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

11-AMRC-0178

JUL 20 2011

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

Dear Ms. Hedges:

TRANSMITTAL OF APPROVED WASTE SITE RECLASSIFICATION FORM AND SUPPORTING DOCUMENTATION FOR THE 100-D-74, 105-DR DRY WELL, REVISION 0

Attached for your use is the approved Waste Site Reclassification Form No. 2010-083 and supporting "Remaining Sites Verification Package for the 100-D-74, 105-DR Dry Well," Revision 0. If you have questions, please contact me or your staff may contact Tom Post of my staff, at (509) 376-3232.

Sincerely,

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

AMRC:TCP

Attachment

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

cc w/o attach:
R. D. Cantwell, WCH
S. A. Christman, CHPRC
S. L. Feaster, WCH
T. A. Harris, WCH
M. L. Proctor, WCH

Date Submitted: 11/11/2010 Originator: M. L. Proctor Phone: 372-9227	**WASTE SITE RECLASSIFICATION FORM** Operable Unit(s): 100-DR-1 Waste Site Code: 100-D-74 Type of Reclassification Action: Closed Out ☐ Interim Closed Out ☐ No Action ☒ RCRA Postclosure ☐ Rejected ☐ Consolidated ☐	Control Number: 2010-083

This form documents agreement among parties listed authorizing classification of the subject unit as Closed Out, Interim Closed Out, No Action, RCRA Postclosure, Rejected, or Consolidated. This form also authorizes backfill of the waste management unit, if appropriate, for Closed Out and Interim Closed Out units. Final removal from the NPL of No Action and Closed Out waste management units will occur at a future date.

Description of current waste site condition:

The 100-D-74, 105-DR Dry Well waste site is located just north of the 105-DR Reactor. The dry well received steam condensate from the heating units inside the 105-DR Reactor. This waste site is included in 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, as a candidate site for confirmatory sampling. Confirmatory sampling of this site has been performed in August 2010 in accordance with remedial action objectives and goals established by the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington. The selected action involved (1) evaluating the site using available process information, (2) demonstrating through confirmatory sampling that remedial action goals (RAGs) have been achieved, and (3) proposing the site for reclassification to No Action.

Basis for reclassification:

In accordance with this evaluation, the confirmatory sampling results support a reclassification of the 100-D-74 waste site to No Action. The current site conditions achieve RAGs established by the Remaining Sites ROD. The results of confirmatory sampling show that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. Site contamination did not extend into the deep zone soils. 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-D-74, 105-DR Dry Well* (attached).

Regulator Comments:

Approval of this WSRF documents regulator agreement that the 100-D-74 waste site qualifies for "No Action" under this Interim Action ROD. In addition, Ecology has evaluated the data for this site against WAC 173-340 (2007) clean-up levels for direct contact, groundwater protection, and river protection. This evaluation is documented in the letter transmitting Ecology's approval of the site's interim reclassification to "No Action."

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.

M. S. French DOE Federal Project Director (printed)	MSFrench Signature	4/15/11 Date
N. Menard Ecology Project Manager (printed)	Nina M. Menard Signature	6/15/11 Date
N/A EPA Project Manager (printed)	Signature	Date

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-D-74, 105-DR DRY WELL

Attachment to Waste Site Reclassification Form 2010-083

November 2010

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-D-74, 105-DR DRY WELL

EXECUTIVE SUMMARY

The 100-D-74, 105-DR Dry Well waste site located in the 100-DR-1 Operable Unit, just north of the 105-DR Reactor, received steam condensate from heating units inside the 105-DR Reactor. The site was connected to a flush tank, located inside the 105-DR Reactor wall, by a 5-cm (2-in.) drain line to the dry well. Neither the diameter nor the depth of the dry well is known. In reviewing remediation footprints in the area, it cannot be confirmed that the dry well was removed. However, because the dry well was in close proximity to the external wall of the 105-DR Reactor, it would have been difficult to remove the wall of the reactor without removing the dry well in the process. Site visits in March of 2008 and October 2009 observed no evidence of visible staining, structures, debris, or vegetation existing within a 5 m (16 ft) diameter area of the coordinates of the waste site. The area has been heavily disturbed by remediation activities at other waste sites and is overlaid by a gravel road.

Based on observations during the site visit, review of historical drawings, process knowledge, and a geophysical survey of the 100-D-74 waste site, confirmatory sampling was performed in August 2010. The results indicated that the waste site achieved compliance with the remedial action objectives (RAOs) and remedial action goals (RAGs) for the 100-D-74 waste site, and remediation was not necessary. A summary of the evaluation of the soil analyses against the applicable RAGs is presented in Table ES-1. The results of the confirmatory sampling are used to make reclassification decisions for the 100-D-74 waste site in accordance with the TPA-MP-14 procedure in the *Tri-Party Agreement Handbook Management Procedures* (DOE-RL 2007).

In accordance with this evaluation, the confirmatory sampling results support a reclassification of this site to No Action. The current site conditions achieve the RAOs and the corresponding RAGs established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE-RL 2009) 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 contaminant levels remaining in the soil are protective of groundwater and the Columbia River. The 100-D-74 waste site did not extend into the deep zone. Institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the site are not required.

Table ES-1. Summary of Remedial Action Goals for the 100-D-74 Waste Site.

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain 15-mrem/yr dose rate above background over 1,000 years.	Radionuclides were not COPCs for the 100-D-74 waste site.	NA
Direct Exposure – Nonradionuclides	Attain individual COPC RAGs.	All individual COPC concentrations are below the direct exposure criteria.	Yes
Risk Requirements – Nonradionuclides	Attain a hazard quotient of <1 for all individual noncarcinogens.	The hazard quotients for individual nonradionuclide COPCs are <1.	Yes
	Attain a cumulative hazard quotient of <1 for noncarcinogens.	The cumulative hazard quotient for all sampling areas (8.2×10^{-4}) is <1.	
	Attain an excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	Excess cancer risk values for individual nonradionuclide COPCs are $<1 \times 10^{-6}$.	
	Attain a cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	The total excess carcinogenic risk for all sampling areas (9.6×10^{-8}) is $<1 \times 10^{-5}$.	
Groundwater/River Protection – Radionuclides	Attain single COPC groundwater and river RAGs.	Radionuclides were not COPCs for the 100-D-74 waste site.	NA
	Attain National Primary Drinking Water Regulations: 4 mrem/yr (beta/gamma) dose standard to target receptor/organ [a].		
	Meet drinking water standards for alpha emitters: the more stringent of 15 pCi/L MCL or 1/25th of the derived concentration guide for DOE Order 5400.5 [b].		
	Meet total uranium standard of 21.2 pCi/L [c].		
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and Columbia River cleanup requirements.	All individual COC and COPC concentrations are below the groundwater and/or Columbia River protection criteria.	Yes

[a] "National Primary Drinking Water Regulations" (40 *Code of Federal Regulations* 141).
[b] *Radiation Protection of the Public and Environment* (DOE Order 5400.5).
[c] Based on the isotopic distribution of uranium in the 100 Area, the 30 µg/L MCL corresponds to 21.2 pCi/L. Concentration-to-activity calculations are documented in *Calculation of Total Uranium Activity Corresponding to a Maximum Contaminant Level for Total Uranium of 30 Micrograms per Liter in Groundwater* (BHI 2001).

COC = contaminant of concern
COPC = contaminant of potential concern
MCL = maximum contaminant level
NA = not applicable
RAG = remedial action goal

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 site contaminants of potential concern, and other constituents (Appendix A). The only constituent exceeding the ecological screening level in the *Washington Administrative Code* Chapter 173-340, Table 749-3 was vanadium. U.S. Environmental Protection Agency ecological soil screening levels were exceeded for manganese and vanadium. Exceedance of screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because the maximum detected levels of manganese and vanadium were below Hanford Site background levels, it is believed that the presence of these constituents does not pose a risk to the ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for ecological effects as a part of the final closeout decision for the Columbia River corridor portion of the Hanford Site.

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-D-74, 105-DR DRY WELL

STATEMENT OF PROTECTIVENESS

The 100-D-74, 105-DR Dry Well waste site confirmatory sampling data, site evaluations, and supporting documentation demonstrate that this site meets the objectives established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2009) 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. This site does not extend into the deep zone. Institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the site are not required.

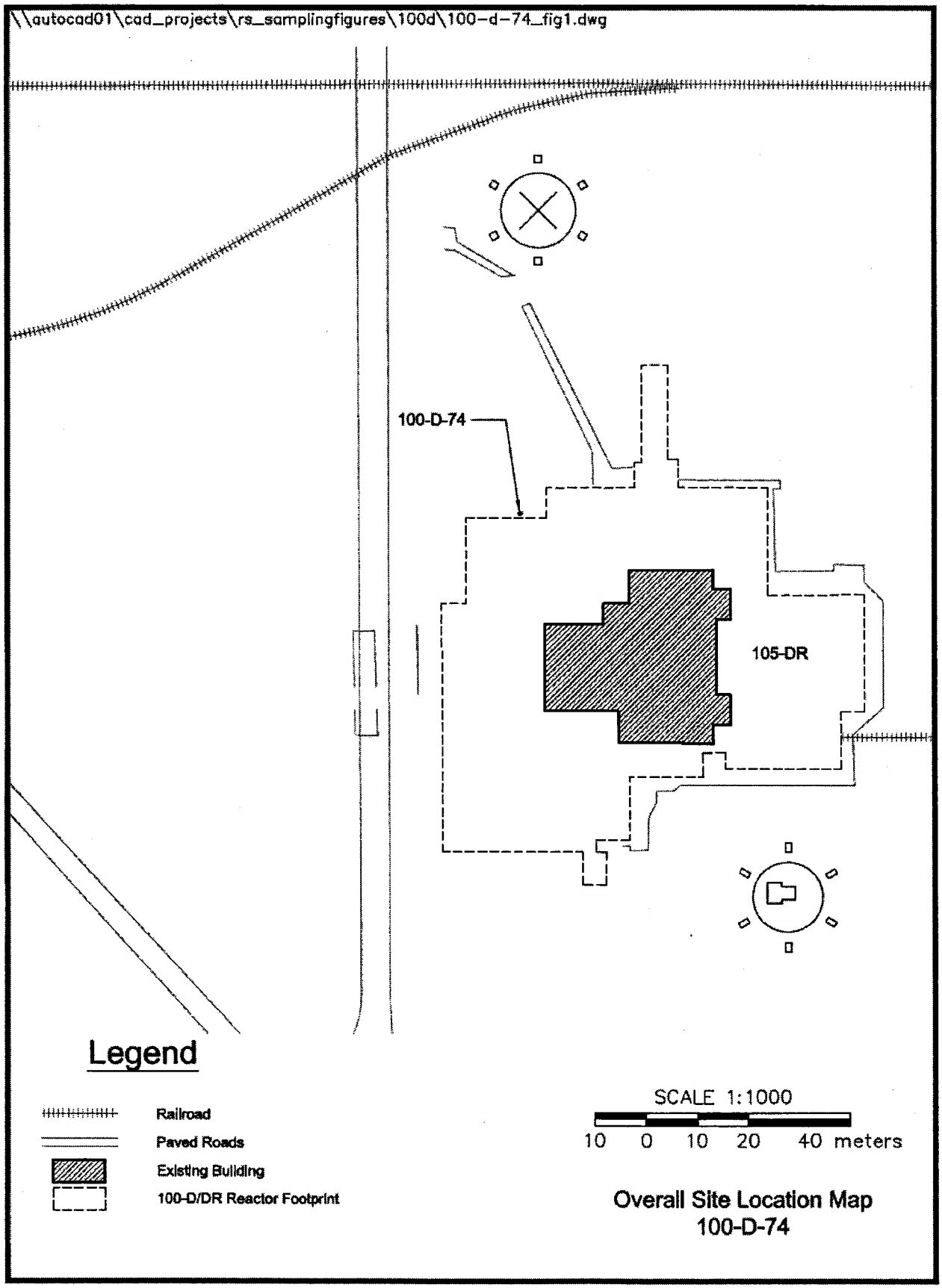
Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based in part on a limited ecological risk assessment. Although not required by the Remaining Sites ROD, a comparison against ecological risk screening levels has been made for the site contaminants of potential concern, and other constituents (Appendix A). The only constituent exceeding the ecological screening level in the *Washington Administrative Code* Chapter 173-340, Table 749-3 was vanadium. U.S. Environmental Protection Agency ecological soil screening levels were exceeded for manganese and vanadium. Exceedance of screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because the maximum detected levels of manganese and vanadium were below Hanford Site background levels, it is believed that the presence of these constituents does not pose a risk to the ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for ecological effects as a part of the final closeout decision for the Columbia River corridor portion of the Hanford Site.

GENERAL SITE INFORMATION AND BACKGROUND

The 100-D-74 waste site, located in the 100-DR-1 Operable Unit, just north of the 105-DR Reactor, received steam condensate from heating units inside the 105-DR Reactor (Figure 1). The site was connected to a flush tank, located inside the 105-DR Reactor wall, by a 5-cm (2-in.) drain line to the dry well. Neither the diameter nor the depth of the dry well is known. In reviewing remediation footprints in the area, it cannot be confirmed that the dry well was removed. However, because the dry well was in close proximity to the eternal wall of the 105-DR Reactor, it would have been difficult to remove the wall of the reactor without removing the dry well in the process. The Washington State Plane coordinates for the center of the 100-D-74 waste site are N 151316, E 573744.

The 105-DR Reactor was the Hanford Site's fifth single-pass, graphite-moderated production reactor. Construction began in 1947 and was completed in 1950. After its shutdown in 1964, the

Figure 1. The 100-D-74 Waste Site Location Map.



105-DR Reactor remained in a state of surveillance and maintenance until the reactor was placed in interim safe storage from 1998 to 2003.

The 105-DR dry well was constructed in 1948. The purpose of this dry well was to receive steam condensate from heaters inside the 105-DR Reactor Building. Steam heating is a noncontact system vented through the 117-D Filter Building, eliminating the possibility of radiological contamination in this part of the building. It is also possible that floor drains in the reactor facility were connected to the dry well.

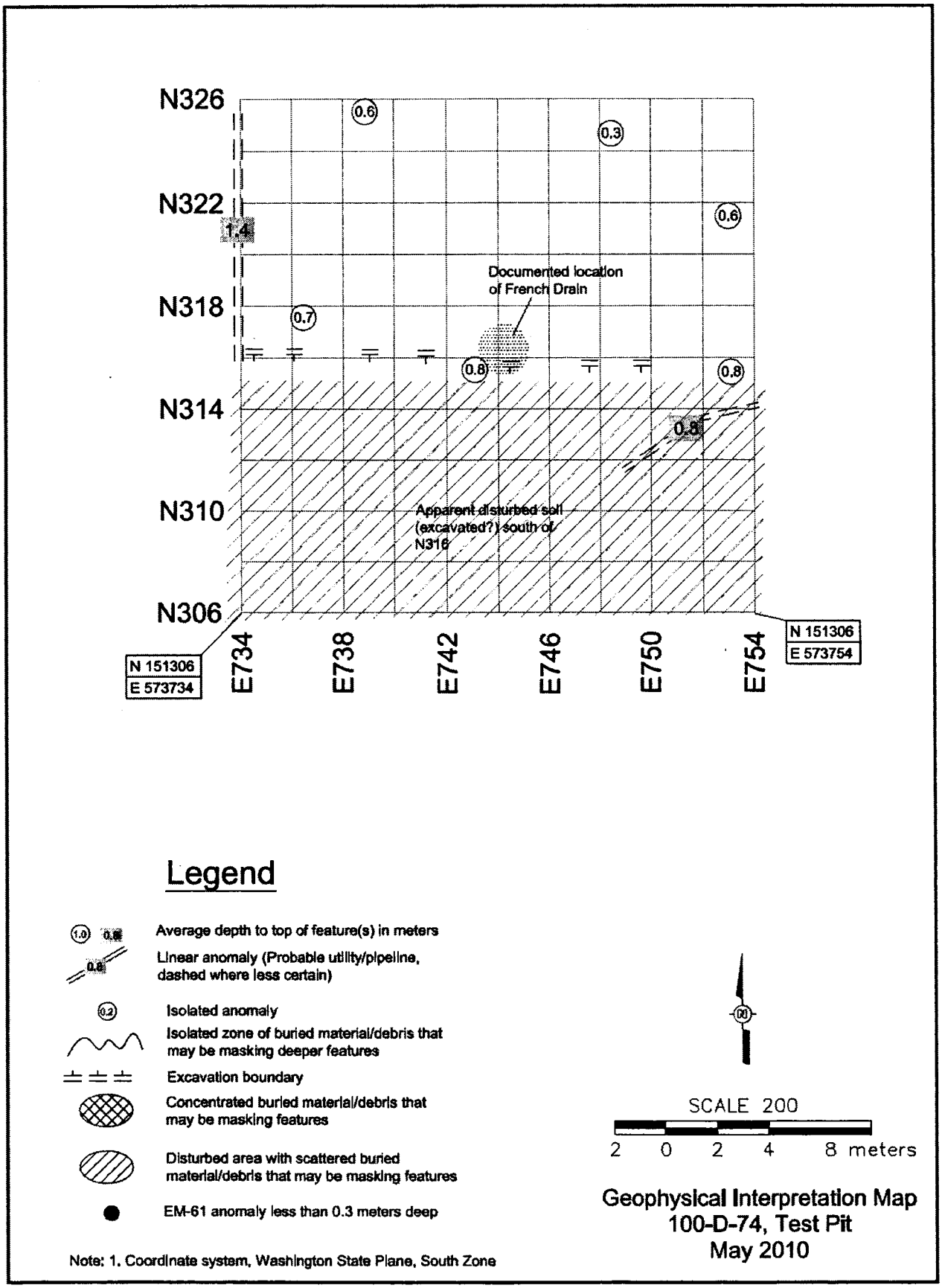
The area around the dry well was disturbed and/or excavated during the 105-DR Reactor decommissioning activities. The site was then backfilled and returned to grade (Figure 2). The dry well was likely removed during these decommissioning activities. However, the dry well would have been difficult to distinguish from the demolition debris, and no record of the dry well removal can be found.

Figure 2. The 100-D-74 Waste Site, Facing South Towards the 105-DR Reactor.

Geophysical Survey

A geophysical survey was determined to be ineffective at the location of dry wells due to the lack of physical contrast between the construction material and the surrounding soil; therefore, a geophysical survey was not conducted to locate this dry well. A geophysical survey was conducted prior to confirmatory sampling activities to identify live electrical utilities in support of the excavation permitting process (Figure 3).

Figure 3. Geophysical Survey for the 100-D-74 Waste Site.



Site Visit

An orphan sites field investigation completed in this area on March 11, 2008 found no features associated with the dry well at this site (WCH 2009). The area is heavily disturbed by remediation activities at other waste sites and is currently overlain by a gravel road. No evidence of visible staining, structures, debris, or vegetation existed within a 5 m (16 ft) diameter area. A second visit in October 2009 confirmed the findings of the previous visit.

Ecological and Cultural

An ecological and cultural resources review was performed for the 100-D-74 waste site in June 2010. The waste site is located within a heavily disturbed area. Existing roads were to be used as much as possible when accessing the site, to reduce the spread of noxious weeds and minimize impacts to existing vegetation. Nesting birds such as killdeer and nighthawks sometimes use these heavily disturbed areas for nesting, and workers were advised to watch for nesting activity. No nests or nesting activity were observed during confirmatory sampling.

No archaeological sites were known or expected to exist in the 100-D project area near the 100-D-74 waste site. All workers were directed to watch for cultural materials (e.g., bones, stone tools, mussel shells, cans, bottles, Hanford era artifacts) during all work activities. No ecologically or culturally significant materials were encountered during confirmatory sampling.

CONFIRMATORY SAMPLING SUMMARY

A focused sample collected from the excavated test pit was used to evaluate the 100-D-74 waste site. The extent of the backhoe was reached at approximately 4.6 m (15 ft) below ground surface (bgs) during sampling at the test pit location. No evidence of a dry well (vertical piping or sized gravel) was found. Only small pieces of metal debris, concrete pieces, one large piece of concrete, and some asphalt were observed within the test pit. No undisturbed native soil was encountered during the excavation. The focused sample was collected from near the deepest extent of the sampling excavation, at approximately 4.6 m (15 ft) bgs. A focused sample and a duplicate sample were collected for analysis to evaluate if contamination associated with the discharged steam condensate was present. Field surveys for radiological contamination and volatile organic compounds (VOCs) were conducted during sampling. Confirmatory sampling determined that environmental contamination was not present at this waste site. Based on confirmatory sampling at the 100-D-74 waste site, remedial action was determined to be unnecessary, and the confirmatory sampling data has been used to document this waste site for reclassification as a "No Action" site. The expected location of the dry well was identified as a worst case location of the waste site. It was determined that if no contamination was present at the "worst case" location of the waste site, then no contamination would extend into the deep zone. Tables 1 and 2 identify the location and analysis selected for confirmatory sampling. No anomalous features were identified during confirmatory sampling.

Table 1. 100-D-74 Confirmatory Sampling Summary Table.

Sample Location	Sample Media	HEIS Number	Washington State Plane Coordinates		Sample Analysis
			Northing (m)	Easting (m)	
Main (15 ft bgs)	Soil	J1B5K2	151316	573744	ICP metals [a], hexavalent chromium, mercury, PAH, PCBs
Duplicate of J1B5K2	Soil	J1B5K5	151316	573744	
Equipment blank	Silica sand	J1B5K1	NA	NA	ICP metals [a], mercury, PAH

[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.

bgs = below ground surface
HEIS = Hanford Environmental Information System
ICP = inductively coupled plasma
NA = not applicable
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl

Table 2. 100-D-74 Laboratory Analytical Methods.

Analytical Method	Contaminant of Potential Concern
ICP metals [a] – EPA Method 6010	Expanded list
Mercury – EPA Method 7471	Mercury
Cr^{+6} – EPA Method 7196	Hexavalent chromium
PCB – EPA Method 8082	Polychlorinated biphenyls
PAH – EPA Method 8310	Polycyclic aromatic hydrocarbons

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

EPA = U.S. Environmental Protection Agency
ICP = inductively coupled plasma
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl

Contaminants of Potential Concern

The contaminants of potential concern (COPCs) for the 100-D-74 waste site were identified based on consideration of possible discharges to the dry well from floor drains. Polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCBs), mercury, and the expanded list of inductively coupled plasma (ICP) metals have been identified as COPCs. While not considered a COPC, analysis for hexavalent chromium was also performed to support the effort to identify hexavalent chromium sources across the 100-D Area. Mercury was included because evidence of mercury-contaminated sulfuric acid has been found at other waste sites in the 100 Area. Because no suspected asbestos-containing material, oily stained soil, or evidence of burning was observed during confirmatory sampling, analysis was not performed for asbestos or total petroleum hydrocarbons (TPH). Volatile organic compounds (VOCs) and radiological activity were not detected in the field during confirmatory sampling activities; therefore, analysis for VOCs and radionuclides were not performed.

Confirmatory Sample Results

Confirmatory samples were analyzed using U.S. Environmental Protection Agency-approved analytical methods. Evaluation of the sample data was performed by direct comparison of the maximum detected value for each COPC against the RAGs. If no detections for a given COPC were reported in the data set, then no comparisons were performed for that COPC.

Comparisons of the maximum results for COPCs and the site RAGs for 100-D-74 are presented in Table 3. Contaminants that were not detected by laboratory analysis are excluded from these tables. Calculated cleanup levels for aluminum, calcium, iron, magnesium, potassium, silicon, and sodium are not presented in the RDR/RAWP (DOE-RL 2009). Parameters to calculate cleanup levels for these constituents are not presented in the Cleanup Levels and Risk Calculations (CLARC) Database (Ecology 2009) under WAC 173-340-740(3) or other reference databases; therefore, these constituents are not considered COPCs and are not included in the tables. The laboratory-reported data results for all constituents are stored in the Environmental Restoration (ENRE) project-specific database prior to provision to the Hanford Environmental Information System (HEIS) and are presented as an attachment to the direct contact hazard quotient and relative percent difference (RPD) calculation in Appendix B.

Table 3. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 100-D-74 Confirmatory Sampling Data. (2 Pages)

COPC	Maximum Result (mg/kg)	Remedial Action Goals[a] (mg/kg)			Does the Maximum Result Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Arsenic	1.5 (<BG)	20[b]	20[b]	20[b]	No	--
Barium	54.3 (<BG)	5,600	200	400	No	--
Beryllium	0.12 (<BG)	10.4[c]	1.51[b]	1.51[b]	No	--
Chromium (total)	6.4 (<BG)	80,000	18.5[b]	18.5[b]	No	--
Cobalt	8.3 (<BG)	24	15.7[b]	--[d]	No	--
Copper	13.4 (<BG)	2,960	59.2	22.0[b]	No	--
Lead	2.3 (<BG)	353	10.2[b]	10.2[b]	No	--
Manganese	278 (<BG)	3,760	512[b]	512[b]	No	--
Mercury	0.017 (<BG)	24	0.33[b]	0.33[b]	No	--
Molybdenum[e]	0.32	400	8	--[d]	No	--
Nickel	9.5 (<BG)	1,600	19.1[b]	27.4	No	--
Vanadium	57.6 (<BG)	560	85.1[b]	--[d]	No	--
Zinc	40.9 (<BG)	24,000	480	67.8[b]	No	--
Anthracene	0.010	24,000	240	1,920	No	--
Benzo(a)pyrene	0.011	0.137	0.015[f]	0.015[f]	No	--
Benzo(b)fluoranthene	0.011	1.37	0.015[f]	0.015[f]	No	--
Benzo(k)fluoranthene	0.0089	1.37	0.015[f]	0.015[f]	No	--
Chrysene	0.016	13.7	0.12	0.1[f]	No	--
Phenanthrene[g]	0.023	24,000	240	1,920	No	--

Table 3. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 100-D-74 Confirmatory Sampling Data. (2 Pages)

COPC	Maximum Result (mg/kg)	Remedial Action Goals [a] (mg/kg)			Does the Maximum Result Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Pyrene	0.040	2,400	48	192	No	--

[a] RAGs obtained from the RDR/RAWP (DOE-RL 2009) unless otherwise noted.
[b] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d)(1996). 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).
[c] Carcinogenic cleanup level calculated based on the inhalation exposure pathway per WAC 173-340-750(3), 1996 (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]).
[d] No parameters (bioconcentration factors or AWQC values) are available from the Cleanup Levels and Risk Calculations Database (Ecology 2009) or other databases to calculate cleanup levels (WAC 173-340-730(3)(a)(iii), 1996 [Method B for surface waters]).
[e] No Hanford Site-specific or Washington State background value available.
[f] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2)(Ecology 1996).
[g] Toxicity data for phenanthrene are not available. The cleanup level is based on the surrogate chemical anthracene.

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

DATA EVALUATION

Nonradionuclides

Table 3 compares the confirmatory sample values to the applicable soil RAGs for direct exposure, protection of groundwater, and protection of the Columbia River. No confirmatory sample analyses exceeded soil RAGs.

Assessment of the risk requirements for the 100-D-74 waste site was determined by calculation of the hazard quotient and excess carcinogenic risk values for direct contact (Appendix B). 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-D-74 waste site, 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 values. The calculations indicated that all individual hazard quotients for noncarcinogenic constituents are less than 1.0. The cumulative direct contact hazard quotient for the 100-D-74 waste site is 8.2×10^{-4}. All individual carcinogen risk values for carcinogenic constituents are less than 1×10^{-6}. The cumulative direct contact excess cancer risk is 9.6×10^{-8}. Therefore, nonradionuclide risk requirements are met.

A three-part test evaluation was performed for focused sampling results. Table 3 presents the maximum value associated with each detected constituent. There were no constituents with maximum results exceeding soil RAGs for direct exposure, groundwater and/or river protection.

Because the data set for each focused sample consists of one sample, greater than 10% of the data for these analytes also do not exceed soil RAG values. Finally, no results exceed more than twice the lowest RAG value.

DATA QUALITY ASSESSMENT

A data quality assessment (DQA) was performed to compare the confirmatory sampling approach (WCH 2010b), the field logbook (WCH 2010a), and resulting analytical data with the sampling and data quality requirements specified by the project objectives and performance specifications.

The DQA for the 100-D-74 waste site 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 confirmation. The confirmatory sample analytical data are stored in the ENRE project-specific database for data evaluation prior to archival in the HEIS and are provided as an attachment to the direct contact hazard quotient RPD calculation in Appendix B. The detailed DQA is presented in Appendix C.

SUMMARY FOR NO ACTION DETERMINATION

The 100-D-74 waste site has been evaluated in accordance with the Remaining Sites ROD (EPA 1999) and the RDR/RAWP (DOE-RL 2009). Confirmatory sampling was performed, and the analytical results indicate that the residual concentrations of COPCs at this 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-D-74 waste site to No Action.

REFERENCES

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

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

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

DOE-RL, 2007, *Tri-Party Agreement Handbook Management Procedures,* RL-TPA-90-0001, Guideline Number TPA-MP-14, "Maintenance of the Waste Information Data System (WIDS)," Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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APPENDIX A

ECOLOGICAL RISK COMPARISON TABLE

Maximum Contaminant Concentrations that Exceed Ecological Screening Levels for the 100-D-74 Waste Site [a].

Hazardous Substance		2001 WAC 173-340 Table 749-3			EPA Ecological Soil Screening Levels [b]				Maximum Result
		Plants	Soil Biota	Wildlife	Plants	Soil Biota	Avian [c]	Mammalian [c]	
	Background	Metals (mg/kg)							
Manganese	512	1,100	NA	1,500	220	450	4,300	4,000	278 (<BG)
Vanadium	85.1	2	NA	NA	NA	NA	7.8	280	57.6 (<BG)

[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.

BG = background
EPA = U.S. Environmental Protection Agency
NA = not available
WAC = *Washington Administrative Code*

APPENDIX B

RELATIVE PERCENT DIFFERENCE (RPD)

AND

DIRECT CONTACT HAZARD QUOTIENT AND CARCINOGENIC RISK CALCULATION

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 100-D Area Confirmatory Sampling **Job No. 14655**

Area: 100-D

Discipline: Environmental Calculation No: 0100D-CA-G0009

Subject: 100-D-74 Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk Calculation

Computer Program: Excel Program No: Excel 2003

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

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Summary = 6 Attachment 1 = 2 Total = 9	I. B. Berezovskiy	T. E. Queen	J. D. Skoglie	D. F. Obenauer	Signed 11/10/10
1	Cover = 1 Summary = 6 Attachment 1 = 2 Total = 9	I. B. Berezovskiy IB Berezovskiy	T. E. Queen TE Queen	N/A	D. F. Obenauer D. F. Obenauer	2/7/11

SUMMARY OF REVISION

1	Qualifier "X" and description was added to Table 2, Page 5; acronyms.

WCH-DE-018 (05/08/2007)

DE01-437.03

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	I. B. Berezovskiy	Date:	10/20/2010	Calc. No.:	0100D-CA-G0009	Rev.:	0
Project:	100-D Field Remediation	Job No:	14655	Checked:	T. E. Queen	Date:	10/20/2010
Subject:	100-D-74 Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk 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-D-74 waste site. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2009a), 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.

Also, calculate the relative percent difference (RPD) for primary-duplicate sample pairs from 100-D-74 confirmatory sampling, as necessary.

GIVEN/REFERENCES:

1) DOE-RL, 2009a, *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.

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

3) EPA, 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, EPA 540/R-94/013. U.S. Environmental Protection Agency, Washington, D.C.

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

5) WCH, 2010, *Remaining Sites Verification Package for the 100-D-74, 105-DR Dry Well,* Attachment to Waste Site Reclassification Form 2010-083, Washington Closure Hanford, Inc., Richland, Washington.

SOLUTION:

1) Generate an HQ for each noncarcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the individual HQ of <1.0 (DOE-RL 2009a).

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 2009a).

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	I. B. Berezovskiy	Date:	10/20/2010	Calc. No.:	0100D-CA-G0009	Rev.:	0
Project:	100-D Field Remediation	Job No:	14655	Checked:	T. E. Queen	Date:	10/20/2010
Subject:	100-D-74 Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 2 of 6	

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

5) Use data from WCH (2010) to perform the RPD calculations for primary-duplicate sample pairs, as required.

METHODOLOGY:

The 100-D-74 waste site was comprised of a single decision unit for confirmatory sampling. The direct contact hazard quotient and carcinogenic risk calculations for the 100-D-74 waste site were conservatively calculated for the entire waste site using the one confirmatory soil sample and duplicate (WCH 2010). Of the contaminants of potential concern (COPCs) for this site, molybdenum and the detected polycyclic aromatic hydrocarbons require HQ and risk calculations because these analytes were detected and a Washington State or Hanford Site background value is not available. 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 maximum value for anthracene is 0.010 mg/kg, divided by the noncarcinogenic RAG value of 24,000 mg/kg (calculated in accordance with the noncarcinogenic toxics effects formula in WAC 173-340-740[3]), is 4.2×10^{-7}. 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 8.2×10^{-4}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, then multiplied by 1.0×10^{-6}. For example, the maximum value for benzo(a)pyrene is 0.011 mg/kg, divided by 0.137 mg/kg, and multiplied as indicated, is 8.0×10^{-8}. Comparing this value, and all other individual values, 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 can be obtained by summing the individual values. To avoid errors due to intermediate rounding, the individual cancer risk values prior to rounding are used for this calculation. The sum of the excess cancer risk values is 9.6×10^{-8}. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

5) 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 2009b). 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:

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	I. B. Berezovskiy	Date:	10/20/2010	Calc. No.:	0100D-CA-G0009	Rev.:	0
Project:	100-D Field Remediation	Job No:	14655	Checked:	T. E. Queen	Date:	10/20/2010
Subject:	100-D-74 Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 3 of 6	

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

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

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 RSVP.

For quality assurance/quality control (QA/QC) duplicate RPD calculations, a value less than 30% indicates the data compare favorably. For regulatory splits, a threshold of 35% is used (EPA 1994). If the RPD is greater than 30% (or 35% for regulatory split data), further investigation regarding the usability of the data is performed. No split samples were collected for cleanup verification of the subject site. Additional discussion is provided in the data quality assessment section of the applicable RSVP (WCH 2010), as necessary.

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 direct contact hazard quotient and excess cancer risk calculations.

Table 2 shows the results of the RPD calculations for the 100-D-74 waste site. The evaluation of the QA/QC duplicate RPD calculations is performed within the data quality assessment section of the RSVP.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	I. B. Berezovskiy	Date:	10/20/2010	Calc. No.:	0100D-CA-G0009	Rev.:	0
Project:	100-D Field Remediation	Job No:	14655	Checked:	T. E. Queen	Date:	10/20/2010
Subject:	100-D-74 Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 4 of 6	

Table 1. Direct Contact Hazard Quotient and Excess Cancer Risk Results for the 100-D-74 Waste Site.

Contaminants of Potential Concern	Maximum Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Molybdenum	0.32	400	8.0E-04	--	--
Polyaromatic Hydrocarbons					
Anthracene	0.010	24,000	4.2E-07	--	--
Benzo(a)pyrene	0.011	--	--	0.137	8.0E-08
Benzo(b)fluoranthene	0.011	--	--	1.37	8.0E-09
Benzo(k)fluoranthene	0.0089	--	--	1.37	6.5E-09
Chrysene	0.016	--	--	13.7	1.2E-09
Phenanthrene[c]	0.023	24,000	9.6E-07	--	--
Pyrene	0.040	2,400	1.7E-05	--	--
Totals					
Cumulative Hazard Quotient:			**8.2E-04**		
Cumulative Excess Cancer Risk:					**9.6E-08**

Notes:

[a] = From WCH (2010).

[b] = Value obtained from the RDR/RAWP (DOE-RL 2009a) or *Washington Administrative Code* (WAC) 173-340-740(3), Method B, 1996, unless otherwise noted.

[c] = Toxicity data for these chemicals are not available. The cleanup levels are based on use of surrogate chemicals.

phenanthrene surrogate: anthracene

-- = not applicable

RAG = remedial action goal

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	I. B. Berezovskiy	Date:	2/7/2011	Calc. No.:	0100D-CA-G0009	Rev.:	1
Project:	100-D Field Remediation	Job No:	14655	Checked:	T. E. Queen	Date:	2/7/2011
Subject:	100-D-74 Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 5 of 6	

Table 2. Relative Percent Difference Calculations for the 100-D-74 Waste Site. (2 Pages)

100-D-74 Duplicate Analysis

Sampling Area	HEIS Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Main (15 ft bgs)	J1B5K2	8/12/10	4740	J	1.4	1.5		0.60	42.7		0.069	0.11	B	0.030
Duplicate of J1B5K2	J1B5K5	8/12/10	5010	J	1.4	1.5		0.61	54.3		0.070	0.12	B	0.031

Analysis:

TDL		5	10	2	0.2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	5.5%		23.9%	
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable

100-D-74 Duplicate Analysis

Sampling Area	HEIS Number	Sample Date	Calcium			Chromium			Cobalt			Copper		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Main (15 ft bgs)	J1B5K2	8/12/10	6450	J	12.8	5.2		0.053	8.3		0.091	13.3		0.20
Duplicate of J1B5K2	J1B5K5	8/12/10	6870	J	13.1	6.4		0.054	7.3		0.093	13.4		0.20

Analysis:

TDL		100	1	2	1.0
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	6.3%	20.7%		0.7%
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	Not applicable

100-D-74 Duplicate Analysis

Sampling Area	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Main (15 ft bgs)	J1B5K2	8/12/10	22200	J	3.5	2.3		0.25	3910	J	3.4	274	J	0.091
Duplicate of J1B5K2	J1B5K5	8/12/10	22900	J	3.5	2.3		0.25	4120	J	-3.4	278	J	0.093

Analysis:

TDL		5	5	75	5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD	3.1%		5.2%	1.4%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	Not applicable

100-D-74 Duplicate Analysis

Sampling Area	HEIS Number	Sample Date	Mercury			Nickel			Potassium			Silicon		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Main (15 ft bgs)	J1B5K2	8/12/10	0.015	B	0.0055	8.6		0.11	566		37.3	241	JL	1.9
Duplicate of	J1B5K5	8/12/10	0.017		0.0055	9.5		0.11	587		38.0	196	JL	1.9

Analysis:

TDL		0.2	4	400	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				20.6%
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	Not applicable

Note: Gray cells indicate not applicable.

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

J = estimated result.

HEIS = Hanford Environmental Information System

PQL = practical quantitation limit.

Q = qualifier.

RPD = relative percent difference.

TDL = target detection limit

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

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	I. B. Berezovskiy	Date:	10/20/2010	Calc. No.:	0100D-CA-G0009	Rev.:	0
Project:	100-D Field Remediation	Job No:	14655	Checked:	T. E. Queen	Date:	10/20/2010
Subject:	100-D-74 Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 6 of 6	

Table 2. Relative Percent Difference Calculations for the 100-D-74 Waste Site. (2 Pages)

100-D-74 Duplicate Analysis

Sampling Area	HEIS Number	Sample Date	Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Main (15 ft bgs)	J1B5K2	8/12/10	264		53.7	57.6		0.086	40.2	J	0.36
Duplicate of J1B5K2	J1B5K5	8/12/10	256		54.6	56.4		0.087	40.9	J	0.37

Analysis:

TDL		50	2.5	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD	3.1%	2.1%	1.7%
	Difference > 2 TDL?	Not applicable	Not applicable	Not applicable

100-D-74 Duplicate Analysis

Sampling Area	HEIS Number	Sample Date	Benzo(b)fluoranthene		
			mg/kg	Q	PQL
Main (15 ft bgs)	J1B5K2	8/12/10	0.011	JX	0.0044
Duplicate of J1B5K2	J1B5K5	8/12/10	0.0050	J	0.0044

Analysis:

TDL		0.015
Duplicate Analysis	Both > PQL?	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)
	RPD	
	Difference > 2 TDL?	No - acceptable

CONCLUSION:

The calculations in Tables 1 and 2 demonstrate that the 100-D-74 waste site meets the requirements for the hazard quotients and carcinogenic (excess cancer) risk and RPDs, respectively, as identified in the RDR/RAWP (DOE-RL 2009a) and SAP (DOE-RL 2009b). The hazard quotients and carcinogenic (excess cancer) risk and RPD calculations are for use in the RSVP for this site.

Attachment 1. 100-D-74 Waste Site Confirmatory 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
Main (15 ft bgs)	J1B5K2	8/12/10	4740	J	1.4	0.35	U	0.35	1.5		0.60	42.7		0.069	0.11	B	0.030	0.89	U	0.89
Duplicate of J1B5K2	J1B5K5	8/12/10	5010	J	1.4	0.35	U	0.35	1.5		0.61	54.3		0.070	0.12	B	0.031	0.91	U	0.91
Equipment Blank	J1B5K1	8/12/10	208	JN	1.5	0.37	B	0.37	0.64	U	0.64	2.4	M	0.073	0.032	U	0.032	0.94	U	0.94

Sample Location	HEIS Number	Sample Date	Cadmium			Calcium			Chromium			Cobalt			Copper			Hexavalent Chromium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Main (15 ft bgs)	J1B5K2	8/12/10	0.037	U	0.037	6450	J	12.8	5.2		0.053	8.3		0.091	13.3		0.20	0.148	U	0.148
Duplicate of J1B5K2	J1B5K5	8/12/10	0.038	U	0.038	6870	J	13.1	6.4		0.054	7.3		0.093	13.4		0.20	0.145	U	0.145
Equipment Blank	J1B5K1	8/12/10	0.039	U	0.039	77.5	UJC	13.6	0.17	B	0.056	0.096	U	0.096	0.21	U	0.21			

Sample Location	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Mercury			Molybdenum		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Main (15 ft bgs)	J1B5K2	8/12/10	22200	J	3.5	2.3		0.25	3910	J	3.4	274	J	0.091	0.015	B	0.0055	0.32	B	0.24
Duplicate of J1B5K2	J1B5K5	8/12/10	22900	J	3.5	2.3		0.25	4120	J	3.4	278	J	0.093	0.017		0.0055	0.24	U	0.24
Equipment Blank	J1B5K1	8/12/10	243	JMN	3.7	0.36	B	0.26	35.7	J	3.6	4.4	JM	0.096	0.0054	U	0.0054	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
Main (15 ft bgs)	J1B5K2	8/12/10	8.6		0.11	566		37.3	0.78	U	0.78	241	JL	1.9	0.15	U	0.15	264		53.7
Duplicate of J1B5K2	J1B5K5	8/12/10	9.5		0.11	587		38.0	0.80	U	0.80	196	JL	1.9	0.15	U	0.15	256		54.6
Equipment Blank	J1B5K1	8/12/10	0.16	BM	0.12	53.4	B	39.5	0.83	U	0.83	148	JL	2	0.15	U	0.15	56.8	U	56.8

Sample Location	HEIS Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
Main (15 ft bgs)	J1B5K2	8/12/10	57.6		0.086	40.2	J	0.36
Duplicate of J1B5K2	J1B5K5	8/12/10	56.4		0.087	40.9	J	0.37
Equipment Blank	J1B5K1	8/12/10	0.37	BM	0.091	1.3	UJC	0.38

Note: Gray cells indicate not applicable.

B = estimated result; result is less than the RL but greater than the MDL

D = analyte reported from a dilution

HEIS = Hanford Environmental Information System

J = estimated result

PQL = practical quantitation limit

Q = qualifier

U = undetected

Attachment	1	Sheet No.	1 of 2
Originator	I.B. Berezovskiy	Date	10/20/10
Checked	T. E. Queen	Date	10/20/10
Calc. No.	0100D-CA-G0009	Rev. No.	0

Attachment 1. 100-D-74 Waste Site Confirmatory Sample Results (Organics).

CONSTITUENT	Main (15 ft. bgs) - J1B5K2, 8/12/10			Duplicate of J1B5K2 - J1B5K5, 8/12/10			Equipment Blank - J1B5K1, 8/12/10		
	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)									
Acenaphthene	10	U	10	10	U	10	9.6	U	9.6
Acenaphthylene	9.4	U	9.4	9.4	U	9.4	8.6	U	8.6
Anthracene	10	J	3.2	3.2	U	3.2	2.9	U	2.9
Benzo(a)anthracene	3.3	U	3.3	3.3	U	3.3	3.1	U	3.1
Benzo(a)pyrene	11	JX	6.7	6.7	U	6.7	6.2	U	6.2
Benzo(b)fluoranthene	11	JX	4.4	5.0	J	4.4	4.0	U	4.0
Benzo(ghi)perylene	7.5	U	7.5	7.5	U	7.5	6.9	U	6.9
Benzo(k)fluoranthene	8.9	J	4.1	4.1	U	4.1	3.8	U	3.8
Chrysene	16	JX	5	5.0	U	5.0	4.6	U	4.6
Dibenz[a,h]anthracene	11	U	11	11	U	11	11	U	11
Fluoranthene	14	U	14	14	U	14	12	U	12
Fluorene	5.5	U	5.5	5.5	U	5.5	5.1	U	5.1
Indeno(1,2,3-cd)pyrene	12	U	12	12	U	12	12	U	12
Naphthalene	12	U	12	12	U	12	12	U	12
Phenanthrene	23	J	12	12	U	12	12	U	12
Pyrene	40	JX	12	12	U	12	12	U	12
POLYCHLORINATED BIPHENYLS (PCBs)									
Aroclor-1016	2.8	U	2.8	2.8	U	2.8			
Aroclor-1221	8.0	U	8.0	8.0	U	8.0			
Aroclor-1232	2.0	U	2.0	2.0	U	2.0			
Aroclor-1242	4.7	U	4.7	4.7	U	4.7			
Aroclor-1248	4.7	U	4.7	4.7	U	4.7			
Aroclor-1254	2.6	U	2.6	2.6	U	2.6			
Aroclor-1260	2.6	U	2.6	2.6	U	2.6			

Attachment	1	Sheet No.	2 of 2
Originator	I.B. Berezovskiy	Date	10/20/10
Checked	T. E. Queen	Date	10/20/10
Calc. No.	0100D-CA-G0009	Rev. No.	0

APPENDIX C

DATA QUALITY ASSESSMENT

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DATA QUALITY ASSESSMENT

CONFIRMATORY SAMPLING

A data quality assessment (DQA) was performed to compare the confirmatory sampling approach and resulting analytical data with the sampling and data requirements specified in the site-specific sample design (WCH 2010b). This DQA was performed in accordance with site specific data quality objectives found in the *100 Area Remedial Action Sampling and Analysis Plan* (SAP) (DOE-RL 2009).

A review of the sample design (WCH 2010b), the field logbook (WCH 2010a), and applicable analytical data packages has been performed as part of this DQA. All samples were collected and analyzed per the sample design. To ensure quality data, the SAP data assurance requirements and the data validation procedure 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).

Confirmatory sample data collected at the 100-D-74 waste site were provided by the laboratory in sample delivery group (SDG) J00828. SDG J00828 was submitted for third-party validation. No major deficiencies were identified in the analytical data set. Minor deficiencies are discussed as follows below. If no comments are made about a specific analysis, it should be assumed that no deficiencies affecting the quality of the data were found.

SDG J00828

This SDG comprises a field duplicate pair (J1B5K2/J1B5K5) from the 100-D-74 waste site. These samples were analyzed for inductively coupled plasma (ICP) metals, mercury, hexavalent chromium, polycyclic aromatic hydrocarbons (PAH), and polychlorinated biphenyls (PCB). In addition, one equipment blank (J1B5K1) was collected and analyzed for ICP metals, mercury, and PAH. SDG J00828 was submitted for third-party validation. Minor deficiencies are as follows:

In the PAH analysis, the benz(a)pyrene, benzo(b)fluoranthene, chrysene, and pyrene results for sample J1B5K2 were considered estimated and flagged "J" due matrix interference. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the calcium and zinc results for sample J1B5K1 (the equipment blank) are of similar magnitude as the method blank result. Third-party validation qualified the results for calcium and zinc in sample J1B5K1 as undetected and flagged "UJ" due to method blank contamination. The data are useable for decision-making purposes.

In the ICP metals analysis, the matrix spike (MS) recoveries were out of project acceptance criteria for aluminum, iron, and silicon. These analytes did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for aluminum, iron, and silicon were 342%, 361%, and 29%, respectively. All aluminum, iron, and silicon data for SDG J00828 were considered estimated and flagged "J" by third-party validation due to the MS recoveries outside the quality control (QC) limits. Estimated data are useable for decision-making purposes.

In the ICP metals analysis, all silicon results were qualified as estimates and flagged "J" by third-party validation, due to a laboratory control sample below QC limits at 24%. Estimated data are useable for decision-making purposes.

In the ICP metals analysis, all iron and manganese results were qualified as estimates and flagged "J" by third-party validation, due to relative percent differences (RPD) above QC limits at 65% and 158%, respectively. Estimated data are useable for decision-making purposes.

FIELD QUALITY ASSURANCE/QUALITY CONTROL

The RPD 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/quality control (QA/QC) measures are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples, listed in the field logbook (WCH 2010a), are the 100-D-74 primary and duplicate samples (J1B5K2/J1B5K5). The main and QA/QC sample results are presented in Appendix B.

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 (COPC). RPDs are not calculated for analytes that are not detected in both the main and duplicate sample at more than 5 times the target detection limit (TDL). RPDs of analytes detected at low concentrations (less than 5 times the detection limit) are not considered to be indicative of the analytical system performance. The RPD calculation brief in Appendix B provides details on duplicate pair evaluation and RPD calculation.

None of the RPDs calculated for the field duplicate sample are above the acceptance criteria (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 5 times the TDL, including undetected analytes. In these cases, a control limit of ± 2 times the TDL is used (Appendix B) to indicate that a visual check of the data is required by the reviewer. No data required this check. A visual inspection of all of the data is also performed. No additional major or minor deficiencies are noted. The data are useable 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-D-74 waste site confirmatory sampling data found that the analytical results are accurate within the standard errors associated with the analytical methods, sampling, and sample handling. The DQA review for 100-D-74 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 confirmatory sample analytical data are stored in the Environmental Restoration (ENRE) project-specific database prior to being submitted for inclusion in the Hanford Environmental Information System (HEIS) database. The confirmatory sample analytical data are also summarized in Appendix B.

REFERENCES

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WCH, 2010a, *100 Area Confirmatory Sampling*, Logbook EL-1649, pp. 20-22, Washington Closure Hanford, Richland, Washington.

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