q. Howell	S. G. Wilkinson	6/15/15

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:	05/07/15	Calc. No.:	0100H-CA-V0227	Rev.:	0
Project:	100-H Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	05/07/15
Subject:	100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Direct Contact Hazard Quotient, Carcinogenic Risk, and Sum of Fractions Calculations					Sheet No.	1 of 6

PURPOSE:

Provide documentation to support the calculation of the direct contact hazard quotient (HQ) and excess carcinogenic risk for the 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2009b), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens
4) A cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.

This calculation also provides documentation to support the calculation of the sum of fractions evaluation for radionuclide direct exposure risk. Attainment of direct exposure RAGs is demonstrated using the single-radionuclide dose-equivalence lookup values to perform sum of fractions evaluations for comparison of the total radionuclide dose to the RAG of 15 mrem/yr above background. The model used to develop these dose-equivalence lookup values is presented in the 100 Area RDR/RAWP (DOE-RL 2009b).

GIVEN/REFERENCES:

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

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

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

4) WCH, 2015, *100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations*, 0100H-CA-V0226, Rev. 0, Washington Closure Hanford, Richland, Washington.

SOLUTION:

1) Generate an HQ for each noncarcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the individual HQ of <1.0 (DOE-RL 2009b).

2) Sum the HQs and compare this value to the cumulative HQ of <1.0.

3) Generate an excess cancer risk value for each carcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the excess cancer risk of $<1 \times 10^{-6}$ (DOE-RL 2009b).

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

Washington Closure Hanford CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	05/07/15	Calc. No.:	0100H-CA-V0227	Rev.:	0
Project:	100-H Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	05/07/15
Subject:	100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Direct Contact Hazard Quotient, Carcinogenic Risk, and Sum of Fractions Calculations					Sheet No.	2 of 6

Summation of Fractions

The sum-of-fractions compares the radionuclide cleanup verification results from the 100-H-28:3, 100-H-28:5, and 100-H-44 waste sites north overburden (NOB) and south overburden (SOB) to the direct exposure single radionuclide 15 mrem/yr dose-equivalence values and shows the sum-of-fractions evaluation for comparison of the total radionuclide dose to the RAG of 15 mrem/yr above background. The first two columns of the table present the COPCs and the maximum radionuclide activities for the samples. The third column presents the single radionuclide 15 mrem/yr dose-equivalence activities, and the last column presents the radionuclide activities divided by the dose-equivalence activities, followed by the sum of the fractions and determination of the total waste site dose for comparison to the 15 mrem/yr RAG.

METHODOLOGY:

The 100-H-28:3, 100-H-28:5, and 100-H-44 waste sites is comprised of four decision units for verification sampling; excavation 1-12, excavation 13-24, NOB, and SOB. Also collected were four focused samples. The direct contact hazard quotient and carcinogenic risk calculations for the 100-H-28:3, 100-H-28:5, and 100-H-44 waste sites was conservatively calculated using the greater of the statistical or maximum value for each analyte from all decision units from WCH (2015). Of the contaminants of potential concern (COPCs) for this site, boron, hexavalent chromium, molybdenum, nitrogen in nitrite, dimethylphthalate, the detected polycyclic aromatic hydrocarbons (PAHs), the detected pesticides, and the detected polychlorinated biphenyls (PCBs) require HQ and risk calculations because these analytes were detected and a Washington State or Hanford Site background value is not available. Chromium (total), copper, mercury, selenium, and silver require HQ and risk calculations because these analytes were detected above a Washington State or Hanford Site background value. Lead was detected above background; however, lead does not have a reference dose for calculation of a hazard quotient because toxic effects of lead are correlated with blood-lead levels rather than exposure levels or daily intake. Additionally, arsenic was detected above background; however, the arsenic standard is not toxicity based. Although total petroleum hydrocarbons (motor oil [high boiling] + diesel range) were detected and no background value is available, the risk associated with total petroleum hydrocarbons do not contribute to the cumulative toxicity calculation. All other site nonradionuclide COPCs were not detected or were quantified below background levels. An example of the HQ and risk calculations is presented below:

1) For example, the statistical value for boron is 17.6 mg/kg, divided by the noncarcinogenic RAG value of 7,200 mg/kg (calculated in accordance with the noncarcinogenic toxics effects formula in WAC 173-340-740[3]), is 2.4×10^{-3}. Comparing this value, and all other individual values, to the requirement of <1.0, this criterion is met.

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ can be obtained by summing the individual values. To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation. The sum of the HQ values is 2.6×10^{-1}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, and then multiplied by 1.0×10^{-6}. For example, the statistical value for hexavalent

Washington Closure Hanford CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	05/07/15	Calc. No.:	0100H-CA-V0227	Rev.:	0
Project:	100-H Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	05/07/15
Subject:	100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Direct Contact Hazard Quotient, Carcinogenic Risk, and Sum of Fractions Calculations					Sheet No.	3 of 6

chromium is 0.465 mg/kg; divided by 2.1 mg/kg, and multiplied as indicated, is 2.2×10^{-7}. Comparing this value to the requirement of $<1 \times 10^{-6}$, this criterion is met.

4) After these calculations are completed for the carcinogenic analytes, the cumulative excess cancer risk is obtained by summing the individual values. The excess cancer risk for the carcinogenic constituents detected is 1.5×10^{-6}. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

Summation of Fractions

The sum-of-fractions were calculated for the data set using the greater of the statistical or maximum value for each radionuclide COPC from the 95% upper confidence limit (UCL) calculation (WCH 2015).

Calculations for the 100-H-28:3, 100-H-28:5, and 100-H-44 waste sites were performed using RAGs from the 100 Area RDR/RAWP (DOE/RL 2009b). An example of the sum of fractions calculation of COPCs is presented below:

1) To calculate the fraction, the statistical value for cobalt-60 (0.038 pCi/g) is divided by the soil activity equivalent of 1.4 pCi/g equivalent to a 15 mrem/yr dose, resulting in a fraction of 0.0214.

2) The fractions for the remaining COPCs are determined and summed. The sum of these fractions equals 0.0924. The sum of fractions is then multiplied by 15 mrem/yr to determine the total equivalent dose of 1.39 mrem/yr for the 100-H-28:3, 100-H-28:5, and 100-H-44 waste sites. Comparing this value to the dose limit of <15 mrem/yr, the requirement is met.

RESULTS:

Hazard Quotient and Excess Cancer Risk Calculations

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None
3) List individual carcinogens and corresponding excess cancer risk $>1 \times 10^{-6}$: None
4) List the cumulative excess cancer risk for carcinogens $>1 \times 10^{-5}$: None

Table 1 shows the results of the calculations.

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Project:	100-H Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	05/07/15
Subject:	100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Direct Contact Hazard Quotient, Carcinogenic Risk, and Sum of Fractions Calculations					Sheet No.	4 of 6

Summation of Fractions

As demonstrated by the summation of the fractions, the maximum cumulative dose values contributed by the residual radionuclide populations (1.39 mrem/yr) is predicted to be less than the RAG of 15 mrem/yr above background.

Table 2 shows the results of the sum of fraction evaluation for radionuclide direct exposure risk.

Table 1. Direct Contact Hazard Quotient and Excess Cancer Risk Results for the 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites (Page 1 of 2).

Contaminants of Potential Concern	Maximum or Statistical Value [a] (mg/kg)	Noncarcinogen RAG [b] (mg/kg)	Hazard Quotient	Carcinogen RAG [b] (mg/kg)	Carcinogen Risk
Metals					
Arsenic [c]	8.52	20	--	--	--
Boron	17.6	7,200	2.4E-03	--	--
Chromium, total	19.0	80,000	2.4E-04	--	--
Chromium, hexavalent [d]	0.465	240	1.9E-03	2.1	2.2E-07
Copper	24.9	2,960	8.4E-03	--	--
Lead [e]	28.2	353	--	--	--
Mercury	4.85	24	2.0E-01	--	--
Molybdenum	1.66	400	4.2E-03	--	--
Selenium	1.40	400	3.5E-03	--	--
Silver	3.14	400	7.9E-03	--	--
Anions					
Nitrogen in nitrate	14.8	128,000	1.2E-04	--	--
Nitrogen in nitrite	4.50	8,000	5.6E-04	--	--
Semivolatiles					
Dimethylphthalate	0.095	80,000	1.2E-06	--	--
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	0.0678	4,800	1.4E-05	--	--
Anthracene	0.0294	24,000	1.2E-06	--	--
Benzo(a)anthracene	0.0534	--	--	1.37	3.9E-08
Benzo(a)pyrene	0.0800	--	--	0.137	5.8E-07
Benzo(b)fluoranthene	0.0518	--	--	1.37	3.8E-08
Benzo(ghi)perylene [f]	0.0987	2,400	4.1E-05	--	--
Benzo(k)fluoranthene	0.620	--	--	1.37	4.5E-07
Chrysene	0.187	--	--	13.7	1.4E-08
Dibenz(a,h)anthracene	0.0180	--	--	1.37	1.3E-08
Fluoranthene	0.0730	3,200	2.3E-05	--	--
Fluorene	0.0196	3,200	6.1E-06	--	--
Indeno(1,2,3-cd)pyrene	0.0260	--	--	1.37	1.9E-08
Phenanthrene [f]	0.120	24,000	5.0E-06	--	--
Pyrene	0.357	2,400	1.5E-04	--	--

Washington Closure Hanford CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	05/07/15	Calc. No.:	0100H-CA-V0227	Rev.:	0
Project:	100-H Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	05/07/15
Subject:	100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Direct Contact Hazard Quotient, Carcinogenic Risk, and Sum of Fractions Calculations					Sheet No.	5 of 6

Table 1. Direct Contact Hazard Quotient and Excess Cancer Risk Results for the 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites (Page 2 of 2).

Contaminants of Potential Concern	Maximum or Statistical Value [a] (mg/kg)	Noncarcinogen RAG [b] (mg/kg)	Hazard Quotient	Carcinogen RAG [b] (mg/kg)	Carcinogen Risk
Pesticides					
DDE, 4,4'-	0.00435	--	--	2.94	1.5E-09
DDT, 4,4'-	0.00078	40	2.0E-05	2.94	2.7E-10
Dieldrin	0.000489	4	1.2E-04	0.0625	7.8E-09
Polychlorinated Biphenyls					
Aroclor-1254	0.0393	1.6	2.5E-02	0.5	7.9E-08
Aroclor-1260	0.0132	--	--	0.5	2.6E-08
Total Petroleum Hydrocarbons					
TPH - Motor Oil (high boiling) + Diesel Range [g]	13.8	200	--	--	--
Totals					
Cumulative Hazard Quotient:			**2.6E-01**		
Cumulative Excess Cancer Risk:					**1.5E-06**

Notes:

[a] = From (WCH 2015).

[b] = Value obtained from the 100 Area RDR/RAWP (DOE-RL 2009b) or *Washington Administrative Code* (WAC) 173-340-740(3), Method B, 1996, unless otherwise noted.

[c] = The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement Project Managers as discussed in Section 2.1.2.1 of the RDR/RAWP (DOE-RL 2009b).

[d] = Value for the carcinogen RAG calculated based on the inhalation exposure pathway (WAC) 173-340-750(3), 1996.

[e] = Value for the noncarcinogenic RAG calculated using Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children, EPA/540/R 93/081, Publication No. 9285.7, U.S. Environmental Protection Agency, Washington, D.C.

[f] = Toxicity data for these chemicals are not available. The cleanup levels are based on use of surrogate chemicals.
benzo(g,h,i)perylene surrogate: pyrene
phenanthrene surrogate: anthracene

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

-- = not applicable

RAG = remedial action goal

Washington Closure Hanford CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	05/11/15	Calc. No.:	0100H-CA-V0227	Rev.:	0
Project:	100-H Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	05/11/15
Subject:	100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Direct Contact Hazard Quotient, Carcinogenic Risk, and Sum of Fractions Calculations					Sheet No.	6 of 6

Table 2. 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Overburden Sum of Fractions Prediction of Maximum Radionuclide Dose.

COPC	95% UCL Statistical Values (pCi/g)	Background (pCi/g) [a]	Statistical Value (Background Corrected) (pCi/g)	Soil Activity for 15 mrem/yr Dose (pCi/g) [b]	Fraction
Cesium-137	0.027	1.1	0	6.2	0
Cobalt-60	0.038	0.008	0.030	1.4	0.0214
Europium-152	0.102	NA	0.102	3.3	0.0309
Europium-154	0.0448	0.033	0.0118	3.0	0.00393
Europium-155	0.087	0.054	0.033	125	0.000264
Nickel-63	3.802	NA	3.802	4,013	0.000947
Total beta radiostrontium	0.337	0.18	0.157	4.5	0.0349
				Sum of Fractions	0.0924
				Equivalent Dose (mrem/yr)	1.39

[a] Background is subtracted from all isotopes in the overburden decision unit.

[b] Single radionuclide 15 mrem/yr dose-equivalence values and methodology are presented in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE-RL 2009b).

COPC = contaminant of potential concern

CONCLUSION:

The calculations in Tables 1 and 2 demonstrate that the 100-H-28:3, 100-H-28:5, and 100-H-44 waste sites meet the requirements for the direct contact hazard quotient, carcinogenic (excess cancer) risk, and radionuclide direct exposure risk as identified in the RDR/RAWP (DOE-RL 2009b) and SAP (DOE-RL 2009a). The direct contact hazard quotient, carcinogenic (excess cancer) risk calculations, and the sum of fractions evaluation for radionuclide direct exposure risk are for use in the RSVP for the 100-H-28:3, 100-H-28:5, and 100-H-44 waste sites.

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CALCULATION COVER SHEET

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

Area: 100-H

Discipline: Environmental *Calculation No: 0100H-CA-V0228

Subject: 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites (Excavation 1-12) Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater

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 = 3 Total = 4	J. D. Skoglie	I.B. Berezovskiy	R. J. Nielson	S. G. Wilkinson	6/15/15

SUMMARY OF REVISION

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

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	5/20/2015	Calc. No.:	0100H-CA-V0228	Rev.:	0
Project:	100-H Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	5/20/2015
Subject:	100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites (Excavation 1-12) Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater					Sheet No.	1 of 3

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and excess carcinogenic risk associated with soil contaminant levels compared to soil cleanup levels for protection of groundwater for the 100-H-28:3 and 100-H-44 excavation (EXC) 1-12 decision unit. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2009), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens
4) A cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.

GIVEN/REFERENCES:

1) BHI, 2005, *100 Area Analogous Sites RESRAD Evaluation*, Calculation No. 0100X-CA-V0050 Rev 0, Bechtel Hanford, Inc., Richland, Washington.

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

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

4) WCH, 2015, *100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations*, 0100H-CA-V0226, Rev. 0, Washington Closure Hanford, Inc., Richland, Washington.

SOLUTION:

1) Generate a HQ for each noncarcinogenic constituent detected above background in soil and with a K_d less than that required to show no migration to groundwater in 1,000 years using the RESRAD generic site model (BHI 2005).

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 in soil and with a K_d less than that required to show no migration to groundwater in 1,000 years using the RESRAD generic site model (BHI 2005).

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

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	5/20/2015	Calc. No.:	0100H-CA-V0228	Rev.:	0
Project:	100-H Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	5/20/2015
Subject:	100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites (Excavation 1-12) Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater					Sheet No.	2 of 3

METHODOLOGY:

The 100-H-28:3, 100-H-28:5, and 100-H-44 waste sites are comprised of four decision units for verification sampling; 100-H-28:3 and 100-H-44 excavation (EXC 1-12), 100-H-28:5 excavation (EXC 13-24), north overburden (NOB), and south overburden (SOB). Also collected were four focused samples. This hazard quotient and carcinogenic risk calculations for potential impact to groundwater at the 100-H-28:3, 100-H-28:5, and 100-H-44 waste sites were conservatively calculated for only the EXC 1-12 decision unit using the statistical value for each analyte from the 95% UCL calculation (WCH 2015). Based on the generic site RESRAD model (BHI 2005) and a vadose zone of approximately 2 m (6.6 ft) thickness, a K_d of 27 mL/g or greater is required to show no predicted migration to groundwater in 1,000 years. Of the contaminants of potential concern (COPCs) for this site, boron, hexavalent chromium, molybdenum, and nitrogen in nitrite are included because no Washington State or Hanford background value has been established and the distribution coefficient is less than that necessary to show no migration to groundwater in 1,000 years using this model. Copper was included because this analyte was detected above a Washington State or Hanford Site background value and the distribution coefficient is less than that necessary to show no migration to groundwater in 1,000 years using this model. All other site nonradionuclide COPCs were not detected, quantified below background levels, or has a K_d greater than or equal to 27 mL/g. An example of the HQ and risk calculations for soil constituents with a potential impact to groundwater is presented below:

1) The hazard quotient is defined as the ratio of the dose of a substance obtained over a specified time (mg/kg/day) to a reference dose for the same substance derived over the same specified time (mg/kg/day). The hazard quotient can also be calculated as the ratio of the concentration in soil (maximum or statistical value) (mg/kg) to the soil RAG (mg/kg) for protection of groundwater, where the RAG is the groundwater cleanup level (mg/L) (calculated with, and related to the hazard quotient through, WAC 173-340-720(3)(a)(ii)(A), 1996) x 100 x 1 mg/1000 mg (conversion factor). This is based on the "100 times rule" of WAC 173-340-740(3)(a)(ii)(A) (1996). For example, the statistical value for boron is 17.6 mg/kg, divided by the noncarcinogenic RAG value of 320 mg/kg is 5.5×10^{-2}. Comparing this value to the requirement of <1.0, this criterion is met.

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ can be obtained by summing the individual values. (To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation.) The cumulative HQ for the EXC 1-12 decision unit is 7.8×10^{-1}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, and then multiplied by 1×10^{-6}. All COPCs with carcinogenic RAGs were either not detected, quantified below background levels, or have a K_d greater than or equal to 27 mL/g. Therefore, the individual carcinogenic risk requirement of $<1 \times 10^{-6}$ and the cumulative excess cancer risk for carcinogens requirement of $<1 \times 10^{-5}$ are both met.

4) The soil cleanup RAGs for protection of groundwater are based on the "100 times" provision in WAC 173-340-740(3)(a)(ii)(A). WAC 173-340-740(3)(a)(ii)(A) (1996) provides the "100 times rule" but also states "unless it can be demonstrated that a higher soil concentration is protective of groundwater at the site." When the "100 times rule" values are exceeded, RESRAD was used to demonstrate that higher soil concentrations may be protective of groundwater.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	5/20/2015	Calc. No.:	0100H-CA-V0228	Rev.:	0
Project:	100-H Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	5/20/2015
Subject:	100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites (Excavation 1-12) Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater					Sheet No.	3 of 3

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None
3) List individual carcinogens and corresponding excess cancer risk >1 x 10^{-6}: None
4) List the cumulative excess cancer risk for carcinogens >1 x 10^{-5}: None.

Table 1 shows the results of the calculations.

Table 1. Hazard Quotient and Excess Cancer Risk Results for the 100-H-28:3 and 100-H-44 Excavation (EXC 1-12) Decision Unit.

Contaminants of Potential Concern[a]	Statistical Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Boron	17.6	320	5.5E-02	--	--
Chromium, hexavalent	0.421	4.8	8.8E-02	--	--
Copper	24.9	59.2	4.2E-01	--	--
Molybdenum	1.66	8	2.1E-01	--	--
Anions					
Nitrogen in nitrite	0.518	100	5.2E-03	--	--
Totals					
Cumulative Hazard Quotient:			**7.8E-01**		
Cumulative Excess Cancer Risk:					**0.0E+00**

Notes:

[a] = From (WCH 2015).

[b] = Value obtained from the Cleanup Levels and Risk Calculations (CLARC) database using Groundwater, Method B, results and the "100 times" model.

-- = not applicable

RAG = remedial action goal

CONCLUSION:

This calculation demonstrates that the 100-H-28:3 and 100-H-44 excavation (EXC 1-12) decision unit meets the requirements for the hazard quotient and excess carcinogenic risk for protection of groundwater as identified in the RDR/RAWP (DOE-RL 2009).

Acrobat 8.0

CALCULATION COVER SHEET

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

Area: 100-H

Discipline: Environmental *Calculation No: 0100H-CA-V0229

Subject: 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites (Excavation 13-24, NOB, SOB, & FS) Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater

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. B. Wilkinson	6/11/15

SUMMARY OF REVISION

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

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	5/20/2015	Calc. No.:	0100H-CA-V0229	Rev.:	0
Project:	100-H Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	5/20/2015
Subject:	100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites (Excavation 13-24, NOB, SOB, & FS) Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater					Sheet No.	1 of 4

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and excess carcinogenic risk associated with soil contaminant levels compared to soil cleanup levels for protection of groundwater for the 100-H-28:5, excavation (EXC 13-24), north overburden (NOB), south overburden (SOB), and focused samples (FS) decision units. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2009), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens
4) A cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.

GIVEN/REFERENCES:

1) BHI, 2005, *100 Area Analogous Sites RESRAD Evaluation*, Calculation No. 0100X-CA-V0050 Rev 0, Bechtel Hanford, Inc., Richland, Washington.

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

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

4) WCH, 2015, *100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Verification 95% UCL Calculations*, 0100H-CA-V0226, Rev. 0, Washington Closure Hanford, Inc., Richland, Washington.

SOLUTION:

1) Generate a HQ for each noncarcinogenic constituent detected above background in soil and with a K_d less than that required to show no migration to groundwater in 1,000 years using the RESRAD generic site model (BHI 2005).

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 in soil and with a K_d less than that required to show no migration to groundwater in 1,000 years using the RESRAD generic site model (BHI 2005).

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

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	6/10/2015	Calc. No.:	0100H-CA-V0229	Rev.:	0
Project:	100-H Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	6/10/2015
Subject:	100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites (Excavation 13-24, NOB, SOB, & FS) Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater					Sheet No. 2 of 4	

METHODOLOGY:

The 100-H-28:3, 100-H-28:5, and 100-H-44 waste sites are comprised of four decision units for verification sampling; 100-H-28:3 and 100-H-44 excavation (EXC 1-12), 100-H-28:5 excavation (EXC 13-24), NOB, and SOB. Also collected were four focused samples. This hazard quotient and carcinogenic risk calculations for potential impact to groundwater was conservatively calculated for only the EXC 13-24, NOB, SOB, and focused samples decision units using the greater of the statistical or maximum value for each analyte from the 95% UCL calculation (WCH 2015). Based on the generic site RESRAD model (BHI 2005) and a vadose zone of approximately 2 m (6.6 ft) thickness, a K_d of 27 mL/g or greater is required to show no predicted migration to groundwater in 1,000 years. Of the contaminants of potential concern (COPCs) for this site, boron, hexavalent chromium, molybdenum, dimethylphthalate, dieldrin, nitrogen in nitrite, acenaphthene, anthracene, fluorene, and phenanthrene are included because no Washington State or Hanford background value has been established and the distribution coefficient is less than that necessary to show no migration to groundwater in 1,000 years using this model. Selenium and nitrogen in nitrate were included because these analytes were detected above a Washington State or Hanford Site background value and the distribution coefficient is less than that necessary to show no migration to groundwater in 1,000 years using this model. Additionally, arsenic was detected above background; however, the arsenic standard is not toxicity based, therefore a groundwater HQ is not calculated. All other site nonradionuclide COPCs were not detected, quantified below background levels, or has a K_d greater than or equal to 27 mL/g. An example of the HQ and risk calculations for soil constituents with a potential impact to groundwater is presented below:

1) The hazard quotient is defined as the ratio of the dose of a substance obtained over a specified time (mg/kg/day) to a reference dose for the same substance derived over the same specified time (mg/kg/day). The hazard quotient can also be calculated as the ratio of the concentration in soil (maximum or statistical value) (mg/kg) to the soil RAG (mg/kg) for protection of groundwater, where the RAG is the groundwater cleanup level (mg/L) (calculated with, and related to the hazard quotient through, WAC 173-340-720(3)(a)(ii)(A), 1996) x 100 x 1 mg/1000 mg (conversion factor). This is based on the "100 times rule" of WAC 173-340-740(3)(a)(ii)(A) (1996). For example, the statistical value for selenium is 1.40 mg/kg, divided by the noncarcinogenic RAG value of 8 mg/kg is 1.8×10^{-1}. Comparing this value to the requirement of <1.0, this criterion is met.

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ can be obtained by summing the individual values. (To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation.) The cumulative HQ for the 100-H-28:3, 100-H-28:5, and 100-H-44 waste sites (EXC 13-24, NOB, SOB, & FS decision units) is 4.1×10^{-1}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, and then multiplied by 1×10^{-6}. For example the statistical value for dieldrin is 0.000489 mg/kg, divided by 0.0033, and multiplied by 1×10^{-6} is 1.5×10^{-7}. Therefore, the requirement of $<1 \times 10^{-6}$ is met. Dieldrin was the only analyte detected with a carcinogenic RAG. Therefore, the individual cancer risk and the cumulative cancer risk are the same. The criterion for cumulative excess cancer risk for carcinogens of $<1 \times 10^{-5}$ is also met.

4) The soil cleanup RAGs for protection of groundwater are based on the "100 times" provision in WAC 173-340-740(3)(a)(ii)(A). WAC 173-340-740(3)(a)(ii)(A) (1996) provides the "100 times

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	6/10/2015	Calc. No.:	0100H-CA-V0229	Rev.:	0
Project:	100-H Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	6/10/2015
Subject:	100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites (Excavation 13-24, NOB, SOB, & FS) Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater					Sheet No. 3 of 4	

rule" but also states "unless it can be demonstrated that a higher soil concentration is protective of groundwater at the site." When the "100 times rule" values are exceeded, RESRAD was used to demonstrate that higher soil concentrations may be protective of groundwater.

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None
3) List individual carcinogens and corresponding excess cancer risk >1 x 10^{-6}: None
4) List the cumulative excess cancer risk for carcinogens >1 x 10^{-5}: None.

Table 1 shows the results of the calculations.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	6/10/2015	Calc. No.:	0100H-CA-V0229	Rev.:	0
Project:	100-H Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	6/10/2015
Subject:	100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites (Excavation 13-24, NOB, SOB, & FS) Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater					Sheet No. 4 of 4	

Table 1. Hazard Quotient and Excess Cancer Risk Results for the 100-H-28:3, 100-H-28:5, and 100-H-44 (EXC 13-24, NOB, SOB, & FS Decision Units) Waste Sites.

Contaminants of Potential Concern[a]	Statistical Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Arsenic[c]	8.52	20	--	--	--
Boron	2.75	320	8.6E-03	--	--
Chromium, hexavalent	0.465	4.8	9.7E-02	--	--
Molybdenum	0.520	8	6.5E-02	--	--
Selenium	1.40	8	1.8E-01	--	--
Polycyclic Aromatic Hydrocarbones					
Acenaphthene	0.0678	96	7.1E-04	--	--
Anthracene	0.0294	240	1.2E-04	--	--
Fluorene	0.0196	64	3.1E-04	--	--
Phenanthrene[d]	0.120	240	5.0E-04	--	--
Semivolatiles					
Dimethylphthalate	0.095	1,600	5.9E-05	--	--
Pesticides					
Dieldrin	0.000489	0.80	6.1E-04	0.0033	1.5E-07
Anions					
Nitrogen in nitrate	14.8	1,000	1.5E-02	--	--
Nitrogen in nitrite	4.50	100	4.5E-02	--	--
Totals					
Cumulative Hazard Quotient:			**4.1E-01**		
Cumulative Excess Cancer Risk:					**1.5E-07**

Notes:

[a] = From WCH (2015).

[b] = Value obtained from the Cleanup Levels and Risk Calculations (CLARC) database using Groundwater, Method B, results and the "100 times" model.

[c] = The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement Project Managers as discussed in Section 2.1.2.1 of the RDR/RAWP (DOE-RL 2009).

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

Contaminant: phenanthrene; surrogate: anthracene

-- = not applicable

RAG = remedial action goal

CONCLUSION:

This calculation demonstrates that the 100-H-28:3, 100-H-28:5, and 100-H-44 waste sites (EXC 13-24, NOB, SOB, & FS decision units) meets the requirements for the hazard quotient and excess carcinogenic risk for protection of groundwater as identified in the RDR/RAWP (DOE-RL 2009).

APPENDIX D

DATA QUALITY ASSESSMENT

APPENDIX D

DATA QUALITY ASSESSMENT

VERIFICATION SAMPLING

A data quality assessment (DQA) was performed to compare the verification sampling approach and resulting analytical data with the sampling and data requirements specified in the site-specific sample design (WCH 2014). This DQA was performed in accordance with site-specific data quality objectives found in the *100 Area Remedial Action Sampling and Analysis Plan* (100 Area SAP) (DOE-RL 2009).

A review of the sample design (WCH 2014), the field logbooks (WCH 2013a, 2013b, 2015a, 2015b), and applicable analytical data packages has been performed as part of this DQA. To ensure quality data, the 100 Area SAP (DOE-RL 2009) data assurance requirements and the data validation procedures for chemical analysis and radiochemical analysis (BHI 2000a, 2000b) are used as appropriate. This review involves evaluation of the data to determine if they are of the right type, quality, and quantity to support the intended use (i.e., closeout decisions). The DQA completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data quality objectives process (EPA 2006).

Verification sample data collected at the 100-H-28:3 and 100-H-28:5 subsites and 100-H-44 waste site and at the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 overburden piles were provided by the laboratories in 11 sample delivery groups (SDGs): JP0614, JP0675, JP0903, JP0913, JP0920, JP0930, XP0161, XP0164, XP0165, XP0166, and XP0168. The SDG XP0168 was submitted for third-party validation. Major and minor deficiencies were identified in the analytical data set and are discussed in the following sections. If no comments are made about a specific analysis, it should be assumed that no deficiencies affecting the quality of the data were found.

MAJOR DEFICIENCIES

In SDG XP0168 third-party validation qualified all undetected nitrate, nitrite, and orthophosphate data as rejected with "R" flags due to exceedances of more than twice the Method 9056 holding time limit. In anticipation of this result, the project also requested analysis by Method 353.2 to obtain usable nitrate and nitrite data. Orthophosphate is not a regulated compound and the rejected data will not impact the evaluation of the target sites. Therefore, the resulting data set is sufficient for the intended purpose.

Similarly, the project has identified the same major deficiency associated with hold times for the Method 9056 nitrate, nitrite, and orthophosphate data in SDGs JP0614, JP0675, JP0903, JP0913, JP0920, JP0930, XP0161, XP0164, XP0165, and XP0166. The project has qualified these data as rejected with "R" flags. Method 353.2 was also run on these samples to obtain usable nitrate and nitrite data. The resulting data set is sufficient for the intended purpose.

In the SDG XP0161 pesticide analysis, anomalies associated with the continuing calibration verification samples were reported by the laboratory, which may be associated with software problems and/or shifting retention time windows. In addition, deficiencies were also reported associated with the matrix spikes, relative percent difference calculations, and surrogate recoveries. The project has qualified all nondetected pesticide results from SDG XP0161 as rejected with "R" flags, with the exception of sample J1V1K8, which was reported from a separate analytical batch. Additionally, as discussed in the Minor Deficiency section below, all detected results including those from sample J1V1K8 have been qualified as estimated with "J" flags.

As a result of exceedances in COPC data other than pesticides, additional remediation of the waste site(s) were performed in some areas, and many of the samples included in SDG XP0161 were recollected.

Once the project determined that non-detected pesticide data from SDG XP0161 would be rejected, and in conference with the Washington State Department of Ecology, a second round of additional samples were collected; therefore, a preponderance of the SDG XP0161 pesticide sample data has been replaced. The rejection of these data does not have a significant impact on the evaluation of the waste sites. The resulting data set is sufficient for decision-making purposes.

MINOR DEFICIENCIES

SDG JP0614

This SDG comprises one focused soil sample (J1RWF8) associated with the 100-H-28:3 pipeline. This sample was analyzed for semivolatile organic compounds (SVOCs), PAH, pesticides, inductively coupled plasma (ICP) metals, mercury, hexavalent chromium, ion chromatography anions by Method 9056, nitrogen in nitrate and nitrite by Method 353.2, and polychlorinated biphenyls (PCBs). Minor deficiencies are as follows.

In the SVOC analysis, the matrix spike (MS) and matrix spike duplicate (MSD) recoveries for 4,6-dinitro-2-methyphenol, and 2,4-dinitrophenol are outside the quality control (QC) limits. The laboratory has qualified the associated data with "T" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, serial dilutions of a digestate indicate physical and chemical interference are present for cobalt 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, the MS recovery for silicon is outside the QC limits. The laboratory has qualified the associated data with "N" flags. Method accuracy is verified by an acceptable laboratory control sample (LCS) recovery. Silicon is known to be a poor performing analyte for

ICP metals analysis. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the IC anions by Method 9056 analysis, the MS recovery for orthophosphate is outside the QC limits. The laboratory has qualified the associated data with "N" flags. An acceptable LCS recovery indicates that the analytical system was operating within control. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the IC anions by Method 9056 analysis, the holding time for nitrate, nitrite, and orthophosphate is exceeded by more than twice the limit. Nondetected results for these analytes in SDG JP0614 are discussed above in the Major Deficiencies section. Detected results for these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

General chemical analysis of soil samples includes a measurement of the percent moisture. The relative percent difference (RPD) calculated for the laboratory duplicate of sample J1RWF8 exceeded the QC limit. The laboratory has qualified the associated data with "M" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0675

This SDG comprises three focused soil sample (J1RXJ6, J1RXJ7, and J1RXJ8) associated with the 100-H-28:3 and 100-H-28:5 pipelines. These samples were analyzed for volatile organic compounds, SVOCs, PAH, pesticides, northwest total petroleum hydrocarbon (TPH) - diesel range, ICP metals, mercury, hexavalent chromium, IC anions by Method 9056, nitrogen in nitrate and nitrite by Method 353.2, and PCBs. Minor deficiencies are as follows.

In the ICP metals analysis, serial dilutions of a digestate indicate physical and chemical interference are present for cobalt 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, the analytes magnesium and zinc were detected in the method blank (MB) at concentrations greater than the associated reporting limits; however, the field sample results are all more than 20 times the detected concentrations. There is no significant impact on the field sample data. The data are usable for decision-making purposes.

In the ICP metals analysis, antimony was detected in an instrument blank at a concentration greater than one half of the reporting limit. This indicates a possible high bias for antimony. However, antimony was not detected in any of the field sample results. There is no impact on the data. The data are usable for decision-making purposes.

In the ICP metals analysis, the MS recovery for silicon is outside the QC limits. The laboratory has qualified the associated data with "N" flags. Method accuracy is verified by an acceptable LCS recovery. Silicon is known to be a poor performing analyte for ICP metals analysis. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the mercury analysis, the LCS recovery for mercury is outside the QC limits. This result indicates a possible high bias in the mercury data. The laboratory has qualified the associated samples with "N" flags. High biased data are usable for decision-making purposes.

In the IC anions by Method 9056 analysis, the holding time for nitrate, nitrite, and orthophosphate is exceeded by more than twice the limit. Nondetected results for these analytes in SDG JP0675 are discussed above in the Major Deficiencies section. Detected results for these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the Method 353.2 analysis, the MS recovery for "nitrate/nitrite as N" is outside the QC limits. There is no indication that the analytical system was operating out of control and method accuracy is verified by an acceptable LCS analysis. The laboratory has qualified the associated data with "N" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

General chemical analysis of soil samples includes a measurement of the percent moisture. The RPD calculated for the laboratory duplicate exceeded the QC limit. The laboratory has qualified the associated data with "M" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0903

This SDG comprises four statistical soil samples (J1V459, J1V460, J1V462, and J1V464) associated with the main excavation. This SDG contains a field sample pair (J1V459, J1V464). These samples were analyzed for PAH, pesticides, ICP metals, mercury, hexavalent chromium, IC anions by Method 9056, nitrogen in nitrate and nitrite by Method 353.2, and PCBs. Minor deficiencies are as follows.

In the PAH analysis, the RPDs calculated between the primary and confirmatory columns for samples J1V460 and J1V462 exceeded the QC limits. The laboratory has reported matrix interference is evident on both columns and qualified the associated data with "X" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the PAH analysis, the MS/MSD recoveries are outside the QC limits. The laboratory has qualified the associated data with "N" flags. Acceptable LCS analysis indicates that the analytical system was operating within control. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the IC anions by Method 9056 analysis, the holding time for nitrate, nitrite, and orthophosphate is exceeded by more than twice the limit. Nondetected results for these analytes in SDG JP0903 are discussed above in the Major Deficiencies section. Detected results for these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, serial dilutions of a digestate indicate physical and chemical interference are present for cobalt. 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, aluminum, barium, calcium, chromium, magnesium, manganese, and zinc were detected in the MB at concentrations that are either less than half of the reporting limit or are less than 1/20th of the associated field sample results. There is no significant impact on the field sample data. The data are usable for decision-making purposes.

SDG JP0913

This SDG comprises one statistical soil sample (J1V463) associated with the main excavation. This sample was analyzed for PAH, pesticides, ICP metals, mercury, hexavalent chromium, IC anions by Method 9056, nitrogen in nitrate and nitrite by Method 353.2, and PCBs. Minor deficiencies are as follows.

In the ICP metals analysis, serial dilutions of a digestate indicate physical and chemical interference are present. 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, the analytes barium and magnesium were detected in the MB at concentrations less than half of the associated reporting limits. There is no significant impact on the field sample data. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon is outside the QC limits. The laboratory has qualified the associated data with "N" flags. Silicon is known to be a poor performing analyte for this method. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals and mercury analyses, the RPDs calculated for boron and mercury are outside the control limit. 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 IC anions by Method 9056 analysis, the holding time for nitrate, nitrite, and orthophosphate is exceeded by more than twice the limit. Nondetected results for these analytes in SDG JP0913 are discussed above in the Major Deficiencies section. Detected results for these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0920

This SDG comprises one statistical soil sample (J1V461) associated with the main excavation. This sample was analyzed for PAH, pesticides, ICP metals, mercury, hexavalent chromium, IC anions by Method 9056, nitrogen in nitrate and nitrite by Method 353.2, and PCBs. Minor deficiencies are as follows.

In the ICP metals analysis, serial dilution of a digestate indicates physical and chemical interference may be present for nickel, copper, iron, and zinc. The laboratory has qualified the

associated results with "X" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, low levels of aluminum, barium, calcium, chromium, magnesium, manganese, and copper were reported in the MB. Because these detections are either less than half of the associated reporting limit or less than 1/20th of the field sample results, there is no significant impact on the field sample data. The data are usable for decision-making purposes.

In the ICP metals analysis, the MS recovery for silicon is outside the QC limits. The laboratory has qualified the associated data with "N" flags. Silicon is a known to be a poor performing analyte for this method. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the IC anions by Method 9056 analysis, the holding time for nitrate, nitrite, and orthophosphate is exceeded by more than twice the limit. Nondetected results for these analytes in SDG JP0913 are discussed above in the Major Deficiencies section. Detected results for these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

In the nitrate/nitrite as N analysis (Method 353.2), the RPD calculated is outside the QC limits. The laboratory has qualified the associated data with "M" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0930

This SDG comprises two statistical soil sample (J1V596 and J1V597) associated with the northern overburden pile. These samples were analyzed for PAH, pesticides, ICP metals, mercury, hexavalent chromium, TPH, IC anions by Method 9056, nitrogen in nitrate and nitrite by Method 353.2, PCBs, SVOCs, carbon-14, nickel-63, hydrogen ion concentration (pH), and by gamma energy analysis (GEA). Minor deficiencies are as follows.

In the SVOC analysis, the LCS recovery for pentachlorophenol is outside the QC limits. The laboratory has qualified the associated data with "T" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the SVOC analysis, MS/MSD recoveries were reported outside the QC limits. The laboratory has qualified the associated data with "T" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the pesticides analysis, the RPDs calculated between the MS and MSD for endosulfan II, endosulfan sulfate, and methoxychlor are outside the QC limits. Acceptable LCS recoveries indicate that the analytical system was operating within control. The data are usable for decision-making purposes.

In the PAH analysis, the RPDs calculated between the primary and confirmatory columns are outside the QC limits. 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 PAH analysis, MSD recoveries were reported outside the QC limits. 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, serial dilutions of a digestate indicate physical and chemical interferences for cobalt and lead. 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, low levels of aluminum, barium, calcium, chromium, magnesium, manganese, and copper were reported in the MB. Because these detections are either less than half of the associated reporting limit or less than 1/20th of the field sample results, there is no significant impact on the field sample data. The data are usable for decision-making purposes.

In the ICP metals analysis, the common laboratory contaminant iron was detected in the MB at a concentration greater than the reporting limit. The field sample results for iron are all more than 20 times the MB result. There is no impact on the field sample data. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon is outside the QC limits. The laboratory has qualified the associated data with "N" flags. Silicon is known to be a poor performing analyte for this method. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculated for mercury in the laboratory duplicate analysis is outside the QC limits. 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 Method 9056 IC anions analysis, chloride was detected in the MB at less than half of the practical quantitation limit. There is no impact on the field sample data. The data are usable for decision-making purposes.

In the IC anions by Method 9056 analysis, the holding time for nitrate, nitrite, and orthophosphate was exceeded by more than twice the limit. Nondetected results for these analytes in SDG JP0913 are discussed above in the Major Deficiencies section. Detected results for these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG JP0970

This SDG comprises 4 replacement statistical soil samples (J1V7C8, J1V7C9, J1V7D0, and J1V7D1) associated with the main excavation. These samples were collected to replace the rejected pesticide data described above in the Major Deficiencies section; therefore, they were analyzed for pesticides only. Minor deficiencies are as follows.

In the pesticide analysis, no QC spiked samples (LCS, MS, MSD) were prepared for toxaphene. Toxaphene is a mixture of compounds which could interfere with the other pesticides in the analysis. It is typical for the laboratory to leave it out of the spiking mixture. Toxaphene data for SDG JP0970 may be considered estimated. Estimated data are useable for decision-making purposes.

SDG XP0161

This SDG comprises 13 statistical soil sample (J1V1J6 through J1V1J9, J1V1K0 through J1V1K8) associated with the main excavation. These samples were analyzed for PAH, pesticides, ICP metals, mercury, hexavalent chromium, IC anions by Method 9056, nitrogen in nitrate and nitrite by Method 353.2, and PCBs. Minor deficiencies are as follows.

In the PAH analysis, the MS recoveries are outside the QC limits. The laboratory has qualified the associated data with "T" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the PAH analysis, the RPDs calculated between the primary and confirmatory samples are outside the QC limits. The laboratory has qualified the associated data with "P" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the PAH analysis, due to high target analyte concentrations the samples were diluted by as much as 200 fold. The laboratory has qualified the associated data with "D" flags. The reporting limits have been adjusted appropriately. The data are usable for decision-making purposes.

In the PAH analysis, matrix interference has impacted several analytes. 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 pesticide analysis, the calibration verification standards were outside the QC limits. These standards were reanalyzed with similar results. Nondetected pesticide results for SDG XP0161 were qualified as described in the Major Deficiency section above. Detected results have been qualified by the project as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the pesticide analysis, MS/MSD recoveries for several analytes were outside the QC limits. The laboratory has qualified the associated data with "T" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the pesticide analysis, the RPDs calculated between the MS and MSD were not all within the QC limits. The laboratory has qualified the associated data with "P" flags. These data may be considered estimated.

In the ICP metals analysis, the analytes lead, zinc, and selenium were detected in the MB. The laboratory has qualified the associated data with "C" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS/MSD recoveries for lead, potassium, and silicon were outside the QC limits. 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, the RPDs calculated for the laboratory duplicate analytes barium and silicon are not within the QC limits. 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 IC anions by Method 9056 analysis, the holding time for nitrate, nitrite, and orthophosphate is exceeded by more than twice the limit. Nondetected results for these analytes in SDG JP0614 are discussed above in the Major Deficiencies section. Detected results for these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG XP0164

This SDG comprises 13 statistical soil samples (J1V1H3 through J1V1H9, J1V1J0 through J1V1J5) associated with the main excavation. These samples were analyzed for ICP metals, mercury, hexavalent chromium, IC anions by Method 9056, nitrogen in nitrate and nitrite by Method 353.2, PCBs, and pH. Minor deficiencies are as follows.

In the PCB analysis, the RPD calculated between the primary and confirmatory column for the aroclor-1254 result in sample J1V1J3 is outside the QC limits. The laboratory has qualified this result with a "P" flag. This result may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recovery for silicon is outside the QC limits. 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, the RPD calculated from the laboratory duplicate sample for silicon is outside the QC limits. 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 IC anions by Method 9056 analysis, the holding time for nitrate, nitrite, and orthophosphate is exceeded by more than twice the limit. Nondetected results for these analytes in SDG JP0614 are discussed above in the Major Deficiencies section. Detected results for these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG XP0165

This SDG comprises eight statistical soil samples (J1V1M3 through J1V1M5, J1V1M7, J1V1M9, J1V1N0, J1V1N5, and J1V1N6) associated with the southern overburden. These samples were analyzed for ICP metals, mercury, hexavalent chromium, IC anions by Method 9056, nitrogen in nitrate and nitrite by Method 353.2, PAH, PCBs, pesticides, SVOCs, TPH, carbon-14, nickel-63, pH, and by GEA. Minor deficiencies are as follows.

In the SVOC analysis, the LCS recoveries for several analytes were outside the QC limits and biased high. None of these analytes were detected in the field sample results; therefore, the high bias has had no impact on the field sample data. The data are usable for decision-making purposes.

In the SVOC analysis, the RPD calculated between the MS and MSD for hexachlorocyclopentadiene is outside the QC limits. The individual MS and MSD results for hexachlorocyclopentadiene are within QC limits. Acceptable LCS results confirm the analytical system was operating within control. The data are usable for decision-making purposes.

In the TPH analysis, the MS recovery is slightly below the QC limits. The RPD calculated between the MS and the MSD was also outside the QC limits. Acceptable LCS results indicate the analytical system was operating within control. This result appears to be a spiking error. There is no impact to the field sample data. The data are usable for decision-making purposes.

In the ICP metals analysis, the MS recovery for silicon is outside the QC limits. 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, the analytes sodium, zinc, and selenium were detected in the MB. The laboratory has qualified the associated data with "C" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the IC anions by Method 9056 analysis, the holding time for nitrate, nitrite, and orthophosphate is exceeded by more than twice the limit. Nondetected results for these analytes in SDG JP0614 are discussed above in the Major Deficiencies section. Detected results for these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG XP0166

This SDG comprises six statistical soil samples (J1V1M6, J1V1M8, and J1V1N1 through J1V1N4) associated with the southern overburden. These samples were analyzed for ICP metals, mercury, hexavalent chromium, IC anions by Method 9056, nitrogen in nitrate and nitrite by Method 353.2, PAH, PCBs, pesticides, SVOCs, TPH, carbon-14, nickel-63, pH, and GEA. Minor deficiencies are as follows.

In the SVOC analysis, the continuing calibration verification standards did not all meet the primary QC criteria. However, for the SVOC method the secondary QC criteria allows for a

percentage of outliers. The continuing calibration verification standards meet the secondary QC criteria. The data are usable for decision-making purposes.

In the SVOC analysis, the RPDs calculated between the MS and MSD results were not all within the QC limits. However, all of the individual MS and MSD results are within QC limits. Acceptable LCS results confirm that the analytical system was operating within control. The data are usable for decision-making purposes.

In the PAH analysis, the RPD calculated between the primary and confirmatory column for the acenaphthene result in sample J1V1N3 is outside the QC limits. The laboratory has qualified this result with a "P" flag. This result may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, a low level of zinc was detected in the MB. The field sample results for zinc are all more than 10 times the MB result. There is no appreciable impact on the field sample results. The data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries for vanadium, zinc, cobalt, and lead are outside the QC limits. The laboratory has qualified the associated results with "N" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPDs calculated from the laboratory duplicate for vanadium is outside QC limits. The laboratory has qualified the associated data with "M" flags. These data are usable for decision-making purposes.

In the IC anions by Method 9056 analysis, the holding time for nitrate, nitrite, and orthophosphate is exceeded by more than twice the limit. Nondetected results for these analytes in SDG JP0614 are discussed above in the Major Deficiencies section. Detected results for these analytes may be considered estimated. Estimated data are usable for decision-making purposes.

SDG XP0168

This SDG comprises 13 statistical soil samples (J1V1L0 through J1V1L9, and J1V1M0 through J1V1M2) associated with the northern overburden. These samples were analyzed for ICP metals, mercury, hexavalent chromium, IC anions by Method 9056, nitrogen in nitrate and nitrite by Method 353.2, PAH, PCBs, pesticides, SVOCs, TPH, carbon-14, nickel-63, pH, and GEA. SDG XP0168 was submitted for third-party validation. Minor deficiencies are as follows.

In the SVOC analysis, the LCS recoveries for several analytes 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 SVOC analysis, the MSD recoveries for many of the analytes are outside the QC limits. The MSD recoveries are in the range of 40 to 50%, suggesting a spiking error in the sample preparation. The MS recoveries were within the QC range. As a result many of the RPDs calculated between the MS and MSD were also 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 pesticide analysis, due to a lack of MS, MSD, or LCS results for toxaphene, third-party validation has qualified all toxaphene results in SDG XP0168 as estimated with "J" flags. This is a standard result for toxaphene which is a mixture of compounds that would interfere with the evaluation of other analytes if it were included in the spiking mixtures. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recovery for silicon is outside the QC limits. Silicon is a known poor performing analyte for this analytical method. Third-party validation qualified all silicon results in SDG XP0168 as estimated with "J" flags. Estimated 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)/QC measures are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples listed in the field logbooks (WCH 2013a, 2013b, 2015a, 2015b) are shown in Table D-1. The main and QA/QC sample results are presented in Appendix C.

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

Sample Area	Main Sample	Duplicate Sample
Excavation area	J1V1H5	J1V1J5
Excavation area	J1V459	J1V464
Northern Overburden	J1V1L8	J1V1M2
Southern Overburden	J1V1M5	J1V1N5

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 C provides details on duplicate pair evaluation and RPD calculation.

The field duplicate RPDs calculated for chromium (32%), copper (77.1%), iron (41%), zinc (46.5%), and chloride (52.2%) in the excavation area and silicon (34.8%) in the northern overburden are above the duplicate acceptance criteria of 30%.

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

Summary

Limited, random, or sample matrix-specific influenced batch QC issues, such as those discussed above, are a potential for any analysis. The number and types seen in these data sets are within expectations for the matrix types and analyses performed. The DQA review of the 100-H-28:3, 100-H-28:5, and 100-H-44 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 the 100-H-28:3 and 100-H-28:5 subsites and the 100-H-44 waste site concludes that the reviewed data are of the right type, quality, and quantity to support the intended use. The analytical data were found acceptable for decision-making purposes.

The verification sample analytical data are stored in the Environmental Restoration project-specific database prior to being submitted for inclusion in the Hanford Environmental Information System database. The verification sample analytical data are also summarized in Appendix C.

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