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

15-AMRP-0281

AUG 07 2015

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

Dear Mr. Faulk:

TRANSMITTAL OF APPROVED WASTE SITE RECLASSIFICATION FORM AND SUPPORTING INFORMATION FOR RECLASSIFICATION OF THE 300-15:4, 3906 NORTH SIDE AND 3906-B LIFT STATIONS SUBSITE, REVISION 0

Attached for your use is the approved Waste Site Reclassification Form No. 2013-117 and supporting information for reclassification of the, "300-15:4, 3906 North Side and 3906-B Lift Stations Subsite," Rev. 0. If you have any questions, please contact me, or your staff may contact, Rudy Guercia, of my staff, on (509) 376-5494.

Sincerely,

Mark S. French, Director
River Corridor Division

AMRP:RFG

Attachment

cc w/attach:
B. Simes, EPA-HQ
Administrative Record, H6-08 (300-FF-2 OU)

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

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WASTE SITE RECLASSIFICATION FORM

Operable Unit: 300-FF-2 **Control No.:** 2013-117

Waste Site Code(s)/Subsite Code(s): 300-15:4

Reclassification Category: Interim ☐ Final ☒

Reclassification Status: Closed Out ☐ No Action ☒ Rejected ☐

RCRA Postclosure ☐ Consolidated ☐ None ☐

Approvals Needed: DOE ☒ Ecology ☐ EPA ☒

Description of current waste site condition:

The 300-15:4, 3906 North Side and 3906-B Lift Stations is a subsite of the 300-15, 300 Area Process Sewer System waste site, part of the 300-FF-2 Operable Unit. The 300-15 waste site was identified as requiring remediation in the *Hanford Site 300 Area, Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1, Hanford Site, Benton County, Washington* (300 Area ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA and DOE/RL 2013). Based on the results of characterization sampling, the 300-15:4 waste subsite meets the remedial action objectives (RAOs) established by the 300 Area ROD and can be reclassified as Final No Action. The southern half of the 3906 Lift Station was reclassified separately in July 2013 as Interim No Action as part of the 300-257, 309 Process Sewer to River waste site. The 300-257 waste site was further reclassified as Final Closed Out by WSRF 2014-037 in May 2014.

The 300-15:4 subsite consists of the north portion of a 3.7- by 3.7- by 5.5- m (12- by 12- by 18- ft) reinforced concrete vault, lying mostly below grade, that was the 3906 Lift Station and the below-grade 5.8-m (19-ft deep) and 1.8-m (6-ft)-diameter reinforced concrete well that was the 3906-B Lift Station. The 3906 Lift Station provided a gravity drain collection point in the southeast part of the 300 Area for both the sanitary sewer system and the process sewer system. Wastewater was pumped westward where it could then flow by gravity to the end of the sewage collection systems for both sanitary and wastewater discharges. The lift station pumps were shut down in 2009 with closure of the 300 Area Treated Effluent Disposal Facility. However, a temporary tie-in via a sump pump continued to send effluent to the 3906-B Lift Station until the summer of 2012 when the 3906 Lift Station was deactivated.

Demolition of the above grade portion of the 3906 Lift Station was completed in July 2013. The below-grade portion of the 3906 Lift Station was removed to a depth of 0.9 m (3 ft) below grade. The debris was removed and disposed of at the Environmental Restoration Disposal Facility, as specified in the *Removal Action Work Plan for 300 Area Facilities* (300 Area RAWP), DOE/RL-2004-77, Rev. 2, U.S. Department of Energy, Richland, Washington (DOE-RL 2007). No portion of the 3906-B below-grade structure was removed because of interference from adjacent and active underground electrical power lines. Both lift stations were backfilled with clean borrow pit material. All work was performed in accordance with the 300 Area RAWP (DOE-RL 2007) and current site conditions have been evaluated in accordance with the *Remedial Design Report/Remedial Action Work Plan for 300-FF-2 Soils* (300-FF-2 RDR/RAWP), DOE/RL-2014-13-ADD1, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington (DOE-RL 2015).

Basis for reclassification:

Characterization sampling of the 3906 North Side and 3906-B Lift Station was conducted on March 7, 2013, and July 12, 2013, respectively. The characterization sampling results were evaluated in comparison to the cleanup levels (CULs) and RAOs from the 300 Area ROD (EPA and DOE-RL 2013), as described in the 300-FF-2 RDR/RAWP (DOE-RL 2015). In accordance with this evaluation, the sampling results support a reclassification of the 300-15:4 subsite to Final No Action. The current site conditions achieve the industrial land use CULs and RAOs established by the 300 Area ROD (EPA and DOE-RL 2013). The results of sampling show that residual contaminant concentrations of aroclor-1254, aroclor-1260, benzo(a)pryene, and cobalt in the 3906 North Side Lift Station sample do not meet CULs for unlimited use and unrestricted exposure; therefore, institutional controls to maintain industrial land use are required for the 300-15:4 subsite. The basis for reclassification is described in Attachment A.

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 300-FF-2 **Control No.:** 2013-117

Waste Site Code(s)/Subsite Code(s): 300-15:4

Regulator comments:

Waste Site Controls:

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

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

The 300-15:4 subsite does not meet CULs for unlimited use and unrestricted exposure. Therefore, institutional controls to maintain industrial land use are required as established in the 300 Area ROD (EPA and DOE-RL 2013).

M. French	M French	7/21/15
DOE Federal Project Director (printed)	Signature	Date
NA		
Ecology Project Manager (printed)	Signature	Date
B. Simes		7/28/15
EPA Project Manager (printed)	Signature	Date

300-15:4, 3906 NORTH SIDE AND 3906-B LIFT STATIONS SUBSITE

Attachment to Waste Site Reclassification Form 2013-117

August 2015

ATTACHMENT A

300-15:4 "FINAL NO ACTION" EVALUATION

ATTACHMENT A

300-15:4 "FINAL NO ACTION" EVALUATION

INTRODUCTION

This evaluation documents that the 300-15:4, 3906 North Side and 3906-B Lift Stations subsite meets the remedial action objectives and associated cleanup levels (CULs) established in the *Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1, Hanford Site, Benton County, Washington* (300 Area ROD) (EPA and DOE-RL 2013) and incorporated into the *Remedial Design Report/Remedial Action Work Plan for 300-FF-2 Soils* (300-FF-2 RDR/RAWP) (DOE-RL 2015). Therefore, the 300-15:4 subsite is reclassified as "Final No Action." Because results of sampling show that residual contaminant concentrations do not meet CULs for unlimited use and unrestricted exposure, institutional controls to maintain industrial land use are required.

This evaluation provides a summary of the operational history, decommissioning activities, characterization sampling, and data evaluation that was performed to support a Final No Action reclassification of the subsite.

SITE DESCRIPTION and BACKGROUND

The 300-15:4, 3906 North Side and 3906-B Lift Stations subsite consists of the northern half of the 3906 Lift Station and the nearby 3906-B Lift Station (Figures A-1 through A-4). The 3906 Lift Station is located northeast of the location of the former 337 Building and just south of Locust Road. The 3906-B Lift Station is located just east of Riverview Loop near the 3906 Lift Station. The 3906 Lift Station facility and the 3906-B facility were both isolated and made inactive in late 2012.

The 3906 Lift Station structure is a 3.7- by 3.7- by 5.5- m (12- by 12- by 18- ft) reinforced concrete vault with walls from 25 to 30 cm (10 to 12 in.) thick. The structure lies mostly below grade. The 3906 Lift Station is divided into two separate systems by a concrete wall. The northern portion of the structure served the sanitary sewer and contained two 3-horsepower pumps that could operate at 190 Lpm (50 gpm). The southern portion of the structure contained two 20-horsepower pumps rated at 2650 Lpm (700 gpm) and was used for process sewer waste streams. The lift station provided a gravity-drain collection point in the southeast part of the 300 Area for both the sanitary sewer system and the process sewer system. Wastewater was pumped westward and then flowed by gravity to the end of the sewage collection systems for sanitary and wastewater (WCH 2013a). The 3906 Lift Station pumps were shut down in 2009 with closure of the 300 Area Treated Effluent Disposal Facility. However, a temporary tie-in via a sump pump continued to send effluent to the 3906-B Lift Station until the summer of 2012 when the lift station was deactivated. During 2009 to 2012, both portions of the lift station received process sewer effluent because of temporary system reconfigurations that supported utility reroutes. The southern half of the 3906 Lift Station is part of the 300-257 waste site and has been reclassified separately as a "Final No Action" site (WCH 2013f).

Figure A-1. The 300-15:4 Subsite Location Map.

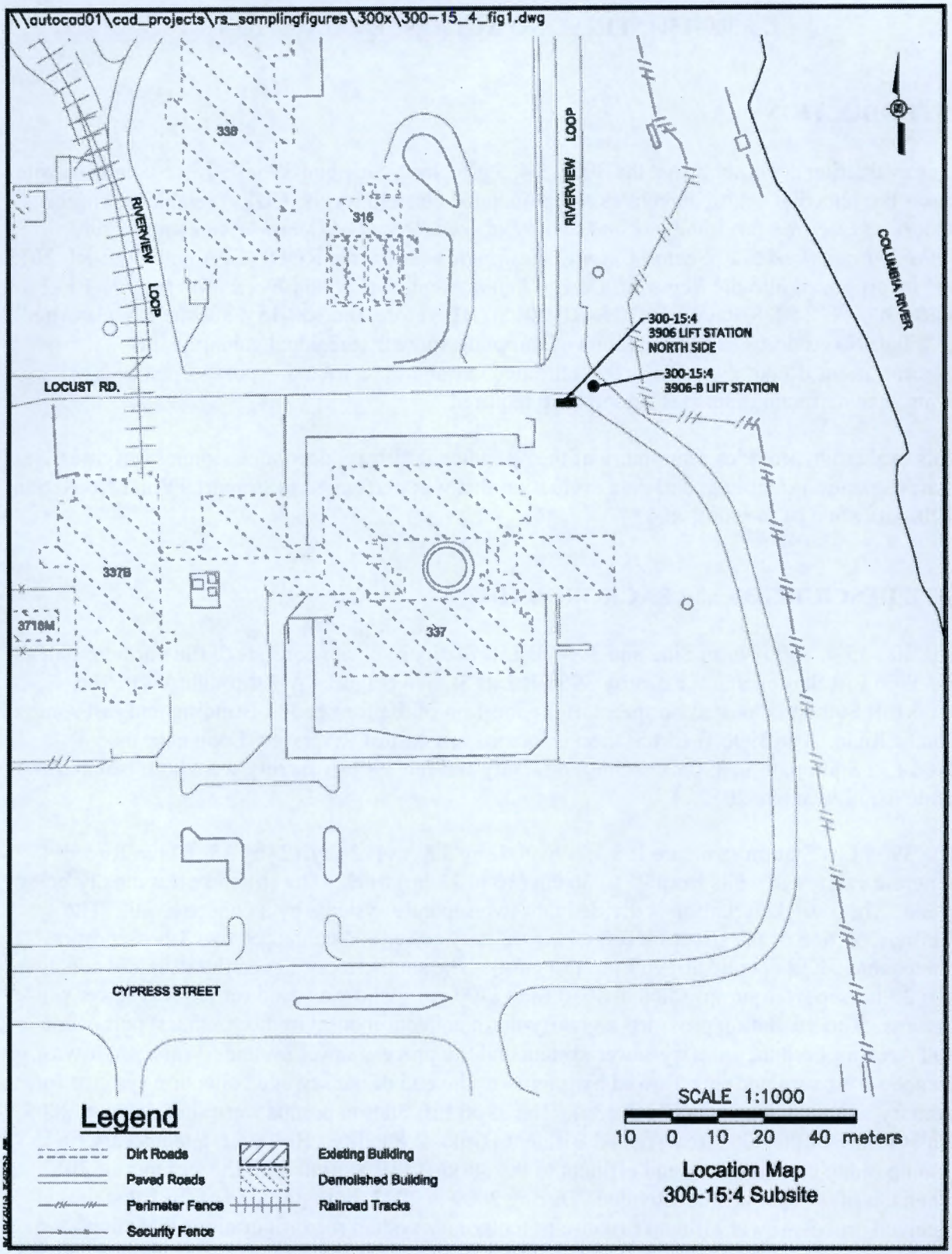


Figure A-2. Aerial Photograph of the 300-15:4 Area (March 22, 2013).

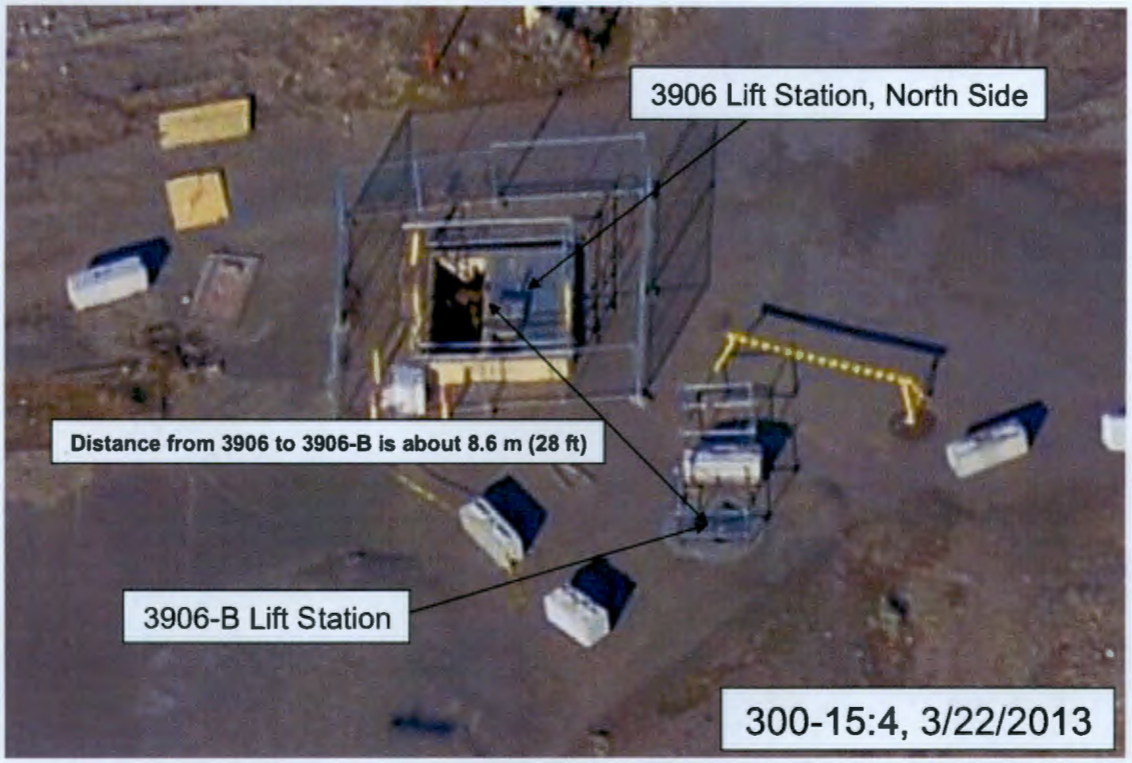
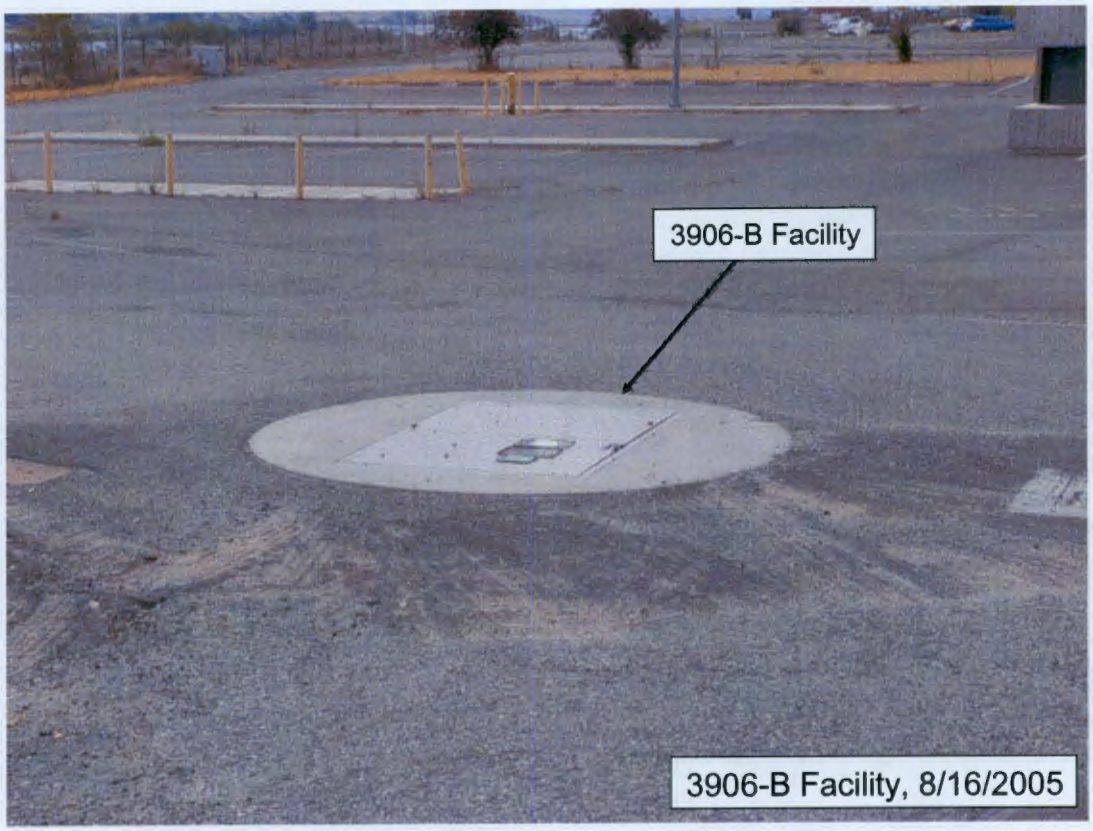


Figure A-3. The 3906 Lift Station, March 7, 2013 (View to Southeast).

Figure A-4. The 3906-B Lift Station, August 2005 (View to Southeast).



The 3906-B Lift Station served historically as a gravity collection point and a pump station for the sanitary sewer wastewaters (WCH 2013a). The lift station consisted of an entirely below-grade, reinforced concrete well that was approximately 5.8-m (19 ft) deep and 1.8 m (6 ft) in diameter. Wastewater was pumped westward and then flowed by gravity to the end of the sewage collection systems for sanitary and wastewater.

The 3906 Lift Station and the 1906-B Lift Station were identified in the *Removal Action Work Plan for 300 Area Facilities* (300 Area RAWP) (DOE-RL 2007) for deactivation, decontamination, decommissioning, and demolition. As noted in the 300 Area RAWP, characterization sampling is performed to support waste disposal activities, to define contaminants present before or after the completion of the removal action, and in some cases to support site closeout documentation. Based upon facility inspections, process knowledge, and scoping surveys it was determined that characterization of the sludge present in the 3906 North Lift Station and the 3906-B Lift Station was needed to determine if the sludge required removal prior to demolition of the lift stations. The sludge in the 3906 South Lift Station was characterized as part of verification sampling for the 300-257 waste site (WCH 2013b) and determined to be acceptable for leaving in place (WCH 2013f).

The following section provides information concerning the characterization sampling and the evaluation of the sample results.

CHARACTERIZATION SAMPLING

Characterization sampling for the 300-15:4 subsite was conducted on March 7 and July 12, 2013, to determine if contaminant concentrations at this site meet the cleanup criteria specified in the 300 Area RDR/RAWP (DOE-RL 2009) and the 300-FF-2 Interim ROD (EPA 2001). The following subsections provide additional discussion of the information used to develop the sampling design. A more detailed discussion of the sampling design can be found in the *Work Instruction for Characterization Sampling of Subsite 300-15:4, 3906 North Side and 3906-B Lift Stations* (WCH 2013g).

Contaminants of Potential Concern

At the time of sampling, the 300 Area ROD (EPA and DOE-RL 2013) was not issued and development of a list of contaminants of potential concern (COPC) was developed using the requirements identified in the 300 Area RDR/RAWP (DOE-RL 2009) and the 300-FF-2 Interim ROD (EPA 2001). The COPCs and analytical methods for the 300-15:4 subsite were specified in the work instruction (WCH 2013g) and are provided in Table A-1. Characterization samples were analyzed using U.S. Environmental Protection Agency (EPA)-approved analytical methods.

Sample Design

A focused sample design was used to characterize the 3906 North and 3906-B Lift Stations. A focused sample of the sludge present in each of the 3906 and 3906-B Lift Stations was collected as specified in the work instruction (WCH 2013g) with the objective of providing a worst-case basis representation of contaminant concentrations present at these lift stations. One duplicate sample of the sludge within the 3906-B Lift Station was also collected. Figures A-5 through A-8 provide photographs of the sludge sampling activity.

Field quality control samples consisted of one equipment blank sample, one field duplicate sample, and one trip blank sample. All samples were submitted for full protocol laboratory analysis. The field logbooks (WCH 2013c, WCH 2013d) provide additional information concerning the sample collection.

All sampling was performed in accordance with ENV-1, *Environmental Monitoring & Management*, to fulfill the requirements of the *300 Area Remedial Action Sampling and Analysis Plan* (300 Area SAP) (DOE-RL 2011). All samples were submitted to offsite laboratories for full protocol laboratory analysis using approved EPA analytical methods as required per the 300 Area SAP. The analytical methods are provided in Table A-1 and a summary of the samples that were collected is provided in Table A-2.

Table A-1. Laboratory Analytical Methods and Contaminants of Potential Concern for Subsite 300-15:4, 3906 North Side and 3906-B Lift Stations.

Analytical Method	Contaminant of Potential Concern
ICP metals [a] – EPA Method 6010	Metals
Mercury – EPA Method 7471	Mercury
Uranium (total) – KPA	Uranium (total)
GEA – gamma spectroscopy	Gamma-emitting radionuclides
Gross alpha – proportional counting	Alpha-emitting radionuclides
Gross beta – proportional counting	Beta-emitting radionuclides
Isotopic plutonium – alpha specific analysis for plutonium	Plutonium-238, plutonium-239/240
Plutonium-241 – scintillation	Plutonium-241
Isotopic uranium – alpha specific analysis for uranium	Uranium-233/234, uranium-238
Isotopic americium – alpha specific analysis for americium	Americium-241/curium-244
Technetium-99 – scintillation	Technetium-99
H_3 – scintillation	Tritium
C-14 – scintillation	Carbon-14
Ni-63 – scintillation	Nickel-63
Strontium-90 – scintillation	Strontium-90
PAH – EPA Method 8310	Polycyclic aromatic hydrocarbons
PCB – EPA Method 8082	Polychlorinated biphenyls
SVOA – EPA Method 8270	Semivolatile organic compounds
TPH – EPA Method 418.1	Petroleum hydrocarbons
VOA – EPA Method 8260	Volatile organic compounds
IC anions [b] – EPA Method 300.0	Anions
NO_2/NO_3 [c] – EPA Method 353.2	Nitrogen in nitrate and nitrite
Sulfides – EPA Method 9030	Sulfides
Total cyanides – EPA Method 9010	Cyanide
pH – EPA Method 9045	pH soil

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

[b] Analysis was performed for the expanded list of IC anions to include bromide, chloride, fluoride, nitrate, nitrite, phosphate, and sulfate.

[c] To preclude holding time issues associated with EPA Method 300.0 for nitrates, EPA Method 353.2 was performed.

EPA = U.S. Environmental Protection Agency
GEA = gamma energy analysis
IC = ion exchange chromatography
ICP = inductively coupled plasma
KPA = kinetic phosphorescence analysis
NO_2/NO_3 = nitrate/nitrite
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
pH = hydrogen ion concentration
SVOA = semivolatile organic analysis
TPH = total petroleum hydrocarbons
VOA = volatile organic analysis

Figure A-5. Sediment Sample, 3906 Lift Station, North Side, March 7, 2013.

Figure A-6. Sampling the 3906-B Lift Station Floor Sediment, July 12, 2013 (View to Southeast).

Figure A-7. Sampling Tools for the 3906-B Lift Station, July 12, 2013.

Figure A-8. Sampling the 3906-B Lift Station, July 12, 2013.

Table A-2. Sample Summary for the 300-15:4 Subsite.

Sample Location	HEIS Sample Number	Washington State Plane Coordinates		Sample Depth bgs (m)	Sample Analysis [a]
		Northing (m)	Easting (m)		
3906 North	J1RH85	115710	594534.5	5.5 m	ICP metals [b], mercury, uranium (total) KPA, GEA, gross alpha, gross beta, isotopic plutonium, plutonium-241, isotopic uranium, americium-241/curium-244, technetium-99, tritium, carbon-14, nickel-63, strontium-90, PAH, PCB, SVOA, TPH, VOA, IC anions [c], nitrogen in nitrate and nitrite, sulfides, total cyanides, pH
3906-B	J1RRK0	115716.5 [d]	594541.0 [d]	5.8	
Duplicate of J1RRK0	J1RRK1	115716.5 [d]	594541.0 [d]	5.8	
Equipment blank	J1RRJ9	NA	NA	NA	ICP metals [b], mercury
Trip blank	J1RRJ8	NA	NA	NA	VOA

[a] Full protocol laboratory analysis was performed as defined in Table 1, Laboratory Analytical Methods.
[b] The expanded list of ICP metals was requested to include antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc.
[c] Analysis was performed for the expanded list of IC anions to include bromide, chloride, fluoride, nitrate, nitrite, phosphate, and sulfate.
[d] Sample location coordinates are estimated based on identifying the approximate center of the 3906-B Lift Station.

bgs = below ground surface
GEA = gamma energy analysis
HEIS = Hanford Environmental Information System
IC = ion exchange chromatography
ICP = inductively coupled plasma
KPA = kinetic phosphorescence analysis
NA = not applicable
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
pH = hydrogen ion concentration
SVOA = semivolatile organic analysis
TPH = total petroleum hydrocarbons
VOA = volatile organic analysis

CHARACTERIZATION SAMPLING RESULTS

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

The results of the characterization sampling indicated that the sludge in the 3906 North and 3906-B Lift stations does not require removal and the below-grade structures meet the cleanup criteria and are acceptable for leaving in place. A Facility Status Change Form (WCH 2013e) documenting U.S. Department of Energy and EPA agreement was approved in August 2013.

Comparison of the sample results for the 3906 North and the 3906-B Lift Stations are provided in Tables A-3 and A-4, respectively. Contaminants that were not detected by laboratory analysis are excluded from Tables A-3 and A-4 but are reported in Attachment B. Calculated CULs for calcium, magnesium, potassium, silicon, and sodium are not presented in the 300-FF-2 RDR/RAWP (DOE-RL 2015). Parameters to calculate CULs for these constituents are not presented in the Cleanup Levels and Risk Calculations Database (Ecology 2015) under *Washington Administrative Code* (WAC) 173-340-740(3), "Model Toxics Control Act – Cleanup," or other reference databases. 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 contaminants of concern (COCs) and are not included in the table.

Table A-3. Comparison of Contaminant Concentrations to Industrial Cleanup Levels for the 3906 North Side Lift Station Sampling. (2 Pages)

COC	Sample Result [a] (pCi/g)	Radionuclide Direct Exposure CULs [b] (pCi/g)	Radionuclide Groundwater and River Protection CULs [b] (pCi/g)	Does the Result Exceed CULs?
Americium-241	0.242	210	--	No
Cesium-137	0.083 (<BG)	18	--	No
Plutonium-239/240	0.262	245	--	No
Uranium-234	2.18	167	--	No
Uranium-235	0.0921 (<BG)	16	--	No
Uranium-238	1.76	167	--	No
COC	**Sample Result [a] (mg/kg)**	**Nonradionuclide Direct Exposure CULs [b] (mg/kg)**	**Nonradionuclide Groundwater and River Protection CULs [b] (mg/kg)**	**Does the Result Exceed CULs?**
Arsenic	5.2 (<BG)	20	--	No
Barium	268	700,000	--	No
Beryllium	0.35 (<BG)	7,000	--	No
Cadmium	2.7	3,500	--	No
Chromium (total)	157	>1,000,000	--	No
Cobalt	88.0 [c]	1,050	--	No
Copper	2,120	140,000	--	No
Lead	190	1,000	--	No
Lithium	8.0 (<BG)	7,000	--	No
Manganese	357 (<BG)	490,000	--	No
Mercury	2.5	1,050	--	No
Nickel	129	70,000	--	No

Table A-3. Comparison of Contaminant Concentrations to Industrial Cleanup Levels for the 3906 North Side Lift Station Sampling. (2 Pages)

COC	Sample Result [a] (mg/kg)	Nonradionuclide Direct Exposure CULs [b] (mg/kg)	Nonradionuclide Groundwater and River Protection CULs [b] (mg/kg)	Does the Result Exceed CULs?
Silver	22.9	17,500	--	No
Uranium	4.6	505	157	No
Vanadium	37.1 (<BG)	17,500	--	No
Zinc	2,250	>1,000,000	--	No
Cyanide	0.21	42	1,960	No
Fluoride	3.7	210,000	--	No
Nitrogen in nitrate	0.92 (<BG)	>1,000,000	4,740	No
Nitrogen in nitrite and nitrate	0.74 (<BG)	>1,000,000	4,740	No
Total petroleum hydrocarbons – diesel range	880	2,000	2,000	No
Total petroleum hydrocarbons – diesel range extended	1,500	2,000	2,000	No
Aroclor-1254	1.2 [c]	66	--	No
Aroclor-1260	0.63 [c]	66	--	No
Methyl ethyl ketone (2-butanone)	0.011	62,200	2,590	No
Toluene	0.0013	10,400	2,190	No
Benzo(a)pyrene TEC [d]	0.522 [c]	18	--	No

[a] Background values from DOE-RL 1996, 2001, and 2013.
[b] CULs obtained from Table 4 of the 300 Area ROD (EPA and DOE-RL 2013) as described in the 300-FF-2 RDR/RAWP (DOE-RL 2015).
[c] The residential direct exposure CUL was exceeded for this constituent.
[d] Benzo(a)pyrene toxic equivalent concentration (Table A-6).

-- = not applicable
BG = background
COC = contaminant of concern
CUL = cleanup level
RDR/RAWP = remedial design report/remedial action work plan
ROD = record of decision
TEC = toxic equivalent concentration

Table A-4. Comparison of Contaminant Concentrations to Industrial Cleanup Levels for the 3906-B Lift Station Sampling. (2 Pages)

COC	Sample Result [a] (pCi/g)	Radionuclide Direct Exposure CULs [b] (pCi/g)	Radionuclide Groundwater and River Protection CULs [b] (pCi/g)	Does the Result Exceed CULs?
Plutonium-241	2.56	12,900	--	No
Technetium-99	1.06	166,000	420	No
Tritium	0.253	1,980	12,200	No
Uranium-234	1.09 (<BG)	167	--	No
Uranium-235	0.0774 (<BG)	16	--	No
Uranium-238	0.984 (<BG)	167	--	No
COC	**Sample Result [a] (mg/kg)**	**Nonradionuclide Direct Exposure CULs [c] (mg/kg)**	**Nonradionuclide Groundwater and River Protection CULs [c] (mg/kg)**	**Does the Result Exceed CULs?**
Antimony	0.40	1,400	760	No
Barium	13.1 (<BG)	700,000	--	No
Cadmium	0.12 (<BG)	3,500	--	No
Chromium (total)	3.7 (<BG)	>1,000,000	--	No
Cobalt	1.5 (<BG)	1,050	--	No
Copper	63.1	140,000	--	No
Lead	2.7 (<BG)	1,000	--	No
Lithium	1.4 (<BG)	7,000	--	No
Manganese	29.4 (<BG)	490,000	--	No
Mercury	0.13	1,050	--	No
Nickel	3.0 (<BG)	70,000	--	No
Selenium	2.4	17,500	912	No
Silver	0.26	17,500	--	No
Uranium	0.26 (<BG)	505	157	No
Vanadium	5.6 (<BG)	17,500	--	No
Zinc	91.8	>1,000,000	--	No
Cyanide	0.15	42	1,960	No
Fluoride	0.94 (<BG)	210,000	--	No
Nitrogen in nitrate	5.2 (<BG)	>1,000,000	4,740	No
Nitrogen in nitrite and nitrate	0.99 (<BG)	>1,000,000	4,740	No
Total petroleum hydrocarbons – diesel range	13	2,000	2,000	No
Total petroleum hydrocarbons – diesel ranged extended	95	2,000	2,000	No

Table A-4. Comparison of Contaminant Concentrations to Industrial Cleanup Levels for the 3906-B Lift Station Sampling. (2 Pages)

COC	Sample Result [a] (mg/kg)	Nonradionuclide Direct Exposure CULs [c] (mg/kg)	Nonradionuclide Groundwater and River Protection CULs [c] (mg/kg)	Does the Result Exceed CULs?
Aroclor-1254	0.0028	66	--	No
Methyl ethyl ketone (2-butanone)	0.038	62,200	2,590	No
Benzo(a)pyrene TEC[c]	0.012	18	--	No

[a] Background values from DOE-RL 1996, 2001, and 2013.
[b] CULs obtained from Table 4 of the 300 Area ROD (EPA and DOE-RL 2013).
[c] Benzo(a)pyrene toxic equivalent concentration (Table 7).

-- = not applicable
BG = background
COC = contaminant of concern
CUL = cleanup level
ROD = record of decision
TEC = toxic equivalent concentration

The 300 Area COCs and CULs are provided in the 300 Area ROD (EPA and DOE-RL 2013). While not identified as COCs, several non-COCs were detected in the 300-15:4 subsite characterization samples. These non-COC detections (Table A-5) were below risk based CULs calculated during development of the 300 Area Final ROD (EPA and DOE-RL 2013). Therefore, the detected concentrations of these constituents do not require further discussion.

Table A-5. Non-Contaminants of Concern Detected in Characterization Samples.

acenaphthene	bis(2-ethylhexyl)phthalate	di-n-butylphthalate	phenanthrene
acetone	boron	fluoranthene	pyrene
anthracene	bromoform	butylbenzylphthalate	sulfate
benzo(ghi)perylene	carbon disulfide	methylenechloride	sulfide
dimethyl phthalate	chloride	3+4 methylphenol	zirconium
nickel-63	molybdenum		

DATA QUALITY ASSESSMENT PROCESS

A data quality assessment (DQA) is performed to compare the characterization sampling approach and resulting analytical data with the sampling and data quality requirements specified by the project objectives and performance specifications.

The DQA for the 300-15:4 subsite determined that the data are of the right type, quality, and quantity to support site closeout decisions within specified error tolerances. All analytical data were found to be acceptable for decision-making purposes. The evaluation also verified that the characterization sample design was sufficient to support waste site closeout.

The characterization sample analytical data are stored in a Washington Closure Hanford project-specific database prior to archiving in HEIS and are presented as an attachment to the relative percent difference calculations in Attachment B. The detailed DQA is presented in Attachment C.

DATA EVALUATION

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

Evaluation of the results provided in Tables A-3 and A-4 indicate that all radionuclide and nonradionuclide COCs were quantified below the industrial direct exposure, groundwater protection, and river protection CULs. Residential and industrial soil CULs to be protective of groundwater and the river were calculated based on federal drinking water standards as described in Section 8.2 of the 300 Area ROD (EPA and DOE-RL 2013). Characterization sampling results for aroclor-1254, aroclor-1260, benzo(a)pyrene, and cobalt detected in the 3906 North Side Lift Station exceed the residential direct exposure CUL as noted in Table A-3; therefore, the residual contaminant concentrations do not meet human health direct exposure CULs for residential land use.

Although concentrations of some metals such as barium, cadmium, chromium, cobalt, lead, mercury, nickel, selenium, silver, uranium, and zinc are elevated above background concentrations, the volume of residual sediment containing elevated metals remaining in the lift station is negligible. An estimated 58 cubic feet of residual sediment remained on the bottom of the lift station that was subsequently backfilled with clean borrow pit material.

Compliance with CULs for mixtures of carcinogenic polycyclic aromatic hydrocarbons (carcinogenic PAHs) is determined by considering mixtures of carcinogenic PAHs as a single hazardous substance and using the CULs established for benzo(a)pyrene as the CUL for mixtures of carcinogenic PAH (Ecology 2007). Because the COCs benzo(a)pyrene and chrysene were detected in the characterization samples, a toxic equivalent concentration of benzo(a)pyrene was determined for each carcinogenic PAH including PAHs that were identified as COPCs in the sample results using the maximum concentrations detected (Tables A-6 and A-7). The toxic equivalent concentrations of all the carcinogenic PAH are added to obtain the total toxic equivalent concentration of benzo(a)pyrene for the 300-15:4 subsite. The maximum calculated toxic equivalent concentration of benzo(a)pyrene, 0.522 mg/kg (Table A-6), is well below the industrial CUL of 18 mg/kg; however, the value exceeds the residential benzo(a)pyrene CUL of 0.14 mg/kg.

The ecological risk evaluations discussed in Section 7.2 of the 300 Area ROD (EPA and DOE-RL 2013) concluded that once human health CULs are achieved, residual contamination would not be sufficient to adversely impact populations and communities of ecological receptors. Therefore, no further screening of potential ecological risk has been performed for the 300-15:4 subsite.

Table A-6. Toxic Equivalent Concentrations of Benzo(a)pyrene for Sample J1RH85 Collected at the 3906 Lift Station, North Side.

Carcinogenic Polycyclic Aromatic Hydrocarbons	Maximum Result (mg/kg) [a]	Toxic Equivalency Factors (Unitless) [b]	Toxic Equivalent BAP Concentration mg/kg
Benzo[a]pyrene	0.450	1	0.45
Benzo[a]anthracene	0.200	0.1	0.020
Benzo[b]fluoranthene	0.310	0.1	0.031
Benzo[k]fluoranthene	--	0.1	--
Chrysene	0.110	0.01	0.0011
Dibenz[a,h]anthracene	--	0.1	--
Indeno[1,2,3-cd]pyrene	0.200	0.1	0.020
Total Toxic Equivalent Concentration of Benzo(a)pyrene			0.522

[a] Polycyclic aromatic hydrocarbon results used.
[b] From WAC 173-340-708(8)(e), Table 708-2 (Ecology 2007).
-- = no value
BAP = benzo(a)pyrene
WAC = *Washington Administrative Code*

Table A-7. Toxic Equivalent Concentrations of Benzo(a)pyrene for 3906-B Lift Station Sampling [a]

Carcinogenic Polycyclic Aromatic Hydrocarbons	Maximum Result (mg/kg) [a]	Toxic Equivalency Factors (Unitless) [b]	Toxic Equivalent BAP Concentration (mg/kg)
Benzo[a]pyrene	0.010	1	0.010
Benzo[a]anthracene	--	0.1	--
Benzo[b]fluoranthene	--	0.1	--
Benzo[k]fluoranthene	0.0047	0.1	0.00047
Chrysene	0.110	0.01	0.0011
Dibenz[a,h]anthracene	--	0.1	--
Indeno[1,2,3-cd]pyrene	--	0.1	--
Total Toxic Equivalent Concentration of Benzo(a)pyrene			0.012

[a] Polycyclic aromatic hydrocarbon results used.
[b] From WAC 173-340-708(8)(e), Table 708-2 (Ecology 2007).
-- = no value
BAP = benzo(a)pyrene
WAC = *Washington Administrative Code*

DECOMMISSIONING ACTIVITIES

Field inspections, scoping surveys, and characterization sampling of the 3906 North and 3906-B Lift Stations indicated that no materials were present that required removal prior to demolition of the structures (WCH 2013e). The lift stations were outside of the 300 Area industrial radioactive material area and scoping surveys did not identify any radiological contamination present within either facility. Demolition of the above grade structures for the two lift stations was completed in July 2013. The below-grade portion of the 3906 Lift Station was removed to 0.9 m (3 ft) below grade. No portion of the 3906-B below-grade structure was removed because of interference from adjacent and active utilities. The debris was removed and disposed of at the Environmental Disposal Facility as specified in the 300 Area RAWP (DOE-RL 2007). No anomalies were discovered during demolition and post-demolition soils displayed no evidence of staining or discoloration (WCH 2013a, WCH 2013e). Both lift stations were backfilled with clean borrow pit material. All work was performed in accordance with the 300 Area RAWP.

SUMMARY FOR FINAL NO ACTION RECLASSIFICATION

The 300-15:4 subsite achieves the remedial action objectives and corresponding CULs established for the industrial land-use scenario in the 300 Area ROD (EPA and DOE-RL 2013) and meets the requirements of the 300 Area RDR/RAWP (DOE-RL 2015). The 300-15:4 subsite has been sampled, analyzed, and evaluated. Results indicate that the site supports future land uses that can be represented (or bounded) by the industrial land-use scenario and poses no threat to groundwater or the Columbia River. Sampling results for aroclor-1254, aroclor-1260, benzo(a)pyrene, and cobalt detected in the 3906 North Side Lift Station exceed the residential direct exposure CUL. Due to these exceedances, the residual contaminant concentrations do not allow for unlimited use and unrestricted exposure. Therefore, institutional controls to maintain industrial land use are required as established in the 300 Area ROD (EPA and DOE/RL 2013). Based upon the evaluation of the characterization sampling, the 300-15:4 subsite has been reclassified to a status of Final No Action.

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WCH, 2013c, *D4 Miscellaneous Sampling and Characterization*, Logbook EL-1656, pp. 70-76, Washington Closure Hanford, Richland, Washington.

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WCH, 2013g, *Work Instruction for Characterization Sampling of Subsite 300-15:4, 3906 North Side and 3906-B Lift Stations*, 0300X-WI-G0048, Rev. 0, Washington Closure Hanford, Richland, Washington.

ATTACHMENT B

CALCULATIONS

ATTACHMENT B

CALCULATION BRIEF

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

300-15:4 *Subsite Relative Percent Difference (RPD) Calculations,* 0300X-CA-V0179, Rev. 0, Washington Closure Hanford, Richland, Washington.

DISCLAIMER FOR CALCULATIONS

The calculations that are provided in this attachment 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: 300 Area Closure Operations **Job No. 14655**

Area: 300

Discipline: Environmental *Calculation No: 0300X-CA-V0179

Subject: 300-15:4 Subsite Relative Percent Difference (RPD) Calculations

Computer Program: Excel Program No: Excel 2010

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

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Summary = 5 Attachment = 6 Total = 12	J. D. Skoglie	I. B. Berezovskiy	R. J. Nielson	S. G. Wilkinson	7/28/15

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:	5/21/2015	Calc. No.:	0300X-CA-V0179	Rev.:	0
Project:	300 Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	5/21/2015
Subject:	300-15:4 Subsite Relative Percent Difference Calculations					Sheet No.	1 of 5

PURPOSE:

Provide documentation to support the relative percent difference (RPD) calculations for the primary-duplicate sample pairs from the 300-15:4 subsite verification sampling, as necessary.

GIVEN/REFERENCES:

1) DOE-RL, 2014, *300 Area Remedial Action Sampling and Analysis Plan*, DOE/RL-2001-48, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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

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

4) WCH, 2015, *300-15:4, 3906 North Side and 3906-B Lift Stations Subsite*, Attachment to Waste Site Reclassification Form 2013-117, Rev. 0, Washington Closure Hanford, Richland, Washington.

SOLUTION:

1) Use data from Attachment 1 to perform the RPD calculations for primary-duplicate sample pairs, as required.

METHODOLOGY:

The 300-15:4 subsite underwent focused sampling at two locations for the purpose of verification sampling. One duplicate was also collected. Because these samples were taken from sludge and not soil, only an RPD calculation will be completed for data quality analysis (DQA) purposes and included in WCH (2015).

1) The RPD is calculated when both the primary value and the duplicate value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The TDL is a laboratory detection limit pre-determined for each analytical method and is listed for certain analytes in Table II-1 of the SAP (DOE-RL 2014). Other analytes will have their own pre-determined constituents and will have their own TDLs 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:

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

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

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	5/21/2015	Calc. No.:	0300X-CA-V0179	Rev.:	0
Project:	300 Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	5/21/2015
Subject:	300-15:4 Subsite Relative Percent Difference Calculations					Sheet No. 2 of 5	

When an analyte is detected in the primary or duplicate 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 results exceeds a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed. This assessment is provided in the data quality assessment section of the WSRF (WCH 2015).

For quality assurance/quality control (QA/QC) duplicate RPD calculations, a value less than 30% indicates the data compare favorably. If the RPD is greater than 30%, further investigation regarding the usability of the data is performed. Additional discussion is provided in the data quality assessment section of the applicable WSRF (WCH 2015), as necessary.

RESULTS:

Table 1 shows the results of the RPD calculations for the 300-15:4 subsite.

Table 1. Relative Percent Difference Calculations for the 300-15:4 Subsite. (4 Pages)

Duplicate Analysis - 300-15:4 Subsite Verification Samples

Sample Location	Sample Number	Sample Date	Gross beta			Potassium-40			Technetium-99			Uranium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	ug/kg	Q	PQL
3906-B	J1RRK0	7/12/13	16.2		2.21	12.0		0.744	1.06		0.680	2.41		0.138
Duplicate of J1RRK0	J1RRK1	7/12/13	17.9		2.33	10.6		0.709	0.881		0.685	2.24		0.134

Analysis:

	TDL	15	0.5	15	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD		12.4%		
	Difference > 2 TDL?	No - acceptable	Yes - assess further	No - acceptable	No - acceptable

Duplicate Analysis - 300-15:4 Subsite Verification Samples

Sample Location	HEIS Number	Sample Date	Uranium-234			Uranium-238 AEA			Aluminum			Barium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	1.01		0.0654	0.984		0.0615	1050		1.5	12.5		0.072
Duplicate of J1RRK0	J1RRK1	7/12/13	1.09		0.0668	0.970		0.0804	1090		1.5	13.1		0.074

Analysis:

	TDL	1	1	5	10
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD			3.7%	
	Difference > 2 TDL?	No - acceptable	No - acceptable	Yes - assess further	No - acceptable

Note: Data qualified with B, C, J, N, and/or X are considered acceptable values.
AEA = alpha energy analysis
B = blank contamination (organic constituents) = Estimated (inorganic)
C = analyte was detected in both the sample and associated QC blank, and the sample concentration was ≤ 5x the blank concentration.
HEIS = Hanford Environmental Information System
J = estimate (organic) = blank contamination (inorganic)
MDA = minimal detectable activity
N = recovery is outside control limits
PQL = practical quantitation limit
Q = qualifier
X (organics) = >40% difference between primary and confirmation detector results.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	5/20/2015	Calc. No.:	0300X-CA-V0179	Rev.:	0
Project:	300 Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	5/20/2015
Subject:	300-15:4 Subsite Relative Percent Difference Calculations					Sheet No. 3 of 5	

Table 1. Relative Percent Difference Calculations for the 300-15:4 Subsite. (4 Pages)

Duplicate Analysis - 300-15:4 Subsite Verification Samples

Sample Location	HEIS Number	Sample Date	Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	0.12	B	0.039	1060		13.3	3.7		0.055	1.5		0.094
Duplicate of J1RRK0	J1RRK1	7/12/13	0.099	B	0.040	1230		13.7	2.4		0.056	1.5		0.097

Analysis:

	TDL	0.5	100	1	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD		14.8%		
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 300-15:4 Subsite Verification Samples

Sample Location	HEIS Number	Sample Date	Copper			Iron			Lead			Lithium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	57.7		0.20	4030		3.6	2.4		0.25	1.4	B	0.28
Duplicate of J1RRK0	J1RRK1	7/12/13	63.1		0.21	4130		3.7	2.7		0.26	1.2	B	0.29

Analysis:

	TDL	1	5	5	2.5
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	8.9%	2.5%		
	Difference > 2 TDL?	Yes - assess further	Yes - assess further	No - acceptable	No - acceptable

Duplicate Analysis - 300-15:4 Subsite Verification Samples

Sample Location	HEIS Number	Sample Date	Magnesium			Manganese			Mercury			Molybdenum		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	464		3.5	28.5		0.094	0.11	M	0.0064	0.85	B	0.25
Duplicate of J1RRK0	J1RRK1	7/12/13	475		3.6	29.4		0.097	0.13		0.0051	0.92	B	0.25

Analysis:

	TDL	75	5	0.2	2
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	2.3%	3.1%		
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 300-15:4 Subsite Verification Samples

Sample Location	HEIS Number	Sample Date	Nickel			Potassium			Selenium			Silicon		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	3.0	B	0.12	202	B	38.7	2.4		0.81	225		5.3
Duplicate of J1RRK0	J1RRK1	7/12/13	2.6	B	0.12	220	B	39.8	2.2		0.83	210		5.5

Analysis:

	TDL	4	400	10	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)
	RPD				6.9%
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	Yes - assess further

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	5/20/2015	Calc. No.:	0300X-CA-V0179	Rev.:	0
Project:	300 Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	5/20/2015
Subject:	300-15:4 Subsite Relative Percent Difference Calculations					Sheet No. 4 of 5	

Table 1. Relative Percent Difference Calculations for the 300-15:4 Subsite. (4 Pages)

Duplicate Analysis - 300-15:4 Subsite Verification Samples

Sample Location	Sample Number	Sample Date	Silver			Sodium			Uranium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	0.15	B	0.15	169		55.7	0.26		0.0016	5.2		0.089
Duplicate of J1RRK0	J1RRK1	7/12/13	0.26		0.16	168		57.3	0.26		0.0015	5.6		0.091

Analysis:

	TDL	1.0	50	1	2.5
Duplicate Analysis	Both > PQL?	No-Stop (acceptable)	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	No - acceptable

Duplicate Analysis - 300-15:4 Subsite Verification Samples

Sample Location	Sample Number	Sample Date	Zinc			Chloride			Cyanide			Fluoride		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	87.7		0.38	41.5		1.9	0.14	BNC	0.11	0.93	B	0.80
Duplicate of J1RRK0	J1RRK1	7/12/13	91.8		0.39	40.6		1.9	0.15	BMC	0.10	0.94	BN	0.81

Analysis:

	TDL	1.0	2	0.5	5
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	4.6%	2.2%		
	Difference > 2 TDL?	Yes - assess further	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 300-15:4 Subsite Verification Samples

Sample Location	Sample Number	Sample Date	Nitrogen in Nitrate			Nitrogen in Nitrite			Sulfate			Sulfide		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	1.2	B	0.30	1.2	B	0.33	23.8		1.7	579		2.5
Duplicate of J1RRK0	J1RRK1	7/12/13	5.2		0.31	1.4	B	0.33	19.1		1.7	620		2.4

Analysis:

	TDL	0.75	0.75	5	5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)
	RPD				6.8%
	Difference > 2 TDL?	Yes - assess further	No - acceptable	No - acceptable	Yes - assess further

Duplicate Analysis - 300-15:4 Subsite Verification Samples

Sample Location	Sample Number	Sample Date	TPH - Diesel Range			TPH - Diesel Range EXT			Acenaphthene (Method 8310)			2-Butanone		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
3906-B	J1RRK0	7/12/13	12000		660	75000		970	23	JX	9.4	38	J	7.6
Duplicate of J1RRK0	J1RRK1	7/12/13	13000		680	95000		990	22	JX	9.6	32	J	7.6

Analysis:

	TDL	5000	5000	100	10
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD		23.5%		
	Difference > 2 TDL?	No - acceptable	Yes - assess further	No - acceptable	No - acceptable

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	5/20/2015	Calc. No.:	0300X-CA-V0179	Rev.:	0
Project:	300 Area Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	5/20/2015
Subject:	300-15:4 Subsite Relative Percent Difference Calculations					Sheet No.	5 of 5

Table 1. Relative Percent Difference Calculations for the 300-15:4 Subsite. (4 Pages)

Duplicate Analysis - 300-15:4 Subsite Verification Samples

Sample Location	Sample Number	Sample Date	Acetone			Carbon disulfide			Methylenechloride		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
3906-B	J1RRK0	7/12/13	170		22	5.5	JB	1.8	11	JB	6.7
Duplicate of J1RRK0	J1RRK1	7/12/13	140		22	4.5	JB	1.8	10	JB	6.7

Analysis:

TDL		10	10	10
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	19.4%		
	Difference > 2 TDL?	Yes - assess further	No - acceptable	No - acceptable

CONCLUSION:

The calculations in Table 1 demonstrate that the 300-15:4 subsite meets the requirements for the RPDs, as identified in the RDR/RAWP (DOE-RL 2015). The RPD calculations are for use in the WSRF for this site.

Attachment 1. 300-15:4 Subsite Verification Sample Results (Radionuclides).

Sample Location	HEIS Number	Sample Date	Americium-241 AEA			Americium-241GS			Antimony-125			Carbon-14			Cerium-144			Cesium-134		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
3906-B	J1RRK0	7/12/13	0.0136	U	0.0494	-0.179	U	0.376	-0.0276	U	0.202	0.0156	U	0.264	-0.00876	U	0.366	-0.0142	U	0.100
Duplicate of J1RRK0	J1RRK1	7/12/13	0.0141	U	0.0536	-0.0195	U	0.067	0.0947	U	0.177	-0.0124	U	0.264	-0.0211	U	0.266	0.00914	U	0.0953
3906 North Side	J1RH85	3/7/13	0.242		0.0983	0.0998	U	0.0666	0.0196	U	0.0809	0.129	UJ	0.932	0.0157	U	0.161	0.0276	U	0.0395

Sample Location	HEIS Number	Sample Date	Cesium-137			Cobalt-60			Curium-242			Curium-244			Europium-152			Europium-154		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
3906-B	J1RRK0	7/12/13	0.0827	U	0.0995	-0.0224	U	0.0927	0	U	0.0552	0	U	0.0495	0.0102	U	0.200	-0.156	U	0.303
Duplicate of J1RRK0	J1RRK1	7/12/13	-0.0175	U	0.0809	-0.0202	U	0.0817	-0.000658	U	0.0598	0	U	0.0537	-0.0122	U	0.171	-0.0733	U	0.220
3906 North Side	J1RH85	3/7/13	0.0830		0.0367	0.00703	U	0.0346	-0.000890	UJ	0.0810	-0.000823	UJ	0.0748	-0.00105	U	0.0798	0.0577	U	0.115

Sample Location	HEIS Number	Sample Date	Europium-155			Gross alpha			Gross beta			Nickel-63			Plutonium-238			Plutonium-239/240		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
3906-B	J1RRK0	7/12/13	0.0226	U	0.185	3.3	U	7.42	16.2		2.21	25.6		15.3	-0.000599	U	0.0545	0.0144	U	0.0545
Duplicate of J1RRK0	J1RRK1	7/12/13	0.00664	U	0.117	6.58		6.45	17.9		2.33	-0.764	U	13.6	-0.000702	U	0.0638	0.0168	U	0.0638
3906 North Side	J1RH85	3/7/13	0.0374	U	0.0826	6.75	U	6.83	28.1		2.30	-3.71	U	11.0	0.0281	UJ	0.0748	0.262		0.0779

Acronyms and notes apply to all of the tables in this attachment.
Note: Data qualified with B, C, D, J, M, N, P and/or X are considered acceptable values.

AEA = alpha energy analysis
B = blank contamination (organic constituents) = Estimated (inorganic)
C = analyte was detected in both the sample and associated QC blank, and the sample concentration was ≤ 5x the blank concentration.
D = dilution
GS = gamma spectroscopy
HEIS = Hanford Environmental Information System
J = estimate (organic) = blank contamination (inorganic)
M = sample duplicate precision not met.
MDA = minimal detectable activity
N = recovery is outside control limits
P = >25% difference between column analyses
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyls
PQL = practical quantitation limit
Q = qualifier
SVOA = semivolatile organic analysis
U = undetected
VOA = volatile organic analysis
X (Metals) = serial dilution in the analytical batch indicates that physical and chemical interferences are present.
X (organics) = >40% difference between primary and confirmation detector results.

Attachment	1	Sheet No.	1 of 6
Originator	J. D. Skoglie	Date	5/20/15
Checked	I. B. Berezovskiy	Date	5/20/15
Calc. No.	0300X-CA-V0179	Rev. No.	0

Attachment 1. 300-15:4 Subsite Verification Sample Results (Radionuclides).

Sample Location	HEIS Number	Sample Date	Plutonium-241			Potassium-40			Radium-226			Radium-228			Ruthenium-106			Technetium-99		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
3906-B	J1RRK0	7/12/13	0.740	U	1.18	12.0		0.744	0.236	U	0.274	0.554		0.327	-0.240	U	0.760	1.06		0.680
Duplicate of J1RRK0	J1RRK1	7/12/13	2.56		1.39	10.6		0.709	0.321	U	0.241	0.513	U	0.467	-0.0451	U	0.669	0.881		0.685
3906 North Side	J1RH85	3/7/13	0.493	UJ	1.45	17.3		0.271	0.621		0.0614	0.913		0.127	-0.129	U	0.247	0.573	U	0.622

Sample Location	HEIS Number	Sample Date	Total beta radiostrontium			Tritium			Uranium KPA			Uranium-234			Uranium-235 AEA			Uranium-235 GS		
			pCi/g	Q	MDA	pCi/g	Q	MDA	ug/g	Q	PQL	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
3906-B	J1RRK0	7/12/13	-0.0100	U	0.173	0.0463	U	0.0963	2.41		0.138	1.01		0.0654	0.0114	U	0.0433	0.0256	U	0.370
Duplicate of J1RRK0	J1RRK1	7/12/13	-0.0364	U	0.175	0.253		0.218	2.24		0.134	1.09		0.0668	0.0774		0.0596	0.0225	U	0.256
3906 North Side	J1RH85	3/7/13	0.0559	U	0.117	0.0188	UJ	0.311	1.98		0.134	2.18		0.0884	0.0921	J	0.0592	0.131	U	0.173

Sample Location	HEIS Number	Sample Date	Uranium-238 AEA			Uranium-238 GS			Zinc-65		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
3906-B	J1RRK0	7/12/13	0.984		0.0615	2.24	U	3.25	-0.186	U	0.249
Duplicate of J1RRK0	J1RRK1	7/12/13	0.970		0.0804	0.232	U	0.723	-0.0404	U	0.167
3906 North Side	J1RH85	3/7/13	1.76		0.0803	1.13		0.455	-0.0056	U	0.0746

Attachment	1	Sheet No.	2 of 6
Originator	J. D. Skoglie	Date	5/19/15
Checked	I. B. Berezovskiy	Date	5/19/15
Calc. No.	0300X-CA-V0179	Rev. No.	0

Attachment 1. 300-15:4 Subsite Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	1050		1.5	0.36	U	0.36	0.62	U	0.62	12.5		0.072	0.031	U	0.031	0.92	U	0.92
Duplicate of J1RRK0	J1RRK1	7/12/13	1090		1.5	0.40	B	0.37	0.64	U	0.64	13.1		0.074	0.032	U	0.032	0.95	U	0.95
3906 North Side	J1RH85	3/7/13	8110		2.8	0.69	UJ	0.69	5.2		1.2	268		0.14	0.35	B	0.060	5.4		1.8
Equipment Blank	J1RRJ9	7/12/13	180		1.5	0.37	U	0.37	0.68	B	0.64	1.9		0.074	0.064	B	0.032	0.95	U	0.95

Sample Location	HEIS Number	Sample Date	Cadmium			Calcium			Chromium			Cobalt			Copper			Iron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	0.12	B	0.039	1060		13.3	3.7		0.055	1.5		0.094	57.7		0.20	4030		3.6
Duplicate of J1RRK0	J1RRK1	7/12/13	0.099	B	0.040	1230		13.7	2.4		0.056	1.5		0.097	63.1		0.21	4130		3.7
3906 North Side	J1RH85	3/7/13	2.7	J	0.074	17000	X	25.6	157	J	0.11	88.0	J	0.18	2120	J	0.39	52100	J	6.9
Equipment Blank	J1RRJ9	7/12/13	0.040	U	0.040	34.2	B	13.7	0.098	B	0.056	0.21	B	0.097	0.63	B	0.21	1290		3.7

Sample Location	HEIS Number	Sample Date	Lead			Lithium			Magnesium			Manganese			Mercury			Molybdenum		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	2.4		0.25	1.4	B	0.28	464		3.5	28.5		0.094	0.11	M	0.0064	0.85	B	0.25
Duplicate of J1RRK0	J1RRK1	7/12/13	2.7		0.26	1.2	B	0.29	475		3.6	29.4		0.097	0.13		0.0051	0.92	B	0.25
3906 North Side	J1RH85	3/7/13	190		0.49	8.0		0.54	6150		6.7	357	J	0.18	2.5		0.048	14.1		0.47
Equipment Blank	J1RRJ9	7/12/13	0.36	B	0.26	0.48	B	0.29	24.1		3.6	7.9		0.097	0.0059	U	0.0059	0.25	U	0.25

Sample Location	HEIS Number	Sample Date	Nickel			Potassium			Selenium			Silicon			Silver			Sodium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	3.0	B	0.12	202	B	38.7	2.4		0.81	225		5.3	0.15	B	0.15	169		55.7
Duplicate of J1RRK0	J1RRK1	7/12/13	2.6	B	0.12	220	B	39.8	2.2		0.83	210		5.5	0.26		0.16	168		57.3
3906 North Side	J1RH85	3/7/13	129	J	0.22	1430		74.4	1.6	U	1.6	352	JN	10.3	22.9		0.29	3950		107
Equipment Blank	J1RRJ9	7/12/13	0.26	B	0.12	52.1	B	39.8	0.83	U	0.83	149		5.5	0.16	U	0.16	57.3	U	57.3

Sample Location	HEIS Number	Sample Date	Uranium			Vanadium			Zinc			Zirconium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	0.26		0.0016	5.2		0.089	87.7		0.38	0.33	UN	0.33
Duplicate of J1RRK0	J1RRK1	7/12/13	0.26		0.0015	5.6		0.091	91.8		0.39	0.34	U	0.34
3906 North Side	J1RH85	3/7/13	4.6		0.0026	37.1		0.17	2550	J	0.72	15.9		0.64
Equipment Blank	J1RRJ9	7/12/13	0.091	B	0.0015	0.85	B	0.091	2.5		0.39	0.74	B	0.34

Attachment	1	Sheet No.	3 of 6
Originator	J. D. Skoglie	Date	5/19/15
Checked	I. B. Berezovskiy	Date	5/19/15
Calc. No.	0300X-CA-V0179	Rev. No.	0

Attachment 1. 300-15:4 Subsite Verification Sample Results (Anions, TPH, and Physical).

Sample Location	HEIS Number	Sample Date	Bromide			Chloride			Cyanide			Fluoride			Nitrogen in Nitrate			Nitrogen in Nitrite		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
3906-B	J1RRK0	7/12/13	0.38	U	0.38	41.5		1.9	0.14	BNC	0.11	0.93	B	0.80	1.2	B	0.30	1.2	B	0.33
Duplicate of J1RRK0	J1RRK1	7/12/13	0.38	U	0.38	40.6		1.9	0.15	BMC	0.10	0.94	BN	0.81	5.2		0.31	1.4	B	0.33
3906 North Side	J1RH85	3/7/13	0.71	U	0.71	533		3.6	0.21	BMN	0.19	3.7	B	1.5	0.92	JB	0.58	0.62	UR	0.62

Sample Location	HEIS Number	Sample Date	Nitrogen in Nitrite and Nitrate			Phosphorous in phosphate			Sulfate			Sulfide			TPH - Diesel Range			TPH - Diesel Range EXT		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
3906-B	J1RRK0	7/12/13	0.99	NC	0.31	1.2	U	1.2	23.8		1.7	579		2.5	12000		660	75000		970
Duplicate of J1RRK0	J1RRK1	7/12/13	0.31	U	0.31	1.2	UN	1.2	19.1		1.7	620		2.4	13000		680	95000		990
3906 North Side	J1RH85	3/7/13	0.74	B	0.54	112	J	2.3	697		3.2	4.5	UJ	4.5	880000	J	1200	1500000	J	1800

Sample Location	HEIS Number	Sample Date	Percent moisture (wet sample)			pH Measurement		
			%	Q	PQL	PH	Q	PQL
3906-B	J1RRK0	7/12/13				7.41		0.100
Duplicate of J1RRK0	J1RRK1	7/12/13				7.48		0.100
3906 North Side	J1RH85	3/7/13	46.5		0.10	9.20	J	0.100

Attachment	1	Sheet No.	4 of 6
Originator	J. D. Skoglie	Date	5/19/15
Checked	I. B. Berezovskiy	Date	5/19/15
Calc. No.	0300X-CA-V0179	Rev. No.	0

Attachment 1. 300-15:4 Subsite Verification Sample Results (Organics).

SAMPLE NUMBER		3906-B - J1RRK0			Duplicate of J1RRK0 - J1RRK1			3906 North Side - J1RH85			Trip Blank - J1RRJ8		
CONSTITUENT	CLASS	7/12/13			7/12/13			3/7/13			7/12/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	23	JX	9.4	22	JX	9.6	19	UJ	19			
Acenaphthylene	PAH	8.4	U	8.4	8.6	U	8.6	17	U	17			
Anthracene	PAH	2.9	U	2.9	2.9	U	2.9	140	JX	5.7			
Benzo(a)anthracene	PAH	3.0	U	3.0	3.1	UN	3.1	200	JX	6.0			
Benzo(a)pyrene	PAH	6.0	U	6.0	10	JXN	6.1	450	J	12			
Benzo(b)fluoranthene	PAH	3.9	U	3.9	4.0	U	4.0	310	JX	7.8			
Benzo(ghi)perylene	PAH	6.8	U	6.8	6.9	UN	6.9	580		13			
Benzo(k)fluoranthene	PAH	3.7	U	3.7	4.7	JX	3.8	7.4	UJ	7.4			
Chrysene	PAH	110	X	4.5	4.6	UN	4.6	9.0	UJ	9.0			
Dibenz[a,h]anthracene	PAH	10	U	10	11	U	11	21	U	21			
Fluoranthene	PAH	12	U	12	12	U	12	990	J	24			
Fluorene	PAH	5.0	U	5.0	5.1	U	5.1	9.9	UJ	9.9			
Indeno(1,2,3-cd)pyrene	PAH	11	U	11	12	U	12	200	JX	22			
Naphthalene	PAH	11	U	11	12	U	12	22	UJ	22			
Phenanthrene	PAH	11	U	11	12	U	12	720	J	22			
Pyrene	PAH	11	U	11	12	U	12	640	JX	22			
Aroclor-1016	PCB	2.8	U	2.8	2.6	U	2.6	51	UD	51			
Aroclor-1221	PCB	8.0	U	8.0	7.6	U	7.6	150	UD	150			
Aroclor-1232	PCB	2.0	U	2.0	1.9	U	1.9	37	UD	37			
Aroclor-1242	PCB	4.6	U	4.6	4.4	U	4.4	86	UD	86			
Aroclor-1248	PCB	4.6	U	4.6	4.4	U	4.4	86	UD	86			
Aroclor-1254	PCB	2.6	U	2.6	2.8	JP	2.5	1200	JD	48			
Aroclor-1260	PCB	2.6	U	2.6	2.5	U	2.5	630	JD	48			
1,1,1-Trichloroethane	VOA	2.2	U	2.2	2.2	U	2.2	0.96	U	0.96	0.54	U	0.54
1,1,2,2-Tetrachloroethane	VOA	2.5	U	2.5	2.5	U	2.5	1.1	U	1.1	0.63	U	0.63
1,1,2-Trichloroethane	VOA	3.7	U	3.7	3.7	U	3.7	1.6	U	1.6	0.91	U	0.91
1,1-Dichloroethane	VOA	0.88	U	0.88	0.88	U	0.88	0.39	U	0.39	0.22	U	0.22
1,1-Dichloroethene	VOA	2.5	U	2.5	2.5	U	2.5	1.1	U	1.1	0.61	U	0.61
1,2-Dichloroethane	VOA	2.9	U	2.9	2.9	U	2.9	1.3	U	1.3	0.73	U	0.73
1,2-Dichloroethene(Total)	VOA	1.6	U	1.6	1.6	U	1.6	0.72	U	0.72	0.41	U	0.41
1,2-Dichloropropane	VOA	2.3	U	2.3	2.3	U	2.3	1.0	U	1.0	0.57	U	0.57
2-Butanone	VOA	38	J	7.6	32	J	7.6	11	JBU	3.4	3.1	J	1.9
2-Hexanone	VOA	20	U	20	20	U	20	9.0	U	9.0	5.1	U	5.1
4-Methyl-2-Pentanone	VOA	18	U	18	18	U	18	8.1	U	8.1	4.5	U	4.5
Acetone	VOA	170		22	140		22	50	UB	9.9	12	J	5.6
Benzene	VOA	2.0	U	2.0	2.0	U	2.0	0.87	U	0.87	0.49	U	0.49
Bromodichloromethane	VOA	0.92	U	0.92	0.92	U	0.92	0.41	U	0.41	0.23	U	0.23
Bromoform	VOA	0.96	U	0.96	0.96	U	0.96	10	U	0.43	0.24	U	0.24
Bromomethane	VOA	2.1	U	2.1	2.1	U	2.1	0.92	U	0.92	0.52	U	0.52
Carbon disulfide	VOA	5.5	JB	1.8	4.5	JB	1.8	1.2	J	0.78	0.44	U	0.44
Carbon tetrachloride	VOA	2.6	U	2.6	2.6	U	2.6	1.2	U	1.2	0.65	U	0.65
Chlorobenzene	VOA	2.3	U	2.3	2.3	U	2.3	1.0	U	1.0	0.56	U	0.56
Chloroethane	VOA	3.7	U	3.7	3.7	U	3.7	1.6	U	1.6	0.92	U	0.92
Chloroform	VOA	1.2	U	1.2	1.2	U	1.2	0.54	U	0.54	0.30	U	0.30
Chloromethane	VOA	3.2	U	3.2	3.2	U	3.2	1.4	U	1.4	0.80	U	0.80
cis-1,3-Dichloropropene	VOA	5.4	U	5.4	5.4	U	5.4	2.4	U	2.4	1.3	U	1.3
Dibromochloromethane	VOA	2.4	U	2.4	2.4	U	2.4	1.1	U	1.1	0.59	U	0.59
Ethylbenzene	VOA	2.8	U	2.8	2.8	U	2.8	1.2	U	1.2	0.70	U	0.70
Methylenechloride	VOA	11	JB	6.7	10	JB	6.7	10	U	3.0	1.9	JB	1.7
Styrene	VOA	2.6	U	2.6	2.6	U	2.6	1.2	U	1.2	0.65	U	0.65
Tetrachloroethene	VOA	2.5	U	2.5	2.5	U	2.5	1.1	U	1.1	0.61	U	0.61
Toluene	VOA	2.9	U	2.9	2.9	U	2.9	1.3	J	1.3	0.72	U	0.72
trans-1,3-Dichloropropene	VOA	2.8	U	2.8	2.8	U	2.8	1.2	U	1.2	0.70	U	0.70
Trichloroethene	VOA	0.96	U	0.96	0.96	U	0.96	0.43	U	0.43	0.24	U	0.24
Vinyl chloride	VOA	5.6	U	5.6	5.6	U	5.6	2.5	U	2.5	1.4	U	1.4
Xylenes (total)	VOA	2.5	U	2.5	2.5	U	2.5	1.1	U	1.1	0.63	U	0.63

Attachment	1	Sheet No.	5 of 6
Originator	J. D. Skoglie	Date	5/19/15
Checked	I. B. Berezovskiy	Date	5/19/15
Calc. No.	0300X-CA-V0179	Rev. No.	0

Attachment 1. 300-15:4 Subsite Verification Sample Results (Organics).

SAMPLE NUMBER		3906-B - J1RRK0			Duplicate of J1RRK0 - J1RRK1			3906 North Side - J1RH85		
CONSTITUENT	CLASS	7/12/13			7/12/13			3/7/13		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	140	UD	140	140	UD	140	200	UD	200
1,2-Dichlorobenzene	SVOA	110	UD	110	110	UD	110	160	UD	160
1,3-Dichlorobenzene	SVOA	59	UD	59	58	UD	58	85	UD	85
1,4-Dichlorobenzene	SVOA	67	UD	67	66	UD	66	96	UD	96
2,4,5-Trichlorophenol	SVOA	49	UD	49	48	UD	48	71	UD	71
2,4,6-Trichlorophenol	SVOA	49	UD	49	48	UD	48	71	UD	71
2,4-Dichlorophenol	SVOA	49	UD	49	48	UD	48	71	UD	71
2,4-Dimethylphenol	SVOA	320	UD	320	320	UD	320	470	UD	470
2,4-Dinitrophenol	SVOA	1600	UD	1600	1600	UD	1600	2400	UD	2400
2,4-Dinitrotoluene	SVOA	320	UD	320	320	UD	320	470	UD	470
2,6-Dinitrotoluene	SVOA	140	UD	140	140	UD	140	200	UD	200
2-Chloronaphthalene	SVOA	49	UD	49	48	UD	48	71	UD	71
2-Chlorophenol	SVOA	100	UD	100	100	UD	100	150	UD	150
2-Methylnaphthalene	SVOA	93	UD	93	92	UD	92	130	UD	130
2-Methylphenol (cresol, o-)	SVOA	64	UD	64	63	UD	63	92	UD	92
2-Nitroaniline	SVOA	250	UD	250	240	UD	240	350	UD	350
2-Nitrophenol	SVOA	49	UD	49	48	UD	48	71	UD	71
3,3'-Dichlorobenzidine	SVOA	440	UD	440	440	UD	440	640	UD	640
3+4 Methylphenol (cresol, m+p)	SVOA	160	UD	160	160	UD	160	230	JD	230
3-Nitroaniline	SVOA	360	UD	360	350	UD	350	520	UD	520
4,6-Dinitro-2-methylpheno	SVOA	1600	UD	1600	1600	UD	1600	2300	UD	2300
4-Bromophenylphenyl ether	SVOA	93	UD	93	92	UD	92	130	UD	130
4-Chloro-3-methylpheno	SVOA	320	UD	320	320	UD	320	470	UD	470
4-Chloroaniline	SVOA	400	UD	400	400	UD	400	580	UD	580
4-Chlorophenylphenyl ether	SVOA	100	UD	100	100	UD	100	150	UD	150
4-Nitroaniline	SVOA	360	UD	360	350	UD	350	510	UD	510
4-Nitrophenol	SVOA	480	UD	480	470	UD	470	690	UD	690
Acenaphthene	SVOA	51	UD	51	50	UD	50	73	UD	73
Acenaphthylene	SVOA	84	UD	84	82	UD	82	120	UD	120
Anthracene	SVOA	84	UD	84	82	UD	82	120	UD	120
Benzo(a)anthracene	SVOA	98	UD	98	97	UD	97	210	JD	140
Benzo(a)pyrene	SVOA	98	UD	98	97	UD	97	230	JD	140
Benzo(b)fluoranthene	SVOA	130	UD	130	130	UD	130	430	JXD	190
Benzo(ghi)perylene	SVOA	79	UD	79	77	UD	77	240	JD	110
Benzo(k)fluoranthene	SVOA	200	UD	200	190	UD	190	280	UXD	280
Bis(2-chloro-1-methylethyl)ethe	SVOA	110	UD	110	110	UD	110	160	UD	160
Bis(2-Chloroethoxy)methane	SVOA	110	UD	110	110	UD	110	160	UD	160
Bis(2-chloroethyl) ether	SVOA	82	UD	82	80	UD	80	120	UD	120
Bis(2-ethylhexyl) phthalate	SVOA	230	UD	230	540	JD	220	12000	JD	330
Butylbenzylphthalate	SVOA	210	UD	210	210	UD	210	420	JD	300
Carbazole	SVOA	180	UD	180	170	UD	170	250	UD	250
Chrysene	SVOA	130	UD	130	130	UD	130	300	JD	190
Dibenz[a,h]anthracene	SVOA	93	UD	93	92	UD	92	130	UD	130
Dibenzofuran	SVOA	98	UD	98	97	UD	97	140	UD	140
Diethylphthalate	SVOA	130	UD	130	130	UD	130	180	UD	180
Dimethyl phthalate	SVOA	110	UD	110	110	UD	110	160	JD	160
Di-n-butylphthalate	SVOA	140	UD	140	140	UD	140	650	JD	210
Di-n-octylphthalate	SVOA	71	UD	71	70	UD	70	100	UD	100
Fluoranthene	SVOA	180	UD	180	170	UD	170	270	JD	250
Fluorene	SVOA	89	UD	89	87	UD	87	130	UD	130
Hexachlorobenzene	SVOA	140	UD	140	140	UD	140	210	UD	210
Hexachlorobutadiene	SVOA	49	UD	49	48	UD	48	71	UD	71
Hexachlorocyclopentadiene	SVOA	250	UD	250	240	UD	240	350	UD	350
Hexachloroethane	SVOA	100	UD	100	100	UD	100	150	UD	150
Indeno(1,2,3-cd)pyrene	SVOA	110	UD	110	110	UD	110	210	JD	160
Isophorone	SVOA	84	UD	84	82	UD	82	120	UD	120
Naphthalene	SVOA	150	UD	150	150	UD	150	220	UD	220
Nitrobenzene	SVOA	110	UD	110	110	UD	110	160	UD	160
N-Nitroso-di-n-dipropylamine	SVOA	150	UD	150	150	UD	150	220	UD	220
N-Nitrosodiphenylamine	SVOA	100	UD	100	100	UD	100	150	UD	150
Pentachlorophenol	SVOA	1600	UD	1600	1600	UD	1600	2300	UD	2300
Phenanthrene	SVOA	84	UD	84	82	UD	82	120	UJD	120
Phenol	SVOA	89	UD	89	87	UD	87	1000	JD	130
Pyrene	SVOA	60	UD	60	59	UD	59	240	JD	86

Attachment	1	Sheet No.	6 of 6
Originator	J. D. Skoglie	Date	5/19/15
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ATTACHMENT C

DATA QUALITY ASSESSMENT

ATTACHMENT C

DATA QUALITY ASSESSMENT

CHARACTERIZATION SAMPLING

A data quality assessment (DQA) was performed to compare the characterization sampling approach and resulting analytical data with the sampling and data requirements specified in the site-specific sample design (WCH 2013c). This DQA was performed in accordance with site-specific data quality objectives found in the *300 Area Remedial Action Sampling and Analysis Plan* (300 Area SAP) (DOE-RL 2011).

A review of the sample design (WCH 2013c), the field logbook (WCH 2013a, 2013b), and applicable analytical data packages has been performed as part of this DQA. All samples were collected and analyzed per the sample design. To ensure quality data, the 300 Area SAP (DOE-RL 2011) data assurance requirements and the data validation procedures for chemical analysis (BHI 2000) are used as appropriate. This review involves evaluation of the data to determine if they are of the right type, quality, and quantity to support the intended use (i.e., closeout decisions). The DQA completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data quality objectives process (EPA 2006).

Characterization sample data collected at the 300-15:4 subsite were provided by the laboratories in two sample delivery groups (SDGs) J01744 and J01861. SDG J01744 was submitted for third-party validation. Major and minor deficiencies are discussed for the 300-15:4 subsite data set as follows below. If no comments are made about a specific analysis, it should be assumed that no deficiencies affecting the quality of the data were found.

MAJOR DEFICIENCIES

In SDG J01744, the holding time for the Method 300.0 inductively coupled anions, nitrate, nitrite, and orthophosphate were exceeded by more than twice the quality control (QC) limit. Third-party validation has qualified the nondetected results for these analytes as rejected with "R" flags.

These results were anticipated by the project. To obtain usable nitrate and nitrite data method 353.2 was also run which has longer allowable holding time. These data effectively replace the rejected method 300.0 nitrate and nitrite data. Orthophosphate is not a regulated compound; therefore, the resulting data set is sufficient for decision-making purposes.

MINOR DEFICIENCIES

SDG J01744

This SDG comprises two sludge samples (J1RH84, J1RH85) both collected from the 3906 lift station. However, sample J1RH84 was collected from the southern portion of the vault which administratively is part of the 300-257 waste site. Sample J1RH85 was collected from the northern section of the 3906 lift station vault which is designated as the 300-15:4 subsite. Only results affecting the 300-15:4 waste site (sample J1RH85) are expanded upon in this DQA.

Both samples were analyzed for inductively coupled plasma (ICP) metals, inductively coupled plasma mass spectrometry (total uranium), mercury, total uranium by kinetic phosphorescence analysis (KPA), gamma energy analysis (GEA), gross alpha, gross beta, isotopic plutonium, plutonium-241, isotopic uranium, americium-241/curium-244, technetium-99, tritium, carbon-14, nickel-63, strontium-90, inductively coupled anions, nitrate/nitrite, sulfide, total cyanide, semivolatile organic compounds (SVOC), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), and volatile organic compounds (VOC). SDG J01744 was submitted for third-party validation. Minor deficiencies are as follows.

In the tritium, plutonium-241, and carbon-14 analyses no matrix spike (MS) was performed. In the americium-241/curium-244, isotopic plutonium, and isotopic uranium analyses, no laboratory control sample (LCS) analysis was performed for curium-242, curium-243/244, plutonium-238, and uranium 235. Third-party validation qualified all curium-242, curium-243/244, tritium, plutonium 238, and uranium-235 results in SDG J01744 as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the americium-241/curium-244 analysis, the tracer yield is outside of QC limits at 11%. Third-party validation qualified all americium-241, curium-242, and curium-243/244 results as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the PCB analysis, the MS and matrix spike duplicate (MSD) recoveries are outside of QC limits for aroclor-1260 at 201% and 229%, respectively. Third-party validation qualified the aroclor-1260 as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the PCB analysis, surrogate recoveries are outside of laboratory QC limits. Third-party validation qualified the aroclor-1254 and aroclor-1260 results for sample J1RH85 as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the volatile organic analysis, acetone, bromoform, 2-butanone, and methylene chloride contamination were detected in the method blank (MB). The results are not above applicable remedial action goals and there is no impact on the evaluation of the 300-15:4 subsite. Due to the MB contamination, third-party validation qualified the acetone and 2-butanone results as undetected with "U" flags. Additionally, Third-party validation qualified the bromoform, and methylene chloride results as undetected with "U" flags while also raising these results to the required quantitation limit. The data are usable for decision-making purposes.

In the total petroleum hydrocarbon (TPH) analysis, the MSD recoveries are above QC limits for diesel range (164%) and diesel range extended (177%) hydrocarbons. Additionally, the surrogate recoveries in the TPH analysis are above laboratory QC limits. Third-party validation qualified all TPH results in SDG J01744 as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the SVOA analysis, MS/MSD recoveries are outside of QC limits for bis(2-ethylhexyl)phthalate (301% [MSD only]), fluoranthene (191% and 153%), phenanthrene (190% [MS only]), and pyrene (179% [MS only]). The MS/MSD relative percent difference (RPD) calculations were above QC limits for bis(2 ethylhexyl)phthalate (68%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Due to MS/MSD recoveries and/or RPD calculations outside of QC limits, the bis(2-ethylhexyl)phthalate, fluoranthene, phenanthrene, and pyrene results were qualified as estimated with "J" flags by third-party validation. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, due to an LCS recovery for silicon (9%) outside of QC limits, third-party validation qualified the associated data as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the RPD calculations for the laboratory duplicate are above QC limits for cadmium (95%), chromium (117%), cobalt (61%), copper (55%), iron (80%), manganese (78%), nickel (124%), and zinc (35%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. These results were qualified as estimated with "J" flags by third-party validation. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries for antimony (63%) and silicon (23%) are outside of QC limits. Third-party validation qualified the associated results as estimated with "J" flags. Estimated data are acceptable for decision-making purposes.

In the PAH analysis, the MS and MSD recoveries are above QC limits for acenaphthene (214% [MSD only]), anthracene (180% and 279%), benzo(a)anthracene (179% and 287%), benzo(a)pyrene (162% and 222%), benzo(b)fluoranthene (204% [MSD only]), benzo(k)fluoranthene (162% [MSD only]), chrysene (156% and 246%), fluoranthene (368% and 719%), fluorene (213% [MSD only]), indeno(1,2,3-cd)pyrene (166% and 210%), naphthalene (193% [MSD only]), phenanthrene (-60% and -37%), and pyrene (317% and 598%). The MS/MSD RPD calculations were above QC limits for acenaphthene, anthracene, benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene. The surrogate recoveries for the MS and MSD are also above QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Due to MS/MSD recoveries and/or RPD calculations outside of QC limits, the acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene results were qualified as

estimated and flagged with a "J" by third-party validation. Estimated data are usable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by more than twice the specified holding time for nitrate, nitrite, and orthophosphate. The nondetected results for these analytes are discussed above in the Major Deficiencies section. Due to the holding time exceedance, detected nitrate, nitrite, and orthophosphate results were qualified as estimated with "J" flags by third-party validation. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, the MS recovery for orthophosphate (69%) is outside of QC limits. Due to the MS recovery, the orthophosphate results were qualified as estimated and flagged with a "J" by third-party validation. Estimated data are acceptable for decision-making purposes.

In the sulfide analysis, the MSD recovery is outside of QC limits at 68%. Due to the MSD recovery, the sulfide results were qualified as estimated and flagged with a "J" by third-party validation. Estimated data are acceptable for decision-making purposes.

SDG J01861

This SDG comprises four samples (J1RRK0, J1RRK1, J1RRJ9, J1RRJ8) associated with the 300-15:4 subsite. Samples J1RRK0 and J1RRK1 are a field duplicate pair collected from the 3906 Lift Station, which were analyzed for ICP metals, mercury, uranium (total) KPA, GEA, gross alpha, gross beta, isotopic plutonium, plutonium-241, isotopic uranium, americium-241/curium-244, technetium-99, tritium, carbon-14, nickel-63, strontium-90, PAH, PCB, SVOCs, TPH, VOCs, IC anions, nitrogen in nitrate and nitrite, sulfides, total cyanides, and hydrogen ion concentration. Sample J1RRJ9 is an equipment blank that was analyzed for ICP metals and mercury. Sample J1RRJ8 is a VOC trip blank analyzed for VOCs. Minor deficiencies are as follows.

In the VOC analysis, carbon disulfide and methylene chloride were detected in the MB at concentrations less than half of the method detection limit. The laboratory has qualified detected sample results above the method detection limit for these analytes as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the PCB analysis, the RPD calculated between the primary and confirmatory columns for aroclor-1254 in sample J1RRK1 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 PCB analysis, due to insufficient sample volume no MS or MSD was prepared. The laboratory added a duplicate LCS (LCSD) to provide a measure of batch precision. All PCB results in SDG J01861 may be considered estimated. Estimated data are usable for decision-making purposes.

In the Northwest total petroleum hydrocarbons – diesel range organics (NWTPH-Dx) analysis, due to insufficient sample volume no MS or MSD was prepared. The laboratory added an LCSD

to provide a measure of batch precision. All NWTPH-Dx results in SDG J01861 may be considered estimated. Estimated data are usable for decision-making purposes.

In the PAH analysis, the RPD calculated between the primary and confirmatory columns exceeds the QC limit for some 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 PAH analysis, the MS/MSD recoveries are outside the QC limits for some analytes. 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 MS recovery for zirconium is 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 RPD calculated for the 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 353.2 nitrate/nitrite as N analysis, low levels were detected in the MB. Because this detection was less than half of the reporting limit there is minimal impact to the field sample data. The data are usable for decision-making purposes.

In the Method 353.2 nitrate/nitrite as N analysis, the MS recovery is outside the QC limits. The laboratory has qualified the associated data with "N" flags. Method accuracy has been verified by acceptable LCS results. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the total cyanide analysis, low levels were detected in the MB. Because this detection was less than half of the reporting limit there is minimal impact to the field sample data. The data are usable for decision-making purposes.

In the total cyanide analysis, the MS recovery is outside the QC limits. The laboratory has qualified the associated data with "N" flags. Method accuracy has been verified by acceptable LCS results. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the total cyanide analysis, the RPD calculated from the laboratory duplicate is outside the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Acceptable LCS results confirm method accuracy. 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 sulfide analysis, due to insufficient sample volume no MS or MSD was prepared. The laboratory added an LCSD to provide a measure of batch precision. All sulfide results in SDG J01861 may be considered estimated. Estimated data are usable for decision-making purposes.

In the Method 9056 IC anions analysis, the MS recoveries for orthophosphate as P and fluoride are outside the QC limits. Method accuracy is confirmed by acceptable LCS recoveries. The laboratory has qualified the associated data with "N" flags. These data may be considered estimated. 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) measurements are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples, listed in the field logbook (WCH 2014a) are shown in Table C-1. The main and QA/QC sample results are presented in Attachment B.

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

Sample Area	Main Sample	Duplicate Sample
3906 Lift Station	J1RRK0	J1RRK1

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 Attachment B provides details on duplicate pair evaluation and RPD calculation.

No major or minor deficiencies in the RPDs calculated were found. The data are usable for decision-making purposes.

A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) is less than five times the target detection limit. In these cases, a control limit of ±2 times the target detection limit is used (Attachment B) to indicate that a visual check of the data is required by the reviewer. In the duplicate analysis multiple analytes were flagged for this evaluation. A visual inspection of all of the data is also performed.

No additional major or minor deficiencies are noted. The data are usable for decision-making purposes.

Summary

Limited, random, or sample matrix-specific influenced batch QC issues, such as those discussed above, are a potential for any analysis. The number and types seen in these data sets are within expectations for the matrix types and analyses performed. The DQA review of the 300-15:4 subsite characterization 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 300-15:4 data set 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.

These data are stored in the Washington Closure Hanford project-specific database prior to being submitted for inclusion in the Hanford Environmental Information System database. The characterization sample data are also summarized in Attachment B.

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