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DOE/RL-2007-38
Revision 0

Remaining Sites Verification Package for the 216-N-3 Waste Site, 212-N Building Cooling Water Trench Located Within the 200-CW-3 Operable Unit

Documentation for Waste Site Reclassification Form 2007-017

Date Published
July 2007

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

United States Department of Energy
P.O. Box 550
Richland, Washington 99352

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Date Submitted:	**WASTE SITE RECLASSIFICATION FORM**	Control Number: 2007-017
Originator: D.L. Klages	Operable Unit(s): 200-CW-3	
Phone: 373-6312	Waste Site Code: 216-N-3	
	Type of Reclassification Action:	
	Closed Out ☐ Interim Closed Out ☐ No Action ☒ RCRA Postclosure ☐ Rejected ☐ Consolidated ☐	

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 216-N-3 Waste Site was a trench that received basin water and sludge cleanout from the 212-N Building Basin during shutdown of the area. Focused sampling through the use of test pits was performed for the 216-N-3 Waste Site in accordance with the *Sampling and Analysis Plan for Remediation of Select 200 North Area Waste Sites (216-N-2, -3, -5, and -7) in the 200-CW-3 Operable Unit*, DOE/RL-2006-65, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

The sample results indicate that the 216-N-3 Waste Site achieved compliance with the remedial action objectives and goals established in the *Remedial Design/Remedial Action Work Plan for Select 200 North Area Waste Sites (216-N-2, -3, -5, & -7) in the 200-CW-3 Operable Unit* (DOE/RL-2006-69), U.S. Department of Energy, Richland Operations Office, Richland Washington, 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), 1999, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. The results of the waste site characterization and conceptual model evaluation sampling are used to make reclassification decisions for the 216-N-3 Waste Site. A baseline, quantitative ecological risk assessment of Hanford began in 2004. That baseline risk assessment will be used to support a future final closeout decision for the 216-N-3 Waste Site.

Basis for Reclassification

The current site conditions achieve the remedial action objectives and the corresponding remedial action goals specified in the Remaining Sites ROD. 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 meters (15 feet)] and that contaminant levels remaining in the soil are protective of groundwater and the Columbia River. There is no deep zone for the 216-N-3 Waste Site therefore no institutional controls are required. The basis for reclassification to No Action is described in detail in the *Remaining Sites Verification Package for the 216-N-3 Waste Site, 212-N Building Cooling Water Trench Located Within the 200-CW-3 Operable Unit* (DOE/RL-2007-38), U.S. Department of Energy, Richland Operations Office, Richland Washington,.

Waste Site Controls

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

L. D. Romine DOE Federal Project Director (printed)	Signature	7-30-07 Date
N/A Ecology Project Manager (printed)	Signature	Date
D. A. Faulk EPA Project Manager (printed)	Signature	7/30/07 Date

REMAINING SITES VERIFICATION PACKAGE FOR THE 216-N-3 WASTE SITE, 212-N BUILDING COOLING WATER TRENCH LOCATED WITHIN THE 200-CW-3 OPERABLE UNIT

EXECUTIVE SUMMARY

The 216-N-3 Waste Site was a trench that received basin water and sludge cleanout from the 212-N Building Basin during shutdown of the area. The Waste Information Data System (WIDS) describes the 216-N-3 Waste Site as a trench that was approximately 15.24 meters (50.00 feet) in length by 6.10 meters (20.00 feet) in width and 1.83 meters (6.00 feet) deep prior to backfilling. When the trench was no longer needed for disposal, it was backfilled. Any aboveground piping was placed in the trench prior to backfilling. The 216-N-3 Waste Site is located approximately 15 to 30 meters (50 to 100 feet) northwest of 212-N Building.

The 216-N-3 Waste Site was investigated through field observations, radiological screening, and focused sampling and analysis for the purpose of determining if hazardous or radiological contaminants were present. The results of the focused sampling of test pits identified levels of contaminants of concern below the Remedial Action Goals (RAGs).

During the excavation and sampling of the test pits, radiological field surveys were conducted on each excavator bucket of soil utilizing a cesium-137 tracer (i.e., indicator) to determine the presence of radiological contamination, as described in the *Sampling and Analysis Plan for Remediation of Select 200 North Area Waste Sites (216-N-2, -3, -5, and -7) in the 200-CW-3 Operable Unit* (SAP) (DOE/RL-2006-65).

The sample results indicate that the 216-N-3 Waste Site achieved compliance with the remedial action objectives (RAOs) and the RAGs. A summary of the data evaluation for the soil results against the applicable criteria is presented in Table 1. The results of the waste site sampling are used to make reclassification decisions for the 216-N-3 Waste Site in accordance with the TPA-MP-14 (DOE-RL 2007) process.

In accordance with this evaluation, the waste site 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/Remedial Action Work Plan for Select 200 North Area Waste Sites (216-N-2, -3, -5, & -7) in the 200-CW-3 Operable Unit* (DOE/RL-2006-69) 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 meters (15 feet)] and that contaminant levels remaining in the soil are protective of groundwater and the Columbia River. There is no deep zone for the 216-N-3 Waste Site therefore, no institutional controls are required. The site will be re-graded and re-vegetated with native grasses in accordance with the RD/RAWP.

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based on a limited ecological risk assessment. Although not required by the Remaining Sites ROD, a comparison against ecological risk screening levels has been made for the site contaminants of concern. Screening levels were not exceeded for the site constituents. A baseline risk assessment for the river corridor portion of

Hanford began in 2004, which includes a more complete quantitative ecological risk assessment. That baseline risk assessment will be used to support a future final closeout decision for the 216-N-3 Waste Site.

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REMAINING SITES VERIFICATION PACKAGE FOR THE 216-N-3 WASTE SITE, 212-N BUILDING COOLING WATER TRENCH LOCATED WITHIN THE 200-CW-3 OPERABLE UNIT

1.0 STATEMENT OF PROTECTIVENESS

This report demonstrates that the 216-N-3 Waste Site meets the objectives for reclassification to No Action as established in the TPA-MP-14 procedure (DOE-RL 2007), following the cleanup standards in the *Remedial Design/Remedial Action Work Plan for Select 200 North Area Waste Sites (216-N-2, -3, -5 & -7) in the 200-CW-3 Operable Unit* (RD/RAWP) (DOE/RL-2006-69) 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 meters (15 feet)] and that contaminant levels remaining in the soil are protective of groundwater and the Columbia River. There is no deep zone for the 216-N-3 Waste Site therefore no institutional controls are required.

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based on a limited ecological risk assessment. These soil cleanup levels are referred to as Look-Up Values. Although not required by the Remaining Sites ROD, a comparison against ecological risk screening levels has been made for the site contaminants of concern. Screening levels were not exceeded for the site constituents. A baseline risk assessment for the river corridor portion of Hanford began in 2004, which includes a more complete quantitative ecological risk assessment. That baseline risk assessment will be used to support a future final closeout decision for the 216-N-3 Waste Site.

2.0 GENERAL SITE INFORMATION AND BACKGROUND

The Waste Information Data System (WIDS) describes the 216-N-3 Waste Site as a trench that was approximately 15.24 meters (50.00 feet) in length by 6.10 meters (20.00 feet) in width and 1.83 meters (6.00 feet) deep prior to backfilling. When the trench was no longer needed for disposal, it was backfilled. Any aboveground piping was placed in the trench prior to backfilling.

The 216-N-3 Waste Site is located approximately 15 to 30 meters (50 to 100 feet) northwest of 212-N Building (Figure 1). The 216-N-3 Waste Site is adjacent and parallel to the 216-N-2 Waste Site. The waste site is located at Hanford Site coordinates N55460, W65820 based on geophysical surveys.

3.0 SUMMARY OF REMEDIAL ACTION OBJECTIVES FOR THE 216-N-3 WASTE SITE

The results from the sampling and analysis of the 216-N-3 Waste Site soils indicate achievement of compliance with the remedial action objectives (RAOs) and the remedial action goals (RAGs) identified in the Remaining Sites ROD (EPA 1999) and the RD/RAWP (DOE/RL-2006-69). The summary of the cleanup evaluation for the soil results against the applicable criteria is presented in Table 1. Detailed analysis results are presented by both Waste Sampling and Characterization Facility (WSCF) and Hanford Environmental Information System (HEIS) numbers in Appendix E.

Table 1. Summary of Attainment of Remedial Action Objectives for the 216-N-3 Waste Site.

Regulatory Requirement	Remedial Action Goals*	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain 15-mrem/year dose rate above background over 1,000 years.	Residual concentrations of radionuclide COCs are below background or less than one-tenth the single radionuclide soil concentration equivalent to a 15 mrem/year dose rate calculated by RESRAD (see Appendix A).	Yes
Direct Exposure – Nonradionuclides	Attain individual COC RAGs.	All individual COC concentrations are below the direct exposure criteria presented in Appendix B and Appendix E, Table E-2.	Yes
Risk Requirements – Nonradionuclides	Attain a hazard quotient of <1 for all individual noncarcinogens.	There is no hazard quotient for the COCs. No COCs were detected above background levels.	Yes
	Attain a cumulative hazard quotient of <1 for noncarcinogens.	There is no cumulative hazard quotient for the COCs. No COCs were detected above background levels.	
	Attain an excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	There is no excess cancer risk for the COCs. No carcinogens were detected above background levels.	
	Attain a cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	There is no cumulative excess cancer risk for the COCs. No carcinogens were detected above background levels.	
Groundwater/River Protection – Radionuclides	Attain single COC groundwater and river protection RAGs.	Maximum residual concentrations of radionuclide COCs were detected below groundwater and river protection exposure criteria (Table 2 and Appendix C). RESRAD calculated values that are protective of the groundwater are also protective of the Columbia River, since contaminant access to the Columbia River is through the groundwater. **NOTE**: For uranium-233/234 and uranium-238, the groundwater MCL of 21.2 pCi/L corresponds to a soil concentration of 0.185 pCi/g. However, the Hanford specific background for these two uranium isotopes is 1.1 pCi/g. The RAG therefore defaults to 1.1 pCi/g[c].	Yes
	Attain national primary drinking water standards:[a] 4 mrem/yr (beta/gamma) dose rate to target receptor/organs.	Maximum residual concentrations of beta/gamma radionuclide COCs were detected below groundwater and river protection exposure criteria (Table 2 and Appendix A, Footnote a).	
	Meet drinking water standards for alpha emitters: the most stringent of 15 pCi/L MCL or 1/25th of the derived concentration guides from DOE Order 5400.5.[b]	Maximum residual concentrations of alpha emitting radionuclide COCs were detected below groundwater and river protection exposure criteria (Table 2 and Appendix C).	

Table 1. Summary of Attainment of Remedial Action Objectives for the 216-N-3 Waste Site.

Regulatory Requirement	Remedial Action Goals*	Results	Remedial Action Objectives Attained?
	Meet total uranium standard of 21.2 pCi/L.[c]	For uranium-233/234 and uranium-238, the groundwater MCL of 21.2 pCi/L corresponds to a soil concentration of 0.185 pCi/g (Appendix C). However, the Hanford specific background for these two uranium isotopes is 1.1 pCi/g. The RAG therefore defaults to 1.1 pCi/g[c].	
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and river cleanup requirements.	Maximum detected results for all nonradionuclides are below the RAGs for protection of groundwater and the river (Appendix D).	Yes

* Remaining Sites Rod (EPA 1999)`

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

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

[c] Based on the isotopic distribution of uranium in the 100 Areas, 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*, 0100X-CA-V0038 (BHI 2001).

COC = contaminant of concern
MCL = maximum contaminant level (drinking water standard)
RAG = remedial action goal

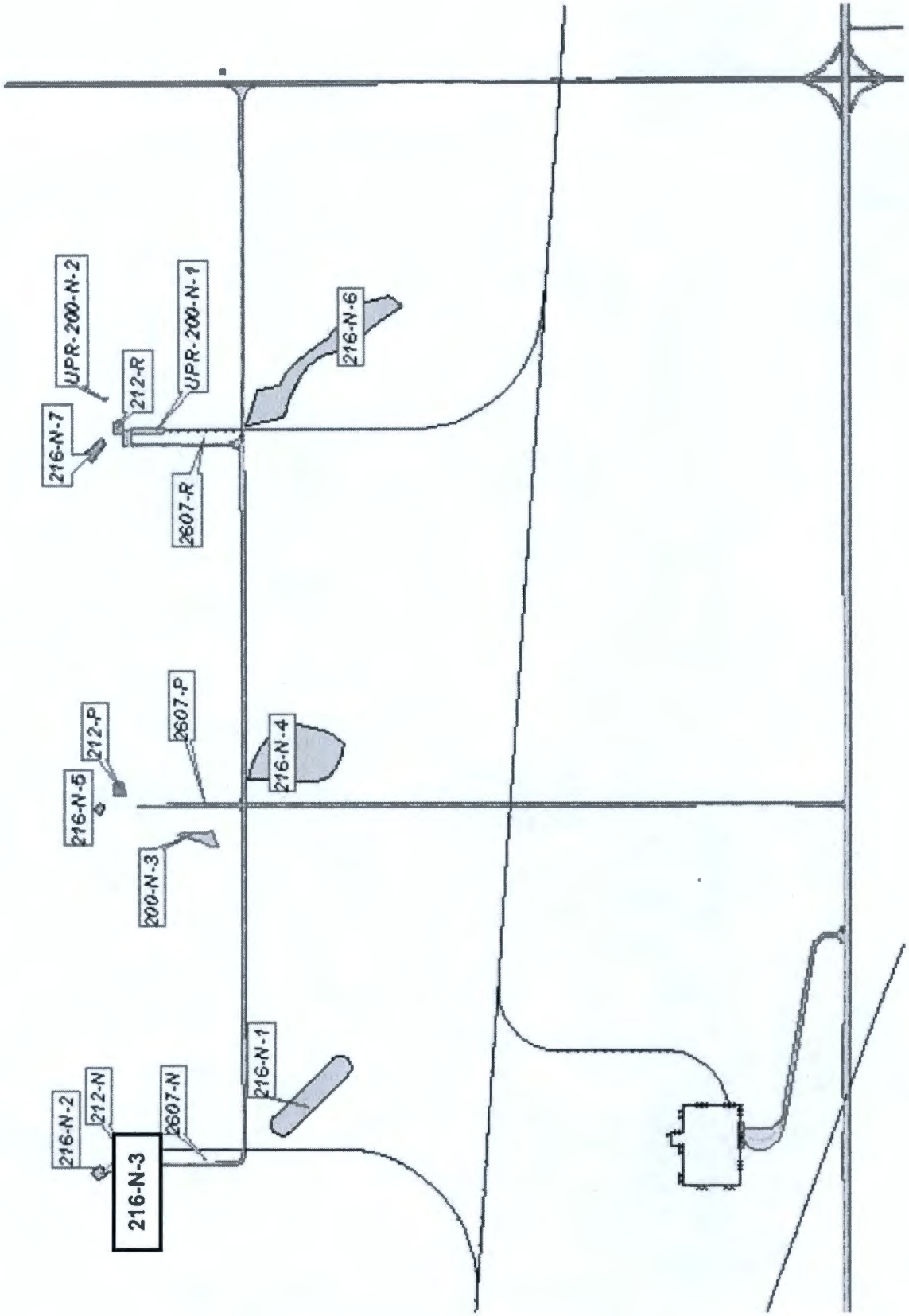

Figure 1. 216-N-3 Cooling Water Waste Site Location Map.

4.0 WASTE SITE CHARACTERIZATION AND CONCEPTUAL MODEL CONFIRMATION SAMPLING

To determine if remediation of waste site 216-N-3 was required, the waste site was characterized and the conceptual model of No Action was confirmed through radiological soil screening, sampling and analysis.

4.1 Geophysical Survey Results

There were no features identified in the geophysical data that are typically associated with an excavation or trench. If there is a trench or a previously excavated area it has to be shallow and/or relatively small. There are two small subtle zones that have some characteristics of disturbed zones that may represent small trenches but this may also have been caused by a natural localized change in the properties of the soil. Given that both 216-N-2 and 216-N-3 are mapped within the same survey monuments, it can be concluded that these anomalies probably represent the 216-N-2 and 216-N-3 trenches (Figure 2). The notable anomalies shown on the contour plots are related to surface obstacles (i.e. metal T post and monuments).

4.2 Contaminants of Concern

The contaminants of concern (COCs) for the 216-N-3 Waste Site were identified based on existing information for the site and the COCs listed in the Remaining Sites ROD. The COC list identified in the *Sampling and Analysis Plan for Remediation of Select 200 North Area Waste Sites (216-N-2, -3, -5, & -7) in the 200-CW-3 Operable Unit* (SAP) (DOE/RL-2006-65) includes americium-241, cobalt-60, cesium-137, europium-152, europium-154, europium-155, tritium, strontium-90, plutonium-238, plutonium-239/240, nickel-63, thorium-232, technetium-99, uranium-233/234, uranium-235, uranium-238, hexavalent chromium, mercury, lead, barium, trivalent chromium, cadmium, antimony, arsenic, manganese, zinc, and polychlorinated biphenyls.

4.3 Waste Site Sample Design for Waste Site Characterization and Conceptual Model Confirmation Activities

For waste characterization, focused, discrete sampling designs are appropriate to ensure compliance with the receiving facilities' waste acceptance criteria. In addition, this sampling technique is being used for conceptual model remedy confirmation.

To confirm the conceptual model of either Removal, Treatment and Disposal or No Action, an investigation of the site was performed. Due to the rocky backfill material that had previously been placed in the 216-N-3 Waste Site, focused, discrete samples were collected from four test pits dug using an excavator at depths of 3.0 meters (10 feet) and 4.6 meters (15 feet). The 10-foot depth was chosen as the most probable location for accumulation of contaminants and the 15-foot depth was chosen because it is the separation depth between the shallow and deep zones. In addition, one duplicate sample was collected from the waste site plus one field blank, one equipment blank, and one trip blank for laboratory analysis for the sampling day. The trip blank was analyzed for tritium only.

For the sampling effort, field screening was used to establish site radiological contamination levels. In addition, field screening for radiological contamination (cesium-137) was used as a "tracer" (i.e., indicator) to locate areas of chemical contamination. When field-screening results indicated the presence of radiological contamination, the areas were further characterized with laboratory analytical samples.

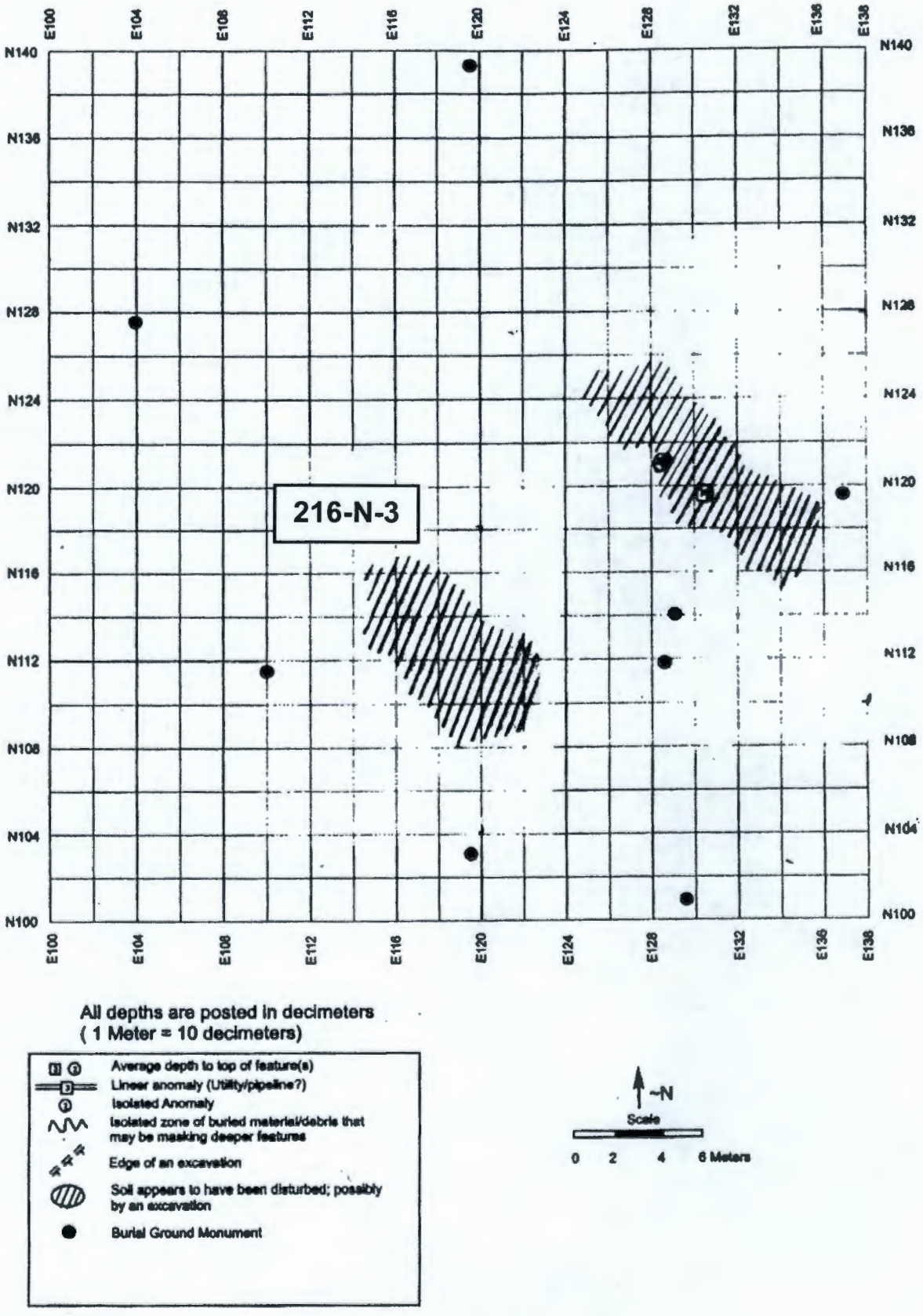

Figure 2. Geophysical Survey Investigation.

4.4 Sample Summary

On March 1, 2007, focused, discrete samples were collected from four specific test pits [2 samples at 3-meter (10-foot) depths and 2 samples at 4.6-meter (15-foot) depths], with collection of an additional sample at less than 3 meters (10 feet), composed of soil, which represented a higher radiological field reading during the test pit excavations [i.e., 527 counts per minute (cpm) including a 350 cpm background using a Electra Detector for beta/gamma]. During this initial characterization investigation, each bucket of soil was radiologically surveyed, with readings recorded in a survey report at each foot in depth. On average, the readings were comparable to the background readings[1]. No hose or piping was found during the test pit excavation. While awaiting the analytical results, all soil was placed back into the excavated trench, and the area was stabilized.

The analytical results[2] from the sampling campaign were compared to the Deep Zone [≥4.6 meters (15 feet) below surface to groundwater] and Shallow Zone [surface to 4.6 meters (15 feet)] Look-Up Values, to determine whether remediation was required. The analytical results from the soil samples were all well below the Look-Up Values, the RAGs, and the RAOs.

Photographs and results for the 216-N-3 Waste Site waste characterization/conceptual model remedy confirmation sampling and analysis data are presented in Appendix E. The HEIS and WSCF sample numbers are listed for each sample with a description of the sample depth and the trench area where the sample was collected.

5.0 DATA EVALUATION

Results for the 216-N-3 Waste Site sampling and analysis for verification of No Action remedy completion in "Data Validation Report for Fluor Hanford VSR07-006" (AQA 2007) are summarized in Appendix E. All detected analytes were reported at concentrations below direct exposure, groundwater protection, and river protection RAGs, or below the Hanford Specific Background default value RAGs in the case of uranium-233/234 and uranium-238.

Nonradionuclide risk requirements for the 216-N-3 Waste Site include an individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, individual contaminant carcinogenic risks of less than 1×10^{-6}, and a cumulative carcinogenic risk of less than 1×10^{-5}. Risk values are not calculated for constituents that are either not detected or are detected at concentrations below Hanford Site or Washington State background values (Appendix E).

- All individual hazard quotients for noncarcinogenic constituents must be less than 1.0. No COCs were detected above their Hanford Specific Background value. Therefore, no hazard quotient calculation was required.

- The cumulative hazard quotient for all noncarcinogenic constituents must be less than 1.0. Again, no COCs were detected above their Hanford Specific Background value. Therefore, no cumulative hazard quotient calculation was required.

- No carcinogens were detected above the Hanford-Specific Background values. Therefore, the individual carcinogenic risk values for carcinogenic constituents above background are all below

[1] "Project Hanford Radiological Survey Reports" RSR-FD-N-07-11 (02/28/07) and RSR-FD-N-07-12 (03/01/07).
[2] Internal Memo, M4W41-SLF-07-183, S.L. Fitzgerald to D.L. Klages, dated March 30, 2007; and Certificate of Analysis, SAF Number R07-007, Sherryl A. Adam, Severn Trent, to John Trechter, FH, dated March 2, 2007.

1×10^{-6} and the cumulative excess carcinogenic risk value for carcinogenic constituents are all below 1×10^{-5}.

6.0 DATA QUALITY ASSESSMENT

A data quality assessment (DQA) review was performed to compare the sampling approach and analytical data with the sampling and data requirements specified by the SAP (DOE/RL-2006-65). This review involves evaluation of the data to determine if they are of the right type, quality, and quantity to support the intended use (EPA 2000). The assessment review completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data quality process.

The completed data package for the sampling and analysis activities was validated by Analytical Quality Associates, Inc., a qualified independent contractor (AQA 2007), thereby providing third-party validation.

Level C data validation as defined in the contractor's validation procedures, which are based on EPA functional guidelines [e.g., *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses* (Bleyler 1988a); *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses* (Bleyler 1988b)], was performed for the entire sampling and analysis data package for the samples collected for the 216-N-3 Waste Site. Level C validation is a review of the quality control (QC) data and specifically requires verification of deliverables and requested versus reported analyses and qualification of the results based on: analytical holding times; method blank results; matrix spike/matrix spike duplicate; surrogate recoveries; duplicates; and analytical method blanks.

Specific data quality objectives for the site are found in the SAP (DOE/RL-2006-65). All samples were collected per the sample design described in Sections 4.3. The COCs for the 216-N-3 Waste Site are in Section 4.2.

All of the sampling and analysis data generated from the sample collection for the 216-N-3 Waste Site are included in sample delivery group (SDG) WSCF20070354, excluding nickel-63, which was provided in SDG W05132 by Severn-Trent Laboratory. Third-party validation was performed on both SDG WSCF20070354 and SDG W05132 and summarized in the AQA 2007, and resulted in no major deficiencies. Minor deficiencies found are discussed in the following. The third-party validator also reviewed the analytical information for the equipment, field and trip blanks, and found all information to be acceptable. All of the 216-N-3 sampling and analysis data were found to be useable for decision-making purposes.

SDG WSCF20070354 and SDG W05132

ICP Metals Analysis: Minor deficiencies were identified by third-party validation, applying qualification of sample results as estimates ("J") for analysis of manganese on all samples due to low matrix spike duplicate recovery and poor matrix spike/matrix spike duplicate precision. ICP Metal COCs data are useable for decision-making purposes.

Radiochemistry Analysis: Minor deficiencies were identified by third-party validation, applying qualification of sample results as estimates ("J") for americium-241, plutonium-238 and plutonium-239/240 in sample B1ML89 due to lack of a laboratory duplicate analysis. The data remain useable for decision-making purposes.

Relative to analytical data in sample media, physical data and/or field screening results are of lesser importance in making inferences of risk. Because of the secondary importance of such data, no validation for physical property data and/or field screening results was performed. However, field quality

assurance/quality control (QA/QC) was reviewed to ensure that the data are useable. Field instrumentation, calibration, and QA checks were performed in accordance with the following.

- Calibration of radiological field instruments on the Hanford Site is performed under contract by Pacific Northwest National Laboratory, as specified in their program documentation.

- Daily calibration checks are performed and documented for each instrument used to characterize areas that are under investigation. These checks are made on standard materials that are sufficiently like the matrix under consideration that direct comparison of data can be made.

The approval of field-data collection plans by the radiological controls organization represents the data validation and usability review for handheld field radiological measurements.

The DQA review for the 216-N-3 Waste Site found the results to be accurate within the standard errors associated with the methods, including sampling and sample handling. The data are of the right type, quality, and quantity to support the intended use. Detection limits, precision, accuracy, and sampling data group completeness were assessed to determine if any analytical results should be rejected as a result of quality assurance and quality control deficiencies. All analytical data were found acceptable for decision-making purposes. All of the sampling analytical data are stored in the Hanford Environmental Information System and are summarized in Appendix E. All qualifiers have also been added accordingly into the data for Appendix E.

7.0 SUMMARY FOR NO ACTION

On March 1, 2007, focused, discrete samples were collected from four specific test pits [2 samples at 3-meter (10-foot) depths and 2 samples at 4.6-meter (15-foot) depths], with collection of an additional sample at less than 3 meters (10 feet), composed of soil, which represented a higher radiological field reading during the test pit excavations. (During this initial investigation excavation, each bucket of soil was radiologically surveyed, with readings recorded in a survey report.) The analytical results were compared to the Deep and Shallow Zone Look-Up Values to determine whether remediation was required. The analytical results from the soil samples were well below the Shallow Zone and Deep Zone Look-Up Values as well as the RAGs and RAOs. The 3-meter (10-foot) and the 4.6-meter (15-foot) test pit samples did not exceed the appropriate Look-Up Values.

The analytical results from the test pit soil sampling were shown to meet the cleanup objectives for direct exposure, groundwater protection, and river protection. In accordance with this evaluation, the sampling results support a reclassification of the 216-N-3 Waste Site to No Action, as recorded on Waste Site Reclassification Form 2007-017.

Table 2. Comparison of Maximum Soil Analyses to Remedial Action Goals for the 216-N-3 Waste Site.*

Contaminant of Concern	Hanford Site-Specific Background Activity (pCi/g)	Maximum Soil Analyses (pCi/g)	Remedial Action Goals (pCi/g)			Does the Maximum Exceed RAGs?
			Direct Exposure (pCi/g)	Soil Cleanup Level for Groundwater Protection (pCi/g)	Soil Cleanup Level for River Protection (pCi/g)	
Americium-241	N/A	0.0380	31.1	NA[c]	NA[c]	No
Cesium-137	1.1	0.242 (<BG)	6.2	1,465	1,465	No
Cobalt-60	0.008	<0.00546	1.4	13,900	13,900	No
Europium-152	N/A	<0.00967	3.3	NA[c]	NA[c]	No
Europium-154	0.033	<0.00454 (<BG)	3.0	NA[c]	NA[c]	No
Europium-155	0.054	<0.0845 (<BG)	125	NA[c]	NA[c]	No
Nickel-63	N/A	<3.63	4,013	83	83	No
Plutonium-238	0.004	<0.0180	34	NA[c]	NA[c]	No
Plutonium-239/240	0.025	0.0910	35.1	NA[c]	NA[c]	No
Strontium-90	0.18	0.980	4.5	27.6	27.6	No
Technetium-99	N/A	<0.100	5.7	0.46	0.46	No
Thorium-232	1.3	0.304 (<BG)	1.0	NA[c]	NA[c]	No
Tritium (H-3)	N/A	<0.560	459	12.6	12.6	No
Uranium-233/234	1.1	0.150 (<BG)	0.57	1.1[a]	1.1[a]	No
Uranium-235	0.11	0.0240 (<BG)	0.61	1.0[b]	1.0[b]	No
Uranium	1.1	0.140 (<BG)	0.61	1.1[a]	1.1[a]	No
Contaminant of Concern	**Hanford Site-Specific Background Activity (mg/kg)**	**Maximum Soil Analyses (mg/kg)**	**Remedial Action Goals (mg/kg)**			**Does the Maximum Exceed RAGs?**
			Direct Exposure (mg/kg)	**Soil Cleanup Level for Groundwater Protection (mg/kg)**	**Soil Cleanup Level for River Protection (mg/kg)**	
Antimony	5[d]	1.13 (<BG)	32	5[d]	5[d]	No
Arsenic	6.5	2.86 (<BG)	20	20[d]	20[d]	No
Barium	132	73.6 (<BG)	5,600	132	224	No
Cadmium[f]	0.81[d]	0.118 (<BG)	13.9	0.81[d]	0.81[d]	No
Chromium (III)	18.5	8.11 (<BG)	120,000	18.5[d]	18.5[d]	No
Chromium (VI)	N/A	<0.1	2.1	4.8	2	No
Lead	10.2	6.16 (<BG)	353	10.2	10.2	No
Manganese	512	338 (<BG)	11,200	512	512	No
Mercury	0.33	<0.0517 (<BG)	24	0.33	0.33	No
Zinc	67.8	45.5(<BG)	24,000	480	67.8[d]	No
Polychlorinated Biphenyls	N/A	<0.0110	0.5	0.017	0.017	No

[a] The calculated soil concentration cleanup level of 0.185 pCi/g is below the Hanford Specific Background Activity of 1.1 pCi/g. Therefore the soil concentration protection of groundwater defaults to 1.1 pCi/g.

[b] The remedial action goal is below the practical quantitation limit (PQL). The value presented is the PQL.

[c] NA = Not Applicable. RESRAD predicts constituent will not reach groundwater within 1,000 years based on 100 Area generic site model using soil column layers and depths. Described in the text of Calculation Number 0100X-CA-V0046, *100 Area Radionuclide and Nonradionuclide Lookup Values for the 1995 Interim Remedial Action Record of Decision* (BHI 2004) July 2004, Bechtel Hanford, Inc., Richland, WA.

[d] Where cleanup levels are less than background or required detection limit (RDLs), cleanup levels default to background or RDLs per Ecology 1996, WAC 173-340-700(4)(d) and WAC 173-340-707(2), respectively. The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement Project Managers.

* Site RAGs are taken from the RD/RAWP (DOE/RL-2006-69), where available, without further consideration of updated toxicity data or amendments (2004) to cleanup regulations in WAC 173-340.

BG = Hanford Site-Specific Background.
N/A = Not Available.
RAG = Remediation Action Goal.

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APPENDIX A

COMPARISON OF MAXIMUM SOIL ANALYSES TO 100 AREA RADIONUCLIDE SOIL CONCENTRATIONS CORRESPONDING TO AN EQUIVALENT DOSE OF 15 MREM/YR.

Table A-1. Comparison of Maximum Soil Analyses to 100 Area Radionuclide Soil Concentrations Corresponding to an Equivalent Dose of 15 mrem/yr.

Radionuclide	Soil Activity for 15 mrem/yr Dose (except as noted) (p/Ci/g)	Source of Single Radionuclide Soil Concentration	Maximum Results (pCi/g)
Americium-241	31.1	WDOH/320-015[c]	0.0380
Cesium-137	6.2	WDOH/320-015[c]	0.242 (<BG)
Cobalt-60	1.4[a]	WDOH/320-015[c]	<0.00546
Europium-152	3.3[a]	WDOH/320-015[c]	<0.00967
Europium-154	3.0[a]	WDOH/320-015[c]	<0.00454 (<BG)
Europium-155	125[a]	RESRAD Calc[b]	<0.0845 (<BG)
Nickel-63	4,013[a]	RESRAD Calc[b]	<3.63
Plutonium-238	34	RESRAD Calc[b]	<0.0180
Plutonium-239/240	35.1	WDOH/320-015[c]	0.0910
Strontium-90	4.5[a]	WDOH/320-015[c]	0.980
Technetium-99	5.7[a]	WDOH/320-015[c]	<0.100
Thorium-232	1.0	RESRAD Calc[b]	0.304 (<BG)
Tritium (H-3)	459[a]	RESRAD Calc[b]	<0.560
Uranium-233/234	0.57	RESRAD Calc[b]	0.150 (<BG)
Uranium-235	0.61	RESRAD Calc[b]	0.0240 (<BG)
Uranium-238	0.61	RESRAD Calc[b]	0.140 (<BG)

[a] Radionuclide concentrations for beta/gamma in water corresponding to a 4 mrem/yr dose (C4 mrem/yr) from *Soil Screening Guidance for Radionuclides: User's Guide*, EPA/540-R-00-007, U.S. Environmental Protection Agency, Office or Radiation and Indoor Air, Washington D.C.

[b] Described in the text of Calculation Number 0100X-CA-V0046, *100 Area Radionuclide and Nonradionuclide Lookup Values for the 1995 Interim Remedial Action Record of Decision* (BHI 2004) July 2004, Bechtel Hanford, Inc., Richland, WA.

[c] From *State of Washington Department of Health Interim Regulatory Guidance: Hanford Guidance for Radiological Cleanup,* WDOH/320-015, Rev. 1 (WDOH 1997) Washington State Department of Health, Richland, Washington.

BG = Hanford Site-Specific Background.

APPENDIX B

COMPARISON OF MAXIMUM SOIL ANALYSES TO NONRADIONUCLIDE DIRECT EXPOSURE CLEANUP LEVELS

Table B-1. Comparison of Maximum Soil Analyses to Nonradionuclide Direct Exposure Cleanup Levels.

Contaminant	Background (mg/kg)	RDL (mg/kg)	Direct Exposure Cleanup Levels (mg/kg)[a]		Direct Exposure Cleanup Level (mg/kg)	Maximum Results (mg/kg)
			Carcinogen	Noncarcinogen		
Metals						
Antimony	5[b]	0.6	N/A	32	32	1.13 (<BG)
Arsenic	6.5	10	0.667	24	20[c]	2.86 (<BG)
Barium	132	2	N/A	5,600	5,600	73.6 (<BG)
Cadmium	0.81[b]	0.5	13.9[d]	80	13.9	0.118 (<BG)
Chromium III	18.5	1	N/A	120,000	120,000	8.11 (<BG)
Chromium VI	NA	0.5	2.1[d]	240	2.1	<0.1
Lead	10.2	5	N/A	353[e]	353	6.16 (<BG)
Manganese	512	5	N/A	11,200	11,200	338 (<BG)
Mercury	0.33	0.2	N/A	24	24	<0.0517 (<BG)
Zinc	67.8	1	N/A	24,000	24,000	45.5(<BG)
PCBs						
Polychlorinated Biphenyls[f]	NA	0.017	0.5	N/A	0.5	<0.0110

[a] Calculated using the appropriate formulas from Ecology 1996, WAC 173-340-740, with toxicity values updated through July 2004, from the EPA Integrated Risk Information System (IRIS) at http://www.epa.gov/iris or from the Risk Assessment Information System (RAIS) database of the Oak Ridge National Laboratory (ORNL) on the Internet at http://risk.lsd.ornl.gov.

[b] Hanford Site-specific background not available. Value is from Ecology, 1994, *Natural Background Soil Metals Concentrations in Washington State,* Publication No. 94-115, Washington State Department of Ecology, Olympia, Washington.

[c] The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement Project Managers.

[d] Carcinogenic cleanup level calculated based on the inhalation exposure pathway; WAC 173-340-750(3), 1996.

[e] Calculated using EPA, 1994, *Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children*, EPA/540/R-93/081, Publication No. 9285.7, U.S. Environmental Protection Agency, Washington, D.C.

[f] The soil cleanup value for PCBs is based on the formula presented in WAC 173-340-740(3)(a)(iii)(B), Ecology 1996, and the cancer potency factor for ingestion of PCBs of 2.0 kg-day/mg (soils) from the EPA Integrated Risk Information System (IRIS) on the internet at http://www.epa.gov/iris on January 3, 2006.

BG = Hanford Site-Specific Background.
NA = Not Available.
N/A =Not Applicable.
RDL = Required Detection Limit.

APPENDIX C

COMPARISON OF MAXIMUM SOIL ANALYSES TO SOIL ACTIVITIES CALCULATED BY RESRAD TO BE PROTECTIVE OF 100 AREA GROUNDWATER.

Table C-1. Comparison of Maximum Soil Analyses to Soil Activities Calculated by RESRAD to be Protective of 100 Area Groundwater.

Radionuclide	Groundwater MCL[a] (pCi/L)	Soil Concentration Protective of Groundwater (pCi/g)	Maximum Results (pCi/g)
Americium-241	1.2	NA[b]	0.0380
Cesium-137	60	1,465	0.242 (<BG)
Cobalt-60	100	13,900	<0.00546
Europium-152	200	NA[b]	<0.00967
Europium-154	60	NA[b]	<0.00454 (<BG)
Europium-155	600	NA[b]	<0.0845 (<BG)
Nickel-63	50	83	<3.63
Plutonium-238	1.6	NA[b]	<0.0180
Plutonium-239/240	1.2	NA[b]	0.0910
Strontium-90	8	27.6	0.980
Technetium-99	900	0.46	<0.100
Thorium-232	2	NA[b]	0.304 (<BG)
Tritium (H-3)	20,000	12.6	<0.560
Uranium-233/234	21.2	1.1[c]	0.150 (<BG)
Uranium-235	21.2	0.185	0.0240 (<BG)
Uranium-238	21.2	1.1[c]	0.140 (<BG)

[a] MCL = Maximum contaminant level calculated from National Bureau of Standards (NBS Handbook 69) maximum permissible concentration (MPC) as cited in EPA/540-R-00-007, the RAG from the RD/RAWP (DOE/RL-2006-69), or the MCL from 40 CFR 141.66.

[b] NA = Not Applicable. RESRAD predicts constituent will not reach groundwater within 1,000 years based on 100 Area generic site model using soil column layers and depths. Described in the text of Calculation Number 0100X-CA-V0046, *100 Area Radionuclide and Nonradionuclide Lookup Values for the 1995 Interim Remedial Action Record of Decision* (BHI 2004) July 2004, Bechtel Hanford, Inc., Richland, WA.

[c] The calculated soil concentration cleanup level of 0.185 pCi/g is below the Hanford Specific Background Activity of 1.1 pCi/g. Therefore the soil concentration protection of groundwater defaults to 1.1 pCi/g.

BG = Hanford Site-Specific Background.

APPENDIX D

SUMMARY OF COMPARISON OF MAXIMUM SOIL ANALYSES TO 100 AREA NONRADIONUCLIDE CLEANUP LEVELS FOR PROTECTION OF GROUNDWATER AND THE COLUMBIA RIVER

Table D-1. Summary of Comparison of Maximum Soil Analyses to 100 Area Nonradionuclide Cleanup Levels for Protection of Groundwater and the Columbia River.

Contaminant	Soil Cleanup Levels (mg/kg)		Maximum Results (mg/kg)
	Protective of Groundwater	Protective of the Columbia River	
Metals			
Antimony	5[c]	5[c]	1.13 (<BG)
Arsenic	20[d]	20[d]	2.86 (<BG)
Barium	132[c] (200[b])	224[a] (400[b])	73.6 (<BG)
Cadmium	0.81[c]	0.81[c]	0.118 (<BG)
Chromium III	18.5[c]	18.5[c]	8.11 (<BG)
Chromium VI	4.8	2	<0.1
Lead	10.2[c]	10.2[c]	6.16 (<BG)
Manganese	512[c]	512[a]	338 (<BG)
Mercury	0.33[c]	0.33[c]	<0.0517 (<BG)
Zinc	480	67.8[c]	45.5(<BG)
PCBs			
Polychlorinated Biphenyl	0.017[c]	0.017[c]	<0.0110

[a] Remedial action goal established in the RD/RAWP (DOE/RL-2006-69).

[b] Calculated using the appropriate formulas from Ecology 1996, WAC 173-340-740, with toxicity values updated through July 2004, from the EPA Integrated Risk Information System (IRIS) at http://www.epa.gov/iris or from the Risk Assessment Information System (RAIS) database of the Oak Ridge National Laboratory (ORNL) on the Internet at http://risk.lsd.ornl.gov. Parameters have been checked against Ecology's CLARC Database on the internet at https://fortress.wa.gov/ecy/clarc/CLARCOverview.html.

[c] Where cleanup levels are less than background or RDLs, cleanup levels default to background or RDLs consistent with Ecology 1996, WAC 173-340-700(4)(d) and WAC 173-340-707(2), respectively.

[d] The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement Project Managers. (Table 2 of the 1996 version of WAC 173-340-740 states that the cleanup level of 20 mg/kg is based on background concentrations in the state of Washington.

BG = Hanford Site-Specific Background.
NA = Not Available.

APPENDIX E

PHOTOGRAPHS AND WASTE CHARACTERIZATION AND CONCEPTUAL MODEL CONFIRMATION SAMPLING

Figure E-1. 200-CW-3 OU: Measurement of Excavation Depth.

Figure E-2. 200-CW-3 OU: Scanning Soil in Each Excavator Bucket During Test Pit Excavations.

NOTE: Field work was performed using approved work plans based on WIDS data and historical knowledge, with consideration of potential radiological and hazardous contaminant concerns. Field screening of potential contaminants confirmed work plan assumptions and ensured protection of personnel.

Figure E-3. 200-CW-3 OU: Scans for Each Bucket are Recorded on a Radiological Survey Report.

Figure E-4. 200-CW-3 OU: Soil Sampling of Test Pits.

NOTE: Field work was performed using approved work plans based on WIDS data and historical knowledge, with consideration of potential radiological and hazardous contaminant concerns. Field screening of potential contaminants confirmed work plan assumptions and ensured protection of personnel.

ary Action ow Zone eters t)]a g)	Hanford Specific Background Activity (pCi/g)	WSCF#W07/0000246/ HEIS#B1ML84 Test Pit East End of Trench 10 Foot Depth (pCi/g)	WSCF#W07/0000248/ HEIS#B1ML86 Test Pit West End of Trench 10 Foot Depth (pCi/g)	WSCF#W07/0000250/ HEIS#B1ML88 Test Pit East End of Trench 10 Foot Depth Duplicate (pCi/g)	WSCF#W07/0000253/ HEIS#B1ML80 Discrete Sample Higher Field Radiological Reading <10 Foot Depth (pCi/g)	WSCF#W07/0000252/ HEIS#B1ML90 Field Blank (pCi/g)	WSCF#W07/0000251/ HEIS#B1ML89 Equipment Blank (pCi/g)
	NA	0.0310	0.0240	0.0210	0.0380	0.0180	J0.0450
	1.1	0.172	0.0130	0.188	0.242	U<-0.00278	U<0.00639
	0.008	U<-0.00264	U<0.00546	U<0.00391	U<-0.0124	U<0.00217	U<0.00102
	NA	U<0.00967	U<0.00599	U<-0.0179	U<0.00354	U<0.00114	U<0.000375
	0.033	U<0.00454	U<0.0121	U<-0.00918	U<-0.0224	U<-0.00451	U<-0.00382
	0.054	U<0.0594	U<0.0570	U<0.0514	U<0.0845	U<0.0240	U<0.0322
	NA	U<3.19	U<3.63	U<0.187	U<2.07	U<1.06	U<0.867
	0.004	U<0.00750	U<0.00150	U<-0.00540	U<0.0180	U<0.0110	UJ<0.00180
	0.025	0.0480	0.0140	0.0500	0.0910	U<0.0110	J0.0360
	0.18	U<-0.110	0.360	U<0.230	U<-0.0690	U<-0.380	U<-0.550
	NA	U<-0.00	U<0.100	U<0.00	U<0.00	U<0.00	U<0.200
	1.3	D0.296	D0.240	D0.304	D0.244	D0.039	D0.037
	NA	U<0.440	U<-0.0330	U<0.320	U<0.560	U<-0.0380	U<0.500
	1.1	0.150	0.0720	0.110	0.130	0.0460	0.0500
	0.11	0.0240	0.00960	U<0.00850	0.0210	0.0280	U<0.00450
	1.1	0.130	0.100	0.110	0.100	0.0240	0.0230

ieve the direct exposure remedial action objectives (RAO) and the groundwater/Columbia River RAO; therefore, the lowest value among the "protection from Direct Exposure," tective of the Columbia River" values is the applicable look-up value.
practical quantitation limit (PQL). The value presented is the PQL.
kground. The value presented is background.

est Results	Converted Test Results
.72 mg/kg	0.296 pCi/g
.34 mg/kg	0.255 pCi/g
.20 mg/kg	0.240 pCi/g
.21 mg/kg	0.241 pCi/g
.79 mg/kg	0.304 pCi/g
.335 mg/kg	0.037 pCi/g
.360 mg/kg	0.039 pCi/g
.24 mg/kg	0.244 pCi/g

-07 Ci/g*
1 g/10^6 µg)(10^{12} pCi/1 Ci)
d Radiological Health, Bernard Shleien, Lester A. Slaback, Jr., and Brian Kent Birky, 1998, Williams and Wilkins Co.

econdary dilution factor.
s analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation.
ove limiting criteria.
ompleted.

terization Facility
rmation System

Table E-2. Results for Shallow Zone Test Pits for Nonradionuclide COCs.

Up Values mmary Action Goal – low Zone ers (15 Feet)][a] ng/kg)	Hanford Specific Background Activity (mg/kg)	Soil Sample WSCF#W070000246/ HEIS#B1ML84 Test Pit East End of Trench 10 Foot Depth (mg/kg)	Soil Sample WSCF#W070000248/ HEIS#B1ML86 Test Pit West End of Trench 10 Foot Depth (mg/kg)	Soil Sample WSCF#W070000250/ HEIS#B1ML88 Test Pit East End of Trench 10 Foot Depth Duplicate (mg/kg)	Soil Sample WSCF#W070000253/ HEIS#B1MLB0 Discrete Sample Higher Field Radiological Reading <10 Foot Depth (mg/kg)	Soil Sample WSCF#W070000252/ HEIS#B1ML90 Field Blank (mg/kg)	W
.0[b]	5[d]	DU<0.308	DU<0.310	DU<0.309	D1.13	U<0.297	
.5[c]	6.5	D2.23	D2.86	D2.12	D2.24	U<0.397	
	132	D59.8	D47.8	D63.0	D64.0	0.228	
	0.81d	D0.118	DU<0.103	D0.114	D0.116	U<0.0992	
	18.5	D7.37	D5.37	D8.11	D8.06	1.32	
.2	NA	U<0.10	U<0.10	U<0.10	U<0.10	U<0.10	
	10.2	D5.53	D5.36	D5.19	D6.16	0.250	
	512	JDN307	JDN282	JDN338	JDN308	JN0.647	
	0.33	DU<0.0512	DU<0.0517	DU<0.0516	DU<0.0514	U<0.0496	
	67.8	D44.1	D42.3	D43.6	D42.7	UJC<1.52	UJ
.5	NA	U<0.011 to U<0.021	U<0.011 to U<0.021	U<0.011 to U<0.021	U<0.011 to U<0.022	U<0.010 to U<0.020	U

ıieve the direct exposure remedial action objectives (RAO) and the groundwater/Columbia River RAO; therefore, the lowest value among the "protection from Direct Exposure," "Protective of ues is the applicable look-up value.

practical quantitation limit (PQL). The value presented is the PQL.

:kground. The value presented is background.

ilable; therefore values were taken from *Natural Background Soil Metals Concentrations in Washington State*, Publication No. 94-115, Washington State Department of Ecology, Olympia, Wa

e associated blank.

:econdary dilution factor

ıtside control limits.

s analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation.

:d above limiting criteria.

terization Facility

rmation System

Table B-3. Results for Deep Zone Test Pits for Radionuclide COCs.

Up Values [Remedial Action Goal – Deep Zone Meters (15 Feet)][a,b] (pCi/g)	Hanford Specific Background Activity (pCi/g)	Soil Sample WSCF#W070000247/ HEIS#B1ML85 Test Pit East End of Trench 15 Foot Depth (pCi/g)	Soil Sample WSCF#W070000249/ HEIS#B1ML87 Test Pit West End of Trench 15 Foot Depth (pCi/g)	Soil Sample WSCF#W070000252/ HEIS#B1ML90 Field Blank (pCi/g)	Soil Sample WSCF#W070000251/ HEIS#B1ML89 Equipment Blank (pCi/g)	WSC H
7,000	NA	0.0370	0.0240	0.0180	J0.0450	
N/A	1.1	0.126	0.0836	U<-0.00278	U<0.00639	
N/A	0.008	U<0.000749	U<0.00395	U<0.00217	U<0.00102	
N/A	NA	U<-0.0158	U<0.00120	U<0.00114	U<0.000375	
N/A	0.033	U<-0.00658	U<-0.0215	U<-0.00451	U<-0.00382	
N/A	0.054	U<0.0753	U<0.0451	U<0.0240	U<0.0322	
N/A	NA	U<0.178	U<0.766	U<1.06	U<0.867	
1,123	0.004	U<0.0030	U<0.00170	U<0.0110	UJ<0.00180	
8,600	0.025	0.0430	0.0140	U<0.0110	J0.0360	
N/A	0.18	0.980	0.460	U<-0.380	U<-0.550	
15[c]	NA	U<-0.00	U<0.100	U<0.00	U<0.200	
N/A	1.3	D0.255	D0.241	D0.039	D0.037	
35.5	NA	U<0.350	U<0.0880	U<-0.0380	U<0.500	
1.1[d]	1.1	0.110	0.120	0.0460	0.0500	
1.0[c]	0.11	U<0.0140	0.0170	0.0280	U<0.00450	
1.1[d]	1.1	0.0960	0.140	0.0240	0.0230	

ve the groundwater/Columbia River RAO; therefore, the lowest value between the "Protective of Groundwater" and the "Protective of the Columbia River" values is the applicable look-up valu
ıot applicable for protection from direct exposure to radionuclides because a potentially exposed individual in a basement is protected from gamma radiation by 3 feet (0.9 meter) of soil and a c
practical quantitation limit (PQL). The value presented is the PQL.
:kground. The value presented is background.

est Results	Converted Test Results
:.72 mg/kg	0.296 pCi/g
:.34 mg/kg	0.255 pCi/g
:.20 mg/kg	0.240 pCi/g
:.21 mg/kg	0.241 pCi/g
:.79 mg/kg	0.304 pCi/g
).335 mg/kg	0.037 pCi/g
).360 mg/kg	0.039 pCi/g
:.24 mg/kg	0.244 pCi/g

-07 Ci/g*
1 g/10^6 µg)(10^{12} pCi/1 Ci)
d Radiological Health, Bernard Shleien, Lester A. Slaback, Jr., and Brian Kent Birky, 1998, Williams and Wilkins Co.

secondary dilution factor

s analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation.
ove limiting criteria.

Table E-4. Results for Deep Zone Test Pits for Nonradionuclide COCs

Look-Up Values Summary emedial Action Goal – Deep Zone [>4.6 Meters (15 Feet)][a,b] (mg/kg)	Hanford Specific Background Activity (mg/kg)	Soil Sample WSCF#W070000247/ HEIS#B1ML85 Test Pit East End of Trench 15 Foot Depth (mg/kg)	Soil Sample WSCF#W070000249/ HEIS#B1ML87 Test Pit West End of Trench 15 Foot Depth (mg/kg)	Soil Sample WSCF#W070000252/ HEIS#B1ML90 Field Blank (mg/kg)	WSCF# HEIS Equip (r
6.0[c]	5[e]	DU<0.302	DU<0.307	U<0.297	DU
6.5[d]	6.5	D2.65	D2.08	U<0.397	DU
N/A	132	D60.4	D73.6	0.228	I
N/A	0.81[e]	D0.116	D0.103	U<0.0992	DU
N/A	18.5	D6.78	D7.22	1.32	DU
2.2	NA	U<0.10	U<0.10	U<0.10	U
N/A	10.2	D5.13	D5.00	0.250	I
N/A	512	JDN312	JDN299	JN0.647	JDI
N/A	0.33	DU<0.0504	DU<0.0511	U<0.0496	DU
N/A	67.8	D45.5	D40.7	UJC<1.52	UJCD
N/A	NA	U<0.011 to U<0.021	U<0.011 to U<0.022	U<0.010 to U<0.020	U<0.01

ve the groundwater/Columbia River RAO; therefore, the lowest value between the "Protective of Groundwater" and the "Protective of the Columbia River" values is the applicable look-up valu
ıot applicable for protection from direct exposure to radionuclides because a potentially exposed individual in a basement is protected from gamma radiation by 3 feet (0.9 meter) of soil and a c
practical quantitation limit (PQL). The value presented is the PQL.
:kground. The value presented is background.
ilable; therefore values were taken from *Natural Background Soil Metals Concentrations in Washington State*, Publication No. 94-115, Washington State Department of Ecology, Olympia, Wa

e associated blank.
secondary dilution factor
ıtside control limits.

s analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation.
:d above limiting criteria.
terization Facility
rmation System