CVP-2006-00011
Rev. 0

Cleanup Verification Package for the 118-C-1, 105-C Solid Waste Burial Ground

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

July 2007

EXECUTIVE SUMMARY

This cleanup verification package documents completion of remedial action for the 118-C-1, 105-C Solid Waste Burial Ground. The 118-C-1 site is located within the 100-BC-2 Operable Unit in the 100-B/C Area of the Hanford Site in southeastern Washington State. This waste site was the primary burial ground for general wastes from the operation of the 105-C Reactor. The burial ground was in operation between 1953 and 1969 and received process tubes, aluminum fuel spacers, control rods, reactor hardware, spent nuclear fuel and soft wastes. The site was located approximately 150 m (500 ft) southeast of the 105-C Reactor.

Remedial action at the 118-C-1 site began on February 2, 2004, and was completed on May 27, 2006. Remedial action activities involved removing the uncontaminated overburden, the buried contaminated debris and the underlying contaminated soil. All contaminated materials were disposed at the Environmental Restoration Disposal Facility, with the exception of spent nuclear fuel, which will be transferred to the 100-K Basins for interim storage prior to final packaging and disposal. Results of the verification sampling, laboratory analyses, and data evaluations for the 118-C-1 site (which includes the remediation footprint, the overburden/below cleanup level soil, and the waste staging pile areas) indicate that all remedial action objectives and goals for direct exposure, protection of groundwater, and protection of the Columbia River have been met (see Table ES-1).

The site meets cleanup standards and has been reclassified as "interim closed out" in accordance with the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989) and the Waste Site Reclassification Guideline TPA-MP-14 (RL-TPA-90-0001) (DOE-RL 1998). A copy of the waste site reclassification form is included as Attachment ES-1.

Table ES-1. Summary of Cleanup Verification Results for the 118-C-1 Burial Ground. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?	Ref.
Direct Exposure – Radionuclides	1. Attain 15 mrem/yr dose rate above background over 1,000 years.	1. Maximum predicted dose rates for each sampling area at the 118-C-1 site are below 15 mrem/yr. Inclusion of one carbon-14 result for the staging pile area resulted in an elevated calculated dose rate; therefore, soil associated with this result was backfilled to deep zone portions of the site per agreement with the EPA Project Manager.	Yes	e
Direct Exposure – Nonradionuclides	1. Attain individual COC RAGs.	1. Polycyclic aromatic hydrocarbons were detected above the direct exposure RAGs in a verification sample at 118-C-1 staging pile area, but determined to be the result of asphalt cross-contamination. Asphalt that has been used for structural and construction purposes is not listed as a CERCLA hazardous substance, and does not present a health risk for this waste site. All other individual COC/COPC concentrations are below the direct exposure criteria.	Yes	f
Meet Nonradionuclide Risk Requirements	1. Hazard quotient of <1 for noncarcinogens.	1. The hazard quotients for individual nonradionuclide COCs/COPCs are less than 1.	Yes	g
	2. Cumulative hazard quotient of <1 for noncarcinogens.	2. The cumulative hazard quotient for all sampling areas (1.6×10^{-1}) is less than 1.		g
	3. Excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	3. Excess cancer risk values for individual nonradionuclide COCs/COPCs are less than 1×10^{-6}.	Yes	g
	4. Attain a total excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	4. The total excess carcinogenic risk for all sampling areas (1.6×10^{-6}) is less than 1×10^{-5}.	Yes	g
Groundwater/ River Protection – Radionuclides	1. Attain single COC groundwater and river protection RAGs.	1. Among the radionuclide COCs, cesium-137, cobalt-60, nickel-63, strontium-90 and tritium are calculated to reach groundwater at concentrations significantly below the RAGs.	Yes	h
	2. Attain National Primary Drinking Water Standards: 4 mrem/yr (beta/gamma) dose rate to target receptor/organs.[a]	2. The maximum calculated drinking water dose from beta/gamma-emitting radionuclides is less than 4 mrem/yr.		h

Table ES-1. Summary of Cleanup Verification Results for the 118-C-1 Burial Ground. (2 Pages)

	3. Meet drinking water standards for alpha emitters: the more stringent of the 15 pCi/L MCL or 1/25th of the derived concentration guide per DOE Order 5400.5.[b]	3. No alpha-emitting radionuclide COCs/COPCs were detected in verification soil samples.	N/A	f
	4. Meet total uranium standard of 21.2 pCi/L.[c]	4. No uranium isotopes were detected above background levels in verification soil samples.	N/A	f
Groundwater/ River Protection – Nonradionuclides	1. Attain individual nonradionuclide groundwater and river cleanup requirements.	1. Residual concentrations of multiple metals and organic compounds exceeded soil RAGs for the protection of groundwater and/or the Columbia River. However, none of these constituents is predicted to migrate to groundwater (and thus the Columbia River) at concentrations exceeding groundwater or river protection criteria within 1,000 years (BHI 2005).[d] Therefore, residual concentrations achieve the remedial action objectives for groundwater and river protection.	Yes	f
Other supporting Information	1. Site-Specific Close-out Approach.[i] 2. 118-C-1 Sample Design (Appendix E).[j]			

[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 Hanford Site background, the 30 µg/L MCL (40 *Code of Federal Regulations* 141) 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).

[d] *100 Area Analogous Sites RESRAD Calculations*, 0100X-CA-V0050, Rev. 0, Bechtel Hanford, Inc., Richland, Washington (2005).

[e] *118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief*, 0100C-CA-V0035, Rev. 0, Washington Closure Hanford, Richland, Washington (2006).

[f] *118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations*, 0100C-CA-V0033, Rev. 0, Washington Closure Hanford, Richland, Washington (2006).

[g] *118-C-1 Burial Ground Hazard Quotient and Carcinogenic Risk Calculations*, 0100C-CA-V0034, Rev. 0, Washington Closure Hanford, Richland, Washington (2006).

[h] *118-C-1 Burial Ground Comparison to Drinking Water Standards (MCL) Calculation,* 0100C-CA-V0036, Rev. 1, Washington Closure Hanford, Richland, Washington (2006).

[i] *Site Specific Instruction for Close-out Approach for 118-C-1*, 100-BC-10, Rev. 0, Washington Closure Hanford, Richland, Washington (2006).

[j] *118-C-1 Shallow Zone, Overburden and Staging Pile Sampling Plan* , 0100B-CA-V0288, Rev. 0, Washington Closure Hanford, Richland, Washington (2006).

COC = contaminant of concern
COPC = contaminant of potential concern
MCL = maximum contaminant level
NA = not applicable
RAG = remedial action goal
RESRAD = RESidual RADioactivity (dose model)

Attachment ES-1

Waste Site Reclassification Form

Date Submitted: 6/21/2007 Originator: L. M. Dittmer Phone: 372-9227	**WASTE SITE RECLASSIFICATION FORM** Operable Unit(s): 100-BC-2 Waste Site Code: 118-C-1 Type of Reclassification Action: Closed Out ☐ Interim Closed Out ☒ No Action ☐ RCRA Postclosure ☐ Rejected ☐ Consolidated ☐	Control Number: 2006-063

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:
Remedial action at this site has been performed in accordance with remedial action objectives and goals established by the U.S. Environmental Protection Agency and the U.S. Department of Energy, Richland Operations Office, in concurrence with the Washington State Department of Ecology. The selected remedial action involves (1) excavating the site to the extent required to meet specified soil cleanup levels, (2) disposing contaminated excavation materials at the Environmental Restoration Disposal Facility at the 200 Area of the Hanford Site, and (3) backfilling the site with clean soil to adjacent grade elevations. The excavation and disposal activities have been completed.

Basis for reclassification:
The results of verification sampling of the soils at the 118-C-1 waste site demonstrated 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 showed that residual contaminant concentrations are protective of groundwater and the Columbia River. The waste site has a deep zone; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone are required. The basis for reclassification is described in detail in the *Cleanup Verification Package for the 118-C-1, 105-C Solid Waste Burial Ground* (CVP-2006-00011), Washington Closure Hanford, Richland, Washington.

Waste Site Controls:
Engineered Controls: Yes ☐ No ☒ Institutional Controls: Yes ☒ No ☐ O&M requirements: Yes ☐ No ☒
Deed restriction to prevent uncontrolled drilling or excavation into the deep zone (greater than 4.6 m [15 ft] below ground surface).

S. L. Charboneau DOE Federal Project Director (printed)	Signature	7/19/07 Date
N/A Ecology Project Manager (printed)	Signature	Date
D. A. Faulk EPA Project Manager (printed)	Signature	7/19/07 Date

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ACRONYMS AND ABBREVIATIONS

BCL	below cleanup level
COC	contaminant of concern
COPC	contaminant of potential concern
DOE-RL	U.S. Department of Energy, Richland Operations Office
DQA	data quality assessment
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
PAH	polycyclic aromatic hydrocarbon
PCBs	polychlorinated biphenyls
RAG	remedial action goal
RDR/RAWP	remedial design report/remedial action work plan
RESRAD	RESidual RADioactivity dose assessment model
ROD	record of decision
SAP	sampling and analysis plan
SNF	spent nuclear fuel
SSI	site-specific instruction
SVOA	semi-volatile organic analysis
TPH	total petroleum hydrocarbons
UCL	upper confidence limit
VOA	volatile organic analysis
WAC	*Washington Administrative Code*

1.0 INTRODUCTION

The purpose of this cleanup verification package is to document that the 118-C-1 Solid Waste Burial Ground site was remediated in accordance with the *Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2, and 100-KR-2 Operable Units, Hanford Site (100 Area Burial Grounds), Benton County, Washington* (ROD) (EPA 2000). Remedial action objectives and goals for the 118-C-1 site were established by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy, Richland Operations Office (DOE-RL), in concurrence with the Washington State Department of Ecology. These goals and objectives are documented in the 100 Area Burial Grounds ROD (EPA 2000) and the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2005). The ROD (EPA 2000) provides the U.S. Department of Energy, Richland Operations Office the authority, guidance, and objectives to conduct this remedial action.

The preferred remedy specified in the ROD (EPA 2000) and conducted for the 118-C-1 site included (1) excavating the site to the extent required to meet specified soil cleanup levels, (2) disposing of contaminated excavation materials at the Environmental Restoration Disposal Facility (ERDF) at the 200 Area of the Hanford Site, and (3) backfilling the site with overburden and clean soil to average adjacent grade elevation. Excavation was driven by remedial action objectives for direct exposure, protection of groundwater, and protection of the Columbia River.

Waste site contaminants of concern (COCs) and contaminants of potential concern (COPCs) were identified in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE-RL 2005) and include tritium, carbon-14, cesium-137, cobalt-60, nickel-63, strontium-90, silver-108m, europium-152, europium-154, cadmium, lead and mercury. Additional waste site COCs/COPCs were identified for this site based on the observed waste forms found during remediation activities and the results of waste characterization sampling as documented in the *Site Specific Instruction (SSI) for Close-Out Approach for 118-C-1* (118-C-1 SSI) (WCH 2006). The 118-C-1 SSI documents the agreements between the Department of Energy Richland Operations Office (DOE-RL) and the Environmental Protection Agency (EPA) regarding waste site close-out for the118-C-1 Burial Ground. The additional COCs/COPCs identified in the 118-C-1 SSI (WCH 2006) include americium-241, plutonium-238, plutonium-239/240, uranium-233/234, uranium-235, uranium-238, the expanded list of inductively coupled plasma (ICP) metals (arsenic, antimony, barium, beryllium, boron, cadmium, chromium, lead, cobalt, copper, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc), hexavalent chromium, polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), semi-volatile organic compounds, and volatile organic compounds. The COCs/COPCs detected at the 118-C-1 Burial Ground and their respective points of compliance, the remedial action goals (RAGs), are summarized in Tables 4 through 9 (Section 4.2) of this CVP.

Soil cleanup levels were established in the interim action ROD based on a limited ecological risk assessment. Although not required by the ROD (EPA 2000), a

comparison against ecological risk screening levels has been made for the site COCs/COPCs. Screening levels were not exceeded for the site constituents, with the exception of barium, boron, copper, lead, and molybdenum. Exceedance of screening values does not necessarily indicate the existence of risk to ecological receptors. It is believed that the presence of these constituents does not pose a risk to ecological receptors as concentrations of barium, copper, and lead are within the range of Hanford Site background levels and boron and molybdenum concentrations are consistent with those seen elsewhere at the Hanford Site (no established background value is available for boron or molybdenum). A baseline risk assessment for the river corridor portion of the Hanford Site began in 2004, which includes a more complete quantitative ecological risk assessment. That baseline risk assessment will be used as part of the final closeout decision for this site.

2.0 SITE DESCRIPTION AND SUPPORTING INFORMATION

The 118-C-1 site is located in the 100-BC-2 Operable Unit of the 100-BC Area approximately 150 m (500 ft) southeast of the 105-C Reactor Building (Figure 1). This waste site was the primary burial ground for general wastes from the operation of the 105-C Reactor. The burial ground was in operation between 1953 and 1969 and received process tubes, aluminum fuel spacers, control rods, reactor hardware, spent nuclear fuel (SNF) and soft wastes. The C-Area Land Burial Log (1962-1965) identifies additional waste including trash, poison splines, dummies, hot laundry, fan filters, irradiated balls, ceramic samples, thimbles, gun barrels, and hoses that were deposited in the site (WCH 2006). The 118-C-1, 105-C Solid Waste Burial Ground was estimated to contain 86 metric tons (94.8 tons) of boron, 1.1 metric tons (1.2 tons) of graphite, 0.51 metric tons (0.56 tons) of lead, 21.6 metric tons (23.8 tons) of lead/cadmium, and 96 metric tons (105.9 tons) of other materials.

2.1 CONTAMINANTS OF CONCERN/CONTAMINANTS OF POTENTIAL CONCERN

The 118-C-1 Burial Ground contains ten trenches, eight oriented in a north-south direction and the other two oriented east-west (Figure 2 and Figure 3). For close-out verification sampling, the trenches and surrounding land between the trenches were grouped into four sampling decision units. The four sampling decision units were grouped based on similarity of the waste forms observed during remediation (WCH 2006). The four different decision units were sampled only for the COCs/COPCs pertinent to the waste forms identified within that area. The waste forms discovered within the four sampling decision units are discussed below and the COCs/COPCs associated with each sampling decision unit are provided in Table 1. The 118-C-1 waste site also includes an overburden/below cleanup level (BCL) decision unit and a waste staging pile area decision unit. Both of these decision units were sampled for all waste site COCs/COPCs identified for the 118-C-1 waste site, as shown in Table 1.

Figure 1. Hanford Site Map and 118-C-1 Site Plan.

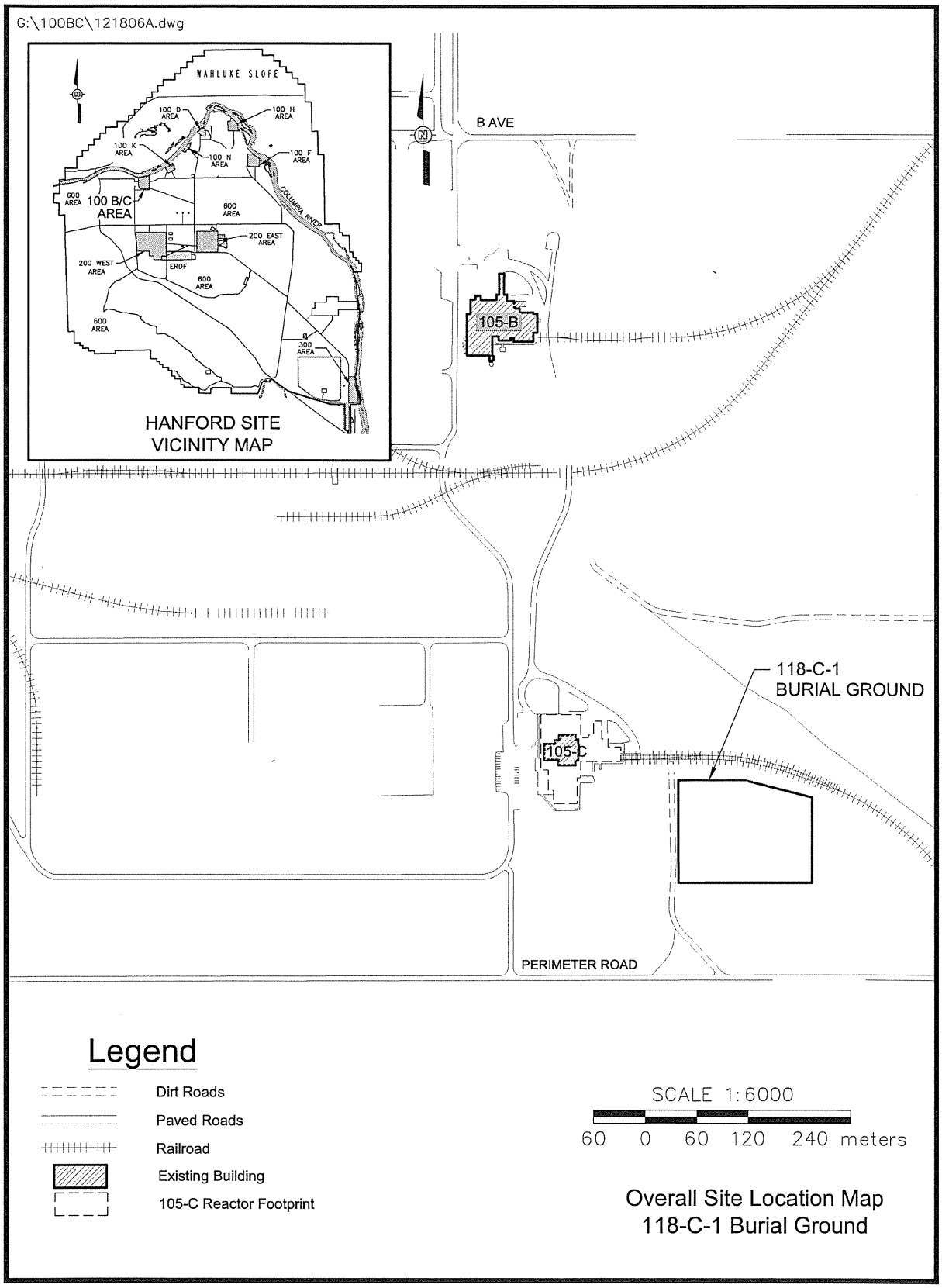


Figure 2. 118-C-1 Burial Ground Post-Excavation Topographic Boundary.

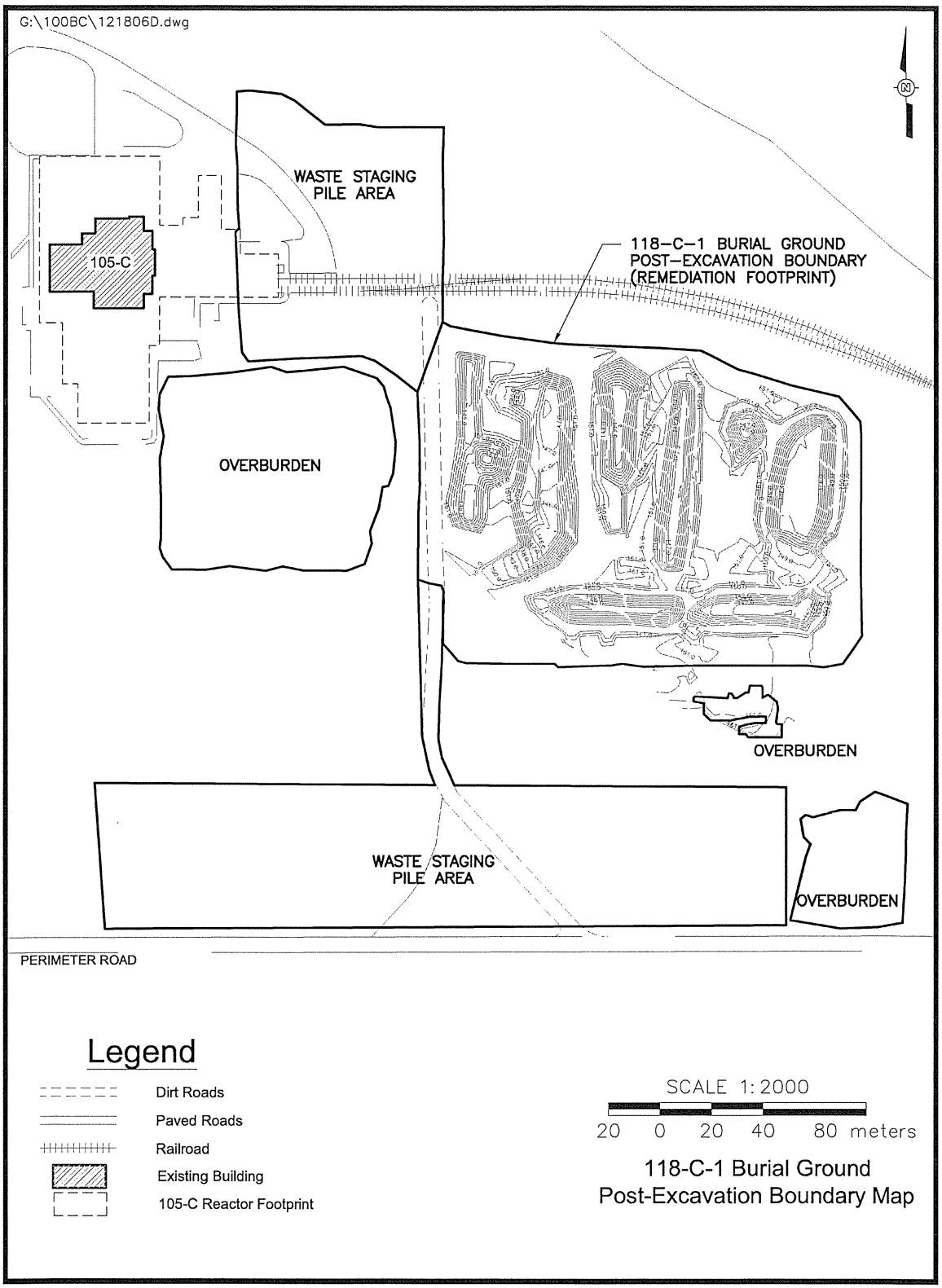
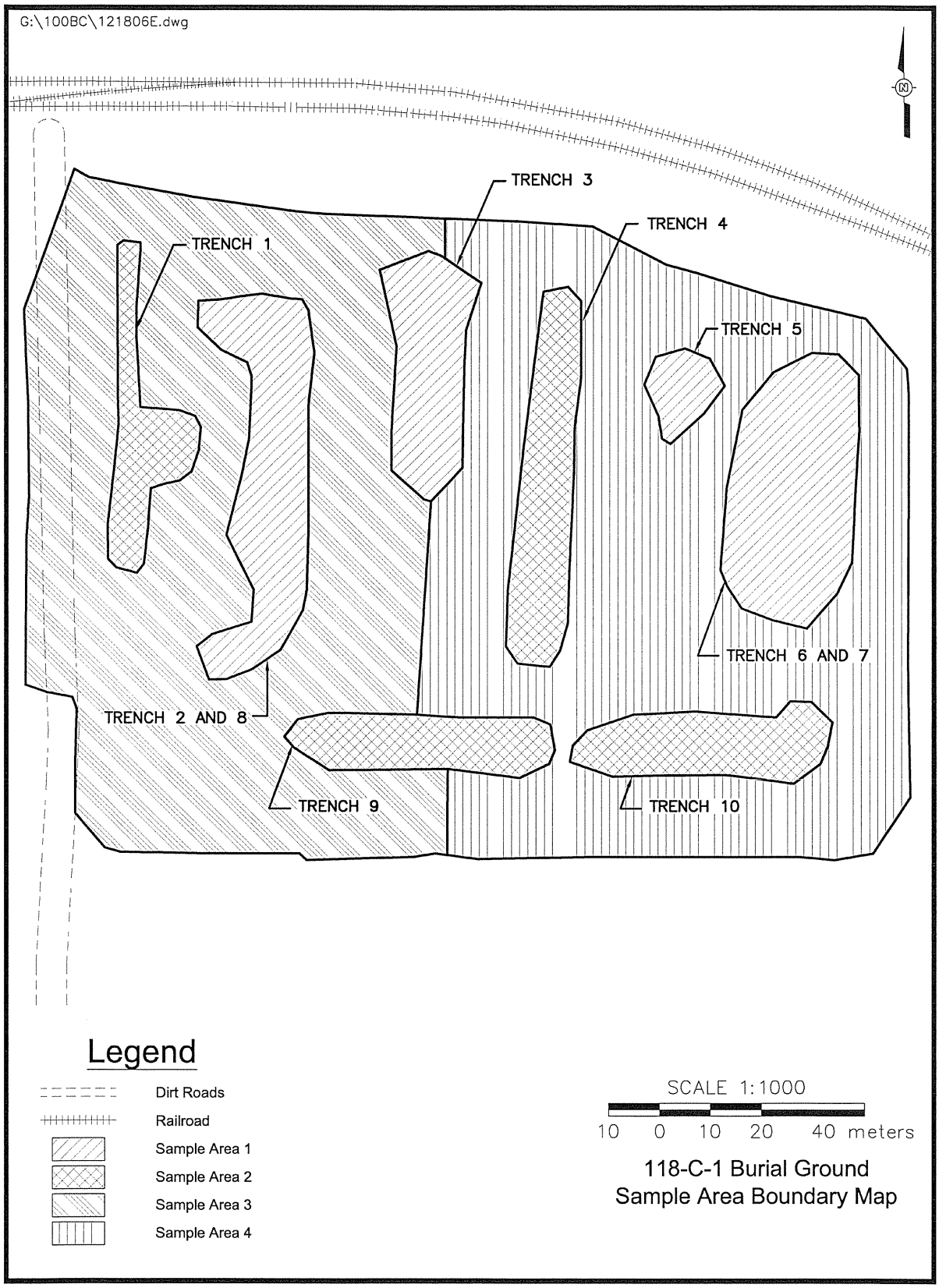


Figure 3. Remediation Footprint Sampling Area Boundaries.



2.1.1 Sampling Area 1.

Sampling Area 1 is composed of Trenches 2, 3, 5, 6, 7, and 8 (Figure 3). The waste forms observed within these trenches included general debris, perforated and non-perforated spacers, mercury tubes, splines, lead, sheet metal, vertical control rods, boron balls, vent pipes, and SNF. Because of the presence of SNF, additional radionuclide COCs were added to this sampling area for close-out purposes. The COCs/COPCs associated with this area are provided in Table 1.

2.1.2 Sampling Area 2.

Sampling Area 2 is composed of Trenches 1, 4, 9, and 10 (Figure 2). The waste forms observed within these trenches included general debris, perforated and non-perforated spacers, vertical control rods, lead, boron balls, paint, piping, wax, tar, tar paper, casks, and concrete blocks. The COCs/COPCs associated with this area are provided in Table 1.

2.1.3 Sampling Area 3.

Sampling Area 3 consists of all the land between the targeted trenches on the west side of the burial ground. This sampling area includes all COCs/COPCs associated with Sampling Areas 1 and 2. The COCs/COPCs associated with this area are provided in Table 1.

2.1.4 Sampling Area 4.

Sampling Area 4 consists of all the land between the targeted trenches on the east side of the burial ground. This sampling area includes all COCs/COPCs associated with Sampling Areas 1 and 2. The COCs/COPCs associated with this area are provided in Table 1.

2.1.5 Overburden/BCL Soil.

The three overburden/BCL soil piles are considered one decision unit (Figure 2). This decision unit contains all COCs/COPCs identified for the remediation footprint, as shown in Table 1.

2.1.6 Waste Staging Pile Area.

The 118-C-1 waste site contained two waste staging pile footprints (Figure 2). Excavated waste material from the 118-C-1 Burial Ground was initially transported to the northern waste staging pile area for sorting and sampling. Subsequent sorting of excavated waste material was performed in the southern waste staging area, which utilized process cells (trenches) for the waste sorting operations. The two staging pile area footprints will collectively be referred to as the waste staging pile area and will be closed out as one decision unit. The waste staging pile area includes all COCs/COPCs identified for the remediation footprint, as shown in Table 1.

Table 1. Summary of the 118-C-1 Waste Site COCs/COPCs for the Six Sampling Subunits.

COCs/COPCs	Sampling Area 1	Sampling Area 2	Sampling Area 3	Sampling Area 4	Overburden/ BCL	Waste Staging Pile Area
Radionuclides						
Carbon-14	X	X	X	X	X	X
Cesium-137	X	X	X	X	X	X
Cobalt-60	X	X	X	X	X	X
Europium-152	X	X	X	X	X	X
Europium-154	X	X	X	X	X	X
Nickel-63	X	X	X	X	X	X
Strontium-90	X	X	X	X	X	X
Silver-108m	X	X	X	X	X	X
Tritium	X	X	X	X	X	X
Americium-241	X		X	X	X	X
Plutonium-238	X		X	X	X	X
Plutonium-239/240	X		X	X	X	X
Plutonium-241	X		X	X	X	X
Uranium-233/234	X		X	X	X	X
Uranium-235	X		X	X	X	X
Uranium-238	X		X	X	X	X
Nonradionuclides						
ICP metals[a]	X	X	X	X	X	X
Mercury	X	X	X	X	X	X
Hexavalent chromium	X	X	X	X	X	X
PCBs		X	X	X	X	X
SVOA		X	X	X	X	X
TPH		X	X	X	X	X
VOA		X	X	X	X	X

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

BCL = below cleanup level TPH = total petroleum hydrocarbons

ICP = inductively coupled plasma VOA = volatile organic analysis
PCBs = polychlorinated biphenyls
SVOA = semi-volatile organic analysis

3.0 REMEDIAL ACTION FIELD ACTIVITIES

3.1 EXCAVATION AND DISPOSAL

Remedial action at the 118-C-1 site began on February 2, 2004. Excavation of the site involved removing the uncontaminated overburden, the buried contaminated debris, and the underlying contaminated soil. On March 31, 2004, excavation and sorting of the burial ground was initiated. Suspect SNF was discovered during the waste debris sorting operation on September 27, 2004. Subsequent characterization of the suspect SNF confirmed it to be SNF. All remedial activities associated with the 118-C-1 Burial Ground were suspended until the Authorization Basis could be properly assessed and revised to include SNF (WCH 2006).

Load-out operations were re-established on April 11, 2005, for previously sorted and segregated material. All remedial activities (excavation, sorting, and load-out) resumed on October 25, 2005 and were completed on May 27, 2006. Over 75,300 metric tons (83,000 tons) of waste and contaminated soil from the 118-C-1 Burial Ground was disposed at ERDF and approximately 9,300 bank cubic meters (BCM) of overburden soil was removed for subsequent backfill. The post-remediation topographic map is shown in Figure 2 and the remediation footprint is shown in Figure 3. At the conclusion of excavation activities, the elevation at the deepest part of the remedial excavation was 146 m (480 ft) above sea level. The remediation excavation was approximately 20,500 m^2 (220,600 ft^2) in area with a maximum depth of approximately 5 m (17 ft).

Visual observations of the buried waste confirmed that the following items were disposed of in the 118-C-1 Burial Ground during its operation: several thousand perforated and non-perforated spacers, piping and tubing, vertical control rods, sheet metal, boron balls, boron ball vacuums, bismuth, paint, high-dose piping, wax, casks, tar, tar paper, miscellaneous metal, mercury tubes, lead items, reactor parts and hardware, SNF, hydraulic hoses and parts, degraded drums, glassware, concrete, electrical components, and other miscellaneous debris. Photographs of the waste site debris and remediation activities are provided in Appendix B.

The SNF discovered during remediation activities was staged in five bunkers within the 118-C-1 northern waste staging pile area. In total, nine intact SNF rods and four fractional pieces of SNF were discovered and characterized at the 118-C-1 waste site. All SNF is awaiting transfer to the 100-K fuel storage basins for interim storage prior to final packaging and disposal, pending completion of shipping and transfer documentation.

3.1.1 FIELD SCREENING

3.1.2 Radiological Surveys

Radiological field screening was conducted during the site remedial actions as specified in the SAP (DOE-RL 2001). Field screening was used to guide the excavation to

quickly assess the presence and level of contamination. Field screening at the site included using a radiological data mapping system survey. The radiological mapping survey was performed over more than 50% of the site excavation surface area using a Global Positioning Environmental Radiological Surveyor (GPERS) with instrumentation specific to the detection of radiation associated with gamma-emitting radionuclides.

The radiological surveys are provided in Appendix D. Several radiological "hot spots" requiring additional remediation were identified in the trenches in Sampling Areas 1 and 2 as well as in the waste staging area process cells. The "hot spots" were targeted and an additional 454 metric tons (500 tons) of soil containing scattered metal debris were removed. These areas were resurveyed to confirm that waste site excavation was complete. Both the initial and final GPERS surveys for the remediation footprint are provided in Appendix D.

The overburden/BCL material was surveyed for radioactivity using GPERS throughout the remedial process. No contamination was identified in the final GPERS survey, and therefore, no further remedial action was required prior to the collection of verification samples.

3.2 BIASED SAMPLING AND ANALYSIS

Biased samples are collected to provide confidence for the absence of contamination in residual soil beneath locations exhibiting visual soil stains, buried liquid wastes or equipment, mercury-containing piping, or large inventories of dangerous/hazardous wastes (e.g., lead bricks). Additionally, biased samples may be collected from locations where process knowledge indicates the potential for elevated concentrations of alpha- or beta-emitter contamination, or where waste characterization sampling results indicate elevated concentrations of chemical contaminants above the RAGs.

Less than twenty unique anomalous waste forms were discovered during excavation and sorting at the 118-C-1 Burial Ground. Anomalous items included: casks, multiple small glass and plastic containers, SNF, sealed metal pipes, filter traps, boron ball vacuums, paraffin wax, high dose metal items, vertical control rods, and mercury tubes. Photographs of anomalous waste debris items are provided in Appendix B.

Twelve discrete soil verification samples (i.e., biased samples) were collected, in addition to the statistical cleanup verification samples, based on agreement with the EPA and DOE-RL (WCH 2006). Seven of the biased samples were collected at locations where anomalous waste items were found within the remediation footprint (Figure 4). Five of the biased samples were collected from soil underlying the SNF bunkers located in the waste staging pile area. Table 2 provides a description of the biased samples along with the associated COCs. The results of the biased verification soil samples are included with the statistical soil verification assays provided in Appendix A.

Figure 4. 118-C-1 Biased Sampling Locations within Remediation Footprint.

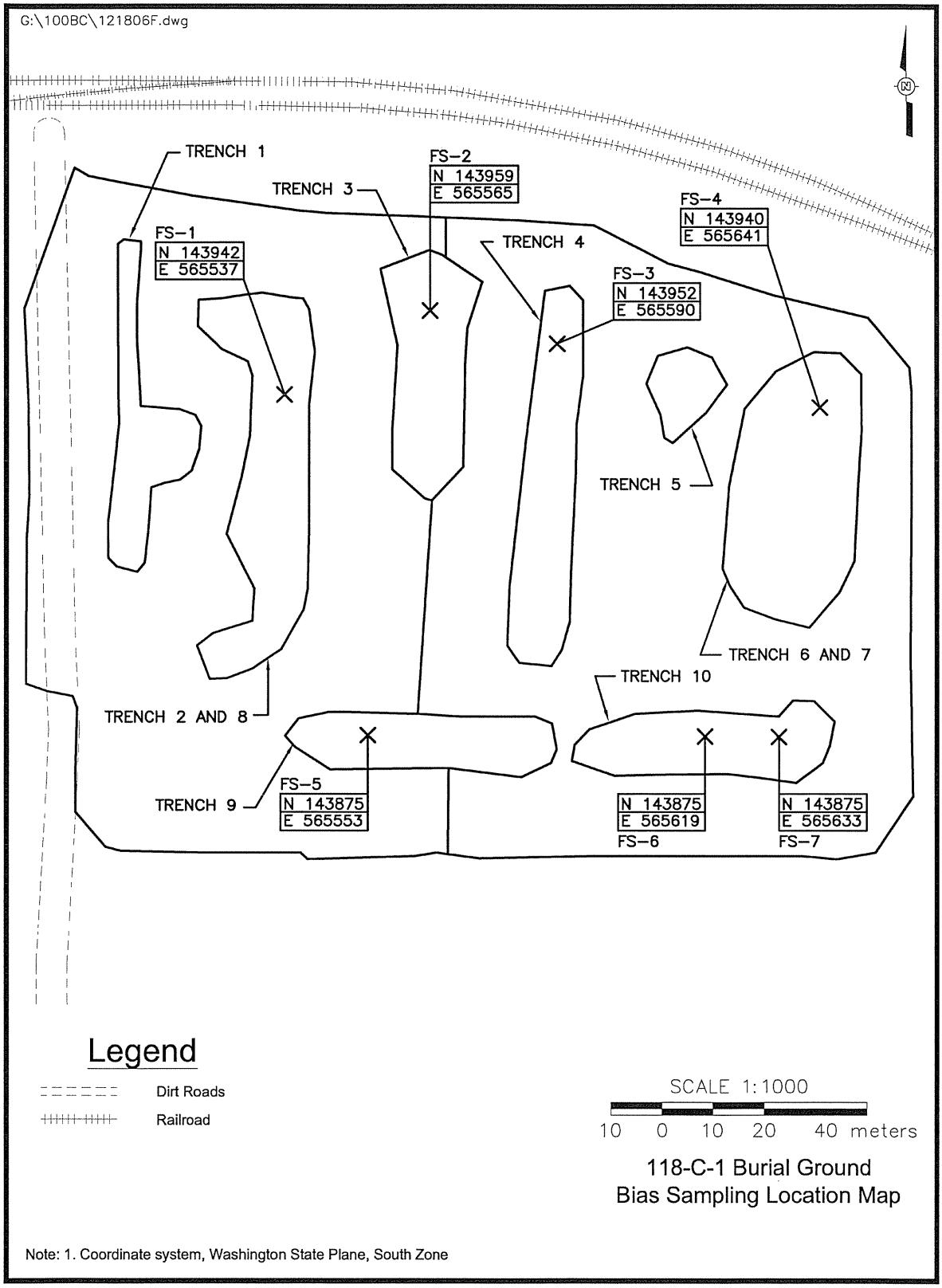


Table 2. 118-C-1 Biased Samples

Biased Sample	Location	Associated Anomaly	COCs
FS-1	Area 1, Trench 2	Cache of lead bricks	ICP Metals[a]
FS-2	Area 1, Trench 3	Cache of lead bricks	ICP Metals[a]
FS-3	Area 2, Trench 4	Miscellaneous lead debris	ICP Metals[a]
FS-4	Area 1, Trench 7	Instrumentation bundle containing high levels of bismuth	ICP Metals[a]
FS-5	Area 2, Trench 9	Cache of paint products	ICP Metals[a], SVOA, VOA, PCBs, TPH
FS-6	Area 2, Trench 10	Cache of tar and wax products	SVOA, VOA, PCBs, TPH
FS-7	Area 2, Trench 10	Cache of boron ball vacuums	ICP Metals[a], GEA
FS-8	Waste Staging Pile Area	SNF Bunker 1	Americium-241, Isotopic Plutonium, Plutonium-241, Isotopic Uranium, GEA
FS-9	Waste Staging Pile Area	SNF Bunker 2	Americium-241, Isotopic Plutonium, Plutonium-241, Isotopic Uranium, GEA
FS-10	Waste Staging Pile Area	SNF Bunker 3	Americium-241, Isotopic Plutonium, Plutonium-241, Isotopic Uranium, GEA
FS-11	Waste Staging Pile Area	SNF Bunker 4	Americium-241, Isotopic Plutonium, Plutonium-241, Isotopic Uranium, GEA
FS-12	Waste Staging Pile Area	SNF Bunker 5	Americium-241, Isotopic Plutonium, Plutonium-241, Isotopic Uranium, GEA

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

GEA = gamma energy analysis
ICP = inductively coupled plasma
PCBs = polychlorinated biphenyls
SVOA = semi-volatile organic analysis
SNF = spent nuclear fuel
TPH = total petroleum hydrocarbons
VOA = volatile organic analysis

3.3 CLEANUP VERIFICATION SAMPLING AND ANALYSIS

Final cleanup verification samples were collected in August and September, 2006 and May 2007 to confirm acceptability of residual contaminant concentrations in the soil at the 118-C-1 waste site. Each statistical verification sample was a composite formed by combining soil collected at four randomly selected nodes within each sampling decision

subunit. The verification samples were submitted to offsite laboratories for analysis using approved EPA analytical methods, as required per the *100 Area Burial Grounds Remedial Action Sampling and Analysis Plan* (SAP) (DOE-RL 2001). The sample design methodology and sample location figures are presented in the calculation brief for verification sample design in Appendix E.

For close-out verification sampling of the 118-C-1 remediation footprint, the ten trenches and surrounding land were grouped into four separate sampling decision units based on similarity of the waste forms observed during remediation. In addition to these four sampling decision units, the 118-C-1 waste site includes one decision unit for the overburden/BCL piles and one decision unit for the waste staging pile area (Figure 3). All six sampling decision units will be closed-out using the more restrictive shallow zone cleanup criteria, even though the remediation footprint does contain a deep zone (greater than 4.6 m (15 ft) below ground surface).

The number of decision subunits is determined by the overall footprint area of the decision unit (DOE-RL 2001). The default number of verification samples for each decision unit is four (4) composite samples. The required number of verification samples for each of the decision units associated with the 118-C-1 Burial Ground waste site are listed in Table 3.

Table 3. Number of Verification Samples for the 118-C-1 Burial Ground.

Decision Unit	Waste Site Footprint (ft^2)	Size Classification (ft^2)	Decision Subunits	Verification Samples
Sampling Area 1	32,500	Small (<100,000)	1	4 composite
Sampling Area 2	25,200	Small (<100,000)	1	4 composite
Sampling Area 3	82,500	Small (<100,000)	1	4 composite
Sampling Area 4	82,500	Small (<100,000)	1	4 composite
Overburden/BCL pile	97,000	Small (<100,000)	1	4 composite
Waste Staging Pile Area	250,00	Medium (>100,000 to 400,000)	4	16 composite

BCL = below cleanup level

4.0 CLEANUP VERIFICATION DATA EVALUATION

This section presents the evaluation and modeling of the 118-C-1 cleanup verification data for comparison with the data quality criteria and RAGs.

4.1 DATA QUALITY ASSESSMENT PROCESS

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

The DQA for the 118-C-1 site established that the data are of the right type, quality, and quantity to support site verification decisions within specified error tolerances. All analytical data were found to be acceptable for decision-making purposes. The evaluation verified that the sample design was sufficient for the purpose of clean site verification. The cleanup verification sample analytical data are stored in the Environmental Restoration (ENRE) project-specific database for data evaluation prior to submittal for archival in the Hanford Environmental Information System (HEIS) and are summarized in Appendix A. The detailed DQA is presented in Appendix C.

4.2 CONTAMINANTS OF CONCERN 95% UPPER CONFIDENCE LIMIT

The primary statistical calculation to support cleanup verification is the 95% upper confidence limit (UCL) on the arithmetic mean of the data. The 95% UCL values for each COC/COPC are computed for each decision unit. Prior to calculating the 95% UCL, the individual sample results are reviewed and, as appropriate, adjusted per the SAP (DOE-RL 2001) and RDR/RAWP (DOE-RL 2005). Statistical evaluations were not performed on data sets with no reported detections. This process is summarized below:

- **Radionuclides:** The laboratory reported value is used in the calculation of the 95% UCL. In cases where the laboratory does not report a value for data qualified with a "U" (i.e., less than the detection limit), half of the minimum detectable activity is used in the calculation of the 95% UCL.

- **Nonradionuclides:** For data flagged with a "U" (i.e., less than detection), a value equal to one-half the practical quantitation limit is used in the calculation of the 95% UCL, as required by Washington State Department of Ecology regulations (*Washington Administrative Code* [WAC] 173-340-740[7][g]). If greater than half of the sample results for a given COC are below detection, then the statistical value is set equal to the maximum concentration detected (i.e., versus computing a 95% UCL).

Statistical calculations are presented in the 118-C-1 cleanup verification 95% UCL calculation brief (Appendix E). Comparisons of the statistical results for waste site COCs/COPCs and the site RAGs are summarized in Tables 4 through 9. Calculated cleanup levels are not presented in the *Cleanup Levels and Risk Calculations (CLARC) Database* (Ecology 2005) under the *Washington Administrative Code* (WAC) 173-340-740(3) for aluminum, calcium, iron, magnesium, potassium, silicon, and sodium; therefore, these constituents are not considered site COCs/COPCs. Potassium-40, radium-226, radium-228, thorium-228, and thorium-232 were detected in samples collected at the site, but are not considered within the statistical calculations as these isotopes are not related to the operational history of the site. All individual sample

cleanup verification results are presented in Appendix A. The cleanup verification data set, summarized in Tables 4 through 9, was used for the RESidual RADioactivity (RESRAD) modeling discussed in Section 5.0.

Initial statistical data results from the waste staging pile area indicated the presence of arsenic and TPHs at concentrations exceeding the cleanup criteria. Consequently, additional soil was removed from these areas and the areas re-sampled and analyzed for ICP metals and TPHs. The second set of analyses for ICP metals and TPH were used to perform the 95% UCL calculations for the waste staging pile area, the results of which are presented in Table 9.

Carbon-14 was detected in a single verification sample collected from the waste staging pile area (Table 9). This detection was in exceedance of the carbon-14 direct exposure dose-equivalence lookup value. Evaluation of radionuclide data from the waste staging pile area indicated that statistical evaluation and dose modeling using this sample would result in an elevated dose estimate due to the presence of the carbon-14. Therefore, this sample was not considered in the statistical calculations for residual radionuclide activities at the waste staging pile area, and instead a sample-specific dose evaluation was performed using RESRAD (Appendix E). Based on this evaluation, it has been determined that the soil containing carbon-14 from the waste staging pile area will be used as backfill in the deep zone.

Table 4. Comparison of Statistical Contaminant Concentrations to Action Levels for Verification Sampling of the 118-C-1 Sample Area 1. (2 Pages)

COC/COPC	Statistical Result (pCi/g)	Generic Site Lookup Values[a] (pCi/g)			Does the Statistical Result Exceed Lookup Values?	Does the Statistical Result Pass RESRAD Modeling?
		Shallow Zone Lookup Value[b]	Groundwater Protection Lookup Value	River Protection Lookup Value		
Cesium-137	0.185	6.2	1,465[c]	1,465[c]	No	Yes[d]
Europium-152	0.121	3.3	--[e]	--[e]	No	
Uranium-233/234	0.506 (<BG)	1.1[f]	1.1[f]	1.1[f]	No	--
Uranium-235	0.084 (<BG)	0.84	0.5[g]	0.5[g]	No	--
Uranium-238	0.637 (<BG)	1.1[f]	1.1[f]	1.1[f]	No	--
COC/COPC	**Statistical Result (mg/kg)**	**Remedial Action Goals[a] (mg/kg)**			**Does the Statistical Data Set Exceed RAGs?**	**Does the Statistical Result Pass RESRAD Modeling?**
		Direct Exposure	**Soil Cleanup Level for Groundwater Protection**	**Soil Cleanup Level for River Protection**		
Arsenic	3.0 (<BG)	20	20	20	No	--
Barium	54.3 (<BG)	5,600[h]	132[i,j]	224[k]	No	--
Beryllium	0.84 (<BG)	10.4[l]	1.51[j]	1.51[j]	No	--

Table 4. Comparison of Statistical Contaminant Concentrations to Action Levels for Verification Sampling of the 118-C-1 Sample Area 1. (2 Pages)

Boron[m]	1.9	16,000	320	--[n]	No	--
Chromium (total)	7.9 (<BG)	80,000[h]	18.5[j]	18.5[j]	No	--
Cobalt	7.9 (<BG)	1,600	32	--[n]	No	--
Copper	13.7 (<BG)	2,960	59.2	22.0[j]	No	--
Lead	4.7 (<BG)	353	10.2[j]	10.2[j]	No	--
Manganese	339 (<BG)	11,200	512[j]	512[j]	No	--
Nickel	10.3 (<BG)	1,600	19.1[j]	27.4	No	--
Vanadium	39.8 (<BG)	560	85.1[j]	--[n]	No	--
Zinc	37.3 (<BG)	24,000	480	67.8[j]	No	--

[a] Lookup values and remedial action goals (RAGs) obtained from the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2005) or calculated per *Washington Administrative Code* (WAC) 173-340-720, 730, and 740, Method B, 1996, unless otherwise noted.

[b] Activity corresponding to a single-radionuclide 15 mrem/yr exposure as calculated using a generic RESidual RADioactivity (RESRAD) model (DOE-RL 2005).

[c] Revised lookup value per *100 Area Radionuclide and Nonradionuclide Lookup Values for the 1995 Interim Remedial Action Record of Decision* (BHI 2004).

[d] *118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief* (Appendix E).

[e] No value—RESRAD modeling predicts the contaminant will not reach groundwater within 1,000 years.

[f] The calculated lookup value is below the Hanford-specific statistical soil background activity. The value presented is the Hanford-specific statistical soil background activity.

[g] The lookup value is below the required minimum detectable activity (MDA). The value presented is the required MDA.

[h] Noncarcinogenic cleanup level calculated from WAC 173-340-740(3), 1996 (Method B for soils) (as presented in the RDR/RAWP [DOE-RL 2005]). Updated oral reference dose values (as provided in the Integrated Risk Information System [IRIS]) yield Method B direct exposure RAG values of 16,000 mg/kg and 120,000 mg/kg for barium and chromium, respectively.

[i] Barium soil cleanup level for groundwater protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule") and WAC 173-340-720(3), 1996 (Method B for groundwater) is 112 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). The updated oral reference dose value (as provided in IRIS) yields a Method B groundwater cleanup criteria of 7 mg/L, as compared to the more restrictive maximum contaminant level of 2 mg/L (40 *Code of Federal Regulations* [CFR] 141). Per WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), the most restrictive updated soil cleanup level for groundwater protection would be 200 mg/kg.

[j] Where cleanup levels are less than background, cleanup levels default to background (WAC 173-340-700[4][d]) (1996).

[k] Barium soil cleanup level for river protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), a dilution-attenuation factor of 2, and WAC 173-340-720(3), 1996 (Method B for groundwater) is 224 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). No surface water bioconcentration factor is available for barium and no ambient water quality criteria value exists separate from the previous drinking water standard; therefore no WAC 173-340-730(3), 1996 (Method B for surface waters) value can be determined.

[l] 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 (WDOH 1997).

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

[n] No parameters (bioconcentration factors or ambient water quality criteria values) are available from the Ecology Cleanup Levels and Risk Calculations database (Ecology 2005) or other databases to calculate cleanup levels (WAC 173-340-730(3)(a)(iii), 1996 [Method B for surface waters]).

-- = not applicable
BG = background (from DOE-RL [1996, 2001], unless otherwise noted)
COC = contaminant of concern
COPC = contaminant of potential concern
RAG = remedial action goal
RESRAD = RESidual RADioactivity

Table 5. Comparison of Statistical Contaminant Concentrations to Action Levels for Verification Sampling of the 118-C-1 Sample Area 2. (2 Pages)

COC/COPC	Statistical Result (pCi/g)	Generic Site Lookup Values[a] (pCi/g)			Does the Statistical Result Exceed Lookup Values?	Does the Statistical Result Pass RESRAD Modeling?
		Shallow Zone Lookup Value[b]	Groundwater Protection Lookup Value	River Protection Lookup Value		
Carbon-14	8.0[c]	5.16	--[d]	--[d]	Yes	Yes[f]
Cesium-137	0.140	6.2	1,465[e]	1,465[e]	No	
Cobalt-60	0.99	1.4	13,900[e]	13,900[e]	No	
Europium-152	0.199	3.3	--[d]	--[d]	No	
Nickel-63	26.1	4,013[e]	83[e]	83[e]	No	
Tritium	4.76	459[e]	12.6[e]	12.6[e]	No	
COC/COPC	**Statistical Result (mg/kg)**	**Remedial Action Goals[a] (mg/kg)**			**Does the Statistical Data Set Exceed RAGs?**	**Does the Statistical Result Pass RESRAD Modeling?**
		Direct Exposure	**Soil Cleanup Level for Groundwater Protection**	**Soil Cleanup Level for River Protection**		
Arsenic	2.7 (<BG)	20	20	20	No	--
Barium	51.9 (<BG)	5,600[g]	132[h,i]	224[j]	No	--
Beryllium	0.88 (<BG)	10.4[k]	1.51[i]	1.51[i]	No	--
Boron[l]	2.1	16,000	320	--[m]	No	--
Chromium (total)	6.1 (<BG)	80,000[h]	18.5[i]	18.5[i]	No	--
Chromium (hexavalent)	0.24	2.1	4.8[n]	2	No	--
Cobalt	7.7 (<BG)	1,600	32	--[l]	No	--
Copper	13.6 (<BG)	2,960	59.2	22.0[h]	No	--
Lead	4.1 (<BG)	353	10.2[h]	10.2[h]	No	--
Manganese	340 (<BG)	11,200	512[h]	512[h]	No	--
Nickel	9.8 (<BG)	1,600	19.1[h]	27.4	No	--
Vanadium	46.2 (<BG)	560	85.1[h]	--[l]	No	--
Zinc	39.3 (<BG)	24,000	480	67.8[i]	No	--

Table 5. Comparison of Statistical Contaminant Concentrations to Action Levels for Verification Sampling of the 118-C-1 Sample Area 2. (2 Pages)

COC/COPC	Statistical Result (mg/kg)	Remedial Action Goals[a] (mg/kg)			Does the Statistical Data Set Exceed RAGs?	Does the Statistical Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
bis(2-Ethylhexyl) phthalate	0.28	71.4	0.625	0.36	Yes[o]	Yes[p]
Di-n-butylphthalate	0.035	8,000	160	540	No	--
Methylene chloride	0.012	133	0.5	0.94	No	--

[a] Lookup values and remedial action goals (RAGs) obtained from the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2005) or calculated per *Washington Administrative Code* (WAC) 173-340-720, 730, and 740, Method B, 1996, unless otherwise noted.

[b] Activity corresponding to a single-radionuclide 15 mrem/yr exposure as calculated using a generic RESidual RADioactivity (RESRAD) model (DOE-RL 2005).

[c] The statistical value for the carbon-14 activity in Sample Area 2 (8 pCi/g) is greater than the shallow zone lookup value (5.16 pCi/g) because the lookup value was calculated for a generic site using the RESRAD model with a carbon-14 distribution coefficient (Kd value) of 0 mL/g while 100 Area RESRAD evaluations use a Kd value of 200 mL/g, per Table E-1 of the 100 Area RDR/RAWP (DOE-RL 2005). Using a Kd value of 200 mL/g the shallow zone lookup value is calculated to be 8.69 pCi/g.

[d] No value—RESRAD modeling predicts the contaminant will not reach groundwater within 1,000 years.

[e] Revised lookup value per *100 Area Radionuclide and Nonradionuclide Lookup Values for the 1995 Interim Remedial Action Record of Decision* (BHI 2004).

[f] *118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief* (Appendix E).

[g] Noncarcinogenic cleanup level calculated from WAC 173-340-740(3), 1996 (Method B for soils) (as presented in the RDR/RAWP [DOE-RL 2005]). Updated oral reference dose values (as provided in the Integrated Risk Information System [IRIS]) yield Method B direct exposure RAG values of 16,000 mg/kg and 120,000 mg/kg for barium and chromium, respectively.

[h] Barium soil cleanup level for groundwater protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule") and WAC 173-340-720(3), 1996 (Method B for groundwater) is 112 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). The updated oral reference dose value (as provided in IRIS) yields a Method B groundwater cleanup criteria of 7 mg/L, as compared to the more restrictive maximum contaminant level of 2 mg/L (40 *Code of Federal Regulations* [CFR] 141). Per WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), the most restrictive updated soil cleanup level for groundwater protection would be 200 mg/kg.

[i] Where cleanup levels are less than background, cleanup levels default to background (WAC 173-340-700[4][d]) (1996).

[j] Barium soil cleanup level for river protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), a dilution-attenuation factor of 2, and WAC 173-340-720(3), 1996 (Method B for groundwater) is 224 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). No surface water bioconcentration factor is available for barium and no ambient water quality criteria value exists separate from the previous drinking water standard; therefore no WAC 173-340-730(3), 1996 (Method B for surface waters) value can be determined.

[k] 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 (WDOH 1997).

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

[m] No parameters (bioconcentration factors or ambient water quality criteria values) are available from the Ecology Cleanup Levels and Risk Calculations database (Ecology 2005) or other databases to calculate cleanup levels (WAC 173-340-730(3)(a)(iii), 1996 [Method B for surface waters]).

[n] Calculated cleanup level (per WAC 173-340-720(3), 1996 [Method B for groundwater] and WAC 173-340-740(3)(a)(ii)(A), 1996 ["100 times rule"]) presented is lower than that presented in the RDR/RAWP (DOE-RL 2005), based on updated oral reference dose value (as provided in IRIS).

[o] The statistical verification data set fails the second and/or third component of the WAC 173-340-740(7)(e) 3-part test in comparison against soil RAGs for groundwater and/or river protection (one or more sample concentrations exceeds twice the soil RAG value and/or more than 10% of the data set exceeds the soil RAG value).

[p] Based on the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005) and contaminant-specific soil portioning coefficient (K_d) value, contaminant will not migrate vertically more than 3 m (10 ft) in 1,000 years. As the vadose zone underlying the site is greater than 25 m (82 ft) thick, the contaminant will not reach groundwater (and thus the Columbia River) in 1,000 years.

-- = not applicable
BG = background (obtained from DOE-RL [1996] and DOE-RL [2001], unless otherwise noted)
COC = contaminant of concern
COPC = contaminant of potential concern
RAG = remedial action goal
RESRAD = RESidual RADioactivity (dose-assessment model)

Table 6. Comparison of Statistical Contaminant Concentrations to Action Levels for Verification Sampling of the 118-C-1 Sample Area 3. (2 Pages)

COC/COPC	Statistical Result (pCi/g)	Generic Site Lookup Values[a] (pCi/g)			Does the Statistical Result Exceed Lookup Values?	Does the Statistical Result Pass RESRAD Modeling?
		Shallow Zone Lookup Value[b]	Groundwater Protection Lookup Value	River Protection Lookup Value		
Cesium-137	0.709	6.2	1,465[c]	1,465[c]	No	Yes[d]
Cobalt-60	0.037	1.4	13,900[c]	13,900[c]	No	
Europium-152	0.140	3.3	--[e]	--[e]	No	
Strontium-90	0.268	4.5	27.6[c]	27.6[c]	No	
Uranium-233/234	0.83 (<BG)	1.1[f]	1.1[f]	1.1[f]	No	--
Uranium-238	0.666(<BG)	1.1[f]	1.1[f]	1.1[f]	No	--
COC/COPC	**Statistical Result (mg/kg)**	**Remedial Action Goals[a] (mg/kg)**			**Does the Statistical Data Set Exceed RAGs?**	**Does the Statistical Result Pass RESRAD Modeling?**
		Direct Exposure	**Soil Cleanup Level for Groundwater Protection**	**Soil Cleanup Level for River Protection**		
Arsenic	4.5 (<BG)	20	20	20	No	--
Barium	75.3 (<BG)	5,600[g]	132[h,i]	224[j]	No	--
Beryllium	0.64 (<BG)	10.4[k]	1.51[i]	1.51[i]	No	--
Boron[l]	2.7	16,000	320	--[m]	No	--
Cadmium[n]	0.12 (<BG)	13.9	0.81[i]	0.81[i]	No	--
Chromium (total)	8.7 (<BG)	80,000[g]	18.5[i]	18.5[i]	No	--
Cobalt	8.8 (<BG)	1,600	32	--[m]	No	--
Copper	38.6	2,960	59.2	22.0[i]	Yes	Yes[o]
Lead	18.6	353	10.2[i]	10.2[i]	Yes	Yes[o]
Manganese	349 (<BG)	11,200	512[i]	512[i]	No	--
Molybdenum[l]	4.5	400	8	--[m]	No	--
Nickel	12.0 (<BG)	1,600	19.1[i]	27.4	No	--
Vanadium	50.6 (<BG)	560	85.1[i]	--[m]	No	--
Zinc	74.8	24,000	480	67.8[i]	Yes	Yes[o]
Aroclor-1254	0.054	0.5	0.017[p]	0.017[p]	Yes	Yes[o]
Benzo(a)anthracene	0.18	1.37[q]	0.33[p]	0.33[p]	No	--
Benzo(a)pyrene	0.12	0.33[p]	0.33[p]	0.33[p]	No	--
Benzo(b)fluoranthene	0.14	1.37[q]	0.33[p]	0.33[p]	No	--
Benzo(g,h,i)perylene[r]	0.051	2,400	48	192	No	--
Benzo(k)fluoranthene	0.14	13.7[q]	0.33[p]	0.33[p]	No	--
bis(2-Ethylhexyl)phthalate	0.22	71.4	0.625	0.36	No	--
Butylbenzylphthalate	0.038	16,000	320	250	No	--
Chrysene	0.21	137[q]	1.2[q]	0.33[p]	No	--

Table 6. Comparison of Statistical Contaminant Concentrations to Action Levels for Verification Sampling of the 118-C-1 Sample Area 3. (2 Pages)

COC/COPC	Statistical Result (mg/kg)	Remedial Action Goals[a] (mg/kg)			Does the Statistical Data Set Exceed RAGs?	Does the Statistical Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Di-n-butylphthalate	0.13	8,000	160	540	No	--
Fluoranthene	0.32	3,200	64	18	No	--
Indeno(1,2,3-cd)pyrene	0.046	1.37	0.33[p]	0.33[p]	No	--
Phenanthrene[r]	0.055	24,000	240	1,920	No	--
Pyrene	0.32	2,400	48	192	No	--
Acetone	0.011	72,000	720	--[m]	No	--
Methylene chloride	0.011	133	0.5	0.94	No	--

[a] Lookup values and remedial action goals (RAGs) obtained from the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2005) or calculated per *Washington Administrative Code* (WAC) 173-340-720, 730, and 740, Method B, 1996, unless otherwise noted.
[b] Activity corresponding to a single-radionuclide 15 mrem/yr exposure as calculated using a generic RESidual RADioactivity (RESRAD) model (DOE-RL 2005).
[c] Revised lookup value per *100 Area Radionuclide and Nonradionuclide Lookup Values for the 1995 Interim Remedial Action Record of Decision* (BHI 2004).
[d] *118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief* (Appendix E).
[e] No value—RESRAD modeling predicts the contaminant will not reach groundwater within 1,000 years.
[f] The calculated lookup value is below the Hanford-specific statistical soil background activity. The value presented is the Hanford-specific statistical soil background activity.
[g] Noncarcinogenic cleanup level calculated from WAC 173-340-740(3), 1996 (Method B for soils) (as presented in the RDR/RAWP [DOE-RL 2005]). Updated oral reference dose values (as provided in the Integrated Risk Information System [IRIS]) yield Method B direct exposure RAG values of 16,000 mg/kg and 120,000 mg/kg for barium and chromium, respectively.
[h] Barium soil cleanup level for groundwater protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule") and WAC 173-340-720(3), 1996 (Method B for groundwater) is 112 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). The updated oral reference dose value (as provided in IRIS) yields a Method B groundwater cleanup criteria of 7 mg/L, as compared to the more restrictive maximum contaminant level of 2 mg/L (40 *Code of Federal Regulations* [CFR] 141). Per WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), the most restrictive updated soil cleanup level for groundwater protection would be 200 mg/kg.
[i] Where cleanup levels are less than background, cleanup levels default to background (WAC 173-340-700[4][d]) (1996).
[j] Barium soil cleanup level for river protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), a dilution-attenuation factor of 2, and WAC 173-340-720(3), 1996 (Method B for groundwater) is 224 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). No surface water bioconcentration factor is available for barium and no ambient water quality criteria value exists separate from the previous drinking water standard; therefore no WAC 173-340-730(3), 1996 (Method B for surface waters) value can be determined.
[k] 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 (WDOH 1997).
[l] No Hanford Site-specific or Washington State background value available.
[m] No parameters (bioconcentration factors or ambient water quality criteria values) are available from the Ecology Cleanup Levels and Risk Calculations database (Ecology 2005) or other databases to calculate cleanup levels (WAC 173-340-730(3)(a)(iii), 1996 [Method B for surface waters]).
[n] Hanford Site-specific background value is not available; not evaluated during background study. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).
[o] Based on the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005) and contaminant-specific soil portioning coefficient (K_d) value, contaminant will not migrate vertically more than 3 m (10 ft) in 1,000 years. As the vadose zone underlying the site is greater than 25 m (82 ft) thick, the contaminant will not reach groundwater (and thus the Columbia River) in 1,000 years.
[p] Where cleanup levels are less than the required detection limit, cleanup levels default to the required detection limit (WAC 173-340-707[2], 1996 and DOE-RL 2005).
[q] RAG value listed in the RDR/RAWP (DOE-RL 2005) is based on the use of benzo(a)pyrene as a surrogate. Compound-specific carcinogenic cleanup level calculated per WAC 173-340-740(3), 1996 (Method B for soils) using Oak Ridge National Laboratory oral cancer potency factors.
[r] Toxicity data for this chemical are not available. RAGs for benzo(g,h,i)perylene and phenanthrene are based on the surrogate chemicals pyrene and anthracene, respectively.

-- = not applicable
BG = background (from DOE-RL [1996, 2001], unless otherwise noted)
COC = contaminant of concern
COPC = contaminant of potential concern
RAG = remedial action goal
RESRAD = RESidual RADioactivity

Table 7. Comparison of Statistical Contaminant Concentrations to Action Levels for Verification Sampling of the 118-C-1 Sample Area 4. (2 Pages)

COC/COPC	Statistical Result (pCi/g)	Generic Site Lookup Values[a] (pCi/g)			Does the Statistical Result Exceed Lookup Values?	Does the Statistical Result Pass RESRAD Modeling?
		Shallow Zone Lookup Value[b]	Groundwater Protection Lookup Value	River Protection Lookup Value		
Cesium-137	0.81	6.2	1,465[c]	1,465[c]	No	Yes[d]
Europium-152	0.114	3.3	--[e]	--[e]	No	
Uranium-233/234	0.479(<BG)	1.1[f]	1.1[f]	1.1[f]	No	--
Uranium-238	0.636(<BG)	1.1[f]	1.1[f]	1.1[f]	No	--
COC/COPC	**Statistical Result (mg/kg)**	**Remedial Action Goals[a] (mg/kg)**			**Does the Statistical Data Set Exceed RAGs?**	**Does the Statistical Result Pass RESRAD Modeling?**
		Direct Exposure	**Soil Cleanup Level for Groundwater Protection**	**Soil Cleanup Level for River Protection**		
Arsenic	2.4 (<BG)	20	20	20	No	--
Barium	206	5,600[g]	132[h,i]	224[j]	Yes	Yes[k]
Beryllium	0.58 (<BG)	10.4[l]	1.51[i]	1.51[i]	No	--
Boron[m]	3.4	16,000	320	--[n]	No	--
Chromium (total)	6.5 (<BG)	80,000[g]	18.5[i]	18.5[i]	No	--
Cobalt	8.7 (<BG)	1,600	32	--[n]	No	--
Copper	15.0 (<BG)	2,960	59.2	22.0[i]	No	--
Lead	5.0 (<BG)	353	10.2[i]	10.2[i]	No	--
Manganese	340 (<BG)	11,200	512[i]	512[i]	No	--
Nickel	9.9 (<BG)	1,600	19.1[i]	27.4	No	--
Vanadium	51.6 (<BG)	560	85.1[i]	--[n]	No	--
Zinc	41.0 (<BG)	24,000	480	67.8[i]	No	--
Aroclor-1254	0.013	0.5	0.017[o]	0.017[o]	No	--
Benzo(a)anthracene	0.13	1.37[p]	0.33[o]	0.33[o]	No	--
Benzo(a)pyrene	0.083	0.33[o]	0.33[o]	0.33[o]	No	--
Benzo(b)fluoranthene	0.11	1.37[p]	0.33[o]	0.33[s]	No	--
Benzo(g,h,i)perylene[q]	0.037	2,400	48	192	No	--
Benzo(k)fluoranthene	0.092	13.7[p]	0.33[o]	0.33[o]	No	--
bis(2-Ethylhexyl)phthalate	0.017	71.4	0.625	0.36	No	--
Chrysene	0.17	137[p]	1.2[p]	0.33[o]	No	--
Di-n-butylphthalate	0.026	8,000	160	540	No	--
Fluoranthene	0.33	3,200	64	18	No	--
Indeno(1,2,3-cd)pyrene	0.035	1.37	0.33[o]	0.33[o]	No	--

Table 7. Comparison of Statistical Contaminant Concentrations to Action Levels for Verification Sampling of the 118-C-1 Sample Area 4. (2 Pages)

COC/COPC	Statistical Result (mg/kg)	Remedial Action Goals[a] (mg/kg)			Does the Statistical Data Set Exceed RAGs?	Does the Statistical Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Phenanthrene[q]	0.097	24,000	240	1,920	No	--
Pyrene	0.35	2,400	48	192	No	--
Acetone	0.012	72,000	720	--[n]	No	--
Benzene	0.001	18	0.080	0.24	No	--
Methylene chloride	0.014	133	0.5	0.94	No	--
Xylene (total)	0.001	16,000	160	--[n]	No	--

[a] Lookup values and remedial action goals (RAGs) obtained from the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2005) or calculated per *Washington Administrative Code* (WAC) 173-340-720, 730, and 740, Method B, 1996, unless otherwise noted.

[b] Activity corresponding to a single-radionuclide 15 mrem/yr exposure as calculated using a generic RESidual RADioactivity (RESRAD) model (DOE-RL 2005).

[c] Revised lookup value per *100 Area Radionuclide and Nonradionuclide Lookup Values for the 1995 Interim Remedial Action Record of Decision* (BHI 2004).

[d] *118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief* (Appendix E).

[e] No value—RESRAD modeling predicts the contaminant will not reach groundwater within 1,000 years.

[f] The calculated lookup value is below the Hanford-specific statistical soil background activity. The value presented is the Hanford-specific statistical soil background activity.

[g] Noncarcinogenic cleanup level calculated from WAC 173-340-740(3), 1996 (Method B for soils) (as presented in the RDR/RAWP [DOE-RL 2005]). Updated oral reference dose values (as provided in the Integrated Risk Information System [IRIS]) yield Method B direct exposure RAG values of 16,000 mg/kg and 120,000 mg/kg for barium and chromium, respectively.

[h] Barium soil cleanup level for groundwater protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule") and WAC 173-340-720(3), 1996 (Method B for groundwater) is 112 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). The updated oral reference dose value (as provided in IRIS) yields a Method B groundwater cleanup criteria of 7 mg/L, as compared to the more restrictive maximum contaminant level of 2 mg/L (40 *Code of Federal Regulations* [CFR] 141). Per WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), the most restrictive updated soil cleanup level for groundwater protection would be 200 mg/kg.

[i] Where cleanup levels are less than background, cleanup levels default to background (WAC 173-340-700[4][d]) (1996).

[j] Barium soil cleanup level for river protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), a dilution-attenuation factor of 2, and WAC 173-340-720(3), 1996 (Method B for groundwater) is 224 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). No surface water bioconcentration factor is available for barium and no ambient water quality criteria value exists separate from the previous drinking water standard; therefore no WAC 173-340-730(3), 1996 (Method B for surface waters) value can be determined.

[k] Based on the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005) and contaminant-specific soil portioning coefficient (K_d) value, contaminant will not migrate vertically more than 3 m (10 ft) in 1,000 years. As the vadose zone underlying the site is greater than 25 m (82 ft) thick, the contaminant will not reach groundwater (and thus the Columbia River) in 1,000 years.

[l] 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 (WDOH 1997).

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

[n] No parameters (bioconcentration factors or ambient water quality criteria values) are available from the Ecology Cleanup Levels and Risk Calculations database (Ecology 2005) or other databases to calculate cleanup levels (WAC 173-340-730(3)(a)(iii), 1996 [Method B for surface waters]).

[o] Where cleanup levels are less than the required detection limit, cleanup levels default to the required detection limit (WAC 173-340-707[2], 1996 and DOE-RL 2005).

[p] RAG value listed in the RDR/RAWP (DOE-RL 2005) is based on the use of benzo(a)pyrene as a surrogate. Compound-specific carcinogenic cleanup level calculated per WAC 173-340-740(3), 1996 (Method B for soils) using Oak Ridge National Laboratory oral cancer potency factors.

[q] Toxicity data for this chemical are not available. RAGs for benzo(g,h,i)perylene and phenanthrene are based on the surrogate chemicals pyrene and anthracene, respectively.

-- = not applicable
BG = background (from DOE-RL [1996, 2001], unless otherwise noted)
COC = contaminant of concern
COPC = contaminant of potential concern
RAG = remedial action goal
RESRAD = RESidual RADioactivity

Table 8. Comparison of Statistical Contaminant Concentrations to Action Levels for Verification Sampling of the 118-C-1 Sample Overburden/BCL Material. (2 Pages)

COC/COPC	Statistical Result (pCi/g)	Generic Site Lookup Values[a] (pCi/g)			Does the Statistical Result Exceed Lookup Values?	Does the Statistical Result Pass RESRAD Modeling?
		Shallow Zone Lookup Value[b]	Groundwater Protection Lookup Value	River Protection Lookup Value		
Cesium-137	0.352(<BG)	6.2	1,465[c]	1,465[c]	No	--
Strontium-90	1.41	4.5	27.6[c]	27.6[c]	No	Yes[d]
Uranium-233/234	0.523(<BG)	1.1[e]	1.1[e]	1.1[e]	No	--
Uranium-238	0.505(<BG)	1.1[e]	1.1[e]	1.1[e]	No	--
COC/COPC	**Statistical Result (mg/kg)**	**Remedial Action Goals[a] (mg/kg)**			**Does the Statistical Data Set Exceed RAGs?**	**Does the Statistical Result Pass RESRAD Modeling?**
		Direct Exposure	**Soil Cleanup Level for Groundwater Protection**	**Soil Cleanup Level for River Protection**		
Arsenic	2.4 (<BG)	20	20	20	No	--
Barium	55.2 (<BG)	5,600[f]	132[g,h]	224[i]	No	--
Beryllium	0.68 (<BG)	10.4[j]	1.51[h]	1.51[h]	No	--
Chromium (total)	6.7 (<BG)	80,000[f]	18.5[h]	18.5[h]	No	--
Chromium (hexavalent)	0.24	2.1	4.8[k]	2	No	--
Cobalt	7.7 (<BG)	1,600	32	--[l]	No	--
Copper	15.4 (<BG)	2,960	59.2	22.0[h]	No	--
Lead	4.9 (<BG)	353	10.2[h]	10.2[h]	No	--
Manganese	325 (<BG)	11,200	512[h]	512[h]	No	--
Nickel	9.5 (<BG)	1,600	19.1[h]	27.4	No	--
Vanadium	44.7 (<BG)	560	85.1[h]	--[l]	No	--
Zinc	37.5 (<BG)	24,000	480	67.8[h]	No	--
Aroclor-1254	0.0065	0.5	0.017[m]	0.017[m]	No	--
Benzo(a)anthracene	0.038	1.37[n]	0.33[m]	0.33[m]	No	--
Benzo(a)pyrene	0.024	0.33[m]	0.33[m]	0.33[m]	No	--
Benzo(b)fluoranthene	0.033	1.37[n]	0.33[m]	0.33[m]	No	--
Benzo(k)fluoranthene	0.029	13.7[n]	0.33[m]	0.33[m]	No	--
Chrysene	0.052	137[n]	1.2[n]	0.33[m]	No	--
Fluoranthene	0.11	3,200	64	18	No	--
Phenanthrene[o]	0.037	24,000	240	1,920	No	--
Pyrene	0.057	2,400	48	192	No	--
Acetone	0.011	72,000	720	--[l]	No	--
Methylene chloride	0.012	133	0.5	0.94	No	--

Table 8. Comparison of Statistical Contaminant Concentrations to Action Levels for Verification Sampling of the 118-C-1 Sample Overburden/BCL Material. (2 Pages)

[a] Lookup values and remedial action goals (RAGs) obtained from the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2005) or calculated per *Washington Administrative Code* (WAC) 173-340-720, 730, and 740, Method B, 1996, unless otherwise noted.

[b] Activity corresponding to a single-radionuclide 15 mrem/yr exposure as calculated using a generic RESidual RADioactivity (RESRAD) model (DOE-RL 2005).

[c] Revised lookup value per *100 Area Radionuclide and Nonradionuclide Lookup Values for the 1995 Interim Remedial Action Record of Decision* (BHI 2004).

[d] *118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief* (Appendix E).

[e] The calculated lookup value is below the Hanford-specific statistical soil background activity. The value presented is the Hanford-specific statistical soil background activity.

[f] Noncarcinogenic cleanup level calculated from WAC 173-340-740(3), 1996 (Method B for soils) (as presented in the RDR/RAWP [DOE-RL 2005]). Updated oral reference dose values (as provided in the Integrated Risk Information System [IRIS]) yield Method B direct exposure RAG values of 16,000 mg/kg and 120,000 mg/kg for barium and chromium, respectively.

[g] Barium soil cleanup level for groundwater protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule") and WAC 173-340-720(3), 1996 (Method B for groundwater) is 112 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). The updated oral reference dose value (as provided in IRIS) yields a Method B groundwater cleanup criteria of 7 mg/L, as compared to the more restrictive maximum contaminant level of 2 mg/L (40 *Code of Federal Regulations* [CFR] 141). Per WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), the most restrictive updated soil cleanup level for groundwater protection would be 200 mg/kg.

[h] Where cleanup levels are less than background, cleanup levels default to background (WAC 173-340-700[4][d]) (1996).

[i] Barium soil cleanup level for river protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), a dilution-attenuation factor of 2, and WAC 173-340-720(3), 1996 (Method B for groundwater) is 224 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). No surface water bioconcentration factor is available for barium and no ambient water quality criteria value exists separate from the previous drinking water standard; therefore no WAC 173-340-730(3), 1996 (Method B for surface waters) value can be determined.

[j] 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 (WDOH 1997).

[k] Calculated cleanup level (per WAC 173-340-720(3), 1996 [Method B for groundwater] and WAC 173-340-740(3)(a)(ii)(A), 1996 ["100 times rule"]) presented is lower than that presented in the RDR/RAWP (DOE-RL 2005), based on updated oral reference dose value (as provided in IRIS).

[l] No parameters (bioconcentration factors or ambient water quality criteria values) are available from the Ecology Cleanup Levels and Risk Calculations database (Ecology 2005) or other databases to calculate cleanup levels (WAC 173-340-730(3)(a)(iii), 1996 [Method B for surface waters]).

[m] Where cleanup levels are less than the required detection limit, cleanup levels default to the required detection limit (WAC 173-340-707[2], 1996 and DOE-RL 2005).

[n] RAG value listed in the RDR/RAWP (DOE-RL 2005) is based on the use of benzo(a)pyrene as a surrogate. Compound-specific carcinogenic cleanup level calculated per WAC 173-340-740(3), 1996 (Method B for soils) using Oak Ridge National Laboratory oral cancer potency factors.

[o] Toxicity data for this chemical are not available. RAGs for benzo(g,h,i)perylene and phenanthrene are based on the surrogate chemicals pyrene and anthracene, respectively.

-- = not applicable
BG = background (obtained from DOE-RL [1996] and DOE-RL [2001], unless otherwise noted)
COC = contaminant of concern
COPC = contaminant of potential concern
RAG = remedial action goal
RESRAD = RESidual RADioactivity (dose-assessment model)

Table 9. Comparison of Statistical Contaminant Concentrations to Action Levels for Verification Sampling of the 118-C-1 Staging Pile Area. (3 Pages)

COC/COPC	Statistical Result (pCi/g)	Generic Site Lookup Values[a] (pCi/g)			Does the Statistical Result Exceed Lookup Values?	Does the Statistical Result Pass RESRAD Modeling?
		Shallow Zone Lookup Value[b]	Groundwater Protection Lookup Value	River Protection Lookup Value		
Carbon-14	182[c]	5.16	--[e]	--[e]	Yes	Yes[d]
Cesium-137	1.03	6.2	1,465[f]	1,465[f]	No	
Cobalt-60	0.029	1.4	13,900[f]	13,900[f]	No	
Europium-152	0.177	3.3	--[e]	--[e]	No	
Strontium-90	0.334	4.5	27.6[f]	27.6[f]	No	
Uranium-233/234	0.489(<BG)	1.1[g]	1.1[g]	1.1[g]	No	--
Uranium-235	0.038(<BG)	0.84	0.5[h]	0.5[h]	No	--
Uranium-238	0.573(<BG)	1.1[g]	1.1[g]	1.1[g]	No	--
COC/COPC	**Statistical Result (mg/kg)**	**Remedial Action Goals[a] (mg/kg)**			**Does the Statistical Data Set Exceed RAGs?**	**Does the Statistical Result Pass RESRAD Modeling?**
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Arsenic	2.8 (<BG)	20	20	20	No	--
Barium	130 (<BG)	5,600[i]	132[j,k]	224[l]	Yes[m]	Yes[n]
Beryllium	0.43 (<BG)	10.4[o]	1.51[k]	1.51[k]	No	--
Boron[p]	2.8	16,000	320	--[q]	No	--
Chromium (total)	8.2 (<BG)	80,000[i]	18.5[k]	18.5[k]	No	--
Chromium (hexavalent)	0.5	2.1	4.8[r]	2	No	--
Cobalt	7.0 (<BG)	1,600	32	--[q]	No	--
Copper	36	2,960	59.2	22.0[k]	Yes	Yes[n]
Lead	10.7	353	10.2[k]	10.2[k]	Yes	Yes[n]
Manganese	323 (<BG)	11,200	512[k]	512[k]	No	--
Mercury	0.06 (<BG)	24	0.33[k]	0.33[k]	No	--
Molybdenum[p]	0.62	400	8	--[q]	No	--
Nickel	10.6 (<BG)	1,600	19.1[k]	27.4	No	--
Selenium[s]	0.80	400	5	1	No	--
Vanadium	46.6 (<BG)	560	85.1[k]	--[q]	No	--
Zinc	46.1 (<BG)	24,000	480	67.8[k]	No	--
Total petroleum hydrocarbons	146	--	200[t]	200[t]	No	--
Aroclor-1254	0.015	0.5	0.017[u]	0.017[u]	Yes[m]	Yes[n]
Aroclor-1260	0.061	0.5	0.017[u]	0.017[u]	Yes	Yes[n]

Table 9. Comparison of Statistical Contaminant Concentrations to Action Levels for Verification Sampling of the 118-C-1 Staging Pile Area. (3 Pages)

COC/COPC	Statistical Result (mg/kg)	Remedial Action Goals[a] (mg/kg)			Does the Statistical Data Set Exceed RAGs?	Does the Statistical Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Acenaphthene	0.041	4,800	96	129	No	--
Anthracene	0.26	24,000	240	1,920	No	--
Benzo(a)anthracene	0.5	1.37[v]	0.33[u]	0.33[u]	No[w]	--
Benzo(a)pyrene	0.48	0.33[u]	0.33[u]	0.33[u]	No[w]	--
Benzo(b)fluoranthene	0.21	1.37[v]	0.33[u]	0.33[u]	No[w]	--
Benzo(g,h,i)perylene[x]	0.26	2,400	48	192	No	--
Benzo(k)fluoranthene	0.20	13.7[v]	0.33[u]	0.33[u]	No[w]	--
bis(2-Ethylhexyl)phthalate	0.052	71.4	0.625	0.36	No	--
Butylbenzylphthalate	0.017	16,000	320	250	No	--
Carbazole	0.24	50	0.438	--[q]	No	--
Chrysene	0.4	137[v]	1.2[v]	0.33[u]	No[w]	--
Di-n-butylphthalate	0.11	8,000	160	540	No	--
Dibenz(a,h)anthracene	0.18	0.33[u]	0.33[u]	0.33[u]	No	--
Dibenzofuran	0.034	160	3.2	--[q]	No	--
Fluoranthene[y]	0.19	3,200	64	18	No	--
Fluorene	0.043	3,200	64	260	No	--
Indeno(1,2,3-cd)pyrene	0.25	1.37	0.33[u]	0.33[u]	No	--
Phenanthrene[x]	1.3	24,000	240	1,920	No	--
Phenol	0.024	24,000	480	4,200	No	--
Pyrene	0.5	2,400	48	192	No	--
2-Butanone	0.004	48,000	480	--[q]	No	--
Acetone	0.015	72,000	720	--[q]	No	--
Methylene chloride	0.023	133	0.5	0.94	No	--
Styrene	0.004	33.3	0.15	--[q]	No	--
Toluene	0.002	6,400	64	1,360	No	--
Xylene (total)	0.001	16,000	160	--[q]	No	--

Table 9. Comparison of Statistical Contaminant Concentrations to Action Levels for Verification Sampling of the 118-C-1 Staging Pile Area. (3 Pages)

[a] Lookup values and remedial action goals (RAGs) obtained from the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2005) or calculated per *Washington Administrative Code* (WAC) 173-340-720, 730, and 740, Method B, 1996, unless otherwise noted.

[b] Activity corresponding to a single-radionuclide 15 mrem/yr exposure as calculated using a generic RESidual RADioactivity (RESRAD) model (DOE-RL 2005).

[c] Carbon-14 value presented is the result for a single sample from the staging pile area; this isotope was not detected in other samples collected at the staging pile area. Initial dose evaluation indicated that including this result in the statistical data set for the entire staging pile area would result in an elevated dose estimate. Material at this location will be backfilled into deep zone portions of the site, and this sample was omitted from statistical calculations for the staging pile area and a sample-specific evaluation was performed using RESRAD (Appendix E).

[d] *118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief* (Appendix E).

[e] No value—RESRAD modeling predicts the contaminant will not reach groundwater within 1,000 years.

[f] Revised lookup value per *100 Area Radionuclide and Nonradionuclide Lookup Values for the 1995 Interim Remedial Action Record of Decision* (BHI 2004).

[g] The calculated lookup value is below the Hanford-specific statistical soil background activity. The value presented is the Hanford-specific statistical soil background activity.

[h] The lookup value is below the required minimum detectable activity (MDA). The value presented is the required MDA.

[i] Noncarcinogenic cleanup level calculated from WAC 173-340-740(3), 1996 (Method B for soils) (as presented in the RDR/RAWP [DOE-RL 2005]). Updated oral reference dose values (as provided in the Integrated Risk Information System [IRIS]) yield Method B direct exposure RAG values of 16,000 mg/kg and 120,000 mg/kg for barium and chromium, respectively.

[j] Barium soil cleanup level for groundwater protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule") and WAC 173-340-720(3), 1996 (Method B for groundwater) is 112 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). The updated oral reference dose value (as provided in IRIS) yields a Method B groundwater cleanup criteria of 7 mg/L, as compared to the more restrictive maximum contaminant level of 2 mg/L (40 *Code of Federal Regulations* [CFR] 141). Per WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), the most restrictive updated soil cleanup level for groundwater protection would be 200 mg/kg.

[k] Where cleanup levels are less than background, cleanup levels default to background (WAC 173-340-700[4][d]) (1996).

[l] Barium soil cleanup level for river protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), a dilution-attenuation factor of 2, and WAC 173-340-720(3), 1996 (Method B for groundwater) is 224 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). No surface water bioconcentration factor is available for barium and no ambient water quality criteria value exists separate from the previous drinking water standard; therefore no WAC 173-340-730(3), 1996 (Method B for surface waters) value can be determined.

[m] The statistical verification data set fails the second and/or third component of the WAC 173-340-740(7)(e) 3-part test in comparison against soil RAGs for groundwater and/or river protection (one or more sample concentrations exceeds twice the soil RAG value and/or more than 10% of the data set exceeds the soil RAG value).

[n] Based on the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005) and contaminant-specific soil portioning coefficient (K_d) value, contaminant will not migrate vertically more than 3 m (10 ft) in 1,000 years. As the vadose zone underlying the site is greater than 25 m (82 ft) thick, the contaminant will not reach groundwater (and thus the Columbia River) in 1,000 years.

[o] 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 (WDOH 1997).

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

[q] No parameters (bioconcentration factors or ambient water quality criteria values) are available from the Ecology Cleanup Levels and Risk Calculations database (Ecology 2005) or other databases to calculate cleanup levels (WAC 173-340-730(3)(a)(iii), 1996 [Method B for surface waters]).

[r] Calculated cleanup level (per WAC 173-340-720(3), 1996 [Method B for groundwater] and WAC 173-340-740(3)(a)(ii)(A), 1996 ["100 times rule"]) presented is lower than that presented in the RDR/RAWP (DOE-RL 2005), based on updated oral reference dose value (as provided in IRIS).

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

[t] RAG values for total petroleum hydrocarbons obtained from WAC 173-340-740(2), 1996 (Method A for soils).

[u] Where cleanup levels are less than the required detection limit, cleanup levels default to the required detection limit (WAC 173-340-707[2], 1996 and DOE-RL 2005).

[v] RAG value listed in the RDR/RAWP (DOE-RL 2005) is based on the use of benzo(a)pyrene as a surrogate. Compound-specific carcinogenic cleanup level calculated per WAC 173-340-740(3), 1996 (Method B for soils) using Oak Ridge National Laboratory oral cancer potency factors.

[w] Constituent is the result of asphalt cross-contamination of the sample matrix. Asphalt that has been used for structural and construction purposes is excluded from consideration as a dangerous waste by WAC 173-303-071(3)(e), 2004, is listed as an inert waste in WAC 173-350-990(2)(b), 2005, and does not present a significant human health risk.

[x] Toxicity data for this chemical are not available. RAGs for benzo(g,h,i)perylene and phenanthrene are based on the surrogate chemicals pyrene and anthracene, respectively.

[y] A portion of the fluoranthene data for the staging pile area was rejected based on data quality deficiencies; the value presented is the maximum detected accepted value. Because polycyclic aromatic hydrocarbons in the staging pile area were determined to be the result of asphalt cross-contamination of the sample matrix, and because fluoranthene is not a significant risk-driver as compared to other polycyclic aromatic hydrocarbons, no further analysis was performed.

-- = not applicable
BG = background (from DOE-RL [1996, 2001], unless otherwise noted)
COC = contaminant of concern
COPC = contaminant of potential concern
RAG = remedial action goal
RESRAD = RESidual RADioactivity

Several polycyclic aromatic hydrocarbons (PAHs) were detected above the RAGs in statistical samples collected from the waste staging pile area (Table 9). The PAHs were determined to be the result of asphalt cross-contamination. The elevated detections of PAHs within the staging pile area occurred at locations formerly overlain by asphalt paving. Because the area previously contained several paved surfaces and was used as a location for temporary structures and staging during construction of the 105-C Reactor Building, the likelihood for the presence of asphalt debris is high. Asphalt that has been used for structural and construction purposes is excluded from consideration as a dangerous waste in WAC 173-303-071(3)(e), is listed as an inert waste in WAC 173-350-990(2)(b), and does not present a significant risk to human health or the environment. A comparison of the statistical PAH concentrations in the verification data set to a known asphalt sample (Table 10) shows a good correlation, as indicated by the ratio column.

Table 10. Comparison of 118-C-1 Staging Pile Area Statistical Results to a Known Asphalt Sample

Analyte	Asphalt Sample Result (mg/kg)	Statistical Verification Result (mg/kg)	Ratio ($x\ 10^{-4}$)
2-Methylnaphthalene	394	ND	--
Acenaphthene	1,783	0.041	2.3
Anthracene	3,699	0.26	7.0
Benzo(a)anthracene	5,792	0.5	8.6
Benzo(a)pyrene	5,533	0.48	8.7
Benzo(b)fluoranthene	4,619	0.21	4.5
Benzo(g,h,i)perylene	2,839	0.26	9.2
Benzo(k)fluoranthene	4,527	0.20	4.4
Carbazole	2,049	0.24	11.7
Chrysene	5,580	0.4	7.2
Dibenzo(a,h)anthracene	1,531	0.18	11.8
Dibenzofuran	1,135	0.034	3.0
Fluoranthene[a]	10,665	0.19	1.8
Fluorene	1,756	0.043	2.4
Indeno(1,2,3-cd) pyrene	2,751	0.25	9.1
Naphthalene	1,917	ND	--
Phenanthrene	10,975	1.3	11.8
Pyrene	10,205	0.5	4.9

ND = not detected
[a] A portion of the fluoranthene data for the staging pile area was rejected due to data quality deficiencies, including the portion where the highest detections of other polycyclic aromatic hydrocarbons occurred. The value presented is the maximum accepted detected value, but is low relative to other polycyclic aromatic hydrocarbon results due to the exclusion of some data.

4.3 BIASED SAMPLE RESULTS

Twelve biased samples were collected from the 118-C-1 waste site. The biased samples were collected from soil underlying anomalous media found within the trenches during the remedial excavations or from soil underlying the SNF interim storage bunkers in the waste staging pile area. Statistical analysis (e.g., calculation of a 95% UCL value) is inappropriate for evaluation of biased samples; therefore, the sample results for each biased sample are evaluated using the maximum detected activity for each COC/COPC and comparing the value directly to the cleanup level. Table 11 provides a comparison of the maximum result of the twelve biased samples against the cleanup criteria. Individual sample results are provided in Appendix A.

Table 11. Comparison of Maximum Biased Sample Concentrations to Cleanup Levels. (2 Pages)

COC/COPC	Maximum Result (pCi/g)	Generic Site Lookup Values[a] (pCi/g)			Does the Statistical Result Exceed Lookup Values?	Does the Statistical Result Pass RESRAD Modeling?
		Shallow Zone Lookup Value[b]	Groundwater Protection Lookup Value	River Protection Lookup Value		
Cesium-137	0.437	6.2	1,465[c]	1,465[c]	No	--
Plutonium-239/240	0.204	33.9	--[d]	--[d]	No	--
Uranium-233/234	0.681(<BG)	1.1[e]	1.1[e]	1.1[e]	No	--
Uranium-238	0.483(<BG)	1.1[e]	1.1[e]	1.1[e]	No	--
COC/COPC	**Maximum Result (mg/kg)**	**Remedial Action Goals[a] (mg/kg)**			**Does the Maximum Result Exceed RAGs?**	**Does the Maximum Result Pass RESRAD Modeling?**
		Direct Exposure	**Soil Cleanup Level for Groundwater Protection**	**Soil Cleanup Level for River Protection**		
Arsenic	5.4 (<BG)	20	20	20	No	--
Barium	80.2 (<BG)	5,600[f]	132[g,h]	224[i]	No	--
Beryllium	0.34 (<BG)	10.4[j]	1.51[h]	1.51[h]	No	--
Boron[k]	3.2	16,000	320	--[l]	No	--
Chromium (total)	10.2 (<BG)	80,000[f]	18.5[h]	18.5[h]	No	--
Cobalt	10.5 (<BG)	1,600	32	--[l]	No	--
Copper	23.3	2,960	59.2	22.0[h]	Yes	Yes[m]
Lead	7.2 (<BG)	353	10.2[h]	10.2[h]	No	--
Manganese	446 (<BG)	11,200	512[h]	512[h]	No	--
Mercury	0.04 (<BG)	24	0.33[h]	0.33[h]	No	--
Nickel	14.1 (<BG)	1,600	19.1[h]	27.4	No	--
Vanadium	46.4 (<BG)	560	85.1[h]	--[l]	No	--
Zinc	45.1 (<BG)	24,000	480	67.8[h]	No	--
Aroclor-1254	0.022	0.5	0.017[n]	0.017[n]	Yes	Yes[m]

Table 11. Comparison of Maximum Biased Sample Concentrations to Cleanup Levels. (2 Pages)

COC/COPC	Maximum Result (mg/kg)	Remedial Action Goals[a] (mg/kg)			Does the Maximum Result Exceed RAGs?	Does the Maximum Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
bis(2-Ethylhexyl)phthalate	0.067	71.4	0.625	0.36	No	--
Di-n-butylphthalate	0.055	8,000	160	540	No	--
Diethylphthalate	0.022	64,000	1,280	4,600	No	--
Phenol	0.036	24,000	480	4,200	No	--
Acetone	0.024	72,000	720	--[l]	No	--
Carbon tetrachloride	0.039	7.7	0.034	0.05	Yes	Yes[o]
Methylene chloride	0.019	133	0.5	0.94	No	--

[a] Lookup values and remedial action goals (RAGs) obtained from the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2005) or calculated per *Washington Administrative Code* (WAC) 173-340-720, 730, and 740, Method B, 1996, unless otherwise noted.

[b] Activity corresponding to a single-radionuclide 15 mrem/yr exposure as calculated using a generic RESidual RADioactivity (RESRAD) model (DOE-RL 2005).

[c] Revised lookup value per *100 Area Radionuclide and Nonradionuclide Lookup Values for the 1995 Interim Remedial Action Record of Decision* (BHI 2004).

[d] No value—RESRAD modeling predicts the contaminant will not reach groundwater within 1,000 years.

[e] The calculated lookup value is below the Hanford-specific statistical soil background activity. The value presented is the Hanford-specific statistical soil background activity.

[f] Noncarcinogenic cleanup level calculated from WAC 173-340-740(3), 1996 (Method B for soils) (as presented in the RDR/RAWP [DOE-RL 2005]). Updated oral reference dose values (as provided in the Integrated Risk Information System [IRIS]) yield Method B direct exposure RAG values of 16,000 mg/kg and 120,000 mg/kg for barium and chromium, respectively.

[g] Barium soil cleanup level for groundwater protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule") and WAC 173-340-720(3), 1996 (Method B for groundwater) is 112 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). The updated oral reference dose value (as provided in IRIS) yields a Method B groundwater cleanup criteria of 7 mg/L, as compared to the more restrictive maximum contaminant level of 2 mg/L (40 *Code of Federal Regulations* [CFR] 141). Per WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), the most restrictive updated soil cleanup level for groundwater protection would be 200 mg/kg.

[h] Where cleanup levels are less than background, cleanup levels default to background (WAC 173-340-700[4][d]) (1996).

[i] Barium soil cleanup level for river protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), a dilution-attenuation factor of 2, and WAC 173-340-720(3), 1996 (Method B for groundwater) is 224 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). No surface water bioconcentration factor is available for barium and no ambient water quality criteria value exists separate from the previous drinking water standard; therefore no WAC 173-340-730(3), 1996 (Method B for surface waters) value can be determined.

[j] 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 (WDOH 1997).

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

[l] No parameters (bioconcentration factors or ambient water quality criteria values) are available from the Ecology Cleanup Levels and Risk Calculations database (Ecology 2005) or other databases to calculate cleanup levels (WAC 173-340-730(3)(a)(iii), 1996 [Method B for surface waters]).

[m] Based on the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005) and contaminant-specific soil portioning coefficient (K_d) value, contaminant will not migrate vertically more than 3 m (10 ft) in 1,000 years. As the vadose zone underlying the site is greater than 25 m (82 ft) thick, the contaminant will not reach groundwater (and thus the Columbia River) in 1,000 years.

[n] Where cleanup levels are less than the required detection limit, cleanup levels default to the required detection limit (WAC 173-340-707[2], 1996 and DOE-RL 2005).

[o] The total mass of carbon tetrachloride present is not expected to be sufficient to migrate to groundwater and result in a concentration exceeding the WAC 173-340-720(3), 1996 (Method B for groundwater) carcinogenic groundwater cleanup level (0.34 µg/L).

-- = not applicable
BG = background (obtained from DOE-RL [1996] and DOE-RL [2001], unless otherwise noted)
COC = contaminant of concern
COPC = contaminant of potential concern
RAG = remedial action goal
RESRAD = RESidual RADioactivity (dose-assessment model)

4.3.1 Biased Sample Data Evaluation

All biased sample results are below the direct exposure RAGs. The maximum values detected in the biased samples for copper and aroclor-1254 exceed the soil RAG for the protection of groundwater and/or river protection (Table 11). Copper and aroclor-1254 are not predicted to reach groundwater based on RESRAD modeling using their soil partitioning coefficients (BHI 2005). Data were not collected showing the vertical extent of residual contamination; however, given the soil-partitioning coefficients of 22 mL/g and 75.6 mL/g for copper and aroclor-1254, respectively, the RESRAD modeling predicts these constituents will not migrate vertically more than 3 m (10 ft) in 1,000 years. The vadose zone underlying the 118-C-1 site is greater than 25 m (82 ft) thick, so these contaminants are not predicted to reach groundwater (and therefore the Columbia River) in 1,000 years.

The maximum value detected in the biased samples for carbon tetrachloride (0.039 mg/kg) exceeds the soil RAG for the protection of groundwater (0.034 mg/kg). However, because the maximum concentration represents a single sample at a point source, the total mass of carbon tetrachloride present at the site is not expected to be sufficient to migrate to groundwater and result in a concentration exceeding the groundwater cleanup level of 0.34 µg/L. As such, the nonradionuclide soil RAGs for the protection of groundwater and the Columbia River have been attained for the biased samples.

4.4 RESRAD MODELING

The individual radionuclide cleanup verification statistical values (Tables 4 through 9) were entered into the RESRAD computer code, Version 6.30 (ANL 2005), to estimate the dose rate and the impact on groundwater and the river from residual COC concentrations. Separate RESRAD runs were performed for the four individual sampling areas in addition to the overburden/BCL decision unit and the waste staging pile area. A RESRAD run was also performed using the maximum 95% UCL values from the four individual remediation sampling areas in order to provide a combined dose for the entire remediation footprint. To be conservative, the combined dose for the four individual sampling areas (referred to collectively as the remediation footprint) will be presented in Section 5.0. The individual dose contributions from each of the four sampling areas are provided in the RESRAD calculation brief (Appendix E).

Carbon-14 was detected in a single verification sample collected from the waste staging pile area (Table 9). The soil containing carbon-14 will be used as backfill into the deep zone areas of the 118-C-1 waste site, therefore, the contaminated soil was evaluated in RESRAD as deep zone material (with 4.6 m [15 ft] of clean soil cover). All RESRAD modeling methodologies, results, and input values are included in the RESRAD calculation brief (Appendix E). The RESRAD derived groundwater radionuclide concentrations as compared to groundwater remedial action goals and maximum contaminant levels (MCLs) are provided in the MCL calculation brief (Appendix E).

Specific results from the calculations are discussed in the RAG evaluation section (Section 5.0).

5.0 EVALUATION OF REMEDIAL ACTION GOAL ATTAINMENT

This section demonstrates that remedial actions at the 118-C-1 site have achieved the applicable RAGs. Sections 5.1, 5.2, and 5.3 address attainment of direct exposure RAGs, groundwater protection RAGs, and Columbia River protection RAGs, respectively. Section 5.4 summarizes the results of the WAC 173-340 three-part test performed in the 95% UCL calculation brief (Appendix E). This test is required for nonradionuclide COCs only and is based on the most restrictive RAG (defined as the lowest of the direct exposure, groundwater protection, and river protection RAGs).

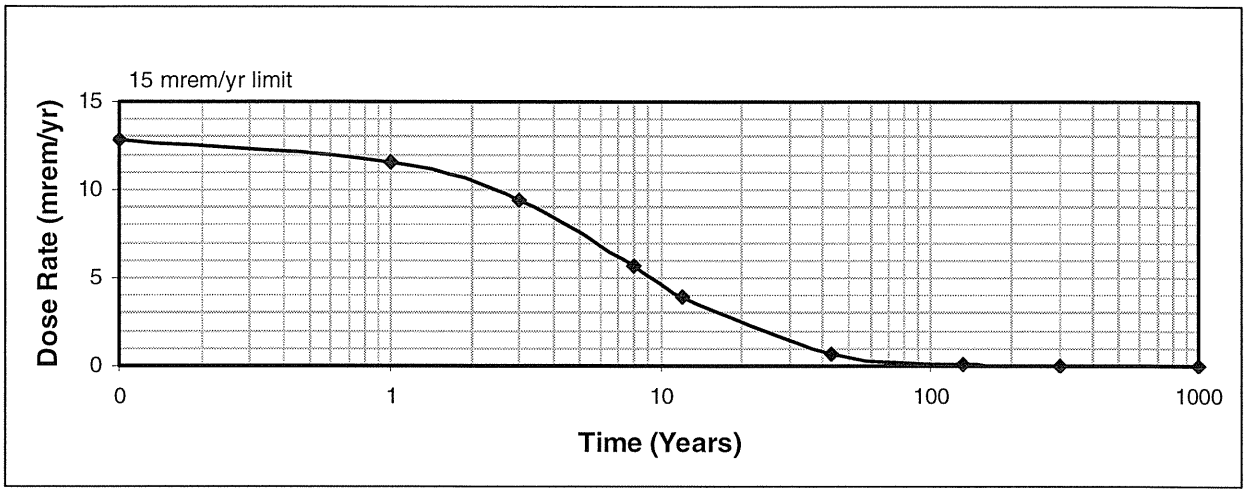
5.1 DIRECT EXPOSURE SOIL REMEDIAL ACTION GOALS ATTAINED

5.1.1 Radionuclides

The results of the 118-C-1 RESRAD dose rate estimates for the all-pathways scenarios for the remediation footprint (sampling areas 1 through 4), the overburden/BCL, and the staging pile area are shown in Figures 5 through 7. These dose rates represent the dose contributions from soils at relevant time periods. The 2018 date corresponds to the 30-year site cleanup schedule of the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989). All dose rate estimates are less than the 15 mrem/yr RAG. The RESRAD computations are shown in detail in the calculation briefs presented in Appendix E.

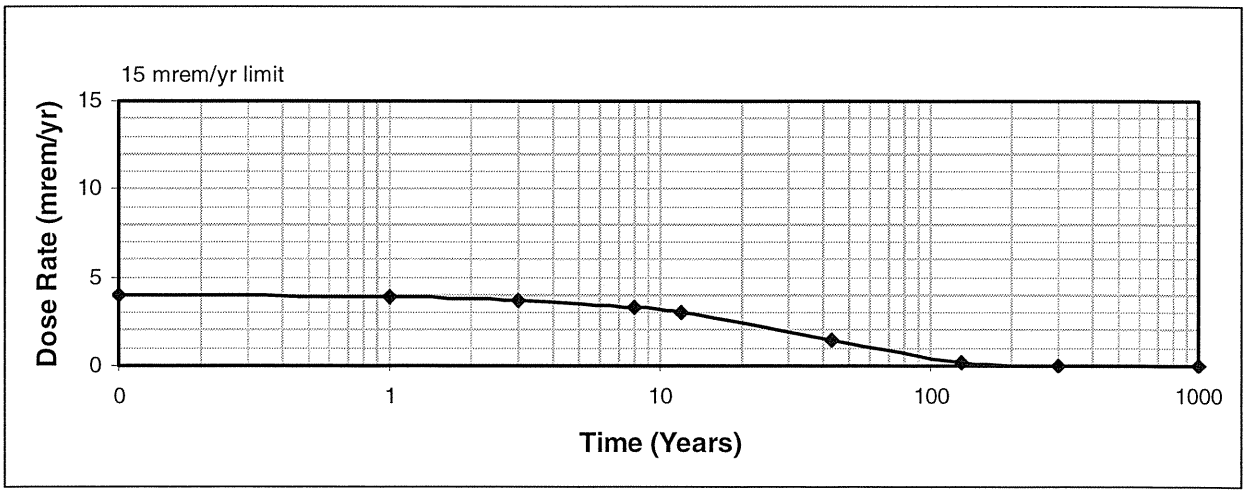
5.1.1.1 118-C-1 Remediation Footprint. The estimated maximum total all-pathways dose rate from the 118-C-1 Burial Ground remediation footprint is 12.8 mrem/yr at year zero (2006) and decreases to 1.01×10^{-4} mrem/yr in 1,000 years (Figure 5). The estimated dose rate in the year 2018 is 3.89 mrem/yr. The all-pathways dose rate estimate remains below the direct exposure RAG.

Figure 5. RESRAD Analysis for the Remediation Footprint– All Radionuclides, All-Pathways Dose Rate Estimate.



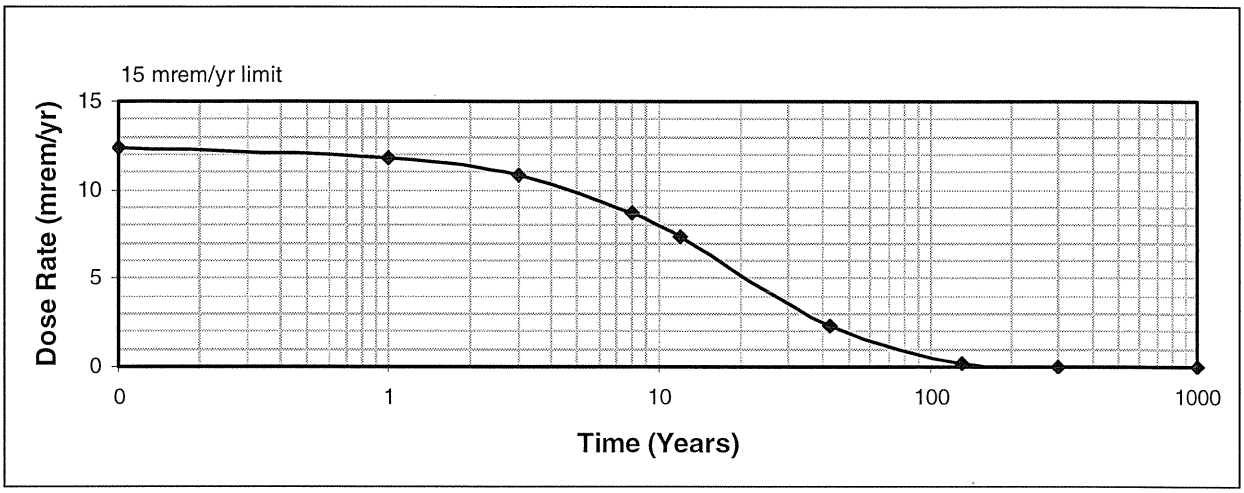
5.1.1.2 118-C-1 Overburden/BCL Soil. The estimated maximum total all-pathways dose rate from the 118-C-1 Burial Ground overburden/BCL soil is 4.01 mrem/yr at year zero (2006) and decreases to 2.47 x 10^{-10} mrem/yr in 1,000 years (Figure 6). The estimated dose rate in the year 2018 is 3.04 mrem/yr. The all-pathways dose rate estimate remains below the direct exposure RAG.

Figure 6. RESRAD Analysis for the Overburden/BCL soil– All Radionuclides, All-Pathways Dose Rate Estimate.



5.1.1.3 118-C-1 Waste Staging Pile Area. The estimated maximum total all-pathways dose rate from the 118-C-1 Burial Ground waste staging pile area is 12.4 mrem/yr at year zero (2006) and decreases to 2.42 x 10^{-10} mrem/yr in 1,000 years (Figure 7). The estimated dose rate in the year 2018 is 7.38 mrem/yr. The all-pathways dose rate estimate remains below the direct exposure RAG.

Figure 7. RESRAD Analysis for the Waste Staging Pile Area– All Radionuclides, All-Pathways Dose Rate Estimate.



5.1.2 Nonradionuclides

5.1.2.1 Direct Comparison to RAGs. Tables 4 through 9 compare the cleanup verification statistical values to the direct exposure RAGs. All nonradionuclides are below the direct exposure cleanup criteria and, therefore, all applicable RAGs are met.

5.1.2.2 Noncarcinogenic Hazard Quotient RAG Attained. For noncarcinogenic COCs, WAC 173-340-745(a) and (b) specify the evaluation of the hazard quotient which is given as a daily intake divided by a reference dose. Both individual and cumulative hazard quotient values must be less than 1.0. Hazard quotient calculations were performed for the 118-C-1 Burial Ground using the highest statistical value from all sampling areas or individual detections in the biased samples (locations 1 through 7).

The details and results of the hazard quotient calculations are provided in the hazard quotient and carcinogenic risk calculation brief (Appendix E). Results of the hazard quotient calculations show that all individual hazard quotients are less than one and the cumulative hazard quotient for the 118-C-1 waste site is 1.6 x 10^{-1} (Appendix E). Therefore, the noncarcinogenic hazard quotient RAG has been attained for the 118-C-1 waste site.

5.1.2.3 Carcinogenic Risk RAG Attained. For individual nonradionuclide carcinogenic COCs, the WAC 173-340 Method B cleanup limits are based on an incremental cancer risk of 1×10^{-6}. For nonradionuclide carcinogenic COCs, the total excess cancer risk must be less than 1×10^{-5}. Carcinogenic risk calculations were performed for the 118-C-1 Burial Ground using the highest statistical value from all sampling areas or individual detections in the biased samples (locations 1 through 7) for the nonradionuclide carcinogenic COCs. The details and results of the hazard quotient calculations are provided in the hazard quotient and carcinogenic risk calculation brief (Appendix E).

Results of the carcinogenic risk calculations show that all individual nonradionuclide carcinogenic COCs have an incremental cancer risk below 1×10^{-6} (Appendix E). The calculated total excess cancer risk for the 118-C-1 waste site is 1.6×10^{-6}, which is below the RAO of 1×10^{-5}. The nonradionuclide carcinogenic risk RAG has been attained for the 118-C-1 waste site.

5.2 GROUNDWATER REMEDIAL ACTION GOALS ATTAINED

5.2.1 Radionuclides

The estimated groundwater concentrations for all of the radionuclide COCs contributed by the site soils are shown in the RESRAD calculation brief (Appendix E). Among the radionuclide contaminants of concern, only cesium-137, cobalt-60, nickel-63, strontium-90, and tritium are calculated to reach groundwater in 1,000 years at concentrations significantly below the RAGs. Table 12 gives the total peak concentrations predicted for each radionuclide COC along with the individual RAGs for comparison. The peak concentration for each COC is the maximum value, as predicted by RESRAD modeling, from the sampling areas (i.e., remediation footprint, overburden/BCL, and waste staging pile area). No COC concentration is predicted to exceed the RAGs; therefore, the RAOs are attained.

Figure 8 shows the individual organ dose rate for beta- and gamma-emitting radionuclides predicted over 1,000 years as shown in the comparison to drinking water standards calculation brief (MCL calculation brief in Appendix E). The cumulative dose for each total body, bone, liver, and gastrointestinal tract for all beta- and gamma-emitting COCs is less than the 4 mrem/yr standard over 1,000 years. Results of the RESRAD calculations are shown in the MCL calculation brief (Appendix E).

No non-uranium alpha-emitting radionuclide COCs/COPCs were detected in the verification soil samples and no uranium isotopes were detected above background levels in the verification soil samples. Therefore, the drinking water concentration standard for non-uranium alpha emitters and the uranium standard of 30 µg/L have been met.

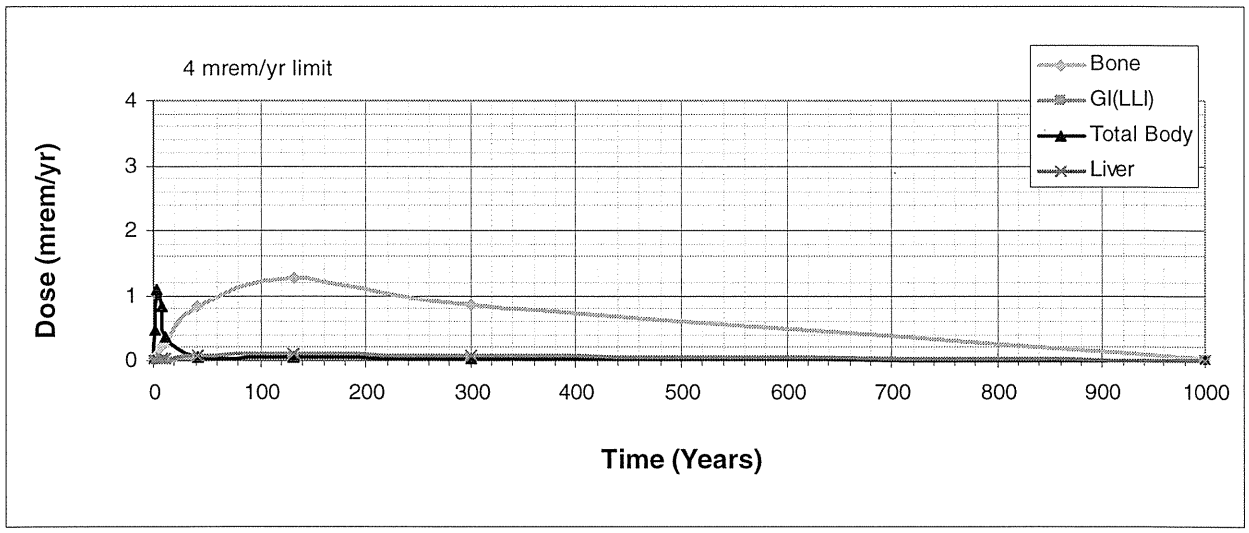
Table 12. Estimated Peak Radionuclide Groundwater Concentrations in the Soils for 118-C-1.

Radionuclide	Peak Concentration (pCi/L) [a]	RAG (pCi/L)	RAGs Attained? (Yes/No)
Cobalt-60	0.00712	100[b]	Yes
Cesium-137	0.0290	60[b]	Yes
Nickel-63	15.7	50[b]	Yes
Strontium-90	0.357	8[c]	Yes
Tritium	5,430	20,000[c]	Yes

[a] The peak concentration is the maximum predicted value from the three sampling areas (remediation footprint, overburden/BCL, and waste staging pile area). All results are presented in the MCL calculation brief (Appendix E).
[b] Lookup value corresponding to a dose rate of 4 mrem/yr.
[c] EPA drinking water promulgated MCL (40 CFR 141.66).

CFR = *Code of Federal Regulations*
EPA = U.S. Environmental Protection Agency
MCL = maximum contaminant level
RAG = remedial action goal

Figure 8. Dose Rate to Organs from Groundwater.



5.2.2 Nonradionuclides

Tables 4 through 9 compare the statistical verification results to the groundwater protection RAGs for all sampling areas. The tables show that the statistical results for barium, lead, aroclor-1254, and aroclor-1260 exceed the soil RAGs for the protection of groundwater. The residual concentrations of these constituents, however, are not predicted to reach groundwater (and, therefore, the Columbia River) in 1,000 years based on the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005) and their contaminant-specific soil partitioning coefficient (K_d) values. Given the soil-partitioning coefficients of barium (25 mL/g), lead (30 mL/g), aroclor-1254 (75.6 mL/g), and

aroclor-1260 (530 mL/g), the results of RESRAD modeling (BHI 2005) indicate that these constituents will not migrate vertically more than 3 m (10 ft) in 1,000 years. The vadose zone underlying the 118-C-1 site is greater than 25 m (82 ft) thick and, as such, these contaminants will not reach groundwater (and, therefore, the Columbia River) in 1,000 years.

5.3 COLUMBIA RIVER REMEDIAL ACTION GOALS ATTAINED

5.3.1 Radionuclides

The river protection RAGs for radionuclides are identical to the groundwater protection RAGs. The RESRAD modeling results are compared to the groundwater protection RAGs in Table 12. The results of RESRAD modeling indicate that radionuclides are not predicted to reach groundwater (and by extension, not predicted to reach the Columbia River) at levels that exceed the RAGs; therefore, the Columbia River protection RAOs have been attained.

5.3.2 Nonradionuclides

Tables 4 through 9 compare the statistical verification results to the Columbia River protection RAGs for all sampling areas. The tables show that the statistical results for copper, lead, zinc, aroclor-1254, and aroclor-1260 exceed the soil RAGs for the protection of groundwater. The residual concentrations of these constituents, however, are not predicted to reach groundwater (and, therefore, the Columbia River) in 1,000 years based on the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005) and their contaminant-specific soil-partitioning coefficient values. Given the soil-partitioning coefficients of copper (22 mL/g), lead (30 mL/g), zinc (30 mL/g), aroclor-1254 (75.6 mL/g), and aroclor-1260 (530 mL/g), the results of the RESRAD modeling (BHI 2005) indicate that these constituents will not migrate vertically more than 3 m (10 ft) in 1,000 years. The vadose zone underlying the 118-C-1 site is greater than 25 m (82 ft) thick and, as such, these contaminants will not reach groundwater (and, therefore, the Columbia River) in 1,000 years.

5.4 WAC 173-340 THREE-PART TEST FOR NONRADIONUCLIDES

Sections 5.1, 5.2, and 5.3 looked separately at compliance with direct exposure RAGs, groundwater protection soil RAGs, and Columbia River protection soil RAGs, respectively. When using a statistical sampling approach, a RAG requirement for nonradionuclides is the WAC 173-340-740(7)(e) three-part test. The WAC 173-340 three-part test consists of the following criteria: 1) the cleanup verification statistical value must be less than the cleanup level, 2) no single detection can exceed two times the cleanup criteria, and 3) the percentage of samples exceeding the cleanup criteria must be less than 10%.

The application of the three-part test for the 118-C-1 waste site is included in the 95% UCL calculation brief (Appendix E) and summarized in Table 13. Only the COCs/COPCs that failed one or more parts of the WAC 173-340 three-part test are provided in Table 13. The table lists the most restrictive RAG, the maximum detected value, the total number of samples collected, and the percentage of samples exceeding the RAG. The final column of the table describes the result of applying the three WAC 173-340-740(7)(e) criteria using the values listed in the preceding columns.

Residual concentrations of bis(2-ethylhexyl)phthalate, barium, copper, lead, zinc, aroclor-1254, and aroclor-1260 fail the three-part test in comparison against the soil RAGs for the protection of groundwater and/or the Columbia River. Based on RESRAD modeling (BHI 2005) and contaminant-specific soil-partitioning coefficient values, these constituents will not vertically migrate more than 3 m (10 ft) in 1,000 years. Given a vadose zone thickness greater than 25 m (82 ft) thick underlying the 118-C-1 waste site, residual concentrations are not predicted to reach groundwater (and, therefore, the Columbia River) within 1,000 years. As such, all non-radionuclide statistical verification data sets pass the WAC 173-340 three part test.

Table 13. Summary of the WAC 173-340 Three-Part Test for the 118-C-1 Burial Ground.[a] (2 Pages)

COC/COPC	Most Restrictive Applicable RAG	Statistical Cleanup Verification Value (mg/kg)[b]	Maximum Detected Cleanup Verification Value (mg/kg)[c]	Total Number of Samples[d]	Percentage of Cleanup Verification Data Set Exceeding RAG[e]	Cleanup Criteria Attained?
Remediation Footprint (Sample Area 2)						
bis(2-Ethylhexyl)phthalate	0.36	0.28	0.40	5	60%	Yes[f]
Remediation Footprint (Sample Area 3)						
Copper	22.0[g]	38.6	45.2	4	50%	Yes[f]
Lead	10.2[g]	18.6	23.1	4	50%	Yes[f]
Zinc	67.8[g]	74.8	77.1	4	50%	Yes[f]
Aroclor-1254	0.017[h]	0.054	0.062	4	75%	Yes[f]
Remediation Footprint (Sample Area 4)						
Barium	132[i,g]	206	286	4	25%	Yes[f]
Waste Staging Pile Area						
Barium	132[i,g]	130 (<BG)	495	16	6%	Yes[f]
Copper	22.0[g]	36	144	16	6%	Yes[f]
Lead	10.2[g]	10.7	25.8	16	12.5%	Yes[f]
Aroclor-1254	0.017[h]	0.015	0.025	16	19%	Yes[f]
Aroclor-1260	0.017[h]	0.061	0.061	16	12.5%	Yes[f]

Table 13. Summary of the WAC 173-340 Three-Part Test for the 118-C-1 Burial Ground.[a] (2 Pages)

[a] Only the COCs/COPCs that failed the WAC 173-340 Three-Part Test are presented.
[b] Criterion is statistical value cannot exceed most restrictive applicable RAG.
[c] Criterion is no single detection can exceed two times the most restrictive applicable RAG.
[d] Total number of samples in the decision unit may include field duplicate samples, which are included in the evaluation as separate samples.
[e] Criterion is percentage of data set exceeding the most restrictive applicable RAG cannot exceed 10%.
[f] Based on the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005) and contaminant-specific soil-portioning coefficient (K_d) value, contaminant will not migrate vertically more than 3 m (10 ft) in 1,000 years. As the vadose zone underlying the site is greater than 25 m (82 ft) thick, the contaminant will not reach groundwater (and thus the Columbia River) in 1,000 years.
[g] Where cleanup levels are less than background, cleanup levels default to background (WAC 173-340-700[4][d]) (1996).
[h] Where cleanup levels are less than the required detection limit, cleanup levels default to the required detection limit (WAC 173-340-707[2], 1996 and DOE-RL 2005).
[i] Barium soil cleanup level for groundwater protection calculated from WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule") and WAC 173-340-720(3), 1996 (Method B for groundwater) is 112 mg/kg (as presented in the RDR/RAWP [DOE-RL 2005]). The updated oral reference dose value (as provided in IRIS) yields a Method B groundwater cleanup criteria of 7 mg/L, as compared to the more restrictive maximum contaminant level of 2 mg/L (40 *Code of Federal Regulations* [CFR] 141). Per WAC 173-340-740(3)(a)(ii)(A), 1996 ("100 times rule"), the most restrictive updated soil cleanup level for groundwater protection would be 200 mg/kg.

COC = contaminant of concern
COPC = contaminant of potential concern
IRIS = Integrates Risk Information System
RAG = remedial action goal
RESRAD = RESidual Radioactivity (dose model)
RDR/RAWP = remedial design report/remedial action work plan
WAC = *Washington Administrative Code*

6.0 RADIONUCLIDE RISK INFORMATION

The radionuclide RAG for direct exposure is derived from the ROD (EPA 2000) and is expressed in terms of an allowable radiation dose rate above background (i.e., 15 mrem/yr). The RAG evaluation (Section 5.0) involved using the RESRAD model to estimate total annual radiation dose rates for 1,000 years for comparison to the RAG. Radiation presents a carcinogenic risk, and the RESRAD model also calculates the excess lifetime cancer risk (ELCR) associated with the estimated radiation dose rates using the EPA's Health Effects Assessment Summary Tables (update dated April 16, 2001, "Update of Radionuclide Carcinogenicity Slope Factors," available on the Internet at www.epa.gov/radiation/heast). The "National Oil and Hazardous Substances Pollution Contingency Plan" (40 *Code of Federal Regulations* 300) presents a target range for residual risk of 10^{-4} to 10^{-6}.

Figures 9 through 11 illustrate ELCR for the remediation footprint, overburden/BCL, and waste staging pile area as estimated using the RESRAD model. Because of radioactive decay, the risk decreases over time. The maximum predicted ELCR occurs at present (year 2006). The maximum ELCR is 9.95×10^{-5} for the remediation footprint, 5.42×10^{-5} for the overburden/BCL soil and 1.55×10^{-4} for the waste staging pile area. The ELCR predicted for the year 2018 is 3.79×10^{-5} for the remediation footprint, 4.10×10^{-5} for the overburden/BCL soil and 9.57×10^{-5} for the waste staging pile footprint. All three sampling areas meet the target risk range of 10^{-4} to 10^{-6}.

Figure 9. RESRAD Analysis – Radionuclide Risk, All Pathways – Remediation Footprint.

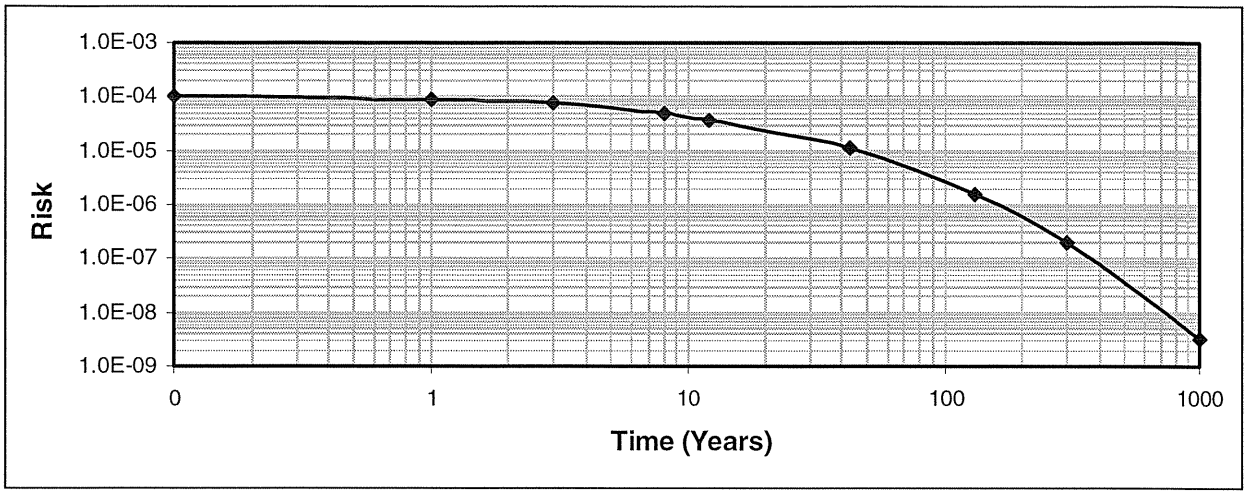


Figure 10. RESRAD Analysis – Radionuclide Risk, All Pathways – Overburden/BCL Soil.

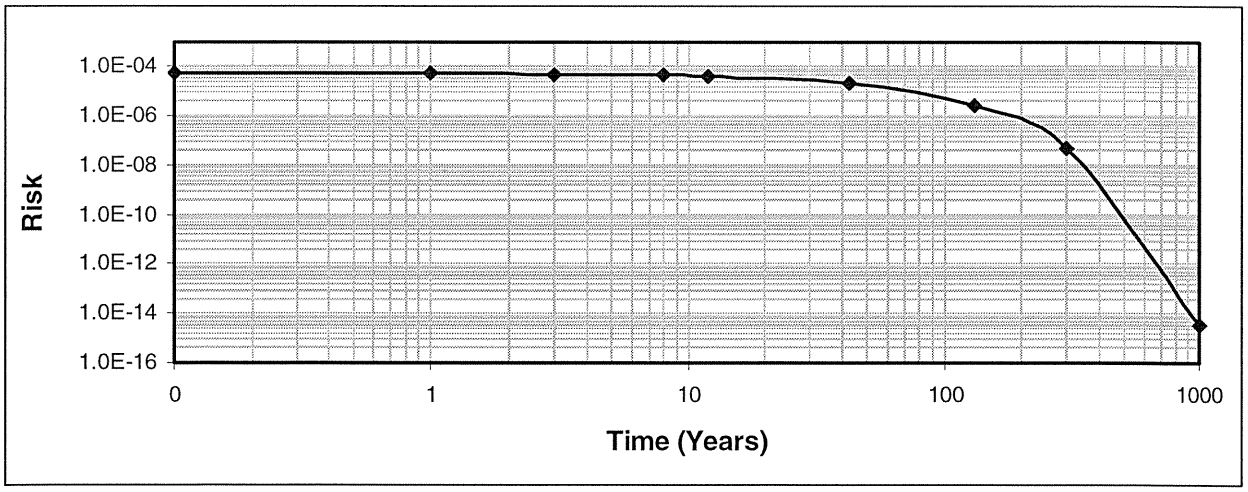
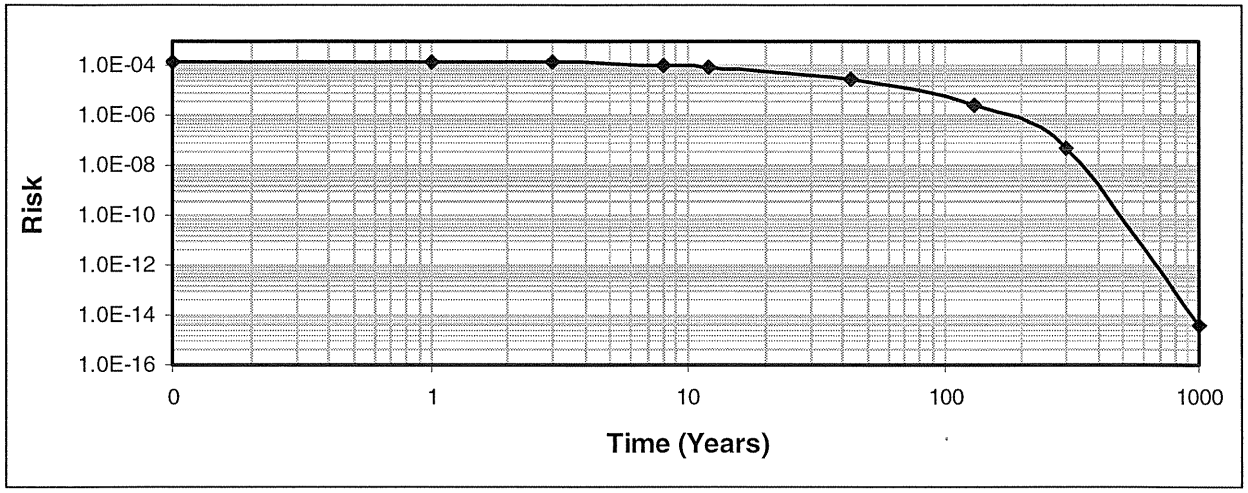


Figure 11. RESRAD Analysis – Radionuclide Risk, All Pathways – Waste Staging Pile Footprint.



7.0 STATEMENT OF PROTECTIVENESS

This cleanup verification package demonstrates that remedial action at the 118-C-1 site has achieved the remedial action objectives and corresponding RAGs established in the ROD (EPA 2000) and RDR/RAWP (DOE-RL 2005). The remaining soils at the 118-C-1 site have been sampled, analyzed, and modeled. The results of this effort indicate that the materials from the 118-C-1 site containing COCs at concentrations exceeding RAGs have been excavated and disposed at ERDF. These results also indicate that residual concentrations will support future land uses that can be represented (or bounded) by a rural-residential scenario and that residual concentrations throughout the site pose no threat to groundwater or the Columbia River. Institutional controls are required for the site to prevent uncontrolled drilling or excavation into deep zone soils. The 118-C-1 site is verified to be remediated in accordance with the ROD (EPA 2000) and may be backfilled.

8.0 REFERENCES

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APPENDIX A

SUMMARY OF VERIFICATION SOIL SAMPLING AND ANALYTICAL RESULTS

118-C-1 Verification Sampling Results

Sample Location	Sample Number	Sample Date	Americium-241			Americium-241 GEA			Carbon-14			Cesium-137			Cobalt-60		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 1 A1	J134Y7	8/17/06	0.073	U	0.28	0.42	U	0.42	-0.292	U	3.0	0.090	U	0.090	0.048	U	0.048
Duplicate of J134Y7	J134Y9	8/17/06	-0.036	U	0.27	0.24	U	0.24	-0.395	U	3.0	0.299		0.032	0.046	U	0.046
Split of J134Y7	J13504	8/17/06	0.0311	U	0.0211				0.418	U	0.720	0.391		0.0162	0.00841	U	0.0217
Area 1 A2	J13500	8/17/06	0	U	0.34	0.18	U	0.18	1.24	U	3.4	0.129		0.021	0.020	U	0.020
Area 1 A3	J134Y8	8/17/06	-0.041	U	0.32	0.15	U	0.15	-1.60	U	3.2	0.178		0.025	0.026	U	0.026
Area 1 A4	J13501	8/17/06	0.036	U	0.28	0.056	U	0.056	1.64	U	2.9	0.018		0.009	0.009	U	0.009
Area 2 A1	J13502	8/17/06				0.32	U	0.32	-0.488	U	2.9	0.128		0.034	0.036	U	0.036
Duplicate of J13502	J13508	8/17/06				0.32	U	0.32	0.048	U	3.5	0.092		0.040	0.034	U	0.034
Split of J13502	J13505	8/17/06							0.407	U	0.719	0.0464		0.0148	0.00506	U	0.0174
Area 2 A2	J13503	8/17/06				0.16	U	0.16	0.827	U	2.8	0.149		0.029	0.087	U	0.087
Area 2 A3	J13506	8/17/06				0.43	U	0.43	1.66	U	2.9	0.063	U	0.063	0.076	U	0.076
Area 2 A4	J13507	8/17/06				0.24	U	0.24	11.7		3.1	0.107		0.047	1.48		0.045
Area 3 A1	J13510	8/21/06	-0.009	U	0.064	0.20	U	0.20	0.660	U	2.8	0.195		0.033	0.034	U	0.034
Area 3 A2	J13511	8/21/06	0.007	U	0.041				0.636	U	2.9	0.240		0.020	0.042		0.025
Area 3 A3	J13512	8/21/06	0.027	U	0.042	0.44	U	0.44	-0.369	U	3.0	0.958		0.049	0.061	U	0.061
Area 3 A4	J13513	8/21/06	0.039	U	0.048				-0.866	U	2.8	0.227		0.027	0.024	U	0.024
Area 4 A1	J13514	8/21/06	-0.031	U	0.063	0.22	U	0.22	1.72	U	2.8	0.065		0.031	0.035	U	0.035
Area 4 A2	J13515	8/21/06	-0.014	U	0.068	1.7	U	1.7	0.560	U	2.8	1.19		0.036	0.050	U	0.050
Area 4 A3	J13516	8/21/06	-0.008	U	0.050				0.360	U	3.0	0.044		0.020	0.016	U	0.016
Area 4 A4	J13517	8/21/06	0.053	U	0.13	0.14	U	0.14	-0.307	U	2.9	0.082		0.024	0.022	U	0.022
OB/BCL A1	J13518	8/22/06	0.123	U	0.31	0.25	U	0.25	-0.903	U	2.9	0.220		0.035	0.030	U	0.030
OB/BCL A2	J13519	8/22/06	0.036	U	0.28	0.20	U	0.20	-0.592	U	2.9	0.059		0.033	0.030	U	0.030
OB/BCL A3	J13520	8/22/06	0.169	U	0.43	0.13	U	0.13	-0.345	U	2.9	0.437		0.018	0.015	U	0.015
OB/BCL A4	J135N5	8/22/06	0.007	U	0.11	0.37	U	0.37	0.472	U	3.3	0.172		0.046	0.040	U	0.040

Note: The following abbreviations apply to all Appendix A tables.

Note: Data qualified with B, B*, C, D, N, or J are considered acceptable values.

B = method blank contamination
B* =estimated
BCL = below cleanup levels
C = method blank contamination
D = diluted
FS = focused sample
GEA = gamma energy analysis
J = estimated
OB = overburden
MDA = minimum detectable activity
N = spiked analyte recovery outside control limits
PQL = practical quantitation limit
Q = qualifier
R = rejected
SPA = staging pile area
U = undetected

118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Americium-241			Americium-241 GEA			Carbon-14			Cesium-137			Cobalt-60		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SPA A1	J13522	9/11/06	0	U	0.24	0.056	U	0.056	-1.24	U	3.3	0.424		0.050	0.040	U	0.040
SPA A2	J13523	9/11/06	0.056	U	0.21	0.26	U	0.26	-1.19	U	2.8	0.141		0.035	0.031	U	0.031
SPA A3	J135P1	9/12/06	0	UJ	1.1	0.39	U	0.39	-0.524	U	2.1	3.00		0.041	0.036	U	0.036
SPA A4	J135P0	9/12/06	-0.068	U	0.22	0.045	U	0.045	-0.403	U	2.5	0.826		0.039	0.029	U	0.029
SPA B5	J13524	9/11/06	0.034	U	0.26	0.15	U	0.15	-1.58	U	2.9	0.494		0.028	0.026	U	0.026
SPA B6	J13525	9/11/06	0	U	0.22	0.47	U	0.47	-1.05	U	3.1	0.830		0.049	0.044	U	0.044
SPA B7	J135N8	9/11/06	0	U	0.23	0.025	U	0.025	-1.27	U	2.7	0.160		0.024	0.022	U	0.022
SPA B8	J135N9	9/11/06	0.060	U	0.23	0.051	U	0.051	-1.53	U	2.8	0.383		0.048	0.034	U	0.034
SPA C9	J135P2	9/12/06	0.030	U	0.23	0.11	U	0.11	-0.600	U	2.6	0.290		0.020	0.023	U	0.023
SPA C10	J135P3	9/12/06	0.271	U	0.52	0.042	U	0.042	-0.647	U	2.1	0.979		0.035	0.055		0.033
SPA C1	J135P4	9/12/06	0	U	0.23	0.49	U	0.49	-0.487	U	2.4	1.16		0.046	0.050	U	0.050
SPA C2	J135P5	9/12/06	-0.033	U	0.25	0.57	U	0.57	-0.935	U	2.1	0.644		0.055	0.055	U	0.055
SPA D3	J135P6	9/12/06	0.063	U	0.24	0.27	U	0.27	-0.356	U	2.1	0.071		0.033	0.034	U	0.034
SPA D4	J135P7	9/12/06	0.085	U	0.22	0.16	U	0.16	182		2.1	0.091		0.033	0.030	U	0.030
SPA D5	J135P8	9/12/06	0	U	0.59	0.067	U	0.067	0.362	U	2.2	1.18		0.053	0.063		0.051
SPA D6	J135P9	9/12/06	0.059	U	0.23	0.020	U	0.020	-1.06	U	2.3	0.198		0.017	0.014	U	0.015
FS-7	J12XM4	7/26/06				0.040	U	0.040				0.045	U	0.045	0.062	U	0.062
FS-8	J14Y70	5/15/07	-0.0334	U	0.11	0.26	U	0.26				0.437		0.038	0.033	U	0.033
FS-9	J14Y71	5/15/07	0	U	0.11	0.085	U	0.085				0.346		0.026	0.025	U	0.025
FS-10	J14Y72	5/15/07	0	U	0.089	0.029	U	0.029				0.305		0.030	0.025	U	0.025
FS-11	J14Y73	5/15/07	0.0355	U	0.10	0.14	U	0.14				0.321		0.026	0.021	U	0.021
FS-12	J14Y74	5/15/07	0.0100	U	0.061	0.057	U	0.057				0.552		0.017	0.019	U	0.019

Sample Location	Sample Number	Sample Date	Europium-152			Europium-154			Europium-155			Nickel-63			Plutonium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 1 A1	J134Y7	8/17/06	0.161		0.097	0.15	U	0.15	0.16	U	0.16	2.49	U	2.9	-0.025	U	0.30
Duplicate of J134Y7	J134Y9	8/17/06	0.142		0.083	0.16	U	0.16	0.12	U	0.12	1.42	U	3.1	-0.074	U	0.57
Split of J134Y7	J13504	8/17/06	0.128	U	0.0519	0.0360	U	0.0648	0.0388	U	0.0437	7.70		5.73	0.00793	U	0.0442
Area 1 A2	J13500	8/17/06	0.083		0.044	0.069	U	0.069	0.068	U	0.068	0.441	U	2.9	0.186	U	0.71
Area 1 A3	J134Y8	8/17/06	0.064	U	0.064	0.082	U	0.082	0.092	U	0.092	-0.194	U	3.1	-0.110	U	0.84
Area 1 A4	J13501	8/17/06	0.024	U	0.024	0.032	U	0.032	0.051	U	0.051	0.086	U	2.8	0	U	0.56
Area 2 A1	J13502	8/17/06	0.082	U	0.082	0.11	U	0.11	0.092	U	0.13	0.673	U	2.9			
Duplicate of J13502	J13508	8/17/06	0.085	U	0.085	0.11	U	0.11	0.12	U	0.12	1.49	U	2.8			
Split of J13502	J13505	8/17/06	0.00852	U	0.0396	0.0175	U	0.0522	0.0255	U	0.0411	3.57	U	5.58			
Area 2 A2	J13503	8/17/06	0.055	U	0.055	0.075	U	0.075	0.073	U	0.073	12.4		2.8			
Area 2 A3	J13506	8/17/06	0.281		0.099	0.15	U	0.15	0.14	U	0.14	1.37	U	2.8			
Area 2 A4	J13507	8/17/06	0.087	U	0.087	0.11	U	0.11	0.11	U	0.11	35.8		2.9			

118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Europium-152			Europium-154			Europium-155			Nickel-63			Plutonium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 3 A1	J13510	8/21/06	0.069	U	0.069	0.090	U	0.090	0.095	U	0.095	-1.60	U	3.6	0	UJ	0.31
Area 3 A2	J13511	8/21/06	0.138		0.053	0.071	U	0.071	0.081	U	0.081	-0.913	U	3.6	0.009	U	0.11
Area 3 A3	J13512	8/21/06	0.140		0.097	0.14	U	0.14	0.16	U	0.16	-0.975	U	3.5	0.030	U	0.097
Area 3 A4	J13513	8/21/06	0.082		0.046	0.068	U	0.068	0.078	U	0.078	-1.31	U	3.6	0.176	UJ	0.67
Area 4 A1	J13514	8/21/06	0.070	U	0.070	0.11	U	0.11	0.098	U	0.098	-0.912	U	3.4	0	UJ	0.79
Area 4 A2	J13515	8/21/06	0.159		0.074	0.095	U	0.095	0.11	U	0.11	-1.91	U	3.5	0	UJ	0.56
Area 4 A3	J13516	8/21/06	0.038	U	0.038	0.049	U	0.049	0.075	U	0.075	-2.31	U	3.6	-0.050	U	0.39
Area 4 A4	J13517	8/21/06	0.048	U	0.048	0.070	U	0.070	0.097	U	0.097	-0.187	U	3.4	0	U	0.62
OB/BCL A1	J13518	8/22/06	0.080	U	0.080	0.097	U	0.097	0.13	U	0.13	0.290	U	2.4	0.037	UJ	0.28
OB/BCL A2	J13519	8/22/06	0.065	U	0.065	0.10	U	0.10	0.094	U	0.094	0.236	U	2.4	0	U	0.18
OB/BCL A3	J13520	8/22/06	0.041	U	0.041	0.050	U	0.050	0.083	U	0.083	-0.523	U	2.3	-0.076	U	0.27
OB/BCL A4	J135N5	8/22/06	0.10	U	0.10	0.12	U	0.12	0.14	U	0.14	-0.556	U	2.4	0	U	0.14
SPA A1	J13522	9/11/06	0.11	U	0.11	0.12	U	0.12	0.088	U	0.088	0.760	U	2.5	-0.070	U	0.53
SPA A2	J13523	9/11/06	0.075	U	0.075	0.12	U	0.12	0.10	U	0.10	0.208	U	2.6	0.060	U	0.46
SPA A3	J135P1	9/12/06	0.483		0.11	0.13	U	0.13	0.15	U	0.15	-0.735	U	3.7	0.168	UJ	0.43
SPA A4	J135P0	9/12/06	0.214		0.085	0.095	U	0.095	0.068	U	0.068	-0.821	U	3.1	0	U	0.51
SPA B5	J13524	9/11/06	0.112		0.064	0.080	U	0.080	0.15	U	0.15	0.382	U	2.7	-0.061	U	0.47
SPA B6	J13525	9/11/06	0.13	U	0.13	0.16	U	0.16	0.17	U	0.17	1.55	U	2.6	0.073	U	0.56
SPA B7	J135N8	9/11/06	0.046	U	0.046	0.078	U	0.078	0.049	U	0.049	-0.340	U	2.7	0	U	0.49
SPA B8	J135N9	9/11/06	0.093	U	0.093	0.10	U	0.10	0.079	U	0.079	0.215	U	2.7	0	U	0.50
SPA C9	J135P2	9/12/06	0.049	U	0.049	0.054	U	0.054	0.065	U	0.065	2.36	U	3.6	0	U	0.45
SPA C10	J135P3	9/12/06	0.363		0.079	0.089	U	0.089	0.064	U	0.064	0.238	U	3.4	0	U	0.46
SPA C1	J135P4	9/12/06	0.156		0.12	0.16	U	0.16	0.18	U	0.18	0.826	U	3.5	0	U	0.44
SPA C2	J135P5	9/12/06	0.16	U	0.16	0.19	U	0.19	0.20	U	0.20	0.462	U	3.6	0.104	U	0.50
SPA D3	J135P6	9/12/06	0.077	U	0.077	0.11	U	0.11	0.11	U	0.11	-0.569	U	3.5	0	U	0.51
SPA D4	J135P7	9/12/06	0.071	U	0.071	0.087	U	0.087	0.095	U	0.095	0	U	3.5	0.075	U	0.57
SPA D5	J135P8	9/12/06	0.14	U	0.14	0.14	U	0.14	0.10	U	0.10	1.66	U	4.0	-0.063	U	0.48
SPA D6	J135P9	9/12/06	0.035	U	0.035	0.041	U	0.041	0.035	U	0.035	-0.594	U	3.6	0.020	U	0.076
FS-7	J12XM4	7/26/06	0.070	U	0.070	0.17	U	0.17	0.041	U	0.041						
FS-8	J14Y70	5/15/07	0.084	U	0.084	0.12	U	0.12	0.098	U	0.098				0.0358	U	0.16
FS-9	J14Y71	5/15/07	0.068	U	0.068	0.086	U	0.086	0.070	U	0.070				0.101	U	0.34
FS-10	J14Y72	5/15/07	0.093	U	0.093	0.083	U	0.083	0.059	U	0.059				0.121	U	0.15
FS-11	J14Y73	5/15/07	0.0355	U	0.10	0.075	U	0.075	0.076	U	0.076				0.0226	U	0.35
FS-12	J14Y74	5/15/07	0.10	U	0.10	0.051	U	0.051	0.047	U	0.047				-0.0137	U	0.13

118-C-1 Verification Sampling Results

Sample Location	Sample Number	Sample Date	Plutonium-239/240			Plutonium-241			Potassium-40			Radium-226			Radium-228		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 1 A1	J134Y7	8/17/06	0.025	U	0.19	1.16	U	24	21.6		0.37	0.754		0.082	1.04		0.19
Duplicate of J134Y7	J134Y9	8/17/06	0	U	0.57	4.91	U	21	11.4		0.28	0.401		0.063	0.530		0.15
Split of J134Y7	J13504	8/17/06	0.0461		0.0250	1.26	U	2.87									
Area 1 A2	J13500	8/17/06	0	U	0.71	14.1	U	21	23.8		0.18	0.843		0.032	1.34		0.080
Area 1 A3	J134Y8	8/17/06	0	U	0.84	6.40	U	22	13.1		0.27	0.566		0.048	0.873		0.11
Area 1 A4	J13501	8/17/06	0	U	0.56	8.14	U	22	11.5		0.10	0.409		0.021	0.638		0.040
Area 2 A1	J13502	8/17/06							21.3		0.29	0.757		0.061	1.17		0.13
Duplicate of J13502	J13508	8/17/06							21.4		0.33	0.758		0.064	1.13		0.14
Split of J13502	J13505	8/17/06															
Area 2 A2	J13503	8/17/06							10.7		0.26	0.414		0.046	0.656		0.096
Area 2 A3	J13506	8/17/06							21.9		0.38	0.832		0.089	1.15		0.17
Area 2 A4	J13507	8/17/06							10.5		0.32	0.382		0.064	0.680		0.25
Area 3 A1	J13510	8/21/06	-0.023	UJ	0.22	-0.542	U	23	11.3		0.23	0.524		0.059	0.781		0.14
Area 3 A2	J13511	8/21/06	0.036	U	0.068	-1.91	U	22	12.3		0.21	0.833		0.042	0.844		0.094
Area 3 A3	J13512	8/21/06	0	U	0.077	-10.6	U	18	20.2		0.41	0.827		0.086	1.14		0.18
Area 3 A4	J13513	8/21/06	0	UJ	0.67	-10.6	U	20	11.7		0.22	0.411		0.042	0.644		0.097
Area 4 A1	J13514	8/21/06	0	UJ	0.79	-4.03	U	24	10.5		0.32	0.441		0.051	0.607		0.15
Area 4 A2	J13515	8/21/06	0.073	UJ	0.56	-7.73	U	27	20.2		0.32	0.981		0.056	1.25		0.13
Area 4 A3	J13516	8/21/06	0.050	U	0.39	-3.48	U	22	12.0		0.16	0.434		0.032	0.649		0.076
Area 4 A4	J13517	8/21/06	0.081	U	0.62	-5.31	U	21	10.4		0.19	0.399		0.036	0.596		0.085
OB/BCL A1	J13518	8/22/06	0.037	UJ	0.14	14.2	U	28	22.0		0.36	0.724		0.062	1.31		0.15
OB/BCL A2	J13519	8/22/06	0	U	0.11	7.02	U	28	11.1		0.25	0.417		0.052	0.670		0.13
OB/BCL A3	J13520	8/22/06	0.045	U	0.12	6.27	U	27	21.7		0.15	0.710		0.030	1.11		0.068
OB/BCL A4	J135N5	8/22/06	0	U	0.069	6.19	U	27	25.8		0.35	0.911		0.076	1.34		0.14

118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Plutonium-239/240			Plutonium-241			Potassium-40			Radium-226			Radium-228		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SPA A1	J13522	9/11/06	0	U	0.53	13.7	U	19	12.4		0.38	0.503		0.078	0.824		0.17
SPA A2	J13523	9/11/06	0	U	0.46	5.29	U	19	12.0		0.34	0.376		0.063	0.598		0.15
SPA A3	J135P1	9/12/06	0.279	UJ	0.43	5.82	U	18	1.3	U	1.3	0.740		0.062	1.08		0.15
SPA A4	J135P0	9/12/06	0	U	0.51	1.71	U	21	12.5		0.26	0.438		0.068	0.765		0.12
SPA B5	J13524	9/11/06	0.061	U	0.47	11.9	U	18	14.1		0.26	0.412		0.053	0.822		0.10
SPA B6	J13525	9/11/06	0.145	U	0.56	2.92	U	18	22.7		0.42	0.799		0.076	1.33		0.18
SPA B7	J135N8	9/11/06	0.064	U	0.49	7.08	U	16	13.0		0.18	0.446		0.043	0.728		0.10
SPA B8	J135N9	9/11/06	0	U	0.50	9.76	U	21	13.6		0.33	0.561		0.072	1.09		0.16
SPA C9	J135P2	9/12/06	0	U	0.45	-1.19	U	18	13.0		0.17	0.670		0.036	0.927		0.082
SPA C10	J135P3	9/12/06	0.179	U	0.46	4.53	U	21	12.6		0.25	0.501		0.061	0.698		0.14
SPA C1	J135P4	9/12/06	0.115	U	0.44	6.88	U	22	27.4		1.7	0.835		0.078	1.37		0.21
SPA C2	J135P5	9/12/06	0.157	U	0.40	6.23	U	20	23.1		0.34	0.878		0.100	1.17		0.24
SPA D3	J135P6	9/12/06	0.106	U	0.41	5.04	U	19	11.4		0.34	0.499		0.069	0.729		0.13
SPA D4	J135P7	9/12/06	0	U	0.57	12.5	U	20	13.1		0.30	0.491		0.053	0.769		0.10
SPA D5	J135P8	9/12/06	0	U	0.48	0.953	U	20	13.1		0.42	0.547		0.100	0.779		0.20
SPA D6	J135P9	9/12/06	0.010	U	0.076	4.26	U	19	13.1		0.13	0.563		0.027	0.824		0.062
FS-7	J12XM4	7/26/06							7.49		0.58	0.256		0.078	0.357		0.21
FS-8	J14Y70	5/15/07	0.0239	U	0.091	7.21	U	27	13.2		0.32	0.471		0.061	0.560		0.14
FS-9	J14Y71	5/15/07	0	U	0.28	4.00	U	24	11.8		0.26	0.431		0.035	0.636		0.096
FS-10	J14Y72	5/15/07	0.0202	U	0.15	14.0	U	29	12.6		0.24	0.449		0.044	0.670		0.080
FS-11	J14Y73	5/15/07	0.204		0.17	11.8	U	28	11.9		0.24	0.440		0.044	0.744		0.095
FS-12	J14Y74	5/15/07	0.0957	U	0.10	11.7	U	26	12.0		0.16	0.441		0.036	0.667		0.063

Sample Location	Sample Number	Sample Date	Silver-108m			Thorium-228			Thorium-232			Total beta Radiostrontium			Tritium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 1 A1	J134Y7	8/17/06	0.034	U	0.034	1.09		0.063	1.04		0.19	0.148	U	0.24	-2.44	U	2.7
Duplicate of J134Y7	J134Y9	8/17/06	0.025	U	0.025	0.622		0.049	0.530		0.15	0.115	U	0.22	-1.10	U	2.7
Split of J134Y7	J13504	8/17/06	-0.00909	U	0.0130							0.323		0.149	0.00726	U	0.044
Area 1 A2	J13500	8/17/06	0.014	U	0.014	1.26		0.025	1.34		0.080	0.048	U	0.27	-1.42	U	3.1
Area 1 A3	J134Y8	8/17/06	0.018	U	0.018	0.705		0.034	0.873		0.11	0.136	U	0.21	-1.21	U	2.9
Area 1 A4	J13501	8/17/06	0.006	U	0.006	0.549		0.012	0.638		0.040	0.049	U	0.24	-1.56	U	2.7
Area 2 A1	J13502	8/17/06	0.024	U	0.024	1.05		0.041	1.17		0.13	0.009	U	0.27	-0.857	U	2.8
Duplicate of J13502	J13508	8/17/06	0.023	U	0.023	1.08		0.043	1.13		0.14	0.065	U	0.22	-1.10	U	3.1
Split of J13502	J13505	8/17/06	0.00243	U	0.0112							0.0128	U	0.157	-0.0323	U	0.0492
Area 2 A2	J13503	8/17/06	0.017	U	0.017	0.646		0.043	0.656		0.096	0.114	U	0.22	-0.836	U	2.7
Area 2 A3	J13506	8/17/06	0.029	U	0.029	1.10		0.055	1.15		0.17	0.035	U	0.21	-1.24	U	2.7
Area 2 A4	J13507	8/17/06	0.026	U	0.026	0.647		0.073	0.680		0.25	0.094	U	0.18	7.71		2.8

118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Silver-108m			Thorium-228			Thorium-232			Total beta Radiostrontium			Tritium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 3 A1	J13510	8/21/06	0.021	U	0.021	0.548		0.036	0.781		0.14	0.016	U	0.27	0.488	U	2.9
Area 3 A2	J13511	8/21/06	0.016	U	0.016	0.693		0.030	0.844		0.094	0.087	U	0.26	-1.16	U	3.0
Area 3 A3	J13512	8/21/06	0.032	U	0.032	1.03		0.058	1.14		0.18	0.279		0.19	-0.361	U	3.1
Area 3 A4	J13513	8/21/06	0.016	U	0.016	0.534		0.028	0.644		0.097	0.263		0.21	-1.58	U	2.9
Area 4 A1	J13514	8/21/06	0.022	U	0.022	0.551		0.038	0.607		0.15	-0.008	U	0.22	-0.966	U	2.9
Area 4 A2	J13515	8/21/06	0.023	U	0.023	1.22		0.040	1.25		0.13	0.139	U	0.19	-1.45	U	2.8
Area 4 A3	J13516	8/21/06	0.010	U	0.010	0.573		0.019	0.649		0.076	0.110	U	0.20	-1.53	U	3.0
Area 4 A4	J13517	8/21/06	0.014	U	0.014	0.515		0.023	0.596		0.085	-0.048	U	0.20	-2.33	U	2.9
OB/BCL A1	J13518	8/22/06	0.021	U	0.021	1.05		0.044	1.31		0.15	0.080	U	0.26	-2.09	UJ	2.8
OB/BCL A2	J13519	8/22/06	0.019	U	0.019	0.550		0.035	0.670		0.13	0.052	U	0.29	-1.49	UJ	2.7
OB/BCL A3	J13520	8/22/06	0.011	U	0.011	1.06		0.022	1.11		0.068	2.10		0.25	-0.518	UJ	2.7
OB/BCL A4	J135N5	8/22/06	0.027	U	0.027	1.20		0.052	1.34		0.14	0.089	U	0.27	-2.00	UJ	3.1
SPA A1	J13522	9/11/06	0.032	U	0.032	0.807		0.075	0.824		0.17	0.211	U	0.22	-0.913	U	3.0
SPA A2	J13523	9/11/06	0.022	U	0.022	0.496		0.036	0.598		0.15	0.158	U	0.21	0	U	2.5
SPA A3	J135P1	9/12/06	0.033	U	0.033	1.36		0.073	1.08		0.15	0.855		0.21	-1.33	U	2.5
SPA A4	J135P0	9/12/06	0.025	U	0.025	0.886		0.057	0.765		0.12	0.315		0.25	0.253	U	3.0
SPA B5	J13524	9/11/06	0.022	U	0.022	0.678		0.036	0.822		0.10	0.235		0.21	-0.768	U	2.6
SPA B6	J13525	9/11/06	0.035	U	0.035	1.41		0.075	1.33		0.18	0.070	U	0.23	-0.821	U	2.8
SPA B7	J135N8	9/11/06	0.014	U	0.014	0.644		0.022	0.728		0.10	0.057	U	0.21	0.189	U	2.5
SPA B8	J135N9	9/11/06	0.028	U	0.028	0.965		0.062	1.09		0.16	0.115	U	0.25	-0.757	U	2.6
SPA C9	J135P2	9/12/06	0.014	U	0.014	0.771		0.025	0.927		0.082	0.203	U	0.21	-0.566	U	3.0
SPA C10	J135P3	9/12/06	0.025	U	0.025	0.898		0.054	0.698		0.14	0.327		0.21	-0.214	U	2.6
SPA C1	J135P4	9/12/06	0.037	U	0.037	1.50		0.076	1.37		0.21	0.333		0.21	-0.952	U	3.0
SPA C2	J135P5	9/12/06	0.040	U	0.040	1.35		0.095	1.17		0.24	0.191	U	0.22	-0.933	U	2.6
SPA D3	J135P6	9/12/06	0.022	U	0.022	0.558		0.038	0.729		0.13	0.117	U	0.23	-1.60	U	2.6
SPA D4	J135P7	9/12/06	0.020	U	0.020	0.703		0.037	0.769		0.10	-0.019	U	0.22	-0.272	U	2.5
SPA D5	J135P8	9/12/06	0.040	U	0.040	0.865		0.084	0.779		0.20	0.475		0.22	-0.322	U	2.7
SPA D6	J135P9	9/12/06	0.011	U	0.011	0.926		0.025	0.824		0.062	0.031	U	0.25	-0.406	U	2.8
FS-7	J12XM4	7/26/06	0.025	U	0.025	0.226		0.033	0.357		0.21						
FS-8	J14Y70	5/15/07	0.026	U	0.026	0.638		0.046	0.560		0.14						
FS-9	J14Y71	5/15/07	0.018	U	0.018	0.777		0.044	0.636		0.096						
FS-10	J14Y72	5/15/07	0.018	U	0.018	0.615		0.035	0.670		0.080						
FS-11	J14Y73	5/15/07	0.018	U	0.018	0.718		0.046	0.744		0.095						
FS-12	J14Y74	5/15/07	0.014	U	0.014	0.626		0.025	0.667		0.063						

118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Uranium-233/234			Uranium-235			Uranium-235 GEA			Uranium-238			Uranium-238 GEA		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 1 A1	J134Y7	8/17/06	0.338		0.022	0.010	U	0.027	0.18	U	0.18	0.389		0.022	5.3	U	5.3
Duplicate of J134Y7	J134Y9	8/17/06	0.387		0.026	0.027		0.025	0.20	U	0.20	0.415		0.034	4.2	U	4.2
Split of J134Y7	J13504	8/17/06	0.545		0.0170	0.0225		0.0354				0.575		0.0300			
Area 1 A2	J13500	8/17/06	0.420		0.031	0.024	U	0.026	0.10	U	0.10	0.422		0.027	2.3	U	2.3
Area 1 A3	J134Y8	8/17/06	0.527		0.029	0.025	U	0.028	0.12	U	0.12	0.479		0.029	2.7	U	2.7
Area 1 A4	J13501	8/17/06	0.480		0.24	0.116	U	0.30	0.044	U	0.044	0.736		0.24	1.1	U	1.1
Area 2 A1	J13502	8/17/06							0.13	U	0.13				4.0	U	4.0
Duplicate of J13502	J13508	8/17/06							0.16	U	0.16				3.8	U	3.8
Split of J13502	J13505	8/17/06															
Area 2 A2	J13503	8/17/06							0.10	U	0.10				2.8	U	2.8
Area 2 A3	J13506	8/17/06							0.18	U	0.18				5.4	U	5.4
Area 2 A4	J13507	8/17/06							0.15	U	0.15				5.4	U	5.4
Area 3 A1	J13510	8/21/06	0.364		0.25	0.040	U	0.31	0.14	U	0.14	0.265		0.25	3.4	U	3.4
Area 3 A2	J13511	8/21/06	1.09		0.20	0.129	U	0.25	0.11	U	0.11	0.825		0.20	2.5	U	2.5
Area 3 A3	J13512	8/21/06	0.235	U	0.26	0.041	U	0.31	0.21	U	0.21	0.269		0.26	4.8	U	4.8
Area 3 A4	J13513	8/21/06	0.328		0.21	0	U	0.25	0.099	U	0.099	0.438		0.21	2.1	U	2.1
Area 4 A1	J13514	8/21/06	0.231		0.22	0.070	U	0.27	0.14	U	0.14	0.607		0.22	3.5	U	3.5
Area 4 A2	J13515	8/21/06	0.211	U	0.23	0	U	0.28	0.19	U	0.19	0.362		0.23	3.3	U	3.3
Area 4 A3	J13516	8/21/06	0.537		0.26	0.041	U	0.31	0.069	U	0.069	0.671		0.26	1.7	U	1.7
Area 4 A4	J13517	8/21/06	0.422		0.29	0	U	0.36	0.091	U	0.091	0.268	U	0.29	2.2	U	2.2
OB/BCL A1	J13518	8/22/06	0.430		0.13	0.020	U	0.15	0.19	U	0.19	0.480		0.13	3.4	U	3.4
OB/BCL A2	J13519	8/22/06	0.428		0.13	0.020	U	0.15	0.13	U	0.13	0.478		0.13	3.4	U	3.4
OB/BCL A3	J13520	8/22/06	0.575		0.13	0	U	0.16	0.072	U	0.072	0.508		0.13	4.4	U	4.4
OB/BCL A4	J135N5	8/22/06	0.383		0.12	0	U	0.14	0.19	U	0.19	0.399		0.12	4.7	U	4.7

118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Uranium-233/234			Uranium-235			Uranium-235 GEA			Uranium-238			Uranium-238 GEA		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SPA A1	J13522	9/11/06	0.415		0.21	0.067	U	0.26	0.15	U	0.15	0.663		0.21	4.5	U	4.5
SPA A2	J13523	9/11/06	0.364		0.25	0.040	U	0.31	0.14	U	0.14	0.398		0.25	4.2	U	4.2
SPA A3	J135P1	9/12/06	0.406		0.26	0	U	0.31	0.18	U	0.18	0.541		0.26	4.2	U	4.2
SPA A4	J135P0	9/12/06	0.387		0.25	0.039	U	0.30	0.11	U	0.11	0.646		0.25	3.7	U	3.7
SPA B5	J13524	9/11/06	0.448		0.21	0	U	0.26	0.14	U	0.14	0.811		0.21	3.0	U	3.0
SPA B6	J13525	9/11/06	0.415		0.23	0	U	0.27	0.22	U	0.22	0.237		0.23	5.1	U	5.1
SPA B7	J135N8	9/11/06	0.276		0.26	0.042	U	0.32	0.072	U	0.072	0.518		0.26	2.7	U	2.7
SPA B8	J135N9	9/11/06	0.320		0.22	0.035	U	0.27	0.13	U	0.13	0.640		0.22	4.1	U	4.1
SPA C9	J135P2	9/12/06	0.626		0.039	0.045		0.038	0.12	U	0.12	0.498		0.039	2.0	U	2.0
SPA C10	J135P3	9/12/06	0.523		0.033	0.047		0.040	0.11	U	0.11	0.554		0.033	3.3	U	3.3
SPA C1	J135P4	9/12/06	0.467		0.042	0.011	U	0.041	0.23	U	0.23	0.370		0.034	5.6	U	5.6
SPA C2	J135P5	9/12/06	0.467		0.032	0.035	U	0.039	0.26	U	0.26	0.396		0.032	6.4	U	6.4
SPA D3	J135P6	9/12/06	0.552		0.047	0.036	U	0.045	0.15	U	0.15	0.489		0.047	4.2	U	4.2
SPA D4	J135P7	9/12/06	0.524		0.038	0.043		0.037	0.14	U	0.14	0.497		0.030	3.2	U	3.2
SPA D5	J135P8	9/12/06	0.484		0.066	0.042		0.040	0.17	U	0.17	0.510		0.033	5.4	U	5.4
SPA D6	J135P9	9/12/06	0.577		0.19	0	U	0.23	0.077	U	0.077	0.426		0.19	1.6	U	1.6
FS-7	J12XM4	7/26/06							0.068	U	0.068				6.4	U	6.4
FS-8	J14Y70	5/15/07	0.483		0.18	0.0278	U	0.21	0.15	U	0.15	0.483		0.18	4.0	U	4.0
FS-9	J14Y71	5/15/07	0.339		0.24	0.0373	U	0.29	0.16	U	0.16	0.462		0.24	2.9	U	2.9
FS-10	J14Y72	5/15/07	0.499		0.20	0.0636	U	0.24	0.11	U	0.11	0.473		0.20	3.0	U	3.0
FS-11	J14Y73	5/15/07	0.306		0.23	0	U	0.28	0.11	U	0.11	0.428		0.23	2.6	U	2.6
FS-12	J14Y74	5/15/07	0.681		0.24	0.0750		0.29	0.076	U	0.076	0.434		0.24	2.1	U	2.1

118-C-1 Verification Sampling Results.

Sample Location	Sample 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
Area 1 A1	J134Y7	8/17/06	3880		8.0	1.2	U	1.2	2.7		1.7	48.1		0.06	0.78		0.06	1.3		0.66
Duplicate of J134Y7	J134Y9	8/17/06	4500		7.9	1.2	U	1.2	2.3		1.7	51.5		0.05	0.82		0.05	1.7		0.66
Split of J134Y7	J13504	8/17/06	6610	N	6.3	1.2	N	0.33	2.6		0.28	57.5		0.50	0.34	B*	0.071	1.6	B*	1.5
Area 1 A2	J13500	8/17/06	4130		8.0	1.2	U	1.2	1.9		1.7	52.0		0.06	0.69		0.06	1.6		0.66
Area 1 A3	J134Y8	8/17/06	4570		8.0	1.2	U	1.2	2.3		1.7	56.0		0.06	0.69		0.06	2.1		0.67
Area 1 A4	J13501	8/17/06	4460		7.9	1.2	U	1.2	3.3		1.7	48.7		0.06	0.88		0.06	1.6		0.66
Area 2 A1	J13502	8/17/06	4690		7.9	1.2	U	1.2	2.3		1.7	48.1		0.06	0.70		0.06	1.9		0.66
Duplicate of J13502	J13508	8/17/06	4090		8.0	1.2	U	1.2	2.4		1.7	48.4		0.06	0.86		0.06	1.7		0.67
Split of J13502	J13505	8/17/06	6210	N	6.3	1.5	N	0.33	3.1		0.28	54.7		0.50	0.34	B*	0.071	1.9	B*	1.5
Area 2 A2	J13503	8/17/06	4310		8.0	1.2	U	1.2	2.8		1.7	45.6		0.06	0.78		0.06	2.0		0.66
Area 2 A3	J13506	8/17/06	4050		8.0	1.2	U	1.2	2.0		1.7	44.4		0.06	0.68		0.06	2.2		0.66
Area 2 A4	J13507	8/17/06	3990		7.9	1.2	U	1.2	2.4		1.7	54.5		0.05	0.93		0.05	1.5		0.66
Area 3 A1	J13510	8/21/06	5540		7.9	1.2	U	1.2	1.8		1.7	63.8		0.06	0.70		0.06	1.6	J	0.66
Area 3 A2	J13511	8/21/06	4550		8.0	4.3		1.2	33.9		1.7	132		0.06	0.50		0.06	4.6	J	0.66
Area 3 A2 resample	J13HN3	9/29/06	4950	C	7.0	1.1	U	1.1	5.8		1.1	71.3	C	0.06	0.28		0.03	2.1		1.1
Area 3 A3	J13512	8/21/06	5040		7.9	1.2	U	1.2	2.2		1.7	78.4		0.06	0.51		0.06	3.2	J	0.66
Area 3 A4	J13513	8/21/06	4700		7.9	1.2	U	1.2	2.0		1.7	55.5		0.05	0.52		0.05	1.5	J	0.66
Area 4 A1	J13514	8/21/06	4880		7.9	1.2	U	1.2	2.1		1.7	48.6		0.05	0.58		0.05	1.0	J	0.66
Area 4 A2	J13515	8/21/06	5100		7.9	1.2	U	1.2	2.3		1.7	286		0.05	0.58		0.05	4.9	J	0.66
Area 4 A3	J13516	8/21/06	4080		7.9	1.2	U	1.2	2.4		1.7	49.9		0.05	0.37		0.05	0.65	UJ	0.65
Area 4 A4	J13517	8/21/06	4070		7.9	1.2	U	1.2	2.2		1.7	49.2		0.06	0.43		0.06	0.66	UJ	0.66
OB/BCL A1	J13518	8/22/06	4660		8.3	1.3	UJ	1.3	2.2		1.8	48.7		0.06	0.65		0.06	2.1	UJ	0.69
OB/BCL A2	J13519	8/22/06	4740		8.4	1.3	UJ	1.3	2.2		1.8	50.0		0.06	0.69		0.06	1.8	UJ	0.70
OB/BCL A3	J13520	8/22/06	3690		8.4	1.3	UJ	1.3	1.8	U	1.8	46.0		0.06	0.60		0.06	1.6	UJ	0.70
OB/BCL A4	J135N5	8/22/06	4760		8.4	1.3	UJ	1.3	2.3		1.8	58.4		0.06	0.52		0.06	2.0	UJ	0.70
SPA A1	J13522	9/11/06	5120		6.6	1.0	U	1.0	3.0		1.1	52.9		0.06	0.43		0.03	1.2		1.1
SPA A2	J13523	9/11/06	5020		6.6	1.0	U	1.0	2.5		1.1	53.4		0.06	0.31		0.03	1.1	U	1.1
SPA A3	J135P1	9/12/06	5300		6.5	1.0	U	1.0	2.3		1.1	53.3		0.06	0.37		0.03	1.7		1.1
SPA A4	J135P0	9/12/06	4600		6.5	1.0	U	1.0	3.3		1.1	53.5		0.06	0.31		0.03	2.0		1.1
SPA B5	J13524	9/11/06	5130		6.6	1.0	U	1.0	2.4		1.1	55.6		0.06	0.31		0.03	1.1	U	1.1
SPA B6	J13525	9/11/06	4830		6.6	1.0	U	1.0	2.3		1.1	54.9		0.06	0.34		0.03	1.1	U	1.1
SPA B7	J135N8	9/11/06	5310		6.6	1.0	U	1.0	2.4		1.1	54.7		0.06	0.35		0.03	1.1	U	1.1
SPA B8	J135N9	9/11/06	4900		6.5	1.0	U	1.0	2.9		1.1	60.1		0.06	0.30		0.03	1.1	U	1.1
SPA C9	J135P2	9/12/06	6390		6.5	1.0	U	1.0	1.8		1.1	495		0.06	0.57		0.03	10.7		1.1
SPA C10	J135P3	9/12/06	4580		6.6	1.0	U	1.0	2.0		1.1	60.0		0.06	0.36		0.03	1.1	U	1.1
SPA C1	J135P4	9/12/06	5100		6.5	1.0	U	1.0	2.8		1.1	58.2		0.06	0.41		0.03	2.4		1.1
SPA C2	J135P5	9/12/06	4840		6.6	1.0	U	1.0	2.6		1.1	62.9		0.06	0.41		0.03	2.6		1.1
SPA D3	J135P6	9/12/06	5000		6.5	1.0	U	1.0	3.0		1.1	63.8		0.06	0.44		0.03	1.5		1.1
SPA D4	J135P7	9/12/06	4870		6.6	1.0	U	1.0	2.0		1.1	56.0		0.06	0.42		0.03	1.1		1.1
SPA D5	J135P8	9/12/06	5540		6.5	1.0	U	1.0	2.5		1.1	59.4		0.06	0.47		0.03	1.1	U	1.1
SPA D6	J135P9	9/12/06	5540		6.5	1.0	U	1.0	2.9		1.1	64.8		0.06	0.49		0.03	1.4		1.1

118-C-1 Verification Sampling Results.

Sample Location	Sample 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
FS-1	J12XL8	7/26/06	5510		8.3	1.3	U	1.3	2.2		1.8	59.6	C	0.06	0.23		0.06	1.9		0.69
FS-2	J12XL9	7/26/06	4040		8.3	1.3	U	1.3	3.5		1.8	40.5	C	0.06	0.18		0.06	1.4		0.69
FS-3	J12XM0	7/26/06	3630		8.2	1.3	U	1.3	2.5		1.7	41.8	C	0.06	0.16		0.06	1.2		0.69
FS-4	J12XM1	7/26/06	5670		8.4	1.3	U	1.3	5.4		1.8	47.7	C	0.06	0.19		0.06	1.9		0.70
FS-5	J12XM2	7/26/06	7520		8.3	1.3	U	1.3	3.4		1.8	80.2	C	0.06	0.34		0.06	3.2		0.69
FS-7	J12XM4	7/26/06	3160		8.4	1.3	U	1.3	1.8	U	1.8	34.3	C	0.06	0.12		0.06	2.5		0.70
Equipment blank	J13509	8/17/06	39.4		2.6	0.40	U	0.40	0.56	U	0.56	1.1		0.02	0.02		0.02	0.42		0.22

Sample Location	Sample 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
Area 1 A1	J134Y7	8/17/06	0.19	U	0.19	4380		4.5	5.6	C	0.36	7.0		0.39	11.7		0.33	0.20	U	0.20
Duplicate of J134Y7	J134Y9	8/17/06	0.19	U	0.19	4570		4.5	6.6	C	0.36	7.9		0.38	12.7		0.33	0.20	U	0.20
Split of J134Y7	J13504	8/17/06	0.14	UN	0.14	5080	CN	8.6	9.1	N	0.36	11.8		0.50	13.2		0.30	0.350	U	0.350
Area 1 A2	J13500	8/17/06	0.19	U	0.19	3820		4.5	8.6	C	0.36	5.9		0.39	9.9		0.33	0.20	U	0.20
Area 1 A3	J134Y8	8/17/06	0.20	U	0.20	6890		4.6	6.8	C	0.36	5.7		0.39	11.3		0.33	0.20	U	0.20
Area 1 A4	J13501	8/17/06	0.19	U	0.19	8720		4.5	6.0	C	0.36	8.4		0.39	14.7		0.33	0.20	U	0.20
Area 2 A1	J13502	8/17/06	0.19	U	0.19	6960		4.5	6.2	C	0.36	7.6		0.39	13.4		0.33	0.20	U	0.20
Duplicate of J13502	J13508	8/17/06	0.20	U	0.20	6310		4.6	5.8	C	0.36	7.5		0.39	13.4		0.34	0.21		0.20
Split of J13502	J13505	8/17/06	0.14	UN	0.14	7420	CN	8.6	8.5	N	0.36	12.9		0.50	14.8		0.30	0.350	U	0.350
Area 2 A2	J13503	8/17/06	0.19	U	0.09	6810		4.5	6.2	C	0.36	7.3		0.39	12.8		0.33	0.24		0.20
Area 2 A3	J13506	8/17/06	0.19	U	0.19	3560		4.5	5.4	C	0.36	6.8		0.39	10.5		0.33	0.20	U	0.20
Area 2 A4	J13507	8/17/06	0.19	U	0.19	5160		4.5	4.9	C	0.36	7.7		0.38	13.2		0.33	0.23		0.20
Area 3 A1	J13510	8/21/06	0.19	U	0.19	4550		4.5	8.0	C	0.36	8.9		0.39	18.1		0.33	0.20	U	0.20
Area 3 A2	J13511	8/21/06	0.19	U	0.19	5450		4.5	8.1	C	0.36	13.1		0.39	286		0.33	0.20	U	0.20
Area 3 A2 resample	J13HN3	9/29/06	0.12		0.09	5080	C	2.6	7.2	C	0.22	8.6		0.15	45.2		0.25			
Area 3 A3	J13512	8/21/06	0.19	U	0.19	14100		4.5	9.2	C	0.36	7.7		0.39	30.6		0.33	0.20	U	0.20
Area 3 A4	J13513	8/21/06	0.19	U	0.19	5580		4.5	7.4	C	0.36	8.5		0.38	17.9		0.33	0.20	U	0.20
Area 4 A1	J13514	8/21/06	0.19	U	0.19	5600		4.5	6.6	C	0.36	8.8		0.38	14.7		0.33	0.20	U	0.20
Area 4 A2	J13515	8/21/06	0.19	U	0.19	7040		4.5	6.2	C	0.35	8.5		0.38	15.1		0.33	0.20	U	0.20
Area 4 A3	J13516	8/21/06	0.19	U	0.19	8360		4.5	6.0	C	0.35	7.2		0.38	14.2		0.33	0.20	U	0.20
Area 4 A4	J13517	8/21/06	0.19	U	0.19	5450		4.5	5.3	C	0.36	8.1		0.39	14.8		0.33	0.20	U	0.20
OB/BCL A1	J13518	8/22/06	0.20	U	0.20	5120		4.7	6.1		0.38	7.7		0.40	15.8		0.35	0.20	U	0.20
OB/BCL A2	J13519	8/22/06	0.21	U	0.21	5110		4.8	6.4		0.38	7.8		0.41	15.0		0.35	0.20	U	0.20
OB/BCL A3	J13520	8/22/06	0.20	U	0.20	4200		4.8	5.3		0.38	6.9		0.41	12.8		0.35	0.24		0.20
OB/BCL A4	J135N5	8/22/06	0.20	U	0.20	4710		4.8	6.8		0.38	7.1		0.41	11.9		0.35	0.20	U	0.20

118-C-1 Verification Sampling Results.

Sample Location	Sample 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
SPA A1	J13522	9/11/06	0.09	U	0.09	5340		2.5	7.5		0.20	7.6		0.14	15.3		0.23	0.20	U	0.20
SPA A2	J13523	9/11/06	0.09	U	0.09	4730		2.5	8.1		0.20	6.2		0.14	15.6		0.23	0.20	U	0.20
SPA A3	J135P1	9/12/06	0.09	U	0.09	6010		2.5	8.0		0.20	7.0		0.14	15.8		0.23	0.20		0.20
SPA A4	J135P0	9/12/06	0.09	U	0.09	5390		2.5	7.0		0.20	6.7		0.14	15.7		0.23	0.30		0.20
SPA B5	J13524	9/11/06	0.09	U	0.09	4420		2.5	8.8		0.20	6.4		0.14	16.4		0.23	1.9		0.20
SPA B6	J13525	9/11/06	0.09	U	0.09	4330		2.5	9.3		0.20	7.2		0.14	15.9		0.23	0.20	U	0.20
SPA B7	J135N8	9/11/06	0.09	U	0.09	4610		2.5	8.0		0.20	7.0		0.14	14.9		0.23	0.20	U	0.20
SPA B8	J135N9	9/11/06	0.09	U	0.09	4090		2.5	7.6		0.20	6.7		0.14	13.9		0.23	0.20	U	0.20
SPA C9	J135P2	9/12/06	0.09	U	0.09	8710		2.5	6.8		0.20	5.6		0.14	144		0.23	0.20	U	0.20
SPA C10	J135P3	9/12/06	0.09	U	0.09	4870		2.5	6.5		0.20	6.5		0.14	13.3		0.23	0.29		0.20
SPA C1	J135P4	9/12/06	0.09	U	0.09	3800		2.5	7.7		0.20	6.4		0.14	14.4		0.23	0.20		0.20
SPA C2	J135P5	9/12/06	0.09	U	0.09	4920		2.5	7.6		0.20	6.8		0.14	15.2		0.23	0.20	U	0.20
SPA D3	J135P6	9/12/06	0.09	U	0.09	5000		2.5	7.7		0.20	6.6		0.14	12.7		0.23	0.26		0.20
SPA D4	J135P7	9/12/06	0.09	U	0.09	5170		2.5	7.2		0.20	6.6		0.14	12.6		0.23	0.34		0.20
SPA D5	J135P8	9/12/06	0.09	U	0.09	4860		2.5	9.1		0.20	7.5		0.14	14.3		0.23	0.20	U	0.20
SPA D6	J135P9	9/12/06	0.09	U	0.09	5180		2.5	8.2		0.20	7.8		0.14	14.1		0.23	0.30		0.20
FS-1	J12XL8	7/26/06	0.20	U	0.20	3880		4.7	8.6		0.38	7.3		0.41	13.8		0.35			
FS-2	J12XL9	7/26/06	0.20	U	0.20	9250		4.7	6.3		0.38	7.9		0.40	13.6		0.35			
FS-3	J12XM0	7/26/06	0.20	U	0.20	6320		4.7	4.8		0.37	6.1		0.40	10.5		0.34			
FS-4	J12XM1	7/26/06	0.20	U	0.20	11400		4.8	7.2		0.38	8.6		0.41	17.4		0.35			
FS-5	J12XM2	7/26/06	0.20	U	0.20	6130		4.7	10.2		0.38	10.5		0.40	23.3		0.35			
FS-7	J12XM4	7/26/06	0.20	U	0.20	13900		4.8	4.0		0.38	7.0		0.41	16.7		0.35			
Equipment blank	J13509	8/17/06	0.06	U	0.06	22.1		1.5	0.70	C	0.12	0.13	U	0.13	0.11	U	0.11			

Sample Location	Sample 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
Area 1 A1	J134Y7	8/17/06	15700		9.7	4.5		0.86	3170		2.7	296		0.08	0.02	U	0.02	0.80	U	0.80
Duplicate of J134Y7	J134Y9	8/17/06	18100		9.6	4.5		0.85	3630		2.7	328		0.08	0.01	U	0.01	0.80	U	0.80
Split of J134Y7	J13504	8/17/06	22600	N	2.4	4.2		0.15	4570		12.2	342	N	0.10	0.0067	U	0.0067	1.2	U	1.2
Area 1 A2	J13500	8/17/06	13900		9.6	4.1		0.86	3270		2.7	260		0.08	0.02	U	0.02	0.80	U	0.80
Area 1 A3	J134Y8	8/17/06	14000		9.7	3.5		0.86	3250		2.7	259		0.08	0.02	U	0.02	0.81	U	0.81
Area 1 A4	J13501	8/17/06	19100		9.6	4.9		0.86	4620		2.7	362		0.08	0.02	U	0.02	0.80	U	0.80
Area 2 A1	J13502	8/17/06	18900		9.6	3.7		0.85	3970		2.7	317		0.08	0.01	U	0.01	0.80	U	0.80
Duplicate of J13502	J13508	8/17/06	17800		9.7	3.7		0.87	3680		2.7	314		0.08	0.01	U	0.01	0.81	U	0.81
Split of J13502	J13505	8/17/06	23700	N	2.4	4.8		0.15	4800		12.2	340	N	0.10	0.0067	U	0.0067	1.2	U	1.2
Area 2 A2	J13503	8/17/06	18400		9.7	3.8		0.86	3760		2.7	285		0.08	0.01	U	0.01	0.80	U	0.80
Area 2 A3	J13506	8/17/06	15900		9.7	4.3		0.86	3150		2.7	279		0.08	0.02	U	0.02	0.80	U	0.80
Area 2 A4	J13507	8/17/06	19000		9.6	3.2		0.85	3660		2.7	359		0.08	0.02	U	0.02	0.80	U	0.80

118-C-1 Verification Sampling Results.

Sample Location	Sample 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
Area 3 A1	J13510	8/21/06	22300		9.6	8.3		0.85	4170		2.7	357		0.08	0.02	U	0.02	0.80	U	0.80
Area 3 A2	J13511	8/21/06	28400		9.7	130		0.86	3350		2.7	313		0.08	0.05		0.01	54.9		0.80
Area 3 A2 resample	J13HN3	9/29/06	21000		7.5	23.1		0.37	3740	C	2.2	338		0.06	0.02	U	0.02	4.5		0.31
Area 3 A3	J13512	8/21/06	21200		9.6	11.8		0.86	3620		2.7	331		0.08	0.02	U	0.02	0.80	U	0.80
Area 3 A4	J13513	8/21/06	20900		9.5	6.9		0.85	4030		2.7	320		0.08	0.01	U	0.01	0.79	U	0.79
Area 4 A1	J13514	8/21/06	23200		9.6	5.0		0.85	4490		2.7	323		0.08	0.01	U	0.01	0.80	U	0.80
Area 4 A2	J13515	8/21/06	20400		9.5	4.7		0.85	3970		2.6	350		0.08	0.02	U	0.02	0.79	U	0.79
Area 4 A3	J13516	8/21/06	17600		9.5	3.1		0.85	3610		2.6	269		0.08	0.01	U	0.01	0.79	U	0.79
Area 4 A4	J13517	8/21/06	19600		9.6	4.5		0.85	3820		2.7	306		0.08	0.02	U	0.02	0.80	U	0.80
OB/BCL A1	J13518	8/22/06	18300		10.1	5.2		0.90	3900		2.8	311		0.09	0.01	U	0.01	0.84	U	0.84
OB/BCL A2	J13519	8/22/06	18800		10.2	4.5		0.91	4010		2.8	329		0.09	0.02	U	0.02	0.85	U	0.85
OB/BCL A3	J13520	8/22/06	15900		10.2	3.8		0.91	3370		2.8	272		0.09	0.02	U	0.02	0.85	U	0.85
OB/BCL A4	J135N5	8/22/06	17100		10.2	4.3		0.90	3680		2.8	308		0.09	0.01	U	0.01	0.84	U	0.84
SPA A1	J13522	9/11/06	21300		7.0	5.7		0.35	4170		2.1	339		0.06	0.02	U	0.02	0.29	U	0.29
SPA A2	J13523	9/11/06	16500		7.0	4.4		0.35	3760		2.1	298		0.06	0.02	U	0.02	0.29	U	0.29
SPA A3	J135P1	9/12/06	19100		7.0	5.7		0.34	4350		2.1	320		0.06	0.02		0.01	0.29	U	0.29
SPA A4	J135P0	9/12/06	18400		7.0	7.5		0.34	3850		2.1	305		0.06	0.02	U	0.02	0.29	U	0.29
SPA B5	J13524	9/11/06	16900		7.0	25.8		0.35	3930		2.1	292		0.06	0.02	U	0.02	0.29	U	0.29
SPA B6	J13525	9/11/06	20000		7.0	6.4		0.35	3690		2.1	292		0.06	0.02	U	0.02	0.29	U	0.29
SPA B7	J135N8	9/11/06	19200		7.0	5.5		0.35	3830		2.1	308		0.06	0.06		0.01	0.29	U	0.29
SPA B8	J135N9	9/11/06	18300		6.9	7.2		0.34	3500		2.1	303		0.06	0.02	U	0.02	0.45		0.29
SPA C9	J135P2	9/12/06	16500		7.0	20.8		0.34	3440		2.1	334		0.06	0.02		0.01	0.62		0.29
SPA C10	J135P3	9/12/06	17300		7.0	5.7		0.35	3600		2.1	300		0.06	0.02	U	0.02	0.29	U	0.29
SPA C1	J135P4	9/12/06	18300		7.0	7.0		0.34	3820		2.1	302		0.06	0.02	U	0.02	0.34		0.29
SPA C2	J135P5	9/12/06	18400		7.0	8.4		0.35	3730		2.1	297		0.06	0.06		0.02	0.29	U	0.29
SPA D3	J135P6	9/12/06	18100		7.0	6.2		0.34	3630		2.1	314		0.06	0.01	U	0.01	0.44		0.29
SPA D4	J135P7	9/12/06	17100		7.0	5.5		0.35	3540		2.1	306		0.06	0.01	U	0.01	0.29	U	0.29
SPA D5	J135P8	9/12/06	20500		6.9	4.7		0.34	3980		2.1	350		0.06	0.02	U	0.02	0.29	U	0.29
SPA D6	J135P9	9/12/06	21100		6.9	5.7		0.34	4020		2.1	367		0.06	0.01	U	0.01	0.45		0.29
FS-1	J12XL8	7/26/06	18200		10.1	4.4		0.90	3880		2.8	311		0.09	0.02	U	0.02	0.84	U	0.84
FS-2	J12XL9	7/26/06	20300		10.1	5.2		0.89	4760		2.8	312		0.09	0.02	U	0.02	0.84	U	0.84
FS-3	J12XM0	7/26/06	16100		10	2.9		0.89	3510		2.8	248		0.09	0.01	U	0.01	0.83	U	0.83
FS-4	J12XM1	7/26/06	20600		10.1	7.2		0.90	5720		2.8	346		0.09	0.02	U	0.02	0.84	U	0.84
FS-5	J12XM2	7/26/06	21900		10.1	7.2		0.90	5080		2.8	446		0.09	0.04		0.01	0.84	U	0.84
FS-7	J12XM4	7/26/06	17800		10.1	2.5		0.90	3830		2.8	241		0.09	0.02	U	0.02	0.84	U	0.84
Equipment blank	J13509	8/17/06	106		3.2	0.28	U	0.28	6.4		0.89	3.3		0.03	0.01	U	0.01	0.27	U	0.27

118-C-1 Verification Sampling Results.

Sample Location	Sample 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
Area 1 A1	J134Y7	8/17/06	8.5		0.66	847		6.3	1.3	UC	1.3	540	R	6.3	0.19	U	0.19	86.3		2.1
Duplicate of J134Y7	J134Y9	8/17/06	9.5		0.66	920		6.2	1.3	UC	1.3	525	R	6.2	0.19	U	0.19	112		2.1
Split of J134Y7	J13504	8/17/06	11.6		0.76	1210		50.4	1.1	B*C	0.17	635	N	4.0	0.20	UN	0.20	166		10.1
Area 1 A2	J13500	8/17/06	10.1		0.66	858		6.3	1.3	UC	1.3	550	R	6.3	0.19	U	0.19	85.3		2.1
Area 1 A3	J134Y8	8/17/06	9.9		0.67	916		6.3	1.3	UC	1.3	560	R	6.3	0.20	U	0.20	122		2.1
Area 1 A4	J13501	8/17/06	10.2		0.66	957		6.3	1.3	UC	1.3	544	R	6.3	0.19	U	0.19	143		2.1
Area 2 A1	J13502	8/17/06	10.4		0.66	813		6.3	1.3	UC	1.3	668	R	6.3	0.19	U	0.19	113		2.1
Duplicate of J13502	J13508	8/17/06	10.1		0.67	770		6.3	1.3	UC	1.3	559	R	6.3	0.20	U	0.20	95.7		2.1
Split of J13502	J13505	8/17/06	13.0		0.76	968		50.4	0.89	B*C	0.17	593	N	4.0	0.20	UN	0.20	171		10.1
Area 2 A2	J13503	8/17/06	9.2		0.66	805		6.3	1.3	UC	1.3	506	R	6.3	0.19	U	0.19	141		2.1
Area 2 A3	J13506	8/17/06	7.9		0.66	862		6.3	1.3	UC	1.3	557	R	6.3	0.19	U	0.19	126		2.1
Area 2 A4	J13507	8/17/06	8.7		0.66	803		6.2	1.3	UC	1.3	530	R	6.2	0.19	U	0.19	127		2.1
Area 3 A1	J13510	8/21/06	11.0		0.66	1120		6.3	1.3	UC	1.3	593	R	6.3	0.19	U	0.19	141		2.1
Area 3 A2	J13511	8/21/06	9.3		0.66	1050		6.3	1.3	UC	1.3	612	R	6.3	0.19	U	0.19	190		2.1
Area 3 A2 resample	J13HN3	9/29/06	10.2		0.40	1080	C	6.5	0.80	U	0.80	550	CJ	1.2	0.34	U	0.34	123	C	0.65
Area 3 A3	J13512	8/21/06	12.7		0.66	1140		6.3	1.3	UC	1.3	660	R	6.3	0.19	U	0.19	228		2.1
Area 3 A4	J13513	8/21/06	9.6		0.66	919		6.2	1.3	UC	1.3	465	R	6.2	0.19	U	0.19	143		2.1
Area 4 A1	J13514	8/21/06	10.1		0.66	933		6.2	1.3	UC	1.3	439	R	6.2	0.19	U	0.19	147		2.1
Area 4 A2	J13515	8/21/06	9.3		0.66	873		6.2	1.3	UC	1.3	516	R	6.2	0.19	U	0.19	160		2.1
Area 4 A3	J13516	8/21/06	9.7		0.65	774		6.2	1.3	UC	1.3	527	R	6.2	0.19	U	0.19	113		2.1
Area 4 A4	J13517	8/21/06	8.7		0.66	853		6.3	1.3	UC	1.3	534	R	6.3	0.19	U	0.19	114		2.1
OB/BCL A1	J13518	8/22/06	9.0		0.69	917		6.6	1.4	U	1.4	527	J	6.6	0.20	U	0.20	110		2.2
OB/BCL A2	J13519	8/22/06	9.3		0.70	960		6.7	1.4	U	1.4	510	J	6.7	0.21	U	0.21	113		2.2
OB/BCL A3	J13520	8/22/06	9.6		0.70	763		6.6	1.4	U	1.4	540	J	6.6	0.20	U	0.20	89.3		2.2
OB/BCL A4	J135N5	8/22/06	9.0		0.70	1080		6.6	1.4	U	1.4	568	J	6.6	0.20	U	0.20	104		2.2
SPA A1	J13522	9/11/06	10.5		0.38	886		6.1	0.75	U	0.75	450	J	1.2	0.32	U	0.32	148		0.61
SPA A2	J13523	9/11/06	10.1		0.38	776		6.1	0.75	U	0.75	373	J	1.2	0.32	U	0.32	138		0.61
SPA A3	J135P1	9/12/06	10.6		0.37	967		6.1	0.74	U	0.74	366	J	1.1	0.32	U	0.32	182		0.60
SPA A4	J135P0	9/12/06	9.5		0.37	932		6.1	0.75	U	0.75	389	J	1.1	0.32	U	0.32	145		0.60
SPA B5	J13524	9/11/06	11.0		0.37	836		6.1	0.75	U	0.75	417	J	1.2	0.32	U	0.32	128		0.61
SPA B6	J13525	9/11/06	13.7		0.38	991		6.1	0.75	U	0.75	377	J	1.2	0.32	U	0.32	156		0.61
SPA B7	J135N8	9/11/06	9.7		0.37	1100		6.1	0.75	U	0.75	461	J	1.2	0.32	U	0.32	148		0.61
SPA B8	J135N9	9/11/06	8.7		0.37	1130		6.1	0.74	U	0.74	415	J	1.1	0.31	U	0.31	139		0.60
SPA C9	J135P2	9/12/06	8.3		0.37	1060		6.1	0.74	U	0.74	632	J	1.1	0.31	U	0.31	274		0.60
SPA C10	J135P3	9/12/06	8.7		0.38	923		6.1	0.75	U	0.75	406	J	1.2	0.32	U	0.32	139		0.61
SPA C1	J135P4	9/12/06	9.3		0.37	1030		6.1	0.74	U	0.74	472	J	1.1	0.31	U	0.31	111		0.60
SPA C2	J135P5	9/12/06	9.4		0.38	943		6.1	0.75	U	0.75	435	J	1.2	0.32	U	0.32	170		0.61
SPA D3	J135P6	9/12/06	10.6		0.37	997		6.1	0.80		0.74	530	J	1.1	0.31	U	0.31	142		0.60
SPA D4	J135P7	9/12/06	9.4		0.38	967		6.1	0.75	U	0.75	459	J	1.2	0.32	U	0.32	115		0.61
SPA D5	J135P8	9/12/06	10.8		0.37	1050		6.1	0.74	U	0.74	584	J	1.1	0.31	U	0.31	126		0.60
SPA D6	J135P9	9/12/06	10.7		0.37	1070		6.1	0.74	U	0.74	449	J	1.1	0.31	U	0.31	165		0.60

118-C-1 Verification Sampling Results.

Sample Location	Sample 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
FS-1	J12XL8	7/26/06	10.7		0.69	1180		6.6	1.4	U	1.4	597	J	6.6	0.20	U	0.20	105		2.2
FS-2	J12XL9	7/26/06	10.1		0.69	828		6.6	1.4	U	1.4	564	J	6.6	0.20	U	0.20	122		2.2
FS-3	J12XM0	7/26/06	9.6		0.69	619		6.5	1.3	U	1.3	618	J	6.5	0.20	U	0.20	101		2.2
FS-4	J12XM1	7/26/06	11.1		0.70	1120		6.6	1.4	U	1.4	670	J	6.6	0.20	U	0.20	185		2.2
FS-5	J12XM2	7/26/06	14.1		0.69	1640		6.6	1.4	U	1.4	697	J	6.6	0.20	U	0.20	153		2.2
FS-7	J12XM4	7/26/06	9.9		0.70	573		6.6	1.4	U	1.4	533	J	6.6	0.20	U	0.20	135		2.2
Equipment blank	J13509	8/17/06	0.26		0.22	16.6		2.1	0.43	UC	0.43	30.7	R	2.1	0.06	U	0.06	7.1		0.70

Sample Location	Sample Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
Area 1 A1	J134Y7	8/17/06	36.2		0.25	33.0		0.44
Duplicate of J134Y7	J134Y9	8/17/06	41.6		0.25	36.7		0.44
Split of J134Y7	J13504	8/17/06	57.4		0.68	40.0		1.4
Area 1 A2	J13500	8/17/06	31.1		0.25	30.1		0.44
Area 1 A3	J134Y8	8/17/06	31.4		0.25	32.2		0.45
Area 1 A4	J13501	8/17/06	41.1		0.25	39.1		0.44
Area 2 A1	J13502	8/17/06	44.1		0.25	37.1		0.44
Duplicate of J13502	J13508	8/17/06	43.0		0.25	35.3		0.45
Split of J13502	J13505	8/17/06	62.7		0.68	41.6		1.4
Area 2 A2	J13503	8/17/06	44.3		0.25	40.2		0.44
Area 2 A3	J13506	8/17/06	36.3		0.25	32.3		0.44
Area 2 A4	J13507	8/17/06	46.3		0.25	37.7		0.44
Area 3 A1	J13510	8/21/06	53.2		0.25	47.4		0.44
Area 3 A2	J13511	8/21/06	36.4		0.25	296		0.44
Area 3 A2 resample	J13HN3	9/29/06	45.7		0.15	77.1		0.09
Area 3 A3	J13512	8/21/06	44.7		0.25	73.8		0.44
Area 3 A4	J13513	8/21/06	45.7		0.25	42.9		0.44
Area 4 A1	J13514	8/21/06	55.4		0.25	42.2		0.44
Area 4 A2	J13515	8/21/06	46.4		0.25	38.8		0.44
Area 4 A3	J13516	8/21/06	38.7		0.25	33.7		0.44
Area 4 A4	J13517	8/21/06	42.4		0.25	37.7		0.44
OB/BCL A1	J13518	8/22/06	43.5		0.26	37.3		0.46
OB/BCL A2	J13519	8/22/06	45.7		0.26	37.5		0.47
OB/BCL A3	J13520	8/22/06	36.2		0.26	31.5		0.47
OB/BCL A4	J135N5	8/22/06	39.6		0.26	34.6		0.47

Sample Location	Sample Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
SPA A1	J13522	9/11/06	52.9		0.14	42.7		0.09
SPA A2	J13523	9/11/06	36.1		0.14	35.1		0.09
SPA A3	J135P1	9/12/06	45.5		0.14	42.3		0.09
SPA A4	J135P0	9/12/06	38.3		0.14	51.2		0.09
SPA B5	J13524	9/11/06	38.9		0.14	66.6		0.09
SPA B6	J13525	9/11/06	48.9		0.14	39.9		0.09
SPA B7	J135N8	9/11/06	44.7		0.14	37.7		0.09
SPA B8	J135N9	9/11/06	42.9		0.14	37.7		0.09
SPA C9	J135P2	9/12/06	39.6		0.14	49.3		0.09
SPA C10	J135P3	9/12/06	40.4		0.14	37.2		0.09
SPA C1	J135P4	9/12/06	43.1		0.14	40.5		0.09
SPA C2	J135P5	9/12/06	45.5		0.14	41.6		0.09
SPA D3	J135P6	9/12/06	45.3		0.14	39.5		0.09
SPA D4	J135P7	9/12/06	41.0		0.14	37.2		0.09
SPA D5	J135P8	9/12/06	49.5		0.14	42.1		0.09
SPA D6	J135P9	9/12/06	54.3		0.14	46.4		0.09
FS-1	J12XL8	7/26/06	41.4		0.26	39.5		0.46
FS-2	J12XL9	7/26/06	46.1		0.26	38.6		0.46
FS-3	J12XM0	7/26/06	38.5		0.26	30.7		0.46
FS-4	J12XM1	7/26/06	41.4		0.26	44.7		0.46
FS-5	J12XM2	7/26/06	46.4		0.26	45.1		0.46
FS-7	J12XM4	7/26/06	38.3		0.26	32.8		0.47
Equipment blank	J13509	8/17/06	0.08	U	0.08	0.47		0.15

118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Total Petroleum Hydrocarbons		
			mg/kg	Q	PQL
Area 2 A1	J135R0	8/28/06	137	U	137
Duplicate of J135R0	J135T6	8/28/06	141	U	141
Split of J135R0	J135T7	8/28/06	173	UN	173
Area 2 A2	J135R1	8/28/06	137	U	137
Area 2 A3	J135R2	8/28/06	139	U	139
Area 2 A4	J135R3	8/28/06	149	U	149
Area 3 A1	J135R4	8/28/06	135	U	135
Area 3 A2	J135R5	8/28/06	133	U	133
Area 3 A3	J135R6	8/28/06	135	U	135
Area 3 A4	J135R7	8/28/06	348		133
Area 3 A4 resample	J13HN4	9/29/06	135	U	135
Area 4 A1	J135R8	8/28/06	143	U	143
Area 4 A2	J135R9	8/28/06	133	U	133
Area 4 A3	J135T0	8/28/06	144	U	144
Area 4 A4	J135T1	8/28/06	142	U	142
OB/BCL A1	J135T2	8/28/06	133	U	133
OB/BCL A2	J135T3	8/28/06	146	U	146
OB/BCL A3	J135T4	8/28/06	138	U	138
OB/BCL A4	J135T5	8/28/06	133	U	133

Sample Location	Sample Number	Sample Date	Total Petroleum Hydrocarbons		
			mg/kg	Q	PQL
SPA A1	J13522	9/11/06	134	U	134
SPA A2	J13523	9/11/06	132	U	132
SPA A3	J135P1	9/12/06	133	UC	133
SPA A4	J135P0	9/12/06	135	CJ	134
SPA B5	J13524	9/11/06	132	U	132
SPA B6	J13525	9/11/06	133	U	133
SPA B7	J135N8	9/11/06	133	U	133
SPA B8	J135N9	9/11/06	133	U	133
SPA C9	J135P2	9/12/06	132	UC	132
SPA C10	J135P3	9/12/06	133	UC	133
SPA C1	J135P4	9/12/06	133	UC	133
SPA C2	J135P5	9/12/06	133	UC	133
SPA D3	J135P6	9/12/06	133	UC	133
SPA D4	J135P7	9/12/06	146	CJ	134
SPA D5	J135P8	9/12/06	133	UC	133
SPA D6	J135P9	9/12/06	133	UC	133
FS-5	J12XM2	7/26/06	133	U	133
FS-6	J12XM3	7/26/06	135	U	135

118-C-1 Verification Sampling Results.

Constituents	J13502 Area 2 A1 Sample Date 8/17/06			J13508 Duplicate of J13502 Sample Date 8/17/06			J13505 Split of J13502 Sample Date 8/17/06			J13503 Area 2 A2 Sample Date 8/17/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	14	U	14	17	U	17	13	U	13
Aroclor-1221	13	U	13	14	U	14	17	U	17	13	U	13
Aroclor-1232	13	U	13	14	U	14	17	U	17	13	U	13
Aroclor-1242	13	U	13	14	U	14	17	U	17	13	U	13
Aroclor-1248	13	U	13	14	U	14	17	U	17	13	U	13
Aroclor-1254	13	U	13	14	U	14	17	U	17	13	U	13
Aroclor-1260	13	U	13	14	U	14	17	U	17	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	340	U	340	340	U	340	330	U	330	340	U	340
1,2-Dichlorobenzene	340	U	340	340	U	340	330	U	330	340	U	340
1,3-Dichlorobenzene	340	U	340	340	U	340	330	U	330	340	U	340
1,4-Dichlorobenzene	340	U	340	340	U	340	330	U	330	340	U	340
2,4,5-Trichlorophenol	840	U	840	840	U	840	330	U	330	840	U	840
2,4,6-Trichlorophenol	340	U	340	340	U	340	330	U	330	340	U	340
2,4-Dichlorophenol	340	U	340	340	U	340	330	U	330	340	U	340
2,4-Dimethylphenol	340	U	340	340	U	340	330	U	330	340	U	340
2,4-Dinitrophenol	840	U	840	840	U	840	1600	UNR	1600	840	U	840
2,4-Dinitrotoluene	340	U	340	340	U	340	330	U	330	340	U	340
2,6-Dinitrotoluene	340	U	340	340	U	340	330	U	330	340	U	340
2-Chloronaphthalene	340	U	340	340	U	340	330	U	330	340	U	340
2-Chlorophenol	340	U	340	340	U	340	330	U	330	340	U	340
2-Methylnaphthalene	340	U	340	340	U	340	330	U	330	340	U	340
2-Methylphenol (cresol, o-)	340	U	340	340	U	340	330	U	330	340	U	340
2-Nitroaniline	840	U	840	840	U	840	1600	U	1600	840	U	840
2-Nitrophenol	340	U	340	340	U	340	330	U	330	340	U	340
3,3'-Dichlorobenzidine	340	U	340	340	U	340	1600	U	1600	340	U	340
3-Nitroaniline	840	U	840	840	U	840	1600	U	1600	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	1600	U	1600	840	U	840
4-Bromophenyl-phenylether	340	U	340	340	U	340	330	U	330	340	U	340
4-Chloro-3-methylphenol	340	U	340	340	U	340	330	U	330	340	U	340
4-Chloroaniline	340	U	340	340	U	340	330	U	330	340	U	340
4-Chlorophenyl-phenylether	340	U	340	340	U	340	330	U	330	340	U	340
4-Methylphenol (p-cresol)	340	U	340	340	U	340	670	U	670	340	U	340
4-Nitroaniline	840	U	840	840	U	840	1600	U	1600	840	U	840
4-Nitrophenol	840	U	840	840	U	840	1600	U	1600	840	U	840
Acenaphthene	340	U	340	340	U	340	330	U	330	340	U	340
Acenaphthylene	340	U	340	340	U	340	330	U	330	340	U	340
Anthracene	340	U	340	340	U	340	330	U	330	340	U	340
Benzo(a)anthracene	340	U	340	340	U	340	330	U	330	340	U	340
Benzo(a)pyrene	340	U	340	340	U	340	330	U	330	340	U	340
Benzo(b)fluoranthene	340	U	340	340	U	340	330	U	330	340	U	340
Benzo(g,h,i)perylene	340	U	340	340	U	340	330	U	330	340	U	340
Benzo(k)fluoranthene	340	U	340	340	U	340	330	U	330	340	U	340
bis(2-Chloro-1-methylethyl)ether	340	U	340	340	U	340	330	U	330	340	U	340
bis(2-Chloroethoxy)methane	340	U	340	340	U	340	330	U	330	340	U	340
bis(2-Chloroethyl)ether	340	U	340	340	U	340	330	U	330	340	U	340
bis(2-Ethylhexyl)phthalate	38	JB	340	36	JB	340	330	U	330	38	JB	340

118-C-1 Verification Sampling Results.

Constituents	J13502 Area 2 A1 Sample Date 8/17/06			J13508 Duplicate of J13502 Sample Date 8/17/06			J13505 Split of J13502 Sample Date 8/17/06			J13503 Area 2 A2 Sample Date 8/17/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	MDL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	340	U	340	340	U	340	330	U	330	340	U	340
Carbazole	340	U	340	340	U	340	330	U	330	340	U	340
Chrysene	340	U	340	340	U	340	330	U	330	340	U	340
Di-n-butylphthalate	22	JB	340	35	JB	340	330	U	330	340	U	340
Di-n-octylphthalate	340	U	340	340	U	340	330	U	330	340	U	340
Dibenz(a,h)anthracene	340	U	340	340	U	340	330	U	330	340	U	340
Dibenzofuran	340	U	340	340	U	340	330	U	330	340	U	340
Diethylphthalate	340	U	340	340	U	340	330	U	330	340	U	340
Dimethylphthalate	340	U	340	340	U	340	330	U	330	340	U	340
Fluoranthene	340	U	340	340	U	340	330	U	330	340	U	340
Fluorene	340	U	340	340	U	340	330	U	330	340	U	340
Hexachlorobenzene	340	U	340	340	U	340	330	U	330	340	U	340
Hexachlorobutadiene	340	U	340	340	U	340	330	U	330	340	U	340
Hexachlorocyclopentadiene	340	U	340	340	U	340	1600	U	1600	340	U	340
Hexachloroethane	340	U	340	340	U	340	330	U	330	340	U	340
Indeno(1,2,3-cd)pyrene	340	U	340	340	U	340	330	U	330	340	U	340
Isophorone	340	U	340	340	U	340	330	U	330	340	U	340
N-Nitroso-di-n-dipropylamine	340	U	340	340	U	340	330	U	330	340	U	340
N-Nitrosodiphenylamine	340	U	340	340	U	340	330	U	330	340	U	340
Naphthalene	340	U	340	340	U	340	330	U	330	340	U	340
Nitrobenzene	340	U	340	340	U	340	330	U	330	340	U	340
Pentachlorophenol	840	U	840	840	U	840	1600	U	1600	840	U	840
Phenanthrene	340	U	340	340	U	340	330	U	330	340	U	340
Phenol	340	U	340	340	U	340	330	U	330	340	U	340
Pyrene	340	U	340	340	U	340	330	U	330	340	U	340

118-C-1 Verification Sampling Results.

Constituents	J135R0 Area 2 A1 Sample Date 8/28/06			J135T6 Duplicate of J135R0 Sample Date 8/28/06			J135T7 Split of J135R0 Sample Date 8/28/06			J135R1 Area 2 A2 Sample Date 8/28/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	MDL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
1,1,2,2-Tetrachloroethane	5	UJ	5	5	UJ	5	5.1	U	5.1	5	UJ	5
1,1,2-Trichloroethane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
1,1-Dichloroethane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
1,1-Dichloroethene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
1,2-Dichloroethane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
1,2-Dichloroethene (total)	5	U	5	5	U	5	10	U	10	5	U	5
1,2-Dichloropropane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
2-Butanone	9	U	9	10	U	10	10	U	10	10	U	10
2-Hexanone	9	U	9	10	U	10	20	U	20	10	U	10
4-Methyl-2-pentanone	9	U	9	10	U	10	10	U	10	10	U	10
Acetone	9	U	9	10	U	10	20	U	20	10	U	10
Benzene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Bromodichloromethane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Bromoform	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Bromomethane	9	U	9	10	U	10	10	U	10	10	U	10
Carbon disulfide	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Carbon tetrachloride	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Chlorobenzene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Chloroethane	9	U	9	10	U	10	10	U	10	10	U	10
Chloroform	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Chloromethane	9	U	9	10	U	10	10	U	10	10	U	10
cis-1,2-Dichloroethylene	5	U	5	5	U	5				5	U	5
cis-1,3-Dichloropropene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Dibromochloromethane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Ethylbenzene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Methylene chloride	5	B	5	11	B	5	5.1	U	5.1	6	B	5
Styrene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Tetrachloroethene	5	U	5	5	U	5	5.1	UN	5.1	5	U	5
Toluene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
trans-1,2-Dichloroethylene	5	U	5	5	U	5				5	U	5
trans-1,3-Dichloropropene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Trichloroethene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Vinyl chloride	9	U	9	10	U	10	5.1	U	5.1	10	U	10
Xylenes (total)	5	U	5	5	U	5	10	U	10	5	U	5

118-C-1 Verification Sampling Results.

Constituents	J13506 Area 2 A3 Sample Date 8/17/06			J13507 Area 2 A4 Sample Date 8/17/06			J13510 Area 3 A1 Sample Date 8/21/06			J13511 Area 3 A2 Sample Date 8/21/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	13	U	13	13	U	13	14		13	46		13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	340	U	340	340	U	340	330	U	330	330	U	330
1,2-Dichlorobenzene	340	U	340	340	U	340	330	U	330	330	U	330
1,3-Dichlorobenzene	340	U	340	340	U	340	330	U	330	330	U	330
1,4-Dichlorobenzene	340	U	340	340	U	340	330	U	330	330	U	330
2,4,5-Trichlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
2,4,6-Trichlorophenol	340	U	340	340	U	340	330	U	330	330	U	330
2,4-Dichlorophenol	340	U	340	340	U	340	330	U	330	330	U	330
2,4-Dimethylphenol	340	U	340	340	U	340	330	U	330	330	U	330
2,4-Dinitrophenol	840	U	840	840	U	840	840	UJ	840	840	UJ	840
2,4-Dinitrotoluene	340	U	340	340	U	340	330	U	330	330	U	330
2,6-Dinitrotoluene	340	U	340	340	U	340	330	U	330	330	U	330
2-Chloronaphthalene	340	U	340	340	U	340	330	U	330	330	U	330
2-Chlorophenol	340	U	340	340	U	340	330	U	330	330	U	330
2-Methylnaphthalene	340	U	340	340	U	340	330	U	330	330	U	330
2-Methylphenol (cresol, o-)	340	U	340	340	U	340	330	U	330	330	U	330
2-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
2-Nitrophenol	340	U	340	340	U	340	330	U	330	330	U	330
3,3'-Dichlorobenzidine	340	U	340	340	U	340	330	U	330	330	U	330
3-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	840	U	840	840	U	840
4-Bromophenyl-phenylether	340	U	340	340	U	340	330	U	330	330	U	330
4-Chloro-3-methylphenol	340	U	340	340	U	340	330	U	330	330	U	330
4-Chloroaniline	340	U	340	340	U	340	330	U	330	330	U	330
4-Chlorophenyl-phenylether	340	U	340	340	U	340	330	U	330	330	U	330
4-Methylphenol (p-cresol)	340	U	340	340	U	340	330	U	330	330	U	330
4-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4-Nitrophenol	840	U	840	840	U	840	840	U	840	840	U	840
Acenaphthene	340	U	340	340	U	340	330	U	330	330	U	330
Acenaphthylene	340	U	340	340	U	340	330	U	330	330	U	330
Anthracene	340	U	340	340	U	340	330	U	330	330	U	330
Benzo(a)anthracene	340	U	340	340	U	340	180	J	330	330	U	330
Benzo(a)pyrene	340	U	340	340	U	340	120	J	330	330	U	330
Benzo(b)fluoranthene	340	U	340	340	U	340	140	J	330	330	U	330
Benzo(g,h,i)perylene	340	U	340	340	U	340	51	J	330	330	U	330
Benzo(k)fluoranthene	340	U	340	340	U	340	140	J	330	330	U	330
bis(2-Chloro-1-methylethyl)ether	340	U	340	340	U	340	330	U	330	330	U	330
bis(2-Chloroethoxy)methane	340	U	340	340	U	340	330	U	330	330	U	330
bis(2-Chloroethyl)ether	340	U	340	340	U	340	330	U	330	330	U	330
bis(2-Ethylhexyl)phthalate	20	JB	340	400	B	340	330	U	330	30	J	330

118-C-1 Verification Sampling Results.

Constituents	J13506 Area 2 A3 Sample Date 8/17/06			J13507 Area 2 A4 Sample Date 8/17/06			J13510 Area 3 A1 Sample Date 8/21/06			J13511 Area 3 A2 Sample Date 8/21/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	340	U	340	340	U	340	330	U	330	330	U	330
Carbazole	340	U	340	340	U	340	330	U	330	330	U	330
Chrysene	340	U	340	340	U	340	210	J	330	330	U	330
Di-n-butylphthalate	340	U	340	340	U	340	51	J	330	330	U	330
Di-n-octylphthalate	340	U	340	340	U	340	330	U	330	330	U	330
Dibenz(a,h)anthracene	340	U	340	340	U	340	330	U	330	330	U	330
Dibenzofuran	340	U	340	340	U	340	330	U	330	330	U	330
Diethylphthalate	340	U	340	340	U	340	330	U	330	330	U	330
Dimethylphthalate	340	U	340	340	U	340	330	U	330	330	U	330
Fluoranthene	340	U	340	340	U	340	320	J	330	330	U	330
Fluorene	340	U	340	340	U	340	330	U	330	330	U	330
Hexachlorobenzene	340	U	340	340	U	340	330	U	330	330	U	330
Hexachlorobutadiene	340	U	340	340	U	340	330	U	330	330	U	330
Hexachlorocyclopentadiene	340	U	340	340	U	340	330	U	330	330	U	330
Hexachloroethane	340	U	340	340	U	340	330	U	330	330	U	330
Indeno(1,2,3-cd)pyrene	340	U	340	340	U	340	46	J	330	330	U	330
Isophorone	340	U	340	340	U	340	330	U	330	330	U	330
N-Nitroso-di-n-dipropylamine	340	U	340	340	U	340	330	U	330	330	U	330
N-Nitrosodiphenylamine	340	U	340	340	U	340	330	U	330	330	U	330
Naphthalene	340	U	340	340	U	340	330	U	330	330	U	330
Nitrobenzene	340	U	340	340	U	340	330	U	330	330	U	330
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	340	U	340	340	U	340	55	J	330	330	U	330
Phenol	340	U	340	340	U	340	330	U	330	330	U	330
Pyrene	340	U	340	340	U	340	320	J	330	330	U	330

118-C-1 Verification Sampling Results.

Constituents	J135R2 Area 2 A3 Sample Date 8/28/06			J135R3 Area 2 A4 Sample Date 8/28/06			J135R4 Area 3 A1 Sample Date 8/21/06			J135R5 Area 3 A2 Sample Date 8/28/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	6	U	6	6	U	6	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	6	UJ	6	6	UJ	6	5	UJ	5	5	UJ	5
1,1,2-Trichloroethane	6	U	6	6	U	6	5	U	5	5	U	5
1,1-Dichloroethane	6	U	6	6	U	6	5	U	5	5	U	5
1,1-Dichloroethene	6	U	6	6	U	6	5	U	5	5	U	5
1,2-Dichloroethane	6	U	6	6	U	6	5	U	5	5	U	5
1,2-Dichloroethene (total)	6	U	6	6	U	6	5	U	5	5	U	5
1,2-Dichloropropane	6	U	6	6	U	6	5	U	5	5	U	5
2-Butanone	11	U	11	11	U	11	10	U	10	10	U	10
2-Hexanone	11	U	11	11	U	11	10	U	10	10	U	10
4-Methyl-2-pentanone	11	U	11	11	U	11	10	U	10	10	U	10
Acetone	11	U	11	11	U	11	10	U	10	10	U	10
Benzene	6	U	6	6	U	6	5	U	5	5	U	5
Bromodichloromethane	6	U	6	6	U	6	5	U	5	5	U	5
Bromoform	6	U	6	6	U	6	5	U	5	5	U	5
Bromomethane	11	U	11	11	U	11	10	U	10	10	U	10
Carbon disulfide	6	U	6	6	U	6	5	U	5	5	U	5
Carbon tetrachloride	6	U	6	6	U	6	5	U	5	5	U	5
Chlorobenzene	6	U	6	6	U	6	5	U	5	5	U	5
Chloroethane	11	U	11	11	U	11	10	U	10	10	U	10
Chloroform	6	U	6	6	U	6	5	U	5	5	U	5
Chloromethane	11	U	11	11	U	11	10	U	10	10	U	10
cis-1,2-Dichloroethylene	6	U	6	6	U	6	5	U	5	5	U	5
cis-1,3-Dichloropropene	6	U	6	6	U	6	5	U	5	5	U	5
Dibromochloromethane	6	U	6	6	U	6	5	U	5	5	U	5
Ethylbenzene	6	U	6	6	U	6	5	U	5	5	U	5
Methylene chloride	9	B	6	14	B	6	12	B	5	8	B	5
Styrene	6	U	6	6	U	6	5	U	5	5	U	5
Tetrachloroethene	6	U	6	6	U	6	5	U	5	5	U	5
Toluene	6	U	6	6	U	6	5	U	5	5	U	5
trans-1,2-Dichloroethylene	6	U	6	6	U	6	5	U	5	5	U	5
trans-1,3-Dichloropropene	6	U	6	6	U	6	5	U	5	5	U	5
Trichloroethene	6	U	6	6	U	6	5	U	5	5	U	5
Vinyl chloride	11	U	11	11	U	11	10	U	10	10	U	10
Xylenes (total)	6	U	6	6	U	6	5	U	5	5	U	5

118-C-1 Verification Sampling Results.

Constituents	J13512 Area 3 A3 Sample Date 8/21/06			J13513 Area 3 A4 Sample Date 8/21/06			J13514 Area 4 A1 Sample Date 8/21/06			J13515 Area 4 A2 Sample Date 8/21/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	62		13	21		13	13	U	13	6.4	J	13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	340	U	340	330	U	330	330	U	330	330	U	330
1,2-Dichlorobenzene	340	U	340	330	U	330	330	U	330	330	U	330
1,3-Dichlorobenzene	340	U	340	330	U	330	330	U	330	330	U	330
1,4-Dichlorobenzene	340	U	340	330	U	330	330	U	330	330	U	330
2,4,5-Trichlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
2,4,6-Trichlorophenol	340	U	340	330	U	330	330	U	330	330	U	330
2,4-Dichlorophenol	340	U	340	330	U	330	330	U	330	330	U	330
2,4-Dimethylphenol	340	U	340	330	U	330	330	U	330	330	U	330
2,4-Dinitrophenol	840	UJ	840	840	UJ	840	840	UJ	840	840	UJ	840
2,4-Dinitrotoluene	340	U	340	330	U	330	330	U	330	330	U	330
2,6-Dinitrotoluene	340	U	340	330	U	330	330	U	330	330	U	330
2-Chloronaphthalene	340	U	340	330	U	330	330	U	330	330	U	330
2-Chlorophenol	340	U	340	330	U	330	330	U	330	330	U	330
2-Methylnaphthalene	340	U	340	330	U	330	330	U	330	330	U	330
2-Methylphenol (cresol, o-)	340	U	340	330	U	330	330	U	330	330	U	330
2-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
2-Nitrophenol	340	U	340	330	U	330	330	U	330	330	U	330
3,3'-Dichlorobenzidine	340	U	340	330	U	330	330	U	330	330	U	330
3-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	840	U	840	840	U	840
4-Bromophenyl-phenylether	340	U	340	330	U	330	330	U	330	330	U	330
4-Chloro-3-methylphenol	340	U	340	330	U	330	330	U	330	330	U	330
4-Chloroaniline	340	U	340	330	U	330	330	U	330	330	U	330
4-Chlorophenyl-phenylether	340	U	340	330	U	330	330	U	330	330	U	330
4-Methylphenol (p-cresol)	340	U	340	330	U	330	330	U	330	330	U	330
4-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4-Nitrophenol	840	U	840	840	U	840	840	U	840	840	U	840
Acenaphthene	340	U	340	330	U	330	330	U	330	330	U	330
Acenaphthylene	340	U	340	330	U	330	330	U	330	330	U	330
Anthracene	340	U	340	330	U	330	330	U	330	330	U	330
Benzo(a)anthracene	340	U	340	330	U	330	330	U	330	130	J	330
Benzo(a)pyrene	340	U	340	330	U	330	330	U	330	83	J	330
Benzo(b)fluoranthene	340	U	340	330	U	330	330	U	330	110	J	330
Benzo(g,h,i)perylene	340	U	340	330	U	330	330	U	330	37	J	330
Benzo(k)fluoranthene	340	U	340	330	U	330	330	U	330	92	J	330
bis(2-Chloro-1-methylethyl)ether	340	U	340	330	U	330	330	U	330	330	U	330
bis(2-Chloroethoxy)methane	340	U	340	330	U	330	330	U	330	330	U	330
bis(2-Chloroethyl)ether	340	U	340	330	U	330	330	U	330	330	U	330
bis(2-Ethylhexyl)phthalate	340	U	340	240	J	330	17	J	330	330	U	330

118-C-1 Verification Sampling Results.

Constituents	J13512 Area 3 A3 Sample Date 8/21/06			J13513 Area 3 A4 Sample Date 8/21/06			J13514 Area 4 A1 Sample Date 8/21/06			J13515 Area 4 A2 Sample Date 8/21/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	340	U	340	38	J	330	330	U	330	330	U	330
Carbazole	340	U	340	330	U	330	330	U	330	330	U	330
Chrysene	340	U	340	330	U	330	330	U	330	170	J	330
Di-n-butylphthalate	25	J	340	63	J	330	330	U	330	330	U	330
Di-n-octylphthalate	340	U	340	330	U	330	330	U	330	330	U	330
Dibenz(a,h)anthracene	340	U	340	330	U	330	330	U	330	330	U	330
Dibenzofuran	340	U	340	330	U	330	330	U	330	330	U	330
Diethylphthalate	340	U	340	330	U	330	330	U	330	330	U	330
Dimethylphthalate	340	U	340	330	U	330	330	U	330	330	U	330
Fluoranthene	340	U	340	330	U	330	330	U	330	330		330
Fluorene	340	U	340	330	U	330	330	U	330	330	U	330
Hexachlorobenzene	340	U	340	330	U	330	330	U	330	330	U	330
Hexachlorobutadiene	340	U	340	330	U	330	330	U	330	330	U	330
Hexachlorocyclopentadiene	340	U	340	330	U	330	330	U	330	330	U	330
Hexachloroethane	340	U	340	330	U	330	330	U	330	330	U	330
Indeno(1,2,3-cd)pyrene	340	U	340	330	U	330	330	U	330	35	J	330
Isophorone	340	U	340	330	U	330	330	U	330	330	U	330
N-Nitroso-di-n-dipropylamine	340	U	340	330	U	330	330	U	330	330	U	330
N-Nitrosodiphenylamine	340	U	340	330	U	330	330	U	330	330	U	330
Naphthalene	340	U	340	330	U	330	330	U	330	330	U	330
Nitrobenzene	340	U	340	330	U	330	330	U	330	330	U	330
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	340	U	340	330	U	330	330	U	330	97	J	330
Phenol	340	U	340	330	U	330	330	U	330	330	U	330
Pyrene	340	U	340	330	U	330	330	U	330	350		330

118-C-1 Verification Sampling Results.

Constituents	J135R6 Area 3 A3 Sample Date 8/28/06			J135R7 Area 3 A4 Sample Date 8/28/06			J135R8 Area 4 A1 Sample Date 8/28/06			J135R9 Area 4 A2 Sample Date 8/28/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	5	UJ	5	5	UJ	5	5	UJ	5	5	UJ	5
1,1,2-Trichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1-Dichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1-Dichloroethene	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloroethene (total)	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloropropane	5	U	5	5	U	5	5	U	5	5	U	5
2-Butanone	10	U	10	10	U	10	10	U	10	10	U	10
2-Hexanone	10	U	10	10	U	10	10	U	10	10	U	10
4-Methyl-2-pentanone	10	U	10	10	U	10	10	U	10	10	U	10
Acetone	10	U	10	11	J	10	13	J	10	10	U	10
Benzene	5	U	5	5	U	5	5	U	5	1	J	5
Bromodichloromethane	5	U	5	5	U	5	5	U	5	5	U	5
Bromoform	5	U	5	5	U	5	5	U	5	5	U	5
Bromomethane	10	U	10	10	U	10	10	U	10	10	U	10
Carbon disulfide	5	U	5	5	U	5	5	U	5	5	U	5
Carbon tetrachloride	5	U	5	5	U	5	5	U	5	5	U	5
Chlorobenzene	5	U	5	5	U	5	5	U	5	5	U	5
Chloroethane	10	U	10	10	U	10	10	U	10	10	U	10
Chloroform	5	U	5	5	U	5	5	U	5	5	U	5
Chloromethane	10	U	10	10	U	10	10	U	10	10	U	10
cis-1,2-Dichloroethylene	5	U	5	5	U	5	5	U	5	5	U	5
cis-1,3-Dichloropropene	5	U	5	5	U	5	5	U	5	5	U	5
Dibromochloromethane	5	U	5	5	U	5	5	U	5	5	U	5
Ethylbenzene	5	U	5	5	U	5	5	U	5	5	U	5
Methylene chloride	9	B	5	10	B	5	13	B	5	12	B	5
Styrene	5	U	5	5	U	5	5	U	5	5	U	5
Tetrachloroethene	5	U	5	5	U	5	5	U	5	5	U	5
Toluene	5	U	5	5	U	5	5	U	5	5	U	5
trans-1,2-Dichloroethylene	5	U	5	5	U	5	5	U	5	5	U	5
trans-1,3-Dichloropropene	5	U	5	5	U	5	5	U	5	5	U	5
Trichloroethene	5	U	5	5	U	5	5	U	5	5	U	5
Vinyl chloride	10	U	10	10	U	10	10	U	10	10	U	10
Xylenes (total)	5	U	5	5	U	5	5	U	5	1	J	5

118-C-1 Verification Sampling Results.

Constituents	J13516 Area 4 A3 Sample Date 8/21/06			J13517 Area 4 A4 Sample Date 8/21/06			J13518 OB/BCL A1 Sample Date 8/22/06			J13519 OB/BCL A2 Sample Date 8/22/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	13	U	13	16		13	13	U	13	4.9	J	13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	U	330	330	U	330	330	U	330	340	U	340
1,2-Dichlorobenzene	330	U	330	330	U	330	330	U	330	340	U	340
1,3-Dichlorobenzene	330	U	330	330	U	330	330	U	330	340	U	340
1,4-Dichlorobenzene	330	U	330	330	U	330	330	U	330	340	U	340
2,4,5-Trichlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
2,4,6-Trichlorophenol	330	U	330	330	U	330	330	U	330	340	U	340
2,4-Dichlorophenol	330	U	330	330	U	330	330	U	330	340	U	340
2,4-Dimethylphenol	330	U	330	330	U	330	330	U	330	340	U	340
2,4-Dinitrophenol	840	UJ	840	840	UJ	840	840	U	840	840	U	840
2,4-Dinitrotoluene	330	U	330	330	U	330	330	U	330	340	U	340
2,6-Dinitrotoluene	330	U	330	330	U	330	330	U	330	340	U	340
2-Chloronaphthalene	330	U	330	330	U	330	330	U	330	340	U	340
2-Chlorophenol	330	U	330	330	U	330	330	U	330	340	U	340
2-Methylnaphthalene	330	U	330	330	U	330	330	U	330	340	U	340
2-Methylphenol (cresol, o-)	330	U	330	330	U	330	330	U	330	340	U	340
2-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
2-Nitrophenol	330	U	330	330	U	330	330	U	330	340	U	340
3,3'-Dichlorobenzidine	330	U	330	330	U	330	330	U	330	340	U	340
3-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	840	U	840	840	U	840
4-Bromophenyl-phenylether	330	U	330	330	U	330	330	U	330	340	U	340
4-Chloro-3-methylphenol	330	U	330	330	U	330	330	U	330	340	U	340
4-Chloroaniline	330	U	330	330	U	330	330	U	330	340	U	340
4-Chlorophenyl-phenylether	330	U	330	330	U	330	330	U	330	340	U	340
4-Methylphenol (p-cresol)	330	U	330	330	U	330	330	U	330	340	U	340
4-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4-Nitrophenol	840	U	840	840	U	840	840	U	840	840	U	840
Acenaphthene	330	U	330	330	U	330	330	U	330	340	U	340
Acenaphthylene	330	U	330	330	U	330	330	U	330	340	U	340
Anthracene	330	U	330	330	U	330	330	U	330	340	U	340
Benzo(a)anthracene	330	U	330	330	U	330	330	U	330	340	U	340
Benzo(a)pyrene	330	U	330	330	U	330	330	U	330	340	U	340
Benzo(b)fluoranthene	330	U	330	330	U	330	330	U	330	340	U	340
Benzo(g,h,i)perylene	330	U	330	330	U	330	330	U	330	340	U	340
Benzo(k)fluoranthene	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Chloro-1-methylethyl)ether	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Chloroethoxy)methane	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Chloroethyl)ether	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Ethylhexyl)phthalate	330	U	330	330	U	330	330	U	330	330	U	340

118-C-1 Verification Sampling Results.

Constituents	J13516 Area 4 A3 Sample Date 8/21/06			J13517 Area 4 A4 Sample Date 8/21/06			J13518 OB/BCL A1 Sample Date 8/22/06			J13519 OB/BCL A2 Sample Date 8/22/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Carbazole	330	U	330	330	U	330	330	U	330	340	U	340
Chrysene	330	U	330	330	U	330	330	U	330	340	U	340
Di-n-butylphthalate	330	U	330	26	J	330	330	U	330	330	U	340
Di-n-octylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Dibenz(a,h)anthracene	330	U	330	330	U	330	330	U	330	340	U	340
Dibenzofuran	330	U	330	330	U	330	330	U	330	340	U	340
Diethylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Dimethylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Fluoranthene	330	U	330	330	U	330	330	UJ	330	340	UJ	340
Fluorene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachlorobenzene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachlorobutadiene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachlorocyclopentadiene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachloroethane	330	U	330	330	U	330	330	U	330	340	U	340
Indeno(1,2,3-cd)pyrene	330	U	330	330	U	330	330	U	330	340	U	340
Isophorone	330	U	330	330	U	330	330	U	330	340	U	340
N-Nitroso-di-n-dipropylamine	330	U	330	330	U	330	330	U	330	340	U	340
N-Nitrosodiphenylamine	330	U	330	330	U	330	330	U	330	340	U	340
Naphthalene	330	U	330	330	U	330	330	U	330	340	U	340
Nitrobenzene	330	U	330	330	U	330	330	U	330	340	U	340
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	330	U	330	330	U	330	330	UJ	330	340	UJ	340
Phenol	330	U	330	330	U	330	330	U	330	340	U	340
Pyrene	330	U	330	330	U	330	330	UJ	330	340	UJ	340

118-C-1 Verification Sampling Results.

Constituents	J135T0 Area 4 A3 Sample Date 8/28/06			J135T1 Area 4 A4 Sample Date 8/28/06			J135T2 OB/BCL A1 Sample Date 8/28/06			J135T3 OB/BCL A2 Sample Date 8/28/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	6	U	6	6	U	6	5	U	5	6	U	6
1,1,2,2-Tetrachloroethane	6	UJ	6	6	UJ	6	5	UJ	5	6	UJ	6
1,1,2-Trichloroethane	6	U	6	6	U	6	5	U	5	6	U	6
1,1-Dichloroethane	6	U	6	6	U	6	5	U	5	6	U	6
1,1-Dichloroethene	6	U	6	6	U	6	5	U	5	6	U	6
1,2-Dichloroethane	6	U	6	6	U	6	5	U	5	6	U	6
1,2-Dichloroethene (total)	6	U	6	6	U	6	5	U	5	6	U	6
1,2-Dichloropropane	6	U	6	6	U	6	5	U	5	6	U	6
2-Butanone	11	U	11	11	U	11	10	U	10	11	U	11
2-Hexanone	11	U	11	11	U	11	10	U	10	11	U	11
4-Methyl-2-pentanone	11	U	11	11	U	11	10	U	10	11	U	11
Acetone	9	J	11	9	J	11	10	U	10	11	U	11
Benzene	6	U	6	6	U	6	5	U	5	6	U	6
Bromodichloromethane	6	U	6	6	U	6	5	U	5	6	U	6
Bromoform	6	U	6	6	U	6	5	U	5	6	U	6
Bromomethane	11	U	11	11	U	11	10	U	10	11	U	11
Carbon disulfide	6	U	6	6	U	6	5	U	5	6	U	6
Carbon tetrachloride	6	U	6	6	U	6	5	U	5	6	U	6
Chlorobenzene	6	U	6	6	U	6	5	U	5	6	U	6
Chloroethane	11	U	11	11	U	11	10	U	10	11	U	11
Chloroform	6	U	6	6	U	6	5	U	5	6	U	6
Chloromethane	11	U	11	11	U	11	10	U	10	11	U	11
cis-1,2-Dichloroethylene	6	U	6	6	U	6	5	U	5	6	U	6
cis-1,3-Dichloropropene	6	U	6	6	U	6	5	U	5	6	U	6
Dibromochloromethane	6	U	6	6	U	6	5	U	5	6	U	6
Ethylbenzene	6	U	6	6	U	6	5	U	5	6	U	6
Methylene chloride	14	B	6	11	B	6	9	B	5	8	B	6
Styrene	6	U	6	6	U	6	5	U	5	6	U	6
Tetrachloroethene	6	U	6	6	U	6	5	U	5	6	U	6
Toluene	6	U	6	6	U	6	5	U	5	6	U	6
trans-1,2-Dichloroethylene	6	U	6	6	U	6	5	U	5	6	U	6
trans-1,3-Dichloropropene	6	U	6	6	U	6	5	U	5	6	U	6
Trichloroethene	6	U	6	6	U	6	5	U	5	6	U	6
Vinyl chloride	11	U	11	11	U	11	10	U	10	11	U	11
Xylenes (total)	6	U	6	6	U	6	5	U	5	6	U	6

118-C-1 Verification Sampling Results.

Constituents	J13520 OB/BCL A3 Sample Date 8/22/06			J135N5 OB/BCL A4 Sample Date 8/22/06			J13522 SPA A1 Sample Date 9/11/06			J13523 SPA A2 Sample Date 9/11/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	5.3	J	13	13	U	13	13	U	13	13	U	13
Aroclor-1260	13	U	13	13	U	13	3.7	J	13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
1,2-Dichlorobenzene	330	U	330	330	U	330	330	U	330	330	U	330
1,3-Dichlorobenzene	330	U	330	330	U	330	330	U	330	330	U	330
1,4-Dichlorobenzene	330	U	330	330	U	330	330	U	330	330	U	330
2,4,5-Trichlorophenol	840	U	840	830	U	830	840	U	840	840	U	840
2,4,6-Trichlorophenol	330	U	330	330	U	330	330	U	330	330	U	330
2,4-Dichlorophenol	330	U	330	330	U	330	330	UJ	330	330	UJ	330
2,4-Dimethylphenol	330	U	330	330	U	330	330	UJ	330	330	UJ	330
2,4-Dinitrophenol	840	U	840	830	U	830	840	UR	840	840	UR	840
2,4-Dinitrotoluene	330	U	330	330	U	330	330	U	330	330	U	330
2,6-Dinitrotoluene	330	U	330	330	U	330	330	U	330	330	U	330
2-Chloronaphthalene	330	U	330	330	U	330	330	U	330	330	U	330
2-Chlorophenol	330	U	330	330	U	330	330	U	330	330	U	330
2-Methylnaphthalene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
2-Methylphenol (cresol, o-)	330	U	330	330	U	330	330	UJ	330	330	UJ	330
2-Nitroaniline	840	U	840	830	U	830	840	U	840	840	U	840
2-Nitrophenol	330	U	330	330	U	330	330	UJ	330	330	UJ	330
3,3'-Dichlorobenzidine	330	U	330	330	U	330	330	U	330	330	U	330
3-Nitroaniline	840	U	840	830	U	830	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	830	U	830	840	U	840	840	U	840
4-Bromophenyl-phenylether	330	U	330	330	U	330	330	U	330	330	U	330
4-Chloro-3-methylphenol	330	U	330	330	U	330	330	UJ	330	330	UJ	330
4-Chloroaniline	330	U	330	330	U	330	330	U	330	330	U	330
4-Chlorophenyl-phenylether	330	U	330	330	U	330	330	U	330	330	U	330
4-Methylphenol (p-cresol)	330	U	330	330	U	330	330	UJ	330	330	UJ	330
4-Nitroaniline	840	U	840	830	U	830	840	U	840	840	U	840
4-Nitrophenol	840	U	840	830	U	830	840	U	840	840	U	840
Acenaphthene	330	U	330	330	U	330	330	U	330	330	U	330
Acenaphthylene	330	U	330	330	U	330	330	U	330	330	U	330
Anthracene	330	U	330	330	U	330	330	U	330	330	U	330
Benzo(a)anthracene	330	U	330	38	J	330	46	J	330	33	J	330
Benzo(a)pyrene	330	U	330	24	J	330	19	J	330	30	J	330
Benzo(b)fluoranthene	330	U	330	33	J	330	43	J	330	32	J	330
Benzo(g,h,i)perylene	330	U	330	330	U	330	19	J	330	22		330
Benzo(k)fluoranthene	330	U	330	29	J	330	41	J	330	31	J	330
bis(2-Chloro-1-methylethyl)ether	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Chloroethoxy)methane	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Chloroethyl)ether	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Ethylhexyl)phthalate	330	U	330	330	U	330	71	JB	330	36	JB	330

118-C-1 Verification Sampling Results.

Constituents	J13520 OB/BCL A3 Sample Date 8/22/06			J135N5 OB/BCL A4 Sample Date 8/22/06			J13522 SPA A1 Sample Date 9/11/06			J13523 SPA A2 Sample Date 9/11/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Carbazole	330	U	330	330	U	330	330	U	330	330	U	330
Chrysene	330	U	330	52	J	330	76	J	330	40	J	330
Di-n-butylphthalate	330	U	330	330	U	330	23	JB	330	27	JB	330
Di-n-octylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Dibenz(a,h)anthracene	330	U	330	330	U	330	330	U	330	330	U	330
Dibenzofuran	330	U	330	330	U	330	330	U	330	330	U	330
Diethylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Dimethylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Fluoranthene	330	UJ	330	110	J	330	110	J	330	56	J	330
Fluorene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorobenzene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorobutadiene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorocyclopentadiene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachloroethane	330	U	330	330	U	330	330	U	330	330	U	330
Indeno(1,2,3-cd)pyrene	330	U	330	330	U	330	17	J	330	330	U	330
Isophorone	330	U	330	330	U	330	330	UJ	330	330	UJ	330
N-Nitroso-di-n-dipropylamine	330	U	330	330	U	330	330	U	330	330	U	330
N-Nitrosodiphenylamine	330	U	330	330	U	330	330	U	330	330	U	330
Naphthalene	330	U	330	330	U	330	330	U	330	330	U	330
Nitrobenzene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
Pentachlorophenol	840	U	840	830	U	830	840	U	840	840	U	840
Phenanthrene	330	UJ	330	37	J	330	27	J	330	330	U	330
Phenol	330	U	330	330	U	330	330	U	330	330	U	330
Pyrene	330	UJ	330	57	J	330	78	J	330	57	J	330

118-C-1 Verification Sampling Results.

Constituents	J135T4 OB/BCL A3 Sample Date 8/28/06			J135T5 OB/BCL A4 Sample Date 8/28/06			J13522 SPA A1 Sample Date 9/11/06			J13523 SPA A2 Sample Date 9/11/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	6	U	6	5	U	5	6	U	6	5	U	5
1,1,2,2-Tetrachloroethane	6	UJ	6	5	UJ	5	6	UJ	6	5	UJ	5
1,1,2-Trichloroethane	6	U	6	5	U	5	6	U	6	5	U	5
1,1-Dichloroethane	6	U	6	5	U	5	6	U	6	5	U	5
1,1-Dichloroethene	6	U	6	5	U	5	6	U	6	5	U	5
1,2-Dichloroethane	6	U	6	5	U	5	6	U	6	5	U	5
1,2-Dichloroethene (total)	6	U	6	5	U	5	6	U	6	5	U	5
1,2-Dichloropropane	6	U	6	5	U	5	6	U	6	5	U	5
2-Butanone	11	U	11	10	U	10	11	U	11	10	U	10
2-Hexanone	11	U	11	10	U	10	11	U	11	10	U	10
4-Methyl-2-pentanone	11	U	11	10	U	10	11	U	11	10	U	10
Acetone	12	J	11	11	J	10	25	J	11	10	U	10
Benzene	6	U	6	5	U	5	6	U	6	5	U	5
Bromodichloromethane	6	U	6	5	U	5	6	U	6	5	U	5
Bromoform	6	U	6	5	U	5	6	U	6	5	U	5
Bromomethane	11	U	11	10	U	10	11	U	11	10	U	10
Carbon disulfide	6	U	6	5	U	5	6	U	6	5	U	5
Carbon tetrachloride	6	U	6	5	U	5	6	U	6	5	U	5
Chlorobenzene	6	U	6	5	U	5	6	U	6	5	U	5
Chloroethane	11	U	11	10	U	10	11	U	11	10	U	10
Chloroform	6	U	6	5	U	5	6	U	6	5	U	5
Chloromethane	11	U	11	10	U	10	11	U	11	10	U	10
cis-1,2-Dichloroethylene	6	U	6	5	U	5	6	U	6	5	U	5
cis-1,3-Dichloropropene	6	U	6	5	U	5	6	U	6	5	U	5
Dibromochloromethane	6	U	6	5	U	5	6	U	6	5	U	5
Ethylbenzene	6	U	6	5	U	5	6	U	6	5	U	5
Methylene chloride	12	B	6	13	B	5	11	B	6	8	B	5
Styrene	6	U	6	5	U	5	6	U	6	5	U	5
Tetrachloroethene	6	U	6	5	U	5	6	U	6	5	U	5
Toluene	6	U	6	5	U	5	1	J	6	5	U	5
trans-1,2-Dichloroethylene	6	U	6	5	U	5	6	U	6	5	U	5
trans-1,3-Dichloropropene	6	U	6	5	U	5	6	U	6	5	U	5
Trichloroethene	6	U	6	5	U	5	6	U	6	5	U	5
Vinyl chloride	11	U	11	10	U	10	11	U	11	10	U	10
Xylenes (total)	6	U	6	5	U	5	6	U	6	5	U	5

118-C-1 Verification Sampling Results.

Constituents	J135P1 SPA A3 Sample Date 9/12/06			J135P0 SPA A4 Sample Date 9/12/06			J13524 SPA B5 Sample Date 9/11/06			J13525 SPA B6 Sample Date 9/11/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	13	U	13	13	U	13	13	U	13	13	J	13
Aroclor-1260	13	U	13	31		13	61		13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
1,2-Dichlorobenzene	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
1,3-Dichlorobenzene	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
1,4-Dichlorobenzene	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
2,4,5-Trichlorophenol	840	U	840	1700	UD	1700	840	U	840	840	U	840
2,4,6-Trichlorophenol	330	U	330	670	UD	670	330	U	330	330	U	330
2,4-Dichlorophenol	330	U	330	670	UD	670	330	UJ	330	330	UJ	330
2,4-Dimethylphenol	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
2,4-Dinitrophenol	840	UJ	840	1700	UDJ	1700	840	UR	840	840	UR	840
2,4-Dinitrotoluene	330	U	330	670	UD	670	330	U	330	330	U	330
2,6-Dinitrotoluene	330	U	330	670	UD	670	330	U	330	330	U	330
2-Chloronaphthalene	330	U	330	670	UD	670	330	U	330	330	U	330
2-Chlorophenol	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
2-Methylnaphthalene	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
2-Methylphenol (cresol, o-)	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
2-Nitroaniline	840	U	840	1700	UD	1700	840	U	840	840	U	840
2-Nitrophenol	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
3,3'-Dichlorobenzidine	330	U	330	670	UD	670	330	U	330	330	U	330
3-Nitroaniline	840	U	840	1700	UD	1700	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	1700	UD	1700	840	U	840	840	U	840
4-Bromophenyl-phenylether	330	U	330	670	UD	670	330	U	330	330	U	330
4-Chloro-3-methylphenol	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
4-Chloroaniline	330	U	330	670	UD	670	330	U	330	330	U	330
4-Chlorophenyl-phenylether	330	U	330	670	UD	670	330	U	330	330	U	330
4-Methylphenol (p-cresol)	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
4-Nitroaniline	840	U	840	1700	UD	1700	840	U	840	840	U	840
4-Nitrophenol	840	U	840	1700	UD	1700	840	U	840	840	U	840
Acenaphthene	330	U	330	670	UD	670	330	U	330	330	U	330
Acenaphthylene	330	U	330	670	UD	670	330	U	330	330	U	330
Anthracene	330	UJ	330	170	JD	670	330	U	330	330	U	330
Benzo(a)anthracene	37	J	330	660	JD	670	25	J	330	27	J	330
Benzo(a)pyrene	330	UJ	330	320	JD	670	330	U	330	20	J	330
Benzo(b)fluoranthene	25	J	330	390	JD	670	27	J	330	27	J	330
Benzo(g,h,i)perylene	330	U	330	140	JD	670	330	U	330	330	U	330
Benzo(k)fluoranthene	27	J	330	360	JD	670	24	J	330	23	J	330
bis(2-Chloro-1-methylethyl)ether	330	U	330	670	UD	670	330	U	330	330	U	330
bis(2-Chloroethoxy)methane	330	U	330	670	UD	670	330	U	330	330	U	330
bis(2-Chloroethyl)ether	330	U	330	670	UD	670	330	U	330	330	U	330
bis(2-Ethylhexyl)phthalate	42	JB	330	50	JBD	670	35	JB	330	59	JB	330

118-C-1 Verification Sampling Results.

Constituents	J135P1 SPA A3 Sample Date 9/12/06			J135P0 SPA A4 Sample Date 9/12/06			J13524 SPA B5 Sample Date 9/11/06			J13525 SPA B6 Sample Date 9/11/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	17	J	330	670	UD	670	330	U	330	330	U	330
Carbazole	330	UJ	330	47	JD	670	330	U	330	330	U	330
Chrysene	51	J	330	790	JD	670	43	J	330	39	J	330
Di-n-butylphthalate	27	JB	330	670	UD	670	27	JB	330	39	JB	330
Di-n-octylphthalate	330	U	330	670	UD	670	330	U	330	330	U	330
Dibenz(a,h)anthracene	330	U	330	75	JD	670	330	U	330	330	U	330
Dibenzofuran	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
Diethylphthalate	330	U	330	670	UD	670	330	U	330	330	U	330
Dimethylphthalate	330	U	330	670	UD	670	330	U	330	330	U	330
Fluoranthene	73	JR	330	1400	DR	670	48	J	330	59	J	330
Fluorene	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
Hexachlorobenzene	330	U	330	670	UD	670	330	U	330	330	U	330
Hexachlorobutadiene	330	U	330	670	UD	670	330	U	330	330	U	330
Hexachlorocyclopentadiene	330	U	330	670	UD	670	330	U	330	330	U	330
Hexachloroethane	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
Indeno(1,2,3-cd)pyrene	330	UJ	330	150	JD	670	330	U	330	330	U	330
Isophorone	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
N-Nitroso-di-n-dipropylamine	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
N-Nitrosodiphenylamine	330	U	330	670	UD	670	330	U	330	330	U	330
Naphthalene	330	U	330	670	UD	670	330	U	330	330	U	330
Nitrobenzene	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
Pentachlorophenol	840	U	840	1700	UD	1700	840	U	840	840	U	840
Phenanthrene	26	J	330	710	D	670	330	U	330	19	J	330
Phenol	330	UJ	330	670	UDJ	670	24	J	330	330	U	330
Pyrene	60	J	330	1700	D	670	38	J	330	51	J	330

118-C-1 Verification Sampling Results.

Constituents	J135P1 SPA A3 Sample Date 9/12/06			J135P0 SPA A4 Sample Date 9/12/06			J13524 SPA B5 Sample Date 9/11/06			J13525 SPA B6 Sample Date 9/11/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	5	U	5	5	U	5	5	UJ	5	5	UJ	5
1,1,2-Trichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1-Dichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1-Dichloroethene	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloroethene (total)	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloropropane	5	U	5	5	U	5	5	U	5	5	U	5
2-Butanone	4	J	10	10	U	10	10	U	10	10	U	10
2-Hexanone	10	U	10	10	U	10	10	U	10	10	U	10
4-Methyl-2-pentanone	10	U	10	10	U	10	10	U	10	10	U	10
Acetone	14		10	9	J	10	10	U	10	10	U	10
Benzene	5	U	5	5	U	5	5	U	5	5	U	5
Bromodichloromethane	5	U	5	5	U	5	5	U	5	5	U	5
Bromoform	5	U	5	5	U	5	5	U	5	5	U	5
Bromomethane	10	U	10	10	U	10	10	U	10	10	U	10
Carbon disulfide	5	U	5	5	U	5	5	U	5	5	U	5
Carbon tetrachloride	5	U	5	5	U	5	5	U	5	5	U	5
Chlorobenzene	5	U	5	5	U	5	5	U	5	5	U	5
Chloroethane	10	U	10	10	U	10	10	U	10	10	U	10
Chloroform	5	U	5	5	U	5	5	U	5	5	U	5
Chloromethane	10	U	10	10	U	10	10	U	10	10	U	10
cis-1,2-Dichloroethylene	5	U	5	5	U	5	5	U	5	5	U	5
cis-1,3-Dichloropropene	5	U	5	5	U	5	5	U	5	5	U	5
Dibromochloromethane	5	U	5	5	U	5	5	U	5	5	U	5
Ethylbenzene	5	U	5	5	U	5	5	U	5	5	U	5
Methylene chloride	23	B	5	17	B	5	11	B	5	14	B	5
Styrene	5	U	5	5	U	5	5	U	5	5	U	5
Tetrachloroethene	5	U	5	5	U	5	5	U	5	5	U	5
Toluene	2	J	5	5	U	5	5	U	5	5	U	5
trans-1,2-Dichloroethylene	5	U	5	5	U	5	5	U	5	5	U	5
trans-1,3-Dichloropropene	5	U	5	5	U	5	5	U	5	5	U	5
Trichloroethene	5	U	5	5	U	5	5	U	5	5	U	5
Vinyl chloride	10	U	10	10	U	10	10	U	10	10	U	10
Xylenes (total)	5	U	5	5	U	5	5	U	5	5	U	5

118-C-1 Verification Sampling Results.

Constituents	J135N8 SPA B7 Sample Date 9/11/06			J135N9 SPA B8 Sample Date 9/11/06			J135P2 SPA C9 Sample Date 9/12/06			J135P3 SPA C10 Sample Date 9/12/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	9.5	J	13	19		13	17		13	6.5	J	13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
1,2-Dichlorobenzene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
1,3-Dichlorobenzene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
1,4-Dichlorobenzene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
2,4,5-Trichlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
2,4,6-Trichlorophenol	330	U	330	330	U	330	330	U	330	330	U	330
2,4-Dichlorophenol	330	UJ	330	330	UJ	330	330	U	330	330	U	330
2,4-Dimethylphenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2,4-Dinitrophenol	840	UR	840	840	UR	840	840	UJ	840	840	UJ	840
2,4-Dinitrotoluene	330	U	330	330	U	330	330	U	330	330	U	330
2,6-Dinitrotoluene	330	U	330	330	U	330	330	U	330	330	U	330
2-Chloronaphthalene	330	U	330	330	U	330	330	U	330	330	U	330
2-Chlorophenol	330	U	330	330	U	330	330	UJ	330	330	UJ	330
2-Methylnaphthalene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2-Methylphenol (cresol, o-)	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
2-Nitrophenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
3,3'-Dichlorobenzidine	330	U	330	330	U	330	330	U	330	330	U	330
3-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	840	U	840	840	U	840
4-Bromophenyl-phenylether	330	U	330	330	U	330	330	U	330	330	U	330
4-Chloro-3-methylphenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
4-Chloroaniline	330	U	330	330	U	330	330	U	330	330	U	330
4-Chlorophenyl-phenylether	330	U	330	330	U	330	330	U	330	330	U	330
4-Methylphenol (p-cresol)	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
4-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4-Nitrophenol	840	U	840	840	U	840	840	U	840	840	U	840
Acenaphthene	330	U	330	330	U	330	330	U	330	330	U	330
Acenaphthylene	330	U	330	330	U	330	330	U	330	330	U	330
Anthracene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
Benzo(a)anthracene	330	U	330	61	J	330	330	UJ	330	330	UJ	330
Benzo(a)pyrene	330	U	330	38	J	330	330	UJ	330	330	UJ	330
Benzo(b)fluoranthene	330	U	330	45	J	330	330	UJ	330	330	U	330
Benzo(g,h,i)perylene	330	U	330	22	J	330	330	U	330	330	U	330
Benzo(k)fluoranthene	330	U	330	43	J	330	330	UJ	330	330	UJ	330
bis(2-Chloro-1-methylethyl)ether	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Chloroethoxy)methane	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Chloroethyl)ether	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Ethylhexyl)phthalate	36	JB	330	35	JB	330	30	JB	330	48	JB	330

118-C-1 Verification Sampling Results.

Constituents	J135N8 SPA B7 Sample Date 9/11/06			J135N9 SPA B8 Sample Date 9/11/06			J135P2 SPA C9 Sample Date 9/12/06			J135P3 SPA C10 Sample Date 9/12/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Carbazole	330	U	330	330	U	330	330	UJ	330	330	UJ	330
Chrysene	330	U	330	81	J	330	330	UJ	330	330	UJ	330
Di-n-butylphthalate	32	JB	330	330	U	330	19	JB	330	17	JB	330
Di-n-octylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Dibenz(a,h)anthracene	330	U	330	330	U	330	330	U	330	330	U	330
Dibenzofuran	330	U	330	330	U	330	330	UJ	330	330	UJ	330
Diethylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Dimethylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Fluoranthene	24	J	330	190	J	330	330	U	330	330	U	330
Fluorene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
Hexachlorobenzene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorobutadiene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorocyclopentadiene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachloroethane	330	U	330	330	U	330	330	UJ	330	330	UJ	330
Indeno(1,2,3-cd)pyrene	330	U	330	19	J	330	330	UJ	330	330	UJ	330
Isophorone	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
N-Nitroso-di-n-dipropylamine	330	U	330	330	U	330	330	UJ	330	330	UJ	330
N-Nitrosodiphenylamine	330	U	330	330	U	330	330	U	330	330	U	330
Naphthalene	330	U	330	330	U	330	330	U	330	330	U	330
Nitrobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	330	U	330	71	J	330	330	UJ	330	330	UJ	330
Phenol	330	U	330	330	U	330	330	U	330	330	U	330
Pyrene	21	J	330	130	J	330	330	U	330	330	U	330

118-C-1 Verification Sampling Results.

Constituents	J135N8 SPA B7 Sample Date 9/11/06			J135N9 SPA B8 Sample Date 9/11/06			J135P2 SPA C9 Sample Date 9/12/06			J135P3 SPA C10 Sample Date 9/12/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	5	UJ	5	5	UJ	5	5	U	5	5	U	5
1,1,2-Trichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1-Dichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1-Dichloroethene	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloroethene (total)	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloropropane	5	U	5	5	U	5	5	U	5	5	U	5
2-Butanone	10	U	10	10	U	10	4	J	10	10	U	10
2-Hexanone	10	U	10	10	U	10	10	U	10	10	U	10
4-Methyl-2-pentanone	10	U	10	10	U	10	10	U	10	10	U	10
Acetone	25	J	10	28	J	10	12		10	7	J	10
Benzene	5	U	5	5	U	5	5	U	5	5	U	5
Bromodichloromethane	5	U	5	5	U	5	5	U	5	5	U	5
Bromoform	5	U	5	5	U	5	5	U	5	5	U	5
Bromomethane	10	U	10	10	U	10	10	U	10	10	U	10
Carbon disulfide	5	U	5	5	U	5	5	U	5	5	U	5
Carbon tetrachloride	5	U	5	5	U	5	5	U	5	5	U	5
Chlorobenzene	5	U	5	5	U	5	5	U	5	5	U	5
Chloroethane	10	U	10	10	U	10	10	U	10	10	U	10
Chloroform	5	U	5	5	U	5	5	U	5	5	U	5
Chloromethane	10	U	10	10	U	10	10	U	10	10	U	10
cis-1,2-Dichloroethylene	5	U	5	5	U	5	5	U	5	5	U	5
cis-1,3-Dichloropropene	5	U	5	5	U	5	5	U	5	5	U	5
Dibromochloromethane	5	U	5	5	U	5	5	U	5	5	U	5
Ethylbenzene	5	U	5	5	U	5	5	U	5	5	U	5
Methylene chloride	14	B	5	15	B	5	21	B	5	24	B	5
Styrene	5	U	5	5	U	5	5	U	5	5	U	5
Tetrachloroethene	5	U	5	5	U	5	5	U	5	5	U	5
Toluene	2	J	5	1	J	5	5	U	5	1	J	5
trans-1,2-Dichloroethylene	5	U	5	5	U	5	5	U	5	5	U	5
trans-1,3-Dichloropropene	5	U	5	5	U	5	5	U	5	5	U	5
Trichloroethene	5	U	5	5	U	5	5	U	5	5	U	5
Vinyl chloride	10	U	10	10	U	10	10	U	10	10	U	10
Xylenes (total)	5	U	5	5	U	5	5	U	5	5	U	5

118-C-1 Verification Sampling Results.

Constituents	J135P4 SPA C1 Sample Date 9/12/06			J135P5 SPA C2 Sample Date 9/12/06			J135P6 SPA D3 Sample Date 9/12/06			J135P7 SPA D4 Sample Date 9/12/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	14		13	25		13	20		13	7.9	J	13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
1,2-Dichlorobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
1,3-Dichlorobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
1,4-Dichlorobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2,4,5-Trichlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
2,4,6-Trichlorophenol	330	U	330	330	U	330	330	U	330	330	U	330
2,4-Dichlorophenol	330	U	330	330	U	330	330	U	330	330	U	330
2,4-Dimethylphenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2,4-Dinitrophenol	840	UJ	840	840	UJ	840	840	UJ	840	840	UJ	840
2,4-Dinitrotoluene	330	U	330	330	U	330	330	U	330	330	U	330
2,6-Dinitrotoluene	330	U	330	330	U	330	330	U	330	330	U	330
2-Chloronaphthalene	330	U	330	330	U	330	330	U	330	330	U	330
2-Chlorophenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2-Methylnaphthalene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2-Methylphenol (cresol, o-)	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
2-Nitrophenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
3,3'-Dichlorobenzidine	330	U	330	330	U	330	330	U	330	330	U	330
3-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	840	U	840	840	U	840
4-Bromophenyl-phenylether	330	U	330	330	U	330	330	U	330	330	U	330
4-Chloro-3-methylphenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
4-Chloroaniline	330	U	330	330	U	330	330	U	330	330	U	330
4-Chlorophenyl-phenylether	330	U	330	330	U	330	330	U	330	330	U	330
4-Methylphenol (p-cresol)	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
4-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4-Nitrophenol	840	U	840	840	U	840	840	U	840	840	U	840
Acenaphthene	330	U	330	330	U	330	330	U	330	41	J	330
Acenaphthylene	330	U	330	330	U	330	330	U	330	330	U	330
Anthracene	330	UJ	330	330	UJ	330	330	UJ	330	260	J	330
Benzo(a)anthracene	330	UJ	330	27	J	330	330	UJ	330	1100	J	330
Benzo(a)pyrene	330	UJ	330	28	J	330	330	UJ	330	480	J	330
Benzo(b)fluoranthene	330	UJ	330	26	J	330	330	UJ	330	600	J	330
Benzo(g,h,i)perylene	330	U	330	21	J	330	330	U	330	260	J	330
Benzo(k)fluoranthene	330	UJ	330	28	J	330	330	UJ	330	540	J	330
bis(2-Chloro-1-methylethyl)ether	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Chloroethoxy)methane	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Chloroethyl)ether	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Ethylhexyl)phthalate	23	JB	330	66	JB	330	56	JB	330	27	JB	330

118-C-1 Verification Sampling Results.

Constituents	J135P4 SPA C1 Sample Date 9/12/06			J135P5 SPA C2 Sample Date 9/12/06			J135P6 SPA D3 Sample Date 9/12/06			J135P7 SPA D4 Sample Date 9/12/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Carbazole	330	UJ	330	330	UJ	330	330	UJ	330	240	J	330
Chrysene	330	UJ	330	43	J	330	330	UJ	330	1300	J	330
Di-n-butylphthalate	330	U	330	31	JB	330	32	JB	32	17	JB	330
Di-n-octylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Dibenz(a,h)anthracene	330	U	330	330	U	330	330	U	330	180	J	330
Dibenzofuran	330	UJ	330	330	UJ	330	330	UJ	330	34	J	330
Diethylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Dimethylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Fluoranthene	330	U	330	52	JR	330	330	UR	330	2100	R	330
Fluorene	330	UJ	330	330	UJ	330	330	UJ	330	43	J	330
Hexachlorobenzene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorobutadiene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorocyclopentadiene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachloroethane	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
Indeno(1,2,3-cd)pyrene	330	UJ	330	18	J	330	330	UJ	330	250	J	330
Isophorone	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
N-Nitroso-di-n-dipropylamine	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
N-Nitrosodiphenylamine	330	U	330	330	U	330	330	U	330	330	U	330
Naphthalene	330	U	330	330	U	330	330	U	330	330	U	330
Nitrobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	330	UJ	330	19	J	330	330	UJ	330	1300	J	330
Phenol	330	U	330	330	U	330	330	U	330	330	U	330
Pyrene	330	U	330	57	J	330	330	U	330	1600		330

118-C-1 Verification Sampling Results.

Constituents	J135P4 SPA C1 Sample Date 9/12/06			J135P5 SPA C2 Sample Date 9/12/06			J135P6 SPA D3 Sample Date 9/12/06			J135P7 SPA D4 Sample Date 9/12/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	5	U	5	6	U	6	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	5	U	5	6	U	6	5	U	5	5	U	5
1,1,2-Trichloroethane	5	U	5	6	U	6	5	U	5	5	U	5
1,1-Dichloroethane	5	U	5	6	U	6	5	U	5	5	U	5
1,1-Dichloroethene	5	U	5	6	U	6	5	U	5	5	U	5
1,2-Dichloroethane	5	U	5	6	U	6	5	U	5	5	U	5
1,2-Dichloroethene (total)	5	U	5	6	U	6	5	U	5	5	U	5
1,2-Dichloropropane	5	U	5	6	U	6	5	U	5	5	U	5
2-Butanone	10	U	10	11	U	11	10	U	10	9	U	9
2-Hexanone	10	U	10	11	U	11	10	U	10	9	U	9
4-Methyl-2-pentanone	10	U	10	11	U	11	10	U	10	9	U	9
Acetone	7	J	10	8	J	11	7	J	10	11		9
Benzene	5	U	5	6	U	6	5	U	5	5	U	5
Bromodichloromethane	5	U	5	6	U	6	5	U	5	5	U	5
Bromoform	5	U	5	6	U	6	5	U	5	5	U	5
Bromomethane	10	U	10	11	U	11	10	U	10	9	U	9
Carbon disulfide	5	U	5	6	U	6	5	U	5	5	U	5
Carbon tetrachloride	5	U	5	6	U	6	5	U	5	5	U	5
Chlorobenzene	5	U	5	6	U	6	5	U	5	5	U	5
Chloroethane	10	U	10	11	U	11	10	U	10	9	U	9
Chloroform	5	U	5	6	U	6	5	U	5	5	U	5
Chloromethane	10	U	10	11	U	11	10	U	10	9	U	9
cis-1,2-Dichloroethylene	5	U	5	6	U	6	5	U	5	5	U	5
cis-1,3-Dichloropropene	5	U	5	6	U	6	5	U	5	5	U	5
Dibromochloromethane	5	U	5	6	U	6	5	U	5	5	U	5
Ethylbenzene	5	U	5	6	U	6	5	U	5	5	U	5
Methylene chloride	24	B	5	27	B	6	26	B	5	18	B	5
Styrene	5	U	5	4	J	6	5	U	5	5	U	5
Tetrachloroethene	5	U	5	6	U	6	5	U	5	5	U	5
Toluene	5	U	5	1	J	6	1	J	5	5	U	5
trans-1,2-Dichloroethylene	5	U	5	6	U	6	5	U	5	5	U	5
trans-1,3-Dichloropropene	5	U	5	6	U	6	5	U	5	5	U	5
Trichloroethene	5	U	5	6	U	6	5	U	5	5	U	5
Vinyl chloride	10	U	10	11	U	11	10	U	10	9	U	9
Xylenes (total)	5	U	5	6	U	6	5	U	5	5	U	5

118-C-1 Verification Sampling Results.

Constituents	J135P8 SPA D5 Sample Date 9/12/06			J135P9 SPA D6 Sample Date 9/12/06			J12XM2 FS-5 Sample Date 7/26/06			J12XM3 FS-6 Sample Date 7/26/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	14	U	14
Aroclor-1221	13	U	13	13	U	13	13	U	13	14	U	14
Aroclor-1232	13	U	13	13	U	13	13	U	13	14	U	14
Aroclor-1242	13	U	13	13	U	13	13	U	13	14	U	14
Aroclor-1248	13	U	13	13	U	13	13	U	13	14	U	14
Aroclor-1254	3.7	J	13	4.7	J	13	22		13	14	U	14
Aroclor-1260	13	U	13	13	U	13	13	U	13	14	U	14
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
1,2-Dichlorobenzene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
1,3-Dichlorobenzene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
1,4-Dichlorobenzene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
2,4,5-Trichlorophenol	840	U	840	840	U	840	840	U	840	850	U	850
2,4,6-Trichlorophenol	330	U	330	330	U	330	330	U	330	340	U	340
2,4-Dichlorophenol	330	U	330	330	U	330	330	U	330	340	U	340
2,4-Dimethylphenol	330	UJ	330	330	UJ	330	330	U	330	340	U	340
2,4-Dinitrophenol	840	UJ	840	840	UJ	840	840	U	840	850	U	850
2,4-Dinitrotoluene	330	U	330	330	U	330	330	U	330	340	U	340
2,6-Dinitrotoluene	330	U	330	330	U	330	330	U	330	340	U	340
2-Chloronaphthalene	330	U	330	330	U	330	330	U	330	340	U	340
2-Chlorophenol	330	UJ	330	330	UJ	330	330	U	330	340	U	340
2-Methylnaphthalene	330	UJ	330	330	U	330	330	U	330	340	U	340
2-Methylphenol (cresol, o-)	330	UJ	330	330	UJ	330	330	U	330	340	U	340
2-Nitroaniline	840	U	840	840	U	840	840	U	840	850	U	850
2-Nitrophenol	330	UJ	330	330	UJ	330	330	U	330	340	U	340
3,3'-Dichlorobenzidine	330	U	330	330	U	330	330	U	330	340	U	340
3-Nitroaniline	840	U	840	840	U	840	840	U	840	850	U	850
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	840	U	840	850	U	850
4-Bromophenyl-phenylether	330	U	330	330	U	330	330	U	330	340	U	340
4-Chloro-3-methylphenol	330	UJ	330	330	UJ	330	330	U	330	340	U	340
4-Chloroaniline	330	U	330	330	U	330	330	U	330	340	U	340
4-Chlorophenyl-phenylether	330	U	330	330	U	330	330	U	330	340	U	340
4-Methylphenol (p-cresol)	330	UJ	330	330	UJ	330	330	U	330	340	U	340
4-Nitroaniline	840	U	840	840	U	840	840	U	840	850	U	850
4-Nitrophenol	840	U	840	840	U	840	840	U	840	850	U	850
Acenaphthene	330	U	330	330	U	330	330	U	330	340	U	340
Acenaphthylene	330	U	330	330	U	330	330	U	330	340	U	340
Anthracene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Benzo(a)anthracene	330	UJ	330	18	J	330	330	U	330	340	U	340
Benzo(a)pyrene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Benzo(b)fluoranthene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Benzo(g,h,i)perylene	330	U	330	330	U	330	330	U	330	340	U	340
Benzo(k)fluoranthene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
bis(2-Chloro-1-methylethyl)ether	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Chloroethoxy)methane	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Chloroethyl)ether	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Ethylhexyl)phthalate	50	JB	330	41	JB	330	39	JB	330	67	JB	340

118-C-1 Verification Sampling Results.

Constituents	J135P8 SPA D5 Sample Date 9/12/06			J135P9 SPA D6 Sample Date 9/12/06			J12XM2 FS-5 Sample Date 7/26/06			J12XM3 FS-6 Sample Date 7/26/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Carbazole	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Chrysene	330	UJ	330	27	J	330	330	U	330	340	U	340
Di-n-butylphthalate	29	JB	330	330	U	330	55	JB	330	49	JB	340
Di-n-octylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Dibenz(a,h)anthracene	330	U	330	330	U	330	330	U	330	340	U	340
Dibenzofuran	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Diethylphthalate	330	U	330	330	U	330	22	J	330	340	U	340
Dimethylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Fluoranthene	18	JR	330	34	JR	330	330	U	330	340	U	340
Fluorene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Hexachlorobenzene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachlorobutadiene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachlorocyclopentadiene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachloroethane	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Indeno(1,2,3-cd)pyrene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Isophorone	330	UJ	330	330	UJ	330	330	U	330	340	U	340
N-Nitroso-di-n-dipropylamine	330	UJ	330	330	UJ	330	330	U	330	340	U	340
N-Nitrosodiphenylamine	330	U	330	330	U	330	330	U	330	340	U	340
Naphthalene	330	U	330	330	U	330	330	U	330	340	U	340
Nitrobenzene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Pentachlorophenol	840	U	840	840	U	840	840	U	840	850	U	850
Phenanthrene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Phenol	330	U	330	330	U	330	36	JB	330	33	JB	340
Pyrene	330	U	330	27	J	330	330	U	330	340	U	340

118-C-1 Verification Sampling Results.

Constituents	J135P8 SPA D5 Sample Date 9/12/06			J135P9 SPA D6 Sample Date 9/12/06			J12XM2 FS-5 Sample Date 7/26/06			J12XM3 FS-6 Sample Date 7/26/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	6	U	6	5	U	5	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	6	U	6	5	U	5	5	U	5	5	U	5
1,1,2-Trichloroethane	6	U	6	5	U	5	5	U	5	5	U	5
1,1-Dichloroethane	6	U	6	5	U	5	5	U	5	5	U	5
1,1-Dichloroethene	6	U	6	5	U	5	5	U	5	5	U	5
1,2-Dichloroethane	6	U	6	5	U	5	5	U	5	5	U	5
1,2-Dichloroethene (total)	6	U	6	5	U	5	5	U	5	5	U	5
1,2-Dichloropropane	6	U	6	5	U	5	5	U	5	5	U	5
2-Butanone	11	U	11	10	U	10	10	U	10	10	U	10
2-Hexanone	11	U	11	10	U	10	10	U	10	10	U	10
4-Methyl-2-pentanone	11	U	11	10	U	10	10	U	10	10	U	10
Acetone	11	U	11	8	J	10	24		10	10	J	10
Benzene	6	U	6	5	U	5	5	U	5	5	U	5
Bromodichloromethane	6	U	6	5	U	5	5	U	5	5	U	5
Bromoform	6	U	6	5	U	5	5	U	5	5	U	5
Bromomethane	11	U	11	10	U	10	10	U	10	10	U	10
Carbon disulfide	6	U	6	5	U	5	5	U	5	5	U	5
Carbon tetrachloride	6	U	6	5	U	5	39		5	10		5
Chlorobenzene	6	U	6	5	U	5	5	U	5	5	U	5
Chloroethane	11	U	11	10	U	10	10	U	10	10	U	10
Chloroform	6	U	6	5	U	5	5	U	5	5	U	5
Chloromethane	11	U	11	10	U	10	10	U	10	10	U	10
cis-1,2-Dichloroethylene	6	U	6	5	U	5	5	U	5	5	U	5
cis-1,3-Dichloropropene	6	U	6	5	U	5	5	U	5	5	U	5
Dibromochloromethane	6	U	6	5	U	5	5	U	5	5	U	5
Ethylbenzene	6	U	6	5	U	5	5	U	5	5	U	5
Methylene chloride	23	B	6	30	B	5	19		5	5	U	5
Styrene	6	U	6	1	J	5	5	U	5	5	U	5
Tetrachloroethene	6	U	6	5	U	5	5	U	5	5	U	5
Toluene	6	U	6	1	J	5	5	U	5	5	U	5
trans-1,2-Dichloroethylene	6	U	6	5	U	5	5	U	5	5	U	5
trans-1,3-Dichloropropene	6	U	6	5	U	5	5	U	5	5	U	5
Trichloroethene	6	U	6	5	U	5	5	U	5	5	U	5
Vinyl chloride	11	U	11	10	U	10	10	U	10	10	U	10
Xylenes (total)	6	U	6	1	J	5	5	U	5	5	U	5

118-C-1 Verification Sampling Results.

Constituents	J13509 Equipment Blank Sample Date 8/17/06		
	µg/kg	Q	PQL
Semivolatile Organic Compounds			
1,2,4-Trichlorobenzene	330	U	330
1,2-Dichlorobenzene	330	U	330
1,3-Dichlorobenzene	330	U	330
1,4-Dichlorobenzene	330	U	330
2,4,5-Trichlorophenol	840	U	840
2,4,6-Trichlorophenol	330	U	330
2,4-Dichlorophenol	330	U	330
2,4-Dimethylphenol	330	U	330
2,4-Dinitrophenol	840	U	840
2,4-Dinitrotoluene	330	U	330
2,6-Dinitrotoluene	330	U	330
2-Chloronaphthalene	330	U	330
2-Chlorophenol	330	U	330
2-Methylnaphthalene	330	U	330
2-Methylphenol (cresol, o-)	330	U	330
2-Nitroaniline	840	U	840
2-Nitrophenol	330	U	330
3,3'-Dichlorobenzidine	330	U	330
3-Nitroaniline	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840
4-Bromophenyl-phenylether	330	U	330
4-Chloro-3-methylphenol	330	U	330
4-Chloroaniline	330	U	330
4-Chlorophenyl-phenylether	330	U	330
4-Methylphenol (p-cresol)	330	U	330
4-Nitroaniline	840	U	840
4-Nitrophenol	840	U	840
Acenaphthene	330	U	330
Acenaphthylene	330	U	330
Anthracene	330	U	330
Benzo(a)anthracene	330	U	330
Benzo(a)pyrene	330	U	330
Benzo(b)fluoranthene	330	U	330
Benzo(g,h,i)perylene	330	U	330
Benzo(k)fluoranthene	330	U	330
bis(2-Chloro-1-methylethyl)ether	330	U	330
bis(2-Chloroethoxy)methane	330	U	330
bis(2-Chloroethyl)ether	330	U	330
bis(2-Ethylhexyl)phthalate	27	JB	330
Butylbenzylphthalate	330	U	330
Carbazole	330	U	330
Chrysene	330	U	330
Di-n-butylphthalate	33	JB	330
Di-n-octylphthalate	330	U	330
Dibenz(a,h)anthracene	330	U	330
Dibenzofuran	330	U	330
Diethylphthalate	330	U	330

Constituents	J13509 Equipment Blank Sample Date 8/17/06		
	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)			
Dimethylphthalate	330	U	330
Fluoranthene	330	U	330
Fluorene	330	U	330
Hexachlorobenzene	330	U	330
Hexachlorobutadiene	330	U	330
Hexachlorocyclopentadiene	330	U	330
Hexachloroethane	330	U	330
Indeno(1,2,3-cd)pyrene	330	U	330
Isophorone	330	U	330
N-Nitroso-di-n-dipropylamine	330	U	330
N-Nitrosodiphenylamine	330	U	330
Naphthalene	330	U	330
Nitrobenzene	330	U	330
Pentachlorophenol	840	U	840
Phenanthrene	330	U	330
Phenol	330	U	330
Pyrene	330	U	330

APPENDIX B
118-C-1 WASTE SITE REMEDIATION PHOTOGRAPHS

Photograph B-1. Aerial View of the 118-C-1 Burial Ground and Surrounding Area (2003).

Photograph B-2. 118-C-1 Burial Ground (Beginning of Remedial Activities).

Photograph B-3. Reactor Hardware.

Photograph B-4. Perforated Spacers.

Photograph B-5. Vacuum Drum for Boron Balls.

Photograph B-6. Excavation of Spacers and Soils at the 118-C-1 Burial Ground.

Photograph B-7. Staged Waste at 118-C-1 Burial Ground.

Photograph B-8. Perforated and Non-Perforated Spacers.

Photograph B-9. Spent Nuclear Fuel.

Photograph B-10. Shield Plug.

Photograph B-11. Boron Balls.

Photograph B-12. Vertical Control Rods.

Photograph B-13. Mercury Tubes.

APPENDIX C

DATA QUALITY ASSESSMENT

C1.0 DATA QUALITY ASSESSMENT FOR THE 118-C-1 BURIAL GROUND

C1.1 OVERVIEW

The data quality assessment (DQA) completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data quality objectives process. The DQA includes a review of the field logbook information (WCH 2006b, WCH 2006c) to verify sample location, date, and time. It also involves a scientific and statistical evaluation of the data to determine if they are of the right type, quality, and quantity to support their intended use for closeout decisions (EPA 2000).

This DQA was performed in accordance with data quality objectives found in the *100 Area Remedial Action Sampling and Analysis Plan* (SAP) (DOE-RL 2001). The DQA is based on the guidelines presented in *Guidance for Data Quality Assessment* (EPA 2000). Statistical tests used in this DQA were performed as specified in the SAP and the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2005).

Prior to performing statistical tests, the field logbooks (WCH 2006b, WCH 2006c), the *Site Specific Instruction for Close-out Approach for 118-C-1* (WCH 2006a), and the sample analytical data were evaluated. A portion of the cleanup verification sample analytical data was validated for compliance requirements (DOE-RL 2005). An evaluation is performed to determine if the laboratory carried out all steps required by the SAP and the laboratory contract governing the conduct of analysis and reporting of the data. Third-party data validation, in accordance with validation procedures specified in *Data Validation Procedure for Chemical Analysis* (BHI 2000a) and in *Data Validation Procedure for Radiochemical Analysis* (BHI 2000b), is performed as part of data evaluation. After validation and data evaluation, the appropriate statistical analyses are performed on the analytical data (Appendix E) to determine statistical values, as appropriate, for each contaminant. The cleanup verification 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 and are also summarized in Appendix A.

C1.2 LABORATORY QUALITY MEASURES

All verification samples are subject to laboratory-specific quality assurance (QA) requirements, including instrument procurement, maintenance, calibration, and operation. Additional laboratory quality control (QC) checks are performed, as appropriate, for the analytical method at a rate of 1 per sample delivery group (SDG), or 1 per 20 samples, whichever is more frequent. Laboratory internal QC checks include the following:

- Laboratory Contamination. Each analytical batch contains a laboratory (method) blank (material of similar composition as the samples with known/minimal concentrations of the analytes of interest) carried through the complete analytical process. The method blank is used to evaluate samples for false-positive results due to contamination at the laboratory.

- Analytical Accuracy. For most analyses, a known quantity of representative analytes of interest are added to a separate aliquot of a sample from the analytical batch, known as the matrix spike/matrix spike duplicate (MS/MSD). The recovery percentages of the added MS are used to evaluate analytical accuracy. For analyses not amenable to MS techniques (e.g., gamma energy analysis) or where analytical recovery is corrected via internal standards (e.g., alpha spectral analyses), accuracy is evaluated from recovery of the QC reference sample (i.e., laboratory control sample [LCS] or blank spike sample).

- Analytical Precision. Separate aliquots removed from the same sample container are analyzed for each analytical batch, and referred to as the laboratory duplicate or replicate. The replicate sample results (evaluated by relative percent differences [RPDs]) are used to assess the analytical precision achieved at the laboratory. However, natural heterogeneities often found in soil matrix samples also play a significant part in the RPD result.

- QC Reference Samples. A QC reference sample is prepared from an independent standard at a concentration other than that used for calibration, but within the calibration range. Reference samples provide an independent check on analytical technique and methodology.

Laboratories are also subject to periodic and random assessments of the laboratory performance, systems, and overall program. These assessments are performed by the Washington Closure Hanford QA group to ensure that the laboratories are performing within laboratory contract requirements.

C1.3 DATA VALIDATION

After sampling was completed, all of the fixed laboratory data from SDG K0528 were submitted for third-party Level C validation. Level C validation procedures are specified in *Data Validation Procedure for Radiochemical Analysis* (BHI 2000b) and *Data Validation Procedure for Chemical Analysis* (BHI 2000a).

Level C validation procedures were used to review and qualify the data for the following parameters:

- Sample holding times
- Method blanks
- MS/MSD recovery

- Surrogate recovery
- Sample replicates (duplicates)
- Laboratory control sample results
- Data package completeness
- Achievement of required detection limits (RDLs) or contract required quantitation limits.

Data qualified as rejected (i.e., "R" flagged) indicate that the associated analytical result is tainted by a major deficiency in the quality of the data. Rejected data are unsuitable for decision-making purposes. Data qualified as estimated (i.e., "J" flagged) indicate that the data is estimated, but may be used for decision-making purposes. Data qualified as undetected (i.e., "U" flagged) indicate the analyte was analyzed for but not detected. For nonradionuclides, nondetected results are reported at the practical quantitation limit (PQL). For radionuclides, nondetected results are reported at the actual value obtained from analysis (positive or negative but less than the minimum detected activity [MDA]), except for limited analyses where no value can be calculated and the analytes are reported nondetected at the MDA. All other validated results are considered accurate within the standard errors associated with the methods.

The adequacy of laboratory QA/QC was evaluated for precision, accuracy, completeness, and RDLs pursuant to the SAP (DOE-RL 2001). The organization performing the data validation reported that, of the data given formal validation, the laboratory met the standards for performance for precision (±30%), accuracy (±30%), and completeness (>90%).

SDG K0528

This SDG comprises four samples (J135N5, J13518, J13519, and J13520) analyzed for carbon-14, tritium, nickel-63, isotopic plutonium, plutonium-241, americium-241, isotopic uranium, total strontium, gamma scan analytes (gamma spectroscopy), semivolatile organic compounds (SVOA), polychlorinated biphenyls (PCB), hexavalent chromium, and by inductively coupled plasma (ICP) analysis for metals including mercury. The samples were collected from the 118-C-1 overburden and the below contaminant level (BCL) staging piles. SDG K0528 was evaluated through a formal third-party validation process. A summary of the validation follows:

Radionuclides. No major deficiencies were found in the SDG K0528 radiological data. Minor deficiencies are as follows:

Due to a lack of MS analysis, third-party validation qualified all tritium results in SDG K0528 as estimates with "J" flags. Matrix spikes for some radionuclides are not typically performed by the laboratory. Other accuracy measures, such as blind audit samples, are used to assess laboratory accuracy for these radionuclides. Estimated data are useable for decision-making purposes.

The radiochemical yield in sample J13518 was outside the QC limits at 18%. Third-party validation qualified all of the plutonium-238 and plutonium-239/240 results in sample J13D61 as estimated with "J" flags. Estimated data are useable for decision-making purposes.

Nonradionuclides. No major or minor deficiencies were found in the SDG K0528 nonradiological data.

Third-party validation qualified all of the boron results, in the ICP metals analysis of SDG K0528, as estimated nondetects with "UJ" flags due to method blank (MB) contamination. Estimated data are useable for decision-making purposes.

Third-party validation qualified all of the antimony results, in the ICP metals analysis of SDG K0528, as estimated with "J" flags due to a low matrix spike (MS) recovery of 63.8%. Estimated data are useable for decision-making purposes.

Third-party validation qualified all of the phenanthrene, pyrene, benzo(a)anthracene, and chrysene results, in the SVOA of SDG K0528, as estimated with "J" flags due to high matrix spike duplicate (MSD) recoveries of 207%,168%,142%, and 168%, respectively. Estimated data are useable for decision-making purposes.

Third-party validation qualified all of the fluoranthene results, in the SVOA of SDG K0528, as estimated with "J" flags due to high MS/MSD recoveries of 171% and 270%, respectively. Estimated data are useable for decision-making purposes.

Third-party validation qualified all of the phenanthrene, fluoranthene, and pyrene results, in the SVOA of SDG K0528, as estimated with "J" flags due to elevated relative percent differences (RPDs) of 52%, 45%, and 33%, respectively. Estimated data are useable for decision-making purposes.

Third-party validation qualified all of the silicon results, in the SVOA of SDG K0528, as estimated with "J" flags due to a low LCS result of 50.5%. Estimated data are useable for decision-making purposes.

Due to MB contamination, third-party validation qualified all of the detected bis(2-ethylhexyl)phthalate and di-n-butylphthalate results, in the SVOA of SDG K0528. The detected results for these two analytes, were reported at the required detection limit (RQL) (aka the contract required quantitation limit [CRQL]) as nondetected with "U" flags. Estimated data are useable for decision-making purposes.

With the exception of the MB contamination and the LCS deficiencies, all of the quality control (QC) issues listed above involve the use of field collected soils. Soil samples are known for heterogeneity, which is known to cause difficulties in the evaluation of QC samples.

Limited, random, or sample matrix-specific influenced batch QC issues, such as those identified in the radionuclide and nonradionuclide SDG K0528 data, are potential issues for any analysis. The number and types seen in SDG K0528 are within expectations for the matrix types and analyses performed. All of the data in SDG K0528 are useable for decision-making purposes.

C1.4 LABORATORY DATA EVALUATION

The following paragraphs include a data evaluation of the remaining verification sample SDGs (J00094, J00095, K0495, K0526, K0527, K0549, K0554, K0559, K0590, K0593, and K0790) for the 118-C-1 waste site. Comments on the comparability of the samples to the project splits are presented in section C1.5.

SDG J00094

This data set comprises two field samples (J13504, J13505). Samples J13504 and J13505 are project field splits of the Area 1 (J134Y7) and the Area 2 (J13502) "A1" samples . Sample J13505 was analyzed for carbon-14, tritium, nickel-63, isotopic plutonium, plutonium-241, americium-241, isotopic uranium, total strontium, gamma scan analytes (gamma spectroscopy), SVOAs, PCBs, hexavalent chromium, and by inductively coupled plasma (ICP) analysis for metals including mercury. Sample J13504 was only analyzed for the radiological contaminants listed above.

Radionuclides. No major or minor deficiencies were found in the SDG J00094 radiological data.

Nonradionuclides. One major deficiency was identified in the SDG J00094 nonradiological data. Major and minor deficiencies are as follows:

A major deficiency was identified for the analyte 2,4-dinitrophenol in SDG J00094. The MS and MSD recoveries of 2,4-dinitrophenol were both 0%. Furthermore, the LCS recovery was below the acceptance criteria at 19% and the analyte was not detected in the field sample (J13505). The 2,4-dinitrophenol data for the field split sample J13505 is not acceptable for decision-making purposes. The project has qualified this result as rejected with an "R" flag.

Recoveries of hexavalent chromium in the associated MS and MSD are below the acceptance criteria at 41% and 54%, respectively. The sample preparation and analytical system are shown to be acceptable by the associated LCS recovery at 105%. The MS/MSD results are attributed to a hostile reduction/oxidation environment within the sample matrix that caused the added hexavalent chromium spike to convert to trivalent chromium. Under these conditions no hexavalent chromium is expected, nor observed, in the sample matrix (J13505) from which the MS and MSD were prepared. The data are useable for decision-making purposes.

The MS and/or MSD recoveries for aluminum, iron, and manganese are outside the acceptance criteria. Because the added spike concentrations of these analytes are less than 1/4th of the native concentration in the sample, the resulting percent recovery information is not representative of the method performance. The method performance is demonstrated by the LCS result. The data are useable for decision-making purposes.

The MS and/or MSD recoveries for antimony, calcium, silicon, silver, and cadmium are outside the acceptance criteria. Relative percent differences (RPDs) and LCS recoveries are within the acceptance criteria. A matrix interference may be indicated in this data. The data may be considered estimated but useable for decision-making purposes.

SDG J00095

This data set contains one field sample (J135T7). Sample J135T7 is a project field split of the overburden/BCL "A1" sample (J135R0). Sample J135T7 was analyzed for volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH).

Radionuclides. No major or minor deficiencies were found in the SDG J00095 radiological data.

Nonradionuclides. No major deficiencies were found in the SDG J00095 chemical data. Minor deficiencies are as follows:

In the VOC analysis, the MS/MSD recoveries for tetrachloroethene are above the acceptance criteria at 161% and 168%, respectively. The laboratory has qualified the data with an "N" flag. A high bias is suggested in the field data for tetrachloroethene. Furthermore, the analyte was not detected in the only sample (J135T7); therefore, a high bias is of no consequence. The data are acceptable for decision-making purposes.

SDG K0495

This data set comprises seven field samples (J12XL8, J12XL9, and J12XM0 through J12XM4). Samples J12XL8, J12XL9, and J12XM0 through J12XM4 are the focused samples designated FS-1 through FS-7, respectively. All but sample J12XM3 were analyzed for ICP metals. Samples J12XM2 and J12XM3 were also analyzed for VOA, SVOAs, PCBs, and TPH. Additionally, sample J12XM4 was analyzed by gamma spectroscopy.

Radionuclides. No major deficiencies were found in the SDG K0495 radiological data. Minor deficiencies are as follows:

The RPD calculated for thorium-228, in the laboratory duplicate, is above the acceptance criteria (less than 30%) at 39%. Elevated RPDs are attributed to sample matrix heterogeneities commonly found in environmental soil samples. The data are useable for decision-making purposes.

Nonradionuclides. No major deficiencies were found in the SDG K0495 nonradiological data. Minor deficiencies are as follows:

In the VOA, 33 of 77 MS or MSD recoveries were above the acceptance criteria. Three of 35 LCS recoveries were above the acceptance criteria. The continuing calibration check for bromomethane was out of criteria, also high. All of these deficiencies suggest a high bias in the VOA data for SDG K0495. High biased data are acceptable for decision-making purposes.

In the SVOA, the MS and/or MSD recoveries for isophorone, nitrobenzene, 2,4-dinitrophenol, 1,2,4-trichlorobenzene, 4-chloro-3-methylphenol, and 2-methyl naphthalene were below the acceptance criteria in the range of 41% to 59%. The LCS recoveries for these analytes indicate that the analytical system was functioning correctly. A matrix interference is possible. The field data for these analytes in SDG K0495 may be considered estimated. Estimated data are useable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for silicon is below the acceptance criteria at 59%. The project has qualified all associated silicon data in SDG K0495 as estimated with "J" flags for detected results and "UJ" flags for nondetected results. Estimated data are useable for decision-making purposes.

In the ICP metals analysis, the MS recoveries for aluminum, iron, antimony, and silicon are outside the acceptance criteria. The added spike concentrations for these analytes are much less than the concentrations found in the original samples. Therefore, the spike concentrations were overwhelmed by the typical analytical variation in the original sample concentrations, resulting in matrix spike recoveries that are not representative of the method performance. Method performance was confirmed by serial dilutions and PDSs at more meaningful concentrations. The PDSs for these analytes all recovered within the acceptance criteria, in the range of 88.8% to 108%. The data are useable for decision-making purposes.

SDG K0526

This data set comprises eleven field samples (J13500 through J13503, J13506 through J13509, and J134Y7 through J135Y9). Samples J134Y9 and J13508 are field duplicates of the Area 1 and Area 2 "A1" samples J134Y7 and J13502, respectively. Sample J13509 is the equipment blank for the site. All of the samples except J13509 were analyzed for carbon-14, tritium, nickel-63, isotopic plutonium, plutonium-241, americium-241, isotopic uranium, total strontium, and by gamma spectroscopy.

Samples J13502, J13503, and J13506 through J13508 were analyzed for SVOCs, PCBs, ICP metals, and hexavalent chromium. Sample J13509 was analyzed for SVOCs, ICP metals, and hexavalent chromium. Samples J13500, J13501, and J134Y7 through J135Y9 were analyzed for ICP metals.

Radionuclides. No major deficiencies were found in the SDG K0526 radiological data. Minor deficiencies are as follows:

The radiochemical yield for the isotopic plutonium analysis in sample J135P1 was outside the QC limits at 16%. The project has qualified all of the plutonium-238 and plutonium-239/240 results in sample J135P1 as estimated and applied "J" flags to the data. Estimated data are useable for decision-making purposes.

Nonradionuclides. One major deficiency was identified in the SDG K0526 nonradiological data. Major and minor deficiencies are as follows:

In the ICP metals analysis, a major deficiency was identified for the analyte silicon. The LCS result for silicon is well below the acceptance criteria at 2.8%. The project has qualified the silicon results for all samples in SDG K0526 as rejected and applied "R" flags to the data (applies to samples J13500 through J13503, J13506 through J13509, and J134Y7 through J135Y9).

In the SVOC analysis, the common laboratory contaminants bis(2-ethylhexyl)phthalate and di-n-butylphthalate were found in the MB at concentrations below the CRQL. These low-level detections have no impact on the field sample data. The data are useable for decision-making purposes.

In the ICP metals analysis, the MS results for aluminum, calcium, iron, magnesium, antimony, and silicon are outside the acceptance criteria. The added spike concentrations for these analytes were inappropriate compared to the original sample concentrations such that the matrix spike recoveries are not representative of the method performance. Method performance was confirmed by serial dilutions and PDSs at more meaningful concentrations. The PDSs for these analytes all recovered within the acceptance criteria in the range of 91.4% to 102.6%. The data are useable for decision-making purposes.

SDG K0527

This data set comprises eight field samples (J13510 through J13517), analyzed for carbon-14, tritium, nickel-63, isotopic plutonium, plutonium-241, americium-241, isotopic uranium, total strontium, SVOAs, PCBs, ICP metals (including mercury) and by gamma spectroscopy.

Radionuclides. No major deficiencies were found in the SDG K0527 radiological data. Minor deficiencies are as follows:

Tracer yields in the isotopic plutonium analysis for samples J13510, J13513, J13514, and J13515 were below the 20% criteria in the range of 13 -19%. The project has qualified the plutonium-238 and plutonium 239/240 results in samples J13510, J13513, J13514, and J13515 as estimated and applied "J" flags to the data. Estimated data are useable for decision making purposes.

Minimum detection activities (MDAs) for plutonium-241 are above the CRQL (15pCi/g) in the range of 18 pCi/g to 27 pCi/g. These results are all well below the lookup value for plutonium-241 (1061 pCi/g) and are, therefore, acceptable. The data are useable for decision making purposes.

Nonradionuclides. One major deficiency was identified in the SDG K0527 nonradiological data. Major and minor deficiencies are as follows:

In the ICP metals analysis, a major deficiency was identified for the analyte silicon. The LCS result for silicon is well below the acceptance criteria at 2.8%. The project has qualified the silicon results for all samples in SDG K0527 as rejected and applied "R" flags to the data (applies to samples J13510 through J13517).

One of 128 MS/MSD results, in the SVOC analysis, is below the acceptance criteria. The MSD result for 2,4-dimethylphenol is 49%. The project has qualified the 2,4-dimethylpehol results in SDG K0527 as estimated and applied "J" flags to the data. Estimated data are useable for decision-making purposes.

In the ICP metals analysis, the MS results for aluminum, iron, magnesium, lead, antimony, and silicon are outside the acceptance criteria. The added spike concentrations for these analytes were inappropriate compared to the original sample concentrations because the matrix spike recoveries are not representative of the method performance. Method performance was confirmed by serial dilutions and PDSs at more meaningful concentrations. The PDSs for these analytes all recovered within the acceptance criteria in the range of 98.5% to 109.5%. The data are useable for decision-making purposes.

The RPD result for boron in the ICP metals analysis is above the acceptance criteria (greater than 30%) at 52.3%. The project has qualified the boron results in SDG K0527 as estimated and applied "J" flags to the data. Estimated data are useable for decision making purposes.

SDG K0549

This data set comprises seventeen field samples (J135R0 through J135R9, and J135T0 through J135T6), analyzed for VOA and TPH.

Radionuclides. The SDG K0549 samples were not analyzed for radiological contaminants.

Nonradionuclides. No major deficiencies are identified in the SDG K0549 nonradiological data. Minor deficiencies are as follows:

Four of 70 MS recoveries in the VOA were outside the acceptance criteria. MS and MSD results for 1,1,2,2-tetrachloroethane are below the acceptance criteria: both at 58%. MS results for carbon disulfide and the common laboratory contaminant acetone are above the acceptance criteria at 172% and 311%, respectively. The project has qualified the 1,1,2,2-tetrachloroethane, carbon disulfide, and acetone results in SDG K0549 as estimated and applied "J" flags to the data. Estimated data are useable for decision-making purposes.

SDG K0554

This data set comprises six field samples (J13522 through J13525, J135N8, and J135N9) analyzed for carbon-14, tritium, nickel-63, isotopic plutonium, plutonium-241, americium-241, isotopic uranium, total strontium, VOAs, SVOAs, PCBs, ICP metals (including mercury), hexavalent chromium, and by gamma spectroscopy.

Radionuclides. No major deficiencies were found in the SDG K0554 radiological data. Minor deficiencies are as follows:

Minimum detection activities (MDAs) for plutonium-241 are above the CRQL (15pCi/g) in the range of 16 pCi/g to 21 pCi/g. These results are all well below the lookup value for plutonium-241 (1061 pCi/g) and are, therefore, acceptable. The data are useable for decision-making purposes.

Nonradionuclides. One major deficiency was identified in the SDG K0554 nonradiological data. Major and minor deficiencies are as follows:

The analyte 2,4-dinitrophenol recovered at 6% in the MS. This result is considered a major deficiency. The project has qualified all of the 2,4-dinitrophenol results in SDG K0554 as rejected with "R" flags. Rejected data are not useable for decision-making purposes.

Three of 70 MS recoveries in the VOA were outside the acceptance criteria. The MS result for 1,1,2,2-tetrachloroethane is below the acceptance criteria, both at 59%. MS results for bromoform and acetone are above the acceptance criteria at 146% and 418%, respectively. The LCS result for acetone was also above the acceptance criteria at 321%. The project has qualified the 1,1,2,2-tetrachloroethane results and the detected bromoform and acetone results in SDG K0554 as estimated with "J" flags applied to the data. Estimated data are useable for decision-making purposes.

The common laboratory contaminant methylene chloride was identified below the CRQL in the VOA's MB. This low-level detection has no impact on the field sample data for methylenechloride. The data are useable for decision-making purposes.

The common laboratory contaminants bis(2-ethylhexyl)phthalate and di-n-butylphthalate were identified below the PQL in the MB for the SVOA, at 31 mg/kg and 18 mg/kg, respectively. The project has qualified results for these analytes as estimated, applied "J" flags to the data. Estimated data are useable for decision-making purposes.

The SVOA analysis has multiple analytes with MS and/or LCS recoveries below the acceptance criteria, in the range of 37% to 56%. The project has qualifed these results as estimated and applied "J" flags to the data. Estimated data are useable for decision-making purposes. The affected analytes in SDG K0554 are:
2-methylphenol, 4-methylphenol, nitrobenzene, isophorone, 2-nitrophenol, 2,4-dimethylphenol, 2,4-dichlorophenol, 1,2,4-trichlorobenzene, 4-chloro-3-methylphenol, and 2-methylnaphthalene.

In the ICP metals analysis, the LCS result for silicon is below the acceptance criteria at 14.5%. The project has qualified the all of the silicon results in SDG K0554 as estimated and applied "J" flags to the data. Estimated data are useable for decision-making purposes.

In the ICP metals analysis, the MS results for aluminum, iron, mangnesium, and antimony are outside the acceptance criteria. The added spike concentrations for these analytes were inappropriate compared to the original sample concentrations because the matrix spike recoveries are not representative of the method performance. Method performance was confirmed by serial dilutions and PDSs at acceptable concentrations. The PDSs for these analytes all recovered within the acceptance criteria in the range of 96.4% to 100.7%. The data are useable for decision-making purposes.

SDG K0559

This data set comprises 10 field samples (J135P0 through J135P9) analyzed for carbon-14, tritium, nickel-63, isotopic plutonium, plutonium-241, americium-241, isotopic uranium, total strontium, VOAs, SVOAs, PCBs, ICP metals (including mercury), hexavalent chromium, and by gamma spectroscopy.

Radionuclides. No major deficiencies were found in the SDG K0559 radiological data. Minor deficiencies are as follows:

Minimum detection activities (MDAs) for plutonium-241 are above the CRQL (15pCi/g) in the range of 18 pCi/g to 22 pCi/g. These results are all well below the lookup value for plutonium-241 (1061 pCi/g) and are, therefore, acceptable. The data are useable for decision-making purposes.

The radiochemical yield for americium-241 in sample J135P1 was outside the QC limits at 16%. The low tracer yield also raised the MDA to 1.1 pCi/g, which is just above the RDL of 1.0 pCi/g. The project has qualified all of the americium-241 results in sample J135P1 as estimated and applied "J" flags to the data. Estimated data are useable for decision-making purposes.

Nonradionuclides. One major deficiency was identified in the SDG K0559 nonradiological data. Major and minor deficiencies are as follows:

In the SVOC analysis, the analyte fluoroanthene has MS/MSD recoveries of 6% and 4%, respectively. This result is considered a major deficiency. The project has qualified all of the fluroanthene results in SDG K0559 as rejected with "R" flags. Rejected data are not useable for decision-making purposes.

The common laboratory contaminant methylenechloride was identified below the CRQL in the VOA's MB. This low-level detection has no impact on the field sample data for methylenechloride. The data are useable for decision-making purposes.

Due to an equipment problem at the laboratory, the VOA was performed 3 days past the 14 day hold time. The samples were all refrigerated and stored in sealed containers after collection. The additional 3 days will have no impact on the field sample data. The data are useable for decision-making purposes.

The common laboratory contaminants bis(2-ethylhexyl)phthalate and di-n-butylphthalate were identified below the PQL in the MB for the SVOA, at 31 mg/kg and 18 mg/kg, respectively. The project has qualified these results as estimated, applied "J" flags to the data. Estimated data are useable for decision-making purposes.

The SVOA analysis has multiple analytes with MS and/or LCS recoveries below the acceptance criteria, in the range of 37% to 59%. The project has qualifed these results as estimated and applied "J" flags to the data. Estimated data are useable for decision making purposes. The affected analytes in SDG K0559 are: 2-methylphenol, 4-methylphenol, nitrobenzene, isophorone, 2-nitrophenol, 2,4-dimethylphenol, 1,2,4-trichlorobenzene, 4-chloro-3-methylphenol, 2-methylnaphthalene, 2-chlorophenol, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, n-nitroso-di-n-propylamine, hexachloroethane, 2,4-dinitrophenol, dibenzofuran, fluorene, phenanthrene, anthracene, carbazole, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and indeno(1,2,3,-cd)pyrene.

In the ICP metals analysis, the LCS recovery for silicon is low at 14.5%. The project has qualified all associated silicon data in SDG K0559 as estimated with "J" flags for detected results and "UJ" flags for nondetected results. Estimated data are useable for decision-making purposes.

In the ICP metals analysis, the MS results for aluminum, iron, magnesium, and antimony are outside the acceptance criteria. The added spike concentrations for these analytes were inappropriate compared to the original sample concentrations because the matrix spike recoveries are not representative of the method performance. Method performance was confirmed by serial dilutions and PDSs at a more meaningful concentrations. The PDSs for these analytes all recovered within the acceptance criteria in the range of 100.9% to 109.0%. The data are useable for decision making purposes.

The RPDs calculated for arsenic and boron, in the ICP metals laboratory duplicate, are above the acceptance criteria (less than 30%) at 35.7% and 35.3%, respectively. Elevated RPDs are attributed to sample matrix heterogeneities commonly found in environmental soil samples. The data are useable for decision-making purposes.

In the TPH analysis the MB result (177 mg/kg) was greater than the PQL. This suggests a high bias in the field sample results. All of the samples that had detections for TPH in SDG K0559 were less than the MB result. The project has qualified the detected TPH results in SDG K0559 as estimated and applied "J" flags to the data. Estimated and/or high biased data are useable for decision making purposes.

SDG K0590

This data set comprises two field samples (J13HN3, J13HN4) analyzed for TPH and ICP metals (including mercury)

Radionuclides. The SDG K0590 samples were not analyzed for radiological contaminants.

Nonradionuclides. No major deficiencies were identified in the SDG K0590 nonradiological data. Minor deficiencies are as follows:

In the ICP metals analysis, the LCS recovery for silicon is low at 19.8%. The project has qualified all associated silicon data in SDG K0590 as estimated with "J" flags for detected results and "UJ" flags for nondetected results. Estimated data are useable for decision-making purposes.

In the ICP metals analysis, the MS results for aluminum, iron, mangnesium, and antimony are outside the acceptance criteria. The added spike concentrations for these analytes were inappropriate compared to the original sample concentrations because the matrix spike recoveries are not representative of the method performance. Method performance was confirmed by serial dilutions and PDSs at appropriate concentrations. The PDSs for these analytes all recovered within the acceptance criteria in the range of 94.2% to 107.4%. The data are useable for decision making purposes.

The RPDs calculated for calcium and molybdenum, in the ICP metals laboratory duplicate, are above the acceptance criteria (less than 30%) at 48.6% and 53.7%, respectively. Elevated RPDs are attributed to sample matrix heterogeneities commonly found in environmental soil samples. The data are useable for decision-making purposes.

SDG K0790

This data set comprises five field samples (J14Y70 through J14Y74, from the spent nuclear fuel bunker footprints) analyzed for isotopic plutonium, plutonium-241, americium-241, isotopic uranium, and by gamma spectroscopy.

Radionuclides. No major deficiencies were identified in the SDG K0790 nonradiological data. Minor deficiencies are as follows:

Minimum detection activities (MDAs) for plutonium-241 are above the CRQL (15pCi/g) in the range of 24 pCi/g to 32 pCi/g. These results are all well below the lookup value for plutonium-241 (1,061 pCi/g) and are therefore acceptable. The data are useable for decision-making purposes.

Nonradionuclides. The SDG K0790 samples were not analyzed for nonradiological contaminants.

C1.4.1 MAJOR DEFICIENCIES

Any data anomaly that causes final data to be qualified as rejected ("R" flagged) is considered a major deficiency. Major deficiencies were identified in SDGs J00094, K0526, K0527, K0554, and K0559. Associated data has been rejected.

C1.4.2 MINOR DEFICIENCIES

Sample Holding Times. The method-specific holding times were met for all samples in the 118-C-1 verification data set, except for the VOA samples in SDG K0559.

Method Blanks. The method blank is used to evaluate false-positive results in samples due to contamination during handling at the laboratory.

Radionuclides. All of the radionuclide method blank results were within the acceptance criteria.

Nonradionuclides. Minor method blank deficiencies were identified in SDGs K0526, K0528, K0554, and K0559 (see above). Some data are qualified as estimated. Estimated data are useable for decision-making purposes.

MS/MSDs Recoveries. Recoveries of spiked analytes in the MS/MSD pair(s) are used to evaluate method efficiency and the effect of the sample matrix on the environmental sample results.

Radionuclides. A minor deficiency is identified in SDG K0528. Some data are qualified as estimated. Estimated data are useable for decision-making purposes.

Nonradionuclides. Minor deficiencies in the MS/MSD recoveries are identified in SDGs J00094, J00095, K0495, K0526, K0527, K0528, K0549, K0554, K0559, and K0590. Some data are qualified as estimated. Estimated data are useable for decision-making purposes.

RDL Comparison. Reported analytical detection levels for nondetected analytes were compared to the RDLs (required detection levels) specified in the SAP (DOE-RL 2001). Where detected results are obtained, an evaluation of detection limits is not performed.

Radionuclides. All of the reported contaminant of concern (COC) MDAs are sufficiently low for decision-making purposes. Minor deficiencies in SDGs K0527, K0554, K0559, and K0790 are identified. All values meet the site cleanup criteria as demonstrated in the calculation briefs (Appendix E) and discussed in this cleanup verification package.

Nonradionuclides. All of the reported MDLs are sufficiently low for decision-making purposes. All values meet the site cleanup criteria as discussed in this cleanup verification package.

Precision and Accuracy Evaluation. RPD evaluation of the main sample(s) versus the laboratory duplicate(s) are routinely performed by the laboratory, and any deficiencies in those calculations are reported by SDG in section C1.4.

C1.5 FIELD QUALITY ASSURANCE/QUALITY CONTROL

Field QA/QC measures were used to assess potential sources of error and cross contamination of soil samples that could bias results. Field QA/QC samples listed in the field logbook (WCH 2006b, WCH 2006c) are summarized in Table C-1. The main and QA/QC sample results are presented in Appendix A.

Table C-1. Summary of Field Quality Control Samples.

Sample location (designation)	Main Sample	Duplicate Sample	Split Sample
Area 1(A1)	J134Y7	J134Y9	J13504
Area 2 (A1)	J13502	J13508	J13505

Field duplicate samples are collected to provide a relative measure of the 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 duplicate samples for each COC. Only analytes with values above five times the detection limits for both the main and duplicate samples are calculated and evaluated. The 95% upper confidence limit (UCL) calculation brief in Appendix E provides details on duplicate pair evaluation and RPD calculation. The data are suitable for the intended purpose of cleanup verification.

Split samples are collected to provide a relative measure of the variability in the sampling, sample handling, and analytical techniques used by commercial laboratories. The field main and split samples are evaluated by computing the RPD of the split samples for each COC to determine the usability of the verification data. The U.S. EPA Contract Laboratory Program duplicate sample comparison methodology, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 1994), is used as an initial test of the data from the splits. Only analytes that had values above five times the contractual RDL for both the main and split sample were compared. The 95% UCL calculation briefs in Appendix E provide details on split pair RPD calculation. The acceptance criteria RPD for project-split samples is ≤ 30% (less than or equal to 30%).

Radionuclides.

- The RPDs calculated for the Area 1 field duplicate sample (J134Y9) analyte potassium-40 is above the acceptance criteria (less than 30%) at 62%. Elevated RPDs, such as this, in the analysis of environmental soil samples, are largely attributed to heterogeneities in the soil matrix and only in small part attributed to precision and accuracy issues at the laboratory. The data are useable for decision-making purposes.

Nonradionuclides.

- The RPD calculated for the Area1 project split sample (J13504) analytes aluminum, chromium, iron, vanadium and magnesium are above the acceptance criteria (30%) at 52%, 48%, 36%, 45%, and 36%, respectively. The RPD calculated for the Area 2 project split sample (J13505) analyte vanadium is above the acceptance criteria at 35%. These RPD results are attributed to heterogeneities in the soil matrix. The data are useable for decision making purposes.

RPDs for the remaining radionuclides and nonradionuclide analytes were either within the acceptance criteria or were not calculated because an evaluation of the data shows the analytes were not detected in both the main and duplicate (or main and split) sample at more than 5 times the target detection limit. RPDs of analytes detected at low concentrations (less than five times the detection limit) are not considered to be indicative of the analytical system performance. The data are useable for decision-making purposes.

A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate or main and split) is less than 5 times the target detection limit (TDL), including undetected analytes. In these cases, a control limit of ± 2 times the TDL is used (Appendix E) to indicate that a visual check of the data is required by the reviewer. The Area 1 cesium-137, radium-226, radium-228, and cobalt results, as well as the Area 2 cobalt results required this check. These results are all attributed to heterogeneities in the sample matrix from which the samples were collected. A visual inspection of all of the data is also performed. No additional major or minor deficiencies were noted.

C1.6 SUITABILITY OF DATA

The DQA for the 118-C-1 waste site determined that the sample design and data are of the right type, quality, and quantity to support site cleanup verification decisions, within specified error tolerances.

C2.0 REFERENCES

BHI, 2000a, *Data Validation Procedure for Chemical Analysis*, BHI-01435, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

BHI, 2000b, *Data Validation Procedure for Radiochemical Analysis*, BHI-01433, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

DOE-RL, 2001, *100 Area Burial Grounds Remedial Action Sampling and Analysis Plan*, DOE/RL-2001-35, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 2005, *Remedial Design Report/Remedial Action Work Plan for the 100 Area*, DOE/RL-96-17, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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.

EPA, 2000, *Guidance for Data Quality Assessment*, EPA QA/G-9, QA00 Update, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C.

WCH, 2006a, *Site Specific Instruction for Close-out Approach for 118-C-1,* CCN 129632, Washington Closure Hanford, Richland, Washington.

WCH, 2006b, *Remedial Sampling*, Logbook EFL-1173-8, Washington Closure Hanford, Richland, Washington.

WCH, 2006c, *Remedial Sampling*, Logbook EFL-1173-9, Washington Closure Hanford, Richland, Washington.

APPENDIX D
118-C-1 RADIOLOGICAL SURVEY MAPS

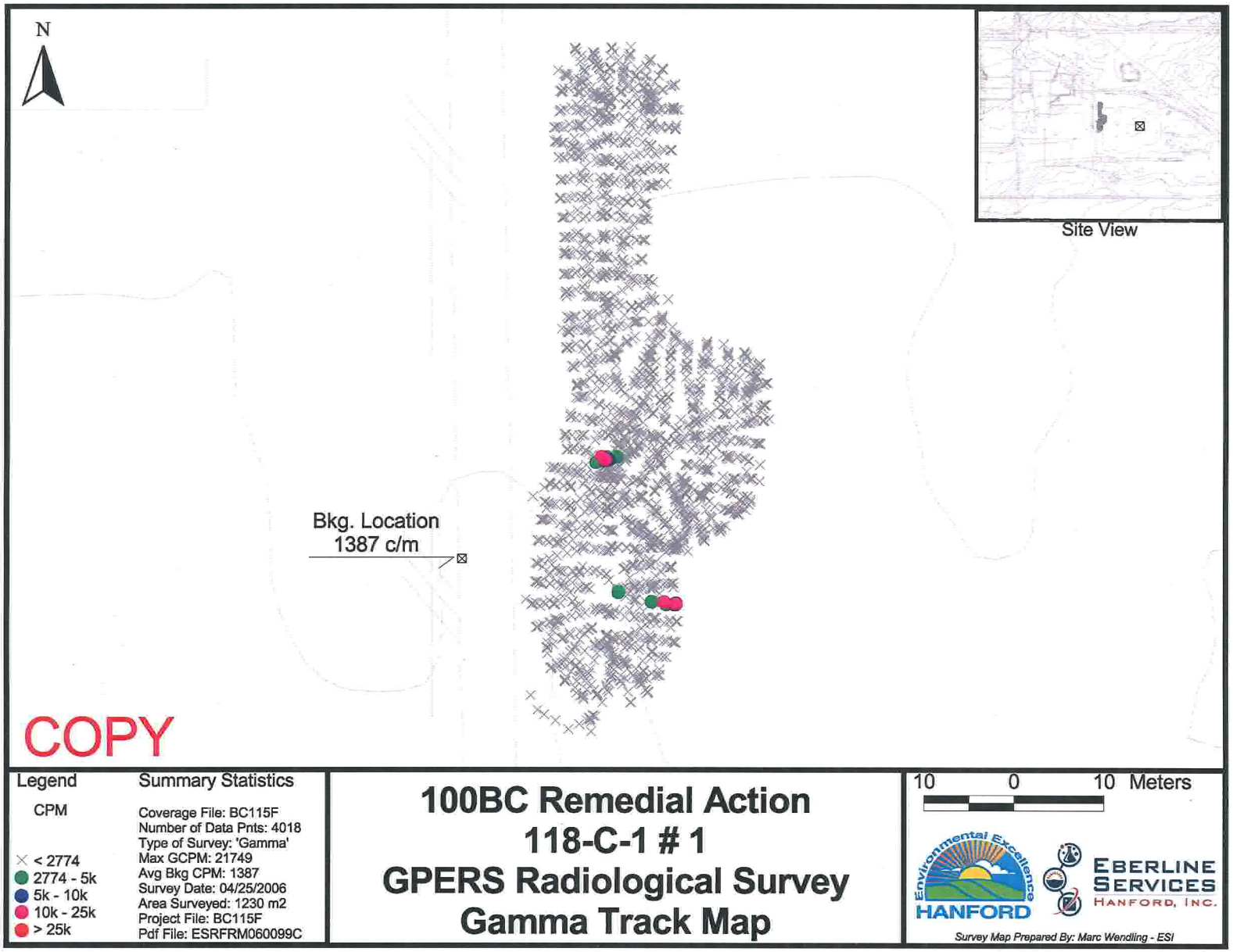


Figure D-1. Initial GPERS Map of 118-C-1 Area 2, Trench 1 Excavation.

Figure D-2. GPERS Map of 118-C-1 Area 2, Trench 1 (Following Additional Excavation).

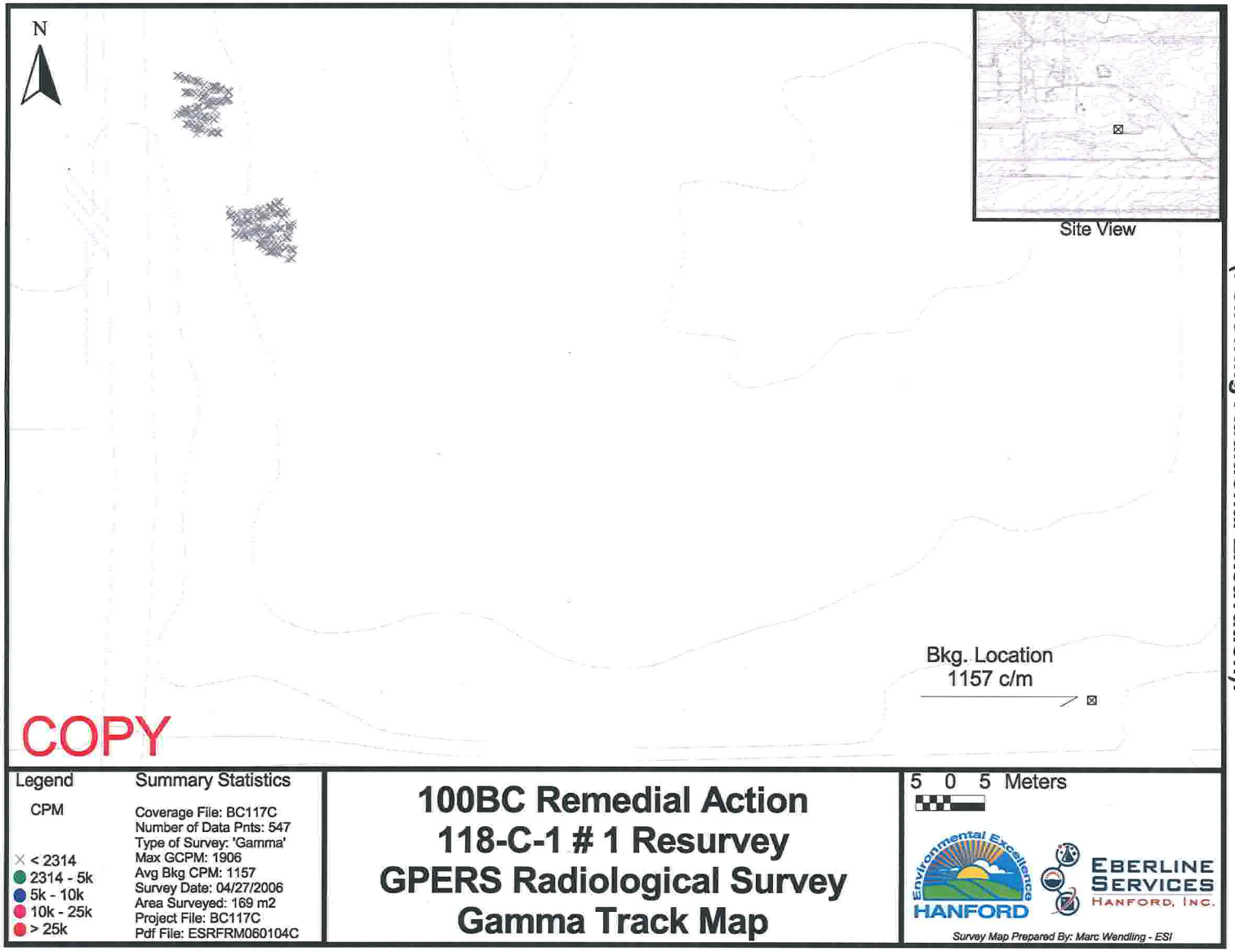


Figure D-3. Initial GPERS Map of 118-C-1 Area 1, Trenches 2 and 8 Excavations.

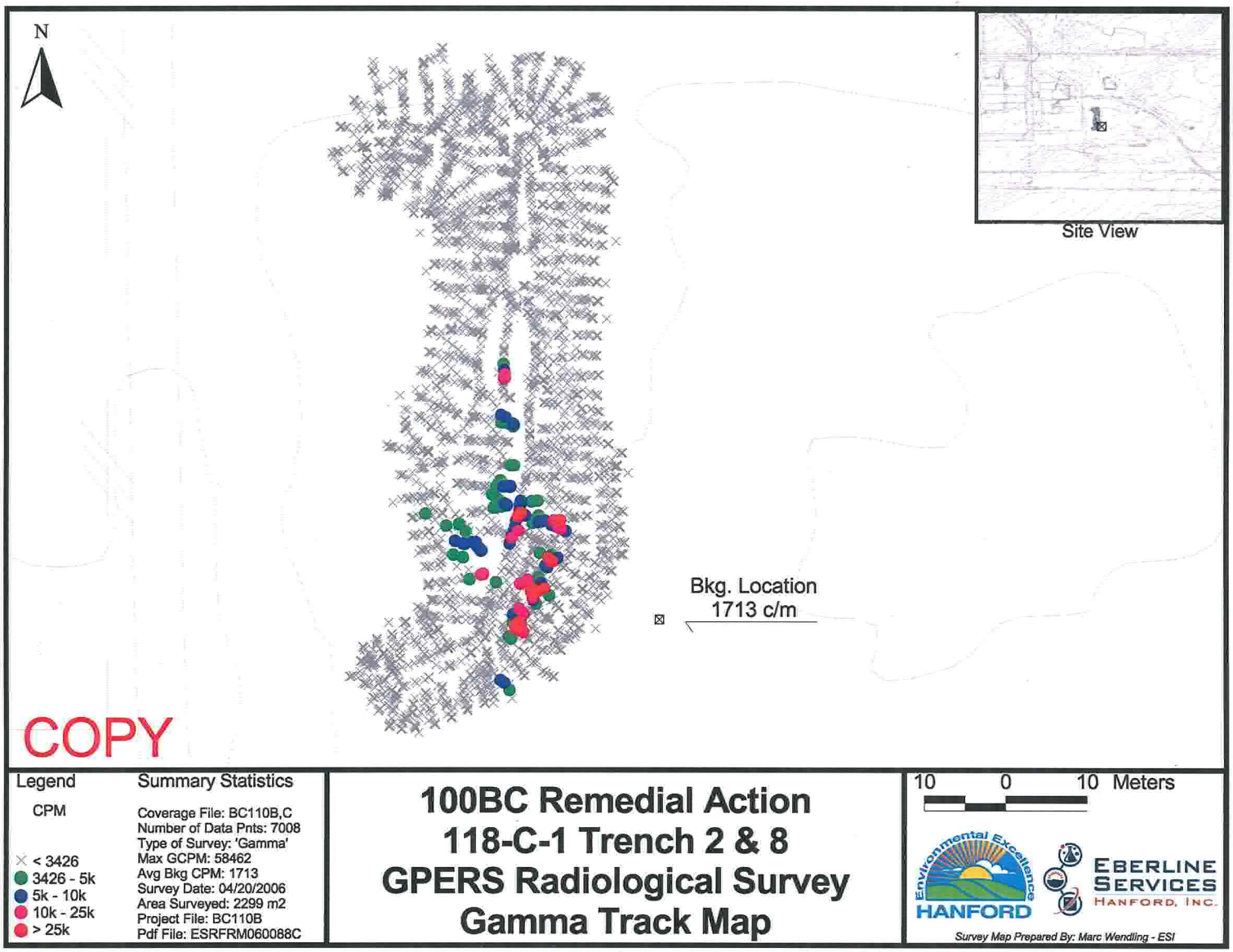


Figure D-4. GPERS Map of 118-C-1, Area 1, Trenches 2 and 8 (Following Additional Excavation).

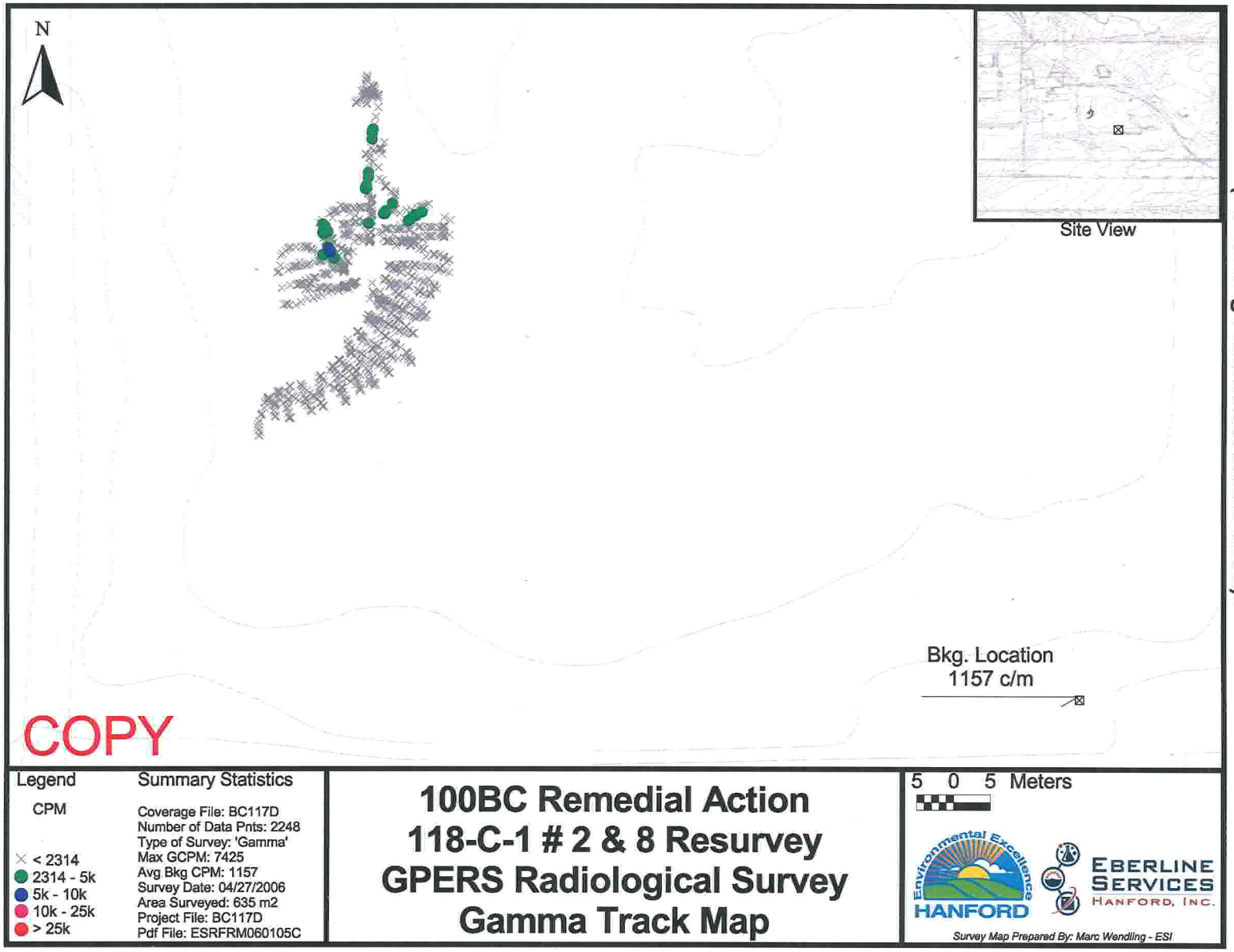
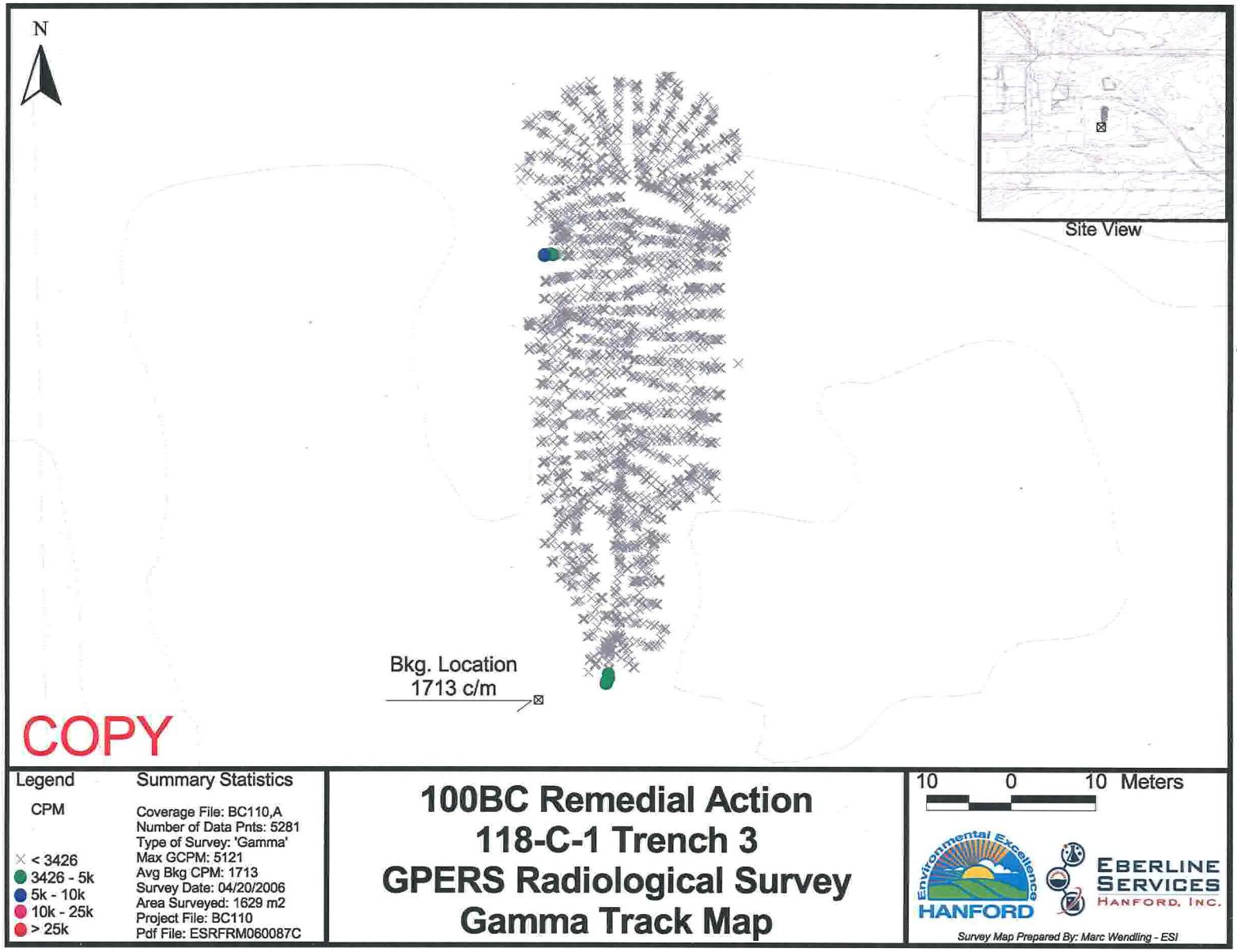


Figure D-5. GPERS Map of 118-C-1, Area 1, Trench 3.



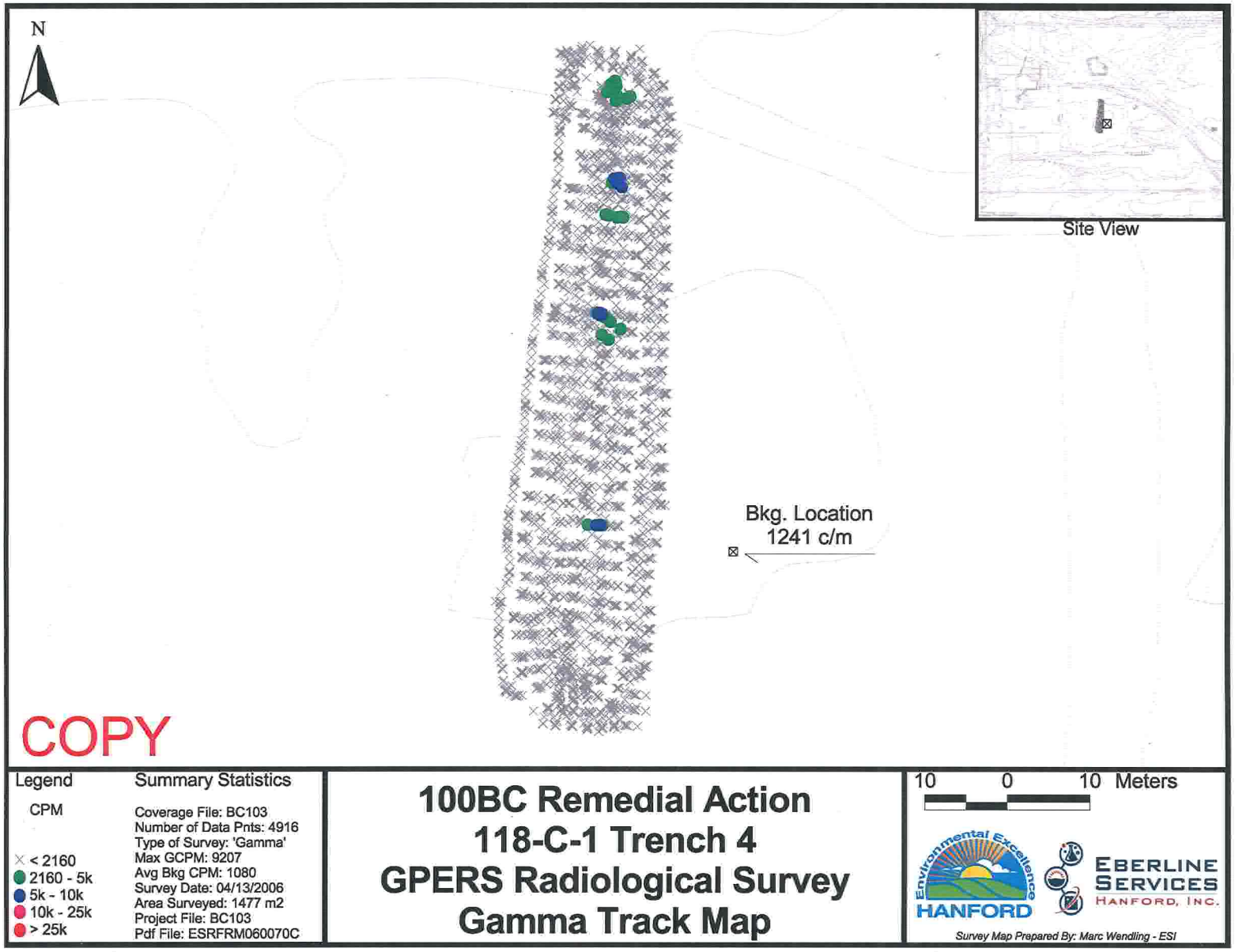
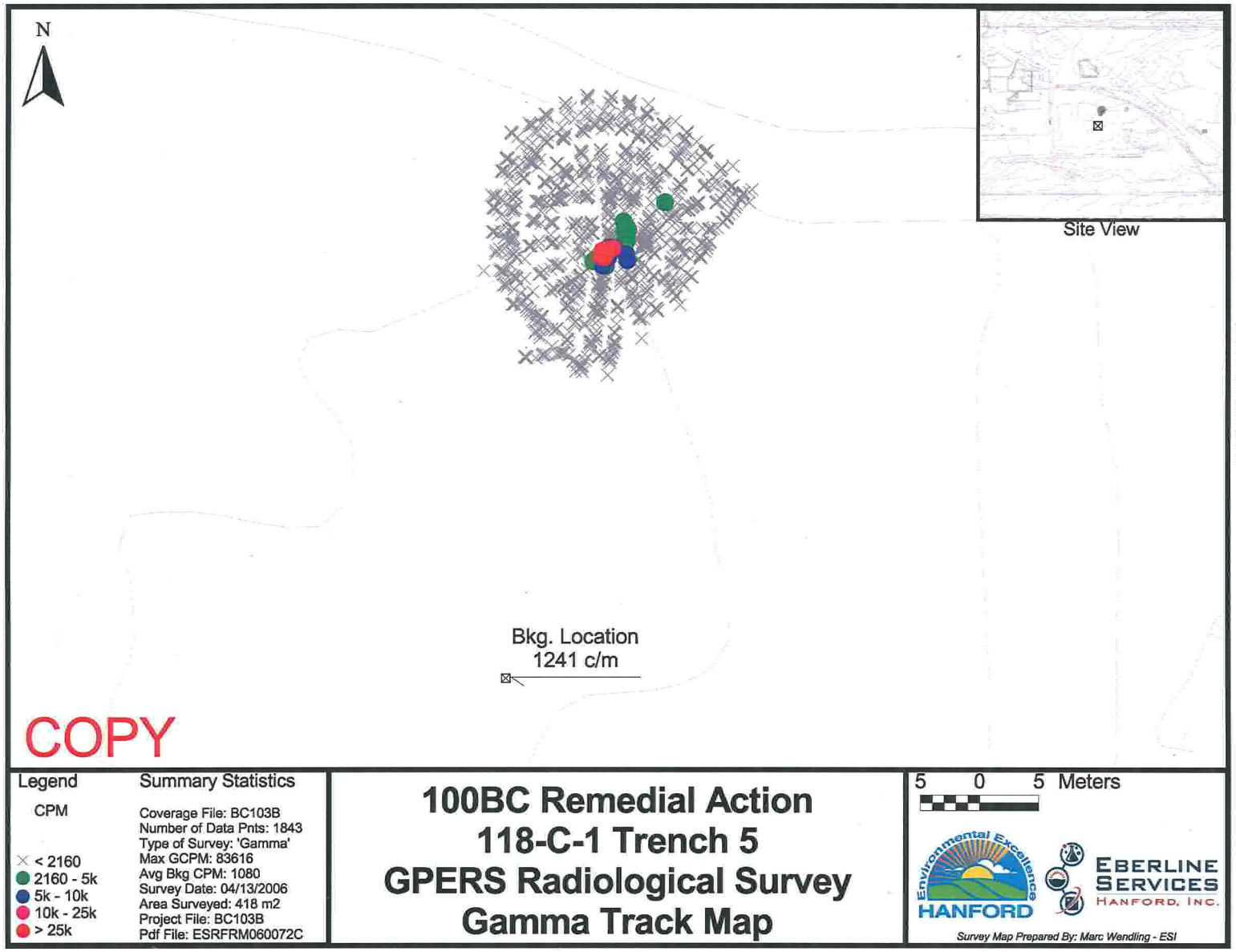


Figure D-6. GPERS Map of 118-C-1, Area 2, Trench 4.

Figure D-7. Initial GPERS Map of 118-C-1, Area 1, Trench 5 Excavation.



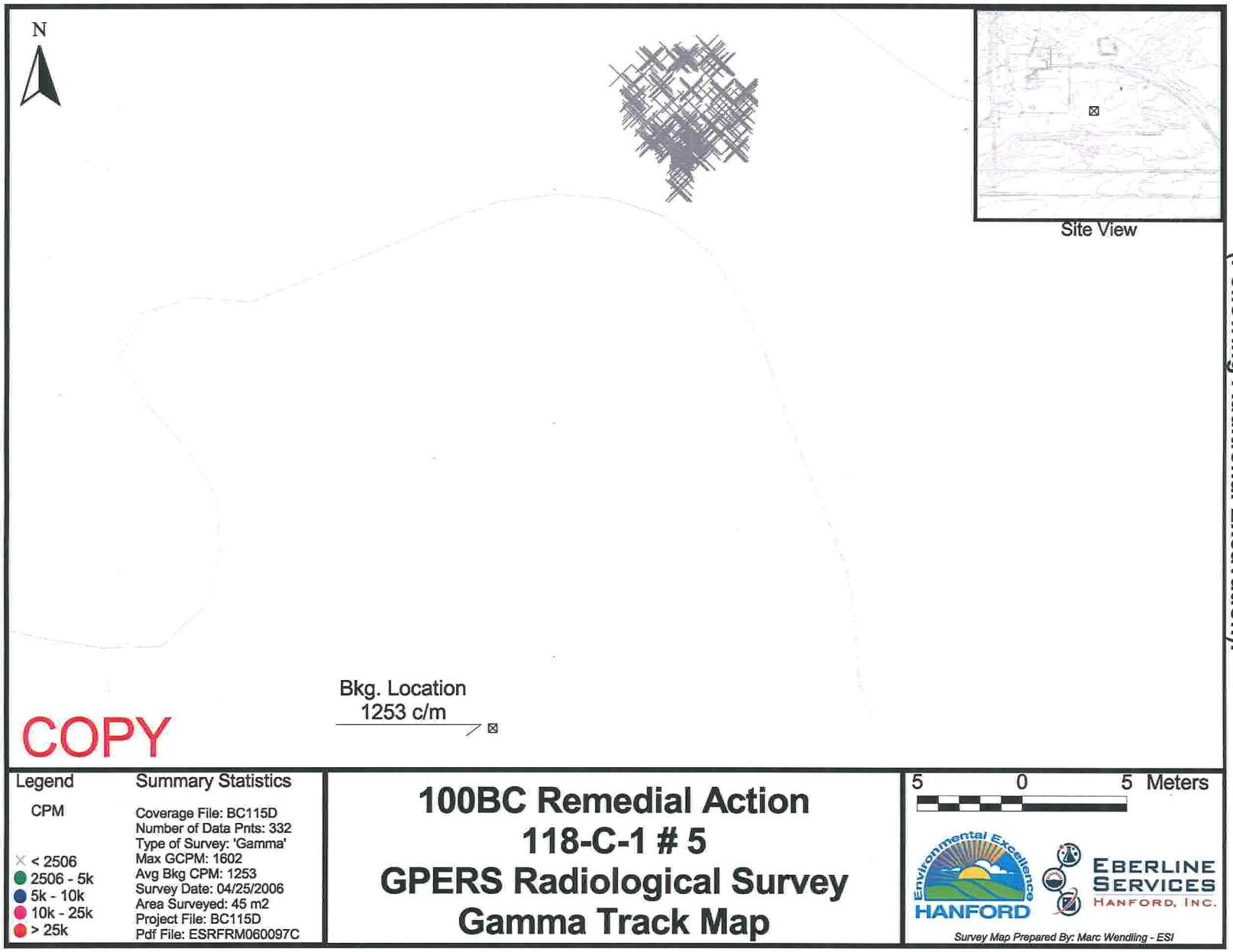


Figure D-8. GPERS Map of 118-C-1, Area 1, Trench 5 (Following Additional Excavation).

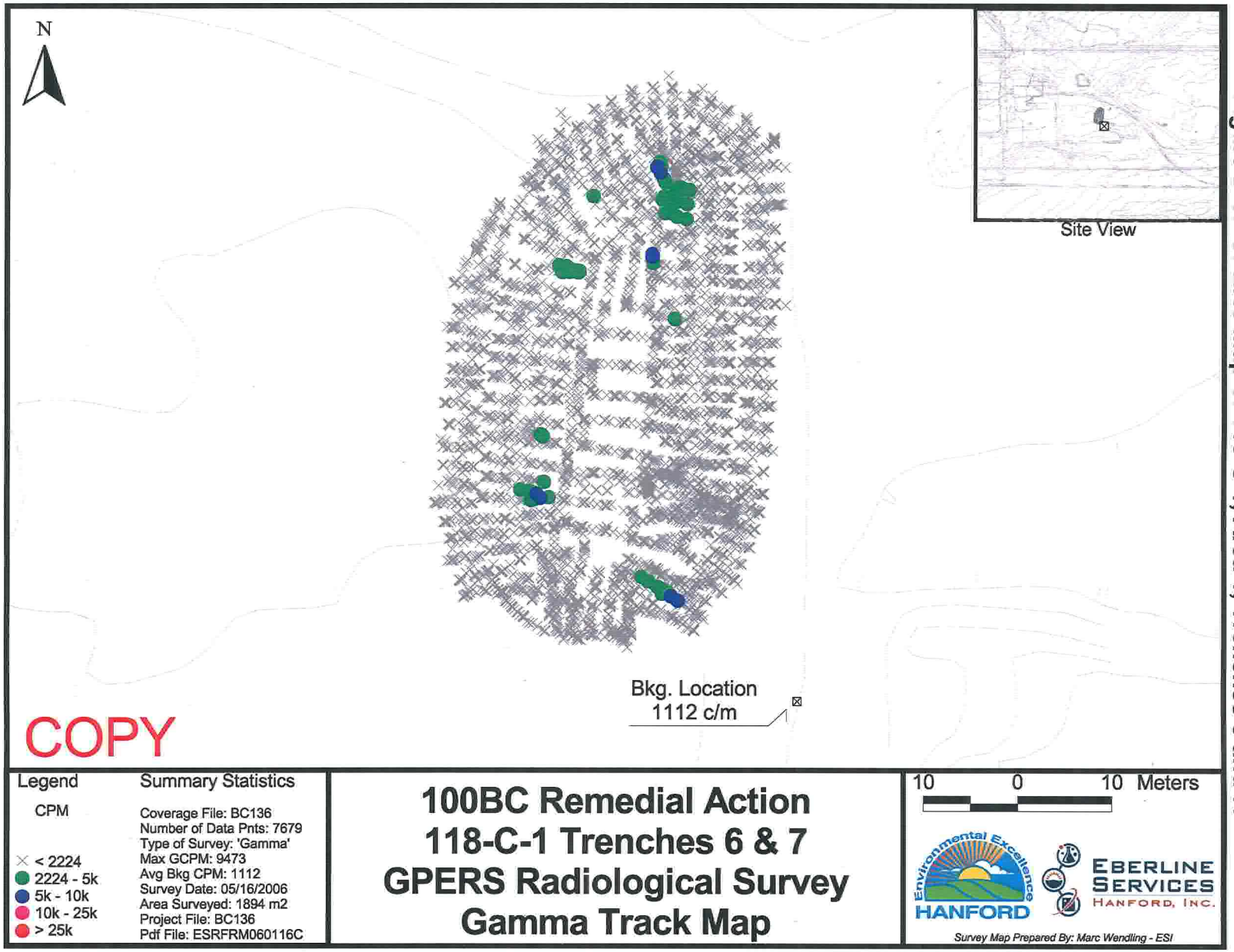


Figure D-9. GPERS Map of 118-C-1, Area 1, Trenches 6 and 7.

Figure D-10. Initial GPERS Map of 118-C-1, Area 2, Trench 9 Excavation.

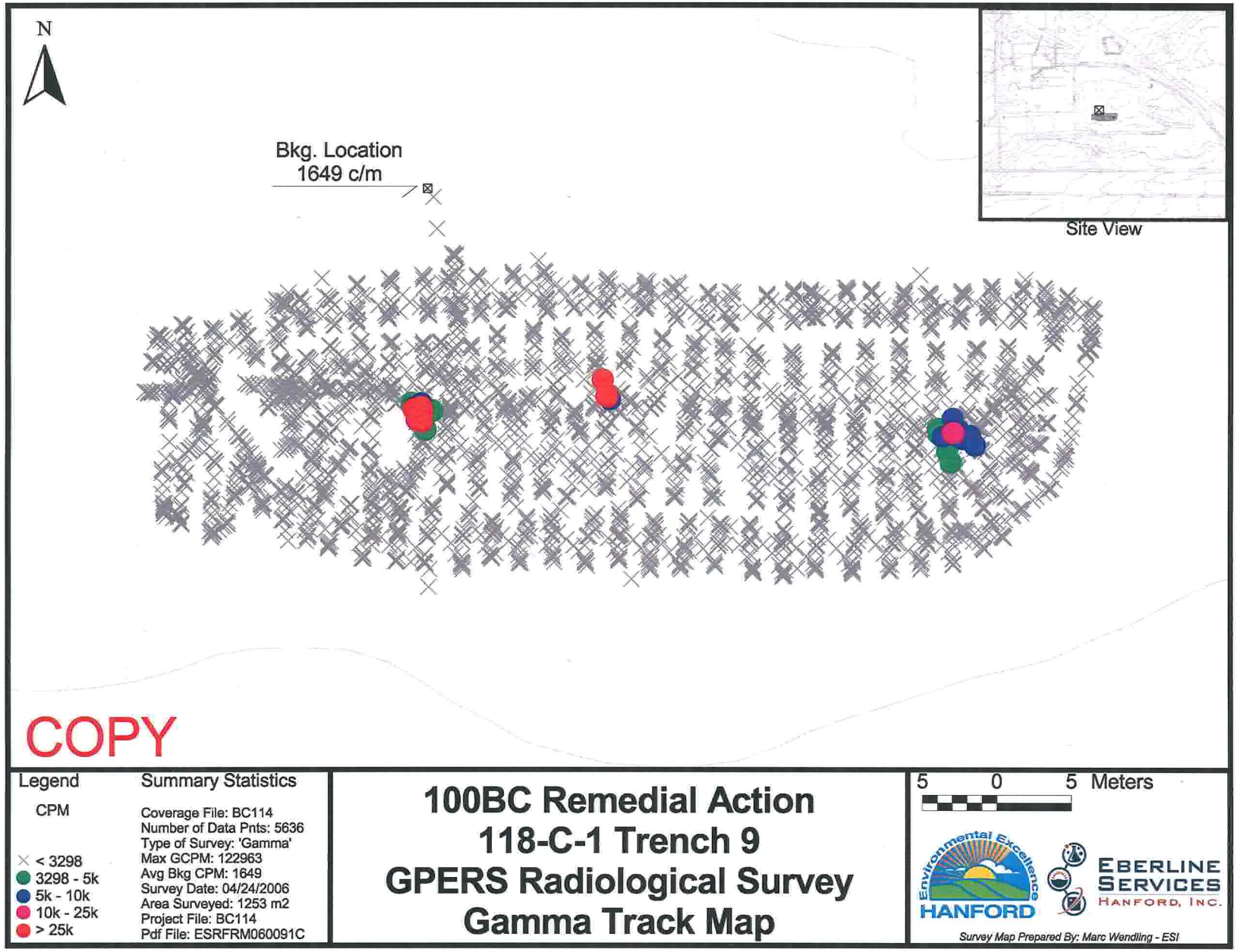


Figure D-11. GPERS Map of 118-C-1, Area 2, Trench 9 (Following Additional Excavation).

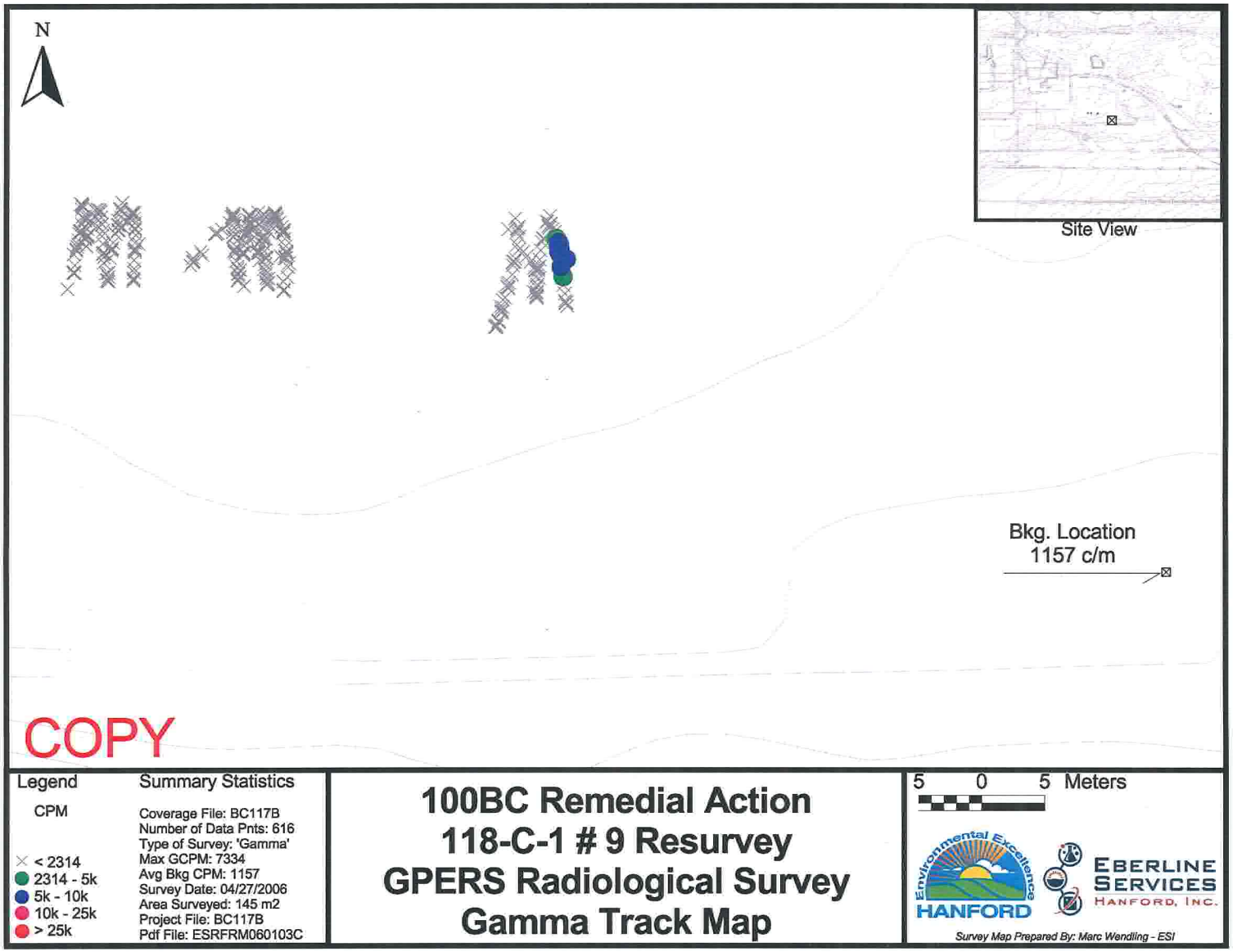
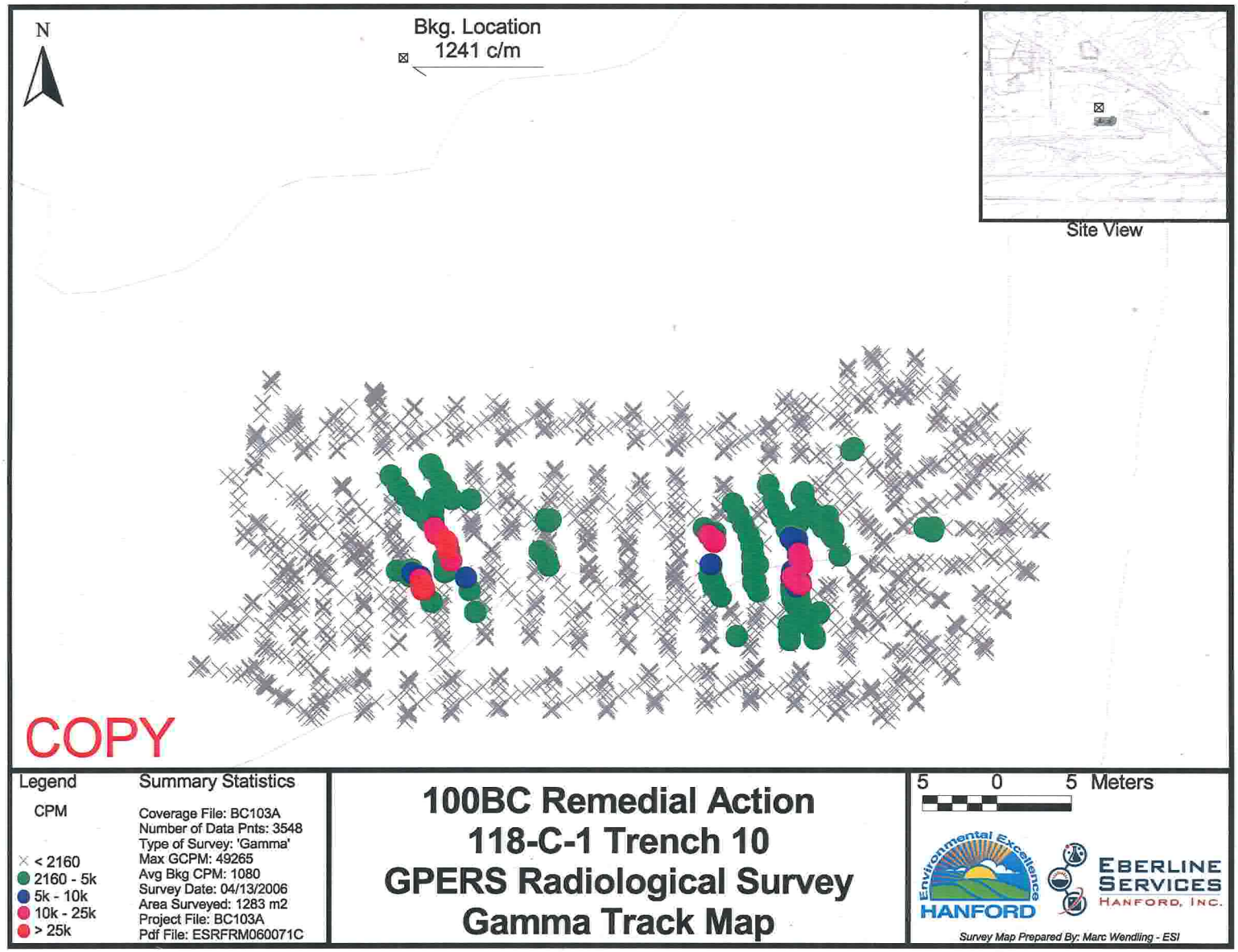


Figure D-12. Initial GPERS Map of 118-C-1, Area 2, Trench 10 Excavation.



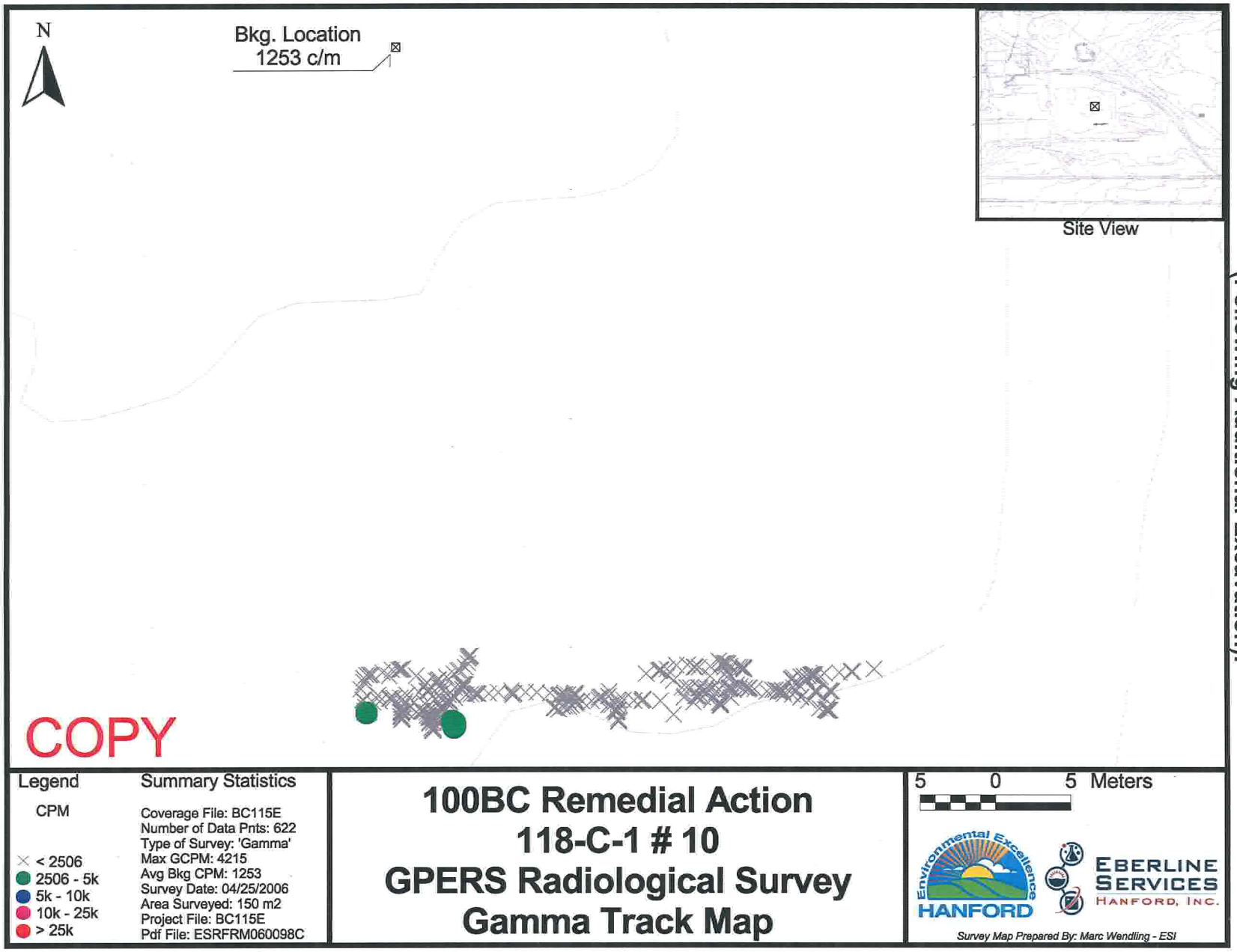


Figure D-13. GPERS Map of 118-C-1, Area 2, Trench 10 (Following Additional Excavation).

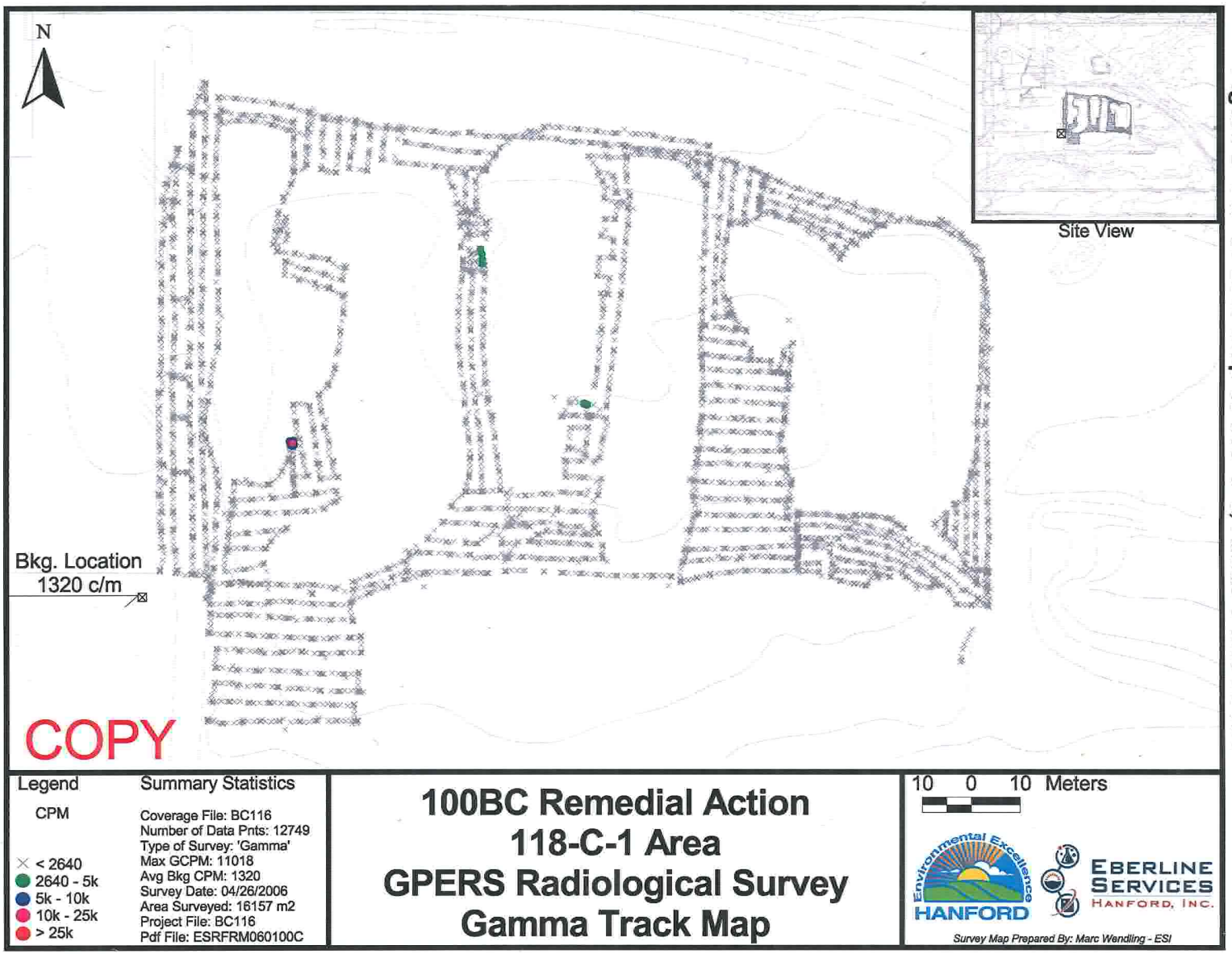
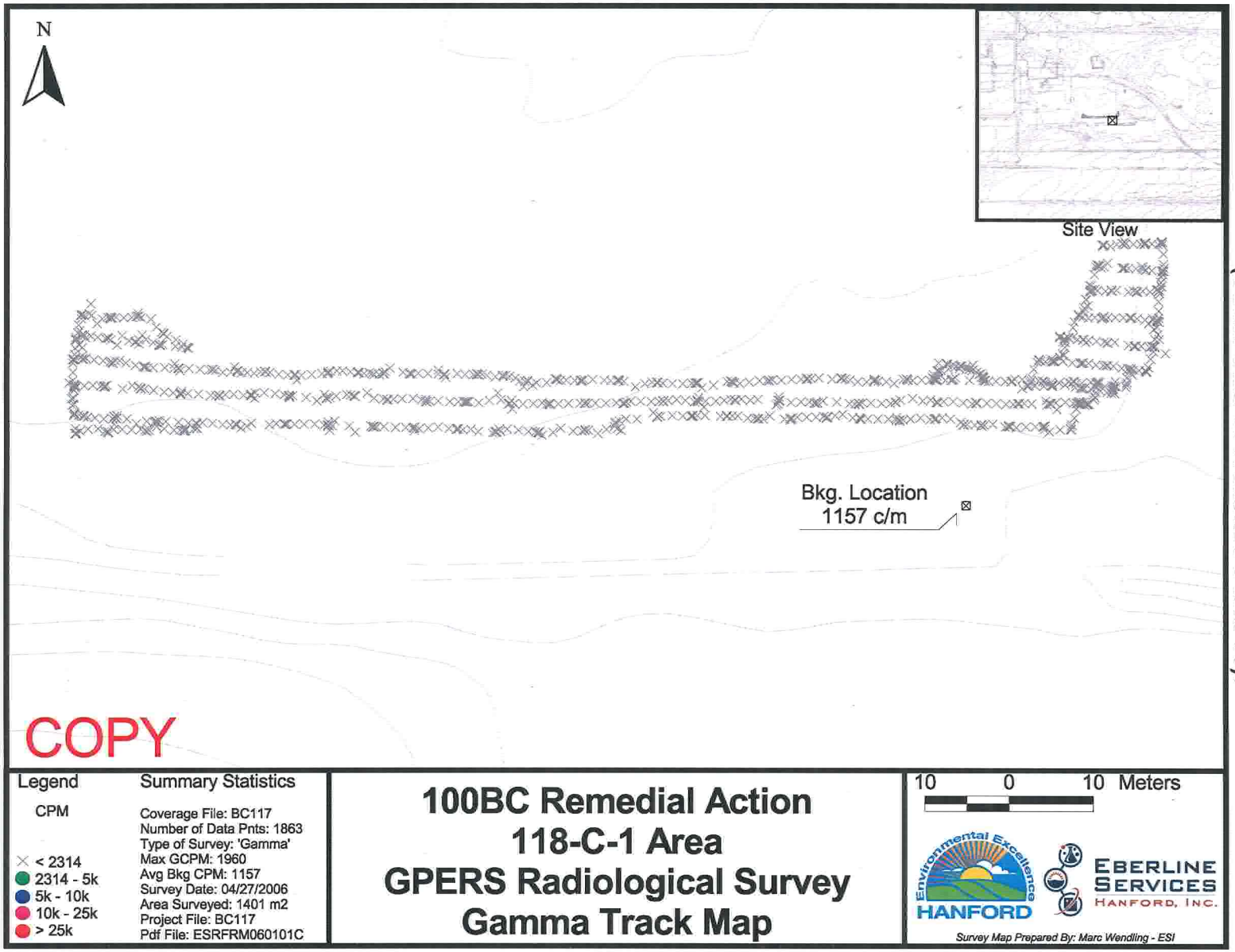


Figure D-14. GPERS Map of 118-C-1, Areas 3 and Areas 4.

Figure D-15. GPERS Map of 118-C-1, Areas 3 and Areas 4 (South Side of Trenches 9 and 10).



APPENDIX E

RESRAD INPUT PARAMETERS AND CALCULATION BRIEF EXCERPTS

CALCULATION COVER SHEET

Project Title 118-C-1 Burial Ground Cleanup Verification **Job No.** 14655
Area 100 B/C Area
Discipline Environmental ***Calc. No.** 0100C-CA-V0035
Subject 118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief
Computer Program RESRAD **Program No.** Version 6.30

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 pg Summary – 8 pg Attm. 1 - 2 pg Attm. 2 - 1 pg Attm. 3 - 19 pg Attm. 4 - 20 pg Attm. 5 - 10 pg Attm. 6 - 21 pg Attm. 7 - 29 pg Attm. 8 - 10 pg Attm. 9 - 20 pg Attm. 10 - 20 pg Attm. 11 - 10 pg Attm. 12 – 19 pg Attm. 13 – 20 pg Attm. 14 – 10 pg Attm. 15 – 22 pg Attm. 16 – 29 pg Attm. 17 - 10 pg Attm. 18 – 18 pg Attm. 19 – 20 pg Attm. 20 - 10 pg Attm. 21 - 20 pg Attm. 22 – 20 pg Attm. 23 – 10 pg Attm. 24 – 19 pg Attm. 25 – 20 pg Attm. 26 – 10 pg Total – 428 pages	S. W. Clark S.W. Clark 12/13/06	M. W. Perrott M.W. Perrott 12/13/06	T. M. Blakley MJ Appel for TM Blakley per telecomference 12/13/06	D. N. Strom 12-13-06	12-13-06

SUMMARY OF REVISION

WCH-DE-018 (9/01/2006) *Obtain Calc. No. from R&DC and Form from Intranet

Washington Closure Hanford CALCULATION SHEET

Originator:	S. W. Clark	Date:	12/13/06	Calc. No.:	0100C-CA-V0035	Rev.:	0
Project:	118-C-1 Burial Ground Cleanup	Job No:	14655	Checked:	M. W. Perrott	Date:	12/13/06
Subject:	118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief					Sheet No. 1 of 8	

PURPOSE:

Calculate the soil and groundwater concentrations, dose, and risk contributions from remaining radionuclide contaminants in remediated 118-C-1 Burial Ground areas, in overburden/below cleanup level soil, and in staging pile (stockpile) areas over a period of 1,000 years.

GIVEN/REFERENCES:

1) Cleanup verification data from *118-C-1 Burial Ground 95% UCL Calculation*, Calculation No. 0100C-CA-V0033, Rev. 0, Washington Closure Hanford, Richland, Washington.
2) *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP), DOE/RL-96-17, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
3) Radioactive and nonradioactive contaminants of concern from the *100 Area Burial Grounds Remedial Action Sampling and Analysis Plan*, DOE/RL-2001-35, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. For the purpose of these RESRAD calculations, the radioactive contaminants of potential concern (COPCs) are americium-241, carbon-14, cesium-137, cobalt-60, europium-152, europium-154, europium-155, nickel-63, plutonium-238, plutonium-239/240, plutonium-241, silver-108m, strontium-90, tritium (H-3), uranium-233/234, uranium-235, and uranium-238. The nonradionuclide contaminants of concern are cadmium, hexavalent chromium, mercury, PCBs, SVOAs, TPH, and VOAs.
4) RESidual RADioactivity (RESRAD) computer code, version 6.30, to calculate compliance with residual radioactivity guidelines, developed for the U.S. Department of Energy by the Environmental Assessment Division of Argonne National Laboratory, Argonne, Illinois.
5) Sample design data from the *118-C-1 Burial Ground Sampling Plan*, Calculation No. 0100B-CA-V0288, Rev. 0, Washington Closure Hanford, Richland, Washington..
6) Groundwater elevation from *Hanford Groundwater Monitoring for Fiscal Year 2005*, PNNL-15670, Pacific Northwest National Laboratory, Richland, Washington.

SOLUTION:

1) Separate RESRAD runs were performed for the 118-C-1 Burial Ground trenches with spent nuclear fuel (Area 1), other trenches (Area 2), west interstitial area (Area 3), east interstitial area (Area 4), combined Areas 1, 2, 3, and 4, overburden/below cleanup level (OB/BCL) material, and staging pile (stockpile) area (SPA). The RESRAD run for the combined Areas 1, 2, 3, and 4 was done using using the maximum 95% UCL values from the individual Areas. Table 1 shows the elevations (NAVD88) and thickness of each soil horizon. The average surrounding grade elevation and the maximum excavation depth are used to represent the burial ground excavation. Attachment 1 shows representative dimensions of soil horizons and contaminant pathways considered for dose, risk, and groundwater protection. Attachment 2 shows a schematic of the 118-C-1 Burial Ground area with the pieces making up the individual units labeled. Input factors for each run are shown in the "Summary" section of the RESRAD "Mixture Sums and Single Radionuclide Guidelines" printouts in the Attachments to this Calculation Summary.

Table 1. Waste Site Dimensions for RESRAD Modeling

Parameter	Units	Area 1	Area 2	Area 3	Area 4	Combined Areas	OB/BCL	Shallow Zone SPA	Deep Zone SPA
Contaminated Zone Dimensions									
Cover Depth	m	0	0	0	0	0	0	0	4.6
Area of Contaminated Zone (CZ)	m^2	3,018	2,339	7,576	7,576	20,509	9,006	23,230	23,230
Length Parallel to Aquifer Flow	m	75	85	130	130	150	80	240	240
Elevations of Vadose Zone Horizons									
Elevation: Surface	m	150.0	149.0	151.0	151.0	151.0	151.5	148.5	148.5
Elevation: Bottom of Excavation	m	145.5	146.0	146.0	146.0	146.0	--	--	--
Elevation: Groundwater	m	121.8	121.8	121.8	121.8	121.8	121.8	121.8	121.8
Thickness: Contaminated Zone	m	28.2	27.2	29.2	29.2	29.2	29.7	4.6	22.1
Thickness: Unsaturated Zone	m	0	0	0	0	0	0	22.1	0

OB/BCL = Overburden/Below Cleanup Levels
SPA = Staging Pile (Stockpile) Area

2) The year where the peak dose (or concentration) occurs from each individual radionuclide COC and layer is determined by a preliminary run. This year is then added for all horizons for the final RESRAD runs. For the direct exposure pathway (i.e. soil ingestion and inhalation and external radiation), the peak year occurred at year zero (year 2006) for all COCs. For the water pathways (i.e. drinking water and food ingestion) the peak year was year 3 for tritium, year 8 for cobalt-60, year 43 for cesium-137 and strontium-90, and year 131 for nickel-63. The 3, 8, 43, and 131-year time periods were added to all RESRAD runs.

To be conservative, shallow zone evaluations were performed for the 118-C-1 Burial Ground areas assuming that the residual contamination levels from the shallow zone sample data sets extend uniformly from the surface to groundwater (Attachment 1). For Area 2 and the combined Areas 1, 2, 3, and 4 this evaluation is too conservative and carbon-14 in the pathways affected by plant ingestion caused the total all pathways dose to be greater than 15 mrem/yr. Because the residual carbon-14 is deeper than the root penetration zone (10 ft), and not accessible to plants, the RESRAD inputs for "contaminated fractions" in the plant ingestion input parameters for Area 2 and the combined Areas 1, 2, 3, and 4 are set equal to zero.

For the staging pile area (SPA) the maximum carbon-14 concentration (182 pCi/g) is above the direct exposure lookup value (5.16 pCi/g per the 100 Area RDR/RAWP) while carbon-14 in all other SPA sampling grid areas was undetected. The soil that contains carbon-14 above lookup values will be used as backfill in deep zone areas and has been evaluated in RESRAD as SPA deep zone material (with 4.6 m [15 ft] of cover; see Table 2).

Washington Closure Hanford CALCULATION SHEET

Originator:	S. W. Clark	Date: 12/13/06	Calc. No.:	0100C-CA-V0035		Rev.:	0
Project:	118-C-1 Burial Ground Cleanup	Job No:	14655	Checked:	M. W. Perrott	Date:	12/13/06
Subject:	118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief					Sheet No. 3 of 8	

METHODOLOGY:

1) Runs of RESRAD version 6.30 were completed for the 118-C-1 Burial Ground trenches with spent nuclear fuel (Area 1), other trenches (Area 2), west interstitial area (Area 3), east interstitial area (Area 4), the combined Areas 1, 2, 3, and 4, overburden/below cleanup level (OB/BCL) material, and staging pile area (SPA) soils using the radionuclide concentrations shown in Table 2. RESRAD numerical output reports for dose, risk, and concentration for the shallow zone, deep zone, and overburden are presented in the Attachments to this calculation summary.

Table 2. Cleanup Verification Data Set [a]

COPCs	Area 1	Area 2	Area 3	Area 4	Combined Areas	OB/BCL	Shallow Zone SPA	Deep Zone SPA
Radionuclide Activity (pCi/g)								
Am-241	--	--	--	--	--	--	--	--
C-14	--	8.0	--	--	8.0	--	--	182
Cs-137	0.185	0.140	0.709	0.81	0.140	0(<BG)	1.03	0.091
Co-60		0.99	0.037		0.99	--	0.029	--
Eu-152	0.121	0.199	0.140	0.114	0.199	--	0.177	--
Eu-154	--	--	--	--	--	--	--	--
Eu-155	--	--	--	--	--	--	--	--
Ni-63		26.1			26.1	--		--
Pu-238	--	--	--	--	--	--	--	--
Pu-239/240	--	--	--	--	--	--	--	--
Pu-241	--	--	--	--	--	--	--	--
Silver (Ag-108m)	--	--	--	--	--	--	--	--
Sr-90	--	--	0.268	--	0.268	1.23	0.334	--
Tritium (H-3)		4.76	--	--	4.76	--	--	--
U-233/234	0(<BG)	--	0(<BG)	0(<BG)	0(<BG)	0(<BG)	0(<BG)	--
U-235	0(<BG)	--	--	--	0(<BG)	--	0(<BG)	--
U-238	0(<BG)	--	0(<BG)	0(<BG)	0(<BG)	0(<BG)	0(<BG)	--

-- = Not evaluated by laboratory analysis or not detected (for all samples in the data set).
OB/BCL = Overburden/Below Cleanup Levels
SPA = Staging Pile (Stockpile) Area
[a] Soil concentration values are from *118-C-1 Burial Ground 95% UCL Calculation*, Calculation No. 0100C-CA-V0033, Rev. 0, Washington Closure Hanford, Richland, Washington. Refer to the 95% UCL for nonradionuclide concentrations. Nonradionuclides are not evaluated in this RESRAD calculation.

Washington Closure Hanford	CALCULATION SHEET						
Originator:	S. W. Clark SWC	Date: 12/13/06	Calc. No.:	0100C-CA-V0035		Rev.:	0
Project:	118-C-1 Burial Ground Cleanup	Job No: 14655	Checked:	M. W. Perrott MWP		Date:	12/13/06
Subject:	118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief					Sheet No. 4 of 8	

RESULTS:

1) Radionuclide "All Pathways" Dose Rate

The "all pathways" (maximum) dose rates are shown in Table 3. The maximum all pathways dose rate from the 118-C-1 Burial Ground combined Areas 1, 2, 3, and 4 is 12.8 mrem/yr at year zero (2006). The maximum all-pathways dose rate for the overburden (OB/BCL) soil is 4.01 mrem/yr at year zero (2006). For the staging pile area (SPA) the total maximum all-pathways dose rate for the shallow and deep zones is 12.4 mrem/yr at year zero (2006).

Table 3. All Pathways Dose Rate (mrem/yr)

RESRAD Run	Vadose Zone Horizons	"All Pathways" Dose Contributions in mrem/yr at Each Time Slice (yr)								
		0	1	3	8	12	43	131	300	1000
Area 1	Shallow Zone	9.45E-01	9.09E-01	8.41E-01	6.95E-01	6.00E-01	2.12E-01	2.10E-02	4.13E-04	4.01E-11
Area 2	Shallow Zone	1.11E+01	9.91E+00	7.95E+00	4.36E+00	2.77E+00	2.40E-01	2.23E-02	4.91E-03	5.61E-05
Area 3	Shallow Zone	3.54E+00	3.41E+00	3.16E+00	2.65E+00	2.33E+00	1.01E+00	1.24E-01	2.50E-03	2.22E-10
Area 4	Shallow Zone	2.43E+00	2.36E+00	2.23E+00	1.94E+00	1.73E+00	7.69E-01	9.46E-02	1.91E-03	1.88E-10
Combined Areas		1.28E+01	1.16E+01	9.46E+00	5.70E+00	3.89E+00	7.26E-01	8.82E-02	6.59E-03	1.01E-04
OB/BCL	Shallow Zone	4.01E+00	3.92E+00	3.74E+00	3.34E+00	3.04E+00	1.49E+00	1.95E-01	3.91E-03	2.47E-10
SPA	Shallow Zone	1.24E+01	1.18E+01	1.08E+01	8.72E+00	7.38E+00	2.31E+00	1.91E-01	3.39E-03	2.39E-10
SPA	Deep Zone	0.00E+00	2.94E-05	9.38E-05	2.30E-04	3.16E-04	5.58E-04	2.23E-04	1.03E-05	3.22E-12
SPA Total All Pathway Dose Rate (mrem/yr)		1.24E+01	1.18E+01	1.08E+01	8.72E+00	7.38E+00	2.31E+00	1.91E-01	3.40E-03	2.42E-10

OB/BCL = Overburden/Below Cleanup Levels
SPA = Staging Pile (Stockpile) Area

2) Radionuclide Excess Lifetime Cancer Risk

The radionuclide excess lifetime cancer risk (ELCR) results are shown in Table 4. The maximum ELCR for the 118-C-1 Burial Ground combined Areas 1, 2, 3, and 4 is 9.95×10^{-5} at year zero (2006). The maximum ELCR for the overburden (OB/BCL) soil is 5.42×10^{-5} which also occurs at year zero (2006). For the staging pile area (SPA) the total maximum all-pathways ELRC for the shallow and deep zones is 1.55×10^{-4} at year zero (2006).

Table 4. Radionuclide Excess Lifetime Cancer Risk

RESRAD Run	Vadose Zone Horizons	Excess Cancer Risk at Each Time Slice (yr)								
		0	1	3	8	12	43	131	300	1000
Area 1	Shallow Zone	1.28E-05	1.24E-05	1.15E-05	9.63E-06	8.38E-06	3.16E-06	3.36E-07	6.68E-09	6.45E-16
Area 2	Shallow Zone	7.35E-05	6.60E-05	5.34E-05	3.12E-05	2.11E-05	3.24E-06	5.05E-07	1.62E-07	1.80E-09
Area 3	Shallow Zone	4.81E-05	4.66E-05	4.38E-05	3.77E-05	3.37E-05	1.51E-05	1.89E-06	3.78E-08	3.37E-15
Area 4	Shallow Zone	3.70E-05	3.60E-05	3.41E-05	2.98E-05	2.68E-05	1.22E-05	1.53E-06	3.09E-08	3.02E-15
Combined Areas		9.95E-05	9.07E-05	7.60E-05	5.04E-05	3.79E-05	1.11E-05	1.57E-06	1.97E-07	3.32E-09
OB/BCL	Shallow Zone	5.42E-05	5.29E-05	5.05E-05	4.50E-05	4.10E-05	2.00E-05	2.59E-06	5.09E-08	3.14E-15
SPA	Shallow Zone	1.55E-04	1.49E-04	1.37E-04	1.12E-04	9.57E-05	3.20E-05	2.88E-06	5.20E-08	3.74E-15
SPA	Deep Zone	7.15E-09	7.51E-09	8.18E-09	9.55E-09	1.04E-08	1.13E-08	3.80E-09	1.66E-10	5.05E-17
SPA Total ELCR		1.55E-04	1.49E-04	1.37E-04	1.12E-04	9.57E-05	3.20E-05	2.89E-06	5.21E-08	3.79E-15

OB/BCL = Overburden/Below Cleanup Levels
SPA = Staging Pile (Stockpile) Area

Washington Closure Hanford	CALCULATION SHEET						
Originator:	S. W. Clark	Date: 12/13/06	Calc. No.:	0100C-CA-V0035		Rev.:	0
Project:	118-C-1 Burial Ground Cleanup	Job No: 14655	Checked:	M. W. Perrott		Date:	12/17/06
Subject:	118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief					Sheet No. 5 of 8	

3) Radionuclide Groundwater Protection

The radionuclide concentrations in groundwater calculated by the RESRAD model are summarized in Table 5. Among the radionuclide contaminants of concern only cesium-137, cobalt-60, nickel-63, strontium-90, and tritium are calculated to reach groundwater in the 1,000 years of the RESRAD model run. The organ specific dose via the groundwater (and river) pathway is presented in a separate calculation brief [*118-C-1 Burial Ground Comparison To Drinking Water Standards (MCL) Calculation*, Calculation No. 0100C-CA-V0036, Rev. 0, Washington Closure Hanford, Richland, Washington]. Only concentrations are presented here.

Table 5. Predicted Groundwater (Well Water/Drinking Water) Concentrations (2 pages)

Radio-nuclides	Vadose Zone Horizon	Groundwater Concentrations in pCi/L at Each Time Slice (yr)									RAGs, pCi/L
		0	1	3	8	12	43	131	300	1000	
Cs-137	Area 1 SZ	0	4.65E-04	1.33E-03	3.17E-03	4.33E-03	7.58E-03	3.02E-03	1.39E-04	4.34E-11	60
	Area 2 SZ	0	3.52E-04	1.01E-03	2.40E-03	3.28E-03	5.74E-03	2.29E-03	1.05E-04	3.29E-11	
	Area 3 SZ	0	1.78E-03	5.11E-03	1.21E-02	1.66E-02	2.91E-02	1.16E-02	5.33E-04	1.67E-10	
	Area 4 SZ	0	2.04E-03	5.84E-03	1.39E-02	1.90E-02	3.32E-02	1.32E-02	6.09E-04	1.90E-10	
	Comb. Areas	0	1.78E-03	5.11E-03	1.21E-02	1.66E-02	2.90E-02	1.16E-02	5.33E-04	1.66E-10	
	OB/BCL	0	0	0	0	0	0	0	0	0	
	SPA SZ	0	0	0	0	0	0	0	0	0	
	SPA DZ	0	2.29E-04	6.56E-04	1.56E-03	2.13E-03	3.73E-03	1.49E-03	6.85E-05	2.15E-11	
	SPA Total	0	2.29E-04	6.56E-04	1.56E-03	2.13E-03	3.73E-03	1.49E-03	6.85E-05	2.15E-11	
Co-60	Area 1 SZ	0	0	0	0	0	0	0	0	0	100
	Area 2 SZ	0	2.24E-03	5.15E-03	7.12E-03	6.31E-03	3.84E-04	1.10E-08	5.60E-18	0	
	Area 3 SZ	0	8.35E-05	1.93E-04	2.66E-04	2.36E-04	1.43E-05	4.11E-10	2.10E-19	0	
	Area 4 SZ	0	0	0	0	0	0	0	0	0	
	Comb. Areas	0	2.24E-03	5.15E-03	7.12E-03	6.31E-03	3.84E-04	1.10E-08	5.60E-18	2.24E-03	
	OB/BCL	0	0	0	0	0	0	0	0	0	
	SPA SZ	0	0	0	0	0	0	0	0	0	
	SPA DZ	0	0	0	0	0	0	0	0	0	
	SPA Total	0	0	0	0	0	0	0	0	0	
Ni-63	Area 1 SZ	0	0	0	0	0	0	0	0	0	50
	Area 2 SZ	0	3.08E-01	9.11E-01	2.34E+00	3.41E+00	9.77E+00	1.57E+01	1.06E+01	1.30E-01	
	Area 3 SZ	0	0	0	0	0	0	0	0	0	
	Area 4 SZ	0	0	0	0	0	0	0	0	0	
	Comb. Areas	0	3.08E-01	9.11E-01	2.34E+00	3.41E+00	9.77E+00	1.57E+01	1.06E+01	2.20E-01	
	OB/BCL	0	0	0	0	0	0	0	0	0	
	SPA SZ	0	0	0	0	0	0	0	0	0	
	SPA DZ	0	0	0	0	0	0	0	0	0	
	SPA Total	0	0	0	0	0	0	0	0	0	

Washington Closure Hanford CALCULATION SHEET

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Project:	118-C-1 Burial Ground Cleanup	Job No:	14655	Checked:	M. W. Perrott	Date:	12/13/06
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Table 5. Predicted Groundwater (Well Water/Drinking Water) Concentrations (2 pages)

Radio-nuclides	Vadose Zone Horizon	Groundwater Concentrations in pCi/L at Each Time Slice (yr)									RAGs, pCi/L
		0	1	3	8	12	43	131	300	1000	
Sr-90	Area 1 SZ	0	0	0	0	0	0	0	0	0	8
	Area 2 SZ	0	0	0	0	0	0	0	0	0	
	Area 3 SZ	0	4.92E-03	1.41E-02	3.33E-02	4.54E-02	7.77E-02	2.91E-02	1.18E-03	1.53E-10	
	Area 4 SZ	0	0	0	0	0	0	0	0	0	
	Comb. Areas	0	4.92E-03	1.41E-02	3.33E-02	4.54E-02	7.77E-02	2.90E-02	1.18E-03	1.77E-10	
	OB/BCL	0	2.26E-02	6.46E-02	1.53E-01	2.08E-01	3.57E-01	1.33E-01	5.44E-03	5.10E-10	
	SPA SZ	0	0	0	0	0	0	0	0	0	
	SPA DZ	0	0	0	0	0	0	0	0	0	
	SPA Total	0	0	0	0	0	0	0	0	0	
Tritium (H-3)	Area 1 SZ	0	0	0	0	0	0	0	0	0	20,000
	Area 2 SZ	0	2.37E+03	5.43E+03	1.82E+03	7.42E+02	6.93E-01	1.64E-09	3.46E-26	0	
	Area 3 SZ	0	0	0	0	0	0	0	0	0	
	Area 4 SZ	0	0	0	0	0	0	0	0	0	
	Comb. Areas	0	2.37E+03	5.43E+03	4.02E+03	1.64E+03	1.53E+00	3.62E-09	7.68E-26	0	
	OB/BCL	0	0	0	0	0	0	0	0	0	
	SPA SZ	0	0	0	0	0	0	0	0	0	
	SPA DZ	0	0	0	0	0	0	0	0	0	
	SPA Total	0	0	0	0	0	0	0	0	0	

RAGs = Remedial action goals from the 100 Area RDR/RAWP
OB/BCL = Overburden/Below Cleanup Levels
SPA = Staging Pile (Stockpile) Area

CONCLUSIONS:

- The "all pathways" (maximum) dose rates are shown in Table 3. The maximum all pathways dose rate from the 118-C-1 Burial Ground excavated combined Areas 1, 2, 3, and 4 is 12.8 mrem/yr at year zero (2006). The maximum all-pathways dose rate for the overburden (OB/BCL) soil is 4.01 mrem/yr at year zero (2006). For the staging pile area (SPA) the total maximum all-pathways dose rate for the shallow and deep zones is 12.4 mrem/yr at year zero (2006).

- The dominant pathway for the dose rate for most of the RESRAD evaluations is direct external exposure (external gamma). See Table 6, below.

- The primary radionuclide contributing to the direct exposure pathway for the majority of the evaluations is cesium-137. The primary radionuclide contributing to the direct exposure pathway for the combined Areas 1, 2, 3, and 4 is cobalt-60. See Table 6, below.

- None of the site COCs are projected to exceed remedial action goals (RAGs).

- The radionuclide excess lifetime cancer risk (ELCR) results are shown in Table 4. The maximum ELCR from the 118-C-1 Burial Ground areas combined Areas 1, 2, 3, and 4 is 9.95×10^{-5} at year zero (2006). The maximum ELCR for the overburden (OB/BCL) soil (5.42×10^{-5}) also occurs at year zero (2006). The total maximum all-pathways ELRC for the staging pile area (SPA) shallow and deep zones is 1.55×10^{-4} at year zero (2006).

Table 6. Dominant Pathways and Primary Radionuclides for RESRAD Evaluations

RESRAD Run	Vadose Zone Horizon	Dominant Pathway	Primary Radionuclide
Area 1	Shallow Zone	External Gamma	Eu-152
Area 2	Shallow Zone	External Gamma	Co-60
Area 3	Shallow Zone	External Gamma	Cs-137
Area 4	Shallow Zone	External Gamma	Cs-137
Combined Areas	Shallow Zone	External Gamma	Co-60
OB/BCL	Shallow Zone	Plant Ingestion	Sr-90
SPA	Shallow Zone	External Gamma	Eu-152
SPA	Deep Zone	Fish	Cs-137

OB/BCL = Overburden/Below Cleanup Levels
SPA = Staging Pile (Stockpile) Area

- Among the radionuclide contaminants of concern, cesium-137, cobalt-60, nickel-63, strontium-90, and tritium are calculated to reach groundwater in the 1,000 years of the RESRAD model run. These radionuclides are predicted to reach groundwater at concentrations significantly below the RAGs.

ATTACHMENTS:

1. Graphic showing 118-C-1 Cleanup Verification Model (2 pages)
2. Schematic of the 118-C-1 Burial Ground Remediation Areas (1 page)
3. RESRAD Output: 118-C-1 Area 1 Shallow Zone Radionuclides – Mixture Sums and Single Radionuclide Guidelines (19 pages)
4. RESRAD Output: 118-C-1 Area 1 Shallow Zone Radionuclides – Intake Quantities and Health Risk Factors (20 pages)
5. RESRAD Output: 118-C-1 Area 1 Shallow Zone Radionuclides – Concentration of Radionuclides, (10 pages)
6. RESRAD Output: 118-C-1 Area 2 Shallow Zone Radionuclides – Mixture Sums and Single Radionuclide Guidelines (21 pages)
7. RESRAD Output: 118-C-1 Area 2 Shallow Zone Radionuclides - Intake Quantities and Health Risk Factors (29 pages)
8. RESRAD Output: 118-C-1 Area 2 Shallow Zone Radionuclides - Concentration of Radionuclides (10 pages)
9. RESRAD Output: 118-C-1 Area 3 Shallow Zone Radionuclides – Mixture Sums and Single Radionuclide Guidelines (20 pages)

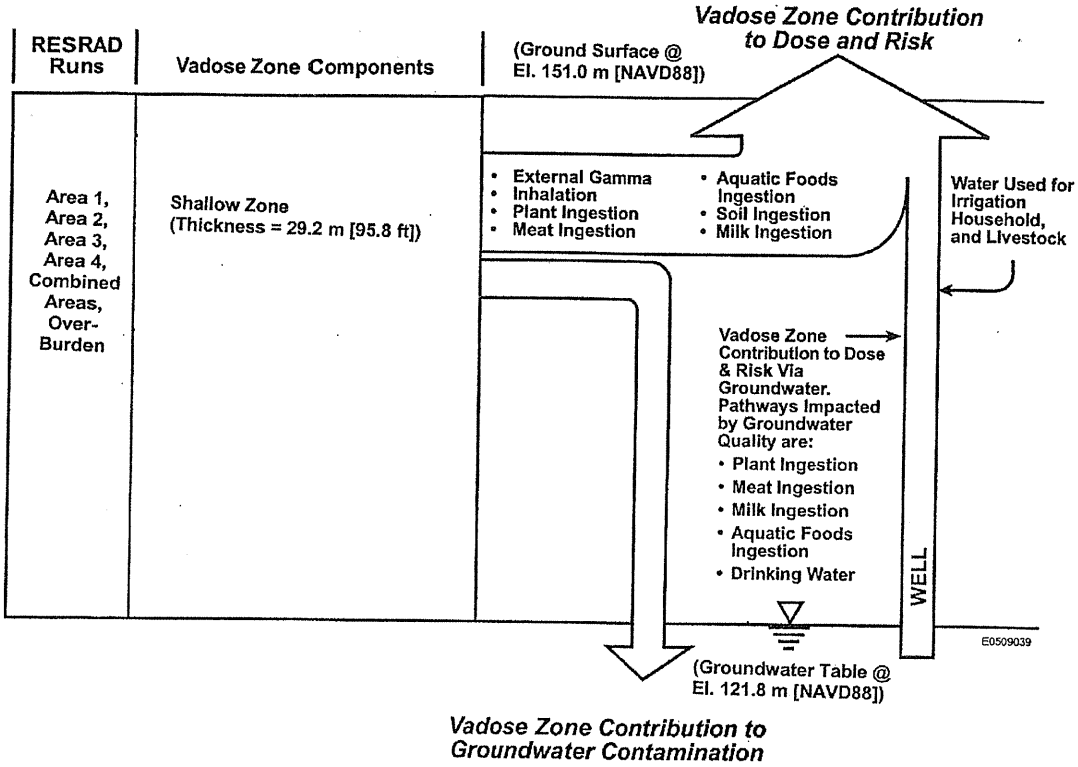
Washington Closure Hanford CALCULATION SHEET

Originator:	S. W. Clark	Date: 12/13/06		Calc. No.:	0100C-CA-V0035	Rev.:	0
Project:	118-C-1 Burial Ground Cleanup	Job No:	14655	Checked:	M. W. Perrott	Date:	12/13/06
Subject:	118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief					Sheet No. 8 of 8	

10. RESRAD Output: 118-C-1 Area 3 Shallow Zone Radionuclides - Intake Quantities and Health Risk Factors (20 pages)
11. RESRAD Output: 118-C-1 Area 3 Shallow Zone Radionuclides - Concentration of Radionuclides (10 pages)
12. RESRAD Output: 118-C-1 Area 4 Shallow Zone Radionuclides – Mixture Sums and Single Radionuclide Guidelines (19 pages)
13. RESRAD Output: 118-C-1 Area 4 Shallow Zone Radionuclides - Intake Quantities and Health Risk Factors (20 pages)
14. RESRAD Output: 118-C-1 Area 4 Shallow Zone Radionuclides - Concentration of Radionuclides (10 pages)
15. RESRAD Output: 118-C-1 Combined Areas 1, 2, 3, and 4 Shallow Zone Radionuclides – Mixture Sums and Single Radionuclide Guidelines (22 pages)
16. RESRAD Output: 118-C-1 Combined Areas 1, 2, 3, and 4 Shallow Zone Radionuclides - Intake Quantities and Health Risk Factors (29 pages)
17. RESRAD Output: 118-C-1 Combined Areas 1, 2, 3, and 4 Shallow Zone Radionuclides - Concentration of Radionuclides (10 pages)
18. RESRAD Output: 118-C-1 Overburden/Below Cleanup Levels Radionuclides – Mixture Sums and Single Radionuclide Guidelines (18 pages)
19. RESRAD Output: 118-C-1 Overburden/Below Cleanup Levels Radionuclides – Intake Quantities and Health Risk Factors (20 pages)
20. RESRAD Output: 118-C-1 Overburden/Below Cleanup Levels Radionuclides – Concentration of Radionuclides (10 pages)
21. RESRAD Output: 118-C-1 Staging Pile (Stockpile) Area Shallow Zone Radionuclides – Mixture Sums and Single Radionuclide Guidelines (20 pages)
22. RESRAD Output: 118-C-1 Staging Pile (Stockpile) Area Shallow Zone Radionuclides - Intake Quantities and Health Risk Factors (20 pages)
23. RESRAD Output: 118-C-1 Staging Pile (Stockpile) Area Shallow Zone Radionuclides - Concentration of Radionuclides (10 pages)
24. RESRAD Output: 118-C-1 Staging Pile (Stockpile) Area Deep Zone Radionuclides – Mixture Sums and Single Radionuclide Guidelines (19 pages)
25. RESRAD Output: 118-C-1 Staging Pile (Stockpile) Area Deep Zone Radionuclides - Intake Quantities and Health Risk Factors (20 pages)
26. RESRAD Output: 118-C-1 Staging Pile (Stockpile) Area Deep Zone Radionuclides - Concentration of Radionuclides (10 pages)

ATTACHMENT 1

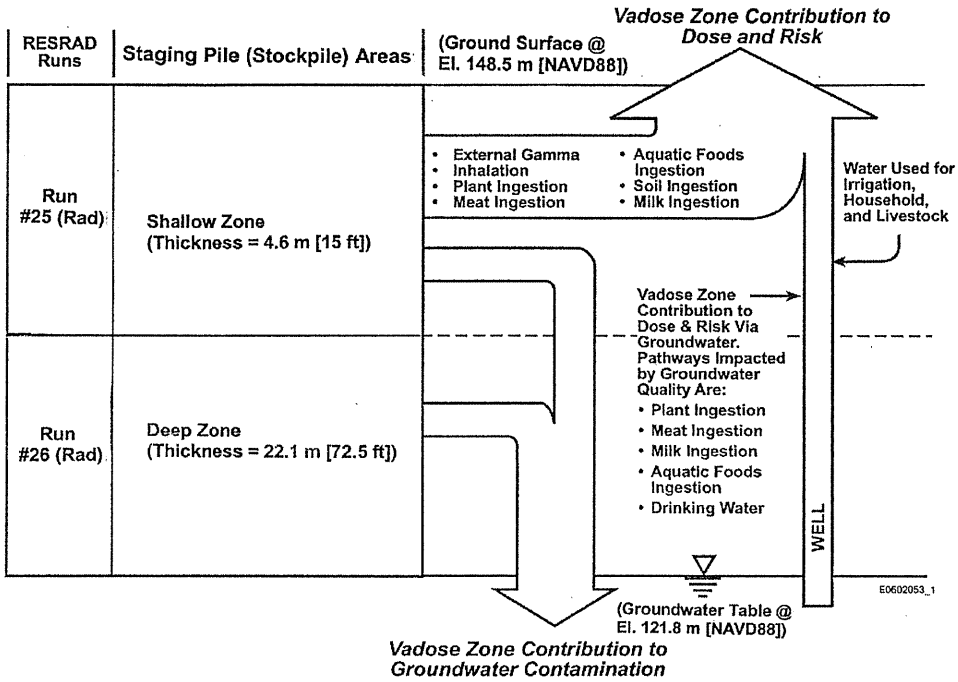
118-C-1 Burial Ground Cleanup Verification Model (2 Pages)



Attachment 1 Sheet No. 1 of 2
Originators: S. W. Clark Date 12/13/06
Chk'd By M. W. Perrott Date 12/13/06
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 1

118-C-1 Burial Ground Cleanup Verification Model (2 Pages)



Attachment 1 Sheet No. ~~1~~ 2 of 2 Rwe 12/13/06
Originators: S. W. Clark Date
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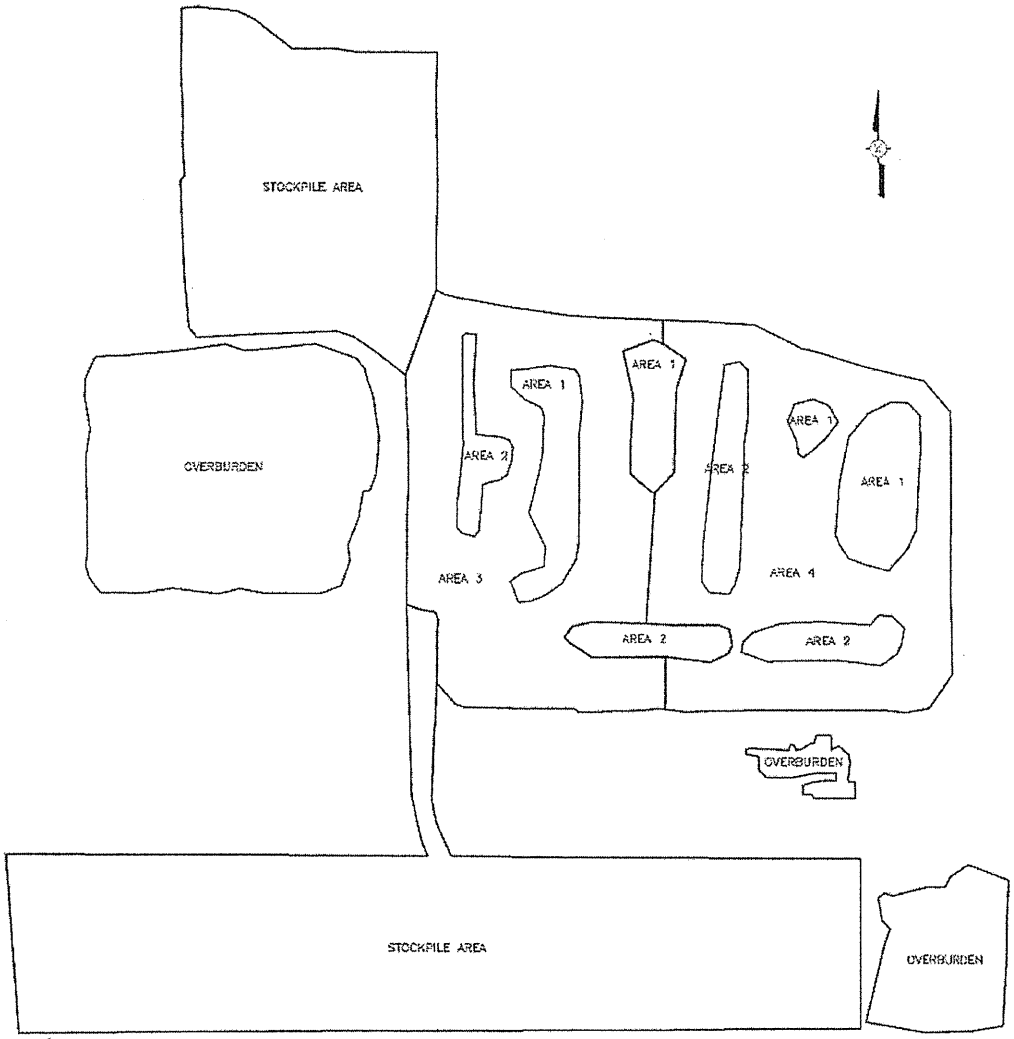
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 2

Schematic of the 118-C-1 Burial Ground Remediation Areas Sampled for Cleanup Verification



Attachment	2	Sheet No.	1 of 1
Originators:	S. W. Clark	Date	12/13/06
Chk'd By	M. W. Perrott	Date	12/13/06
Calc. No.	0100C-CA-V0035	Rev. No.	0

ATTACHMENT 3

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1RESRAD, Version 6.30     T« Limit = 0.5 year        11/30/2006  11:38  Page   1
 Summary : 118-C-1 Burial Ground Area 1 Shallow Zone
 File    : 118-C-1 Area 1 SZ.RAD
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Table of Contents

Part 1: Mixture Sums and Single Radionuclide Guidelines

Attachment	3	Sheet No.	1 of 19
Originators:	S. W. Clark	Date	12/13/06
Chk'd By	M. W. Perrott	Date	12/13/06
Calc. No.	0100C-CA-V0035	Rev. No.	0

ATTACHMENT 3

1RESRAD, Version 6.30 T« Limit = 0.5 year 11/30/2006 11:38 Page 2
Summary : 118-C-1 Burial Ground Area 1 Shallow Zone
File : 118-C-1 Area 1 SZ.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
B-1	Eu-152	2.210E-04	2.210E-04	DCF2(2)
B-1	Gd-152	2.430E-01	2.430E-01	DCF2(4)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-1	Eu-152	6.480E-06	6.480E-06	DCF3(2)
D-1	Gd-152	1.610E-04	1.610E-04	DCF3(4)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-34	Eu-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(2,1)
D-34	Eu-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(2,2)
D-34	Eu-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(2,3)
D-34	Gd-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(4,1)
D-34	Gd-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(4,2)
D-34	Gd-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(4,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5	Eu-152 , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Eu-152 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5	Gd-152 , fish	2.500E+01	2.500E+01	BIOFAC(4,1)
D-5	Gd-152 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(4,2)

Attachment 3 Sheet No. 2 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
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ATTACHMENT 3

1RESRAD, Version 6.30 T« Limit = 0.5 year 11/30/2006 11:38 Page 3
Summary : 118-C-1 Burial Ground Area 1 Shallow Zone
File : 118-C-1 Area 1 SZ.RAD

Site-Specific Parameter Summary

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	3.018E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.820E+01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	7.500E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	8.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.200E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	4.300E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.310E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Cs-137	1.850E-01	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Eu-152	1.210E-01	0.000E+00	---	S1(2)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Eu-152	not used	0.000E+00	---	W1(2)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.500E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.500E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.400E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.100E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	7.600E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.500E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	1.500E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.530E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.250E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	4.600E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Attachment 3 Sheet No. 3 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 3

1RESRAD, Version 6.30 T« Limit = 0.5 year 11/30/2006 11:38 Page 4
Summary : 118-C-1 Burial Ground Area 1 Shallow Zone
File : 118-C-1 Area 1 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.534E-05	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Eu-152				
R016	Contaminated zone (cm**3/g)	2.000E+02	-1.000E+00	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	2.000E+02	-1.000E+00	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.851E-06	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for daughter Gd-152				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCC(4)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.147E-06	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	8.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.000E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

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Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
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ATTACHMENT 3

1RESRAD, Version 6.30 T« Limit = 0.5 year 11/30/2006 11:38 Page 5
Summary : 118-C-1 Burial Ground Area 1 Shallow Zone
File : 118-C-1 Area 1 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.100E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.700E+00	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	3.600E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	1.970E+01	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	7.300E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.151E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.151E+00	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)

Attachment 3 Sheet No. 5 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
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ATTACHMENT 3

1RESRAD, Version 6.30 T« Limit = 0.5 year 11/30/2006 11:38 Page 6
Summary : 118-C-1 Burial Ground Area 1 Shallow Zone
File : 118-C-1 Area 1 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)

Attachment 3 Sheet No. 6 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
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ATTACHMENT 3

1RESRAD, Version 6.30 T« Limit = 0.5 year 11/30/2006 11:38 Page 7
Summary : 118-C-1 Burial Ground Area 1 Shallow Zone
File : 118-C-1 Area 1 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	1	---	---	LYMAX
TITL	Maximum number of integration points for risk	5	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Attachment 3 Sheet No. 7 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 3

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1RESRAD, Version 6.30    T« Limit = 0.5 year         11/30/2006 11:38   Page   8
 Summary : 118-C-1 Burial Ground Area 1 Shallow Zone
 File    : 118-C-1 Area 1 SZ.RAD

      Contaminated Zone Dimensions            Initial Soil Concentrations, pCi/g
      ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ            ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
        Area:   3018.00 square meters                Cs-137     1.850E-01
   Thickness:     28.20 meters                       Eu-152     1.210E-01
 Cover Depth:      0.00 meters
0
                                           Total Dose TDOSE(t), mrem/yr
                                     Basic Radiation Dose Limit = 1.500E+01 mrem/yr
                    Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)
                    ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
    t (years):  0.000E+00  1.000E+00  3.000E+00  8.000E+00  1.200E+01  4.300E+01  1.310E+02  3.000E+02  1.000E+03
     TDOSE(t):  9.453E-01  9.090E-01  8.412E-01  6.954E-01  5.995E-01  2.115E-01  2.096E-02  4.133E-04  4.010E-11
         M(t):  6.302E-02  6.060E-02  5.608E-02  4.636E-02  3.997E-02  1.410E-02  1.398E-03  2.755E-05  2.673E-12
0Maximum TDOSE(t):  9.453E-01 mrem/yr   at t = 0.000E+00 years
```

ATTACHMENT 6

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1RESRAD, Version 6.30     T« Limit = 0.5 year        11/30/2006  13:49  Page   1
 Summary : 118-C-1 Burial Ground Area 2 Shallow Zone
 File    : 118-C-1 Area 2 SZ.RAD
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Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Attachment 6 Sheet No. 1 of 21
Originators: S. W. Clark Date 12/13/06
Chk'd By M. W. Perrott Date 12/13/06
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 6

1RESRAD, Version 6.30 T« Limit = 0.5 year 11/30/2006 13:49 Page 2
Summary : 118-C-1 Burial Ground Area 2 Shallow Zone
File : 118-C-1 Area 2 SZ.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	C-14	2.090E-06	2.090E-06	DCF2(1)
B-1	Co-60	2.190E-04	2.190E-04	DCF2(2)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(3)
B-1	Eu-152	2.210E-04	2.210E-04	DCF2(4)
B-1	Gd-152	2.430E-01	2.430E-01	DCF2(6)
B-1	H-3	6.400E-08	6.400E-08	DCF2(7)
B-1	Ni-63	6.290E-06	6.290E-06	DCF2(8)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	C-14	2.090E-06	2.090E-06	DCF3(1)
D-1	Co-60	2.690E-05	2.690E-05	DCF3(2)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(3)
D-1	Eu-152	6.480E-06	6.480E-06	DCF3(4)
D-1	Gd-152	1.610E-04	1.610E-04	DCF3(6)
D-1	H-3	6.400E-08	6.400E-08	DCF3(7)
D-1	Ni-63	5.770E-07	5.770E-07	DCF3(8)
D-34	Food transfer factors:			
D-34	C-14 , plant/soil concentration ratio, dimensionless	5.500E+00	5.500E+00	RTF(1,1)
D-34	C-14 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.100E-02	3.100E-02	RTF(1,2)
D-34	C-14 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.200E-02	1.200E-02	RTF(1,3)
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(2,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(2,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(2,3)
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(3,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(3,3)
D-34	Eu-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(4,1)
D-34	Eu-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(4,2)
D-34	Eu-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(4,3)
D-34	Gd-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	Gd-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(6,2)
D-34	Gd-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(6,3)
D-34	H-3 , plant/soil concentration ratio, dimensionless	4.800E+00	4.800E+00	RTF(7,1)
D-34	H-3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.200E-02	1.200E-02	RTF(7,2)
D-34	H-3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-02	1.000E-02	RTF(7,3)
D-34	Ni-63 , plant/soil concentration ratio, dimensionless	5.000E-02	5.000E-02	RTF(8,1)
D-34	Ni-63 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(8,2)
D-34	Ni-63 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-02	2.000E-02	RTF(8,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	C-14 , fish	5.000E+04	5.000E+04	BIOFAC(1,1)
D-5	C-14 , crustacea and mollusks	9.100E+03	9.100E+03	BIOFAC(1,2)

Attachment 8 Sheet No. 2 of 21
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 6

1RESRAD, Version 6.30 T« Limit = 0.5 year 11/30/2006 13:49 Page 3
Summary : 118-C-1 Burial Ground Area 2 Shallow Zone
File : 118-C-1 Area 2 SZ.RAD

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(2,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(2,2)
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(3,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5	Eu-152 , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Eu-152 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(4,2)
D-5	Gd-152 , fish	2.500E+01	2.500E+01	BIOFAC(6,1)
D-5	Gd-152 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(6,2)
D-5	H-3 , fish	1.000E+00	1.000E+00	BIOFAC(7,1)
D-5	H-3 , crustacea and mollusks	1.000E+00	1.000E+00	BIOFAC(7,2)
D-5	Ni-63 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Ni-63 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)

Attachment 6 of 8 Sheet No. 3 of 21
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 6

1RESRAD, Version 6.30 T« Limit = 0.5 year 11/30/2006 13:49 Page 4
Summary : 118-C-1 Burial Ground Area 2 Shallow Zone
File : 118-C-1 Area 2 SZ.RAD

Site-Specific Parameter Summary

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.339E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.720E+01	2.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	8.500E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	8.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.200E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	4.300E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.310E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): C-14	8.000E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Co-60	9.900E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Cs-137	1.400E-01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Eu-152	1.990E-01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): H-3	4.760E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Ni-63	2.610E+01	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): C-14	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Eu-152	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): H-3	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Ni-63	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVERO
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.500E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.500E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.400E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	8.000E+00	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.100E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	7.600E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.500E-01	2.000E-01	---	EPSZ

Attachment 86 Sheet No. 4 of 21
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
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ATTACHMENT 6

1RESRAD, Version 6.30 T« Limit = 0.5 year 11/30/2006 13:49 Page 5
Summary : 118-C-1 Burial Ground Area 2 Shallow Zone
File : 118-C-1 Area 2 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Saturated zone field capacity	1.500E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.530E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.250E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	4.600E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for C-14				
R016	Contaminated zone (cm**3/g)	2.000E+02	0.000E+00	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	2.000E+02	0.000E+00	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.176E-06	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.664E-05	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.664E-05	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Eu-152				
R016	Contaminated zone (cm**3/g)	2.000E+02	-1.000E+00	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	2.000E+02	-1.000E+00	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.176E-06	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for H-3				
R016	Contaminated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCC(7)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.517E-02	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Ni-63				
R016	Contaminated zone (cm**3/g)	3.000E+01	1.000E+03	---	DCNUCC(8)
R016	Saturated zone (cm**3/g)	3.000E+01	1.000E+03	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.097E-05	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)

Attachment 6 & 8 Sheet No. 5 of 21
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 6

1RESRAD, Version 6.30 T« Limit = 0.5 year 11/30/2006 13:49 Page 6
Summary : 118-C-1 Burial Ground Area 2 Shallow Zone
File : 118-C-1 Area 2 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Gd-152				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCC(6)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.226E-06	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	8.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.000E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.100E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.700E+00	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	3.600E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	1.970E+01	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	7.300E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI

Attachment 6 of 21 Sheet No. 6 of 21
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
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ATTACHMENT 6

1RESRAD, Version 6.30 T« Limit = 0.5 year 11/30/2006 13:49 Page 7
Summary : 118-C-1 Burial Ground Area 2 Shallow Zone
File : 118-C-1 Area 2 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	0.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	0.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	0.000E+00	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	2.000E-05	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	3.000E-02	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	2.000E-02	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	9.800E-01	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	3.000E-01	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	7.000E-07	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	1.000E-10	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	8.000E-01	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	2.000E-01	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	8.894E+01	8.894E+01	---	CO2F

Attachment 6 & 8 Sheet No. 7 of 21
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
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ATTACHMENT 6

1RESRAD, Version 6.30 T« Limit = 0.5 year 11/30/2006 13:49 Page 8
Summary : 118-C-1 Burial Ground Area 2 Shallow Zone
File : 118-C-1 Area 2 SZ.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	1	---	---	LYMAX
TITL	Maximum number of integration points for risk	5	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Attachment 6 & DVC Sheet No. 8 of 21
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 6

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1RESRAD, Version 6.30     T« Limit = 0.5 year       11/30/2006  13:49  Page   9
 Summary : 118-C-1 Burial Ground Area 2 Shallow Zone
 File    : 118-C-1 Area 2 SZ.RAD

      Contaminated Zone Dimensions           Initial Soil Concentrations, pCi/g
      ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ           ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
        Area:    2339.00 square meters              C-14       8.000E+00
   Thickness:      27.20 meters                     Co-60      9.900E-01
 Cover Depth:       0.00 meters                     Cs-137     1.400E-01
                                                    Eu-152     1.990E-01
                                                    H-3        4.760E+00
                                                    Ni-63      2.610E+01
0
                                         Total Dose TDOSE(t), mrem/yr
                                   Basic Radiation Dose Limit = 1.500E+01 mrem/yr
                    Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)
                    ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
   t (years):  0.000E+00  1.000E+00  3.000E+00  8.000E+00  1.200E+01  4.300E+01  1.310E+02  3.000E+02  1.000E+03
    TDOSE(t):  1.107E+01  9.909E+00  7.947E+00  4.360E+00  2.765E+00  2.401E-01  2.226E-02  4.910E-03  5.611E-05
        M(t):  7.381E-01  6.606E-01  5.298E-01  2.907E-01  1.844E-01  1.601E-02  1.484E-03  3.273E-04  3.740E-06
0Maximum TDOSE(t):  1.107E+01 mrem/yr   at t = 0.000E+00 years
```

ATTACHMENT 9

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1RESRAD, Version 6.30     T« Limit = 0.5 year        12/05/2006  13:14  Page   1
 Summary : 118-C-1 Burial Ground Area 3, Interstitial Area (West) Shallow Zone
 File    : 118-C-1 Area 3 SZ.RAD
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Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Attachment 9 Sheet No. 1 of 20
Originators: S. W. Clark Date 12/12/06
Chk'd By M. W. Perrott Date 12/12/06
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 9

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/05/2006 13:14 Page 2
Summary : 118-C-1 Burial Ground Area 3, Interstitial Area (West) Shallow Zone
File : 118-C-1 Area 3 SZ.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(2)
B-1	Eu-152	2.210E-04	2.210E-04	DCF2(3)
B-1	Gd-152	2.430E-01	2.430E-01	DCF2(5)
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF2(6)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(2)
D-1	Eu-152	6.480E-06	6.480E-06	DCF3(3)
D-1	Gd-152	1.610E-04	1.610E-04	DCF3(5)
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF3(6)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(2,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(2,3)
D-34	Eu-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(3,1)
D-34	Eu-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(3,2)
D-34	Eu-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(3,3)
D-34	Gd-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(5,1)
D-34	Gd-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(5,2)
D-34	Gd-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(5,3)
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(6,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(6,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(6,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(2,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(2,2)
D-5	Eu-152 , fish	5.000E+01	5.000E+01	BIOFAC(3,1)
D-5	Eu-152 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(3,2)
D-5	Gd-152 , fish	2.500E+01	2.500E+01	BIOFAC(5,1)
D-5	Gd-152 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(5,2)

Attachment 9 Sheet No. 2 of 20
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 9

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1RESRAD, Version 6.30     T« Limit = 0.5 year       12/05/2006  13:14  Page   3
 Summary : 118-C-1 Burial Ground Area 3, Interstitial Area (West) Shallow Zone
 File    : 118-C-1 Area 3 SZ.RAD

                    Dose Conversion Factor (and Related) Parameter Summary (continued)
                                        File: HEAST 2001 Morbidity
0     ³                                                          ³  Current  ³           ³  Parameter
 Menu ³                          Parameter                       ³   Value   ³  Default  ³    Name
 ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 D-5  ³ Sr-90+D   , fish                                         ³ 6.000E+01 ³ 6.000E+01 ³ BIOFAC( 6,1)
 D-5  ³ Sr-90+D   , crustacea and mollusks                       ³ 1.000E+02 ³ 1.000E+02 ³ BIOFAC( 6,2)
 ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
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ATTACHMENT 9

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/05/2006 13:14 Page 4
Summary : 118-C-1 Burial Ground Area 3, Interstitial Area (West) Shallow Zone
File : 118-C-1 Area 3 SZ.RAD

Site-Specific Parameter Summary

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	7.576E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.920E+01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.300E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	8.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.200E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	4.300E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.310E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Co-60	3.700E-02	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Cs-137	7.090E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Eu-152	1.400E-01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Sr-90	2.680E-01	0.000E+00	---	S1(6)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Eu-152	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	---	W1(6)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.500E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.500E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.400E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.100E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	7.600E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.500E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	1.500E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.530E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.250E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ

Attachment 9 Sheet No. 4 of 20
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 9

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/05/2006 13:14 Page 5
Summary : 118-C-1 Burial Ground Area 3, Interstitial Area (West) Shallow Zone
File : 118-C-1 Area 3 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	4.600E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.413E-05	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.413E-05	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Eu-152				
R016	Contaminated zone (cm**3/g)	2.000E+02	-1.000E+00	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	2.000E+02	-1.000E+00	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.548E-06	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Sr-90				
R016	Contaminated zone (cm**3/g)	2.500E+01	3.000E+01	---	DCNUCC(6)
R016	Saturated zone (cm**3/g)	2.500E+01	3.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.809E-05	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for daughter Gd-152				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCC(5)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.074E-06	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	8.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.000E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS

Attachment 9 Sheet No. 5 of 20
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 9

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/05/2006 13:14 Page 6
Summary : 118-C-1 Burial Ground Area 3, Interstitial Area (West) Shallow Zone
File : 118-C-1 Area 3 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.100E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.700E+00	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	3.600E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	1.970E+01	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	7.300E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.379E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.379E+00	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI

Attachment 9 Sheet No. 6 of 20
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 9

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/05/2006 13:14 Page 7
Summary : 118-C-1 Burial Ground Area 3, Interstitial Area (West) Shallow Zone
File : 118-C-1 Area 3 SZ.RAD

Site-Specific Parameter Summary (continued)

O Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV

Attachment 9 Sheet No. 7 of 20
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
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ATTACHMENT 9

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/05/2006 13:14 Page 8
Summary : 118-C-1 Burial Ground Area 3, Interstitial Area (West) Shallow Zone
File : 118-C-1 Area 3 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	1	---	---	LYMAX
TITL	Maximum number of integration points for risk	5	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Attachment 9 Sheet No. 8 of 20
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 9

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1RESRAD, Version 6.30     T« Limit = 0.5 year        12/05/2006  13:14  Page   9
 Summary : 118-C-1 Burial Ground Area 3, Interstitial Area (West) Shallow Zone
 File    : 118-C-1 Area 3 SZ.RAD

      Contaminated Zone Dimensions            Initial Soil Concentrations, pCi/g
      ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ            ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
        Area:   7576.00 square meters                Co-60      3.700E-02
   Thickness:     29.20 meters                      Cs-137     7.090E-01
 Cover Depth:      0.00 meters                      Eu-152     1.400E-01
                                                    Sr-90      2.680E-01
0
                                        Total Dose TDOSE(t), mrem/yr
                                   Basic Radiation Dose Limit = 1.500E+01 mrem/yr
                    Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)
                    ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
    t (years):  0.000E+00  1.000E+00  3.000E+00  8.000E+00  1.200E+01  4.300E+01  1.310E+02  3.000E+02  1.000E+03
     TDOSE(t):  3.542E+00  3.405E+00  3.157E+00  2.652E+00  2.334E+00  1.008E+00  1.242E-01  2.498E-03  2.223E-10
        M(t):  2.362E-01  2.270E-01  2.105E-01  1.768E-01  1.556E-01  6.718E-02  8.281E-03  1.666E-04  1.482E-11
0Maximum TDOSE(t):  3.542E+00 mrem/yr   at t = 0.000E+00 years
```

Attachment 9 Sheet No. 9 of 20
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
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ATTACHMENT 12

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 06:33 Page 2
Summary : 118-C-1 Burial Ground Area 4, Interstitial Area (East) Shallow Zone
File : 118-C-1 Area 4 SZ.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
B-1	Eu-152	2.210E-04	2.210E-04	DCF2(2)
B-1	Gd-152	2.430E-01	2.430E-01	DCF2(4)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-1	Eu-152	6.480E-06	6.480E-06	DCF3(2)
D-1	Gd-152	1.610E-04	1.610E-04	DCF3(4)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-34	Eu-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(2,1)
D-34	Eu-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(2,2)
D-34	Eu-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(2,3)
D-34	Gd-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(4,1)
D-34	Gd-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(4,2)
D-34	Gd-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(4,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5	Eu-152 , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Eu-152 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5	Gd-152 , fish	2.500E+01	2.500E+01	BIOFAC(4,1)
D-5	Gd-152 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(4,2)

Attachment 12 Sheet No. 2 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
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ATTACHMENT 12

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 06:33 Page 3
Summary : 118-C-1 Burial Ground Area 4, Interstitial Area (East) Shallow Zone
File : 118-C-1 Area 4 SZ.RAD

Site-Specific Parameter Summary

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	7.576E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.920E+01	2.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	1.300E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	8.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.200E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	4.300E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.310E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Cs-137	8.100E-01	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Eu-152	1.140E-01	0.000E+00	---	S1(2)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Eu-152	not used	0.000E+00	---	W1(2)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVERO
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.500E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.500E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.400E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.100E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	7.600E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.500E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	1.500E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.530E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.250E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	4.600E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Attachment 12 Sheet No. 3 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
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ATTACHMENT 12

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 06:33 Page 4
Summary : 118-C-1 Burial Ground Area 4, Interstitial Area (East) Shallow Zone
File : 118-C-1 Area 4 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.413E-05	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Eu-152				
R016	Contaminated zone (cm**3/g)	2.000E+02	-1.000E+00	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	2.000E+02	-1.000E+00	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.548E-06	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for daughter Gd-152				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCC(4)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.074E-06	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	8.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.000E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Attachment 12 Sheet No. 4 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
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ATTACHMENT 12

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 06:33 Page 5
Summary : 118-C-1 Burial Ground Area 4, Interstitial Area (East) Shallow Zone
File : 118-C-1 Area 4 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.100E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.700E+00	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	3.600E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	1.970E+01	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	7.300E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.379E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.379E+00	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)

Attachment 12 Sheet No. 5 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 12

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 06:33 Page 6
Summary : 118-C-1 Burial Ground Area 4, Interstitial Area (East) Shallow Zone
File : 118-C-1 Area 4 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)

Attachment 12 Sheet No. 6 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 12

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 06:33 Page 7
Summary : 118-C-1 Burial Ground Area 4, Interstitial Area (East) Shallow Zone
File : 118-C-1 Area 4 SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	1	---	---	LYMAX
TITL	Maximum number of integration points for risk	5	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Attachment 12 Sheet No. 7 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 12

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1RESRAD, Version 6.30      T« Limit = 0.5 year       12/06/2006  06:33  Page   8
 Summary : 118-C-1 Burial Ground Area 4, Interstitial Area (East) Shallow Zone
 File    : 118-C-1 Area 4 SZ.RAD

      Contaminated Zone Dimensions              Initial Soil Concentrations, pCi/g
      ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ              ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
        Area:    7576.00 square meters                 Cs-137     8.100E-01
   Thickness:      29.20 meters                        Eu-152     1.140E-01
 Cover Depth:       0.00 meters
0
                                          Total Dose TDOSE(t), mrem/yr
                                    Basic Radiation Dose Limit = 1.500E+01 mrem/yr
                       Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)
                       ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
    t (years):  0.000E+00  1.000E+00  3.000E+00  8.000E+00  1.200E+01  4.300E+01  1.310E+02  3.000E+02  1.000E+03
     TDOSE(t):  2.433E+00  2.364E+00  2.231E+00  1.936E+00  1.732E+00  7.690E-01  9.457E-02  1.912E-03  1.876E-10
         M(t):  1.622E-01  1.576E-01  1.487E-01  1.291E-01  1.155E-01  5.126E-02  6.305E-03  1.274E-04  1.251E-11
0Maximum TDOSE(t):  2.433E+00 mrem/yr    at t = 0.000E+00 years
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ATTACHMENT 15

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1RESRAD, Version 6.30     T« Limit = 0.5 year        12/11/2006  13:58  Page   1
 Summary : 118-C-1 with Max 95% UCLs & Total of Areas 1,2,3,4
 File    : 118-C-1_Combined Areas1-2-3-4.RAD
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Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Attachment 15 Sheet No. 1 of 22
Originators: S. W. Clark Date 12/13/06
Chk'd By M. W. Perrott Date 12/13/06
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 15

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/11/2006 13:58 Page 2
Summary : 118-C-1 with Max 95% UCLs & Total of Areas 1,2,3,4
File : 118-C-1_Combined Areas1-2-3-4.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	C-14	2.090E-06	2.090E-06	DCF2(1)
B-1	Co-60	2.190E-04	2.190E-04	DCF2(2)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(3)
B-1	Eu-152	2.210E-04	2.210E-04	DCF2(4)
B-1	Gd-152	2.430E-01	2.430E-01	DCF2(6)
B-1	H-3	6.400E-08	6.400E-08	DCF2(7)
B-1	Ni-63	6.290E-06	6.290E-06	DCF2(8)
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF2(9)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	C-14	2.090E-06	2.090E-06	DCF3(1)
D-1	Co-60	2.690E-05	2.690E-05	DCF3(2)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(3)
D-1	Eu-152	6.480E-06	6.480E-06	DCF3(4)
D-1	Gd-152	1.610E-04	1.610E-04	DCF3(6)
D-1	H-3	6.400E-08	6.400E-08	DCF3(7)
D-1	Ni-63	5.770E-07	5.770E-07	DCF3(8)
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF3(9)
D-34	Food transfer factors:			
D-34	C-14 , plant/soil concentration ratio, dimensionless	5.500E+00	5.500E+00	RTF(1,1)
D-34	C-14 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.100E-02	3.100E-02	RTF(1,2)
D-34	C-14 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.200E-02	1.200E-02	RTF(1,3)
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(2,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(2,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(2,3)
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(3,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(3,3)
D-34	Eu-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(4,1)
D-34	Eu-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(4,2)
D-34	Eu-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(4,3)
D-34	Gd-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	Gd-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(6,2)
D-34	Gd-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(6,3)
D-34	H-3 , plant/soil concentration ratio, dimensionless	4.800E+00	4.800E+00	RTF(7,1)
D-34	H-3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.200E-02	1.200E-02	RTF(7,2)
D-34	H-3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-02	1.000E-02	RTF(7,3)
D-34	Ni-63 , plant/soil concentration ratio, dimensionless	5.000E-02	5.000E-02	RTF(8,1)
D-34	Ni-63 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(8,2)
D-34	Ni-63 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-02	2.000E-02	RTF(8,3)

Attachment 15 Sheet No. 2 of 22
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 15

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/11/2006 13:58 Page 3
Summary : 118-C-1 with Max 95% UCLs & Total of Areas 1,2,3,4
File : 118-C-1_Combined Areas1-2-3-4.RAD

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(9,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(9,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(9,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	C-14 , fish	5.000E+04	5.000E+04	BIOFAC(1,1)
D-5	C-14 , crustacea and mollusks	9.100E+03	9.100E+03	BIOFAC(1,2)
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(2,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(2,2)
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(3,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5	Eu-152 , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Eu-152 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(4,2)
D-5	Gd-152 , fish	2.500E+01	2.500E+01	BIOFAC(6,1)
D-5	Gd-152 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(6,2)
D-5	H-3 , fish	1.000E+00	1.000E+00	BIOFAC(7,1)
D-5	H-3 , crustacea and mollusks	1.000E+00	1.000E+00	BIOFAC(7,2)
D-5	Ni-63 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Ni-63 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIOFAC(9,1)
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)

Attachment 15 Sheet No. 3 of 22
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 15

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/11/2006 13:58 Page 4
Summary : 118-C-1 with Max 95% UCLs & Total of Areas 1,2,3,4
File : 118-C-1_Combined Areas1-2-3-4.RAD

Site-Specific Parameter Summary

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.051E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.720E+01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.500E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	8.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.200E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	4.300E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.310E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): C-14	8.000E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Co-60	9.900E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Cs-137	7.090E-01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Eu-152	1.990E-01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): H-3	4.760E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Ni-63	2.610E+01	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Sr-90	2.680E-01	0.000E+00	---	S1(9)
R012	Concentration in groundwater (pCi/L): C-14	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Eu-152	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): H-3	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Ni-63	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	---	W1(9)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.500E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.500E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.400E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	8.000E+00	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.100E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	7.600E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ

Attachment 15 Sheet No. 4 of 22
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 15

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/11/2006 13:58 Page 5
Summary : 118-C-1 with Max 95% UCLs & Total of Areas 1,2,3,4
File : 118-C-1_Combined Areas1-2-3-4.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.500E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	1.500E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.530E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.250E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	4.600E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for C-14				
R016	Contaminated zone (cm**3/g)	2.000E+02	0.000E+00	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	2.000E+02	0.000E+00	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.176E-06	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.664E-05	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(3)
R016	Saturated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.664E-05	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Eu-152				
R016	Contaminated zone (cm**3/g)	2.000E+02	-1.000E+00	---	DCNUCC(4)
R016	Saturated zone (cm**3/g)	2.000E+02	-1.000E+00	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.176E-06	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for H-3				
R016	Contaminated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCC(7)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.517E-02	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Ni-63				
R016	Contaminated zone (cm**3/g)	3.000E+01	1.000E+03	---	DCNUCC(8)
R016	Saturated zone (cm**3/g)	3.000E+01	1.000E+03	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.097E-05	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)

Attachment 15 Sheet No. 5 of 22
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 15

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/11/2006 13:58 Page 6
Summary : 118-C-1 with Max 95% UCLs & Total of Areas 1,2,3,4
File : 118-C-1_Combined Areas1-2-3-4.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Sr-90				
R016	Contaminated zone (cm**3/g)	2.500E+01	3.000E+01	---	DCNUCC(9)
R016	Saturated zone (cm**3/g)	2.500E+01	3.000E+01	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.310E-05	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for daughter Gd-152				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCC(6)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.226E-06	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	8.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.000E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.100E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.700E+00	1.400E+01	---	DIET(2)

Attachment 15 Sheet No. 6 of 22
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 15

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/11/2006 13:58 Page 7
Summary : 118-C-1 with Max 95% UCLs & Total of Areas 1,2,3,4
File : 118-C-1_Combined Areas1-2-3-4.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	3.600E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	1.970E+01	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	7.300E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	0.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	0.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	0.000E+00	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	2.000E-05	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	3.000E-02	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	2.000E-02	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	9.800E-01	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	3.000E-01	3.000E-01	---	DMC

Attachment 15 Sheet No. 7 of 22
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 15

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/11/2006 13:58 Page 8
Summary : 118-C-1 with Max 95% UCLs & Total of Areas 1,2,3,4
File : 118-C-1_Combined Areas1-2-3-4.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C14	C-14 evasion flux rate from soil (1/sec)	7.000E-07	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	1.000E-10	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	8.000E-01	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	2.000E-01	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	8.894E+01	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	1	---	---	LYMAX
TITL	Maximum number of integration points for risk	5	---	---	KYMAX

Attachment 15 Sheet No. 8 of 22
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 15

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1RESRAD, Version 6.30     T« Limit = 0.5 year        12/11/2006  13:58  Page   9
 Summary : 118-C-1 with Max 95% UCLs & Total of Areas 1,2,3,4
 File    : 118-C-1_Combined Areas1-2-3-4.RAD
```

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Attachment	15	Sheet No. 9 of 22	
Originators:	S. W. Clark	Date	
Chk'd By	M. W. Perrott	Date	
Calc. No.	0100C-CA-V0035	Rev. No.	0

ATTACHMENT 15

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1RESRAD, Version 6.30      T« Limit = 0.5 year       12/11/2006  13:58  Page  10
 Summary : 118-C-1 with Max 95% UCLs & Total of Areas 1,2,3,4
 File    : 118-C-1_Combined Areas1-2-3-4.RAD

      Contaminated Zone Dimensions           Initial Soil Concentrations, pCi/g
      ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ           ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
        Area:  20509.00 square meters               C-14      8.000E+00
   Thickness:     27.20 meters                      Co-60     9.900E-01
 Cover Depth:      0.00 meters                      Cs-137    7.090E-01
                                                    Eu-152    1.990E-01
                                                    H-3       4.760E+00
                                                    Ni-63     2.610E+01
                                                    Sr-90     2.680E-01
0
                                        Total Dose TDOSE(t), mrem/yr
                                  Basic Radiation Dose Limit = 1.500E+01 mrem/yr
                    Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)
                    ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
    t (years):  0.000E+00  1.000E+00  3.000E+00  8.000E+00  1.200E+01  4.300E+01  1.310E+02  3.000E+02  1.000E+03
     TDOSE(t):  1.282E+01  1.157E+01  9.462E+00  5.700E+00  3.885E+00  7.263E-01  8.821E-02  6.588E-03  1.005E-04
         M(t):  8.546E-01  7.715E-01  6.308E-01  3.800E-01  2.590E-01  4.842E-02  5.881E-03  4.392E-04  6.699E-06
0Maximum TDOSE(t):  1.282E+01 mrem/yr   at t = 0.000E+00 years
```

ATTACHMENT 18

```
1RESRAD, Version 6.30     T« Limit = 0.5 year        12/06/2006  07:07  Page   1
 Summary : 118-C-1 Burial Ground Overburden - Below Cleanup Levels (OB/BCL)
 File    : 118-C-1 OB-BCL.RAD
```

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Attachment 18 Sheet No. 1 of 18
Originators: S. W. Clark SWC Date 12/13/06
Chk'd By M. W. Perrott MWP Date 12/13/06
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 18

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 07:07 Page 2
Summary : 118-C-1 Burial Ground Overburden - Below Cleanup Levels (OB/BCL)
File : 118-C-1 OB-BCL.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF3(1)
D-34	Food transfer factors:			
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(1,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIOFAC(1,1)
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

Attachment 18 Sheet No. 2 of 18
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 18

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 07:07 Page 3
Summary : 118-C-1 Burial Ground Overburden - Below Cleanup Levels (OB/BCL)
File : 118-C-1 OB-BCL.RAD

Site-Specific Parameter Summary

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	9.006E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.970E+01	2.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	9.500E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	8.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.200E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	4.300E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.310E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Sr-90	1.230E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVERO
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.500E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.500E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.400E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.100E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	7.600E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.500E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	1.500E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.530E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.250E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	4.600E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Attachment 18 Sheet No. 3 of 18
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 18

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 07:07 Page 4
Summary : 118-C-1 Burial Ground Overburden - Below Cleanup Levels (OB/BCL)
File : 118-C-1 OB-BCL.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Sr-90				
R016	Contaminated zone (cm**3/g)	2.500E+01	3.000E+01	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	2.500E+01	3.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.695E-05	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	8.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.000E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.100E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.700E+00	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	3.600E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	1.970E+01	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	7.300E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI

Attachment 18 Sheet No. 4 of 18
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 18

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 07:07 Page 5
Summary : 118-C-1 Burial Ground Overburden - Below Cleanup Levels (OB/BCL)
File : 118-C-1 OB-BCL.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.450E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.450E+00	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F

Attachment 18 Sheet No. 5 of 18
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 18

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 07:07 Page 6
Summary : 118-C-1 Burial Ground Overburden - Below Cleanup Levels (OB/BCL)
File : 118-C-1 OB-BCL.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	1	---	---	LYMAX
TITL	Maximum number of integration points for risk	5	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Attachment 18 Sheet No. 6 of 18
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 18

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1RESRAD, Version 6.30     T« Limit = 0.5 year       12/06/2006  07:07  Page   7
 Summary : 118-C-1 Burial Ground Overburden - Below Cleanup Levels (OB/BCL)
 File    : 118-C-1 OB-BCL.RAD

      Contaminated Zone Dimensions           Initial Soil Concentrations, pCi/g
      ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ           ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
        Area:   9006.00 square meters               Sr-90       1.230E+00
   Thickness:     29.70 meters
 Cover Depth:      0.00 meters
0
                                         Total Dose TDOSE(t), mrem/yr
                                   Basic Radiation Dose Limit = 1.500E+01 mrem/yr
                  Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)
                  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
    t (years):  0.000E+00  1.000E+00  3.000E+00  8.000E+00  1.200E+01  4.300E+01  1.310E+02  3.000E+02  1.000E+03
     TDOSE(t):  4.010E+00  3.919E+00  3.742E+00  3.335E+00  3.042E+00  1.489E+00  1.954E-01  3.910E-03  2.472E-10
         M(t):  2.673E-01  2.612E-01  2.495E-01  2.223E-01  2.028E-01  9.926E-02  1.303E-02  2.607E-04  1.648E-11
0Maximum TDOSE(t):  4.010E+00 mrem/yr   at t = 0.000E+00 years
```

ATTACHMENT 21

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:49 Page 1
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Shallow Zone
File : 118-C-1 SPA SZ.RAD

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Attachment 21 Sheet No. 1 of 20
Originators: S. W. Clark Date 12/12/06
Chk'd By M. W. Perrott Date 12/13/06
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 21

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:49 Page 2
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Shallow Zone
File : 118-C-1 SPA SZ.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(2)
B-1	Eu-152	2.210E-04	2.210E-04	DCF2(3)
B-1	Gd-152	2.430E-01	2.430E-01	DCF2(5)
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF2(6)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(2)
D-1	Eu-152	6.480E-06	6.480E-06	DCF3(3)
D-1	Gd-152	1.610E-04	1.610E-04	DCF3(5)
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF3(6)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(2,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(2,3)
D-34	Eu-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(3,1)
D-34	Eu-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(3,2)
D-34	Eu-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(3,3)
D-34	Gd-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(5,1)
D-34	Gd-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(5,2)
D-34	Gd-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(5,3)
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(6,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(6,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(6,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(2,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(2,2)
D-5	Eu-152 , fish	5.000E+01	5.000E+01	BIOFAC(3,1)
D-5	Eu-152 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(3,2)
D-5	Gd-152 , fish	2.500E+01	2.500E+01	BIOFAC(5,1)
D-5	Gd-152 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(5,2)

Attachment 21 Sheet No. 2 of 20
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 21

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1RESRAD, Version 6.30     T« Limit = 0.5 year       12/06/2006  13:49  Page   3
 Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Shallow Zone
 File    : 118-C-1 SPA SZ.RAD

                     Dose Conversion Factor (and Related) Parameter Summary (continued)
                                        File: HEAST 2001 Morbidity
0     ³                                                           ³  Current  ³           ³  Parameter
 Menu ³                          Parameter                        ³   Value   ³  Default  ³    Name
 ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 D-5  ³ Sr-90+D  , fish                                           ³ 6.000E+01 ³ 6.000E+01 ³ BIOFAC( 6,1)
 D-5  ³ Sr-90+D  , crustacea and mollusks                         ³ 1.000E+02 ³ 1.000E+02 ³ BIOFAC( 6,2)
 ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
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ATTACHMENT 21

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:49 Page 4
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Shallow Zone
File : 118-C-1 SPA SZ.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.323E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	4.600E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	2.400E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	8.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.200E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	4.300E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.310E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Co-60	2.900E-02	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Cs-137	1.030E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Eu-152	1.770E+00	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Sr-90	3.340E-01	0.000E+00	---	S1(6)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Eu-152	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	---	W1(6)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.500E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.500E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.400E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.100E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	7.600E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.500E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	1.500E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.530E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.250E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ

Attachment 21 Sheet No. 4 of 20
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 21

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:49 Page 5
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Shallow Zone
File : 118-C-1 SPA SZ.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	4.600E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	2.210E+01	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.600E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.500E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	1.500E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	2.500E+02	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.166E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.166E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Eu-152				
R016	Contaminated zone (cm**3/g)	2.000E+02	-1.000E+00	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+02	-1.000E+00	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	2.000E+02	-1.000E+00	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.426E-05	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Sr-90				
R016	Contaminated zone (cm**3/g)	2.500E+01	3.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	2.500E+01	3.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	2.500E+01	3.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.323E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for daughter Gd-152				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.316E-05	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR

Attachment 21 Sheet No. 5 of 20
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 21

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:49 Page 6
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Shallow Zone
File : 118-C-1 SPA SZ.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	8.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.000E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.100E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.700E+00	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	3.600E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	1.970E+01	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	7.300E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.100E+01	FMEAT

Attachment 21 Sheet No. 6 of 20
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 21

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:49 Page 7
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Shallow Zone
File : 118-C-1 SPA SZ.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of milk	-1	-1	0.100E+01	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)

Attachment 21 Sheet No. 7 of 20
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 21

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:49 Page 8
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Shallow Zone
File : 118-C-1 SPA SZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	1	---	---	LYMAX
TITL	Maximum number of integration points for risk	5	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Attachment 21 Sheet No. 8 of 20
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 21

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1RESRAD, Version 6.30     T« Limit = 0.5 year       12/06/2006  13:49  Page   9
 Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Shallow Zone
 File    : 118-C-1 SPA SZ.RAD

      Contaminated Zone Dimensions           Initial Soil Concentrations, pCi/g
      ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ           ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
        Area:  23230.00 square meters                 Co-60      2.900E-02
   Thickness:      4.60 meters                        Cs-137     1.030E+00
 Cover Depth:      0.00 meters                        Eu-152     1.770E+00
                                                      Sr-90      3.340E-01
0
                                            Total Dose TDOSE(t), mrem/yr
                                      Basic Radiation Dose Limit = 1.500E+01 mrem/yr
                        Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)
                        ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
    t (years):  0.000E+00  1.000E+00  3.000E+00  8.000E+00  1.200E+01  4.300E+01  1.310E+02  3.000E+02  1.000E+03
     TDOSE(t):  1.235E+01  1.181E+01  1.081E+01  8.722E+00  7.384E+00  2.312E+00  1.911E-01  3.386E-03  2.390E-10
         M(t):  8.231E-01  7.872E-01  7.208E-01  5.815E-01  4.923E-01  1.542E-01  1.274E-02  2.257E-04  1.594E-11
0Maximum TDOSE(t):  1.235E+01 mrem/yr   at t = 0.000E+00 years
```

ATTACHMENT 24

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:53 Page 1
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Deep Zone
File : 118-C-1 SPA DZ.RAD

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Attachment 24 Sheet No. 1 of 19
Originators: S. W. Clark Date 12/13/06
Chk'd By M. W. Perrott Date 12/13/06
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 24

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:53 Page 2
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Deep Zone
File : 118-C-1 SPA DZ.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	C-14	2.090E-06	2.090E-06	DCF2(1)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(2)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	C-14	2.090E-06	2.090E-06	DCF3(1)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(2)
D-34	Food transfer factors:			
D-34	C-14 , plant/soil concentration ratio, dimensionless	5.500E+00	5.500E+00	RTF(1,1)
D-34	C-14 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.100E-02	3.100E-02	RTF(1,2)
D-34	C-14 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.200E-02	1.200E-02	RTF(1,3)
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(2,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(2,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	C-14 , fish	5.000E+04	5.000E+04	BIOFAC(1,1)
D-5	C-14 , crustacea and mollusks	9.100E+03	9.100E+03	BIOFAC(1,2)
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(2,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(2,2)

Attachment 24 Sheet No. 2 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 24

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:53 Page 3
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Deep Zone
File : 118-C-1 SPA DZ.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.323E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.210E+01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	2.400E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	8.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.200E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	4.300E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.310E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): C-14	1.820E+02	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Cs-137	9.100E-02	0.000E+00	---	S1(2)
R012	Concentration in groundwater (pCi/L): C-14	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(2)
R013	Cover depth (m)	4.600E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.600E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.500E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.500E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.400E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.100E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	7.600E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.500E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	1.500E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.530E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.250E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	4.600E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Attachment 24 Sheet No. 3 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 24

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:53 Page 4
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Deep Zone
File : 118-C-1 SPA DZ.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for C-14				
R016	Contaminated zone (cm**3/g)	2.000E+02	0.000E+00	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	2.000E+02	0.000E+00	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.129E-05	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(2)
R016	Saturated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.509E-05	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	8.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.000E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)

Attachment 24 Sheet No. 4 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 24

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:53 Page 5
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Deep Zone
File : 118-C-1 SPA DZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Fruits, vegetables and grain consumption (kg/yr)	1.100E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.700E+00	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	3.600E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	1.970E+01	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	7.300E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.100E+01	FMEAT
R018	Contamination fraction of milk	-1	-1	0.100E+01	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	2.000E-05	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	3.000E-02	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	2.000E-02	2.000E-02	---	CSOIL

Attachment 24 Sheet No. 5 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 24

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:53 Page 6
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Deep Zone
File : 118-C-1 SPA DZ.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C14	Fraction of vegetation carbon from air	9.800E-01	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	3.000E-01	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	7.000E-07	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	1.000E-10	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	8.000E-01	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	2.000E-01	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	8.894E+01	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	1	---	---	LYMAX
TITL	Maximum number of integration points for risk	5	---	---	KYMAX

Attachment 24 Sheet No. 6 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 24

1RESRAD, Version 6.30 T« Limit = 0.5 year 12/06/2006 13:53 Page 7
Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Deep Zone
File : 118-C-1 SPA DZ.RAD

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Attachment 24 Sheet No. 7 of 19
Originators: S. W. Clark Date
Chk'd By M. W. Perrott Date
Calc. No. 0100C-CA-V0035 Rev. No. 0

ATTACHMENT 24

```
1RESRAD, Version 6.30     T« Limit = 0.5 year       12/06/2006  13:53  Page    8
 Summary : 118-C-1 Burial Ground Staging Pile Area (SPA) Deep Zone
 File    : 118-C-1 SPA DZ.RAD

       Contaminated Zone Dimensions           Initial Soil Concentrations, pCi/g
       ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ           ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
          Area:  23230.00 square meters              C-14        1.820E+02
     Thickness:     22.10 meters                     Cs-137      9.100E-02
 Cover Depth:        4.60 meters
0
                                              Total Dose TDOSE(t), mrem/yr
                                         Basic Radiation Dose Limit = 1.500E+01 mrem/yr
                               Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)
                               ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
    t (years):  0.000E+00  1.000E+00  3.000E+00  8.000E+00  1.200E+01  4.300E+01  1.310E+02  3.000E+02  1.000E+03
     TDOSE(t):  0.000E+00  2.463E-05  7.957E-05  1.957E-04  2.695E-04  4.763E-04  1.903E-04  8.774E-06  2.752E-12
         M(t):  0.000E+00  1.642E-06  5.305E-06  1.305E-05  1.797E-05  3.175E-05  1.269E-05  5.849E-07  1.835E-13
0Maximum TDOSE(t):  4.763E-04 mrem/yr   at t =   43.43 ñ 0.09 years
0
                                 Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
                                           As mrem/yr and Fraction of Total Dose At t = 4.343E+01 years
0                                            Water Independent Pathways (Inhalation excludes radon)
0              Ground             Inhalation              Radon                Plant                Meat                 Milk                 Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 Nuclide mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
 Nuclide
ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ
 C-14    0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 Cs-137  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
ÎÎÎÎÎÎÎ ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ  ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ  ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ  ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ  ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ  ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ  ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ
 Total   0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
0
                                 Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
                                           As mrem/yr and Fraction of Total Dose At t = 4.343E+01 years
0                                                       Water Dependent Pathways
0              Water                Fish                Radon                Plant                Meat                 Milk            All Pathways*
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 Nuclide mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
 Nuclide
ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ
 C-14    0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 Cs-137  1.361E-04 0.2857  1.416E-04 0.2973  0.000E+00 0.0000  1.518E-05 0.0319  1.035E-04 0.2172  8.002E-05 0.1680  4.763E-04 1.0000
ÎÎÎÎÎÎÎ ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ  ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ  ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ  ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ  ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ  ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ  ÎÎÎÎÎÎÎÎÎ ÎÎÎÎÎÎ
 Total   1.361E-04 0.2857  1.416E-04 0.2973  0.000E+00 0.0000  1.518E-05 0.0319  1.035E-04 0.2172  8.002E-05 0.1680  4.763E-04 1.0000
0*Sum of all water independent and dependent pathways.
```

CALCULATION BRIEF EXCERPTS

DISCLAIMER FOR CALCULATIONS

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

CALCULATION BRIEFS

The following calculation briefs have been prepared in accordance with ENG-1, *Engineering Services,*, ENG-1-4.5, "Project Calculations," Washington Closure Hanford, Richland, Washington.

118-C-1 Shallow Zone, Overburden and Staging Pile Sampling Plan , 0100B-CA-V0288, Rev. 0, Washington Closure Hanford, Richland, Washington (2006).

118-C-1 Burial Ground Hazard Quotient and Carcinogenic Risk Calculations, 0100C-CA-V0034, Rev. 0, Washington Closure Hanford, Richland, Washington (2006).

118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations, 0100C-CA-V0033, Rev. 0, Washington Closure Hanford, Richland, Washington (2006).

118-C-1 Burial Ground Comparison to Drinking Water Standards (MCL) Calculation, 0100C-CA-V0036, Rev. 1, Washington Closure Hanford, Richland, Washington (2006).

118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief, 0100C-CA-V0035, Rev. 0, Washington Closure Hanford, Richland, Washington.

NOTE: The calculation briefs referenced in this appendix are kept in the active Washington Closure Hanford project files and are available upon request. When the project is completed, the files will be stored in a U.S. Department of Energy, Richland Operations Office repository. Only excerpts of the calculation briefs are included in this appendix.

CALCULATION COVER SHEET

Project Title:	118-C-1 Burial Ground Sample Design	**Job No.**	14655
Area	100-B/C		
Discipline	Environmental Engineering	***Calc. No.**	0100B-CA-V0288
Subject	118-C-1 Shallow Zone, Overburden, and Staging Pile Sampling Plan		
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 conjuction with other relevent documents in the administrative record.

Committed Calculation ☒ **Preliminary** ☐ **Superseded** ☐ **Voided** ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sht Calc = 3 Shts Attach1 = 1 Sht Attach2 = 1 Sht Attach3 = 6 Shts Total = 12 Shts	G. Cruz 8/23/06	C.A. Bentz 8/24/06	C.R. Martinez 8/30/06	D.N. Strom 8·30·06	8·30·06

SUMMARY OF REVISIONS

WCH-DE-018 (4/14/06)

*Obtain Calc. No. from R&DC and Form from Intranet

Washington Closure Hanford

CALCULATION SHEET

Originator G. Cruz Date 8/22/2006 Calc. No. 0100B-CA-V0288 Rev. No. 0
Project 118-C-1 Burial Ground Sample Design Job No. 14655 Checked ASB Date 8/24/06
Subject 118-C-1 Shallow Zone, Overburden, and Staging Pile Sampling Plan Sheet No. 1of3

Problem: Calculate and display required sampling nodes in concurrence with 100 Area Burial Grounds Remedial Action Sampling and Analysis Plan, DOE/RL-2001-35 Rev. 0, for verification and closure.

Given:
-SAP (DOE/RL-2001-35 Rev. 0) requirements
-Shallow Sampling Area (Surface area of each zone determined from CAD program,
Attachment 3, Sht 1 of 6, CAD file 1BC:082206A, 118-C-1 Burial Ground Area 1 Shallow Zone Sampling Plan,
Attachment 3, Sht 2 of 6, CAD file 1BC:082206B, 118-C-1 Burial Ground Area 2 Shallow Zone Sampling Plan,
Attachment 3, Sht 3 of 6, CAD file 1BC:082206C, 118-C-1 Burial Ground Area 3 Shallow Zone Sampling Plan,
Attachment 3, Sht 4 of 6, CAD file 1BC:082206D, 118-C-1 Burial Ground Area 4 Shallow Zone Sampling Plan)
-Overburden Sampling Area (Surface area of each zone determined from CAD program,
Attachment 3, Sht 5 of 6, CAD file 1BC:082206E, 118-C-1 Burial Ground Overburden Sampling Plan)
-Staging Pile Sampling Area (Surface area of each zone determined from CAD program,
Attachment 3, Sht 6 of 6, CAD file 1BC:082206F, 118-C-1 Burial Ground Staging Pile Sampling Plan)

SAP Requirements:

Shallow Zone
-Develop a 16 node sampling grid for the sampling area
-Use table 3-2 of the SAP to determine which four of the sixteen nodes will be sampled to collect clean up verification samples

Overburden:
-Develop a 16 node sampling grid for the sampling area
-Use table 3-2 of the SAP to determine which four of the sixteen nodes will be sampled to collect clean up verification samples

Deep Zone:
-Develop a 16 node sampling grid for the sampling area
-Use table 3-2 of the SAP to determine which four of the sixteen nodes will be sampled to collect clean up verification samples

Determination of Area 1 Shallow Zone Sampling Grid:

Shallow Zone Sampling Grid Area determined from Table 3-2, SAP
Attachment 2, Number of Decision Subunits Based on Area (Converted to Sq Meters)

Total Area:	3017.63	m^2
Area of Decision Subunits (total area 1 subunit)	3017.63	m^2
Decision Subunit divided into 4 Sampling Areas:	754.40	m^2
Sampling Areas divided into a 16 node grid (node numbers 1-16):	47.15	m^2

Nodes to be Sampled (as determined from Attachment 1, Table A-1, Sample Grid Point Lookup Table)
See Attachment 3, Sht 1 of 6, 118-C-1 Burial Ground Area 1 Shallow Zone Sampling Plan, for Sample Location Table

Washington Closure Hanford

CALCULATION SHEET

Originator G. Cruz Date 8/22/2006 Calc. No. 0100B-CA-V0288 Rev. No. 0
Project 118-C-1 Burial Ground Sample Design Job No. 14655 Checked CAB Date 8/24/06
Subject 118-C-1 Shallow Zone, Overburden, and Staging Pile Sampling Plan Sheet No. 2of3

Determination of Area 2 Shallow Zone Sampling Grid:

Shallow Zone Sampling Grid Area determined from Table 3-2, SAP
Attachment 2, Number of Decision Subunits Based on Area (Converted to Sq Meters)

Total Area:
Area of Decision Subunits (total area 1 subunit) 2338.63 m^2
2338.63 m^2

Decision Subunit divided into 4 Sampling Areas: 584.65 m^2

Sampling Areas divided into a 16 node grid (node numbers 1-16): 36.54 m^2

Nodes to be Sampled (as determined from Attachment 1, Table A-1, Sample Grid Point Lookup Table)
See Attachment 3, Sht 2 of 6, 118-C-1 Burial Ground Area 2 Shallow Zone Sampling Plan,
for Sample Location Table

Determination of Area 3 Shallow Zone Sampling Grid:

Shallow Zone Sampling Grid Area determined from Table 3-2, SAP
Attachment 2, Number of Decision Subunits Based on Area (Converted to Sq Meters)

Total Area:
Area of Decision Subunits (total area 1 subunit) 7576.26 m^2
7576.26 m^2

Decision Subunit divided into 4 Sampling Areas: 1894.06 m^2

Sampling Areas divided into a 16 node grid (node numbers 1-16): 118.37 m^2

Nodes to be Sampled (as determined from Attachment 1, Table A-1, Sample Grid Point Lookup Table)
See Attachment 3, Sht 3 of 6, 118-C-1 Burial Ground Area 3 Shallow Zone Sampling Plan,
for Sample Location Table

Determination of Area 4 Shallow Zone Sampling Grid:

Shallow Zone Sampling Grid Area determined from Table 3-2, SAP
Attachment 2, Number of Decision Subunits Based on Area (Converted to Sq Meters)

Total Area:
Area of Decision Subunits (total area 1 subunit) 7576.27 m^2
7576.27 m^2

Decision Subunit divided into 4 Sampling Areas: 1894.06 m^2

Sampling Areas divided into a 16 node grid (node numbers 1-16): 118.37 m^2

Nodes to be Sampled (as determined from Attachment 1, Table A-1, Sample Grid Point Lookup Table)
See Attachment 3, Sht 4 of 6, 118-C-1 Burial Ground Area 4 Shallow Zone Sampling Plan,
for Sample Location Table

Washington Closure Hanford

CALCULATION SHEET

Originator G. Cruz Date 8/22/2006 Calc. No. 0100B-CA-V0288 Rev. No. 0
Project 118-C-1 Burial Ground Sample Design Job No. 14655 Checked CAB Date 8/24/06
Subject 118-C-1 Shallow Zone, Overburden, and Staging Pile Sampling Plan Sheet No. 3of3

Determination of Overburden Sampling Grid:

Overburden Sampling Grid Area determined from Table 3-2, SAP
Attachment 2, Number of Decision Subunits Based on Area (Converted to Sq Meters)

Total Area: 9006.18 m^2
Area of Decision Subunits (total area 1 subunit) 9006.18 m^2

Decision Subunit divided into 4 Sampling Areas: 2251.54 m^2

Sampling Areas divided into a 16 node grid (node numbers 1-16): 140.72 m^2

Nodes to be Sampled (as determined from Attachment 1, Table A-1, Sample Grid Point Lookup Table)
See Attachment 3, Sht 5 of 6, 118-C-1 Burial Ground Overburden Sampling Plan,
for Sample Location Table

Determination of Staging Pile Sampling Grid:

Staging Pile Sampling Grid Area determined from Table 3-2, SAP
Attachment 2, Number of Decision Subunits Based on Area (Converted to Sq Meters)

Total Area: 23229.78 m^2
Area of Decision Subunits (total area 4 subunits) 5807.44 m^2

Decision Subunit divided into 4 Sampling Areas: 1451.86 m^2

Sampling Areas divided into a 16 node grid (node numbers 1-16): 90.74 m^2

Nodes to be Sampled (as determined from Attachment 1, Table A-1, Sample Grid Point Lookup Table)
See Attachment 3, Sht 6 of 6, 118-C-1 Burial Ground Staging Pile Sampling Plan,
for Sample Location Table

Washington Closure Hanford

Originator G. Cruz Date 8/22/2006 Calc. No. 0100B-CA-V0288 Rev. No. 0
Project 118-C-1 Burial Ground Sample Design Job No. 14655 Checked CAB Date 8/24/06
Subject 118-C-1 Shallow Zone, Overburden, and Staging Pile Sampling Plan Sheet No 1of1

ATTACHMENT 1

Sample Grid Point Lookup Table.

Default Plan	Sampling Area 1	Sampling Area 2	Sampling Area 3	Sampling Area 4	Sampling Area 5	Sampling Area 6	Sampling Area 7	Sampling Area 8	Sampling Area 9	Sampling Area 10
Closeout	3	6	1	4	5	1	3	3	4	16
Closeout	4	7	11	3	15	15	5	13	10	10
Closeout	16	3	2	7	7	10	11	4	3	14
Closeout	10	15	4	12	1	13	4	8	16	4
Not Sampling	2	14	5	9	13	12	8	2	14	8
Not Sampling	13	10	9	13	2	16	1	12	5	3
Not Sampling	6	1	10	8	14	4	16	5	8	6
Not Sampling	1	9	13	1	10	5	12	1	1	15
Not Sampling	9	12	7	5	6	2	6	7	15	9
Not Sampling	15	16	15	14	16	6	2	15	11	1
Not Sampling	8	13	8	10	12	11	13	14	2	12
Not Sampling	5	2	3	11	4	3	9	10	7	11
Not Sampling	7	11	14	15	11	14	14	6	13	2
Not Sampling	11	4	6	2	9	7	7	11	9	7
Not Sampling	12	8	16	16	3	8	15	9	6	13
Not Sampling	14	5	12	6	8	9	10	16	12	5

** **Note:** Grid nodes for each sampling area in each waste site should be numbered consistently, e.g., begin numbering the nodes in the northwesternmost node. Then number consecutively left to right.

Washington Closure Hanford

Originator G. Cruz Date 8/22/2006 Calc. No. 0100B-CA-V0288 Rev. No. 0
Project 118-C-1 Burial Ground Sample Design Job No. 14655 Checked CAB Date 8/24/06
Subject 118-C-1 Shallow Zone, Overburden, and Staging Pile Sampling Plan Sheet No. 1of1

ATTACHMENT 2

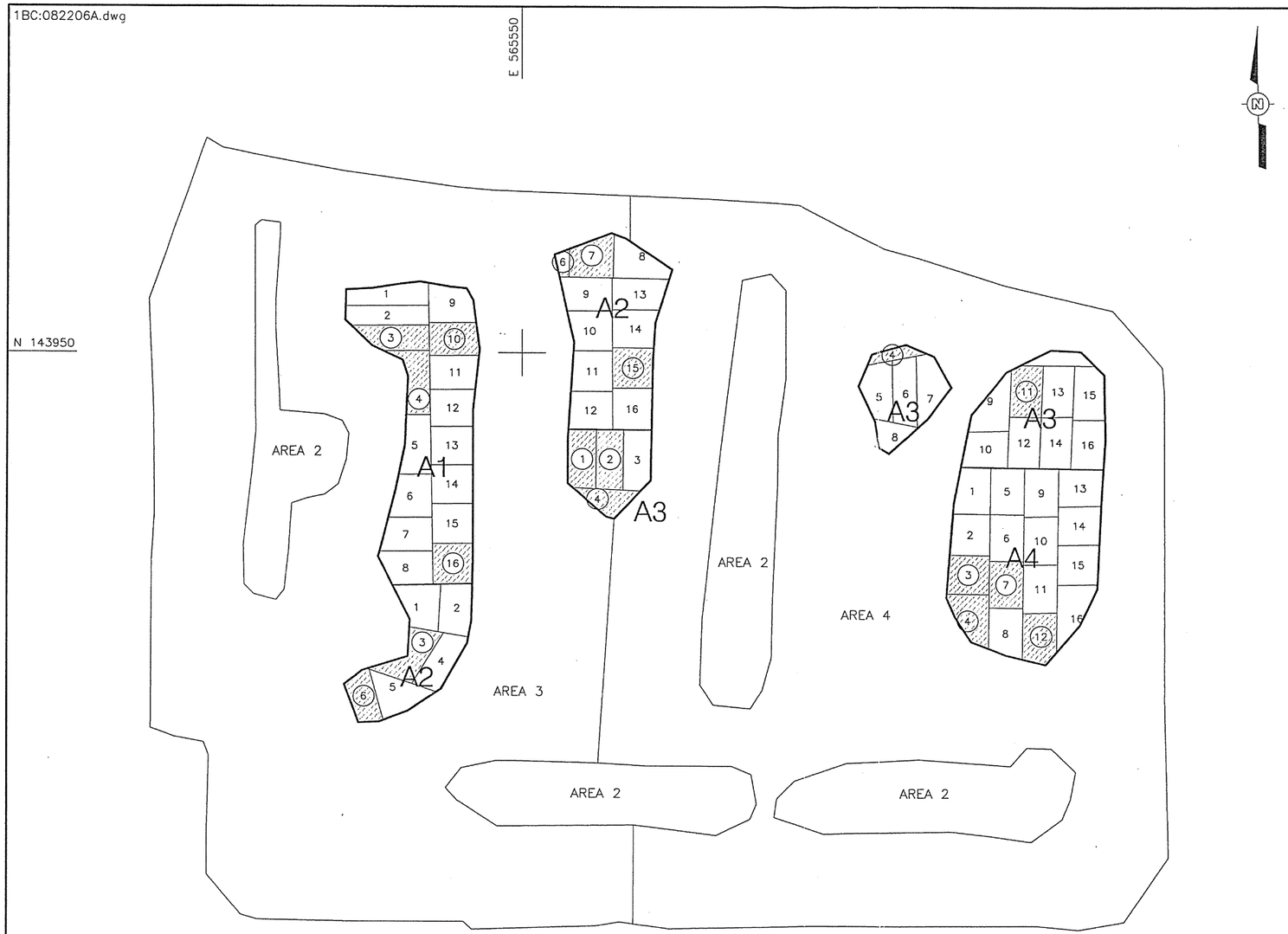
Number of Decision Subunits Based on Area.

Site Verification Sampling Frequencies Based on Area.

Decision Unit[a]	Waste Site Size[b]	Decision Subunits	Blocks[c]	Discrete Samples	Composite Samples
Shallow zone – 0 10 15 ft	Small: < 100,000 ft^2	1	4	16	4
	Medium: >100,000 ft^2 < 400,000 ft^2	4	16	64	16
	Large: >400,000 ft^2	8	32	128	32
Deep Zone - >15 ft	Small: < 100,000 ft^2	1	4	16	4
	Medium: >100,000 ft^2 < 400,000 ft^2	4	16	64	16
	Large: >400,000 ft^2	8	32	128	32
Overburen/layback stockpiles	Small: < 100,000 ft^2	1	4	16	4
	Medium: >100,000 ft^2 < 400,000 ft^2	4	16	64	16
	Large: >400,000 ft^2	8	32	128	32
Staging pile areas (residual soil)	Small: < 100,000 ft^2	1	4	16	4
	Medium: >100,000 ft^2 < 400,000 ft^2	4	16	64	16
	Large: >400,000 ft^2	8	32	128	32

[a] The shallow zone, deep zone, overburden stockpile, and staging pile areas each represent single decision units. The total number of decision units will vary because individual waste sites may not have a deep zone, overburden stockpile, and/or staging pile areas.
[b] Area of exposed surface after excavation or area of stockpile base (as applicable)
[c] Decision subunits are divided into four blocks to ensure that random sampling locations are not bunched together in one area

1BC:082206A.dwg



NOTES

1. SHALLOW ZONE NODE AREAS ARE APPROXIMATELY 47.15 SQUARE METERS.
2. SAMPLES ARE TAKEN FROM THE APPROXIMATE CENTER SQUARE METERS.
3. THE SHALLOW ZONE CONSISTS OF SAMPLING AREAS A1, A2, A3 AND A4 WITHIN DECISION SUBUNIT 1.

LEGEND

(8) VERIFICATION SAMPLING NODE

SAMPLE LOCATION TABLE

DECISION SUBUNIT	SAMPLING AREA	SAMPLE NODE	NORTHING	EASTING
1	A1	S-A1-3	143952.47	565527.69
		S-A1-4	143941.96	565532.44
		S-A1-10	143952.31	565538.43
		S-A1-16	143913.67	565538.26
	A2	S-A2-3	143900.05	565533.09
		S-A2-6A	143890.84	565523.21
		S-A2-6B	143965.59	565556.99
		S-A2-7	143966.72	565561.84
		S-A2-15	143947.42	565568.77
	A3	S-A3-1	143931.72	565560.26
		S-A3-2	143931.68	565564.92
		S-A3-4A	143924.84	565562.84
		S-A3-4B	143949.80	565612.95
		S-A3-11	143943.55	565635.97
	A4	S-A4-3	143911.92	565625.89
		S-A4-4	143903.98	565625.77
		S-A4-7	143910.22	565632.43
		S-A4-12	143901.32	565638.35

Attachment 3 Sheet No. 1 of 6
Originator G.C.Y.B. Date 8/23/06
Chkd By C.Y.B. Date 8/24/06
Site No. 0100B-CA-V0288 Rev. No. 0

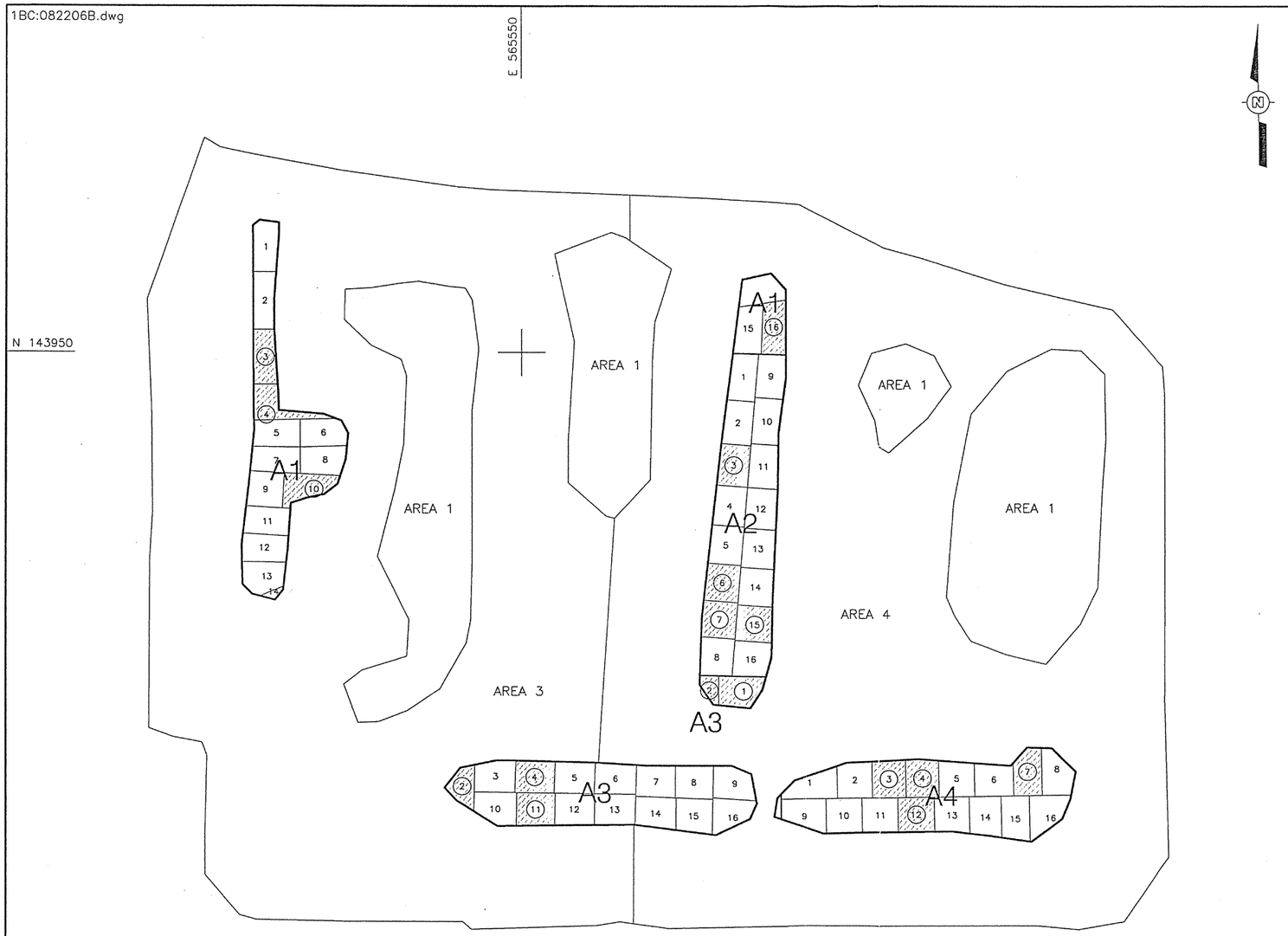
ATTACHMENT 3

SCALE 1:750
7.5 0 7.5 15 30 meters

U.S DEPARTMENT OF ENERGY
DOE RICHLAND OPERATIONS OFFICE
RIVIER CORRIDOR CLOSURE CONTRACT

100-B/C AREA
118-C-1 BURIAL GROUND AREA 1
SHALLOW ZONE SAMPLING PLAN

1BC:082206B.dwg



NOTES

1. SHALLOW ZONE NODE AREAS ARE APPROXIMATELY 36.54 SQUARE METERS.
2. SAMPLES ARE TAKEN FROM THE APPROXIMATE CENTER SQUARE METERS.
3. THE SHALLOW ZONE CONSISTS OF SAMPLING AREAS A1, A2, A3 AND A4 WITHIN DECISION SUBUNIT 1.

LEGEND

VERIFICATION SAMPLING NODE

SAMPLE LOCATION TABLE

DECISION SUBUNIT	SAMPLING AREA	SAMPLE NODE	NORTHING	EASTING
1	A1	S-A1-3	143949.13	565506.71
		S-A1-4	143939.18	565506.87
		S-A1-10	143926.37	565514.92
		S-A1-16	143954.38	565592.76
	A2	S-A2-3	143930.56	565586.05
		S-A2-6	143910.37	565584.12
		S-A2-7	143904.06	565583.62
		S-A2-15	143903.19	565589.52
	A3	S-A3-1	143891.76	565587.62
		S-A3-2A	143891.88	565581.86
		S-A3-2B	143875.31	565539.90
		S-A3-4	143876.91	565552.10
		S-A3-11	143871.33	565552.21
	A4	S-A4-3	143876.63	565612.25
		S-A4-4	143876.72	565617.95
		S-A4-7	143877.86	565635.91
		S-A4-12	143870.49	565616.89

Attachment 3 Sheet No. 2 of 6
Originator G. CRUZ Date 8/23/06
Ch'k'd By DB Date 8/24/06
Calc. No. 01006-CA-V0288 Rev. No. 0

ATTACHMENT 3

SCALE 1: 750
7.5 0 7.5 15 30 meters

U.S DEPARTMENT OF ENERGY
DOE RICHLAND OPERATIONS OFFICE
RIVIER CORRIDOR CLOSURE CONTRACT

100-B/C AREA
118-C-1 BURIAL GROUND AREA 2
SHALLOW ZONE SAMPLING PLAN

1BC:082206C.dwg

NOTES

1. SHALLOW ZONE NODE AREAS ARE APPROXIMATELY 118.37 SQUARE METERS.
2. SAMPLES ARE TAKEN FROM THE APPROXIMATE CENTER SQUARE METERS.
3. THE SHALLOW ZONE CONSISTS OF SAMPLING AREAS A1, A2, A3 AND A4 WITHIN DECISION SUBUNIT 1.

LEGEND

(8) VERIFICATION SAMPLING NODE

SAMPLE LOCATION TABLE

DECISION SUBUNIT	SAMPLING AREA	SAMPLE NODE	NORTHING	EASTING
1	A1	S-A1-3	143956.59	565512.65
		S-A1-4	143954.81	565519.53
		S-A1-10	143948.87	565491.31
		S-A1-16	143920.88	565500.15
	A2	S-A2-3	143886.52	565497.18
		S-A2-6	143895.03	565502.27
		S-A2-7	143882.28	565504.12
		S-A2-15	143881.79	565518.50
	A3	S-A3-1	143978.75	565513.55
		S-A3-2	143975.76	565530.92
		S-A3-4	143972.79	565560.91
		S-A3-11	143924.53	565546.80
	A4	S-A4-3	143901.29	565560.07
		S-A4-4	143887.50	565559.88
		S-A4-7	143881.27	565527.95
		S-A4-12	143864.89	565561.26

Attachment 3 Sheet No. 3 of 6
Originator G. CRUZ Date 8/23/06
Chk'd By CAB Date 8/24/06
Calc. No. 01DOB-CA-V0288 Rev. No. 0

ATTACHMENT 3

SCALE 1:750
7.5 0 7.5 15 30 meters

U.S DEPARTMENT OF ENERGY
DOE RICHLAND OPERATIONS OFFICE
RIVIER CORRIDOR CLOSURE CONTRACT

100-B/C AREA
118-C-1 BURIAL GROUND AREA 3
SHALLOW ZONE SAMPLING PLAN

1BC:082206D.dwg

NOTES

1. SHALLOW ZONE NODE AREAS ARE APPROXIMATELY 118.37 SQUARE METERS.
2. SAMPLES ARE TAKEN FROM THE APPROXIMATE CENTER SQUARE METERS.
3. THE SHALLOW ZONE CONSISTS OF SAMPLING AREAS A1, A2, A3 AND A4 WITHIN DECISION SUBUNIT 1.

LEGEND

(8) VERIFICATION SAMPLING NODE

SAMPLE LOCATION TABLE

DECISION SUBUNIT	SAMPLING AREA	SAMPLE NODE	NORTHING	EASTING
1	A1	S-A1-3	143945.07	565576.11
		S-A1-4	143929.38	565572.19
		S-A1-10	143944.00	565598.01
		S-A1-16	143916.50	565606.24
	A2	S-A2-3	143885.24	565569.17
		S-A2-6	143888.07	565574.86
		S-A2-7	143882.50	565586.74
		S-A2-15	143856.67	565577.74
	A3	S-A3-1	143957.84	565614.24
		S-A3-2	143956.89	565621.94
		S-A3-4	143932.36	565618.69
		S-A3-11	143943.62	565653.82
	A4	S-A4-3	143883.65	565616.22
		S-A4-4	143884.53	565632.48
		S-A4-7	143885.71	565654.56
		S-A4-12	143864.07	565604.05

Attachment 3 Sheet No. 4 of 6
Originator G.C.R.&L. Date 9/23/06
Chk'd By CAS Date 8/24/06
Calc. No. 0100B-CA-V0288 Rev. No. 01

ATTACHMENT 3

SCALE 1: 750
7.5 0 7.5 15 30 meters

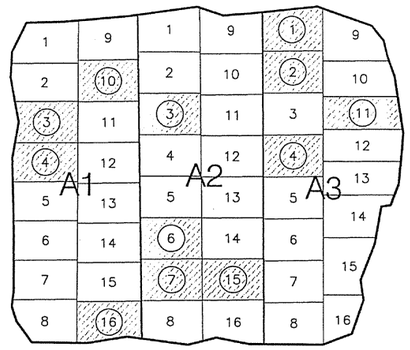
U.S DEPARTMENT OF ENERGY
DOE RICHLAND OPERATIONS OFFICE
RIVIER CORRIDOR CLOSURE CONTRACT

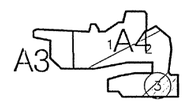
100-B/C AREA
118-C-1 BURIAL GROUND AREA 4
SHALLOW ZONE SAMPLING PLAN

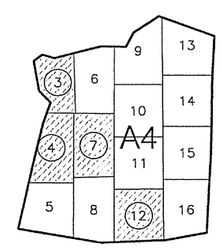
1BC:082206E.dwg

E 565550

N 143950







NOTES

1. OVERBURDEN NODE AREAS ARE APPROXIMATELY 140.72 SQUARE METERS.
2. SAMPLES ARE TAKEN FROM THE APPROXIMATE CENTER SQUARE METERS.
3. THE OVERBURDEN CONSISTS OF SAMPLING AREAS A1, A2, A3 AND A4 WITHIN DECISION SUBUNIT 1.

LEGEND

(8) VERIFICATION SAMPLING NODE

SAMPLE LOCATION TABLE

DECISION SUBUNIT	SAMPLING AREA	SAMPLE NODE	NORTHING	EASTING
1	A1	O–A1–3	143941.51	565394.31
		O–A1–4	143932.06	565394.05
		O–A1–10	143951.29	565408.89
		O–A1–16	143894.00	565409.22
	A2	O–A2–3	143943.54	565423.41
		O–A2–6	143914.05	565423.78
		O–A2–7	143904.18	565423.90
		O–A2–15	143904.31	565438.19
	A3	O–A3–1	143963.59	565451.94
		O–A3–2	143953.59	565452.18
		O–A3–4	143933.75	565452.26
		O–A3–11	143943.94	565468.64
	A4	O–A4–3A	143825.78	565623.40
		O–A4–3B	143785.95	565641.01
		O–A4–4	143770.40	565639.48
		O–A4–7	143770.94	565649.26
		O–A4–12	143754.33	565659.59

Attachment 3 — Sheet No. 5 of 6
Originator Gc (RU) — Date 8/23/06
Chk'd By DJB — Date 8/24/06
Calc. No. 01DDB-CA-V0288 — Rev. No. 101

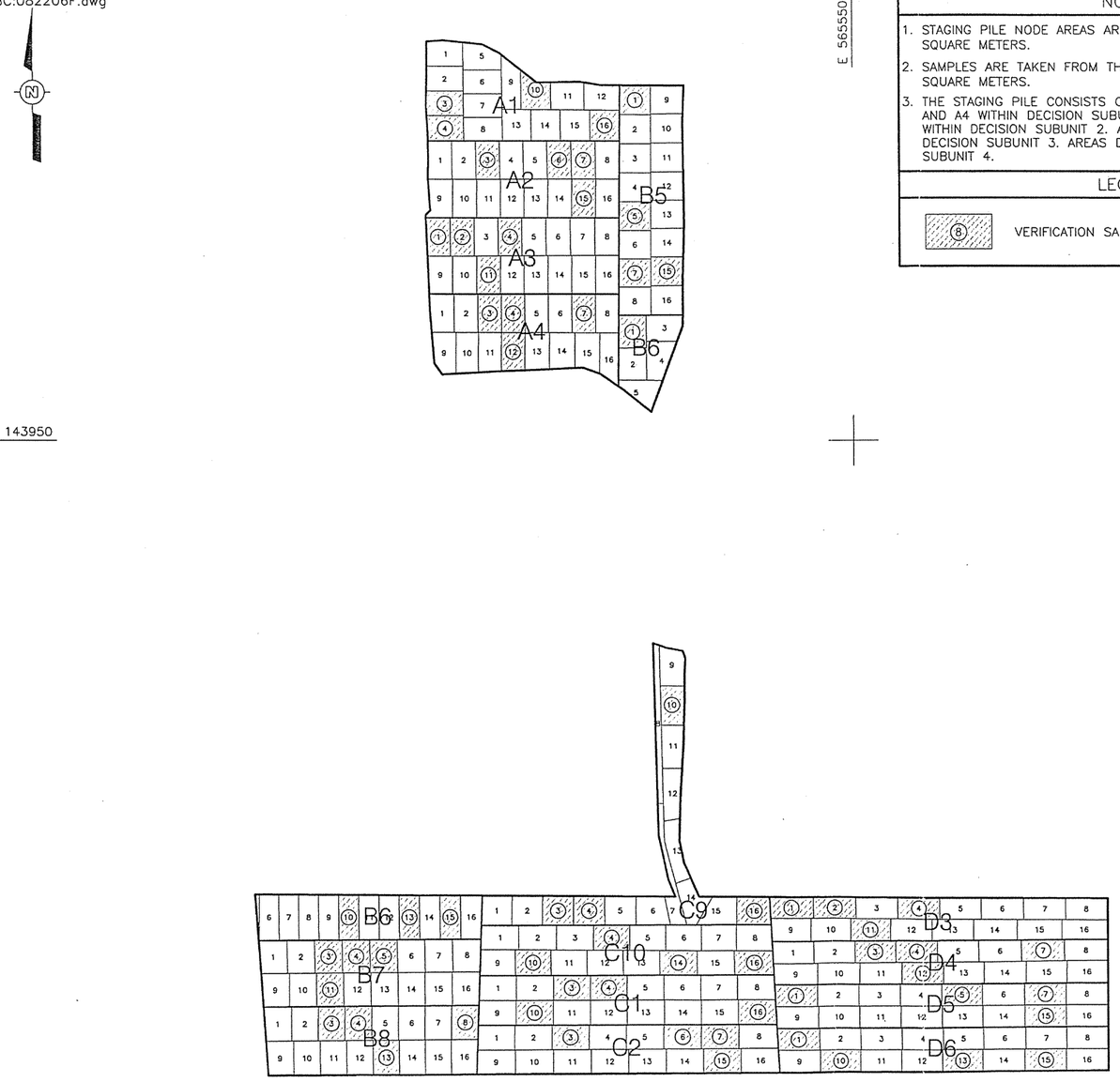
ATTACHMENT 3

SCALE 1:1200
12 0 12 24 48 meters

U.S DEPARTMENT OF ENERGY
DOE RICHLAND OPERATIONS OFFICE
RIVIER CORRIDOR CLOSURE CONTRACT

100–B/C AREA
118–C–1 BURIAL GROUND
OVERBURDEN SAMPLING PLAN

1BC:082206F.dwg



NOTES

1. STAGING PILE NODE AREAS ARE APPROXIMATELY 90.74 SQUARE METERS.
2. SAMPLES ARE TAKEN FROM THE APPROXIMATE CENTER SQUARE METERS.
3. THE STAGING PILE CONSISTS OF SAMPLING AREAS A1, A2, A3 AND A4 WITHIN DECISION SUBUNIT 1. AREAS B5, B6, B7, AND B8 WITHIN DECISION SUBUNIT 2. AREAS C9, C10, C1, AND C2 WITHIN DECISION SUBUNIT 3. AREAS D3, D4, D5, AND D6 WITHIN DECISION SUBUNIT 4.

LEGEND

(8) VERIFICATION SAMPLING NODE

SAMPLE LOCATION TABLE

DECISION SUBUNIT	SAMPLING AREA	SAMPLE NODE	NORTHING	EASTING
1	A1	0-A1-3	144056.99	565421.80
		0-A1-4	144049.15	565421.88
		0-A1-10	144061.39	565450.44
		0-A1-16	144050.09	565471.88
	A2	0-A2-3	144039.10	565435.17
		0-A2-6	144039.13	565457.66
		0-A2-7	144039.14	565465.18
		0-A2-15	144027.01	565465.28
	A3	0-A3-1	144014.81	565419.58
		0-A3-2	144014.84	565427.16
		0-A3-4	144014.88	565442.16
		0-A3-11	144002.76	565435.38
	A4	0-A4-3	143990.59	565435.68
		0-A4-4	143990.57	565443.08
		0-A4-7	143990.53	565465.19
		0-A4-12	143978.29	565443.03
2	B5	0-B5-1	144058.13	565481.52
		0-B5-5	144021.40	565481.40
		0-B5-7	144003.35	565481.35
		0-B5-15	144003.94	565491.38
	B6	0-B6-1	143984.72	565480.47
		0-B6-10	143797.77	565390.57
		0-B6-13	143797.78	565409.72
		0-B6-15	143797.79	565422.67
	B7	0-B7-3	143785.32	565384.19
		0-B7-4	143785.39	565392.88
		0-B7-5	143785.46	565401.57
		0-B7-11	143774.81	565384.69
	B8	0-B8-3	143764.13	565385.08
		0-B8-4	143764.20	565393.50
		0-B8-8	143764.50	565427.31
		0-B8-13	143753.41	565402.30
3	C9	0-C9-3	143799.85	565456.46
		0-C9-4	143799.84	565466.18
		0-C9-10	143865.61	565492.51
		0-C9-16	143799.80	565517.96
	C10	0-C10-4	143791.30	565473.26
		0-C10-10	143783.37	565448.58
		0-C10-14	143783.35	565494.19
		0-C10-16	143783.34	565517.95
	C1	0-C1-3	143775.39	565460.71
		0-C1-4	143775.43	565472.29
		0-C1-10	143767.53	565449.02
		0-C1-16	143767.78	565519.03
	C2	0-C2-3	143759.77	565460.25
		0-C2-6	143759.96	565495.45
		0-C2-7	143760.02	565507.30
		0-C2-15	143752.38	565507.98
4	D3	0-D3-1	143800.79	565529.62
		0-D3-2	143800.71	565543.19
		0-D3-4	143800.54	565570.05
		0-D3-11	143793.76	565554.65
	D4	0-D4-3	143786.72	565556.14
		0-D4-4	143786.81	565569.30
		0-D4-7	143787.07	565609.44
		0-D4-12	143780.00	565571.19
	D5	0-D5-1	143772.95	565530.96
		0-D5-5	143773.18	565583.77
		0-D5-7	143773.29	565610.11
		0-D5-15	143766.40	565610.17
	D6	0-D6-1	143759.15	565531.73
		0-D6-10	143752.23	565544.94
		0-D6-13	143752.41	565583.91
		0-D6-15	143752.54	565610.12

Attachment 3 — Sheet No. 6 of 6
Originator G.CRUZ — Date 8/23/06
Chk'd By GB — Date 8/24/06
Calc. No. D1005-CA-V0288 — Rev. No. 01

ATTACHMENT 3

SCALE 1:1500
15 0 15 30 60 meters

U.S DEPARTMENT OF ENERGY
DOE RICHLAND OPERATIONS OFFICE
RIVIER CORRIDOR CLOSURE CONTRACT

100-B/C AREA
118-C-1 BURIAL GROUND
STAGING PILE SAMPLING PLAN

CALCULATION COVER SHEET

Project Title 100-B/C Field Remediation **Job No.** 14655
Area 100-B/C
Discipline Environmental *Calc. No. 0100C-CA-V0034
Subject 118-C-1 Burial Ground Hazard Quotient and Carcinogenic Risk Calculations
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 = 4 Total = 5	J. M. Capron 12/13/06	T. M. Blakley 12/14/06	N/A	D. N. Strom 12-14-06	12-14-06

SUMMARY OF REVISION	

WCH-DE-018 (9/01/2006) * Obtain Calc. No. from R&DC and Form from Intranet

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron JMC	Date:	12/13/06	Calc. No.:	0100C-CA-V0034	Rev.:	0
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	T. M. Blakley TMB	Date:	12/14/06
Subject:	118-C-1 Burial Ground Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	2 of 4

METHODOLOGY:

Hazard quotient and carcinogenic risk calculations were performed for the 118-C-1 burial ground using the highest statistical value from all sampling areas or individual detections in focused samples (locations 1 through 7). Of the contaminants of concern (COCs) and contaminants of potential concern (COPCs) for the site, boron and molybdenum require the HQ calculations because they were detected and Washington State or Hanford Site background values are not available. Barium, copper, lead, selenium, and zinc are included because they were quantified above their respective Hanford Site background values. Hexavalent chromium, aroclor-1254, aroclor-1260, and multiple volatile and semivolatile organic compounds (as identified in Table 1) are included because they were detected by laboratory analysis and cannot be attributed to natural occurrence. Polycyclic aromatic hydrocarbons (PAHs) detected in the verification samples from the staging pile area are not included because they are the result of asphalt cross-contamination in the sample matrix from a former overlying road and paved area. Asphalt that has been used for structural and construction purposes is excluded from consideration as a dangerous waste by WAC 173-303-071(3)(e), is listed as an inert waste in WAC 173-350-990(2)(b), and its constituents are therefore not considered in attainment of soil RAGs (PAH concentrations in the soil matrix are assumed to be negligible). Residual PAH concentrations detected in other sampling areas were considered for the risk calculations. All other site nonradionuclide COCs and COPCs were not detected or were detected below background levels. An example of the HQ and risk calculations is presented below:

1) For example, the maximum value for boron is 3.4 mg/kg, divided by the noncarcinogenic RAG value of 16,000 mg/kg (calculated in accordance with the noncarcinogenic toxics effects formula in WAC 173-340-740[3]), is 2.1×10^{-4}. Comparing this value, and all other individual values, to the requirement of <1.0, this criterion is met.

2) After the HQ calculations are completed for the appropriate analytes, the cumulative HQ is 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 1.6×10^{-1}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess carcinogenic risk, the 95% upper confidence limit or maximum value is divided by the carcinogenic RAG value, then multiplied by 1×10^{-6}. For example, the maximum value for hexavalent chromium is 0.5 mg/kg; divided by 2.1 mg/kg and multiplied as indicated is 2.4×10^{-7}. 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 carcinogenic risk is obtained by summing the individual values. (To avoid errors due to intermediate rounding, the individual values prior to rounding are used for this calculation.) The sum of the excess carcinogenic risk values is 1.6×10^{-6}. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron JMC	Date:	12/13/06	Calc. No.:	0100C-CA-V0034	Rev.:	0
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	T. M. Blakley TMB	Date:	12/14/06
Subject:	118-C-1 Burial Ground Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	3 of 4

2) List the cumulative noncarcinogenic HQ >1.0: None
3) List individual carcinogens and corresponding excess cancer risk >1 x 10^{-6}: None
4) List the cumulative excess cancer risk for carcinogens >1 x 10^{-5}: None.

Table 1 shows the results of the calculations for the 118-C-1 burial ground.

CONCLUSION:

This calculation demonstrates that the 118-C-1 waste site meets the requirements for hazard quotient and excess carcinogenic risk as identified in the RDR/RAWP (DOE-RL 2005).

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron JMC	Date:	12/13/06	Calc. No.:	0100C-CA-V0034	Rev.:	0
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	T. M. Blakley TMB	Date:	12/14/06
Subject:	118-C-1 Burial Ground Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	4 of 4

Table 1. Hazard Quotient and Excess Cancer Risk Results for the 100-B-14:2 (Area 4) Subsite.

Contaminants of Concern/ Contaminants of Potential Concern	Maximum or Statistical Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Barium	206	5,600	3.7E-02	--	--
Boron	3.4	16,000	2.1E-04	--	--
Chromium, hexavalent[c]	0.5	240	2.1E-03	2.1	2.4E-07
Copper	38.6	2,960	1.3E-02	--	--
Lead[d]	18.6	353	5.3E-02	--	--
Molybdenum	4.5	400	1.1E-02	--	--
Selenium	0.80	400	2.0E-03	--	--
Zinc	74.8	24,000	3.1E-03	--	--
Semivolatiles					
Benzo(a)anthracene	0.18	--	--	1.37	1.3E-07
Benzo(a)pyrene	0.12	--	--	0.137	8.8E-07
Benzo(b)fluoranthene	0.14	--	--	1.37	1.0E-07
Benzo(k)fluoranthene	0.14	--	--	13.7	1.0E-08
Benzo(g,h,i)perylene[e]	0.051	2,400	2.1E-05	--	--
Bis(2-ethylhexyl) phthalate	0.28	1,600	1.8E-04	71.4	3.9E-09
Butylbenzylphthalate	0.038	16,000	2.4E-06	--	--
Chrysene	0.21	--	--	137	1.5E-09
Diethylphthalate	0.022	64,000	3.4E-07	--	--
Di-n-butylphthalate	0.13	8,000	1.6E-05	--	--
Fluoranthene	0.33	3,200	1.0E-04	--	--
Indeno(1,2,3-cd) pyrene	0.046	--	--	1.37	3.4E-08
Phenanthrene[e]	0.097	24,000	4.0E-06	--	--
Phenol	0.036	24,000	1.5E-06	--	--
Pyrene	0.32	2,400	1.3E-04	--	--
Polychlorinated Biphenyls					
Aroclor-1254	0.054	1.6	3.4E-02	0.5	1.1E-07
Aroclor-1260	0.061	--	--	0.5	1.2E-07
Volatile Organic Compounds					
Acetone	0.024	72,000	3.3E-07	--	--
Benzene	0.001	320	3.1E-06	18	5.6E-11
Butanone; 2-	0.004	48,000	8.3E-08	--	--
Carbon tetrachloride	0.039	56	7.0E-04	7.7	5.1E-09
Methylene chloride	0.023	4,800	4.8E-06	133	1.7E-10
Styrene	0.004	16,000	2.5E-07	33.3	1.2E-10
Toluene	0.002	6,400	3.1E-07	--	--
Xylenes (total)	0.001	16,000	6.3E-08	--	--
Totals					
Cumulative Hazard Quotient:			**1.6E-01**		
Cumulative Excess Cancer Risk:					**1.6E-06**

Notes:
[a] = From WCH (2006).
[b] = Value obtained from *Washington Administrative Code* (WAC) 173-340-740(3), Method B, 1996.
[c] = Value for the carcinogen RAG calculated based on the inhalation exposure pathway (WAC) 173-340-750(3), 1996.
[d] = Value for the noncarcinogen RAG obtained from EPA (1994).
[e] = Toxicity data are not available for this constituent. RAGs for benzo(g,h,i)perylene and phenanthrene are based on the surrogate chemicals pyrene and anthracene, respectively.
-- = not applicable
RAG = remedial action goal

CALCULATION COVER SHEET

Project Title:	100-B/C Field Remediation	**Job No.**	14655
Area	100-B/C		
Discipline	Environmental	***Calc. No.**	0100C-CA-V0033
Subject	118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations		
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 Sheets = 31 Attm. 1 = 43 Total = 75	12/13/06 J. M. Capron	12/14/06 T. M. Blakley	N/A	12-14-06 D. N. Strom	12-14-06

SUMMARY OF REVISIONS

WCH-DE-018 (9/01/2006)

* Obtain Calc. No. from R&DC and Form from Intranet

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron	**Date** 12/13/06	**Calc. No.** 0100C-CA-V0033	**Rev. No.** 0
Project 100-B/C Field Remediation	**Job No.** 14655	**Checked** T. M. Blakley	**Date** 12/14/06
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations			**Sheet No.** 1 of 31

Summary

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

Table of Contents:

Given/References:
1) Sample Results (Attachment 1).
2) Background values and remedial action goals (RAGs) are taken from DOE-RL (2005b), DOE-RL (2001), and Ecology (2005).
3) DOE-RL, 2001a, 100 Area Burial Grounds Remedial Action Sampling and Analysis Plan (SAP), DOE/RL-2001-35, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) DOE-RL, 2001b, Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, DOE/RL-92-24, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
5) DOE-RL, 2005, Remedial Design Report/Remedial Action Work Plan for the 100 Area (RDR/RAWP), DOE/RL-96-17, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
6) Ecology, 1992, Statistical Guidance for Ecology Site Managers, Publication #92-54, Washington Department of Ecology, Olympia, Washington.
7) Ecology, 1993, Statistical Guidance for Ecology Site Managers, Supplement S-6, Analyzing Site or Background Data with Below-detection Limit or Below-PQL Values (Censored Data Sets), Publication #92-54, Washington Department of Ecology, Olympia, Washington.
8) Ecology, 2005, Cleanup Levels and Risk Calculations (CLARC) Database, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
9) 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.
10) WAC 173-340, 1996, "Model Toxic Control Act - Cleanup," Washington Administrative Code.

Solution:
Calculation methodology is described in Ecology Pub. #92-54 (Ecology 1992, 1993), below, and in the RDR/RAWP (DOE-RL 2005b). Use data from attached worksheets to perform the 95% UCL calculation for each analyte, the WAC 173-340-740(7)(e) 3-part test for nonradionuclides, and the RPD calculations, as required. The hazard quotient and carcinogenic risk calculations are located in a separate calculation brief as an appendix to the Cleanup Verification Package (CVP).

Calculation Description:
The subject calculations were performed on data from soil verification samples from the subject waste site. The data were entered into an EXCEL 2003 spreadsheet and calculations performed by using the built-in spreadsheet functions and/or creating formulae within the cells. The statistical evaluation of data for use in accordance with the RDR/RAWP (DOE-RL 2005b) is documented by this calculation. Duplicate and split RPD results are used in evaluation of data quality within the CVP for this site.

Methodology:
For nonradioactive analytes with ≤50% of the data below detection limits and all detected radionuclide analytes, the statistical value calculated to evaluate the effectiveness of cleanup is the 95% UCL. For nonradioactive analytes with >50% of the data below detection limits, the maximum detected value for the data set is used instead of the 95% UCL. The 95% UCL is not calculated for data sets with no reported detections. The evaluation of the portion of each analyte's data set below detection limits was performed by direct inspection of the attached sample results, and no further calculations were performed for those data sets where >50% of the data was below detection limits. The 95% UCL values were not calculated for radium-226, radium-228,

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Summary (continued)

thorium-228, thorium-232, and potassium-40, as these isotopes are excluded from consideration as COCs based on natural occurrence and analogous site information. The 95% UCL values were also not calculated for aluminum, calcium, iron, magnesium, potassium, silicon, and sodium, as no parameters to calculate cleanup values under WAC 173-340-740(3) are available in Ecology (2005) or other reference databases, and these constituents are thus not considered site COCs/COPCs.

All calculations for uranium isotopes were performed using data from isotope-specific analysis rather than data resulting from gamma spectroscopy. Due to data quality deficiencies, a portion of the staging pile area (SPA) data for fluoranthene were rejected; therefore, no statistical calculations were performed for this analyte. The result reported in the results summary is the maximum accepted result from the SPA; additional discussion is provided in the CVP.

Initial data results from the SPA indicated the presence of arsenic and total petroleum hydrocarbons (TPH) at concentrations exceeding cleanup criteria in sampling areas A2 and A4, respectively. Therefore, additional material removal was performed and new samples collected and submitted for metals and TPH analysis, respectively. Further evaluation and calculations for affected analytes were performed using the replacement sample data. Initial evaluation of radionuclide data from the SPA indicated that statistical evaluation and dose modeling would result in an overly conservative dose estimate due to the presence of carbon-14 in one sample (J135P7). Therefore, this sample was not considered in statistical calculations for residual radionuclide activities at the SPA, and a sample-specific dose evaluation was performed. Additional discussion is provided in the CVP.

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

For nonradionuclides, the WAC 173-340 statistical guidance suggests that a test for distributional form be performed on the data and the 95% UCL calculated on the appropriate distribution using Ecology software. For nonradionuclide small data sets ($n < 10$) and all radionuclide data sets, the calculations are performed assuming nonparametric distribution, so no tests for distribution are performed. For nonradionuclide data sets of ten or greater, distributional testing and calculation of the 95% UCL is done using Ecology's MTCAStat software (Ecology 1993). Due to differences in addressing censored data between the RDR/RAWP (DOE-RL 2005b) and MTCAStat coding and due to a limitation in the MTCAStat coding (no direct capability to address variable quantitation limits within a data set), substitutions for censored data are performed before software input and the resulting input set treated as uncensored.

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

The WAC 173-340-740(7)(e) 3-part test is not performed for COPCs/COCs where the statistical value defaults to the maximum value in the data set. Instead, direct comparison of the maximum value against site RAGs (within the CVP) is used as the compliance basis.

The RPD values are evaluated for analytes detected in a primary-duplicate or primary-split sample pair for the purposes of data quality assessment within the RSVP (where direct evaluation of the attached data showed that a given analyte was undetected in both the primary and duplicate sample, no further calculations were performed). 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, listed in Table II-1 of the SAP (DOE-RL 2005a). The RPD calculations use the following formula:

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

where, M = main sample value S = split (or duplicate) sample value

For quality assurance/quality control (QA/QC) split and 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. To assist in the identification of anomalous sample pairs, when an analyte is detected in the primary or duplicate/split sample, but was quantified at less than 5 times the TDL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate/split results exceeds a control limit of 2 times the TDL, further assessment regarding the usability of the data is

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Summary (continued)

performed. Additional discussion is provided in the data quality assessment section of the applicable CVP, as necessary.

The results presented in the summary tables that follow are for use in risk analysis and the CVP for this site. In addition to the statistical samples collected at the subject site, focused samples were collected from selected locations based on observations made during site remediation. Statistical methodology is not applicable to non-statistical sampling, and direct evaluation of detected values will be used as the compliance basis. The maximum detected value for each analyte from all focused samples (locations 1 through 7) is presented in the results summary for use in the CVP.

Area 1 - WAC 173-340 3-Part Test for most stringent RAG:

95% UCL > Cleanup Limit?	NO
> 10% above Cleanup Limit?	NO
Any sample > 2x Cleanup Limit?	NO

All data sets evaluated meet the 3-part test criteria when compared to the most stringent cleanup limit

Area 2 - WAC 173-340 3-Part Test for most stringent RAG:

95% UCL > Cleanup Limit?	NO
> 10% above Cleanup Limit?	YES
Any sample > 2x Cleanup Limit?	NO

Because of the "yes" answer to the 3-part test for bis(2-ehtylhexyl)phthalate, additional evaluation of the attainment of cleanup criteria will be performed.

Area 3 - WAC 173-340 3-Part Test for most stringent RAG:

95% UCL > Cleanup Limit?	YES
> 10% above Cleanup Limit?	YES
Any sample > 2x Cleanup Limit?	YES

Because of the "yes" answer to the 3-part test for copper, lead, zinc, and aroclor-1254, additional evaluation of the attainment of cleanup criteria will be performed.

Area 4 - WAC 173-340 3-Part Test for most stringent RAG:

95% UCL > Cleanup Limit?	YES
> 10% above Cleanup Limit?	YES
Any sample > 2x Cleanup Limit?	YES

Because of the "yes" answer to the 3-part test for barium, additional evaluation of the attainment of cleanup criteria will be performed.

OB/BCL - WAC 173-340 3-Part Test for most stringent RAG:

95% UCL > Cleanup Limit?	NO
> 10% above Cleanup Limit?	NO
Any sample > 2x Cleanup Limit?	NO

All data sets evaluated meet the 3-part test criteria when compared to the most stringent cleanup limit

SPA - WAC 173-340 3-Part Test for most stringent RAG:

95% UCL > Cleanup Limit?	YES
> 10% above Cleanup Limit?	YES
Any sample > 2x Cleanup Limit?	YES

Because of the "yes" answer to the 3-part test for barium, copper, lead, aroclor-1254, and multiple polycyclic aromatic hydrocarbons, additional evaluation of the attainment of cleanup criteria will be performed.

Relative Percent Difference Results[a] -

Analyte	Area 1 A1 Duplicate Analysis[b]	Area 1 A1 Split Analysis[b]	Area 2 A1 Duplicate Analysis[b]	Area 2 A1 Split Analysis[b]
Potassium-40	62%	--	0.47%	--
Radium-226	--	--	0.13%	--
Radium-228	--	--	3.5%	--
Aluminum	15%	52%	14%	28%
Barium	6.8%	18%	0.62%	13%
Calcium	4.2%	15%	9.8%	6.4%
Chromium	16%	48%	6.7%	31%
Copper	8.2%	12%	0%	9.9%
Iron	14%	36%	6.0%	23%
Magnesium	14%	36%	7.6%	19%
Manganese	10%	14%	1.0%	7.0%
Silicon	Not applicable	Not applicable	Not applicable	Not applicable
Vanadium	14%	45%	2.5%	35%
Zinc	11%	19%	5.0%	11%

Quantitated results for cesium-137, radium-226, radium-228, and cobalt (metal) in one or more sample pairs did not exceed the relative percent difference quality control threshold of 5XTDL, but the difference between the results exceeded the 2XTDL control threshold.

[a]Relative percent difference evaluation was not required for analytes not included in this table.
[b]The significance of relative percent difference values are discussed within the cleanup verification package for the subject site.
-- = analysis not required
QA/QC = quality assurance/quality control

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1 Summary (continued)

2	Results Summary[a]								
3	Analyte	Area 1[b]	Area 2[b]	Area 3[b]	Area 4[b]	OB-BCL[b]	SPA[b,c]	Focused Samples[d]	Units
4	Carbon-14	--	8.0	--	--	--	--[c]	--	pCi/g
5	Cesium-137	0.185	0.140	0.709	0.81	0 (< BG)	1.03	--	pCi/g
6	Cobalt-60	--	0.99	0.037	--	--	0.029	--	pCi/g
7	Europium-152	0.121	0.199	0.140	0.114	--	0.177	--	pCi/g
8	Nickel-63	--	26.1	--	--	--	--	--	pCi/g
9	Strontium-90	--	--	0.268	--	1.23	0.334	--	pCi/g
10	Tritium	--	4.76	--	--	--	--	--	pCi/g
11	Uranium-233/234	0 (< BG)	--	0 (< BG)	0 (< BG)	0 (< BG)	0 (< BG)	--	pCi/g
12	Uranium-235	0 (< BG)	--	--	--	--	0 (< BG)	--	pCi/g
13	Uranium-238	0 (< BG)	--	0 (< BG)	0 (< BG)	0 (< BG)	0 (< BG)	--	pCi/g
14	Arsenic	3.0	2.7	4.5	2.4	2.4	2.8	5.4	mg/kg
15	Barium	54.3	51.9	75.3	206	55.2	130	80.2	mg/kg
16	Beryllium	0.84	0.88	0.64	0.58	0.68	0.43	0.34	mg/kg
17	Boron	1.9	2.1	2.7	3.4	--	2.8	3.2	mg/kg
18	Cadmium	--	--	0.12	--	--	--	--	mg/kg
19	Chromium (total)	7.9	6.1	8.7	6.5	6.7	8.2	10.2	mg/kg
20	Cobalt	7.9	7.7	8.8	8.7	7.7	7.0	10.5	mg/kg
21	Copper	13.7	13.6	38.6	15.0	15.4	36	23.3	mg/kg
22	Hexavalent chromium	--	0.24	--	--	0.24	0.5	--	mg/kg
23	Lead	4.7	4.1	18.6	5.0	4.9	10.7	7.2	mg/kg
24	Manganese	339	340	349	340	325	323	446	mg/kg
25	Mercury	--	--	--	--	--	0.06	0.04	mg/kg
26	Molybdenum	--	--	4.5	--	--	0.62	--	mg/kg
27	Nickel	10.3	9.8	12.0	9.9	9.5	10.6	14.1	mg/kg
28	Selenium	--	--	--	--	--	0.80	--	mg/kg
29	Vanadium	39.8	46.2	50.6	51.6	44.7	46.6	46.4	mg/kg
30	Zinc	37.3	39.3	74.8	41.0	37.5	46.1	45.1	mg/kg
31	TPH	--	--	--	--	--	146	--	mg/kg
32	Aroclor-1254	--	--	0.054	0.013	0.0065	0.015	0.022	mg/kg
33	Aroclor-1260	--	--	--	--	--	0.061	--	mg/kg
34	Acenaphthene	--	--	--	--	--	0.041	--	mg/kg
35	Anthracene	--	--	--	--	--	0.26	--	mg/kg
36	Benzo(a)anthracene	--	--	0.18	0.13	0.038	0.5	--	mg/kg
37	Benzo(a)pyrene	--	--	0.12	0.083	0.024	0.48	--	mg/kg
38	Benzo(b)fluoranthene	--	--	0.14	0.11	0.033	0.21	--	mg/kg
39	Benzo(g,h,i)perylene	--	--	0.051	0.037	--	0.26	--	mg/kg
40	Benzo(k)fluoranthene	--	--	0.14	0.092	0.029	0.20	--	mg/kg
41	bis(2-Ethylhexyl)phthalate	--	0.28	0.22	0.017	--	0.052	0.067	mg/kg
42	Butylbenzylphthalate	--	--	0.038	--	--	0.017	--	mg/kg
43	Carbazole	--	--	--	--	--	0.24	--	mg/kg
44	Chrysene	--	--	0.21	0.17	0.052	0.4	--	mg/kg
45	Di-n-butylphthalate	--	0.035	0.13	0.026	--	0.11	0.055	mg/kg
46	Dibenz(a,h)anthracene	--	--	--	--	--	0.18	--	mg/kg
47	Dibenzofuran	--	--	--	--	--	0.034	--	mg/kg
48	Diethylphthalate	--	--	--	--	--	--	0.022	mg/kg
49	Fluoranthene	--	--	0.32	0.33	0.11	0.19[e]	--	mg/kg
50	Fluorene	--	--	--	--	--	0.043	--	mg/kg
51	Indeno(1,2,3-cd)pyrene	--	--	0.046	0.035	--	0.25	--	mg/kg
52	Phenanthrene	--	--	0.055	0.097	0.037	1.3	--	mg/kg
53	Phenol	--	--	--	--	--	0.024	0.036	mg/kg
54	Pyrene	--	--	0.32	0.35	0.057	0.5	--	mg/kg
55	2-Butanone	--	--	--	--	--	0.004	--	mg/kg
56	Acetone	--	--	0.011	0.012	0.000	0.015	0.024	mg/kg
57	Benzene	--	--	--	0.001	--	--	--	mg/kg
58	Carbon tetrachlordie	--	--	--	--	--	--	0.039	mg/kg
59	Methylene chloride	--	0.012	0.011	0.014	0.012	0.023	0.019	mg/kg
60	Styrene	--	--	--	--	--	0.004	--	mg/kg
61	Toluene	--	--	--	--	--	0.002	--	mg/kg
62	Xylenes (total)	--	--	--	0.001	--	0.001	--	mg/kg

63 [a]No detections were reported in any data set for COCs/COPCs not listed in this table.
64 [b]Maximum or 95% UCL result, depending on data censorship, as described in the calculation methodology.
65 [c]One sample (J135P7) was excluded from radionuclide evaluation for the SPA, and will be considered separately in subsequent evaluation.
66 [d]Maximum detected result from focused samples 1 through 7.
67 [e]Maximum accepted result.
68 -- = not evaluated by laboratory analysis or not detected (for all samples in the data set)
69 BCL = below cleanup levels
70 COC = contaminant of concern
71 COPC = contaminant of potential concern
72 OB = overburden
73 SPA = staging pile area
74 TPH = total petroleum hydrocarbons
75 UCL = upper confidence limit

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Originator J. M. Capron JMC
Project 100-B/C Field Remediation
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1 **118-C-1 Area 1 Statistical Calculations**
2 **Verification Data**

3	Sample	Sample	Sample	Cesium-137			Europium-152			Uranium-233/234			Uranium-235			Uranium-238			Arsenic			Barium			Beryllium			Boron		
4	Area	Number	Date	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A1	J134Y7	8/17/2006	0.090	U	0.090	0.161		0.097	0.338		0.022	0.010	U	0.027	0.389		0.022	2.7		1.7	48.1		0.06	0.78		0.06	1.3		0.66
6	Duplicate of J134Y7	J134Y9	8/17/2006	0.299		0.032	0.142		0.083	0.387		0.026	0.027		0.025	0.415		0.034	2.3		1.7	51.5		0.05	0.82		0.05	1.7		0.66
7	A2	J13500	8/17/2006	0.129		0.021	0.083		0.044	0.420		0.031	0.024	U	0.026	0.422		0.027	1.9		1.7	52.0		0.06	0.69		0.06	1.6		0.66
8	A3	J134Y8	8/17/2006	0.178		0.025	0.064	U	0.064	0.527		0.029	0.025	U	0.028	0.479		0.029	2.3		1.7	56.0		0.06	0.69		0.06	2.1		0.67
9	A4	J13501	8/17/2006	0.018		0.009	0.024	U	0.024	0.480		0.24	0.116	U	0.30	0.736		0.24	3.3		1.7	48.7		0.06	0.88		0.06	1.6		0.66

10 **Statistical Computation Input Data**

11	Sample	Sample	Sample	Cesium-137	Europium-152	Uranium-233/234	Uranium-235	Uranium-238	Arsenic	Barium	Beryllium	Boron
12	Area	Number	Date	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg
13	A1	J134Y7/J134Y9	8/17/2006	0.172	0.152	0.363	0.019	0.402	2.5	49.8	0.80	1.5
14	A2	J13500	8/17/2006	0.129	0.083	0.420	0.024	0.422	1.9	52.0	0.69	1.6
15	A3	J134Y8	8/17/2006	0.178	0.032	0.527	0.025	0.479	2.3	56.0	0.69	2.1
16	A4	J13501	8/17/2006	0.018	0.012	0.480	0.116	0.736	3.3	48.7	0.88	1.6

17 **Statistical Computations**

18		Cesium-137	Europium-152	Uranium-233/234	Uranium-235	Uranium-238	Arsenic	Barium	Beryllium	Boron
19	95% UCL based on	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.
20	N	4	4	4	4	4	4	4	4	4
21	% < Detection limit	0%	50%	0%	75%	0%	0%	0%	0%	0%
22	Mean	0.124	0.070	0.447	0.046	0.510	2.5	51.6	0.77	1.7
23	Standard deviation	0.074	0.062	0.072	0.047	0.154	0.6	3.2	0.09	0.3
24	95% UCL on mean	0.185	0.121	0.506	0.084	0.637	3.0	54.3	0.84	1.9
25	Maximum detected value	0.299	0.161	0.527	0.027	0.736	3.3	56.0	0.88	2.1
26	Background	NA	NA	1.1	0.11	1.1	6.5	132	1.51	NA
27	Statistical value above background*	0.185	0.121	0 (< BG)	0 (< BG)	0 (< BG)	3.0	54.3	0.84	1.9
28	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**						20 Direct Exposure/GW & River Protection	132 BG/GW Protection	1.51 BG/GW & River Protection	320 GW Protection
29	**WAC 173-340 3-PART TEST**									
30	95% UCL > Cleanup Limit?						NA	NA	NA	NO
31	> 10% above Cleanup Limit?						NA	NA	NA	NO
32	Any sample > 2X Cleanup Limit?						NA	NA	NA	NO
33	**WAC 173-340 Compliance? YES**						Because all values are below background (6.5 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg), the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

34 *Background is not subtracted for nonradionuclides; consideration of background is given by direct comparison against background values.
35 BG = background
36 GW = groundwater
37 MDA = minimum detectable activity
38 NA = not applicable
39 PQL = practical quantitation limit

Q = qualifier
RAG = remedial action goal
U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

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1 **118-C-1 Area 1 Statistical Calculations (continued)**
2 **Verification Data**

3	Sample	Sample	Sample	Chromium			Cobalt			Copper			Lead			Manganese			Nickel			Vanadium			Zinc		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A1	J134Y7	8/17/2006	5.6	C	0.36	7.0		0.39	11.7		0.33	4.5		0.86	296		0.08	8.5		0.66	36.2		0.25	33.0		0.44
6	Duplicate of J134Y7	J134Y9	8/17/2006	6.6	C	0.36	7.9		0.38	12.7		0.33	4.5		0.85	328		0.08	9.5		0.66	41.6		0.25	36.7		0.44
7	A2	J13500	8/17/2006	8.6	C	0.36	5.9		0.39	9.9		0.33	4.1		0.86	260		0.08	10.1		0.66	31.1		0.25	30.1		0.44
8	A3	J134Y8	8/17/2006	6.8	C	0.36	5.7		0.39	11.3		0.33	3.5		0.86	259		0.08	9.9		0.67	31.4		0.25	32.2		0.45
9	A4	J13501	8/17/2006	6.0	C	0.36	8.4		0.39	14.7		0.33	4.9		0.86	362		0.08	10.2		0.66	41.1		0.25	39.1		0.44

10 **Statistical Computation Input Data**

11	Sample	Sample	Sample	Chromium	Cobalt	Copper	Lead	Manganese	Nickel	Vanadium	Zinc
12	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
13	A1	J134Y7/J134Y9	8/17/2006	6.1	7.5	12.2	4.5	312	9.0	38.9	34.9
14	A2	J13500	8/17/2006	8.6	5.9	9.9	4.1	260	10.1	31.1	30.1
15	A3	J134Y8	8/17/2006	6.8	5.7	11.3	3.5	259	9.9	31.4	32.2
16	A4	J13501	8/17/2006	6.0	8.4	14.7	4.9	362	10.2	41.1	39.1

17 **Statistical Computations**

18		Chromium	Cobalt	Copper	Lead	Manganese	Nickel	Vanadium	Zinc
19	95% UCL based on	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.
20	N	4	4	4	4	4	4	4	4
21	% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%
22	Mean	6.9	6.9	12.0	4.3	298	9.8	35.6	34.1
23	Standard deviation	1.2	1.3	2.0	0.6	49	0.5	5.1	3.9
24	95% UCL on mean	7.9	7.9	13.7	4.7	339	10.3	39.8	37.3
25	Maximum detected value	8.6	8.4	14.7	4.9	362	10.2	41.6	39.1
26	Statistical value	7.9	7.9	13.7	4.7	339	10.3	39.8	37.3
27	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	18.5 BG/GW & River Protection	32 GW Protection	22.0 BG/River Protection	10.2 BG/GW & River Protection	512 BG/GW & River Protection	19.1 BG/GW Protection	85.1 BG/GW Protection	67.8 BG/River Protection
28	**WAC 173-340 3-PART TEST**								
29	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NA
30	> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NA
31	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NA
32	**WAC 173-340 Compliance? YES**	Because all values are below background (18.5 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (10.2 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (512 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg), the WAC 173-340 3-part test is not required.

33 BG = background
34 C = method blank contamination
35 GW = groundwater
36 NA = not applicable
37 PQL = practical quantitation limit

Q = qualifier
RAG = remedial action goal
UCL = upper confidence limit
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

Rev. No. 0
Date 12/14/06
Sheet No. 7 of 31

1 **118-C-1 Area 2 Statistical Calculations**
2 **Verification Data**

3	Sample	Sample	Sample	Carbon-14			Cesium-137			Cobalt-60			Europium-152			Nickle-63			Tritium			Arsenic			Barium			Beryllium			Boron		
4	Area	Number	Date	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A1	J13502	8/17/2006	-0.488	U	2.9	0.128		0.034	0.036	U	0.036	0.082	U	0.082	0.673	U	2.9	-0.857	U	2.8	2.3		1.7	48.1		0.06	0.70		0.06	1.9		0.66
6	Duplicate of J13502	J13508	8/17/2006	0.048	U	3.5	0.092		0.040	0.034	U	0.034	0.085	U	0.085	1.49	U	2.8	-1.10	U	3.1	2.4		1.7	48.4		0.06	0.86		0.06	1.7		0.67
7	A2	J13503	8/17/2006	0.827	U	2.8	0.149		0.029	0.087	U	0.087	0.055	U	0.055	12.4		2.8	-0.836	U	2.7	2.8		1.7	45.6		0.06	0.78		0.06	2.0		0.66
8	A3	J13506	8/17/2006	1.66	U	2.9	0.063	U	0.063	0.076	U	0.076	0.281		0.099	1.37	U	2.8	-1.24	U	2.7	2.0		1.7	44.4		0.06	0.68		0.06	2.2		0.66
9	A4	J13507	8/17/2006	11.7		3.1	0.107		0.047	1.48		0.045	0.087	U	0.087	35.8		2.9	7.71		2.8	2.4		1.7	54.5		0.05	0.93		0.05	1.5		0.66

10 **Statistical Computation Input Data**

11	Sample	Sample	Sample	Carbon-14	Cesium-137	Cobalt-60	Europium-152	Nickle-63	Tritium	Arsenic	Barium	Beryllium	Boron
12	Area	Number	Date	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg
13	A1	J13502/ J13508	8/17/2006	-0.220	0.110	0.018	0.042	1.08	-0.98	2.4	48.3	0.78	1.8
14	A2	J13503	8/17/2006	0.827	0.149	0.044	0.028	12.4	-0.836	2.8	45.6	0.78	2.0
15	A3	J13506	8/17/2006	1.66	0.032	0.038	0.281	1.37	-1.24	2.0	44.4	0.68	2.2
16	A4	J13507	8/17/2006	11.7	0.107	1.48	0.044	35.8	7.71	2.4	54.5	0.93	1.5

17 **Statistical Computations**

18		Carbon-14	Cesium-137	Cobalt-60	Europium-152	Nickle-63	Tritium	Arsenic	Barium	Beryllium	Boron
19	95% UCL based on	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.
20	N	4	4	4	4	4	4	4	4	4	4
21	% < Detection limit	75%	25%	75%	75%	50%	75%	0%	0%	0%	0%
22	Mean	3.5	0.099	0.39	0.098	12.7	1.16	2.4	48.2	0.79	1.9
23	Standard deviation	5.5	0.049	0.72	0.122	16.3	4.37	0.3	4.5	0.10	0.3
24	95% UCL on mean	8.0	0.140	0.99	0.199	26.1	4.76	2.7	51.9	0.88	2.1
25	Maximum detected value	11.7	0.149	1.48	0.281	35.8	7.71	2.8	54.5	0.93	2.2
26	Background	NA	NA	NA	NA	NA	NA	6.5	132	1.51	NA
27	Statistical value above background*	8.0	0.140	0.99	0.199	26.1	4.76	2.7	51.9	0.88	2.1
28	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**							20 Direct Exposure/GW & River Protection	132 BG/GW Protection	1.51 BG/GW & River Protection	320 GW Protection
29	**WAC 173-340 3-PART TEST**										
30	95% UCL > Cleanup Limit?							NA	NA	NA	NO
31	> 10% above Cleanup Limit?							NA	NA	NA	NO
32	Any sample > 2X Cleanup Limit?							NA	NA	NA	NO
33	**WAC 173-340 Compliance?** **YES**							Because all values are below background (6.5 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg), the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

34 *Background is not subtracted for nonradionuclides; consideration of background is given by direct comparison against background values.
35 BG = background
36 GW = groundwater
37 MDA = minimum detectable activity
38 NA = not applicable
39 PQL = practical quantitation limit

Q = qualifier
RAG = remedial action goal
U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

Rev. No. 0
Date 12/14/06
Sheet No. 8 of 31

1 118-C-1 Area 2 Statistical Calculations (continued)
2 Verification Data

3	Sample Area	Sample Number	Sample Date	Chromium			Cobalt			Copper			Hexavalent Chromium			Lead			Manganese			Nickel			Vanadium			Zinc			bis(2-Ethylhexyl) phthalate		
4				mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A1	J13502	8/17/2006	6.2	C	0.36	7.6		0.39	13.4		0.33	0.20	U	0.20	3.7		0.85	317		0.08	10.4		0.66	44.1		0.25	37.1		0.44	0.038	JB	0.34
6	Duplicate of J13502	J13508	8/17/2006	5.8	C	0.36	7.5		0.39	13.4		0.34	0.21		0.20	3.7		0.87	314		0.08	10.1		0.67	43.0		0.25	35.3		0.45	0.036	JB	0.34
7	A2	J13503	8/17/2006	6.2	C	0.36	7.3		0.39	12.8		0.33	0.24		0.20	3.8		0.86	285		0.08	9.2		0.66	44.3		0.25	40.2		0.44	0.038	JB	0.34
8	A3	J13506	8/17/2006	5.4	C	0.36	6.8		0.39	10.5		0.33	0.20	U	0.20	4.3		0.86	279		0.08	7.9		0.66	36.3		0.25	32.3		0.44	0.020	JB	0.34
9	A4	J13507	8/17/2006	4.9	C	0.36	7.7		0.38	13.2		0.33	0.23		0.20	3.2		0.85	359		0.08	8.7		0.66	46.3		0.25	37.7		0.44	0.40	B	0.34

10 Statistical Computation Input Data

11	Sample Area	Sample Number	Sample Date	Chromium	Cobalt	Copper	Hexavalent Chromium	Lead	Manganese	Nickel	Vanadium	Zinc	bis(2-Ethylhexyl) phthalate
12				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
13	A1	J13502/ J13508	8/17/2006	6.0	7.6	13.4	0.16	3.7	316	10.3	43.6	36.2	0.037
14	A2	J13503	8/17/2006	6.2	7.3	12.8	0.24	3.8	285	9.2	44.3	40.2	0.038
15	A3	J13506	8/17/2006	5.4	6.8	10.5	0.10	4.3	279	7.9	36.3	32.3	0.020
16	A4	J13507	8/17/2006	4.9	7.7	13.2	0.23	3.2	359	8.7	46.3	37.7	0.40

17 Statistical Computations

18		Chromium	Cobalt	Copper	Hexavalent Chromium	Lead	Manganese	Nickel	Vanadium	Zinc	bis(2-Ethylhexyl) phthalate
19	95% UCL based on	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.
20	N	4	4	4	4	4	4	4	4	4	4
21	% < Detection limit	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%
22	Mean	5.6	7.3	12.5	0.18	3.8	310	9.0	42.6	36.6	0.12
23	Standard deviation	0.6	0.4	1.3	0.07	0.5	37	1.0	4.4	3.3	0.18
24	95% UCL on mean	6.1	7.7	13.6	0.24	4.1	340	9.8	46.2	39.3	0.28
25	Maximum detected value	6.2	7.7	13.4	0.24	4.3	359	10.4	46.3	40.2	0.40
26	Statistical value	6.1	7.7	13.6	0.24	4.1	340	9.8	46.2	39.3	0.28
27	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	18.5 BG/GW & River Protection	32 GW Protection	22.0 BG/River Protection	2 River Protection	10.2 BG/GW & River Protection	512 BG/GW & River Protection	19.1 BG/GW Protection	85.1 BG/GW Protection	67.8 BG/River Protection	0.36 River Protection
28	**WAC 173-340 3-PART TEST**										
29	95% UCL > Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA	NA	NO
30	> 10% above Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA	NA	YES
31	Any sample > 2X Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA	NA	NO
32	**WAC 173-340 Compliance? Further assessment required**	Because all values are below background (18.5 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg), the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	Because all values are below background (10.2 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (512 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg), the WAC 173-340 3-part test is not required.	Because of the "yes" answer to the 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to the direct exposure cleanup level.

33 C = method blank contamination (inorganic constitutents)
34 BG = background
35 GW = groundwater
36 NA = not applicable
37 PQL = practical quantitation limit
38 Q = qualifier

RAG = remedial action goal
RESRAD = RESidual RADioactivity (dose assessment model)
U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron **Date** 12/13/06 **Calc. No.** 0100C-CA-V0033 **Rev. No.** 0
Project 100-B/C Field Remediation **Job No.** 14655 **Checked** T. M. Blakley **Date** 12/14/06
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations **Sheet No.** 9 of 31

118-C-1 Area 2 Statistical Calculations (continued)

Verification Data

Sample Area	Sample Number	Sample Date	Methylene Chloride mg/kg	Q	PQL
A1	J135R0	8/28/2006	0.005	B	0.005
Duplicate of J135R0	J135T6	8/28/2006	0.011	B	0.005
A2	J135R1	8/28/2006	0.006	B	0.005
A3	J135R2	8/28/2006	0.009	B	0.006
A4	J135R3	8/28/2006	0.014	B	0.006

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Methylene Chloride mg/kg		
A1	J13502/ J13508	8/28/2006	0.008		
A2	J135R1	8/28/2006	0.006		
A3	J135R2	8/28/2006	0.009		
A4	J135R3	8/28/2006	0.014		

Statistical Computations

	Methylene Chloride		
95% UCL based on	Small nonradionuclide data set. Use nonparametric z-stat.		
N	4		
% < Detection limit	0%		
Mean	0.009		
Standard deviation	0.003		
95% UCL on mean	0.012		
Maximum detected value	0.014		
Statistical value	0.012		
Most Stringent Cleanup Limit for nonradionuclide and RAG type	0.5	GW Protection	
WAC 173-340 3-PART TEST			
95% UCL > Cleanup Limit?	NO		
> 10% above Cleanup Limit?	NO		
Any sample > 2X Cleanup Limit?	NO		
WAC 173-340 Compliance? **YES**	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		

B = method blank contamination (organic constitutents)
GW = groundwater
PQL = practical quantitation limit
Q = qualifier
RAG = remedial action goal
UCL = upper confidence limit
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

Rev. No. 0
Date 12/14/06
Sheet No. 10 of 31

118-C-1 Area 3 Statistical Calculations

Verification Data

Sample Area	Sample Number	Sample Date	Cesium-137 pCi/g	Q	MDA	Cobalt-60 pCi/g	Q	MDA	Europium-152 pCi/g	Q	MDA	Strontium-90 pCi/g	Q	MDA	Uranium-233/234 pCi/g	Q	MDA	Uranium-238 pCi/g	Q	MDA	Sampling Area	Sample Number	Sample Date	Methylene Chloride mg/kg	Q	PQL
A1	J13510	8/21/2006	0.195		0.033	0.034	U	0.034	0.069	U	0.069	0.016	U	0.27	0.364		0.25	0.265		0.25	A1	J135R4	8/28/2006	0.012	B	0.005
A2	J13511	8/21/2006	0.240		0.020	0.042		0.025	0.138		0.053	0.087	U	0.26	1.09		0.20	0.825		0.20	A2	J135R5	8/28/2006	0.008	B	0.005
A3	J13512	8/21/2006	0.958		0.049	0.061	U	0.061	0.140		0.097	0.279		0.19	0.235	U	0.26	0.269		0.26	A3	J135R6	8/28/2006	0.009	B	0.005
A4	J13513	8/21/2006	0.227		0.027	0.024	U	0.024	0.082		0.046	0.263		0.21	0.328		0.21	0.438		0.21	A4	J135R7	8/28/2006	0.010	B	0.005

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Cesium-137 pCi/g	Cobalt-60 pCi/g	Europium-152 pCi/g	Strontium-90 pCi/g	Uranium-233/234 pCi/g	Uranium-238 pCi/g	Sampling Area	Sample Number	Sample Date	Methylene Chloride mg/kg
A1	J13510	8/21/2006	0.195	0.017	0.035	0.016	0.364	0.265	A1	J135R4	8/28/2006	0.012
A2	J13511	8/21/2006	0.240	0.042	0.138	0.087	1.09	0.825	A2	J135R5	8/28/2006	0.008
A3	J13512	8/21/2006	0.958	0.031	0.140	0.279	0.235	0.269	A3	J135R6	8/28/2006	0.009
A4	J13513	8/21/2006	0.227	0.012	0.082	0.263	0.328	0.438	A4	J135R7	8/28/2006	0.010

Statistical Computations

	Cesium-137	Cobalt-60	Europium-152	Strontium-90	Uranium-233/234	Uranium-238
95% UCL based on	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.
N	4	4	4	4	4	4
% < Detection limit	0%	75%	25%	50%	25%	0%
Mean	0.405	0.025	0.099	0.161	0.50	0.449
Standard deviation	0.369	0.014	0.050	0.130	0.39	0.263
95% UCL on mean	0.709	0.037	0.140	0.268	0.83	0.666
Maximum detected value	0.958	0.042	0.140	0.279	1.09	0.825
Background	NA	NA	NA	NA	1.1	1.1
Statistical value above background*	0.709	0.037	0.140	0.268	0 (< BG)	0 (< BG)

Statistical Computations

	Methylene Chloride
95% UCL based on	Small nonradionuclide data set. Use nonparametric z-stat.
N	4
% < Detection limit	0%
Mean	0.010
Standard deviation	0.002
95% UCL on mean	0.011
Maximum detected value	0.012
Background	NA
Statistical value above background*	0.011
Most Stringent Cleanup Limit for nonradionuclide and RAG type	0.5 GW Protection
WAC 173-340 3-PART TEST	
95% UCL > Cleanup Limit?	NO
> 10% above Cleanup Limit?	NO
Any sample > 2X Cleanup Limit?	NO
WAC 173-340 Compliance? YES	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

*Background is not subtracted for nonradionuclides; consideration of background is given by direct comparison against background values.

B = method blank contamination
BG = background
GW = groundwater
MDA = minimum detectable activity
NA = not applicable
PQL = practical quantitation limit
Q = qualifier
RAG = remedial action goal
U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

Rev. No. 0
Date 12/14/06
Sheet No. 11 of 31

1 **118-C-1 Area 3 Statistical Calculations (continued)**
2 **Verification Data**

3	Sample	Sample	Sample	Arsenic			Barium			Beryllium			Boron			Chromium			Cobalt			Copper			Lead			Manganese		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A1	J13510	8/21/2006	1.8		1.7	63.8		0.06	0.70		0.06	1.6	J	0.66	8.0	C	0.36	8.9		0.39	18.1		0.33	8.3		0.85	357		0.08
6	A2	J13HN3	9/29/2006	5.8		1.1	71.3	C	0.06	0.28		0.03	2.1		1.1	7.2	C	0.22	8.6		0.15	45.2		0.25	23.1		0.37	338		0.06
7	A3	J13512	8/21/2006	2.2		1.7	78.4		0.06	0.51		0.06	3.2	J	0.66	9.2	C	0.36	7.7		0.39	30.6		0.33	11.8		0.86	331		0.08
8	A4	J13513	8/21/2006	2.0		1.7	55.5		0.05	0.52		0.05	1.5	J	0.66	7.4	C	0.36	8.5		0.38	17.9		0.33	6.9		0.85	320		0.08

9 **Statistical Computation Input Data**

10	Sample	Sample	Sample	Arsenic	Barium	Beryllium	Boron	Chromium	Cobalt	Copper	Lead	Manganese
11	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
12	A1	J13510	8/21/2006	1.8	63.8	0.70	1.6	8.0	8.9	18.1	8.3	357
13	A2	J13HN3	9/29/2006	5.8	71.3	0.28	2.1	7.2	8.6	45.2	23.1	338
14	A3	J13512	8/21/2006	2.2	78.4	0.51	3.2	9.2	7.7	30.6	11.8	331
15	A4	J13513	8/21/2006	2.0	55.5	0.52	1.5	7.4	8.5	17.9	6.9	320

16 **Statistical Computations**

17		Arsenic	Barium	Beryllium	Boron	Chromium	Cobalt	Copper	Lead	Manganese
18	95% UCL based on	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.
19	N	4	4	4	4	4	4	4	4	4
20	% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%	0%
21	Mean	3.0	67.3	0.50	2.1	8.0	8.4	28.0	12.5	337
22	Standard deviation	1.9	9.8	0.17	0.8	0.9	0.5	12.9	7.3	16
23	95% UCL on mean	4.5	75.3	0.64	2.7	8.7	8.8	38.6	18.6	349
24	Maximum detected value	5.8	78.4	0.70	3.2	9.2	8.9	45.2	23.1	357
25	Statistical value	4.5	75.3	0.64	2.7	8.7	8.8	38.6	18.6	349
26	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	20 Direct Exposure/GW & River Protection	132 BG/GW Protection	1.51 BG/GW & River Protection	320 GW Protection	18.5 BG/GW & River Protection	32 GW Protection	22.0 BG/River Protection	10.2 BG/GW & River Protection	512 BG/GW & River Protection
27	**WAC 173-340 3-PART TEST**									
28	95% UCL > Cleanup Limit?	NA	NA	NA	NO	NA	NA	YES	YES	NA
29	> 10% above Cleanup Limit?	NA	NA	NA	NO	NA	NA	YES	YES	NA
30	Any sample > 2X Cleanup Limit?	NA	NA	NA	NO	NA	NA	YES	YES	NA
31	**WAC 173-340 Compliance? Further assessment required**	Because all values are below background (6.5 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg), the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	Because all values are below background (18.5 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg), the WAC 173-340 3-part test is not required.	Because of the "yes" answers to the 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to the direct exposure cleanup level.	Because of the "yes" answers to the 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to the direct exposure cleanup level.	Because all values are below background (512 mg/kg), the WAC 173-340 3-part test is not required.

32 C = method blank contamination (inorganic constitutents)
33 BG = background
34 GW = groundwater
35 NA = not applicable
36 PQL = practical quantitation limit

Q = qualifier
RAG = remedial action goal
RESRAD = RESidual RADioactivity (dose assessment model)
UCL = upper confidence limit
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron **Date** 12/13/06 **Calc. No.** 0100C-CA-V0033 **Rev. No.** 0
Project 100-B/C Field Remediation **Job No.** 14655 **Checked** T. M. Blakley **Date** 12/14/06
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations **Sheet No.** 12 of 31

1 **118-C-1 Area 3 Statistical Calculations (continued)**

2 **Verification Data**

3				Nickel			Vanadium			Zinc						Aroclor-1254			bis(2-Ethylhexyl)phthalate			Di-n-butylphthalate		
4	Sample Area	Sample Number	Sample Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	Sampling Area	Sample Number	Sample Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A1	J13510	8/21/2006	11.0		0.66	53.2		0.25	47.4		0.44	A1	J13510	8/21/2006	0.014		0.013	0.33	U	0.33	0.051	J	0.33
6	A2	J13HN3	9/29/2006	10.2		0.40	45.7		0.15	77.1		0.09	A2	J13511	8/21/2006	0.046		0.013	0.030	J	0.33	0.33	U	0.33
7	A3	J13512	8/21/2006	12.7		0.66	44.7		0.25	73.8		0.44	A3	J13512	8/21/2006	0.062		0.013	0.34	U	0.34	0.025	J	0.34
8	A4	J13513	8/21/2006	9.6		0.66	45.7		0.25	42.9		0.44	A4	J13513	8/21/2006	0.021		0.013	0.24	J	0.33	0.063	J	0.33

9 **Statistical Computation Input Data**

10 / 11	Sample Area	Sample Number	Sample Date	Nickel mg/kg			Vanadium mg/kg			Zinc mg/kg			Sampling Area	Sample Number	Sample Date	Aroclor-1254 mg/kg			bis(2-Ethylhexyl)phthalate mg/kg			Di-n-butylphthalate mg/kg		
12	A1	J13510	8/21/2006	11.0			53.2			47.4			A1	J13510	8/21/2006	0.014			0.17			0.051		
13	A2	J13HN3	9/29/2006	10.2			45.7			77.1			A2	J13511	8/21/2006	0.046			0.030			0.17		
14	A3	J13512	8/21/2006	12.7			44.7			73.8			A3	J13512	8/21/2006	0.062			0.17			0.025		
15	A4	J13513	8/21/2006	9.6			45.7			42.9			A4	J13513	8/21/2006	0.021			0.24			0.063		

16 **Statistical Computations**

17		Nickel			Vanadium			Zinc				Aroclor-1254			bis(2-Ethylhexyl)phthalate			Di-n-butylphthalate		
18	95% UCL based on	Small nonradionuclide data set. Use nonparametric z-stat.			Small nonradionuclide data set. Use nonparametric z-stat.			Small nonradionuclide data set. Use nonparametric z-stat.			95% UCL based on	Small nonradionuclide data set. Use nonparametric z-stat.			Small nonradionuclide data set. Use nonparametric z-stat.			Small nonradionuclide data set. Use nonparametric z-stat.		
19	N	4			4			4			N	4			4			4		
20	% < Detection limit	0%			0%			0%			% < Detection limit	0%			50%			25%		
21	Mean	10.9			47.3			60.3			Mean	0.036			0.15			0.08		
22	Standard deviation	1.3			3.9			17.6			Standard deviation	0.022			0.09			0.06		
23	95% UCL on mean	12.0			50.6			74.8			95% UCL on mean	0.054			0.22			0.13		
24	Maximum detected value	12.7			53.2			77.1			Maximum detected value	0.062			0.24			0.06		
25	Statistical value	12.0			50.6			74.8			Statistical value	0.054			0.22			0.13		
26	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	19.1	BG/GW Protection		85.1	BG/GW Protection		67.8	BG/River Protection		**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	0.017	RDL/GW & River Protection		0.36	River Protection		160	GW Protection	
27	**WAC 173-340 3-PART TEST**										**WAC 173-340 3-PART TEST**									
28	95% UCL > Cleanup Limit?	NA			NA			YES			95% UCL > Cleanup Limit?	YES			NO			NO		
29	> 10% above Cleanup Limit?	NA			NA			YES			> 10% above Cleanup Limit?	YES			NO			NO		
30	Any sample > 2X Cleanup Limit?	NA			NA			NO			Any sample > 2X Cleanup Limit?	YES			NO			NO		
31	**WAC 173-340 Compliance? Further assessment required**	Because all values are below background (19.1 mg/kg), the WAC 173-340 3-part test is not required.			Because all values are below background (85.1 mg/kg), the WAC 173-340 3-part test is not required.			Because of the "yes" answers to the 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to the direct exposure cleanup level.			**WAC 173-340 Compliance? Further assessment required**	Because of the "yes" answers to the 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to the direct exposure cleanup level.			The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.			The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		

32 BG = background
33 GW = groundwater
34 J = estimate
35 NA = not applicable
36 PQL = practical quantitation limit
37 Q = qualifier

RAG = remedial action goal
RDL = required detection limit
RESRAD = RESidual RADioactivity (dose assessment model)
U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

Rev. No. 0
Date 12/19/06
Sheet No. 13 of 31

1 **118-C-1 Area 4 Statistical Calculations**
2 **Verification Data**

3	Sample	Sample	Sample	Cesium-137			Europium-152			Uranium-233/234			Uranium-238			Arsenic			Barium			Beryllium			Boron			Chromium		
4	Area	Number	Date	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A1	J13514	8/21/2006	0.065		0.031	0.070	U	0.070	0.231		0.22	0.607		0.22	2.1		1.7	48.6		0.05	0.58		0.05	1.0	J	0.66	6.6	C	0.36
6	A2	J13515	8/21/2006	1.19		0.036	0.159		0.074	0.211	U	0.23	0.362		0.23	2.3		1.7	286		0.05	0.58		0.05	4.9	J	0.66	6.2	C	0.35
7	A3	J13516	8/21/2006	0.044		0.020	0.038	U	0.038	0.537		0.26	0.671		0.26	2.4		1.7	49.9		0.05	0.37		0.05	0.65	UJ	0.65	6.0	C	0.35
8	A4	J13517	8/21/2006	0.082		0.024	0.048	U	0.048	0.422		0.29	0.268	U	0.29	2.2		1.7	49.2		0.06	0.43		0.06	0.66	UJ	0.66	5.3	C	0.36

9 **Statistical Computation Input Data**

10	Sample	Sample	Sample	Cesium-137	Europium-152	Uranium-233/234	Uranium-238	Arsenic	Barium	Beryllium	Boron	Chromium
11	Area	Number	Date	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
12	A1	J13514	8/21/2006	0.065	0.035	0.231	0.607	2.1	48.6	0.58	1.0	6.6
13	A2	J13515	8/21/2006	1.19	0.159	0.211	0.362	2.3	286	0.58	4.9	6.2
14	A3	J13516	8/21/2006	0.044	0.019	0.537	0.671	2.4	49.9	0.37	0.33	6.0
15	A4	J13517	8/21/2006	0.082	0.024	0.422	0.268	2.2	49.2	0.43	0.33	5.3

16 **Statistical Computations**

17		Cesium-137	Europium-152	Uranium-233/234	Uranium-238	Arsenic	Barium	Beryllium	Boron	Chromium
18	95% UCL based on	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.
19	N	4	4	4	4	4	4	4	4	4
20	% < Detection limit	0%	75%	25%	25%	0%	0%	0%	50%	0%
21	Mean	0.35	0.059	0.350	0.477	2.3	108	0.49	1.6	6.0
22	Standard deviation	0.56	0.067	0.157	0.193	0.1	118	0.11	2.2	0.5
23	95% UCL on mean	0.81	0.114	0.479	0.636	2.4	206	0.58	3.4	6.5
24	Maximum detected value	1.19	0.159	0.537	0.671	2.4	286	0.58	4.9	6.6
25	Background	NA	NA	1.1	1.1	6.5	132	1.51	NA	18.5
26	Statistical value above background*	0.81	0.114	0 (< BG)	0 (< BG)	2.4	206	0.58	3.4	6.5
27	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**					20 Direct Exposure/GW & River Protection	132 BG/GW Protection	1.51 BG/GW & River Protection	320 GW Protection	18.5 BG/GW & River Protection
28	**WAC 173-340 3-PART TEST**									
29	95% UCL > Cleanup Limit?					NA	YES	NA	NO	NA
30	> 10% above Cleanup Limit?					NA	YES	NA	NO	NA
31	Any sample > 2X Cleanup Limit?					NA	YES	NA	NO	NA
32	**WAC 173-340 Compliance? Further assessment required**					Because all values are below background (6.5 mg/kg), the WAC 173-340 3-part test is not required.	Because of the "yes" answers to the 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to the direct exposure	Because all values are below background (1.51 mg/kg), the WAC 173-340 3 part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	Because all values are below background (18.5 mg/kg), the WAC 173-340 3-part test is not required.

33 *Background is not subtracted for nonradionuclides; consideration of background is given by direct comparison against background values.
34 C = method blank contamination (inorganic constitutents)
35 BG = background
36 GW = groundwater
37 MDA = minimum detectable activity
38 NA = not applicable
39 PQL = practical quantitation limit

Q = qualifier
RAG = remedial action goal
RESRAD = RESidual RADioactivity (dose assessment model)
U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

Rev. No. 0
Date 12/14/06
Sheet No. 14 of 31

1 **118-C-1 Area 4 Statistical Calculations (continued)**

2 **Verification Data**

3	Sample	Sample	Sample	Cobalt			Copper			Lead			Manganese			Nickel			Vanadium			Zinc			Aroclor-1254		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A1	J13514	8/21/2006	8.8		0.38	14.7		0.33	5.0		0.85	323		0.08	10.1		0.66	55.4		0.25	42.2		0.44	0.013	U	0.013
6	A2	J13515	8/21/2006	8.5		0.38	15.1		0.33	4.7		0.85	350		0.08	9.3		0.66	46.4		0.25	38.8		0.44	0.0064	J	0.013
7	A3	J13516	8/21/2006	7.2		0.38	14.2		0.33	3.1		0.85	269		0.08	9.7		0.65	38.7		0.25	33.7		0.44	0.013	U	0.013
8	A4	J13517	8/21/2006	8.1		0.39	14.8		0.33	4.5		0.85	306		0.08	8.7		0.66	42.4		0.25	37.7		0.44	0.016		0.013

9 **Statistical Computation Input Data**

10	Sample	Sample	Sample	Cobalt	Copper	Lead	Manganese	Nickel	Vanadium	Zinc	Aroclor-1254
11	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
12	A1	J13514	8/21/2006	8.8	14.7	5.0	323	10.1	55.4	42.2	0.0065
13	A2	J13515	8/21/2006	8.5	15.1	4.7	350	9.3	46.4	38.8	0.0064
14	A3	J13516	8/21/2006	7.2	14.2	3.1	269	9.7	38.7	33.7	0.0065
15	A4	J13517	8/21/2006	8.1	14.8	4.5	306	8.7	42.4	37.7	0.016

16 **Statistical Computations**

17		Cobalt	Copper	Lead	Manganese	Nickel	Vanadium	Zinc	Aroclor-1254
18	95% UCL based on	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.
19	N	4	4	4	4	4	4	4	4
20	% < Detection limit	0%	0%	0%	0%	0%	0%	0%	50%
21	Mean	8.2	14.7	4.3	312	9.5	45.7	38.1	0.009
22	Standard deviation	0.7	0.4	0.8	34	0.6	7.2	3.5	0.005
23	95% UCL on mean	8.7	15.0	5.0	340	9.9	51.6	41.0	0.013
24	Maximum detected value	8.8	15.1	5.0	350	10.1	55.4	42.2	0.016
25	Statistical value	8.7	15.0	5.0	340	9.9	51.6	41.0	0.013
26	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	32 GW Protection	22.0 BG/River Protection	10.2 BG/GW & River Protection	512 BG/GW & River Protection	19.1 BG/GW Protection	85.1 BG/GW Protection	67.8 BG/River Protection	0.017 RDL/GW & River Protection
27	**WAC 173-340 3-PART TEST**								
28	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NO
29	> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NO
30	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NO
31	**WAC 173-340 Compliance?** YES	Because all values are below background (15.7 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (10.2 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (512 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg), the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

32 BG = background
33 GW = groundwater
34 J = estimate
35 NA = not applicable
36 PQL = practical quantitation limit

Q = qualifier
RAG = remedial action goal
U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron **Date** 12/13/06 **Calc. No.** 0100C-CA-V0033 **Rev. No.** 0
Project 100-B/C Field Remediation **Job No.** 14655 **Checked** T. M. Blakley **Date** 12/14/06
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations **Sheet No.** 15 of 31

118-C-1 Area 4 Statistical Calculations (continued)

Verification Data

Sample Area	Sample Number	Sample Date	Acetone mg/kg	Acetone Q	Acetone PQL	Methylene Chloride mg/kg	Methylene Chloride Q	Methylene Chloride PQL
A1	J135R8	8/28/2006	0.013	J	0.010	0.013	B	0.005
A2	J135R9	8/28/2006	0.010	U	0.010	0.012	B	0.005
A3	J135T0	8/28/2006	0.009	J	0.011	0.014	B	0.006
A4	J135T1	8/28/2006	0.009	J	0.011	0.011	B	0.006

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Acetone mg/kg			Methylene Chloride mg/kg		
A1	J135R8	8/28/2006	0.013			0.013		
A2	J135R9	8/28/2006	0.0050			0.012		
A3	J135T0	8/28/2006	0.009			0.014		
A4	J135T1	8/28/2006	0.009			0.011		

Statistical Computations

	Acetone			Methylene Chloride		
95% UCL based on	Small nonradionuclide data set. Use nonparametric z-stat.			Small nonradionuclide data set. Use nonparametric z-stat.		
N	4			4		
% < Detection limit	25%			0%		
Mean	0.009			0.013		
Standard deviation	0.003			0.001		
95% UCL on mean	0.012			0.014		
Maximum detected value	0.013			0.014		
Statistical value	0.012			0.014		
Most Stringent Cleanup Limit for nonradionuclide and RAG type	720	GW Protection		0.5	GW Protection	
WAC 173-340 3-PART TEST						
95% UCL > Cleanup Limit?	NO			NO		
> 10% above Cleanup Limit?	NO			NO		
Any sample > 2X Cleanup Limit?	NO			NO		
WAC 173-340 Compliance? **YES**	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.			The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		

B = method blank contamination (organic constitutents)
GW = groundwater
J = estimated
PQL = practical quantitation limit
Q = qualifier
RAG = remedial action goal
UCL = upper confidence limit
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

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Date 12/14/06
Sheet No. 16 of 31

1 **118-C-1 Overburden/BCL Material Statistical Calculations**
2 **Verification Data**

3	Sample	Sample	Sample	Cesium-137			Strontium-90			Uranium-233/234			Uranium-238			Arsenic			Barium			Beryllium			Chromium		
4	Area	Number	Date	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A1	J13518	8/22/2006	0.220		0.035	0.080	U	0.26	0.430		0.13	0.480		0.13	2.2		1.8	48.7		0.06	0.65		0.06	6.1		0.38
6	A2	J13519	8/22/2006	0.059		0.033	0.052	U	0.29	0.428		0.13	0.478		0.13	2.2		1.8	50.0		0.06	0.69		0.06	6.4		0.38
7	A3	J13520	8/22/2006	0.437		0.018	2.10		0.25	0.575		0.13	0.508		0.13	1.8	U	1.8	46.0		0.06	0.60		0.06	5.3		0.38
8	A4	J135N5	8/22/2006	0.172		0.046	0.089	U	0.27	0.383		0.12	0.399		0.12	2.3		1.8	58.4		0.06	0.52		0.06	6.8		0.38

9 **Statistical Computation Input Data**

10	Sample	Sample	Sample	Cesium-137	Strontium-90	Uranium-233/234	Uranium-238	Arsenic	Barium	Beryllium	Chromium
11	Area	Number	Date	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg
12	A1	J13518	8/22/2006	0.220	0.080	0.430	0.480	2.2	48.7	0.65	6.1
13	A2	J13519	8/22/2006	0.059	0.052	0.428	0.478	2.2	50.0	0.69	6.4
14	A3	J13520	8/22/2006	0.437	2.10	0.575	0.508	0.90	46.0	0.60	5.3
15	A4	J135N5	8/22/2006	0.172	0.089	0.383	0.399	2.3	58.4	0.52	6.8

16 **Statistical Computations**

17		Cesium-137	Strontium-90	Uranium-233/234	Uranium-238	Arsenic	Barium	Beryllium	Chromium
18	95% UCL based on	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.
19	N	4	4	4	4	4	4	4	4
20	% < Detection limit	0%	75%	0%	0%	25%	0%	0%	0%
21	Mean	0.222	0.58	0.454	0.466	1.9	50.8	0.62	6.2
22	Standard deviation	0.158	1.01	0.084	0.047	0.7	5.3	0.07	0.6
23	95% UCL on mean	0.352	1.41	0.523	0.505	2.4	55.2	0.68	6.7
24	Maximum detected value	0.437	2.1	0.575	0.508	2.3	58.4	0.69	6.8
25	Background	1.1	0.18	1.1	1.1	6.5	132	1.51	18.5
26	Statistical value above background*	0 (< BG)	1.23	0 (< BG)	0 (< BG)	2.4	55.2	0.68	6.7
27	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**					20 Direct Exposure/GW & River Protection	132 BG/GW Protection	1.51 BG/GW & River Protection	18.5 BG/GW & River Protection
28	**WAC 173-340 3-PART TEST**								
29	95% UCL > Cleanup Limit?					NA	NA	NA	NA
30	> 10% above Cleanup Limit?					NA	NA	NA	NA
31	Any sample > 2X Cleanup Limit?					NA	NA	NA	NA
32	**WAC 173-340 Compliance? YES**					Because all values are below background (6.5 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg), the WAC 173-340 3-part test is not required.

33 *Background is not subtracted for nonradionuclides; consideration of background is given by direct comparison against background values.

34 BCL = below-cleanup-levels
35 BG = background
36 GW = groundwater
37 MDA = minimum detectable activity
38 NA = not applicable
39 PQL = practical quantitation limit

Q = qualifier
RAG = remedial action goal
U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

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Checked T. M. Blakley TMB

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Sheet No. 17 of 31

1 **118-C-1 Overburden/BCL Material Statistical Calculations (continued)**

2 **Verification Data**

3			Cobalt			Copper			Lead			Manganese			Nickel			Vanadium			Zinc			Aroclor-1254		
4	Sample Area	Sample Number	Sample Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A1	J13518	8/22/2006	7.7		0.40	15.8		0.35	5.2		0.90	311		0.09	9.0		0.69	43.5		0.26	37.3		0.46	0.013	U	0.013
6	A2	J13519	8/22/2006	7.8		0.41	15.0		0.35	4.5		0.91	329		0.09	9.3		0.70	45.7		0.26	37.5		0.47	0.0049	J	0.013
7	A3	J13520	8/22/2006	6.9		0.41	12.8		0.35	3.8		0.91	272		0.09	9.6		0.70	36.2		0.26	31.5		0.47	0.0053	J	0.013
8	A4	J135N5	8/22/2006	7.1		0.41	11.9		0.35	4.3		0.90	308		0.09	9.0		0.70	39.6		0.26	34.6		0.47	0.013	U	0.013

9 **Statistical Computation Input Data**

10	Sample	Sample	Sample	Cobalt	Copper	Lead	Manganese	Nickel	Vanadium	Zinc	Aroclor-1254
11	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
12	A1	J13518	8/22/2006	7.7	15.8	5.2	311	9.0	43.5	37.3	0.0065
13	A2	J13519	8/22/2006	7.8	15.0	4.5	329	9.3	45.7	37.5	0.0049
14	A3	J13520	8/22/2006	6.9	12.8	3.8	272	9.6	36.2	31.5	0.0053
15	A4	J135N5	8/22/2006	7.1	11.9	4.3	308	9.0	39.6	34.6	0.0065

16 **Statistical Computations**

17		Cobalt	Copper	Lead	Manganese	Nickel	Vanadium	Zinc	Aroclor-1254
18	95% UCL based on	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.	Small nonradionuclide data set. Use nonparametric z-stat.
19	N	4	4	4	4	4	4	4	4
20	% < Detection limit	0%	0%	0%	0%	0%	0%	0%	50%
21	Mean	7.4	13.9	4.5	305	9.2	41.3	35.2	0.0058
22	Standard deviation	0.4	1.8	0.6	24	0.3	4.2	2.8	0.0008
23	95% UCL on mean	7.7	15.4	4.9	325	9.5	44.7	37.5	0.0065
24	Maximum detected value	7.8	15.8	5.2	329	9.6	45.7	37.5	0.0053
25	Statistical value	7.7	15.4	4.9	325	9.5	44.7	37.5	0.0065
26	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	32 GW Protection	22.0 BG/River Protection	10.2 BG/GW & River Protection	512 BG/GW & River Protection	19.1 BG/GW Protection	85.1 BG/GW Protection	67.8 BG/River Protection	0.017 RDL/GW & River Protection
27	**WAC 173-340 3-PART TEST**								
28	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NO
29	> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NO
30	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NO
31	**WAC 173-340 Compliance? YES**	Because all values are below background (15.7 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (10.2 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (512 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg), the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

32 BCL = below-cleanup-levels
33 BG = background
34 GW = groundwater
35 J = estimate
36 NA = not applicable
37 PQL = practical quantitation limit

Q = qualifier
RAG = remedial action goal
RDL = required detection limit
U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

Rev. No. 0
Date 12/14/06
Sheet No. 19 of 31

1 **118-C-1 Staging Pile Area Statistical Calculations**
2 **Verification Data**

3	Sample	Sample	Sample	Cesium-137			Cobalt-60			Europium-152			Strontium-90			Uranium-233/234			Uranium-235			Uranium-238		
4	Area	Number	Date	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
5	A1	J13522	9/11/06	0.424		0.050	0.040	U	0.040	0.11	U	0.11	0.211	U	0.22	0.415		0.21	0.067	U	0.26	0.663		0.21
6	A2	J13523	9/11/06	0.141		0.035	0.031	U	0.031	0.075	U	0.075	0.158	U	0.21	0.364		0.25	0.040	U	0.31	0.398		0.25
7	A3	J135P1	9/12/06	3.00		0.041	0.036	U	0.036	0.483		0.11	0.855		0.21	0.406		0.26	0	U	0.31	0.541		0.26
8	A4	J135P0	9/12/06	0.826		0.039	0.029	U	0.029	0.214		0.085	0.315		0.25	0.387		0.25	0.039	U	0.30	0.646		0.25
9	B5	J13524	9/11/06	0.494		0.028	0.026	U	0.026	0.112		0.064	0.235		0.21	0.448		0.21	0	U	0.26	0.811		0.21
10	B6	J13525	9/11/06	0.830		0.049	0.044	U	0.044	0.13	U	0.13	0.070	U	0.23	0.415		0.23	0	U	0.27	0.237		0.23
11	B7	J135N8	9/11/06	0.160		0.024	0.022	U	0.022	0.046	U	0.046	0.057	U	0.21	0.276		0.26	0.042	U	0.32	0.518		0.26
12	B8	J135N9	9/11/06	0.383		0.048	0.034	U	0.034	0.093	U	0.093	0.115	U	0.25	0.320		0.22	0.035	U	0.27	0.640		0.22
13	C9	J135P2	9/12/06	0.290		0.020	0.023	U	0.023	0.049	U	0.049	0.203	U	0.21	0.626		0.039	0.045		0.038	0.498		0.039
14	C10	J135P3	9/12/06	0.979		0.035	0.055		0.033	0.363		0.079	0.327		0.21	0.523		0.033	0.047		0.040	0.554		0.033
15	C1	J135P4	9/12/06	1.16		0.046	0.050	U	0.050	0.156		0.12	0.333		0.21	0.467		0.042	0.011	U	0.041	0.370		0.034
16	C2	J135P5	9/12/06	0.644		0.055	0.055	U	0.055	0.16	U	0.16	0.191	U	0.22	0.467		0.032	0.035	U	0.039	0.396		0.032
17	D3	J135P6	9/12/06	0.071		0.033	0.034	U	0.034	0.077	U	0.077	0.117	U	0.23	0.552		0.047	0.036	U	0.045	0.489		0.047
18	D5	J135P8	9/12/06	1.18		0.053	0.063		0.051	0.14	U	0.14	0.475		0.22	0.484		0.066	0.042		0.040	0.510		0.033
19	D6	J135P9	9/12/06	0.198		0.017	0.014	U	0.015	0.035	U	0.035	0.031	U	0.25	0.577		0.19	0	U	0.23	0.426		0.19

20 **Statistical Computation Input Data**

21	Sample	Sample	Sample	Cesium-137	Cobalt-60	Europium-152	Strontium-90	Uranium-233/234	Uranium-235	Uranium-238
22	Area	Number	Date	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g
23	A1	J13522	9/11/2006	0.424	0.020	0.055	0.211	0.415	0.067	0.663
24	A2	J13523	9/11/2006	0.141	0.016	0.038	0.158	0.364	0.040	0.398
25	A3	J135P1	9/12/2006	3.00	0.018	0.483	0.855	0.406	0	0.541
26	A4	J135P0	9/12/2006	0.826	0.015	0.214	0.315	0.387	0.039	0.646
27	B5	J13524	9/11/2006	0.494	0.013	0.112	0.235	0.448	0	0.811
28	B6	J13525	9/11/2006	0.830	0.022	0.065	0.070	0.415	0	0.237
29	B7	J135N8	9/11/2006	0.160	0.011	0.023	0.057	0.276	0.042	0.518
30	B8	J135N9	9/11/2006	0.383	0.017	0.047	0.115	0.320	0.035	0.640
31	C9	J135P2	9/12/2006	0.290	0.012	0.025	0.203	0.626	0.045	0.498
32	C10	J135P3	9/12/2006	0.979	0.055	0.363	0.327	0.523	0.047	0.554
33	C1	J135P4	9/12/2006	1.16	0.025	0.156	0.333	0.467	0.011	0.370
34	C2	J135P5	9/12/2006	0.644	0.028	0.080	0.191	0.467	0.035	0.396
35	D3	J135P6	9/12/2006	0.071	0.017	0.039	0.117	0.552	0.036	0.489
36	D5	J135P8	9/12/2006	1.18	0.063	0.070	0.475	0.484	0.042	0.510
37	D6	J135P9	9/12/2006	0.198	0.014	0.018	0.031	0.577	0	0.426

38 **Statistical Computations**

39		Cesium-137	Cobalt-60	Europium-152	Strontium-90	Uranium-233/234	Uranium-235	Uranium-238
40	95% UCL value based on	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.
41	N	15	15	15	15	15	15	15
42	% < Detection limit	0%	87%	67%	60%	0%	80%	0%
43	Mean	0.72	0.023	0.119	0.246	0.448	0.029	0.513
44	Standard deviation	0.73	0.015	0.136	0.208	0.095	0.021	0.141
45	95% UCL on mean	1.03	0.029	0.177	0.334	0.489	0.038	0.573
46	Maximum detected value	3.00	0.063	0.483	0.855	0.626	0.047	0.811
47	Background	NA	NA	NA	NA	1.1	0.11	1.1
48	Statistical value above background	1.03	0.029	0.177	0.334	0 (< BG)	0 (< BG)	0 (< BG)

49 BG = background
50 MDA = minimum detectable activity
51 NA = not applicable

Q = qualifier
U = undetected
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron — Date 12/13/06 — Checked T. M. Blakley — Date 12/14/06 — Calc. No. 0100C-CA-V0033 — Rev. No. 0
Project 100-B/C Field Remediation — Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations — Job No. 14655 — Sheet No. 20 of 31

118-C-1 Staging Pile Area Statistical Calculations (continued)

Verification Data

Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Boron mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL	Hexavalent Chromium mg/kg	Q	PQL
A1	J13522	9/11/06	3.0		1.1	52.9		0.06	0.43		0.03	1.2		1.1	7.5		0.20	7.6		0.14	15.3		0.23	0.20	U	0.20
A2	J13523	9/11/06	2.5		1.1	53.4		0.06	0.31		0.03	1.1	U	1.1	8.1		0.20	6.2		0.14	15.6		0.23	0.20	U	0.20
A3	J135P1	9/12/06	2.3		1.1	53.3		0.06	0.37		0.03	1.7		1.1	8.0		0.20	7.0		0.14	15.8		0.23	0.20		0.20
A4	J135P0	9/12/06	3.3		1.1	53.5		0.06	0.31		0.03	2.0		1.1	7.0		0.20	6.7		0.14	15.7		0.23	0.30		0.20
B5	J13524	9/11/06	2.4		1.1	55.6		0.06	0.31		0.03	1.1	U	1.1	8.8		0.20	6.4		0.14	16.4		0.23	1.9		0.20
B6	J13525	9/11/06	2.3		1.1	54.9		0.06	0.34		0.03	1.1	U	1.1	9.3		0.20	7.2		0.14	15.9		0.23	0.20	U	0.20
B7	J135N8	9/11/06	2.4		1.1	54.7		0.06	0.35		0.03	1.1	U	1.1	8.0		0.20	7.0		0.14	14.9		0.23	0.20	U	0.20
B8	J135N9	9/11/06	2.9		1.1	60.1		0.06	0.30		0.03	1.1	U	1.1	7.6		0.20	6.7		0.14	13.9		0.23	0.20	U	0.20
C9	J135P2	9/12/06	1.8		1.1	495		0.06	0.57		0.03	10.7		1.1	6.8		0.20	5.6		0.14	144		0.23	0.20	U	0.20
C10	J135P3	9/12/06	2.0		1.1	60.0		0.06	0.36		0.03	1.1	U	1.1	6.5		0.20	6.5		0.14	13.3		0.23	0.29		0.20
C1	J135P4	9/12/06	2.8		1.1	58.2		0.06	0.41		0.03	2.4		1.1	7.7		0.20	6.4		0.14	14.4		0.23	0.20		0.20
C2	J135P5	9/12/06	2.6		1.1	62.9		0.06	0.41		0.03	2.6		1.1	7.6		0.20	6.8		0.14	15.2		0.23	0.20	U	0.20
D3	J135P6	9/12/06	3.0		1.1	63.8		0.06	0.44		0.03	1.5		1.1	7.7		0.20	6.6		0.14	12.7		0.23	0.26		0.20
D4	J135P7	9/12/06	2.0		1.1	56.0		0.06	0.42		0.03	1.1		1.1	7.2		0.20	6.6		0.14	12.6		0.23	0.34		0.20
D5	J135P8	9/12/06	2.5		1.1	59.4		0.06	0.47		0.03	1.1	U	1.1	9.1		0.20	7.5		0.14	14.3		0.23	0.20	U	0.20
D6	J135P9	9/12/06	2.9		1.1	64.8		0.06	0.49		0.03	1.4		1.1	8.2		0.20	7.8		0.14	14.1		0.23	0.30		0.20

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Hexavalent Chromium mg/kg
A1	J13522	9/11/2006	3.0	52.9	0.43	1.2	7.5	7.6	15.3	0.10
A2	J13523	9/11/2006	2.5	53.4	0.31	0.55	8.1	6.2	15.6	0.10
A3	J135P1	9/12/2006	2.3	53.3	0.37	1.7	8.0	7.0	15.8	0.20
A4	J135P0	9/12/2006	3.3	53.5	0.31	2.0	7.0	6.7	15.7	0.30
B5	J13524	9/11/2006	2.4	55.6	0.31	0.55	8.8	6.4	16.4	1.9
B6	J13525	9/11/2006	2.3	54.9	0.34	0.55	9.3	7.2	15.9	0.10
B7	J135N8	9/11/2006	2.4	54.7	0.35	0.55	8.0	7.0	14.9	0.10
B8	J135N9	9/11/2006	2.9	60.1	0.30	0.55	7.6	6.7	13.9	0.10
C9	J135P2	9/12/2006	1.8	495	0.57	10.7	6.8	5.6	144	0.10
C10	J135P3	9/12/2006	2.0	60.0	0.36	0.55	6.5	6.5	13.3	0.29
C1	J135P4	9/12/2006	2.8	58.2	0.41	2.4	7.7	6.4	14.4	0.20
C2	J135P5	9/12/2006	2.6	62.9	0.41	2.6	7.6	6.8	15.2	0.10
D3	J135P6	9/12/2006	3.0	63.8	0.44	1.5	7.7	6.6	12.7	0.26
D4	J135P7	9/12/2006	2.0	56.0	0.42	1.1	7.2	6.6	12.6	0.34
D5	J135P8	9/12/2006	2.5	59.4	0.47	0.55	9.1	7.5	14.3	0.10
D6	J135P9	9/12/2006	2.9	64.8	0.49	1.4	8.2	7.8	14.1	0.30

Statistical Computations

	Arsenic	Barium	Beryllium	Boron	Chromium	Cobalt	Copper	Hexavalent Chromium
95% UCL value based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	16	16	16	16	16	16	16	16
% < Detection limit	0%	0%	0%	44%	0%	0%	0%	50%
Mean	2.5	85	0.39	1.8	7.8	6.8	23	0.3
Standard deviation	0.4	109	0.08	2.5	0.8	0.6	32	0.4
95% UCL on mean	2.8	130	0.43	2.8	8.2	7.0	36	0.5
Maximum detected value	3.3	495	0.57	10.7	9.3	7.8	144	1.9
Statistical value	2.8	130	0.43	2.8	8.2	7.0	36	0.5
Most Stringent Cleanup Limit for nonradionuclide and RAG type	20 Direct Exposure/GW & River Protection	132 BG/GW Protection	1.51 BG/GW & River Protection	320 GW Protection	18.5 BG/GW & River Protection	32 GW Protection	22.0 BG/River Protection	2 River Protection
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?	NA	NO	NA	NO	NA	NA	YES	NO
> 10% above Cleanup Limit?	NA	NO	NA	NO	NA	NA	NO	NO
Any sample > 2X Cleanup Limit?	NA	YES	NA	NO	NA	NA	YES	NO
WAC 173-340 Compliance? Further Assessment Required	Because all values are below background (6.5 mg/kg), the WAC 173-340 3-part test is not required.	Because of the "yes" answers to the 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to the direct exposure cleanup level.	Because all values are below background (1.51 mg/kg), the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	Because all values are below background (18.5 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg), the WAC 173-340 3-part test is not required.	Because of the "yes" answers to the 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to the direct exposure cleanup level.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

BG = background — NA = not applicable — Q = qualifier — RESRAD = RESidual RADioactivity (dose assessment model) — UCL = upper confidence limit
GW = groundwater — PQL = practical quantitation limit — RAG = remedial action goal — U = undetected — WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC | Date 12/13/06 | Checked T. M. Blakley TMB | Date 12/14/06 | Calc. No. 0100C-CA-V0033 | Rev. No. 0
Project 100-B/C Field Remediation | Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations | Job No. 14655 | Sheet No. 21 of 31

1 **118-C-1 Staging Pile Area Statistical Calculations (continued)**

2 **Verification Data**

3	Sample	Sample	Sample	Lead			Manganese			Nickel			Vanadium			Zinc			Aroclor-1254			Benzo(a)anthracene			Benzo(b)fluoranthene		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A1	J13522	9/11/06	5.7		0.35	339		0.06	10.5		0.38	52.9		0.14	42.7		0.09	0.013	U	0.013	0.046	J	0.33	0.043	J	0.33
6	A2	J13523	9/11/06	4.4		0.35	298		0.06	10.1		0.38	36.1		0.14	35.1		0.09	0.013	U	0.013	0.033	J	0.33	0.032	J	0.33
7	A3	J135P1	9/12/06	5.7		0.34	320		0.06	10.6		0.37	45.5		0.14	42.3		0.09	0.013	U	0.013	0.037	J	0.33	0.025	J	0.33
8	A4	J135P0	9/12/06	7.5		0.34	305		0.06	9.5		0.37	38.3		0.14	51.2		0.09	0.013	U	0.013	0.66	JD	0.67	0.39	JD	0.67
9	B5	J13524	9/11/06	25.8		0.35	292		0.06	11.0		0.37	38.9		0.14	66.6		0.09	0.013	U	0.013	0.025	J	0.33	0.027	J	0.33
10	B6	J13525	9/11/06	6.4		0.35	292		0.06	13.7		0.38	48.9		0.14	39.9		0.09	0.013	J	0.013	0.027	J	0.33	0.027	J	0.33
11	B7	J135N8	9/11/06	5.5		0.35	308		0.06	9.7		0.37	44.7		0.14	37.7		0.09	0.0095	J	0.013	0.33	U	0.33	0.33	U	0.33
12	B8	J135N9	9/11/06	7.2		0.34	303		0.06	8.7		0.37	42.9		0.14	37.7		0.09	0.019		0.013	0.061	J	0.33	0.045	J	0.33
13	C9	J135P2	9/12/06	20.8		0.34	334		0.06	8.3		0.37	39.6		0.14	49.3		0.09	0.017		0.013	0.33	UJ	0.33	0.33	UJ	0.33
14	C10	J135P3	9/12/06	5.7		0.35	300		0.06	8.7		0.38	40.4		0.14	37.2		0.09	0.0065	J	0.013	0.33	UJ	0.33	0.33	UJ	0.33
15	C1	J135P4	9/12/06	7.0		0.34	302		0.06	9.3		0.37	43.1		0.14	40.5		0.09	0.014		0.013	0.33	UJ	0.33	0.33	UJ	0.33
16	C2	J135P5	9/12/06	8.4		0.35	297		0.06	9.4		0.38	45.5		0.14	41.6		0.09	0.025		0.013	0.027	J	0.33	0.026	J	0.33
17	D3	J135P6	9/12/06	6.2		0.34	314		0.06	10.6		0.37	45.3		0.14	39.5		0.09	0.020		0.013	0.33	UJ	0.33	0.33	UJ	0.33
18	D4	J135P7	9/12/06	5.5		0.35	306		0.06	9.4		0.38	41.0		0.14	37.2		0.09	0.0079	J	0.013	1.1	J	0.33	0.60	J	0.33
19	D5	J135P8	9/12/06	4.7		0.34	350		0.06	10.8		0.37	49.5		0.14	42.1		0.09	0.0037	J	0.013	0.33	UJ	0.33	0.33	UJ	0.33
20	D6	J135P9	9/12/06	5.7		0.34	367		0.06	10.7		0.37	54.3		0.14	46.4		0.09	0.0047	J	0.013	0.018	J	0.33	0.33	UJ	0.33

21 **Statistical Computation Input Data**

22	Sample	Sample	Sample	Lead	Manganese	Nickel	Vanadium	Zinc	Aroclor-1254	Benzo(a)anthracene	Benzo(b)fluoranthene
23	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
24	A1	J13522	9/11/2006	5.7	339	10.5	52.9	42.7	0.0065	0.046	0.043
25	A2	J13523	9/11/2006	4.4	298	10.1	36.1	35.1	0.0065	0.033	0.032
26	A3	J135P1	9/12/2006	5.7	320	10.6	45.5	42.3	0.0065	0.037	0.025
27	A4	J135P0	9/12/2006	7.5	305	9.5	38.3	51.2	0.0065	0.66	0.39
28	B5	J13524	9/11/2006	25.8	292	11.0	38.9	66.6	0.0065	0.025	0.027
29	B6	J13525	9/11/2006	6.4	292	13.7	48.9	39.9	0.013	0.027	0.027
30	B7	J135N8	9/11/2006	5.5	308	9.7	44.7	37.7	0.0095	0.17	0.17
31	B8	J135N9	9/11/2006	7.2	303	8.7	42.9	37.7	0.019	0.061	0.045
32	C9	J135P2	9/12/2006	20.8	334	8.3	39.6	49.3	0.017	0.17	0.17
33	C10	J135P3	9/12/2006	5.7	300	8.7	40.4	37.2	0.0065	0.17	0.17
34	C1	J135P4	9/12/2006	7.0	302	9.3	43.1	40.5	0.014	0.17	0.17
35	C2	J135P5	9/12/2006	8.4	297	9.4	45.5	41.6	0.025	0.027	0.026
36	D3	J135P6	9/12/2006	6.2	314	10.6	45.3	39.5	0.02	0.17	0.17
37	D4	J135P7	9/12/2006	5.5	306	9.4	41.0	37.2	0.0079	1.1	0.60
38	D5	J135P8	9/12/2006	4.7	350	10.8	49.5	42.1	0.0037	0.17	0.17
39	D6	J135P9	9/12/2006	5.7	367	10.7	54.3	46.4	0.0047	0.018	0.17

40 **Statistical Computations**

41		Lead	Manganese	Nickel	Vanadium	Zinc	Aroclor-1254	Benzo(a)anthracene	Benzo(b)fluoranthene
42	95% UCL value based on	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
43	N	16	16	16	16	16	16	16	16
44	% < Detection limit	0%	0%	0%	0%	0%	31%	38%	44%
45	Mean	8.3	314	10.1	44.2	42.9	0.011	0.2	0.15
46	Standard deviation	6.0	22	1.3	5.2	7.7	0.006	0.3	0.15
47	95% UCL on mean	10.7	323	10.6	46.6	46.1	0.015	0.5	0.21
48	Maximum detected value	25.8	367	13.7	54.3	66.6	0.025	1.1	0.60
49	Statistical value	10.7	323	10.6	46.6	46.1	0.015	0.5	0.21
50	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	10.2 BG/GW & River Protection	512 BG/GW & River Protection	19.1 BG/GW Protection	85.1 BG/GW Protection	67.8 BG/River Protection	0.017 RDL/GW & River Protection	0.33 RDL/GW & River Protection	0.33 RDL/GW & River Protection
51	**WAC 173-340 3-PART TEST**								
52	95% UCL > Cleanup Limit?	YES	NA	NA	NA	NA	NO	YES	NO
53	> 10% above Cleanup Limit?	YES	NA	NA	NA	NA	YES	YES	YES
54	Any sample > 2X Cleanup Limit?	YES	NA	NA	NA	NA	NO	YES	NO
55	**WAC 173-340 Compliance? Further Assessment Required**	Because of the "yes" answers to the 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to the direct exposure cleanup level.	Because all values are below background (512 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg), the WAC 173-340 3-part test is not required.	Because of the "yes" answer to the 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to the direct exposure cleanup level.	Because of the "yes" answers to the 3-part test, additional assessment of all PAH data will be performed	Because of the "yes" answer to the 3-part test, additional assessment of all PAH data will be performed

56 BG = background | J = estimate | PQL = practical quantitation limit | RDL = required detection limit | UCL = upper confidence limit
57 D = diluted | NA = not applicable | Q = qualifier | RESRAD = RESidual RADioactivity (dose assessment model) | WAC = *Washington Administrative Code*
58 GW = groundwater | PAH = polycyclic aromatic hydrocarbon | RAG = remedial action goal | U = undetected

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC | Date 12/13/06 | Checked T. M. Blakley TMB | Date 12/14/06 | Calc. No. 0100C-CA-V0033 | Rev. No. 0
Project 100-B/C Field Remediation | Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations | Job No. 14655 | Sheet No. 22 of 31

1 **118-C-1 Staging Pile Area Statistical Calculations (continued)**

2 **Verification Data**

3	Sample	Sample	Sample	Benzo(k)fluoranthene			bis(2-Ethylhexyl)phthalate			Chrysene			Di-n-butylphthalate			Pyrene			Acetone			Methylene Chloride			Toluene		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A1	J13522	9/11/06	0.041	J	0.33	0.071	JB	0.33	0.076	J	0.33	0.023	JB	0.33	0.078	J	0.33	0.025	J	0.011	0.011	B	0.006	0.001	J	0.006
6	A2	J13523	9/11/06	0.031	J	0.33	0.036	JB	0.33	0.040	J	0.33	0.027	JB	0.33	0.057	J	0.33	0.010	U	0.010	0.008	B	0.005	0.005	U	0.005
7	A3	J135P1	9/12/06	0.027	J	0.33	0.042	JB	0.33	0.051	J	0.33	0.027	JB	0.33	0.060	J	0.33	0.014		0.010	0.023	B	0.005	0.002	J	0.005
8	A4	J135P0	9/12/06	0.36	JD	0.67	0.050	JBD	0.67	0.79	JD	0.67	0.67	UD	0.67	1.7	D	0.67	0.009	J	0.010	0.017	B	0.005	0.005	U	0.005
9	B5	J13524	9/11/06	0.024	J	0.33	0.035	JB	0.33	0.043	J	0.33	0.027	JB	0.33	0.038	J	0.33	0.010	U	0.010	0.011	B	0.005	0.005	U	0.005
10	B6	J13525	9/11/06	0.023	J	0.33	0.059	JB	0.33	0.039	J	0.33	0.039	JB	0.33	0.051	J	0.33	0.010	U	0.010	0.014	B	0.005	0.005	U	0.005
11	B7	J135N8	9/11/06	0.33	U	0.33	0.036	JB	0.33	0.33	U	0.33	0.032	JB	0.33	0.021	J	0.33	0.025	J	0.010	0.014	B	0.005	0.002	J	0.005
12	B8	J135N9	9/11/06	0.043	J	0.33	0.035	JB	0.33	0.081	J	0.33	0.33	U	0.33	0.13	J	0.33	0.028	J	0.010	0.015	B	0.005	0.001	J	0.005
13	C9	J135P2	9/12/06	0.33	UJ	0.33	0.030	JB	0.33	0.33	UJ	0.33	0.019	JB	0.33	0.33	U	0.33	0.012		0.010	0.021	B	0.005	0.005	U	0.005
14	C10	J135P3	9/12/06	0.33	UJ	0.33	0.048	JB	0.33	0.33	UJ	0.33	0.017	JB	0.33	0.33	U	0.33	0.007	J	0.010	0.024	B	0.005	0.001	J	0.005
15	C1	J135P4	9/12/06	0.33	UJ	0.33	0.023	JB	0.33	0.33	UJ	0.33	0.33	U	0.33	0.33	U	0.33	0.007	J	0.010	0.024	B	0.005	0.005	U	0.005
16	C2	J135P5	9/12/06	0.028	J	0.33	0.066	JB	0.33	0.043	J	0.33	0.031	JB	0.33	0.057	J	0.33	0.008	J	0.011	0.027	B	0.006	0.001	J	0.006
17	D3	J135P6	9/12/06	0.33	UJ	0.33	0.056	JB	0.33	0.33	UJ	0.33	0.032	JB	0.33	0.33	U	0.33	0.007	J	0.010	0.026	B	0.005	0.001	J	0.005
18	D4	J135P7	9/12/06	0.54	J	0.33	0.027	JB	0.33	1.3	J	0.33	0.017	JB	0.33	1.6		0.33	0.011		0.009	0.018	B	0.005	0.005	U	0.005
19	D5	J135P8	9/12/06	0.33	UJ	0.33	0.050	JB	0.33	0.33	UJ	0.33	0.029	JB	0.33	0.33	U	0.33	0.011	U	0.011	0.023	B	0.006	0.006	U	0.006
20	D6	J135P9	9/12/06	0.33	UJ	0.33	0.041	JB	0.33	0.027	J	0.33	0.33	U	0.33	0.027	J	0.33	0.008	J	0.010	0.030	B	0.005	0.001	J	0.005

21 **Statistical Computation Input Data**

22	Sample	Sample	Sample	Benzo(k)fluoranthene	bis(2-Ethylhexyl)phthalate	Chrysene	Di-n-butylphthalate	Pyrene	Acetone	Methylene Chloride	Toluene
23	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
24	A1	J13522	9/11/2006	0.041	0.071	0.076	0.023	0.078	0.025	0.011	0.001
25	A2	J13523	9/11/2006	0.031	0.036	0.040	0.027	0.057	0.0050	0.008	0.003
26	A3	J135P1	9/12/2006	0.027	0.042	0.051	0.027	0.060	0.014	0.023	0.002
27	A4	J135P0	9/12/2006	0.36	0.050	0.79	0.34	1.7	0.009	0.017	0.003
28	B5	J13524	9/11/2006	0.024	0.035	0.043	0.027	0.038	0.0050	0.011	0.003
29	B6	J13525	9/11/2006	0.023	0.059	0.039	0.039	0.051	0.0050	0.014	0.003
30	B7	J135N8	9/11/2006	0.17	0.036	0.17	0.032	0.021	0.025	0.014	0.002
31	B8	J135N9	9/11/2006	0.043	0.035	0.081	0.17	0.13	0.028	0.015	0.001
32	C9	J135P2	9/12/2006	0.17	0.030	0.17	0.019	0.17	0.012	0.021	0.003
33	C10	J135P3	9/12/2006	0.17	0.048	0.17	0.017	0.17	0.007	0.024	0.001
34	C1	J135P4	9/12/2006	0.17	0.023	0.17	0.17	0.17	0.007	0.024	0.003
35	C2	J135P5	9/12/2006	0.028	0.066	0.043	0.031	0.057	0.008	0.027	0.001
36	D3	J135P6	9/12/2006	0.17	0.056	0.17	0.032	0.17	0.007	0.026	0.001
37	D4	J135P7	9/12/2006	0.54	0.027	1.3	0.017	1.6	0.011	0.018	0.003
38	D5	J135P8	9/12/2006	0.17	0.050	0.17	0.029	0.17	0.0055	0.023	0.003
39	D6	J135P9	9/12/2006	0.17	0.041	0.027	0.17	0.027	0.008	0.030	0.001

40 **Statistical Computations**

41		Benzo(k)fluoranthene	bis(2-Ethylhexyl)phthalate	Chrysene	Di-n-butylphthalate	Pyrene	Acetone	Methylene Chloride	Toluene
42	95% UCL value based on	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
43	N	16	16	16	16	16	16	16	16
44	% < Detection limit	44%	0%	38%	25%	31%	25%	0%	50%
45	Mean	0.14	0.044	0.2	0.07	0.3	0.011	0.019	0.002
46	Standard deviation	0.14	0.014	0.3	0.09	0.5	0.008	0.007	0.001
47	95% UCL on mean	0.20	0.052	0.4	0.11	0.5	0.015	0.023	0.002
48	Maximum detected value	0.54	0.071	1.3	0.04	1.7	0.028	0.030	0.002
49	Statistical value	0.20	0.052	0.4	0.11	0.5	0.015	0.023	0.002
50	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	0.33 RDL/GW & River Protection	0.36 River Protection	0.33 RDL/River Protection	160 GW Protection	48 GW Protection	720 GW Protection	0.5 GW Protection	64 GW Protection
51	**WAC 173-340 3-PART TEST**								
52	95% UCL > Cleanup Limit?	NO	NO	YES	NO	NO	NO	NO	NO
53	> 10% above Cleanup Limit?	YES	NO	YES	NO	NO	NO	NO	NO
54	Any sample > 2X Cleanup Limit?	NO	NO	YES	NO	NO	NO	NO	NO
55	**WAC 173-340 Compliance? Further Assessment Required**	Because of the "yes" answers to the 3-part test, additional assessment of all PAH data will be performed	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	Because of the "yes" answers to the 3-part test, additional assessment of all PAH data will be performed	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

56 B = method blank contamination | J = estimate | Q = qualifier | U = undetected
57 D = diluted | PAH = polycyclic aromatic hydrocarbon | RAG = remedial action goal | UCL = upper confidence limit
58 GW = groundwater | PQL = practical quantitation limit | RDL = required detection limit | WAC = *Washington Administrative Code*

1 118-C-1 Staging Pile Area Statistical Calculations (continued)

2 Verification Data

3	Sample	Sample	Sample	Benzo(k)fluoranthene			bis(2-Ethylhexyl)phthalate			Chrysene			Di-n-butylphthalate			Pyrene			Acetone			Methylene Chloride			Toluene		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A1	J13522	9/11/06	0.041	J	0.33	0.071	JB	0.33	0.076	J	0.33	0.023	JB	0.33	0.078	J	0.33	0.025	J	0.011	0.011	B	0.006	0.001	J	0.006
6	A2	J13523	9/11/06	0.031	J	0.33	0.036	JB	0.33	0.040	J	0.33	0.027	JB	0.33	0.057	J	0.33	0.010	U	0.010	0.008	B	0.005	0.005	U	0.005
7	A3	J135P1	9/12/06	0.027	J	0.33	0.042	JB	0.33	0.051	J	0.33	0.027	JB	0.33	0.060	J	0.33	0.014		0.010	0.023	B	0.005	0.002	J	0.005
8	A4	J135P0	9/12/06	0.30	JD	0.67	0.050	JBD	0.67	0.79	JD	0.67	0.07	UD	0.67	1.7	D	0.67	0.009	J	0.010	0.017	B	0.005	0.005	U	0.005
9	B5	J13524	9/11/06	0.024	J	0.33	0.035	JB	0.33	0.043	J	0.33	0.027	JB	0.33	0.038	J	0.33	0.010	U	0.010	0.011	B	0.005	0.005	U	0.005
10	B6	J13525	9/11/06	0.023	J	0.33	0.059	JB	0.33	0.039	J	0.33	0.039	JB	0.33	0.051	J	0.33	0.010	U	0.010	0.014	B	0.005	0.005	U	0.005
11	B7	J135N8	9/11/06	0.33	U	0.33	0.036	JB	0.33	0.33	U	0.33	0.032	JB	0.33	0.021	J	0.33	0.025	J	0.010	0.014	B	0.005	0.002	J	0.005
12	B8	J135N9	9/11/06	0.043	J	0.33	0.035	JB	0.33	0.081	J	0.33	0.33	U	0.33	0.13	J	0.33	0.028	J	0.010	0.015	B	0.005	0.001	J	0.005
13	C9	J135P2	9/12/06	0.33	UJ	0.33	0.030	JB	0.33	0.33	UJ	0.33	0.019	JB	0.33	0.33	U	0.33	0.012		0.010	0.021	B	0.005	0.005	U	0.005
14	C10	J135P3	9/12/06	0.33	UJ	0.33	0.048	JB	0.33	0.33	UJ	0.33	0.017	JB	0.33	0.33	U	0.33	0.007	J	0.010	0.024	B	0.005	0.001	J	0.005
15	C1	J135P4	9/12/06	0.33	UJ	0.33	0.023	JB	0.33	0.33	UJ	0.33	0.33	U	0.33	0.33	U	0.33	0.007	J	0.010	0.024	B	0.005	0.005	U	0.005
16	C2	J135P5	9/12/06	0.028	J	0.33	0.066	JB	0.33	0.043	J	0.33	0.031	JB	0.33	0.057	J	0.33	0.008	J	0.011	0.027	B	0.006	0.001	J	0.006
17	D3	J135P6	9/12/06	0.33	UJ	0.33	0.056	JB	0.33	0.33	UJ	0.33	0.032	JB	0.33	0.33	U	0.33	0.007	J	0.010	0.026	B	0.005	0.001	J	0.005
18	D4	J135P7	9/12/06	0.54	J	0.33	0.027	JB	0.33	1.3	J	0.33	0.017	JB	0.33	1.6		0.33	0.011		0.009	0.018	B	0.005	0.005	U	0.005
19	D5	J135P8	9/12/06	0.33	UJ	0.33	0.050	JB	0.33	0.33	UJ	0.33	0.029	JB	0.33	0.33	U	0.33	0.011	U	0.011	0.023	B	0.006	0.006	U	0.006
20	D6	J135P9	9/12/06	0.33	UJ	0.33	0.041	JB	0.33	0.027	J	0.33	0.33	U	0.33	0.027	J	0.33	0.008	J	0.010	0.030	B	0.005	0.001	J	0.005

21 Statistical Computation Input Data

22	Sample	Sample	Sample	Benzo(k)fluoranthene	bis(2-Ethylhexyl)phthalate	Chrysene	Di-n-butylphthalate	Pyrene	Acetone	Methylene Chloride	Toluene
23	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
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33	C10	J135P3	9/12/2006	0.17	0.048	0.17	0.017	0.17	0.007	0.024	0.001
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37	D4	J135P7	9/12/2006	0.54	0.027	1.3	0.017	1.6	0.011	0.018	0.003
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40 Statistical Computations

41		Benzo(k)fluoranthene	bis(2-Ethylhexyl)phthalate	Chrysene	Di-n-butylphthalate	Pyrene	Acetone	Methylene Chloride	Toluene
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44	% < Detection limit	44%	0%	38%	25%	31%	25%	0%	50%
45	Mean	0.14	0.044	0.2	0.07	0.3	0.011	0.019	0.002
46	Standard deviation	0.14	0.014	0.3	0.09	0.5	0.008	0.007	0.001
47	95% UCL on mean	0.20	0.052	0.4	0.11	0.5	0.015	0.023	0.002
48	Maximum detected value	0.54	0.071	1.3	0.04	1.7	0.028	0.030	0.002
49	Statistical value	0.20	0.052	0.4	0.11	0.5	0.015	0.023	0.002
50	Most Stringent Cleanup Limit for nonradionuclide and RAG type	0.33 RDL/GW & River Protection	0.36 River Protection	0.33 RDL/River Protection	160 GW Protection	48 GW Protection	720 GW Protection	0.5 GW Protection	54 GW Protection
51	WAC 173-340 3-PART TEST								
52	95% UCL > Cleanup Limit?	NO	NO	YES	NO	NO	NO	NO	NO
53	> 10% above Cleanup Limit?	YES	NO	YES	NO	NO	NO	NO	NO
54	Any sample > 2X Cleanup Limit?	NO	NO	YES	NO	NO	NO	NO	NO
55	WAC 173-340 Compliance? Further Assessment Required	Because of the "yes" answers to the 3-part test, additional assessment of all PAH data will be performed	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	Because of the "yes" answers to the 3-part test, additional assessment of all PAH data will be performed	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

56 B = method blank contamination J = estimate Q = qualifier U = undetected
57 D = diluted PAH = polycyclic aromatic hydrocarbon RAG = remedial action goal UCL = upper confidence limit
58 GW = groundwater PQL = practical quantitation limit RDL = required detection limit WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

Rev. No. 0
Date 12/14/06
Sheet No. 23 of 31

Ecology Software (MTCAStat) Results (Staging Pile Area)

	DATA	ID	Arsenic 95% UCL Calculation			
1	DATA	ID				
2	3.0	J13522				
3	2.5	J13523				
4	2.3	J135P1	Number of samples		Uncensored values	
5	3.3	J135P0	Uncensored	16	Mean	2.5
6	2.4	J13524	Censored		Lognormal mean	2.5
7	2.3	J13525	Detection limit or PQL		Std. devn.	0.4
8	2.4	J135N8	Method detection limit		Median	2.5
9	2.9	J135N9	TOTAL	16	Min.	1.8
10	1.8	J135P2			Max.	3.3
11	2.0	J135P3				
12	2.8	J135P4				
13	2.6	J135P5	Lognormal distribution?		Normal distribution?	
14	3.0	J135P6	r-squared is: 0.967		r-squared is: 0.976	
15	2.0	J135P7	Recommendations:			
16	2.5	J135P8	Use lognormal distribution.			
17	2.9	J135P9				
18						
19			UCL (Land's method) is		2.8	
20						

	DATA	ID	Barium 95% UCL Calculation			
	DATA	ID				
	52.9	J13522				
	53.4	J13523				
	53.3	J135P1	Number of samples		Uncensored values	
	53.5	J135P0	Uncensored	16	Mean	85
	55.6	J13524	Censored		Lognormal mean	76
	54.9	J13525	Detection limit or PQL		Std. devn.	109
	54.7	J135N8	Method detection limit		Median	57
	60.1	J135N9	TOTAL	16	Min.	52.9
	495	J135P2			Max.	495
	60.0	J135P3				
	58.2	J135P4				
	62.9	J135P5	Lognormal distribution?		Normal distribution?	
	63.8	J135P6	r-squared is: 0.351		r-squared is: 0.273	
	56.0	J135P7	Recommendations:			
	59.4	J135P8	Reject BOTH lognormal and normal distributions.			
	64.8	J135P9				
			UCL (based on Z-statistic) is		130	

	DATA	ID	Beryllium 95% UCL Calculation			
21	DATA	ID				
22	0.43	J13522				
23	0.31	J13523				
24	0.37	J135P1	Number of samples		Uncensored values	
25	0.31	J135P0	Uncensored	16	Mean	0.39
26	0.31	J13524	Censored		Lognormal mean	0.39
27	0.34	J13525	Detection limit or PQL		Std. devn.	0.08
28	0.35	J135N8	Method detection limit		Median	0.39
29	0.30	J135N9	TOTAL	16	Min.	0.30
30	0.57	J135P2			Max.	0.57
31	0.36	J135P3				
32	0.41	J135P4				
33	0.41	J135P5	Lognormal distribution?		Normal distribution?	
34	0.44	J135P6	r-squared is: 0.959		r-squared is: 0.937	
35	0.42	J135P7	Recommendations:			
36	0.47	J135P8	Use lognormal distribution.			
37	0.49	J135P9				
38						
39			UCL (Land's method) is		0.43	
40						

	DATA	ID	Boron 95% UCL Calculation			
	DATA	ID				
	1.2	J13522				
	0.55	J13523				
	1.7	J135P1	Number of samples		Uncensored values	
	2.0	J135P0	Uncensored	16	Mean	1.8
	0.55	J13524	Censored		Lognormal mean	1.6
	0.55	J13525	Detection limit or PQL		Std. devn.	2.5
	0.55	J135N8	Method detection limit		Median	1.2
	0.55	J135N9	TOTAL	16	Min.	0.55
	10.7	J135P2			Max.	10.7
	0.55	J135P3				
	2.4	J135P4				
	2.6	J135P5	Lognormal distribution?		Normal distribution?	
	1.5	J135P6	r-squared is: 0.825		r-squared is: 0.483	
	1.1	J135P7	Recommendations:			
	0.55	J135P8	Reject BOTH lognormal and normal distributions.			
	1.4	J135P9				
			UCL (based on Z-statistic) is		2.8	

41 PQL = practical quantitation limit
42 UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC | Date 12/13/06 | Calc. No. 0100C-CA-V0033 | Rev. No. 0

Project 100-B/C Field Remediation | Job No. 14655 | Checked T. M. Blakley TMB | Date 12/14/06

Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations | Sheet No. 24 of 31

Ecology Software (MTCAStat) Results (Staging Pile Area)

Chromium 95% UCL Calculation

DATA	ID
7.5	J13522
8.1	J13523
8.0	J135P1
7.0	J135P0
8.8	J13524
9.3	J13525
8.0	J135N8
7.6	J135N9
6.8	J135P2
6.5	J135P3
7.7	J135P4
7.6	J135P5
7.7	J135P6
7.2	J135P7
9.1	J135P8
8.2	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	7.8
Censored		Lognormal mean	7.8
Detection limit or PQL		Std. devn.	0.8
Method detection limit		Median	7.7
TOTAL	16	Min.	6.5
		Max.	9.3

Lognormal distribution? r-squared is: 0.977

Normal distribution? r-squared is: 0.969

Recommendations:

Use lognormal distribution.

UCL (Land's method) is 8.2

Cobalt 95% UCL Calculation

DATA	ID
7.6	J13522
6.2	J13523
7.0	J135P1
6.7	J135P0
6.4	J13524
7.2	J13525
7.0	J135N8
6.7	J135N9
5.6	J135P2
6.5	J135P3
6.4	J135P4
6.8	J135P5
6.6	J135P6
6.6	J135P7
7.5	J135P8
7.8	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	6.8
Censored		Lognormal mean	6.8
Detection limit or PQL		Std. devn.	0.6
Method detection limit		Median	6.7
TOTAL	16	Min.	5.6
		Max.	7.8

Lognormal distribution? r-squared is: 0.959

Normal distribution? r-squared is: 0.964

Recommendations:

Use lognormal distribution.

UCL (Land's method) is 7.0

Copper 95% UCL Calculation

DATA	ID
15.3	J13522
15.6	J13523
15.8	J135P1
15.7	J135P0
16.4	J13524
15.9	J13525
14.9	J135N8
13.9	J135N9
144	J135P2
13.3	J135P3
14.4	J135P4
15.2	J135P5
12.7	J135P6
12.6	J135P7
14.3	J135P8
14.1	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	23
Censored		Lognormal mean	20
Detection limit or PQL		Std. devn.	32
Method detection limit		Median	15
TOTAL	16	Min.	12.6
		Max.	144

Lognormal distribution? r-squared is: 0.367

Normal distribution? r-squared is: 0.273

Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 36

Hexavalent Chromium 95% UCL Calculation

DATA	ID
0.10	J13522
0.10	J13523
0.20	J135P1
0.30	J135P0
1.9	J13524
0.10	J13525
0.10	J135N8
0.10	J135N9
0.10	J135P2
0.29	J135P3
0.20	J135P4
0.10	J135P5
0.26	J135P6
0.34	J135P7
0.10	J135P8
0.30	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	0.3
Censored		Lognormal mean	0.3
Detection limit or PQL		Std. devn.	0.4
Method detection limit		Median	0.2
TOTAL	16	Min.	0.10
		Max.	1.9

Lognormal distribution? r-squared is: 0.741

Normal distribution? r-squared is: 0.410

Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.5

PQL = practical quantitation limit

UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC | Date 12/13/06 | Calc. No. 0100C-CA-V0033 | Rev. No. 0

Project 100-B/C Field Remediation | Job No. 14655 | Checked T. M. Blakley TMB | Date 12/14/06

Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations | Sheet No. 25 of 31

Ecology Software (MTCAStat) Results (Staging Pile Area)

	DATA	ID	Lead 95% UCL Calculation			
1	DATA	ID				
2	5.7	J13522				
3	4.4	J13523				
4	5.7	J135P1	Number of samples		Uncensored values	
5	7.5	J135P0	Uncensored	16	Mean	8.3
6	25.8	J13524	Censored		Lognormal mean	8.0
7	6.4	J13525	Detection limit or PQL		Std. devn.	6.0
8	5.5	J135N8	Method detection limit		Median	6.0
9	7.2	J135N9	TOTAL	16	Min.	4.4
10	20.8	J135P2			Max.	25.8
11	5.7	J135P3				
12	7.0	J135P4				
13	8.4	J135P5	Lognormal distribution?		Normal distribution?	
14	6.2	J135P6	r-squared is: 0.712		r-squared is: 0.555	
15	5.5	J135P7	Recommendations:			
16	4.7	J135P8	Reject BOTH lognormal and normal distributions.			
17	5.7	J135P9				
18						
19			UCL (based on Z-statistic) is		10.7	
20						

	DATA	ID	Manganese 95% UCL Calculation			
	DATA	ID				
	339	J13522				
	298	J13523				
	320	J135P1	Number of samples		Uncensored values	
	305	J135P0	Uncensored	16	Mean	314
	292	J13524	Censored		Lognormal mean	314
	292	J13525	Detection limit or PQL		Std. devn.	22
	308	J135N8	Method detection limit		Median	306
	303	J135N9	TOTAL	16	Min.	292
	334	J135P2			Max.	367
	300	J135P3				
	302	J135P4				
	297	J135P5	Lognormal distribution?		Normal distribution?	
	314	J135P6	r-squared is: 0.871		r-squared is: 0.855	
	306	J135P7	Recommendations:			
	350	J135P8	Reject BOTH lognormal and normal distributions.			
	367	J135P9				
			UCL (based on Z-statistic) is		323	

	DATA	ID	Nickel 95% UCL Calculation			
21	DATA	ID				
22	10.5	J13522				
23	10.1	J13523				
24	10.6	J135P1	Number of samples		Uncensored values	
25	9.5	J135P0	Uncensored	16	Mean	10.1
26	11.0	J13524	Censored		Lognormal mean	10.1
27	13.7	J13525	Detection limit or PQL		Std. devn.	1.3
28	9.7	J135N8	Method detection limit		Median	9.9
29	8.7	J135N9	TOTAL	16	Min.	8.3
30	8.3	J135P2			Max.	13.7
31	8.7	J135P3				
32	9.3	J135P4				
33	9.4	J135P5	Lognormal distribution?		Normal distribution?	
34	10.6	J135P6	r-squared is: 0.909		r-squared is: 0.863	
35	9.4	J135P7	Recommendations:			
36	10.8	J135P8	Use lognormal distribution.			
37	10.7	J135P9				
38						
39			UCL (Land's method) is		10.6	
40						

	DATA	ID	Vandium 95% UCL Calculation			
	DATA	ID				
	52.9	J13522				
	36.1	J13523				
	45.5	J135P1	Number of samples		Uncensored values	
	38.3	J135P0	Uncensored	16	Mean	44.2
	38.9	J13524	Censored		Lognormal mean	44.2
	48.9	J13525	Detection limit or PQL		Std. devn.	5.2
	44.7	J135N8	Method detection limit		Median	43.9
	42.9	J135N9	TOTAL	16	Min.	36.1
	39.6	J135P2			Max.	54.3
	40.4	J135P3				
	43.1	J135P4				
	45.5	J135P5	Lognormal distribution?		Normal distribution?	
	45.3	J135P6	r-squared is: 0.980		r-squared is: 0.968	
	41.0	J135P7	Recommendations:			
	49.5	J135P8	Use lognormal distribution.			
	54.3	J135P9				
			UCL (Land's method) is		46.6	

41 PQL = practical quantitation limit

42 UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

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Ecology Software (MTCAStat) Results (Staging Pile Area)

Zinc 95% UCL Calculation

DATA	ID
42.7	J13522
35.1	J13523
42.3	J135P1
51.2	J135P0
66.6	J13524
39.9	J13525
37.7	J135N8
37.7	J135N9
49.3	J135P2
37.2	J135P3
40.5	J135P4
41.6	J135P5
39.5	J135P6
37.2	J135P7
42.1	J135P8
46.4	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	42.9
Censored		Lognormal mean	42.9
Detection limit or PQL		Std. devn.	7.7
Method detection limit		Median	41.1
TOTAL	16	Min.	35.1
		Max.	66.6

Lognormal distribution? r-squared is: 0.840
Normal distribution? r-squared is: 0.764
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 46.1

Aroclor-1254 95% UCL Calculation

DATA	ID
0.0065	J13522
0.0065	J13523
0.0065	J135P1
0.0065	J135P0
0.0065	J13524
0.013	J13525
0.0095	J135N8
0.019	J135N9
0.017	J135P2
0.0065	J135P3
0.014	J135P4
0.025	J135P5
0.02	J135P6
0.0079	J135P7
0.0037	J135P8
0.0047	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	0.011
Censored		Lognormal mean	0.011
Detection limit or PQL		Std. devn.	0.006
Method detection limit		Median	0.007
TOTAL	16	Min.	0.0037
		Max.	0.025

Lognormal distribution? r-squared is: 0.927
Normal distribution? r-squared is: 0.860
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.015

Benzo(a)anthracene 95% UCL Calculation

DATA	ID
0.046	J13522
0.033	J13523
0.037	J135P1
0.66	J135P0
0.025	J13524
0.027	J13525
0.17	J135N8
0.061	J135N9
0.17	J135P2
0.17	J135P3
0.17	J135P4
0.027	J135P5
0.17	J135P6
1.1	J135P7
0.17	J135P8
0.018	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	0.2
Censored		Lognormal mean	0.2
Detection limit or PQL		Std. devn.	0.3
Method detection limit		Median	0.1
TOTAL	16	Min.	0.018
		Max.	1.1

Lognormal distribution? r-squared is: 0.904
Normal distribution? r-squared is: 0.572
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.5

Benzo(b)fluoranthene 95% UCL Calculation

DATA	ID
0.043	J13522
0.032	J13523
0.025	J135P1
0.39	J135P0
0.027	J13524
0.027	J13525
0.17	J135N8
0.045	J135N9
0.17	J135P2
0.17	J135P3
0.17	J135P4
0.026	J135P5
0.17	J135P6
0.60	J135P7
0.17	J135P8
0.17	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	0.15
Censored		Lognormal mean	0.16
Detection limit or PQL		Std. devn.	0.15
Method detection limit		Median	0.17
TOTAL	16	Min.	0.025
		Max.	0.60

Lognormal distribution? r-squared is: 0.868
Normal distribution? r-squared is: 0.714
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.21

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

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Ecology Software (MTCAStat) Results (Staging Pile Area)

Benzo(k)fluoranthene 95% UCL Calculation

DATA	ID
0.041	J13522
0.031	J13523
0.027	J135P1
0.36	J135P0
0.024	J13524
0.023	J13525
0.17	J135N8
0.043	J135N9
0.17	J135P2
0.17	J135P3
0.17	J135P4
0.028	J135P5
0.17	J135P6
0.54	J135P7
0.17	J135P8
0.17	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	0.14
Censored		Lognormal mean	0.15
Detection limit or PQL		Std. devn.	0.14
Method detection limit		Median	0.17
TOTAL	16	Min.	0.023
		Max.	0.54

Lognormal distribution? r-squared is: 0.870
Normal distribution? r-squared is: 0.744
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.20

bis(2-Ethylhexyl)phthalate 95% UCL Calculation

DATA	ID
0.071	J13522
0.036	J13523
0.042	J135P1
0.050	J135P0
0.035	J13524
0.059	J13525
0.036	J135N8
0.035	J135N9
0.030	J135P2
0.048	J135P3
0.023	J135P4
0.066	J135P5
0.056	J135P6
0.027	J135P7
0.050	J135P8
0.041	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	0.044
Censored		Lognormal mean	0.044
Detection limit or PQL		Std. devn.	0.014
Method detection limit		Median	0.042
TOTAL	16	Min.	0.023
		Max.	0.071

Lognormal distribution? r-squared is: 0.985
Normal distribution? r-squared is: 0.969
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.052

Chrysene 95% UCL Calculation

DATA	ID
0.076	J13522
0.040	J13523
0.051	J135P1
0.79	J135P0
0.043	J13524
0.039	J13525
0.17	J135N8
0.081	J135N9
0.17	J135P2
0.17	J135P3
0.17	J135P4
0.043	J135P5
0.17	J135P6
1.3	J135P7
0.17	J135P8
0.027	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	0.2
Censored		Lognormal mean	0.2
Detection limit or PQL		Std. devn.	0.3
Method detection limit		Median	0.1
TOTAL	16	Min.	0.027
		Max.	1.3

Lognormal distribution? r-squared is: 0.880
Normal distribution? r-squared is: 0.533
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.4

Di-n-butylphthalate 95% UCL Calculation

DATA	ID
0.023	J13522
0.027	J13523
0.027	J135P1
0.34	J135P0
0.027	J13524
0.039	J13525
0.032	J135N8
0.17	J135N9
0.019	J135P2
0.017	J135P3
0.17	J135P4
0.031	J135P5
0.032	J135P6
0.017	J135P7
0.029	J135P8
0.17	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	0.07
Censored		Lognormal mean	0.07
Detection limit or PQL		Std. devn.	0.09
Method detection limit		Median	0.03
TOTAL	16	Min.	0.017
		Max.	0.34

Lognormal distribution? r-squared is: 0.794
Normal distribution? r-squared is: 0.623
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.11

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC | Date 12/13/06 | Calc. No. 0100C-CA-V0033 | Rev. No. 0

Project 100-B/C Field Remediation | Job No. 14655 | Checked T. M. Blakley TMB | Date 12/14/06

Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations | Sheet No. 28 of 31

Ecology Software (MTCAStat) Results (Staging Pile Area)

Pyrene 95% UCL Calculation

DATA	ID
0.078	J13522
0.057	J13523
0.060	J135P1
1.7	J135P0
0.038	J13524
0.051	J13525
0.021	J135N8
0.13	J135N9
0.17	J135P2
0.17	J135P3
0.17	J135P4
0.057	J135P5
0.17	J135P6
1.6	J135P7
0.17	J135P8
0.027	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	0.3
Censored		Lognormal mean	0.2
Detection limit or PQL		Std. devn.	0.5
Method detection limit		Median	0.1
TOTAL	16	Min.	0.021
		Max.	1.7

Lognormal distribution? r-squared is: 0.867

Normal distribution? r-squared is: 0.484

Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.5

Acetone 95% UCL Calculation

DATA	ID
0.025	J13522
0.0050	J13523
0.014	J135P1
0.009	J135P0
0.0050	J13524
0.0050	J13525
0.025	J135N8
0.028	J135N9
0.012	J135P2
0.007	J135P3
0.007	J135P4
0.008	J135P5
0.007	J135P6
0.011	J135P7
0.0055	J135P8
0.008	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	0.011
Censored		Lognormal mean	0.011
Detection limit or PQL		Std. devn.	0.008
Method detection limit		Median	0.008
TOTAL	16	Min.	0.0050
		Max.	0.028

Lognormal distribution? r-squared is: 0.896

Normal distribution? r-squared is: 0.770

Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.015

Methylene Chloride 95% UCL Calculation

DATA	ID
0.011	J13522
0.008	J13523
0.023	J135P1
0.017	J135P0
0.011	J13524
0.014	J13525
0.014	J135N8
0.015	J135N9
0.021	J135P2
0.024	J135P3
0.024	J135P4
0.027	J135P5
0.026	J135P6
0.018	J135P7
0.023	J135P8
0.030	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	0.019
Censored		Lognormal mean	0.019
Detection limit or PQL		Std. devn.	0.007
Method detection limit		Median	0.020
TOTAL	16	Min.	0.008
		Max.	0.030

Lognormal distribution? r-squared is: 0.943

Normal distribution? r-squared is: 0.970

Recommendations:

Use lognormal distribution.

UCL (Land's method) is 0.023

Toluene 95% UCL Calculation

DATA	ID
0.001	J13522
0.003	J13523
0.002	J135P1
0.003	J135P0
0.003	J13524
0.003	J13525
0.002	J135N8
0.001	J135N9
0.003	J135P2
0.001	J135P3
0.003	J135P4
0.001	J135P5
0.001	J135P6
0.003	J135P7
0.003	J135P8
0.001	J135P9

Number of samples		Uncensored values	
Uncensored	16	Mean	0.002
Censored		Lognormal mean	0.002
Detection limit or PQL		Std. devn.	0.001
Method detection limit		Median	0.002
TOTAL	16	Min.	0.001
		Max.	0.003

Lognormal distribution? r-squared is: 0.757

Normal distribution? r-squared is: 0.793

Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.002

PQL = practical quantitation limit

UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

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Split/Duplicate Analysis

Sample Area	Sample Number	Sample Date	Cesium-137			Europium-152			Nickel-63			Plutonium-239/240			Potassium-40			Radium-226			Radium-228			Thorium-228		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 1 A1	J134Y7	8/17/06	0.090	U	0.090	0.161		0.097	2.49	U	2.9	0.025	U	0.19	21.6		0.37	0.754		0.082	1.04		0.19	1.09		0.063
Duplicate of J134Y7	J134Y9	8/17/06	0.299		0.032	0.142		0.083	1.42	U	3.1	0	U	0.57	11.4		0.28	0.401		0.063	0.530		0.15	0.622		0.049
Split of J134Y7	J13504	8/17/06	0.391		0.0162	0.128	U	0.0519	7.70		5.73	0.0461		0.0250	--		--	--		--	--		--	--		--

Analysis:

		Cesium-137	Europium-152	Nickel-63	Plutonium-239/240	Potassium-40	Radium-226	Radium-228	Thorium-228
TDL		0.1	0.1	30	1	0.5	0.1	0.2	1
Duplicate Analysis	Both > MDA?	No - evaluate difference	**Yes (continue)**	No - evaluate difference	No - evaluate difference	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?		No - evaluate difference			**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference	No - evaluate difference
	RPD					***62%***			
	Difference >2xTDL?	***Yes - assess further***	No - acceptable	No - acceptable	No - acceptable	Not applicable	***Yes - assess further***	***Yes - assess further***	No - acceptable
Split Analysis	Both > MDA?	No - evaluate difference	**Yes (continue)**	No - evaluate difference	No - evaluate difference				
	Both >5xTDL?		No - evaluate difference						
	RPD								
	Difference >2xTDL?	***Yes - assess further***	No - acceptable	No - acceptable	No - acceptable				

Sample Area	Sample Number	Sample Date	Thorium-232			Strontium-90			Uranium-233/234			Uranium-235			Uranium-238			Aluminum			Antimony			Arsenic		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Area 1 A1	J134Y7	8/17/06	1.04		0.19	0.148	U	0.24	0.338		0.022	0.010	U	0.027	0.389		0.022	3880		8.0	1.2	U	1.2	2.7		1.7
Duplicate of J134Y7	J134Y9	8/17/06	0.530		0.15	0.115	U	0.22	0.387		0.026	0.027		0.025	0.415		0.034	4500		7.9	1.2	U	1.2	2.3		1.7
Split of J134Y7	J13504	8/17/06	--		--	0.323		0.149	0.545		0.0170	0.0225		0.0354	0.575		0.0300	6610	N	6.3	1.2	N	0.33	2.6		0.28

Analysis:

		Thorium-232	Strontium-90	Uranium-233/234	Uranium-235	Uranium-238	Aluminum	Antimony	Arsenic
TDL		1	1	1	0.5	1	5	0.6	10
Duplicate Analysis	Both > PQL/MDA?	**Yes (continue)**	No - evaluate difference	**Yes (continue)**	No - evaluate difference	**Yes (continue)**	**Yes (continue)**	No - evaluate difference	**Yes (continue)**
	Both >5xTDL?	No - evaluate difference		No - evaluate difference		No - evaluate difference	**Yes (calc RPD)**		No - evaluate difference
	RPD						15%		
	Difference >2xTDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	No - acceptable	No - acceptable
Split Analysis	Both > PQL/MDA?		No - evaluate difference	**Yes (continue)**	No - evaluate difference	**Yes (continue)**	**Yes (continue)**	No - evaluate difference	**Yes (continue)**
	Both >5xTDL?			No - evaluate difference		No - evaluate difference	**Yes (calc RPD)**		No - evaluate difference
	RPD						***52%***		
	Difference >2xTDL?		No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	No - acceptable	No - acceptable

Sample Area	Sample Number	Sample Date	Barium			Beryllium			Boron			Calcium			Chromium			Cobalt			Copper			Iron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Area 1 A1	J134Y7	8/17/06	48.1		0.06	0.78		0.06	1.3		0.66	4380		4.5	5.6	C	0.36	7.0		0.39	11.7		0.33	15700		9.7
Duplicate of J134Y7	J134Y9	8/17/06	51.5		0.05	0.82		0.05	1.7		0.66	4570		4.5	6.6	C	0.36	7.9		0.38	12.7		0.33	18100		9.6
Split of J134Y7	J13504	8/17/06	57.5		0.50	0.34	B*	0.071	1.6	B*	1.5	5080	CN	8.6	9.1	N	0.36	11.8		0.50	13.2		0.30	22600	N	2.4

Analysis:

		Barium	Beryllium	Boron	Calcium	Chromium	Cobalt	Copper	Iron
TDL		2	0.5	2	100	1	2	1	5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD	6.8%			4.2%	16%		8.2%	14%
	Difference >2xTDL?	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable
Split Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD	18%			15%	***48%***		12%	***36%***
	Difference >2xTDL?	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	***Yes - assess further***	Not applicable	Not applicable

-- = not reported
B* =estimated
C = method blank contamination
MDA = minimum detectable activity
N = spiked analyte recovery outside control limits

PQL = practical quantitation limit
Q = qualifier
RPD = relative percent difference
TDL = target detection limit
U = undetected

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

Rev. No. 0
Date 12/14/06
Sheet No. 30 of 31

Split/Duplicate Analysis (continued)

Sample Area	Sample Number	Sample Date	Lead			Magnesium			Manganese			Nickel			Potassium			Selenium			Silicon			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	mg/kg	Q	PQL	mg/kg	Q	PQL
Area 1 A1	J134Y7	8/17/06	4.5		0.86	3170		2.7	296		0.08	8.5		0.66	847		6.3	1.3	UC	1.3	540	R	6.3	86.3		2.1
Duplicate of J134Y7	J134Y9	8/17/06	4.5		0.85	3630		2.7	328		0.08	9.5		0.66	920		6.2	1.3	UC	1.3	525	R	6.2	112		2.1
Split of J134Y7	J13504	8/17/06	4.2		0.15	4570		12.2	342	N	0.10	11.6		0.76	1210		50.4	1.1	B*C	0.17	635	N	4.0	166		10.1

Analysis:

		Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silicon	Sodium
TDL		5	75	5	4	400	1	2	50
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No - evaluate difference	Not applicable	**Yes (continue)**
	Both >5xTDL?	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference		Not applicable	No - evaluate difference
	RPD		14%	10%				***Not applicable***	
	Difference >2xTDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	No - acceptable
Split Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No - evaluate difference	Not applicable	**Yes (continue)**
	Both >5xTDL?	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference		Not applicable	No - evaluate difference
	RPD		***36%***	14%				***Not applicable***	
	Difference >2xTDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	No - acceptable

Sample Area	Sample Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
Area 1 A1	J134Y7	8/17/06	36.2		0.25	33.0		0.44
Duplicate of J134Y7	J134Y9	8/17/06	41.6		0.25	36.7		0.44
Split of J134Y7	J13504	8/17/06	57.4		0.68	40.0		1.4

Analysis:

		Vanadium	Zinc
TDL		2.5	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD	14%	11%
	Difference >2xTDL?	Not applicable	Not applicable
Split Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**
	RPD	***45%***	19%
	Difference >2xTDL?	Not applicable	Not applicable

Sample Area	Sample Number	Sample Date	Cesium-137			Potassium-40			Radium-226			Radium-228			Thorium-228			Thorium-232			Aluminum			Antimony		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL
Area 2 A1	J13502	8/17/06	0.128		0.034	21.3		0.29	0.757		0.061	1.17		0.13	1.05		0.041	1.17		0.13	4690		7.9	1.2	U	1.2
Duplicate of J13502	J13508	8/17/06	0.092		0.040	21.4		0.33	0.758		0.064	1.13		0.14	1.08		0.043	1.13		0.14	4090		8.0	1.2	U	1.2
Split of J13502	J13505	8/17/06	0.0464		0.0148	--		--	--		--	--		--	--		--	--		--	6210	N	6.3	1.5	N	0.33

Analysis:

		Cesium-137	Potassium-40	Radium-226	Radium-228	Thorium-228	Thorium-232	Aluminum	Antimony
TDL		0.1	0.5	0.1	0.2	1	1	5	0.6
Duplicate Analysis	Both > PQL/MDA?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No - evaluate difference
	Both >5xTDL?	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference	**Yes (calc RPD)**	
	RPD		0.47%	0.13%	3.5%			14%	
	Difference >2xTDL?	No - acceptable	Not applicable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable
Split Analysis	Both > PQL/MDA?	**Yes (continue)**						**Yes (continue)**	No - evaluate difference
	Both >5xTDL?	No - evaluate difference						**Yes (calc RPD)**	
	RPD							28%	
	Difference >2xTDL?	No - acceptable						Not applicable	No - acceptable

-- = not reported
B* =estimated
C = method blank contamination
MDA = minimum detectable activity
N = spiked analyte recovery outside control limits
PQL = practical quantitation limit
Q = qualifier
RPD = relative percent difference
R = rejected
TDL = target detection limit
U = undetected

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Field Remediation
Subject 118-C-1 Burial Ground Cleanup Verification 95% UCL Calculations

Date 12/13/06
Job No. 14655

Calc. No. 0100C-CA-V0033
Checked T. M. Blakley TMB

Rev. No. 0
Date 12/14/06
Sheet No. 31 of 31

Split/Duplicate Analysis (continued)

Sample Area	Sample Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Calcium			Chromium			Cobalt			Copper		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Area 2 A1	J13502	8/17/06	2.3		1.7	48.1		0.06	0.70		0.06	1.9		0.66	6960		4.5	6.2	C	0.36	7.6		0.39	13.4		0.33
Duplicate of J13502	J13508	8/17/06	2.4		1.7	48.4		0.06	0.86		0.06	1.7		0.67	6310		4.6	5.8	C	0.36	7.5		0.39	13.4		0.34
Split of J13502	J13505	8/17/06	3.1		0.28	54.7		0.50	0.34	B*	0.071	1.9	B*	1.5	7420	CN	8.6	8.5	N	0.36	12.9		0.50	14.8		0.30

Analysis:

TDL		10	2	0.5	2	100	1	2	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No - evaluate difference	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	**Yes (calc RPD)**
	RPD		0.62%			9.8%	6.7%		0%
	Difference >2xTDL?	No - acceptable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable
Split Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No - evaluate difference	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	**Yes (calc RPD)**
	RPD		13%			6.4%	***31%***		9.9%
	Difference >2xTDL?	No - acceptable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	***Yes - assess further***	Not applicable

Sample Area	Sample Number	Sample Date	Hexavalent Chromium			Iron			Lead			Magnesium			Manganese			Nickel			Potassium			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Area 2 A1	J13502	8/17/06	0.20	U	0.20	18900		9.6	3.7		0.85	3970		2.7	317		0.08	10.4		0.66	813		6.3	1.3	UC	1.3
Duplicate of J13502	J13508	8/17/06	0.21		0.20	17800		9.7	3.7		0.87	3680		2.7	314		0.08	10.1		0.67	770		6.3	1.3	UC	1.3
Split of J13502	J13505	8/17/06	0.350	U	0.350	23700	N	2.4	4.8		0.15	4800		12.2	340	N	0.10	13.0		0.76	968		50.4	0.89	B*C	0.17

Analysis:

TDL		0.5	5	5	75	5	4	400	1
Duplicate Analysis	Both > PQL?	No - evaluate difference	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No - evaluate difference
	Both >5xTDL?		**Yes (calc RPD)**	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference	
	RPD		6.0%		7.6%	1.0%			
	Difference >2xTDL?	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable
Split Analysis	Both > PQL?	No - evaluate difference	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No - evaluate difference
	Both >5xTDL?		**Yes (calc RPD)**	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference	
	RPD		23%		19%	7.0%			
	Difference >2xTDL?	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable

Sample Area	Sample Number	Sample Date	Silicon			Sodium			Vanadium			Zinc			bis(2-Ethylhexyl) phthalate			Di-n-butylphthalate			Methylene Chloride		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Area 2 A1	J13502	8/17/06	668	R	6.3	113		2.1	44.1		0.25	37.1		0.44	38	JB	340	22	JB	340	5	B	5
Duplicate of J13502	J13508	8/17/06	559	R	6.3	95.7		2.1	43.0		0.25	35.3		0.45	36	JB	340	35	JB	340	11	B	5
Split of J13502	J13505	8/17/06	593	N	4.0	171		10.1	62.7		0.68	41.6		1.4	330	U	330	330	U	330	5.1	U	5.1

Analysis:

TDL		2	50	2.5	1	330	330	10
Duplicate Analysis	Both > PQL?	Not applicable	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No - evaluate difference	No - evaluate difference	No - evaluate difference
	Both >5xTDL?	Not applicable	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**			
	RPD	***Not applicable***		2.5%	5.0%			
	Difference >2xTDL?	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable
Split Analysis	Both > PQL?	Not applicable	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No - evaluate difference	No - evaluate difference	No - evaluate difference
	Both >5xTDL?	Not applicable	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**			
	RPD	***Not applicable***		***35%***	11%			
	Difference >2xTDL?	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable

-- = not reported
B = method blank contamination (organic constituents)
B* =estimated
C = method blank contamination (inorganic constituents)
J = estimate
N = spiked analyte recovery outside control limits

PQL = practical quantitation limit
Q = qualifier
RPD = relative percent difference
TDL = target detection limit
U = undetected

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Americium-241			Americium-241 GEA			Carbon-14			Cesium-137			Cobalt-60		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 1 A1	J134Y7	8/17/06	0.073	U	0.28	0.42	U	0.42	-0.292	U	3.0	0.090	U	0.090	0.048	U	0.048
Duplicate of J134Y7	J134Y9	8/17/06	-0.036	U	0.27	0.24	U	0.24	-0.395	U	3.0	0.299		0.032	0.046	U	0.046
Split of J134Y7	J13504	8/17/06	0.0311	U	0.0211				0.418	U	0.720	0.391		0.0162	0.00841	U	0.0217
Area 1 A2	J13500	8/17/06	0	U	0.34	0.18	U	0.18	1.24	U	3.4	0.129		0.021	0.020	U	0.020
Area 1 A3	J134Y8	8/17/06	-0.041	U	0.32	0.15	U	0.15	-1.60	U	3.2	0.178		0.025	0.026	U	0.026
Area 1 A4	J13501	8/17/06	0.036	U	0.28	0.056	U	0.056	1.64	U	2.9	0.018		0.009	0.009	U	0.009
Area 2 A1	J13502	8/17/06				0.32	U	0.32	-0.488	U	2.9	0.128		0.034	0.036	U	0.036
Duplicate of J13502	J13508	8/17/06				0.32	U	0.32	0.048	U	3.5	0.092		0.040	0.034	U	0.034
Split of J13502	J13505	8/17/06							0.407	U	0.719	0.0464		0.0148	0.00506	U	0.0174
Area 2 A2	J13503	8/17/06				0.16	U	0.16	0.827	U	2.8	0.149		0.029	0.087	U	0.087
Area 2 A3	J13506	8/17/06				0.43	U	0.43	1.66	U	2.9	0.063	U	0.063	0.076	U	0.076
Area 2 A4	J13507	8/17/06				0.24	U	0.24	11.7		3.1	0.107		0.047	1.48		0.045
Area 3 A1	J13510	8/21/06	-0.009	U	0.064	0.20	U	0.20	0.660	U	2.8	0.195		0.033	0.034	U	0.034
Area 3 A2	J13511	8/21/06	0.007	U	0.041				0.636	U	2.9	0.240		0.020	0.042		0.025
Area 3 A3	J13512	8/21/06	0.027	U	0.042	0.44	U	0.44	-0.369	U	3.0	0.958		0.049	0.061	U	0.061
Area 3 A4	J13513	8/21/06	0.039	U	0.048				-0.866	U	2.8	0.227		0.027	0.024	U	0.024
Area 4 A1	J13514	8/21/06	-0.031	U	0.063	0.22	U	0.22	1.72	U	2.8	0.065		0.031	0.035	U	0.035
Area 4 A2	J13515	8/21/06	-0.014	U	0.068	1.7	U	1.7	0.560	U	2.8	1.19		0.036	0.050	U	0.050
Area 4 A3	J13516	8/21/06	-0.008	U	0.050				0.360	U	3.0	0.044		0.020	0.016	U	0.016
Area 4 A4	J13517	8/21/06	0.053	U	0.13	0.14	U	0.14	-0.307	U	2.9	0.082		0.024	0.022	U	0.022
OB/BCL A1	J13518	8/22/06	0.123	U	0.31	0.25	U	0.25	-0.903	U	2.9	0.220		0.035	0.030	U	0.030
OB/BCL A2	J13519	8/22/06	0.036	U	0.28	0.20	U	0.20	-0.592	U	2.9	0.059		0.033	0.030	U	0.030
OB/BCL A3	J13520	8/22/06	0.169	U	0.43	0.13	U	0.13	-0.345	U	2.9	0.437		0.018	0.015	U	0.015
OB/BCL A4	J135N5	8/22/06	0.007	U	0.11	0.37	U	0.37	0.472	U	3.3	0.172		0.046	0.040	U	0.040

Note: The following abbreviations apply to all Attachment 1 tables.

Note: Data qualified with B, B*, C, D, N, or J are considered acceptable values.

B = method blank contamination
B* =estimated
BCL = below cleanup levels
C = method blank contamination
D = diluted
FS = focused sample
GEA = gamma energy analysis
J = estimated
OB = overburden
MDA = minimum detectable activity
N = spiked analyte recovery outside control limits
PQL = practical quantitation limit
Q = qualifier
R = rejected
SPA = staging pile area
U = undetected

Attachment	1	Sheet No.	1 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	12/14/06
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Americium-241			Americium-241 GEA			Carbon-14			Cesium-137			Cobalt-60		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SPA A1	J13522	9/11/06	0	U	0.24	0.056	U	0.056	-1.24	U	3.3	0.424		0.050	0.040	U	0.040
SPA A2	J13523	9/11/06	0.056	U	0.21	0.26	U	0.26	-1.19	U	2.8	0.141		0.035	0.031	U	0.031
SPA A3	J135P1	9/12/06	0	UJ	1.1	0.39	U	0.39	-0.524	U	2.1	3.00		0.041	0.036	U	0.036
SPA A4	J135P0	9/12/06	-0.068	U	0.22	0.045	U	0.045	-0.403	U	2.5	0.826		0.039	0.029	U	0.029
SPA B5	J13524	9/11/06	0.034	U	0.26	0.15	U	0.15	-1.58	U	2.9	0.494		0.028	0.026	U	0.026
SPA B6	J13525	9/11/06	0	U	0.22	0.47	U	0.47	-1.05	U	3.1	0.830		0.049	0.044	U	0.044
SPA B7	J135N8	9/11/06	0	U	0.23	0.025	U	0.025	-1.27	U	2.7	0.160		0.024	0.022	U	0.022
SPA B8	J135N9	9/11/06	0.060	U	0.23	0.051	U	0.051	-1.53	U	2.8	0.383		0.048	0.034	U	0.034
SPA C9	J135P2	9/12/06	0.030	U	0.23	0.11	U	0.11	-0.600	U	2.6	0.290		0.020	0.023	U	0.023
SPA C10	J135P3	9/12/06	0.271	U	0.52	0.042	U	0.042	-0.647	U	2.1	0.979		0.035	0.055		0.033
SPA C1	J135P4	9/12/06	0	U	0.23	0.49	U	0.49	-0.487	U	2.4	1.16		0.046	0.050	U	0.050
SPA C2	J135P5	9/12/06	-0.033	U	0.25	0.57	U	0.57	-0.935	U	2.1	0.644		0.055	0.055	U	0.055
SPA D3	J135P6	9/12/06	0.063	U	0.24	0.27	U	0.27	-0.356	U	2.1	0.071		0.033	0.034	U	0.034
SPA D4	J135P7	9/12/06	0.085	U	0.22	0.16	U	0.16	182		2.1	0.091		0.033	0.030	U	0.030
SPA D5	J135P8	9/12/06	0	U	0.59	0.067	U	0.067	0.362	U	2.2	1.18		0.053	0.063		0.051
SPA D6	J135P9	9/12/06	0.059	U	0.23	0.020	U	0.020	-1.06	U	2.3	0.198		0.017	0.014	U	0.015
FS-7	J12XM4	7/26/06				0.040	U	0.040				0.045	U	0.045	0.062	U	0.062

Sample Location	Sample Number	Sample Date	Europium-152			Europium-154			Europium-155			Nickel-63			Plutonium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 1 A1	J134Y7	8/17/06	0.161		0.097	0.15	U	0.15	0.16	U	0.16	2.49	U	2.9	-0.025	U	0.30
Duplicate of J134Y7	J134Y9	8/17/06	0.142		0.083	0.16	U	0.16	0.12	U	0.12	1.42	U	3.1	-0.074	U	0.57
Split of J134Y7	J13504	8/17/06	0.128	U	0.0519	0.0360	U	0.0648	0.0388	U	0.0437	7.70		5.73	0.00793	U	0.0442
Area 1 A2	J13500	8/17/06	0.083		0.044	0.069	U	0.069	0.068	U	0.068	0.441	U	2.9	0.186	U	0.71
Area 1 A3	J134Y8	8/17/06	0.064	U	0.064	0.082	U	0.082	0.092	U	0.092	-0.194	U	3.1	-0.110	U	0.84
Area 1 A4	J13501	8/17/06	0.024	U	0.024	0.032	U	0.032	0.051	U	0.051	0.086	U	2.8	0	U	0.56
Area 2 A1	J13502	8/17/06	0.082	U	0.082	0.11	U	0.11	0.092	U	0.13	0.673	U	2.9			
Duplicate of J13502	J13508	8/17/06	0.085	U	0.085	0.11	U	0.11	0.12	U	0.12	1.49	U	2.8			
Split of J13502	J13505	8/17/06	0.00852	U	0.0396	0.0175	U	0.0522	0.0255	U	0.0411	3.57	U	5.58			
Area 2 A2	J13503	8/17/06	0.055	U	0.055	0.075	U	0.075	0.073	U	0.073	12.4		2.8			
Area 2 A3	J13506	8/17/06	0.281		0.099	0.15	U	0.15	0.14	U	0.14	1.37	U	2.8			
Area 2 A4	J13507	8/17/06	0.087	U	0.087	0.11	U	0.11	0.11	U	0.11	35.8		2.9			

Attachment	1	Sheet No.	2 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Europium-152			Europium-154			Europium-155			Nickel-63			Plutonium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 3 A1	J13510	8/21/06	0.069	U	0.069	0.090	U	0.090	0.095	U	0.095	-1.60	U	3.6	0	UJ	0.31
Area 3 A2	J13511	8/21/06	0.138		0.053	0.071	U	0.071	0.081	U	0.081	-0.913	U	3.6	0.009	U	0.11
Area 3 A3	J13512	8/21/06	0.140		0.097	0.14	U	0.14	0.16	U	0.16	-0.975	U	3.5	0.030	U	0.097
Area 3 A4	J13513	8/21/06	0.082		0.046	0.068	U	0.068	0.078	U	0.078	-1.31	U	3.6	0.176	UJ	0.67
Area 4 A1	J13514	8/21/06	0.070	U	0.070	0.11	U	0.11	0.098	U	0.098	-0.912	U	3.4	0	UJ	0.79
Area 4 A2	J13515	8/21/06	0.159		0.074	0.095	U	0.095	0.11	U	0.11	-1.91	U	3.5	0	UJ	0.56
Area 4 A3	J13516	8/21/06	0.038	U	0.038	0.049	U	0.049	0.075	U	0.075	-2.31	U	3.6	-0.050	U	0.39
Area 4 A4	J13517	8/21/06	0.048	U	0.048	0.070	U	0.070	0.097	U	0.097	-0.187	U	3.4	0	U	0.62
OB/BCL A1	J13518	8/22/06	0.080	U	0.080	0.097	U	0.097	0.13	U	0.13	0.290	U	2.4	0.037	UJ	0.28
OB/BCL A2	J13519	8/22/06	0.065	U	0.065	0.10	U	0.10	0.094	U	0.094	0.236	U	2.4	0	U	0.18
OB/BCL A3	J13520	8/22/06	0.041	U	0.041	0.050	U	0.050	0.083	U	0.083	-0.523	U	2.3	-0.076	U	0.27
OB/BCL A4	J135N5	8/22/06	0.10	U	0.10	0.12	U	0.12	0.14	U	0.14	-0.556	U	2.4	0	U	0.14
SPA A1	J13522	9/11/06	0.11	U	0.11	0.12	U	0.12	0.088	U	0.088	0.760	U	2.5	-0.070	U	0.53
SPA A2	J13523	9/11/06	0.075	U	0.075	0.12	U	0.12	0.10	U	0.10	0.208	U	2.6	0.060	U	0.46
SPA A3	J135P1	9/12/06	0.483		0.11	0.13	U	0.13	0.15	U	0.15	-0.735	U	3.7	0.168	UJ	0.43
SPA A4	J135P0	9/12/06	0.214		0.085	0.095	U	0.095	0.068	U	0.068	-0.821	U	3.1	0	U	0.51
SPA B5	J13524	9/11/06	0.112		0.064	0.080	U	0.080	0.15	U	0.15	0.382	U	2.7	-0.061	U	0.47
SPA B6	J13525	9/11/06	0.13	U	0.13	0.16	U	0.16	0.17	U	0.17	1.55	U	2.6	0.073	U	0.56
SPA B7	J135N8	9/11/06	0.046	U	0.046	0.078	U	0.078	0.049	U	0.049	-0.340	U	2.7	0	U	0.49
SPA B8	J135N9	9/11/06	0.093	U	0.093	0.10	U	0.10	0.079	U	0.079	0.215	U	2.7	0	U	0.50
SPA C9	J135P2	9/12/06	0.049	U	0.049	0.054	U	0.054	0.065	U	0.065	2.36	U	3.6	0	U	0.45
SPA C10	J135P3	9/12/06	0.363		0.079	0.089	U	0.089	0.064	U	0.064	0.238	U	3.4	0	U	0.46
SPA C1	J135P4	9/12/06	0.156		0.12	0.16	U	0.16	0.18	U	0.18	0.826	U	3.5	0	U	0.44
SPA C2	J135P5	9/12/06	0.16	U	0.16	0.19	U	0.19	0.20	U	0.20	0.462	U	3.6	0.104	U	0.50
SPA D3	J135P6	9/12/06	0.077	U	0.077	0.11	U	0.11	0.11	U	0.11	-0.569	U	3.5	0	U	0.51
SPA D4	J135P7	9/12/06	0.071	U	0.071	0.087	U	0.087	0.095	U	0.095	0	U	3.5	0.075	U	0.57
SPA D5	J135P8	9/12/06	0.14	U	0.14	0.14	U	0.14	0.10	U	0.10	1.66	U	4.0	-0.063	U	0.48
SPA D6	J135P9	9/12/06	0.035	U	0.035	0.041	U	0.041	0.035	U	0.035	-0.594	U	3.6	0.020	U	0.076
FS-7	J12XM4	7/26/06	0.070	U	0.070	0.17	U	0.17	0.041	U	0.041						

Attachment	1	Sheet No.	3 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Plutonium-239/240			Plutonium-241			Potassium-40			Radium-226			Radium-228		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 1 A1	J134Y7	8/17/06	0.025	U	0.19	1.16	U	24	21.6		0.37	0.754		0.082	1.04		0.19
Duplicate of J134Y7	J134Y9	8/17/06	0	U	0.57	4.91	U	21	11.4		0.28	0.401		0.063	0.530		0.15
Split of J134Y7	J13504	8/17/06	0.0461		0.0250	1.26	U	2.87									
Area 1 A2	J13500	8/17/06	0	U	0.71	14.1	U	21	23.8		0.18	0.843		0.032	1.34		0.080
Area 1 A3	J134Y8	8/17/06	0	U	0.84	6.40	U	22	13.1		0.27	0.566		0.048	0.873		0.11
Area 1 A4	J13501	8/17/06	0	U	0.56	8.14	U	22	11.5		0.10	0.409		0.021	0.638		0.040
Area 2 A1	J13502	8/17/06							21.3		0.29	0.757		0.061	1.17		0.13
Duplicate of J13502	J13508	8/17/06							21.4		0.33	0.758		0.064	1.13		0.14
Split of J13502	J13505	8/17/06															
Area 2 A2	J13503	8/17/06							10.7		0.26	0.414		0.046	0.656		0.096
Area 2 A3	J13506	8/17/06							21.9		0.38	0.832		0.089	1.15		0.17
Area 2 A4	J13507	8/17/06							10.5		0.32	0.382		0.064	0.680		0.25
Area 3 A1	J13510	8/21/06	-0.023	UJ	0.22	-0.542	U	23	11.3		0.23	0.524		0.059	0.781		0.14
Area 3 A2	J13511	8/21/06	0.036	U	0.068	-1.91	U	22	12.3		0.21	0.833		0.042	0.844		0.094
Area 3 A3	J13512	8/21/06	0	U	0.077	-10.6	U	18	20.2		0.41	0.827		0.086	1.14		0.18
Area 3 A4	J13513	8/21/06	0	UJ	0.67	-10.6	U	20	11.7		0.22	0.411		0.042	0.644		0.097
Area 4 A1	J13514	8/21/06	0	UJ	0.79	-4.03	U	24	10.5		0.32	0.441		0.051	0.607		0.15
Area 4 A2	J13515	8/21/06	0.073	UJ	0.56	-7.73	U	27	20.2		0.32	0.981		0.056	1.25		0.13
Area 4 A3	J13516	8/21/06	0.050	U	0.39	-3.48	U	22	12.0		0.16	0.434		0.032	0.649		0.076
Area 4 A4	J13517	8/21/06	0.081	U	0.62	-5.31	U	21	10.4		0.19	0.399		0.036	0.596		0.085
OB/BCL A1	J13518	8/22/06	0.037	UJ	0.14	14.2	U	28	22.0		0.36	0.724		0.062	1.31		0.15
OB/BCL A2	J13519	8/22/06	0	U	0.11	7.02	U	28	11.1		0.25	0.417		0.052	0.670		0.13
OB/BCL A3	J13520	8/22/06	0.045	U	0.12	6.27	U	27	21.7		0.15	0.710		0.030	1.11		0.068
OB/BCL A4	J135N5	8/22/06	0	U	0.069	6.19	U	27	25.8		0.35	0.911		0.076	1.34		0.14

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Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Plutonium-239/240			Plutonium-241			Potassium-40			Radium-226			Radium-228		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SPA A1	J13522	9/11/06	0	U	0.53	13.7	U	19	12.4		0.38	0.503		0.078	0.824		0.17
SPA A2	J13523	9/11/06	0	U	0.46	5.29	U	19	12.0		0.34	0.376		0.063	0.598		0.15
SPA A3	J135P1	9/12/06	0.279	UJ	0.43	5.82	U	18	1.3	U	1.3	0.740		0.062	1.08		0.15
SPA A4	J135P0	9/12/06	0	U	0.51	1.71	U	21	12.5		0.26	0.438		0.068	0.765		0.12
SPA B5	J13524	9/11/06	0.061	U	0.47	11.9	U	18	14.1		0.26	0.412		0.053	0.822		0.10
SPA B6	J13525	9/11/06	0.145	U	0.56	2.92	U	18	22.7		0.42	0.799		0.076	1.33		0.18
SPA B7	J135N8	9/11/06	0.064	U	0.49	7.08	U	16	13.0		0.18	0.446		0.043	0.728		0.10
SPA B8	J135N9	9/11/06	0	U	0.50	9.76	U	21	13.6		0.33	0.561		0.072	1.09		0.16
SPA C9	J135P2	9/12/06	0	U	0.45	-1.19	U	18	13.0		0.17	0.670		0.036	0.927		0.082
SPA C10	J135P3	9/12/06	0.179	U	0.46	4.53	U	21	12.6		0.25	0.501		0.061	0.698		0.14
SPA C1	J135P4	9/12/06	0.115	U	0.44	6.88	U	22	27.4		1.7	0.835		0.078	1.37		0.21
SPA C2	J135P5	9/12/06	0.157	U	0.40	6.23	U	20	23.1		0.34	0.878		0.100	1.17		0.24
SPA D3	J135P6	9/12/06	0.106	U	0.41	5.04	U	19	11.4		0.34	0.499		0.069	0.729		0.13
SPA D4	J135P7	9/12/06	0	U	0.57	12.5	U	20	13.1		0.30	0.491		0.053	0.769		0.10
SPA D5	J135P8	9/12/06	0	U	0.48	0.953	U	20	13.1		0.42	0.547		0.100	0.779		0.20
SPA D6	J135P9	9/12/06	0.010	U	0.076	4.26	U	19	13.1		0.13	0.563		0.027	0.824		0.062
FS-7	J12XM4	7/26/06							7.49		0.58	0.256		0.078	0.357		0.21

Sample Location	Sample Number	Sample Date	Silver-108m			Thorium-228			Thorium-232			Total beta Radiostrontium			Tritium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 1 A1	J134Y7	8/17/06	0.034	U	0.034	1.09		0.063	1.04		0.19	0.148	U	0.24	-2.44	U	2.7
Duplicate of J134Y7	J134Y9	8/17/06	0.025	U	0.025	0.622		0.049	0.530		0.15	0.115	U	0.22	-1.10	U	2.7
Split of J134Y7	J13504	8/17/06	-0.00909	U	0.0130							0.323		0.149	0.00726	U	0.044
Area 1 A2	J13500	8/17/06	0.014	U	0.014	1.26		0.025	1.34		0.080	0.048	U	0.27	-1.42	U	3.1
Area 1 A3	J134Y8	8/17/06	0.018	U	0.018	0.705		0.034	0.873		0.11	0.136	U	0.21	-1.21	U	2.9
Area 1 A4	J13501	8/17/06	0.006	U	0.006	0.549		0.012	0.638		0.040	0.049	U	0.24	-1.56	U	2.7
Area 2 A1	J13502	8/17/06	0.024	U	0.024	1.05		0.041	1.17		0.13	0.009	U	0.27	-0.857	U	2.8
Duplicate of J13502	J13508	8/17/06	0.023	U	0.023	1.08		0.043	1.13		0.14	0.065	U	0.22	-1.10	U	3.1
Split of J13502	J13505	8/17/06	0.00243	U	0.0112							0.0128	U	0.157	-0.0323	U	0.0492
Area 2 A2	J13503	8/17/06	0.017	U	0.017	0.646		0.043	0.656		0.096	0.114	U	0.22	-0.836	U	2.7
Area 2 A3	J13506	8/17/06	0.029	U	0.029	1.10		0.055	1.15		0.17	0.035	U	0.21	-1.24	U	2.7
Area 2 A4	J13507	8/17/06	0.026	U	0.026	0.647		0.073	0.680		0.25	0.094	U	0.18	7.71		2.8

Attachment	1	Sheet No.	5 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Silver-108m			Thorium-228			Thorium-232			Total beta Radiostrontium			Tritium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 3 A1	J13510	8/21/06	0.021	U	0.021	0.548		0.036	0.781		0.14	0.016	U	0.27	0.488	U	2.9
Area 3 A2	J13511	8/21/06	0.016	U	0.016	0.693		0.030	0.844		0.094	0.087	U	0.26	-1.16	U	3.0
Area 3 A3	J13512	8/21/06	0.032	U	0.032	1.03		0.058	1.14		0.18	0.279		0.19	-0.361	U	3.1
Area 3 A4	J13513	8/21/06	0.016	U	0.016	0.534		0.028	0.644		0.097	0.263		0.21	-1.58	U	2.9
Area 4 A1	J13514	8/21/06	0.022	U	0.022	0.551		0.038	0.607		0.15	-0.008	U	0.22	-0.966	U	2.9
Area 4 A2	J13515	8/21/06	0.023	U	0.023	1.22		0.040	1.25		0.13	0.139	U	0.19	-1.45	U	2.8
Area 4 A3	J13516	8/21/06	0.010	U	0.010	0.573		0.019	0.649		0.076	0.110	U	0.20	-1.53	U	3.0
Area 4 A4	J13517	8/21/06	0.014	U	0.014	0.515		0.023	0.596		0.085	-0.048	U	0.20	-2.33	U	2.9
OB/BCL A1	J13518	8/22/06	0.021	U	0.021	1.05		0.044	1.31		0.15	0.080	U	0.26	-2.09	UJ	2.8
OB/BCL A2	J13519	8/22/06	0.019	U	0.019	0.550		0.035	0.670		0.13	0.052	U	0.29	-1.49	UJ	2.7
OB/BCL A3	J13520	8/22/06	0.011	U	0.011	1.06		0.022	1.11		0.068	2.10		0.25	-0.518	UJ	2.7
OB/BCL A4	J135N5	8/22/06	0.027	U	0.027	1.20		0.052	1.34		0.14	0.089	U	0.27	-2.00	UJ	3.1
SPA A1	J13522	9/11/06	0.032	U	0.032	0.807		0.075	0.824		0.17	0.211	U	0.22	-0.913	U	3.0
SPA A2	J13523	9/11/06	0.022	U	0.022	0.496		0.036	0.598		0.15	0.158	U	0.21	0	U	2.5
SPA A3	J135P1	9/12/06	0.033	U	0.033	1.36		0.073	1.08		0.15	0.855		0.21	-1.33	U	2.5
SPA A4	J135P0	9/12/06	0.025	U	0.025	0.886		0.057	0.765		0.12	0.315		0.25	0.253	U	3.0
SPA B5	J13524	9/11/06	0.022	U	0.022	0.678		0.036	0.822		0.10	0.235		0.21	-0.768	U	2.6
SPA B6	J13525	9/11/06	0.035	U	0.035	1.41		0.075	1.33		0.18	0.070	U	0.23	-0.821	U	2.8
SPA B7	J135N8	9/11/06	0.014	U	0.014	0.644		0.022	0.728		0.10	0.057	U	0.21	0.189	U	2.5
SPA B8	J135N9	9/11/06	0.028	U	0.028	0.965		0.062	1.09		0.16	0.115	U	0.25	-0.757	U	2.6
SPA C9	J135P2	9/12/06	0.014	U	0.014	0.771		0.025	0.927		0.082	0.203	U	0.21	-0.566	U	3.0
SPA C10	J135P3	9/12/06	0.025	U	0.025	0.898		0.054	0.698		0.14	0.327		0.21	-0.214	U	2.6
SPA C1	J135P4	9/12/06	0.037	U	0.037	1.50		0.076	1.37		0.21	0.333		0.21	-0.952	U	3.0
SPA C2	J135P5	9/12/06	0.040	U	0.040	1.35		0.095	1.17		0.24	0.191	U	0.22	-0.933	U	2.6
SPA D3	J135P6	9/12/06	0.022	U	0.022	0.558		0.038	0.729		0.13	0.117	U	0.23	-1.60	U	2.6
SPA D4	J135P7	9/12/06	0.020	U	0.020	0.703		0.037	0.769		0.10	-0.019	U	0.22	-0.272	U	2.5
SPA D5	J135P8	9/12/06	0.040	U	0.040	0.865		0.084	0.779		0.20	0.475		0.22	-0.322	U	2.7
SPA D6	J135P9	9/12/06	0.011	U	0.011	0.926		0.025	0.824		0.062	0.031	U	0.25	-0.406	U	2.8
FS-7	J12XM4	7/26/06	0.025	U	0.025	0.226		0.033	0.357		0.21						

Attachment	1	Sheet No.	6 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Uranium-233/234			Uranium-235			Uranium-235 GEA			Uranium-238			Uranium-238 GEA		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Area 1 A1	J134Y7	8/17/06	0.338		0.022	0.010	U	0.027	0.18	U	0.18	0.389		0.022	5.3	U	5.3
Duplicate of J134Y7	J134Y9	8/17/06	0.387		0.026	0.027		0.025	0.20	U	0.20	0.415		0.034	4.2	U	4.2
Split of J134Y7	J13504	8/17/06	0.545		0.0170	0.0225		0.0354				0.575		0.0300			
Area 1 A2	J13500	8/17/06	0.420		0.031	0.024	U	0.026	0.10	U	0.10	0.422		0.027	2.3	U	2.3
Area 1 A3	J134Y8	8/17/06	0.527		0.029	0.025	U	0.028	0.12	U	0.12	0.479		0.029	2.7	U	2.7
Area 1 A4	J13501	8/17/06	0.480		0.24	0.116	U	0.30	0.044	U	0.044	0.736		0.24	1.1	U	1.1
Area 2 A1	J13502	8/17/06							0.13	U	0.13				4.0	U	4.0
Duplicate of J13502	J13508	8/17/06							0.16	U	0.16				3.8	U	3.8
Split of J13502	J13505	8/17/06															
Area 2 A2	J13503	8/17/06							0.10	U	0.10				2.8	U	2.8
Area 2 A3	J13506	8/17/06							0.18	U	0.18				5.4	U	5.4
Area 2 A4	J13507	8/17/06							0.15	U	0.15				5.4	U	5.4
Area 3 A1	J13510	8/21/06	0.364		0.25	0.040	U	0.31	0.14	U	0.14	0.265		0.25	3.4	U	3.4
Area 3 A2	J13511	8/21/06	1.09		0.20	0.129	U	0.25	0.11	U	0.11	0.825		0.20	2.5	U	2.5
Area 3 A3	J13512	8/21/06	0.235	U	0.26	0.041	U	0.31	0.21	U	0.21	0.269		0.26	4.8	U	4.8
Area 3 A4	J13513	8/21/06	0.328		0.21	0	U	0.25	0.099	U	0.099	0.438		0.21	2.1	U	2.1
Area 4 A1	J13514	8/21/06	0.231		0.22	0.070	U	0.27	0.14	U	0.14	0.607		0.22	3.5	U	3.5
Area 4 A2	J13515	8/21/06	0.211	U	0.23	0	U	0.28	0.19	U	0.19	0.362		0.23	3.3	U	3.3
Area 4 A3	J13516	8/21/06	0.537		0.26	0.041	U	0.31	0.069	U	0.069	0.671		0.26	1.7	U	1.7
Area 4 A4	J13517	8/21/06	0.422		0.29	0	U	0.36	0.091	U	0.091	0.268	U	0.29	2.2	U	2.2
OB/BCL A1	J13518	8/22/06	0.430		0.13	0.020	U	0.15	0.19	U	0.19	0.480		0.13	3.4	U	3.4
OB/BCL A2	J13519	8/22/06	0.428		0.13	0.020	U	0.15	0.13	U	0.13	0.478		0.13	3.4	U	3.4
OB/BCL A3	J13520	8/22/06	0.575		0.13	0	U	0.16	0.072	U	0.072	0.508		0.13	4.4	U	4.4
OB/BCL A4	J135N5	8/22/06	0.383		0.12	0	U	0.14	0.19	U	0.19	0.399		0.12	4.7	U	4.7

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Checked	T. M. Blakley	Date	
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Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Uranium-233/234			Uranium-235			Uranium-235 GEA			Uranium-238			Uranium-238 GEA		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SPA A1	J13522	9/11/06	0.415		0.21	0.067	U	0.26	0.15	U	0.15	0.663		0.21	4.5	U	4.5
SPA A2	J13523	9/11/06	0.364		0.25	0.040	U	0.31	0.14	U	0.14	0.398		0.25	4.2	U	4.2
SPA A3	J135P1	9/12/06	0.406		0.26	0	U	0.31	0.18	U	0.18	0.541		0.26	4.2	U	4.2
SPA A4	J135P0	9/12/06	0.387		0.25	0.039	U	0.30	0.11	U	0.11	0.646		0.25	3.7	U	3.7
SPA B5	J13524	9/11/06	0.448		0.21	0	U	0.26	0.14	U	0.14	0.811		0.21	3.0	U	3.0
SPA B6	J13525	9/11/06	0.415		0.23	0	U	0.27	0.22	U	0.22	0.237		0.23	5.1	U	5.1
SPA B7	J135N8	9/11/06	0.276		0.26	0.042	U	0.32	0.072	U	0.072	0.518		0.26	2.7	U	2.7
SPA B8	J135N9	9/11/06	0.320		0.22	0.035	U	0.27	0.13	U	0.13	0.640		0.22	4.1	U	4.1
SPA C9	J135P2	9/12/06	0.626		0.039	0.045		0.038	0.12	U	0.12	0.498		0.039	2.0	U	2.0
SPA C10	J135P3	9/12/06	0.523		0.033	0.047		0.040	0.11	U	0.11	0.554		0.033	3.3	U	3.3
SPA C1	J135P4	9/12/06	0.467		0.042	0.011	U	0.041	0.23	U	0.23	0.370		0.034	5.6	U	5.6
SPA C2	J135P5	9/12/06	0.467		0.032	0.035	U	0.039	0.26	U	0.26	0.396		0.032	6.4	U	6.4
SPA D3	J135P6	9/12/06	0.552		0.047	0.036	U	0.045	0.15	U	0.15	0.489		0.047	4.2	U	4.2
SPA D4	J135P7	9/12/06	0.524		0.038	0.043		0.037	0.14	U	0.14	0.497		0.030	3.2	U	3.2
SPA D5	J135P8	9/12/06	0.484		0.066	0.042		0.040	0.17	U	0.17	0.510		0.033	5.4	U	5.4
SPA D6	J135P9	9/12/06	0.577		0.19	0	U	0.23	0.077	U	0.077	0.426		0.19	1.6	U	1.6
FS-7	J12XM4	7/26/06							0.068	U	0.068				6.4	U	6.4

Attachment	1	Sheet No.	8 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample 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
Area 1 A1	J134Y7	8/17/06	3880		8.0	1.2	U	1.2	2.7		1.7	48.1		0.06	0.78		0.06	1.3		0.66
Duplicate of J134Y7	J134Y9	8/17/06	4500		7.9	1.2	U	1.2	2.3		1.7	51.5		0.05	0.82		0.05	1.7		0.66
Split of J134Y7	J13504	8/17/06	6610	N	6.3	1.2	N	0.33	2.6		0.28	57.5		0.50	0.34	B*	0.071	1.6	B*	1.5
Area 1 A2	J13500	8/17/06	4130		8.0	1.2	U	1.2	1.9		1.7	52.0		0.06	0.69		0.06	1.6		0.66
Area 1 A3	J134Y8	8/17/06	4570		8.0	1.2	U	1.2	2.3		1.7	56.0		0.06	0.69		0.06	2.1		0.67
Area 1 A4	J13501	8/17/06	4460		7.9	1.2	U	1.2	3.3		1.7	48.7		0.06	0.88		0.06	1.6		0.66
Area 2 A1	J13502	8/17/06	4690		7.9	1.2	U	1.2	2.3		1.7	48.1		0.06	0.70		0.06	1.9		0.66
Duplicate of J13502	J13508	8/17/06	4090		8.0	1.2	U	1.2	2.4		1.7	48.4		0.06	0.86		0.06	1.7		0.67
Split of J13502	J13505	8/17/06	6210	N	6.3	1.5	N	0.33	3.1		0.28	54.7		0.50	0.34	B*	0.071	1.9	B*	1.5
Area 2 A2	J13503	8/17/06	4310		8.0	1.2	U	1.2	2.8		1.7	45.6		0.06	0.78		0.06	2.0		0.66
Area 2 A3	J13506	8/17/06	4050		8.0	1.2	U	1.2	2.0		1.7	44.4		0.06	0.68		0.06	2.2		0.66
Area 2 A4	J13507	8/17/06	3990		7.9	1.2	U	1.2	2.4		1.7	54.5		0.05	0.93		0.05	1.5		0.66
Area 3 A1	J13510	8/21/06	5540		7.9	1.2	U	1.2	1.8		1.7	63.8		0.06	0.70		0.06	1.6	J	0.66
Area 3 A2	J13511	8/21/06	4550		8.0	4.3		1.2	33.9		1.7	132		0.06	0.50		0.06	4.6	J	0.66
Area 3 A2 resample	J13HN3	9/29/06	4950	C	7.0	1.1	U	1.1	5.8		1.1	71.3	C	0.06	0.28		0.03	2.1		1.1
Area 3 A3	J13512	8/21/06	5040		7.9	1.2	U	1.2	2.2		1.7	78.4		0.06	0.51		0.06	3.2	J	0.66
Area 3 A4	J13513	8/21/06	4700		7.9	1.2	U	1.2	2.0		1.7	55.5		0.05	0.52		0.05	1.5	J	0.66
Area 4 A1	J13514	8/21/06	4880		7.9	1.2	U	1.2	2.1		1.7	48.6		0.05	0.58		0.05	1.0	J	0.66
Area 4 A2	J13515	8/21/06	5100		7.9	1.2	U	1.2	2.3		1.7	286		0.05	0.58		0.05	4.9	J	0.66
Area 4 A3	J13516	8/21/06	4080		7.9	1.2	U	1.2	2.4		1.7	49.9		0.05	0.37		0.05	0.65	UJ	0.65
Area 4 A4	J13517	8/21/06	4070		7.9	1.2	U	1.2	2.2		1.7	49.2		0.06	0.43		0.06	0.66	UJ	0.66
OB/BCL A1	J13518	8/22/06	4660		8.3	1.3	UJ	1.3	2.2		1.8	48.7		0.06	0.65		0.06	2.1	UJ	0.69
OB/BCL A2	J13519	8/22/06	4740		8.4	1.3	UJ	1.3	2.2		1.8	50.0		0.06	0.69		0.06	1.8	UJ	0.70
OB/BCL A3	J13520	8/22/06	3690		8.4	1.3	UJ	1.3	1.8	U	1.8	46.0		0.06	0.60		0.06	1.6	UJ	0.70
OB/BCL A4	J135N5	8/22/06	4760		8.4	1.3	UJ	1.3	2.3		1.8	58.4		0.06	0.52		0.06	2.0	UJ	0.70
SPA A1	J13522	9/11/06	5120		6.6	1.0	U	1.0	3.0		1.1	52.9		0.06	0.43		0.03	1.2		1.1
SPA A2	J13523	9/11/06	5020		6.6	1.0	U	1.0	2.5		1.1	53.4		0.06	0.31		0.03	1.1	U	1.1
SPA A3	J135P1	9/12/06	5300		6.5	1.0	U	1.0	2.3		1.1	53.3		0.06	0.37		0.03	1.7		1.1
SPA A4	J135P0	9/12/06	4600		6.5	1.0	U	1.0	3.3		1.1	53.5		0.06	0.31		0.03	2.0		1.1
SPA B5	J13524	9/11/06	5130		6.6	1.0	U	1.0	2.4		1.1	55.6		0.06	0.31		0.03	1.1	U	1.1
SPA B6	J13525	9/11/06	4830		6.6	1.0	U	1.0	2.3		1.1	54.9		0.06	0.34		0.03	1.1	U	1.1
SPA B7	J135N8	9/11/06	5310		6.6	1.0	U	1.0	2.4		1.1	54.7		0.06	0.35		0.03	1.1	U	1.1
SPA B8	J135N9	9/11/06	4900		6.5	1.0	U	1.0	2.9		1.1	60.1		0.06	0.30		0.03	1.1	U	1.1
SPA C9	J135P2	9/12/06	6390		6.5	1.0	U	1.0	1.8		1.1	495		0.06	0.57		0.03	10.7		1.1
SPA C10	J135P3	9/12/06	4580		6.6	1.0	U	1.0	2.0		1.1	60.0		0.06	0.36		0.03	1.1	U	1.1
SPA C1	J135P4	9/12/06	5100		6.5	1.0	U	1.0	2.8		1.1	58.2		0.06	0.41		0.03	2.4		1.1
SPA C2	J135P5	9/12/06	4840		6.6	1.0	U	1.0	2.6		1.1	62.9		0.06	0.41		0.03	2.6		1.1
SPA D3	J135P6	9/12/06	5000		6.5	1.0	U	1.0	3.0		1.1	63.8		0.06	0.44		0.03	1.5		1.1
SPA D4	J135P7	9/12/06	4870		6.6	1.0	U	1.0	2.0		1.1	56.0		0.06	0.42		0.03	1.1		1.1
SPA D5	J135P8	9/12/06	5540		6.5	1.0	U	1.0	2.5		1.1	59.4		0.06	0.47		0.03	1.1	U	1.1
SPA D6	J135P9	9/12/06	5540		6.5	1.0	U	1.0	2.9		1.1	64.8		0.06	0.49		0.03	1.4		1.1

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Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample 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
FS-1	J12XL8	7/26/06	5510		8.3	1.3	U	1.3	2.2		1.8	59.6	C	0.06	0.23		0.06	1.9		0.69
FS-2	J12XL9	7/26/06	4040		8.3	1.3	U	1.3	3.5		1.8	40.5	C	0.06	0.18		0.06	1.4		0.69
FS-3	J12XM0	7/26/06	3630		8.2	1.3	U	1.3	2.5		1.7	41.8	C	0.06	0.16		0.06	1.2		0.69
FS-4	J12XM1	7/26/06	5670		8.4	1.3	U	1.3	5.4		1.8	47.7	C	0.06	0.19		0.06	1.9		0.70
FS-5	J12XM2	7/26/06	7520		8.3	1.3	U	1.3	3.4		1.8	80.2	C	0.06	0.34		0.06	3.2		0.69
FS-7	J12XM4	7/26/06	3160		8.4	1.3	U	1.3	1.8	U	1.8	34.3	C	0.06	0.12		0.06	2.5		0.70
Equipment blank	J13509	8/17/06	39.4		2.6	0.40	U	0.40	0.56	U	0.56	1.1		0.02	0.02		0.02	0.42		0.22

Sample Location	Sample 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
Area 1 A1	J134Y7	8/17/06	0.19	U	0.19	4380		4.5	5.6	C	0.36	7.0		0.39	11.7		0.33	0.20	U	0.20
Duplicate of J134Y7	J134Y9	8/17/06	0.19	U	0.19	4570		4.5	6.6	C	0.36	7.9		0.38	12.7		0.33	0.20	U	0.20
Split of J134Y7	J13504	8/17/06	0.14	UN	0.14	5080	CN	8.6	9.1	N	0.36	11.8		0.50	13.2		0.30	0.350	U	0.350
Area 1 A2	J13500	8/17/06	0.19	U	0.19	3820		4.5	8.6	C	0.36	5.9		0.39	9.9		0.33	0.20	U	0.20
Area 1 A3	J134Y8	8/17/06	0.20	U	0.20	6890		4.6	6.8	C	0.36	5.7		0.39	11.3		0.33	0.20	U	0.20
Area 1 A4	J13501	8/17/06	0.19	U	0.19	8720		4.5	6.0	C	0.36	8.4		0.39	14.7		0.33	0.20	U	0.20
Area 2 A1	J13502	8/17/06	0.19	U	0.19	6960		4.5	6.2	C	0.36	7.6		0.39	13.4		0.33	0.20	U	0.20
Duplicate of J13502	J13508	8/17/06	0.20	U	0.20	6310		4.6	5.8	C	0.36	7.5		0.39	13.4		0.34	0.21		0.20
Split of J13502	J13505	8/17/06	0.14	UN	0.14	7420	CN	8.6	8.5	N	0.36	12.9		0.50	14.8		0.30	0.350	U	0.350
Area 2 A2	J13503	8/17/06	0.19	U	0.09	6810		4.5	6.2	C	0.36	7.3		0.39	12.8		0.33	0.24		0.20
Area 2 A3	J13506	8/17/06	0.19	U	0.19	3560		4.5	5.4	C	0.36	6.8		0.39	10.5		0.33	0.20	U	0.20
Area 2 A4	J13507	8/17/06	0.19	U	0.19	5160		4.5	4.9	C	0.36	7.7		0.38	13.2		0.33	0.23		0.20
Area 3 A1	J13510	8/21/06	0.19	U	0.19	4550		4.5	8.0	C	0.36	8.9		0.39	18.1		0.33	0.20	U	0.20
Area 3 A2	J13511	8/21/06	0.19	U	0.19	5450		4.5	8.1	C	0.36	13.1		0.39	286		0.33	0.20	U	0.20
Area 3 A2 resample	J13HN3	9/29/06	0.12		0.09	5080	C	2.6	7.2	C	0.22	8.6		0.15	45.2		0.25			
Area 3 A3	J13512	8/21/06	0.19	U	0.19	14100		4.5	9.2	C	0.36	7.7		0.39	30.6		0.33	0.20	U	0.20
Area 3 A4	J13513	8/21/06	0.19	U	0.19	5580		4.5	7.4	C	0.36	8.5		0.38	17.9		0.33	0.20	U	0.20
Area 4 A1	J13514	8/21/06	0.19	U	0.19	5600		4.5	6.6	C	0.36	8.8		0.38	14.7		0.33	0.20	U	0.20
Area 4 A2	J13515	8/21/06	0.19	U	0.19	7040		4.5	6.2	C	0.35	8.5		0.38	15.1		0.33	0.20	U	0.20
Area 4 A3	J13516	8/21/06	0.19	U	0.19	8360		4.5	6.0	C	0.35	7.2		0.38	14.2		0.33	0.20	U	0.20
Area 4 A4	J13517	8/21/06	0.19	U	0.19	5450		4.5	5.3	C	0.36	8.1		0.39	14.8		0.33	0.20	U	0.20
OB/BCL A1	J13518	8/22/06	0.20	U	0.20	5120		4.7	6.1		0.38	7.7		0.40	15.8		0.35	0.20	U	0.20
OB/BCL A2	J13519	8/22/06	0.21	U	0.21	5110		4.8	6.4		0.38	7.8		0.41	15.0		0.35	0.20	U	0.20
OB/BCL A3	J13520	8/22/06	0.20	U	0.20	4200		4.8	5.3		0.38	6.9		0.41	12.8		0.35	0.24		0.20
OB/BCL A4	J135N5	8/22/06	0.20	U	0.20	4710		4.8	6.8		0.38	7.1		0.41	11.9		0.35	0.20	U	0.20

Attachment	1	Sheet No.	10 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample 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
SPA A1	J13522	9/11/06	0.09	U	0.09	5340		2.5	7.5		0.20	7.6		0.14	15.3		0.23	0.20	U	0.20
SPA A2	J13523	9/11/06	0.09	U	0.09	4730		2.5	8.1		0.20	6.2		0.14	15.6		0.23	0.20	U	0.20
SPA A3	J135P1	9/12/06	0.09	U	0.09	6010		2.5	8.0		0.20	7.0		0.14	15.8		0.23	0.20		0.20
SPA A4	J135P0	9/12/06	0.09	U	0.09	5390		2.5	7.0		0.20	6.7		0.14	15.7		0.23	0.30		0.20
SPA B5	J13524	9/11/06	0.09	U	0.09	4420		2.5	8.8		0.20	6.4		0.14	16.4		0.23	1.9		0.20
SPA B6	J13525	9/11/06	0.09	U	0.09	4330		2.5	9.3		0.20	7.2		0.14	15.9		0.23	0.20	U	0.20
SPA B7	J135N8	9/11/06	0.09	U	0.09	4610		2.5	8.0		0.20	7.0		0.14	14.9		0.23	0.20	U	0.20
SPA B8	J135N9	9/11/06	0.09	U	0.09	4090		2.5	7.6		0.20	6.7		0.14	13.9		0.23	0.20	U	0.20
SPA C9	J135P2	9/12/06	0.09	U	0.09	8710		2.5	6.8		0.20	5.6		0.14	144		0.23	0.20	U	0.20
SPA C10	J135P3	9/12/06	0.09	U	0.09	4870		2.5	6.5		0.20	6.5		0.14	13.3		0.23	0.29		0.20
SPA C1	J135P4	9/12/06	0.09	U	0.09	3800		2.5	7.7		0.20	6.4		0.14	14.4		0.23	0.20		0.20
SPA C2	J135P5	9/12/06	0.09	U	0.09	4920		2.5	7.6		0.20	6.8		0.14	15.2		0.23	0.20	U	0.20
SPA D3	J135P6	9/12/06	0.09	U	0.09	5000		2.5	7.7		0.20	6.6		0.14	12.7		0.23	0.26		0.20
SPA D4	J135P7	9/12/06	0.09	U	0.09	5170		2.5	7.2		0.20	6.6		0.14	12.6		0.23	0.34		0.20
SPA D5	J135P8	9/12/06	0.09	U	0.09	4860		2.5	9.1		0.20	7.5		0.14	14.3		0.23	0.20	U	0.20
SPA D6	J135P9	9/12/06	0.09	U	0.09	5180		2.5	8.2		0.20	7.8		0.14	14.1		0.23	0.30		0.20
FS-1	J12XL8	7/26/06	0.20	U	0.20	3880		4.7	8.6		0.38	7.3		0.41	13.8		0.35			
FS-2	J12XL9	7/26/06	0.20	U	0.20	9250		4.7	6.3		0.38	7.9		0.40	13.6		0.35			
FS-3	J12XM0	7/26/06	0.20	U	0.20	6320		4.7	4.8		0.37	6.1		0.40	10.5		0.34			
FS-4	J12XM1	7/26/06	0.20	U	0.20	11400		4.8	7.2		0.38	8.6		0.41	17.4		0.35			
FS-5	J12XM2	7/26/06	0.20	U	0.20	6130		4.7	10.2		0.38	10.5		0.40	23.3		0.35			
FS-7	J12XM4	7/26/06	0.20	U	0.20	13900		4.8	4.0		0.38	7.0		0.41	16.7		0.35			
Equipment blank	J13509	8/17/06	0.06	U	0.06	22.1		1.5	0.70	C	0.12	0.13	U	0.13	0.11	U	0.11			

Sample Location	Sample 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
Area 1 A1	J134Y7	8/17/06	15700		9.7	4.5		0.86	3170		2.7	296		0.08	0.02	U	0.02	0.80	U	0.80
Duplicate of J134Y7	J134Y9	8/17/06	18100		9.6	4.5		0.85	3630		2.7	328		0.08	0.01	U	0.01	0.80	U	0.80
Split of J134Y7	J13504	8/17/06	22600	N	2.4	4.2		0.15	4570		12.2	342	N	0.10	0.0067	U	0.0067	1.2	U	1.2
Area 1 A2	J13500	8/17/06	13900		9.6	4.1		0.86	3270		2.7	260		0.08	0.02	U	0.02	0.80	U	0.80
Area 1 A3	J134Y8	8/17/06	14000		9.7	3.5		0.86	3250		2.7	259		0.08	0.02	U	0.02	0.81	U	0.81
Area 1 A4	J13501	8/17/06	19100		9.6	4.9		0.86	4620		2.7	362		0.08	0.02	U	0.02	0.80	U	0.80
Area 2 A1	J13502	8/17/06	18900		9.6	3.7		0.85	3970		2.7	317		0.08	0.01	U	0.01	0.80	U	0.80
Duplicate of J13502	J13508	8/17/06	17800		9.7	3.7		0.87	3680		2.7	314		0.08	0.01	U	0.01	0.81	U	0.81
Split of J13502	J13505	8/17/06	23700	N	2.4	4.8		0.15	4800		12.2	340	N	0.10	0.0067	U	0.0067	1.2	U	1.2
Area 2 A2	J13503	8/17/06	18400		9.7	3.8		0.86	3760		2.7	285		0.08	0.01	U	0.01	0.80	U	0.80
Area 2 A3	J13506	8/17/06	15900		9.7	4.3		0.86	3150		2.7	279		0.08	0.02	U	0.02	0.80	U	0.80
Area 2 A4	J13507	8/17/06	19000		9.6	3.2		0.85	3660		2.7	359		0.08	0.02	U	0.02	0.80	U	0.80

Attachment	1	Sheet No.	11 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample 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
Area 3 A1	J13510	8/21/06	22300		9.6	8.3		0.85	4170		2.7	357		0.08	0.02	U	0.02	0.80	U	0.80
Area 3 A2	J13511	8/21/06	28400		9.7	130		0.86	3350		2.7	313		0.08	0.05		0.01	54.9		0.80
Area 3 A2 resample	J13HN3	9/29/06	21000		7.5	23.1		0.37	3740	C	2.2	338		0.06	0.02	U	0.02	4.5		0.31
Area 3 A3	J13512	8/21/06	21200		9.6	11.8		0.86	3620		2.7	331		0.08	0.02	U	0.02	0.80	U	0.80
Area 3 A4	J13513	8/21/06	20900		9.5	6.9		0.85	4030		2.7	320		0.08	0.01	U	0.01	0.79	U	0.79
Area 4 A1	J13514	8/21/06	23200		9.6	5.0		0.85	4490		2.7	323		0.08	0.01	U	0.01	0.80	U	0.80
Area 4 A2	J13515	8/21/06	20400		9.5	4.7		0.85	3970		2.6	350		0.08	0.02	U	0.02	0.79	U	0.79
Area 4 A3	J13516	8/21/06	17600		9.5	3.1		0.85	3610		2.6	269		0.08	0.01	U	0.01	0.79	U	0.79
Area 4 A4	J13517	8/21/06	19600		9.6	4.5		0.85	3820		2.7	306		0.08	0.02	U	0.02	0.80	U	0.80
OB/BCL A1	J13518	8/22/06	18300		10.1	5.2		0.90	3900		2.8	311		0.09	0.01	U	0.01	0.84	U	0.84
OB/BCL A2	J13519	8/22/06	18800		10.2	4.5		0.91	4010		2.8	329		0.09	0.02	U	0.02	0.85	U	0.85
OB/BCL A3	J13520	8/22/06	15900		10.2	3.8		0.91	3370		2.8	272		0.09	0.02	U	0.02	0.85	U	0.85
OB/BCL A4	J135N5	8/22/06	17100		10.2	4.3		0.90	3680		2.8	308		0.09	0.01	U	0.01	0.84	U	0.84
SPA A1	J13522	9/11/06	21300		7.0	5.7		0.35	4170		2.1	339		0.06	0.02	U	0.02	0.29	U	0.29
SPA A2	J13523	9/11/06	16500		7.0	4.4		0.35	3760		2.1	298		0.06	0.02	U	0.02	0.29	U	0.29
SPA A3	J135P1	9/12/06	19100		7.0	5.7		0.34	4350		2.1	320		0.06	0.02		0.01	0.29	U	0.29
SPA A4	J135P0	9/12/06	18400		7.0	7.5		0.34	3850		2.1	305		0.06	0.02	U	0.02	0.29	U	0.29
SPA B5	J13524	9/11/06	16900		7.0	25.8		0.35	3930		2.1	292		0.06	0.02	U	0.02	0.29	U	0.29
SPA B6	J13525	9/11/06	20000		7.0	6.4		0.35	3690		2.1	292		0.06	0.02	U	0.02	0.29	U	0.29
SPA B7	J135N8	9/11/06	19200		7.0	5.5		0.35	3830		2.1	308		0.06	0.06		0.01	0.29	U	0.29
SPA B8	J135N9	9/11/06	18300		6.9	7.2		0.34	3500		2.1	303		0.06	0.02	U	0.02	0.45		0.29
SPA C9	J135P2	9/12/06	16500		7.0	20.8		0.34	3440		2.1	334		0.06	0.02		0.01	0.62		0.29
SPA C10	J135P3	9/12/06	17300		7.0	5.7		0.35	3600		2.1	300		0.06	0.02	U	0.02	0.29	U	0.29
SPA C1	J135P4	9/12/06	18300		7.0	7.0		0.34	3820		2.1	302		0.06	0.02	U	0.02	0.34		0.29
SPA C2	J135P5	9/12/06	18400		7.0	8.4		0.35	3730		2.1	297		0.06	0.06		0.02	0.29	U	0.29
SPA D3	J135P6	9/12/06	18100		7.0	6.2		0.34	3630		2.1	314		0.06	0.01	U	0.01	0.44		0.29
SPA D4	J135P7	9/12/06	17100		7.0	5.5		0.35	3540		2.1	306		0.06	0.01	U	0.01	0.29	U	0.29
SPA D5	J135P8	9/12/06	20500		6.9	4.7		0.34	3980		2.1	350		0.06	0.02	U	0.02	0.29	U	0.29
SPA D6	J135P9	9/12/06	21100		6.9	5.7		0.34	4020		2.1	367		0.06	0.01	U	0.01	0.45		0.29
FS-1	J12XL8	7/26/06	18200		10.1	4.4		0.90	3880		2.8	311		0.09	0.02	U	0.02	0.84	U	0.84
FS-2	J12XL9	7/26/06	20300		10.1	5.2		0.89	4760		2.8	312		0.09	0.02	U	0.02	0.84	U	0.84
FS-3	J12XM0	7/26/06	16100		10	2.9		0.89	3510		2.8	248		0.09	0.01	U	0.01	0.83	U	0.83
FS-4	J12XM1	7/26/06	20600		10.1	7.2		0.90	5720		2.8	346		0.09	0.02	U	0.02	0.84	U	0.84
FS-5	J12XM2	7/26/06	21900		10.1	7.2		0.90	5080		2.8	446		0.09	0.04		0.01	0.84	U	0.84
FS-7	J12XM4	7/26/06	17800		10.1	2.5		0.90	3830		2.8	241		0.09	0.02	U	0.02	0.84	U	0.84
Equipment blank	J13509	8/17/06	106		3.2	0.28	U	0.28	6.4		0.89	3.3		0.03	0.01	U	0.01	0.27	U	0.27

Attachment	1	Sheet No.	12 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample 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
Area 1 A1	J134Y7	8/17/06	8.5		0.66	847		6.3	1.3	UC	1.3	540	R	6.3	0.19	U	0.19	86.3		2.1
Duplicate of J134Y7	J134Y9	8/17/06	9.5		0.66	920		6.2	1.3	UC	1.3	525	R	6.2	0.19	U	0.19	112		2.1
Split of J134Y7	J13504	8/17/06	11.6		0.76	1210		50.4	1.1	B*C	0.17	635	N	4.0	0.20	UN	0.20	166		10.1
Area 1 A2	J13500	8/17/06	10.1		0.66	858		6.3	1.3	UC	1.3	550	R	6.3	0.19	U	0.19	85.3		2.1
Area 1 A3	J134Y8	8/17/06	9.9		0.67	916		6.3	1.3	UC	1.3	560	R	6.3	0.20	U	0.20	122		2.1
Area 1 A4	J13501	8/17/06	10.2		0.66	957		6.3	1.3	UC	1.3	544	R	6.3	0.19	U	0.19	143		2.1
Area 2 A1	J13502	8/17/06	10.4		0.66	813		6.3	1.3	UC	1.3	668	R	6.3	0.19	U	0.19	113		2.1
Duplicate of J13502	J13508	8/17/06	10.1		0.67	770		6.3	1.3	UC	1.3	559	R	6.3	0.20	U	0.20	95.7		2.1
Split of J13502	J13505	8/17/06	13.0		0.76	968		50.4	0.89	B*C	0.17	593	N	4.0	0.20	UN	0.20	171		10.1
Area 2 A2	J13503	8/17/06	9.2		0.66	805		6.3	1.3	UC	1.3	506	R	6.3	0.19	U	0.19	141		2.1
Area 2 A3	J13506	8/17/06	7.9		0.66	862		6.3	1.3	UC	1.3	557	R	6.3	0.19	U	0.19	126		2.1
Area 2 A4	J13507	8/17/06	8.7		0.66	803		6.2	1.3	UC	1.3	530	R	6.2	0.19	U	0.19	127		2.1
Area 3 A1	J13510	8/21/06	11.0		0.66	1120		6.3	1.3	UC	1.3	593	R	6.3	0.19	U	0.19	141		2.1
Area 3 A2	J13511	8/21/06	9.3		0.66	1050		6.3	1.3	UC	1.3	612	R	6.3	0.19	U	0.19	190		2.1
Area 3 A2 resample	J13HN3	9/29/06	10.2		0.40	1080	C	6.5	0.80	U	0.80	550	CJ	1.2	0.34	U	0.34	123	C	0.65
Area 3 A3	J13512	8/21/06	12.7		0.66	1140		6.3	1.3	UC	1.3	660	R	6.3	0.19	U	0.19	228		2.1
Area 3 A4	J13513	8/21/06	9.6		0.66	919		6.2	1.3	UC	1.3	465	R	6.2	0.19	U	0.19	143		2.1
Area 4 A1	J13514	8/21/06	10.1		0.66	933		6.2	1.3	UC	1.3	439	R	6.2	0.19	U	0.19	147		2.1
Area 4 A2	J13515	8/21/06	9.3		0.66	873		6.2	1.3	UC	1.3	516	R	6.2	0.19	U	0.19	160		2.1
Area 4 A3	J13516	8/21/06	9.7		0.65	774		6.2	1.3	UC	1.3	527	R	6.2	0.19	U	0.19	113		2.1
Area 4 A4	J13517	8/21/06	8.7		0.66	853		6.3	1.3	UC	1.3	534	R	6.3	0.19	U	0.19	114		2.1
OB/BCL A1	J13518	8/22/06	9.0		0.69	917		6.6	1.4	U	1.4	527	J	6.6	0.20	U	0.20	110		2.2
OB/BCL A2	J13519	8/22/06	9.3		0.70	960		6.7	1.4	U	1.4	510	J	6.7	0.21	U	0.21	113		2.2
OB/BCL A3	J13520	8/22/06	9.6		0.70	763		6.6	1.4	U	1.4	540	J	6.6	0.20	U	0.20	89.3		2.2
OB/BCL A4	J135N5	8/22/06	9.0		0.70	1080		6.6	1.4	U	1.4	568	J	6.6	0.20	U	0.20	104		2.2
SPA A1	J13522	9/11/06	10.5		0.38	886		6.1	0.75	U	0.75	450	J	1.2	0.32	U	0.32	148		0.61
SPA A2	J13523	9/11/06	10.1		0.38	776		6.1	0.75	U	0.75	373	J	1.2	0.32	U	0.32	138		0.61
SPA A3	J135P1	9/12/06	10.6		0.37	967		6.1	0.74	U	0.74	366	J	1.1	0.32	U	0.32	182		0.60
SPA A4	J135P0	9/12/06	9.5		0.37	932		6.1	0.75	U	0.75	389	J	1.1	0.32	U	0.32	145		0.60
SPA B5	J13524	9/11/06	11.0		0.37	836		6.1	0.75	U	0.75	417	J	1.2	0.32	U	0.32	128		0.61
SPA B6	J13525	9/11/06	13.7		0.38	991		6.1	0.75	U	0.75	377	J	1.2	0.32	U	0.32	156		0.61
SPA B7	J135N8	9/11/06	9.7		0.37	1100		6.1	0.75	U	0.75	461	J	1.2	0.32	U	0.32	148		0.61
SPA B8	J135N9	9/11/06	8.7		0.37	1130		6.1	0.74	U	0.74	415	J	1.1	0.31	U	0.31	139		0.60
SPA C9	J135P2	9/12/06	8.3		0.37	1060		6.1	0.74	U	0.74	632	J	1.1	0.31	U	0.31	274		0.60
SPA C10	J135P3	9/12/06	8.7		0.38	923		6.1	0.75	U	0.75	406	J	1.2	0.32	U	0.32	139		0.61
SPA C1	J135P4	9/12/06	9.3		0.37	1030		6.1	0.74	U	0.74	472	J	1.1	0.31	U	0.31	111		0.60
SPA C2	J135P5	9/12/06	9.4		0.38	943		6.1	0.75	U	0.75	435	J	1.2	0.32	U	0.32	170		0.61
SPA D3	J135P6	9/12/06	10.6		0.37	997		6.1	0.80		0.74	530	J	1.1	0.31	U	0.31	142		0.60
SPA D4	J135P7	9/12/06	9.4		0.38	967		6.1	0.75	U	0.75	459	J	1.2	0.32	U	0.32	115		0.61
SPA D5	J135P8	9/12/06	10.8		0.37	1050		6.1	0.74	U	0.74	584	J	1.1	0.31	U	0.31	126		0.60
SPA D6	J135P9	9/12/06	10.7		0.37	1070		6.1	0.74	U	0.74	449	J	1.1	0.31	U	0.31	165		0.60

Attachment	1	Sheet No.	13 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample 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
FS-1	J12XL8	7/26/06	10.7		0.69	1180		6.6	1.4	U	1.4	597	J	6.6	0.20	U	0.20	105		2.2
FS-2	J12XL9	7/26/06	10.1		0.69	828		6.6	1.4	U	1.4	564	J	6.6	0.20	U	0.20	122		2.2
FS-3	J12XM0	7/26/06	9.6		0.69	619		6.5	1.3	U	1.3	618	J	6.5	0.20	U	0.20	101		2.2
FS-4	J12XM1	7/26/06	11.1		0.70	1120		6.6	1.4	U	1.4	670	J	6.6	0.20	U	0.20	185		2.2
FS-5	J12XM2	7/26/06	14.1		0.69	1640		6.6	1.4	U	1.4	697	J	6.6	0.20	U	0.20	153		2.2
FS-7	J12XM4	7/26/06	9.9		0.70	573		6.6	1.4	U	1.4	533	J	6.6	0.20	U	0.20	135		2.2
Equipment blank	J13509	8/17/06	0.26		0.22	16.6		2.1	0.43	UC	0.43	30.7	R	2.1	0.06	U	0.06	7.1		0.70

Sample Location	Sample Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
Area 1 A1	J134Y7	8/17/06	36.2		0.25	33.0		0.44
Duplicate of J134Y7	J134Y9	8/17/06	41.6		0.25	36.7		0.44
Split of J134Y7	J13504	8/17/06	57.4		0.68	40.0		1.4
Area 1 A2	J13500	8/17/06	31.1		0.25	30.1		0.44
Area 1 A3	J134Y8	8/17/06	31.4		0.25	32.2		0.45
Area 1 A4	J13501	8/17/06	41.1		0.25	39.1		0.44
Area 2 A1	J13502	8/17/06	44.1		0.25	37.1		0.44
Duplicate of J13502	J13508	8/17/06	43.0		0.25	35.3		0.45
Split of J13502	J13505	8/17/06	62.7		0.68	41.6		1.4
Area 2 A2	J13503	8/17/06	44.3		0.25	40.2		0.44
Area 2 A3	J13506	8/17/06	36.3		0.25	32.3		0.44
Area 2 A4	J13507	8/17/06	46.3		0.25	37.7		0.44
Area 3 A1	J13510	8/21/06	53.2		0.25	47.4		0.44
Area 3 A2	J13511	8/21/06	36.4		0.25	296		0.44
Area 3 A2 resample	J13HN3	9/29/06	45.7		0.15	77.1		0.09
Area 3 A3	J13512	8/21/06	44.7		0.25	73.8		0.44
Area 3 A4	J13513	8/21/06	45.7		0.25	42.9		0.44
Area 4 A1	J13514	8/21/06	55.4		0.25	42.2		0.44
Area 4 A2	J13515	8/21/06	46.4		0.25	38.8		0.44
Area 4 A3	J13516	8/21/06	38.7		0.25	33.7		0.44
Area 4 A4	J13517	8/21/06	42.4		0.25	37.7		0.44
OB/BCL A1	J13518	8/22/06	43.5		0.26	37.3		0.46
OB/BCL A2	J13519	8/22/06	45.7		0.26	37.5		0.47
OB/BCL A3	J13520	8/22/06	36.2		0.26	31.5		0.47
OB/BCL A4	J135N5	8/22/06	39.6		0.26	34.6		0.47

Sample Location	Sample Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
SPA A1	J13522	9/11/06	52.9		0.14	42.7		0.09
SPA A2	J13523	9/11/06	36.1		0.14	35.1		0.09
SPA A3	J135P1	9/12/06	45.5		0.14	42.3		0.09
SPA A4	J135P0	9/12/06	38.3		0.14	51.2		0.09
SPA B5	J13524	9/11/06	38.9		0.14	66.6		0.09
SPA B6	J13525	9/11/06	48.9		0.14	39.9		0.09
SPA B7	J135N8	9/11/06	44.7		0.14	37.7		0.09
SPA B8	J135N9	9/11/06	42.9		0.14	37.7		0.09
SPA C9	J135P2	9/12/06	39.6		0.14	49.3		0.09
SPA C10	J135P3	9/12/06	40.4		0.14	37.2		0.09
SPA C1	J135P4	9/12/06	43.1		0.14	40.5		0.09
SPA C2	J135P5	9/12/06	45.5		0.14	41.6		0.09
SPA D3	J135P6	9/12/06	45.3		0.14	39.5		0.09
SPA D4	J135P7	9/12/06	41.0		0.14	37.2		0.09
SPA D5	J135P8	9/12/06	49.5		0.14	42.1		0.09
SPA D6	J135P9	9/12/06	54.3		0.14	46.4		0.09
FS-1	J12XL8	7/26/06	41.4		0.26	39.5		0.46
FS-2	J12XL9	7/26/06	46.1		0.26	38.6		0.46
FS-3	J12XM0	7/26/06	38.5		0.26	30.7		0.46
FS-4	J12XM1	7/26/06	41.4		0.26	44.7		0.46
FS-5	J12XM2	7/26/06	46.4		0.26	45.1		0.46
FS-7	J12XM4	7/26/06	38.3		0.26	32.8		0.47
Equipment blank	J13509	8/17/06	0.08	U	0.08	0.47		0.15

Attachment	1	Sheet No.	14 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Total Petroleum Hydrocarbons		
			mg/kg	Q	PQL
Area 2 A1	J135R0	8/28/06	137	U	137
Duplicate of J135R0	J135T6	8/28/06	141	U	141
Split of J135R0	J135T7	8/28/06	173	UN	173
Area 2 A2	J135R1	8/28/06	137	U	137
Area 2 A3	J135R2	8/28/06	139	U	139
Area 2 A4	J135R3	8/28/06	149	U	149
Area 3 A1	J135R4	8/28/06	135	U	135
Area 3 A2	J135R5	8/28/06	133	U	133
Area 3 A3	J135R6	8/28/06	135	U	135
Area 3 A4	J135R7	8/28/06	348		133
Area 3 A4 resample	J13HN4	9/29/06	135	U	135
Area 4 A1	J135R8	8/28/06	143	U	143
Area 4 A2	J135R9	8/28/06	133	U	133
Area 4 A3	J135T0	8/28/06	144	U	144
Area 4 A4	J135T1	8/28/06	142	U	142
OB/BCL A1	J135T2	8/28/06	133	U	133
OB/BCL A2	J135T3	8/28/06	146	U	146
OB/BCL A3	J135T4	8/28/06	138	U	138
OB/BCL A4	J135T5	8/28/06	133	U	133

Sample Location	Sample Number	Sample Date	Total Petroleum Hydrocarbons		
			mg/kg	Q	PQL
SPA A1	J13522	9/11/06	134	U	134
SPA A2	J13523	9/11/06	132	U	132
SPA A3	J135P1	9/12/06	133	UC	133
SPA A4	J135P0	9/12/06	135	CJ	134
SPA B5	J13524	9/11/06	132	U	132
SPA B6	J13525	9/11/06	133	U	133
SPA B7	J135N8	9/11/06	133	U	133
SPA B8	J135N9	9/11/06	133	U	133
SPA C9	J135P2	9/12/06	132	UC	132
SPA C10	J135P3	9/12/06	133	UC	133
SPA C1	J135P4	9/12/06	133	UC	133
SPA C2	J135P5	9/12/06	133	UC	133
SPA D3	J135P6	9/12/06	133	UC	133
SPA D4	J135P7	9/12/06	146	CJ	134
SPA D5	J135P8	9/12/06	133	UC	133
SPA D6	J135P9	9/12/06	133	UC	133
FS-5	J12XM2	7/26/06	133	U	133
FS-6	J12XM3	7/26/06	135	U	135

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Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J13502 Area 2 A1 Sample Date 8/17/06			J13508 Duplicate of J13502 Sample Date 8/17/06			J13505 Split of J13502 Sample Date 8/17/06			J13503 Area 2 A2 Sample Date 8/17/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	14	U	14	17	U	17	13	U	13
Aroclor-1221	13	U	13	14	U	14	17	U	17	13	U	13
Aroclor-1232	13	U	13	14	U	14	17	U	17	13	U	13
Aroclor-1242	13	U	13	14	U	14	17	U	17	13	U	13
Aroclor-1248	13	U	13	14	U	14	17	U	17	13	U	13
Aroclor-1254	13	U	13	14	U	14	17	U	17	13	U	13
Aroclor-1260	13	U	13	14	U	14	17	U	17	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	340	U	340	340	U	340	330	U	330	340	U	340
1,2-Dichlorobenzene	340	U	340	340	U	340	330	U	330	340	U	340
1,3-Dichlorobenzene	340	U	340	340	U	340	330	U	330	340	U	340
1,4-Dichlorobenzene	340	U	340	340	U	340	330	U	330	340	U	340
2,4,5-Trichlorophenol	840	U	840	840	U	840	330	U	330	840	U	840
2,4,6-Trichlorophenol	340	U	340	340	U	340	330	U	330	340	U	340
2,4-Dichlorophenol	340	U	340	340	U	340	330	U	330	340	U	340
2,4-Dimethylphenol	340	U	340	340	U	340	330	U	330	340	U	340
2,4-Dinitrophenol	840	U	840	840	U	840	1600	UNR	1600	840	U	840
2,4-Dinitrotoluene	340	U	340	340	U	340	330	U	330	340	U	340
2,6-Dinitrotoluene	340	U	340	340	U	340	330	U	330	340	U	340
2-Chloronaphthalene	340	U	340	340	U	340	330	U	330	340	U	340
2-Chlorophenol	340	U	340	340	U	340	330	U	330	340	U	340
2-Methylnaphthalene	340	U	340	340	U	340	330	U	330	340	U	340
2-Methylphenol (cresol, o-)	340	U	340	340	U	340	330	U	330	340	U	340
2-Nitroaniline	840	U	840	840	U	840	1600	U	1600	840	U	840
2-Nitrophenol	340	U	340	340	U	340	330	U	330	340	U	340
3,3'-Dichlorobenzidine	340	U	340	340	U	340	1600	U	1600	340	U	340
3-Nitroaniline	840	U	840	840	U	840	1600	U	1600	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	1600	U	1600	840	U	840
4-Bromophenyl-phenylether	340	U	340	340	U	340	330	U	330	340	U	340
4-Chloro-3-methylphenol	340	U	340	340	U	340	330	U	330	340	U	340
4-Chloroaniline	340	U	340	340	U	340	330	U	330	340	U	340
4-Chlorophenyl-phenylether	340	U	340	340	U	340	330	U	330	340	U	340
4-Methylphenol (p-cresol)	340	U	340	340	U	340	670	U	670	340	U	340
4-Nitroaniline	840	U	840	840	U	840	1600	U	1600	840	U	840
4-Nitrophenol	840	U	840	840	U	840	1600	U	1600	840	U	840
Acenaphthene	340	U	340	340	U	340	330	U	330	340	U	340
Acenaphthylene	340	U	340	340	U	340	330	U	330	340	U	340
Anthracene	340	U	340	340	U	340	330	U	330	340	U	340
Benzo(a)anthracene	340	U	340	340	U	340	330	U	330	340	U	340
Benzo(a)pyrene	340	U	340	340	U	340	330	U	330	340	U	340
Benzo(b)fluoranthene	340	U	340	340	U	340	330	U	330	340	U	340
Benzo(g,h,i)perylene	340	U	340	340	U	340	330	U	330	340	U	340
Benzo(k)fluoranthene	340	U	340	340	U	340	330	U	330	340	U	340
bis(2-Chloro-1-methylethyl)ether	340	U	340	340	U	340	330	U	330	340	U	340
bis(2-Chloroethoxy)methane	340	U	340	340	U	340	330	U	330	340	U	340
bis(2-Chloroethyl)ether	340	U	340	340	U	340	330	U	330	340	U	340
bis(2-Ethylhexyl)phthalate	38	JB	340	36	JB	340	330	U	330	38	JB	340

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Checked	T. M. Blakley	Date	
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Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J13502 Area 2 A1 Sample Date 8/17/06			J13508 Duplicate of J13502 Sample Date 8/17/06			J13505 Split of J13502 Sample Date 8/17/06			J13503 Area 2 A2 Sample Date 8/17/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	MDL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	340	U	340	340	U	340	330	U	330	340	U	340
Carbazole	340	U	340	340	U	340	330	U	330	340	U	340
Chrysene	340	U	340	340	U	340	330	U	330	340	U	340
Di-n-butylphthalate	22	JB	340	35	JB	340	330	U	330	340	U	340
Di-n-octylphthalate	340	U	340	340	U	340	330	U	330	340	U	340
Dibenz(a,h)anthracene	340	U	340	340	U	340	330	U	330	340	U	340
Dibenzofuran	340	U	340	340	U	340	330	U	330	340	U	340
Diethylphthalate	340	U	340	340	U	340	330	U	330	340	U	340
Dimethylphthalate	340	U	340	340	U	340	330	U	330	340	U	340
Fluoranthene	340	U	340	340	U	340	330	U	330	340	U	340
Fluorene	340	U	340	340	U	340	330	U	330	340	U	340
Hexachlorobenzene	340	U	340	340	U	340	330	U	330	340	U	340
Hexachlorobutadiene	340	U	340	340	U	340	330	U	330	340	U	340
Hexachlorocyclopentadiene	340	U	340	340	U	340	1600	U	1600	340	U	340
Hexachloroethane	340	U	340	340	U	340	330	U	330	340	U	340
Indeno(1,2,3-cd)pyrene	340	U	340	340	U	340	330	U	330	340	U	340
Isophorone	340	U	340	340	U	340	330	U	330	340	U	340
N-Nitroso-di-n-dipropylamine	340	U	340	340	U	340	330	U	330	340	U	340
N-Nitrosodiphenylamine	340	U	340	340	U	340	330	U	330	340	U	340
Naphthalene	340	U	340	340	U	340	330	U	330	340	U	340
Nitrobenzene	340	U	340	340	U	340	330	U	330	340	U	340
Pentachlorophenol	840	U	840	840	U	840	1600	U	1600	840	U	840
Phenanthrene	340	U	340	340	U	340	330	U	330	340	U	340
Phenol	340	U	340	340	U	340	330	U	330	340	U	340
Pyrene	340	U	340	340	U	340	330	U	330	340	U	340

Attachment	1	Sheet No.	17 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135R0 Area 2 A1 Sample Date 8/28/06			J135T6 Duplicate of J135R0 Sample Date 8/28/06			J135T7 Split of J135R0 Sample Date 8/28/06			J135R1 Area 2 A2 Sample Date 8/28/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	MDL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
1,1,2,2-Tetrachloroethane	5	UJ	5	5	UJ	5	5.1	U	5.1	5	UJ	5
1,1,2-Trichloroethane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
1,1-Dichloroethane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
1,1-Dichloroethene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
1,2-Dichloroethane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
1,2-Dichloroethene (total)	5	U	5	5	U	5	10	U	10	5	U	5
1,2-Dichloropropane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
2-Butanone	9	U	9	10	U	10	10	U	10	10	U	10
2-Hexanone	9	U	9	10	U	10	20	U	20	10	U	10
4-Methyl-2-pentanone	9	U	9	10	U	10	10	U	10	10	U	10
Acetone	9	U	9	10	U	10	20	U	20	10	U	10
Benzene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Bromodichloromethane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Bromoform	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Bromomethane	9	U	9	10	U	10	10	U	10	10	U	10
Carbon disulfide	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Carbon tetrachloride	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Chlorobenzene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Chloroethane	9	U	9	10	U	10	10	U	10	10	U	10
Chloroform	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Chloromethane	9	U	9	10	U	10	10	U	10	10	U	10
cis-1,2-Dichloroethylene	5	U	5	5	U	5				5	U	5
cis-1,3-Dichloropropene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Dibromochloromethane	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Ethylbenzene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Methylene chloride	5	B	5	11	B	5	5.1	U	5.1	6	B	5
Styrene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Tetrachloroethene	5	U	5	5	U	5	5.1	UN	5.1	5	U	5
Toluene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
trans-1,2-Dichloroethylene	5	U	5	5	U	5				5	U	5
trans-1,3-Dichloropropene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Trichloroethene	5	U	5	5	U	5	5.1	U	5.1	5	U	5
Vinyl chloride	9	U	9	10	U	10	5.1	U	5.1	10	U	10
Xylenes (total)	5	U	5	5	U	5	10	U	10	5	U	5

Attachment	1	Sheet No.	18 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J13506 Area 2 A3 Sample Date 8/17/06			J13507 Area 2 A4 Sample Date 8/17/06			J13510 Area 3 A1 Sample Date 8/21/06			J13511 Area 3 A2 Sample Date 8/21/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	13	U	13	13	U	13	14		13	46		13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	340	U	340	340	U	340	330	U	330	330	U	330
1,2-Dichlorobenzene	340	U	340	340	U	340	330	U	330	330	U	330
1,3-Dichlorobenzene	340	U	340	340	U	340	330	U	330	330	U	330
1,4-Dichlorobenzene	340	U	340	340	U	340	330	U	330	330	U	330
2,4,5-Trichlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
2,4,6-Trichlorophenol	340	U	340	340	U	340	330	U	330	330	U	330
2,4-Dichlorophenol	340	U	340	340	U	340	330	U	330	330	U	330
2,4-Dimethylphenol	340	U	340	340	U	340	330	U	330	330	U	330
2,4-Dinitrophenol	840	U	840	840	U	840	840	UJ	840	840	UJ	840
2,4-Dinitrotoluene	340	U	340	340	U	340	330	U	330	330	U	330
2,6-Dinitrotoluene	340	U	340	340	U	340	330	U	330	330	U	330
2-Chloronaphthalene	340	U	340	340	U	340	330	U	330	330	U	330
2-Chlorophenol	340	U	340	340	U	340	330	U	330	330	U	330
2-Methylnaphthalene	340	U	340	340	U	340	330	U	330	330	U	330
2-Methylphenol (cresol, o-)	340	U	340	340	U	340	330	U	330	330	U	330
2-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
2-Nitrophenol	340	U	340	340	U	340	330	U	330	330	U	330
3,3'-Dichlorobenzidine	340	U	340	340	U	340	330	U	330	330	U	330
3-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	840	U	840	840	U	840
4-Bromophenyl-phenylether	340	U	340	340	U	340	330	U	330	330	U	330
4-Chloro-3-methylphenol	340	U	340	340	U	340	330	U	330	330	U	330
4-Chloroaniline	340	U	340	340	U	340	330	U	330	330	U	330
4-Chlorophenyl-phenylether	340	U	340	340	U	340	330	U	330	330	U	330
4-Methylphenol (p-cresol)	340	U	340	340	U	340	330	U	330	330	U	330
4-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4-Nitrophenol	840	U	840	840	U	840	840	U	840	840	U	840
Acenaphthene	340	U	340	340	U	340	330	U	330	330	U	330
Acenaphthylene	340	U	340	340	U	340	330	U	330	330	U	330
Anthracene	340	U	340	340	U	340	330	U	330	330	U	330
Benzo(a)anthracene	340	U	340	340	U	340	180	J	330	330	U	330
Benzo(a)pyrene	340	U	340	340	U	340	120	J	330	330	U	330
Benzo(b)fluoranthene	340	U	340	340	U	340	140	J	330	330	U	330
Benzo(g,h,i)perylene	340	U	340	340	U	340	51	J	330	330	U	330
Benzo(k)fluoranthene	340	U	340	340	U	340	140	J	330	330	U	330
bis(2-Chloro-1-methylethyl)ether	340	U	340	340	U	340	330	U	330	330	U	330
bis(2-Chloroethoxy)methane	340	U	340	340	U	340	330	U	330	330	U	330
bis(2-Chloroethyl)ether	340	U	340	340	U	340	330	U	330	330	U	330
bis(2-Ethylhexyl)phthalate	20	JB	340	400	B	340	330	U	330	30	J	330

Attachment	1	Sheet No.	19 of 43
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Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J13506 Area 2 A3 Sample Date 8/17/06			J13507 Area 2 A4 Sample Date 8/17/06			J13510 Area 3 A1 Sample Date 8/21/06			J13511 Area 3 A2 Sample Date 8/21/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	340	U	340	340	U	340	330	U	330	330	U	330
Carbazole	340	U	340	340	U	340	330	U	330	330	U	330
Chrysene	340	U	340	340	U	340	210	J	330	330	U	330
Di-n-butylphthalate	340	U	340	340	U	340	51	J	330	330	U	330
Di-n-octylphthalate	340	U	340	340	U	340	330	U	330	330	U	330
Dibenz(a,h)anthracene	340	U	340	340	U	340	330	U	330	330	U	330
Dibenzofuran	340	U	340	340	U	340	330	U	330	330	U	330
Diethylphthalate	340	U	340	340	U	340	330	U	330	330	U	330
Dimethylphthalate	340	U	340	340	U	340	330	U	330	330	U	330
Fluoranthene	340	U	340	340	U	340	320	J	330	330	U	330
Fluorene	340	U	340	340	U	340	330	U	330	330	U	330
Hexachlorobenzene	340	U	340	340	U	340	330	U	330	330	U	330
Hexachlorobutadiene	340	U	340	340	U	340	330	U	330	330	U	330
Hexachlorocyclopentadiene	340	U	340	340	U	340	330	U	330	330	U	330
Hexachloroethane	340	U	340	340	U	340	330	U	330	330	U	330
Indeno(1,2,3-cd)pyrene	340	U	340	340	U	340	46	J	330	330	U	330
Isophorone	340	U	340	340	U	340	330	U	330	330	U	330
N-Nitroso-di-n-dipropylamine	340	U	340	340	U	340	330	U	330	330	U	330
N-Nitrosodiphenylamine	340	U	340	340	U	340	330	U	330	330	U	330
Naphthalene	340	U	340	340	U	340	330	U	330	330	U	330
Nitrobenzene	340	U	340	340	U	340	330	U	330	330	U	330
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	340	U	340	340	U	340	55	J	330	330	U	330
Phenol	340	U	340	340	U	340	330	U	330	330	U	330
Pyrene	340	U	340	340	U	340	320	J	330	330	U	330

Attachment	1	Sheet No.	20 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135R2 Area 2 A3 Sample Date 8/28/06			J135R3 Area 2 A4 Sample Date 8/28/06			J135R4 Area 3 A1 Sample Date 8/21/06			J135R5 Area 3 A2 Sample Date 8/28/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	6	U	6	6	U	6	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	6	UJ	6	6	UJ	6	5	UJ	5	5	UJ	5
1,1,2-Trichloroethane	6	U	6	6	U	6	5	U	5	5	U	5
1,1-Dichloroethane	6	U	6	6	U	6	5	U	5	5	U	5
1,1-Dichloroethene	6	U	6	6	U	6	5	U	5	5	U	5
1,2-Dichloroethane	6	U	6	6	U	6	5	U	5	5	U	5
1,2-Dichloroethene (total)	6	U	6	6	U	6	5	U	5	5	U	5
1,2-Dichloropropane	6	U	6	6	U	6	5	U	5	5	U	5
2-Butanone	11	U	11	11	U	11	10	U	10	10	U	10
2-Hexanone	11	U	11	11	U	11	10	U	10	10	U	10
4-Methyl-2-pentanone	11	U	11	11	U	11	10	U	10	10	U	10
Acetone	11	U	11	11	U	11	10	U	10	10	U	10
Benzene	6	U	6	6	U	6	5	U	5	5	U	5
Bromodichloromethane	6	U	6	6	U	6	5	U	5	5	U	5
Bromoform	6	U	6	6	U	6	5	U	5	5	U	5
Bromomethane	11	U	11	11	U	11	10	U	10	10	U	10
Carbon disulfide	6	U	6	6	U	6	5	U	5	5	U	5
Carbon tetrachloride	6	U	6	6	U	6	5	U	5	5	U	5
Chlorobenzene	6	U	6	6	U	6	5	U	5	5	U	5
Chloroethane	11	U	11	11	U	11	10	U	10	10	U	10
Chloroform	6	U	6	6	U	6	5	U	5	5	U	5
Chloromethane	11	U	11	11	U	11	10	U	10	10	U	10
cis-1,2-Dichloroethylene	6	U	6	6	U	6	5	U	5	5	U	5
cis-1,3-Dichloropropene	6	U	6	6	U	6	5	U	5	5	U	5
Dibromochloromethane	6	U	6	6	U	6	5	U	5	5	U	5
Ethylbenzene	6	U	6	6	U	6	5	U	5	5	U	5
Methylene chloride	9	B	6	14	B	6	12	B	5	8	B	5
Styrene	6	U	6	6	U	6	5	U	5	5	U	5
Tetrachloroethene	6	U	6	6	U	6	5	U	5	5	U	5
Toluene	6	U	6	6	U	6	5	U	5	5	U	5
trans-1,2-Dichloroethylene	6	U	6	6	U	6	5	U	5	5	U	5
trans-1,3-Dichloropropene	6	U	6	6	U	6	5	U	5	5	U	5
Trichloroethene	6	U	6	6	U	6	5	U	5	5	U	5
Vinyl chloride	11	U	11	11	U	11	10	U	10	10	U	10
Xylenes (total)	6	U	6	6	U	6	5	U	5	5	U	5

Attachment	1	Sheet No.	21 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J13512 Area 3 A3 Sample Date 8/21/06			J13513 Area 3 A4 Sample Date 8/21/06			J13514 Area 4 A1 Sample Date 8/21/06			J13515 Area 4 A2 Sample Date 8/21/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	62		13	21		13	13	U	13	6.4	J	13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	340	U	340	330	U	330	330	U	330	330	U	330
1,2-Dichlorobenzene	340	U	340	330	U	330	330	U	330	330	U	330
1,3-Dichlorobenzene	340	U	340	330	U	330	330	U	330	330	U	330
1,4-Dichlorobenzene	340	U	340	330	U	330	330	U	330	330	U	330
2,4,5-Trichlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
2,4,6-Trichlorophenol	340	U	340	330	U	330	330	U	330	330	U	330
2,4-Dichlorophenol	340	U	340	330	U	330	330	U	330	330	U	330
2,4-Dimethylphenol	340	U	340	330	U	330	330	U	330	330	U	330
2,4-Dinitrophenol	840	UJ	840	840	UJ	840	840	UJ	840	840	UJ	840
2,4-Dinitrotoluene	340	U	340	330	U	330	330	U	330	330	U	330
2,6-Dinitrotoluene	340	U	340	330	U	330	330	U	330	330	U	330
2-Chloronaphthalene	340	U	340	330	U	330	330	U	330	330	U	330
2-Chlorophenol	340	U	340	330	U	330	330	U	330	330	U	330
2-Methylnaphthalene	340	U	340	330	U	330	330	U	330	330	U	330
2-Methylphenol (cresol, o-)	340	U	340	330	U	330	330	U	330	330	U	330
2-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
2-Nitrophenol	340	U	340	330	U	330	330	U	330	330	U	330
3,3'-Dichlorobenzidine	340	U	340	330	U	330	330	U	330	330	U	330
3-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	840	U	840	840	U	840
4-Bromophenyl-phenylether	340	U	340	330	U	330	330	U	330	330	U	330
4-Chloro-3-methylphenol	340	U	340	330	U	330	330	U	330	330	U	330
4-Chloroaniline	340	U	340	330	U	330	330	U	330	330	U	330
4-Chlorophenyl-phenylether	340	U	340	330	U	330	330	U	330	330	U	330
4-Methylphenol (p-cresol)	340	U	340	330	U	330	330	U	330	330	U	330
4-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4-Nitrophenol	840	U	840	840	U	840	840	U	840	840	U	840
Acenaphthene	340	U	340	330	U	330	330	U	330	330	U	330
Acenaphthylene	340	U	340	330	U	330	330	U	330	330	U	330
Anthracene	340	U	340	330	U	330	330	U	330	330	U	330
Benzo(a)anthracene	340	U	340	330	U	330	330	U	330	130	J	330
Benzo(a)pyrene	340	U	340	330	U	330	330	U	330	83	J	330
Benzo(b)fluoranthene	340	U	340	330	U	330	330	U	330	110	J	330
Benzo(g,h,i)perylene	340	U	340	330	U	330	330	U	330	37	J	330
Benzo(k)fluoranthene	340	U	340	330	U	330	330	U	330	92	J	330
bis(2-Chloro-1-methylethyl)ether	340	U	340	330	U	330	330	U	330	330	U	330
bis(2-Chloroethoxy)methane	340	U	340	330	U	330	330	U	330	330	U	330
bis(2-Chloroethyl)ether	340	U	340	330	U	330	330	U	330	330	U	330
bis(2-Ethylhexyl)phthalate	340	U	340	240	J	330	17	J	330	330	U	330

Attachment	1	Sheet No.	22 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J13512 Area 3 A3 Sample Date 8/21/06			J13513 Area 3 A4 Sample Date 8/21/06			J13514 Area 4 A1 Sample Date 8/21/06			J13515 Area 4 A2 Sample Date 8/21/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	340	U	340	38	J	330	330	U	330	330	U	330
Carbazole	340	U	340	330	U	330	330	U	330	330	U	330
Chrysene	340	U	340	330	U	330	330	U	330	170	J	330
Di-n-butylphthalate	25	J	340	63	J	330	330	U	330	330	U	330
Di-n-octylphthalate	340	U	340	330	U	330	330	U	330	330	U	330
Dibenz(a,h)anthracene	340	U	340	330	U	330	330	U	330	330	U	330
Dibenzofuran	340	U	340	330	U	330	330	U	330	330	U	330
Diethylphthalate	340	U	340	330	U	330	330	U	330	330	U	330
Dimethylphthalate	340	U	340	330	U	330	330	U	330	330	U	330
Fluoranthene	340	U	340	330	U	330	330	U	330	330		330
Fluorene	340	U	340	330	U	330	330	U	330	330	U	330
Hexachlorobenzene	340	U	340	330	U	330	330	U	330	330	U	330
Hexachlorobutadiene	340	U	340	330	U	330	330	U	330	330	U	330
Hexachlorocyclopentadiene	340	U	340	330	U	330	330	U	330	330	U	330
Hexachloroethane	340	U	340	330	U	330	330	U	330	330	U	330
Indeno(1,2,3-cd)pyrene	340	U	340	330	U	330	330	U	330	35	J	330
Isophorone	340	U	340	330	U	330	330	U	330	330	U	330
N-Nitroso-di-n-dipropylamine	340	U	340	330	U	330	330	U	330	330	U	330
N-Nitrosodiphenylamine	340	U	340	330	U	330	330	U	330	330	U	330
Naphthalene	340	U	340	330	U	330	330	U	330	330	U	330
Nitrobenzene	340	U	340	330	U	330	330	U	330	330	U	330
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	340	U	340	330	U	330	330	U	330	97	J	330
Phenol	340	U	340	330	U	330	330	U	330	330	U	330
Pyrene	340	U	340	330	U	330	330	U	330	350		330

Attachment	1	Sheet No.	23 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135R6 Area 3 A3 Sample Date 8/28/06			J135R7 Area 3 A4 Sample Date 8/28/06			J135R8 Area 4 A1 Sample Date 8/28/06			J135R9 Area 4 A2 Sample Date 8/28/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	5	UJ	5	5	UJ	5	5	UJ	5	5	UJ	5
1,1,2-Trichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1-Dichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1-Dichloroethene	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloroethene (total)	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloropropane	5	U	5	5	U	5	5	U	5	5	U	5
2-Butanone	10	U	10	10	U	10	10	U	10	10	U	10
2-Hexanone	10	U	10	10	U	10	10	U	10	10	U	10
4-Methyl-2-pentanone	10	U	10	10	U	10	10	U	10	10	U	10
Acetone	10	U	10	11	J	10	13	J	10	10	U	10
Benzene	5	U	5	5	U	5	5	U	5	1	J	5
Bromodichloromethane	5	U	5	5	U	5	5	U	5	5	U	5
Bromoform	5	U	5	5	U	5	5	U	5	5	U	5
Bromomethane	10	U	10	10	U	10	10	U	10	10	U	10
Carbon disulfide	5	U	5	5	U	5	5	U	5	5	U	5
Carbon tetrachloride	5	U	5	5	U	5	5	U	5	5	U	5
Chlorobenzene	5	U	5	5	U	5	5	U	5	5	U	5
Chloroethane	10	U	10	10	U	10	10	U	10	10	U	10
Chloroform	5	U	5	5	U	5	5	U	5	5	U	5
Chloromethane	10	U	10	10	U	10	10	U	10	10	U	10
cis-1,2-Dichloroethylene	5	U	5	5	U	5	5	U	5	5	U	5
cis-1,3-Dichloropropene	5	U	5	5	U	5	5	U	5	5	U	5
Dibromochloromethane	5	U	5	5	U	5	5	U	5	5	U	5
Ethylbenzene	5	U	5	5	U	5	5	U	5	5	U	5
Methylene chloride	9	B	5	10	B	5	13	B	5	12	B	5
Styrene	5	U	5	5	U	5	5	U	5	5	U	5
Tetrachloroethene	5	U	5	5	U	5	5	U	5	5	U	5
Toluene	5	U	5	5	U	5	5	U	5	5	U	5
trans-1,2-Dichloroethylene	5	U	5	5	U	5	5	U	5	5	U	5
trans-1,3-Dichloropropene	5	U	5	5	U	5	5	U	5	5	U	5
Trichloroethene	5	U	5	5	U	5	5	U	5	5	U	5
Vinyl chloride	10	U	10	10	U	10	10	U	10	10	U	10
Xylenes (total)	5	U	5	5	U	5	5	U	5	1	J	5

Attachment	1	Sheet No.	24 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J13516 Area 4 A3 Sample Date 8/21/06			J13517 Area 4 A4 Sample Date 8/21/06			J13518 OB/BCL A1 Sample Date 8/22/06			J13519 OB/BCL A2 Sample Date 8/22/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	13	U	13	16		13	13	U	13	4.9	J	13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	U	330	330	U	330	330	U	330	340	U	340
1,2-Dichlorobenzene	330	U	330	330	U	330	330	U	330	340	U	340
1,3-Dichlorobenzene	330	U	330	330	U	330	330	U	330	340	U	340
1,4-Dichlorobenzene	330	U	330	330	U	330	330	U	330	340	U	340
2,4,5-Trichlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
2,4,6-Trichlorophenol	330	U	330	330	U	330	330	U	330	340	U	340
2,4-Dichlorophenol	330	U	330	330	U	330	330	U	330	340	U	340
2,4-Dimethylphenol	330	U	330	330	U	330	330	U	330	340	U	340
2,4-Dinitrophenol	840	UJ	840	840	UJ	840	840	U	840	840	U	840
2,4-Dinitrotoluene	330	U	330	330	U	330	330	U	330	340	U	340
2,6-Dinitrotoluene	330	U	330	330	U	330	330	U	330	340	U	340
2-Chloronaphthalene	330	U	330	330	U	330	330	U	330	340	U	340
2-Chlorophenol	330	U	330	330	U	330	330	U	330	340	U	340
2-Methylnaphthalene	330	U	330	330	U	330	330	U	330	340	U	340
2-Methylphenol (cresol, o-)	330	U	330	330	U	330	330	U	330	340	U	340
2-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
2-Nitrophenol	330	U	330	330	U	330	330	U	330	340	U	340
3,3'-Dichlorobenzidine	330	U	330	330	U	330	330	U	330	340	U	340
3-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	840	U	840	840	U	840
4-Bromophenyl-phenylether	330	U	330	330	U	330	330	U	330	340	U	340
4-Chloro-3-methylphenol	330	U	330	330	U	330	330	U	330	340	U	340
4-Chloroaniline	330	U	330	330	U	330	330	U	330	340	U	340
4-Chlorophenyl-phenylether	330	U	330	330	U	330	330	U	330	340	U	340
4-Methylphenol (p-cresol)	330	U	330	330	U	330	330	U	330	340	U	340
4-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4-Nitrophenol	840	U	840	840	U	840	840	U	840	840	U	840
Acenaphthene	330	U	330	330	U	330	330	U	330	340	U	340
Acenaphthylene	330	U	330	330	U	330	330	U	330	340	U	340
Anthracene	330	U	330	330	U	330	330	U	330	340	U	340
Benzo(a)anthracene	330	U	330	330	U	330	330	U	330	340	U	340
Benzo(a)pyrene	330	U	330	330	U	330	330	U	330	340	U	340
Benzo(b)fluoranthene	330	U	330	330	U	330	330	U	330	340	U	340
Benzo(g,h,i)perylene	330	U	330	330	U	330	330	U	330	340	U	340
Benzo(k)fluoranthene	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Chloro-1-methylethyl)ether	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Chloroethoxy)methane	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Chloroethyl)ether	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Ethylhexyl)phthalate	330	U	330	330	U	330	330	U	330	330	U	340

Attachment	1	Sheet No.	25 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J13516 Area 4 A3 Sample Date 8/21/06			J13517 Area 4 A4 Sample Date 8/21/06			J13518 OB/BCL A1 Sample Date 8/22/06			J13519 OB/BCL A2 Sample Date 8/22/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Carbazole	330	U	330	330	U	330	330	U	330	340	U	340
Chrysene	330	U	330	330	U	330	330	U	330	340	U	340
Di-n-butylphthalate	330	U	330	26	J	330	330	U	330	330	U	340
Di-n-octylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Dibenz(a,h)anthracene	330	U	330	330	U	330	330	U	330	340	U	340
Dibenzofuran	330	U	330	330	U	330	330	U	330	340	U	340
Diethylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Dimethylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Fluoranthene	330	U	330	330	U	330	330	UJ	330	340	UJ	340
Fluorene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachlorobenzene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachlorobutadiene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachlorocyclopentadiene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachloroethane	330	U	330	330	U	330	330	U	330	340	U	340
Indeno(1,2,3-cd)pyrene	330	U	330	330	U	330	330	U	330	340	U	340
Isophorone	330	U	330	330	U	330	330	U	330	340	U	340
N-Nitroso-di-n-dipropylamine	330	U	330	330	U	330	330	U	330	340	U	340
N-Nitrosodiphenylamine	330	U	330	330	U	330	330	U	330	340	U	340
Naphthalene	330	U	330	330	U	330	330	U	330	340	U	340
Nitrobenzene	330	U	330	330	U	330	330	U	330	340	U	340
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	330	U	330	330	U	330	330	UJ	330	340	UJ	340
Phenol	330	U	330	330	U	330	330	U	330	340	U	340
Pyrene	330	U	330	330	U	330	330	UJ	330	340	UJ	340

Attachment	1	Sheet No.	26 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135T0 Area 4 A3 Sample Date 8/28/06			J135T1 Area 4 A4 Sample Date 8/28/06			J135T2 OB/BCL A1 Sample Date 8/28/06			J135T3 OB/BCL A2 Sample Date 8/28/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	6	U	6	6	U	6	5	U	5	6	U	6
1,1,2,2-Tetrachloroethane	6	UJ	6	6	UJ	6	5	UJ	5	6	UJ	6
1,1,2-Trichloroethane	6	U	6	6	U	6	5	U	5	6	U	6
1,1-Dichloroethane	6	U	6	6	U	6	5	U	5	6	U	6
1,1-Dichloroethene	6	U	6	6	U	6	5	U	5	6	U	6
1,2-Dichloroethane	6	U	6	6	U	6	5	U	5	6	U	6
1,2-Dichloroethene (total)	6	U	6	6	U	6	5	U	5	6	U	6
1,2-Dichloropropane	6	U	6	6	U	6	5	U	5	6	U	6
2-Butanone	11	U	11	11	U	11	10	U	10	11	U	11
2-Hexanone	11	U	11	11	U	11	10	U	10	11	U	11
4-Methyl-2-pentanone	11	U	11	11	U	11	10	U	10	11	U	11
Acetone	9	J	11	9	J	11	10	U	10	11	U	11
Benzene	6	U	6	6	U	6	5	U	5	6	U	6
Bromodichloromethane	6	U	6	6	U	6	5	U	5	6	U	6
Bromoform	6	U	6	6	U	6	5	U	5	6	U	6
Bromomethane	11	U	11	11	U	11	10	U	10	11	U	11
Carbon disulfide	6	U	6	6	U	6	5	U	5	6	U	6
Carbon tetrachloride	6	U	6	6	U	6	5	U	5	6	U	6
Chlorobenzene	6	U	6	6	U	6	5	U	5	6	U	6
Chloroethane	11	U	11	11	U	11	10	U	10	11	U	11
Chloroform	6	U	6	6	U	6	5	U	5	6	U	6
Chloromethane	11	U	11	11	U	11	10	U	10	11	U	11
cis-1,2-Dichloroethylene	6	U	6	6	U	6	5	U	5	6	U	6
cis-1,3-Dichloropropene	6	U	6	6	U	6	5	U	5	6	U	6
Dibromochloromethane	6	U	6	6	U	6	5	U	5	6	U	6
Ethylbenzene	6	U	6	6	U	6	5	U	5	6	U	6
Methylene chloride	14	B	6	11	B	6	9	B	5	8	B	6
Styrene	6	U	6	6	U	6	5	U	5	6	U	6
Tetrachloroethene	6	U	6	6	U	6	5	U	5	6	U	6
Toluene	6	U	6	6	U	6	5	U	5	6	U	6
trans-1,2-Dichloroethylene	6	U	6	6	U	6	5	U	5	6	U	6
trans-1,3-Dichloropropene	6	U	6	6	U	6	5	U	5	6	U	6
Trichloroethene	6	U	6	6	U	6	5	U	5	6	U	6
Vinyl chloride	11	U	11	11	U	11	10	U	10	11	U	11
Xylenes (total)	6	U	6	6	U	6	5	U	5	6	U	6

Attachment	1	Sheet No.	27 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J13520 OB/BCL A3 Sample Date 8/22/06			J135N5 OB/BCL A4 Sample Date 8/22/06			J13522 SPA A1 Sample Date 9/11/06			J13523 SPA A2 Sample Date 9/11/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	5.3	J	13	13	U	13	13	U	13	13	U	13
Aroclor-1260	13	U	13	13	U	13	3.7	J	13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
1,2-Dichlorobenzene	330	U	330	330	U	330	330	U	330	330	U	330
1,3-Dichlorobenzene	330	U	330	330	U	330	330	U	330	330	U	330
1,4-Dichlorobenzene	330	U	330	330	U	330	330	U	330	330	U	330
2,4,5-Trichlorophenol	840	U	840	830	U	830	840	U	840	840	U	840
2,4,6-Trichlorophenol	330	U	330	330	U	330	330	U	330	330	U	330
2,4-Dichlorophenol	330	U	330	330	U	330	330	UJ	330	330	UJ	330
2,4-Dimethylphenol	330	U	330	330	U	330	330	UJ	330	330	UJ	330
2,4-Dinitrophenol	840	U	840	830	U	830	840	UR	840	840	UR	840
2,4-Dinitrotoluene	330	U	330	330	U	330	330	U	330	330	U	330
2,6-Dinitrotoluene	330	U	330	330	U	330	330	U	330	330	U	330
2-Chloronaphthalene	330	U	330	330	U	330	330	U	330	330	U	330
2-Chlorophenol	330	U	330	330	U	330	330	U	330	330	U	330
2-Methylnaphthalene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
2-Methylphenol (cresol, o-)	330	U	330	330	U	330	330	UJ	330	330	UJ	330
2-Nitroaniline	840	U	840	830	U	830	840	U	840	840	U	840
2-Nitrophenol	330	U	330	330	U	330	330	UJ	330	330	UJ	330
3,3'-Dichlorobenzidine	330	U	330	330	U	330	330	U	330	330	U	330
3-Nitroaniline	840	U	840	830	U	830	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	830	U	830	840	U	840	840	U	840
4-Bromophenyl-phenylether	330	U	330	330	U	330	330	U	330	330	U	330
4-Chloro-3-methylphenol	330	U	330	330	U	330	330	UJ	330	330	UJ	330
4-Chloroaniline	330	U	330	330	U	330	330	U	330	330	U	330
4-Chlorophenyl-phenylether	330	U	330	330	U	330	330	U	330	330	U	330
4-Methylphenol (p-cresol)	330	U	330	330	U	330	330	UJ	330	330	UJ	330
4-Nitroaniline	840	U	840	830	U	830	840	U	840	840	U	840
4-Nitrophenol	840	U	840	830	U	830	840	U	840	840	U	840
Acenaphthene	330	U	330	330	U	330	330	U	330	330	U	330
Acenaphthylene	330	U	330	330	U	330	330	U	330	330	U	330
Anthracene	330	U	330	330	U	330	330	U	330	330	U	330
Benzo(a)anthracene	330	U	330	38	J	330	46	J	330	33	J	330
Benzo(a)pyrene	330	U	330	24	J	330	19	J	330	30	J	330
Benzo(b)fluoranthene	330	U	330	33	J	330	43	J	330	32	J	330
Benzo(g,h,i)perylene	330	U	330	330	U	330	19	J	330	22		330
Benzo(k)fluoranthene	330	U	330	29	J	330	41	J	330	31	J	330
bis(2-Chloro-1-methylethyl)ether	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Chloroethoxy)methane	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Chloroethyl)ether	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Ethylhexyl)phthalate	330	U	330	330	U	330	71	JB	330	36	JB	330

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Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J13520 OB/BCL A3 Sample Date 8/22/06			J135N5 OB/BCL A4 Sample Date 8/22/06			J13522 SPA A1 Sample Date 9/11/06			J13523 SPA A2 Sample Date 9/11/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Carbazole	330	U	330	330	U	330	330	U	330	330	U	330
Chrysene	330	U	330	52	J	330	76	J	330	40	J	330
Di-n-butylphthalate	330	U	330	330	U	330	23	JB	330	27	JB	330
Di-n-octylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Dibenz(a,h)anthracene	330	U	330	330	U	330	330	U	330	330	U	330
Dibenzofuran	330	U	330	330	U	330	330	U	330	330	U	330
Diethylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Dimethylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Fluoranthene	330	UJ	330	110	J	330	110	J	330	56	J	330
Fluorene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorobenzene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorobutadiene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorocyclopentadiene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachloroethane	330	U	330	330	U	330	330	U	330	330	U	330
Indeno(1,2,3-cd)pyrene	330	U	330	330	U	330	17	J	330	330	U	330
Isophorone	330	U	330	330	U	330	330	UJ	330	330	UJ	330
N-Nitroso-di-n-dipropylamine	330	U	330	330	U	330	330	U	330	330	U	330
N-Nitrosodiphenylamine	330	U	330	330	U	330	330	U	330	330	U	330
Naphthalene	330	U	330	330	U	330	330	U	330	330	U	330
Nitrobenzene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
Pentachlorophenol	840	U	840	830	U	830	840	U	840	840	U	840
Phenanthrene	330	UJ	330	37	J	330	27	J	330	330	U	330
Phenol	330	U	330	330	U	330	330	U	330	330	U	330
Pyrene	330	UJ	330	57	J	330	78	J	330	57	J	330

Attachment	1	Sheet No.	29 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135T4 OB/BCL A3 Sample Date 8/28/06			J135T5 OB/BCL A4 Sample Date 8/28/06			J13522 SPA A1 Sample Date 9/11/06			J13523 SPA A2 Sample Date 9/11/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	6	U	6	5	U	5	6	U	6	5	U	5
1,1,2,2-Tetrachloroethane	6	UJ	6	5	UJ	5	6	UJ	6	5	UJ	5
1,1,2-Trichloroethane	6	U	6	5	U	5	6	U	6	5	U	5
1,1-Dichloroethane	6	U	6	5	U	5	6	U	6	5	U	5
1,1-Dichloroethene	6	U	6	5	U	5	6	U	6	5	U	5
1,2-Dichloroethane	6	U	6	5	U	5	6	U	6	5	U	5
1,2-Dichloroethene (total)	6	U	6	5	U	5	6	U	6	5	U	5
1,2-Dichloropropane	6	U	6	5	U	5	6	U	6	5	U	5
2-Butanone	11	U	11	10	U	10	11	U	11	10	U	10
2-Hexanone	11	U	11	10	U	10	11	U	11	10	U	10
4-Methyl-2-pentanone	11	U	11	10	U	10	11	U	11	10	U	10
Acetone	12	J	11	11	J	10	25	J	11	10	U	10
Benzene	6	U	6	5	U	5	6	U	6	5	U	5
Bromodichloromethane	6	U	6	5	U	5	6	U	6	5	U	5
Bromoform	6	U	6	5	U	5	6	U	6	5	U	5
Bromomethane	11	U	11	10	U	10	11	U	11	10	U	10
Carbon disulfide	6	U	6	5	U	5	6	U	6	5	U	5
Carbon tetrachloride	6	U	6	5	U	5	6	U	6	5	U	5
Chlorobenzene	6	U	6	5	U	5	6	U	6	5	U	5
Chloroethane	11	U	11	10	U	10	11	U	11	10	U	10
Chloroform	6	U	6	5	U	5	6	U	6	5	U	5
Chloromethane	11	U	11	10	U	10	11	U	11	10	U	10
cis-1,2-Dichloroethylene	6	U	6	5	U	5	6	U	6	5	U	5
cis-1,3-Dichloropropene	6	U	6	5	U	5	6	U	6	5	U	5
Dibromochloromethane	6	U	6	5	U	5	6	U	6	5	U	5
Ethylbenzene	6	U	6	5	U	5	6	U	6	5	U	5
Methylene chloride	12	B	6	13	B	5	11	B	6	8	B	5
Styrene	6	U	6	5	U	5	6	U	6	5	U	5
Tetrachloroethene	6	U	6	5	U	5	6	U	6	5	U	5
Toluene	6	U	6	5	U	5	1	J	6	5	U	5
trans-1,2-Dichloroethylene	6	U	6	5	U	5	6	U	6	5	U	5
trans-1,3-Dichloropropene	6	U	6	5	U	5	6	U	6	5	U	5
Trichloroethene	6	U	6	5	U	5	6	U	6	5	U	5
Vinyl chloride	11	U	11	10	U	10	11	U	11	10	U	10
Xylenes (total)	6	U	6	5	U	5	6	U	6	5	U	5

Attachment	1	Sheet No.	30 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135P1 SPA A3 Sample Date 9/12/06			J135P0 SPA A4 Sample Date 9/12/06			J13524 SPA B5 Sample Date 9/11/06			J13525 SPA B6 Sample Date 9/11/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	13	U	13	13	U	13	13	U	13	13	J	13
Aroclor-1260	13	U	13	31		13	61		13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
1,2-Dichlorobenzene	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
1,3-Dichlorobenzene	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
1,4-Dichlorobenzene	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
2,4,5-Trichlorophenol	840	U	840	1700	UD	1700	840	U	840	840	U	840
2,4,6-Trichlorophenol	330	U	330	670	UD	670	330	U	330	330	U	330
2,4-Dichlorophenol	330	U	330	670	UD	670	330	UJ	330	330	UJ	330
2,4-Dimethylphenol	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
2,4-Dinitrophenol	840	UJ	840	1700	UDJ	1700	840	UR	840	840	UR	840
2,4-Dinitrotoluene	330	U	330	670	UD	670	330	U	330	330	U	330
2,6-Dinitrotoluene	330	U	330	670	UD	670	330	U	330	330	U	330
2-Chloronaphthalene	330	U	330	670	UD	670	330	U	330	330	U	330
2-Chlorophenol	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
2-Methylnaphthalene	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
2-Methylphenol (cresol, o-)	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
2-Nitroaniline	840	U	840	1700	UD	1700	840	U	840	840	U	840
2-Nitrophenol	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
3,3'-Dichlorobenzidine	330	U	330	670	UD	670	330	U	330	330	U	330
3-Nitroaniline	840	U	840	1700	UD	1700	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	1700	UD	1700	840	U	840	840	U	840
4-Bromophenyl-phenylether	330	U	330	670	UD	670	330	U	330	330	U	330
4-Chloro-3-methylphenol	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
4-Chloroaniline	330	U	330	670	UD	670	330	U	330	330	U	330
4-Chlorophenyl-phenylether	330	U	330	670	UD	670	330	U	330	330	U	330
4-Methylphenol (p-cresol)	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
4-Nitroaniline	840	U	840	1700	UD	1700	840	U	840	840	U	840
4-Nitrophenol	840	U	840	1700	UD	1700	840	U	840	840	U	840
Acenaphthene	330	U	330	670	UD	670	330	U	330	330	U	330
Acenaphthylene	330	U	330	670	UD	670	330	U	330	330	U	330
Anthracene	330	UJ	330	170	JD	670	330	U	330	330	U	330
Benzo(a)anthracene	37	J	330	660	JD	670	25	J	330	27	J	330
Benzo(a)pyrene	330	UJ	330	320	JD	670	330	U	330	20	J	330
Benzo(b)fluoranthene	25	J	330	390	JD	670	27	J	330	27	J	330
Benzo(g,h,i)perylene	330	U	330	140	JD	670	330	U	330	330	U	330
Benzo(k)fluoranthene	27	J	330	360	JD	670	24	J	330	23	J	330
bis(2-Chloro-1-methylethyl)ether	330	U	330	670	UD	670	330	U	330	330	U	330
bis(2-Chloroethoxy)methane	330	U	330	670	UD	670	330	U	330	330	U	330
bis(2-Chloroethyl)ether	330	U	330	670	UD	670	330	U	330	330	U	330
bis(2-Ethylhexyl)phthalate	42	JB	330	50	JBD	670	35	JB	330	59	JB	330

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Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135P1 SPA A3 Sample Date 9/12/06			J135P0 SPA A4 Sample Date 9/12/06			J13524 SPA B5 Sample Date 9/11/06			J13525 SPA B6 Sample Date 9/11/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	17	J	330	670	UD	670	330	U	330	330	U	330
Carbazole	330	UJ	330	47	JD	670	330	U	330	330	U	330
Chrysene	51	J	330	790	JD	670	43	J	330	39	J	330
Di-n-butylphthalate	27	JB	330	670	UD	670	27	JB	330	39	JB	330
Di-n-octylphthalate	330	U	330	670	UD	670	330	U	330	330	U	330
Dibenz(a,h)anthracene	330	U	330	75	JD	670	330	U	330	330	U	330
Dibenzofuran	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
Diethylphthalate	330	U	330	670	UD	670	330	U	330	330	U	330
Dimethylphthalate	330	U	330	670	UD	670	330	U	330	330	U	330
Fluoranthene	73	JR	330	1400	DR	670	48	J	330	59	J	330
Fluorene	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
Hexachlorobenzene	330	U	330	670	UD	670	330	U	330	330	U	330
Hexachlorobutadiene	330	U	330	670	UD	670	330	U	330	330	U	330
Hexachlorocyclopentadiene	330	U	330	670	UD	670	330	U	330	330	U	330
Hexachloroethane	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
Indeno(1,2,3-cd)pyrene	330	UJ	330	150	JD	670	330	U	330	330	U	330
Isophorone	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
N-Nitroso-di-n-dipropylamine	330	UJ	330	670	UDJ	670	330	U	330	330	U	330
N-Nitrosodiphenylamine	330	U	330	670	UD	670	330	U	330	330	U	330
Naphthalene	330	U	330	670	UD	670	330	U	330	330	U	330
Nitrobenzene	330	UJ	330	670	UDJ	670	330	UJ	330	330	UJ	330
Pentachlorophenol	840	U	840	1700	UD	1700	840	U	840	840	U	840
Phenanthrene	26	J	330	710	D	670	330	U	330	19	J	330
Phenol	330	UJ	330	670	UDJ	670	24	J	330	330	U	330
Pyrene	60	J	330	1700	D	670	38	J	330	51	J	330

Attachment	1	Sheet No.	32 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135P1 SPA A3 Sample Date 9/12/06			J135P0 SPA A4 Sample Date 9/12/06			J13524 SPA B5 Sample Date 9/11/06			J13525 SPA B6 Sample Date 9/11/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	5	U	5	5	U	5	5	UJ	5	5	UJ	5
1,1,2-Trichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1-Dichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1-Dichloroethene	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloroethene (total)	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloropropane	5	U	5	5	U	5	5	U	5	5	U	5
2-Butanone	4	J	10	10	U	10	10	U	10	10	U	10
2-Hexanone	10	U	10	10	U	10	10	U	10	10	U	10
4-Methyl-2-pentanone	10	U	10	10	U	10	10	U	10	10	U	10
Acetone	14		10	9	J	10	10	U	10	10	U	10
Benzene	5	U	5	5	U	5	5	U	5	5	U	5
Bromodichloromethane	5	U	5	5	U	5	5	U	5	5	U	5
Bromoform	5	U	5	5	U	5	5	U	5	5	U	5
Bromomethane	10	U	10	10	U	10	10	U	10	10	U	10
Carbon disulfide	5	U	5	5	U	5	5	U	5	5	U	5
Carbon tetrachloride	5	U	5	5	U	5	5	U	5	5	U	5
Chlorobenzene	5	U	5	5	U	5	5	U	5	5	U	5
Chloroethane	10	U	10	10	U	10	10	U	10	10	U	10
Chloroform	5	U	5	5	U	5	5	U	5	5	U	5
Chloromethane	10	U	10	10	U	10	10	U	10	10	U	10
cis-1,2-Dichloroethylene	5	U	5	5	U	5	5	U	5	5	U	5
cis-1,3-Dichloropropene	5	U	5	5	U	5	5	U	5	5	U	5
Dibromochloromethane	5	U	5	5	U	5	5	U	5	5	U	5
Ethylbenzene	5	U	5	5	U	5	5	U	5	5	U	5
Methylene chloride	23	B	5	17	B	5	11	B	5	14	B	5
Styrene	5	U	5	5	U	5	5	U	5	5	U	5
Tetrachloroethene	5	U	5	5	U	5	5	U	5	5	U	5
Toluene	2	J	5	5	U	5	5	U	5	5	U	5
trans-1,2-Dichloroethylene	5	U	5	5	U	5	5	U	5	5	U	5
trans-1,3-Dichloropropene	5	U	5	5	U	5	5	U	5	5	U	5
Trichloroethene	5	U	5	5	U	5	5	U	5	5	U	5
Vinyl chloride	10	U	10	10	U	10	10	U	10	10	U	10
Xylenes (total)	5	U	5	5	U	5	5	U	5	5	U	5

Attachment	1	Sheet No.	33 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135N8 SPA B7 Sample Date 9/11/06			J135N9 SPA B8 Sample Date 9/11/06			J135P2 SPA C9 Sample Date 9/12/06			J135P3 SPA C10 Sample Date 9/12/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	9.5	J	13	19		13	17		13	6.5	J	13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
1,2-Dichlorobenzene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
1,3-Dichlorobenzene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
1,4-Dichlorobenzene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
2,4,5-Trichlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
2,4,6-Trichlorophenol	330	U	330	330	U	330	330	U	330	330	U	330
2,4-Dichlorophenol	330	UJ	330	330	UJ	330	330	U	330	330	U	330
2,4-Dimethylphenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2,4-Dinitrophenol	840	UR	840	840	UR	840	840	UJ	840	840	UJ	840
2,4-Dinitrotoluene	330	U	330	330	U	330	330	U	330	330	U	330
2,6-Dinitrotoluene	330	U	330	330	U	330	330	U	330	330	U	330
2-Chloronaphthalene	330	U	330	330	U	330	330	U	330	330	U	330
2-Chlorophenol	330	U	330	330	U	330	330	UJ	330	330	UJ	330
2-Methylnaphthalene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2-Methylphenol (cresol, o-)	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
2-Nitrophenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
3,3'-Dichlorobenzidine	330	U	330	330	U	330	330	U	330	330	U	330
3-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	840	U	840	840	U	840
4-Bromophenyl-phenylether	330	U	330	330	U	330	330	U	330	330	U	330
4-Chloro-3-methylphenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
4-Chloroaniline	330	U	330	330	U	330	330	U	330	330	U	330
4-Chlorophenyl-phenylether	330	U	330	330	U	330	330	U	330	330	U	330
4-Methylphenol (p-cresol)	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
4-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4-Nitrophenol	840	U	840	840	U	840	840	U	840	840	U	840
Acenaphthene	330	U	330	330	U	330	330	U	330	330	U	330
Acenaphthylene	330	U	330	330	U	330	330	U	330	330	U	330
Anthracene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
Benzo(a)anthracene	330	U	330	61	J	330	330	UJ	330	330	UJ	330
Benzo(a)pyrene	330	U	330	38	J	330	330	UJ	330	330	UJ	330
Benzo(b)fluoranthene	330	U	330	45	J	330	330	UJ	330	330	U	330
Benzo(g,h,i)perylene	330	U	330	22	J	330	330	U	330	330	U	330
Benzo(k)fluoranthene	330	U	330	43	J	330	330	UJ	330	330	UJ	330
bis(2-Chloro-1-methylethyl)ether	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Chloroethoxy)methane	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Chloroethyl)ether	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Ethylhexyl)phthalate	36	JB	330	35	JB	330	30	JB	330	48	JB	330

Attachment	1	Sheet No.	34 of 43
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Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135N8 SPA B7 Sample Date 9/11/06			J135N9 SPA B8 Sample Date 9/11/06			J135P2 SPA C9 Sample Date 9/12/06			J135P3 SPA C10 Sample Date 9/12/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Carbazole	330	U	330	330	U	330	330	UJ	330	330	UJ	330
Chrysene	330	U	330	81	J	330	330	UJ	330	330	UJ	330
Di-n-butylphthalate	32	JB	330	330	U	330	19	JB	330	17	JB	330
Di-n-octylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Dibenz(a,h)anthracene	330	U	330	330	U	330	330	U	330	330	U	330
Dibenzofuran	330	U	330	330	U	330	330	UJ	330	330	UJ	330
Diethylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Dimethylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Fluoranthene	24	J	330	190	J	330	330	U	330	330	U	330
Fluorene	330	U	330	330	U	330	330	UJ	330	330	UJ	330
Hexachlorobenzene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorobutadiene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorocyclopentadiene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachloroethane	330	U	330	330	U	330	330	UJ	330	330	UJ	330
Indeno(1,2,3-cd)pyrene	330	U	330	19	J	330	330	UJ	330	330	UJ	330
Isophorone	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
N-Nitroso-di-n-dipropylamine	330	U	330	330	U	330	330	UJ	330	330	UJ	330
N-Nitrosodiphenylamine	330	U	330	330	U	330	330	U	330	330	U	330
Naphthalene	330	U	330	330	U	330	330	U	330	330	U	330
Nitrobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	330	U	330	71	J	330	330	UJ	330	330	UJ	330
Phenol	330	U	330	330	U	330	330	U	330	330	U	330
Pyrene	21	J	330	130	J	330	330	U	330	330	U	330

Attachment	1	Sheet No.	35 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135N8 SPA B7 Sample Date 9/11/06			J135N9 SPA B8 Sample Date 9/11/06			J135P2 SPA C9 Sample Date 9/12/06			J135P3 SPA C10 Sample Date 9/12/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	5	UJ	5	5	UJ	5	5	U	5	5	U	5
1,1,2-Trichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1-Dichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,1-Dichloroethene	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloroethane	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloroethene (total)	5	U	5	5	U	5	5	U	5	5	U	5
1,2-Dichloropropane	5	U	5	5	U	5	5	U	5	5	U	5
2-Butanone	10	U	10	10	U	10	4	J	10	10	U	10
2-Hexanone	10	U	10	10	U	10	10	U	10	10	U	10
4-Methyl-2-pentanone	10	U	10	10	U	10	10	U	10	10	U	10
Acetone	25	J	10	28	J	10	12		10	7	J	10
Benzene	5	U	5	5	U	5	5	U	5	5	U	5
Bromodichloromethane	5	U	5	5	U	5	5	U	5	5	U	5
Bromoform	5	U	5	5	U	5	5	U	5	5	U	5
Bromomethane	10	U	10	10	U	10	10	U	10	10	U	10
Carbon disulfide	5	U	5	5	U	5	5	U	5	5	U	5
Carbon tetrachloride	5	U	5	5	U	5	5	U	5	5	U	5
Chlorobenzene	5	U	5	5	U	5	5	U	5	5	U	5
Chloroethane	10	U	10	10	U	10	10	U	10	10	U	10
Chloroform	5	U	5	5	U	5	5	U	5	5	U	5
Chloromethane	10	U	10	10	U	10	10	U	10	10	U	10
cis-1,2-Dichloroethylene	5	U	5	5	U	5	5	U	5	5	U	5
cis-1,3-Dichloropropene	5	U	5	5	U	5	5	U	5	5	U	5
Dibromochloromethane	5	U	5	5	U	5	5	U	5	5	U	5
Ethylbenzene	5	U	5	5	U	5	5	U	5	5	U	5
Methylene chloride	14	B	5	15	B	5	21	B	5	24	B	5
Styrene	5	U	5	5	U	5	5	U	5	5	U	5
Tetrachloroethene	5	U	5	5	U	5	5	U	5	5	U	5
Toluene	2	J	5	1	J	5	5	U	5	1	J	5
trans-1,2-Dichloroethylene	5	U	5	5	U	5	5	U	5	5	U	5
trans-1,3-Dichloropropene	5	U	5	5	U	5	5	U	5	5	U	5
Trichloroethene	5	U	5	5	U	5	5	U	5	5	U	5
Vinyl chloride	10	U	10	10	U	10	10	U	10	10	U	10
Xylenes (total)	5	U	5	5	U	5	5	U	5	5	U	5

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Checked	T. M. Blakley	Date	
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Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135P4 SPA C1 Sample Date 9/12/06			J135P5 SPA C2 Sample Date 9/12/06			J135P6 SPA D3 Sample Date 9/12/06			J135P7 SPA D4 Sample Date 9/12/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1221	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1232	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1242	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1248	13	U	13	13	U	13	13	U	13	13	U	13
Aroclor-1254	14		13	25		13	20		13	7.9	J	13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
1,2-Dichlorobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
1,3-Dichlorobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
1,4-Dichlorobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2,4,5-Trichlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
2,4,6-Trichlorophenol	330	U	330	330	U	330	330	U	330	330	U	330
2,4-Dichlorophenol	330	U	330	330	U	330	330	U	330	330	U	330
2,4-Dimethylphenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2,4-Dinitrophenol	840	UJ	840	840	UJ	840	840	UJ	840	840	UJ	840
2,4-Dinitrotoluene	330	U	330	330	U	330	330	U	330	330	U	330
2,6-Dinitrotoluene	330	U	330	330	U	330	330	U	330	330	U	330
2-Chloronaphthalene	330	U	330	330	U	330	330	U	330	330	U	330
2-Chlorophenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2-Methylnaphthalene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2-Methylphenol (cresol, o-)	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
2-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
2-Nitrophenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
3,3'-Dichlorobenzidine	330	U	330	330	U	330	330	U	330	330	U	330
3-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	840	U	840	840	U	840
4-Bromophenyl-phenylether	330	U	330	330	U	330	330	U	330	330	U	330
4-Chloro-3-methylphenol	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
4-Chloroaniline	330	U	330	330	U	330	330	U	330	330	U	330
4-Chlorophenyl-phenylether	330	U	330	330	U	330	330	U	330	330	U	330
4-Methylphenol (p-cresol)	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
4-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
4-Nitrophenol	840	U	840	840	U	840	840	U	840	840	U	840
Acenaphthene	330	U	330	330	U	330	330	U	330	41	J	330
Acenaphthylene	330	U	330	330	U	330	330	U	330	330	U	330
Anthracene	330	UJ	330	330	UJ	330	330	UJ	330	260	J	330
Benzo(a)anthracene	330	UJ	330	27	J	330	330	UJ	330	1100	J	330
Benzo(a)pyrene	330	UJ	330	28	J	330	330	UJ	330	480	J	330
Benzo(b)fluoranthene	330	UJ	330	26	J	330	330	UJ	330	600	J	330
Benzo(g,h,i)perylene	330	U	330	21	J	330	330	U	330	260	J	330
Benzo(k)fluoranthene	330	UJ	330	28	J	330	330	UJ	330	540	J	330
bis(2-Chloro-1-methylethyl)ether	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Chloroethoxy)methane	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Chloroethyl)ether	330	U	330	330	U	330	330	U	330	330	U	330
bis(2-Ethylhexyl)phthalate	23	JB	330	66	JB	330	56	JB	330	27	JB	330

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Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135P4 SPA C1 Sample Date 9/12/06			J135P5 SPA C2 Sample Date 9/12/06			J135P6 SPA D3 Sample Date 9/12/06			J135P7 SPA D4 Sample Date 9/12/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Carbazole	330	UJ	330	330	UJ	330	330	UJ	330	240	J	330
Chrysene	330	UJ	330	43	J	330	330	UJ	330	1300	J	330
Di-n-butylphthalate	330	U	330	31	JB	330	32	JB	32	17	JB	330
Di-n-octylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Dibenz(a,h)anthracene	330	U	330	330	U	330	330	U	330	180	J	330
Dibenzofuran	330	UJ	330	330	UJ	330	330	UJ	330	34	J	330
Diethylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Dimethylphthalate	330	U	330	330	U	330	330	U	330	330	U	330
Fluoranthene	330	U	330	52	JR	330	330	UR	330	2100	R	330
Fluorene	330	UJ	330	330	UJ	330	330	UJ	330	43	J	330
Hexachlorobenzene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorobutadiene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachlorocyclopentadiene	330	U	330	330	U	330	330	U	330	330	U	330
Hexachloroethane	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
Indeno(1,2,3-cd)pyrene	330	UJ	330	18	J	330	330	UJ	330	250	J	330
Isophorone	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
N-Nitroso-di-n-dipropylamine	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
N-Nitrosodiphenylamine	330	U	330	330	U	330	330	U	330	330	U	330
Naphthalene	330	U	330	330	U	330	330	U	330	330	U	330
Nitrobenzene	330	UJ	330	330	UJ	330	330	UJ	330	330	UJ	330
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	330	UJ	330	19	J	330	330	UJ	330	1300	J	330
Phenol	330	U	330	330	U	330	330	U	330	330	U	330
Pyrene	330	U	330	57	J	330	330	U	330	1600		330

Attachment	1	Sheet No.	38 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135P4 SPA C1 Sample Date 9/12/06			J135P5 SPA C2 Sample Date 9/12/06			J135P6 SPA D3 Sample Date 9/12/06			J135P7 SPA D4 Sample Date 9/12/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	5	U	5	6	U	6	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	5	U	5	6	U	6	5	U	5	5	U	5
1,1,2-Trichloroethane	5	U	5	6	U	6	5	U	5	5	U	5
1,1-Dichloroethane	5	U	5	6	U	6	5	U	5	5	U	5
1,1-Dichloroethene	5	U	5	6	U	6	5	U	5	5	U	5
1,2-Dichloroethane	5	U	5	6	U	6	5	U	5	5	U	5
1,2-Dichloroethene (total)	5	U	5	6	U	6	5	U	5	5	U	5
1,2-Dichloropropane	5	U	5	6	U	6	5	U	5	5	U	5
2-Butanone	10	U	10	11	U	11	10	U	10	9	U	9
2-Hexanone	10	U	10	11	U	11	10	U	10	9	U	9
4-Methyl-2-pentanone	10	U	10	11	U	11	10	U	10	9	U	9
Acetone	7	J	10	8	J	11	7	J	10	11		9
Benzene	5	U	5	6	U	6	5	U	5	5	U	5
Bromodichloromethane	5	U	5	6	U	6	5	U	5	5	U	5
Bromoform	5	U	5	6	U	6	5	U	5	5	U	5
Bromomethane	10	U	10	11	U	11	10	U	10	9	U	9
Carbon disulfide	5	U	5	6	U	6	5	U	5	5	U	5
Carbon tetrachloride	5	U	5	6	U	6	5	U	5	5	U	5
Chlorobenzene	5	U	5	6	U	6	5	U	5	5	U	5
Chloroethane	10	U	10	11	U	11	10	U	10	9	U	9
Chloroform	5	U	5	6	U	6	5	U	5	5	U	5
Chloromethane	10	U	10	11	U	11	10	U	10	9	U	9
cis-1,2-Dichloroethylene	5	U	5	6	U	6	5	U	5	5	U	5
cis-1,3-Dichloropropene	5	U	5	6	U	6	5	U	5	5	U	5
Dibromochloromethane	5	U	5	6	U	6	5	U	5	5	U	5
Ethylbenzene	5	U	5	6	U	6	5	U	5	5	U	5
Methylene chloride	24	B	5	27	B	6	26	B	5	18	B	5
Styrene	5	U	5	4	J	6	5	U	5	5	U	5
Tetrachloroethene	5	U	5	6	U	6	5	U	5	5	U	5
Toluene	5	U	5	1	J	6	1	J	5	5	U	5
trans-1,2-Dichloroethylene	5	U	5	6	U	6	5	U	5	5	U	5
trans-1,3-Dichloropropene	5	U	5	6	U	6	5	U	5	5	U	5
Trichloroethene	5	U	5	6	U	6	5	U	5	5	U	5
Vinyl chloride	10	U	10	11	U	11	10	U	10	9	U	9
Xylenes (total)	5	U	5	6	U	6	5	U	5	5	U	5

Attachment	1	Sheet No.	39 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135P8 SPA D5 Sample Date 9/12/06			J135P9 SPA D6 Sample Date 9/12/06			J12XM2 FS-5 Sample Date 7/26/06			J12XM3 FS-6 Sample Date 7/26/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	13	U	13	13	U	13	13	U	13	14	U	14
Aroclor-1221	13	U	13	13	U	13	13	U	13	14	U	14
Aroclor-1232	13	U	13	13	U	13	13	U	13	14	U	14
Aroclor-1242	13	U	13	13	U	13	13	U	13	14	U	14
Aroclor-1248	13	U	13	13	U	13	13	U	13	14	U	14
Aroclor-1254	3.7	J	13	4.7	J	13	22		13	14	U	14
Aroclor-1260	13	U	13	13	U	13	13	U	13	14	U	14
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
1,2-Dichlorobenzene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
1,3-Dichlorobenzene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
1,4-Dichlorobenzene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
2,4,5-Trichlorophenol	840	U	840	840	U	840	840	U	840	850	U	850
2,4,6-Trichlorophenol	330	U	330	330	U	330	330	U	330	340	U	340
2,4-Dichlorophenol	330	U	330	330	U	330	330	U	330	340	U	340
2,4-Dimethylphenol	330	UJ	330	330	UJ	330	330	U	330	340	U	340
2,4-Dinitrophenol	840	UJ	840	840	UJ	840	840	U	840	850	U	850
2,4-Dinitrotoluene	330	U	330	330	U	330	330	U	330	340	U	340
2,6-Dinitrotoluene	330	U	330	330	U	330	330	U	330	340	U	340
2-Chloronaphthalene	330	U	330	330	U	330	330	U	330	340	U	340
2-Chlorophenol	330	UJ	330	330	UJ	330	330	U	330	340	U	340
2-Methylnaphthalene	330	UJ	330	330	U	330	330	U	330	340	U	340
2-Methylphenol (cresol, o-)	330	UJ	330	330	UJ	330	330	U	330	340	U	340
2-Nitroaniline	840	U	840	840	U	840	840	U	840	850	U	850
2-Nitrophenol	330	UJ	330	330	UJ	330	330	U	330	340	U	340
3,3'-Dichlorobenzidine	330	U	330	330	U	330	330	U	330	340	U	340
3-Nitroaniline	840	U	840	840	U	840	840	U	840	850	U	850
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	840	U	840	850	U	850
4-Bromophenyl-phenylether	330	U	330	330	U	330	330	U	330	340	U	340
4-Chloro-3-methylphenol	330	UJ	330	330	UJ	330	330	U	330	340	U	340
4-Chloroaniline	330	U	330	330	U	330	330	U	330	340	U	340
4-Chlorophenyl-phenylether	330	U	330	330	U	330	330	U	330	340	U	340
4-Methylphenol (p-cresol)	330	UJ	330	330	UJ	330	330	U	330	340	U	340
4-Nitroaniline	840	U	840	840	U	840	840	U	840	850	U	850
4-Nitrophenol	840	U	840	840	U	840	840	U	840	850	U	850
Acenaphthene	330	U	330	330	U	330	330	U	330	340	U	340
Acenaphthylene	330	U	330	330	U	330	330	U	330	340	U	340
Anthracene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Benzo(a)anthracene	330	UJ	330	18	J	330	330	U	330	340	U	340
Benzo(a)pyrene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Benzo(b)fluoranthene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Benzo(g,h,i)perylene	330	U	330	330	U	330	330	U	330	340	U	340
Benzo(k)fluoranthene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
bis(2-Chloro-1-methylethyl)ether	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Chloroethoxy)methane	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Chloroethyl)ether	330	U	330	330	U	330	330	U	330	340	U	340
bis(2-Ethylhexyl)phthalate	50	JB	330	41	JB	330	39	JB	330	67	JB	340

Attachment	1	Sheet No.	40 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135P8 SPA D5 Sample Date 9/12/06			J135P9 SPA D6 Sample Date 9/12/06			J12XM2 FS-5 Sample Date 7/26/06			J12XM3 FS-6 Sample Date 7/26/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Carbazole	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Chrysene	330	UJ	330	27	J	330	330	U	330	340	U	340
Di-n-butylphthalate	29	JB	330	330	U	330	55	JB	330	49	JB	340
Di-n-octylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Dibenz(a,h)anthracene	330	U	330	330	U	330	330	U	330	340	U	340
Dibenzofuran	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Diethylphthalate	330	U	330	330	U	330	22	J	330	340	U	340
Dimethylphthalate	330	U	330	330	U	330	330	U	330	340	U	340
Fluoranthene	18	JR	330	34	JR	330	330	U	330	340	U	340
Fluorene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Hexachlorobenzene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachlorobutadiene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachlorocyclopentadiene	330	U	330	330	U	330	330	U	330	340	U	340
Hexachloroethane	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Indeno(1,2,3-cd)pyrene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Isophorone	330	UJ	330	330	UJ	330	330	U	330	340	U	340
N-Nitroso-di-n-dipropylamine	330	UJ	330	330	UJ	330	330	U	330	340	U	340
N-Nitrosodiphenylamine	330	U	330	330	U	330	330	U	330	340	U	340
Naphthalene	330	U	330	330	U	330	330	U	330	340	U	340
Nitrobenzene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Pentachlorophenol	840	U	840	840	U	840	840	U	840	850	U	850
Phenanthrene	330	UJ	330	330	UJ	330	330	U	330	340	U	340
Phenol	330	U	330	330	U	330	36	JB	330	33	JB	340
Pyrene	330	U	330	27	J	330	330	U	330	340	U	340

Attachment	1	Sheet No.	41 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 118-C-1 Verification Sampling Results.

Constituents	J135P8 SPA D5 Sample Date 9/12/06			J135P9 SPA D6 Sample Date 9/12/06			J12XM2 FS-5 Sample Date 7/26/06			J12XM3 FS-6 Sample Date 7/26/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	6	U	6	5	U	5	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	6	U	6	5	U	5	5	U	5	5	U	5
1,1,2-Trichloroethane	6	U	6	5	U	5	5	U	5	5	U	5
1,1-Dichloroethane	6	U	6	5	U	5	5	U	5	5	U	5
1,1-Dichloroethene	6	U	6	5	U	5	5	U	5	5	U	5
1,2-Dichloroethane	6	U	6	5	U	5	5	U	5	5	U	5
1,2-Dichloroethene (total)	6	U	6	5	U	5	5	U	5	5	U	5
1,2-Dichloropropane	6	U	6	5	U	5	5	U	5	5	U	5
2-Butanone	11	U	11	10	U	10	10	U	10	10	U	10
2-Hexanone	11	U	11	10	U	10	10	U	10	10	U	10
4-Methyl-2-pentanone	11	U	11	10	U	10	10	U	10	10	U	10
Acetone	11	U	11	8	J	10	24		10	10	J	10
Benzene	6	U	6	5	U	5	5	U	5	5	U	5
Bromodichloromethane	6	U	6	5	U	5	5	U	5	5	U	5
Bromoform	6	U	6	5	U	5	5	U	5	5	U	5
Bromomethane	11	U	11	10	U	10	10	U	10	10	U	10
Carbon disulfide	6	U	6	5	U	5	5	U	5	5	U	5
Carbon tetrachloride	6	U	6	5	U	5	39		5	10		5
Chlorobenzene	6	U	6	5	U	5	5	U	5	5	U	5
Chloroethane	11	U	11	10	U	10	10	U	10	10	U	10
Chloroform	6	U	6	5	U	5	5	U	5	5	U	5
Chloromethane	11	U	11	10	U	10	10	U	10	10	U	10
cis-1,2-Dichloroethylene	6	U	6	5	U	5	5	U	5	5	U	5
cis-1,3-Dichloropropene	6	U	6	5	U	5	5	U	5	5	U	5
Dibromochloromethane	6	U	6	5	U	5	5	U	5	5	U	5
Ethylbenzene	6	U	6	5	U	5	5	U	5	5	U	5
Methylene chloride	23	B	6	30	B	5	19		5	5	U	5
Styrene	6	U	6	1	J	5	5	U	5	5	U	5
Tetrachloroethene	6	U	6	5	U	5	5	U	5	5	U	5
Toluene	6	U	6	1	J	5	5	U	5	5	U	5
trans-1,2-Dichloroethylene	6	U	6	5	U	5	5	U	5	5	U	5
trans-1,3-Dichloropropene	6	U	6	5	U	5	5	U	5	5	U	5
Trichloroethene	6	U	6	5	U	5	5	U	5	5	U	5
Vinyl chloride	11	U	11	10	U	10	10	U	10	10	U	10
Xylenes (total)	6	U	6	1	J	5	5	U	5	5	U	5

Attachment	1	Sheet No.	42 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

Attachment 1. 100-C-9:2 Verification Sampling Results.

Constituents	J13509 Equipment Blank Sample Date 8/17/06		
	µg/kg	Q	PQL
Semivolatile Organic Compounds			
1,2,4-Trichlorobenzene	330	U	330
1,2-Dichlorobenzene	330	U	330
1,3-Dichlorobenzene	330	U	330
1,4-Dichlorobenzene	330	U	330
2,4,5-Trichlorophenol	840	U	840
2,4,6-Trichlorophenol	330	U	330
2,4-Dichlorophenol	330	U	330
2,4-Dimethylphenol	330	U	330
2,4-Dinitrophenol	840	U	840
2,4-Dinitrotoluene	330	U	330
2,6-Dinitrotoluene	330	U	330
2-Chloronaphthalene	330	U	330
2-Chlorophenol	330	U	330
2-Methylnaphthalene	330	U	330
2-Methylphenol (cresol, o-)	330	U	330
2-Nitroaniline	840	U	840
2-Nitrophenol	330	U	330
3,3'-Dichlorobenzidine	330	U	330
3-Nitroaniline	840	U	840
4,6-Dinitro-2-methylphenol	840	U	840
4-Bromophenyl-phenylether	330	U	330
4-Chloro-3-methylphenol	330	U	330
4-Chloroaniline	330	U	330
4-Chlorophenyl-phenylether	330	U	330
4-Methylphenol (p-cresol)	330	U	330
4-Nitroaniline	840	U	840
4-Nitrophenol	840	U	840
Acenaphthene	330	U	330
Acenaphthylene	330	U	330
Anthracene	330	U	330
Benzo(a)anthracene	330	U	330
Benzo(a)pyrene	330	U	330
Benzo(b)fluoranthene	330	U	330
Benzo(g,h,i)perylene	330	U	330
Benzo(k)fluoranthene	330	U	330
bis(2-Chloro-1-methylethyl)ether	330	U	330
bis(2-Chloroethoxy)methane	330	U	330
bis(2-Chloroethyl)ether	330	U	330
bis(2-Ethylhexyl)phthalate	27	JB	330
Butylbenzylphthalate	330	U	330
Carbazole	330	U	330
Chrysene	330	U	330
Di-n-butylphthalate	33	JB	330
Di-n-octylphthalate	330	U	330
Dibenz(a,h)anthracene	330	U	330
Dibenzofuran	330	U	330
Diethylphthalate	330	U	330

Constituents	J13509 Equipment Blank Sample Date 8/17/06		
	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)			
Dimethylphthalate	330	U	330
Fluoranthene	330	U	330
Fluorene	330	U	330
Hexachlorobenzene	330	U	330
Hexachlorobutadiene	330	U	330
Hexachlorocyclopentadiene	330	U	330
Hexachloroethane	330	U	330
Indeno(1,2,3-cd)pyrene	330	U	330
Isophorone	330	U	330
N-Nitroso-di-n-dipropylamine	330	U	330
N-Nitrosodiphenylamine	330	U	330
Naphthalene	330	U	330
Nitrobenzene	330	U	330
Pentachlorophenol	840	U	840
Phenanthrene	330	U	330
Phenol	330	U	330
Pyrene	330	U	330

Attachment	1	Sheet No.	43 of 43
Originator	J. M. Capron	Date	12/13/06
Checked	T. M. Blakley	Date	
Calc. No.	0100C-CA-V0033	Rev. No.	0

CALCULATION COVER SHEET

Project Title:	118-C-1 Burial Ground Cleanup Verification	**Job No.**	14655
Area	100-BC Area		
Discipline	Environmental	***Calc. No.**	0100C-CA-V0036
Subject	118-C-1 Burial Ground Comparison to Drinking Water Standards (MCL) 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 Calculatior X **Preliminary** **Superseded** **Voided**

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover - 1 Calculations - 3 Total - 4	S. W. Clark *Approved 12/13/06*	M. W. Perrott *Approved 12/13/06*	T. M. Blakley *Approved by M. J. Appel 12/13/06*	D. N. Strom *Approved 12/13/06*	*Approved 12/13/06*
1	Cover - 1 Calculations - 3 Total - 4	S. W. Clark S.W. Clark 12/19/06	M. W. Perrott M.W. Perrott 12/19/06	T. M. Blakley J.M. Blakley 12/19/06	D. N. Strom D.N. Strom 12-20-06	12-20-06

SUMMARY OF REVISIONS

1	This revision was necessary to replace the concentrations for strontium-90 from the combined Areas 1, 2, 3, and 4 with higher (more conservative) strontium-90 concentrations predicted by RESRAD for the staging pile (stockpile) area. This will provide the most conservative evaluation of groundwater protection for the 118-C-1 Burial Ground. Changes are indicated by change bars in the right margin of the affected pages.

WCH-DE-018 (9/01/2006) *Obtain Calc. No. from R&DC and Form from Intranet

Washington Closure Hanford **CALCULATION SHEET**

Originator	S. W. Clark	**Date**	12/19/06	**Calc. No.**	0100C-CA-V0036	**Rev. No.**	1
Project	118-C-1 Burial Ground Cleanup Verification	**Job No.**	14655	**Checked**	M. W. Perrott	**Date**	12/19/06
Subject	118-C-1 Burial Ground Comparison to Drinking Water Standards (MCL) Calculation					**Sheet No.**	1 of 3

Purpose:
Compare RESRAD derived groundwater radionuclide concentrations to remedial action goals and maximum contaminant levels (MCLs) for groundwater. Compare beta/gamma emitter dose contributions to the maximum allowable dose of 4 mrem/yr. Compare alpha emitter dose contributions to the maximum allowable gross particle activity of 15 pCi/L or 1/25th of the derived concentration guide (DCG).

Table of Contents:

Given/References:
1) RESRAD derived groundwater radionuclide concentrations from Calculation 0100C-CA-V0035, *118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief*. To be conservative, the highest predicted groundwater concentrations of the individual radionuclides from the combined Areas 1, 2, 3, and 4 and from the overburden/below cleanup level soil and the staging pile (stockpile) soil are evaluated to determine if the maximum allowable dose of 4 mrem/yr may be exceeded.

2) Remedial action goals for groundwater and MCLs are summarized in Table 2-3 of the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP), DOE/RL-96-17, Rev. 5, U.S. Department of Energy, Richland Operations office, Richland, WA.

3) Maximum allowable dose of 4 mrem/yr for beta/gamma emitters and maximum allowable gross particle activity of 15 pCi/L for alpha emitters from: 40 CFR 141, "National Primary Drinking Water Regulation," *Code of Federal Regulations*, as amended (40 CFR Part 141, Subpart G, 141.66).

4) 1/25th of the derived concentration guide values from *Radiation Protection of the Public and Environment,* DOE Order 5400.5, U.S. Department of Energy, Washington D.C.

5) Individual organ-dose caclulation methodology for beta/gamma emitter dose contribution to the maximum allowable dose of 4 mrem/yr from: *Maximum Permissible Body Burdens and Maximum Permissible Concetrations of Radionuclides in Air or Water for Occupational Exposure*, National Bureau of Standards (NBS) Handbook 69, as amended, U.S. Department of Commerce, Washington D.C., and National Primary Drinking Water Regulations, EPA-570/9-76-003, U.S. Environmental Protection Agency, Office of Water Supply, Washington D.C.

Solution:
1. The site data for the calculation are the groundwater concentrations for the contaminants of concern (COCs) (daughter products are not considered) over time from the RESRAD groundwater concentration file.

2. Where the site conceptual model breaks the contamination into multiple layers with differing concentrations, then the groundwater concentrations from the various model runs are added (for each time interval) to provide the concentration data for comparison to the individual remedial action goals and MCLs and the dose calculation for the beta and gamma emitters.

3. Compare the summed concentrations for each radionuclide to the groundwater remedial action goal and MCL given in the RDR/RAWP, Table 2-3.

4. The cumulative dose for each organ for all beta and gamma emitting COCs (C-14, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, Ni-63, and Sr-90) at time t is calculated separately using the concentration corresponding to 4 mrem/year dose (C4) and the sum of fractions equation shown below (from EPA-570/9-76-003). The organs for which doses need to be computed are total body, bone, liver and gastrointestinal tract [lower large intestine] (GI(LLI)). The individual organ doses are compared to 4 mrem/yr.

Doseorgan x (t) = [ConcA(t)/C4A(x) + ConcB(t)/C4B(x) + ...] x (4 mrem/yr)

where:
Doseorgan x (t) is the total dose to organ x in mrem/yr
ConcA(t) is the concentration of isotope A at time t in pCi/L
C4A(x) is the 4 mrem/yr dose equivalent concentration for organ x of isotope A at time t in pCi/L
If the dose for organ x < 4 mrem/yr, then the standard is met.

Conclusions:
1. The summed concentrations for each radionuclide COC are less than the groundwater remedial action goals and MCLs given in the RDR/RAWP, Table 2-3.

2. The cumulative dose for each total body, bone, liver and gastrointestinal tract for all beta and gamma emitting COCs is less than 4 mrem/yr

3. RESRAD modeling indicates that the alpha emitting COCs (Am-241, Pu-238, Pu-239, Pu-240, and Pu-241) will not impact groundwater. Therefore, concentrations for the alpha emitting COCs are less than the maximum allowable gross particle activity of 15 pCi/L and the 1/25th of the DCG.

4. The total uranium COCs (U-233/234, U-235, and U-238) are present at concentrations less than natural background.

Comparison of the summed concentrations for each radionuclide to the GW MCL
Data derived from RESRAD modelling, units are pCi/L.

Radionuclide	Time (years) 0	1	3	8	12	43	131	300	1000	MCL	Exceeds MCL?	Peak Conc.	Year of Peak Conc.
C-14	0	0	0	0	0	0	0	0	0	2,000	No	0	0
Cs-137	0	1.78E-03	5.11E-03	1.21E-02	1.66E-02	2.90E-02	1.16E-02	5.33E-04	0	60	No	2.90E-02	43
Co-60	0	2.24E-03	5.15E-03	7.12E-03	6.31E-03	3.84E-04	1.10E-08	5.60E-18	2.24E-03	100	No	7.12E-03	8
Eu-152	0	0	0	0	0	0	0	0	0	200	No	0	0
Eu-154	0	0	0	0	0	0	0	0	0	60	No	0	0
Eu-155	0	0	0	0	0	0	0	0	0	600	No	0	0
H-3	0	2.37E+03	5.43E+03	4.02E+03	1.64E+03	1.53E+00	3.62E-09	7.68E-26	0	20000	No	5.43E+03	3
Ni-63	0	3.08E-01	9.11E-01	2.34E+00	3.41E+00	9.77E+00	1.57E+01	1.06E+01	2.20E-01	50	No	1.57E+01	131
Sr-90	0	2.26E-02	6.46E-02	1.53E-01	2.08E-01	3.57E-01	1.33E-01	5.44E-03	5.10E-10	8	No	3.57E-01	43

Washington Closure Hanford

CALCULATION SHEET

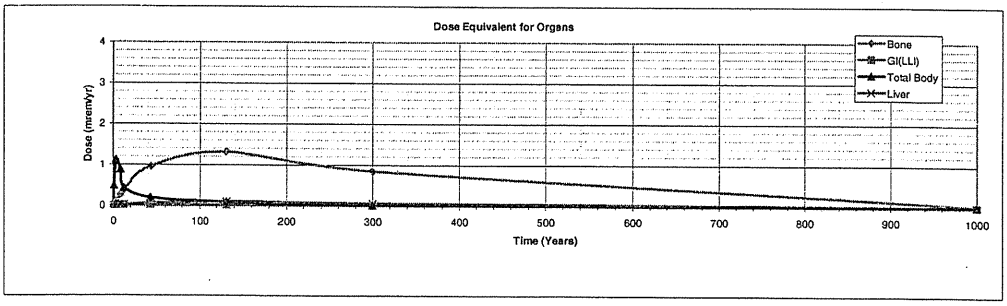
Originator	S. W. Clark	Date 12/19/06	Calc. No. 0100C-CA-V0036		Rev. No. 1
Project	118-C-1 Burial Ground Cleanup Verification	Job 14695	Checked M. W. Perrott		Date 12/19/06
Subject	118-C-1 Burial Ground Comparison to Drinking Water Standards (MCL) Calculation				Sheet No. 3 of 3

Comparison of the summed concentrations for each radionuclide to the groundwater maximum contaminant levels (MCL)
Data derived from RESRAD modelling, units are pCi/L.

Radionuclide	Time (years) 0	1	3	8	12	43	131	300	1000	Organ	C_4	Exceeds 4 mrem/yr?	Peak Conc.	Year of Peak Conc.
C-14	0	0	0	0	0	0	0	0	0	Total Body	9,000	No	0	0
										Bone	2,000	No		
										Fat	2,000	No		
Cs-137	0	1.78E-03	5.11E-03	1.21E-02	1.66E-02	2.90E-02	1.16E-02	5.33E-04	0	Bone	80	No	2.90E-02	43
										GI(LLI)	2,000	No		
										Total Body	200	No		
										Liver	60	No		
Co-60	0	2.24E-03	5.15E-03	7.12E-03	6.31E-03	3.84E-04	1.10E-08	5.60E-18	2.24E-03	GI(LLI)	100	No	7.12E-03	8
										Total Body	900	No		
										Liver	3,000	No		
Eu-152	0	0	0	0	0	0	0	0	0	Bone	30,000	No	0.00E+00	0
										GI(LLI)	200	No		
										Total Body	200,000	No		
										Liver	100,000	No		
Eu-154	0	0	0	0	0	0	0	0	0	Bone	5,000	No	0.00E+00	0
										GI(LLI)	60	No		
										Total Body	70,000	No		
										Liver	60,000	No		
Eu-155	0	0	0	0	0	0	0	0	0	Bone	100,000	No	0.00E+00	0
										GI(LLI)	600	No		
										Total Body	900,000	No		
										Liver	600,000	No		
H-3	0	2.37E+03	5.43E+03	4.02E+03	1.64E+03	1.53E+00	3.62E-09	7.68E-26	0	Total Body	20,000	No	5.43E+03	3
Ni-63	0	3.08E-01	9.11E-01	2.34E+00	3.41E+00	9.77E+00	1.57E+01	1.06E+01	2.20E-01	Bone	50	No	1.57E+01	131
										GI(LLI)	3,000	No		
										Total Body	2,000	No		
										Liver	600	No		
Sr-90	0	2.26E-02	6.46E-02	1.53E-01	2.08E-01	3.57E-01	1.33E-01	5.44E-03	5.10E-10	Bone	8	No	3.57E-01	43
										GI(LLI)	100	No		
										Total Body	8	No		

Cumulative dose for each organ (with time)

Organ	Time (years) 0	1	3	8	12	43	131	300	1000	Exceeds 4 mrem/yr?	Peak Dose	Year of Peak Dose
Bone	0	3.60E-02	1.05E-01	2.64E-01	3.78E-01	9.62E-01	1.32E+00	8.51E-01	1.76E-02	No	1.32E+00	131
GI(LLI)	0	1.41E-03	4.01E-03	9.55E-03	1.32E-02	2.74E-02	2.63E-02	1.44E-02	3.83E-04	No	2.74E-02	43
Total Body	0	4.86E-01	1.12E+00	8.85E-01	4.39E-01	1.99E-01	9.81E-02	2.39E-02	4.50E-04	No	1.12E+00	3
Liver	0	2.17E-03	6.42E-03	1.64E-02	2.38E-02	6.71E-02	1.05E-01	7.07E-02	1.47E-03	No	1.05E-01	131



CALCULATION COVER SHEET

Project Title 118-C-1 Burial Ground Cleanup Verification **Job No.** 14655
Area 100 B/C Area
Discipline Environmental ***Calc. No.** 0100C-CA-V0035
Subject 118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief
Computer Program RESRAD **Program No.** Version 6.30

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 pg Summary – 8 pg Attm. 1 - 2 pg Attm. 2 - 1 pg Attm. 3 - 19 pg Attm. 4 - 20 pg Attm. 5 - 10 pg Attm. 6 - 21 pg Attm. 7 - 29 pg Attm. 8 - 10 pg Attm. 9 - 20 pg Attm. 10 - 20 pg Attm. 11 - 10 pg Attm. 12 – 19 pg Attm. 13 – 20 pg Attm. 14 – 10 pg Attm. 15 – 22 pg Attm. 16 – 29 pg Attm. 17 - 10 pg Attm. 18 – 18 pg Attm. 19 – 20 pg Attm. 20 - 10 pg Attm. 21 - 20 pg Attm. 22 – 20 pg Attm. 23 – 10 pg Attm. 24 – 19 pg Attm. 25 – 20 pg Attm. 26 – 10 pg Total – 428 pages	S. W. Clark S.W. Clark 12/13/06	M. W. Perrott M.W. Perrott 12/13/06	T. M. Blakley M J Appel for TM Blakley per telecon 12/13/06	D. N. Strom D.N. Strom 12-13-06	12-13-06

SUMMARY OF REVISION

WCH-DE-018 (9/01/2006) *Obtain Calc. No. from R&DC and Form from Intranet

Washington Closure Hanford CALCULATION SHEET

Originator:	S. W. Clark	Date:	12/13/06	Calc. No.:	0100C-CA-V0035	Rev.:	0
Project:	118-C-1 Burial Ground Cleanup	Job No:	14655	Checked:	M. W. Perrott	Date:	12/13/06
Subject:	118-C-1 Burial Ground Cleanup Verification RESRAD Calculation Brief					Sheet No. 1 of 8	

PURPOSE:

Calculate the soil and groundwater concentrations, dose, and risk contributions from remaining radionuclide contaminants in remediated 118-C-1 Burial Ground areas, in overburden/below cleanup level soil, and in staging pile (stockpile) areas over a period of 1,000 years.

GIVEN/REFERENCES:

1) Cleanup verification data from *118-C-1 Burial Ground 95% UCL Calculation*, Calculation No. 0100C-CA-V0033, Rev. 0, Washington Closure Hanford, Richland, Washington.
2) *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP), DOE/RL-96-17, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
3) Radioactive and nonradioactive contaminants of concern from the *100 Area Burial Grounds Remedial Action Sampling and Analysis Plan*, DOE/RL-2001-35, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. For the purpose of these RESRAD calculations, the radioactive contaminants of potential concern (COPCs) are americium-241, carbon-14, cesium-137, cobalt-60, europium-152, europium-154, europium-155, nickel-63, plutonium-238, plutonium-239/240, plutonium-241, silver-108m, strontium-90, tritium (H-3), uranium-233/234, uranium-235, and uranium-238. The nonradionuclide contaminants of concern are cadmium, hexavalent chromium, mercury, PCBs, SVOAs, TPH, and VOAs.
4) RESidual RADioactivity (RESRAD) computer code, version 6.30, to calculate compliance with residual radioactivity guidelines, developed for the U.S. Department of Energy by the Environmental Assessment Division of Argonne National Laboratory, Argonne, Illinois.
5) Sample design data from the *118-C-1 Burial Ground Sampling Plan*, Calculation No. 0100B-CA-V0288, Rev. 0, Washington Closure Hanford, Richland, Washington..
6) Groundwater elevation from *Hanford Groundwater Monitoring for Fiscal Year 2005*, PNNL-15670, Pacific Northwest National Laboratory, Richland, Washington.

SOLUTION:

1) Separate RESRAD runs were performed for the 118-C-1 Burial Ground trenches with spent nuclear fuel (Area 1), other trenches (Area 2), west interstitial area (Area 3), east interstitial area (Area 4), combined Areas 1, 2, 3, and 4, overburden/below cleanup level (OB/BCL) material, and staging pile (stockpile) area (SPA). The RESRAD run for the combined Areas 1, 2, 3, and 4 was done using using the maximum 95% UCL values from the individual Areas. Table 1 shows the elevations (NAVD88) and thickness of each soil horizon. The average surrounding grade elevation and the maximum excavation depth are used to represent the burial ground excavation. Attachment 1 shows representative dimensions of soil horizons and contaminant pathways considered for dose, risk, and groundwater protection. Attachment 2 shows a schematic of the 118-C-1 Burial Ground area with the pieces making up the individual units labeled. Input factors for each run are shown in the "Summary" section of the RESRAD "Mixture Sums and Single Radionuclide Guidelines" printouts in the Attachments to this Calculation Summary.

Table 1. Waste Site Dimensions for RESRAD Modeling

Parameter	Units	Area 1	Area 2	Area 3	Area 4	Combined Areas	OB/BCL	Shallow Zone SPA	Deep Zone SPA
Contaminated Zone Dimensions									
Cover Depth	m	0	0	0	0	0	0	0	4.6
Area of Contaminated Zone (CZ)	m^2	3,018	2,339	7,576	7,576	20,509	9,006	23,230	23,230
Length Parallel to Aquifer Flow	m	75	85	130	130	150	80	240	240
Elevations of Vadose Zone Horizons									
Elevation: Surface	m	150.0	149.0	151.0	151.0	151.0	151.5	148.5	148.5
Elevation: Bottom of Excavation	m	145.5	146.0	146.0	146.0	146.0	--	--	--
Elevation: Groundwater	m	121.8	121.8	121.8	121.8	121.8	121.8	121.8	121.8
Thickness: Contaminated Zone	m	28.2	27.2	29.2	29.2	29.2	29.7	4.6	22.1
Thickness: Unsaturated Zone	m	0	0	0	0	0	0	22.1	0

OB/BCL = Overburden/Below Cleanup Levels
SPA = Staging Pile (Stockpile) Area

2) The year where the peak dose (or concentration) occurs from each individual radionuclide COC and layer is determined by a preliminary run. This year is then added for all horizons for the final RESRAD runs. For the direct exposure pathway (i.e. soil ingestion and inhalation and external radiation), the peak year occurred at year zero (year 2006) for all COCs. For the water pathways (i.e. drinking water and food ingestion) the peak year was year 3 for tritium, year 8 for cobalt-60, year 43 for cesium-137 and strontium-90, and year 131 for nickel-63. The 3, 8, 43, and 131-year time periods were added to all RESRAD runs.

To be conservative, shallow zone evaluations were performed for the 118-C-1 Burial Ground areas assuming that the residual contamination levels from the shallow zone sample data sets extend uniformly from the surface to groundwater (Attachment 1). For Area 2 and the combined Areas 1, 2, 3, and 4 this evaluation is too conservative and carbon-14 in the pathways affected by plant ingestion caused the total all pathways dose to be greater than 15 mrem/yr. Because the residual carbon-14 is deeper than the root penetration zone (10 ft), and not accessible to plants, the RESRAD inputs for "contaminated fractions" in the plant ingestion input parameters for Area 2 and the combined Areas 1, 2, 3, and 4 are set equal to zero.

For the staging pile area (SPA) the maximum carbon-14 concentration (182 pCi/g) is above the direct exposure lookup value (5.16 pCi/g per the 100 Area RDR/RAWP) while carbon-14 in all other SPA sampling grid areas was undetected. The soil that contains carbon-14 above lookup values will be used as backfill in deep zone areas and has been evaluated in RESRAD as SPA deep zone material (with 4.6 m [15 ft] of cover; see Table 2).

METHODOLOGY:

1) Runs of RESRAD version 6.30 were completed for the 118-C-1 Burial Ground trenches with spent nuclear fuel (Area 1), other trenches (Area 2), west interstitial area (Area 3), east interstitial area (Area 4), the combined Areas 1, 2, 3, and 4, overburden/below cleanup level (OB/BCL) material, and staging pile area (SPA) soils using the radionuclide concentrations shown in Table 2. RESRAD numerical output reports for dose, risk, and concentration for the shallow zone, deep zone, and overburden are presented in the Attachments to this calculation summary.

Table 2. Cleanup Verification Data Set [a]

COPCs	Area 1	Area 2	Area 3	Area 4	Combined Areas	OB/BCL	Shallow Zone SPA	Deep Zone SPA
Radionuclide Activity (pCi/g)								
Am-241	--	--	--	--	--	--	--	--
C-14	--	8.0	--	--	8.0	--	--	182
Cs-137	0.185	0.140	0.709	0.81	0.140	0(<BG)	1.03	0.091
Co-60		0.99	0.037		0.99	--	0.029	--
Eu-152	0.121	0.199	0.140	0.114	0.199	--	0.177	--
Eu-154	--	--	--	--	--	--	--	--
Eu-155	--	--	--	--	--	--	--	--
Ni-63		26.1			26.1	--		--
Pu-238	--	--	--	--	--	--	--	--
Pu-239/240	--	--	--	--	--	--	--	--
Pu-241	--	--	--	--	--	--	--	--
Silver (Ag-108m)	--	--	--	--	--	--	--	--
Sr-90	--	--	0.268	--	0.268	1.23	0.334	--
Tritium (H-3)		4.76	--	--	4.76	--	--	--
U-233/234	0(<BG)	--	0(<BG)	0(<BG)	0(<BG)	0(<BG)	0(<BG)	--
U-235	0(<BG)	--	--	--	0(<BG)	--	0(<BG)	--
U-238	0(<BG)	--	0(<BG)	0(<BG)	0(<BG)	0(<BG)	0(<BG)	--

-- = Not evaluated by laboratory analysis or not detected (for all samples in the data set).
OB/BCL = Overburden/Below Cleanup Levels
SPA = Staging Pile (Stockpile) Area
[a] Soil concentration values are from *118-C-1 Burial Ground 95% UCL Calculation*, Calculation No. 0100C-CA-V0033, Rev. 0, Washington Closure Hanford, Richland, Washington. Refer to the 95% UCL for nonradionuclide concentrations. Nonradionuclides are not evaluated in this RESRAD calculation.

RESULTS:

1) Radionuclide "All Pathways" Dose Rate

The "all pathways" (maximum) dose rates are shown in Table 3. The maximum all pathways dose rate from the 118-C-1 Burial Ground combined Areas 1, 2, 3, and 4 is 12.8 mrem/yr at year zero (2006). The maximum all-pathways dose rate for the overburden (OB/BCL) soil is 4.01 mrem/yr at year zero (2006). For the staging pile area (SPA) the total maximum all-pathways dose rate for the shallow and deep zones is 12.4 mrem/yr at year zero (2006).

Table 3. All Pathways Dose Rate (mrem/yr)

RESRAD Run	Vadose Zone Horizons	"All Pathways" Dose Contributions in mrem/yr at Each Time Slice (yr)								
		0	1	3	8	12	43	131	300	1000
Area 1	Shallow Zone	9.45E-01	9.09E-01	8.41E-01	6.95E-01	6.00E-01	2.12E-01	2.10E-02	4.13E-04	4.01E-11
Area 2	Shallow Zone	1.11E+01	9.91E+00	7.95E+00	4.36E+00	2.77E+00	2.40E-01	2.23E-02	4.91E-03	5.61E-05
Area 3	Shallow Zone	3.54E+00	3.41E+00	3.16E+00	2.65E+00	2.33E+00	1.01E+00	1.24E-01	2.50E-03	2.22E-10
Area 4	Shallow Zone	2.43E+00	2.36E+00	2.23E+00	1.94E+00	1.73E+00	7.69E-01	9.46E-02	1.91E-03	1.88E-10
Combined Areas		1.28E+01	1.16E+01	9.46E+00	5.70E+00	3.89E+00	7.26E-01	8.82E-02	6.59E-03	1.01E-04
OB/BCL	Shallow Zone	4.01E+00	3.92E+00	3.74E+00	3.34E+00	3.04E+00	1.49E+00	1.95E-01	3.91E-03	2.47E-10
SPA	Shallow Zone	1.24E+01	1.18E+01	1.08E+01	8.72E+00	7.38E+00	2.31E+00	1.91E-01	3.39E-03	2.39E-10
SPA	Deep Zone	0.00E+00	2.94E-05	9.38E-05	2.30E-04	3.16E-04	5.58E-04	2.23E-04	1.03E-05	3.22E-12
SPA Total All Pathway Dose Rate (mrem/yr)		1.24E+01	1.18E+01	1.08E+01	8.72E+00	7.38E+00	2.31E+00	1.91E-01	3.40E-03	2.42E-10

OB/BCL = Overburden/Below Cleanup Levels
SPA = Staging Pile (Stockpile) Area

2) Radionuclide Excess Lifetime Cancer Risk

The radionuclide excess lifetime cancer risk (ELCR) results are shown in Table 4. The maximum ELCR for the 118-C-1 Burial Ground combined Areas 1, 2, 3, and 4 is 9.95 x 10^{-5} at year zero (2006). The maximum ELCR for the overburden (OB/BCL) soil is 5.42 x 10^{-5} which also occurs at year zero (2006). For the staging pile area (SPA) the total maximum all-pathways ELRC for the shallow and deep zones is 1.55 x 10^{-4} at year zero (2006).

Table 4. Radionuclide Excess Lifetime Cancer Risk

RESRAD Run	Vadose Zone Horizons	Excess Cancer Risk at Each Time Slice (yr)								
		0	1	3	8	12	43	131	300	1000
Area 1	Shallow Zone	1.28E-05	1.24E-05	1.15E-05	9.63E-06	8.38E-06	3.16E-06	3.36E-07	6.68E-09	6.45E-16
Area 2	Shallow Zone	7.35E-05	6.60E-05	5.34E-05	3.12E-05	2.11E-05	3.24E-06	5.05E-07	1.62E-07	1.80E-09
Area 3	Shallow Zone	4.81E-05	4.66E-05	4.38E-05	3.77E-05	3.37E-05	1.51E-05	1.89E-06	3.78E-08	3.37E-15
Area 4	Shallow Zone	3.70E-05	3.60E-05	3.41E-05	2.98E-05	2.68E-05	1.22E-05	1.53E-06	3.09E-08	3.02E-15
Combined Areas		9.95E-05	9.07E-05	7.60E-05	5.04E-05	3.79E-05	1.11E-05	1.57E-06	1.97E-07	3.32E-09
OB/BCL	Shallow Zone	5.42E-05	5.29E-05	5.05E-05	4.50E-05	4.10E-05	2.00E-05	2.59E-06	5.09E-08	3.14E-15
SPA	Shallow Zone	1.55E-04	1.49E-04	1.37E-04	1.12E-04	9.57E-05	3.20E-05	2.88E-06	5.20E-08	3.74E-15
SPA	Deep Zone	7.15E-09	7.51E-09	8.18E-09	9.55E-09	1.04E-08	1.13E-08	3.80E-09	1.66E-10	5.05E-17
SPA Total ELCR		1.55E-04	1.49E-04	1.37E-04	1.12E-04	9.57E-05	3.20E-05	2.89E-06	5.21E-08	3.79E-15

OB/BCL = Overburden/Below Cleanup Levels
SPA = Staging Pile (Stockpile) Area

3) Radionuclide Groundwater Protection

The radionuclide concentrations in groundwater calculated by the RESRAD model are summarized in Table 5. Among the radionuclide contaminants of concern only cesium-137, cobalt-60, nickel-63, strontium-90, and tritium are calculated to reach groundwater in the 1,000 years of the RESRAD model run. The organ specific dose via the groundwater (and river) pathway is presented in a separate calculation brief [*118-C-1 Burial Ground Comparison To Drinking Water Standards (MCL) Calculation*, Calculation No. 0100C-CA-V0036, Rev. 0, Washington Closure Hanford, Richland, Washington]. Only concentrations are presented here.

Table 5. Predicted Groundwater (Well Water/Drinking Water) Concentrations (2 pages)

Radio-nuclides	Vadose Zone Horizon	Groundwater Concentrations in pCi/L at Each Time Slice (yr)									RAGs, pCi/L
		0	1	3	8	12	43	131	300	1000	
Cs-137	Area 1 SZ	0	4.65E-04	1.33E-03	3.17E-03	4.33E-03	7.58E-03	3.02E-03	1.39E-04	4.34E-11	60
	Area 2 SZ	0	3.52E-04	1.01E-03	2.40E-03	3.28E-03	5.74E-03	2.29E-03	1.05E-04	3.29E-11	
	Area 3 SZ	0	1.78E-03	5.11E-03	1.21E-02	1.66E-02	2.91E-02	1.16E-02	5.33E-04	1.67E-10	
	Area 4 SZ	0	2.04E-03	5.84E-03	1.39E-02	1.90E-02	3.32E-02	1.32E-02	6.09E-04	1.90E-10	
	Comb. Areas	0	1.78E-03	5.11E-03	1.21E-02	1.66E-02	2.90E-02	1.16E-02	5.33E-04	1.66E-10	
	OB/BCL	0	0	0	0	0	0	0	0	0	
	SPA SZ	0	0	0	0	0	0	0	0	0	
	SPA DZ	0	2.29E-04	6.56E-04	1.56E-03	2.13E-03	3.73E-03	1.49E-03	6.85E-05	2.15E-11	
	SPA Total	0	2.29E-04	6.56E-04	1.56E-03	2.13E-03	3.73E-03	1.49E-03	6.85E-05	2.15E-11	
Co-60	Area 1 SZ	0	0	0	0	0	0	0	0	0	100
	Area 2 SZ	0	2.24E-03	5.15E-03	7.12E-03	6.31E-03	3.84E-04	1.10E-08	5.60E-18	0	
	Area 3 SZ	0	8.35E-05	1.93E-04	2.66E-04	2.36E-04	1.43E-05	4.11E-10	2.10E-19	0	
	Area 4 SZ	0	0	0	0	0	0	0	0	0	
	Comb. Areas	0	2.24E-03	5.15E-03	7.12E-03	6.31E-03	3.84E-04	1.10E-08	5.60E-18	2.24E-03	
	OB/BCL	0	0	0	0	0	0	0	0	0	
	SPA SZ	0	0	0	0	0	0	0	0	0	
	SPA DZ	0	0	0	0	0	0	0	0	0	
	SPA Total	0	0	0	0	0	0	0	0	0	
Ni-63	Area 1 SZ	0	0	0	0	0	0	0	0	0	50
	Area 2 SZ	0	3.08E-01	9.11E-01	2.34E+00	3.41E+00	9.77E+00	1.57E+01	1.06E+01	1.30E-01	
	Area 3 SZ	0	0	0	0	0	0	0	0	0	
	Area 4 SZ	0	0	0	0	0	0	0	0	0	
	Comb. Areas	0	3.08E-01	9.11E-01	2.34E+00	3.41E+00	9.77E+00	1.57E+01	1.06E+01	2.20E-01	
	OB/BCL	0	0	0	0	0	0	0	0	0	
	SPA SZ	0	0	0	0	0	0	0	0	0	
	SPA DZ	0	0	0	0	0	0	0	0	0	
	SPA Total	0	0	0	0	0	0	0	0	0	

Washington Closure Hanford CALCULATION SHEET

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Table 5. Predicted Groundwater (Well Water/Drinking Water) Concentrations (2 pages)

Radio-nuclides	Vadose Zone Horizon	Groundwater Concentrations in pCi/L at Each Time Slice (yr)									RAGs, pCi/L
		0	1	3	8	12	43	131	300	1000	
Sr-90	Area 1 SZ	0	0	0	0	0	0	0	0	0	8
	Area 2 SZ	0	0	0	0	0	0	0	0	0	
	Area 3 SZ	0	4.92E-03	1.41E-02	3.33E-02	4.54E-02	7.77E-02	2.91E-02	1.18E-03	1.53E-10	
	Area 4 SZ	0	0	0	0	0	0	0	0	0	
	Comb. Areas	0	4.92E-03	1.41E-02	3.33E-02	4.54E-02	7.77E-02	2.90E-02	1.18E-03	1.77E-10	
	OB/BCL	0	2.26E-02	6.46E-02	1.53E-01	2.08E-01	3.57E-01	1.33E-01	5.44E-03	5.10E-10	
	SPA SZ	0	0	0	0	0	0	0	0	0	
	SPA DZ	0	0	0	0	0	0	0	0	0	
	SPA Total	0	0	0	0	0	0	0	0	0	
Tritium (H-3)	Area 1 SZ	0	0	0	0	0	0	0	0	0	20,000
	Area 2 SZ	0	2.37E+03	5.43E+03	1.82E+03	7.42E+02	6.93E-01	1.64E-09	3.46E-26	0	
	Area 3 SZ	0	0	0	0	0	0	0	0	0	
	Area 4 SZ	0	0	0	0	0	0	0	0	0	
	Comb. Areas	0	2.37E+03	5.43E+03	4.02E+03	1.64E+03	1.53E+00	3.62E-09	7.68E-26	0	
	OB/BCL	0	0	0	0	0	0	0	0	0	
	SPA SZ	0	0	0	0	0	0	0	0	0	
	SPA DZ	0	0	0	0	0	0	0	0	0	
	SPA Total	0	0	0	0	0	0	0	0	0	

RAGs = Remedial action goals from the 100 Area RDR/RAWP
OB/BCL = Overburden/Below Cleanup Levels
SPA = Staging Pile (Stockpile) Area

CONCLUSIONS:

- The "all pathways" (maximum) dose rates are shown in Table 3. The maximum all pathways dose rate from the 118-C-1 Burial Ground excavated combined Areas 1, 2, 3, and 4 is 12.8 mrem/yr at year zero (2006). The maximum all-pathways dose rate for the overburden (OB/BCL) soil is 4.01 mrem/yr at year zero (2006). For the staging pile area (SPA) the total maximum all-pathways dose rate for the shallow and deep zones is 12.4 mrem/yr at year zero (2006).

- The dominant pathway for the dose rate for most of the RESRAD evaluations is direct external exposure (external gamma). See Table 6, below.

- The primary radionuclide contributing to the direct exposure pathway for the majority of the evaluations is cesium-137. The primary radionuclide contributing to the direct exposure pathway for the combined Areas 1, 2, 3, and 4 is cobalt-60. See Table 6, below.

- None of the site COCs are projected to exceed remedial action goals (RAGs).

- The radionuclide excess lifetime cancer risk (ELCR) results are shown in Table 4. The maximum ELCR from the 118-C-1 Burial Ground areas combined Areas 1, 2, 3, and 4 is 9.95×10^{-5} at year zero (2006). The maximum ELCR for the overburden (OB/BCL) soil (5.42×10^{-5}) also occurs at year zero (2006). The total maximum all-pathways ELRC for the staging pile area (SPA) shallow and deep zones is 1.55×10^{-4} at year zero (2006).

Table 6. Dominant Pathways and Primary Radionuclides for RESRAD Evaluations

RESRAD Run	Vadose Zone Horizon	Dominant Pathway	Primary Radionuclide
Area 1	Shallow Zone	External Gamma	Eu-152
Area 2	Shallow Zone	External Gamma	Co-60
Area 3	Shallow Zone	External Gamma	Cs-137
Area 4	Shallow Zone	External Gamma	Cs-137
Combined Areas	Shallow Zone	External Gamma	Co-60
OB/BCL	Shallow Zone	Plant Ingestion	Sr-90
SPA	Shallow Zone	External Gamma	Eu-152
SPA	Deep Zone	Fish	Cs-137

OB/BCL = Overburden/Below Cleanup Levels
SPA = Staging Pile (Stockpile) Area

- Among the radionuclide contaminants of concern, cesium-137, cobalt-60, nickel-63, strontium-90, and tritium are calculated to reach groundwater in the 1,000 years of the RESRAD model run. These radionuclides are predicted to reach groundwater at concentrations significantly below the RAGs.

ATTACHMENTS:

1. Graphic showing 118-C-1 Cleanup Verification Model (2 pages)
2. Schematic of the 118-C-1 Burial Ground Remediation Areas (1 page)
3. RESRAD Output: 118-C-1 Area 1 Shallow Zone Radionuclides – Mixture Sums and Single Radionuclide Guidelines (19 pages)
4. RESRAD Output: 118-C-1 Area 1 Shallow Zone Radionuclides – Intake Quantities and Health Risk Factors (20 pages)
5. RESRAD Output: 118-C-1 Area 1 Shallow Zone Radionuclides – Concentration of Radionuclides, (10 pages)
6. RESRAD Output: 118-C-1 Area 2 Shallow Zone Radionuclides – Mixture Sums and Single Radionuclide Guidelines (21 pages)
7. RESRAD Output: 118-C-1 Area 2 Shallow Zone Radionuclides - Intake Quantities and Health Risk Factors (29 pages)
8. RESRAD Output: 118-C-1 Area 2 Shallow Zone Radionuclides - Concentration of Radionuclides (10 pages)
9. RESRAD Output: 118-C-1 Area 3 Shallow Zone Radionuclides – Mixture Sums and Single Radionuclide Guidelines (20 pages)

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10. RESRAD Output: 118-C-1 Area 3 Shallow Zone Radionuclides - Intake Quantities and Health Risk Factors (20 pages)
11. RESRAD Output: 118-C-1 Area 3 Shallow Zone Radionuclides - Concentration of Radionuclides (10 pages)
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