Date Submitted: 3/6/07 Originator: L. M. Dittmer Phone: 372-9664	**WASTE SITE RECLASSIFICATION FORM** Operable Unit(s): 100-BC-1 Waste Site Code: 100-B-14:2 Type of Reclassification Action: Closed Out ☐ Interim Closed Out ☒ No Action ☐ RCRA Postclosure ☐ Rejected ☐ Consolidated ☐	Control Number: 2004-006

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

Description of current waste site condition:

The 100-B-14:2 subsite encompasses the former sanitary sewer feeder lines associated with the 1607-B2 and 1607-B7 septic systems. Feeder lines associated with the 185/190-B building have also been identified as the 100-B-14:8 subsite, and feeder lines associated with the 1607-B7 septic system have also been identified as the 100-B-14:9 subsite. These two subsites have been administratively cancelled to resolve the redundancy. The 100-B-14:2 subsite was evaluated by confirmatory sampling and determined to require remediation, except for feeder lines associated with the former 1704-B, 1707-BA, 1713-B, 1717-B, 1719-B, and 1722-B facilities. Remedial actions and verification sampling at the remainder of the subsite have been performed in accordance with remedial action objectives and goals established by the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington. The selected action involved (1) evaluating the site using available process information and confirmatory sample data, (2) remediating portions of the site, as necessary, (3) demonstrating through verification sampling that cleanup goals have been met, and (4) proposing the site for reclassification as interim closed out.

Basis for reclassification:

Residual conditions at the feeder lines associated with the former 1704-B, 1707-BA, 1713-B, 1717-B, 1719-B, and 1722-B facilities have been shown to meet the remedial action objectives specified in the Remaining Sites ROD. The remainder of the subsite has been remediated to achieve the same remedial action objectives. The results of verification sampling 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. This subsite does not have a deep zone; therefore, no deep zone institutional controls are required. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 1607-B2 Septic System and 100-B-14:2 Sanitary Sewer System (*attached to Waste Site Reclassification Form Control Number 2006-055 for the 1607-B2 waste site*).*

Waste Site Controls:
Engineered Controls: Yes ☐ No ☒ Institutional Controls: Yes ☐ No ☒ O&M requirements: Yes ☐ No ☒
If any of the Waste Site Controls are checked Yes specify control requirements including reference to the Record of Decision, TSD Closure Letter, or other relevant documents.

K. D. Bazzell	[signature]	3/13/07
DOE Federal Project Director (printed)	Signature	Date
NA		
Ecology Project Manager (printed)	Signature	Date
D. A. Faulk	[signature]	3/21/07
EPA Project Manager (printed)	Signature	Date

REMAINING SITES VERIFICATION PACKAGE FOR THE 1607-B2 SEPTIC SYSTEM AND 100-B-14:2 SANITARY SEWER SYSTEM

Attachment to Waste Site Reclassification Form 2006-055 and 2004-006

RLK 12/2/08

March 2007

REMAINING SITES VERIFICATION PACKAGE FOR THE 1607-B2 SEPTIC SYSTEM AND THE 100-B-14:2 SANITARY SEWER SYSTEM

EXECUTIVE SUMMARY

The 1607-B2 waste site was the primary septic system for 100-B facilities, formerly providing service to the 105-B, 108-B, 115-B/C, 185/190-B, and various 1700-B-series buildings. The 100-B-14 waste site encompasses pre-reactor underground process and sanitary pipelines and sewers, and has been divided into subsites for decision-making purposes based on functional use and geographical location. This remaining sites verification package addresses the 1607-B2 septic system and the 100-B-14:2 subsite, which encompasses the sanitary sewer feeder lines that formerly discharged to the 1607-B2 septic system, as well as the sanitary sewer formerly discharging to the 1607-B7 septic system. The 1607-B7 septic system has been separately remediated and closure documented (BHI 2003a). Portions of the 100-B-14:2 subsite were previously given redundant subsite identification numbers as follows: 100-B-14:8 and 100-B-14:9. These designations have been cancelled to resolve the redundancy.

The sites (100-B-14:2 and 1607-B2) were evaluated during September/October 2003 and June 2005 using confirmatory sampling efforts to make a decision whether remedial action would be required. Focused samples were collected from manholes, pipelines exposed by other remedial activities, and underlying soils. Multiple chemical and radiological contaminants were detected above action levels within the feeder pipelines, and remedial action was determined to be necessary for all of the pipelines, except the feeder lines formerly associated with the 1704-B, 1707-BA, 1713-B, 1717-B, 1719-B, and 1722-B facilities (designated as area 3 of the 100-B-14:2 subsite).

Site remediation consisted of the removal of the sewer piping, septic tank, and drain field, as well as adjacent, potentially-contaminated soils for disposal at the Environmental Restoration Disposal Facility. Overburden material presumed to be below cleanup levels (BCL) was stockpiled on site for use in backfill. Remedial actions were performed so as to not preclude any future uses (as bounded by the rural-residential scenario) and to allow unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep).

Following site remediation, verification sampling of BCL material and soil within the remediation footprints was conducted from August 2005 to July 2006. The results indicated that the waste removal action achieved compliance with the remedial action objectives for the 100-B-14:2 and 1607-B2 waste sites. A summary of the cleanup evaluation for the soil results against the applicable criteria is presented in Table ES-1. The results of the verification sampling are used to make reclassification decisions for the 100-B-14 and 1607-B2 waste sites in accordance with the TPA-MP-14 (DOE-RL 1998) procedure.

In accordance with this evaluation, the verification sampling results support a reclassification of these sites to interim closed out. The current site conditions achieve the remedial action objectives and the corresponding remedial action goals established in the *Remedial Design*

Report/Remedial Action Work Plan for the 100 Area (DOE-RL 2005b) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD) (EPA 1999). The results of verification sampling show that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. These sites do not have a deep zone component; therefore, no deep zone institutional controls are required.

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based on a limited ecological risk assessment. Although not required by the Remaining Sites ROD, a comparison to ecological risk screening levels has been made for the site contaminants of concern, contaminants of potential concern, and other constituents. Ecological screening levels were exceeded for arsenic, barium, boron, cadmium, chromium (total), copper, lead, mercury, nickel, vanadium, zinc, 4,4'-DDD/DDE/DDT, dieldrin, pentachlorophenol, and polychlorinated biphenyls. Exceedance of screening values does not necessarily indicate the existence of risk to ecological receptors. The majority of the exceedances are for constituents confined to the interior of residual pipelines within 100-B-14:2 (area 3). Concentrations of these constituents were quantified below screening levels and/or background levels in soils at other areas of the 100-B-14:2/1607-B2 site. All exceedances at the 100-B-14:2 and 1607-B2 sites will be evaluated in the context of additional lines of evidence for ecological effects following a baseline risk assessment for the river corridor portion of the Hanford Site, which includes a more complete quantitative ecological risk assessment. That baseline risk assessment will be used to support the final closeout decision for the 100-B-14 and 1607-B2 waste sites.

Table ES-1. Summary of Remedial Action Goals for the 1607-B2 and 100-B-14:2 Waste Sites. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain 15-mrem/yr dose rate above background over 1,000 years.	Only cesium-137, tritium, and strontium-90 were detected in closure samples, at activities significantly below the direct exposure dose-equivalence lookup values.	Yes
Direct Exposure – Nonradionuclides	Attain individual COC/COPC RAGs.	Aroclor-1248 and dieldrin were detected within the 100-B-14:2 (area 3) pipelines above direct exposure RAGs. Based on site-specific risk assessment for area 3, residual concentrations of aroclor-1248 and dieldrin satisfy the RAOs for direct exposure. Benzo(a) pyrene and dibenzo(a,h)anthracene were detected within the 100-B-14:2 (area 4) remediation footprint and BCL stockpiles above direct exposure RAGs. Residual PAH concentrations within area 4 were determined to be the result of asphalt cross-contamination. Asphalt that has been used for structural and construction purposes is excluded from consideration as a dangerous waste, is listed as an inert solid waste, and does not present a significant health risk for this waste site. All other COCs/ COPCs were not quantified above direct exposure RAGs in all areas.	Yes
Risk Requirements – Nonradionuclides	Attain a hazard quotient of <1 for all individual noncarcinogens.	All individual hazard quotients are less than 1.	Yes
	Attain a cumulative hazard quotient of <1 for noncarcinogens.	The cumulative hazard quotient for each area is less than 1.	
	Attain an excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	All individual excess cancer risk values are less than 1×10^{-6}.	
	Attain a cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	The total excess cancer risk value for each area is less than 1×10^{-5}.	

Table ES-1. Summary of Remedial Action Goals for the 1607-B2 and 100-B-14:2 Waste Sites. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Groundwater/River Protection – Radionuclides	Attain single-COPC groundwater and river protection RAGs.	Only cesium-137, tritium, and strontium-90 were detected in closure samples, at activities significantly below the lookup values for protection of groundwater and the Columbia River.	Yes
	Attain national primary drinking water standards:[a] 4 mrem/yr (beta/gamma) dose rate to target receptor/organs.		
	Meet drinking water standards for alpha emitters: the most stringent of 15 pCi/L MCL or 1/25th of the derived concentration guides from DOE Order 5400.5.[b]	No alpha-emitting radionuclides were detected in verification samples.	
	Meet total uranium standard of 30 µg/L (21.2 pCi/L).[c]	Uranium was not identified as a site COC/COPC.	N/A
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and river cleanup requirements.	Residual concentrations of multiple organic and inorganic contaminants are above soil RAGs for groundwater and/or river protection. However, these contaminants are not predicted to reach groundwater (and, therefore, the Columbia River) within 1,000 years. Therefore, the residual concentrations achieve the RAOs for groundwater and river protection.	Yes

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

BCL = below cleanup levels
COC = contaminant of concern
COPC = contaminant of potential concern
MCL = maximum contaminant level
N/A = not applicable
PAH = polycyclic aromatic hydrocarbon
RAG = remedial action goal
RAO = remedial action objective

REMAINING SITES VERIFICATION PACKAGE FOR THE 1607-B2 SEPTIC SYSTEM AND THE 100-B-14:2 SANITARY SEWER SYSTEM

STATEMENT OF PROTECTIVENESS

This report demonstrates that the 1607-B2 and 100-B-14:2 waste sites meet the objectives for interim closure as established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2005b) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD) (EPA 1999). Portions of the pipelines within the 100-B-14:2 subsite have also been identified as the 100-B-14:8 and 100-B-14:9 subsites; the latter two subsite designations have been administratively cancelled to resolve the redundancy. The results of verification sampling show that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. This site does not have a deep zone component; therefore, no deep zone institutional controls are required.

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based on a limited ecological risk assessment. Although not required by the Remaining Sites ROD, a comparison to ecological risk screening levels has been made for the site contaminants of concern (COCs), contaminants of potential concern (COPCs), and other constituents. Ecological screening levels were exceeded for arsenic, barium, boron, cadmium, chromium (total), copper, lead, mercury, nickel, vanadium, zinc, 4,4'-DDD/DDE/DDT, dieldrin, pentachlorophenol, and polychlorinated biphenyls. Exceedance of screening values does not necessarily indicate the existence of risk to ecological receptors. The majority of the exceedances are for constituents confined to the residual pipelines within 100-B-14:2 (area 3). Concentrations of these constituents were quantified below screening levels and/or background levels in soils at other areas of the 100-B-14:2/1607-B2 site. All exceedances at the 100-B-14:2 and 1607-B2 sites will be evaluated in the context of additional lines of evidence for ecological effects following a baseline risk assessment for the river corridor portion of the Hanford Site, which includes a more complete quantitative ecological risk assessment. That baseline risk assessment will be used to support the final closeout decision for the 100-B-14 and 1607-B2 waste sites.

GENERAL SITE INFORMATION AND BACKGROUND

The 1607-B2 and 100-B-14:2 waste sites encompass the vitrified clay sanitary sewers, septic tank, and drain field that formerly serviced the 105-B Reactor Building, the 185/190-B Pumphouse, the 108-B Chemical Pumphouse and Tritium Separation Facility, the 115-B/C Gas Recirculation Facility, and miscellaneous 1700-series support buildings. The 100-B-14:2 subsite is also inclusive of the sanitary sewer collection line for the 1607-B7 septic system, formerly servicing the 183-B Filter Plant Pumphouse.

According to the Waste Information Data System (WIDS) (WCH 2006e), the 1607-B2 septic system included a large-capacity (59,620 L [15,750 gal]) septic tank and drain field located north of the 105-B Reactor Building. The system was initially designed to support waste loading from 450 users at a rate of 133 L (35 gal) per capita per day with a 24-hour cell retention time. The 1607-B2 waste site has been administratively divided into two subsites for the purposes of verification sampling: the drain field is designated as the 1607-B2:1 subsite, and the collection main, septic tank, and discharge line to the drain field are collectively designated as the 1607-B2:2 subsite. Both of these subsites are addressed within this remaining sites verification package.

The 100-B-14 waste site, in its entirety, encompasses the underground process pipelines and process and sanitary sewers associated with the 100-B Area pre-reactor cooling water treatment facilities. For confirmatory sampling efforts, the 100-B-14 site was administratively divided into seven subsites for decision-making purposes based on the use of the pipelines (e.g., sanitary versus process sewers), expected sources of contamination, potential differing remedial action determinations, and geographical location. Two additional subsites were, subsequently, created to encompass pipelines thought to have been excluded from the initial delineation, but which had actually been included within the 100-B-14:2 subsite; these subsites were administratively cancelled to resolve the redundancy. The nine subsites, including those cancelled, are as follows:

- 100-B-14:1 Main process sewer collection pipeline
- 100-B-14:2 Sanitary sewer pipelines
- 100-B-14:3 West process sewer feeder lines (182-B and 183-B)
- 100-B-14:4 190-B/105-B cooling water tunnel pipelines
- 100-B-14:5 Sodium dichromate and sodium silicate pipelines
- 100-B-14:6 184-B Powerhouse pipelines
- 100-B-14:7 185-B/190-B sump and process sewer pipelines
- 100-B-14:8 190-B sanitary sewer pipelines (*cancelled*)
- 100-B-14:9 1607-B7 sanitary sewer pipelines (*cancelled*).

The 100-B-14:2 subsite was further divided into five service areas based on the facilities serviced, as follows:

- 100-B-14:2 (area 1) 108-B and 1703-B sanitary sewer pipelines, including sanitary sewer pipelines discovered during previous remedial activites (100-B-21 waste site, pipelines DS-100BC-012 and DS-100BC-034)
- 100-B-14:2 (area 2) 1607-B7 sanitary sewer pipelines (*variously identified as the 100-B-14:9 subsite*)
- 100-B-14:2 (area 3) Miscellaneous 1700-series buildings sanitary sewer pipelines
- 100-B-14:2 (area 4) 190-B Pumphouse sanitary sewer pipelines (*variously identified as the 100-B-14:8 subsite*)
- 100-B-14:2 (area 5) 115-B/C Gas Recirculation Facility sanitary sewer pipelines.

This remaining sites verification package addresses only the sanitary sewers included within the 100-B-14:2 subsite and the 1607-B2 septic system.

Administrative boundaries for the 1607-B2 and 100-B-14:2 waste sites are shown in Figure 1.

CONFIRMATORY EVALUATION AND SAMPLING ACTIVITIES

The 100-B-14:2 subsite was evaluated during September and October 2003 using confirmatory sampling efforts to make a decision whether remedial action would be required at the subsite, with the exception of areas 1 and 3. Sanitary sewer pipelines associated with area 1 were partially removed during the remediation of the underlying 100-B-8 cooling water effluent pipelines (BHI 2004b), and field radiological surveys of exposed portions of the remaining pipelines detected sufficient radiological activity to warrant remedial action without further investigation. Evaluation of area 3 was deferred until June 2005 due to the presence of office trailers associated with 100-B/C Area remediation activities.

Based on the results of confirmatory sampling and previous investigations, it was decided that remedial action was necessary at areas 1, 2, 4, and 5 (BHI 2003c and Feist 2004) and that no further action was required at area 3. A decision was also made that remediation was necessary at the 1607-B2 waste site without further investigation based on the confirmatory sampling results for the influent feeder pipelines.

The following subsections provide additional discussion of the information used to develop the confirmatory sampling design. The results of confirmatory sampling are also summarized to provide support for the no action determination for area 3 and development of the remedial action strategies and verification sample designs for the remaining pipelines.

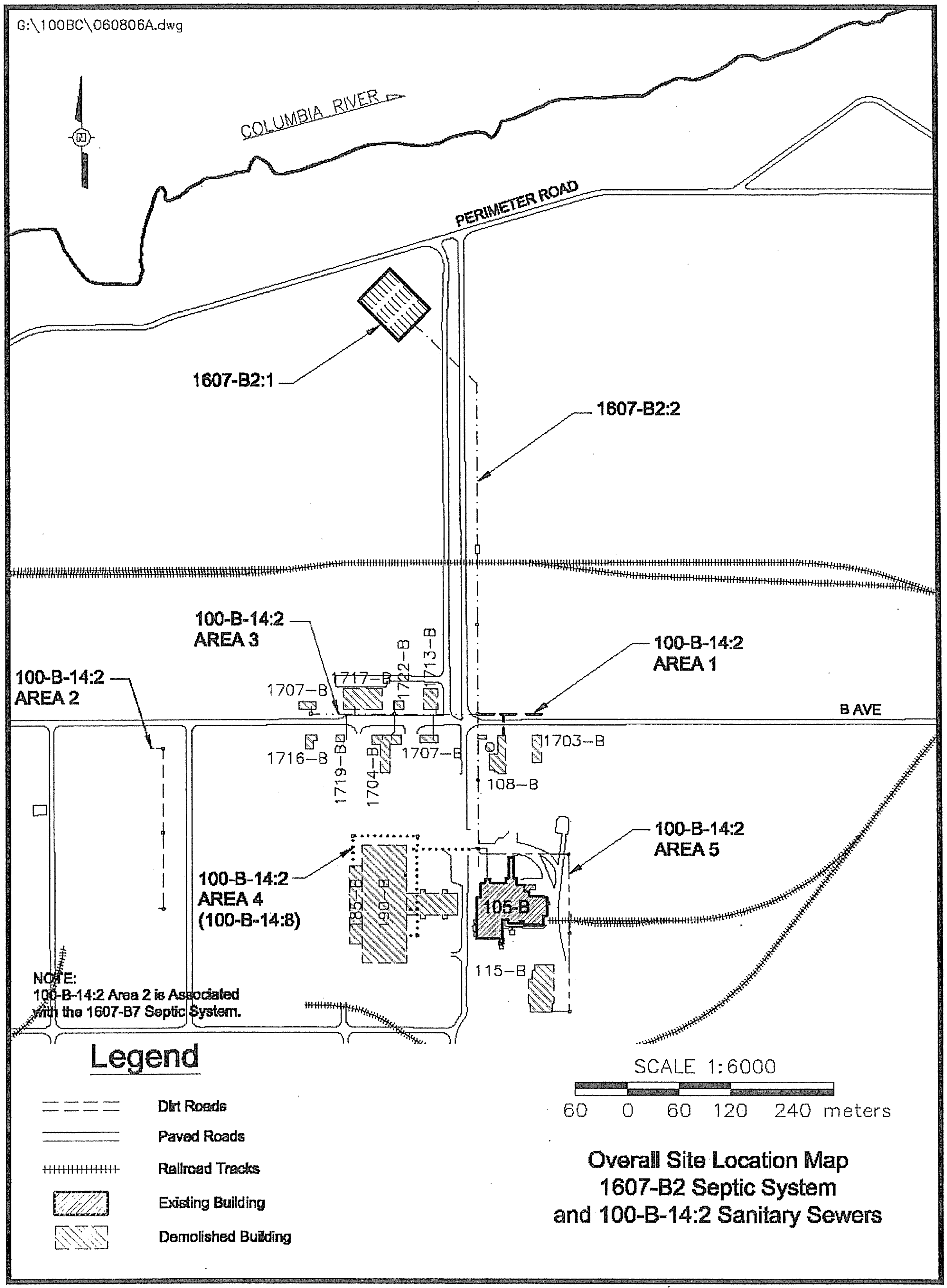
Contaminants of Potential Concern for Confirmatory Sampling

The COPCs for confirmatory sampling at the 100-B-14:2 subsite were identified based on existing analytical data and process knowledge of the facilities serviced by the sewer system. The COPC list included metals, polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs), hexavalent chromium, and chlorinated pesticides. Additionally, tritium was identified as a COPC for area 1, because those pipelines formerly provided service to the 108-B Tritium Separation Facility; and tritium and carbon-14 were identified as COPCs for area 5, because those pipelines formerly provided service to the 115-B Gas Recirculation Facility (BHI 2003c).

Confirmatory Sample Design

Historical information, site construction drawings, process knowledge, and site visit observations were used to develop a confirmatory sampling design with focused sampling in consideration of access and the likely worst case for potential residual contamination, as described below.

Figure 1. Location of the 1607-B2 and 100-B-14:2 Waste Sites.



100-B-14:2 (Area 2), 1607-B7 Sanitary Sewer Pipeline

The confirmatory sample design for the 1607-B7 sanitary sewer pipelines identified two manholes (A1 and A2) and the exposed end of the piping at the boundary of the 1607-B7 septic system remediation footprint (A3/A4) as sampling locations. No accessible sediment was identified at location A1, and an alternate location approximately 50 m (160 ft) south was selected. The remaining samples were collected at the locations identified in the sample design. Sampling locations are shown in Figure 2; a summary of the samples collected and laboratory analyses performed is provided in Table 1.

100-B-14:2 (Area 3), Miscellaneous 1700-Series Buildings Sanitary Sewer Pipelines

Confirmatory sampling for area 3 of the 100-B-14:2 subsite consisted of one sample of pipe sediment collected directly upstream (west) of the former discharge to the 1607-B2:2 pipeline (B1), and one sample from underlying soil at that location (B2). Sampling locations are shown in Figure 2; a summary of the samples collected and laboratory analyses performed is provided in Table 1.

100-B-14:2 (Area 4), 190-B Pumphouse Sanitary Sewer Pipelines

Confirmatory sampling for the 190-B Pumphouse sanitary sewers consisted of samples of sewer contents and underlying soils at two manholes (A9/A10 and A11/A12). Sampling locations are shown in Figure 2; a summary of the samples collected and laboratory analyses performed is provided in Table 1.

100-B-14:2 (Area 5), 115-B/C Gas Recirculation Facility Sanitary Sewer Pipelines

The confirmatory sample design for the 115-B/C Gas Recirculation Facility sanitary sewer pipelines called for collection of samples from sewer contents and underlying soils at a manhole (A13/A14) and at a pipeline location exposed by remediation of the underlying 100-B-8:1 pipeline (A15/A16). A sample was collected from within the manhole, but soils underlying the pipeline were sampled approximately 13.5 m (44 ft) west of the manhole due to access considerations. The exposed section of pipeline identified by the sampling design was inaccessible; therefore, samples were collected at the exposed pipeline at the opposite side of the 100-B-8:1 pipeline excavation (approximately 50 m [164 ft] north of the planned location. Sampling locations are shown in Figure 2; a summary of the samples collected and laboratory analyses performed is provided in Table 1.

Figure 2. Confirmatory Sampling Locations at the 100-B-14:2 Subsite.

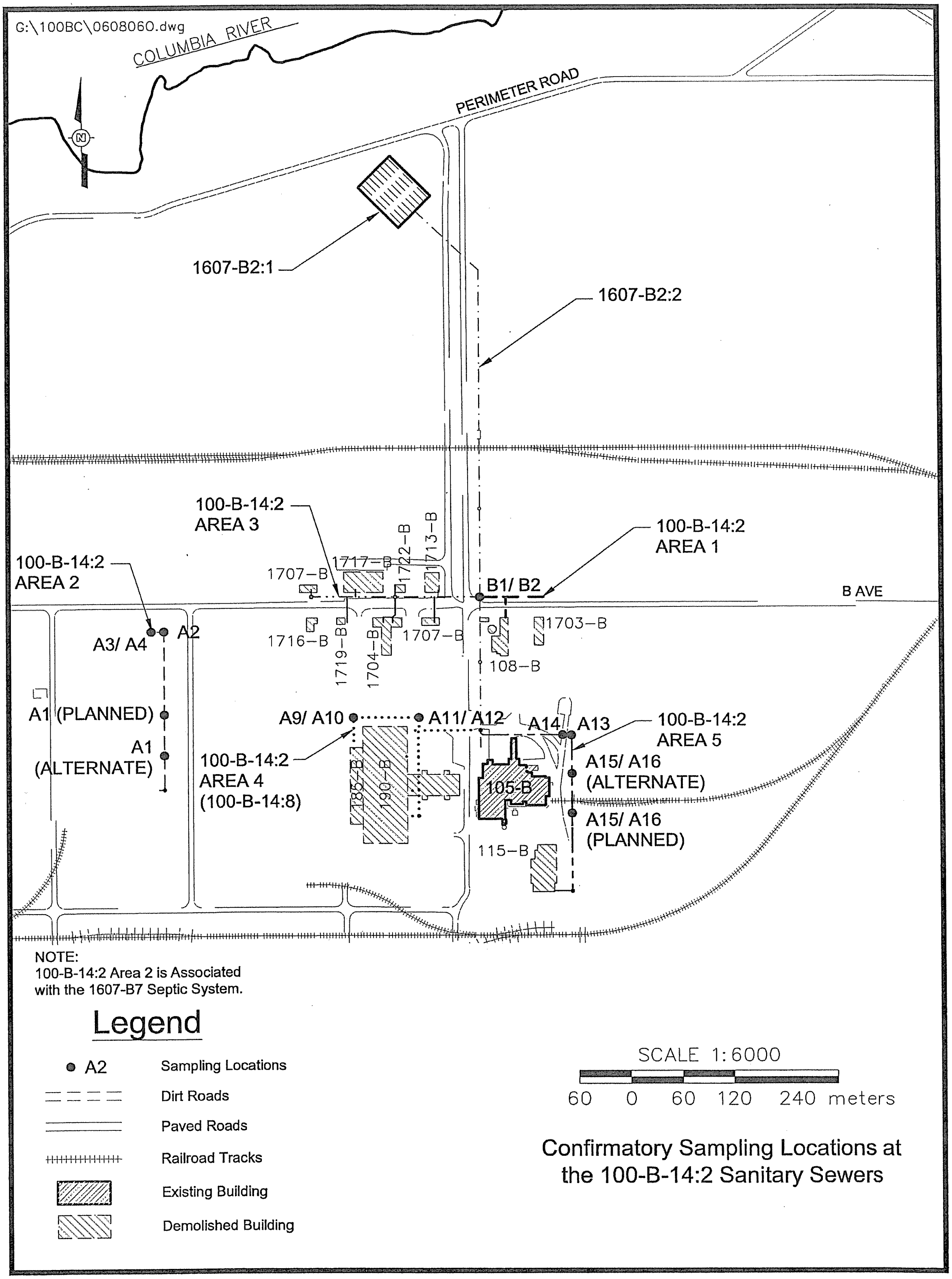


Table 1. Confirmatory Sample Summary for the 100-B-14:2 Subsite. (3 Pages)

Sample Location	Sample Media	Sample Number	Coordinate Locations	Depth (Field estimate, bgs)	Sample Analyses
100-B-14:2 Area 2					
A1 (alternate[a])	Sediment in manhole	J00Y63	N 144551.1 E 564887.4	2.4 m (8 ft)	ICP metals, mercury, PCB, pesticide, SVOA, GEA, gross alpha, and gross beta
		J00Y67			Hexavalent chromium
A2	Sediment and debris in manhole	J00Y64	N 144699.0 E 564887.1	2.4 m (8 ft)	ICP metals, mercury, PCB, pesticide, SVOA, GEA, gross alpha, and gross beta
		J00Y68			Hexavalent chromium
A3	Pipe debris	J00Y65	N 144699.2 E 564855.7	2.4 m (8 ft)	ICP metals, mercury, PCB, pesticide, SVOA, GEA, gross alpha, and gross beta
		J00Y69			Hexavalent chromium
A4	Soil underlying pipeline	J00Y70	N 144699.2 E 564855.7	2.4 m (8 ft)	ICP metals, mercury, hexavalent chromium, PCB, pesticide, SVOA, GEA, gross alpha, and gross beta
Duplicate of J00Y70	Soil underlying pipeline	J00Y71	N 144699.2 E 564855.7	2.4 m (8 ft)	ICP metals, mercury, hexavalent chromium, PCB, pesticide, SVOA, GEA, gross alpha, and gross beta
Equipment blank	Silica sand	J00Y72	N/A	N/A	ICP metals, mercury, hexavalent chromium, PCB, pesticide, and SVOA
100-B-14:2 Area 3					
B1	Sediment in pipeline	J037M8	N 144739.8 E 565255.4	3.4 m (11 ft)	ICP metals, mercury, PCB, pesticide, herbicide, SVOA, GEA, gross alpha, gross beta, ICP metals (TCLP), mercury (TCLP), PCB (TCLP), and SVOA (TCLP)
		J037M7			Hexavalent chromium
B2	Soil underlying pipeline	J037M6	N 144739.8 E 565255.4	3.7 m (12 ft)	ICP metals, mercury, hexavalent chromium, PCB, pesticide, herbicide, SVOA, GEA, gross alpha, gross beta, ICP metals (TCLP), mercury (TCLP), PCB (TCLP), and SVOA (TCLP)

Table 1. Confirmatory Sample Summary for the 100-B-14:2 Subsite. (3 Pages)

Sample Location	Sample Media	Sample Number	Coordinate Locations	Depth (Field estimate, bgs)	Sample Analyses
100-B-14:2 Area 4					
A9	Sediment and debris in manhole	J00Y74	N 565108.3 E 144595.9	Not recorded	ICP metals, mercury, PCB, pesticide, SVOA, GEA, gross alpha, and gross beta
		J00Y76			Hexavalent chromium
A10	Soil underlying manhole	J00YV2	N 565108.3 E 144595.9	Not recorded	GEA, gross alpha, and gross beta
		J00YV6			ICP metals, mercury, hexavalent chromium, and SVOA
A11	Sediment and debris in manhole	J00Y75	N 565186.0 E 144596.2	Not recorded	ICP metals, mercury, PCB, pesticide, SVOA, GEA, gross alpha, and gross beta
		J00Y77			Hexavalent chromium
A12	Soil underlying manhole	J00YV1	N 565186.0 E 144596.2	Not recorded	GEA, gross alpha, and gross beta
		J00YV5			ICP metals, mercury, hexavalent chromium, and SVOA
Duplicate of J00YV2	Sediment and debris in manhole	J00YV3	N 565108.3 E 144595.9	Not recorded	GEA, gross alpha, and gross beta
Duplicate of J00YV6	Sediment and debris in manhole	J00YV7	N 565108.3 E 144595.9	Not recorded	ICP metals, mercury, hexavalent chromium, and SVOA
Equipment blank	Silica sand	J00YV8	N/A	N/A	ICP metals, mercury, hexavalent chromium, and SVOA
100-B-14:2 Area 5					
A13	Sediment in manhole	J00Y79	N 144574.8 E 565361.0	3.7 m (12 ft)	PCB, pesticide, SVOA, ICP metals (TCLP), mercury (TCLP), GEA, gross alpha, gross beta, tritium, and carbon-14
		J00Y81			Hexavalent chromium
A14	Soil underlying pipeline	J00Y83	N 144574.8 E 565347.3	3.7 m (12 ft)	ICP metals, mercury, hexavalent chromium, PCB, pesticide, SVOA, GEA, gross alpha, gross beta, tritium, and carbon-14

Table 1. Confirmatory Sample Summary for the 100-B-14:2 Subsite. (3 Pages)

Sample Location	Sample Media	Sample Number	Coordinate Locations	Depth (Field estimate, bgs)	Sample Analyses
A15 (alternate[b])	Pipe debris	J00Y80	N 144528.7 E 565361.6	3.7 m (12 ft)	PCB, pesticide, SVOA, ICP metals (TCLP), mercury (TCLP), GEA, gross alpha, gross beta, tritium, and carbon-14
		J00Y82			Hexavalent chromium
A16 (alternate[b])	Soil underlying pipeline	J00Y84	N 144528.7 E 565361.6	3.7 m (12 ft)	ICP metals, mercury, hexavalent chromium, PCB, pesticide, SVOA, GEA, gross alpha, gross beta, tritium, carbon-14, and total beta radiostrontium
Duplicate of J00Y84	Soil underlying pipeline	J00Y85	N 144528.7 E 565361.6	3.7 m (12 ft)	ICP metals, mercury, hexavalent chromium, PCB, pesticide, SVOA, GEA, gross alpha, gross beta, tritium, carbon-14, and total beta radiostrontium
Equipment blank	Silica sand	J00YF5	N/A	N/A	ICP metals, mercury, PCB, pesticide, herbicide and SVOA

Sources: *Remaining Sites Field Sampling*, Logbook EL-1578-1 (BHI 2003b) and *100BC Remaining Pipeline and Sewers Sampling and Field Services*, Logbook EL-1585-2 (BHI 2005b)

[a] No sample material was present at the planned location; alternate location sampled.

[b] Planned location was inaccessible; alternate location sampled.

bgs = below ground surface
GEA = gamma energy analysis
ICP = inductively coupled plasma
N/A = not applicable
PCB = polychlorinated biphenyl
SVOA = semivolatile organic analysis
TCLP = toxicity characteristic leaching procedure

Confirmatory Sample Results

Confirmatory samples were analyzed using analytical methods approved by the U.S. Environmental Protection Agency (EPA) (DOE-RL 2005a), and the results were compared to the cleanup criteria specified in the RDR/RAWP (DOE-RL 2005b). The laboratory results were stored in the Environmental Restoration (ENRE) project-specific database prior to being provided to the Hanford Environmental Information System (HEIS) and are provided in Appendix A as well as summarized below.

<u>100-B-14:2 (Area 2), 1607-B7 Sanitary Sewer Pipeline</u>

Aroclor-1254 was detected in the sample of manhole sediments at a concentration (49 mg/kg) exceeding the direct exposure remedial action goal (RAG). Based on this exceedance, it was determined that remedial action was necessary at the site (Feist 2004), with aroclor-1254 retained as a COC. Multiple metals (including hexavalent chromium), polycyclic aromatic hydrocarbons (PAHs), and chlorinated pesticides were also detected above RAGs in the sample of manhole sediments and retained as site COCs/COPCs.

100-B-14:2 (Area 3), Miscellaneous 1700-Series Buildings Sanitary Sewer Pipelines

A comparison of the maximum concentrations of detected analytes in area 3 of the 100-B-14:2 subsite and the site RAGs is summarized in Table 2 (due to the large number of comparison tables in this document, all comparison table footnotes are provided at the end of the document body to reduce redundancy). Contaminants that were not detected by laboratory analysis are excluded from Table 2. Potassium-40, radium-226, radium-228, thorium-228, and thorium-232 were detected in samples but are not considered in Table 2 because these isotopes are not related to the operational history of the site and were all detected at levels below statistical background activities. (Based on an assumption of secular equilibrium, the background activities for radium-228 and thorium-228 are equal to the statistical background activity of 1.32 pCi/g for thorium-232 [DOE-RL 1996]). Calculated cleanup levels are not presented in the *Cleanup Levels and Risk Calculations (CLARC) Database* (Ecology 2005) under WAC 173-340-740(3) for aluminum, calcium, iron, magnesium, phosphate, potassium, silicon, sodium, and zirconium (results for total phosphorus are attributed to phosphorus in phosphate). These analytes are also essential nutrients and can be eliminated from evaluation as human health concerns per EPA guidance (EPA 1989). Therefore, these constituents are not considered COPCs. The laboratory-reported confirmatory data results for all constituents are provided in Appendix A (Table A-2).

Residual concentrations of aroclor-1248 and dieldrin were detected slightly above their respective direct exposure RAGs in the pipe sediment sample. However, because of the small footprint of the 100-B-14:2 (area 3) pipelines, site-specific risk assessments were performed using *Hanford Site Risk Assessment Methodology* (DOE-RL 1995), incorporating area and occupancy correction factors used in RESRAD software (ANL 2005). Based on these assessments (Appendix B), residual concentrations of aroclor-1248 and dieldrin individually pose excess carcinogenic risks less than 1×10^{-6}, and thus satisfy RAOs. All other site COPCs were detected below direct exposure RAGs.

Protection of Groundwater and/or the Columbia River

A contaminant depth/soil-partitioning coefficient (K_d) value model has been developed to predict if the concentrations of contaminants in soil that exceed cleanup levels for groundwater or river protection are protective of groundwater and the river at a site. The *100 Area Analogous Sites RESRAD Calculations* calculation brief (included in this RSVP as Appendix D) predicts whether or not contaminants in 100 Area soils are expected to migrate to groundwater within a 1,000 year time frame based on their K_d value and the vertical distance to groundwater. The contaminant depth/K_d value model assumes that uncontaminated soil exists in the vadose zone between the bottom of the waste site and groundwater. The assumption of an uncontaminated zone beneath the waste site is reasonable based on analogous site data that includes test pits and boreholes completed at several operable units in the 100 Area, including the 100-B/C Area. The test pit and/or borehole data show that contaminant concentrations that are below direct exposure

Table 2. Comparison of Maximum Detected Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 3) Confirmatory Sampling Event.* (3 Pages)

COPC	Pipe Sediment Analytical Result (pCi/g)	Underlying Soil Analytical Result (pCi/g)	Generic Site Lookup Values[a] (pCi/g)			Does the Pipe Sediment Result Exceed Lookup Values?	Does the Pipe Sediment Result Pass Site-Specific Modeling?	Does the Underlying Soil Result Exceed Lookup Values?
			Shallow Zone Lookup Value[b]	Groundwater Protection Lookup Value	River Protection Lookup Value			
Cesium-137	0.177	ND	6.2	1,465[c]	1,465[c]	No	--	--
COPC	**Pipe Sediment Analytical Result (mg/kg)**	**Underlying Soil Analytical Result (mg/kg)**	**Remedial Action Goals[a] (mg/kg)**			**Does the Pipe Sediment Result Exceed RAGs?**	**Does the Pipe Sediment Result Pass Site-Specific Modeling?**	**Does the Underlying Soil Result Exceed RAGs?**
			Direct Exposure	**Soil Cleanup Level for Groundwater Protection**	**Soil Cleanup Level for River Protection**			
Arsenic	7.7	4.1 (<BG)	20	20	20	No	--	No
Barium	998	73.1 (<BG)	5,600[d]	132[e,f]	224[g]	Yes	Yes[h]	No
Beryllium	0.81 (<BG)	0.58 (<BG)	10.4[i]	1.51[f]	1.51[f]	No	--	No
Boron[j]	4.4	3.0	16,000	320	--[k]	No	--	No
Cadmium[l]	1.5	0.24 (<BG)	13.9	0.81[f]	0.81[f]	Yes	Yes[h]	No
Chromium (total)	67.8	9.4 (<BG)	80,000[d]	18.5[f]	18.5[f]	Yes	Yes[h]	No
Chromium (hexavalent)	0.25	ND	2.1	4.8[m]	2	No	--	--
Cobalt	5.3 (<BG)	7.9 (<BG)	1,600	32	--[k]	No	--	No
Copper	102	16.5 (<BG)	2,960	59.2	22.0[f]	Yes	Yes[h]	No
Lead	279	8.9 (<BG)	353	10.2[f]	10.2[f]	Yes	Yes[h]	No
Lithium	6.1 (<BG)	6.4 (<BG)	1,600	33.5[f]	--[k]	No	--	No
Manganese	166 (<BG)	347 (<BG)	11,200	512[f]	512[f]	No	--	No
Mercury	7.2	0.04 (<BG)	24	0.33[f]	0.33[f]	Yes	Yes[h]	No
Molybdenum[j]	1.7	ND	400	8	--[k]	No	--	--
Nickel	34.0	12.5 (<BG)	1,600	19.1[f]	27.4	Yes	Yes[h]	No
Silver	2.8	ND	400	8	0.73[f]	Yes	Yes[h]	--
Strontium[j]	40.4	34.2	48,000	960	--[k]	No	--	No

Table 2. Comparison of Maximum Detected Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 3) Confirmatory Sampling Event.[*] (3 Pages)

COPC	Pipe Sediment Analytical Result (mg/kg)	Underlying Soil Analytical Result (mg/kg)	Remedial Action Goals[a] (mg/kg)			Does the Pipe Sediment Result Exceed RAGs?	Does the Pipe Sediment Result Pass Site-Specific Modeling?	Does the Underlying Soil Result Exceed RAGs?
			Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection			
Tin[j]	13.5	ND	48,000	960	--[k]	No	--	--
Titanium	1,080 (<BG)	1,450 (<BG)	320,000[n]	6,400[n]	--[k]	No	--	No
Vanadium	40.9 (<BG)	47.8 (<BG)	560	85.1[f]	--[k]	No	--	No
Zinc	223	50.8 (<BG)	24,000	480	67.8[f]	Yes	Yes[h]	No
Aroclor-1248	1.1	ND	0.5	0.017[o]	0.017[o]	Yes	Yes[h,p]	--
Aroclor-1260	0.28	ND	0.5	0.017[o]	0.017[o]	Yes	Yes[h]	--
beta-BHC	0.0040	ND	0.556	0.00486	0.00554	No	--	--
4,4'-DDD	0.023	ND	4.17	0.0365	0.005[o]	Yes	Yes[h]	--
4,4'-DDE	0.037	ND	2.94	0.0257	0.005[o]	Yes	Yes[h]	--
4,4'-DDT	0.031	ND	2.94	0.0257	0.005[o]	Yes	Yes[h]	--
Dieldrin	0.084	ND	0.0625	0.003[o]	0.003[o]	Yes	Yes[h,p]	--
Endosulfan I	0.0046	ND	480	9.6	0.186	No	--	--
Endosulfan sulfate	0.0036	ND	480	9.6	0.186	No	--	--
Endrin aldehyde	0.011	ND	24	0.2	0.039	No	--	--
gamma-Chlordane	0.022	ND	2.86[q]	0.025[q]	0.0165[o]	Yes	Yes[h]	--
Methoxychlor	0.032	ND	400	4	1.67	No	--	--
Benzo(a)anthracene	0.21	ND	1.37[r]	0.33[o]	0.33[o]	No	--	--
Benzo(a)pyrene	0.18	ND	0.33[o]	0.33[o]	0.33[o]	No	--	--
Benzo(b)fluoranthene	0.18	ND	1.37[r]	0.33[o]	0.33[o]	No	--	--
Benzo(g,h,i)perylene[s]	0.13	ND	2,400	48	192	No	--	--
Benzo(k)fluoranthene	0.18	ND	13.7[r]	0.33[o]	0.33[o]	No	--	--
bis(2-Ethylhexyl)phthalate	1.1	0.30	71.4	0.625	0.36	Yes	Yes[h]	No

Table 2. Comparison of Maximum Detected Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 3) Confirmatory Sampling Event.[*] (3 Pages)

COPC	Pipe Sediment Analytical Result (mg/kg)	Underlying Soil Analytical Result (mg/kg)	Remedial Action Goals[a] (mg/kg)			Does the Pipe Sediment Result Exceed RAGs?	Does the Pipe Sediment Result Pass Site-Specific Modeling?	Does the Underlying Soil Result Exceed RAGs?
			Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection			
Butylbenzylphthalate	0.42	ND	16,000	320	250	No	--	--
Chrysene	0.24	ND	137[r]	1.2[r]	0.33[o]	No	--	--
Di-n-butylphthalate	21	ND	8,000	160	540	No	--	--
Fluoranthene	0.38	ND	3,200	64	18	No	--	--
Indeno(1,2,3-cd)pyrene	0.12	ND	1.37	0.33[o]	0.33[o]	No	--	--
Phenanthrene[s]	0.19	ND	24,000	240	1,920	No	--	--
Pyrene	0.37	ND	2,400	48	192	No	--	--

* All Table 2 notes and acronyms are provided at the end of the document body.

cleanup levels decrease to background concentrations within less than 3 m (10 ft) below the elevation at which the contamination occurs. For the 100-B/C Area, references BHI 1999, DOE-RL 1992, and DOE-RL 1994 discuss the thickness of the uncontaminated vadose zone beneath remediated waste sites.

To apply the contaminant depth/K_d value model, the thickness of the vadose zone beneath a remediated waste site must be at least 3 m (10 ft), per the penultimate sentence in the previous paragraph. Table 3a shows the minimum K_d values from Appendix D at which contaminants are not predicted to migrate to groundwater within 1,000 years at uncontaminated vadose zone thicknesses from 0 m to 25 m. Table 3b shows the K_d values of contaminants in this RSVP that present groundwater protection concerns.

Table 3a. Minimum Contaminant K_d Values Protective of Groundwater.

Uncontaminated Zone Thickness (m)	K_d Value Protective of Groundwater (mL/g)
0	80
2	40
2	27
3	20
4	16
5	14
6	12
7	10
8	9
9	8
10	8
11	7
12	7
16	6
18	6
20	4
22	4
25	3

K_d = Distribution coefficient

Table 3b. K_d Values for Selected Contaminants.

Contaminant	Contaminant K_d Value (mL/g)
Barium	25
Cadmium	30
Chromium, Total	200
Copper	22
Lead	30
Manganese	50
Mercury	30
Nickel	30
Silver	90
Zinc	30
Aldrin	48.7
Aroclor-1248	43.9
Aroclor-1254	75.6
Aroclor-1260	530
BEHP	110
DDD, 4,4'-	45.8
DDE, 4,4'-	86.4
DDT, 4,4'-	678
Dieldrin	25.6
Endrin aldehyde	10.8
Gamma-chlordane	51.3

BEHP = bis(2-ethylhexyl)phthalate

Barium, cadmium, chromium (total), copper, lead, mercury, nickel, silver, zinc, aroclor-1248, aroclor-1260, bis(2-ethylhexyl)phthalate, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, endrin aldehyde, and gamma-chlordane were detected above soil RAGs for protection of groundwater and/or the Columbia River in the pipe sediment sample. Based on the analytical results for the underlying soil sample, elevated concentrations of these COPCs are confined to the pipeline. Further, based on the contaminant depth/K_d value model discussed above and the K_d values for these constituents (the lowest of which is 10.8 mL/g for endrin aldehyde), none are expected to migrate further than 7 m (23 ft) vertically in 1,000 years. The vadose zone underlying the 100-B-14:2 (area 3) pipelines is approximately 18-m (59-ft)-thick; therefore, residual concentrations of these constituents are protective of groundwater. The only pathway for contamination to reach the Columbia River is via groundwater migration, so these contaminant concentrations are also protective of river water.

Nonradionuclide risk requirements include an individual hazard quotient of <1.0, a cumulative hazard quotient of <1.0, an individual contaminant carcinogenic risk of $<1 \times 10^{-6}$, and a cumulative carcinogenic risk of $<1 \times 10^{-5}$. For area 3 of the 100-B-14:2 subsite, these risk values were not calculated for constituents that were either not detected or were detected at concentrations below Hanford Site or Washington State background values. All individual hazard quotients were less than 1.0, and all individual excess carcinogenic risk values were less than 1×10^{-6} (Appendix B). The cumulative hazard quotient for those noncarcinogenic constituents above background or detection levels is 6.0×10^{-1}, and the cumulative excess carcinogenic risk value for these constituents is 2.8×10^{-6}. Therefore, nonradionuclide risk requirements are met.

When using a statistical sampling approach, a RAG requirement for nonradionuclides is the WAC 173-340-740(7)(e) three-part test. However, this test is not applicable to this focused sampling approach because maximum detected concentration data are used as the compliance basis.

<u>100-B-14:2 (Area 4), 190-B Pumphouse Sanitary Sewer Pipelines</u>

Aroclor-1254 was detected in one sample of manhole sediments at a concentration (2.6 mg/kg) exceeding the direct exposure RAG. Based on this exceedance, it was determined that remedial action was necessary at the site (Feist 2004), with aroclor-1254 retained as a COC. Multiple metals (including hexavalent chromium), PAHs, and chlorinated pesticides were also detected above RAGs in the sample of manhole sediments and retained as site COCs/COPCs.

<u>100-B-14:2 (Area 5), 115-B/C Gas Recirculation Facility Sanitary Sewer Pipelines</u>

Cesium-137, cobalt-60, europium-152, europium-154, and strontium-90 were detected in soil samples at activities cumulatively exceeding the direct exposure RAG for beta-/gamma-emitters. Based on this exceedance, it was determined that remedial action was necessary at the site (Feist 2004), with these radionuclides retained as COCs. Hexavalent chromium, aroclor-1260, and chlorinated pesticides were also detected above RAGs in samples of pipeline material and retained as site COCs/COPCs. Further, metals analyses for pipeline material samples were mistakenly performed by the toxicity characteristic leaching procedure rather than totals procedures; therefore, these metals were retained as site COPCs.

REMEDIAL ACTION SUMMARY

Remediation of the 100-B-14:2 and 1607-B2 waste sites was performed in stages from January 2005 through June 2006 as part of the 100-B/C Area Remaining Pipes and Sewers remediation.

In general, remediation of pipelines consisted of the excavation and stockpiling (on-site) of overlying soils presumed to contain no residual contamination above cleanup levels (referred to as "below cleanup levels" [BCL]), removal of soils around and approximately 0.3 m (1 ft) below the pipelines, and disposal of the pipeline and suspect potentially contaminated soil at the Environmental Restoration Disposal Facility. Stockpiled BCL material was used in site backfill operations following verification that the soil did not contain site COCs/COPCs at levels exceeding cleanup criteria.

All excavation was restricted within the shallow zone (less than 4.6 m [15 ft] bgs), with an average depth of approximately 2.5 m [8 ft] bgs, and a maximum depth of approximately 4 m [13 ft] bgs at the septic tank. Excavation at the northern portion of the site continued to greater depth due to concurrent remediation of the underlying 100-B-14:1 process sewer. Due to co-location and concurrent remediation of differing functional pipeline groups, excavated and disposed material quantities could not be explicitly separated for the 1607-B2 and 100-B-14:2 sites. A pre-excavation topographic survey of the sites is shown in Figure 3; post-excavation civil surveys are shown in Figures 4 through 9.

The eastern portion of the 100-B-14:2 (area 1) pipelines was previously removed with remediation of the underlying 100-B-8:1 reactor cooling water effluent lines (BHI 2004b) and was not further considered in 100-B-14:2 remedial activities or verification sampling. The southernmost portion of the 100-B-14:2 (area 2) pipeline, at the former 183-B Filter Plant pumphouse, is coincident with several other pipelines in the area. During excavation, suspect hexavalent chromium staining was identified in soils in the area. The staining is presumably related to the 100-B-28 sodium dichromate transfer line, and remediation and subsequent closure of footprint soils was deferred until planned remediation of that site. The southernmost portion of the 1607-B2 collection line, formerly servicing the 105-B Reactor Building, was not removed, in agreement with the U.S. Environmental Protection Agency (WCH 2005) due to its proximity to the reactor building. This portion of the pipeline will be addressed with the 118-B-8, 105-B Reactor waste site.

In-process samples of soil and waste materials were collected during site remediation as needed to support waste characterization and evaluation of the waste profile for disposal of excavated material and to guide remediation efforts. The analytical results for these samples are provided in Appendix A. Photographs taken during remedial activities are provided in Appendix C.

VERIFICATION SAMPLING ACTIVITIES

Verification sampling was performed separately for the 100-B-14:2 (area 2), 100-B-14:2 (area 4), 100-B-14:2 (area 5), and 1607-B2:1 excavations and associated BCL material from August 2005 to July 2006. The 100-B-14:2 (area 1) and 1607-B2:2 excavations were combined into one decision unit for the purposes of verification sampling, due to the small footprint of the 100-B-14:2 (area 1) pipelines, and sampled in June 2006. Verification sampling was performed to collect data to make a decision whether the remedial action objectives had been reached. Based on statistical evaluation of the resulting data, the residual contaminant concentrations meet the cleanup criteria specified in the RDR/RAWP (DOE-RL 2005b) and the Remaining Sites ROD (EPA 1999). The following

Figure 3. Pre-Excavation Topographic Survey of the 100-B-14:2 and 1607-B2 Waste Site Vicinity.

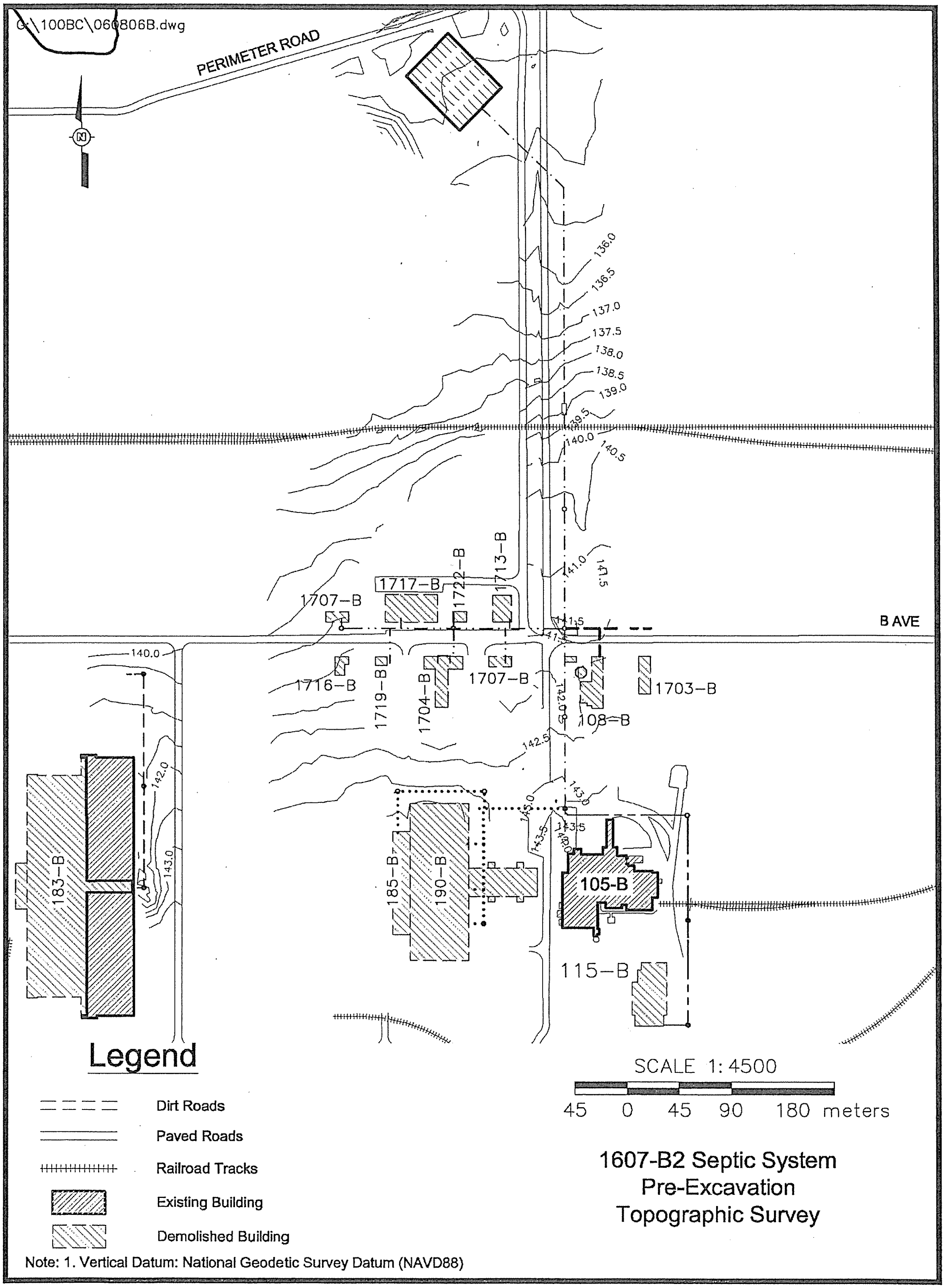


Figure 4. Post-Excavation Civil Survey of the 100-B-14:2 (Area 2) Subsite.

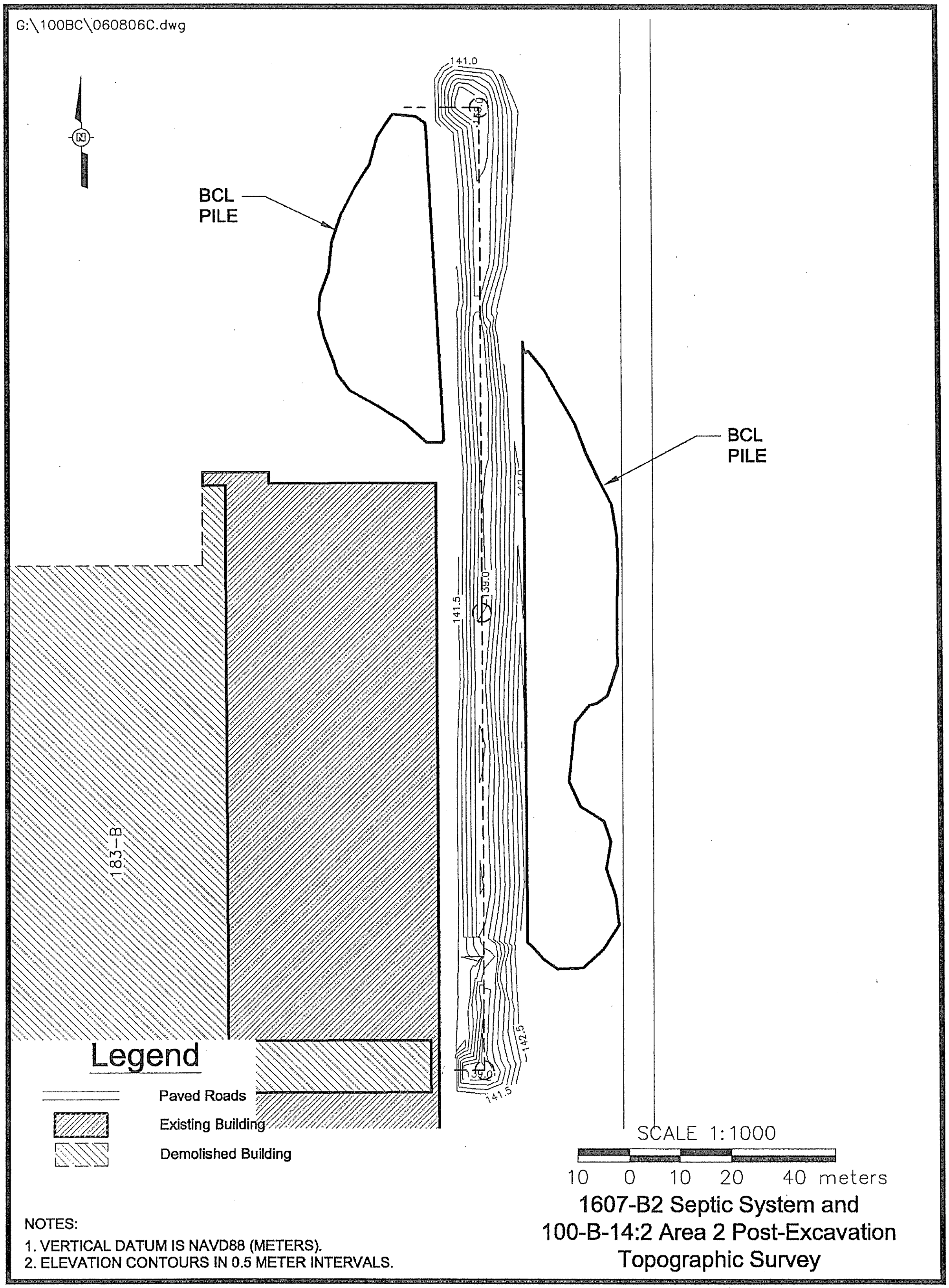


Figure 5. Post-Excavation Civil Survey of the 100-B-14:2 (Area 4) Subsite.

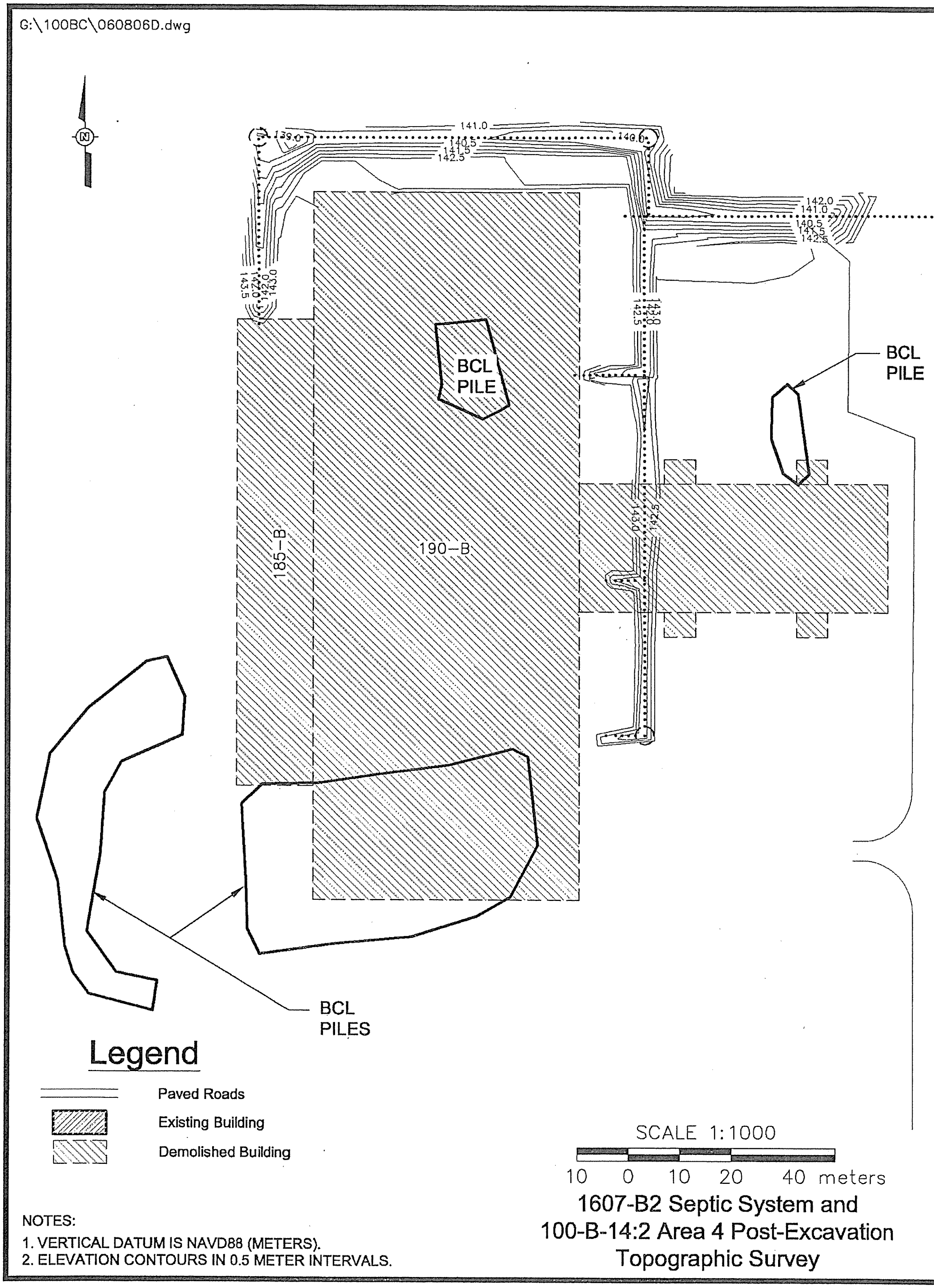


Figure 6. Post-Excavation Civil Survey of the 100-B-14:2 (Area 5) Subsite.

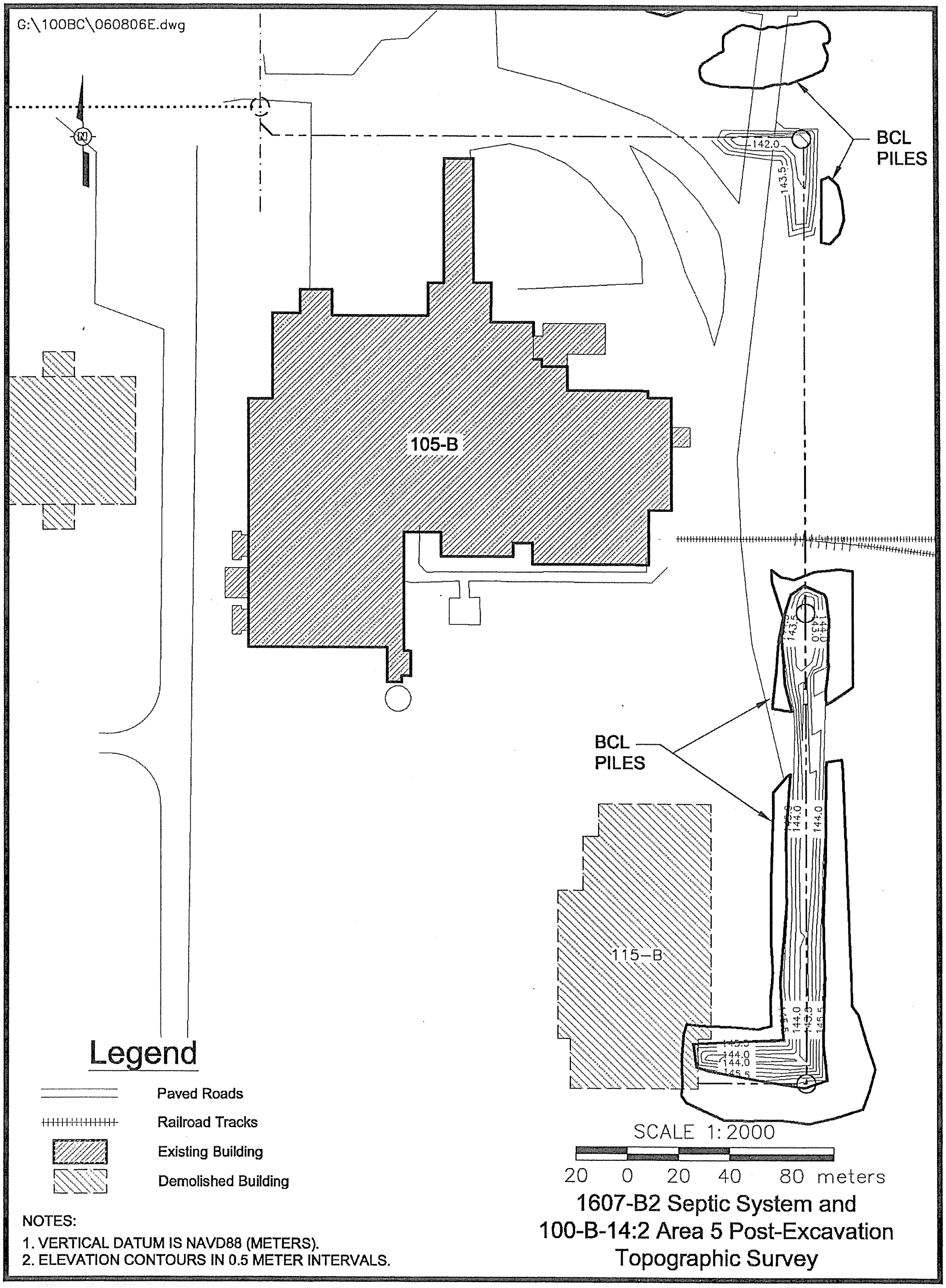


Figure 7. Post-Excavation Civil Survey of the Southern 1607-B2:2 Subsite and 100-B-14:2 (Area 1) Subsite.

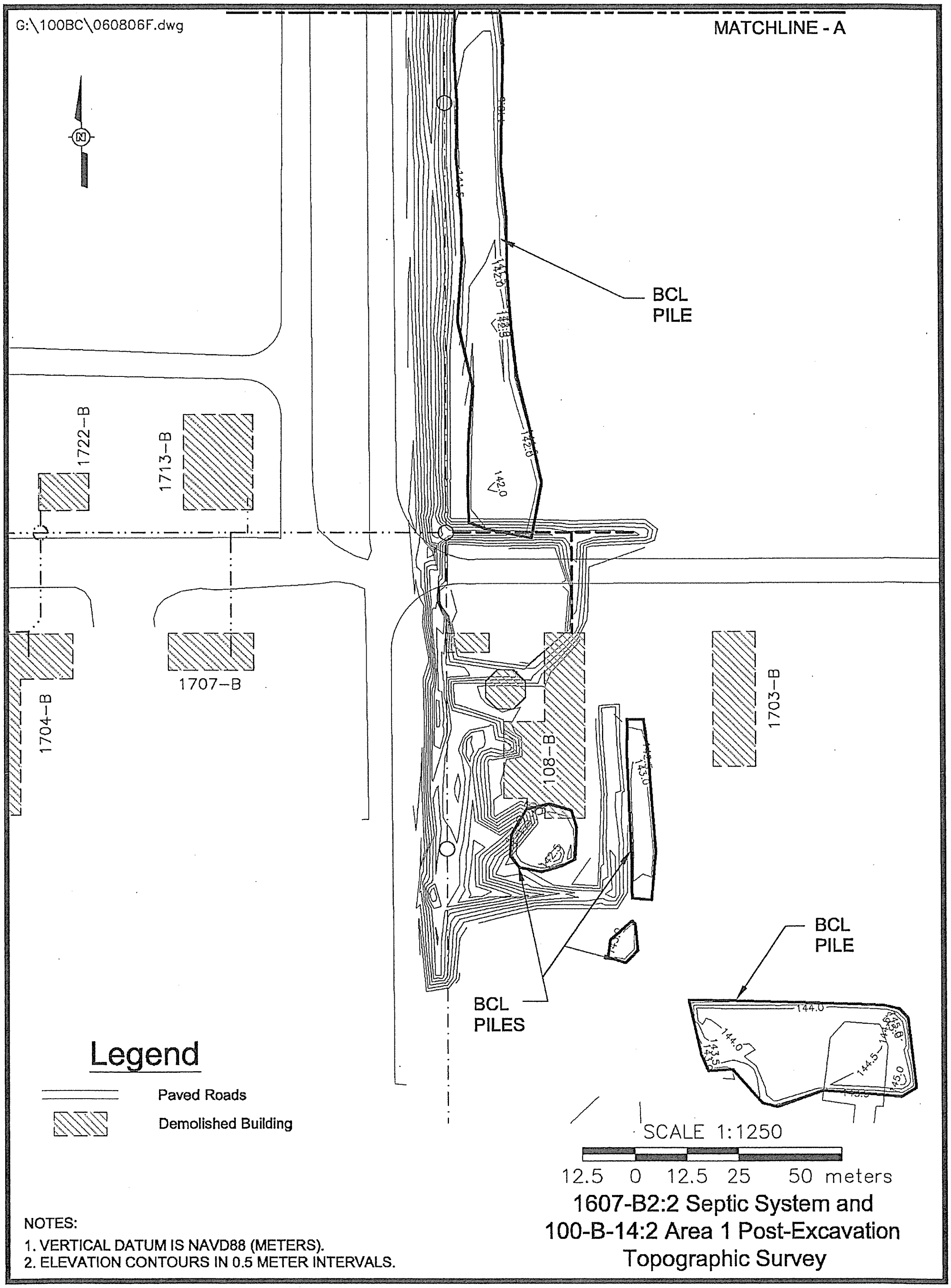


Figure 8. Post-Excavation Civil Survey of the Northern 1607-B2:2 Subsite.

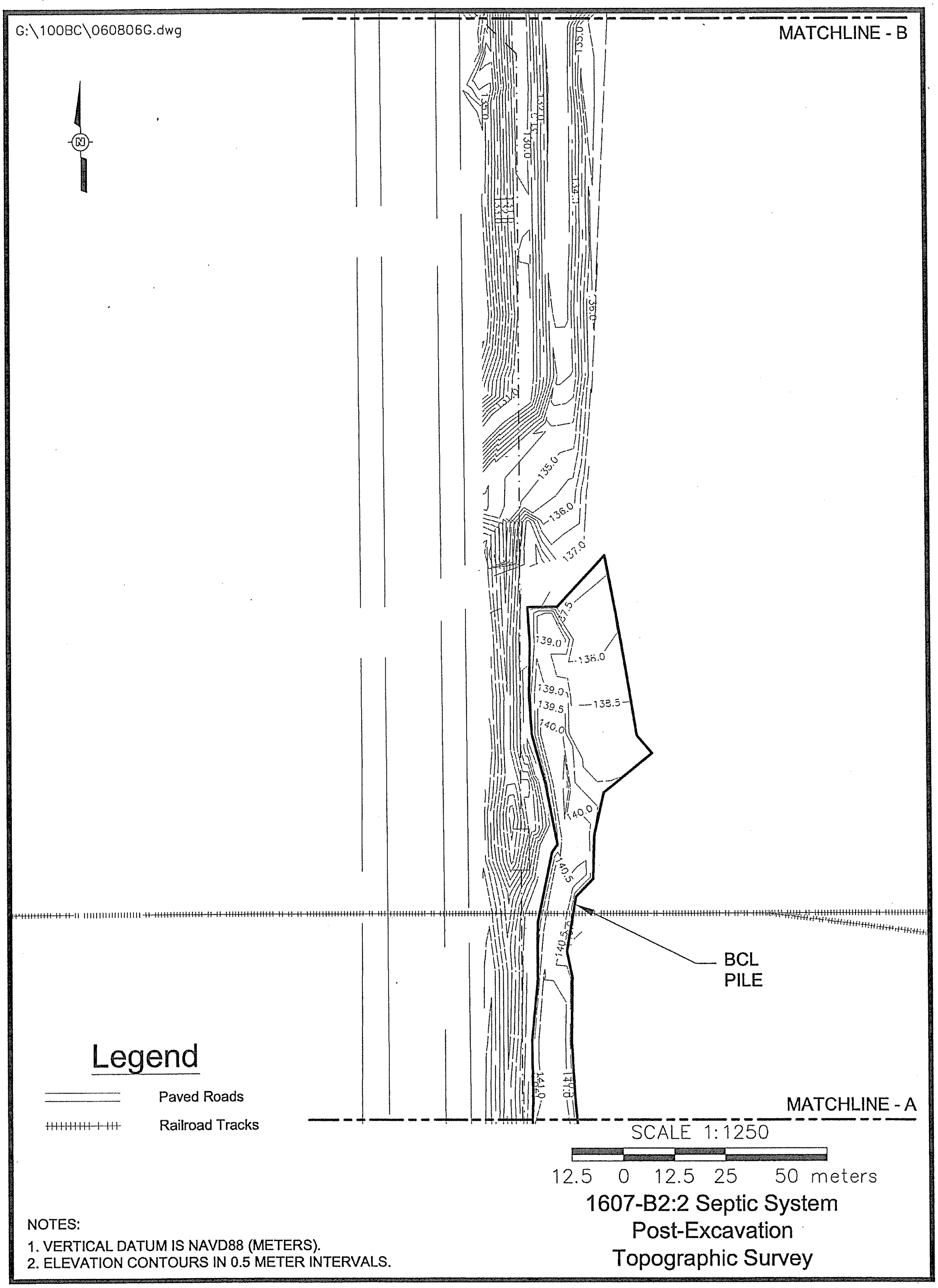
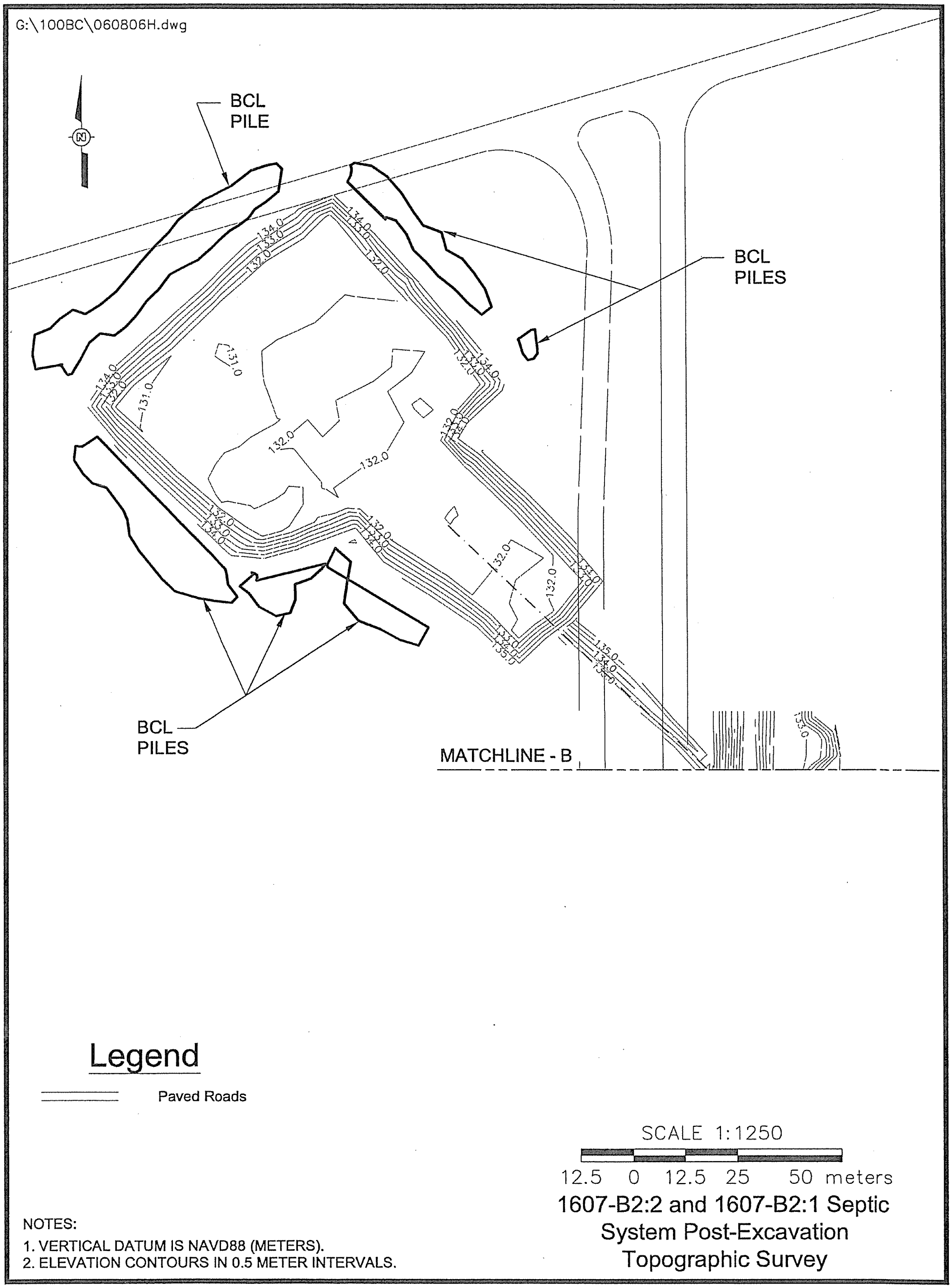


Figure 9. Post-Excavation Civil Survey of the 1607-B2:1 Subsite.



subsections provide additional discussion of the information used to develop the verification sampling design. The results of verification sampling are also summarized to support interim closure of the 100-B-14:2 and 1607-B2 waste sites.

Contaminants of Concern and Contaminants of Potential Concern

The results of confirmatory sampling, waste characterization sampling, and field-screening were used to determine the COCs and COPCs for verification sampling. The analyses performed for verification samples from each area, listed in Table 4, are inclusive of the constituents that were detected above direct exposure RAGs or dose-equivalence lookup values and/or above RAGs for the protection of groundwater and the Columbia River. These analyses are also inclusive of those methods with significant data quality deficiencies in the confirmatory data set.

Table 4. Analyses Performed on Verification Samples for Site Contaminants of Concern and Contaminants of Potential Concern.

Analysis	Subsite				
	100-B-14:2 Area 2	100-B-14:2 Area 4	100-B-14:2 Area 5	1607-B2:1	1607-B2:2 and 100-B-14:2 Area 1
Gamma energy analysis	●	●	●		●
Gross alpha proportional counting	●		●		
Gross beta proportional counting	●		●		
Total beta radiostrontium (strontium-90)			●[a]		●
Tritium by liquid scintillation counting			●		●
ICP metals EPA Method 6010	●	●	●	●	●
Mercury EPA Method 7471	●	●	●	●	●
Hexavalent chromium EPA Method 7196	●	●	●	●	●
PCB EPA Method 8082	●	●	●	●	●
Pesticide EPA Method 8081	●	●	●	●	●
Herbicide EPA Method 8151				●[a]	
SVOA EPA Method 8270	●	●	●	●	●
VOA EPA Method 8260				●[a]	

[a] Extra analysis inadvertently requested at the analytical laboratory.
EPA = U.S. Environmental Protection Agency
ICP = inductively coupled plasma
PCB = polychlorinated biphenyl
SVOA = semivolatile organic analysis
VOA = volatile organic analysis

Verification Sample Design

Statistical sampling was performed for the 100-B-14:2 and 1607-B2 remediation footprints because the spatial distribution of potential residual soil contamination over the study area was uncertain. The decision rule for demonstrating compliance with the cleanup criteria requires comparison of the true population mean of COCs/COPCs, as estimated by the 95% upper confidence limit on the sample mean, with the cleanup level. The Washington State Department of Ecology publication *Guidance on Sampling and Data Analysis Methods* (Ecology 1995) recommends that systematic sampling with sample locations distributed over the entire study area be used. Therefore, sampling locations were distributed over the entire remediation footprint on an area-by-area basis using random-start systematic grids in an effort to determine the potential residual presence of contamination.

Visual Sample Plan[1] (VSP) was used as a tool to develop the statistical sampling design for the 100-B-14:2 and 1607-B2 waste sites. The remediation footprints (Figures 4 through 9) were delineated in VSP and used as the basis for location of systematic grid for verification soil sample collection.

Ten soil verification sample locations were identified for each of the 100-B-14:2 areas 2, 4, and 5 remediation footprints; 11 soil verification sample locations were identified for the 1607-B2:1 drain field remediation footprint; 14 soil verification sample locations were identified for the 1607-B2:2 and 100-B-14:2 area 1 remediation footprints. Additional details concerning the use of VSP to develop the statistical sampling designs are provided in the subsite-specific verification sampling work instructions (BHI 2005d, WCH 2006c, 2006d, 2006e).

Verification samples were also collected from stockpiled suspect BCL soils associated with the 100-B-14:2 and 1607-B2 excavations. Because this material is not believed to have received discharges from the gravity-flow sanitary sewer system, statistical sampling designs were not warranted, and professional judgment was used to develop the sampling approach. Sampling consisted of the collection of 25 to 30 aliquots of soil distributed across the surface of each BCL pile or group of smaller BCL piles and combining into one sample per pile or pile group for laboratory analysis (BHI 2005d; WCH 2006c, 2006d, 2006e).

Figures 10 through 15 show maps of the statistical sample locations that were selected for verification sampling; coordinates for each statistical sample are provided in Table 5. The soil sample locations were surveyed and staked prior to sample collection (BHI 2005c, WCH 2006a, 2006b). All sampling was performed in accordance with ENV-1, *Environmental Monitoring & Management*, to fulfill the requirements of the *100 Area Remedial Action Sampling and Analysis Plan* (SAP) (DOE-RL 2005a). One soil sample was collected at each location by collecting 25 to 30 aliquots of surficial soils from within approximately 1 m (3 ft) of the staked location and combining the aliquots into 1 sample. Field quality control (QC) samples consisted of one field duplicate sample and one equipment blank per area or subsite; field duplicate sample locations are identified in Table 5. All samples were submitted for full protocol laboratory analysis.

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[1] Visual Sample Plan is a site map-based user-interface program that may be downloaded at http://dqo.pnl.gov.

Figure 10. Statistical Verification Sampling Locations at the 100-B-14:2 (Area 2) Subsite.

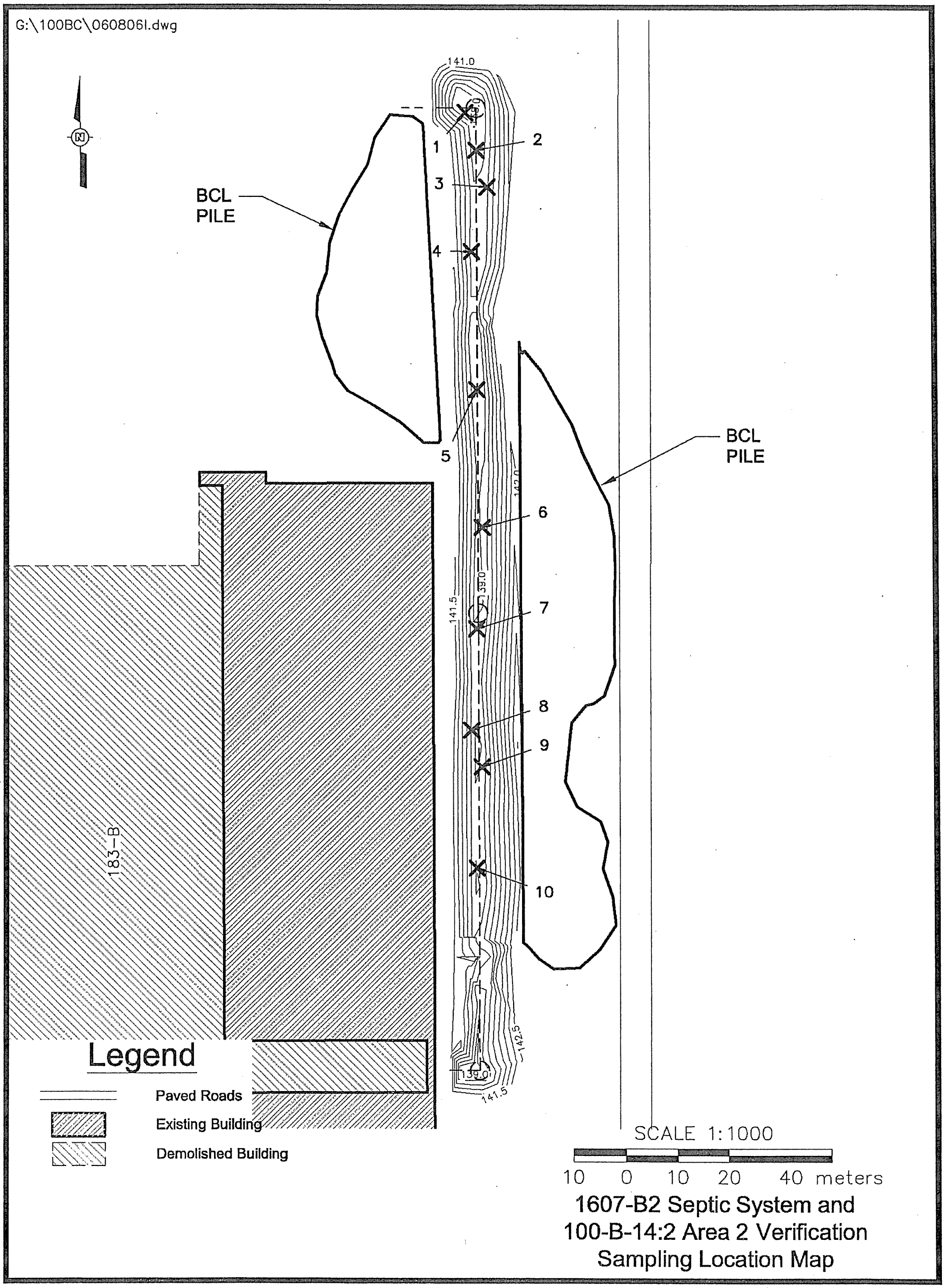

Figure 11. Statistical Verification Sampling Locations at the 100-B-14:2 (Area 4) Subsite.

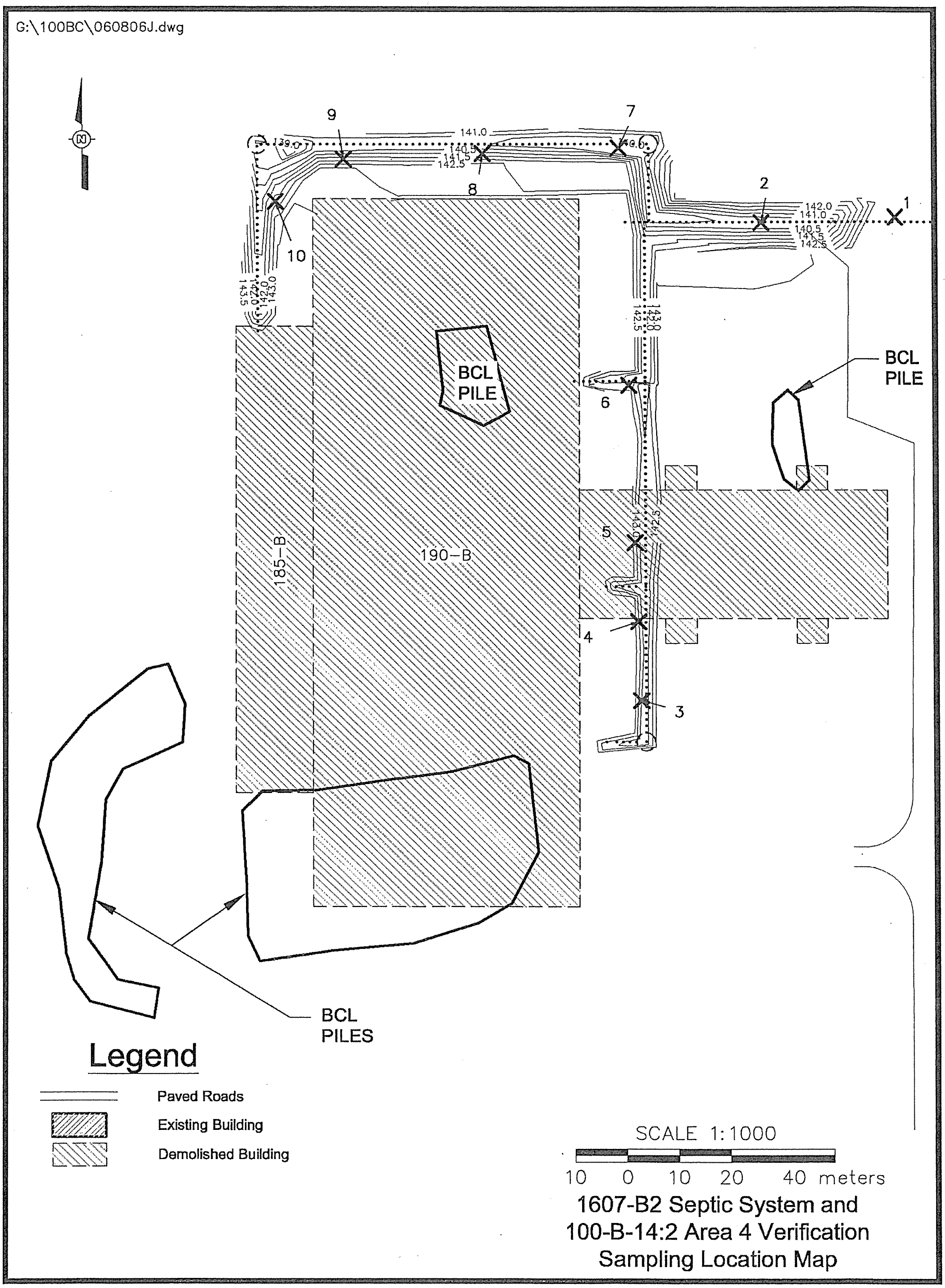

Figure 12. Statistical Verification Sampling Locations at the 100-B-14:2 (Area 5) Subsite.

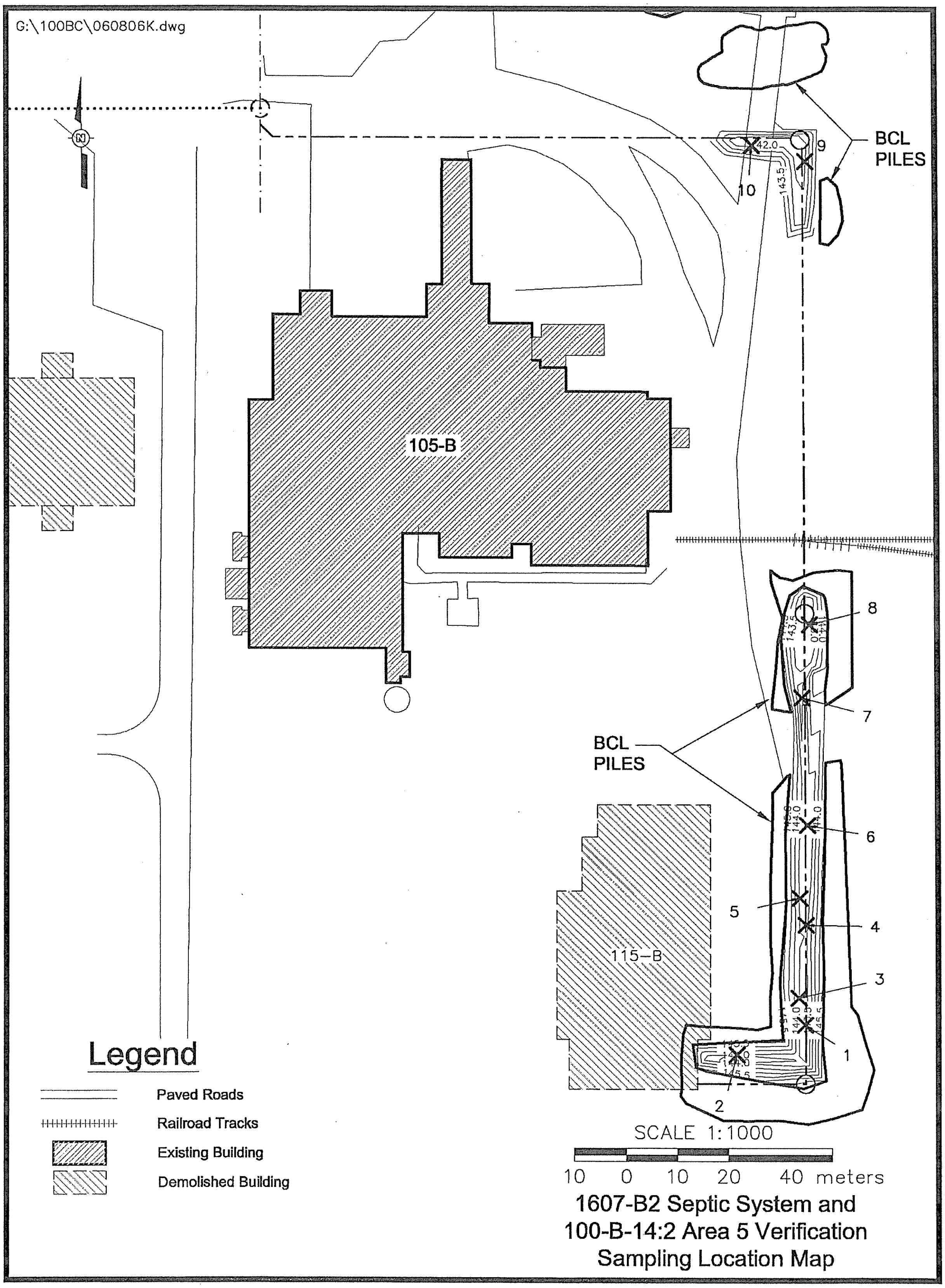

Figure 13. Statistical Verification Sampling Locations at the Southern 1607-B2:2 Subsite and 100-B-14:2 (Area 1) Subsite.

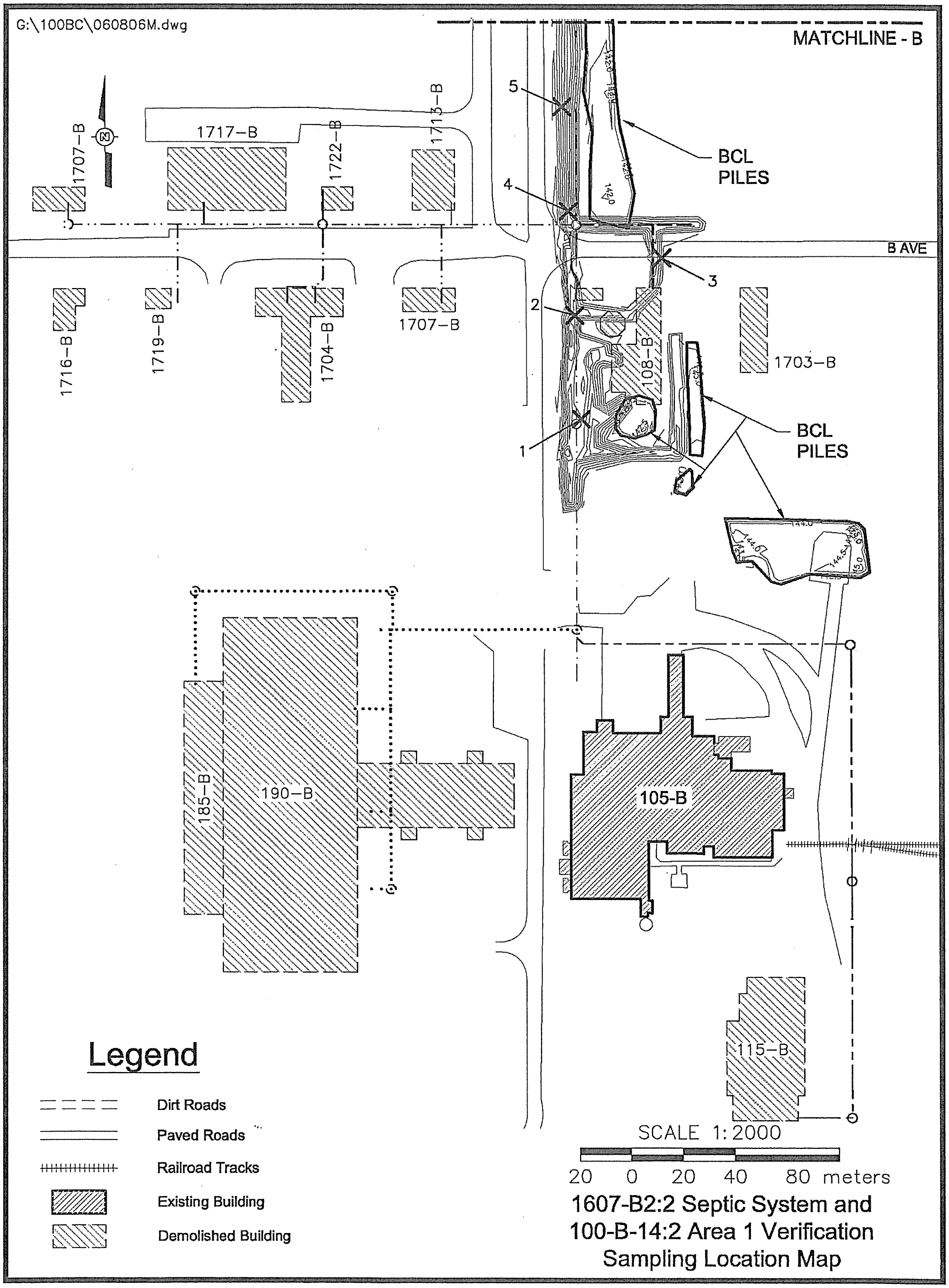

Figure 14. Statistical Verification Sampling Locations at the Northern 1607-B2:2 Subsite.

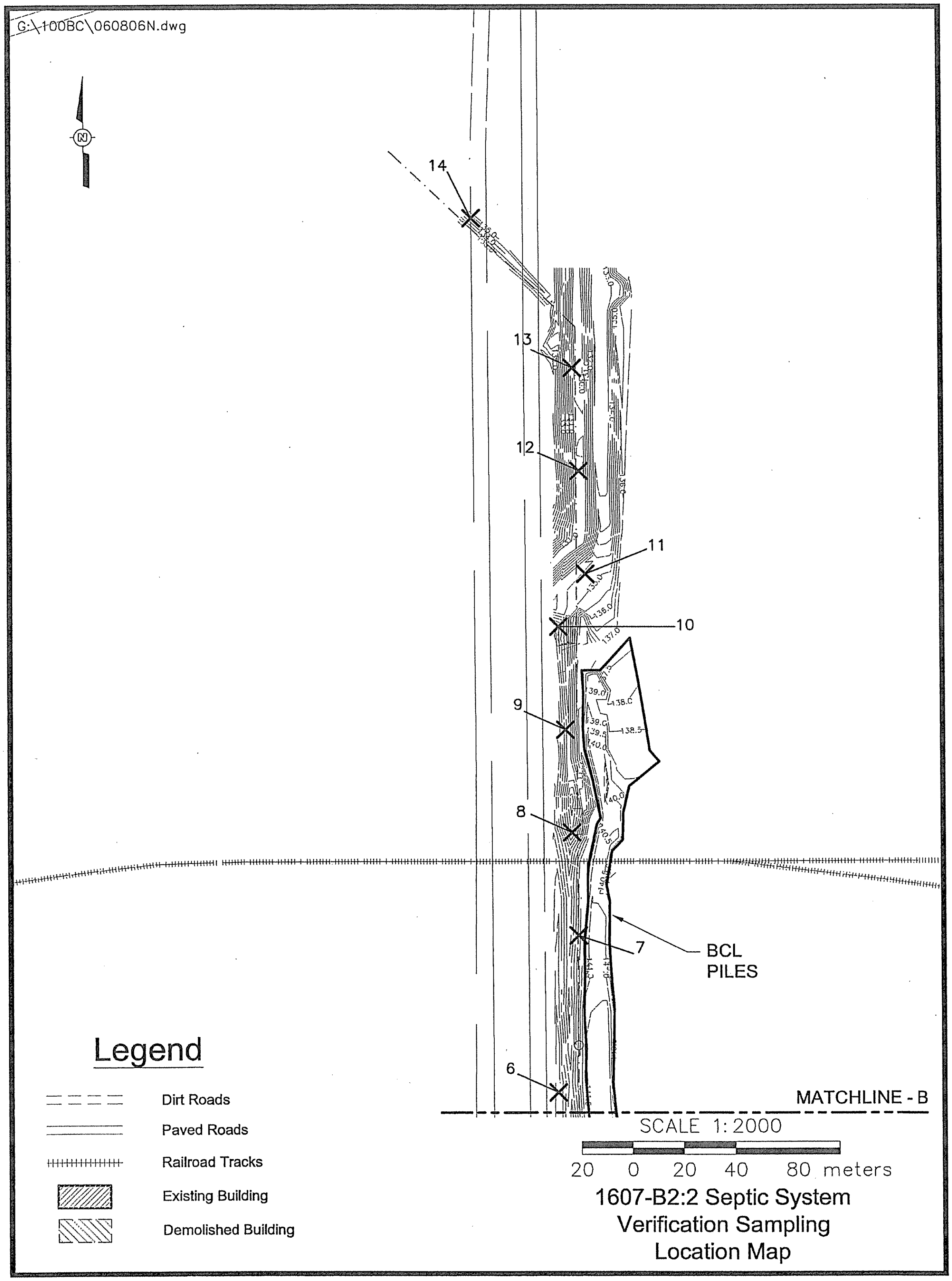

Figure 15. Statistical Verification Sampling Locations at the 1607-B2:1 Subsite.

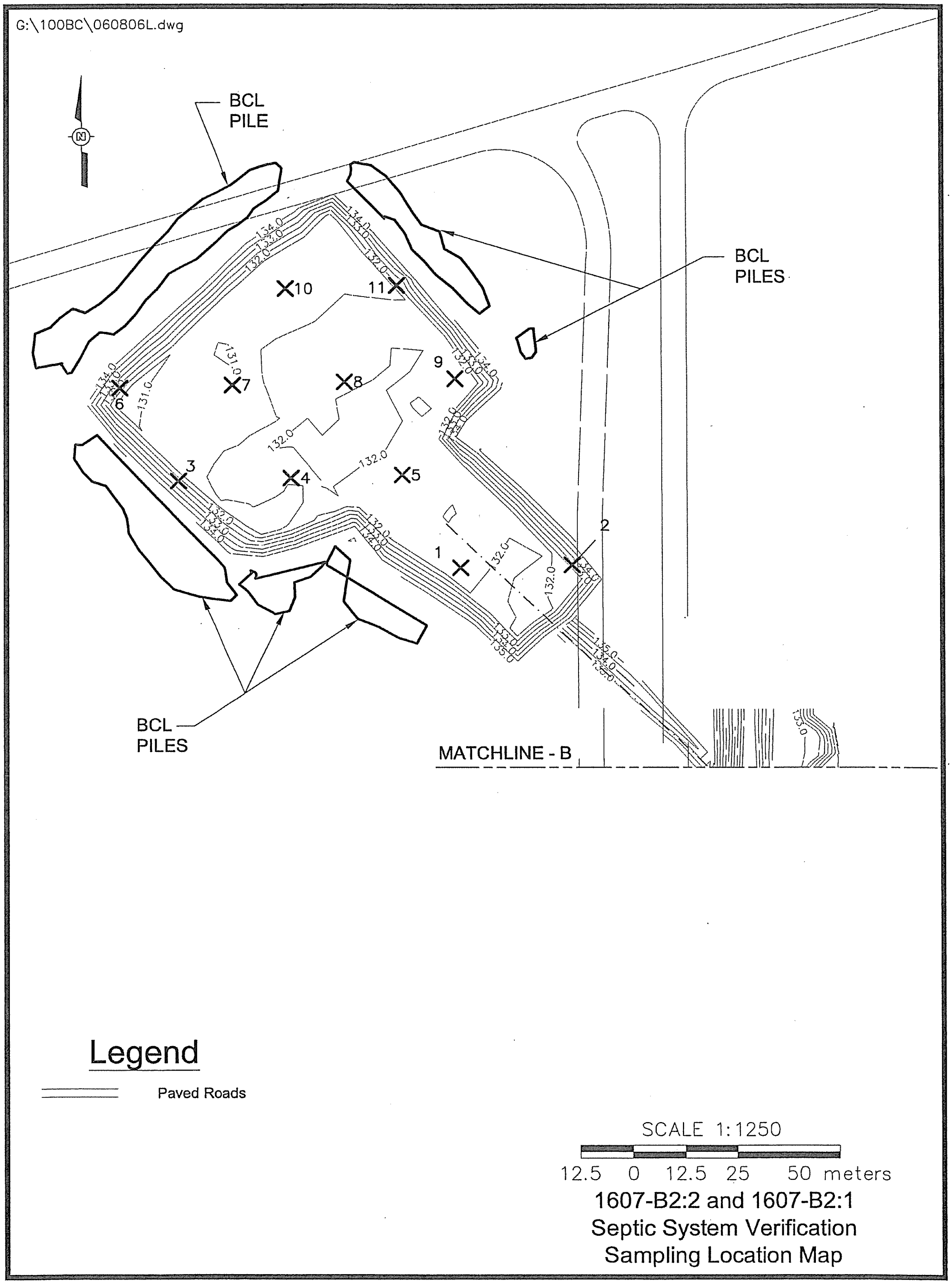

Table 5. 100-B-14:2 and 1607-B2 Verification Sample Location Coordinates. (4 Pages)

Sample Location	Sample Number	Washington State Plane Coordinates
100-B-14:2 Area 2		
1	J11K85	N 144698.1 E 564885.0
2[a]	J11K86/J11K95[a]	N 144690.8 E 564887.1
3	J11K87	N 144683.6 E 564889.2
4	J11K88	N 144671.0 E 564886.1
5	J11K89	N 144643.9 E 564887.1
6	J11K90	N 144616.8 E 564888.1
7	J11K91	N 144596.9 E 564887.0
8	J11K92	N 144577.0 E 564886.0
9	J11K93	N 144569.8 E 564888.0
10	J11K94	N 144549.9 E 564887.0
East BCL stockpile	J11KD1	N/A[b]
West BCL stockpile	J11KD2	N/A[b]
Equipment blank	J11K96	N/A
100-B-14:2 Area 4		
1	J12R02	N 144581.6 E 565232.8
2	J12R03	N 144580.5 E 565206.0
3	J12R04	N 144486.5 E 565182.8
4	J12R05	N 144502.0 E 565182.2
5	J12R06	N 144517.5 E 565181.6
6	J12R07	N 144548.5 E 565180.4
7	J12R08	N 144595.0 E 565178.5

Table 5. 100-B-14:2 and 1607-B2 Verification Sample Location Coordinates. (4 Pages)

Sample Location	Sample Number	Washington State Plane Coordinates
8[a]	J12R09/J12R14[a]	N 144593.9 E 565151.7
9	J12R10	N 144592.8 E 565124.8
10	J12R11	N 144584.5 E 565111.7
East BCL stockpile	J12R12	N/A[b]
West BCL stockpile	J12R13	N/A[b]
Equipment blank	J12R15	N/A
100-B-14:2 Area 5		
1	J11KB3	N 144400.6 E 565361.4
2	J11KB4	N 144394.7 E 565348.2
3	J11KB5	N 144405.9 E 565360.2
4[a]	J11KB6/J11KC3[a]	N 144420.3 E 565361.6
5	J11KB7	N 144425.6 E 565360.4
6	J11KB8	N 144440.0 E 565361.9
7	J11KB9	N 144465.1 E 565360.9
8	J11KC0	N 144479.5 E 565362.4
9	J11KC1	N 144570.6 E 565361.9
10	J11KC2	N 144573.7 E 565351.4
South BCL stockpile (south)	J11KD3	N/A[b]
South BCL stockpile (north)	J11KD4	N/A[b]
Central BCL stockpile	J11KD5	N/A[b]
North BCL stockpile	J11KD6	N/A[b]
Equipment blank	J11KC4	N/A

Table 5. 100-B-14:2 and 1607-B2 Verification Sample Location Coordinates. (4 Pages)

Sample Location	Sample Number	Washington State Plane Coordinates
1607-B2:1		
1	J03VB8	N 145187.4 E 565186.9
2[a]	J03VB9/J03VD2[a]	N 145188.1 E 565213.8
3	J03VC0	N 145208.8 E 565119
4	J03VC1	N 145209.5 E 565145.9
5	J03VC2	N 145210.3 E 565172.8
6	J03VC3	N 145231.7 E 565104.9
7	J03VC4	N 145232.4 E 565131.8
8	J03VC5	N 145233.2 E 565158.7
9	J03VC6	N 145234 E 565185.6
10	J03VC7	N 145256.1 E 565144.6
11	J03VC8	N 145256.9 E 565171.5
Southwest overburden stockpile	J03VC9	N/A[b]
Northwest overburden stockpile	J03VD0	N/A[b]
Northeast overburden stockpile	J03VD1	N/A[b]
Equipment blank	J03WW6	N/A
1607-B2:2		
1	J12NX9	N 144663.7 E 565257.3
2	J12NY0	N 144704.4 E 565254.8
3	J12NY1	N 144726.9 E 565288.9
4	J12NY2	N 144745.1 E 565252.4

Table 5. 100-B-14:2 and 1607-B2 Verification Sample Location Coordinates. (4 Pages)

Sample Location	Sample Number	Washington State Plane Coordinates
5[a]	J12NY3/J12NY4[a]	N 144785.8 E 565250.0
6	J12NY5	N 144826.6 E 565247.5
7	J12NY6	N 144888.4 E 565255.6
8	J12NY7	N 144929.1 E 565253.2
9	J12NY8	N 144969.8 E 565250.8
10	J12NY9	N 145010.6 E 565248.3
11	J12PW5	N 145031.6 E 565258.9
12	J12PW6	N 145072.4 E 565256.5
13	J12PW7	N 145113.1 E 565254.0
14	J12PW8	N 145172.1 E 565215.1
North BCL stockpile (north)	J12NX4	N/A[b]
North BCL stockpile (middle)	J12NX5	N/A[b]
North BCL stockpile (south)	J12NX6	N/A[b]
Southeast BCL stockpile	J12NX7	N/A[b]
Small south BCL stockpiles	J12NX8	N/A[b]
Equipment blank	J12P04	N/A

Source: *Remaining Pipeline and Sewers Sampling and Field Services*, Logbooks EL-1585-3, EL-1585-5, and EL-1585-6 (BHI 2005c, WCH 2006a, 2006b).

[a] A field duplicate sample was collected at sample location 7.

[b] Sampling of the BCL stockpiles consisted of collecting aliquots across the stockpile surface(s) and combining into one sample per pile or pile group for analysis.

BCL = below cleanup levels

N/A = not applicable

Verification Sampling Results

Verification samples were analyzed using U.S. Environmental Protection Agency-approved analytical methods. The 95% upper confidence limits on the true population means for residual concentrations of COCs and COPCs were calculated for the remediation footprints as specified by the RDR/RAWP (DOE-RL 2005b), with calculations provided in Appendix B. When a nonradionuclide COC or COPC was detected in fewer than 50% of the verification samples collected for each decision unit, the maximum detected value was used for comparison to RAGs. If no detections for a given COC/COPC were reported a given data set, then no statistical evaluation or calculations were performed for that COC/COPC for the associated decision unit. Evaluation of the verification data from the BCL stockpiles was performed by direct comparison of the maximum sample results for each COC/COPC against cleanup criteria for each sampling area.

Comparisons of the statistical and maximum results for COCs and COPCs and the site RAGs for the remediation footprints and BCL stockpiles are summarized in Tables 6a through 7b and 9a through 11b (due to the large number of comparison tables in this document, all comparison table footnotes are provided at the end of the document body to reduce redundancy). Contaminants that were not detected by laboratory analysis are excluded from these tables. Potassium-40, radium-226, radium-228, thorium-228, and thorium-232 were detected in samples but are not considered within these tables because these isotopes are not related to the operational history of the sanitary sewer system. Calculated cleanup levels for aluminum, calcium, iron, magnesium, phosphate, potassium, silicon, sodium, and zirconium are not presented in the RDR/RAWP (DOE-RL 2005b). Parameters to calculate cleanup levels for these constituents are not presented in the *Cleanup Levels and Risk Calculations (CLARC) Database* (Ecology 2005) under WAC 173-340-740(3) or other reference databases (results for total phosphorus are attributed to phosphorus in phosphate). These analytes are also essential nutrients and can be eliminated from evaluation as human health concerns per EPA guidance (EPA 1989). Therefore, these constituents are not considered COPCs and are not included in the tables. The laboratory-reported data results for all constituents are stored in the ENRE project-specific database prior to providing to HEIS and are presented within the statistical calculations in Appendix B.

Table 6a. Comparison of Statistical Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 2) Remediation Footprint Verification Sampling Event.* (2 Pages)

COC/COPC	Analytical Result (pCi/g)	Generic Site Lookup Values[a] (pCi/g)			Does the Result Exceed Lookup Values?	Does the Result Pass RESRAD Modeling?
		Shallow Zone Lookup Value[b]	Groundwater Protection Lookup Value	River Protection Lookup Value		
Strontium-90	0.311	4.5	27.6[c]	27.6[c]	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	3.4 (<BG)	20	20	20	No	--

Table 6a. Comparison of Statistical Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 2) Remediation Footprint Verification Sampling Event.* (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		
Barium	163	5,600[d]	132[e,f]	224[g]	Yes	Yes[h]
Beryllium	0.38 (<BG)	10.4[i]	1.51[f]	1.51[f]	No	--
Boron[j]	4.5	16,000	320	--[k]	No	--
Cadmium[l]	0.14 (<BG)	13.9	0.81[f]	0.81[f]	No	--
Chromium (total)	9.0 (<BG)	80,000[d]	18.5[f]	18.5[f]	No	--
Chromium (hexavalent)	0.26	2.1	4.8[m]	2	No	--
Cobalt	8.3 (<BG)	1,600	32	--[k]	No	--
Copper	17.7 (<BG)	2,960	59.2	22.0[f]	No	--
Lead	5.8 (<BG)	353	10.2[f]	10.2[f]	No	--
Lithium	7.4 (<BG)	1,600	33.5[f]	--[k]	No	--
Manganese	349 (<BG)	11,200	512[f]	512[f]	No	--
Mercury	0.05 (<BG)	24	0.33[f]	0.33[f]	No	--
Molybdenum[j]	0.7	400	8	--[k]	No	--
Nickel	11.5 (<BG)	1,600	19.1[f]	27.4	No	--
Strontium[j]	57	48,000	960	--[k]	No	--
Titanium	1,637 (<BG)	320,000[n]	6,400[n]	--[k]	No	--
Vanadium	48.6 (<BG)	560	85.1[f]	--[k]	No	--
Zinc	44.8 (<BG)	24,000	480	67.8[f]	No	--
beta-BHC	0.00060	0.556	0.00486	0.00554	No	--
Endosulfan sulfate	0.00053	480	9.6	0.186	No	--
2-Methylnaphthalene	0.034	320	3.2	--[k]	No	--
Benzo(a)pyrene	0.021	0.33[o]	0.33[o]	0.33[o]	No	--
Benzo(b)fluoranthene	0.023	1.37[r]	0.33[o]	0.33[o]	No	--
Benzo(k)fluoranthene	0.022	13.7[r]	0.33[o]	0.33[o]	No	--
Chrysene	0.022	137[r]	1.2[r]	0.33[o]	No	--
Naphthalene	0.024	1,600	16	988	No	--
Phenanthrene[s]	0.024	24,000	240	1,920	No	--

* All Table 6a notes and acronyms are provided at the end of the document body.

Table 6b. Comparison of Statistical Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 2) BCL Stockpiles Verification Sampling Event.*

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	2.9 (<BG)	20	20	20	No	--
Barium	141	5,600[d]	132[e,f]	224[g]	Yes	Yes[h]
Beryllium	0.34 (<BG)	10.4[i]	1.51[f]	1.51[f]	No	--
Boron[j]	3.6	16,000	320	--[k]	No	--
Cadmium[l]	0.21 (<BG)	13.9	0.81[f]	0.81[f]	No	--
Chromium (total)	8.9 (<BG)	80,000[d]	18.5[f]	18.5[f]	No	--
Chromium (hexavalent)	0.28	2.1	4.8[m]	2	No	--
Cobalt	9.2 (<BG)	1,600	32	--[k]	No	--
Copper	17.6 (<BG)	2,960	59.2	22.0[f]	No	--
Lead	6.0 (<BG)	353	10.2[f]	10.2[f]	No	--
Lithium	6.7 (<BG)	1,600	33.5[f]	--[k]	No	--
Manganese	351 (<BG)	11,200	512[f]	512[f]	No	--
Mercury	0.08 (<BG)	24	0.33[f]	0.33[f]	No	--
Molybdenum[j]	0.51	400	8	--[k]	No	--
Nickel	11.1 (<BG)	1,600	19.1[f]	27.4	No	--
Strontium[j]	57.1	48,000	960	--[k]	No	--
Titanium	1,490 (<BG)	320,000[n]	6,400[n]	--[k]	No	--
Vanadium	47.2 (<BG)	560	85.1[f]	--[k]	No	--
Zinc	43.6 (<BG)	24,000	480	67.8[f]	No	--
beta-BHC	0.0043	0.556	0.00486	0.00554	No	--

* All Table 6b notes and acronyms are provided at the end of the document body.

100-B-14:2 (Area 2), 1607-B7 Sanitary Sewer Pipeline Data Evaluation

Residual concentrations of barium in the remediation footprint and BCL stockpiles were determined to exceed soil RAGs for the protection of groundwater at area 2 of the 100-B-14:2 subsite. Based on the K_d value for barium (25 mL/g) and the discussion of the contaminant depth/K_d value model presented within the confirmatory sampling discussion, above, and the *100 Area Analogous Sites RESRAD Calculations* calculation brief (Appendix D), this constituent is not expected to migrate further than 3 m (10 ft) vertically in 1,000 years. The vadose zone underlying the 100-B-14:2 (area 2) excavation is approximately 18-m (59-ft)-thick; therefore, residual concentrations of barium are protective of groundwater.

The individual gross alpha and beta analytical results were below background activity levels for all samples, with the exception of the statistical sample collected at location 7 (J11K91), which had a slightly elevated gross beta reading (28.8 pCi/g). Accordingly, per the work instruction (WCH 2006c), radiostrontium-specific analysis was performed for this sample only. This result was used to quantify residual strontium-90 for the entire remediation footprint (as reported in Table 6a) without further statistical evaluation, and is likely conservative, as the gross beta measurements for all other statistical samples were below background.

Nonradionuclide risk requirements include an individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual contaminant carcinogenic risk of less than 1 x 10^{-6}, and a cumulative carcinogenic risk of less than 1 x 10^{-5}. For area 2 of the 100-B-14:2 subsite, these risk values were conservatively calculated using the higher of the remediation footprint statistical value and the BCL material maximum value for each constituent. These risk values were not calculated for constituents that were either not detected or were detected at concentrations below Hanford Site or Washington State background values. All individual hazard quotients were less than 1.0, and all individual excess carcinogenic risk values were less than 1 x 10^{-6} (Appendix B). The cumulative hazard quotient for those noncarcinogenic constituents above background or detection levels is 3.4 x 10^{-2}, and the cumulative excess carcinogenic risk value for these constituents is 3.1 x 10^{-7}. Therefore, nonradionuclide risk requirements are met.

When using a statistical sampling approach, a RAG requirement for nonradionuclides is the WAC 173-340-740(7)(e) three-part test. The application of the three-part test for the 100-B-14:2 (area 2) remediation footprint is included in the site-specific statistical calculations (Appendix B). The three-part test is not applicable to the BCL stockpile results, since direct evaluation of the maximum detected sampling results was used as the compliance basis. All residual COC/COPC concentrations for the 100-B-14:2 (area 2) remediation footprint pass the three-part test in comparison to direct exposure RAGs. Residual concentrations of barium fail the three-part test in comparison to soil RAGs for the protection of groundwater. However, as described above, barium is not predicted to reach groundwater within 1,000 years. Residual concentrations are, therefore, protective of groundwater.

Table 7a. Comparison of Statistical Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 4) Remediation Footprint Verification Sampling Event.* (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		
Antimony[l]	0.64 (<BG)	32	5[f]	5[f]	No	--
Arsenic	4.2 (<BG)	20	20	20	No	--
Barium	74 (<BG)	5,600[d]	132[e,f]	224[g]	No	--
Beryllium	0.50 (<BG)	10.4[i]	1.51[f]	1.51[f]	No	--
Boron[j]	3.6	16,000	320	--[k]	No	--
Cadmium[l]	0.18 (<BG)	13.9	0.81[f]	0.81[f]	No	--

Table 7a. Comparison of Statistical Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 4) Remediation Footprint Verification Sampling Event.* (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		
Chromium (total)	11.2 (<BG)	80,000[d]	18.5[f]	18.5[f]	No	--
Chromium (hexavalent)	0.74	2.1	4.8[m]	2	No	--
Cobalt	8.4 (<BG)	1,600	32	--[k]	No	--
Copper	23.8	2,960	59.2	22.0[f]	Yes	Yes[h]
Lead	27.1	353	10.2[f]	10.2[f]	Yes	Yes[h]
Lithium	6.8 (<BG)	1,600	33.5[f]	--[k]	No	--
Manganese	343 (<BG)	11,200	512[f]	512[f]	No	--
Mercury	0.47	24	0.33[f]	0.33[f]	Yes	Yes[h]
Molybdenum[j]	0.8	400	8	--[k]	No	--
Nickel	15.8 (<BG)	1,600	19.1[f]	27.4	No	--
Strontium[j]	36.2	48,000	960	--[k]	No	--
Tin[j]	1.1	48,000	960	--[k]	No	--
Titanium	1,411 (<BG)	320,000[n]	6,400[n]	--[k]	No	--
Vanadium	45.6 (<BG)	560	85.1[f]	--[k]	No	--
Zinc	82	24,000	480	67.8[f]	Yes	Yes[h]
Aroclor-1254	0.050	0.5	0.017[o]	0.017[o]	Yes	Yes[h]
Aroclor-1260	0.0053	0.5	0.017[o]	0.017[o]	No	--
Aldrin	0.0024	0.0588	0.00165[o]	0.00165[o]	Yes	Yes[h]
4,4'-DDD	0.0021	4.17	0.0365	0.005[o]	No	--
4,4'-DDE	0.0076	2.94	0.0257	0.005[o]	Yes	Yes[h]
4,4'-DDT	0.0067	2.94	0.0257	0.005[o]	Yes	Yes[h]
Dieldrin	0.0036	0.0625	0.003[o]	0.003[o]	Yes	Yes[h]
Endosulfan sulfate	0.0033	480	9.6	0.186	No	--
Endrin aldehyde	0.0016	24	0.2	0.039	No	--
gamma-Chlordane	0.0013	2.86[q]	0.025[q]	0.0165[o]	No	--
Acenaphthene	0.21	4,800	96	129	No	--
Anthracene	0.39	24,000	240	1,920	No	--
Benzo(a)anthracene	1.2	1.37[r]	0.33[o]	0.33[o]	No[t]	--
Benzo(a)pyrene	1.1	0.33[o]	0.33[o]	0.33[o]	No[t]	--
Benzo(b)fluoranthene	0.8	1.37[r]	0.33[o]	0.33[o]	No[t]	--
Benzo(g,h,i)perylene[s]	0.8	2,400	48	192	No	--
Benzo(k)fluoranthene	0.9	13.7[r]	0.33[o]	0.33[o]	No[t]	--
Carbazole	0.25	50	0.438	--[k]	No	--

Table 7a. Comparison of Statistical Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 4) Remediation Footprint Verification Sampling Event.* (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		
Chrysene	1.1	137[r]	1.2[r]	0.33[o]	No[t]	--
Di-n-butylphthalate	0.030	8,000	160	540	No	--
Di-n-octylphthalate	0.095	1,600	32	--[k]	No	--
Dibenz(a,h)anthracene	0.66	0.33[o]	0.33[o]	0.33[o]	No[t]	--
Dibenzofuran	0.082	160	3.2	--[k]	No	--
Fluoranthene	10.4	3,200	64	18	No	--
Fluorene	0.13	3,200	64	260	No	--
Indeno(1,2,3-cd)pyrene	0.9	1.37	0.33[o]	0.33[o]	No[t]	--
Naphthalene	0.055	1,600	16	988	No	--
Pentachlorophenol	1.9	8.33	0.33[o]	0.33[o]	No[u]	--
Phenanthrene[s]	3.0	24,000	240	1,920	No	--
Pyrene	9.1	2,400	48	192	No	--

* All Table 7a notes and acronyms are provided at the end of the document body.

Table 7b. Comparison of Statistical Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 4) BCL Stockpiles Verification Sampling Event.* (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		
Arsenic	3.8 (<BG)	20	20	20	No	--
Barium	72.1 (<BG)	5,600[d]	132[e,f]	224[g]	No	--
Beryllium	0.55 (<BG)	10.4[i]	1.51[f]	1.51[f]	No	--
Cadmium[l]	0.10 (<BG)	13.9	0.81[f]	0.81[f]	No	--
Chromium (total)	10.7 (<BG)	80,000[d]	18.5[f]	18.5[f]	No	--
Chromium (hexavalent)	0.98	2.1	4.8[m]	2	No	--
Cobalt	7.7 (<BG)	1,600	32	--[k]	No	--
Copper	18.1 (<BG)	2,960	59.2	22.0[f]	No	--
Lead	17.0	353	10.2[f]	10.2[f]	Yes	Yes[h]
Lithium	7.0 (<BG)	1,600	33.5[f]	--[k]	No	--
Manganese	335 (<BG)	11,200	512[f]	512[f]	No	--

Table 7b. Comparison of Statistical Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 4) BCL Stockpiles Verification Sampling Event.* (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		
Mercury	0.47	24	0.33[f]	0.33[f]	Yes	Yes[h]
Molybdenum[j]	0.60	400	8	--[k]	No	--
Nickel	12.2 (<BG)	1,600	19.1[f]	27.4	No	--
Strontium[j]	31.1	48,000	960	--[k]	No	--
Titanium	1,480 (<BG)	320,000[n]	6,400[n]	--[k]	No	--
Vanadium	47.4 (<BG)	560	85.1[f]	--[k]	No	--
Zinc	48.8 (<BG)	24,000	480	67.8[f]	No	--
Aroclor-1254	0.015	0.5	0.017[o]	0.017[o]	No	--
alpha-BHC	0.0020	0.159	0.00165[o]	0.00165[o]	No	--
Dieldrin	0.00070	0.0625	0.003[o]	0.003[o]	Yes	Yes[h]
Anthracene	0.39	24,000	240	1,920	No	--
Benzo(a)anthracene	1.6	1.37[r]	0.33[o]	0.33[o]	No[t]	--
Benzo(a)pyrene	1.5	0.33[o]	0.33[o]	0.33[o]	No[t]	--
Benzo(b)fluoranthene	1.3	1.37[r]	0.33[o]	0.33[o]	No[t]	--
Benzo(g,h,i)perylene[s]	1.2	2,400	48	192	No	--
Benzo(k)fluoranthene	1.3	13.7[r]	0.33[o]	0.33[o]	No[t]	--
Chrysene	0.26	137[r]	1.2[r]	0.33[o]	No	--
Fluoranthene	0.44	3,200	64	18	No	--
Indeno(1,2,3-cd)pyrene	0.087	1.37	0.33[o]	0.33[o]	No	--
Phenanthrene[s]	0.42	24,000	240	1,920	No	--
Pyrene	0.71	2,400	48	192	No	--

* All Table 7b notes and acronyms are provided at the end of the document body.

<u>100-B-14:2 (Area 4), 190-B Pumphouse Sanitary Sewer Pipelines Data Evaluation</u>

Residual concentrations of copper, lead, mercury, zinc, aroclor-1254, Aldrin, 4,4'-DDE, 4,4'-DDT, and dieldrin in the remediation footprint and concentrations of lead, mercury, and dieldrin in the BCL stockpiles were determined to exceed soil RAGs for the protection of groundwater and/or the river at area 4 of the 100-B-14:2 subsite. Based on the K_d values for these contaminants (>22 mL/g) and the discussion of the contaminant depth/K_d value model presented within the confirmatory sampling discussion, above, and the *100 Area Analogous Sites RESRAD Calculations* calculation brief (Appendix D), none are expected to migrate further than 3 m (10 ft) vertically in 1,000 years. The vadose zone underlying the 100-B-14:2 (area 4) excavation is approximately 18-m (59-ft)-thick; therefore, residual concentrations of these constituents are protective of groundwater. The only pathway for contamination to reach the Columbia River is via groundwater migration, so these contaminant concentrations are also protective of river water.

Multiple PAHs were also detected above soil RAGs within the remediation footprint and BCL stockpiles at the site. However, the sanitary sewers associated with the 185-B/190-B Building were formerly overlain by asphalt paving and residual fragments of the paving were visible within the site excavation. Asphaltic fragments within the verification samples would result in elevated detections of PAHs. A comparison of the statistical PAH concentrations in the verification data set to a known asphalt sample (Table 8) shows a good correlation, as indicated by the Ratio Column. 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.

Table 8. Comparison of 100-B-14:2 (Area 4) Statistical Results to a Known Asphalt Sample. (1 Pages)

Analyte	Asphalt Sample Result (mg/kg)	Statistical Verification Result (mg/kg)	Ratio ($x 10^{-4}$)
2-Methylnaphthalene	394	ND	--
Acenaphthene	1,783	0.21	1.18
Anthracene	3,699	0.39	1.05
Benzo(a)anthracene	5,792	1.2	2.07
Benzo(a)pyrene	5,533	1.1	1.99
Benzo(b)fluoranthene	4,619	0.8	1.73
Benzo(g,h,i)perylene	2,839	0.8	2.82
Benzo(k)fluoranthene	4,527	0.9	1.99
Carbazole	2,049	0.25	1.22
Chrysene	5,580	1.1	1.97
Dibenzo(a,h)anthracene	1,531	0.66	4.31
Dibenzofuran	1,135	0.082	0.72
Fluoranthene	10,665	10.4	9.75
Fluorene	1,756	0.13	0.74
Indeno(1,2,3-cd) pyrene	2,751	0.9	3.27
Naphthalene	1,917	0.055	0.29
Phenanthrene	10,975	3.0	2.73
Pyrene	10,205	9.1	8.92

-- = not applicable
ND = not detected

Nonradionuclide risk requirements include an individual hazard quotient of <1.0, a cumulative hazard quotient of <1.0, an individual contaminant carcinogenic risk of <1 x 10^{-6}, and a cumulative carcinogenic risk of <1 x 10^{-5}. For area 4 of the 100-B-14:2 subsite, these risk values were conservatively calculated using the higher of the remediation footprint statistical value and the BCL material maximum value for each constituent. These risk values were not calculated for constituents that were not detected, were detected at concentrations below Hanford Site or Washington State background values, or were the result of asphalt cross-contamination of the sample matrices. All individual hazard quotients were <1.0, and all individual excess carcinogenic risk values were <1 x 10^{-6} (Appendix B). The cumulative hazard quotient for those noncarcinogenic constituents above background or detection levels is 7.3 x 10^{-2}, and the cumulative excess carcinogenic risk value for these constituents is 9.2 x 10^{-7}. Therefore, nonradionuclide risk requirements are met.

When using a statistical sampling approach, a RAG requirement for nonradionuclides is the WAC 173-340-740(7)(e) three-part test. The application of the three-part test for the 100-B-14:2 (area 4) remediation footprint is included in the site-specific statistical calculations (Appendix B). The three-part test is not applicable to the BCL stockpile results since direct evaluation of the maximum detected sampling results was used as the compliance basis. Copper, lead, zinc, aroclor-1254, and multiple PAHs failed the three-part test in comparison to the most restrictive RAGs. However, as described above, residual concentrations of these contaminants have either been demonstrated to be protective of groundwater and the Columbia River or the result of asphalt cross-contamination.

Table 9a. Comparison of Statistical Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 5) Remediation Footprint Verification Sampling Event.* (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	0.048	6.2	1,465[c]	1,465[c]	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	3.8 (<BG)	20	20	20	No	--
Barium	60.4 (<BG)	5,600[d]	132[e,f]	224[g]	No	--
Beryllium	0.33 (<BG)	10.4[i]	1.51[f]	1.51[f]	No	--
Boron[j]	1.7	16,000	320	--[k]	No	--
Cadmium[l]	0.16 (<BG)	13.9	0.81[f]	0.81[f]	No	--
Chromium (total)	7.7 (<BG)	80,000[d]	18.5[f]	18.5[f]	No	--

Table 9a. Comparison of Statistical Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 5) Remediation Footprint Verification Sampling Event.* (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		
Chromium (hexavalent)	0.37	2.1	4.8[m]	2	No	--
Cobalt	7.9 (<BG)	1,600	32	--[k]	No	--
Copper	17.6 (<BG)	2,960	59.2	22.0[f]	No	--
Lead	7.0 (<BG)	353	10.2[f]	10.2[f]	No	--
Lithium	7.6 (<BG)	1,600	33.5[f]	--[k]	No	--
Manganese	338 (<BG)	11,200	512[f]	512[f]	No	--
Mercury	0.1 (<BG)	24	0.33[f]	0.33[f]	No	--
Molybdenum[j]	0.52	400	8	--[k]	No	--
Nickel	10.9 (<BG)	1,600	19.1[f]	27.4	No	--
Strontium[j]	33.0	48,000	960	--[k]	No	--
Tin[j]	1.3	48,000	960	--[k]	No	--
Titanium	1,490 (<BG)	320,000[n]	6,400[n]	--[k]	No	--
Vanadium	44.6 (<BG)	560	85.1[f]	--[k]	No	--
Zinc	39.8 (<BG)	24,000	480	67.8[f]	No	--
Aroclor-1254	0.011	0.5	0.017[o]	0.017[o]	No	--
beta-BHC	0.00062	0.556	0.00486	0.00554	No	--
Endrin	0.0013	24	0.2	0.039	No	--
Methoxychlor	0.049	400	4	1.67	No	--
bis(2-Ethylhexyl)phthalate	0.036	71.4	0.625	0.36	No	--
Di-n-butylphthalate	0.021	8,000	160	540	No	--
Pyrene	0.020	2,400	48	192	No	--

* All Table 9a notes and acronyms are provided at the end of the document body.

Table 9b. Comparison of Statistical Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 5) BCL Stockpiles Verification Sampling Event.* (2 Pages)

COC/COPC	Maximum Result (pCi/g)	Generic Site Lookup Values[a] (pCi/g)			Does the Maximum Result Exceed Lookup Values?	Does the Maximum Result Pass RESRAD Modeling?
		Shallow Zone Lookup Value[b]	Groundwater Protection Lookup Value	River Protection Lookup Value		
Tritium	0.296	459[c]	12.6[c]	12.6[c]	No	--

Table 9b. Comparison of Statistical Contaminant Concentrations to Action Levels for the 100-B-14:2 (Area 5) BCL Stockpiles Verification Sampling Event.* (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		
Arsenic	2.6 (<BG)	20	20	20	No	--
Barium	75.0 (<BG)	5,600[d]	132[e,f]	224[g]	No	--
Beryllium	0.32 (<BG)	10.4[i]	1.51[f]	1.51[f]	No	--
Boron[j]	3.3	16,000	320	--[k]	No	--
Cadmium[l]	0.14 (<BG)	13.9	0.81[f]	0.81[f]	No	--
Chromium (total)	12.7 (<BG)	80,000[d]	18.5[f]	18.5[f]	No	--
Chromium (hexavalent)	0.65	2.1	4.8[m]	2	No	--
Cobalt	7.4 (<BG)	1,600	32	--[k]	No	--
Copper	15.8 (<BG)	2,960	59.2	22.0[f]	No	--
Lead	26.1	353	10.2[f]	10.2[f]	Yes	Yes[v]
Lithium	5.9 (<BG)	1,600	33.5[f]	--[k]	No	--
Manganese	324 (<BG)	11,200	512[f]	512[f]	No	--
Mercury	0.1 (<BG)	24	0.33[f]	0.33[f]	No	--
Molybdenum[j]	0.50	400	8	--[k]	No	--
Nickel	9.7 (<BG)	1,600	19.1[f]	27.4	No	--
Strontium[j]	33.1	48,000	960	--[k]	No	--
Tin[j]	1.3	48,000	960	--[k]	No	--
Titanium	1,250 (<BG)	320,000[n]	6,400[n]	--[k]	No	--
Vanadium	42.0 (<BG)	560	85.1[f]	--[k]	No	--
Zinc	41.3 (<BG)	24,000	480	67.8[f]	No	--
bis(2-Ethylhexyl)phthalate	0.027	71.4	0.625	0.36	No	--
Chrysene	0.021	137[r]	1.2[r]	0.33[o]	No	--
Fluoranthene	0.019	3,200	64	18	No	--
Pyrene	0.019	2,400	48	192	No	--

* All Table 9b notes and acronyms are provided at the end of the document body.

<u>100-B-14:2 (Area 5), 115-B/C Gas Recirculation Facility Sanitary Sewer Pipelines</u>

The residual concentration of lead in the BCL stockpiles was determined to exceed soil RAGs for the protection of groundwater and the Columbia River at area 5 of the 100-B-14:2 subsite. Based on the K_d value for lead (30 mL/g) and the discussion of the contaminant depth/K_d value model presented within the confirmatory sampling discussion, above, and the *100 Area Analogous Sites RESRAD Calculations* calculation brief (Appendix D), this constituent is not expected to migrate further than 3 m (10 ft) vertically in 1,000 years. The vadose zone underlying the 100-B-14:2 (area 5) excavation is approximately 22-m (72-ft)-thick; therefore, residual concentrations of lead are protective of groundwater. No COCs/COPCs were quantified above RAGs within the remediation footprint.

The individual gross alpha and gross beta analytical results were below background activity levels for all samples. Additionally, radiostrontium analysis was inadvertently requested for samples collected from the remediation footprint, and no beta-strontium was quantitated above minimum detectable activity levels.

Nonradionuclide risk requirements include an individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual contaminant carcinogenic risk of less than 1 x 10^{-6}, and a cumulative carcinogenic risk of less than 1 x 10^{-5}. For area 5 of the 100-B-14:2 subsite, these risk values were conservatively calculated using the higher of the remediation footprint statistical value and the BCL material maximum value for each constituent. These risk values were not calculated for constituents that were either not detected or were detected at concentrations below Hanford Site or Washington State background values. All individual hazard quotients were less than 1.0, and all individual excess carcinogenic risk values were less than 1 x 10^{-6} (Appendix B). The cumulative hazard quotient for those noncarcinogenic constituents above background or detection levels is 1.2 x 10^{-2}, and the cumulative excess carcinogenic risk value for these constituents is 3.3 x 10^{-7}. Therefore, nonradionuclide risk requirements are met.

When using a statistical sampling approach, a RAG requirement for nonradionuclides is the WAC 173-340-740(7)(e) three-part test. The application of the three-part test for the 100-B-14:2 (area 2) remediation footprint is included in the site-specific statistical calculations (Appendix B). The three-part test is not applicable to the BCL stockpile results since direct evaluation of the maximum detected sampling results was used as the compliance basis. All residual COC/COPC concentrations for the 100-B-14:2 (area 5) remediation footprint pass the three-part test in comparison to the most restrictive RAG.

Table 10a. Comparison of Statistical Contaminant Concentrations to Action Levels for the 1607-B2:1 Remediation Footprint Verification Sampling Event.* (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		
Antimony[l]	0.58 (<BG)	32	5[f]	5[f]	No	--
Arsenic	7.2	20	20	20	No	--
Barium	258	5,600[d]	132[e,f]	224[g]	Yes	Yes[w]
Beryllium	0.8 (<BG)	10.4[i]	1.51[f]	1.51[f]	No	--
Boron[j]	8.3	16,000	320	--[k]	No	--

Table 10a. Comparison of Statistical Contaminant Concentrations to Action Levels for the 1607-B2:1 Remediation Footprint Verification Sampling Event.* (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		
Cadmium[l]	0.13 (<BG)	13.9	0.81[f]	0.81[f]	No	--
Chromium (total)	19.8	80,000[d]	18.5[f]	18.5[f]	Yes	Yes[w]
Chromium (hexavalent)	0.33	2.1	4.8[m]	2	No	--
Cobalt	12.9 (<BG)	1,600	32	--[k]	No	--
Copper	29.6	2,960	59.2	22.0[f]	Yes	Yes[w]
Lead	10.2 (<BG)	353	10.2[f]	10.2[f]	Yes[x]	Yes[w]
Manganese	588	11,200	512[f]	512[f]	Yes	Yes[w]
Mercury	0.02 (<BG)	24	0.33[f]	0.33[f]	No	--
Molybdenum[j]	1.2	400	8	--[k]	No	--
Nickel	21.2	1,600	19.1[f]	27.4	Yes	Yes[w]
Silver	0.20 (<BG)	400	8	0.73[f]	No	--
Vanadium	54.9 (<BG)	560	85.1[f]	--[k]	No	--
Zinc	69	24,000	480	67.8[f]	Yes	Yes[w]
4,4'-DDD	0.0017	4.17	0.0365	0.005[o]	No	--
Dieldrin	0.0017	0.0625	0.003[o]	0.003[o]	No	--
Endrin aldehyde	0.0022	24	0.2	0.039	No	--
2,4-D	0.11	800	7	--[k]	No	--
2,4-Db	0.25	640	12.8	--[k]	No	--
2,4,5-T	0.041	800	16	--[k]	No	--
2,4,5-Tp (Silvex)	0.023	640	5	--[k]	No	--
Dinoseb	0.027	80	0.7	--[k]	No	--
2-Methylnaphthalene	0.15	320	3.2	--[k]	No	--
Di-n-butylphthalate	0.021	8,000	160	540	No	--
Dibenzofuran	0.034	160	3.2	--[k]	No	--
Diethylphthalate	0.026	64,000	1,280	4,600	No	--
Indeno(1,2,3-cd)pyrene	0.024	1.37	0.33[o]	0.33[o]	No	--
Naphthalene	0.11	1,600	16	988	No	--
Phenanthrene[s]	0.037	24,000	240	1,920	No	--
Acetone	0.010	72,000	720	--[k]	No	--

* All Table 10a notes and acronyms are provided at the end of the document body.

Table 10b. Comparison of Statistical Contaminant Concentrations to Action Levels for the 1607-B2:1 BCL Stockpiles Verification Sampling Event.*

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		
Antimony[l]	0.49 (<BG)	32	5[f]	5[f]	No	--
Arsenic	5.3 (<BG)	20	20	20	No	--
Barium	101 (<BG)	5,600[d]	132[e,f]	224[g]	No	--
Beryllium	0.47 (<BG)	10.4[i]	1.51[f]	1.51[f]	No	--
Boron[j]	2.3	16,000	320	--[k]	No	--
Cadmium[l]	0.13 (<BG)	13.9	0.81[f]	0.81[f]	No	--
Chromium (total)	14.6 (<BG)	80,000[d]	18.5[f]	18.5[f]	No	--
Chromium (hexavalent)	0.24	2.1	4.8[m]	2	No	--
Cobalt	8.0 (<BG)	1,600	32	--[k]	No	--
Copper	17.5 (<BG)	2,960	59.2	22.0[f]	No	--
Lead	6.6 (<BG)	353	10.2[f]	10.2[f]	No	--
Manganese	357 (<BG)	11,200	512[f]	512[f]	No	--
Molybdenum[j]	0.61	400	8	--[k]	No	--
Nickel	14.4 (<BG)	1,600	19.1[f]	27.4	No	--
Silver	0.09 (<BG)	400	8	0.73[f]	No	--
Vanadium	40.0 (<BG)	560	85.1[f]	--[k]	No	--
Zinc	42.5 (<BG)	24,000	480	67.8[f]	No	--
2,4,5-T	0.049	800	16	--[k]	No	--
Acetone	0.009	72,000	720	--[k]	No	--

* All Table 10b notes and acronyms are provided at the end of the document body.

1607-B2:1 Drain Field Data Evaluation

Residual concentrations of barium, chromium (total), copper, manganese, nickel, and zinc in the remediation footprint were determined to exceed soil RAGs for the protection of groundwater and/or the Columbia River at the 1607-B2:1 subsite. Based on the K_d value for these constituents (>25 mL/g) and the discussion of the contaminant depth/K_d value model presented within the confirmatory sampling discussion, above, and the *100 Area Analogous Sites RESRAD Calculations* calculation brief (Appendix D), none are expected to migrate further than 3 m (10 ft) vertically in 1,000 years. The vadose zone underlying the 1607-B2:1 excavation is approximately 11-m (36-ft)-thick; therefore, residual concentrations of lead are protective of groundwater. No COCs/COPCs were quantified above RAGs within the BCL stockpiles.

When using a statistical sampling approach, a RAG requirement for nonradionuclides is the WAC 173-340-740(7)(e) three-part test. The application of the three-part test for the 1607-B2:1 remediation footprint is included in the site-specific statistical calculations (Appendix B). The three-part test is not applicable to the BCL stockpile results since direct evaluation of the maximum detected sampling results was used as the compliance basis. All residual COC/COPC concentrations for the 1607-B2:1 remediation footprint pass the three-part test in comparison to direct exposure RAGs. In addition to the exceedances addressed above, lead fails the three-part test in comparison to soil RAGs for the protection of groundwater and the Columbia River. As with the other metals, lead (K_d = 30 mL/g) is not predicted to migrate more than 3 m (10 ft) vertically in 1,000 years, as compared to an 11-m- (36-ft-) thick vadose zone underlying the lowest point of the 1607-B2:1 excavation. Therefore, residual concentrations of lead are also protective of groundwater and the Columbia River.

Nonradionuclide risk requirements include an individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual contaminant carcinogenic risk of less than 1×10^{-6}, and a cumulative carcinogenic risk of less than 1×10^{-5}. For the 1607-B2:1 subsite, these risk values were conservatively calculated using the higher of the remediation footprint statistical value and the BCL material maximum value for each constituent. Risk values were not calculated for constituents that were either not detected or were detected at concentrations below Hanford Site or Washington State background values. All individual hazard quotients were less than 1.0, and all individual excess carcinogenic risk values were less than 1×10^{-6} (Appendix B). The cumulative hazard quotient for those noncarcinogenic constituents above background or detection levels is 1.3×10^{-1}, and the cumulative excess carcinogenic risk value for these constituents is 2.0×10^{-7}. Therefore, nonradionuclide risk requirements are met.

Table 11a. Comparison of Statistical Contaminant Concentrations to Action Levels for the 1607-B2:2 and 100-B-14:2 (Area 1) Remediation Footprint Verification Sampling Event.* (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		
Cesium-137	0.107	6.2	1,465[c]	1,465[c]	No	--
Strontium-90	0.181	4.5	27.6[c]	27.6[c]	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**		
Antimony[l]	0.51 (<BG)	32	5[f]	5[f]	No	--
Arsenic	4.1 (<BG)	20	20	20	No	--
Barium	112 (<BG)	5,600[d]	132[e,f]	224[g]	Yes[x]	Yes[y]

Table 11a. Comparison of Statistical Contaminant Concentrations to Action Levels for the 1607-B2:2 and 100-B-14:2 (Area 1) Remediation Footprint Verification Sampling Event.[*] (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		
Beryllium	0.44 (<BG)	10.4[i]	1.51[f]	1.51[f]	No	--
Boron[j]	4.7	16,000	320	--[k]	No	--
Cadmium[l]	0.43 (<BG)	13.9	0.81[f]	0.81[f]	No	--
Chromium (total)	10.5 (<BG)	80,000[d]	18.5[f]	18.5[f]	No	--
Chromium (hexavalent)	0.35	2.1	4.8[m]	2	No	--
Cobalt	8.5 (<BG)	1,600	32	--[k]	No	--
Copper	34	2,960	59.2	22.0[f]	Yes	Yes[y]
Lead	10.1 (<BG)	353	10.2[f]	10.2[f]	Yes[x]	Yes[y]
Lithium	8.3 (<BG)	1,600	33.5[f]	--[k]	No	--
Manganese	362 (<BG)	11,200	512[f]	512[f]	No	--
Mercury	0.92	24	0.33[f]	0.33[f]	Yes	Yes[y]
Molybdenum[j]	0.37	400	8	--[k]	No	--
Nickel	12.5 (<BG)	1,600	19.1[f]	27.4	No	--
Strontium[j]	48.2	48,000	960	--[k]	No	--
Titanium	1,509 (<BG)	320,000[n]	6,400[n]	--[k]	No	--
Vanadium	46.4 (<BG)	560	85.1[f]	--[k]	No	--
Zinc	51.5 (<BG)	24,000	480	67.8[f]	No	--
Aroclor-1254	0.33	0.5	0.017[o]	0.017[o]	Yes	Yes[y]
Aroclor-1260	0.0067	0.5	0.017[o]	0.017[o]	No	--
alpha-Chlordane	0.00087	2.86[q]	0.025[q]	0.0165[o]	No	--
Beta-BHC	0.0019	0.556	0.00486	0.00554	No	--
4,4'-DDE	0.018	2.94	0.0257	0.005[o]	Yes	Yes[y]
4,4'-DDT	0.017	2.94	0.0257	0.005[o]	Yes	Yes[y]
Endosulfan I	0.0069	480	9.6	0.186	No	--
Endosulfan II	0.0034	480	9.6	0.186	No	--
Endosulfan sulfate	0.00050	480	9.6	0.186	No	--
Endrin aldehyde	0.0074	24	0.2	0.039	No	--
Endrin ketone	0.0011	24	0.2	0.039	No	--
gamma-Chlordane	0.00043	2.86[q]	0.025[q]	0.0165[o]	No	--
Heptachlor epoxide	0.00060	0.11	0.002[o]	0.002[o]	No	--
Methoxychlor	0.015	400	4	1.67	No	--
2-Methylnaphthalene	0.019	320	3.2	--[k]	No	--

Table 11a. Comparison of Statistical Contaminant Concentrations to Action Levels for the 1607-B2:2 and 100-B-14:2 (Area 1) Remediation Footprint Verification Sampling Event.*
(3 Pages)

COC/COPC	Statistical Result (mg/kg)	Remedial Action Goals[a] (mg/kg) Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection	Does the Statistical Data Set Exceed RAGs?	Does the Statistical Result Pass RESRAD Modeling?
Benzo(a)anthracene	0.041	1.37[r]	0.33[o]	0.33[o]	No	--
Benzo(a)pyrene	0.033	0.33[o]	0.33[o]	0.33[o]	No	--
Benzo(b)fluoranthene	0.041	1.37[r]	0.33[o]	0.33[o]	No	--
Benzo(g,h,i)perylene[s]	0.030	2,400	48	192	No	--
Benzo(k)fluoranthene	0.035	13.7[r]	0.33[o]	0.33[o]	No	--
bis(2-Ethylhexyl)phthalate	1.6	71.4	0.625	0.36	Yes	Yes[y]
Chrysene	0.064	137[r]	1.2[r]	0.33[o]	No	--
Di-n-butylphthalate	0.07	8,000	160	540	No	--
Dibenz(a,h)anthracene	0.022	0.33[o]	0.33[o]	0.33[o]	No	--
Fluoranthene	0.079	3,200	64	18	No	--
Indeno(1,2,3-cd)pyrene	0.028	1.37	0.33[o]	0.33[o]	No	--
Naphthalene	0.017	1,600	16	988	No	--
Phenanthrene[s]	0.046	24,000	240	1,920	No	--
Phenol	0.017	24,000	480	4,200	No	--
Pyrene	0.066	2,400	48	192	No	--

* All Table 11a notes and acronyms are provided at the end of the document body.

Table 11b. Comparison of Statistical Contaminant Concentrations to Action Levels for the 1607-B2:2 and 100-B-14:2 (Area 1) BCL Stockpiles Verification Sampling Event.*
(2 Pages)

COC/COPC	Maximum Result (pCi/g)	Generic Site Lookup Values[a] (pCi/g) Shallow Zone Lookup Value[b]	Groundwater Protection Lookup Value	River Protection Lookup Value	Does the Maximum Result Exceed Lookup Values?	Does the Maximum Result Pass RESRAD Modeling?
Strontium-90	2.10	4.5	27.6[c]	27.6[c]	No	--
COC/COPC	**Maximum Result (mg/kg)**	**Remedial Action Goals[a] (mg/kg) Direct Exposure**	**Soil Cleanup Level for Groundwater Protection**	**Soil Cleanup Level for River Protection**	**Does the Maximum Result Exceed RAGs?**	**Does the Maximum Result Pass RESRAD Modeling?**
Antimony[l]	0.47 (<BG)	32	5[f]	5[f]	No	--
Arsenic	3.6 (<BG)	20	20	20	No	--

Table 11b. Comparison of Statistical Contaminant Concentrations to Action Levels for the 1607-B2:2 and 100-B-14:2 (Area 1) BCL Stockpiles Verification Sampling Event.* (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		
Barium	91.0 (<BG)	5,600[d]	132[e,f]	224[g]	No	--
Beryllium	0.39 (<BG)	10.4[i]	1.51[f]	1.51[f]	No	--
Boron[j]	2.8	16,000	320	--[k]	No	--
Cadmium[l]	0.1 (<BG)	13.9	0.81[f]	0.81[f]	No	--
Chromium (total)	12.8 (<BG)	80,000[d]	18.5[f]	18.5[f]	No	--
Chromium (hexavalent)	0.28	2.1	4.8[m]	2	No	--
Cobalt	8.2 (<BG)	1,600	32	--[k]	No	--
Copper	16.0 (<BG)	2,960	59.2	22.0[f]	No	--
Lead	8.9 (<BG)	353	10.2[f]	10.2[f]	No	--
Lithium	7.7 (<BG)	1,600	33.5[f]	--[k]	No	--
Manganese	340 (<BG)	11,200	512[f]	512[f]	No	--
Mercury	0.14 (<BG)	24	0.33[f]	0.33[f]	No	--
Molybdenum[j]	0.36	400	8	--[k]	No	--
Nickel	12.5 (<BG)	1,600	19.1[f]	27.4	No	--
Strontium[j]	31.0	48,000	960	--[k]	No	--
Titanium	1,330 (<BG)	320,000[n]	6,400[n]	--[k]	No	--
Vanadium	46.6 (<BG)	560	85.1[f]	--[k]	No	--
Zinc	49.6 (<BG)	24,000	480	67.8[f]	No	--
Aroclor-1254	0.0062	0.5	0.017[o]	0.017[o]	No	--
Aroclor-1260	0.011	0.5	0.017[o]	0.017[o]	No	--
4,4'-DDE	0.00044	2.94	0.0257	0.005[o]	No	--
4,4'-DDT	0.016	2.94	0.0257	0.005[o]	Yes	Yes[y]
Endrin aldehyde	0.0022	24	0.2	0.039	No	--
Benzo(b)fluoranthene	0.018	1.37[r]	0.33[o]	0.33[o]	No	--
bis(2-Ethylhexyl)phthalate	1.1	71.4	0.625	0.36	Yes	Yes[y]
Di-n-butylphthalate	0.080	8,000	160	540	No	--
Diethylphthalate	0.018	64,000	1,280	4,600	No	--
Fluoranthene	0.032	3,200	64	18	No	--
Phenol	0.027	24,000	480	4,200	No	--
Pyrene	0.026	2,400	48	192	No	--

* All Table 11b notes and acronyms are provided at the end of the document body.

1607-B2:2 Collection Main, Septic Tank, and Effluent Piping and 100-B-14:2 (Area 1), 108-B Facility Sanitary Sewers Data Evaluation

Residual concentrations of copper, mercury, aroclor-1254, 4,4'-DDE, 4,4'-DDT, and bis(2-ethylhexyl)phthalate in the remediation footprint and 4,4'-DDT and bis(2-ethylhexyl)phthalate in the BCL stockpiles were determined to exceed soil RAGs for the protection of groundwater and/or the Columbia River at the 1607-B2:2 subsite. Based on the K_d value for these constituents (>22 mL/g) and the discussion of the contaminant depth/K_d value model presented within the confirmatory sampling discussion, above, and the *100 Area Analogous Sites RESRAD Calculations* calculation brief (Appendix D), none are expected to migrate further than 3 m (10 ft) vertically in 1,000 years. The vadose zone underlying the 1607-B2:2 excavation is approximately 10 m (33 ft) thick; therefore, residual concentrations of lead are protective of groundwater.

When using a statistical sampling approach, a RAG requirement for nonradionuclides is the WAC 173-340-740(7)(e) three-part test. The application of the three-part test for the 1607-B2:2 remediation footprint is included in the site-specific statistical calculations (Appendix B). The three-part test is not applicable to the BCL stockpile results since direct evaluation of the maximum detected sampling results was used as the compliance basis. All residual COC/COPC concentrations for the 1607-B2:2 remediation footprint pass the three-part test in comparison to direct exposure RAGs. In addition to the exceedances addressed above, barium and lead fail the three-part test in comparison to soil RAGs for the protection of groundwater and/or the Columbia River. As above, neither barium (K_d = 25 mL/g) nor lead (K_d = 30 mL/g) is predicted to migrate more than 3 m (10 ft) vertically in 1,000 years, as compared to an 10-m (30-ft)- thick vadose zone underlying the lowest point of the 1607-B2:2 excavation. Therefore, residual concentrations of these metals are also protective of groundwater and the Columbia River.

Nonradionuclide risk requirements include an individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual contaminant carcinogenic risk of less than 1×10^{-6}, and a cumulative carcinogenic risk of less than 1×10^{-5}. For the 1607-B2:2 subsite, these risk values were conservatively calculated using the higher of the remediation footprint statistical value and the BCL material maximum value for each constituent. These risk values were not calculated for constituents that were either not detected or were detected at concentrations below Hanford Site or Washington State background values. All individual hazard quotients were less than 1.0, and all individual excess carcinogenic risk values were less than 1×10^{-6} (Appendix B). The cumulative hazard quotient for those noncarcinogenic constituents above background or detection levels is 2.6×10^{-1}, and the cumulative excess carcinogenic risk value for these constituents is 1.4×10^{-6}. Therefore, nonradionuclide risk requirements are met.

DATA QUALITY ASSESSMENTS

Individual data quality assessments (DQAs) were performed for each sampling event, as is described in the follow subsections. Each DQA was performed to compare the sampling approach and resulting analytical data with the sampling and data requirements specified in the site-specific work instructions. All DQAs were performed in accordance with specific data quality objectives found in the SAP (DOE-RL 2005a). The data quality requirements in the SAP are used for assessing data resulting from statistical sampling and do not specifically apply to the data sets resulting from the (confirmatory) focused sampling performed for the 100-B-14:2 subsite. However, to ensure quality data sets, the SAP data quality assurance requirements, as well as the data validation procedures for chemical and radiochemical analysis (BHI 2000a, 2000b), have been followed where appropriate.

The DQAs involve evaluation of the data to determine if they are of the right type, quality, and quantity to support the intended use (i.e., closeout decisions). A DQA completes the data life cycle (i.e., planning, implementation, and assessment) initiated by the data quality objectives process (EPA 2000). It was concluded that all interim closure data was of the right quality and quantity to support a closeout decision.

100-B-14:2 (Area 2) Confirmatory Sampling Data Quality Assessment

Because holding times for hexavalent chromium analysis in other solids (i.e., pipe sediment/debris) were exceeded by more than twice the requirement, third-party validation of confirmatory data directed that all nondetects be rejected. Nondetected hexavalent chromium results were not found in pipe sediments, but the detections should be considered estimated and potentially low-biased.

Due to detections and data quality issues in the confirmatory data set, all confirmatory analyses were retained for verification sampling following site remediation.

Verification sampling for the 100-B-14:2 (area 2) subsite was combined with that for the 100-B-14:2 (area 5) subsite, and the verification DQA for the combined sampling event is presented following the 100-B-14:2 (area 5) confirmatory DQA.

100-B-14:2 (Area 5) Confirmatory Sampling Data Quality Assessment

Because holding times for hexavalent chromium analysis in other solids (i.e., pipe sediment/debris) were exceeded by more than twice the requirement, the nondetected result in sample J00Y82 was rejected by the project, and the detection in sample J00Y81 should be considered estimated and potentially low-biased.

Samples of residual pipeline contents (J00Y79 and J00Y80) were mistakenly submitted for ICP metals analysis by toxicity characteristic leaching procedure (TCLP), rather than totals procedures; no reanalysis was performed to correct the deficiency.

Due to detections and data quality issues in the confirmatory data set, all confirmatory analyses were retained for verification sampling following site remediation.

100-B-14:2 (Areas 2 and 5) Verification Sampling Data Quality Assessment

A review of the work instruction (WCH 2006c), the field logbook (WCH 2006a), and applicable analytical data packages has been performed as part of this DQA. All samples were collected per the sample design. Where the sample design allowed for additional samples, if required to properly characterize the site, no additional data needs were identified at the time of field sampling.

Data from verification samples collected at the 100-B-14:2 (area 2) subsite were provided by the laboratory in sample delivery group (SDG) K0284, and from the 100-B-14:2 (area 5) subsite in SDG K0285. Both SDGs were submitted for third-party validation. No major deficiencies were found in the data and all of the data were found to be acceptable for decision-making purposes. Minor deficiencies, as well as qualifiers applied by third-party validation, will be discussed below.

<u>SDG K0284</u>

SDG K0284 consists of 13 field samples (J11KD1, J11KD2, and J11K85 through J11K95) collected from the 100-B-14:2 (area 2) subsite. These field samples were analyzed for SVOCs, pesticides, PCBs, ICP metals, mercury, hexavalent chromium, and by gross alpha, gross beta, and gamma spectroscopy. This SDG also includes a field equipment blank (J11K96), analyzed for SVOCs, ICP metals, and mercury. Sample J11K91 had an elevated gross beta reading and was further analyzed for total beta strontium. Sample J11K95 is a field duplicate of sample J11K86. Sample J11KD1 is from the east BCL stockpile. Sample J11KD2 is from the west BCL stockpile. The ten remaining samples were collected from statistically selected locations within the 100-B-14:2 (area 2) excavation (WCH 2006c).

The SVOC analysis matrix spike (MS) for hexachlorocyclopentadiene was above the acceptance criteria at 101% recovery (some compounds are expected to have low recoveries; recoveries around 100% are considered high for those compounds). This result may suggest a high bias in the field sample data. High-biased data is acceptable for the intended purpose of the data.

The common laboratory contaminants bis(2-ethylhexyl)phthalate and di-n-butylphthalate were found in the method blank (MB) below the contract-required quantitation limit (CRQL). All of the field samples and MBs were reported in the range of 21 µg/kg to 62 µg/kg for both phthalates. Third-party validation identified the field samples as being within a 5-fold multiplier of the MB results and reset all of the values in the field samples to the CRQLs and requalified the samples as nondetected with "U" flags.

The SVOC analyte 2,4-dinitrophenol, in the laboratory duplicate, had a relative percent difference (RPD) value of 68%. Therefore, third-party validation qualified all of the 2,4-dinitrophenol results as estimated with "J" flags. Estimated data is accepted for decision-making purposes.

In the chlorinated pesticide analysis, many of the surrogates tested above the acceptance criteria, suggesting a high bias in the sample data. However, almost all of the sample results were non-detect. A high bias in the data has no affect on nondetected analytes. In samples J11KD1 and J11K93, the analyte beta-BHC was detected. Third-party validation identified the beta-BHC results in samples J11KD1 and J11K93 as estimates and qualified those results with "J" flags.

The laboratory control sample (LCS) in the chlorinated pesticide analysis had consistently low recoveries (13-17%) for all analytes except toxaphene, which was not included in the LCS (see below). The MS/matrix spike duplicate (MSD) results were within criteria. Third-party validation qualified the SDG K0284 data for all chlorinated pesticide analytes, except toxaphene, as estimated with "J" flags because of the LCS results.

In the chlorinated pesticide analysis, the analyte toxaphene was not included in the MS, MSD, or LCS samples. Toxaphene is actually a mixture of compounds rather than a discrete analyte. While the overall concentration of toxaphene can be calculated using several unobstructed peaks in the chromatography, the inclusion of toxaphene in the spiking mixture would be problematic for the other pesticide analytes. The laboratory typically quantitates toxaphene but does not include toxaphene in quality assurance (QA)/QC samples. The toxaphene data is therefore considered estimated but useable for decision-making purposes.

In the metals analysis, eight analytes were out of criteria for MS recovery. For most of these analytes, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. For these analytes, the deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, post digestion spikes (PDSs) and serial dilutions were prepared for all eight analytes with acceptable results. The analytes antimony, calcium, and phosphorus did not have mismatched spike and native concentrations in the original MS. These three analytes have been qualified by third party validation as estimates with "J" flags for all samples in SDG K0284. The original MS recoveries for antimony, calcium, and phosphorus were 46.3%, 137%, and 55.4%, respectively. Estimated, or "J"-flagged, data are considered acceptable for the intended use of the data.

The analytes boron, tin, aluminum, and lithium were reported in the MB at concentrations that were below the CRQLs but not less than 1/5th of some of the concentrations reported in the field samples (i.e., the field sample concentrations were low enough that the MB concentration is of similar magnitude). Third-party validation has qualified the analytical data for aluminum and lithium in sample J11K96 (the equipment blank), for tin in samples J11K85, J11K93, and J11KD1, and for boron in samples J11K86, J11K88, J11K89, J11K90, J11K92, J11K95, and J11K96, as estimated nondetections with "UJ" flags.

The RPDs for eight analytes (cadmium, potassium, silicon, titanium, vanadium, tin, mercury, and total uranium) in the metals analysis were above the laboratory acceptance criteria of 20%. Most of these were less than the project acceptance criteria of 30%. The RPDs for mercury and total uranium were 65% and 75%, respectively. Elevated RPDs in environmental soil samples are generally attributed to natural heterogeneities in the soil matrix from which the sample and duplicate are prepared. However, all of the total uranium data in SDG K0284 were qualified as estimated, with "J" flags, by third-party validation.

In the gamma spectroscopy data, an elevated RPD was reported for radium-226 at 56%. Third-party validation has qualified all of the radium-226 results in SDG K0284 as estimated, with "J" flags.

An elevated gross-beta reading was reported for sample J11K91 (28.8 pCi/g). The project requested the analysis of total beta strontium on sample J11K91. There were no problems with the total beta strontium data.

SDG K0286

SDG K0286 comprises 15 field samples (J11KB3 through J11KB9, J11KC0 through J11KC3, and J11KD3 through J11KD6) collected from the 100-B-14:2 (area 5) subsite. These field samples were analyzed for SVOCs, pesticides, PCBs, ICP metals, mercury, hexavalent chromium, tritium, total beta strontium, and by gross alpha, gross beta, and gamma spectroscopy. This SDG also includes a field equipment blank (J11KC4) that was analyzed for SVOCs, ICP metals, and mercury. Sample J11C3 is a field duplicate of sample J11KC6. Four samples (J11KD3 through J11KD6) were collected from the BCL stockpiles associated with the 115-B sanitary sewer pipeline remediation. The 10 remaining samples were collected from statistically selected locations within the 100-B-14:2 (area 5) excavation (WCH 2006c).

The work instruction called for a sample to be collected from a small BCL stockpile north of the 100-B-14:2 (area 5) excavation. As described in the logbook (WCH 2006a), the northern BCL stockpile had been removed. Further investigation determined that the missing BCL stockpile was incorporated into the larger BCL stockpile associated with the nearby excavation of the 1607-B2:2 and 100-B-14:2 (area 1) subsites. The lack of a sample for the northern 100-B-14:2 (area 5) BCL stockpile has been determined to acceptable because the other BCL samples from (area 5) are all significantly below action levels and the "missing" BCL material was still evaluated as part of the 100-B-14:2/1607-B2 waste sites. Confusion caused by the relocation of the material resulted in sampling of the 100-B-14:2 (area 5) southeastern BCL stockpile twice rather than once, as called for in the work instruction (WCH 2006c).

In the SVOC analysis, the MS recovery for 1,2,4-trichlorobenzene was below the laboratory criteria (60-120%) at 59%. The MSD for 1,2,4-trichlorobenzene was within criteria at 79%. Third-party validation qualified all of the 1,2,4-trichlorobenzene data in SDG K0286 as estimated with "J" flags.

The RPDs for eleven analytes (phenol, 1,2-dichlorobenzene, 2-methylphenol, bis(2-chloro-1-methylethyl)ether, 4-methylphenol, n-nitroso-di-n-propylamine, 2-nitrophenol, 2,4-dimethylphenol, 2,4-dichlorophenol, 4,6-dinitro-2-methylphenol, and 2,4,6-trichlorophenol) were reported above the 30% acceptance criteria in the range of 30-40%. The analyte 2,4-dinitrophenol was reported with an RPD of 52%. Third-party validation has qualified all twelve of the analytes listed above, in all of the samples in SDG K0286, as estimates with "J" flags. Elevated RPDs in environmental soil samples are generally attributed to natural heterogeneities in the soil matrix from which the sample and duplicate are prepared.

The LCS in the chlorinated pesticide analysis had consistently low recoveries (9-15%) for all analytes except toxaphene, which was not included in the LCS (see below). The MS/MSD results were within criteria. Third party validation qualified the SDG K0286 data for all chlorinated pesticide analytes, except toxaphene, as estimated with "J" flags.

In the chlorinated pesticide analysis, the analyte toxaphene was not included in the MS, MSD, or LCS samples (see the discussion on toxaphene given for SDG K0284). All of the toxaphene data in SDG K0286 was qualified by third-party validation as estimated with "J" flags.

Surrogates in the chlorinated pesticide analysis were consistently above the acceptance criteria in the field samples. This suggests a high bias in the data. However, most of the data is listed as nondetected and a high bias has no affect on nondetected analytical data. The detected concentrations of beta-BHC in samples J11KB3 and J11KC3, as well as the detected concentration of methoxychlor in sample J11KB4 were qualified as estimates with "J" flags by third-party validation.

Surrogates in the PCB analysis were also consistently above the acceptance criteria. This suggests a high bias in the data. However, most of the data is listed as nondetected and a high bias has no affect on nondetected analytical data. The detected concentrations of aroclor-1254 in samples J11KB6, J11KB9, J11KC0, and J11KC3 were qualified as estimates with "J" flags by third-party validation.

In the metals analysis, the detected concentrations of lithium, sodium, and phosphorus in sample J11KC4 (the equipment blank) were low enough to be less than 1/5th of the reported concentrations in the MB. All of these detections were below the CRQL. Third-party validation has qualified the lithium, sodium, and phosphorus data in sample J11KC4 as estimated non-detections with "UJ" flags. Similarly, all of the detected concentrations of uranium in SDG K0286 were qualified by third-party validation as estimated nondetections with "UJ" flags.

The LCS recovery for silicon was reported below the acceptance criteria at 50.3%. Third party validation has qualified all of the silicon results in SDG K0286 as estimated with "J" flags.

In the metals analysis, seven analytes had MS recoveries outside of acceptance criteria. For most of these analytes, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. For these analytes, the deficiency in the MS is a reflection of the analytical variability of the native concentration, rather than a measure of the recovery from the sample. To confirm quantitation, PDSs and serial dilutions were prepared for all seven analytes with acceptable results. The analytes antimony and calcium did not have mismatched spike and native concentrations in the original MS. Both of these analytes have been qualified by third-party validation as estimates with "J" flags for all samples in SDG K0286. The original MS recoveries for antimony and calcium were 59.2% and 68.6%, respectively. Estimated, or "J"-flagged, data are considered acceptable for the intended use of the data.

In the hexavalent chromium data, the laboratory reported an RPD of 60.3%. This calculation is misleading because the main sample (J11KB3) was reported as nondetected at 0.22 mg/kg U and the duplicate sample was reported as detected at 0.26 mg/kg. It is more common not to calculate RPDs for analytes where one value is detected and one value is not detected. The actual meaning of such a calculation is unclear. Third-party validation did not assign any qualifiers to the hexavalent chromium data.

The RPD calculated for thorium-232 was above the acceptance criteria at 39%. Third-party validation qualified all of the thorium-232 data in SDG K0286 as estimated with "J" flags.

In order to calculate the number of samples needed in the statistical sampling plan, the standard deviation in the then-unknown data set had to be assumed. Examination of the verification data set shows that the assumptions in the sampling plan were valid for the design.

<u>Summary</u>

Limited, random, or sample matrix-specific influenced batch QC issues such as those identified above are a potential for any analysis. The number and types seen in these data sets were within expectations for the matrix types and analyses performed. The DQA review of the 100-B-14:2 areas 2 and 5 verification sampling data found the results to be accurate within the standard errors associated with the analytical methods, sampling, and sample handling. The DQA review for 100-B-14:2 areas 2 and 5 concludes that the reviewed data are of the right type, quality, and quantity to support the intended use. Detection limits, precision, accuracy, and sampling data group completeness were assessed to determine if any analytical results should be rejected as a result of QA/QC deficiencies. All analytical data were found acceptable for decision-making purposes.

100-B-14:2 (Area 3) Confirmatory Sampling Data Quality Assessment

A review of the field logbook (BHI 2005b) and applicable analytical data packages has been performed as part of this DQA. All samples were collected per agreements with the lead regulatory agency.

Three SDGs were generated by confirmatory sampling activities: W04683, H3219, and H3220. Some of the samples in these SDGs were analyzed using by TCLP for potential waste designation purposes. The TCLP data is not used for site closure and is not addressed in this DQA.

<u>SDG W04683</u>

SDG W04683 consists of one sample, J037M7, analyzed for hexavalent chromium. The MS and MSD were both nondetected for hexavalent chromium. The LCS had a good recovery (102%) for hexavalent chromium. As hexavalent chromium also was not detected in the field sample, the sample matrix appears to be reactive (destructive) with hexavalent chromium. The field sample and the MS/MSD samples were prepared, extracted, and analyzed a second time (out of hold time) for sample J037M7. For the second analysis, 1/10th of the sample matrix was used so that when the MS/MSD were prepared, they were effectively at 10 times greater concentration than in the previous extraction. In the second analysis, the MS/MSD did not return nondetects but did confirm that the hexavalent chromium was reacting with the sample matrix. Because the laboratory was able to run a valid standard curve with calibration verifications, and obtained a 102% result for the LCS in the first analysis, it is clear that the analytical equipment was functioning. Hexavalent chromium was added to the sample matrix in the MS/MSD pair but did not persist long enough to be analyzed for in the first analysis. Results from the second analysis confirm that the sample matrix is destructive to hexavalent chromium. Under these conditions, it is expected that no hexavalent chromium would exist in the field sample, which was nondetect for hexavalent chromium. The original data, which was not out of hold time, has been reported in the data set. The data is valid and useable for decision-making purposes.

SDG H3219

SDG H3219 consists of one sample, J037M6, analyzed for SVOCs, chlorinated pesticides, PCBs, herbicides, ICP metals, mercury, hexavalent chromium, and analyzed by gross alpha, gross beta, and gamma spectroscopy methods.

In the SVOC analysis for SDG H3219, there were 58 MS/MSD recoveries outside of acceptance criteria. Almost all of these deficiencies were in the MSD. The MS and LCS show good recoveries. The MSD result is certainly the result of a lab error--the analyst cites "loss during extraction" in reference to the MSD result, although a error during spiking seems more likely to have caused the entire range of analytes to be systemically reduced by a similar amount. This error is limited to the MSD and the field sample data is not affected. The data is useable for decision-making purposes.

Also in the SVOC analysis for SDG H3219, the analytes 2,6-dinitrotoluene, 4-nitroaniline, and carbazole had high recoveries in the MS. The analyte 2,6-dinitrotoluene also had a high recovery in the LCS. In each of these cases, the high recovery suggests a high bias in the sample data. None of these analytes were detected in the field sample so their results are unaffected. The data is useable for decision-making purposes.

Bis(2-ethylhexyl)phthalate and di-n-butyl phthalate were found in the MB for the SVOC analysis of SDG H3219. These analytes are common laboratory contaminants, and the results are below the CRQLs. There is no significant impact to the field sample data, relative to the RAGs. The data is useable for decision-making purposes.

In the PCB analysis for SDG H3219, the LCS recoveries for aroclor-1016 (184%) and aroclor-1260 (147%) were above criteria. In the herbicide analysis for SDG H3219, the MS recovery for dinoseb (164%) was also above acceptance criteria. These high recoveries suggest a high bias in the data for these analytes. However, the field sample was nondetect for these analytes. Therefore, there is no impact on the field sample data. The data is useable for decision-making purposes.

In the metals analysis for SDG H3219, the analyte boron was detected in the MB at 0.84 mg/kg. Boron was also detected in the field sample, at 3.0 mg/kg. The boron result in the MB is greater than three times the instrument detection limit (IDL). The MB result is also more than 1/20th of the field sample result. For both of these reasons, the laboratory is required to identify the boron results. However, the boron results are not significant with respect to the applicable RAGs and will have no impact on this site. The data is useable for decision-making purposes.

SDG H3220

SDG H3220 consists of one sample, J037M8, analyzed for SVOCs, chlorinated pesticides, PCBs, herbicides, ICP metals, and analyzed by gross alpha, gross beta, and gamma spectroscopy methods.

In the SVOC analysis for SDG H3220, the nature of the extract forced the laboratory to dilute the samples as much as 10-fold. With this type of extract, it is expected that matrix effects will be observed. Twenty-one of the analytes had low recoveries in the MS or MSD. None of these recoveries were low enough to indicate any significant problems. There is no impact on the sample data. The data is useable for decision-making purposes.

Bis(2-ethylhexyl)phthalate and di-n-butyl phthalate were found in the MB for the SVOC analysis of SDG H3220. These analytes are common laboratory contaminants and there is no significant impact to the field sample data, relative to the RAGs. The data is useable for decision-making purposes.

The LCS in the SVOC analysis of SDG H3220 for 3-nitroanaline had a high recovery (147%). This suggests a high bias in the data set for this analyte. However, 3-nitroanaline was not detected in the field samples. There is no impact on the field data. The data is useable for decision-making purposes.

In the chlorinated pesticide analysis for SDG H3220, five analytes were out of acceptance criteria for the MS (heptachlor epoxide 189%, dieldrin 190% in MS [140% in MSD], 4-4' DDE 138%, and methoxychlor 229%). This suggests a high bias in the sample data for these analytes. Examination of the field sample data shows low-level detections for some of these analytes. The data is useable for decision-making purposes.

In the herbicide analysis for SDG H3220, the analyte dinoseb had a MS recovery of 182%. This suggests a high bias in the sample data for dinoseb. However dinoseb was not detected in the field sample data. There is no impact on the sample data. The data is useable for decision-making purposes.

In the metals analysis for SDG H3220, the analytes boron and zirconium were detected in the MB at levels that were greater than the IDL and more than 1/20th of the sample results for these metals. Examination of the data shows that the results are insignificant compared to the applicable RAGs. Any laboratory contamination suggested by these results has no impact on the site. The data is useable for decision-making purposes.

Samples in the SVOC analyses in SDGs H3219 and H3220 were diluted for analysis, resulting in practical quantitation limits (PQLs) elevated above RAGs for multiple nondetected analytes. Similarly, trace metals analysis was inadvertently not specified for selenium in the ICP metals analyses in these SDGs, resulting in a PQL above the soil RAG for protection of the Columbia River. However, PQLs reported by the laboratory are as much as an order of magnitude above the IDLs. Analytes that are detected below the PQLs and above the IDLs are regularly reported with "J" qualifiers. In the case of the nondetected analytes, it is assumed that, had the analytes been present below the PQLs and above RAG concentrations, they would have been detected and reported with "J" qualifiers.

Limited, random, or sample matrix-specific influenced batch quality control issues such as those identified are a potential for any analysis. The number and types seen in these data sets were within expectations for the matrix types and analyses performed.

The DQA review for the 100-B-14:2 (area 3) subsite found the results to be accurate within the standard errors associated with the methods, including sampling and sample handling. The DQA review concludes that the data are of the right type, quality, and quantity to support the intended use. Detection limits, precision, accuracy, and sampling data group completeness were assessed to determine if any analytical results should be rejected as a result of QA and QC deficiencies. All analytical data were found to be acceptable for decision-making purposes.

100-B-14:2 (Area 4) Confirmatory Sampling Data Quality Assessment

Because holding times for hexavalent chromium analysis in other solids (i.e., pipe sediment/debris) were exceeded by more than twice the requirement, third-party validation of confirmatory data directed that all nondetects be rejected. There were no nondetected hexavalent chromium results in pipe sediments, but the detections should be considered estimated and potentially low-biased.

Due to detections and data quality issues in the confirmatory data set, all confirmatory analyses were retained for verification sampling following site remediation, with the exception of gross alpha and gross beta analyses. There were no quantitations above background or significant data quality issues in these analyses.

100-B-14:2 (Area 4) Verification Sampling Data Quality Assessment

A review of the work instruction (WCH 2006d), the field logbook (WCH 2006a), and applicable analytical data packages has been performed as part of this DQA. All samples were collected per the sample design.

Data from verification samples collected at the 100-B-14:2 (area 4) subsite was provided by the laboratory in SDG K0468. This SDG was submitted for third-party validation. No major deficiencies were found in the data and all of the data was found to be acceptable for decision-making purposes. Minor deficiencies, as well as qualifiers applied by third-party validation, will be discussed below.

<u>SDG K0468</u>

SDG K0468 comprises 13 field samples (J12R02 through J12R14) collected from the 100-B-14:2 (area 4) subsite. These field samples were analyzed for SVOCs, pesticides, PCBs, ICP metals, mercury, hexavalent chromium, and tested by gamma spectroscopy. Sample J12R14 is a field duplicate of sample J12R09; sample J12R12 is from the east BCL stockpile; sample J12R13 is from the west BCL stockpile. Ten samples were collected from statistically selected locations within the 100-B-14:2 (area 4) excavation (WCH 2006d). This SDG also includes an equipment blank, sample J12R15, analyzed for SVOCs, ICP metals, and mercury.

As discussed in the verification sampling results data evaluation section, the samples collected contained pieces of asphalt. Analytically, the asphalt presents a myriad of difficulties to the various methods which are not designed for elevated concentrations of the oils and tars in asphalt. As a result, many of the analytes in the following discussion were qualified as estimated for one or more QA/QC issues. However, none of the data have been rejected and all remain useable for decision-making purposes.

The SVOC analysis MS and MSD were prepared in separate batches. Third-party validation qualified all of the SVOC analytes in all of the samples in SDG K0468 as estimates with "J" flags because the MS/MSD pair was not prepared together.

The SVOC analysis MS for 1,2,4-trichlorobenzene was below the acceptance criteria at 59%. Third-party validation qualified the 1,2,4-trichlorobenzene results in all SDG K0468 samples, except samples J12R03, J12R05, and J12R15, as estimated with "J" flags.

An SVOC surrogate recovery (2-fluorobiphenyl) in sample J12R02 was below acceptance criteria at 27%. Third party validation qualified the related SVOC analytes in sample J12R02 as estimates with "J" flags. The analytes related to the 2-fluorobiphenyl surrogate and qualified by third-party validation are 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 1,2,4-trichlorobenzene, 2-chloronaphthalene, hexachlorobenzene, hexachloroethane, hexachlorobenzene, hexachloroethane, hexachlorobutadiene, hexachlorocyclopentadiene, 4-chloroaniline, and 3,3'-dichlorobenzidine.

The SVOC analyte and common laboratory contaminant bis(2-ethylhexyl)phthalate was found in the MB at less than the CRQL. Bis(2-ethylhexyl)phthalate was also detected in field samples J12R02 through J12R08 and sample J12R11 at similar concentrations to that found in the MB and also below the CRQL. Third-party validation raised the reporting level for bis(2-ethylhexyl)phthalate to the CRQL and qualified the results as nondetected with "U" flags for the samples in which bis(2-ethylhexyl)phthalate was detected.

The SVOC analytes and common laboratory contaminants di-n-butylphthalate and diethylphthalate were detected in the equipment blank (and some samples) at concentrations below the CRQL. This is an artifact of the sampling process and is small enough to not have any impact on the decision-making process. No qualifications were added to the data set based on this issue.

The LCS results for analytes 2-methylnaphthalene, 2,6-dinitrotoluene, and hexachlorocyclopentadiene are above the acceptance criteria at 102%, 111%, and 115%. These analytes are expected to display low recoveries, therefore, recoveries around 100% are considered high. These results may suggest a high bias in the field sample data for 2-methylnaphthalene, 2,6-dinitrotoluene, and hexachlorocyclopentadiene. High-biased data is acceptable for the intended use of the data. No qualifications were added to the data set based on this issue.

Boron was detected in the ICP metals MB. Third-party validation qualified the boron data in all of the samples except J12R07 as nondetected estimates with "UJ" flags.

Beryllium and lithium were also detected in the ICP metals MB at low levels below the CRQL. Only sample J12R15, the equipment blank, had low enough concentrations for the concentration in the method blank to be considered significant. Third-party validation qualified the beryllium and lithium results in sample J12R15 as nondetected estimates with a "UJ" flag.

The MS recoveries for antimony and mercury were below the acceptance criteria at 56.7% and 54.5%, respectively. Third-party validation qualified all of the antimony and mercury results in SDG K0468 as estimates with "J" flags.

The LCS recovery for silicon was below the acceptance criteria at 37.5%. Third-party validation qualified all of the silicon results in SDG K0468 as estimates with "J" flags.

The RPDs calculated for molybdenum, nickel, and mercury in the laboratory duplicate were above the acceptance criteria (+/- 30%) at 35.1%, 32.6%, and 67.5%, respectively. Difficulty in producing truly homogeneous mixtures of soils is well known, and the lack of homogenous samples often results in high RPDs. No qualifications were added to the data set based on this issue.

MS recoveries in the ICP metals analysis were out of criteria for aluminum, iron, manganese, phosphorus, antimony, silicon, and titanium. Because the MS is prepared from a field sample, the initial concentrations of the analytes are not known when the MS is being prepared. When the spike concentration is small compared to the already present concentration of an analyte, the spike response can be overwhelmed by the variability in the analytical response and in the variability introduced by the heterogeneity in the sample. The standard laboratory response to this situation is to run serial dilution PDSs to confirm the quantitation of the affected analytes. All of the PDS results were within criteria, in the range of 73% to 98.7%, except for iron which had a 50.9% recovery in the PDS. Iron is not a COC/COPC for the 100-B-14:2 (area 4) subsite. No qualifications were added to the data set based on these issues.

In the pesticide analysis, the analyte toxaphene was not included in the MS, MSD, or LCS samples. Toxaphene is actually a mixture of compounds rather than a discrete analyte. While the overall concentration of toxaphene can be calculated using several unobstructed peaks in the chromatography, the inclusion of toxaphene in the spiking mixture would be problematic for the other pesticide analytes. The laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples. Third-party validation qualified all of the toxaphene data in SDG K0468 as estimated with "J" flags and, therefore, useable for decision-making purposes.

The pesticide MS had low recoveries (approximately 28%) on all of the analytes (except toxaphene) while the MSD recoveries were all acceptable (approximately 71%). This resulted in RPDs between the MS and MSD that were above the acceptance criteria for all of the analytes, except toxaphene. Third-party validation qualified all of the pesticide data, except toxaphene, as estimates with "J" flags due to the MS recoveries and the RPDs.

The pesticide analysis surrogate recoveries were elevated above the acceptance criteria in samples J12R05, J12R06, J12R10, and J12R14. The elevated surrogates suggest a high bias in the sample data. Third-party validation qualified all of the detected analytical results in these samples as estimated with "J" flags.

The laboratory reported an elevated RPD for the laboratory duplicate in the hexavalent chromium analysis. The main sample and duplicate had results of 0.20 mg/kg U, and 0.35 mg/kg, respectively. It is more common not to calculate RPD when one analysis in a pair is nondetected, and interpretation of this result is problematic. No qualifications were added to the data set based on this issue.

In the PCB analysis, patterns for aroclor-1254 and aroclor-1260 were recognized. Due to possible interferences between the two analytes, quantitation was performed using congeners common to both aroclors. This approach gives the best overall PCB concentration but is not specific between the two aroclors. The overall values have been reported as aroclor-1254 while aroclor-1260 has been reported as nondetected. No qualifications were added to the data set based on this issue.

The gamma spectroscopy analysis of SDG K0468 had elevated RPDs for radium-226 in the laboratory duplicate, and for thorium-232 in the field duplicate. Third-party validation qualified all of the radium-226 data in SDG K0468 as estimated with "J" flags due to the 67% RPD in the laboratory duplicate. The 36% RPD result for thorium-232 in the field duplicate did not result in any qualification of the data set.

In order to calculate the number of samples needed in the statistical sampling plan, the standard deviation in the then unknown data set had to be assumed. Examination of the verification data set shows that the assumptions in the sampling plan were valid for the design.

Summary

Limited, random, or sample matrix-specific influenced batch QC issues such as those identified are a potential for any analysis. The number and types seen in these data sets were within expectations for the matrix types and analyses performed. The DQA review of the 100-B-14:2 (area 4) verification sampling data found the results to be accurate within the standard errors associated with the analytical methods, sampling, and sample handling. The DQA review for 100-B-14:2 (area 4) verification data set concludes that the reviewed data are of the right type, quality, and quantity to support the intended use. Detection limits, precision, accuracy, and sampling data group completeness were assessed to determine if any analytical results should be rejected as a result of QA and QC deficiencies. All analytical data were found acceptable for decision-making purposes.

1607-B2:1 Verification Sampling Data Quality Assessment

A review of the work instruction (BHI 2005d), the field logbook (BHI 2005c), and applicable analytical data packages has been performed as part of this DQA. All samples were collected per the sample design. Where the sample design allowed for additional samples, if required to properly characterize the site, no additional data needs were identified at the time of field sampling.

Data from verification samples collected at the 1607-B2:1 subsite were provided by the laboratory in SDG H3339. The analytical laboratory reprepared and reanalyzed sample J03VC1 for SVOCs within this SDG due to surrogate recovery problems. Third-party validation rejected the majority of the data from the initial analysis. SVOC data presented for this sample is based on the reanalysis. Beyond this issue, no major deficiencies were found in the data and all of the remaining data was found to be acceptable for decision-making purposes. A more complete discussion of sample J03VC1, minor deficiencies in the data, and the third-party validation data qualifiers is presented below.

SDG H3339

SDG H3339 comprises 14 field samples (J03VB8, J03VB9, and J03VC0 through J03VC9, J03VD0, and J03VD1) collected from the 1607-B2:1 subsite. The field samples were analyzed for volatile organic compounds (VOCs), SVOCs, pesticides, herbicides, PCBs, ICP metals, mercury, and hexavalent chromium. This SDG also includes a field equipment blank (J03WW6), analyzed for SVOCs, ICP metals, and mercury. Sample J03VD2 is a field duplicate of sample J03VB9. Samples J03VC9, J03VD0, and J03VD1 were collected from overburden stockpiles to the southwest, northwest, and northeast of the 1607-B2:1 excavation. The 11 remaining samples were collected from statistically selected locations within the 1607-B2:1 excavation (BHI 2005d).

In the SVOC analysis, sample J03VC1 had very poor recoveries for 4 of 5 surrogates. Third-party validation rejected approximately 80% of the SVOC analytes in that analysis of J03VC1. The laboratory re-extracted and reanalyzed the sample with significantly improved results. The project determined that the remaining 20% of the data from the original run of sample J03VC1 were not of significantly higher quality than the rejected data for that analysis. Therefore, none of the original SVOC data from sample J03VC1 were used for decision-making. All SVOC data presented for sample J03VC1 is from the second aliquot of the J03VC1 sample that was prepared, extracted, and analyzed separately from the rest of the samples. The MS and MSD normally included with a sample batch were not included in the separate J03VC1 sample batch. Third-party validation has, therefore, qualified all of the data for sample J03VC1 with "J" flags as estimated values.

The SVOC carbazole recovery for the LCS run with the J03VC1 batch was below acceptance criteria at 46%. Third-party validation qualified the carbazole result in sample J03VC1 as an estimated value with a "J" flag.

The SVOC RPDs for 3-nitroanaline, 4-nitrophenol, and 4-nitroanaline were above the acceptance criteria at 50%, 38%, and 43%, respectively. Third-party validation qualified the sample data for these three analytes as estimated in all samples except sample J03VC1.

The common SVOC laboratory contaminant bis(2-ethylhexyl)phthalate was detected in the MB at 24 µg/kg, and in all but one of the field samples in the range of 21 to 61 µg/kg. Third-party validation raised the reported sample values to the CRQL (660 µg/kg) and requalified the samples as nondetected with "U" flags for all samples except sample J03VD0, where bis(2-ethylhexyl)phthalate was not detected.

In the pesticide analysis, the MS had low recoveries for all analytes, including the surrogates, all in the range of 8 to 21%. The MSD and LCS results were all acceptable in the ranges of 92 to 117% and 94 to 119%, respectively. The laboratory commented that the MS may have been prepared with the wrong spike concentration. However, that would not explain the low surrogate concentrations in the MS, which are added separately. The spiked analytes and surrogates, all low in a narrow range, suggest that the liquid injector system delivered a poor injection to the analytical system. Surrogate recoveries are ideal indicators for this type of error. Fortunately, the typical symptom (low recovery on all surrogates in a narrow range) is not seen in the remaining samples.

In the pesticide analysis, the analyte toxaphene was not included in the MS, MSD, or LCS samples. Toxaphene is actually a mixture of compounds rather than a discrete analyte. While the overall concentration of toxaphene can be calculated using several unobstructed peaks in the chromatography, the inclusion of toxaphene in the spiking mixture would be problematic for the other pesticide analytes. The laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples. Third party validation qualified all of the toxaphene data as estimated with "J" flags.

The MS result in the ICP metals analysis for antimony was below criteria at 36.7%. Third-party validation qualified all of the antimony data as estimated with "J" flags.

The analyte, chromium (total), was detected in the ICP metals MB. Third-party validation requalified the chromium (total) result in sample J03WW6, the equipment blank, as an estimated nondetection with a "UJ" flag.

The MS recovery for 4-methyl-2-pentanone in the VOA analysis was above the acceptance criteria at 155%. Similarly, the MS and MSD recoveries for 1,1,2,2-tetrachloroethane are above the acceptance criteria at 144% and 133%, respectively. These results suggest a high bias in the field sample data for these analytes. High biased data are acceptable for decision-making purposes.

The VOA analysis MS and MSD were prepared in a separate batch from samples J03VB8, J03VC1, J03VC4, J03VC7, and J03VC8. Third-party validation has qualified all VOA results in these samples as estimated with "J" flags.

The common VOA laboratory contaminant, methylene chloride, was detected in the method blank and the field samples at concentrations below the CRQL, in the range of 2 µg/kg to 13 µg/kg. Methylene chloride results for all of the samples, except J03VC5, J03VC9, and J03VC7R, were raised to the CRQL and qualified as nondetections with "U" flags by third-party validation. Third-party validation also qualified the results for samples J03VC5, J03VC9, and J03VC7R as nondetections with "U" flags.

Herbicide analysis was not called for in the work instruction. The chain of custody shows that the project inadvertently requested this analysis for SDG H3339.

The herbicide surrogate recovery of DCAA in sample J03VB8 was below the acceptance criteria at 27%. However, the sample meets the secondary criteria of no more than one surrogate outlier per sample.

The herbicide RPDs for the analytes dicamba, dichloroprop, 2,4,5-Tp, and 2,4,5-T were above the acceptance criteria at 33%, 33%, 32%, and 32%, respectively. Elevated RPDs are attributed to natural heterogeneities in the sample matrix. Third-party validation qualified the results for these analytes as estimates with "J" flags.

Summary

Limited, random, or sample matrix-specific influenced batch QC issues such as those identified are a potential for any analysis. The number and types in this data set are within expectations for the matrix types and analyses performed. With the exception of the rejected data for the original SVOC analysis of sample J03VC1, the DQA review of the 1607-B2:1 verification sampling data found the results to be accurate within the standard errors associated with the analytical methods, sampling, and sample handling. The DQA review for the 1607-B2:1 verification data set concludes that the retained data reviewed are of the right type, quality, and quantity to support the intended use. Detection limits, precision, accuracy, and sampling data group completeness were assessed to determine if any analytical results should be rejected as a result of QA/QC deficiencies. All analytical data other than the original SVOC analysis of sample J03VC1 were found to be acceptable for decision-making purposes.

1607-B2:2 and 100-B-14:2 (Area 1) Verification Sampling Data Quality Assessment

Review of the work instruction (WCH 2006e), the field logbook (WCH 2006b), and applicable analytical data packages has been performed as part of this DQA. All samples were collected per the sample design.

Data from verification samples collected at the 1607-B2:2 and 100-B-14:2 (area 1) subsites were provided by the laboratory in SDGs K0454 and K0459. No major deficiencies were found in the data and all of the data was found to be acceptable for decision-making purposes. SDG K0459 was submitted for third-party validation. Minor deficiencies, as well as qualifiers applied by third-party validation, will be discussed below.

SDG K0454

This SDG consists of 16 field samples (J12NX4 through J12NX9, and J12NY0 through J12NY9) collected from the 1607-B2:2 and 100-B-14:2 (area 1) subsites. The field samples were analyzed for SVOCs, pesticides, PCBs, ICP metals, mercury, hexavalent chromium, gamma-emitting radionuclides, total beta radiostrontium, and tritium. This SDG also includes a field equipment blank (J12P04), analyzed for SVOCs, ICP metals, and mercury. Sample J12NY4 is a field duplicate of sample J12NY3. Samples J12NX4, J12NX5, J12NX6, J12NX7, and J12NX8 were collected from BCL stockpiles from the 1607-B2:2 and 100-B-14:2 (area 1) excavations. The remaining samples were collected from statistically selected locations within the excavations (WCH 2006e).

In the SVOC analysis of sample J12NX4, the surrogate recovery for 2,4,6-tribromophenol was above the laboratory acceptance criteria at 123%. However, this is within the project acceptance criteria (+/- 30%). This was the only surrogate deficiency found out of 156 surrogates analyzed in this SDG.

The common laboratory contaminant analytes bis(2-ethylhexyl)phthalate and di-n-butylphthalate were found in the method blank at concentrations less than twice their CRQLs. The data is not significantly affected.

The original extraction of sample J12P04 had a low recovery on the internal standard, so the sample was reprepared, re-extracted, and reported. The resulting data is acceptable.

In the chlorinated pesticide analysis, 9 of 46 surrogate recoveries were above the acceptance criteria with recoveries in the range of 119% to 156%. These high recoveries suggest a high bias in the sample results. High-biased data are useable for decision-making purposes.

In the chlorinated pesticide analysis, the analyte toxaphene was not included in the MS, MSD, or LCS samples. Toxaphene is actually a mixture of compounds rather than a discrete analyte. While the overall concentration of toxaphene can be calculated using several unobstructed peaks in the chromatography, the inclusion of toxaphene in the spiking mixture would be problematic for the other pesticide analytes. The laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples. The toxaphene data is considered estimated but useable for decision-making purposes.

The laboratory reported interferences on one analytical column for the analytes endrin aldehyde (J12NX6, J12NY9), methoxychlor (J12NX9, J12NY0), endosulfan II (J12NY5), and endrin ketone (J12NY5). Results were quantitated based on the remaining column, and the data is useable for decision-making purposes.

In the PCB analysis, 9 of 44 surrogate recoveries were above the laboratory acceptance criteria with recoveries in the range of 119% to 123%. These are within the project acceptance criteria. The results may suggest a high bias in the data, which is acceptable for decision-making purposes.

The PCB analysis of the LCS for aroclor-1260 was above the acceptance criteria at 148%. This result suggests a high bias in the sample data. High biased data are useable for decision-making purposes.

A continuing calibration verification (CCV) sample returned a high bias reading of 17.6% (laboratory limit = 15.6%) in the PCB analysis. This CCV is only associated with the MB and the LCS samples. None of the field sample data are affected. The data are useable for decision-making purposes.

In the ICP metals, analysis of a CCV sample returned a high bias reading for calcium and phosphorus. The affected samples were rerun. There is no issue with the final data.

The ICP metals MB result for potassium (6.9 mg/kg) was greater than the PQL for potassium. MB contamination is considered significant when it is within 20 times a sample concentration. Sample J12P04 (the equipment blank) was the only sample with a low enough concentration to be within the 20 times the MB concentration for potassium. While the equipment blank value for potassium may be considered estimated, none of the field verification samples are affected. The data are useable for decision-making purposes.

The LCS recovery for silicon was above the acceptance criteria (+/- 30%) at 40.1%. This may suggest a high bias in the silicon data for the field samples. However, high biased data are acceptable for decision-making purposes.

The MS recoveries for aluminum, iron, antimony, silicon, and titanium were out of acceptance criteria. Because the concentrations of these analytes are unknown when the matrix spike is prepared, the concentration of the spike is often inappropriate for the sample. The laboratory confirms quantitation of these analytes by running serial dilutions and PDSs. All of these analytes had good results in the PDSs, with recoveries in the range of 70.9% to 115.3%. The data are useable for decision-making purposes.

The laboratory duplicate had a high RPD for lead at 40%. Difficulty in producing truly homogeneous mixtures in soils is well-known. Heterogeneous soil samples often result in high RPDs. It is likely that more essentially inert material (e.g., larger size gravel) was present in either the sample or the duplicate. The data are useable for decision-making purposes.

The laboratory reported a high RPD for hexavalent chromium at 66.1%. In this case, hexavalent chromium was not detected in the main sample (0.20 mg/kg U), but was detected in the laboratory duplicate (0.32 mg/kg). Calculation of RPDs is usually not performed for sample pairs that have one nondetected value. This is because the analytical response near the detection limit is variable, which is the reason for the detection limit. The RPD is meant to gauge the laboratory performance in general, rather than the analytical device performance at its defined limit of usefulness. The field sample data are not affected by this result, and the data are useable for decision-making purposes.

<u>SDG K0459</u>

This SDG consists of the remaining 4 statistical samples (J12PW5, J12PW6, J12PW7, and J12PW8) collected from within the 1607-B2:2/100-B-14:2 (area 1) excavation. The field samples were analyzed for SVOCs, pesticides, PCBs, ICP metals, mercury, hexavalent chromium, gamma-emitting radionuclides, total beta radiostrontium, and tritium. This SDG was submitted for third-party validation.

In the SVOC analysis, the MSD recovery for 2,4-dinitrophenol was low at 18%. The MS recovery was within criteria. Because of the low recovery in the MSD, the RPD calculated for 2,4-dinitrophenol in the MS/MSD pair was high at 43%. Third-party validation qualified all of the 2,4-dinitrophenol results in SDG K0459 as estimates with "J" flags. The data remain useable for decision-making purposes.

The common laboratory contaminant bis(2-ethylhexyl)phthalate was found in the MB. Third-party validation increased the reported value for all samples in SDG K0459 to the CRQL and requalified these results as nondetections with "U" flags. The data remain useable for decision-making purposes.

In the chlorinated pesticide analysis, the analyte toxaphene was not included in the MS, MSD, or LCS samples. As discussed previously, the laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples. Third-party validation qualified all of the toxaphene data in SDG K0459 as estimated with "J" flags. The data remain useable for decision-making purposes.

The LCS recovery for silicon was above the acceptance criteria (+/- 30%) at 45.5%. This may suggest a high bias in the silicon data for the field samples. However, high-biased data are acceptable for decision-making purposes.

The MS recoveries for aluminum, iron, manganese, phosphorus, antimony, silicon, and titanium were outside of acceptance criteria. Because the concentrations of these analytes are unknown when the matrix spike is prepared, the concentration of the spike is often inappropriate for the sample. The laboratory routinely confirms quantitation of these analytes by running serial dilutions and PDSs. All of these analytes had good results in the PDSs, with recoveries in the range of 80.9% to 95.7%. The data are useable for decision-making purposes.

There were no issues found in the radiological data (gamma spectrum, total strontium, and tritium) for SDG K0459. However, it should be noted that the radiological data was mistakenly not included in the SDG K0459 data package submitted for third-party validation. The amount of data submitted for third-party validation is still within the criteria established in the SAP (DOE-RL 2005a). The data are useable for decision-making purposes.

In order to calculate the number of samples needed in the statistical sampling plan, the standard deviation in the then-unknown data set had to be assumed. Examination of the verification data set shows that the assumptions in the sampling plan were valid for the design.

Summary

Limited, random, or sample matrix-specific influenced batch QC issues such as those identified are a potential for any analysis. The number and types seen in this data set are within expectations for the matrix types and analyses performed. The DQA review of the

1607-B2:2/100-B-14:2 (area 1) verification sampling data found the results to be accurate within the standard errors associated with the analytical methods, sampling, and sample handling. The DQA review of the 1607-B2:2/100-B-14:2 (area 1) verification data set concludes that the data is of the right type, quality, and quantity to support the intended use. Detection limits, precision, accuracy, and sampling data group completeness were assessed to determine if any analytical results should be rejected as a result of QA/QC deficiencies. All analytical data were found acceptable for decision-making purposes.

All analytical data are stored in the ENRE project-specific database prior to being submitted for inclusion in the HEIS database. The confirmatory sample analytical data are also summarized in Appendix A, and verification sample data are included with the calculations provided in Appendix B.

SUMMARY FOR INTERIM CLOSURE

The 100-B-14:2 and 1607-B2 waste sites have been evaluated and remediated in accordance with the Remaining Sites ROD (EPA 1999) and the RDR/RAWP (DOE-RL 2005b). Because chemical and radionuclide contaminants were detected within feeder pipelines, the site was remediated by removing piping, the septic system, and surrounding soils and transporting them to ERDF, except at 100-B-14:2 (area 3), where confirmatory sampling did not demonstrate a need for remediation. Statistical and judgmental sampling to verify the completeness of remediation was performed, and analytical results were shown to meet the cleanup objectives for direct exposure, groundwater protection, and river protection. In accordance with this evaluation, the verification sampling results support a reclassification of the 100-B-14:2 and 1607-B2 sites to interim closed out. These sites do not have a deep zone component; therefore, no deep zone institutional controls are required.

ENDNOTES

The following endnotes apply to the data result comparison tables presented in the document body (Tables 2, 6a, 6b, 7a, 7b, 9a, 9b, 10a, 10b, 11a, and 11b).

[a] Lookup values and RAGs obtained from the RDR/RAWP (DOE-RL 2005b) or calculated per WAC 173-340-720, 173-340-730, and 173-340-740, Method B, 1996, unless otherwise noted.

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

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

[d] Noncarcinogenic cleanup level calculated from WAC 173-340-740(3), 1996 (Method B for soils) (as presented in the 100 Area RDR/RAWP [DOE-RL 2005b]). 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 (total), respectively.

[e] 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 2005b]). 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 (MCL)

of 2 mg/L (40 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.

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

[g] 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 2005b]). No surface water bioconcentration factor is available for barium and no ambient water quality criteria (AWQC) 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.

[h] Contaminant is not predicted to reach groundwater (and thus the Columbia River) based on discussion of the contaminant depth/K_d value model presented within the confirmatory sampling discussion, above, and the *100 Area Analogous Sites RESRAD Calculations* calculation brief (Appendix D), with a groundwater table elevation of 120 m (394 ft) and a clean zone extending from groundwater to an elevation of 138 m (453 ft).

[i] 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).

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

[k] No parameters are available from the Ecology Cleanup Levels and Risk Calculations database (Ecology 2005), and no bioconcentration factor or AWQC values are available to calculate cleanup levels (WAC 173-340-730(3)(a)(iii), 1996 [Method B for surface waters]).

[l] 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).

[m] 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 2005b), based on updated oral reference dose value (as provided in IRIS).

[n] No cleanup levels are available from the Ecology: Cleanup Levels and Risk Calculations database (Ecology 2005); RAG values calculated using toxicity data from the Oak Ridge National Laboratory (ORNL) risk assessment database.

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

[p] Based on site-specific risk assessments (Appendix B), residual pipe sediment concentrations of aroclor-1248 and dieldrin at the 100-B-14:2 subsite (area 3) satisfy RAOs for direct exposure.

[q] Direct exposure and groundwater protection RAG values for chlordane were mistakenly calculated based on carcinogenicity data for lindane in the RDR/RAWP (DOE-RL 2005b). Corrected values are presented in this table.

[r] RAG value listed in the RDR/RAWP (DOE-RL 2005b) 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 ORNL oral cancer potency factors.

[s] 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.

[t] 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.

[u] Pentachlorophenol was detected below the associated PQL (2.5 mg/kg) in one sample, and satisfies the conditions for considering cleanup criteria as achieved under the Analytical Considerations Rule (WAC 173-340-707[2], 1996).

[v] Contaminant is not predicted to reach groundwater (and thus the Columbia River) based on discussion of the contaminant depth/K_d value model presented within the confirmatory sampling discussion, above, and the *100 Area Analogous Sites RESRAD Calculations* calculation brief (Appendix D), with a groundwater table elevation of 120 m (394 ft) and a clean zone extending from groundwater to an elevation of 142 m (466 ft).

[w] Contaminant is not predicted to reach groundwater (and thus the Columbia River) based on discussion of the contaminant depth/K_d value model presented within the confirmatory sampling discussion, above, and the *100 Area Analogous Sites RESRAD Calculations* calculation brief (Appendix D), with a groundwater table elevation of 120 m (394 ft) and a clean zone extending from groundwater to an elevation of 131 m (430 ft).

[x] The statistical verification data set fails the second and/or third component of the WAC 173-340-740(7)(e) three-part test in comparison to soil RAGs for groundwater and/or river protection (one or more sample concentrations exceed twice the soil RAG value and/or more than 10% of the data set exceeds the soil RAG value).
[y] Contaminant is not predicted to reach groundwater (and thus the Columbia River) based on discussion of the contaminant depth/K_d value model presented within the confirmatory sampling discussion, above, and the *100 Area Analogous Sites RESRAD Calculations* calculation brief (Appendix D), with a groundwater table elevation of 120 m (394 ft) and a clean zone extending from groundwater to an elevation of 130 m (427 ft).

Table Acronyms

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

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APPENDIX A

CONFIRMATORY SAMPLING AND WASTE CHARACTERIZATION ANALYTICAL RESULTS

Note: Confirmatory sample results for the 100-B-14:2 (areas 2, 4, and 5) subsite led to a decision that remediation was necessary. Verification sampling results and calculations to support reclassification of these areas, as well as the 1607-B2 site, to interim closed out are provided in Appendix B.

Table A-1. 100-B-14:2 Area 2 Confirmatory Data Results. (7 Pages)

Sample Location	Sample Number	Sample Date	Americium-241			Cesium-137			Cobalt-60			Europium-152			Europium-154		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
A1	J00Y63	9/16/03	0.072	U	0.072	0.137		0.043	0.037	U	0.037	0.084	U	0.084	0.12	U	0.12
A2	J00Y64	9/16/03	0.19	U	0.19	0.13		0.063	0.051	U	0.051	0.12	U	0.12	0.17	U	0.17
A3	J00Y65	9/16/03	0.11	U	0.11	0.038	U	0.038	0.04	U	0.04	0.11	U	0.11	0.13	U	0.13
A4	J00Y70	9/16/03	0.092	U	0.092	0.042	U	0.042	0.045	U	0.045	0.12	U	0.12	0.14	U	0.14
Duplicate of J00Y70	J00Y71	9/16/03	0.29	U	0.29	0.068	U	0.068	0.067	U	0.067	0.2	U	0.2	0.27	U	0.27

Sample Location	Sample Number	Sample Date	Europium-155			Gross alpha			Gross beta			Potassium-40			Radium-226		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
A1	J00Y63	9/16/03	0.071	U	0.071	12.4		2.8	16.8		7.1	8.4		0.36	0.385		0.068
A2	J00Y64	9/16/03	0.12	U	0.12	9.72		4.2	13.1		6.4	9.46		0.42	0.559		0.09
A3	J00Y65	9/16/03	0.12	U	0.12	17.2		2.8	23.3		7.1	10.1		0.46	1.17		0.086
A4	J00Y70	9/16/03	0.1	U	0.1	5.74		3.2	15		7.2	9.38		0.6	0.39		0.082
Duplicate of J00Y70	J00Y71	9/16/03	0.18	U	0.18	6.74		3	16.6		7.2	10.7		0.46	0.492		0.12

Sample Location	Sample Number	Sample Date	Radium-228			Thorium-228			Thorium-232			Uranium-235			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
A1	J00Y63	9/16/03	0.404		0.12	0.357		0.04	0.404		0.12	0.12	U	0.12	4.8	U	4.8
A2	J00Y64	9/16/03	0.593		0.21	0.504		0.053	0.593		0.21	0.17	U	0.17	6	U	6
A3	J00Y65	9/16/03	1.39		0.18	1.36		0.049	1.39		0.18	0.17	U	0.17	4.4	U	4.4
A4	J00Y70	9/16/03	0.565		0.16	0.5		0.055	0.565		0.16	0.16	U	0.16	6.3	U	6.3
Duplicate of J00Y70	J00Y71	9/16/03	0.755		0.21	0.487		0.078	0.755		0.21	0.26	U	0.26	8.9	U	8.9

Acronyms and notes apply to all of the tables in this appendix.

Note: Data qualified with B, C, D, I, and/or J are considered acceptable values.

B = method blank contamination (organic constituents)
C = method blank contamination (organic constituents)
D = diluted (organic constituents)
I = interference on one analytical column
J = estimate
MDA = minimum detectable activity
PQL = practical quantitation limit
Q = qualifier
R = rejected
TCLP = toxicity characteristic leaching procedure
U = undetected

Table A-1. 100-B-14:2 Area 2 Confirmatory Data Results. (7 Pages)

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
A1	J00Y63	9/16/03	6850		4.8	8.1		0.3	8.1		0.43	3250		0.02	0.14		0.04	14		0.22
A2	J00Y64	9/16/03	5970		4.3	1.9		0.27	10.1		0.39	172		0.02	0.3		0.04	29.5		0.2
A3	J00Y65	9/16/03	666		4.6	0.29	U	0.29	0.88		0.41	23.5		0.02	0.04		0.04	0.65		0.22
A4	J00Y70	9/16/03	6070		3.7	0.23	U	0.23	2.4		0.34	78.5		0.02	0.34		0.03	3.4		0.18
Duplicate of J00Y70	J00Y71	9/16/03	6710		4.2	0.26	U	0.26	2.4		0.38	115		0.02	0.41		0.04	10		0.2
Equipment Blank	J00Y72	9/16/03	55.9		3.8	0.24	U	0.24	0.34	U	0.34	1.2		0.02	0.05		0.03	0.18	U	0.18

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
A1	J00Y63	09/16/03	8.1		0.04	16000	C	3.2	60.2	C	0.1	8.8		0.12	304		0.12			
A2	J00Y64	09/16/03	0.76		0.04	32700	C	2.9	32.7	C	0.09	13.1		0.11	38.3		0.11			
A3	J00Y65	09/16/03	0.04	U	0.04	1650	C	3	0.28	UC	0.1	0.12		0.12	0.58	U	0.12			
A4	J00Y70	09/16/03	0.04		0.03	4380	C	2.5	8	C	0.08	9.2		0.1	17.4		0.1	0.41	U	0.41
A1	J00Y67*	09/16/03																2.41		0.35
A2	J00Y68*	09/16/03																1.79		0.35
A3	J00Y69*	09/16/03																1.1		0.35
Duplicate of J00Y70	J00Y71	09/16/03	0.04	U	0.04	5830	C	2.8	8.4	C	0.09	9.7		0.11	17.8		0.11	0.41	U	0.41
Equipment Blank	J00Y72	09/16/03	0.03	U	0.03	27.4	C	2.6	0.17	C	0.08	0.1	U	0.1	0.1	U	0.1	0.41	U	0.41

*Only analyte was hexavalent chromium.

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
A1	J00Y63	9/16/03	13400	C	2	218	C	0.19	2400		0.71	203		0.03	21.5		0.4	4.2		0.19
A2	J00Y64	9/16/03	14900	C	1.8	42.4	C	0.18	3930		0.65	267		0.03	1.2		0.02	0.99		0.18
A3	J00Y65	9/16/03	201	C	1.9	0.44	C	0.19	85.4		0.69	6		0.03	0.1		0.02	0.19		0.19
A4	J00Y70	9/16/03	22500	C	1.6	4.7	C	0.15	4030		0.56	364		0.02	0.02		0.02	0.15		0.15
Duplicate of J00Y70	J00Y71	9/16/03	24800	C	1.8	4.7	C	0.17	4530		0.63	368		0.03	0.02	U	0.02	0.3		0.17
Equipment Blank	J00Y72	9/16/03	135	C	1.6	0.34	C	0.15	8.3		0.57	3.7		0.02	0.01	U	0.02	0.15	U	0.15

Table A-1. 100-B-14:2 Area 2 Confirmatory Data Results. (7 Pages)

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
A1	J00Y63	9/16/03	20.4	C	0.2	1090		2.4	3.4		0.3	380	C	0.55	18.7		0.08	2990	C	0.72
A2	J00Y64	9/16/03	12.7	C	0.19	3080		2.3	0.59		0.27	454	C	0.5	0.43		0.07	7290	C	0.66
A3	J00Y65	9/16/03	0.42	C	0.2	114		2.3	0.29	U	0.29	46.4	C	0.53	0.08	U	0.08	300	C	0.7
A4	J00Y70	9/16/03	10.1	C	0.16	1460		1.9	0.23	U	0.23	382	C	0.43	0.06	U	0.06	302	C	0.57
Duplicate of J00Y70	J00Y71	9/16/03	11.5	C	0.18	1470		3.1	0.26	U	0.26	395	C	0.48	0.07	U	0.07	333	C	0.63
Equipment Blank	J00Y72	9/16/03	0.16	C	0.16	24.6		1.9	0.24	U	0.24	38.2	C	0.44	0.07	U	0.07	12	C	0.58

Sample Location	Sample Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
A1	J00Y63	9/16/03	94.6		0.09	852		0.26
A2	J00Y64	9/16/03	61.2		0.08	250		0.24
A3	J00Y65	9/16/03	0.67		0.09	5.7		0.26
A4	J00Y70	9/16/03	56.6		0.07	49.4		0.21
Duplicate of J00Y70	J00Y71	9/16/03	60.6		0.08	51.9		0.23
Equipment Blank	J00Y72	9/16/03	0.07		0.07	0.63		0.21

Table A-1. 100-B-14:2 Area 2 Confirmatory Data Results. (7 Pages)

Constituents	J00Y63 Location A1 Sample Date 9/16/03			J00Y64 Location A2 Sample Date 9/16/03			J00Y65 Location A3 Sample Date 9/16/03			J00Y70 Location A4 Sample Date 9/16/03		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	3000	UD	3000	13	U	13	13	U	13	14	U	14
Aroclor-1221	3000	UD	3000	13	U	13	13	U	13	14	U	14
Aroclor-1232	3000	UD	3000	13	U	13	13	U	13	14	U	14
Aroclor-1242	3000	UD	3000	13	U	13	13	U	13	14	U	14
Aroclor-1248	3000	UD	3000	13	U	13	13	U	13	14	U	14
Aroclor-1254	49000	D	49000	70		13	13	U	13	14	U	14
Aroclor-1260	3000	UD	3000	13	U	13	13	U	13	13	U	13
Pesticides												
Aldrin	19	UD	19	17	UD	17	1.7	U	1.7	1.7	U	1.7
alpha-BHC	19	UD	19	17	UD	17	1.7	U	1.7	1.7	U	1.7
alpha-Chlordane	19	UD	19	17	UD	17	1.7	U	1.7	1.7	U	1.7
beta-BHC	19	UD	19	17	UD	17	1.7	U	1.7	1.7	U	1.7
delta-BHC	19	UD	19	17	UD	17	1.7	U	1.7	1.7	U	1.7
Dichlorodiphenyldichloroethane	81	I	37	34	UD	34	3.3	U	3.3	3.4	U	3.4
Dichlorodiphenyldichloroethylene	74	I	37	34	UD	34	3.3	U	3.3	3.4	U	3.4
Dichlorodiphenyltrichloroethane	4800	D	37	34	UD	34	3.3	U	3.3	3.4	U	3.4
Dieldrin	37	UD	37	34	UD	34	3.3	U	3.3	3.4	U	3.4
Endosulfan I	19	UD	19	17	UD	17	1.7	U	1.7	1.7	U	1.7
Endosulfan II	37	UD	37	34	UD	34	3.3	U	3.3	3.4	U	3.4
Endosulfan sulfate	43	I	37	34	UD	34	3.3	U	3.3	3.4	U	3.4
Endrin	37	UD	37	34	UD	34	3.3	U	3.3	3.4	U	3.4
Endrin aldehyde	37	UD	37	34	UD	34	3.3	U	3.3	3.4	U	3.4
Endrin ketone	37	UD	37	34	UD	34	3.3	U	3.3	3.4	U	3.4
gamma-BHC (Lindane)	19	UD	19	17	UD	17	1.7	U	1.7	1.7	U	1.7
gamma-Chlordane	210	I	19	17	UD	17	1.7	U	1.7	1.7	U	1.7
Heptachlor	19	UD	19	17	UD	17	1.7	U	1.7	1.7	U	1.7
Heptachlor epoxide	19	UD	19	17	UD	17	1.7	U	1.7	1.7	U	1.7
Methoxychlor	190	UD	190	170	UD	170	17	U	17	17	U	17
Toxaphene	1900	UD	1900	1700	UD	1700	170	U	170	170	U	170
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	370	U	370	1700	UD	1700	330	U	330	340	U	340
1,2-Dichlorobenzene	370	U	370	1700	UD	1700	330	U	330	340	U	340
1,3-Dichlorobenzene	370	U	370	1700	UD	1700	330	U	330	340	U	340
1,4-Dichlorobenzene	370	U	370	1700	UD	1700	330	U	330	340	U	340
2,4,5-Trichlorophenol	930	U	930	4200	UD	4200	840	U	840	860	U	860
2,4,6-Trichlorophenol	370	U	370	1700	UD	1700	330	U	330	340	U	340
2,4-Dichlorophenol	370	U	370	1700	UD	1700	330	U	330	340	U	340
2,4-Dimethylphenol	370	U	370	1700	UD	1700	330	U	330	340	U	340
2,4-Dinitrophenol	930	U	930	4200	UD	4200	840	U	840	860	U	860
2,4-Dinitrotoluene	370	U	370	1700	UD	1700	330	U	330	340	U	340
2,6-Dinitrotoluene	370	U	370	1700	UD	1700	330	U	330	340	U	340
2-Chloronaphthalene	370	U	370	1700	UD	1700	330	U	330	340	U	340
2-Chlorophenol	370	U	370	1700	UD	1700	330	U	330	340	U	340
2-Methylnaphthalene	370	U	370	200	JD	1700	330	U	330	340	U	340
2-Methylphenol (cresol, o-)	370	U	370	1700	UD	1700	330	U	330	340	U	340
2-Nitroaniline	930	U	930	4200	UD	4200	840	U	840	860	U	860
2-Nitrophenol	370	U	370	1700	UD	1700	330	U	330	340	U	340
3,3'-Dichlorobenzidine	370	U	370	1700	UD	1700	330	U	330	340	U	340
3-Nitroaniline	930	U	930	4200	UD	4200	840	U	840	860	U	860
4,6-Dinitro-2-methylphenol	930	U	930	4200	UD	4200	840	U	840	860	U	860
4-Bromophenylphenyl ether	370	U	370	1700	UD	1700	330	U	330	340	U	340
4-Chloro-3-methylphenol	370	U	370	1700	UD	1700	330	U	330	340	U	340
4-Chloroaniline	370	U	370	1700	UD	1700	330	U	330	340	U	340
4-Chlorophenylphenyl ether	370	U	370	1700	UD	1700	330	U	330	340	U	340
4-Methylphenol (cresol, p-)	370	U	370	1700	UD	1700	330	U	330	340	U	340
4-Nitroaniline	930	U	930	4200	UD	4200	840	U	840	860	U	860
4-Nitrophenol	930	U	930	4200	UD	4200	840	U	840	860	U	860

Table A-1. 100-B-14:2 Area 2 Confirmatory Data Results. (7 Pages)

Constituents	J00Y63 Location A1 Sample Date 9/16/03			J00Y64 Location A2 Sample Date 9/16/03			J00Y65 Location A3 Sample Date 9/16/03			J00Y70 Location A4 Sample Date 9/16/03		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Acenaphthene	370	U	370	1700	UD	1700	330	U	330	340	U	340
Acenaphthylene	370	U	370	1900	D	1700	330	U	330	340	U	340
Anthracene	370	U	370	1200	JD	1700	330	U	330	340	U	340
Benzo(a)anthracene	33	J	370	500	JD	1700	330	U	330	340	U	340
Benzo(a)pyrene	38	J	370	1400	JD	1700	330	U	330	340	U	340
Benzo(b)fluoranthene	370	U	370	830	JD	1700	330	U	330	340	U	340
Benzo(g,h,i)perylene	25	J	370	1700	D	1700	330	U	330	340	U	340
Benzo(k)fluoranthene	370	U	370	690	JD	1700	330	U	330	340	U	340
bis(2-Chloro-1-methylethyl)ether	370	U	370	1700	UD	1700	330	U	330	340	U	340
bis(2-Chloroethoxy)methane	370	U	370	1700	UD	1700	330	U	330	340	U	340
bis(2-Chloroethyl) ether	370	U	370	1700	UD	1700	330	U	330	340	U	340
bis(2-Ethylhexyl) phthalate	69	J	370	1700	UD	1700	330	U	330	340	U	340
Butylbenzylphthalate	370	U	370	1700	UD	1700	330	U	330	340	U	340
Carbazole	370	U	370	1700	UD	1700	330	U	330	340	U	340
Chrysene	48	J	370	830	JD	1700	330	U	330	340	U	340
Dibenz[a,h]anthracene	20	J	370	1700	UD	1700	330	U	330	340	U	340
Dibenzofuran	370	U	370	1700	UD	1700	330	U	330	340	U	340
Diethylphthalate	370	U	370	360	JD	1700	330	U	330	340	U	340
Dimethyl phthalate	370	U	370	130	JD	1700	330	U	330	340	U	340
Di-n-butylphthalate	370	U	370	1700	UD	1700	330	U	330	340	U	340
Di-n-octylphthalate	370	U	370	1700	UD	1700	330	U	330	340	U	340
Fluoranthene	54	J	370	520	JD	1700	330	U	330	340	U	340
Fluorene	370	U	370	190	JD	1700	330	U	330	340	U	340
Hexachlorobenzene	370	U	370	1700	UD	1700	330	U	330	340	U	340
Hexachlorobutadiene	370	U	370	1700	UD	1700	330	U	330	340	U	340
Hexachlorocyclopentadiene	370	U	370	1700	UD	1700	330	U	330	340	U	340
Hexachloroethane	370	U	370	1700	UD	1700	330	U	330	340	U	340
Indeno(1,2,3-cd)pyrene	22	J	370	1200	JD	1200	330	U	330	340	U	340
Isophorone	370	U	370	1700	UD	1700	330	U	330	340	U	340
Naphthalene	370	U	370	1700	UD	1700	330	U	330	340	U	340
Nitrobenzene	370	U	370	1700	UD	1700	330	U	330	340	U	340
N-Nitroso-di-n-dipropylamine	370	U	370	1700	UD	1700	330	U	330	340	U	340
N-Nitrosodiphenylamine	370	U	370	1700	UD	1700	330	U	330	340	U	340
Pentachlorophenol	930	U	930	4200	UD	4200	840	U	840	860	U	860
Phenanthrene	24	J	370	190	JD	1700	330	U	330	340	U	340
Phenol	370	U	370	1700	UD	1700	330	U	330	340	U	340
Pyrene	24	J	370	510	JD	1700	330	U	330	340	U	340

Table A-1. 100-B-14:2 Area 2 Confirmatory Data Results. (7 Pages)

Constituents	J00Y71 Duplicate of J00Y70 Sample Date 9/16/03			J00Y72 Equipment Blank Sample Date 9/16/03		
	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls						
Aroclor-1016	14	U	14	13	U	13
Aroclor-1221	14	U	14	13	U	13
Aroclor-1232	14	U	14	13	U	13
Aroclor-1242	14	U	14	13	U	13
Aroclor-1248	14	U	14	13	U	13
Aroclor-1254	14	U	14	13	U	13
Aroclor-1260	14	U	14	13	U	13
Pesticides						
Aldrin	1.7	U	1.7	1.7	U	1.7
alpha-BHC	1.7	U	1.7	1.7	U	1.7
alpha-Chlordane	1.7	U	1.7	1.7	U	1.7
beta-BHC	1.7	U	1.7	1.7	U	1.7
delta-BHC	1.7	U	1.7	1.7	U	1.7
Dichlorodiphenyldichloroethane	3.4	U	3.4	3.3	U	3.3
Dichlorodiphenyldichloroethylene	3.4	U	3.4	3.3	U	3.3
Dichlorodiphenyltrichloroethane	3.4	U	3.4	3.3	U	3.3
Dieldrin	3.4	U	3.4	3.3	U	3.3
Endosulfan I	1.7	U	1.7	1.7	U	1.7
Endosulfan II	3.4	U	3.4	3.3	U	3.3
Endosulfan sulfate	3.4	U	3.4	3.3	U	3.3
Endrin	3.4	U	3.4	3.3	U	3.3
Endrin aldehyde	3.4	U	3.4	3.3	U	3.3
Endrin ketone	3.4	U	3.4	3.3	U	3.3
gamma-BHC (Lindane)	1.7	U	1.7	1.7	U	1.7
gamma-Chlordane	1.7	U	1.7	1.7	U	1.7
Heptachlor	1.7	U	1.7	1.7	U	1.7
Heptachlor epoxide	1.7	U	1.7	1.7	U	1.7
Methoxychlor	17	U	17	17	U	17
Toxaphene	170	U	170	170	U	170
Semivolatile Organic Compounds						
1,2,4-Trichlorobenzene	340	U	340	330	U	330
1,2-Dichlorobenzene	340	U	340	330	U	330
1,3-Dichlorobenzene	340	U	340	330	U	330
1,4-Dichlorobenzene	340	U	340	330	U	330
2,4,5-Trichlorophenol	850	U	850	830	U	830
2,4,6-Trichlorophenol	340	U	340	330	U	330
2,4-Dichlorophenol	340	U	340	330	U	330
2,4-Dimethylphenol	340	U	340	330	U	330
2,4-Dinitrophenol	850	U	850	830	U	830
2,4-Dinitrotoluene	340	U	340	330	U	330
2,6-Dinitrotoluene	340	U	340	330	U	330
2-Chloronaphthalene	340	U	340	330	U	330
2-Chlorophenol	340	U	340	330	U	330
2-Methylnaphthalene	340	U	340	330	U	330
2-Methylphenol (cresol, o-)	340	U	340	330	U	330
2-Nitroaniline	850	U	850	830	U	830
2-Nitrophenol	340	U	340	330	U	330
3,3'-Dichlorobenzidine	340	U	340	330	U	330
3-Nitroaniline	850	U	850	830	U	830
4,6-Dinitro-2-methylphenol	850	U	850	830	U	830
4-Bromophenylphenyl ether	340	U	340	330	U	330
4-Chloro-3-methylphenol	340	U	340	330	U	330
4-Chloroaniline	340	U	340	330	U	330
4-Chlorophenylphenyl ether	340	U	340	330	U	330
4-Methylphenol (cresol, p-)	340	U	340	330	U	330
4-Nitroaniline	850	U	850	830	U	830
4-Nitrophenol	850	U	850	830	U	830

Table A-1. 100-B-14:2 Area 2 Confirmatory Data Results. (7 Pages)

Constituents	J00Y71 Duplicate of J00Y70 Sample Date 9/16/03			J00Y72 Equipment Blank Sample Date 9/16/03		
	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)						
Acenaphthene	340	U	340	330	U	330
Acenaphthylene	340	U	340	330	U	330
Anthracene	340	U	340	330	U	330
Benzo(a)anthracene	340	U	340	330	U	330
Benzo(a)pyrene	340	U	340	330	U	330
Benzo(b)fluoranthene	340	U	340	330	U	330
Benzo(g,h,i)perylene	340	U	340	330	U	330
Benzo(k)fluoranthene	340	U	340	330	U	330
bis(2-Chloro-1-methylethyl)ether	340	U	340	330	U	330
bis(2-Chloroethoxy)methane	340	U	340	330	U	330
bis(2-Chloroethyl) ether	340	U	340	330	U	330
bis(2-Ethylhexyl) phthalate	340	U	340	36	J	330
Butylbenzylphthalate	340	U	340	330	U	330
Carbazole	340	U	340	330	U	330
Chrysene	340	U	340	330	U	330
Dibenz[a,h]anthracene	340	U	340	330	U	330
Dibenzofuran	340	U	340	330	U	330
Diethylphthalate	340	U	340	330	U	330
Dimethyl phthalate	340	U	340	330	U	330
Di-n-butylphthalate	340	U	340	330	U	330
Di-n-octylphthalate	340	U	340	330	U	330
Fluoranthene	340	U	340	330	U	330
Fluorene	340	U	340	330	U	330
Hexachlorobenzene	340	U	340	330	U	330
Hexachlorobutadiene	340	U	340	330	U	330
Hexachlorocyclopentadiene	340	U	340	330	U	330
Hexachloroethane	340	U	340	330	U	330
Indeno(1,2,3-cd)pyrene	340	U	340	330	U	330
Isophorone	340	U	340	330	U	330
Naphthalene	340	U	340	330	U	330
Nitrobenzene	340	U	340	330	U	330
N-Nitroso-di-n-dipropylamine	340	U	340	330	U	330
N-Nitrosodiphenylamine	340	U	340	330	U	330
Pentachlorophenol	850	U	850	830	U	830
Phenanthrene	340	U	340	330	U	330
Phenol	340	U	340	330	U	330
Pyrene	340	U	340	330	U	330

Table A-2. 100-B-14:2 Area 3 Confirmatory Data Results. (4 Pages)

Sample Location	Sample Number	Sample Date	Americium-241			Cesium-137			Cobalt-60			Europium-152			Europium-154		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
B2	J037M6	6/20/05	0.12	U	0.12	0.047	U	0.047	0.048	U	0.048	0.12	U	0.12	0.15	U	0.15
B1	J037M8	6/20/05	0.21	U	0.21	0.177		0.055	0.056	U	0.056	0.13	U	0.13	0.18	U	0.18

Sample Location	Sample Number	Sample Date	Europium-155			Gross alpha			Gross beta			Potassium-40			Radium-226		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
B2	J037M6	6/20/05	0.11	U	0.11	6.93		3.4	23.3		6	10.5		0.38	0.474		0.084
B1	J037M8	6/20/05	0.13	U	0.13	3.44	U	3.8	19.8		5.9	11.6		0.54	0.573		0.110

Sample Location	Sample Number	Sample Date	Radium-228			Thorium-228			Thorium-232			Uranium-235			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
B2	J037M6	6/20/05	0.700		0.19	0.583		0.048	0.700		0.19	0.16	U	0.16	5.4	U	5.4
B1	J037M8	6/20/05	0.694		0.23	0.565		0.063	0.694		0.23	0.20	U	0.20	6.2	U	6.2

Table A-2. 100-B-14:2 Area 3 Confirmatory Data Results. (4 Pages)

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
B2	J037M6	6/20/05	6350		2.2	2.2	U	2.2	4.1		2.5	73.1	C	0.11	0.81		0.06	3.0	C	1.3
B1	J037M8	6/20/05	5970		6.8	2.5	U	2.5	7.7		2.8	998	C	0.12	0.58		0.06	4.4	C	1.4

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
B2	J037M6	6/20/05	0.24		0.17	6740		1.7	9.4	C	0.39	7.9		0.5	16.5		0.27	0.25		0.22
B1	J037M7*	6/20/05																0.35	U	0.35
B1	J037M8	6/20/05	1.5		0.19	2570		1.9	67.8	C	0.44	5.3		0.56	102		0.3			

*Only analyte was hexavalent chromium.

Sample Location	Sample Number	Sample Date	Iron			Lead			Lithium			Magnesium			Manganese			Mercury		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
B2	J037M6	6/20/05	20500		16.4	8.9		1.4	6.4	C	0.11	4340		4	347		0.11	0.04		0.02
B1	J037M8	6/20/05	20500		18.3	279		1.6	6.1	C	0.12	3190		4.4	166		0.12	7.2		0.14

Sample Location	Sample Number	Sample Date	Molybdenum			Nickel			Phosphorus			Potassium			Selenium			Silicon		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
B2	J037M6	6/20/05	0.9	U	0.9	12.5		1.2	953		1.1	1200		50.8	2.7	U	2.7	402		3.8
B1	J037M8	6/20/05	1.7		1.0	34.0		1.4	1520		1.2	1130		56.7	3.1	U	3.1	420		4.2

Sample Location	Sample Number	Sample Date	Silver			Sodium			Strontium			Thallium			Tin			Titanium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
B2	J037M6	6/20/05	0.50	U	0.50	199		2.200	34.2	C	0.06	4.42	U	4.4	3.1	UC	3.1	1450	C	0.17
B1	J037M8	6/20/05	2.8		0.56	264		2.400	40.4	C	0.06	4.9	U	4.9	13.5	C	3.5	1080	C	0.19

Sample Location	Sample Number	Sample Date	Uranium			Vanadium			Zinc			Zirconium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
B2	J037M6	6/20/05	11.1	U	11.1	47.8		0.34	50.8		0.28	32.6	C	2
B1	J037M8	6/20/05	12.4	U	12.4	40.9		0.37	223		0.31	11.5	C	2.2

Table A-2. 100-B-14:2 Area 3 Confirmatory Data Results. (4 Pages)

Constituents	J037M6 Location B2 Sample Date 6/20/05			J037M8 Location B1 Sample Date 6/20/05		
	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls						
Aroclor-1016	14	U	14	330	UD	330
Aroclor-1221	14	U	14	330	UD	330
Aroclor-1232	14	U	14	330	UD	330
Aroclor-1242	14	U	14	330	UD	330
Aroclor-1248	14	U	14	1100	D	330
Aroclor-1254	14	U	14	330	UD	330
Aroclor-1260	14	U	14	280	JD	330
Pesticides						
Aldrin	8.9	UD	8.9	8.3	UD	8.3
alpha-BHC	8.9	UD	8.9	8.3	UD	8.3
alpha-Chlordane.	8.9	UD	8.9	8.3	UD	8.3
beta-BHC	8.9	UD	8.9	4.0	ID	8.3
delta-BHC	8.9	UD	8.9	8.3	UD	8.3
Dichlorodiphenyldichloroethane	18	UD	18	23	D	17
Dichlorodiphenyldichloroethylene	18	UD	18	37	D	17
Dichlorodiphenyltrichloroethane	18	UD	18	31	D	17
Dieldrin	8.9	UD	8.9	84	D	8.3
Endosulfan I	8.9	UD	8.9	4.6	JD	8.3
Endosulfan II	18	UD	18	17	UD	17
Endosulfan sulfate	18	UD	18	3.6	ID	17
Endrin	18	UD	18	17	UD	17
Endrin aldehyde	18	UD	18	11	JD	17
Endrin ketone	18	UD	18	17	UD	17
gamma-BHC (Lindane)	8.9	UD	8.9	8.3	UD	8.3
gamma-Chlordane	8.9	UD	8.9	22	D	8.3
Heptachlor	8.9	UD	8.9	8.3	UD	8.3
Heptachlor epoxide	8.9	UD	8.9	8.3	UD	8.3
Methoxychlor	89	UD	89	32	JD	83
Toxaphene	890	UD	890	830	UD	830
Herbicides						
2,4,5-Trichlorophenoxyacetic acid	18	U	18	17	U	17
2,4-Dichlorophenoxyacetic acid	36	U	36	33	U	33
2-(2,4,5-Trichlorophenoxy)propionic acid	18	U	18	17	U	17
2-secButyl-4,6-dinitrophenol (DNBP)	18	U	18	17	U	17
4-(2,4-Dichlorophenoxy)butanoic acid	180	U	180	170	U	170
Dalapon	180	U	180	170	U	170
Dicamba	72	U	72	67	U	67
Dichloroprop	180	U	180	170	U	170
Semivolatile Organic Compounds						
1,2,4-Trichlorobenzene	1800	UD	1800	2000	UD	2000
1,2-Dichlorobenzene	1800	UD	1800	2000	UD	2000
1,3-Dichlorobenzene	1800	UD	1800	2000	UD	2000
1,4-Dichlorobenzene	1800	UD	1800	2000	UD	2000
2,4,5-Trichlorophenol	4500	UD	4500	5000	UD	5000
2,4,6-Trichlorophenol	1800	UD	1800	2000	UD	2000
2,4-Dichlorophenol	1800	UD	1800	2000	UD	2000
2,4-Dimethylphenol	1800	UD	1800	2000	UD	2000
2,4-Dinitrophenol	4500	UD	4500	5000	UD	5000
2,4-Dinitrotoluene	1800	UD	1800	2000	UD	2000
2,6-Dinitrotoluene	1800	UD	1800	2000	UD	2000
2-Chloronaphthalene	1800	UD	1800	2000	UD	2000
2-Chlorophenol	1800	UD	1800	2000	UD	2000
2-Methylnaphthalene	1800	UD	1800	2000	UD	2000
2-Methylphenol (cresol, o-)	1800	UD	1800	2000	UD	2000
2-Nitroaniline	4500	UD	4500	5000	UD	5000
2-Nitrophenol	1800	UD	1800	2000	UD	2000
3,3'-Dichlorobenzidine	1800	UD	1800	2000	UD	2000
3-Nitroaniline	4500	UD	4500	5000	UD	5000
4,6-Dinitro-2-methylphenol	4500	UD	4500	5000	UD	5000

Table A-2. 100-B-14:2 Area 3 Confirmatory Data Results. (4 Pages)

Constituents	J037M6 Location B2 Sample Date 6/20/05			J037M8 Location B1 Sample Date 6/20/05		
	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)						
4-Bromophenylphenyl ether	1800	UD	1800	2000	UD	2000
4-Chloro-3-methylphenol	1800	UD	1800	2000	UD	2000
4-Chloroaniline	1800	UD	1800	2000	UD	2000
4-Chlorophenylphenyl ether	1800	UD	1800	2000	UD	2000
4-Methylphenol (cresol, p-)	1800	UD	1800	2000	UD	2000
4-Nitroaniline	4500	UD	4500	5000	UD	5000
4-Nitrophenol	4500	UD	4500	5000	UD	5000
Acenaphthene	1800	UD	1800	2000	UD	2000
Acenaphthylene	1800	UD	1800	2000	UD	2000
Anthracene	1800	UD	1800	2000	UD	2000
Benzo(a)anthracene	1800	UD	1800	210	JD	2000
Benzo(a)pyrene	1800	UD	1800	180	JD	2000
Benzo(b)fluoranthene	1800	UD	1800	180	JD	2000
Benzo(g,h,i)perylene	1800	UD	1800	130	JD	2000
Benzo(k)fluoranthene	1800	UD	1800	180	JD	2000
bis(2-Chloro-1-methylethyl)ether	1800	UD	1800	2000	UD	2000
bis(2-Chloroethoxy)methane	1800	UD	1800	2000	UD	2000
bis(2-Chloroethyl) ether	1800	UD	1800	2000	UD	2000
bis(2-Ethylhexyl) phthalate	300	JBD	1800	1100	JBD	2000
Butylbenzylphthalate	1800	UD	1800	420	JD	2000
Carbazole	1800	UD	1800	2000	UD	2000
Chrysene	1800	UD	1800	240	JD	2000
Di-n-butylphthalate	1800	UD	1800	21000	BD	2000
Di-n-octylphthalate	1800	UD	1800	2000	UD	2000
Dibenz[a,h]anthracene	1800	UD	1800	2000	UD	2000
Dibenzofuran	1800	UD	1800	2000	UD	2000
Diethylphthalate	1800	UD	1800	2000	UD	2000
Dimethyl phthalate	1800	UD	1800	2000	UD	2000
Fluoranthene	1800	UD	1800	380	JD	2000
Fluorene	1800	UD	1800	2000	UD	2000
Hexachlorobenzene	1800	UD	1800	2000	UD	2000
Hexachlorobutadiene	1800	UD	1800	2000	UD	2000
Hexachlorocyclopentadiene	1800	UD	1800	2000	UD	2000
Hexachloroethane	1800	UD	1800	2000	UD	2000
Indeno(1,2,3-cd)pyrene	1800	UD	1800	120	JD	2000
Isophorone	1800	UD	1800	2000	UD	2000
N-Nitroso-di-n-dipropylamine	1800	UD	1800	2000	UD	2000
N-Nitrosodiphenylamine	1800	UD	1800	2000	UD	2000
Naphthalene	1800	UD	1800	2000	UD	2000
Nitrobenzene	1800	UD	1800	2000	UD	2000
Pentachlorophenol	4500	UD	4500	5000	UD	5000
Phenanthrene	1800	UD	1800	190	JD	2000
Phenol	1800	UD	1800	2000	UD	2000
Pyrene	1800	UD	1800	370	JD	2000

Table A-3. 100-B-14:2 Area 3 Additional Characterization Data Results.

Sample Location	Sample Number	Sample Date	1,4-Dichlorobenzene			2,4,5-Trichlorophenol			2,4,6-Trichlorophenol			2,4-Dinitrotoluene			2-Methylphenol			3+4 Methylphenol		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
B2	J037M6	6/20/05	0.05	U	0.05	0.1	U	0.12	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05
B1	J037M8	6/20/05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05

Sample Location	Sample Number	Sample Date	Hexachlorobenzene			Hexachlorobutadiene			Hexachloroethane			Nitrobenzene			Pentachlorophenol			Pyridine		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
B2	J037M6	6/20/05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05
B1	J037M8	6/20/05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.1	U	0.05	0.12	U	0.12	0.05	U	0.05

Sample Location	Sample Number	Sample Date	Aroclor-1016			Aroclor-1221			Aroclor-1232			Aroclor-1242			Aroclor-1248			Aroclor-1254		
			µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL
B2	J037M6	6/20/05	4	U	4	4	U	4	4	U	4	4	U	4	4.0	U	4	4	U	4.00
B1	J037M8	6/20/05	10	U	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U	10

Sample Location	Sample Number	Sample Date	Aroclor-1260		
			µg/L	Q	PQL
B2	J037M6	6/20/05	4	U	4
B1	J037M8	6/20/05	10	U	10

Sample Location	Sample Number	Sample Date	Arsenic			Barium			Cadmium			Chromium			Lead			Mercury		
			µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL
B2	J037M6	6/20/05	27	U	27	228	C	1.200	1.8	U	1.8	4.2	U	4.2	15	U	15	0.1	U	0.1
B1	J037M8	6/20/05	27	U	27	597	C	1.200	9.7		1.8	5.5		4.2	28.3		15	0.1		0.1

Sample Location	Sample Number	Sample Date	Selenium			Silver		
			µg/L	Q	PQL	µg/L	Q	PQL
B2	J037M6	6/20/05	29.4	U	29.4	5.4	UC	5.4
B1	J037M8	6/20/05	29.4	U	29.4	5.4	U	5.4

Table A-4. 100-B-14:2 Area 4 Confirmatory Data Results. (7 Pages)

Sample Location	Sample Number	Sample Date	Americium-241			Cesium-137			Cobalt-60			Europium-152			Europium-154		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
A9	J00Y74	09/18/03	0.2	U	0.2	0.064		0.043	0.041	U	0.041	0.094	U	0.094	0.13	U	0.13
A11	J00Y75	09/18/03	0.047	U	0.047	0.18		0.062	0.054	U	0.054	0.12	U	0.12	0.15	U	0.15
A12	J00YV1	10/02/03	0.09	U	0.09	0.022	U	0.022	0.026	U	0.026	0.06	U	0.06	0.082	U	0.082
A10	J00YV2	10/02/03	0.07	U	0.07	0.066	U	0.066	0.076	U	0.076	0.17	U	0.17	0.26	U	0.26
Duplicate of J00YV2	J00YV3	10/02/03	0.32	U	0.32	0.032	U	0.032	0.029	U	0.029	0.081	U	0.081	0.13	U	0.13

Sample Location	Sample Number	Sample Date	Europium-155			Gross alpha			Gross beta			Potassium-40			Radium-226		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
A9	J00Y74	09/18/03	0.099	U	0.099	3.73	U	6	8.4		7.7	7.11		0.44	0.321		0.077
A11	J00Y75	09/18/03	0.088	U	0.088	3.02	U	7.2	12.9		6.7	5.3		0.48	0.318		0.1
A12	J00YV1	10/02/03	0.071	U	0.071	2.03	U	3.7	13.8		5.6	12.5		0.25	0.434		0.046
A10	J00YV2	10/02/03	0.14	U	0.14	3.38	U	4.7	14.5		5.6	8.27		0.66	0.299		0.13
Duplicate of J00YV2	J00YV3	10/02/03	0.11	U	0.11	2.34	U	4.3	15.5		6.4	10.9		0.46	0.42		0.066

Sample Location	Sample Number	Sample Date	Radium-228			Thorium-228			Thorium-232			Uranium-235			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
A9	J00Y74	09/18/03	0.356		0.16	0.334		0.043	0.356		0.16	0.14	U	0.14	4.6	U	4.6
A11	J00Y75	09/18/03	0.46	U	0.46	0.248		0.053	0.46	U	0.46	0.16	U	0.16	6	U	6
A12	J00YV1	10/02/03	0.636		0.1	0.641		0.028	0.636		0.1	0.09	U	0.09	3	U	3
A10	J00YV2	10/02/03	0.546		0.31	0.373		0.087	0.546		0.31	0.24	U	0.24	9	U	9
Duplicate of J00YV2	J00YV3	10/02/03	0.577		0.17	0.535		0.045	0.577		0.17	0.14	U	0.14	4.5	U	4.5

Table A-4. 100-B-14:2 Area 4 Confirmatory Data Results. (7 Pages)

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
A9	J00Y74	09/18/03	4600		4.7	7.5		0.29	32.9		0.42	162		0.02	0.07		0.04	31.9		0.22
A11	J00Y75	09/18/03	6010		4.6	9.1		0.29	22.2		0.42	178		0.02	0.12		0.04	6.4		0.22
A12	J00YV5	10/02/03	5940		4.6	0.28	U	0.28	4		0.41	51.9		0.02	0.3		0.04	0.92		0.22
A10	J00YV6	10/02/03	5380		4.6	0.29	U	0.29	2.3		0.42	55.2		0.02	0.32		0.04	1.2		0.22
Duplicate of J00YV6	J00YV7	10/02/03	5250		4.2	0.26	U	0.26	2.3		0.38	55.5		0.02	0.25		0.04	1		0.2
Equipment blank	J00YV8	10/02/03	53.7		3.8	0.23	U	0.23	0.34	U	0.34	1.2		0.02	0.03	U	0.03	0.18	U	0.18

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
A9	J00Y74	09/18/03	3.1		0.04	22000		3.1	62.2		0.1	13.8		0.12	311		0.12			
A11	J00Y75	09/18/03	2.6		0.04	68600		36.8	97.6		0.1	10.1		0.12	186		0.12			
A9	J00Y76*	09/18/03																2.52		0.35
A11	J00Y77*	09/18/03																2.14		0.35
A12	J00YV5	10/02/03	0.13		0.04	9810		3	7.1		0.1	9.9		0.12	18.4		0.12	0.42	U	0.42
A10	J00YV6	10/02/03	0.43		0.04	5250		3.1	7.1		0.1	9.9		0.12	18.8		0.12	0.425	U	0.425
Duplicate of J00YV6	J00YV7	10/02/03	0.43		0.04	5550		2.8	7.1		0.09	8.7		0.11	17.3		0.11	0.42	U	0.42
Equipment Blank	J00YV8	10/02/03	0.03	U	0.03	18.3		2.5	0.15		0.08	0.1	U	0.1	0.1	U	0.1	0.4	U	0.4

*Only analyte was hexavalent chromium.

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
A9	J00Y74	09/18/03	99000		23.8	172		0.19	3440		0.7	476		0.03	8.2		0.15	7.6		0.19
A11	J00Y75	09/18/03	61900		23.5	71.7		0.19	3810		0.69	476		0.03	2.7		0.06	3		0.19
A12	J00YV5	10/02/03	26000		1.9	5.3		0.19	5410		0.68	378		0.03	0.01	U	0.01	0.44		0.19
A10	J00YV6	10/02/03	27300		2	5.1		0.19	4920		0.7	364		0.03	0.21		0.01	0.44		0.19
Duplicate of J00YV6	J00YV7	10/02/03	25000		1.8	5.2		0.17	4260		0.63	316		0.03	0.22		0.01	0.43		0.17
Equipment blank	J00YV8	10/02/03	118		1.6	0.36		0.18	9.2		0.56	3.1		0.03	0.01	U	0.01	0.15		0.16

Table A-4. 100-B-14:2 Area 4 Confirmatory Data Results. (7 Pages)

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
A9	J00Y74	09/18/03	99.2		0.2	678		2.4	1.4		0.29	406		0.54	0.48		0.008	546		0.71
A11	J00Y75	09/18/03	43.4		0.2	2030		2.3	0.37		0.29	384		0.53	0.65		0.08	1030		0.7
A12	J00YV5	10/02/03	11		0.2	1260		2.3	0.28	U	0.28	167		0.53	0.08	U	0.08	234		0.69
A10	J00YV6	10/02/03	12.1		0.2	888		2.3	0.29	U	0.29	144		0.54	0.08		0.08	237		0.71
Duplicate of J00YV6	J00YV7	10/02/03	10.8		0.18	874		2.1	0.26	U	0.26	159		0.49	0.07	U	0.07	215		0.64
Equipment blank	J00YV8	10/02/03	0.16	U	0.16	20.1		1.9	0.23	U	0.23	44.9		0.44	0.06	U	0.06	4.8		0.57

Sample Location	Sample Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
A9	J00Y74	09/18/03	34.5		0.09	995		0.26
A11	J00Y75	09/18/03	47		0.09	730		0.26
A12	J00YV5	10/02/03	60.7		0.09	49.2		0.26
A10	J00YV6	10/02/03	67.3		0.09	241		0.26
Duplicate of J00YV6	J00YV7	10/02/03	64.3		0.08	249		0.24
Equipment blank	J00YV8	10/02/03	0.07	U	0.07	0.66		0.21

Table A-4. 100-B-14:2 Area 4 Confirmatory Data Results. (7 Pages)

Constituents	J00YV5 Location A12 Sample Date 10/2/03			J00YV6 Location A10 Sample Date 10/2/03			J00YV7 Duplicate of J00YV6 Sample Date 10/2/03			J00YV8 Equipment Blank Sample Date 10/2/03		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	350	U	350	350	U	350	350	U	350	330	U	330
1,2-Dichlorobenzene	350	U	350	350	U	350	350	U	350	330	U	330
1,3-Dichlorobenzene	350	U	350	350	U	350	350	U	350	330	U	330
1,4-Dichlorobenzene	350	U	350	350	U	350	350	U	350	330	U	330
2,4,5-Trichlorophenol	870	U	870	890	U	890	880	U	880	830	U	830
2,4,6-Trichlorophenol	350	U	350	350	U	350	350	U	350	330	U	330
2,4-Dichlorophenol	350	U	350	350	U	350	350	U	350	330	U	330
2,4-Dimethylphenol	350	U	350	350	U	350	350	U	350	330	U	330
2,4-Dinitrophenol	870	U	870	890	U	890	880	U	880	830	U	830
2,4-Dinitrotoluene	350	U	350	350	U	350	350	U	350	330	U	330
2,6-Dinitrotoluene	350	U	350	350	U	350	350	U	350	330	U	330
2-Chloronaphthalene	350	U	350	350	U	350	350	U	350	330	U	330
2-Chlorophenol	350	U	350	350	U	350	350	U	350	330	U	330
2-Methylnaphthalene	350	U	350	350	U	350	350	U	350	330	U	330
2-Methylphenol (cresol, o-)	350	U	350	350	U	350	350	U	350	330	U	330
2-Nitroaniline	870	U	870	890	U	890	880	U	880	830	U	830
2-Nitrophenol	350	U	350	350	U	350	350	U	350	330	U	330
3,3'-Dichlorobenzidine	350	U	350	350	U	350	350	U	350	330	U	330
3-Nitroaniline	870	U	870	890	U	890	880	U	880	830	U	830
4,6-Dinitro-2-methylphenol	870	U	870	890	U	890	880	U	880	830	U	830
4-Bromophenylphenyl ether	350	U	350	350	U	350	350	U	350	330	U	330
4-Chloro-3-methylphenol	350	U	350	350	U	350	350	U	350	330	U	330
4-Chloroaniline	350	U	350	350	U	350	350	U	350	330	U	330
4-Chlorophenylphenyl ether	350	U	350	350	U	350	350	U	350	330	U	330
4-Methylphenol (cresol, p-)	350	U	350	350	U	350	350	U	350	330	U	330
4-Nitroaniline	870	U	870	890	U	890	880	U	880	830	U	830
4-Nitrophenol	870	U	870	890	U	890	880	U	880	830	U	830
Acenaphthene	350	U	350	350	U	350	350	U	350	330	U	330
Acenaphthylene	350	U	350	350	U	350	350	U	350	330	U	330
Anthracene	350	U	350	350	U	350	350	U	350	330	U	330
Benzo(a)anthracene	350	U	350	350	U	350	350	U	350	330	U	330
Benzo(a)pyrene	350	U	350	350	U	350	350	U	350	330	U	330
Benzo(b)fluoranthene	350	U	350	350	U	350	350	U	350	330	U	330
Benzo(g,h,i)perylene	350	U	350	350	U	350	350	U	350	330	U	330
Benzo(k)fluoranthene	350	U	350	350	U	350	350	U	350	330	U	330
bis(2-Chloro-1-methylethyl)ether	350	U	350	350	U	350	350	U	350	330	U	330
bis(2-Chloroethoxy)methane	350	U	350	350	U	350	350	U	350	330	U	330
bis(2-Chloroethyl) ether	350	U	350	350	U	350	350	U	350	330	U	330
bis(2-Ethylhexyl) phthalate	25	C	350	350	U	350	30	C	350	330	U	330
Butylbenzylphthalate	350	U	350	350	U	350	350	U	350	330	U	330
Carbazole	350	U	350	350	U	350	350	U	350	330	U	330
Chrysene	350	U	350	350	U	350	350	U	350	330	U	330
Dibenz[a,h]anthracene	350	U	350	350	U	350	350	U	350	330	U	330
Dibenzofuran	350	U	350	350	U	350	350	U	350	330	U	330
Diethylphthalate	350	U	350	350	U	350	350	U	350	330	U	330
Dimethyl phthalate	350	U	350	350	U	350	350	U	350	330	U	330
Di-n-butylphthalate	350	U	350	100	J	350	110	J	350	330	U	330
Di-n-octylphthalate	350	U	350	350	U	350	350	U	350	330	U	330

Table A-4. 100-B-14:2 Area 4 Confirmatory Data Results. (7 Pages)

Constituents	J00YV5 Location A12 Sample Date 10/2/03			J00YV6 Location A10 Sample Date 10/2/03			J00YV7 Duplicate of J00YV6 Sample Date 10/2/03			J00YV8 Equipment Blank Sample Date 10/2/03		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Fluoranthene	350	U	350	350	U	350	350	U	350	330	U	330
Fluorene	350	U	350	350	U	350	350	U	350	330	U	330
Hexachlorobenzene	350	U	350	350	U	350	350	U	350	330	U	330
Hexachlorobutadiene	350	U	350	350	U	350	350	U	350	330	U	330
Hexachlorocyclopentadiene	350	U	350	350	U	350	350	U	350	330	U	330
Hexachloroethane	350	U	350	350	U	350	350	U	350	330	U	330
Indeno(1,2,3-cd)pyrene	350	U	350	350	U	350	350	U	350	330	U	330
Isophorone	350	U	350	350	U	350	350	U	350	330	U	330
Naphthalene	350	U	350	350	U	350	350	U	350	330	U	330
Nitrobenzene	350	U	350	350	U	350	350	U	350	330	U	330
N-Nitroso-di-n-dipropylamine	350	U	350	350	U	350	350	U	350	330	U	330
N-Nitrosodiphenylamine	350	U	350	350	U	350	350	U	350	330	U	330
Pentachlorophenol	870	U	870	890	U	890	880	U	880	830	U	830
Phenanthrene	350	U	350	350	U	350	350	U	350	330	U	330
Phenol	350	U	350	350	U	350	350	U	350	330	U	330
Pyrene	350	U	350	350	U	350	350	U	350	330	U	330

Table A-4. 100-B-14:2 Area 4 Confirmatory Data Results. (7 Pages)

Constituents	J00Y74 Location A9 Sample Date 9/18/03			J00Y75 Location A11 Sample Date 9/18/03		
	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls						
Aroclor-1016	270	U	270	15	U	15
Aroclor-1221	270	U	270	15	U	15
Aroclor-1232	270	U	270	15	U	15
Aroclor-1242	270	U	270	15	U	15
Aroclor-1248	270	U	270	15	U	15
Aroclor-1254	2600		270	150		15
Aroclor-1260	270	U	270	15	U	15
Pesticides						
Aldrin	17	U	17	18	U	18
alpha-BHC	17	U	17	18	U	18
alpha-Chlordane	17	U	17	18	U	18
beta-BHC	17	U	17	18	U	18
delta-BHC	17	U	17	18	U	18
Dichlorodiphenyldichloroethane	34	U	34	37	U	37
Dichlorodiphenyldichloroethylene	34	U	34	37	U	37
Dichlorodiphenyltrichloroethane	210		34	37	U	37
Dieldrin	34	U	34	37	U	37
Endosulfan I	17	U	17	18	U	18
Endosulfan II	34	U	34	37	U	37
Endosulfan sulfate	34	U	34	37	U	37
Endrin	34	U	34	37	U	37
Endrin aldehyde	34	U	34	37	U	37
Endrin ketone	34	U	34	37	U	37
gamma-BHC (Lindane)	17	U	17	18	U	18
gamma-Chlordane	19		17	18	U	18
Heptachlor	17	U	17	18	U	18
Heptachlor epoxide	17	U	17	18	U	18
Methoxychlor	170	U	170	180	U	180
Toxaphene	1700	U	1700	1800	U	1800
Semivolatile Organic Compounds						
1,2,4-Trichlorobenzene	1000	U	1000	730	U	730
1,2-Dichlorobenzene	1000	U	1000	730	U	730
1,3-Dichlorobenzene	1000	U	1000	730	U	730
1,4-Dichlorobenzene	1000	U	1000	730	U	730
2,4,5-Trichlorophenol	2600	U	2600	1800	U	1800
2,4,6-Trichlorophenol	1000	U	1000	730	U	730
2,4-Dichlorophenol	1000	U	1000	730	U	730
2,4-Dimethylphenol	1000	U	1000	730	U	730
2,4-Dinitrophenol	2600	U	2600	1800	U	1800
2,4-Dinitrotoluene	1000	U	1000	730	U	730
2,6-Dinitrotoluene	1000	U	1000	730	U	730
2-Chloronaphthalene	1000	U	1000	730	U	730
2-Chlorophenol	1000	U	1000	730	U	730
2-Methylnaphthalene	1000	U	1000	730	U	730
2-Methylphenol (cresol, o-)	1000	U	1000	730	U	730
2-Nitroaniline	2600	U	2600	1800	U	1800
2-Nitrophenol	1000	U	1000	730	U	730
3,3'-Dichlorobenzidine	1000	U	1000	730	U	730
3-Nitroaniline	2600	U	2600	1800	U	1800
4,6-Dinitro-2-methylphenol	2600	U	2600	1800	U	1800
4-Bromophenylphenyl ether	1000	U	1000	730	U	730
4-Chloro-3-methylphenol	1000	U	1000	730	U	730
4-Chloroaniline	1000	U	1000	730	U	730
4-Chlorophenylphenyl ether	1000	U	1000	730	U	730
4-Methylphenol (cresol, p-)	1000	U	1000	730	U	730
4-Nitroaniline	2600	U	2600	1800	U	1800
4-Nitrophenol	2600	U	2600	1800	U	1800

Table A-4. 100-B-14:2 Area 4 Confirmatory Data Results. (7 Pages)

Constituents	J00Y74 Location A9 Sample Date 9/18/03			J00Y75 Location A11 Sample Date 9/18/03		
	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)						
Acenaphthene	1000	U	1000	120	J	730
Acenaphthylene	1000	U	1000	48	J	730
Anthracene	1000	U	1000	210	J	730
Benzo(a)anthracene	160	J	1000	650	J	730
Benzo(a)pyrene	160	J	1000	600	J	730
Benzo(b)fluoranthene	120	J	1000	530	J	730
Benzo(g,h,i)perylene	1000	U	1000	380	J	730
Benzo(k)fluoranthene	150	J	1000	510	J	730
bis(2-Chloro-1-methylethyl)ether	1000	U	1000	730	U	730
bis(2-Chloroethoxy)methane	1000	U	1000	730	U	730
bis(2-Chloroethyl) ether	1000	U	1000	730	U	730
bis(2-Ethylhexyl) phthalate	330	J	1000	160	J	730
Butylbenzylphthalate	1000	U	1000	730	U	730
Carbazole	1000	U	1000	160	J	730
Chrysene	180	J	1000	780		730
Dibenz[a,h]anthracene	1000	U	1000	100	J	730
Dibenzofuran	1000	U	1000	68	J	730
Diethylphthalate	1000	U	1000	730	U	730
Dimethyl phthalate	1000	U	1000	730	U	730
Di-n-butylphthalate	4200		1000	4000		730
Di-n-octylphthalate	1000	U	1000	730	U	730
Fluoranthene	230	J	230	1900		730
Fluorene	1000	U	1000	100	J	730
Hexachlorobenzene	1000	U	1000	730	U	730
Hexachlorobutadiene	1000	U	1000	730	U	730
Hexachlorocyclopentadiene	1000	U	1000	730	U	730
Hexachloroethane	1000	U	1000	730	U	730
Indeno(1,2,3-cd)pyrene	58	J	58	330	J	730
Isophorone	1000	U	1000	730	U	730
Naphthalene	1000	U	1000	60	J	730
Nitrobenzene	1000	U	1000	730	U	730
N-Nitroso-di-n-dipropylamine	1000	U	1000	730	U	730
N-Nitrosodiphenylamine	1000	U	1000	730	U	730
Pentachlorophenol	2600	U	2600	1800	U	1800
Phenanthrene	160	J	1000	1200		730
Phenol	1000	U	1000	730	U	730
Pyrene	330	J	1000	980		730

Table A-5. 100-B-14:2 Area 5 Confirmatory Data Results. (6 Pages)

Sample Location	Sample Number	Sample Date	Americium-241 GEA			Carbon-14			Cesium-137			Cobalt-60			Europium-152			Europium-154		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
A13	J00Y79	09/18/03	0.15	U	0.15	-0.915	U	3.4	0.423		0.069	0.07	U	0.07	0.15	U	0.15	0.2	U	0.2
A14	J00Y83	09/18/03	0.12	U	0.12	-1.02	UJ	2.8	0.15		0.058	0.057	U	0.057	0.13	U	0.13	0.15	U	0.15
A15	J00Y80	09/18/03	0.083	U	0.083	-0.912	U	2.7	0.123		0.039	0.03	U	0.03	0.081	U	0.081	0.095	U	0.095
A16	J00Y84	09/18/03	0.99	U	0.99	0.365	UJ	2.9	41		0.23	0.427		0.092	4.4		0.75	0.454		0.33
Duplicate of J00Y84	J00Y85	09/18/03	0.46	U	0.46	-0.035	UJ	2.7	46.8		0.11	0.506		0.05	5.57		0.42	0.588		0.16

Sample Location	Sample Number	Sample Date	Europium-155			Gross alpha			Gross beta			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	pCi/g	Q	MDA
A13	J00Y79	09/18/03	0.13	U	0.13	10.1		3.3	14.1		7.2	9.42		0.79	0.432		0.12	0.583		0.25
A14	J00Y83	09/18/03	0.13	U	0.13	6.47		2.4	16.5		5.7	10.7		0.51	0.402		0.1	0.377	J	0.27
A15	J00Y80	09/18/03	0.1	U	0.1	18.7		3.8	24		6.3	10.1		0.36	1.04		0.058	1.48		0.12
A16	J00Y84	09/18/03	0.49	U	0.49	7.39		4	91.8		6.3	7.61		0.78	0.43	U	0.43	0.611	J	0.51
Duplicate of J00Y84	J00Y85	09/18/03	0.27	U	0.27	9.71		3.3	110		7.2	10.1		0.38	0.365		0.18	0.481	J	0.26

Sample Location	Sample Number	Sample Date	Thorium-228			Thorium-232			Total beta Radiostrontium			Tritium			Uranium-235			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
A13	J00Y79	09/18/03	0.407		0.067	0.583		0.25				11.9		3.1	0.21	U	0.21	7.4	U	7.4
A14	J00Y83	09/18/03	0.473		0.059	0.377		0.27				0.147	U	0.24	0.17	U	0.17	6.6	U	6.6
A15	J00Y80	09/18/03	1.3		0.039	1.48		0.12				-0.31	U	2.3	0.21	U	0.21	3.6	U	3.6
A16	J00Y84	09/18/03	0.384		0.3	0.611		0.51	2.47		0.22	0.046	U	0.22	0.65	U	0.65	13	U	13
Duplicate of J00Y84	J00Y85	09/18/03	0.462		0.15	0.481		0.26	2.66		0.2	0.017	U	0.23	0.35	U	0.35	8.6	U	8.6

Table A-5. 100-B-14:2 Area 5 Confirmatory Data Results. (6 Pages)

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
A14	J00Y83	09/18/03	8250		4.6	0.28	J	0.28	4.1		0.41	92.6		0.02	0.64		0.04	2.9		0.22
A16	J00Y84	09/18/03	5980		4.6	0.28	J	0.28	3.2		0.41	60.3		0.02	0.59		0.04	1.5		0.21
Duplicate of J00Y84	J00Y85	09/18/03	6050		4.7	0.29	J	0.29	2.9		0.42	64.9		0.02	0.61		0.04	1.7		0.22
Equipment Blank	J00YF5	09/18/03	44.1		4.6	0.28	U	0.28	0.41	U	0.41	0.9		0.02	0.04	U	0.04	0.23		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
A13	J00Y81*	09/18/03																2.21		0.35
A14	J00Y83	09/18/03	0.1		0.04	8470	J	3	12		0.1	9.9		0.12	20		0.12	0.8	U	0.8
A15	J00Y82*	09/18/03																0.35	U	0.35
A16	J00Y84	09/18/03	0.05		0.04	5840	J	3	15.8		0.1	8.5		0.12	18.7		0.12	0.41	U	0.41
Duplicate of J00Y84	J00Y85	09/18/03	0.04		0.04	6280	J	3.1	14		0.1	7.9		0.12	18.1		0.12	0.41	U	0.41
Equipment Blank	J00YF5	09/18/03	0.04	U	0.04	18.5		3	1.9		0.1	0.12	U	0.12	0.28		0.12			

*Only analyte was hexavalent chromium.

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
A14	J00Y83	09/18/03	24300		1.09	7.1		0.19	5280		0.68	412		0.03	0.02		0.02	0.19	U	0.19
A16	J00Y84	09/18/03	24500		1.9	5		0.19	4310		0.68	330		0.03	0.1		0.02	0.42		0.19
Duplicate of J00Y84	J00Y85	09/18/03	22700		2	4.5		0.2	4200		0.7	324		0.03	0.13		0.02	0.25		0.19
Equipment Blank	J00YF5	09/18/03	151		1.9	0.27		0.19	6.2		0.69	2.4		0.03	0.01	U	0.01	0.19	U	0.19

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
A14	J00Y83	09/18/03	13.8		0.2	2000		2.3	0.28	U	0.28	336		0.53	0.08	U	0.08	466		0.69
A16	J00Y84	09/18/03	10.8		0.2	970		2.3	0.28	U	0.28	313		0.53	0.08	U	0.08	275		0.69
Duplicate of J00Y84	J00Y85	09/18/03	10.3		0.2	1010		2.4	0.29	U	0.29	331		0.54	0.08	U	0.08	281		0.71
Equipment Blank	J00YF5	09/18/03	1.1		0.2	17.2		2.3	0.28	U	0.28	39.3		0.53	0.08	U	0.08	6.6		0.7

Sample Location	Sample Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
A14	J00Y83	09/18/03	58		0.09	51.2		0.25
A16	J00Y84	09/18/03	51		0.09	50		0.25
Duplicate of J00Y84	J00Y85	09/18/03	55.5		0.09	47.5		0.26
Equipment Blank	J00YF5	09/18/03	0.09		0.09	0.53		0.25

Table A-5. 100-B-14:2 Area 5 Confirmatory Data Results. (6 Pages)

Constituents	J00Y79 Location A13 Sample Date 9/18/03			J00Y83 Location A14 Sample Date 9/18/03			J00Y80 Location A15 Sample Date 9/18/03			J00Y84 Location A16 Sample Date 9/18/03		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	270	U	270	13	U	13	12	U	12	14	U	14
Aroclor-1221	270	U	270	13	U	13	12	U	12	14	U	14
Aroclor-1232	270	U	270	13	U	13	12	U	12	14	U	14
Aroclor-1242	270	U	270	13	U	13	12	U	12	14	U	14
Aroclor-1248	270	U	270	13	U	13	12	U	12	14	U	14
Aroclor-1254	1200		270	13	U	13	12	U	12	14	U	14
Aroclor-1260	270	U	270	13	U	13	12	U	12	14	U	14
Pesticides												
Aldrin	86	U	86	17	UJ	17	17	U	17	17	UJ	17
alpha-BHC	86	U	86	17	UJ	17	17	U	17	17	UJ	17
alpha-Chlordane	290		86	17	UJ	17	17	U	17	17	UJ	17
beta-BHC	86	U	86	17	UJ	17	17	U	17	17	UJ	17
delta-BHC	86	U	86	17	UJ	17	17	U	17	17	UJ	17
Dichlorodiphenyldichloroethane	170	U	170	34	UJ	34	34	U	34	34	UJ	34
Dichlorodiphenyldichloroethylene	170	U	170	34	UJ	34	34	U	34	34	UJ	34
Dichlorodiphenyltrichloroethane	140	J	170	34	UJ	34	34	U	34	34	UJ	34
Dieldrin	170	U	170	34	UJ	34	34	U	34	34	UJ	34
Endosulfan I	86	U	86	17	UJ	17	17	U	17	17	UJ	17
Endosulfan II	170	U	170	34	UJ	34	34	U	34	34	UJ	34
Endosulfan sulfate	170	U	170	34	UJ	34	34	U	34	34	UJ	34
Endrin	170	U	170	34	UJ	34	34	U	34	34	UJ	34
Endrin aldehyde	170	U	170	34	UJ	34	34	U	34	34	UJ	34
Endrin ketone	170	U	170	34	UJ	34	34	U	34	34	UJ	34
gamma-BHC (Lindane)	86	U	86	17	UJ	17	17	U	17	17	UJ	17
gamma-Chlordane	480		86	17	UJ	17	17	U	17	17	UJ	17
Heptachlor	86	U	86	17	UJ	17	17	U	17	17	UJ	17
Heptachlor epoxide	86	U	86	17	UJ	17	17	U	17	17	UJ	17
Methoxychlor	860	U	860	170	UJ	170	170	U	170	170	UJ	170
Toxaphene	8600	U	8600	1700	UJ	1700	1700	U	1700	1700	UJ	1700
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	680	U	680	670	U	670	670	U	670	690	U	690
1,2-Dichlorobenzene	680	U	680	670	U	670	670	U	670	690	U	690
1,3-Dichlorobenzene	680	U	680	670	U	670	670	U	670	690	U	690
1,4-Dichlorobenzene	680	U	680	670	U	670	670	U	670	690	U	690
2,4,5-Trichlorophenol	1700	U	1700	1700	U	1700	1700	U	1700	1700	U	1700
2,4,6-Trichlorophenol	680	U	680	670	U	670	670	U	670	690	U	690
2,4-Dichlorophenol	680	U	680	670	U	670	670	U	670	690	U	690
2,4-Dimethylphenol	680	U	680	670	U	670	670	U	670	690	U	690
2,4-Dinitrophenol	1700	U	1700	1700	U	1700	1700	U	1700	1700	U	1700
2,4-Dinitrotoluene	680	U	680	670	U	670	670	U	670	690	U	690
2,6-Dinitrotoluene	680	U	680	670	U	670	670	U	670	690	U	690
2-Chloronaphthalene	680	U	680	670	U	670	670	U	670	690	U	690
2-Chlorophenol	680	U	680	670	U	670	670	U	670	690	U	690
2-Methylnaphthalene	680	U	680	670	U	670	670	U	670	690	U	690
2-Methylphenol (cresol, o-)	680	U	680	670	U	670	670	U	670	690	U	690
2-Nitroaniline	1700	U	1700	1700	U	1700	1700	U	1700	1700	U	1700
2-Nitrophenol	680	U	680	670	U	670	670	U	670	690	U	690
3,3'-Dichlorobenzidine	680	U	680	670	U	670	670	U	670	690	U	690
3-Nitroaniline	1700	U	1700	1700	U	1700	1700	U	1700	1700	U	1700
4,6-Dinitro-2-methylphenol	1700	U	1700	1700	U	1700	1700	U	1700	1700	U	1700
4-Bromophenylphenyl ether	680	U	680	670	U	670	670	U	670	690	U	690
4-Chloro-3-methylphenol	680	U	680	670	U	670	670	U	670	690	U	690
4-Chloroaniline	680	U	680	670	U	670	670	U	670	690	U	690
4-Chlorophenylphenyl ether	680	U	680	670	U	670	670	U	670	690	U	690
4-Methylphenol (cresol, p-)	680	U	680	670	U	670	670	U	670	690	U	690
4-Nitroaniline	1700	U	1700	1700	U	1700	1700	U	1700	1700	U	1700
4-Nitrophenol	1700	U	1700	1700	U	1700	1700	U	1700	1700	U	1700

Table A-5. 100-B-14:2 Area 5 Confirmatory Data Results. (6 Pages)

Constituents	J00Y79 Location A13 Sample Date 9/18/03			J00Y83 Location A14 Sample Date 9/18/03			J00Y80 Location A15 Sample Date 9/18/03			J00Y84 Location A16 Sample Date 9/18/03		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Acenaphthene	680	U	680	670	U	670	670	U	670	690	U	690
Acenaphthylene	680	U	680	670	U	670	670	U	670	690	U	690
Anthracene	680	U	680	670	U	670	670	U	670	690	U	690
Benzo(a)anthracene	73	J	680	670	U	670	670	U	670	110	J	690
Benzo(a)pyrene	67	J	680	670	U	670	670	U	670	81	J	690
Benzo(b)fluoranthene	65	J	680	670	U	670	670	U	670	92	J	690
Benzo(g,h,i)perylene	46	J	680	670	U	670	670	U	670	39	J	690
Benzo(k)fluoranthene	63	J	680	670	U	670	670	U	670	80	J	690
bis(2-Chloro-1-methylethyl)ether	680	U	680	670	U	670	670	U	670	690	U	690
bis(2-Chloroethoxy)methane	680	U	680	670	U	670	670	U	670	690	U	690
bis(2-Chloroethyl) ether	680	U	680	670	U	670	670	U	670	690	U	690
bis(2-Ethylhexyl) phthalate	220	J	680	670	U	670	58	J	670	690	U	690
Butylbenzylphthalate	680	U	680	670	U	670	670	U	670	690	U	690
Carbazole	680	U	680	670	U	670	670	U	670	690	U	690
Chrysene	100	J	680	670	U	670	670	U	670	120	J	690
Di-n-butylphthalate	510	J	680	670	U	670	670	U	670	690	U	690
Di-n-octylphthalate	680	U	680	670	U	670	670	U	670	690	U	690
Dibenz[a,h]anthracene	680	U	680	670	U	670	670	U	670	690	U	690
Dibenzofuran	680	U	680	670	U	670	670	U	670	690	U	690
Diethylphthalate	680	U	680	670	U	670	670	U	670	690	U	690
Dimethyl phthalate	680	U	680	670	U	670	670	U	670	690	U	690
Fluoranthene	180	J	680	670	U	670	670	U	670	210	J	690
Fluorene	680	U	680	670	U	670	670	U	670	690	U	690
Hexachlorobenzene	680	U	680	670	U	670	670	U	670	690	U	690
Hexachlorobutadiene	680	U	680	670	U	670	670	U	670	690	U	690
Hexachlorocyclopentadiene	680	U	680	670	U	670	670	U	670	690	U	690
Hexachloroethane	680	U	680	670	U	670	670	U	670	690	U	690
Indeno(1,2,3-cd)pyrene	48	J	680	670	U	670	670	U	670	35	J	690
Isophorone	680	U	680	670	U	670	670	U	670	690	U	690
N-Nitroso-di-n-dipropylamine	680	U	680	670	U	670	670	U	670	690	U	690
N-Nitrosodiphenylamine	680	U	680	670	U	670	670	U	670	690	U	690
Naphthalene	680	U	680	670	U	670	670	U	670	690	U	690
Nitrobenzene	680	U	680	670	U	670	670	U	670	690	U	690
Pentachlorophenol	1700	U	1700	1700	U	1700	1700	U	1700	1700	U	1700
Phenanthrene	94	J	680	670	U	670	670	U	670	690	U	690
Phenol	680	U	680	670	U	670	670	U	670	690	U	690
Pyrene	110	J	680	670	U	670	670	U	670	150	J	690

Table A-5. 100-B-14:2 Area 5 Confirmatory Data Results. (6 Pages)

Constituents	J00Y85 Duplicate of J00Y84 Sample Date 9/18/03			J00YF5 Equipment Blank Sample Date 9/18/03		
	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls						
Aroclor-1016	14	U	14	13	U	13
Aroclor-1221	14	U	14	13	U	13
Aroclor-1232	14	U	14	13	U	13
Aroclor-1242	14	U	14	13	U	13
Aroclor-1248	14	U	14	13	U	13
Aroclor-1254	14	U	14	13	U	13
Aroclor-1260	16		14	13	U	13
Pesticides						
Aldrin	17	UJ	17	1.7	U	1.7
alpha-BHC	17	UJ	17	1.7	U	1.7
alpha-Chlordane	17	UJ	17	1.7	U	1.7
beta-BHC	17	UJ	17	1.7	U	1.7
delta-BHC	17	UJ	17	1.7	U	1.7
Dichlorodiphenyldichloroethane	34	UJ	34	3.3	U	3.3
Dichlorodiphenyldichloroethylene	34	UJ	34	3.3	U	3.3
Dichlorodiphenyltrichloroethane	34	UJ	34	3.3	U	3.3
Dieldrin	34	UJ	34	3.3	U	3.3
Endosulfan I	17	UJ	17	1.7	U	1.7
Endosulfan II	34	UJ	34	3.3	U	3.3
Endosulfan sulfate	34	UJ	34	3.3	U	3.3
Endrin	34	UJ	34	3.3	U	3.3
Endrin aldehyde	34	UJ	34	3.3	U	3.3
Endrin ketone	34	UJ	34	3.3	U	3.3
gamma-BHC (Lindane)	17	UJ	17	1.7	U	1.7
gamma-Chlordane	17	UJ	17	1.7	U	1.7
Heptachlor	17	UJ	17	1.7	U	1.7
Heptachlor epoxide	17	UJ	17	1.7	U	1.7
Methoxychlor	170	UJ	170	17	U	17
Toxaphene	1700	UJ	1700	170	U	170
Herbicides						
2,4,5-Trichlorophenoxyacetic acid				17	U	17
2,4-Dichlorophenoxyacetic acid				33	U	33
2-(2,4,5-Trichlorophenoxy)propionic acid				17	U	17
2-secButyl-4,6-dinitrophenol (DNBP)				17	U	17
4-(2,4-Dichlorophenoxy)butanoic acid				170	U	170
Dalapon				170	U	170
Dicamba				67	U	67
Dichloroprop				170	U	170
Semivolatile Organic Compounds						
1,2,4-Trichlorobenzene	690	U	690	330	U	330
1,2-Dichlorobenzene	690	U	690	330	U	330
1,3-Dichlorobenzene	690	U	690	330	U	330
1,4-Dichlorobenzene	690	U	690	330	U	330
2,4,5-Trichlorophenol	1700	U	1700	830	U	830
2,4,6-Trichlorophenol	690	U	690	330	U	330
2,4-Dichlorophenol	690	U	690	330	U	330
2,4-Dimethylphenol	690	U	690	330	U	330
2,4-Dinitrophenol	1700	U	1700	830	U	830
2,4-Dinitrotoluene	690	U	690	330	U	330
2,6-Dinitrotoluene	690	U	690	330	U	330
2-Chloronaphthalene	690	U	690	330	U	330
2-Chlorophenol	690	U	690	330	U	330
2-Methylnaphthalene	690	U	690	330	U	330
2-Methylphenol (cresol, o-)	690	U	690	330	U	330
2-Nitroaniline	1700	U	1700	830	U	830
2-Nitrophenol	690	U	690	330	U	330
3,3'-Dichlorobenzidine	690	U	690	330	U	330
3-Nitroaniline	1700	U	1700	830	U	830
4,6-Dinitro-2-methylphenol	1700	U	1700	830	U	830

Table A-5. 100-B-14:2 Area 5 Confirmatory Data Results. (6 Pages)

Constituents	J00Y85 Duplicate of J00Y84 Sample Date 9/18/03			J00YF5 Equipment Blank Sample Date 9/18/03		
	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)						
4-Bromophenylphenyl ether	690	U	690	330	U	330
4-Chloro-3-methylphenol	690	U	690	330	U	330
4-Chloroaniline	690	U	690	330	U	330
4-Chlorophenylphenyl ether	690	U	690	330	U	330
4-Methylphenol (cresol, p-)	690	U	690	330	U	330
4-Nitroaniline	1700	U	1700	830	U	830
4-Nitrophenol	1700	U	1700	830	U	830
Acenaphthene	690	U	690	330	U	330
Acenaphthylene	690	U	690	330	U	330
Anthracene	690	U	690	330	U	330
Benzo(a)anthracene	690	U	690	330	U	330
Benzo(a)pyrene	690	U	690	330	U	330
Benzo(b)fluoranthene	690	U	690	330	U	330
Benzo(g,h,i)perylene	690	U	690	330	U	330
Benzo(k)fluoranthene	690	U	690	330	U	330
bis(2-Chloro-1-methylethyl)ether	690	U	690	330	U	330
bis(2-Chloroethoxy)methane	690	U	690	330	U	330
bis(2-Chloroethyl) ether	690	U	690	330	U	330
bis(2-Ethylhexyl) phthalate	690	U	690	330	U	330
Butylbenzylphthalate	690	U	690	330	U	330
Carbazole	690	U	690	330	U	330
Chrysene	690	U	690	330	U	330
Di-n-butylphthalate	690	U	690	29	J	330
Di-n-octylphthalate	690	U	690	330	U	330
Dibenz[a,h]anthracene	690	U	690	330	U	330
Dibenzofuran	690	U	690	330	U	330
Diethylphthalate	690	U	690	330	U	330
Dimethyl phthalate	690	U	690	330	U	330
Fluoranthene	47	J	690	330	U	330
Fluorene	690	U	690	330	U	330
Hexachlorobenzene	690	U	690	330	U	330
Hexachlorobutadiene	690	U	690	330	U	330
Hexachlorocyclopentadiene	690	U	690	330	U	330
Hexachloroethane	690	U	690	330	U	330
Indeno(1,2,3-cd)pyrene	690	U	690	330	U	330
Isophorone	690	U	690	330	U	330
N-Nitroso-di-n-dipropylamine	690	U	690	330	U	330
N-Nitrosodiphenylamine	690	U	690	330	U	330
Naphthalene	690	U	690	330	U	330
Nitrobenzene	690	U	690	330	U	330
Pentachlorophenol	1700	U	1700	830	U	830
Phenanthrene	690	U	690	330	U	330
Phenol	690	U	690	330	U	330
Pyrene	35	J	690	330	U	330

Table A-6. 100-B-14:2 Area 5 Additional Characterization Data Results.

Sample Location	Sample Number	Sample Date	Arsenic (TCLP)			Barium (TCLP)			Cadmium (TCLP)			Chromium (TCLP)			Lead (TCLP)		
			µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL
A13	J00Y79	09/18/03	47.4	U	47.4	252		2.8	37.4		4.7	34.7		7.9	39.5	U	39.5
A15	J00Y80	09/18/03	47.4	U	47.4	346		2.8	4.7	U	4.7	7.9	U	7.9	39.5	U	39.5

Sample Location	Sample Number	Sample Date	Mercury (TCLP)			Selenium (TCLP)			Silver (TCLP)		
			µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL
A13	J00Y79	09/18/03	0.59		0.1	77.6	U	77.6	4.3	U	4.3
A15	J00Y80	09/18/03	0.1	U	0.1	77.6	U	77.6	4.3	U	4.3

Table A-7. 100-B-14:2 Waste Characterization and In-Process Analytical Results. (6 Pages)

Sample Location	Sample Number	Sample Date	Americium-241			Cesium-137			Cobalt-60			Europium-152			Europium-154		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Suspect BCL	J03JT7	6/30/05	0.22	U	0.22	0.095	U	0.095	0.089	U	0.089	0.22	U	0.22	0.26	U	0.26
Suspect BCL	J03JT8	6/30/05	0.29	U	0.29	0.083	U	0.083	0.082	U	0.082	0.18	U	0.18	0.23	U	0.23
Suspect BCL	J03JT9	6/30/05	0.21	U	0.21	0.059	U	0.059	0.062	U	0.062	0.21	U	0.21	0.19	U	0.19

Sample Location	Sample Number	Sample Date	Europium-155			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
Suspect BCL	J03JT7	6/30/05	0.21	U	0.21	9.46		1.1	0.402		0.16	0.611		0.36	0.52		0.093
Suspect BCL	J03JT8	6/30/05	0.19	U	0.19	11.6		0.49	0.453		0.14	0.53		0.31	0.67		0.13
Suspect BCL	J03JT9	6/30/05	0.18	U	0.18	4.76		0.64	0.208		0.11	0.328		0.19	0.486		0.091

Sample Location	Sample Number	Sample Date	Thorium-232			Uranium-235			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Suspect BCL	J03JT7	6/30/05	0.611		0.36	0.29	U	0.29	13	U	13
Suspect BCL	J03JT8	6/30/05	0.53		0.31	0.26	U	0.26	9.3	U	9.3
Suspect BCL	J03JT9	6/30/05	0.328		0.19	0.28	U	0.28	7.2	U	7.2

Table A-7. 100-B-14:2 Waste Characterization and In-Process Analytical Results. (6 Pages)

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
West of B Reactor	J02MB6	2/23/05	6410		1.40	0.244	U	0.244	6		0.56	46.1	C	0.03	0.709		0.01	9.5		0.28
Northeast of B Reactor	J032X8	4/20/05	4190		1.46	0.76		0.3	2.2		0.58	61.4	C	0.03	0.23		0.01	29.4	C	0.29
West of BG trailers	J032X9	4/20/05	1190		1.10	0.24	U	0.24	5.1		0.44	591	C	0.02	0.01	U	0.01	18.7	C	0.22
West of B Reactor	J03D44	6/24/05	3850		1.12	0.434	U	0.434	3.6		0.45	32.4	C	0.02	0.574		0.01	2.4		0.22
Southern part of 1607-B7 stockpile	J03JT7	6/30/05	6150		1.01	2.3	U	2.3	4		2.41	143	C	0.12	0.68		0.06	4.6	C	1.21
Northern part of 1607-B7 stockpile	J03JT8	6/30/05	5480		1.00	2.3	U	2.3	4.4		2.40	132	C	0.12	0.78		0.06	3.6	C	1.20
Small 1607-B7 stockpile	J03JT9	6/30/05	5250		1.00	2.2	U	2.2	2.9		2.40	91.6	C	0.12	0.73		0.06	2.5	C	1.20

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
West of B Reactor	J02MB6	2/23/05	0.151		0.04	66200	C	41.90	7.7	C	0.04	7.2		0.10	30.2		0.07			
Northeast of B Reactor	J032X8	4/20/05	0.45		0.04	269000		21.83	713	C	0.04	4.1		0.10	99.2		0.07			
West of BG trailers	J032X9	4/20/05	1.7		0.03	339000		33.08	0.79	C	0.03	0.09		0.08	42.6		0.06			
West of B Reactor	J03D44	6/24/05	0.173		0.03	32100	C	2.79	5.1		0.03	6.7		0.08	19.4		0.06	0.223	U	0.223
Southern part of 1607-B7 stockpile	J03JT7	6/30/05	0.17	U	0.17	8060	C	2.51	10.9	C	0.18	6.6		0.42	17.1		0.05			
Northern part of 1607-B7 stockpile	J03JT8	6/30/05	0.22		0.18	8470	C	2.51	7.4	C	0.18	8.5		0.42	15.5		0.05			
Small 1607-B7 stockpile	J03JT9	6/30/05	0.22		0.18	5690	C	2.51	8.2	C	0.18	7.3		0.42	15		0.05			

Sample Location	Sample Number	Sample Date	Iron			Lead			Lithium			Magnesium			Manganese			Mercury		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
West of B Reactor	J02MB6	2/23/05	18100	C	1.40	5.6		0.28	11.2	C	0.01	11600		5.59	266		0.03	0.129		0.02
Northeast of B Reactor	J032X8	4/20/05	14600	C	1.46	17.8		0.29	5.5	C	0.01	3470	C	5.82	226		0.03	7.5		0.1
West of BG trailers	J032X9	4/20/05	184	C	1.10	4.3		0.22	0.5	C	0.01	5710	C	4.41	11.2		0.02	0.38		0.02
West of B Reactor	J03D44	6/24/05	17800		1.12	3.6		0.22	5.1		0.01	4170	C	4.46	241		0.02	0.018	U	0.018
Southern part of 1607-B7 stockpile	J03JT7	6/30/05	17200		6.03	7		1.21	7.5	C	0.06	4280		4.02	310	C	0.12	0.02		0.02
Northern part of 1607-B7 stockpile	J03JT8	6/30/05	19000		6.01	5.9		1.20	5.8	C	0.06	4100		4.01	358	C	0.12	0.16		0.02
Small 1607-B7 stockpile	J03JT9	6/30/05	18200		6.01	7.3		1.20	5.6	C	0.06	3910		4.01	323	C	0.12	0.02		0.02

Table A-7. 100-B-14:2 Waste Characterization and In-Process Analytical Results. (6 Pages)

Sample Location	Sample Number	Sample Date	Molybdenum			Nickel			pH Measurement			Phosphorus			Potassium			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL				mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
West of B Reactor	J02MB6	2/23/05	0.524	C	1.26	13.7		0.28				1390		1.40	1670	C	62.85	0.443	U	0.443
Northeast of B Reactor	J032X8	4/20/05	2		1.31	6.6		0.29	12.2			744		8.73	1110		393.01	0.58	U	0.58
West of BG trailers	J032X9	4/20/05	0.18	U	0.18	1.5		0.22	9.5			528		1.10	65.4		49.61	0.43	U	0.43
West of B Reactor	J03D44	6/24/05	0.424		1.00	8.2		0.22				1160		1.12	718		50.22	0.531	U	0.531
Southern part of 1607-B7 stockpile	J03JT7	6/30/05	0.9	U	0.90	11.9		1.21				798		1.01	1120		45.23	2.8	U	2.8
Northern part of 1607-B7 stockpile	J03JT8	6/30/05	0.91	U	0.91	11.3		1.20				902		1.00	1030		45.09	2.8	U	2.8
Small 1607-B7 stockpile	J03JT9	6/30/05	0.88	U	0.88	14.2		1.20				836		1.00	1070		45.09	2.7	U	2.7

Sample Location	Sample Number	Sample Date	Silicon			Silver			Sodium			Strontium			Thallium			Tin		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
West of B Reactor	J02MB6	2/23/05	291		0.98	0.055	U	0.055	564	C	2.79	226	C	0.01	0.72	U	0.72	1	C	0.84
Northeast of B Reactor	J032X8	4/20/05	922		1.02	0.12		0.05	1160	C	17.47	74.7	C	0.01	0.95	U	0.95	2	C	3.00
West of BG trailers	J032X9	4/20/05	662		0.77	0.05	U	0.05	211	C	2.21	721	C	0.01	0.7	U	0.7	0.93	C	0.66
West of B Reactor	J03D44	6/24/05	333		0.78	0.098	U	0.098	199		2.23	61.7		0.01	0.856	U	0.856	0.661	C	0.67
Southern part of 1607-B7 stockpile	J03JT7	6/30/05	414	C	4.22	0.51	U	0.51	186	C	2.01	51.3	C	0.06	4.5	U	4.5	3.2	UC	3.20
Northern part of 1607-B7 stockpile	J03JT8	6/30/05	317	C	4.21	0.51	U	0.51	181	C	2.00	54.4	C	0.06	4.5	U	4.5	3.2	UC	3.20
Small 1607-B7 stockpile	J03JT9	6/30/05	375	C	4.21	0.5	U	0.5	154	C	2.00	32.8	C	0.06	4.4	U	4.4	3.1	UC	3.10

Sample Location	Sample Number	Sample Date	Titanium			Uranium			Vanadium			Zinc			Zirconium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
West of B Reactor	J02MB6	2/23/05	1400	C	0.03	0.897	U	0.897	43.5		0.07	44.1	C	0.08	9.3		0.84
Northeast of B Reactor	J032X8	4/20/05	900		0.03	1.2	U	1.2	28.2		0.07	75.2	C	0.09	11.3		0.87
West of BG trailers	J032X9	4/20/05	0.02	U	0.02	0.88	U	0.88	3.7		0.06	70.6	C	0.07	0.69	U	0.69
West of B Reactor	J03D44	6/24/05	1550		0.02	2.15	U	2.15	43.7		0.06	36.4		0.07	8.5		0.67
Southern part of 1607-B7 stockpile	J03JT7	6/30/05	1070	C	0.12	11.2	U	11.2	37.2		0.30	42.8	C	0.36	23.3		3.62
Northern part of 1607-B7 stockpile	J03JT8	6/30/05	1490	C	0.12	11.2	U	11.2	44.1		0.30	41.9	C	0.36	29.6		3.61
Small 1607-B7 stockpile	J03JT9	6/30/05	1320	C	0.12	10.9	U	10.9	40.7		0.30	45.1	C	0.36	29		3.61

Table A-7. 100-B-14:2 Waste Characterization and In-Process Analytical Results. (6 Pages)

Constituent	J02MB6 West of B Reactor Sample Date 2/23/05			J032X8 NE of B Reactor Sample Date 4/20/05			J032X9 West of BG trailers Sample Date 4/20/05			J03D44 West of B Reactor Sample Date 6/24/05		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Analytes												
1,2,4-Trichlorobenzene	470	U	470	480	U	480	370	U	370	370	U	370
1,2-Dichlorobenzene	470	U	470	480	U	480	370	U	370	370	U	370
1,3-Dichlorobenzene	470	U	470	480	U	480	370	U	370	370	U	370
1,4-Dichlorobenzene	470	U	470	480	U	480	370	U	370	370	U	370
2,4,5-Trichlorophenol	1200	U	1200	1200	U	1200	920	U	920	930	U	930
2,4,6-Trichlorophenol	470	U	470	480	U	480	370	U	370	370	U	370
2,4-Dichlorophenol	470	U	470	480	U	480	370	U	370	370	U	370
2,4-Dimethylphenol	470	U	470	480	U	480	370	U	370	370	U	370
2,4-Dinitrophenol	1200	U	1200	1200	U	1200	920	U	920	930	U	930
2,4-Dinitrotoluene	470	U	470	480	U	480	370	U	370	370	U	370
2,6-Dinitrotoluene	470	U	470	480	U	480	370	U	370	370	U	370
2-Chloronaphthalene	470	U	470	480	U	480	370	U	370	370	U	370
2-Chlorophenol	470	U	470	480	U	480	370	U	370	370	U	370
2-Methylnaphthalene	470	U	470	480	U	480	370	U	370	370	U	370
2-Methylphenol (cresol, o-)	470	U	470	480	U	480	370	U	370	370	U	370
2-Nitroaniline	1200	U	1200	1200	U	1200	920	U	920	930	U	930
2-Nitrophenol	470	U	470	480	U	480	370	U	370	370	U	370
3+4 Methylphenol (cresol, m+p)	470	U	470	480	U	480	370	U	370	370	U	370
3,3'-Dichlorobenzidine	470	U	470	480	U	480	370	U	370	370	U	370
3-Nitroaniline	1200	U	1200	1200	U	1200	920	U	920	930	U	930
4,6-Dinitro-2-methylphenol	1200	U	1200	1200	U	1200	920	U	920	930	U	930
4-Bromophenylphenyl ether	470	U	470	480	U	480	370	U	370	370	U	370
4-Chloro-3-methylphenol	470	U	470	480	U	480	370	U	370	370	U	370
4-Chloroaniline	470	U	470	480	U	480	370	U	370	370	U	370
4-Chlorophenylphenyl ether	470	U	470	480	U	480	370	U	370	370	U	370
4-Nitroaniline	1200	U	1200	1200	U	1200	920	U	920	930	U	930
4-Nitrophenol	1200	U	1200	1200	U	1200	920	U	920	930	U	930
Acenaphthene	470	U	470	480	U	480	370	U	370	370	U	370
Acenaphthylene	470	U	470	480	U	480	370	U	370	370	U	370
Anthracene	470	U	470	480	U	480	370	U	370	370	U	370
Benzo(a)anthracene	470	U	470	480	U	480	370	U	370	370	U	370
Benzo(a)pyrene	470	U	470	480	U	480	370	U	370	370	U	370
Benzo(b)fluoranthene	470	U	470	480	U	480	370	U	370	370	U	370
Benzo(ghi)perylene	470	U	470	480	U	480	370	U	370	370	U	370
Benzo(k)fluoranthene	470	U	470	480	U	480	370	U	370	370	U	370
Bis(2-chloro-1-methylethyl)ether	470	U	470	480	U	480	370	U	370	370	U	370
Bis(2-Chloroethoxy)methane	470	U	470	480	U	480	370	U	370	370	U	370
Bis(2-chloroethyl) ether	470	U	470	480	U	480	370	U	370	370	U	370
Bis(2-ethylhexyl) phthalate	107	JBD	470	80	JB	480	56	JB	370	309	JBC	370
Butylbenzylphthalate	470	U	470	480	U	480	370	U	370	370	U	370
Carbazole	470	U	470	480	U	480	370	U	370	370	U	370
Chrysene	470	U	470	480	U	480	370	U	370	370	U	370
Di-n-butylphthalate	47	J	470	35	J	480	25	J	370	55	J	370
Di-n-octylphthalate	470	U	470	480	U	480	370	U	370	370	U	370
Dibenz[a,h]anthracene	470	U	470	480	U	480	370	U	370	370	U	370
Dibenzofuran	470	U	470	480	U	480	370	U	370	370	U	370

Table A-7. 100-B-14:2 Waste Characterization and In-Process Analytical Results. (6 Pages)

Constituent	J02MB6 West of B Reactor Sample Date 2/23/05			J032X8 NE of B Reactor Sample Date 4/20/05			J032X9 West of BG trailers Sample Date 4/20/05			J03D44 West of B Reactor Sample Date 6/24/05		
	μg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL
Semivolatile Organic Analytes (cont.)												
Diethylphthalate	470	U	470	480	U	480	370	U	370	19	J	370
Dimethyl phthalate	470	U	470	480	U	480	370	U	370	370	U	370
Fluoranthene	470	U	470	480	U	480	370	U	370	370	U	370
Fluorene	470	U	470	480	U	480	370	U	370	370	U	370
Hexachlorobenzene	470	U	470	480	U	480	370	U	370	370	U	370
Hexachlorobutadiene	470	U	470	480	U	480	370	U	370	370	U	370
Hexachlorocyclopentadiene	470	U	470	480	U	480	370	U	370	370	U	370
Hexachloroethane	470	U	470	480	U	480	370	U	370	370	U	370
Indeno(1,2,3-cd)pyrene	470	U	470	480	U	480	370	U	370	370	U	370
Isophorone	470	U	470	480	U	480	370	U	370	370	U	370
N-Nitroso-di-n-dipropylamine	470	U	470	480	U	480	370	U	370	370	U	370
N-Nitrosodiphenylamine	470	U	470	480	U	480	370	U	370	370	U	370
Naphthalene	470	U	470	480	U	480	370	U	370	370	U	370
Nitrobenzene	470	U	470	480	U	480	370	U	370	370	U	370
Pentachlorophenol	1200	U	1200	1200	U	1200	920	U	920	930	U	930
Phenanthrene	470	U	470	480	U	480	370	U	370	370	U	370
Phenol	470	U	470	480	U	480	370	U	370	29	J	370
Pyrene	470	U	470	480	U	480	370	U	370	370	U	370

Table A-7. 100-B-14:2 Waste Characterization and In-Process Analytical Results. (6 Pages)

Sample Location	Sample Number	Sample Date	Arsenic (TCLP)			Barium (TCLP)			Cadmium (TCLP)			Chromium (TCLP)			Lead (TCLP)		
			µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL
West of B Reactor	J02MB6	2/23/05	32.9		20	100	C	12	2.4	U	2.4	2.4	U	2.4	11.4	U	11.4
NE of B Reactor	J032X8	4/20/05	17.4	U	17.4	1310		12	2.4	U	2.4	2.4	U	2.4	11.4	U	11.4
West of BG trailers	J032X9	4/20/05	17.4	U	17.4	621		12	2.4	U	2.4	12300		12300	11.4	U	11.4
West of B Reactor	J03D44	6/24/05	34.9		20	141	C	12	1.8	UC	1.8	8.5	C	2.4	15	U	15

Sample Location	Sample Number	Sample Date	Mercury (TCLP)			Selenium (TCLP)			Silver (TCLP)		
			µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL
West of B Reactor	J02MB6	2/23/05	0.1	UC	0.1	24	U	24	3	U	3
NE of B Reactor	J032X8	4/20/05	0.1	U	0.1	24	U	24	3	U	3
West of BG trailers	J032X9	4/20/05	0.55		0.1	24	U	24	3	U	3
West of B Reactor	J03D44	6/24/05	0.1	U	0.1	29.4	U	29.4	5.4	U	5.4

Sample Location	Sample Number	Sample Date	1,1-Dichloroethene*			1,2-Dichloroethane*			2-Butanone*			Benzene*			Carbon tetrachloride*		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
West of B Reactor	J02MB6	2/23/05	0.025	UD	0.025	0.025	UD	0.025	0.006	JD	0.025	0.025	UD	0.025	0.025	UD	0.025

Sample Location	Sample Number	Sample Date	Chlorobenzene*			Chloroform*			Tetrachloroethene*			Trichloroethene*			Vinyl chloride*		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
West of B Reactor	J02MB6	2/23/05	0.025	UD	0.025	0.025	UD	0.025	0.025	UD	0.025	0.025	UD	0.025	0.05	UD	0.05

Sample Location	Sample Number	Sample Date	1,4-Dichlorobenzene*			2,4,5-Trichlorophenol*			2,4,6-Trichlorophenol*			2,4-Dinitrotoluene*			2-Methylphenol (cresol, o-)*		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
NE of B Reactor	J032X8	4/20/05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05
West of BG trailers	J032X9	4/20/05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05
West of B Reactor	J03D44	6/24/05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05

Sample Location	Sample Number	Sample Date	3+4 Methylphenol (cresol, m+p)*			Hexachlorobenzene*			Hexachlorobutadiene*			Hexachloroethane*			Nitrobenzene*		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
NE of B Reactor	J032X8	4/20/05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05
West of BG trailers	J032X9	4/20/05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05
West of B Reactor	J03D44	6/24/05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05

Sample Location	Sample Number	Sample Date	Pentachlorophenol*			Pyridine*		
			mg/L	Q	PQL	mg/L	Q	PQL
NE of B Reactor	J032X8	4/20/05	0.12	U	0.12	0.05	U	0.05
West of BG trailers	J032X9	4/20/05	0.12	U	0.12	0.05	U	0.05
West of B Reactor	J03D44	6/24/05	0.12	U	0.12	0.05	U	0.05

*Analysis by TCLP.

Table A-8. 1607-B2 Waste Characterization and In-Process Analytical Results. (6 Pages)

Sample Location	Sample Number	Sample Date	Americium-241			Carbon-14			Cesium-137			Cobalt-60			Europium-152			Europium-154		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Contaminated area	J02HF9	2/9/05	0.22	U	0.22	-0.67	U	3.1	0.097	U	0.097	0.10	U	0.10	0.21	U	0.21	0.26	U	0.26
Drainfield	J02J04	2/17/05	0.38	U	0.38	-0.42	U	3.1	0.07	U	0.07	0.072	U	0.072	0.19	U	0.19	0.24	U	0.24
Drainfield	J02MB8	02/23/05	0.23	U	0.23	-1.97	U	4.3	0.1	U	0.1	0.085	U	0.085	0.23	U	0.23	0.27	U	0.27
Drainfield	J02MF8	02/28/05	0.22	U	0.22	-1.66	U	2.8	0.083	U	0.083	0.091	U	0.091	0.23	U	0.23	0.32	U	0.32
Pipe to drainfield	J02MJ8	3/7/05	0.30	U	0.30	-1.28	U	4.8	0.12	U	0.12	0.14	U	0.14	0.26	U	0.26	0.32	U	0.32
Stockpiles	J03JN6	6/29/05	0.23	U	0.23				0.065	U	0.065	0.068	U	0.068	0.23	U	0.23	0.24	U	0.24

Sample Location	Sample Number	Sample Date	Europium-155			Nickel-63			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
Contaminated area	J02HF9	2/9/05	0.20	U	0.20	2.24	U	3.3	12.5		0.63	0.406		0.18	0.647		0.39	0.597		0.08
Drainfield	J02J04	2/17/05	0.2	U	0.2	-0.67	U	3.3	11.1		0.69	0.538		0.15	0.77		0.27	0.756		0.079
Drainfield	J02MB8	02/23/05	0.21	U	0.21	-0.79	U	4.1	10.8		0.72	0.514		0.16	0.615		0.4	0.692		0.14
Drainfield	J02MF8	02/28/05	0.2	U	0.2	-0.665	U	3.3	10.7		1	0.451		0.17	0.825		0.35	0.616		0.14
Pipe to drainfield	J02MJ8	3/7/05	0.27	U	0.27	-0.553	U	3.3	13.2		0.20	0.674		0.16	0.767		0.30	0.716		0.11
Stockpiles	J03JN6	6/29/05	0.21	U	0.21				6.26		0.51	0.169		0.14	0.42	U	0.42	0.446		0.1

Sample Location	Sample Number	Sample Date	Thorium-232			Total beta Radiostrontium			Tritium			Uranium-235			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Contaminated area	J02HF9	2/9/05	0.647		0.39	0.014	U	0.27	0.082	U	0.40	0.30	U	0.30	12	U	12
Drainfield	J02J04	2/17/05	0.77		0.27	-0.02	U	0.22	2.16	U	3.6	0.27	U	0.27	8.8	U	8.8
Drainfield	J02MB8	02/23/05	0.615		0.4	-0.064	U	0.26	-0.457	U	5.3	0.31	U	0.31	11	U	11
Drainfield	J02MF8	02/28/05	0.825		0.35	0.002	U	0.22	2.01	U	3	0.29	U	0.29	10	U	10
Pipe to drainfield	J02MJ8	3/7/05	0.767		0.30	-0.077	U	0.28	-0.676	U	4.1	0.41	U	0.41	14	U	14
Stockpiles	J03JN6	6/29/05	0.42	U	0.42							0.3	U	0.3	7.6	U	7.6

Table A-8. 1607-B2 Waste Characterization and In-Process Analytical Results. (6 Pages)

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
Contaminated area	J02HF8	2/9/05	7430		1.0	0.40		0.25	2.7		0.3	73.5	C	0.02	0.96		0.01	2.1		0.2
Equip. Blank	J02J01	2/17/05	38.4		1.0	0.17	U	0.17				0.8	C	0.0	0.01		0.0	0.13	U	0.1
Drainfield	J02J02	2/17/05	9800		1.2	0.24		2.5				106	C	0.0	0.84		0.0	4.5		0.2
Dup. of J02J02	J02J03	2/17/05	8980		1.2	0.24	U	0.24				110	C	0.0	0.86		0.0	2.6		0.2
Drainfield	J02J05	2/17/05				0.81	B	0.1	3.8		1	107	C	0.0	0.39	B	0.0	11.4	BC	1.0
Drainfield	J02MB7	02/23/05	10500		0.99	0.229	U	0.23	5.5		0.31	131	C	0.02	1.1		0.01	4.1		0.18
Drainfield	J02MF7	02/28/05	9930		0.8	0.57		0.19	5.2		0.25	112		0.02	1.2		0.009	2.4	C	0.15
Pipe to drainfield	J02MJ7	3/7/05	9180		6.0	1.2	U	1.5	2.4		1.8	97.6	C	0.12	0.76		0.06	3.1		1.2
Rust-stained soil	J03JN0	6/28/05	4940		2.3	2.3	U	2.3	2.6		2.6	110	C	0.11	0.16		0.06	1.3	UC	1.3
Stockpile	J03JN6	6/29/05	6590		1.0	2.1	U	2.1	2.4	U	2.4	82.1	C	0.1	0.14		0.1	1.2	UC	1.2

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
Contaminated area	J02HF8	2/9/05	0.26		0.04	4530	C	1.0	11.2	C	0.05	6.9		0.08	15.8	C	0.05	0.23	U	0.23
Equip. Blank	J02J01	2/17/05	0.03	U	0.0	17.1	C	2.5	0.03	U	0.0	0.06	U	0.1	0.04	U	0.0	0.2	U	0.2
Drainfield	J02J02	2/17/05	0.07		0.0	4960	C	2.9	15.5		0.0	9.1		0.1	20.8		0.1	0.23	U	0.23
Dup. of J02J02	J02J03	2/17/05	0.04	U	0.0	5400	C	2.9	14.4		0.0	9		0.1	19.1		0.1	0.32		0.25
Drainfield	J02J05	2/17/05	0.025	U	0.0	5450	C	2.8	13		0.0	12.2		0.1	18.8		0.1	0.35	U	0.35
Drainfield	J02MB7	02/23/05	0.045		0.04	5910	C	0.83	15.3	C	0.04	9.6		0.07	24.5		0.05	0.782		0.22
Drainfield	J02MF7	02/28/05	0.11		0.03	4690	C	0.67	15.2	C	0.03	8.8		0.06	22.7	C	0.04	0.43		0.22
Pipe to drainfield	J02MJ7	3/7/05	0.22	U	0.24	5810	C	6.0	17.7	C	0.30	8.8		0.32	19.8	C	0.30	0.22	U	0.22
Rust-stained soil	J03JN0	6/28/05	1.7		0.17	4270		1.8	14.5	C	0.40	10.0		0.52	22.6		0.28			
Stockpile	J03JN6	6/29/05	1.4		0.2	5250		2.5	9.9	C	0.2	8.5		0.4	16.3		0.1			

Table A-8. 1607-B2 Waste Characterization and In-Process Analytical Results. (6 Pages)

Sample Location	Sample Number	Sample Date	Iron			Lead			Lithium			Magnesium			Manganese			Mercury		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Contaminated area	J02HF8	2/9/05	21100	C	1.0	4.6		0.2	7.6	C	0.01	4210	C	0.6	290		0.02	0.06		0.02
Equip. Blank	J02J01	2/17/05	80.4		1.0				0.04	C	0.0	6.2	C	4.0	1.8		0.0	0.01	U	0.01
Drainfield	J02J02	2/17/05	25800		1.2				10.2	C	0.0	5340	C	4.6	421		0.0	0.02	U	0.02
Dup. of J02J02	J02J03	2/17/05	24800		1.2				9.5	C	0.0	5190	C	4.6	402		0.0	0.02	U	0.02
Drainfield	J02J05	2/17/05	23500	C	1.1	5		0.2	9.6	C	0.0	4470	C	4.5	320		0.0	0.091	C	0.091
Drainfield	J02MB7	02/23/05	28700	C	0.89	7.4		0.20	12.4	C	0.01	6000		0.60	432		0.02	0.071		0.02
Drainfield	J02MF7	02/28/05	24500	C	0.72	6.9		0.16	12		0.009	5430		0.49	368	C	0.02	0.04		0.02
Pipe to drainfield	J02MJ7	3/7/05	23100	C	6.0	7.2		1.2	10.6	C	0.06	5470	C	3.2	422		0.12	0.02	U	0.02
Rust-stained soil	J03JN0	6/28/05	23200		16.8	7.7		1.4	5.2	C	0.11	3810		4.1	258		0.11	0.43		0.02
Stockpile	J03JN6	6/29/05	21200		6.0	5		1.2	6	C	0.1	4350		4.0	350		0.1	0.01	U	0.01

Sample Location	Sample Number	Sample Date	Molybdenum			Nickel			Phosphorus			Potassium			Selenium			Silicon		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Contaminated area	J02HF8	2/9/05	0.47	C	0.2	10.8		0.12	869		1.5	1550		1.0	0.48		0.5	300	C	0.6
Equip. Blank	J02J01	2/17/05	0.13	U	0.1	0.08	U	0.1	3.6		1.0	60.9		45.0				31.5		0.7
Drainfield	J02J02	2/17/05	0.56		1.0	15		0.2	958.0		1.2	2070		52.3				278		0.8
Dup. of J02J02	J02J03	2/17/05	0.53		1.0	14.6		0.2	875.0		1.2	1940		51.8				226		0.8
Drainfield	J02J05	2/17/05	0.8	U	0.8	11.9		0.2	1150.0	C	1.1	1850		50.6	0.34	U	0.34	1340	C	0.8
Drainfield	J02MB7	02/23/05	0.807	C	0.18	15.7		0.11	1050		1.07	1900	C	0.89	0.417	U	0.42	273		0.60
Drainfield	J02MF7	02/28/05	0.72		0.15	15.5		0.09	967		0.87	1760	C	0.72	0.34	U	0.34	121		0.49
Pipe to drainfield	J02MJ7	3/7/05	1.0		1.2	18.3		0.72	834		9.0	1240	C	6.0	2.2	U	3.0	272	C	3.6
Rust-stained soil	J03JN0	6/28/05	0.92	U	0.92	10.1		1.3	1520		1.1	790		52.2	2.8	U	2.8	335		3.9
Stockpile	J03JN6	6/29/05	0.85	U	0.9	12.3		1.2	897.0		1.0	1260		45.3	2.6	U	2.6	298		4.2

Table A-8. 1607-B2 Waste Characterization and In-Process Analytical Results. (6 Pages)

Sample Location	Sample Number	Sample Date	Silver			Sodium			Strontium			Thallium			Tin			Titanium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Contaminated area	J02HF8	2/9/05	0.05	U	0.05	193		0.17	28	C	0.01	0.71	U	0.71	1.2	C	0.5	1280		0.02
Equip. Blank	J02J01	2/17/05	0.04	U	0.04	5.5	C	2.0	0.17	C	0.0	0.52	U	0.52	0.37	UC	0.4	1.7		0.0
Drainfield	J02J02	2/17/05	0.05	U	0.05	229	C	2.3	36.1	C	0.0	0.69	U	0.69	0.92	C	0.7	1510		0.0
Dup. of J02J02	J02J03	2/17/05	0.05	U	0.05	210	C	2.3	32.7	C	0.0	0.71	U	0.71	0.74	C	0.7	1680		0.0
Drainfield	J02J05	2/17/05	0.65	U	0.65	305	BC	2.2	35.8	C	0.0	1.1		0.5	6.2	U	6.2	1970	C	0.0
Drainfield	J02MB7	02/23/05	0.052	U	0.06	282	C	0.16	40.6	C	0.01	0.678	U	0.68	1.2	C	0.49	2220	C	0.02
Drainfield	J02MF7	02/28/05	0.04	U	0.05	257		0.13	30.6		0.009	0.55	U	0.55	1.4	C	0.4	1900		0.02
Pipe to drainfield	J02MJ7	3/7/05	0.27	U	0.27	213	C	1	32	C	0.06	3.5	U	3.5	2.6	UC	2.6	1400	C	0.12
Rust-stained soil	J03JN0	6/28/05	0.52	U	0.52	151		2.2	19.9	C	0.06	4.5	U	4.5	8.9	C	3.2	1510	C	0.17
Stockpile	J03JN6	6/29/05	0.48	U	0.48	198		2.0	37.3	C	0.1	4.2	U	4.2	3	UC	3.0	1560	C	0.1

Sample Location	Sample Number	Sample Date	Uranium			Vanadium			Zinc			Zirconium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Contaminated area	J02HF8	2/9/05	1.9		1.00	46.5		0.06	45.1		0.05	17.7		0.07
Equip. Blank	J02J01	2/17/05	0.64	U	0.64	0.05	U	0.1	0.37		0.1	0.54		0.6
Drainfield	J02J02	2/17/05	0.86	U	0.86	59.1		0.1	52.8		0.1	26.3		0.7
Dup. of J02J02	J02J03	2/17/05	0.89	U	0.89	57.7		0.1	49.9		0.1	26.1		0.7
Drainfield	J02J05	2/17/05	15.7	U	15.7	70		0.1	53.3		0.1	177		0.7
Drainfield	J02MB7	02/23/05	1.1		0.85	69.4		0.06	68.4	C	0.05	29.7		0.07
Drainfield	J02MF7	02/28/05	0.69	U	0.69	60.2		0.05	68.8		0.04	23.9		0.06
Pipe to drainfield	J02MJ7	3/7/05	4.4	U	4.4	53.3		0.36	54.7	C	0.30	15.2		0.42
Rust-stained soil	J03JN0	6/28/05	11.4	U	11.4	46.5		0.34	121		0.29	2.1	UC	2.1
Stockpile	J03JN6	6/29/05	10.5	U	10.5	52.9		0.3	47.7		0.4	5	C	3.6

Table A-8. 1607-B2 Waste Characterization and In-Process Analytical Results. (6 Pages)

Sample Location	Sample Number	Sample Date	Arsenic (TCLP)			Barium (TCLP)			Cadmium (TCLP)			Chromium (TCLP)			Lead (TCLP)			Mercury (TCLP)		
			µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL	µg/L	Q	PQL
Contaminated area	J02HF8	2/9/05	18.8		17.4	230	C	1.2	2.4	U	2.4	6.7		2.4	12.5		11.4	0.10	U	0.10
Equip. Blank	J02J01	2/17/05	17.4	U	17.4	44.3	C	12	2.4	U	2.4	2.4	U	2.4	11.4	U	11.4	0.1	U	0.1
Drainfield	J02J02	2/17/05	17.4	U	17.4	363	C	12	2.4	U	2.4	2.4	U	2.4	11.4	U	11.4	0.1	U	0.1
Dup. of J02J02	J02J03	2/17/05	17.4	U	17.4	411	C	12	2.4	U	2.4	2.4	U	2.4	11.4	U	11.4	0.1	U	0.1
Drainfield	J02J05	2/17/05	180	U	180	400	BC	5	5	U	5	18	U	18	200	U	200	0.046	U	0.046
Drainfield	J02MB7	02/23/05	17.4	U	17.4	390	C	1.2	3.1		2.4	19.4		2.4	11.4	U	11.4	0.1	UC	0.1
Drainfield	J02MF7	02/28/05	17.4	U	17.4	418	C	1.2	2.4	U	2.4	2.4	U	2.4	11.4	U	11.4	0.1	U	0.1
Pipe to drainfield	J02MJ7	3/7/05	17.4	U	17.4	389	C	1.2	2.4	U	2.4	5.6	C	2.4	11.4	U	11.4	0.10	U	0.10

Sample Location	Sample Number	Sample Date	Selenium (TCLP)			Silver (TCLP)		
			µg/L	Q	PQL	µg/L	Q	PQL
Contaminated area	J02HF8	2/9/05	24.0	U	24.0	3.0	U	3.0
Equip. Blank	J02J01	2/17/05	24	U	24	3	U	3
Drainfield	J02J02	2/17/05	24	U	24	3	U	3
Dup. of J02J02	J02J03	2/17/05	24	U	24	3	U	3
Drainfield	J02J05	2/17/05	240	U	240	4.5	U	4.5
Drainfield	J02MB7	02/23/05	24	U	24	3	U	3
Drainfield	J02MF7	02/28/05	24	U	24	3	UC	3
Pipe to drainfield	J02MJ7	3/7/05	24.0	U	24.0	3.0	U	3.0

Table A-8. 1607-B2 Waste Characterization and In-Process Analytical Results. (6 Pages)

Sample Location	Sample Number	Sample Date	1,4-Dichlorobenzene (TCLP)			2,4,5-Trichlorophenol (TCLP)			2,4,6-Trichlorophenol (TCLP)			2,4-Dinitrotoluene (TCLP)			2-Methylphenol (cresol, o-) (TCLP)			3+4 Methylphenol (cresol, m+p) (TCLP)		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
Contaminated area	J02HF8	2/9/05	0.050	U	0.050	0.12	U	0.12	0.050	U	0.050	0.050	U	0.050	0.050	U	0.050	0.050	U	0.050
Equip. Blank	J02J01	2/17/05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05
Drainfield	J02J02	2/17/05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05
Dup. of J02J02	J02J03	2/17/05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05
Drainfield	J02J05	2/17/05	0.0046	U	0.0046	0.012	U	0.012	0.012	U	0.012	0.02	U	0.02	0.0046	U	0.0046	0.0086	U	0.0086
Drainfield	J02MB7	02/23/05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05
Drainfield	J02MF7	02/28/05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05
Pipe to drainfield	J02MJ7	3/7/05	0.050	U	0.050	0.12	U	0.12	0.050	U	0.050	0.050	U	0.050	0.050	U	0.050	0.050	U	0.050

Sample Location	Sample Number	Sample Date	Hexachlorobenzene (TCLP)			Hexachlorobutadiene (TCLP)			Hexachloroethane (TCLP)			Nitrobenzene (TCLP)			Pentachlorophenol (TCLP)			Pyridine (TCLP)		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
Contaminated area	J02HF8	2/9/05	0.050	U	0.050	0.050	U	0.050	0.050	U	0.050	0.050	U	0.050	0.12	U	0.12	0.050	U	0.050
Equip. Blank	J02J01	2/17/05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05
Drainfield	J02J02	2/17/05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05
Dup. of J02J02	J02J03	2/17/05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05
Drainfield	J02J05	2/17/05	0.0058	U	0.0058	0.0046	U	0.0046	0.004	U	0.004	0.0043	U	0.0043	0.019	U	0.019	0.0085	U	0.0085
Drainfield	J02MB7	02/23/05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05
Drainfield	J02MF7	02/28/05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.12	U	0.12	0.05	U	0.05
Pipe to drainfield	J02MJ7	3/7/05	0.050	U	0.050	0.050	U	0.050	0.050	U	0.050	0.050	U	0.050	0.12	U	0.12	0.050	U	0.050

APPENDIX B

CALCULATION BRIEFS

DISCLAIMER FOR CALCULATIONS

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

A list of calculations provided in this appendix is as follows:

Human Health Risk Assessment for PCB's at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site, Calculation No. 0100B-CA-V0266, Rev. 1, Washington Closure Hanford, Richland, Washington.

Human Health Risk Assessment for Dieldrin at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site, Calculation No. 0100B-CA-V0268, Rev. 1, Washington Closure Hanford, Richland, Washington.

100-B-14:2 (Area 3) Hazard Quotient and Carcinogenic Risk Calculations, Calculation No. 0100B-CA-V0269, Rev. 1, Washington Closure Hanford, Richland, Washington.

100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations, Calculation No. 0100B-CA-V0281, Rev. 0, Washington Closure Hanford, Richland, Washington.

100-B-14:2 (Areas 2 & 5) Waste Site Hazard Quotient and Carcinogenic Risk Calculations, Calculation No. 0100B-CA-V0282, Rev. 1, Washington Closure Hanford, Richland, Washington.

100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations, Calculation No. 0100B-CA-V0290, Rev. 0, Washington Closure Hanford, Richland, Washington.

100-B-14:2 (Area 4) Waste Site Hazard Quotient and Carcinogenic Risk Calculations, Calculation No. 0100B-CA-V0291, Rev. 1, Washington Closure Hanford, Richland, Washington.

1607-B2:1 Drain Field Cleanup Verification 95% UCL Calculations, Calculation No. 0100B-CA-V0264, Rev. 0, Washington Closure Hanford, Richland, Washington.

1607-B2:1 Drain Field Hazard Quotient and Carcinogenic Risk Calculations, Calculation No. 0100B-CA-V0265, Rev. 1, Washington Closure Hanford, Richland, Washington.

1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations, Calculation No. 0100B-CA-V0292, Rev. 0, Washington Closure Hanford, Richland, Washington.

1607-B2:2 Drain Field Hazard Quotient and Carcinogenic Risk Calculations, Calculation No. 0100B-CA-V0293, Rev. 0, Washington Closure Hanford, Richland, Washington.

CALCULATION COVER SHEET

Project Title 100-B/C Field Remediation **Job No.** 14655
Area 100-B/C Area
Discipline Environmental ***Calc. No.** 0100B-CA-V0266
Subject Human Health Risk Assessment for PCB's at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site
Computer Program Excel **Program No.** Excel 2003

The attached calculations have been generated to document compliance with established cleanup levels. These documents 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 – 6 pg Total – 7 pages	S. W. Clark *Approved* *10/13/05*	B. L. Vedder *Approved* *10/13/05*	W. S. Thompson *Approved* *10/13/05*	D. N. Strom *Approved* *10/13/05*	*10/13/05*
1	Cover – 1 pg Summary – ~~6~~ 8 pg Total – ~~7~~ 9 pages KAA 8/9/12/8/05	J. M. Capron [signature] 12/5/05	B. L. Vedder B L Vedder 12/8/05	W. S. Thompson W. S. Thompson 12/8/05	D. N. Strom [signature]	12-08-05

SUMMARY OF REVISION	
1	Replaced cover page for convenience. Page 1 replaced in entirety, revision to Table 1 (to differentiate between adult and child inputs), created Page 1a. Page 2 replaced in entirety, revision to Methodology Item 2 (to use HSRAM Equation D-24 and removed listing of input values in variable explanations). Revised Page 3, Lines 6-8, 15 (to include mass conversion factor in numerator), and 18. Replaced Page 4 in entirety, revision to Table 3 (to reflect use of HSRAM Equation D-24), created Page 5a. Page 5 replaced in entirety, revision to Table 4 (to correct interpolation of coefficient *a* and update subsequent dependent equations). Revised Page 6 to update conclusions to reflect corrected calculations.

*Obtain Calc. No. from DIS

DE01-437.03 (12/09/2004)

River Corridor Closure Project

CALCULATION SHEET

Originator:	J. M. Capron	Date:	12/5/05	Calc. No.:	0100B-CA-V0266	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	B. L. Vedder	Date:	12/8/05
Subject:	Human Health Risk Assessment for PCB's at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site					Sheet No. 1 of 6	

PURPOSE:

Calculate the incremental cancer risk from residual concentrations of polychlorinated biphenyls (PCBs) at the 100-B-14:2, Area 3, pipeline waste sub-site.

GIVEN/REFERENCES:

1) Maximum residual concentration of PCBs from Hanford Environmental Information System (HEIS) number J037M8.
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) Equations for calculating contaminant intake from Appendix D of *Hanford Site Risk Assessment Methodology* (HSRAM), DOE/RL-91-45, Rev. 3, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) Use of area factors and occupancy factors to account for small waste site size and actual period of occupancy in the rural-residential scenario is discussed in the *User's Manual for RESRAD Version 6*, ANL/EAD-4, Environmental Assessment Division, Argonne National Laboratory, Argonne, Illinois.

SOLUTION:

1) Table 1 shows the risk assessment input parameters used for this calculation.

Table 1. Risk Assessment Input Parameters.

Parameter	Units	Value	Citation
Area of contaminated zone	m^2	57.1	Site-specific
Exposure duration, adult	years	24	HSRAM
Exposure duration, child	years	6	HSRAM
Fraction of time spent indoors	unitless	0.6	100 Area RDR/RAWP
Fraction of time spent outdoors (on site)	unitless	0.2	100 Area RDR/RAWP
Soil ingestion rate, adult	g/yr	36.5	HSRAM
Soil ingestion rate, child	g/yr	73	HSRAM
Inhalation rate	m^3/yr	7,300	100 Area RDR/RAWP
Mass dust loading for inhalation	g/m^3	0.0001	100 Area RDR/RAWP
Wind speed	m/s	3.4	100 Area RDR/RAWP
Body weight, adult	kg	70	HSRAM
Body weight, child	kg	16	HSRAM
Average lifetime	yr	70	HSRAM

River Corridor Closure Project

CALCULATION SHEET

Originator:	J. M. Capron	Date:	12/5/05	Calc. No.:	0100B-CA-V0266	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	B. L. Vedder	Date:	12/8/05
Subject:	Human Health Risk Assessment for PCB's at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site					Sheet No. 1a of 6	

2) Table 2 shows the contaminant-specific risk assessment input parameters for the inhalation and soil ingestion pathways. PCBs have high distribution coefficients (>30 mL/g) and will not move through the vadose zone in water-dependent pathways within 1,000 years. Only the inhalation and soil ingestion pathways will be affected by the PCBs. There are no

noncarcinogenic reference doses for soil ingestion or inhalation (RfDo or RfDi) for PCBs so there is no hazard quotient calculation.

Table 2. Contaminant-Specific Risk Assessment Input Parameters

Contaminant	Pathway: Inhalation (Fugitive Dust)		Pathway: Soil Ingestion	
	RfDi [a] (mg/kg-d)	CSFi [b] (kg-d/mg)	RfDo [a] (mg/kg-d)	CSFo [b] (kg-d/mg)
PCBs	N/A	2.00E+00	N/A	2.00E+00

[a] RfDi or RfDo = Noncarcinogenic Reference Dose for dust inhalation or soil ingestion. Refers to chemical-specific toxicity values used to evaluate noncarcinogenic effects resulting from exposures to chemicals. Obtained from the EPA IRIS (Integrated Risk Information System) database or the Oak Ridge National Laboratory Risk Assessment Information System database.

[b] CSFi or CSFo = Cancer Slope Factor for dust inhalation or soil ingestion. Refers to chemical-specific Cancer Slope Factors used to calculate carcinogenic risk Obtained from the EPA IRIS (Integrated Risk Information System) database or the Oak Ridge National Laboratory Risk Assessment Information System database.

N/A = Not Available

METHODOLOGY:

1) Incremental Cancer Risk:

The incremental cancer risk is calculated from the following general formula:

$$ICR = (\text{Daily Intake})\ CSF$$

Where CSF = the cancer slope factor with units of kg - day/mg. As applicable, the EPA provides separate values of the cancer slope factor for the inhalation and oral ingestion pathways (CSFi and CSFo, respectively).

2) Daily Intake for the Soil Ingestion Pathway:

Daily Intake for the soil ingestion pathway is calculated from the following formula from HSRAM Equation D-24, including the area factor and occupancy factor from the *User's Manual for RESRAD Version 6*:

$$DIS = \frac{C \times \left[\left(\frac{SI \times ED}{BW} \right)_{child} + \left(\frac{SI \times ED}{BW} \right)_{adult} \right] \times AFS \times OFS \times 0.001(kg/g)}{AL \times 365(d/yr)}$$

Where: C is contaminant concentration, (site-specific statistical value, mg/kg).

SI is Soil Ingestion Rate, (g/yr)

AFS is an area factor for soil ingestion: AFS = A/1000 for A < 1000 m^2

AFS = 1 for A > 1000 m^2

A is the area of the contaminated zone, m^2

River Corridor Closure Project CALCULATION SHEET

Originator:	J. M. Capron *JMC*	Date:	*12/6/05*	Calc. No.:	0100B-CA-V0266	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	B. L. Vedder *BLVedder*	Date:	*12/8/05*
Subject:	Human Health Risk Assessment for PCB's at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site					Sheet No. 3 of 6	

OFS is the occupancy factor for soils: OFS = (IT) + (OT)

IT is the Indoor Time Factor (0.6)
OT is the Outdoor Time Factor (0.2)
OFS = 0.6 + 0.2 = 0.8

ED is exposure duration (~~30~~ yr)
BW is body weight (~~70~~ kg)
AL is average lifetime (~~70~~ yr)

3) Daily Intake for the Inhalation Pathway:

Daily Intake for the inhalation pathway is calculated using the following formula from HSRAM Equation D-30, including the area factor and occupancy factor from the *User's Manual for RESRAD Version 6*:

$$DII = \frac{C \times IR \times ML \times ED \times AFI \times OFI \times 0.001(kg/g)}{BW \times AL \times 365(d/yr)}$$

Where: C is contaminant concentration, (site-specific statistical value, mg/kg)
IR is Inhalation Rate, (7,300 m^3/yr)
ML is Mass Loading, (0.0001 g/m^3)
ED is exposure duration (30 yr)
AFI is the site specific area factor for dust inhalation calculated from formula B.4 of the *User's Manual for RESRAD Version 6*:

$$AFI = \frac{a}{1 + b\left(\sqrt{A}\right)^c}$$

In this equation, A is the area of the contaminated zone, m^2, and a, b, and c are least squares regression coefficients dependent upon the average wind speed as described in Table B.2 of the *User's Manual for RESRAD Version 6*. Calculation results are shown in the RESULTS section of this Calculation Summary.

OFI is the occupancy factor for inhalation: OFI = (IT x IDF) + (OT)

IT is the Indoor Time Factor (0.6)
IDF = Indoor dust filtration factor (0.4)
OT is the Outdoor Time Factor (0.2)
OFI = (0.6 x 0.4) + 0.2 = 0.44

BW is body weight (70 kg)
AL is average lifetime (70 yr)

River Corridor Closure Project

CALCULATION SHEET

Originator:	J. M. Capron	Date:	12/5/05	Calc. No.:	0100B-CA-V0266	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	B. L. Vedder	Date:	12/8/05
Subject:	Human Health Risk Assessment for PCB's at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site					Sheet No. 4 of 6	

RESULTS:

Calculations were performed using an Excel spreadsheet, incorporating the formulas shown in the METHODOLOGY section of this Calculation Summary.

1) Incremental Cancer Risk from the Soil Ingestion Pathway:
The following Excel spreadsheet incorporates the formulas for calculation of incremental cancer risk from PCBs in the soil ingestion pathway:

Table 3. Excel Calculation of Incremental Cancer Risk in the Soil Ingestion Pathway

	A	B	C	D	E	F	G	H
1	Area factor for soil ingestion pathway is calculated per the *User's Manual for RESRAD Version 6.0*, Formula F.3:							
2	Area, m^2	AFS = Area/1000 for Area < 1000 m^2						
3	57.1	0.0571						
4								
5	Soil Ingestion Intake = (C*((SIc*EDc/BWc)+(SIa*EDa/BWa))*AFS*OFS*UCF1)/(AL*UCF2)							
6	Variable	Value	Description					
7	C	1.1	mg/kg, Maximum concentration of PCBs in pipeline sediment					
8	SIc	73	g/yr, Childhood soil ingestion rate					
9	SIa	36.5	g/yr, Adult soil ingestion rate					
10	EDc	6	years, Childhood exposure duration					
11	EDa	24	years, Adult exposure duration					
12	BWc	16	kg, Child body weight					
13	BWa	70	kg, Adult body weight					
14	AFS	0.0571	unitless area factor					
15	OFS	0.8	unitless occupancy factor					
16	UCF1	0.001	kg/g, Units conversion factor					
17	AL	70	years, Average lifetime					
18	UCF2	365	days/year, Units conversion factor					
19	CFSo	2	kg - d / mg, Cancer slope factor for PCBs					
20								
21	Calculated Ingestion Daily Intake = E24 = (B7*((B8*B10/B12)+(B9*B11/B13))*B14*B15*B16)/(B17*B18)							
22	Soil Ingestion Incremental Cancer Risk = E25 = (E24*B19)							
23								
24				Calculated Ingestion Daily Intake =	7.84E-08	mg / kg - day		
25				Soil Ingestion Incremental Cancer Risk =	1.57E-07			

River Corridor Closure Project

CALCULATION SHEET

Originator:	J. M. Capron *JMC*	Date:	*12/5/05*	Calc. No.:	0100B-CA-V0266	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	B. L. Vedder *BLVedder*	Date:	*12/8/05*
Subject:	Human Health Risk Assessment for PCB's at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site					Sheet No. 4a of 6	

2) Incremental Cancer Risk from the Inhalation Pathway:

The following Excel spreadsheet incorporates the formulas for calculation of incremental cancer risk from PCB's in the inhalation pathway:

River Corridor Closure Project

CALCULATION SHEET

Originator:	J. M. Capron JMC	Date:	12/5/05	Calc. No.:	0100B-CA-V0266	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	B. L. Vedder BLVedder	Date:	12/8/05
Subject:	Human Health Risk Assessment for PCB's at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site					Sheet No. 5 of 6	

Table 4. Excel Calculation of Incremental Cancer Risk in the Inhalation Pathway

	A	B	C	D	E	F	G	H
1	Area factor for inhalation pathway is calculated per the *User's Manual for RESRAD Version 6.0*, Formula B.4, calculating least squares regression coefficients for a wind speed of 3.4 m/s per the *User's Manual for RESRAD Version 6.0*, Formula B.2:							
2	Coefficient a for 3.4 m/s Wind Speed = B7 = (B6-((A7-A6)/(A8-A6))*(B6-B8))							
3	Coefficient b for 3.4 m/s Wind Speed = C7 = (C6-((A7-A6)/(A8-A6))*(C6-C8))							
4	Coefficient c for 3.4 m/s Wind Speed = D7 = (D6-((A7-A6)/(A8-A6))*(D6-D8))							
5	Wind Speed, m/s	a	b	c				
6	2	1.6819	25.5076	-0.2278				
7	3.4	1.2627	28.3173	-0.2315				
8	5	0.7837	31.5283	-0.2358				
	Area Factor for Inhalation Pathway = AFI = (B7/(1 +C7(((SQRT(A10))^D7)))							
9	Area, m^2	AFI						
10	57.1	0.0674						
11								
12	Inhalation Intake = (C*IR*ML*ED*AFI*OFI*UCF1)/(BW*AL*UCF2)							
13	Variable	Value	Description					
14	C	1.1	mg/kg, Maximum concentration of PCBs in pipeline sediment					
15	IR	7,300	m^3/yr, Inhalation rate					
16	ML	0.0001	gm/m^3, Mass dust loading for inhalation					
17	ED	30	years, Exposure Duration					
18	AFI	0.0674	unitless area factor					
19	OFI	0.44	unitless occupancy factor					
20	UCF1	0.001	kg/gm, Units conversion factor					
21	BW	70	kg, Body weight					
22	AL	70	years, Average lifetime					
23	UCF2	365	days/year, Units conversion factor					
24	CFSi	2	kg - d / mg, Cancer slope factor for PCB's					
25								
26	Inhalation Daily Intake = E-29 = (B14*B15*B16*B17*B18*B19*B20)/(B21*B22*B23)							
27	Inhalation Incremental Cancer Risk = E30 = (E29*B24)							
28								
29	Calculated Inhalation Daily Intake =				3.99E-10	mg / kg - day		
30	Inhalation Incremental Cancer Risk =				7.99E-10			

River Corridor Closure Project CALCULATION SHEET

Originator:	J. M. Capron *JMC*	Date:	*12/5/05*	Calc. No.:	0100B-CA-V0266	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	B. L. Vedder *BLVedder*	Date:	*12/8/05*
Subject:	Human Health Risk Assessment for PCB's at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site					Sheet No. 6 of 6	

CONCLUSIONS:

- The incremental cancer risk due to PCB's in the soil ingestion pathway is ~~1.23E-07~~1.57E-07.
- The incremental cancer risk due to PCB's in the inhalation pathway is ~~7.61E-10~~7.99E-10.
- The total human health excess cancer risk due to PCB's at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site is sum of the incremental cancer risks from the soil ingestion and inhalation pathways: ~~1.24E-07~~ 1.58E-07.

CALCULATION COVER SHEET

Project Title 100-B/C Field Remediation **Job No.** 14655
Area 100-B/C
Discipline Environmental ***Calc. No.** 0100B-CA-V0268
Subject Human Health Risk Assessment of Dieldrin at the 100-B-14:2 (Area 3) Pipeline Waste Sub-Site
Computer Program Excel **Program No.** Excel 2003

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

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

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Summary = 5 Total = 6	J. M. Capron JMCapron 12/5/05	B. L. Vedder B L Vedder 12/5/05	W. S. Thompson WS Thompson 12/8/05	D. N. Strom [signature]	12-8-05

SUMMARY OF REVISION	

*Obtain Calc. No. from DIS

DE01-437.03 (12/09/2004)

River Corridor Closure Project

CALCULATION SHEET

Originator:	J. M. Capron	Date:	12/5/05	Calc. No.:	0100B-CA-V0268	Rev.:	0
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	B. L. Vedder	Date:	12/5/05
Subject:	Human Health Risk Assessment for Dieldrin at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site					Sheet No. 1 of 5	

PURPOSE:

Calculate the excess carcinogenic risk from the residual concentration of dieldrin at the 100-B-14:2 (Area 3) pipeline waste sub-site.

GIVEN/REFERENCES:

1) Analytical results for samples J037M6, J037M7, and J037M8.

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) Equations for calculating contaminant intake from Appendix D of *Hanford Site Risk Assessment Methodology* (HSRAM), DOE/RL-91-45, Rev. 3, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

4) Use of area factors and occupancy factors to account for small waste site size and actual period of occupancy in the rural-residential scenario is discussed in the *User's Manual for RESRAD Version 6*, ANL/EAD-4, Environmental Assessment Division, Argonne National Laboratory, Argonne, Illinois.

SOLUTION:

1) Table 1 shows the risk assessment input parameters used for this calculation.

Table 1. Risk Assessment Input Parameters.

Parameter	Units	Value	Citation
Area of contaminated zone	m^2	57.1	Site-specific
Exposure duration, adult	years	24	HSRAM
Exposure duration, child	years	6	HSRAM
Fraction of time spent indoors	unitless	0.6	RDR/RAWP
Fraction of time spent outdoors (on-site)	unitless	0.2	RDR/RAWP
Soil ingestion rate, adult	g/yr	36.5	HSRAM
Soil ingestion rate, child	g/yr	73	HSRAM
Inhalation rate	m^3/yr	7,300	RDR/RAWP
Dust mass loading for inhalation	g/m^3	0.0001	RDR/RAWP
Wind speed	m/s	3.4	RDR/RAWP
Body weight, adult	kg	70	HSRAM
Body weight, child	kg	16	HSRAM
Average lifetime	yr	70	HSRAM

2) Table 2 shows the contaminant-specific risk assessment input parameters for the inhalation and soil ingestion pathways. Dieldrin has a high distribution coefficient (25.6 mL/g) and

River Corridor Closure Project

CALCULATION SHEET

Originator:	J. M. Capron	Date:	12/5/05	Calc. No.:	0100B-CA-V0268	Rev.:	0
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	B. L. Vedder	Date:	12/5/05
Subject:	Human Health Risk Assessment for Dieldrin at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site					Sheet No. 2 of 5	

will not migrate through the vadose zone at the site in water-dependent pathways within 1,000 years. Only the inhalation and soil ingestion pathways will be affected.

Table 2. Contaminant-Specific Cancer Slope Factor Values.

Contaminant	CSFi[a] (kg-d/mg)	CSFo[a] (kg-d/mg)
Dieldrin	16.1	16

[a] CSFi/CSFo = Cancer slope factor for dust inhalation or soil ingestion. Refers to the chemical-specific cancer slope factors used to calculate carcinogenic risk. Obtained from the U. S. Environmental Protection Agency's Integrated Risk Information System database.

METHODOLOGY:

1) Excess Carcinogenic Risk:
The incremental excess carcinogenic risk is calculated from the following general formula:

ICR = (Daily Intake) x (CSF)

Where, CSF = the cancer slope factor with units of kg - day/mg. As applicable, the U.S. Environmental Protection Agency (EPA) provides separate values of the cancer slope factor for the inhalation and oral ingestion pathways (CSFi and CSFo, respectively).

2) Daily Intake for the Soil Ingestion Pathway:
Daily intake for the soil ingestion pathway is calculated from the following formula from HSRAM Equation D-24, including the area factor and occupancy factor from the *User's Manual for RESRAD Version 6*:

$$DIS = \frac{C \times \left[\left(\frac{SI \times ED}{BW} \right)_{child} + \left(\frac{SI \times ED}{BW} \right)_{adult} \right] \times AFS \times OFS \times 0.001(kg/g)}{AL \times 365(d/yr)}$$

Where, C is contaminant concentration, (site-specific statistical value, mg/kg)
SI is Soil Ingestion Rate, (g/yr)
AFS is an area factor for soil ingestion: AFS = A/1000 for A < 1000 m^2
AFS = 1 for A > 1000 m^2
A is the area of the contaminated zone, m^2
OFS is the occupancy factor for soils: OFS = (IT) + (OT)
IT is the Indoor Time Factor (0.6)
OT is the Outdoor Time Factor (0.2)
OFS = 0.6 + 0.2 = 0.8
ED is exposure duration (yr)
BW is body weight (kg)
AL is average lifetime (yr)

River Corridor Closure Project

CALCULATION SHEET

Originator:	J. M. Capron *JMC*	Date:	12/5/05	Calc. No.:	0100B-CA-V0268	Rev.:	0
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	B. L. Vedder *BLV*	Date:	12/5/05
Subject:	Human Health Risk Assessment for Dieldrin at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site					Sheet No. 3 of 5	

Daily Intake for the Inhalation Pathway:

Daily intake for the inhalation pathway is calculated using the following formula from HSRAM Equation D-30, including the area factor and occupancy factor from the *User's Manual for RESRAD Version 6*:

$$DII = \frac{C \times IR \times ML \times ED \times AFI \times OFI \times 0.001(kg/g)}{BW \times AL \times 365(d/yr)}$$

Where, C is contaminant concentration, (site-specific statistical value, mg/kg)

IR is Inhalation Rate, (m^3/yr)

ML is Mass Loading, (g/m^3)

ED is exposure duration (yr)

AFI is the area factor for dust inhalation calculated from formula B.4 of the *User's Manual for RESRAD Version 6*:

$$AFI = \frac{a}{1 + b\left(\sqrt{A}\right)^c}$$

In this equation, A is the area of the contaminated zone, m^2, and a, b, and c are least squares regression coefficients dependent upon the average wind speed as described in Table B.2 of the *User's Manual for RESRAD Version 6*. Calculation results are shown in the Results section of this Calculation Summary.

OFI is the occupancy factor for inhalation: OFI = (IT x IDF) + (OT)

IT is the Indoor Time Factor (0.6)

IDF = Indoor dust filtration factor (0.4)

OT is the Outdoor Time Factor (0.2)

OFI = (0.6 x 0.4) + 0.2 = 0.44

BW is body weight (kg)

AL is average lifetime (yr)

RESULTS:

Calculations were performed using an Excel spreadsheet, incorporating the formulae shown in the Methodology section of this Calculation Summary.

1) Excess Carcinogenic Risk from the Soil Ingestion Pathway:

Table 3 shows the results from the Excel-based calculation of excess incremental carcinogenic risk from dieldrin in the soil ingestion pathway.

River Corridor Closure Project

CALCULATION SHEET

Originator:	J. M. Capron JMC	Date:	12/5/05	Calc. No.:	0100B-CA-V0268	Rev.:	0
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	B. L. Vedder BLV	Date:	12/5/05
Subject:	Human Health Risk Assessment for Dieldrin at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site					Sheet No. 4 of 5	

Table 3. Excel Calculation of Excess Incremental Carcinogenic Risk from the Soil Ingestion Pathway.

	A	B	C	D	E	F	G	H
1	Area factor for soil ingestion pathway is calculated per the *User's Manual for RESRAD Version 6.0, Formula F.3*							
2	Area, m^2	AFS = Area/1000 for Area < 1000 m^2						
3	57.1	0.0571						
4								
5	Soil Ingestion Intake = (C*((SIc*EDc/BWc)+(SIa*EDa/BWa))*AFS*OFS*CF1)/(AL*CF2)							
6	Variable	Value	Description					
7	C	0.084	mg/kg, Maximum concentration of dieldrin in pipeline sediment					
8	SIc	73	g/yr, Childhood soil ingestion rate					
9	SIa	36.5	g/yr, Adult soil ingestion rate					
10	EDc	6	yr, Childhood exposure duration					
11	EDa	24	yr, Adult exposure duration					
12	BWc	16	kg, Child body weight					
13	BWa	70	kg, Adult body weight					
14	AFS	0.0571	Unitless area factor					
15	OFS	0.8	Unitless occupancy factor					
16	CF1	0.001	kg/g, Conversion factor					
17	AL	70	yr, Average lifetime					
18	CF2	365	d/yr, Conversion factor					
19	CFSo	16	kg-d/mg, Cancer slope factor for soil ingestion					
20								
21	Calculated ingestion daily intake = E24 = (B7*((B8*B10/B12)+(B9*B11/B13))*B14*B15*B16)/(B17*B18)							
22	Soil ingestion excess carcinogenic risk = E25 = (E24*B19)							
23								
24				Calculated ingestion daily intake =	5.99E-09	mg/kg-d		
25				Soil ingestion excess carcinogenic risk =	9.58E-08			

2) Incremental Cancer Risk from the Inhalation Pathway:

Table 4 shows the results from the Excel-based calculation of excess incremental carcinogenic risk from dieldrin in the dust inhalation pathway.

River Corridor Closure Project

CALCULATION SHEET

Originator:	J. M. Capron JMC	Date:	12/5/05	Calc. No.:	0100B-CA-V0268	Rev.:	0
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	B. L. Vedder BLV	Date:	12/5/05
Subject:	Human Health Risk Assessment for Dieldrin at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site					Sheet No. 5 of 5	

Table 4. Excel Calculation of Excess Incremental Carcinogenic Risk from the Dust Inhalation Pathway.

	A	B	C	D	E	F	G	H
1	Least squares regression coefficients for a wind speed of 3.4 m/s interpolated from values in the *User's Manual for RESRAD Version 6.0*, Table B.2:							
2	Coefficient a for 3.4 m/s wind speed = B7 = (B8+((A8-A7)/(A8-A6))*(B6-B8))							
3	Coefficient b for 3.4 m/s wind speed = C7 = (C8+((A8-A7)/(A8-A6))*(C6-C8))							
4	Coefficient c for 3.4 m/s wind speed = D7 = (D8+((A8-A7)/(A8-A6))*(D6-D8))							
5	Wind speed (m/s)	a	b	c				
6	2	1.6819	25.5076	-0.2278				
7	3.4	1.2627	28.3173	-0.2315				
8	5	0.7837	31.5283	-0.2358				
9	Area factor for inhalation pathway is calculated per the *User's Manual for RESRAD Version 6.0*, Formula B.4:							
10	AFI = B7/(1+(C7*((SQRT(A12))^D7)))							
11	Area (m^2)	AFI						
12	57.1	0.0674						
13								
14	Inhalation intake = (C*IR*ML*ED*AFI*OFI*CF1)/(BW*AL*CF2)							
15	Variable	Value	Description					
16	C	0.084	mg/kg, Maximum concentration of dieldrin in pipeline sediment					
17	IR	7,300	m^3/yr, Inhalation rate					
18	ML	0.0001	g/m^3, Dust mass loading for inhalation					
19	ED	30	yr, Exposure duration					
20	AFI	0.0674	Unitless area factor					
21	OFI	0.44	Unitless occupancy factor					
22	CF1	0.001	kg/g, Conversion factor					
23	BW	70	kg, Body weight					
24	AL	70	yr, Average lifetime					
25	CF2	365	d/yr, Conversion factor					
26	CFSi	16.1	kg-d/mg, Cancer slope factor for inhalation					
27								
28	Inhalation daily intake = E31=(B16*B17*B18*B19*B20*B21*B22)/(B23*B24*B25)							
29	Dust inhalation excess carcinogenic risk = E32=(E31*B26)							
30								
31	Calculated inhalation daily intake =				3.05E-11	mg/kg-d		
32	Dust inhalation excess carcinogenic risk =				4.91E-10			

CONCLUSIONS:

- The excess carcinogenic risk due to dieldrin in the soil ingestion pathway is 9.58×10^{-8}.
- The excess carcinogenic risk due to dieldrin in the inhalation pathway is 4.91×10^{-10}.
- The total human health excess carcinogenic risk due to dieldrin at the 100-B-14:2, Area 3, pipeline waste sub-site is the sum of the excess carcinogenic risks from the soil ingestion and inhalation pathways: 9.63×10^{-8}.

CALCULATION COVER SHEET

Project Title 100-B/C Field Remediation **Job No.** 14655
Area 100-B/C
Discipline Environmental *__Calc. No.__ 0100B-CA-V0269
Subject 100-B-14:2 (Area 3) 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 *Approved 12/14/05*	W. S. Thompson *Approved 12/19/05*	L. M. Dittmer *Approved 12/29/05*	D. N. Strom *Approved 1/5/06*	*1/5/06*
1	Cover = 1 Summary = ~~4~~ 5 DNS 11-21-06 Total = ~~5~~ 6	J. M. Capron JMC 11/16/06	S. W. Clark S.W. Clark 11/16/06	N/A	D. N. Strom DNStrom 11-21-06	11-21-06

	SUMMARY OF REVISION
1	Replaced cover page for convenience. Sheet 2, lines 8 to 11, discussion of arsenic included. Sheet 3, lines 18 to 19, additional significant figure included for benzo(a)pyrene's contribution to cumulative risk

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	Date:	12/14/05	Calc. No.:	0100B-CA-V0269	Rev.:	0
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	W. S. Thompson	Date:	12/19/05
Subject:	100-B-14:2 (Area 3) Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 1 of 4	

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and excess carcinogenic risk values for the 100-B-14:2 (Area 3) pipelines. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2005), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess cancer risk of <1 x 10^{-6} for individual carcinogens
4) A cumulative excess cancer risk of <1 x 10^{-5} for carcinogens.

GIVEN/REFERENCES:

1) Analytical results for samples J037M6, J037M7, and J037M8.
2) DOE-RL, 2005, *Remedial Design Report/Remedial Action Work Plan for the 100 Areas,* DOE/RL-96-17, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
3) WAC 173-340, "Model Toxics Control Act – Cleanup," *Washington Administrative Code*, 1996.
4) WCH, 2005a, *Human Health Risk Assessment of Dieldrin at the 100-B-14:2 (Area 3) Pipeline Waste Sub-Site*, 0100B-CA-V0268, Rev. 0, Washington Closure Hanford, Richland, Washington.
5) WCH, 2005b, *Human Health Risk Assessment for PCB's at the 100-B-14:2, Area 3, Pipeline Waste Sub-Site*, 0100B-CA-V0266, Rev. 1, Washington Closure Hanford, Richland, Washington.

SOLUTION:

1) Generate an HQ for each noncarcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the individual HQ of <1.0 (DOE-RL 2005).

2) Sum the HQs and compare to the cumulative HQ criterion of <1.0.

3) Generate an excess cancer risk value for each carcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the excess cancer risk of <1 x 10^{-6} (DOE-RL 2005).

4) Sum the excess cancer risk values and compare to the cumulative cancer risk criterion of <1 x 10^{-5}.

METHODOLOGY:

Hazard quotient and carcinogenic risk calculations were computed using the higher of the values between underlying soil results and pipe sediment results. Of the detected analytes for the site, boron, molybdenum, strontium, and tin require the risk calculations because these analytes were detected and a Washington State or Hanford Site background value is not available. Barium, cadmium, chromium,

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron	Date:	11/16/06	Calc. No.:	0100B-CA-V0269	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	S. W. Clark	Date:	11/16/06
Subject:	100-B-14:2 (Area 3) Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 2 of 4	

copper, mercury, nickel, silver, and zinc are included because they were detected at concentrations above their respective Washington State or Hanford Site background value. Lead does not have a reference dose for calculation of a hazard quotient because toxic effects of lead are correlated with blood-lead levels rather than exposure levels or daily intake. As a result, the maximum lead concentration is reported but not included in the hazard quotient calculation. Hexavalent chromium, aroclor-1248, arcolor-1260, multiple pesticides, and multiple semivolatile organic analytes (as shown in Table 1) are included because they were detected by laboratory analysis and cannot be attributed to natural occurrence. Arsenic was detected above the Hanford Site Background value but below the WAC 173-340 Method A cleanup level. Due to the intent of Method A cleanup values and the allowance to use such values for arsenic (DOE-RL 2005), arsenic has been excluded from the Method B individual analyte and cumulative risk requirements. An example of the HQ and risk calculations is presented below:

1) For example, the maximum value for boron is 4.4 mg/kg, divided by the noncarcinogenic RAG value of 16,000 mg/kg (boron is identified as a noncarcinogen in WAC 173-340-740[3]), is 2.8×10^{-4}. Comparing this value, and all other individual values, to the requirement of <1.0, this criterion is met.

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ 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 6.0×10^{-1}, which satisfies the requirement of <1.0.

3) Residual dieldrin and aroclor-1248 concentrations in pipeline sediment exceed the carcinogenic direct exposure RAG values calculated by WAC 173-340-740(3), Method B. However, these RAGs were calculated based on generic assumptions that result in highly conservative values. Site-specific risk assessments (WCH 2005a, 2005b) were therefore performed and residual concentrations of dieldrin and aroclor-1248 shown to satisfy the WAC 173-340-740(3), Method B carcinogenic requirements for human health protection from soil direct exposure.

4) To calculate the excess carcinogenic risk for all other residual contaminants, the maximum value is divided by the carcinogenic RAG value, then multiplied by 1×10^{-6}. For example, the maximum value for benzo(a)anthracene is 0.21 mg/kg; divided by 1.37 mg/kg and multiplied as indicated is 1.5×10^{-7}. Comparing this value, and all other individual values, to the requirement of $<1 \times 10^{-6}$, this criterion is met.

5) After these calculations are completed for the carcinogenic analytes, the cumulative excess cancer risk is obtained by summing the individual values. (To avoid errors due to intermediate rounding, the individual excess carcinogenic risk values prior to rounding are used for this calculation.) The sum of the excess cancer risk values is 2.8×10^{-6}, which satisfies the requirement of $<1 \times 10^{-5}$.

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None
3) List individual carcinogens and corresponding excess cancer risk $>1 \times 10^{-6}$: None

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron	Date:	11/16/06	Calc. No.:	0100B-CA-V0269	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	S. W. Clark	Date:	11/16/06
Subject:	100-B-14:2 (Area 3) Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	2a of 4

4) List the cumulative excess cancer risk for carcinogens >1 x 10^{-5}: None.

Table 1 shows the results of the hazard quotient and excess carcinogenic risk calculations.

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron	Date:	11/16/06	Calc. No.:	0100B-CA-V0269	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	S. W. Clark	Date:	11/16/06
Subject:	100-B-14:2 (Area 3) Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 3 of 4	

Table 1. Hazard Quotient and Excess Carcinogenic Risk Results for the 100-B-14:2 (Area 3) Pipelines.

Contaminants of Potential Concern	Maximum Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Barium	998	5,600	1.8E-01	--	--
Boron	4.4	16,000	2.8E-04	--	--
Cadmium[c]	1.5	80	1.9E-02	13.9	1.1E-07
Chromium, total	67.8	120,000	5.7E-04	--	--
Chromium, hexavalent[c]	0.25	240	1.0E-03	2.1	1.2E-07
Copper	102	2,960	3.4E-02	--	--
Lead	279	--	--	--	--
Mercury	7.2	24	3.0E-01	--	--
Molybdenum	1.7	400	4.3E-03	--	--
Nickel	34.0	1,600	2.1E-02	--	--
Silver	2.8	400	7.0E-03	--	--
Strontium	40.4	48,000	8.4E-04	--	--
Tin	13.5	48,000	2.8E-04	--	--
Zinc	223	24,000	9.3E-03	--	--
Semivolatiles					
Benzo(a)anthracene	0.21	--	--	1.37	1.5E-07
Benzo(a)pyrene[d]	0.18	--	--	0.33	5.5E-07 / 1.3E-06
Benzo(b)fluoranthene	0.18	--	--	1.37	1.3E-07
Benzo(k)fluoranthene	0.18	--	--	13.7	1.3E-08
Benzo(ghi)perylene	0.13	2,400	5.4E-05	--	--
Bis(2-ethylhexyl) phthalate	1.1	1,600	6.9E-04	71.4	1.5E-08
Butylbenzylphthalate	0.42	16,000	2.6E-05	--	--
Chrysene	0.24	--	--	137	1.8E-09
Di-n-butylphthalate	21	8,000	2.6E-03	--	--
Fluoranthene	0.38	3,200	1.2E-04	--	--
Indeno(1,2,3-cd) pyrene	0.12	--	--	1.37	8.8E-08
Phenanthrene[e]	0.19	24,000	7.9E-06	--	--
Pyrene	0.37	2,400	1.5E-04	--	--
Pesticides					
BHC, beta (Hexachlorocyclohexane)	0.0040	--	--	0.556	7.2E-09
Chlordane (alpha, gamma)	0.022	40	5.5E-04	2.86	7.7E-09
DDD, 4,4'-	0.023	--	--	4.17	5.5E-09
DDE, 4,4'-	0.037	--	--	2.94	1.3E-08
DDT, 4,4'-	0.031	40	7.8E-04	2.94	1.1E-08
Dieldrin	0.084	4	2.1E-02	0.0625	9.6E-08[f]
Endosulfan (I, II, sulfate)	0.0082	480	1.7E-05	--	--
Endrin (and ketone, aldehyde)	0.011	24	4.6E-04	--	--
Methoxychlor	0.032	400	8.0E-05	--	--
Polychlorinated Biphenyls					
Aroclor-1248	1.1	--	--	0.5	1.6E-07[g]
Aroclor-1260	0.28	--	--	0.5	5.6E-07
Totals					
Cumulative Hazard Quotient:			**6.0E-01**		
Cumulative Excess Cancer Risk:					**2.8E-06**

Notes:
RAG = remedial action goal
-- = not applicable
[a] = Maximum value determined by comparison of analytical results for samples J037M6, J037M7, and J037M8.
[b] = Value obtained from *Washington Administrative Code* (WAC) 173-340-740(3), Method B, 1996, unless otherwise noted.
[c] = Value for the carcinogen RAG calculated based on the inhalation exposure pathway (WAC) 173-340-750(3), 1996.
[d] = Individual carcinogenic risk (5.5E-07) calculated using the required detection limit (0.33 mg/kg). Contribution to cumulative carcinogenic risk (1.3E-06) calculated based on the cleanup level (0.137 mg/kg) instead of the required detection limit, per WAC 173-340-740(3), Method B, 1996.
[e] = Toxicity data are not available for phenanthrene; RAG based on the surrogate chemical anthracene.
[f] = Value from site-specific risk assessment (WCH 2005a).
[g] = Value from site-specific risk assessment (WCH 2005b).

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron	Date:	12/14/05	Calc. No.:	0100B-CA-V0269	Rev.:	0
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	W. S. Thompson	Date:	12/19/05
Subject:	100-B-14:2 (Area 3) Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	4 of 4

CONCLUSION:

This calculation demonstrates that the 100-B-14:2 (Area 3) pipelines meet the requirements for the hazard quotient and excess carcinogenic risk as identified in the RDR/RAWP (DOE-RL 2005).

CALCULATION COVER SHEET

Project Title:	100-B/C Remaining Pipes and Sewers Field Remediation	**Job No.**	14655
Area	100-B/C		
Discipline	Environmental	***Calc. No.**	0100B-CA-V0281
Subject	100-B-14:2 (Areas 2 & 5) Waste Site 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 = 21 Attm. 1 = 13 Attm. 2 = 13 Total = 48	J M Capron 7/31/06 J. M. Capron	T.M. Blakley 8/1/06 T. M. Blakley	LM Dittmer 8/1/06 L. M. Dittmer	D. N. Strom	8-1-06

SUMMARY OF REVISIONS	

WCH-DE-018 (4/14/06) * Obtain Calc No. from R&DC and Form from Intranet

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron *JMC* **Date** 07/31/06 **Calc. No.** 0100B-CA-V0281 **Rev. No.** 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation **Job No.** 14655 **Checked** T. M. Blakley *TMB* **Date** 8/1/06
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations **Sheet No.** 1 of 21

Summary

Purpose:
Calculate the 95% upper confidence limit (UCL) values to evaluate compliance with cleanup standards for the remediation footprints of Areas 2 and 5 of the 100-B-14:2 subsite. 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 sample pairs, as necessary.

Table of Contents:

Sheets 1 to 4 - Calculation Sheet Summary
Sheets 5 to 6 - Calculation Sheet 100-B-14:2 Area 2 Remediation Footprint Verification Data
Sheet 7 - Calculation Sheet 100-B-14:2 Area 2 Duplicate Analysis
Sheets 8 to 12 - Ecology Software (MTCAStat) Results (Area 2)
Sheets 13 to 15 - Calculation Sheet 100-B-14:2 Area 5 Remediation Footprint Verification Data
Sheet 16 - Calculation Sheet 100-B-14:2 Area 5 Duplicate Analysis
Sheets 17 to 21 - Ecology Software (MTCAStat) Results (Area 5)
Attachment 1 - 100-B-14:2 Area 2 Verification Sampling Results (13 sheets)
Attachment 2 - 100-B-14:2 Area 5 Verification Sampling Results (13 sheets)

Given/References:

1) Sample Results (Attachments 1 and 2).
2) Background values and remedial action goals (RAGs) are taken from DOE-RL (2005b), DOE-RL (2001), Ecology (1994), and Ecology (2005).
3) DOE-RL, 2001, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) DOE-RL, 2005a, *100 Area Remedial Action Sampling and Analysis Plan* (SAP), DOE/RL-96-22, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
5) DOE-RL, 2005b, *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, 1994, *Natural Background Soil Metals Concentrations in Washington State*, Publication No. 94-115, Washington State 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 Remaining Sites Verification Package (RSVP).

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 RPD results are used in evaluation of data quality within the RSVP for this site.

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC Date 07/31/06 Calc. No. 0100B-CA-V0281 Rev. No. 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation Job No. 14655 Checked T. M. Blakley TMB Date 7/31/06
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations Sheet No. 2 of 21

Summary (continued)

Methodology:

For nonradioactive analytes with ≤50% of the data below detection limits and detected radionuclide analytes (with the exception of strontium-90 in Area 2), 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. Gross beta analysis results for statistical verification samples for Area 2 were all below background, with the exception of sample J11K91. Radiostrontium analysis was requested for that sample only, and the result used as the residual strontium-90 activity for the Area 2 remediation footprint. The 95% UCL values were not calculated for aluminum, calcium, iron, magnesium, phosphate, potassium, silicon, sodium, and zirconium, as no cleanup values are available in Ecology (2005) under WAC 173-340-740(3), and these constituents are thus not considered site COPCs (results for total phosphorus are attributed to phosphorus in phosphate).

All nonradionuclide data reported as being undetected are set to ½ the detection limit value for calculation of the statistics (Ecology 1993). In cases where third-party validation requalified detected results as nondetected due to method blank contamination, but did not change the laboratory quantitation limit (*e.g.*, boron in Area 2), ½ the reported value was used for calculation of the statistics. For radionuclide data, calculation of the statistics was done on 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, as for the subject site, 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 RSVP) is used as the compliance basis.

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). Where direct evaluation of the attached sample data showed that a given analyte was not detected in the primary and/or duplicate sample, further evaluation of the RPD value was not performed. The RPD calculations use the following formula:

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

where, M = main sample value S = split (or duplicate) sample value

For quality assurance/quality control (QA/QC) 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. No split samples were collected for cleanup verification of the subject site. Additional discussion is provided in the data quality assessment section of the applicable RSVP, as necessary.

In addition to the statistical samples collected from the remediation footprint at the subject site, multi-aliquot samples were collected from stockpiles of overburden and other material assumed to be below cleanup levels. Statistical methodology is not applicable to non-statistical sampling, and direct evaluation of maximum detected values within these decision units will be used as the compliance basis. These maximum detected values are presented in the results summary for use in the RSVP.

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC **Date** 07/31/06 **Job No.** 14655 **Calc. No.** 0100B-CA-V0281 **Rev. No.** 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation **Checked** T. M. Blakley TMB **Date** 8/1/06
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations **Sheet No.** 3 of 21

Summary (continued)

Results:
The results presented in the summary tables that follow are for use in risk analysis and the RSVP for this site.

Results Summary - Area 2 Remediation Footprint			
Analyte	**95% UCL[a]**	**Maximum[b]**	**Units**
Strontium-90[c]		0.311	pCi/g
Arsenic	3.4		mg/kg
Barium	163		mg/kg
Beryllium	0.38		mg/kg
Boron	4.5		mg/kg
Cadmium	0.14		mg/kg
Chromium	9.0		mg/kg
Cobalt	8.3		mg/kg
Copper	17.7		mg/kg
Hexavalent chromium	0.26		mg/kg
Lead	5.8		mg/kg
Lithium	7.4		mg/kg
Manganese	349		mg/kg
Mercury		0.05	mg/kg
Molybdenum	0.7		mg/kg
Nickel	11.5		mg/kg
Strontium	57		mg/kg
Titanium	1637		mg/kg
Vanadium	48.6		mg/kg
Zinc	44.8		mg/kg
beta-BHC		0.00060	mg/kg
Endosulfan sulfate		0.00053	mg/kg
2-Methylnaphthalene		0.034	mg/kg
Benzo(a)pyrene		0.021	mg/kg
Benzo(b)fluoranthene		0.023	mg/kg
Benzo(k)fluoranthene		0.022	mg/kg
Chrysene		0.022	mg/kg
Naphthalene		0.024	mg/kg
Phenanthrene		0.024	mg/kg

WAC 173-340-740(7)(e) Evaluation		
WAC 173-340 3-Part Test for most stringent RAG:		Because of the "yes" answers to the WAC 173-340 3-part test for barium, additional evaluation of the attainment of cleanup criteria will be performed.
95% UCL > Cleanup Limit?	YES	
> 10% above Cleanup Limit?	NO	
Any sample > 2x Cleanup Limit?	YES	

Results Summary - Area 2 BCL Stockpiles		
Analyte	**Maximum[a]**	**Units**
Arsenic	2.9	mg/kg
Barium	141	mg/kg
Beryllium	0.34	mg/kg
Boron	3.6	mg/kg
Cadmium	0.21	mg/kg
Chromium	8.9	mg/kg
Cobalt	9.2	mg/kg
Copper	17.6	mg/kg
Hexavalent chromium	0.28	mg/kg
Lead	6.0	mg/kg
Lithium	6.7	mg/kg
Manganese	351	mg/kg
Mercury	0.08	mg/kg
Molybdenum	0.51	mg/kg
Nickel	11.1	mg/kg
Strontium	57.1	mg/kg
Titanium	1490	mg/kg
Vanadium	47.2	mg/kg
Zinc	43.6	mg/kg
beta-BHC	0.0043	mg/kg

[a]Verification sampling of the BCL stockpiles was based on multi-aliquot, rather than statistical, sampling.
BCL = below cleanup levels

[a]For nonradionuclides, where ≤ 50% of a data set is censored (below detection limits), the 95% UCL value is used for a given analyte.
[b]For nonradionuclides, where > 50% of a data set is censored, the statistical value defaults to the maximum detected value in the data set (Attachment 1).
[c]Strontium-90 results based on the reported value for sample J11K91 (radiostrontium-specific analysis was not performed for other samples in the data set based on evaluation of gross beta results).
RAG = remedial action goal WAC = *Washington Adminstrative Code*
UCL = upper confidence level

Relative Percent Difference Results[a] - QA/QC Analysis			
Analyte	**Duplicate Analysis[b]**	**Analyte**	**Duplicate Analysis[b]**
Potassium-40	2.8%	Manganese	3.2%
Aluminum	5.1%	Phosphorus	11%
Barium	3.0%	Silicon	10%
Calcium	13%	Strontium	7.2%
Chromium	2.6%	Titanium	7.4%
Copper	2.4%	Vanadium	4.5%
Iron	1.7%	Zinc	1.1%
Magnesium	0.90%	Zirconium	2.6%

[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 RSVP for the subject site.
QA/QC = quality assurance/quality control
RSVP = remaining sites verification package

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC **Date** 07/31/06 **Job No.** 14655 **Calc. No.** 0100B-CA-V0281 **Rev. No.** 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation **Checked** T. M. Blakley TMB **Date** 8/1/06
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations **Sheet No.** 4 of 21

Summary (continued)

Results:
The results presented in the summary tables that follow are for use in risk analysis and the RSVP for this site.

Results Summary - Area 5 Remediation Footprint			
Analyte	**95% UCL[a]**	**Maximum[b]**	**Units**
Cesium-137	0.048		pCi/g
Arsenic	3.8		mg/kg
Barium	60.4		mg/kg
Beryllium	0.33		mg/kg
Boron	1.7		mg/kg
Cadmium	0.16		mg/kg
Chromium	7.7		mg/kg
Cobalt	7.9		mg/kg
Copper	17.6		mg/kg
Hexavalent chromium		0.37	mg/kg
Lead	7.0		mg/kg
Lithium	7.6		mg/kg
Manganese	338		mg/kg
Mercury		0.1	mg/kg
Molybdenum	0.52		mg/kg
Nickel	10.9		mg/kg
Strontium	33.0		mg/kg
Tin	1.3		mg/kg
Titanium	1490		mg/kg
Vanadium	44.6		mg/kg
Zinc	39.8		mg/kg
Aroclor-1254		0.011	mg/kg
beta-BHC		0.00062	mg/kg
Endrin		0.0013	mg/kg
Methoxychlor		0.049	mg/kg
bis(2-Ethylhexyl)phthalate		0.036	mg/kg
Di-n-butylphthalate		0.021	mg/kg
Pyrene		0.020	mg/kg
WAC 173-340-740(7)(e) Evaluation			All individual analyte data sets meet the 3-part test criteria when compared against the most stringent applicable cleanup limit.
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		

Results Summary - Area 5 BCL Stockpiles		
Analyte	**Maximum[a]**	**Units**
Tritium	0.296	pCi/g
Arsenic	2.6	mg/kg
Barium	75.0	mg/kg
Beryllium	0.32	mg/kg
Boron	3.3	mg/kg
Cadmium	0.14	mg/kg
Chromium	12.7	mg/kg
Cobalt	7.4	mg/kg
Copper	15.8	mg/kg
Hexavalent chromium	0.65	mg/kg
Lead	26.1	mg/kg
Lithium	5.9	mg/kg
Manganese	324	mg/kg
Mercury	0.1	mg/kg
Molybdenum	0.50	mg/kg
Nickel	9.7	mg/kg
Strontium	33.1	mg/kg
Tin	1.3	mg/kg
Titanium	1250	mg/kg
Vanadium	42.0	mg/kg
Zinc	41.3	mg/kg
bis(2-Ethylhexyl)phthalate	0.027	mg/kg
Chrysene	0.021	mg/kg
Fluoranthene	0.019	mg/kg
Pyrene	0.019	mg/kg

[a]Verification sampling of the BCL stockpiles was based on multi-aliquot, rather than statistical, sampling.
BCL = below cleanup levels

[a]For nonradionuclides, where ≤ 50% of a data set is censored (below detection limits), the 95% UCL value is used for a given analyte.
[b]For nonradionuclides, where > 50% of a data set is censored, the statistical value defaults to the maximum detected value in the data set (Attachment 2).
RAG = remedial action goal
UCL = upper confidence level
WAC = *Washington Adminstrative Code*

Relative Percent Difference Results[a] - QA/QC Analysis			
Analyte	**Duplicate Analysis[b]**	**Analyte**	**Duplicate Analysis[b]**
Potassium-40	15%	Manganese	5.6%
Aluminum	0.19%	Phosphorus	6.6%
Barium	0.89%	Silicon	8.8%
Calcium	15%	Strontium	2.5%
Chromium	2.7%	Titanium	0.69%
Copper	4.4%	Vanadium	3.5%
Iron	1.1%	Zinc	4.3%
Magnesium	3.4%	Zirconium	1.0%

[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 RSVP for the subject site.
QA/QC = quality assurance/quality control
RSVP = remaining sites verification package

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC
Project 100-B/C Remaining Pipes and Sewers Field Remediation
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations

Date 07/31/06
Job No. 14655

Calc. No. 0100B-CA-V0281
Checked T. M. Blakley TMB

Rev. No. 0
Date 8/1/06
Sheet No. 5 of 21

100-B-14:2 Area 2 Remediation Footprint Verification Data

Sampling Area	Sample Number	Sample Date	Arsenic mg/kg	Arsenic Q	Arsenic PQL	Barium mg/kg	Barium Q	Barium PQL	Beryllium mg/kg	Beryllium Q	Beryllium PQL	Boron mg/kg	Boron Q	Boron PQL
2	J11K86	4/3/2006	1.8		0.60	62.4		0.02	0.25		0.02	1.1	UJC	0.24
Duplicate of J11K86	J11K95	4/3/2006	2.3		0.60	64.3		0.02	0.29		0.02	0.64	UJC	0.24
1	J11K85	4/3/2006	2.9		0.61	61.3		0.02	0.36		0.02	1.4	C	0.24
3	J11K87	4/3/2006	3.2		0.61	72.7		0.02	0.38		0.02	1.6	C	0.24
4	J11K88	4/3/2006	2.9		0.61	63.2		0.02	0.30		0.02	1.1	UJC	0.24
5	J11K89	4/3/2006	3.0		0.61	55.8		0.02	0.35		0.02	0.47	UJC	0.24
6	J11K90	4/3/2006	2.7		0.60	49.6		0.02	0.33		0.02	0.54	UJC	0.24
7	J11K91	4/3/2006	3.4		0.60	409		0.02	0.41		0.02	5.0	C	0.24
8	J11K92	4/3/2006	3.5		0.59	63.6		0.02	0.42		0.02	0.83	UJC	0.23
9	J11K93	4/3/2006	3.3		0.60	131		0.02	0.37		0.02	2.7	C	0.24
10	J11K94	4/3/2006	3.8		0.63	95.6		0.02	0.32		0.02	1.6	C	0.25

Sample Number	Cadmium mg/kg	Cadmium Q	Cadmium PQL	Chromium mg/kg	Chromium Q	Chromium PQL	Cobalt mg/kg	Cobalt Q	Cobalt PQL	Copper mg/kg	Copper Q	Copper PQL	Hexavalent Chromium mg/kg	Hexavalent Chromium Q	Hexavalent Chromium PQL
J11K86	0.12		0.07	7.7		0.13	7.1		0.14	12.9		0.12	0.22		0.21
J11K95	0.07	U	0.07	7.5		0.13	7.3		0.14	12.6		0.12	0.34		0.21
J11K85	0.17		0.07	8.5		0.133	8.7		0.14	17.7		0.12	0.25		0.22
J11K87	0.11		0.07	8.6		0.13	8.3		0.14	17.1		0.12	0.21	U	0.21
J11K88	0.11		0.07	6.5		0.13	7.8		0.14	16.3		0.12	0.26		0.21
J11K89	0.15		0.07	7.6		0.13	8.0		0.14	17.2		0.12	0.21	U	0.21
J11K90	0.12		0.07	5.9		0.13	8.0		0.14	18.2		0.12	0.22		0.21
J11K91	0.14		0.07	10.1		0.13	6.5		0.14	15.9		0.12	0.28		0.21
J11K92	0.09		0.07	6.1		0.13	8.2		0.14	18.3		0.12	0.24		0.21
J11K93	0.07		0.07	7.9		0.13	8.8		0.14	17.4		0.12	0.25		0.21
J11K94	0.09		0.07	10.4		0.13	7.5		0.14	17.4		0.12	0.27		0.22

Statistical Computation Input Data

Sampling Area	Sample Number	Sample Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Hexavalent Chromium mg/kg
2	J11K86/J11K95	4/3/2006	2.1	63.4	0.27	0.44	0.08	7.6	7.2	12.8	0.28
1	J11K85	4/3/2006	2.9	61.3	0.36	1.4	0.17	8.5	8.7	17.7	0.25
3	J11K87	4/3/2006	3.2	72.7	0.38	1.6	0.11	8.6	8.3	17.1	0.11
4	J11K88	4/3/2006	2.9	63.2	0.3	0.55	0.11	6.5	7.8	16.3	0.26
5	J11K89	4/3/2006	3.0	55.8	0.35	0.24	0.15	7.6	8.0	17.2	0.11
6	J11K90	4/3/2006	2.7	49.6	0.33	0.27	0.12	5.9	8.0	18.2	0.22
7	J11K91	4/3/2006	3.4	409	0.41	5.0	0.14	10.1	6.5	15.9	0.28
8	J11K92	4/3/2006	3.5	63.6	0.42	0.42	0.09	6.1	8.2	18.3	0.24
9	J11K93	4/3/2006	3.3	131	0.37	2.7	0.07	7.9	8.8	17.4	0.25
10	J11K94	4/3/2006	3.8	95.6	0.32	1.6	0.09	10.4	7.5	17.4	0.27

Statistical Computations

	Arsenic	Barium	Beryllium	Boron	Cadmium
95% UCL based on	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
N	10	10	10	10	10
% < Detection limit	0%	0%	0%	50%	0%
Mean	3.1	107	0.35	1.4	0.11
Standard deviation	0.5	109	0.05	1.5	0.03
95% UCL on mean	3.4	163	0.38	4.5	0.14
Maximum detected value	3.8	409	0.42	5.0	0.17
Statistical value	3.4	163	0.38	4.5	0.14
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	0.81 BG/GW & River Protection
WAC 173-340 3-PART TEST					
95% UCL > Cleanup Limit?	NA	YES	NA	NO	NA
> 10% above Cleanup Limit?	NA	NO	NA	NO	NA
Any sample > 2X Cleanup Limit?	NA	YES	NA	NO	NA
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 (0.81 mg/kg), the WAC 173-340 3-part test is not required.

	Chromium	Cobalt	Copper	Hexavalent Chromium
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	10	10	10	10
% < Detection limit	0%	0%	0%	20%
Mean	7.9	7.9	16.8	0.23
Standard deviation	1.5	0.7	1.6	0.07
95% UCL on mean	9.0	8.3	17.7	0.26
Maximum detected value	10.4	8.8	18.3	0.34
Statistical value	9.0	8.3	17.7	0.26
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
WAC 173-340 3-PART TEST				
95% UCL > Cleanup Limit?	NA	NA	NA	NO
> 10% above Cleanup Limit?	NA	NA	NA	NO
Any sample > 2X Cleanup Limit?	NA	NA	NA	NO
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.

BG = background
C = blank contamination
GW = groundwater
J = estimated
NA = not applicable
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* Date 07/31/06 Calc. No. 0100B-CA-V0281 Rev. No. 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation Job No. 14655 Checked T. M. Blakley *TMB* Date 8/1/06
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations Sheet No. 6 of 21

1 **100-B-14:2 Area 2 Remediation Footprint Verification Data (continued)**

				Lead			Lithium			Manganese			Molybdenum			Nickel			Strontium			Titanium			Vanadium			Zinc		
2-3	Sampling 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	mg/kg	Q	PQL
4	2	J11K86	4/3/2006	4.2		0.31	5.1	C	0.03	334		0.03	0.38		0.29	9.3		0.24	21.5		0.01	1170		0.03	38.8		0.09	36.9		0.16
5	Duplicate of J11K86	J11K95	4/3/2006	4.4		0.31	4.6	C	0.03	345		0.03	0.47		0.29	9.7		0.24	20.0		0.01	1260		0.03	40.6		0.09	37.3		0.16
6	1	J11K85	4/3/2006	6.1		0.31	7.1	C	0.03	380		0.03	0.54		0.29	11.1		0.24	23.8		0.01	1860		0.03	53.6		0.09	46.1		0.16
7	3	J11K87	4/3/2006	5.5		0.31	7.0	C	0.03	355		0.03	0.50		0.29	11.6		0.24	36.1		0.01	1520		0.03	47.1		0.09	44.6		0.16
8	4	J11K88	4/3/2006	4.7		0.31	6.6	C	0.03	315		0.03	0.29		0.29	9.9		0.24	30.3		0.01	1340		0.03	37.8		0.09	39.5		0.16
9	5	J11K89	4/3/2006	4.6		0.31	6.3	C	0.03	317		0.03	0.44		0.29	10.2		0.24	23.4		0.01	1580		0.03	49.2		0.09	42.8		0.16
10	6	J11K90	4/3/2006	4.4		0.30	4.6	C	0.03	293		0.03	1.1		0.28	9.9		0.24	24.1		0.01	1580		0.03	43.8		0.09	39.1		0.16
11	7	J11K91	4/3/2006	5.6		0.31	8.6	C	0.03	279		0.03	0.60		0.29	12.1		0.24	118		0.01	727		0.03	28.1		0.09	38.5		0.16
12	8	J11K92	4/3/2006	5.5		0.30	5.9	C	0.03	348		0.03	0.50		0.28	10.6		0.23	28.0		0.01	1820		0.03	51.4		0.09	44.9		0.15
13	9	J11K93	4/3/2006	5.7		0.31	6.3	C	0.03	352		0.03	0.58		0.29	11.2		0.24	64.2		0.01	1590		0.03	49.8		0.09	44.5		0.16
14	10	J11K94	4/3/2006	6.5		0.32	7.9	C	0.03	318		0.03	0.53		0.30	12.5		0.25	42.8		0.01	1190		0.03	40.7		0.09	48.0		0.16

15 **Statistical Computation Input Data**

16-17	Sampling Area	Sample Number	Sample Date	Lead mg/kg	Lithium mg/kg	Manganese mg/kg	Molybdenum mg/kg	Nickel mg/kg	Strontium mg/kg	Titanium mg/kg	Vanadium mg/kg	Zinc mg/kg
18	2	J11K86/J11K95	4/3/2006	4.3	4.9	340	0.43	9.5	20.8	1215	39.7	37.1
19	1	J11K85	4/3/2006	6.1	7.1	380	0.54	11.1	23.8	1860	53.6	46.1
20	3	J11K87	4/3/2006	5.5	7.0	355	0.50	11.6	36.1	1520	47.1	44.6
21	4	J11K88	4/3/2006	4.7	6.6	315	0.29	9.9	30.3	1340	37.8	39.5
22	5	J11K89	4/3/2006	4.6	6.3	317	0.44	10.2	23.4	1580	49.2	42.8
23	6	J11K90	4/3/2006	4.4	4.6	293	1.1	9.9	24.1	1580	43.8	39.1
24	7	J11K91	4/3/2006	5.6	8.6	279	0.60	12.1	118	727	28.1	38.5
25	8	J11K92	4/3/2006	5.5	5.9	348	0.50	10.6	28.0	1820	51.4	44.9
26	9	J11K93	4/3/2006	5.7	6.3	352	0.58	11.2	64.2	1590	49.8	44.5
27	10	J11K94	4/3/2006	6.5	7.9	318	0.53	12.5	42.8	1190	40.7	48.0

28 **Statistical Computations**

29		Lead		Lithium		Manganese		Molybdenum		Nickel		Strontium		Titanium		Vanadium		Zinc	
30	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.		Large data set (n ≥ 10), use MTCAStat lognormal distribution.		Large data set (n ≥ 10), use MTCAStat lognormal distribution.		Large data set (n ≥ 10), 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 normal distribution.		Large data set (n ≥ 10), use MTCAStat normal distribution.		Large data set (n ≥ 10), use MTCAStat lognormal distribution.	
31	N	10		10		10		10		10		10		10		10		10	
32	% < Detection limit	0%		0%		0%		0%		0%		0%		0%		0%		0%	
33	Mean	5.3		6.5		330		0.6		10.9		41		1442		44.1		42.5	
34	Standard deviation	0.8		1.2		31		0.21		1.0		30.0		337		7.7		3.7	
35	95% UCL on mean	5.8		7.4		349		0.7		11.5		57		1637		48.6		44.8	
36	Maximum detected value	6.5		8.6		380		1.1		12.5		118		1860		53.6		48.0	
37	Statistical value	5.8		7.4		349		0.7		11.5		57		1637		48.6		44.8	
38	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	10.2	BG/GW & River Protection	33.5	BG/GW Protection	512	BG/GW & River Protection	8	GW Protection	19.1	BG/GW Protection	960	GW Protection	6400	GW Protection	85.1	BG/GW Protection	67.8	BG/River Protection
39	**WAC 173-340 3-PART TEST**																		
40	95% UCL > Cleanup Limit?	NA		NA		NA		NO		NA		NO		NA		NA		NA	
41	> 10% above Cleanup Limit?	NA		NA		NA		NO		NA		NO		NA		NA		NA	
42	Any sample > 2X Cleanup Limit?	NA		NA		NA		NO		NA		NO		NA		NA		NA	
43	**WAC 173-340 Compliance? Yes**	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 (33.5 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.		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		Because all values are below background (19.1 mg/kg), the WAC 173-340 3-part test is not required.		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		Because all values are below background (2570 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.	

44 BG = background NA = not applicable RAG = remedial action goal
45 C = blank contamination PQL = practical quantitation limit UCL = upper confidence limit
46 GW = groundwater Q = qualifier WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC	**Date** 07/31/06	**Calc. No.** 0100B-CA-V0281	**Rev. No.** 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation	**Job No.** 14655	**Checked** T. M. Blakley TMB	**Date** 7/1/06
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations			**Sheet No.** 7 of 21

100-B-14:2 Area 2 Duplicate Analysis

Sampling Area	Sample Number	Sample Date	Gross Beta			Potassium-40			Radium-226			Radium-228			Thorium-228			Thorium-232			Aluminum			Arsenic		
			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
2	J11K86	4/3/2006	13.4		4.0	10.2		0.73	0.470	J	0.16	0.576		0.38	0.595		0.094	0.576		0.38	5210	C	2.3	1.8		0.60
Duplicate of J11K86	J11K95	4/3/2006	17.6		4.6	9.92		0.67	0.439	J	0.13	0.860		0.25	0.597		0.082	0.860		0.25	4950	C	2.3	2.3		0.60

Analysis:

		Gross Beta	Potassium-40	Radium-226	Radium-228	Thorium-228	Thorium-232	Aluminum	Arsenic
	TDL	15	0.5	0.1	0.2	1	1	5	10
Duplicate Analysis	Both > PQL/MDA?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD		2.8%					5.1%	

Sampling Area	Sample Number	Sample Date	Barium			Beryllium			Calcium			Chromium			Cobalt			Copper			Hexavalent Chromium			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
2	J11K86	4/3/2006	62.4		0.02	0.25		0.02	4080	J	2.2	7.7		0.13	7.1		0.14	12.9		0.12	0.22		0.21	17000	C	3.5
Duplicate of J11K86	J11K95	4/3/2006	64.3		0.02	0.29		0.02	3600	J	2.2	7.5		0.13	7.3		0.14	12.6		0.12	0.34		0.21	17300	C	3.4

Analysis:

		Barium	Beryllium	Calcium	Chromium	Cobalt	Copper	Hexavalent Chromium	Iron
	TDL	2	0.5	100	1	2	1	0.5	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-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	3.0%		13%	2.6%		2.4%		1.7%

Sampling Area	Sample Number	Sample Date	Lead			Lithium			Magnesium			Manganese			Molybdenum			Nickel			Phosphorus			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
2	J11K86	4/3/2006	4.2		0.31	5.1	C	0.03	3330		3.9	334		0.03	0.38		0.29	9.3		0.24	987	J	0.89	1210		76.4
Duplicate of J11K86	J11K95	4/3/2006	4.4		0.31	4.6	C	0.03	3300		3.9	345		0.03	0.47		0.29	9.7		0.24	887	J	0.89	1220		76.1

Analysis:

		Lead	Lithium	Magnesium	Manganese	Molybdenum	Nickel	Phosphorus	Potassium
	TDL	5	2.5	75	5	2	4	1.3	400
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD			0.90%	3.2%			11%	

Sampling Area	Sample Number	Sample Date	Silicon			Sodium			Strontium			Titanium			Vanadium			Zinc			Zirconium		
			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
2	J11K86	4/3/2006	502	J	2.2	118		2.5	21.5		0.01	1170		0.03	38.8		0.09	36.9		0.16	19.2		1.1
Duplicate of J11K86	J11K95	4/3/2006	452	J	2.2	109		2.5	20.0		0.01	1260		0.03	40.6		0.09	37.3		0.16	19.7		1.0

Analysis:

		Silicon	Sodium	Strontium	Titanium	Vanadium	Zinc	Zirconium
	TDL	2	50	1	0.5	2.5	1	2.5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD	10%		7.2%	7.4%	4.5%	1.1%	2.6%

C = blank contamination
J = estimated
MDA = minimum detectable activity
PQL = practical quantitation limit
Q = qualifier
RPD = relative percent difference
TDL = target detection limit

CALCULATION SHEET

Washington Closure Hanford

Originator	J. M. Capron JMC	Date	07/31/06	Calc. No.	0100B-CA-V0281
Project	100-B/C Remaining Pipes and Sewers Field Remediation	Job No.	14655	Checked	T. M. Blakley TMB
Subject	100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations				

Rev. No. 0
Date 8/1/06
Sheet No. 9 of 21

Ecology Software (MTCAStat) Results (Area 2)

Cadmium 95% UCL Calculation

DATA	ID
0.08	J11K86/J11K95
0.17	J11K85
0.11	J11K87
0.11	J11K88
0.15	J11K89
0.12	J11K90
0.14	J11K91
0.09	J11K92
0.07	J11K93
0.09	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	0.11
Censored		Lognormal mean	0.11
Detection limit or PQL		Std. devn.	0.03
Method detection limit		Median	0.11
TOTAL	10	Min.	0.07
		Max.	0.17

Lognormal distribution?
r-squared is: 0.981

Normal distribution?
r-squared is: 0.965

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.14

Chromium 95% UCL Calculation

DATA	ID
7.6	J11K86/J11K95
8.5	J11K85
8.6	J11K87
6.5	J11K88
7.6	J11K89
5.9	J11K90
10.1	J11K91
6.1	J11K92
7.9	J11K93
10.4	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	7.9
Censored		Lognormal mean	7.9
Detection limit or PQL		Std. devn.	1.5
Method detection limit		Median	7.8
TOTAL	10	Min.	5.9
		Max.	10.4

Lognormal distribution?
r-squared is: 0.961

Normal distribution?
r-squared is: 0.953

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 9.0

Cobalt 95% UCL Calculation

DATA	ID
7.2	J11K86/J11K95
8.7	J11K85
8.3	J11K87
7.8	J11K88
8.0	J11K89
8.0	J11K90
6.5	J11K91
8.2	J11K92
8.8	J11K93
7.5	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	7.9
Censored		Lognormal mean	7.9
Detection limit or PQL		Std. devn.	0.7
Method detection limit		Median	8.0
TOTAL	10	Min.	6.5
		Max.	8.8

Lognormal distribution?
r-squared is: 0.932

Normal distribution?
r-squared is: 0.952

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 8.3

Copper 95% UCL Calculation

DATA	ID
12.8	J11K86/J11K95
17.7	J11K85
17.1	J11K87
16.3	J11K88
17.2	J11K89
18.2	J11K90
15.9	J11K91
18.3	J11K92
17.4	J11K93
17.4	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	16.8
Censored		Lognormal mean	16.8
Detection limit or PQL		Std. devn.	1.6
Method detection limit		Median	17.3
TOTAL	10	Min.	12.8
		Max.	18.3

Lognormal distribution?
r-squared is: 0.720

Normal distribution?
r-squared is: 0.764

Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 17.7

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator	J. M. Capron *JMC*	**Date**	07/31/06	**Calc. No.** 0100B-CA-V0281	**Rev. No.** 0
Project	100-B/C Remaining Pipes and Sewers Field Remediation	**Job No.**	14655	**Checked** T. M. Blakley *TMB*	**Date** 8/1/06
Subject	100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations				**Sheet No.** 10 of 21

Ecology Software (MTCAStat) Results (Area 2)

Hexavalent Chromium 95% UCL Calculation

DATA	ID
0.28	J11K86/J11K95
0.25	J11K85
0.11	J11K87
0.26	J11K88
0.11	J11K89
0.22	J11K90
0.28	J11K91
0.24	J11K92
0.25	J11K93
0.27	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	0.23
Censored		Lognormal mean	0.23
Detection limit or PQL		Std. devn.	0.07
Method detection limit		Median	0.25
TOTAL	10	Min.	0.11
		Max.	0.28

Lognormal distribution? r-squared is: 0.679
Normal distribution? r-squared is: 0.750
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.26

Lead 95% UCL Calculation

DATA	ID
4.3	J11K86/J11K95
6.1	J11K85
5.5	J11K87
4.7	J11K88
4.6	J11K89
4.4	J11K90
5.6	J11K91
5.5	J11K92
5.7	J11K93
6.5	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	5.3
Censored		Lognormal mean	5.3
Detection limit or PQL		Std. devn.	0.8
Method detection limit		Median	5.5
TOTAL	10	Min.	4.3
		Max.	6.5

Lognormal distribution? r-squared is: 0.938
Normal distribution? r-squared is: 0.941
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 5.8

Lithium 95% UCL Calculation

DATA	ID
4.9	J11K86/J11K95
7.1	J11K85
7.0	J11K87
6.6	J11K88
6.3	J11K89
4.6	J11K90
8.6	J11K91
5.9	J11K92
6.3	J11K93
7.9	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	6.5
Censored		Lognormal mean	6.5
Detection limit or PQL		Std. devn.	1.2
Method detection limit		Median	6.5
TOTAL	10	Min.	4.6
		Max.	8.6

Lognormal distribution? r-squared is: 0.960
Normal distribution? r-squared is: 0.973
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 7.4

Manganese 95% UCL Calculation

DATA	ID
340	J11K86/J11K95
380	J11K85
355	J11K87
315	J11K88
317	J11K89
293	J11K90
279	J11K91
348	J11K92
352	J11K93
318	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	330
Censored		Lognormal mean	330
Detection limit or PQL		Std. devn.	31
Method detection limit		Median	329
TOTAL	10	Min.	279
		Max.	380

Lognormal distribution? r-squared is: 0.967
Normal distribution? r-squared is: 0.971
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 349

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford					
Originator	J. M. Capron *JMC*	Date	07/31/06	Calc. No.	0100B-CA-V0281
Project	100-B/C Remaining Pipes and Sewers Field Remediation	Job No.	14655	Checked	T. M. Blakley *TMB*
Subject	100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations				

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Ecology Software (MTCAStat) Results (Area 2)

Molybdenum 95% UCL Calculation

DATA	ID
0.43	J11K86/J11K95
0.54	J11K85
0.50	J11K87
0.29	J11K88
0.44	J11K89
1.1	J11K90
0.60	J11K91
0.50	J11K92
0.58	J11K93
0.53	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	0.6
Censored		Lognormal mean	0.6
Detection limit or PQL		Std. devn.	0.21
Method detection limit		Median	0.5
TOTAL	10	Min.	0.29
		Max.	1.1

Lognormal distribution? r-squared is: 0.858
Normal distribution? r-squared is: 0.731
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.7

Nickel 95% UCL Calculation

DATA	ID
9.5	J11K86/J11K95
11.1	J11K85
11.6	J11K87
9.9	J11K88
10.2	J11K89
9.9	J11K90
12.1	J11K91
10.6	J11K92
11.2	J11K93
12.5	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	10.9
Censored		Lognormal mean	10.9
Detection limit or PQL		Std. devn.	1.0
Method detection limit		Median	10.9
TOTAL	10	Min.	9.5
		Max.	12.5

Lognormal distribution? r-squared is: 0.972
Normal distribution? r-squared is: 0.968
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 11.5

Strontium 95% UCL Calculation

DATA	ID
20.8	J11K86/J11K95
23.8	J11K85
36.1	J11K87
30.3	J11K88
23.4	J11K89
24.1	J11K90
118	J11K91
28.0	J11K92
64.2	J11K93
42.8	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	41
Censored		Lognormal mean	41
Detection limit or PQL		Std. devn.	30.0
Method detection limit		Median	29
TOTAL	10	Min.	20.8
		Max.	118

Lognormal distribution? r-squared is: 0.844
Normal distribution? r-squared is: 0.676
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 57

Titanium 95% UCL Calculation

DATA	ID
1215	J11K86/J11K95
1860	J11K85
1520	J11K87
1340	J11K88
1580	J11K89
1580	J11K90
727	J11K91
1820	J11K92
1590	J11K93
1190	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	1442
Censored		Lognormal mean	1453
Detection limit or PQL		Std. devn.	337
Method detection limit		Median	1550
TOTAL	10	Min.	727
		Max.	1860

Lognormal distribution? r-squared is: 0.832
Normal distribution? r-squared is: 0.915
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 1637

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron *JMC*	**Date** 07/31/06	**Calc. No.** 0100B-CA-V0281	**Rev. No.** 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation	**Job No.** 14655	**Checked** T. M. Blakley *TMB*	**Date** 8/1/06
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations			**Sheet No.** 12 of 21

Ecology Software (MTCAStat) Results (Area 2)

DATA	ID	Vanadium 95% UCL Calculation			
39.7	J11K86/J11K95				
53.6	J11K85				
47.1	J11K87	Number of samples		Uncensored values	
37.8	J11K88	Uncensored	10	Mean	44.1
49.2	J11K89	Censored		Lognormal mean	44.3
43.8	J11K90	Detection limit or PQL		Std. devn.	7.7
28.1	J11K91	Method detection limit		Median	45.5
51.4	J11K92	TOTAL	10	Min.	28.1
49.8	J11K93			Max.	53.6
40.7	J11K94				

Lognormal distribution?
r-squared is: 0.885
Recommendations:
Use normal distribution.

Normal distribution?
r-squared is: 0.935

UCL (based on t-statistic) is 48.6

DATA	ID	Zinc 95% UCL Calculation			
37.1	J11K86/J11K95				
46.1	J11K85				
44.6	J11K87	Number of samples		Uncensored values	
39.5	J11K88	Uncensored	10	Mean	42.5
42.8	J11K89	Censored		Lognormal mean	42.5
39.1	J11K90	Detection limit or PQL		Std. devn.	3.7
38.5	J11K91	Method detection limit		Median	43.7
44.9	J11K92	TOTAL	10	Min.	37.1
44.5	J11K93			Max.	48.0
48.0	J11K94				

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

Normal distribution?
r-squared is: 0.942

UCL (Land's method) is 44.8

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron *JMC* Date 07/31/06 Calc. No. 0100B-CA-V0281 Rev. No. 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation Job No. 14655 Checked T. M. Blakley *TMB* Date *8/1/06*
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations Sheet No. 8 of 21

Ecology Software (MTCAStat) Results (Area 2)

Arsenic 95% UCL Calculation

DATA	ID
2.1	J11K86/J11K95
2.9	J11K85
3.2	J11K87
2.9	J11K88
3.0	J11K89
2.7	J11K90
3.4	J11K91
3.5	J11K92
3.3	J11K93
3.8	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	3.1
Censored		Lognormal mean	3.1
Detection limit or PQL		Std. devn.	0.5
Method detection limit		Median	3.1
TOTAL	10	Min.	2.1
		Max.	3.8

Lognormal distribution? r-squared is: 0.895
Normal distribution? r-squared is: 0.946
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 3.4

Barium 95% UCL Calculation

DATA	ID
63.4	J11K86/J11K95
61.3	J11K85
72.7	J11K87
63.2	J11K88
55.8	J11K89
49.6	J11K90
409	J11K91
63.6	J11K92
131	J11K93
95.6	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	107
Censored		Lognormal mean	101
Detection limit or PQL		Std. devn.	109
Method detection limit		Median	63
TOTAL	10	Min.	49.6
		Max.	409

Lognormal distribution? r-squared is: 0.710
Normal distribution? r-squared is: 0.508
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 163

Beryllium 95% UCL Calculation

DATA	ID
0.27	J11K86/J11K95
0.36	J11K85
0.38	J11K87
0.3	J11K88
0.35	J11K89
0.33	J11K90
0.41	J11K91
0.42	J11K92
0.37	J11K93
0.32	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	0.35
Censored		Lognormal mean	0.35
Detection limit or PQL		Std. devn.	0.05
Method detection limit		Median	0.36
TOTAL	10	Min.	0.27
		Max.	0.42

Lognormal distribution? r-squared is: 0.979
Normal distribution? r-squared is: 0.989
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.38

Boron 95% UCL Calculation

DATA	ID
0.44	J11K86/J11K95
1.4	J11K85
1.6	J11K87
0.55	J11K88
0.24	J11K89
0.27	J11K90
5.0	J11K91
0.42	J11K92
2.7	J11K93
1.6	J11K94

Number of samples		Uncensored values	
Uncensored	10	Mean	1.4
Censored		Lognormal mean	1.5
Detection limit or PQL		Std. devn.	1.5
Method detection limit		Median	1.0
TOTAL	10	Min.	0.24
		Max.	5.0

Lognormal distribution? r-squared is: 0.948
Normal distribution? r-squared is: 0.778
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 4.5

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron *JMC*
Project 100-B/C Remaining Pipes and Sewers Field Remediation
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations

Date 07/31/06
Job No. 14655

Calc. No. 0100B-CA-V0281
Checked T. M. Blakley *TMB*

Rev. No. 0
Date 8/1/06
Sheet No. 13 of 21

1 **100-B-14:2 Area 5 Remediation Footprint Verification Data**

	Sampling Area	Sample Number	Sample Date	Cesium-137			Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt		
3				pCi/g	Q	MDA	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
4	4	J11KB6	4/4/2006	0.071	U	0.071	2.7		0.60	56.2		0.02	0.31		0.02	0.98		0.24	0.14		0.07	7.6		0.13	7.5		0.14
5	Duplicate of J11KB6	J11KC3	4/4/2006	0.097	U	0.097	3.0		0.60	55.7		0.02	0.35		0.02	0.82		0.24	0.12		0.07	7.4		0.13	7.8		0.14
6	1	J11KB3	4/4/2006	0.077	U	0.077	2.6		0.61	44.2		0.02	0.24		0.02	0.88		0.24	0.09		0.07	5.8		0.13	7.1		0.14
7	2	J11KB4	4/4/2006	0.067	U	0.067	2.4		0.59	51.2		0.02	0.31		0.02	1.5		0.23	0.15		0.07	6.5		0.13	7.4		0.14
8	3	J11KB5	4/4/2006	0.071	U	0.071	2.9		0.56	43.6		0.02	0.22		0.02	0.70		0.23	0.14		0.07	5.8		0.13	6.5		0.14
9	5	J11KB7	4/4/2006	0.062	U	0.062	2.3		0.59	46.8		0.02	0.30		0.02	0.37		0.23	0.12		0.07	5.9		0.13	8.3		0.14
10	6	J11KB8	4/4/2006	0.067	U	0.067	2.3		0.60	56.2		0.02	0.29		0.02	0.76		0.24	0.13		0.07	6.4		0.13	7.2		0.14
11	7	J11KB9	4/4/2006	0.065	U	0.065	2.0		0.60	60.1		0.02	0.26		0.02	1.0		0.24	0.13		0.07	6.7		0.13	6.2		0.14
12	8	J11KC0	4/4/2006	0.077		0.063	1.7		0.58	48.1		0.02	0.24		0.02	0.68		0.23	0.09		0.07	5.2		0.12	6.2		0.13
13	9	J11KC1	4/4/2006	0.059	U	0.059	2.8		0.58	67.2		0.02	0.34		0.02	1.8		0.23	0.15		0.07	7.8		0.12	8.4		0.13
14	10	J11KC2	4/4/2006	0.098	U	0.098	7.5		0.69	70.5		0.02	0.42		0.02	2.6		0.27	0.21		0.08	10.9		0.15	8.6		0.16

15 **Statistical Computation Input Data**

	Sampling Area	Sample Number	Sample Date	Cesium-137 pCi/g	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg
18	4	J11KB6/J11KC3	4/4/2006	0.042	2.9	56.0	0.33	0.90	0.13	7.5	7.7
19	1	J11KB3	4/4/2006	0.039	2.6	44.2	0.24	0.88	0.09	5.8	7.1
20	2	J11KB4	4/4/2006	0.034	2.4	51.2	0.31	1.5	0.15	6.5	7.4
21	3	J11KB5	4/4/2006	0.036	2.9	43.6	0.22	0.70	0.14	5.8	6.5
22	5	J11KB7	4/4/2006	0.031	2.3	46.8	0.30	0.37	0.12	5.9	8.3
23	6	J11KB8	4/4/2006	0.034	2.3	56.2	0.29	0.76	0.13	6.4	7.2
24	7	J11KB9	4/4/2006	0.033	2.0	60.1	0.26	1.0	0.13	6.7	6.2
25	8	J11KC0	4/4/2006	0.077	1.7	48.1	0.24	0.68	0.09	5.2	6.2
26	9	J11KC1	4/4/2006	0.030	2.8	67.2	0.34	1.8	0.15	7.8	8.4
27	10	J11KC2	4/4/2006	0.049	7.5	70.5	0.42	2.6	0.21	10.9	8.6

28 **Statistical Computations**

29		Cesium-137	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt
30	95% UCL based on	Radionuclide data set. Use nonparametric 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), 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.
31	N	10	10	10	10	10	10	10	10
32	% < Detection limit	90%	0%	0%	0%	0%	0%	0%	0%
33	Mean	0.040	2.9	54.4	0.30	1.1	0.13	6.9	7.4
34	Standard deviation	0.014	1.6	9.4	0.06	0.66	0.03	1.6	0.9
35	Z-statistic	1.645	NA*	NA*	NA*	NA*	NA*	NA*	NA*
36	95% UCL on mean	0.048	3.8	60.4	0.33	1.7	0.16	7.7	7.9
37	Maximum detected value	0.077	7.5	70.5	0.42	2.6	0.21	10.9	8.6
38	Statistical value	0.048	3.8	60.4	0.33	1.7	0.16	7.7	7.9
39	**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	0.81 BG/GW & River Protection	18.5 BG/GW & River Protection	32 GW Protection
40	**WAC 173-340 3-PART TEST**								
41	95% UCL > Cleanup Limit?		NO	NA	NA	NO	NA	NA	NA
42	> 10% above Cleanup Limit?		NO	NA	NA	NO	NA	NA	NA
43	Any sample > 2X Cleanup Limit?		NO	NA	NA	NO	NA	NA	NA
44	**WAC 173-340 Compliance?** **Yes**		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	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 (0.81 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg), the WAC 173-340 3-part test is not required.

45 *Calculation of 95% UCL for nonradionuclides performed using MTCAStat software.
46 BG = background Q = qualifier
47 GW = groundwater RAG = remedial action goal
48 MDA = minimum detectable activity U = undetected
49 NA = not applicable UCL = upper confidence limit
50 PQL = practical quantitation limit WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron *JMC*	Date 07/31/06	Calc. No. 0100B-CA-V0281	Rev. No. 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation	Job No. 14655	Checked T. M. Blakley *TMB*	Date 8/1/06
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations			Sheet No. 14 of 21

1 **100-B-14:2 Area 5 Remediation Footprint Verification Data (continued)**

2	Sampling Area	Sample Number	Sample Date	Copper			Lead			Lithium			Manganese			Molybdenum			Nickel			Strontium			Tin		
3				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
4	4	J11KB6	4/4/2006	16.4		0.12	5.8		0.31	6.4	C	0.03	315		0.03	0.43		0.29	10.0		0.24	24.3	C	0.01	1.4		1.1
5	Duplicate of J11KB6	J11KC3	4/4/2006	15.7		0.12	5.8		0.30	6.4	C	0.03	333		0.03	0.52		0.29	10.0		0.24	23.7	C	0.01	1.3		1.1
6	1	J11KB3	4/4/2006	14.8		0.12	5.1		0.31	5.6	C	0.03	289		0.03	0.49		0.29	8.7		0.24	21.6	C	0.01	1.1		1.1
7	2	J11KB4	4/4/2006	16.3		0.12	4.8		0.30	8.4	C	0.03	306		0.03	0.53		0.28	9.8		0.23	21.6	C	0.01	1.4		1.0
8	3	J11KB5	4/4/2006	16.0		0.12	6.5		0.30	5.2	C	0.03	259		0.03	0.41		0.28	8.7		0.23	24.2	C	0.01	1.2		1.0
9	5	J11KB7	4/4/2006	17.5		0.12	3.9		0.30	5.7	C	0.03	312		0.03	0.50		0.28	10.6		0.23	25.7	C	0.01	1.5		1.0
10	6	J11KB8	4/4/2006	15.0		0.12	5.7		0.31	5.5	C	0.03	308		0.03	0.49		0.29	9.7		0.24	19.8	C	0.01	1.2		1.1
11	7	J11KB9	4/4/2006	15.4		0.12	5.0		0.31	5.4	C	0.03	302		0.03	0.49		0.29	8.6		0.24	25.6	C	0.01	1.3		1.1
12	8	J11KC0	4/4/2006	14.8		0.11	3.2		0.30	3.9	C	0.03	232		0.03	0.40		0.28	8.3		0.23	20.2	C	0.01	1.2		1.0
13	9	J11KC1	4/4/2006	18.4		0.11	5.6		0.30	5.9	C	0.03	362		0.03	0.53		0.28	11.7		0.23	27.5	C	0.01	1.3		1.0
14	10	J11KC2	4/4/2006	21.2		0.14	10.6		0.35	11.9	C	0.03	388		0.03	0.56		0.33	14.1		0.27	59.2	C	0.01	1.2	U	1.2

15 **Statistical Computation Input Data**

16	Sampling Area	Sample Number	Sample Date	Copper	Lead	Lithium	Manganese	Molybdenum	Nickel	Strontium	Tin
17				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
18	4	J11KB6/J11KC3	4/4/2006	16.1	5.8	6.4	324	0.48	10.0	24.0	1.4
19	1	J11KB3	4/4/2006	14.8	5.1	5.6	289	0.49	8.7	21.6	1.1
20	2	J11KB4	4/4/2006	16.3	4.8	8.4	306	0.53	9.8	21.6	1.4
21	3	J11KB5	4/4/2006	16.0	6.5	5.2	259	0.41	8.7	24.2	1.2
22	5	J11KB7	4/4/2006	17.5	3.9	5.7	312	0.50	10.6	25.7	1.5
23	6	J11KB8	4/4/2006	15.0	5.7	5.5	308	0.49	9.7	19.8	1.2
24	7	J11KB9	4/4/2006	15.4	5.0	5.4	302	0.49	8.6	25.6	1.3
25	8	J11KC0	4/4/2006	14.8	3.2	3.9	232	0.40	8.3	20.2	1.2
26	9	J11KC1	4/4/2006	18.4	5.6	5.9	362	0.53	11.7	27.5	1.3
27	10	J11KC2	4/4/2006	21.2	10.6	11.9	388	0.56	14.1	59.2	0.60

28 **Statistical Computations**

29		Copper	Lead	Lithium	Manganese	Molybdenum	Nickel	Strontium	Tin
30	95% UCL based on	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), 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.
31	N	10	10	10	10	10	10	10	10
32	% < Detection limit	0%	0%	0%	0%	0%	0%	0%	10%
33	Mean	16.5	5.6	6.4	308	0.49	10.0	26.9	1.2
34	Standard deviation	2.0	2.0	2.2	45	0.05	1.8	11.6	0.25
35	95% UCL on mean	17.6	7.0	7.6	338	0.52	10.9	33.0	1.3
36	Maximum detected value	21.2	10.6	11.9	388	0.56	14.1	59.2	1.5
37	Statistical value	17.6	7.0	7.6	338	0.52	10.9	33.0	1.3
38	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	22.0 BG/River Protection	10.2 BG/GW & River Protection	33.5 BG/GW Protection	512 BG/GW & River Protection	8 GW Protection	19.1 BG/GW Protection	960 GW Protection	960 GW Protection
39	**WAC 173-340 3-PART TEST**								
40	95% UCL > Cleanup Limit?	NA	NO	NA	NA	NO	NA	NO	NO
41	> 10% above Cleanup Limit?	NA	NO	NA	NA	NO	NA	NO	NO
42	Any sample > 2X Cleanup Limit?	NA	NO	NA	NA	NO	NA	NO	NO
43	**WAC 173-340 Compliance?** Yes	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 (33.5 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.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	Because all values are below background (19.1 mg/kg), the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

44 BG = background Q = qualifier
45 C = blank contamination RAG = remedial action goal
46 GW = groundwater U = undetected
47 NA = not applicable UCL = upper confidence limit
48 PQL = practical quantitation limit WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC Date 07/31/06 Job No. 14655 Calc. No. 0100B-CA-V0281 Rev. No. 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation Checked T. M. Blakley TMB Date 8/1/06
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations Sheet No. 15 of 21

100-B-14:2 Area 5 Remediation Footprint Verification Data (continued)

Sampling Area	Sample Number	Sample Date	Titanium mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL
4	J11KB6	4/4/2006	1450		0.03	46.2		0.09	40.2		0.16
Duplicate of J11KB6	J11KC3	4/4/2006	1460		0.03	44.6		0.09	38.5		0.16
1	J11KB3	4/4/2006	1330		0.03	40.8		0.09	38.8		0.16
2	J11KB4	4/4/2006	1560		0.03	46.9		0.09	38.5		0.16
3	J11KB5	4/4/2006	1360		0.03	41.1		0.09	35.5		0.15
5	J11KB7	4/4/2006	1730		0.03	49.1		0.09	38.4		0.15
6	J11KB8	4/4/2006	1270		0.03	39.1		0.09	35.5		0.16
7	J11KB9	4/4/2006	1100		0.03	35.2		0.09	34.4		0.16
8	J11KC0	4/4/2006	1010		0.03	31.2		0.09	29.2		0.15
9	J11KC1	4/4/2006	1460		0.03	43.7		0.09	39.4		0.15
10	J11KC2	4/4/2006	1020		0.03	36.7		0.10	44.8		0.18

Statistical Computation Input Data

Sampling Area	Sample Number	Sample Date	Titanium mg/kg			Vanadium mg/kg			Zinc mg/kg		
4	J11KB6/ J11KC3	4/4/2006	1455			45.4			39.4		
1	J11KB3	4/4/2006	1330			40.8			38.8		
2	J11KB4	4/4/2006	1560			46.9			38.5		
3	J11KB5	4/4/2006	1360			41.1			35.5		
5	J11KB7	4/4/2006	1730			49.1			38.4		
6	J11KB8	4/4/2006	1270			39.1			35.5		
7	J11KB9	4/4/2006	1100			35.2			34.4		
8	J11KC0	4/4/2006	1010			31.2			29.2		
9	J11KC1	4/4/2006	1460			43.7			39.4		
10	J11KC2	4/4/2006	1020			36.7			44.8		

Statistical Computations

	Titanium		Vanadium		Zinc	
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.		Large data set (n ≥ 10), use MTCAStat lognormal distribution.		Large data set (n ≥ 10), use MTCAStat normal distribution.	
N	10		10		10	
% < Detection limit	0%		0%		0%	
Mean	1330		40.9		37.4	
Standard deviation	236		5.6		4.1	
95% UCL on mean	1490		44.6		39.8	
Maximum detected value	1730		49.1		44.8	
Statistical value	1490		44.6		39.8	
Most Stringent Cleanup Limit for nonradionuclide and RAG type	6400	GW Protection	85.1	BG/GW Protection	67.8	BG/River Protection
WAC 173-340 3-PART TEST						
95% UCL > Cleanup Limit?	NA		NA		NA	
> 10% above Cleanup Limit?	NA		NA		NA	
Any sample > 2X Cleanup Limit?	NA		NA		NA	
WAC 173-340 Compliance? Yes	Because all values are below background (2570 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.	

BG = background
GW = groundwater
NA = not applicable
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 Remaining Pipes and Sewers Field Remediation
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations

Date 07/31/06
Job No. 14655

Calc. No. 0100B-CA-V0281
Checked T. M. Blakley TMB

Rev. No. 0
Date 8/1/06
Sheet No. 16 of 21

100-B-14:2 Area 5 Duplicate Analysis

Sampling Area	Sample Number	Sample Date	Gross Alpha			Gross Beta			Potassium-40			Radium-226			Radium-228			Thorium-228			Thorium-232			Aluminum			Arsenic		
			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	mg/kg	Q	PQL	mg/kg	Q	PQL
4	J11KB6	4/4/2006	6.75		4.7	19.1		5.5	10.3		0.54	0.292		0.14	0.479		0.32	0.696		0.12	0.479	J	0.32	5390		2.3	2.7		0.60
Duplicate of J11KB6	J11KC3	4/4/2006	8.50		5.8	19.8		8.9	8.82		1.1	0.377		0.19	0.835		0.35	0.589		0.14	0.835	J	0.35	5380		2.3	3.0		0.60

Analysis:

		Gross Alpha	Gross Beta	Potassium-40	Radium-226	Radium-228	Thorium-228	Thorium-232	Aluminum	Arsenic
	TDL	10	15	0.5	0.1	0.2	1	1	5	10
Duplicate Analysis	Both > PQL/MDA?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD			15%					0.19%	

Sampling Area	Sample Number	Sample Date	Barium			Beryllium			Boron			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	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
4	J11KB6	4/4/2006	56.2		0.02	0.31		0.02	0.98		0.24	0.14		0.07	5670	J	2.2	7.6		0.13	7.5		0.14	16.4		0.12	0.26		0.22
Duplicate of J11KB6	J11KC3	4/4/2006	55.7		0.02	0.35		0.02	0.82		0.24	0.12		0.07	6580	J	2.2	7.4		0.13	7.8		0.14	15.7		0.12	0.36		0.22

Analysis:

		Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Hexavalent Chromium
	TDL	2	0.5	2	0.2	100	1	2	1	0.5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	0.89%				15%	2.7%		4.4%	

Sampling Area	Sample Number	Sample Date	Iron			Lead			Lithium			Magnesium			Manganese			Molybdenum			Nickel			Phosphorus			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
4	J11KB6	4/4/2006	18400		0.53	5.8		0.31	6.4	C	0.03	4030		3.9	315		0.03	0.43		0.29	10.0		0.24	829	C	0.89	1050		76.0
Duplicate of J11KB6	J11KC3	4/4/2006	18200		0.53	5.8		0.30	6.4	C	0.03	4170		3.8	333		0.03	0.52		0.29	10.0		0.24	886	C	0.88	1100		75.8

Analysis:

		Iron	Lead	Lithium	Magnesium	Manganese	Molybdenum	Nickel	Phosphorus	Potassium
	TDL	5	5	2.5	75	5	2	4	1.3	400
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	1.1%			3.4%	5.6%			6.6%	

Sampling Area	Sample Number	Sample Date	Silicon			Sodium			Strontium			Tin			Titanium			Vanadium			Zinc			Zirconium			Aroclor-1254		
			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	µg/kg	Q	PQL
4	J11KB6	4/4/2006	478	J	2.2	111	C	2.5	24.3	C	0.01	1.4		1.1	1450		0.03	46.2		0.09	40.2		0.16	19.6		1.0	3.9	J	15
Duplicate of J11KB6	J11KC3	4/4/2006	522	J	2.2	108	C	2.5	23.7	C	0.01	1.3		1.1	1460		0.03	44.6		0.09	38.5		0.16	19.8		1.0	11	J	15

Analysis:

		Silicon	Sodium	Strontium	Tin	Titanium	Vanadium	Zinc	Zirconium	Aroclor-1254
	TDL	2	50	1	10	0.5	2.5	1	2.5	16.5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	
	RPD	8.8%		2.5%		0.69%	3.5%	4.3%	1.0%	

C = blank contamination
J = estimated
MDA = minimum detectable activity
PQL = practical quantitation limit
Q = qualifier
RPD = relative percent difference
TDL = target detection limit

CALCULATION SHEET

Washington Closure Hanford

Originator: J. M. Capron *JMC*	Date: 07/31/06	Calc. No.: 0100B-CA-V0281	Rev. No.: 0
Project: 100-B/C Remaining Pipes and Sewers Field Remediation	Job No.: 14655	Checked: T. M. Blakley *TMB*	Date: *8/1/06*
Subject: 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations			Sheet No.: 17 of 21

Ecology Software (MTCAStat) Results (Area 5)

Arsenic 95% UCL Calculation

DATA	ID
2.9	J11KB6/J11KC3
2.6	J11KB3
2.4	J11KB4
2.9	J11KB5
2.3	J11KB7
2.3	J11KB8
2.0	J11KB9
1.7	J11KC0
2.8	J11KC1
7.5	J11KC2

Number of samples		Uncensored values	
Uncensored	10	Mean	2.9
Censored		Lognormal mean	2.9
Detection limit or PQL		Std. devn.	1.6
Method detection limit		Median	2.5
TOTAL	10	Min.	1.7
		Max.	7.5

Lognormal distribution? r-squared is: 0.738

Normal distribution? r-squared is: 0.560

Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 3.8

Barium 95% UCL Calculation

DATA	ID
56.0	J11KB6/J11KC3
44.2	J11KB3
51.2	J11KB4
43.6	J11KB5
46.8	J11KB7
56.2	J11KB8
60.1	J11KB9
48.1	J11KC0
67.2	J11KC1
70.5	J11KC2

Number of samples		Uncensored values	
Uncensored	10	Mean	54.4
Censored		Lognormal mean	54.5
Detection limit or PQL		Std. devn.	9.4
Method detection limit		Median	53.6
TOTAL	10	Min.	43.6
		Max.	70.5

Lognormal distribution? r-squared is: 0.958

Normal distribution? r-squared is: 0.943

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 60.4

Beryllium 95% UCL Calculation

DATA	ID
0.33	J11KB6/J11KC3
0.24	J11KB3
0.31	J11KB4
0.22	J11KB5
0.30	J11KB7
0.29	J11KB8
0.26	J11KB9
0.24	J11KC0
0.34	J11KC1
0.42	J11KC2

Number of samples		Uncensored values	
Uncensored	10	Mean	0.30
Censored		Lognormal mean	0.30
Detection limit or PQL		Std. devn.	0.06
Method detection limit		Median	0.30
TOTAL	10	Min.	0.22
		Max.	0.42

Lognormal distribution? r-squared is: 0.966

Normal distribution? r-squared is: 0.935

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.33

Boron 95% UCL Calculation

DATA	ID
0.90	J11KB6/J11KC3
0.88	J11KB3
1.5	J11KB4
0.70	J11KB5
0.37	J11KB7
0.76	J11KB8
1.0	J11KB9
0.68	J11KC0
1.8	J11KC1
2.6	J11KC2

Number of samples		Uncensored values	
Uncensored	10	Mean	1.1
Censored		Lognormal mean	1.1
Detection limit or PQL		Std. devn.	0.66
Method detection limit		Median	0.9
TOTAL	10	Min.	0.37
		Max.	2.6

Lognormal distribution? r-squared is: 0.954

Normal distribution? r-squared is: 0.849

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1.7

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford			
Originator J. M. Capron *JMC*	Date 07/31/06	Calc. No. 0100B-CA-V0281	Rev. No. 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation	Job No. 14655	Checked T. M. Blakley *TMB*	Date *8/1/06*
Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations			Sheet No. 18 of 21

Ecology Software (MTCAStat) Results (Area 5)

Cadmium 95% UCL Calculation

DATA	ID
0.13	J11KB6/J11KC3
0.09	J11KB3
0.15	J11KB4
0.14	J11KB5
0.12	J11KB7
0.13	J11KB8
0.13	J11KB9
0.09	J11KC0
0.15	J11KC1
0.21	J11KC2

Number of samples		Uncensored values	
Uncensored	10	Mean	0.13
Censored		Lognormal mean	0.13
Detection limit or PQL		Std. devn.	0.03
Method detection limit		Median	0.13
TOTAL	10	Min.	0.09
		Max.	0.21

Lognormal distribution?
r-squared is: 0.905

Normal distribution?
r-squared is: 0.871

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.16

Chromium 95% UCL Calculation

DATA	ID
7.5	J11KB6/J11KC3
5.8	J11KB3
6.5	J11KB4
5.8	J11KB5
5.9	J11KB7
6.4	J11KB8
6.7	J11KB9
5.2	J11KC0
7.8	J11KC1
10.9	J11KC2

Number of samples		Uncensored values	
Uncensored	10	Mean	6.9
Censored		Lognormal mean	6.9
Detection limit or PQL		Std. devn.	1.6
Method detection limit		Median	6.5
TOTAL	10	Min.	5.2
		Max.	10.9

Lognormal distribution?
r-squared is: 0.870

Normal distribution?
r-squared is: 0.788

Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 7.7

Cobalt 95% UCL Calculation

DATA	ID
7.7	J11KB6/J11KC3
7.1	J11KB3
7.4	J11KB4
6.5	J11KB5
8.3	J11KB7
7.2	J11KB8
6.2	J11KB9
6.2	J11KC0
8.4	J11KC1
8.6	J11KC2

Number of samples		Uncensored values	
Uncensored	10	Mean	7.4
Censored		Lognormal mean	7.4
Detection limit or PQL		Std. devn.	0.9
Method detection limit		Median	7.3
TOTAL	10	Min.	6.2
		Max.	8.6

Lognormal distribution?
r-squared is: 0.946

Normal distribution?
r-squared is: 0.948

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 7.9

Copper 95% UCL Calculation

DATA	ID
16.1	J11KB6/J11KC3
14.8	J11KB3
16.3	J11KB4
16.0	J11KB5
17.5	J11KB7
15.0	J11KB8
15.4	J11KB9
14.8	J11KC0
18.4	J11KC1
21.2	J11KC2

Number of samples		Uncensored values	
Uncensored	10	Mean	16.5
Censored		Lognormal mean	16.6
Detection limit or PQL		Std. devn.	2.0
Method detection limit		Median	16.0
TOTAL	10	Min.	14.8
		Max.	21.2

Lognormal distribution?
r-squared is: 0.860

Normal distribution?
r-squared is: 0.827

Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 17.6

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron *JMC* Date 07/31/06 Calc. No. 0100B-CA-V0281 Rev. No. 0

Project 100-B/C Remaining Pipes and Sewers Field Remediation Job No. 14655 Checked T. M. Blakley *TMB* Date *8/1/06*

Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations Sheet No. 19 of 21

Ecology Software (MTCAStat) Results (Area 5)

Lead 95% UCL Calculation

DATA	ID				
5.8	J11KB6/J11KC3				
5.1	J11KB3				
4.8	J11KB4	Number of samples		Uncensored values	
6.5	J11KB5	Uncensored	10	Mean	5.6
3.9	J11KB7	Censored		Lognormal mean	5.6
5.7	J11KB8	Detection limit or PQL		Std. devn.	2.0
5.0	J11KB9	Method detection limit		Median	5.4
3.2	J11KC0	TOTAL	10	Min.	3.2
5.6	J11KC1			Max.	10.6
10.6	J11KC2				

Lognormal distribution? r-squared is: 0.906

Normal distribution? r-squared is: 0.794

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 7.0

Lithium 95% UCL Calculation

DATA	ID				
6.4	J11KB6/J11KC3				
5.6	J11KB3				
8.4	J11KB4	Number of samples		Uncensored values	
5.2	J11KB5	Uncensored	10	Mean	6.4
5.7	J11KB7	Censored		Lognormal mean	6.4
5.5	J11KB8	Detection limit or PQL		Std. devn.	2.2
5.4	J11KB9	Method detection limit		Median	5.7
3.9	J11KC0	TOTAL	10	Min.	3.9
5.9	J11KC1			Max.	11.9
11.9	J11KC2				

Lognormal distribution? r-squared is: 0.848

Normal distribution? r-squared is: 0.748

Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 7.6

Manganese 95% UCL Calculation

DATA	ID				
324	J11KB6/J11KC3				
289	J11KB3				
306	J11KB4	Number of samples		Uncensored values	
259	J11KB5	Uncensored	10	Mean	308
312	J11KB7	Censored		Lognormal mean	309
308	J11KB8	Detection limit or PQL		Std. devn.	45
302	J11KB9	Method detection limit		Median	307
232	J11KC0	TOTAL	10	Min.	232
362	J11KC1			Max.	388
388	J11KC2				

Lognormal distribution? r-squared is: 0.951

Normal distribution? r-squared is: 0.954

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 338

Molybdenum 95% UCL Calculation

DATA	ID				
0.48	J11KB6/J11KC3				
0.49	J11KB3				
0.53	J11KB4	Number of samples		Uncensored values	
0.41	J11KB5	Uncensored	10	Mean	0.49
0.50	J11KB7	Censored		Lognormal mean	0.49
0.49	J11KB8	Detection limit or PQL		Std. devn.	0.05
0.49	J11KB9	Method detection limit		Median	0.49
0.40	J11KC0	TOTAL	10	Min.	0.40
0.53	J11KC1			Max.	0.56
0.56	J11KC2				

Lognormal distribution? r-squared is: 0.891

Normal distribution? r-squared is: 0.912

Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.52

PQL = practical quantitation limit

UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron *JMC* Date 07/31/06 Calc. No. 0100B-CA-V0281 Rev. No. 0

Project 100-B/C Remaining Pipes and Sewers Field Remediation Job No. 14655 Checked T. M. Blakley *TMB* Date *8/1/06*

Subject 100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations Sheet No. 20 of 21

Ecology Software (MTCAStat) Results (Area 5)

Nickel 95% UCL Calculation

DATA	ID
10.0	J11KB6/J11KC3
8.7	J11KB3
9.8	J11KB4
8.7	J11KB5
10.6	J11KB7
9.7	J11KB8
8.6	J11KB9
8.3	J11KC0
11.7	J11KC1
14.1	J11KC2

Number of samples		Uncensored values	
Uncensored	10	Mean	10.0
Censored		Lognormal mean	10.0
Detection limit or PQL		Std. devn.	1.8
Method detection limit		Median	9.8
TOTAL	10	Min.	8.3
		Max.	14.1

Lognormal distribution? r-squared is: 0.890
Normal distribution? r-squared is: 0.844
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 10.9

Strontium 95% UCL Calculation

DATA	ID
24.0	J11KB6/J11KC3
21.6	J11KB3
21.6	J11KB4
24.2	J11KB5
25.7	J11KB7
19.8	J11KB8
25.6	J11KB9
20.2	J11KC0
27.5	J11KC1
59.2	J11KC2

Number of samples		Uncensored values	
Uncensored	10	Mean	26.9
Censored		Lognormal mean	26.8
Detection limit or PQL		Std. devn.	11.6
Method detection limit		Median	24.1
TOTAL	10	Min.	19.8
		Max.	59.2

Lognormal distribution? r-squared is: 0.668
Normal distribution? r-squared is: 0.543
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 33.0

Tin 95% UCL Calculation

DATA	ID
1.4	J11KB6/J11KC3
1.1	J11KB3
1.4	J11KB4
1.2	J11KB5
1.5	J11KB7
1.2	J11KB8
1.3	J11KB9
1.2	J11KC0
1.3	J11KC1
0.60	J11KC2

Number of samples		Uncensored values	
Uncensored	10	Mean	1.2
Censored		Lognormal mean	1.2
Detection limit or PQL		Std. devn.	0.25
Method detection limit		Median	1.3
TOTAL	10	Min.	0.60
		Max.	1.5

Lognormal distribution? r-squared is: 0.675
Normal distribution? r-squared is: 0.788
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 1.3

Titanium 95% UCL Calculation

DATA	ID
1455	J11KB6/J11KC3
1330	J11KB3
1560	J11KB4
1360	J11KB5
1730	J11KB7
1270	J11KB8
1100	J11KB9
1010	J11KC0
1460	J11KC1
1020	J11KC2

Number of samples		Uncensored values	
Uncensored	10	Mean	1330
Censored		Lognormal mean	1332
Detection limit or PQL		Std. devn.	236
Method detection limit		Median	1345
TOTAL	10	Min.	1010
		Max.	1730

Lognormal distribution? r-squared is: 0.958
Normal distribution? r-squared is: 0.966
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1490

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator	J. M. Capron JMC	**Date**	07/31/06	**Calc. No.**	0100B-CA-V0281
Project	100-B/C Remaining Pipes and Sewers Field Remediation	**Job No.**	14655	**Checked**	T. M. Blakley TMB
Subject	100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations				

Rev. No. 0
Date 8/1/06
Sheet No. 21 of 21

Ecology Software (MTCAStat) Results (Area 5)

DATA	ID	Vanadium 95% UCL Calculation			
45.4	J11KB6/J11KC3				
40.8	J11KB3				
46.9	J11KB4	Number of samples		Uncensored values	
41.1	J11KB5	Uncensored	10	Mean	40.9
49.1	J11KB7	Censored		Lognormal mean	41.0
39.1	J11KB8	Detection limit or PQL		Std. devn.	5.6
35.2	J11KB9	Method detection limit		Median	41.0
31.2	J11KC0	TOTAL	10	Min.	31.2
43.7	J11KC1			Max.	49.1
36.7	J11KC2				
		Lognormal distribution?		Normal distribution?	
		r-squared is: 0.976		r-squared is: 0.990	
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is	44.6		

DATA	ID	Zinc 95% UCL Calculation			
39.4	J11KB6/J11KC3				
38.8	J11KB3				
38.5	J11KB4	Number of samples		Uncensored values	
35.5	J11KB5	Uncensored	10	Mean	37.4
38.4	J11KB7	Censored		Lognormal mean	37.4
35.5	J11KB8	Detection limit or PQL		Std. devn.	4.1
34.4	J11KB9	Method detection limit		Median	38.5
29.2	J11KC0	TOTAL	10	Min.	29.2
39.4	J11KC1			Max.	44.8
44.8	J11KC2				
		Lognormal distribution?		Normal distribution?	
		r-squared is: 0.890		r-squared is: 0.906	
		Recommendations:			
		Use normal distribution.			
		UCL (based on t-statistic) is	39.8		

PQL = practical quantitation limit
UCL = upper confidence limit

Attachment 1. 100-B-14:2 Area 2 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Americium-241			Antimony-125			Cesium-134			Cesium-137			Cobalt-60			Europium-152		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J11K85	4/3/06	0.26	U	0.26	0.15	U	0.15	0.12	U	0.12	0.072	U	0.072	0.080	U	0.080	0.18	U	0.18
2	J11K86	4/3/06	0.32	U	0.32	0.19	U	0.19	0.11	U	0.11	0.085	U	0.085	0.089	U	0.089	0.18	U	0.18
Duplicate of J11K86	J11K95	4/3/06	0.28	U	0.28	0.16	U	0.16	0.086	U	0.086	0.070	U	0.070	0.069	U	0.069	0.17	U	0.17
3	J11K87	4/3/06	0.26	U	0.26	0.15	U	0.15	0.091	U	0.091	0.068	U	0.068	0.085	U	0.085	0.16	U	0.16
4	J11K88	4/3/06	0.20	U	0.20	0.19	U	0.19	0.098	U	0.098	0.082	U	0.082	0.091	U	0.091	0.20	U	0.20
5	J11K89	4/3/06	0.26	U	0.26	0.14	U	0.14	0.080	U	0.080	0.066	U	0.066	0.065	U	0.065	0.14	U	0.14
6	J11K90	4/3/06	0.19	U	0.19	0.11	U	0.11	0.079	U	0.079	0.060	U	0.060	0.069	U	0.069	0.13	U	0.13
7	J11K91	4/3/06	0.26	U	0.26	0.14	U	0.14	0.097	U	0.097	0.084	U	0.084	0.089	U	0.089	0.18	U	0.18
8	J11K92	4/3/06	0.18	U	0.18	0.16	U	0.16	0.089	U	0.089	0.071	U	0.071	0.069	U	0.069	0.16	U	0.16
9	J11K93	4/3/06	0.21	U	0.21	0.21	U	0.21	0.12	U	0.12	0.084	U	0.084	0.081	U	0.081	0.18	U	0.18
10	J11K94	4/3/06	0.28	U	0.28	0.18	U	0.18	0.10	U	0.10	0.080	U	0.080	0.088	U	0.088	0.20	U	0.20
East BCL stockpile	J11KD1	4/3/06	0.21	U	0.21	0.14	U	0.14	0.081	U	0.081	0.071	U	0.071	0.079	U	0.079	0.15	U	0.15
West BCL stockpile	J11KD2	4/3/06	0.27	U	0.27	0.16	U	0.16	0.098	U	0.098	0.077	U	0.077	0.085	U	0.085	0.17	U	0.17

Note: The following abbreviations apply to all Attachment 1 and 2 tables.

Note: Data qualified with C, D and/or J are considered acceptable values.

BCL = below cleanup levels
C = method blank contamination (inorganic constituents)
D = diluted
J = estimated

MDA = minimum detectable activity
PQL = practical quantitation limit
Q = qualifier
U = undetected

Attachment	1	Sheet No.	1 of 13
Originator	J. M. Capron JMC	Date	07/31/06
Checked	T. M. Blakley TMB	Date	8/1/06
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 1. 100-B-14:2 Area 2 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Europium-154			Europium-155			Gross Alpha			Gross Beta			Potassium-40			Radium-226		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J11K85	4/3/06	0.25	U	0.25	0.19	U	0.19	-0.656	U	9.8	15.5		6.2	6.66		0.95	0.328	J	0.13
2	J11K86	4/3/06	0.27	U	0.27	0.20	U	0.20	1.74	U	4.1	13.4		4.0	10.2		0.73	0.470	J	0.16
Duplicate of J11K86	J11K95	4/3/06	0.23	U	0.23	0.18	U	0.18	8.98		7.8	17.6		4.6	9.92		0.67	0.439	J	0.13
3	J11K87	4/3/06	0.24	U	0.24	0.20	U	0.20	11.2		7.2	17.1		10	9.24		0.67	0.325	J	0.13
4	J11K88	4/3/06	0.27	U	0.27	0.19	U	0.19	3.31	U	5.3	12.2		4.5	10.5		0.74	0.399	J	0.15
5	J11K89	4/3/06	0.22	U	0.22	0.16	U	0.16	5.62	U	5.9	14.1		5.6	9.36		0.61	0.345	J	0.12
6	J11K90	4/3/06	0.19	U	0.19	0.15	U	0.15	10.8		5.7	16.9		3.7	6.12		0.72	0.185	J	0.13
7	J11K91	4/3/06	0.26	U	0.26	0.20	U	0.20	2.50	U	5.4	28.8		4.5	6.94		0.95	0.443	J	0.13
8	J11K92	4/3/06	0.21	U	0.21	0.17	U	0.17	1.21	U	11	17.3		5.1	8.39		0.93	0.354	J	0.13
9	J11K93	4/3/06	0.27	U	0.27	0.20	U	0.20	7.38		6.7	14.1		3.9	8.73		0.84	0.508	J	0.19
10	J11K94	4/3/06	0.27	U	0.27	0.22	U	0.22	-2.10	U	11	19.4		5.1	9.27		0.90	0.361	J	0.15
East BCL stockpile	J11KD1	4/3/06	0.20	U	0.20	0.16	U	0.16	0.744	U	9.5	16.4		6.9	6.54		0.59	0.386	J	0.11
West BCL stockpile	J11KD2	4/3/06	0.27	U	0.27	0.21	U	0.21	2.52	U	7.9	17.9		6.6	9.54		0.66	0.400	J	0.14

Sample Location	Sample Number	Sample Date	Radium-228			Thorium-228			Thorium-232			Total Beta Radiostrontium			Uranium-235			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J11K85	4/3/06	0.663		0.29	0.423		0.079	0.663		0.29				0.25	U	0.25	8.3	U	8.3
2	J11K86	4/3/06	0.576		0.38	0.595		0.094	0.576		0.38				0.30	U	0.30	8.8	U	8.8
Duplicate of J11K86	J11K95	4/3/06	0.860		0.25	0.597		0.082	0.860		0.25				0.27	U	0.27	8.6	U	8.6
3	J11K87	4/3/06	0.766		0.36	0.552		0.13	0.766		0.36				0.25	U	0.25	8.4	U	8.4
4	J11K88	4/3/06	0.493		0.27	0.489		0.081	0.493		0.27				0.27	U	0.27	11	U	11
5	J11K89	4/3/06	0.463		0.22	0.642		0.11	0.463		0.22				0.24	U	0.24	7.8	U	7.8
6	J11K90	4/3/06	0.497		0.26	0.355		0.065	0.497		0.26				0.18	U	0.18	7.1	U	7.1
7	J11K91	4/3/06	0.565		0.29	0.506		0.078	0.565		0.29	0.311		0.19	0.25	U	0.25	8.6	U	8.6
8	J11K92	4/3/06	0.522		0.25	0.556		0.12	0.522		0.25				0.25	U	0.25	9.9	U	9.9
9	J11K93	4/3/06	0.721		0.40	0.751		0.14	0.721		0.40				0.31	U	0.31	10	U	10
10	J11K94	4/3/06	0.832		0.36	0.415		0.10	0.832		0.36				0.29	U	0.29	9.9	U	9.9
East BCL stockpile	J11KD1	4/3/06	0.616		0.25	0.438		0.11	0.616		0.25				0.20	U	0.20	7.3	U	7.3
West BCL stockpile	J11KD2	4/3/06	0.669		0.32	0.536		0.12	0.669		0.32				0.27	U	0.27	9.3	U	9.3

Attachment 1. 100-B-14:2 Area 2 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
1	J11K85	4/3/06	6040	C	2.4	0.44	UJ	0.44	2.9		0.61	61.3		0.02	0.36		0.02	1.4	C	0.24
2	J11K86	4/3/06	5210	C	2.3	0.44	UJ	0.44	1.8		0.60	62.4		0.02	0.25		0.02	1.1	UJC	0.24
Duplicate of J11K86	J11K95	4/3/06	4950	C	2.3	0.43	UJ	0.43	2.3		0.60	64.3		0.02	0.29		0.02	0.64	UJC	0.24
3	J11K87	4/3/06	5840	C	2.4	0.44	UJ	0.44	3.2		0.61	72.7		0.02	0.38		0.02	1.6	C	0.24
4	J11K88	4/3/06	5450	C	2.4	0.44	UJ	0.44	2.9		0.61	63.2		0.02	0.30		0.02	1.1	UJC	0.24
5	J11K89	4/3/06	5470	C	2.4	0.44	UJ	0.44	3.0		0.61	55.8		0.02	0.35		0.02	0.47	UJC	0.24
6	J11K90	4/3/06	4160	C	2.3	0.43	UJ	0.43	2.7		0.60	49.6		0.02	0.33		0.02	0.54	UJC	0.24
7	J11K91	4/3/06	6390	C	2.3	0.43	UJ	0.43	3.4		0.60	409		0.02	0.41		0.02	5.0	C	0.24
8	J11K92	4/3/06	5020	C	2.3	0.43	UJ	0.43	3.5		0.59	63.6		0.02	0.42		0.02	0.83	UJC	0.23
9	J11K93	4/3/06	5700	C	2.3	0.44	UJ	0.44	3.3		0.60	131		0.02	0.37		0.02	2.7	C	0.24
10	J11K94	4/3/06	6210	C	2.4	0.45	UJ	0.45	3.8		0.63	95.6		0.02	0.32		0.02	1.6	C	0.25
East BCL stockpile	J11KD1	4/3/06	5330	C	2.3	0.44	UJ	0.44	2.7		0.60	141		0.02	0.34		0.02	3.6	C	0.24
West BCL stockpile	J11KD2	4/3/06	6040	C	2.4	0.44	UJ	0.44	2.9		0.61	86.6		0.02	0.31		0.02	3.5	C	0.24
Equipment blank	J11K96	4/3/06	50.7	UJC	2.2	0.41	UJ	0.41	0.56	U	0.56	1.4		0.02	0.02	U	0.02	0.61	UJC	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
1	J11K85	4/3/06	0.17		0.07	4880	J	2.2	8.5		0.133	8.7		0.14	17.7		0.12	0.25		0.22
2	J11K86	4/3/06	0.12		0.07	4080	J	2.2	7.7		0.13	7.1		0.14	12.9		0.12	0.22		0.21
Duplicate of J11K86	J11K95	4/3/06	0.07	U	0.07	3600	J	2.2	7.5		0.13	7.3		0.14	12.6		0.12	0.34		0.21
3	J11K87	4/3/06	0.11		0.07	8070	J	2.2	8.6		0.13	8.3		0.14	17.1		0.12	0.21	U	0.21
4	J11K88	4/3/06	0.11		0.07	6710	J	2.2	6.5		0.13	7.8		0.14	16.3		0.12	0.26		0.21
5	J11K89	4/3/06	0.15		0.07	6000	J	2.2	7.6		0.13	8.0		0.14	17.2		0.12	0.21	U	0.21
6	J11K90	4/3/06	0.12		0.07	6290	J	2.1	5.9		0.13	8.0		0.14	18.2		0.12	0.22		0.21
7	J11K91	4/3/06	0.14		0.07	7950	J	2.2	10.1		0.13	6.5		0.14	15.9		0.12	0.28		0.21
8	J11K92	4/3/06	0.09		0.07	8840	J	2.1	6.1		0.13	8.2		0.14	18.3		0.12	0.24		0.21
9	J11K93	4/3/06	0.07		0.07	8290	J	2.2	7.9		0.13	8.8		0.14	17.4		0.12	0.25		0.21
10	J11K94	4/3/06	0.09		0.07	9770	J	2.3	10.4		0.13	7.5		0.14	17.4		0.12	0.27		0.22
East BCL stockpile	J11KD1	4/3/06	0.21		0.07	7610	J	2.2	7.6		0.13	9.2		0.14	17.6		0.12	0.21	U	0.21
West BCL stockpile	J11KD2	4/3/06	0.20		0.07	5450	J	2.2	8.9		0.13	8.4		0.14	16.3		0.12	0.28		0.21
Equipment blank	J11K96	4/3/06	0.06	U	0.06	22.9	J	2.0	0.20		0.12	0.13	U	0.13	0.11	U	0.11			

Attachment	1	Sheet No.	3 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 1. 100-B-14:2 Area 2 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Iron			Lead			Lithium			Magnesium			Manganese			Mercury		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J11K85	4/3/06	22700	C	3.5	6.1		0.31	7.1	C	0.03	4480		3.9	380		0.03	0.02	U	0.02
2	J11K86	4/3/06	17000	C	3.5	4.2		0.31	5.1	C	0.03	3330		3.9	334		0.03	0.02	U	0.02
Duplicate of J11K86	J11K95	4/3/06	17300	C	3.4	4.4		0.31	4.6	C	0.03	3300		3.9	345		0.03	0.01	U	0.01
3	J11K87	4/3/06	20500	C	3.5	5.5		0.31	7.0	C	0.03	4640		3.9	355		0.03	0.02	U	0.02
4	J11K88	4/3/06	17900	C	3.5	4.7		0.31	6.6	C	0.03	4310		3.9	315		0.03	0.02	U	0.02
5	J11K89	4/3/06	19600	C	3.5	4.6		0.31	6.3	C	0.03	4120		3.9	317		0.03	0.02		0.01
6	J11K90	4/3/06	19100	C	3.4	4.4		0.30	4.6	C	0.03	3740		3.8	293		0.03	0.05		0.02
7	J11K91	4/3/06	13300	C	3.4	5.6		0.31	8.6	C	0.03	3820		3.9	279		0.03	0.03		0.02
8	J11K92	4/3/06	22000	C	3.4	5.5		0.30	5.9	C	0.03	4610		3.8	348		0.03	0.01	U	0.01
9	J11K93	4/3/06	21200	C	3.5	5.7		0.31	6.3	C	0.03	4210		3.9	352		0.03	0.03		0.01
10	J11K94	4/3/06	18700	C	3.6	6.5		0.32	7.9	C	0.03	4590		4.0	318		0.03	0.02	U	0.02
East BCL stockpile	J11KD1	4/3/06	19400	C	3.5	6.0		0.31	6.3	C	0.03	3920		3.9	322		0.03	0.08		0.01
West BCL stockpile	J11KD2	4/3/06	20300	C	3.5	5.7		0.31	6.7	C	0.03	4160		3.9	351		0.03	0.02	U	0.02
Equipment blank	J11K96	4/3/06	283	C	3.2	0.34		0.29	0.09	UJC	0.03	7.3		3.6	4.1		0.03	0.02	U	0.02

Sample Location	Sample Number	Sample Date	Molybdenum			Nickel			Phosphorus			Potassium			Selenium			Silicon		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J11K85	4/3/06	0.54		0.29	11.1		0.24	954	J	0.91	1310		77.6	0.47	U	0.47	468	J	2.3
2	J11K86	4/3/06	0.38		0.29	9.3		0.24	987	J	0.89	1210		76.4	0.47	U	0.47	502	J	2.2
Duplicate of J11K86	J11K95	4/3/06	0.47		0.29	9.7		0.24	887	J	0.89	1220		76.1	0.46	U	0.46	452	J	2.2
3	J11K87	4/3/06	0.50		0.29	11.6		0.24	1030	J	0.90	1130		77.3	0.47	U	0.47	418	J	2.3
4	J11K88	4/3/06	0.29		0.29	9.9		0.24	975	J	0.90	1060		77.5	0.47	U	0.47	514	J	2.3
5	J11K89	4/3/06	0.44		0.29	10.2		0.24	984	J	0.90	1070		76.9	0.47	U	0.47	510	J	2.3
6	J11K90	4/3/06	1.1		0.28	9.9		0.24	1150	J	0.88	863		75.6	0.46	U	0.46	417	J	2.2
7	J11K91	4/3/06	0.60		0.29	12.1		0.24	780	J	0.89	1080		76.1	0.46	U	0.46	600	J	2.2
8	J11K92	4/3/06	0.50		0.28	10.6		0.23	1200	J	0.87	1030		74.5	0.45	U	0.45	405	J	2.2
9	J11K93	4/3/06	0.58		0.29	11.2		0.24	1080	J	0.89	1070		76.3	0.47	U	0.47	541	J	2.2
10	J11K94	4/3/06	0.53		0.30	12.5		0.25	989	J	0.93	1170		79.5	0.48	U	0.48	560	J	2.3
East BCL stockpile	J11KD1	4/3/06	0.51		0.29	11.1		0.24	1090	J	0.89	1040		76.3	0.46	U	0.46	517	J	2.2
West BCL stockpile	J11KD2	4/3/06	0.51		0.29	11.0		0.24	923	J	0.90	1150		76.9	0.47	U	0.47	524	J	2.3
Equipment blank	J11K96	4/3/06	0.29		0.27	0.22	U	0.22	5.4	J	0.83	71.4	U	71.4	0.44	U	0.44	38.9	J	2.1

Attachment	1	Sheet No.	4 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 1. 100-B-14:2 Area 2 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Silver			Sodium			Strontium			Thallium			Tin			Titanium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J11K85	4/3/06	0.07	U	0.07	139		2.5	23.8		0.01	0.70	U	0.70	1.2	UJC	1.1	1860		0.03
2	J11K86	4/3/06	0.07	U	0.07	118		2.5	21.5		0.01	0.69	U	0.69	1.1	UC	1.1	1170		0.03
Duplicate of J11K86	J11K95	4/3/06	0.07	U	0.07	109		2.5	20.0		0.01	0.69	U	0.69	1.1	UC	1.1	1260		0.03
3	J11K87	4/3/06	0.07	U	0.07	153		2.5	36.1		0.01	0.70	U	0.70	1.1	UC	1.1	1520		0.03
4	J11K88	4/3/06	0.07	U	0.07	154		2.5	30.3		0.01	0.70	U	0.70	1.1	UC	1.1	1340		0.03
5	J11K89	4/3/06	0.07	U	0.07	208		2.5	23.4		0.01	0.70	U	0.70	1.1	UC	1.1	1580		0.03
6	J11K90	4/3/06	0.07	U	0.07	142		2.5	24.1		0.01	0.69	U	0.69	1.0	UC	1.0	1580		0.03
7	J11K91	4/3/06	0.07	U	0.07	182		2.5	118		0.01	0.69	U	0.69	1.1	UC	1.1	727		0.03
8	J11K92	4/3/06	0.07	U	0.07	156		2.4	28.0		0.01	0.68	U	0.68	1.0	UC	1.0	1820		0.03
9	J11K93	4/3/06	0.07	U	0.07	160		2.5	64.2		0.01	0.69	U	0.69	1.1	UJC	1.1	1590		0.03
10	J11K94	4/3/06	0.07	U	0.07	163		2.6	42.8		0.01	0.72	U	0.72	1.1	UC	1.1	1190		0.03
East BCL stockpile	J11KD1	4/3/06	0.07	U	0.07	160		2.5	57.1		0.01	0.69	U	0.69	1.3	UJC	1.1	1250		0.03
West BCL stockpile	J11KD2	4/3/06	0.07	U	0.07	146		2.5	30.8		0.01	0.70	U	0.70	1.1	UC	1.1	1490		0.03
Equipment blank	J11K96	4/3/06	0.06	U	0.06	7.6		2.3	0.30		0.009	0.65	U	0.65	0.99	UC	0.99	2.0		0.03

Sample Location	Sample Number	Sample Date	Uranium			Vanadium			Zinc			Zirconium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J11K85	4/3/06	0.89	UJ	0.89	53.6		0.09	46.1		0.16	24.8		1.1
2	J11K86	4/3/06	0.87	UJ	0.87	38.8		0.09	36.9		0.16	19.2		1.1
Duplicate of J11K86	J11K95	4/3/06	0.87	UJ	0.87	40.6		0.09	37.3		0.16	19.7		1.0
3	J11K87	4/3/06	0.88	UJ	0.88	47.1		0.09	44.6		0.16	21.0		1.1
4	J11K88	4/3/06	0.88	UJ	0.88	37.8		0.09	39.5		0.16	18.6		1.1
5	J11K89	4/3/06	0.88	UJ	0.88	49.2		0.09	42.8		0.16	20.8		1.1
6	J11K90	4/3/06	0.86	UJ	0.86	43.8		0.09	39.1		0.16	20.9		1.0
7	J11K91	4/3/06	0.87	UJ	0.87	28.1		0.09	38.5		0.16	10.2		1.0
8	J11K92	4/3/06	0.85	UJ	0.85	51.4		0.09	44.9		0.15	22.7		1.0
9	J11K93	4/3/06	0.87	UJ	0.87	49.8		0.09	44.5		0.16	21.9		1.0
10	J11K94	4/3/06	0.91	UJ	0.91	40.7		0.09	48.0		0.16	14.7		1.1
East BCL stockpile	J11KD1	4/3/06	2.2	J	0.87	39.8		0.09	40.6		0.16	19.6		1.0
West BCL stockpile	J11KD2	4/3/06	1.2	J	0.88	47.2		0.09	43.6		0.16	20.4		1.1
Equipment blank	J11K96	4/3/06	0.81	UJ	0.81	0.12		0.08	1.4		0.15	3.0		0.98

Attachment	1	Sheet No.	5 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 1. 100-B-14:2 Area 2 Verification Sampling Results.

Constituents	J11K85 Location 1 Sample Date 4/3/06			J11K86 Location 2 Sample Date 4/3/06			J11K95 Duplicate of J11K86 Sample Date 4/3/06			J11K87 Location 3 Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	15	U	15	14	U	14	14	U	14	14	U	14
Aroclor-1221	15	U	15	14	U	14	14	U	14	14	U	14
Aroclor-1232	15	U	15	14	U	14	14	U	14	14	U	14
Aroclor-1242	15	U	15	14	U	14	14	U	14	14	U	14
Aroclor-1248	15	U	15	14	U	14	14	U	14	14	U	14
Aroclor-1254	15	U	15	14	U	14	14	U	14	14	U	14
Aroclor-1260	15	U	15	14	U	14	14	U	14	14	U	14
Pesticides												
Aldrin	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
alpha-BHC	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
alpha-Chlordane	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
beta-BHC	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
delta-BHC	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Dichlorodiphenyldichloroethane	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Dichlorodiphenyldichloroethylene	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Dichlorodiphenyltrichloroethane	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Dieldrin	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Endosulfan I	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Endosulfan II	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Endosulfan sulfate	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Endrin	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Endrin aldehyde	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Endrin ketone	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
gamma-BHC (Lindane)	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
gamma-Chlordane	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Heptachlor	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Heptachlor epoxide	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Methoxychlor	1.5	UDJ	1.5	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Toxaphene	15	UDJ	15	14	UDJ	14	14	UDJ	14	14	UDJ	14
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	370	U	370	360	U	360	360	U	360	350	U	350
1,2-Dichlorobenzene	370	U	370	360	U	360	360	U	360	350	U	350
1,3-Dichlorobenzene	370	U	370	360	U	360	360	U	360	350	U	350
1,4-Dichlorobenzene	370	U	370	360	U	360	360	U	360	350	U	350
2,4,5-Trichlorophenol	920	U	920	890	U	890	890	U	890	890	U	890
2,4,6-Trichlorophenol	370	U	370	360	U	360	360	U	360	350	U	350
2,4-Dichlorophenol	370	U	370	360	U	360	360	U	360	350	U	350
2,4-Dimethylphenol	370	U	370	360	U	360	360	U	360	350	U	350
2,4-Dinitrophenol	920	UJ	920	890	UJ	890	890	UJ	890	890	UJ	890
2,4-Dinitrotoluene	370	U	370	360	U	360	360	U	360	350	U	350
2,6-Dinitrotoluene	370	U	370	360	U	360	360	U	360	350	U	350
2-Chloronaphthalene	370	U	370	360	U	360	360	U	360	350	U	350
2-Chlorophenol	370	U	370	360	U	360	360	U	360	350	U	350
2-Methylnaphthalene	370	U	370	360	U	360	360	U	360	350	U	350
2-Methylphenol (cresol, o-)	370	U	370	360	U	360	360	U	360	350	U	350
2-Nitroaniline	920	U	920	890	U	890	890	U	890	890	U	890
2-Nitrophenol	370	U	370	360	U	360	360	U	360	350	U	350

Attachment	1	Sheet No.	6 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 1. 100-B-14:2 Area 2 Verification Sampling Results.

Constituents	J11K85 Location 1 Sample Date 4/3/06			J11K86 Location 2 Sample Date 4/3/06			J11K95 Duplicate of J11K86 Sample Date 4/3/06			J11K87 Location 3 Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	370	U	370	360	U	360	360	U	360	350	U	350
3-Nitroaniline	920	U	920	890	U	890	890	U	890	890	U	890
4,6-Dinitro-2-methylphenol	920	U	920	890	U	890	890	U	890	890	U	890
4-Bromophenyl-phenylether	370	U	370	360	U	360	360	U	360	350	U	350
4-Chloro-3-methylphenol	370	U	370	360	U	360	360	U	360	350	U	350
4-Chloroaniline	370	U	370	360	U	360	360	U	360	350	U	350
4-Chlorophenyl-phenylether	370	U	370	360	U	360	360	U	360	350	U	350
4-Methylphenol (p-cresol)	370	U	370	360	U	360	360	U	360	350	U	350
4-Nitroaniline	920	U	920	890	U	890	890	U	890	890	U	890
4-Nitrophenol	920	U	920	890	U	890	890	U	890	890	U	890
Acenaphthene	370	U	370	360	U	360	360	U	360	350	U	350
Acenaphthylene	370	U	370	360	U	360	360	U	360	350	U	350
Anthracene	370	U	370	360	U	360	360	U	360	350	U	350
Benzo(a)anthracene	370	U	370	360	U	360	360	U	360	350	U	350
Benzo(a)pyrene	370	U	370	360	U	360	360	U	360	350	U	350
Benzo(b)fluoranthene	370	U	370	360	U	360	360	U	360	350	U	350
Benzo(g,h,i)perylene	370	U	370	360	U	360	360	U	360	350	U	350
Benzo(k)fluoranthene	370	U	370	360	U	360	360	U	360	350	U	350
bis(2-Chloro-1-methylethyl)ether	370	U	370	360	U	360	360	U	360	350	U	350
bis(2-Chloroethoxy)methane	370	U	370	360	U	360	360	U	360	350	U	350
bis(2-Chloroethyl)ether	370	U	370	360	U	360	360	U	360	350	U	350
bis(2-Ethylhexyl)phthalate	660	U	660	660	U	660	660	U	660	660	U	660
Butylbenzylphthalate	370	U	370	360	U	360	360	U	360	350	U	350
Carbazole	370	U	370	360	U	360	360	U	360	350	U	350
Chrysene	370	U	370	360	U	360	360	U	360	350	U	350
Di-n-butylphthalate	660	U	660	660	U	660	660	U	660	660	U	660
Di-n-octylphthalate	370	U	370	360	U	360	360	U	360	350	U	350
Dibenz(a,h)anthracene	370	U	370	360	U	360	360	U	360	350	U	350
Dibenzofuran	370	U	370	360	U	360	360	U	360	350	U	350
Diethylphthalate	370	U	370	360	U	360	360	U	360	350	U	350
Dimethylphthalate	370	U	370	360	U	360	360	U	360	350	U	350
Fluoranthene	370	U	370	360	U	360	360	U	360	350	U	350
Fluorene	370	U	370	360	U	360	360	U	360	350	U	350
Hexachlorobenzene	370	U	370	360	U	360	360	U	360	350	U	350
Hexachlorobutadiene	370	U	370	360	U	360	360	U	360	350	U	350
Hexachlorocyclopentadiene	370	U	370	360	U	360	360	U	360	350	U	350
Hexachloroethane	370	U	370	360	U	360	360	U	360	350	U	350
Indeno(1,2,3-cd)pyrene	370	U	370	360	U	360	360	U	360	350	U	350
Isophorone	370	U	370	360	U	360	360	U	360	350	U	350
N-Nitroso-di-n-dipropylamine	370	U	370	360	U	360	360	U	360	350	U	350
N-Nitrosodiphenylamine	370	U	370	360	U	360	360	U	360	350	U	350
Naphthalene	370	U	370	360	U	360	360	U	360	350	U	350
Nitrobenzene	370	U	370	360	U	360	360	U	360	350	U	350
Pentachlorophenol	920	U	920	890	U	890	890	U	890	890	U	890
Phenanthrene	370	U	370	360	U	360	360	U	360	350	U	350
Phenol	370	U	370	360	U	360	360	U	360	350	U	350
Pyrene	370	U	370	360	U	360	360	U	360	350	U	350

Attachment	1	Sheet No.	7 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 1. 100-B-14:2 Area 2 Verification Sampling Results.

Constituents	J11K88 Location 4 Sample Date 4/3/06			J11K89 Location 5 Sample Date 4/3/06			J11K90 Location 6 Sample Date 4/3/06			J11K91 Location 7 Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1221	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1232	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1242	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1248	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1254	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1260	14	U	14	14	U	14	14	U	14	14	U	14
Pesticides												
Aldrin	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
alpha-BHC	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
alpha-Chlordane	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
beta-BHC	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
delta-BHC	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Dichlorodiphenyldichloroethane	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Dichlorodiphenyldichloroethylene	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Dichlorodiphenyltrichloroethane	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Dieldrin	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Endosulfan I	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Endosulfan II	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Endosulfan sulfate	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	0.53	JD	1.4
Endrin	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Endrin aldehyde	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Endrin ketone	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
gamma-BHC (Lindane)	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
gamma-Chlordane	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Heptachlor	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Heptachlor epoxide	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Methoxychlor	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4	1.4	UDJ	1.4
Toxaphene	14	UDJ	14	14	UDJ	14	14	UDJ	14	14	UDJ	14
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	360	U	360	350	U	350	350	U	350	360	U	360
1,2-Dichlorobenzene	360	U	360	350	U	350	350	U	350	360	U	360
1,3-Dichlorobenzene	360	U	360	350	U	350	350	U	350	360	U	360
1,4-Dichlorobenzene	360	U	360	350	U	350	350	U	350	360	U	360
2,4,5-Trichlorophenol	890	U	890	880	U	880	880	U	880	890	U	890
2,4,6-Trichlorophenol	360	U	360	350	U	350	350	U	350	360	U	360
2,4-Dichlorophenol	360	U	360	350	U	350	350	U	350	360	U	360
2,4-Dimethylphenol	360	U	360	350	U	350	350	U	350	360	U	360
2,4-Dinitrophenol	890	UJ	890	880	UJ	880	880	UJ	880	890	UJ	890
2,4-Dinitrotoluene	360	U	360	350	U	350	350	U	350	360	U	360
2,6-Dinitrotoluene	360	U	360	350	U	350	350	U	350	360	U	360
2-Chloronaphthalene	360	U	360	350	U	350	350	U	350	360	U	360
2-Chlorophenol	360	U	360	350	U	350	350	U	350	360	U	360
2-Methylnaphthalene	360	U	360	350	U	350	350	U	350	34	J	360
2-Methylphenol (cresol, o-)	360	U	360	350	U	350	350	U	350	360	U	360
2-Nitroaniline	890	U	890	880	U	880	880	U	880	890	U	890
2-Nitrophenol	360	U	360	350	U	350	350	U	350	360	U	360

Attachment	1	Sheet No.	8 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 1. 100-B-14:2 Area 2 Verification Sampling Results.

Constituents	J11K88 Location 4 Sample Date 4/3/06			J11K89 Location 5 Sample Date 4/3/06			J11K90 Location 6 Sample Date 4/3/06			J11K91 Location 7 Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	360	U	360	350	U	350	350	U	350	360	U	360
3-Nitroaniline	890	U	890	880	U	880	880	U	880	890	U	890
4,6-Dinitro-2-methylphenol	890	U	890	880	U	880	880	U	880	890	U	890
4-Bromophenyl-phenylether	360	U	360	350	U	350	350	U	350	360	U	360
4-Chloro-3-methylphenol	360	U	360	350	U	350	350	U	350	360	U	360
4-Chloroaniline	360	U	360	350	U	350	350	U	350	360	U	360
4-Chlorophenyl-phenylether	360	U	360	350	U	350	350	U	350	360	U	360
4-Methylphenol (p-cresol)	360	U	360	350	U	350	350	U	350	360	U	360
4-Nitroaniline	890	U	890	880	U	880	880	U	880	890	U	890
4-Nitrophenol	890	U	890	880	U	880	880	U	880	890	U	890
Acenaphthene	360	U	360	350	U	350	350	U	350	360	U	360
Acenaphthylene	360	U	360	350	U	350	350	U	350	360	U	360
Anthracene	360	U	360	350	U	350	350	U	350	360	U	360
Benzo(a)anthracene	360	U	360	350	U	350	350	U	350	360	U	360
Benzo(a)pyrene	360	U	360	350	U	350	350	U	350	360	U	360
Benzo(b)fluoranthene	360	U	360	350	U	350	350	U	350	360	U	360
Benzo(g,h,i)perylene	360	U	360	350	U	350	350	U	350	360	U	360
Benzo(k)fluoranthene	360	U	360	350	U	350	350	U	350	360	U	360
bis(2-Chloro-1-methylethyl)ether	360	U	360	350	U	350	350	U	350	360	U	360
bis(2-Chloroethoxy)methane	360	U	360	350	U	350	350	U	350	360	U	360
bis(2-Chloroethyl)ether	360	U	360	350	U	350	350	U	350	360	U	360
bis(2-Ethylhexyl)phthalate	660	U	660	660	U	660	660	U	660	660	U	660
Butylbenzylphthalate	360	U	360	350	U	350	350	U	350	360	U	360
Carbazole	360	U	360	350	U	350	350	U	350	360	U	360
Chrysene	360	U	360	350	U	350	350	U	350	360	U	360
Di-n-butylphthalate	360	U	360	660	U	660	660	U	660	660	U	660
Di-n-octylphthalate	360	U	360	350	U	350	350	U	350	360	U	360
Dibenz(a,h)anthracene	360	U	360	350	U	350	350	U	350	360	U	360
Dibenzofuran	360	U	360	350	U	350	350	U	350	360	U	360
Diethylphthalate	360	U	360	350	U	350	350	U	350	360	U	360
Dimethylphthalate	360	U	360	350	U	350	350	U	350	360	U	360
Fluoranthene	360	U	360	350	U	350	350	U	350	360	U	360
Fluorene	360	U	360	350	U	350	350	U	350	360	U	360
Hexachlorobenzene	360	U	360	350	U	350	350	U	350	360	U	360
Hexachlorobutadiene	360	U	360	350	U	350	350	U	350	360	U	360
Hexachlorocyclopentadiene	360	U	360	350	U	350	350	U	350	360	U	360
Hexachloroethane	360	U	360	350	U	350	350	U	350	360	U	360
Indeno(1,2,3-cd)pyrene	360	U	360	350	U	350	350	U	350	360	U	360
Isophorone	360	U	360	350	U	350	350	U	350	360	U	360
N-Nitroso-di-n-dipropylamine	360	U	360	350	U	350	350	U	350	360	U	360
N-Nitrosodiphenylamine	360	U	360	350	U	350	350	U	350	360	U	360
Naphthalene	360	U	360	350	U	350	350	U	350	24	J	360
Nitrobenzene	360	U	360	350	U	350	350	U	350	360	U	360
Pentachlorophenol	890	U	890	880	U	880	880	U	880	890	U	890
Phenanthrene	360	U	360	350	U	350	350	U	350	24	J	360
Phenol	360	U	360	350	U	350	350	U	350	360	U	360
Pyrene	360	U	360	350	U	350	350	U	350	360	U	360

Attachment	1	Sheet No.	9 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 1. 100-B-14:2 Area 2 Verification Sampling Results.

Constituents	J11K92 Location 8 Sample Date 4/3/06			J11K93 Location 9 Sample Date 4/3/06			J11K94 Location 10 Sample Date 4/3/06			J11KD1 East BCL Stockpile Sample Date 4/3/06		
	μg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	14	U	14	15	U	15	14	U	14
Aroclor-1221	14	U	14	14	U	14	15	U	15	14	U	14
Aroclor-1232	14	U	14	14	U	14	15	U	15	14	U	14
Aroclor-1242	14	U	14	14	U	14	15	U	15	14	U	14
Aroclor-1248	14	U	14	14	U	14	15	U	15	14	U	14
Aroclor-1254	14	U	14	14	U	14	15	U	15	14	U	14
Aroclor-1260	14	U	14	14	U	14	15	U	15	14	U	14
Pesticides												
Aldrin	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
alpha-BHC	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
alpha-Chlordane	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
beta-BHC	1.4	UDJ	1.4	0.60	JD	0.60	1.5	UDJ	1.5	4.3	JD	4.3
delta-BHC	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Dichlorodiphenyldichloroethane	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Dichlorodiphenyldichloroethylene	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Dichlorodiphenyltrichloroethane	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Dieldrin	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Endosulfan I	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Endosulfan II	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Endosulfan sulfate	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Endrin	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Endrin aldehyde	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Endrin ketone	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
gamma-BHC (Lindane)	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
gamma-Chlordane	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Heptachlor	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Heptachlor epoxide	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Methoxychlor	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5	1.4	UDJ	1.4
Toxaphene	14	UDJ	14	14	UDJ	14	15	UDJ	15	14	UDJ	14
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	350	U	350	350	U	350	370	U	370	350	U	350
1,2-Dichlorobenzene	350	U	350	350	U	350	370	U	370	350	U	350
1,3-Dichlorobenzene	350	U	350	350	U	350	370	U	370	350	U	350
1,4-Dichlorobenzene	350	U	350	350	U	350	370	U	370	350	U	350
2,4,5-Trichlorophenol	880	U	880	880	U	880	930	U	930	870	U	870
2,4,6-Trichlorophenol	350	U	350	350	U	350	370	U	370	350	U	350
2,4-Dichlorophenol	350	U	350	350	U	350	370	U	370	350	U	350
2,4-Dimethylphenol	350	U	350	350	U	350	370	U	370	350	U	350
2,4-Dinitrophenol	880	UJ	880	880	UJ	880	930	UJ	930	870	UJ	870
2,4-Dinitrotoluene	350	U	350	350	U	350	370	U	370	350	U	350
2,6-Dinitrotoluene	350	U	350	350	U	350	370	U	370	350	U	350
2-Chloronaphthalene	350	U	350	350	U	350	370	U	370	350	U	350
2-Chlorophenol	350	U	350	350	U	350	370	U	370	350	U	350
2-Methylnaphthalene	350	U	350	350	U	350	370	U	370	350	U	350
2-Methylphenol (cresol, o-)	350	U	350	350	U	350	370	U	370	350	U	350
2-Nitroaniline	880	U	880	880	U	880	930	U	930	870	U	870
2-Nitrophenol	350	U	350	350	U	350	370	U	370	350	U	350

Attachment	1	Sheet No.	10 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 1. 100-B-14:2 Area 2 Verification Sampling Results.

Constituents	J11K92 Location 8 Sample Date 4/3/06			J11K93 Location 9 Sample Date 4/3/06			J11K94 Location 10 Sample Date 4/3/06			J11KD1 East BCL Stockpile Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	350	U	350	350	U	350	370	U	370	350	U	350
3-Nitroaniline	880	U	880	880	U	880	930	U	930	870	U	870
4,6-Dinitro-2-methylphenol	880	U	880	880	U	880	930	U	930	870	U	870
4-Bromophenyl-phenylether	350	U	350	350	U	350	370	U	370	350	U	350
4-Chloro-3-methylphenol	350	U	350	350	U	350	370	U	370	350	U	350
4-Chloroaniline	350	U	350	350	U	350	370	U	370	350	U	350
4-Chlorophenyl-phenylether	350	U	350	350	U	350	370	U	370	350	U	350
4-Methylphenol (p-cresol)	350	U	350	350	U	350	370	U	370	350	U	350
4-Nitroaniline	880	U	880	880	U	880	930	U	930	870	U	870
4-Nitrophenol	880	U	880	880	U	880	930	U	930	870	U	870
Acenaphthene	350	U	350	350	U	350	370	U	370	350	U	350
Acenaphthylene	350	U	350	350	U	350	370	U	370	350	U	350
Anthracene	350	U	350	350	U	350	370	U	370	350	U	350
Benzo(a)anthracene	350	U	350	350	U	350	370	U	370	350	U	350
Benzo(a)pyrene	350	U	350	350	U	350	21	J	370	350	U	350
Benzo(b)fluoranthene	350	U	350	350	U	350	23	J	370	350	U	350
Benzo(g,h,i)perylene	350	U	350	350	U	350	370	U	370	350	U	350
Benzo(k)fluoranthene	350	U	350	350	U	350	22	J	370	350	U	350
bis(2-Chloro-1-methylethyl)ether	350	U	350	350	U	350	370	U	370	350	U	350
bis(2-Chloroethoxy)methane	350	U	350	350	U	350	370	U	370	350	U	350
bis(2-Chloroethyl)ether	350	U	350	350	U	350	370	U	370	350	U	350
bis(2-Ethylhexyl)phthalate	660	U	660	660	U	660	660	U	660	660	U	660
Butylbenzylphthalate	350	U	350	350	U	350	370	U	370	350	U	350
Carbazole	350	U	350	350	U	350	370	U	370	350	U	350
Chrysene	350	U	350	350	U	350	22	J	370	350	U	350
Di-n-butylphthalate	660	U	660	660	U	660	660	U	660	660	U	660
Di-n-octylphthalate	350	U	350	350	U	350	370	U	370	350	U	350
Dibenz(a,h)anthracene	350	U	350	350	U	350	370	U	370	350	U	350
Dibenzofuran	350	U	350	350	U	350	370	U	370	350	U	350
Diethylphthalate	350	U	350	350	U	350	370	U	370	350	U	350
Dimethylphthalate	350	U	350	350	U	350	370	U	370	350	U	350
Fluoranthene	350	U	350	350	U	350	370	U	370	350	U	350
Fluorene	350	U	350	350	U	350	370	U	370	350	U	350
Hexachlorobenzene	350	U	350	350	U	350	370	U	370	350	U	350
Hexachlorobutadiene	350	U	350	350	U	350	370	U	370	350	U	350
Hexachlorocyclopentadiene	350	U	350	350	U	350	370	U	370	350	U	350
Hexachloroethane	350	U	350	350	U	350	370	U	370	350	U	350
Indeno(1,2,3-cd)pyrene	350	U	350	350	U	350	370	U	370	350	U	350
Isophorone	350	U	350	350	U	350	370	U	370	350	U	350
N-Nitroso-di-n-dipropylamine	350	U	350	350	U	350	370	U	370	350	U	350
N-Nitrosodiphenylamine	350	U	350	350	U	350	370	U	370	350	U	350
Naphthalene	350	U	350	350	U	350	370	U	370	350	U	350
Nitrobenzene	350	U	350	350	U	350	370	U	370	350	U	350
Pentachlorophenol	880	U	880	880	U	880	930	U	930	870	U	870
Phenanthrene	350	U	350	350	U	350	370	U	370	350	U	350
Phenol	350	U	350	350	U	350	370	U	370	350	U	350
Pyrene	350	U	350	350	U	350	370	U	370	350	U	350

Attachment	1	Sheet No.	11 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 1. 100-B-14:2 Area 2 Verification Sampling Results.

Constituents	J11KD2 West BCL Stockpile Sample Date 4/3/06			J11K96 Equipment Blank Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls						
Aroclor-1016	14	U	14			
Aroclor-1221	14	U	14			
Aroclor-1232	14	U	14			
Aroclor-1242	14	U	14			
Aroclor-1248	14	U	14			
Aroclor-1254	14	U	14			
Aroclor-1260	14	U	14			
Pesticides						
Aldrin	1.4	UDJ	1.4			
alpha-BHC	1.4	UDJ	1.4			
alpha-Chlordane	1.4	UDJ	1.4			
beta-BHC	1.4	UDJ	1.4			
delta-BHC	1.4	UDJ	1.4			
Dichlorodiphenyldichloroethane	1.4	UDJ	1.4			
Dichlorodiphenyldichloroethylene	1.4	UDJ	1.4			
Dichlorodiphenyltrichloroethane	1.4	UDJ	1.4			
Dieldrin	1.4	UDJ	1.4			
Endosulfan I	1.4	UDJ	1.4			
Endosulfan II	1.4	UDJ	1.4			
Endosulfan sulfate	1.4	UDJ	1.4			
Endrin	1.4	UDJ	1.4			
Endrin aldehyde	1.4	UDJ	1.4			
Endrin ketone	1.4	UDJ	1.4			
gamma-BHC (Lindane)	1.4	UDJ	1.4			
gamma-Chlordane	1.4	UDJ	1.4			
Heptachlor	1.4	UDJ	1.4			
Heptachlor epoxide	1.4	UDJ	1.4			
Methoxychlor	1.4	UDJ	1.4			
Toxaphene	14	UDJ	14			
Semivolatile Organic Compounds						
1,2,4-Trichlorobenzene	350	U	350	330	U	330
1,2-Dichlorobenzene	350	U	350	330	U	330
1,3-Dichlorobenzene	350	U	350	330	U	330
1,4-Dichlorobenzene	350	U	350	330	U	330
2,4,5-Trichlorophenol	880	U	880	830	U	830
2,4,6-Trichlorophenol	350	U	350	330	U	330
2,4-Dichlorophenol	350	U	350	330	U	330
2,4-Dimethylphenol	350	U	350	330	U	330
2,4-Dinitrophenol	880	UJ	880	830	UJ	830
2,4-Dinitrotoluene	350	U	350	330	U	330
2,6-Dinitrotoluene	350	U	350	330	U	330
2-Chloronaphthalene	350	U	350	330	U	330
2-Chlorophenol	350	U	350	330	U	330
2-Methylnaphthalene	350	U	350	330	U	330
2-Methylphenol (cresol, o-)	350	U	350	330	U	330
2-Nitroaniline	880	U	880	830	U	830
2-Nitrophenol	350	U	350	330	U	330

Attachment	1	Sheet No.	12 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 1. 100-B-14:2 Area 2 Verification Sampling Results.

Constituents	J11KD2 West BCL Stockpile Sample Date 4/3/06			J11K96 Equipment Blank Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)						
3,3'-Dichlorobenzidine	350	U	350	330	U	330
3-Nitroaniline	880	U	880	830	U	830
4,6-Dinitro-2-methylphenol	880	U	880	830	U	830
4-Bromophenyl-phenylether	350	U	350	330	U	330
4-Chloro-3-methylphenol	350	U	350	330	U	330
4-Chloroaniline	350	U	350	330	U	330
4-Chlorophenyl-phenylether	350	U	350	330	U	330
4-Methylphenol (p-cresol)	350	U	350	330	U	330
4-Nitroaniline	880	U	880	830	U	830
4-Nitrophenol	880	U	880	830	U	830
Acenaphthene	350	U	350	330	U	330
Acenaphthylene	350	U	350	330	U	330
Anthracene	350	U	350	330	U	330
Benzo(a)anthracene	350	U	350	330	U	330
Benzo(a)pyrene	350	U	350	330	U	330
Benzo(b)fluoranthene	350	U	350	330	U	330
Benzo(g,h,i)perylene	350	U	350	330	U	330
Benzo(k)fluoranthene	350	U	350	330	U	330
bis(2-Chloro-1-methylethyl)ether	350	U	350	330	U	330
bis(2-Chloroethoxy)methane	350	U	350	330	U	330
bis(2-Chloroethyl)ether	350	U	350	330	U	330
bis(2-Ethylhexyl)phthalate	660	U	660	660	U	660
Butylbenzylphthalate	350	U	350	330	U	330
Carbazole	350	U	350	330	U	330
Chrysene	350	U	350	330	U	330
Di-n-butylphthalate	350	U	350	660	U	660
Di-n-octylphthalate	350	U	350	330	U	330
Dibenz(a,h)anthracene	350	U	350	330	U	330
Dibenzofuran	350	U	350	330	U	330
Diethylphthalate	350	U	350	91	J	330
Dimethylphthalate	350	U	350	330	U	330
Fluoranthene	350	U	350	330	U	330
Fluorene	350	U	350	330	U	330
Hexachlorobenzene	350	U	350	330	U	330
Hexachlorobutadiene	350	U	350	330	U	330
Hexachlorocyclopentadiene	350	U	350	330	U	330
Hexachloroethane	350	U	350	330	U	330
Indeno(1,2,3-cd)pyrene	350	U	350	330	U	330
Isophorone	350	U	350	330	U	330
N-Nitroso-di-n-dipropylamine	350	U	350	330	U	330
N-Nitrosodiphenylamine	350	U	350	330	U	330
Naphthalene	350	U	350	330	U	330
Nitrobenzene	350	U	350	330	U	330
Pentachlorophenol	880	U	880	830	U	830
Phenanthrene	350	U	350	330	U	330
Phenol	350	U	350	330	U	330
Pyrene	350	U	350	330	U	330

Attachment	1	Sheet No.	13 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 2. 100-B-14:2 Area 5 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Americium-241			Cesium-137			Cobalt-60			Europium-152			Europium-154			Europium-155		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J11KB3	4/4/06	0.24	U	0.24	0.077	U	0.077	0.093	U	0.093	0.18	U	0.18	0.21	U	0.21	0.18	U	0.18
2	J11KB4	4/4/06	0.19	U	0.19	0.067	U	0.067	0.068	U	0.068	0.16	U	0.16	0.25	U	0.25	0.18	U	0.18
3	J11KB5	4/4/06	0.23	U	0.23	0.071	U	0.071	0.090	U	0.090	0.15	U	0.15	0.22	U	0.22	0.17	U	0.17
4	J11KB6	4/4/06	0.26	U	0.26	0.071	U	0.071	0.065	U	0.065	0.16	U	0.16	0.25	U	0.25	0.16	U	0.16
Duplicate of J11KB6	J11KC3	4/4/06	0.22	U	0.22	0.097	U	0.097	0.082	U	0.082	0.19	U	0.19	0.26	U	0.26	0.21	U	0.21
5	J11KB7	4/4/06	0.22	U	0.22	0.062	U	0.062	0.082	U	0.082	0.14	U	0.14	0.22	U	0.22	0.16	U	0.16
6	J11KB8	4/4/06	0.21	U	0.21	0.067	U	0.067	0.077	U	0.077	0.15	U	0.15	0.20	U	0.20	0.17	U	0.17
7	J11KB9	4/4/06	0.37	U	0.37	0.065	U	0.065	0.078	U	0.078	0.19	U	0.19	0.19	U	0.19	0.18	U	0.18
8	J11KC0	4/4/06	0.21	U	0.21	0.077		0.063	0.068	U	0.068	0.15	U	0.15	0.19	U	0.19	0.18	U	0.18
9	J11KC1	4/4/06	0.19	U	0.19	0.059	U	0.059	0.083	U	0.083	0.14	U	0.14	0.20	U	0.20	0.16	U	0.16
10	J11KC2	4/4/06	0.23	U	0.23	0.098	U	0.098	0.094	U	0.094	0.20	U	0.20	0.31	U	0.31	0.22	U	0.22
South BCL stockpile (south)	J11KD3	4/4/06	0.27	U	0.27	0.074	U	0.074	0.070	U	0.070	0.19	U	0.19	0.23	U	0.23	0.18	U	0.18
South BCL stockpile (north)	J11KD4	4/4/06	0.30	U	0.30	0.17	U	0.17	0.092	U	0.092	0.19	U	0.19	0.26	U	0.26	0.24	U	0.24
Central BCL stockpile	J11KD5	4/4/06	0.26	U	0.26	0.079	U	0.079	0.082	U	0.082	0.18	U	0.18	0.23	U	0.23	0.20	U	0.20
North BCL stockpile	J11KD6	4/4/06	0.26	U	0.26	0.066	U	0.066	0.081	U	0.081	0.17	U	0.17	0.21	U	0.21	0.19	U	0.19

Sample Location	Sample Number	Sample Date	Gross Alpha			Gross Beta			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
1	J11KB3	4/4/06	4.82	U	5.4	22.3		5.9	8.39		0.84	0.294		0.12	0.489		0.34	0.354		0.080
2	J11KB4	4/4/06	1.86	U	4.4	13.8		10	8.83		0.53	0.419		0.14	0.551		0.32	0.516		0.087
3	J11KB5	4/4/06	4.35		4.3	8.32	U	11	6.75		0.82	0.280		0.13	0.302	U	0.31	0.460		0.099
4	J11KB6	4/4/06	6.75		4.7	19.1		5.5	10.3		0.54	0.292		0.14	0.479		0.32	0.696		0.12
Duplicate of J11KB6	J11KC3	4/4/06	8.50		5.8	19.8		8.9	8.82		1.1	0.377		0.19	0.835		0.35	0.589		0.14
5	J11KB7	4/4/06	4.34	U	4.9	10.2		6.5	7.29		0.60	0.185		0.11	0.404		0.25	0.265		0.070
6	J11KB8	4/4/06	9.17		3.9	15.3		5.4	7.68		0.62	0.248		0.14	0.546		0.27	0.341		0.071
7	J11KB9	4/4/06	5.90		4.4	17.6		5.6	8.45		0.76	0.404		0.10	0.648		0.33	0.498		0.089
8	J11KC0	4/4/06	0.948	U	5.9	15.1		5.7	11.0		0.69	0.346		0.13	0.574		0.26	0.408		0.072
9	J11KC1	4/4/06	0.581	U	4.9	18.4		5.6	6.16		0.67	0.314		0.11	0.464		0.20	0.463		0.096
10	J11KC2	4/4/06	7.72		5.8	14.6		5.7	12.2		0.62	0.431		0.17	0.909		0.33	0.742		0.083
South BCL stockpile (south)	J11KD3	4/4/06	6.32	U	6.7	15.6		8.6	9.81		0.096	0.324		0.12	0.546		0.32	0.490		0.080
South BCL stockpile (north)	J11KD4	4/4/06	4.20	U	5.1	11.9		5.4	11.6		0.66	0.455		0.12	0.64	U	0.64	0.450		0.097
Central BCL stockpile	J11KD5	4/4/06	4.37	U	5.3	20.1		5.9	9.15		0.87	0.258		0.15	0.575		0.33	0.566		0.12
North BCL stockpile	J11KD6	4/4/06	6.36		4.5	19.8		10	9.42		0.81	0.349		0.14	0.501		0.31	0.509		0.12

Attachment	2	Sheet No.	1 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	8/1/06
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 2. 100-B-14:2 Area 5 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Thorium-232			Total Beta Radiostrontium			Tritium			Uranium-235			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J11KB3	4/4/06	0.489	J	0.34	-0.051	U	0.32	-0.076	UJ	0.37	0.23	U	0.23	9.4	U	9.4
2	J11KB4	4/4/06	0.551	J	0.32	-0.052	U	0.31	-0.130	UJ	0.36	0.26	U	0.26	10	U	10
3	J11KB5	4/4/06	0.302	UJ	0.31	-0.135	U	0.37	-0.140	UJ	0.36	0.22	U	0.22	8.2	U	8.2
4	J11KB6	4/4/06	0.479	J	0.32	-0.039	U	0.28	-0.028	UJ	0.36	0.26	U	0.26	7.9	U	7.9
Duplicate of J11KB6	J11KC3	4/4/06	0.835	J	0.35	-0.045	U	0.25	0.151	U	0.27	0.31	U	0.31	11	U	11
5	J11KB7	4/4/06	0.404	J	0.25	0.090	U	0.29	-0.024	UJ	0.37	0.21	U	0.21	7.1	U	7.1
6	J11KB8	4/4/06	0.546	J	0.27	0.085	U	0.29	-0.085	U	0.37	0.22	U	0.22	7.8	U	7.8
7	J11KB9	4/4/06	0.648	J	0.33	0.018	U	0.31	0.110	U	0.36	0.29	U	0.29	8.2	U	8.2
8	J11KC0	4/4/06	0.574	J	0.26	-0.033	U	0.31	0.094	U	0.35	0.22	U	0.22	6.7	U	6.7
9	J11KC1	4/4/06	0.464	J	0.20	-0.041	U	0.26	-0.005	U	0.38	0.19	U	0.19	7.8	U	7.8
10	J11KC2	4/4/06	0.909	J	0.33	0.114	U	0.33	0.239	U	0.40	0.33	U	0.33	12	U	12
South BCL stockpile (south)	J11KD3	4/4/06	0.546	J	0.32				-0.105	U	0.25	0.27	U	0.27	9.4	U	9.4
South BCL stockpile (north)	J11KD4	4/4/06	0.64	UJ	0.64				0.296		0.27	0.34	U	0.34	9.0	U	9.0
Central BCL stockpile	J11KD5	4/4/06	0.575	J	0.33				0.045	U	0.26	0.24	U	0.24	9.0	U	9.0
North BCL stockpile	J11KD6	4/4/06	0.501	J	0.31				-0.114	U	0.25	0.28	U	0.28	8.3	U	8.3

Attachment	2	Sheet No.	2 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 2. 100-B-14:2 Area 5 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium		
			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
1	J11KB3	4/4/06	4250		2.4	0.44	UJ	0.44	2.6		0.61	44.2		0.02	0.24		0.02	0.88		0.24	0.09		0.07
2	J11KB4	4/4/06	4720		2.3	0.43	UJ	0.43	2.4		0.59	51.2		0.02	0.31		0.02	1.5		0.23	0.15		0.07
3	J11KB5	4/4/06	4020		2.3	0.43	UJ	0.43	2.9		0.56	43.6		0.02	0.22		0.02	0.70		0.23	0.14		0.07
4	J11KB6	4/4/06	5390		2.3	0.43	UJ	0.43	2.7		0.60	56.2		0.02	0.31		0.02	0.98		0.24	0.14		0.07
Duplicate of J11KB6	J11KC3	4/4/06	5380		2.3	0.43	UJ	0.43	3.0		0.60	55.7		0.02	0.35		0.02	0.82		0.24	0.12		0.07
5	J11KB7	4/4/06	4310		2.3	0.43	UJ	0.43	2.3		0.59	46.8		0.02	0.30		0.02	0.37		0.23	0.12		0.07
6	J11KB8	4/4/06	4560		2.3	0.43	UJ	0.43	2.3		0.60	56.2		0.02	0.29		0.02	0.76		0.24	0.13		0.07
7	J11KB9	4/4/06	4530		2.3	0.43	UJ	0.43	2.0		0.60	60.1		0.02	0.26		0.02	1.0		0.24	0.13		0.07
8	J11KC0	4/4/06	3420		2.3	0.42	UJ	42	1.7		0.58	48.1		0.02	0.24		0.02	0.68		0.23	0.09		0.07
9	J11KC1	4/4/06	5780		2.3	0.42	UJ	0.42	2.8		0.58	67.2		0.02	0.34		0.02	1.8		0.23	0.15		0.07
10	J11KC2	4/4/06	7870		2.7	0.50	UJ	0.50	7.5		0.69	70.5		0.02	0.42		0.02	2.6		0.27	0.21		0.08
South BCL stockpile (south)	J11KD3	4/4/06	3810		2.3	0.43	UJ	0.43	2.0		0.59	50.6		0.02	0.24		0.02	0.59		0.23	0.14		0.07
South BCL stockpile (north)	J11KD4	4/4/06	5170		2.3	0.42	UJ	0.42	2.4		0.59	58.2		0.02	0.32		0.02	0.95		0.23	0.09		0.07
Central BCL stockpile	J11KD5	4/4/06	4790		2.4	0.44	UJ	0.44	2.3		0.61	65.5		0.02	0.32		0.02	0.97		0.24	0.1		0.07
North BCL stockpile	J11KD6	4/4/06	4090		2.2	0.42	UJ	0.42	2.6		0.58	75.0		0.02	0.26		0.02	3.3		0.23	0.1		0.07
Equipment blank	J11KC4	4/4/06	40.8		2.1	0.39	UJ	0.39	0.54	U	0.54	1.3		0.02	0.02	U	0.02	0.80		0.21	0.06	U	0.06

Sample Location	Sample Number	Sample Date	Calcium			Chromium			Cobalt			Copper			Hexavalent Chromium			Iron			Lead		
			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
1	J11KB3	4/4/06	6860	J	2.2	5.8		0.13	7.1		0.14	14.8		0.12	0.22	U	0.22	17300		0.54	5.1		0.31
2	J11KB4	4/4/06	5680	J	2.1	6.5		0.13	7.4		0.14	16.3		0.12	0.26		0.21	18200		0.52	4.8		0.30
3	J11KB5	4/4/06	6840	J	2.1	5.8		0.13	6.5		0.14	16.0		0.12	0.21	U	0.21	16500		0.52	6.5		0.30
4	J11KB6	4/4/06	5670	J	2.2	7.6		0.13	7.5		0.14	16.4		0.12	0.26		0.22	18400		0.53	5.8		0.31
Duplicate of J11KB6	J11KC3	4/4/06	6580	J	2.2	7.4		0.13	7.8		0.14	15.7		0.12	0.36		0.22	18200		0.53	5.8		0.30
5	J11KB7	4/4/06	7710	J	2.1	5.9		0.13	8.3		0.14	17.5		0.12	0.21	U	0.21	18800		0.52	3.9		0.30
6	J11KB8	4/4/06	4370	J	2.2	6.4		0.13	7.2		0.14	15.0		0.12	0.22	U	0.22	15900		0.53	5.7		0.31
7	J11KB9	4/4/06	5910	J	2.2	6.7		0.13	6.2		0.14	15.4		0.12	0.36		0.22	14500		0.53	5.0		0.31
8	J11KC0	4/4/06	4310	J	2.1	5.2		0.12	6.2		0.13	14.8		0.11	0.21	U	0.21	13200		0.52	3.2		0.30
9	J11KC1	4/4/06	4820	J	2.1	7.8		0.12	8.4		0.13	18.4		0.11	0.21	U	0.21	19800		0.52	5.6		0.30
10	J11KC2	4/4/06	32500	J	2.5	10.9		0.15	8.6		0.16	21.2		0.14	0.37		0.24	21000		0.61	10.6		0.35
South BCL stockpile (south)	J11KD3	4/4/06	4720	J	2.1	5.4		0.13	6.8		0.14	14.2		0.12	0.65		0.21	15200		0.52	26.1		0.30
South BCL stockpile (north)	J11KD4	4/4/06	4830	J	2.1	8.7		0.13	7.0		0.14	15.5		0.12	0.22		0.21	16700		0.52	7.2		0.30
Central BCL stockpile	J11KD5	4/4/06	4010	J	2.2	6.3		0.13	7.4		0.14	14.6		0.12	0.22	U	0.22	15700		0.54	4.8		0.31
North BCL stockpile	J11KD6	4/4/06	6970	J	2.1	12.7		0.12	6.6		0.13	15.8		0.11	0.22		0.21	14000		0.51	7.4		0.29
Equipment blank	J11KC4	4/4/06	18.1	J	1.9	0.12	U	0.12	0.12	U	0.12	0.11	U	0.11				359		0.48	0.34		0.27

Attachment	2	Sheet No.	3 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 2. 100-B-14:2 Area 5 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Lithium			Magnesium			Manganese			Mercury			Molybdenum			Nickel			Phosphorus		
			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
1	J11KB3	4/4/06	5.6	C	0.03	3680		3.9	289		0.03	0.02	U	0.02	0.49		0.29	8.7		0.24	939	C	0.90
2	J11KB4	4/4/06	8.4	C	0.03	3690		3.8	306		0.03	0.04		0.02	0.53		0.28	9.8		0.23	887	C	0.87
3	J11KB5	4/4/06	5.2	C	0.03	3650		3.8	259		0.03	0.02	U	0.02	0.41		0.28	8.7		0.23	874	C	0.87
4	J11KB6	4/4/06	6.4	C	0.03	4030		3.9	315		0.03	0.02	U	0.02	0.43		0.29	10.0		0.24	829	C	0.89
Duplicate of J11KB6	J11KC3	4/4/06	6.4	C	0.03	4170		3.8	333		0.03	0.02	U	0.02	0.52		0.29	10.0		0.24	886	C	0.88
5	J11KB7	4/4/06	5.7	C	0.03	4100		3.8	312		0.03	0.02	U	0.02	0.50		0.28	10.6		0.23	1030	C	0.87
6	J11KB8	4/4/06	5.5	C	0.03	3550		3.8	308		0.03	0.02	U	0.02	0.49		0.29	9.7		0.24	808	C	0.89
7	J11KB9	4/4/06	5.4	C	0.03	3360		3.9	302		0.03	0.03		0.02	0.49		0.29	8.6		0.24	717	C	0.89
8	J11KC0	4/4/06	3.9	C	0.03	2930		3.7	232		0.03	0.02	U	0.02	0.40		0.28	8.3		0.23	801	C	0.86
9	J11KC1	4/4/06	5.9	C	0.03	4090		3.7	362		0.03	0.02		0.01	0.53		0.28	11.7		0.23	944	C	0.86
10	J11KC2	4/4/06	11.9	C	0.03	6020		4.4	388		0.03	0.02	U	0.02	0.56		0.33	14.1		0.27	802	C	1.0
South BCL stockpile (south)	J11KD3	4/4/06	4.9	C	0.03	3060		3.8	276		0.03	0.04		0.02	0.45		0.28	8.0		0.23	889	C	0.87
South BCL stockpile (north)	J11KD4	4/4/06	5.9	C	0.03	3630		3.8	306		0.03	0.02	U	0.02	0.50		0.28	9.7		0.23	801	C	0.87
Central BCL stockpile	J11KD5	4/4/06	5.0	C	0.03	3470		3.9	324		0.03	0.02	U	0.02	0.39		0.29	9.0		0.24	859	C	0.90
North BCL stockpile	J11KD6	4/4/06	4.9	C	0.03	3120		3.7	264		0.03	0.1		0.02	0.46		0.28	8.1		0.23	896	C	0.86
Equipment blank	J11KC4	4/4/06	0.07	UJC	0.03	6.7		3.5	5.4		0.03	0.02	U	0.02	0.26	U	0.26	0.21	U	0.21	3.3	UJC	0.80

Sample Location	Sample Number	Sample Date	Potassium			Selenium			Silicon			Silver			Sodium			Strontium			Thallium		
			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
1	J11KB3	4/4/06	951		77.5	0.47	U	0.47	522	J	2.3	0.07	U	0.07	119	C	2.5	21.6	C	0.01	0.70	U	0.70
2	J11KB4	4/4/06	925		74.9	0.46	U	0.46	441	J	2.2	0.07	U	0.07	135	C	2.4	21.6	C	0.01	0.68	U	0.68
3	J11KB5	4/4/06	685		74.5	0.45	U	0.45	416	J	2.2	0.07	U	0.07	98.4	C	2.4	24.2	C	0.01	0.68	U	0.68
4	J11KB6	4/4/06	1050		76.0	0.46	U	0.46	478	J	2.2	0.07	U	0.07	111	C	2.5	24.3	C	0.01	0.69	U	0.69
Duplicate of J11KB6	J11KC3	4/4/06	1100		75.8	0.46	U	0.46	522	J	2.2	0.07	U	0.07	108	C	2.5	23.7	C	0.01	0.69	U	0.69
5	J11KB7	4/4/06	757		74.5	0.45	U	0.45	466	J	2.2	0.07	U	0.07	105	C	2.4	25.7	C	0.01	0.68	U	0.68
6	J11KB8	4/4/06	866		74.9	0.46	U	0.46	587	J	2.2	0.07	U	0.07	89.8	C	2.5	19.8	C	0.01	0.69	U	0.69
7	J11KB9	4/4/06	825		76.2	0.46	U	0.46	491	J	2.2	0.07	U	0.07	110	C	2.5	25.6	C	0.01	0.69	U	0.69
8	J11KC0	4/4/06	660		73.9	0.45	U	0.45	387	J	2.2	0.07	U	0.07	101	C	2.4	20.2	C	0.01	0.67	U	0.67
9	J11KC1	4/4/06	1150		73.7	0.45	U	0.45	483	J	2.2	0.07	U	0.07	129	C	2.4	27.5	C	0.01	0.67	U	0.67
10	J11KC2	4/4/06	1290		86.8	0.53	U	0.53	526	J	2.6	0.08	U	0.08	218	C	2.8	59.2	C	0.01	0.79	U	0.79
South BCL stockpile (south)	J11KD3	4/4/06	772		74.5	0.45	U	0.45	482	J	2.2	0.07	U	0.07	101	C	2.4	23.9	C	0.01	0.68	U	0.68
South BCL stockpile (north)	J11KD4	4/4/06	1050		74.4	0.45	U	0.45	486	J	2.2	0.07	U	0.07	103	C	2.4	21.6	C	0.01	0.68	U	0.68
Central BCL stockpile	J11KD5	4/4/06	1130		77.3	0.47	U	0.47	519	J	2.3	0.07	U	0.07	91.6	C	2.5	20.0	C	0.01	0.70	U	0.70
North BCL stockpile	J11KD6	4/4/06	742		73.2	0.45	U	0.45	517	J	2.2	0.07	U	0.07	154	C	2.4	33.1	C	0.01	0.66	U	0.66
Equipment blank	J11KC4	4/4/06	68.3	U	68.3	0.42	U	0.42	42.2	J	2.0	0.06	U	0.06	6.9	UJC	2.2	0.22	C	0.009	0.62	U	0.62

Attachment	2	Sheet No.	4 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 2. 100-B-14:2 Area 5 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Tin			Titanium			Uranium			Vanadium			Zinc			Zirconium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J11KB3	4/4/06	1.1		1.1	1330		0.03	0.88	UC	0.88	40.8		0.09	38.8		0.16	16.1		1.1
2	J11KB4	4/4/06	1.4		1.0	1560		0.03	0.85	UC	0.85	46.9		0.09	38.5		0.16	19.8		1.0
3	J11KB5	4/4/06	1.2		1.0	1360		0.03	0.85	UC	0.85	41.1		0.09	35.5		0.15	17.0		1.0
4	J11KB6	4/4/06	1.4		1.1	1450		0.03	0.87	UC	0.87	46.2		0.09	40.2		0.16	19.6		1.0
Duplicate of J11KB6	J11KC3	4/4/06	1.3		1.1	1460		0.03	2.2	UJC	0.87	44.6		0.09	38.5		0.16	19.8		1.0
5	J11KB7	4/4/06	1.5		1.0	1730		0.03	0.85	UC	0.85	49.1		0.09	38.4		0.15	18.3		1.0
6	J11KB8	4/4/06	1.2		1.1	1270		0.03	1.1	UJC	0.87	39.1		0.09	35.5		0.16	17.9		1.0
7	J11KB9	4/4/06	1.3		1.1	1100		0.03	1.3	UJC	0.87	35.2		0.09	34.4		0.16	14.5		1.0
8	J11KC0	4/4/06	1.2		1.0	1010		0.03	0.84	UC	0.84	31.2		0.09	29.2		0.15	14.4		1.0
9	J11KC1	4/4/06	1.3		1.0	1460		0.03	1.6	UJC	0.84	43.7		0.09	39.4		0.15	23.1		1.0
10	J11KC2	4/4/06	1.2	U	1.2	1020		0.03	3.1	UJC	0.99	36.7		0.10	44.8		0.18	11.2		1.2
South BCL stockpile (south)	J11KD3	4/4/06	1.1		1.0	1020		0.03	1.9	UJC	0.85	33.6		0.09	33.2		0.15	14.6		1.0
South BCL stockpile (north)	J11KD4	4/4/06	1.1		1.0	1250		0.03	1.8	UJC	0.85	42.0		0.09	38.2		0.15	17.4		1.0
Central BCL stockpile	J11KD5	4/4/06	1.3		1.1	1140		0.03	1.8	UJC	0.88	35.7		0.09	41.3		0.16	19.4		1.1
North BCL stockpile	J11KD6	4/4/06	1.3		1.0	1090		0.03	2.2	UJC	0.84	33.9		0.09	39.0		0.15	14.5		1.0
Equipment blank	J11KC4	4/4/06	0.95	U	0.95	1.9		0.03	0.78	UC	0.78	0.12		0.08	1.2		0.14	0.94	U	0.94

Attachment	2	Sheet No.	5 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 2. 100-B-14:2 Area 5 Verification Sampling Results.

Constituents	J11KB3 Location 1 Sample Date 4/4/06			J11KB4 Location 2 Sample Date 4/4/06			J11KB5 Location 3 Sample Date 4/4/06			J11KB6 Location 4 Sample Date 4/4/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	15	U	15	14	U	14	14	U	14	15	U	15
Aroclor-1221	15	U	15	14	U	14	14	U	14	15	U	15
Aroclor-1232	15	U	15	14	U	14	14	U	14	15	U	15
Aroclor-1242	15	U	15	14	U	14	14	U	14	15	U	15
Aroclor-1248	15	U	15	14	U	14	14	U	14	15	U	15
Aroclor-1254	15	U	15	14	U	14	3.5	J	14	3.9	J	15
Aroclor-1260	15	U	15	14	U	14	14	U	14	15	U	15
Pesticides												
Aldrin	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
alpha-BHC	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
alpha-Chlordane	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
beta-BHC	0.62	JD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
delta-BHC	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Dichlorodiphenyldichloroethane	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Dichlorodiphenyldichloroethylene	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Dichlorodiphenyltrichloroethane	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Dieldrin	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Endosulfan I	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Endosulfan II	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Endosulfan sulfate	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Endrin	1.5	UJD	1.5	1.4	UJD	1.4	1.3	JD	1.3	1.5	UJD	1.5
Endrin aldehyde	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Endrin ketone	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
gamma-BHC (Lindane)	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
gamma-Chlordane	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Heptachlor	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Heptachlor epoxide	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Methoxychlor	1.5	UJD	1.5	49	D	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Toxaphene	15	UJD	15	14	UJD	14	14	UJD	14	15	UJD	15
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	370	UJ	370	360	UJ	360	350	UJ	350	360	UJ	360
1,2-Dichlorobenzene	370	UJ	370	360	UJ	360	350	UJ	350	360	UJ	360
1,3-Dichlorobenzene	370	U	370	360	U	360	350	U	350	360	U	360
1,4-Dichlorobenzene	370	U	370	360	U	360	350	U	350	360	U	360
2,4,5-Trichlorophenol	910	U	910	890	U	890	890	U	890	910	U	910
2,4,6-Trichlorophenol	370	U	370	360	U	360	350	U	350	360	U	360
2,4-Dichlorophenol	370	UJ	370	360	UJ	360	350	UJ	350	360	UJ	360
2,4-Dimethylphenol	370	UJ	370	360	UJ	360	350	UJ	350	360	UJ	360
2,4-Dinitrophenol	910	UJ	910	890	UJ	890	890	UJ	890	910	UJ	910
2,4-Dinitrotoluene	370	U	370	360	U	360	350	U	350	360	U	360
2,6-Dinitrotoluene	370	U	370	360	U	360	350	U	350	360	U	360
2-Chloronaphthalene	370	U	370	360	U	360	350	U	350	360	U	360
2-Chlorophenol	370	U	370	360	U	360	350	U	350	360	U	360
2-Methylnaphthalene	370	U	370	360	U	360	350	U	350	360	U	360
2-Methylphenol (cresol, o-)	370	UJ	370	360	UJ	360	350	UJ	350	360	UJ	360
2-Nitroaniline	910	U	910	890	U	890	890	U	890	910	U	910
2-Nitrophenol	370	UJ	370	360	UJ	360	350	UJ	350	360	UJ	360

Attachment	2	Sheet No.	6 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 2. 100-B-14:2 Area 5 Verification Sampling Results.

Constituents	J11KB3 Location 1 Sample Date 4/4/06			J11KB4 Location 2 Sample Date 4/4/06			J11KB5 Location 3 Sample Date 4/4/06			J11KB6 Location 4 Sample Date 4/4/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	370	U	370	360	U	360	350	U	350	360	U	360
3-Nitroaniline	910	U	910	890	U	890	890	U	890	910	U	910
4,6-Dinitro-2-methylphenol	910	UJ	910	890	UJ	890	890	UJ	890	910	UJ	910
4-Bromophenyl-phenylether	370	U	370	360	U	360	350	U	350	360	U	360
4-Chloro-3-methylphenol	370	U	370	360	U	360	350	U	350	360	U	360
4-Chloroaniline	370	U	370	360	U	360	350	U	350	360	U	360
4-Chlorophenyl-phenylether	370	U	370	360	U	360	350	U	350	360	U	360
4-Methylphenol (p-cresol)	370	UJ	370	360	UJ	360	350	UJ	350	360	UJ	360
4-Nitroaniline	910	U	910	890	U	890	890	U	890	910	U	910
4-Nitrophenol	910	U	910	890	U	890	890	U	890	910	U	910
Acenaphthene	370	U	370	360	U	360	350	U	350	360	U	360
Acenaphthylene	370	U	370	360	U	360	350	U	350	360	U	360
Anthracene	370	U	370	360	U	360	350	U	350	360	U	360
Benzo(a)anthracene	370	U	370	360	U	360	350	U	350	360	U	360
Benzo(a)pyrene	370	U	370	360	U	360	350	U	350	360	U	360
Benzo(b)fluoranthene	370	U	370	360	U	360	350	U	350	360	U	360
Benzo(g,h,i)perylene	370	U	370	360	U	360	350	U	350	360	U	360
Benzo(k)fluoranthene	370	U	370	360	U	360	350	U	350	360	U	360
bis(2-Chloro-1-methylethyl)ether	370	UJ	370	360	UJ	360	350	UJ	350	360	UJ	360
bis(2-Chloroethoxy)methane	370	U	370	360	U	360	350	U	350	360	U	360
bis(2-Chloroethyl)ether	370	U	370	360	U	360	350	U	350	360	U	360
bis(2-Ethylhexyl)phthalate	370	U	370	36	J	360	33	J	350	19	J	360
Butylbenzylphthalate	370	U	370	360	U	360	350	U	350	360	U	360
Carbazole	370	U	370	360	U	360	350	U	350	360	U	360
Chrysene	370	U	370	360	U	360	350	U	350	360	U	360
Di-n-butylphthalate	370	U	370	360	U	360	21	J	350	360	U	360
Di-n-octylphthalate	370	U	370	360	U	360	350	U	350	360	U	360
Dibenz(a,h)anthracene	370	U	370	360	U	360	350	U	350	360	U	360
Dibenzofuran	370	U	370	360	U	360	350	U	350	360	U	360
Diethylphthalate	370	U	370	360	U	360	350	U	350	360	U	360
Dimethylphthalate	370	U	370	360	U	360	350	U	350	360	U	360
Fluoranthene	370	U	370	360	U	360	350	U	350	360	U	360
Fluorene	370	U	370	360	U	360	350	U	350	360	U	360
Hexachlorobenzene	370	U	370	360	U	360	350	U	350	360	U	360
Hexachlorobutadiene	370	U	370	360	U	360	350	U	350	360	U	360
Hexachlorocyclopentadiene	370	U	370	360	U	360	350	U	350	360	U	360
Hexachloroethane	370	U	370	360	U	360	350	U	350	360	U	360
Indeno(1,2,3-cd)pyrene	370	U	370	360	U	360	350	U	350	360	U	360
Isophorone	370	U	370	360	U	360	350	U	350	360	U	360
N-Nitroso-di-n-dipropylamine	370	UJ	370	360	UJ	360	350	UJ	350	360	UJ	360
N-Nitrosodiphenylamine	370	U	370	360	U	360	350	U	350	360	U	360
Naphthalene	370	U	370	360	U	360	350	U	350	360	U	360
Nitrobenzene	370	U	370	360	U	360	350	U	350	360	U	360
Pentachlorophenol	910	U	910	890	U	890	890	U	890	910	U	910
Phenanthrene	370	U	370	360	U	360	350	U	350	360	U	360
Phenol	370	UJ	370	360	UJ	360	350	UJ	350	360	UJ	360
Pyrene	370	U	370	360	U	360	350	U	350	360	U	360

Attachment	2	Sheet No.	7 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 2. 100-B-14:2 Area 5 Verification Sampling Results.

Constituents	J11KC3 Duplicate of J11KB6 Sample Date 4/4/06			J11KB7 Location 5 Sample Date 4/4/06			J11KB8 Location 6 Sample Date 4/4/06			J11KB9 Location 7 Sample Date 4/4/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	15	U	15	14	U	14	14	U	14	15	U	15
Aroclor-1221	15	U	15	14	U	14	14	U	14	15	U	15
Aroclor-1232	15	U	15	14	U	14	14	U	14	15	U	15
Aroclor-1242	15	U	15	14	U	14	14	U	14	15	U	15
Aroclor-1248	15	U	15	14	U	14	14	U	14	15	U	15
Aroclor-1254	11	J	15	14	U	14	14	U	14	2.9	J	15
Aroclor-1260	15	U	15	14	U	14	14	U	14	15	U	15
Pesticides												
Aldrin	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
alpha-BHC	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
alpha-Chlordane	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
beta-BHC	0.62	JD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
delta-BHC	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Dichlorodiphenyldichloroethane	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Dichlorodiphenyldichloroethylene	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Dichlorodiphenyltrichloroethane	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Dieldrin	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Endosulfan I	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Endosulfan II	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Endosulfan sulfate	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Endrin	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Endrin aldehyde	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Endrin ketone	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
gamma-BHC (Lindane)	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
gamma-Chlordane	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Heptachlor	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Heptachlor epoxide	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Methoxychlor	1.5	UJD	1.5	1.4	UJD	1.4	1.4	UJD	1.4	1.5	UJD	1.5
Toxaphene	15	UJD	15	14	UJD	14	14	UJD	14	15	UJD	15
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	360	UJ	360	350	UJ	350	360	UJ	360	370	UJ	370
1,2-Dichlorobenzene	360	UJ	360	350	UJ	350	360	UJ	360	370	UJ	370
1,3-Dichlorobenzene	360	U	360	350	U	350	360	U	360	370	U	370
1,4-Dichlorobenzene	360	U	360	350	U	350	360	U	360	370	U	370
2,4,5-Trichlorophenol	910	U	910	890	U	890	900	U	900	910	U	910
2,4,6-Trichlorophenol	360	U	360	350	U	350	360	U	360	370	U	370
2,4-Dichlorophenol	360	UJ	360	350	UJ	350	360	UJ	360	370	UJ	370
2,4-Dimethylphenol	360	UJ	360	350	UJ	350	360	UJ	360	370	UJ	370
2,4-Dinitrophenol	910	UJ	910	890	UJ	890	900	UJ	900	910	UJ	910
2,4-Dinitrotoluene	360	U	360	350	U	350	360	U	360	370	U	370
2,6-Dinitrotoluene	360	U	360	350	U	350	360	U	360	370	U	370
2-Chloronaphthalene	360	U	360	350	U	350	360	U	360	370	U	370
2-Chlorophenol	360	U	360	350	U	350	360	U	360	370	U	370
2-Methylnaphthalene	360	U	360	350	U	350	360	U	360	370	U	370
2-Methylphenol (cresol, o-)	360	UJ	360	350	UJ	350	360	UJ	360	370	UJ	370
2-Nitroaniline	910	U	910	890	U	890	900	U	900	910	U	910
2-Nitrophenol	360	UJ	360	350	UJ	350	360	UJ	360	370	UJ	370

Attachment	2	Sheet No.	8 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 2. 100-B-14:2 Area 5 Verification Sampling Results.

Constituents	J11KC3 Duplicate of J11KB6 Sample Date 4/4/06			J11KB7 Location 5 Sample Date 4/4/06			J11KB8 Location 6 Sample Date 4/4/06			J11KB9 Location 7 Sample Date 4/4/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	360	U	360	350	U	350	360	U	360	370	U	370
3-Nitroaniline	910	U	910	890	U	890	900	U	900	910	U	910
4,6-Dinitro-2-methylphenol	910	UJ	910	890	UJ	890	900	UJ	900	910	UJ	910
4-Bromophenyl-phenylether	360	U	360	350	U	350	360	U	360	370	U	370
4-Chloro-3-methylphenol	360	U	360	350	U	350	360	U	360	370	U	370
4-Chloroaniline	360	U	360	350	U	350	360	U	360	370	U	370
4-Chlorophenyl-phenylether	360	U	360	350	U	350	360	U	360	370	U	370
4-Methylphenol (p-cresol)	360	UJ	360	350	UJ	350	360	UJ	360	370	UJ	370
4-Nitroaniline	910	U	910	890	U	890	900	U	900	910	U	910
4-Nitrophenol	910	U	910	890	U	890	900	U	900	910	U	910
Acenaphthene	360	U	360	350	U	350	360	U	360	370	U	370
Acenaphthylene	360	U	360	350	U	350	360	U	360	370	U	370
Anthracene	360	U	360	350	U	350	360	U	360	370	U	370
Benzo(a)anthracene	360	U	360	350	U	350	360	U	360	370	U	370
Benzo(a)pyrene	360	U	360	350	U	350	360	U	360	370	U	370
Benzo(b)fluoranthene	360	U	360	350	U	350	360	U	360	370	U	370
Benzo(g,h,i)perylene	360	U	360	350	U	350	360	U	360	370	U	370
Benzo(k)fluoranthene	360	U	360	350	U	350	360	U	360	370	U	370
bis(2-Chloro-1-methylethyl)ether	360	UJ	360	350	UJ	350	360	UJ	360	370	UJ	370
bis(2-Chloroethoxy)methane	360	U	360	350	U	350	360	U	360	370	U	370
bis(2-Chloroethyl)ether	360	U	360	350	U	350	360	U	360	370	U	370
bis(2-Ethylhexyl)phthalate	24	J	360	350	U	350	360	U	360	370	U	370
Butylbenzylphthalate	360	U	360	350	U	350	360	U	360	370	U	370
Carbazole	360	U	360	350	U	350	360	U	360	370	U	370
Chrysene	360	U	360	350	U	350	360	U	360	370	U	370
Di-n-butylphthalate	360	U	360	350	U	350	360	U	360	370	U	370
Di-n-octylphthalate	360	U	360	350	U	350	360	U	360	370	U	370
Dibenz(a,h)anthracene	360	U	360	350	U	350	360	U	360	370	U	370
Dibenzofuran	360	U	360	350	U	350	360	U	360	370	U	370
Diethylphthalate	360	U	360	350	U	350	360	U	360	370	U	370
Dimethylphthalate	360	U	360	350	U	350	360	U	360	370	U	370
Fluoranthene	360	U	360	350	U	350	360	U	360	370	U	370
Fluorene	360	U	360	350	U	350	360	U	360	370	U	370
Hexachlorobenzene	360	U	360	350	U	350	360	U	360	370	U	370
Hexachlorobutadiene	360	U	360	350	U	350	360	U	360	370	U	370
Hexachlorocyclopentadiene	360	U	360	350	U	350	360	U	360	370	U	370
Hexachloroethane	360	U	360	350	U	350	360	U	360	370	U	370
Indeno(1,2,3-cd)pyrene	360	U	360	350	U	350	360	U	360	370	U	370
Isophorone	360	U	360	350	U	350	360	U	360	370	U	370
N-Nitroso-di-n-dipropylamine	360	UJ	360	350	UJ	350	360	UJ	360	370	UJ	370
N-Nitrosodiphenylamine	360	U	360	350	U	350	360	U	360	370	U	370
Naphthalene	360	U	360	350	U	350	360	U	360	370	U	370
Nitrobenzene	360	U	360	350	U	350	360	U	360	370	U	370
Pentachlorophenol	910	U	910	890	U	890	900	U	900	910	U	910
Phenanthrene	360	U	360	350	U	350	360	U	360	370	U	370
Phenol	360	UJ	360	350	UJ	350	360	UJ	360	370	UJ	370
Pyrene	360	U	360	350	U	350	360	U	360	370	U	370

Attachment	2	Sheet No.	9 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 2. 100-B-14:2 Area 5 Verification Sampling Results.

Constituents	J11KC0 Location 8 Sample Date 4/4/06			J11KC1 Location 9 Sample Date 4/4/06			J11KC2 Location 10 Sample Date 4/4/06			J11KD3 South BCL Stockpile Sample Date 4/4/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	14	U	14	16	U	16	14	U	14
Aroclor-1221	14	U	14	14	U	14	16	U	16	14	U	14
Aroclor-1232	14	U	14	14	U	14	16	U	16	14	U	14
Aroclor-1242	14	U	14	14	U	14	16	U	16	14	U	14
Aroclor-1248	14	U	14	14	U	14	16	U	16	14	U	14
Aroclor-1254	4.2	J	14	14	U	14	16	U	16	14	U	14
Aroclor-1260	14	U	14	14	U	14	16	U	16	14	U	14
Pesticides												
Aldrin	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
alpha-BHC	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
alpha-Chlordane	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
beta-BHC	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
delta-BHC	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Dichlorodiphenyldichloroethane	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Dichlorodiphenyldichloroethylene	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Dichlorodiphenyltrichloroethane	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Dieldrin	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Endosulfan I	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Endosulfan II	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Endosulfan sulfate	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Endrin	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Endrin aldehyde	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Endrin ketone	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
gamma-BHC (Lindane)	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
gamma-Chlordane	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Heptachlor	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Heptachlor epoxide	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Methoxychlor	1.4	UJD	1.4	1.4	UJD	1.4	1.6	UJD	1.6	1.4	UJD	1.4
Toxaphene	14	UJD	14	14	UJD	14	16	UJD	16	14	UJD	14
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	350	UJ	350	360	UJ	360	410	UJ	410	350	UJ	350
1,2-Dichlorobenzene	350	UJ	350	360	UJ	360	410	UJ	410	350	UJ	350
1,3-Dichlorobenzene	350	U	350	360	U	360	410	U	410	350	U	350
1,4-Dichlorobenzene	350	U	350	360	U	360	410	U	410	350	U	350
2,4,5-Trichlorophenol	880	U	880	890	U	890	1000	U	1000	890	U	890
2,4,6-Trichlorophenol	350	U	350	360	U	360	410	U	410	350	U	350
2,4-Dichlorophenol	350	UJ	350	360	UJ	360	410	UJ	410	350	UJ	350
2,4-Dimethylphenol	350	UJ	350	360	UJ	360	410	UJ	410	350	UJ	350
2,4-Dinitrophenol	880	UJ	880	890	UJ	890	1000	UJ	1000	890	UJ	890
2,4-Dinitrotoluene	350	U	350	360	U	360	410	U	410	350	U	350
2,6-Dinitrotoluene	350	U	350	360	U	360	410	U	410	350	U	350
2-Chloronaphthalene	350	U	350	360	U	360	410	U	410	350	U	350
2-Chlorophenol	350	U	350	360	U	360	410	U	410	350	U	350
2-Methylnaphthalene	350	U	350	360	U	360	410	U	410	350	U	350
2-Methylphenol (cresol, o-)	350	UJ	350	360	UJ	360	410	UJ	410	350	UJ	350
2-Nitroaniline	880	U	880	890	U	890	1000	U	1000	890	U	890
2-Nitrophenol	350	UJ	350	360	UJ	360	410	UJ	410	350	UJ	350

Attachment	2	Sheet No.	10 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 2. 100-B-14:2 Area 5 Verification Sampling Results.

Constituents	J11KC0 Location 8 Sample Date 4/4/06			J11KC1 Location 9 Sample Date 4/4/06			J11KC2 Location 10 Sample Date 4/4/06			J11KD3 South BCL Stockpile Sample Date 4/4/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	350	U	350	360	U	360	410	U	410	350	U	350
3-Nitroaniline	880	U	880	890	U	890	1000	U	1000	890	U	890
4,6-Dinitro-2-methylphenol	880	UJ	880	890	UJ	890	1000	UJ	1000	890	UJ	890
4-Bromophenyl-phenylether	350	U	350	360	U	360	410	U	410	350	U	350
4-Chloro-3-methylphenol	350	U	350	360	U	360	410	U	410	350	U	350
4-Chloroaniline	350	U	350	360	U	360	410	U	410	350	U	350
4-Chlorophenyl-phenylether	350	U	350	360	U	360	410	U	410	350	U	350
4-Methylphenol (p-cresol)	350	UJ	350	360	UJ	360	410	UJ	410	350	UJ	350
4-Nitroaniline	880	U	880	890	U	890	1000	U	1000	890	U	890
4-Nitrophenol	880	U	880	890	U	890	1000	U	1000	890	U	890
Acenaphthene	350	U	350	360	U	360	410	U	410	350	U	350
Acenaphthylene	350	U	350	360	U	360	410	U	410	350	U	350
Anthracene	350	U	350	360	U	360	410	U	410	350	U	350
Benzo(a)anthracene	350	U	350	360	U	360	410	U	410	350	U	350
Benzo(a)pyrene	350	U	350	360	U	360	410	U	410	350	U	350
Benzo(b)fluoranthene	350	U	350	360	U	360	410	U	410	350	U	350
Benzo(g,h,i)perylene	350	U	350	360	U	360	410	U	410	350	U	350
Benzo(k)fluoranthene	350	U	350	360	U	360	410	U	410	350	U	350
bis(2-Chloro-1-methylethyl)ether	350	UJ	350	360	UJ	360	410	UJ	410	350	UJ	350
bis(2-Chloroethoxy)methane	350	U	350	360	U	360	410	U	410	350	U	350
bis(2-Chloroethyl)ether	350	U	350	360	U	360	410	U	410	350	U	350
bis(2-Ethylhexyl)phthalate	22	J	350	360	U	360	410	U	410	25	J	350
Butylbenzylphthalate	350	U	350	360	U	360	410	U	410	350	U	350
Carbazole	350	U	350	360	U	360	410	U	410	350	U	350
Chrysene	350	U	350	360	U	360	410	U	410	21	J	350
Di-n-butylphthalate	350	U	350	360	U	360	410	U	410	350	U	350
Di-n-octylphthalate	350	U	350	360	U	360	410	U	410	350	U	350
Dibenz(a,h)anthracene	350	U	350	360	U	360	410	U	410	350	U	350
Dibenzofuran	350	U	350	360	U	360	410	U	410	350	U	350
Diethylphthalate	350	U	350	360	U	360	410	U	410	350	U	350
Dimethylphthalate	350	U	350	360	U	360	410	U	410	350	U	350
Fluoranthene	350	U	350	360	U	360	410	U	410	19	J	350
Fluorene	350	U	350	360	U	360	410	U	410	350	U	350
Hexachlorobenzene	350	U	350	360	U	360	410	U	410	350	U	350
Hexachlorobutadiene	350	U	350	360	U	360	410	U	410	350	U	350
Hexachlorocyclopentadiene	350	U	350	360	U	360	410	U	410	350	U	350
Hexachloroethane	350	U	350	360	U	360	410	U	410	350	U	350
Indeno(1,2,3-cd)pyrene	350	U	350	360	U	360	410	U	410	350	U	350
Isophorone	350	U	350	360	U	360	410	U	410	350	U	350
N-Nitroso-di-n-dipropylamine	350	UJ	350	360	UJ	360	410	UJ	410	350	UJ	350
N-Nitrosodiphenylamine	350	U	350	360	U	360	410	U	410	350	U	350
Naphthalene	350	U	350	360	U	360	410	U	410	350	U	350
Nitrobenzene	350	U	350	360	U	360	410	U	410	350	U	350
Pentachlorophenol	880	U	880	890	U	890	1000	U	1000	890	U	890
Phenanthrene	350	U	350	360	U	360	410	U	410	350	U	350
Phenol	350	UJ	350	360	UJ	360	410	UJ	410	350	UJ	350
Pyrene	20	J	350	360	U	360	410	U	410	18	J	350

Attachment	2	Sheet No.	11 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 2. 100-B-14:2 Area 5 Verification Sampling Results.

Constituents	J11KD4 South BCL Stockpile Sample Date 4/4/06			J11KD5 Cntr. BCL Stockpile Sample Date 4/4/06			J11KD6 North BCL Stockpile Sample Date 4/4/06			J11KC4 Equipment Blank Sample Date 4/4/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	15	U	15	14	U	14			
Aroclor-1221	14	U	14	15	U	15	14	U	14			
Aroclor-1232	14	U	14	15	U	15	14	U	14			
Aroclor-1242	14	U	14	15	U	15	14	U	14			
Aroclor-1248	14	U	14	15	U	15	14	U	14			
Aroclor-1254	14	U	14	15	U	15	14	U	14			
Aroclor-1260	14	U	14	15	U	15	14	U	14			
Pesticides												
Aldrin	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
alpha-BHC	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
alpha-Chlordane	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
beta-BHC	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
delta-BHC	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Dichlorodiphenyldichloroethane	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Dichlorodiphenyldichloroethylene	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Dichlorodiphenyltrichloroethane	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Dieldrin	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Endosulfan I	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Endosulfan II	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Endosulfan sulfate	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Endrin	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Endrin aldehyde	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Endrin ketone	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
gamma-BHC (Lindane)	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
gamma-Chlordane	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Heptachlor	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Heptachlor epoxide	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Methoxychlor	1.4	UJD	1.4	1.5	UJD	1.5	1.4	UJD	1.4			
Toxaphene	14	UJD	14	15	UJD	15	14	UJD	14			
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	360	UJ	360	360	UJ	360	350	UJ	350	330	UJ	330
1,2-Dichlorobenzene	360	UJ	360	360	UJ	360	350	UJ	350	330	UJ	330
1,3-Dichlorobenzene	360	U	360	360	U	360	350	U	350	330	U	330
1,4-Dichlorobenzene	360	U	360	360	U	360	350	U	350	330	U	330
2,4,5-Trichlorophenol	890	U	890	910	U	910	890	U	890	830	U	830
2,4,6-Trichlorophenol	360	U	360	360	U	360	350	U	350	330	U	330
2,4-Dichlorophenol	360	UJ	360	360	UJ	360	350	UJ	350	330	UJ	330
2,4-Dimethylphenol	360	UJ	360	360	UJ	360	350	UJ	350	330	UJ	330
2,4-Dinitrophenol	890	UJ	890	910	UJ	910	890	UJ	890	830	UJ	830
2,4-Dinitrotoluene	360	U	360	360	U	360	350	U	350	330	U	330
2,6-Dinitrotoluene	360	U	360	360	U	360	350	U	350	330	U	330
2-Chloronaphthalene	360	U	360	360	U	360	350	U	350	330	U	330
2-Chlorophenol	360	U	360	360	U	360	350	U	350	330	U	330
2-Methylnaphthalene	360	U	360	360	U	360	350	U	350	330	U	330
2-Methylphenol (cresol, o-)	360	UJ	360	360	UJ	360	350	UJ	350	330	UJ	330
2-Nitroaniline	890	U	890	910	U	910	890	U	890	830	U	830
2-Nitrophenol	360	UJ	360	360	UJ	360	350	UJ	350	330	UJ	330

Attachment	2	Sheet No.	12 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

Attachment 2. 100-B-14:2 Area 5 Verification Sampling Results.

Constituents	J11KD4 South BCL Stockpile Sample Date 4/4/06			J11KD5 Cntr. BCL Stockpile Sample Date 4/4/06			J11KD6 North BCL Stockpile Sample Date 4/4/06			J11KC4 Equipment Blank Sample Date 4/4/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	360	U	360	360	U	360	350	U	350	330	U	330
3-Nitroaniline	890	U	890	910	U	910	890	U	890	830	U	830
4,6-Dinitro-2-methylphenol	890	UJ	890	910	UJ	910	890	UJ	890	830	UJ	830
4-Bromophenyl-phenylether	360	U	360	360	U	360	350	U	350	330	U	330
4-Chloro-3-methylphenol	360	U	360	360	U	360	350	U	350	330	U	330
4-Chloroaniline	360	U	360	360	U	360	350	U	350	330	U	330
4-Chlorophenyl-phenylether	360	U	360	360	U	360	350	U	350	330	U	330
4-Methylphenol (p-cresol)	360	UJ	360	360	UJ	360	350	UJ	350	330	UJ	330
4-Nitroaniline	890	U	890	910	U	910	890	U	890	830	U	830
4-Nitrophenol	890	U	890	910	U	910	890	U	890	830	U	830
Acenaphthene	360	U	360	360	U	360	350	U	350	330	U	330
Acenaphthylene	360	U	360	360	U	360	350	U	350	330	U	330
Anthracene	360	U	360	360	U	360	350	U	350	330	U	330
Benzo(a)anthracene	360	U	360	360	U	360	350	U	350	330	U	330
Benzo(a)pyrene	360	U	360	360	U	360	350	U	350	330	U	330
Benzo(b)fluoranthene	360	U	360	360	U	360	350	U	350	330	U	330
Benzo(g,h,i)perylene	360	U	360	360	U	360	350	U	350	330	U	330
Benzo(k)fluoranthene	360	U	360	360	U	360	350	U	350	330	U	330
bis(2-Chloro-1-methylethyl)ether	360	UJ	360	360	UJ	360	350	UJ	350	330	UJ	330
bis(2-Chloroethoxy)methane	360	U	360	360	U	360	350	U	350	330	U	330
bis(2-Chloroethyl)ether	360	U	360	360	U	360	350	U	350	330	U	330
bis(2-Ethylhexyl)phthalate	27	J	360	360	U	360	27	J	350	19	J	330
Butylbenzylphthalate	360	U	360	360	U	360	350	U	350	330	U	330
Carbazole	360	U	360	360	U	360	350	U	350	330	U	330
Chrysene	360	U	360	360	U	360	350	U	350	330	U	330
Di-n-butylphthalate	360	U	360	360	U	360	350	U	350	48	J	330
Di-n-octylphthalate	360	U	360	360	U	360	350	U	350	330	U	330
Dibenz(a,h)anthracene	360	U	360	360	U	360	350	U	350	330	U	330
Dibenzofuran	360	U	360	360	U	360	350	U	350	330	U	330
Diethylphthalate	360	U	360	360	U	360	350	U	350	330	U	330
Dimethylphthalate	360	U	360	360	U	360	350	U	350	330	U	330
Fluoranthene	360	U	360	360	U	360	350	U	350	330	U	330
Fluorene	360	U	360	360	U	360	350	U	350	330	U	330
Hexachlorobenzene	360	U	360	360	U	360	350	U	350	330	U	330
Hexachlorobutadiene	360	U	360	360	U	360	350	U	350	330	U	330
Hexachlorocyclopentadiene	360	U	360	360	U	360	350	U	350	330	U	330
Hexachloroethane	360	U	360	360	U	360	350	U	350	330	U	330
Indeno(1,2,3-cd)pyrene	360	U	360	360	U	360	350	U	350	330	U	330
Isophorone	360	U	360	360	U	360	350	U	350	330	U	330
N-Nitroso-di-n-dipropylamine	360	UJ	360	360	UJ	360	350	UJ	350	330	UJ	330
N-Nitrosodiphenylamine	360	U	360	360	U	360	350	U	350	330	U	330
Naphthalene	360	U	360	360	U	360	350	U	350	330	U	330
Nitrobenzene	360	U	360	360	U	360	350	U	350	330	U	330
Pentachlorophenol	890	U	890	910	U	910	890	U	890	830	U	830
Phenanthrene	360	U	360	360	U	360	350	U	350	330	U	330
Phenol	360	UJ	360	360	UJ	360	350	UJ	350	330	UJ	330
Pyrene	19	J	360	360	U	360	350	U	350	330	U	330

Attachment	2	Sheet No.	13 of 13
Originator	J. M. Capron	Date	07/31/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0281	Rev. No.	0

CALCULATION COVER SHEET

Project Title 100-B/C Remaining Pipes and Sewers Field Remediation **Job No.** 14655
Area 100-B/C
Discipline Environmental ***Calc. No.** 0100B-CA-V0282
Subject 100-B-14:2 (Areas 2 & 5) Waste Site 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 *Approved 9/20/06*	T. M. Blakley *Approved 9/21/06*	L. M. Dittmer *Approved 9/25/06*	D. N. Strom *Approved 9/25/06*	*9/25/06*
1	Cover = 1 Summary = 4 Total = 5	J. M. Capron J M Capron 11/06/06	S. W. Clark S. W. Clark 11/06/06	N/A	D. N. Strom D N Strom 11-21-06	11-21-06

SUMMARY OF REVISION	
1	Cover page replaced for convenience. Sheet 1, line 21, EPA reference removed due to changes in lead calculations. Sheet 2, line 7, discussion of strontium included. Sheet 2, line 9, discussion of barium included. Sheet 2, lines 13 to 16, discussion of lead exclusion included for consistency with other portions of the sewer system. Sheet 2, line 27, cumulative hazard quotient values corrected per changes to individual calculations. Sheet 3 replaced in entirety for convenience due to change in pagination break of preceding sheet and to include strontium in Table 1. Sheet 4, lines 9 to 12, strontium included in Table 2 and calculations for lead removed.

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:	11/16/06	Calc. No.:	0100B-CA-V0282	Rev.:	1
Project:	100-B/C RPAS Field Remediation	Job No:	14655	Checked:	S. W. Clark SWC	Date:	11/16/06
Subject:	100-B-14:2 (Areas 2 & 5) Waste Site Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	1 of 4

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and excess carcinogenic risk values for the 100-B-14:2 subsite, areas 2 and 5 remediation verification sampling results (area 5 was previously designated as the 100-B-14:9 subsite). In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2005), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess carcinogenic risk of $<1 \times 10^{-6}$ for individual carcinogens
4) A cumulative excess carcinogenic risk of $<1 \times 10^{-5}$ for carcinogens.

GIVEN/REFERENCES:

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

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

3) WCH, 2006, *100-B-14:2 (Areas 2 & 5) Waste Site Cleanup Verification 95% UCL Calculations*, Calculation No. 0100B-CA-V0281, Washington Closure Hanford, Richland, Washington.

SOLUTION:

1) Calculate an HQ for each noncarcinogenic constituent detected above background and compare to the individual HQ of <1.0 (DOE-RL 2005).

2) Sum the HQs and compare to the cumulative HQ criterion of <1.0.

3) Calculate an excess carcinogenic risk value for each carcinogenic constituent detected above background and compare to the individual excess carcinogenic risk criterion of $<1 \times 10^{-6}$ (DOE-RL 2005).

4) Sum the excess carcinogenic risk values and compare to the cumulative excess carcinogenic risk criterion of $<1 \times 10^{-5}$.

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron JMC	Date:	11/16/06	Calc. No.:	0100B-CA-V0282	Rev.:	1
Project:	100-B/C RPAS Field Remediation	Job No:	14655	Checked:	S. W. Clark SWC	Date:	11/16/06
Subject:	100-B-14:2 (Areas 2 & 5) Waste Site Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 2 of 4	

METHODOLOGY:

Hazard quotient and carcinogenic risk calculations were performed separately for area 2 and area 5 of the 100-B-14:2 subsite. Calculations for each area were performed using the higher of the remediation footprint statistical value and overburden/below cleanup levels (BCL) material maximum value for each analyte detected above background. Of the contaminants of concern (COCs) and contaminants of potential concern (COPCs) for the site, boron, molybdenum, strontium and tin require the HQ calculations for one or both areas because they were detected and Washington State or Hanford Site background values are not available. Barium was included for area 2 because it was quantified above the Hanford Site background value. Hexavalent chromium, aroclor-1254, and multiple chlorinated pesticides and semivolatile organic compounds (as identified in Tables 1 and 2) are included for one both areas because they were detected by laboratory analysis and cannot be attributed to natural occurrence. Lead does not have a reference dose for calculation of a hazard quotient because toxic effects of lead are correlated with blood-lead levels rather than exposure levels or daily intake. As a result, the maximum lead concentration for area 5 is reported but not included in the hazard quotient calculation. 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 statistical value for boron in area 2 is 4.5 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 2.8×10^{-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 sums of the HQ values for areas 2 and 5 are 3.4×10^{-2} and 1.2×10^{-2}, respectively. Comparing these values 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 in area 2 is 0.28 mg/kg; divided by 2.1 mg/kg and multiplied as indicated is 1.3×10^{-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 sums of the excess carcinogenic risk values for areas 2 and 5 are 3.1×10^{-7} and 3.3×10^{-7}, respectively. Comparing these values to the requirement of $<1 \times 10^{-5}$, this criterion is met.

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None
3) List individual carcinogens and corresponding excess cancer risk $>1 \times 10^{-6}$: None
4) List the cumulative excess cancer risk for carcinogens $>1 \times 10^{-5}$: None.

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron	Date:	11/16/06	Calc. No.:	0100B-CA-V0282	Rev.:	1
Project:	100-B/C RPAS Field Remediation	Job No:	14655	Checked:	S. W. Clark	Date:	11/16/06
Subject:	100-B-14:2 (Areas 2 & 5) Waste Site Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 3 of 4	

Table 1 shows the results of the calculations for the 100-B-14:2 subsite (area 2); results for area 5 are provided in Table 2.

Table 1. Hazard Quotient and Excess Cancer Risk Results for the 100-B-14:2 (Area 2) 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	163	5,600	2.9E-02	--	--
Boron	4.5	16,000	2.8E-04	--	--
Chromium, hexavalent[c]	0.28	240	1.2E-03	2.1	1.3E-07
Molybdenum	0.7	400	1.8E-03	--	--
Strontium	57.1	48,000	1.2E-03	--	--
Semivolatiles					
Benzo(a)pyrene	0.021	--	--	0.137	1.5E-07
Benzo(b)fluoranthene	0.023	--	--	1.37	1.7E-08
Benzo(k)fluoranthene	0.022	--	--	13.7	1.6E-09
Chrysene	0.022	--	--	137	1.6E-10
Methylnaphthalene; 2-	0.034	320	1.1E-04	--	--
Naphthalene	0.024	1,600	1.5E-05	--	--
Phenanthrene[d]	0.024	24,000	1.0E-06	--	--
Pesticides					
BHC, beta-	0.00060	--	--	0.556	1.1E-09
Endosulfan (I, II, sulfate)	0.00053	480	1.1E-06	--	--
Totals					
Cumulative Hazard Quotient:			**3.4E-02**		
Cumulative Excess Cancer Risk:					**3.1E-07**

Notes:
[a] = From WCH (2006).
[b] = Value obtained from *Washington Administrative Code* (WAC) 173-340-740(3), Method B, 1996, unless otherwise noted.
[c] = Value for the carcinogen RAG calculated based on the inhalation exposure pathway (WAC) 173-340-750(3), 1996.
[d] = Toxicity data are not available for this constituent. RAGs for phenanthrene are based on the surrogate chemical anthracene.
-- = not applicable
RAG = remedial action goal

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron	Date:	11/16/06	Calc. No.:	0100B-CA-V0282	Rev.:	1
Project:	100-B/C RPAS Field Remediation	Job No:	14655	Checked:	S. W. Clark	Date:	11/16/06
Subject:	100-B-14:2 (Areas 2 & 5) Waste Site Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 4 of 4	

Table 2. Hazard Quotient and Excess Cancer Risk Results for the 100-B-14:2 (Area 5) 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					
Boron	3.3	16,000	2.1E-04	--	--
Chromium, hexavalent[c]	0.65	240	2.7E-03	2.1	3.1E-07
Lead	26.1	--	--	--	--
Molybdenum	0.52	400	1.3E-03	--	--
Strontium	33.1	48,000	6.9E-04	--	--
Tin	1.3	48,000	2.7E-05	--	--
Semivolatiles					
Bis(2-ethylhexyl) phthalate	0.036	1,600	2.3E-05	71.4	5.0E-10
Chrysene	0.021	--	--	137	1.5E-10
Di-n-butylphthalate	0.021	8,000	2.6E-06	--	--
Fluoranthene	0.019	3,200	5.9E-06	--	--
Pyrene	0.020	2,400	8.3E-06	--	--
Pesticides					
BHC, beta-	0.00062	--	--	0.556	1.1E-09
Endrin (and ketone, aldehyde)	0.0013	24	5.4E-05	--	--
Methoxychlor	0.049	400	1.2E-04	--	--
Polychlorinated Biphenyls					
Aroclor-1254	0.011	1.6	6.9E-03	0.5	2.2E-08
Totals					
Cumulative Hazard Quotient:			**1.2E-02**		
Cumulative Excess Cancer Risk:					**3.3E-07**

Notes:
[a] = From WCH (2006).
[b] = Value obtained from *Washington Administrative Code* (WAC) 173-340-740(3), Method B, 1996, unless otherwise noted.
[c] = Value for the carcinogen RAG calculated based on the inhalation exposure pathway (WAC) 173-340-750(3), 1996.
-- = not applicable
RAG = remedial action goal

CONCLUSION:

This calculation demonstrates that areas 2 and 5 of the 100-B-14:2 subsite meet the requirements for hazard quotient and excess carcinogenic risk as identified in the RDR/RAWP (DOE-RL 2005).

CALCULATION COVER SHEET

Project Title:	100-B/C Remaining Pipes and Sewers Field Remediation	**Job No.**	14655
Area	100-B/C		
Discipline	Environmental	***Calc. No.**	0100B-CA-V0290
Subject	100-B-14:2 (Area 4) Waste Site 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 = 17 Attm. 1 = 13 Total = 31	9/20/06 J. M. Capron	T. M. Blakley 9/21/06 T. M. Blakley	9/25/06 L. M. Dittmer	9-25-06 D. N. Strom	9-25-06

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 *JMC* **Date** 09/20/06 **Calc. No.** 0100B-CA-V0290 **Rev. No.** 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation **Job No.** 14655 **Checked** T. M. Blakley *TMB* **Date** 9/21/06
Subject 100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations **Sheet No.** 1 of 17

Summary

Purpose:
Calculate the 95% upper confidence limit (UCL) values to evaluate compliance with cleanup standards for the remediation footprint of the 100-B-14:2 subsite, area 4 (previously designated as the 100-B-14:8 subsite). 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 sample pairs, as necessary.

Table of Contents:
Sheets 1 to 4 - Calculation Sheet Summary
Sheets 5 to 8 - Calculation Sheet 100-B-14:2 Area 4 Remediation Footprint Verification Data
Sheet 9 - Calculation Sheet Duplicate Analysis
Sheets 10 to 17 - Ecology Software (MTCAStat) Results
Attachment 1 - 100-B-14:2 Area 4 Verification Sampling Results (13 sheets)

Given/References:
1) Sample Results (Attachment 1).
2) Background values and remedial action goals (RAGs) are taken from DOE-RL (2005b), DOE-RL (2001), Ecology (1994), and Ecology (2005).
3) DOE-RL, 2001, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) DOE-RL, 2005a, *100 Area Remedial Action Sampling and Analysis Plan* (SAP), DOE/RL-96-22, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
5) DOE-RL, 2005b, *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, 1994, *Natural Background Soil Metals Concentrations in Washington State*, Publication No. 94-115, Washington State Department of Ecology, Olympia, Washington.
9) Ecology, 2005, *Cleanup Levels and Risk Calculations (CLARC) Database*, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
10) 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.
11) 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 Remaining Sites Verification Package (RSVP).

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 RPD results are used in evaluation of data quality within the RSVP for this site.

Methodology:
For nonradioactive analytes with ≤50% of the data below detection limits and 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 nonradionuclide data sets where >50% of the data was below detection limits or radionuclide data sets with no reported detections. The 95% UCL values were not calculated for aluminum, calcium, iron, magnesium, phosphate, potassium, silicon, sodium, and zirconium, as no cleanup values are available in Ecology (2005) under WAC 173-340-740(3), and these constituents are thus

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Originator J. M. Capron *JMC* Date 09/20/06 Calc. No. 0100B-CA-V0290 Rev. No. 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation Job No. 14655 Checked T. M. Blakley *TMB* Date *9/21/06*
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Summary (continued)

not considered site COPCs (results for total phosphorus are attributed to phosphorus in phosphate). The 95% UCL values were also not calculated for potassium-40, radium-226, radium-228, thorium-228, and thorium-232, as these radionuclides are not related to the site history and are excluded from consideration as COCs/COPCs (DOE-RL 2005a).

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 was done on 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, as for the subject site, 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 RSVP) is used as the compliance basis.

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). Where direct evaluation of the attached sample data showed that a given analyte was not detected in the primary and duplicate sample, further evaluation of the RPD value was not performed. The RPD calculations use the following formula:

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

where, M = main sample value S = split (or duplicate) sample value

For quality assurance/quality control (QA/QC) 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. No split samples were collected for cleanup verification of the subject site. As a matter of good practice, when an analyte is detected in the primary or duplicate sample, but was quantified at less than 5 times the TDL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate results exceeds a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed. Additional discussion is provided in the data quality assessment section of the applicable RSVP, as necessary.

In addition to the statistical samples collected from the remediation footprint at the subject site, multi-aliquot samples were collected from stockpiles of overburden and other material assumed to be below cleanup levels. Statistical methodology is not applicable to non-statistical sampling, and direct evaluation of maximum detected values within these decision units will be used as the compliance basis. These maximum detected values are presented in the results summary for use in the RSVP.

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Summary (continued)

Results:
The results presented in the summary tables that follow are for use in risk analysis and the RSVP for this site.

Results Summary - Remediation Footprint

Analyte	95% UCL[a]	Maximum[b]	Units
Antimony		0.64	mg/kg
Arsenic	4.2		mg/kg
Barium	74		mg/kg
Beryllium	0.50		mg/kg
Boron		3.6	mg/kg
Cadmium	0.18		mg/kg
Chromium	11.2		mg/kg
Cobalt	8.4		mg/kg
Copper	23.8		mg/kg
Hexavalent Chromium		0.74	mg/kg
Lead	27.1		mg/kg
Lithium	6.8		mg/kg
Manganese	343		mg/kg
Mercury	0.47		mg/kg
Molybdenum	0.8		mg/kg
Nickel	15.8		mg/kg
Strontium	36.2		mg/kg
Tin	1.1		mg/kg
Titanium	1411		mg/kg
Vanadium	45.6		mg/kg
Zinc	82		mg/kg
Aroclor-1254	0.050		mg/kg
Aroclor-1260		0.0053	mg/kg
Aldrin		0.0024	mg/kg
4,4'-DDD		0.0021	mg/kg
4,4'-DDE		0.0076	mg/kg
4,4'-DDT		0.0067	mg/kg
Dieldrin		0.0036	mg/kg
Endosulfan sulfate		0.0033	mg/kg
Endrin aldehyde	0.0016		mg/kg
gamma-Chlordane		0.0013	mg/kg
Acenaphthene		0.21	mg/kg
Anthracene		0.39	mg/kg
Benzo(a)anthracene	1.2		mg/kg
Benzo(a)pyrene	1.1		mg/kg
Benzo(b)fluoranthene	0.8		mg/kg
Benzo(g,h,i)perylene	0.8		mg/kg
Benzo(k)fluoranthene	0.9		mg/kg
Carbazole		0.25	mg/kg
Chrysene	1.1		mg/kg
Di-n-butylphthalate		0.030	mg/kg
Di-n-octylphthalate		0.095	mg/kg
Dibenz(a,h)anthracene	0.66		mg/kg
Dibenzofuran		0.082	mg/kg
Fluoranthene	10.4		mg/kg
Fluorene		0.13	mg/kg
Indeno(1,2,3-cd)pyrene	0.9		mg/kg
Naphthalene		0.055	mg/kg
Pentachlorophenol		1.9	mg/kg
Phenanthrene	3.0		mg/kg
Pyrene	9.1		mg/kg

Results Summary - BCL Stockpiles

Analyte	Maximum[a]	Units
Arsenic	3.8	mg/kg
Barium	72.1	mg/kg
Beryllium	0.55	mg/kg
Cadmium	0.10	mg/kg
Chromium	10.7	mg/kg
Cobalt	7.7	mg/kg
Copper	18.1	mg/kg
Hexavalent chromium	0.98	mg/kg
Lead	17.0	mg/kg
Lithium	7.0	mg/kg
Manganese	335	mg/kg
Mercury	0.47	mg/kg
Molybdenum	0.60	mg/kg
Nickel	12.2	mg/kg
Strontium	31.1	mg/kg
Titanium	1480	mg/kg
Vanadium	47.4	mg/kg
Zinc	48.8	mg/kg
Aroclor-1254	0.015	mg/kg
alpha-BHC	0.0020	mg/kg
Dieldrin	0.00070	mg/kg
Anthracene	0.39	mg/kg
Benzo(a)anthracene	1.6	mg/kg
Benzo(a)pyrene	1.5	mg/kg
Benzo(b)fluoranthene	1.3	mg/kg
Benzo(g,h,i)perylene	1.2	mg/kg
Benzo(k)fluoranthene	1.3	mg/kg
Chrysene	0.26	mg/kg
Fluoranthene	0.44	mg/kg
Indeno(1,2,3,-cd)pyrene	0.087	mg/kg
Phenanthrene	0.42	mg/kg
Pyrene	0.71	mg/kg

[a]Verification sampling of the overburden/BCL stockpiles was based on multi-aliquot, rather than statistical, sampling.
BCL = below cleanup levels

WAC 173-340-740(7)(e) Evaluation

WAC 173-340 3-Part Test for most stringent RAG:

95% UCL > Cleanup Limit?	YES	Because of the "yes" answers to the WAC 173-340 3-part test, additional evaluation of the attainment of cleanup criteria will be performed.
> 10% above Cleanup Limit?	YES	
Any sample > 2x Cleanup Limit?	YES	

[a]For nonradionuclides, where ≤ 50% of a data set is censored (below detection limits), the 95% UCL value is used for a given analyte.
[b]For nonradionuclides, where > 50% of a data set is censored, the statistical value defaults to the maximum detected value in the data set (Attachment 1).
RAG = remedial action goal UCL = upper confidence level WAC = *Washington Adminstrative Code*

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Summary (continued)

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

Analyte	**Duplicate Analysis[b]**	**Analyte**	**Duplicate Analysis[b]**
Potassium-40	25%	Manganese	16%
Aluminum	9.6%	Phosphorus	22%
Barium	4.2%	Silicon	5.0%
Calcium	8.7%	Strontium	5.2%
Chromium	6.1%	Titanium	12%
Copper	30%	Vanadium	15%
Iron	17%	Zinc	8.9%
Magnesium	9.6%	Zirconium	4.1%
Quantitated results for lead in both the primary and duplicate field samples 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 RSVP for the subject site.
QA/QC = quality assurance/quality control
RSVP = remaining sites verification package
TDL = target detection limit

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Project 100-B/C Remaining Pipes and Sewers Field Remediation
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Checked T. M. Blakley TMB

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1 **100-B-14:2 Area 4 Remediation Footprint Verification Data**

	Sampling Area	Sample Number	Sample Date	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Cadmium mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL	Lead mg/kg	Q	PQL	Lithium mg/kg	Q	PQL
4	1	J12R02	7/6/2006	4.9		0.59	103		0.02	0.51	C	0.02	0.07	U	0.07	12.5		0.12	8.8		0.13	19.8		0.12	11.9		0.30	8.1	C	0.03
5	2	J12R03	7/6/2006	3.2		0.59	56.2		0.02	0.49	C	0.02	0.07	U	0.07	7.7		0.13	9.1		0.14	17.4		0.12	5.2		0.30	6.2	C	0.03
6	3	J12R04	7/6/2006	2.4		0.60	54.3		0.02	0.32	C	0.02	0.07	U	0.07	6.8		0.13	5.4		0.14	14.0		0.12	6.9		0.30	4.8	C	0.03
7	4	J12R05	7/6/2006	2.6		0.59	64.5		0.02	0.39	C	0.02	0.07		0.07	8.2		0.13	6.4		0.13	17.8		0.12	11.5		0.30	6.0	C	0.03
8	5	J12R06	7/6/2006	2.7		0.58	51.2		0.02	0.33	C	0.02	0.26		0.07	9.4		0.12	6.0		0.13	26.4		0.11	11.6		0.29	5.4	C	0.03
9	6	J12R07	7/6/2006	4.5		0.58	71.8		0.02	0.51	C	0.02	0.28		0.07	11.7		0.12	8.1		0.13	30.8		0.11	20.3		0.30	6.3	C	0.03
10	7	J12R08	7/6/2006	3.6		0.59	61.7		0.02	0.56	C	0.02	0.07	U	0.07	8.5		0.13	8.9		0.13	20.1		0.12	27.2		0.30	6.4	C	0.03
11	8	J12R09	7/6/2006	3.3		0.59	63.0		0.02	0.46	C	0.02	0.31		0.07	11.2		0.12	7.3		0.13	18.2		0.12	17.5		0.30	5.6	C	0.03
12	Duplicate of J12R09	J12R14	7/6/2006	3.9		0.58	65.7		0.02	0.53	C	0.02	0.28		0.07	11.9		0.12	8.0		0.13	24.7		0.11	71.8		0.29	6.2	C	0.03
13	9	J12R10	7/6/2006	3.4		0.59	59.7		0.02	0.46	C	0.02	0.09		0.07	10.5		0.12	6.7		0.13	19.0		0.12	9.3		0.30	6.2	C	0.03
14	10	J12R11	7/6/2006	4.6		0.58	72.2		0.02	0.49	C	0.02	0.09		0.07	11.2		0.12	7.9		0.13	20.1		0.12	12.1		0.30	7.2	C	0.03

15 **Statistical Computation Input Data**

	Sampling Area	Sample Number	Sample Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg	Lithium mg/kg
18	1	J12R02	7/6/2006	4.9	103	0.51	0.04	12.5	8.8	19.8	11.9	8.1
19	2	J12R03	7/6/2006	3.2	56.2	0.49	0.04	7.7	9.1	17.4	5.2	6.2
20	3	J12R04	7/6/2006	2.4	54.3	0.32	0.04	6.8	5.4	14.0	6.9	4.8
21	4	J12R05	7/6/2006	2.6	64.5	0.39	0.07	8.2	6.4	17.8	11.5	6.0
22	5	J12R06	7/6/2006	2.7	51.2	0.33	0.26	9.4	6.0	26.4	11.6	5.4
23	6	J12R07	7/6/2006	4.5	71.8	0.51	0.28	11.7	8.1	30.8	20.3	6.3
24	7	J12R08	7/6/2006	3.6	61.7	0.56	0.04	8.5	8.9	20.1	27.2	6.4
25	8	J12R09/J12R14	7/6/2006	3.6	64.4	0.50	0.30	11.6	7.7	21.5	44.7	5.9
26	9	J12R10	7/6/2006	3.4	59.7	0.46	0.09	10.5	6.7	19.0	9.3	6.2
27	10	J12R11	7/6/2006	4.6	72.2	0.49	0.09	11.2	7.9	20.1	12.1	7.2

28 **Statistical Computations**

29		Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Lithium
30	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
31	N	10	10	10	10	10	10	10	10	10
32	% < Detection limit	0%	0%	0%	40%	0%	0%	0%	0%	0%
33	Mean	3.6	66	0.46	0.12	9.8	7.5	20.7	16.1	6.3
34	Standard deviation	0.9	14.7	0.08	0.11	2.0	1.3	4.8	11.9	0.9
35	95% UCL on mean	4.2	74	0.50	0.18	11.2	8.4	23.8	27.1	6.8
36	Maximum detected value	4.9	103	0.56	0.31	12.5	9.1	30.8	71.8	8.1
37	Statistical value	4.2	74	0.50	0.18	11.2	8.4	23.8	27.1	6.8
38	**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	0.81 BG/GW & River Protection	18.5 BG/GW & River Protection	32 GW Protection	22.0 BG/River Protection	10.2 BG/GW & River Protection	33.5 BG/GW Protection
39	**WAC 173-340 3-PART TEST**									
40	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	NA	YES	YES	NA
41	> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	NA	YES	YES	NA
42	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA	NA	NO	YES	NA
43	**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.	Because all values are below background (0.81 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg), the WAC 173-340 3-part test is not required.	Because 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 (33.5 mg/kg), the WAC 173-340 3-part test is not required.

44 BG = background PQL = practical quantitation limit U = undetected
45 C = blank contamination Q = qualifier UCL = upper confidence limit
46 GW = groundwater RAG = remedial action goal WAC = *Washington Administrative Code*
47 NA = not applicable RESRAD = RESidual RADioactivity (dose assessment model)

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1 **100-B-14:2 Area 4 Remediation Footprint Verification Data (continued)**

2	Sampling Area	Sample Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Strontium			Titanium			Vanadium			Zinc			Aroclor-1254		
3				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
4	1	J12R02	7/6/2006	371		0.03	0.02	UJ	0.02	0.87		0.28	22.1		0.23	43.7	C	0.01	1320		0.03	45.6		0.09	43.5		0.15	0.0057	J	0.013
5	2	J12R03	7/6/2006	354		0.03	0.02	UJ	0.02	0.53		0.28	10.7		0.23	30.4	C	0.01	1570		0.03	50.7		0.09	42.8		0.16	0.014	U	0.014
6	3	J12R04	7/6/2006	248		0.03	0.08	J	0.02	0.43		0.28	8.3		0.23	21.8	C	0.01	871		0.03	29.5		0.09	34.6		0.16	0.014	U	0.014
7	4	J12R05	7/6/2006	279		0.03	0.02	J	0.01	0.62		0.28	9.5		0.23	32.4	C	0.01	1250		0.03	41.7		0.09	48.6		0.15	0.014		0.013
8	5	J12R06	7/6/2006	252		0.03	0.04	J	0.01	0.51		0.27	10.7		0.23	29.3	C	0.009	1180		0.03	40.2		0.09	138		0.15	0.095		0.013
9	6	J12R07	7/6/2006	346		0.03	0.14	J	0.01	1.2		0.28	18.4		0.23	33.6	C	0.01	1430		0.03	45.5		0.09	110		0.15	0.084		0.013
10	7	J12R08	7/6/2006	349		0.03	0.01	UJ	0.01	0.66		0.28	13.3		0.23	24.5	C	0.01	1490		0.03	48.1		0.09	46.7		0.15	0.013	U	0.013
11	8	J12R09	7/6/2006	287		0.03	0.09	J	0.01	0.61		0.28	11.1		0.23	31.6	C	0.01	1180		0.03	39.5		0.09	46.1		0.15	0.063		0.013
12	Duplicate of J12R09	J12R14	7/6/2006	338		0.03	0.06	J	0.02	0.69		0.28	12.5		0.23	33.3	C	0.01	1330		0.03	46.1		0.09	50.4		0.15	0.078		0.013
13	9	J12R10	7/6/2006	298		0.03	0.19	J	0.02	0.44		0.28	11.1		0.23	34.0	C	0.01	1100		0.03	39.7		0.09	44.1		0.15	0.013	U	0.013
14	10	J12R11	7/6/2006	329		0.03	0.15	J	0.02	0.53		0.28	13.6		0.23	37.1	C	0.01	1230		0.03	42.0		0.09	85.6		0.15	0.013	U	0.013

15 **Statistical Computation Input Data**

16	Sampling Area	Sample Number	Sample Date	Manganese	Mercury	Molybdenum	Nickel	Strontium	Titanium	Vanadium	Zinc	Aroclor-1254
17				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
18	1	J12R02	7/6/2006	371	0.01	0.87	22.1	43.7	1320	45.6	43.5	0.0057
19	2	J12R03	7/6/2006	354	0.01	0.53	10.7	30.4	1570	50.7	42.8	0.007
20	3	J12R04	7/6/2006	248	0.08	0.43	8.3	21.8	871	29.5	34.6	0.007
21	4	J12R05	7/6/2006	279	0.02	0.62	9.5	32.4	1250	41.7	48.6	0.014
22	5	J12R06	7/6/2006	252	0.04	0.51	10.7	29.3	1180	40.2	138	0.095
23	6	J12R07	7/6/2006	346	0.14	1.2	18.4	33.6	1430	45.5	110	0.084
24	7	J12R08	7/6/2006	349	0.005	0.66	13.3	24.5	1490	48.1	46.7	0.0065
25	8	J12R09/J12R14	7/6/2006	313	0.08	0.65	11.8	32.5	1255	42.8	48.3	0.071
26	9	J12R10	7/6/2006	298	0.19	0.44	11.1	34.0	1100	39.7	44.1	0.0065
27	10	J12R11	7/6/2006	329	0.15	0.53	13.6	37.1	1230	42.0	85.6	0.0065

28 **Statistical Computations**

29		Manganese	Mercury	Molybdenum	Nickel	Strontium	Titanium	Vanadium	Zinc	Aroclor-1254
30	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
31	N	10	10	10	10	10	10	10	10	10
32	% < Detection limit	0%	30%	0%	0%	0%	0%	0%	0%	50%
33	Mean	314	0.07	0.6	13.0	31.9	1270	42.6	64	0.030
34	Standard deviation	43	0.07	0.23	4.2	6.1	201	5.8	34.9	0.037
35	95% UCL on mean	343	0.47	0.8	15.8	36.2	1411	45.6	82	0.050
36	Maximum detected value	371	0.19	1.2	22.1	43.7	1570	50.7	138	0.095
37	Statistical value	343	0.47	0.8	15.8	36.2	1411	45.6	82	0.050
38	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	512 BG/GW & River Protection	0.33 BG/GW & River Protection	8 GW Protection	19.1 BG/GW Protection	960 GW Protection	6400 GW Protection	85.1 BG/GW Protection	67.8 BG/River Protection	0.017 RDL/GW & River Protection
39	**WAC 173-340 3-PART TEST**									
40	95% UCL > Cleanup Limit?	NA	YES	NO	NO	NO	NA	NA	YES	YES
41	> 10% above Cleanup Limit?	NA	NO	NO	NO	NO	NA	NA	YES	YES
42	Any sample > 2X Cleanup Limit?	NA	NO	NO	NO	NO	NA	NA	YES	YES
43	**WAC 173-340 Compliance? Further assessment required**	Because all values are below background (512 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.	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.	Because all values are below background (2570 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.	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.

44 BG = background PQL = practical quantitation limit U = undetected
45 C = blank contamination Q = qualifier UCL = upper confidence limit
46 GW = groundwater RAG = remedial action goal WAC = *Washington Administrative Code*
47 J = estimated RDL = required detection limit
48 NA = not applicable RESRAD = RESidual RADioactivity (dose assessment model)

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron *JMC*
Project 100-B/C Remaining Pipes and Sewers Field Remediation
Subject 100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations

Date 09/20/06
Job No. 14655

Calc. No. 0100B-CA-V0290
Checked T. M. Blakley *TMB*

Rev. No. 0
Date *9/21/06*
Sheet No. *7* of 17

1 **100-B-14:2 Area 4 Remediation Footprint Verification Data (continued)**

	Sampling Area	Sample Number	Sample Date	Endrin Aldehyde			Benzo(a)anthracene			Benzo(a)pyrene			Benzo(b)fluoranthene		
3				mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
4	1	J12R02	7/6/2006	0.0013	UJD	0.0013	0.34	UJ	0.34	0.34	UJ	0.34	0.34	UJ	0.34
5	2	J12R03	7/6/2006	0.0014	UJD	0.0014	0.083	J	0.34	0.11	J	0.34	0.12	J	0.34
6	3	J12R04	7/6/2006	0.0018	JDI	0.0014	0.46	J	0.34	0.44	J	0.34	0.33	J	0.34
7	4	J12R05	7/6/2006	0.00067	JD	0.0013	0.75	J	0.34	0.64	J	0.34	0.42	J	0.34
8	5	J12R06	7/6/2006	0.0018	JDI	0.0013	0.23	J	0.34	0.24	J	0.34	0.21	J	0.34
9	6	J12R07	7/6/2006	0.0028	JD	0.0013	1.6	JD	1.0	1.5	JD	1.0	1.3	JD	1.0
10	7	J12R08	7/6/2006	0.0013	UJD	0.0013	0.34	UJ	0.34	0.34	UJ	0.34	0.34	UJ	0.34
11	8	J12R09	7/6/2006	0.0013	UJD	0.0013	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0
12	Duplicate of J12R09	J12R14	7/6/2006	0.0011	JDI	0.0013	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0
13	9	J12R10	7/6/2006	0.0015	JD	0.0013	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0
14	10	J12R11	7/6/2006	0.0013	UJD	0.0013	0.089	JD	1.0	0.078	JD	1.0	0.11	JD	1.0

	Sampling Area	Benzo(g,h,i)perylene			Benzo(k)fluoranthene			Chrysene			Dibenz(a,h)anthracene			Fluoranthene		
3		mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
4	1	0.34	UJ	0.34	0.34	UJ	0.34	0.34	UJ	0.34	0.34	UJ	0.34	0.34	UJ	0.34
5	2	0.081	J	0.34	0.11	J	0.34	0.15	J	0.34	0.055	J	0.34	0.10	J	0.34
6	3	0.28	J	0.34	0.36	J	0.34	0.55	J	0.34	0.14	J	0.34	1.2	J	0.34
7	4	0.43	J	0.34	0.54	J	0.34	0.88	J	0.34	0.16	J	0.34	1.9	J	0.34
8	5	0.17	J	0,34	0.20	J	0.34	0.31	J	0.34	0.089	J	0.34	0.41	J	0.34
9	6	1.2	JD	1.0	1.3	JD	1.0	1.8	JD	1.0	0.60	JD	1.0	3.1	JD	1.0
10	7	0.34	UJ	0.34	0.34	UJ	0.34	0.34	UJ	0.34	0.34	UJ	0.34	0.023	J	0.34
11	8	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0
12	Duplicate of J12R09	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0
13	9	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0
14	10	0.10	JD	1.0	0.098	JD	1.0	0.19	JD	1.0	1.0	UJD	1.0	0.068	JD	1.0

15 **Statistical Computation Input Data**

	Sampling Area	Sample Number	Sample Date	Endrin Aldehyde mg/kg	Benzo(a)anthracene mg/kg	Benzo(a)pyrene mg/kg	Benzo(b)fluoranthene mg/kg	Benzo(g,h,i)perylene mg/kg	Benzo(k)fluoranthene mg/kg	Chrysene mg/kg	Dibenz(a,h)anthracene mg/kg	Fluoranthene mg/kg
18	1	J12R02	7/6/2006	0.00065	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
19	2	J12R03	7/6/2006	0.0007	0.083	0.11	0.12	0.081	0.11	0.15	0.055	0.10
20	3	J12R04	7/6/2006	0.0018	0.46	0.44	0.33	0.28	0.36	0.55	0.14	1.2
21	4	J12R05	7/6/2006	0.00067	0.75	0.64	0.42	0.43	0.54	0.88	0.16	1.9
22	5	J12R06	7/6/2006	0.0018	0.23	0.24	0.21	0.17	0.20	0.31	0.089	0.41
23	6	J12R07	7/6/2006	0.0028	1.6	1.5	1.3	1.2	1.3	1.8	0.60	3.1
24	7	J12R08	7/6/2006	0.00065	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.023
25	8	J12R09/J12R14	7/6/2006	0.00088	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
26	9	J12R10	7/6/2006	0.0015	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
27	10	J12R11	7/6/2006	0.00065	0.089	0.078	0.11	0.10	0.098	0.19	0.50	0.068

28 **Statistical Computations**

29		Endrin Aldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene
30	95% UCL based on	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
31	N	10	10	10	10	10	10	10	10	10
32	% < Detection limit	40%	40%	40%	40%	40%	40%	40%	50%	30%
33	Mean	0.0012	0.5	0.4	0.4	0.4	0.4	0.5	0.29	0.8
34	Standard deviation	0.0007	0.46	0.42	0.36	0.33	0.36	0.51	0.21	1.0
35	95% UCL on mean	0.0016	1.2	1.1	0.8	0.8	0.9	1.1	0.66	10.4
36	Maximum detected value	0.0028	1.6	1.5	1.3	1.2	1.3	1.8	0.60	3.1
37	Statistical value	0.0016	1.2	1.1	0.8	0.8	0.9	1.1	0.66	10.4
38	Most Stringent Cleanup Limit for nonradionuclide and RAG type	0.039 River Protection	0.33 RDL/GW & River Protection	0.33 RDL/Direct Exposure/GW & River Protection	0.33 RDL/GW & River Protection	48 GW Protection	0.33 RDL/GW & River Protection	0.33 RDL/River Protection	0.33 RDL/Direct Exposure/GW & River Protection	18 River Protection
39	**WAC 173-340 3-PART TEST**									
40	95% UCL > Cleanup Limit?	NO	YES	YES	YES	NO	YES	YES	YES	NO
41	> 10% above Cleanup Limit?	NO	YES	YES	YES	NO	YES	YES	YES	NO
42	Any sample > 2X Cleanup Limit?	NO	YES	YES	YES	NO	YES	YES	NO	NO
43	**WAC 173-340 Compliance? Further assessment required**	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, a detailed assessment will be performed within the RSVP. 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 will be performed within the RSVP.	Because of the "yes" answers to the 3-part test, a detailed assessment will be performed within the RSVP. 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.	Because of the "yes" answers to the 3-part test, a detailed assessment will be performed within the RSVP. 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 will be performed within the RSVP. 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 will be performed within the RSVP.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

44 D = diluted
45 I = interference (on one analytical column)
46 GW = groundwater
47 J = estimated
48 NA = not applicable

PQL = practical quantitation limit
Q = qualifier
RAG = remedial action goal
RDL = required detection limit
RSVP = remaining sites verification package

U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator	J. M. Capron JMC	**Date**	09/20/06	**Calc. No.** 0100B-CA-V0290	**Rev. No.** 0
Checked	T. M. Blakley	**Date**			**Sheet No.** 8 of 17
Project	100-B/C Remaining Pipes and Sewers Field Remediation			**Job No.** 14655	
Subject	100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations				

1 **100-B-14:2 Area 4 Remediation Footprint Verification Data (continued)**

	Sampling Area	Sample Number	Sample Date	Indeno(1,2,3-cd)pyrene			Phenanthrene			Pyrene		
2–3				mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
4	1	J12R02	7/6/2006	0.34	UJ	0.34	0.34	UJ	0.34	0.34	UJ	0.34
5	2	J12R03	7/6/2006	0.072	J	0.34	0.035	J	0.34	0.13	J	0.34
6	3	J12R04	7/6/2006	0.25	J	0.34	0.74	J	0.34	0.92	J	0.34
7	4	J12R05	7/6/2006	0.42	J	0.34	1.6	J	0.34	1.5	J	0.34
8	5	J12R06	7/6/2006	0.14	J	0.34	0.27	J	0.34	0.40	J	0.34
9	6	J12R07	7/6/2006	1.1	JD	1.0	1.9	JD	1.0	3.4	JD	1.0
10	7	J12R08	7/6/2006	0.34	UJ	0.34	0.34	UJ	0.34	0.020	J	0.34
11	8	J12R09	7/6/2006	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0
12	Duplicate of J12R09	J12R14	7/6/2006	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0
13	9	J12R10	7/6/2006	1.0	UJD	1.0	1.0	UJD	1.0	1.0	UJD	1.0
14	10	J12R11	7/6/2006	0.054	JD	1.0	1.0	UJD	1.0	0.067	JD	1.0

15 **Statistical Computation Input Data**

	Sampling Area	Sample Number	Sample Date	Indeno(1,2,3-cd)pyrene mg/kg	Phenanthrene mg/kg	Pyrene mg/kg
18	1	J12R02	7/6/2006	0.17	0.17	0.17
19	2	J12R03	7/6/2006	0.072	0.035	0.13
20	3	J12R04	7/6/2006	0.25	0.74	0.92
21	4	J12R05	7/6/2006	0.42	1.6	1.5
22	5	J12R06	7/6/2006	0.14	0.27	0.40
23	6	J12R07	7/6/2006	1.1	1.9	3.4
24	7	J12R08	7/6/2006	0.17	0.17	0.020
25	8	J12R09/J12R14	7/6/2006	0.50	0.50	0.50
26	9	J12R10	7/6/2006	0.50	0.50	0.50
27	10	J12R11	7/6/2006	0.054	0.50	0.067

28 **Statistical Computations**

29		Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene
30	95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.
31	N	10	10	10
32	% < Detection limit	40%	50%	30%
33	Mean	0.3	0.6	0.8
34	Standard deviation	0.32	0.63	1.0
35	95% UCL on mean	0.9	3.0	9.1
36	Maximum detected value	1.1	1.9	3.4
37	Statistical value	0.9	3.0	9.1
38	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	0.33 RDL/GW & River Protection	240 GW Protection	48 GW Protection
39	**WAC 173-340 3-PART TEST**			
40	95% UCL > Cleanup Limit?	YES	NO	NO
41	> 10% above Cleanup Limit?	YES	NO	NO
42	Any sample > 2X Cleanup Limit?	YES	NO	NO
43	**WAC 173-340 Compliance?** **Further assessment required**	Because of the "yes" answers to the 3-part test, a detailed assessment will be performed within the RSVP. 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.

44 D = diluted; PQL = practical quantitation limit; RSVP = remaining sites verification package
45 GW = groundwater; Q = qualifier; U = undetected
46 J = estimated; RAG = remedial action goal; UCL = upper confidence limit
47 NA = not applicable; RDL = required detection limit; WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron *JMC* | Date 09/20/06 | Calc. No. 0100B-CA-V0290 | Rev. No. 0

Project 100-B/C Remaining Pipes and Sewers Field Remediation | Job No. 14655 | Checked T. M. Blakley *TMB* | Date *9/21/06*

Subject 100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations | Sheet No. 9 of 17

Duplicate Analysis

Sampling Area	Sample Number	Sample Date	Potassium-40			Radium-226			Radium-228			Thorium-228			Thorium-232			Aluminum			Antimony			Arsenic			Barium			Beryllium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
8	J12R09	7/6/2006	7.56		0.63	0.304	J	0.12	0.346		0.26	0.371		0.11	0.346		0.26	5230		2.3	0.47	J	0.42	3.3		0.59	63.0		0.02	0.46	C	0.02
Duplicate of J12R09	J12R14	7/6/2006	9.75		0.56	0.391	J	0.096	0.500		0.27	0.400		0.071	0.500		0.27	5760		2.2	0.42	UJ	0.42	3.9		0.58	65.7		0.02	0.53	C	0.02

Analysis:

		Potassium-40	Radium-226	Radium-228	Thorium-228	Thorium-232	Aluminum	Antimony	Arsenic	Barium	Beryllium
TDL		0.5	0.1	0.2	1	1	5	0.6	10	2	0.5
Duplicate Analysis	Both > MDA/PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No - evaluate difference	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No - evaluate difference	No - evaluate difference	No - evaluate difference	No - evaluate difference	Yes (calc RPD)		No - evaluate difference	Yes (calc RPD)	No - evaluate difference
	RPD	25%					9.6%			4.2%	
	Difference >2xTDL?	Not applicable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable

Sampling Area	Sample Number	Sample Date	Cadmium			Calcium			Chromium			Cobalt			Copper			Iron			Lead			Lithium			Magnesium			Manganese		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
8	J12R09	7/6/2006	0.31		0.07	9810	C	1.6	11.2		0.12	7.3		0.13	18.2		0.12	16400		0.52	17.5		0.30	5.6	C	0.03	3960		0.93	287		0.03
Duplicate of J12R09	J12R14	7/6/2006	0.28		0.07	10700	C	1.6	11.9		0.12	8.0		0.13	24.7		0.11	19400		0.51	71.8		0.29	6.2	C	0.03	4360		0.92	338		0.03

Analysis:

		Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese
TDL		0.2	100	1	2	1	5	5	2.5	75	5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No - evaluate difference	Yes (calc RPD)	Yes (calc RPD)	No - evaluate difference	Yes (calc RPD)	Yes (calc RPD)	No - evaluate difference	No - evaluate difference	Yes (calc RPD)	Yes (calc RPD)
	RPD		8.7%	6.1%		30%	17%			9.6%	16%
	Difference >2xTDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	*Yes - assess further*	No - acceptable	Not applicable	Not applicable

Sampling Area	Sample Number	Sample Date	Mercury			Molybdenum			Nickel			Phosphorus			Potassium			Silicon			Sodium			Strontium			Titanium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
8	J12R09	7/6/2006	0.09	J	0.01	0.61		0.28	11.1		0.23	846		0.86	958		2.2	409	J	2.2	186		0.73	31.6	C	0.01	1180		0.03	39.5		0.09
Duplicate of J12R09	J12R14	7/6/2006	0.06	J	0.02	0.69		0.28	12.5		0.23	1050		0.86	1030		2.2	389	J	2.2	190		0.72	33.3	C	0.01	1330		0.03	46.1		0.09

Analysis:

		Mercury	Molybdenum	Nickel	Phosphorus	Potassium	Silicon	Sodium	Strontium	Titanium	Vanadium
TDL		0.2	2	4	1.3	400	2	50	1	0.5	2.5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No - evaluate difference	No - evaluate difference	No - evaluate difference	Yes (calc RPD)	No - evaluate difference	Yes (calc RPD)	No - evaluate difference	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD				22%		5.0%		5.2%	12%	15%
	Difference >2xTDL?	No - acceptable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	Not applicable

Sampling Area	Sample Number	Sample Date	Zinc			Zirconium			Aroclor-1254			4,4'-DDE			4,4'-DDT			Dieldrin			Endosulfan Sulfate			Endrin Aldehyde			gamma-Chlordane		
			mg/kg	Q	PQL	mg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL
5	J12NY3	6/27/2006	46.1		0.15	16.8		1.0	63		13	2.0	JD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	2.0	UJD	1.3	1.3	UJD	1.3	0.74	JDI	1.3
Duplicate of J12NY3	J12NY4	6/27/2006	50.4		0.15	17.5		1.0	78		13	2.3	JD	1.3	6.7	JD	1.3	3.6	JD	1.3	3.3	JD	1.3	1.1	JDI	1.3	1.3	JDI	1.3

Analysis:

		Zinc	Zirconium	Aroclor-1254	4,4'-DDE	4,4'-DDT	Dieldrin	Endosulfan Sulfate	Endrin Aldehyde	gamma-Chlordane
TDL		1	2.5	16.5	3.3	3.3	3.3	3.3	3.3	16.5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No - evaluate difference	No - evaluate difference	Yes (continue)	No - evaluate difference	No - evaluate difference
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No - evaluate difference	No - evaluate difference			No - evaluate difference		
	RPD	8.9%	4.1%							
	Difference >2xTDL?	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable

C = method blank contamination (inorganic constituents)
D = diluted
I = interference (on one analytical column)
J = estimated
MDA = minimum detectable activity
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*	Date 09/20/06	Calc. No. 0100B-CA-V0290	Rev. No. 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation	Job No. 14655	Checked T. M. Blakley *TMB*	Date *9/21/06*
Subject 100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations			Sheet No. 10 of 17

Ecology Software (MTCAStat) Results

Arsenic 95% UCL Calculation

DATA	ID				
4.9	J12R02				
3.2	J12R03				
2.4	J12R04	Number of samples		Uncensored values	
2.6	J12R05	Uncensored	10	Mean	3.6
2.7	J12R06	Censored		Lognormal mean	3.6
4.5	J12R07	Detection limit or PQL		Std. devn.	0.9
3.6	J12R08	Method detection limit		Median	3.5
3.6	J12R09/J12R14	TOTAL	10	Min.	2.4
3.4	J12R10			Max.	4.9
4.6	J12R11				

Lognormal distribution? r-squared is: 0.957
Normal distribution? r-squared is: 0.947
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 4.2

Barium 95% UCL Calculation

DATA	ID				
103	J12R02				
56.2	J12R03				
54.3	J12R04	Number of samples		Uncensored values	
64.5	J12R05	Uncensored	10	Mean	66
51.2	J12R06	Censored		Lognormal mean	66
71.8	J12R07	Detection limit or PQL		Std. devn.	14.7
61.7	J12R08	Method detection limit		Median	63
64.4	J12R09/J12R14	TOTAL	10	Min.	51.2
59.7	J12R10			Max.	103
72.2	J12R11				

Lognormal distribution? r-squared is: 0.867
Normal distribution? r-squared is: 0.783
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 74

Beryllium 95% UCL Calculation

DATA	ID				
0.51	J12R02				
0.49	J12R03				
0.32	J12R04	Number of samples		Uncensored values	
0.39	J12R05	Uncensored	10	Mean	0.46
0.33	J12R06	Censored		Lognormal mean	0.46
0.51	J12R07	Detection limit or PQL		Std. devn.	0.08
0.56	J12R08	Method detection limit		Median	0.49
0.50	J12R09/J12R14	TOTAL	10	Min.	0.32
0.46	J12R10			Max.	0.56
0.49	J12R11				

Lognormal distribution? r-squared is: 0.847
Normal distribution? r-squared is: 0.878
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.50

Cadmium 95% UCL Calculation

DATA	ID				
0.04	J12R02				
0.04	J12R03				
0.04	J12R04	Number of samples		Uncensored values	
0.07	J12R05	Uncensored	10	Mean	0.12
0.26	J12R06	Censored		Lognormal mean	0.13
0.28	J12R07	Detection limit or PQL		Std. devn.	0.11
0.04	J12R08	Method detection limit		Median	0.08
0.30	J12R09/J12R14	TOTAL	10	Min.	0.04
0.09	J12R10			Max.	0.30
0.09	J12R11				

Lognormal distribution? r-squared is: 0.849
Normal distribution? r-squared is: 0.771
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.18

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator	J. M. Capron JMC	Date	09/20/06	Calc. No.	0100B-CA-V0290
Project	100-B/C Remaining Pipes and Sewers Field Remediation	Job No.	14655	Checked	T. M. Blakley TMB
Subject	100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations				

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Date 9/21/06
Sheet No. 11 of 17

Ecology Software (MTCAStat) Results

Chromium 95% UCL Calculation

DATA	ID				
12.5	J12R02				
7.7	J12R03				
6.8	J12R04	Number of samples		Uncensored values	
8.2	J12R05	Uncensored	10	Mean	9.8
9.4	J12R06	Censored		Lognormal mean	9.8
11.7	J12R07	Detection limit or PQL		Std. devn.	2.0
8.5	J12R08	Method detection limit		Median	10.0
11.6	J12R09/J12R14	TOTAL	10	Min.	6.8
10.5	J12R10			Max.	12.5
11.2	J12R11				

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

Normal distribution?
r-squared is: 0.959

UCL (Land's method) is 11.2

Cobalt 95% UCL Calculation

DATA	ID				
8.8	J12R02				
9.1	J12R03				
5.4	J12R04	Number of samples		Uncensored values	
6.4	J12R05	Uncensored	10	Mean	7.5
6.0	J12R06	Censored		Lognormal mean	7.5
8.1	J12R07	Detection limit or PQL		Std. devn.	1.3
8.9	J12R08	Method detection limit		Median	7.8
7.7	J12R09/J12R14	TOTAL	10	Min.	5.4
6.7	J12R10			Max.	9.1
7.9	J12R11				

Lognormal distribution?
r-squared is: 0.941
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.952

UCL (Land's method) is 8.4

Copper 95% UCL Calculation

DATA	ID				
19.8	J12R02				
17.4	J12R03				
14.0	J12R04	Number of samples		Uncensored values	
17.8	J12R05	Uncensored	10	Mean	20.7
26.4	J12R06	Censored		Lognormal mean	20.7
30.8	J12R07	Detection limit or PQL		Std. devn.	4.8
20.1	J12R08	Method detection limit		Median	20.0
21.5	J12R09/J12R14	TOTAL	10	Min.	14.0
19.0	J12R10			Max.	30.8
20.1	J12R11				

Lognormal distribution?
r-squared is: 0.928
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.883

UCL (Land's method) is 23.8

Lead 95% UCL Calculation

DATA	ID				
11.9	J12R02				
5.2	J12R03				
6.9	J12R04	Number of samples		Uncensored values	
11.5	J12R05	Uncensored	10	Mean	16.1
11.6	J12R06	Censored		Lognormal mean	16.1
20.3	J12R07	Detection limit or PQL		Std. devn.	11.9
27.2	J12R08	Method detection limit		Median	11.8
44.7	J12R09/J12R14	TOTAL	10	Min.	5.2
9.3	J12R10			Max.	44.7
12.1	J12R11				

Lognormal distribution?
r-squared is: 0.940
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.774

UCL (Land's method) is 27.1

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator	J. M. Capron JMC	Date	09/20/06	Calc. No.	0100B-CA-V0290
Project	100-B/C Remaining Pipes and Sewers Field Remediation	Job No.	14655	Checked	T. M. Blakley TMB
Subject	100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations				

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Ecology Software (MTCAStat) Results

Lithium 95% UCL Calculation

DATA	ID				
8.1	J12R02				
6.2	J12R03				
4.8	J12R04	Number of samples		Uncensored values	
6.0	J12R05	Uncensored	10	Mean	6.3
5.4	J12R06	Censored		Lognormal mean	6.3
6.3	J12R07	Detection limit or PQL		Std. devn.	0.9
6.4	J12R08	Method detection limit		Median	6.2
5.9	J12R09/J12R14	TOTAL	10	Min.	4.8
6.2	J12R10			Max.	8.1
7.2	J12R11				

Lognormal distribution? r-squared is: 0.937
Normal distribution? r-squared is: 0.921
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 6.8

Manganese 95% UCL Calculation

DATA	ID				
371	J12R02				
354	J12R03				
248	J12R04	Number of samples		Uncensored values	
279	J12R05	Uncensored	10	Mean	314
252	J12R06	Censored		Lognormal mean	314
346	J12R07	Detection limit or PQL		Std. devn.	43
349	J12R08	Method detection limit		Median	321
313	J12R09/J12R14	TOTAL	10	Min.	248
298	J12R10			Max.	371
329	J12R11				

Lognormal distribution? r-squared is: 0.934
Normal distribution? r-squared is: 0.948
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 343

Mercury 95% UCL Calculation

DATA	ID				
0.01	J12R02				
0.01	J12R03				
0.08	J12R04	Number of samples		Uncensored values	
0.02	J12R05	Uncensored	10	Mean	0.07
0.04	J12R06	Censored		Lognormal mean	0.09
0.14	J12R07	Detection limit or PQL		Std. devn.	0.07
0.005	J12R08	Method detection limit		Median	0.06
0.08	J12R09/J12R14	TOTAL	10	Min.	0.005
0.19	J12R10			Max.	0.19
0.15	J12R11				

Lognormal distribution? r-squared is: 0.936
Normal distribution? r-squared is: 0.896
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.47

Molybdenum 95% UCL Calculation

DATA	ID				
0.87	J12R02				
0.53	J12R03				
0.43	J12R04	Number of samples		Uncensored values	
0.62	J12R05	Uncensored	10	Mean	0.6
0.51	J12R06	Censored		Lognormal mean	0.6
1.2	J12R07	Detection limit or PQL		Std. devn.	0.23
0.66	J12R08	Method detection limit		Median	0.6
0.65	J12R09/J12R14	TOTAL	10	Min.	0.43
0.44	J12R10			Max.	1.2
0.53	J12R11				

Lognormal distribution? r-squared is: 0.902
Normal distribution? r-squared is: 0.805
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.8

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator	J. M. Capron JMC	Date	09/20/06	Calc. No.	0100B-CA-V0290
Rev. No.	0	Project	100-B/C Remaining Pipes and Sewers Field Remediation	Job No.	14655
Checked	T. M. Blakley TMB	Date	9/21/06	Subject	100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations
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Ecology Software (MTCAStat) Results

Nickel 95% UCL Calculation

DATA	ID
22.1	J12R02
10.7	J12R03
8.3	J12R04
9.5	J12R05
10.7	J12R06
18.4	J12R07
13.3	J12R08
11.8	J12R09/J12R14
11.1	J12R10
13.6	J12R11

Number of samples		Uncensored values	
Uncensored	10	Mean	13.0
Censored		Lognormal mean	13.0
Detection limit or PQL		Std. devn.	4.2
Method detection limit		Median	11.5
TOTAL	10	Min.	8.3
		Max.	22.1

Lognormal distribution? r-squared is: 0.929
Normal distribution? r-squared is: 0.854
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 15.8

Strontium 95% UCL Calculation

DATA	ID
43.7	J12R02
30.4	J12R03
21.8	J12R04
32.4	J12R05
29.3	J12R06
33.6	J12R07
24.5	J12R08
32.5	J12R09/J12R14
34.0	J12R10
37.1	J12R11

Number of samples		Uncensored values	
Uncensored	10	Mean	31.9
Censored		Lognormal mean	32.0
Detection limit or PQL		Std. devn.	6.1
Method detection limit		Median	32.4
TOTAL	10	Min.	21.8
		Max.	43.7

Lognormal distribution? r-squared is: 0.948
Normal distribution? r-squared is: 0.953
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 36.2

Titanium 95% UCL Calculation

DATA	ID
1320	J12R02
1570	J12R03
871	J12R04
1250	J12R05
1180	J12R06
1430	J12R07
1490	J12R08
1255	J12R09/J12R14
1100	J12R10
1230	J12R11

Number of samples		Uncensored values	
Uncensored	10	Mean	1270
Censored		Lognormal mean	1272
Detection limit or PQL		Std. devn.	201
Method detection limit		Median	1253
TOTAL	10	Min.	871
		Max.	1570

Lognormal distribution? r-squared is: 0.925
Normal distribution? r-squared is: 0.960
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1411

Vanadium 95% UCL Calculation

DATA	ID
45.6	J12R02
50.7	J12R03
29.5	J12R04
41.7	J12R05
40.2	J12R06
45.5	J12R07
48.1	J12R08
42.8	J12R09/J12R14
39.7	J12R10
42.0	J12R11

Number of samples		Uncensored values	
Uncensored	10	Mean	42.6
Censored		Lognormal mean	42.7
Detection limit or PQL		Std. devn.	5.8
Method detection limit		Median	42.4
TOTAL	10	Min.	29.5
		Max.	50.7

Lognormal distribution? r-squared is: 0.839
Normal distribution? r-squared is: 0.896
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 45.6

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron *JMC* Date 09/20/06 Calc. No. 0100B-CA-V0290 Rev. No. 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation Job No. 14655 Checked T. M. Blakley *TMB* Date 9/21/06
Subject 100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations Sheet No. 14 of 17

Ecology Software (MTCAStat) Results

Zinc 95% UCL Calculation

DATA	ID				
43.5	J12R02				
42.8	J12R03				
34.6	J12R04	Number of samples		Uncensored values	
48.6	J12R05	Uncensored	10	Mean	64
138	J12R06	Censored		Lognormal mean	64
110	J12R07	Detection limit or PQL		Std. devn.	34.9
46.7	J12R08	Method detection limit		Median	47
48.3	J12R09/J12R14	TOTAL	10	Min.	34.6
44.1	J12R10			Max.	138
85.6	J12R11				

Lognormal distribution? r-squared is: 0.824
Normal distribution? r-squared is: 0.754
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 82

Aroclor-1254 95% UCL Calculation

DATA	ID				
0.0057	J12R02				
0.007	J12R03				
0.007	J12R04	Number of samples		Uncensored values	
0.014	J12R05	Uncensored	10	Mean	0.030
0.095	J12R06	Censored		Lognormal mean	0.031
0.084	J12R07	Detection limit or PQL		Std. devn.	0.037
0.0065	J12R08	Method detection limit		Median	0.007
0.071	J12R09/J12R14	TOTAL	10	Min.	0.0057
0.0065	J12R10			Max.	0.095
0.0065	J12R11				

Lognormal distribution? r-squared is: 0.744
Normal distribution? r-squared is: 0.691
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.050

Endrin Aldehyde 95% UCL Calculation

DATA	ID				
0.00065	J12R02				
0.0007	J12R03				
0.0018	J12R04	Number of samples		Uncensored values	
0.00067	J12R05	Uncensored	10	Mean	0.0012
0.0018	J12R06	Censored		Lognormal mean	0.0012
0.0028	J12R07	Detection limit or PQL		Std. devn.	0.0007
0.00065	J12R08	Method detection limit		Median	0.0008
0.00088	J12R09/J12R14	TOTAL	10	Min.	0.00065
0.0015	J12R10			Max.	0.0028
0.00065	J12R11				

Lognormal distribution? r-squared is: 0.832
Normal distribution? r-squared is: 0.791
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.0016

Benzo(a)anthracene 95% UCL Calculation

DATA	ID				
0.17	J12R02				
0.083	J12R03				
0.46	J12R04	Number of samples		Uncensored values	
0.75	J12R05	Uncensored	10	Mean	0.5
0.23	J12R06	Censored		Lognormal mean	0.5
1.6	J12R07	Detection limit or PQL		Std. devn.	0.46
0.17	J12R08	Method detection limit		Median	0.3
0.50	J12R09/J12R14	TOTAL	10	Min.	0.083
0.50	J12R10			Max.	1.6
0.089	J12R11				

Lognormal distribution? r-squared is: 0.959
Normal distribution? r-squared is: 0.759
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1.2

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator	J. M. Capron *JMC*	Date	09/20/06	Calc. No.	0100B-CA-V0290
Project	100-B/C Remaining Pipes and Sewers Field Remediation	Job No.	14655	Checked	T. M. Blakley *TMB*
Subject	100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations				

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Ecology Software (MTCAStat) Results

Benzo(a)pyrene 95% UCL Calculation

DATA	ID				
0.17	J12R02				
0.11	J12R03				
0.44	J12R04	Number of samples		Uncensored values	
0.64	J12R05	Uncensored	10	Mean	0.4
0.24	J12R06	Censored		Lognormal mean	0.5
1.5	J12R07	Detection limit or PQL		Std. devn.	0.42
0.17	J12R08	Method detection limit		Median	0.3
0.50	J12R09/J12R14	TOTAL	10	Min.	0.078
0.50	J12R10			Max.	1.5
0.078	J12R11				

Lognormal distribution? r-squared is: 0.967
Normal distribution? r-squared is: 0.754
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1.1

Benzo(b)fluoranthene 95% UCL Calculation

DATA	ID				
0.17	J12R02				
0.12	J12R03				
0.33	J12R04	Number of samples		Uncensored values	
0.42	J12R05	Uncensored	10	Mean	0.4
0.21	J12R06	Censored		Lognormal mean	0.4
1.3	J12R07	Detection limit or PQL		Std. devn.	0.36
0.17	J12R08	Method detection limit		Median	0.3
0.50	J12R09/J12R14	TOTAL	10	Min.	0.11
0.50	J12R10			Max.	1.3
0.11	J12R11				

Lognormal distribution? r-squared is: 0.940
Normal distribution? r-squared is: 0.716
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.8

Benzo(g,h,i)perylene 95% UCL Calculation

DATA	ID				
0.17	J12R02				
0.081	J12R03				
0.28	J12R04	Number of samples		Uncensored values	
0.43	J12R05	Uncensored	10	Mean	0.4
0.17	J12R06	Censored		Lognormal mean	0.4
1.2	J12R07	Detection limit or PQL		Std. devn.	0.33
0.17	J12R08	Method detection limit		Median	0.2
0.50	J12R09/J12R14	TOTAL	10	Min.	0.081
0.50	J12R10			Max.	1.2
0.10	J12R11				

Lognormal distribution? r-squared is: 0.954
Normal distribution? r-squared is: 0.752
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.8

Benzo(k)fluoranthene 95% UCL Calculation

DATA	ID				
0.17	J12R02				
0.11	J12R03				
0.36	J12R04	Number of samples		Uncensored values	
0.54	J12R05	Uncensored	10	Mean	0.4
0.20	J12R06	Censored		Lognormal mean	0.4
1.3	J12R07	Detection limit or PQL		Std. devn.	0.36
0.17	J12R08	Method detection limit		Median	0.3
0.50	J12R09/J12R14	TOTAL	10	Min.	0.098
0.50	J12R10			Max.	1.3
0.098	J12R11				

Lognormal distribution? r-squared is: 0.945
Normal distribution? r-squared is: 0.752
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.9

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford					
Originator	J. M. Capron *JMC*	Date	09/20/06	Calc. No.	0100B-CA-V0290
Rev. No.	0				
Project	100-B/C Remaining Pipes and Sewers Field Remediation	Job No.	14655	Checked	T. M. Blakley *TMB*
Date	*9/21/06*				
Subject	100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations			Sheet No.	16 of 17

Ecology Software (MTCAStat) Results

Chrysene 95% UCL Calculation

DATA	ID
0.17	J12R02
0.15	J12R03
0.55	J12R04
0.88	J12R05
0.31	J12R06
1.8	J12R07
0.17	J12R08
0.50	J12R09/J12R14
0.50	J12R10
0.19	J12R11

Number of samples		Uncensored values	
Uncensored	10	Mean	0.5
Censored		Lognormal mean	0.5
Detection limit or PQL		Std. devn.	0.51
Method detection limit		Median	0.4
TOTAL	10	Min.	0.15
		Max.	1.8

Lognormal distribution?
r-squared is: 0.921
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.727

UCL (Land's method) is 1.1

Dibenz(a,h)anthracene 95% UCL Calculation

DATA	ID
0.17	J12R02
0.055	J12R03
0.14	J12R04
0.16	J12R05
0.089	J12R06
0.60	J12R07
0.17	J12R08
0.50	J12R09/J12R14
0.50	J12R10
0.50	J12R11

Number of samples		Uncensored values	
Uncensored	10	Mean	0.29
Censored		Lognormal mean	0.31
Detection limit or PQL		Std. devn.	0.21
Method detection limit		Median	0.17
TOTAL	10	Min.	0.055
		Max.	0.60

Lognormal distribution?
r-squared is: 0.905
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.839

UCL (Land's method) is 0.66

Fluoranthene 95% UCL Calculation

DATA	ID
0.17	J12R02
0.10	J12R03
1.2	J12R04
1.9	J12R05
0.41	J12R06
3.1	J12R07
0.023	J12R08
0.50	J12R09/J12R14
0.50	J12R10
0.068	J12R11

Number of samples		Uncensored values	
Uncensored	10	Mean	0.8
Censored		Lognormal mean	1.1
Detection limit or PQL		Std. devn.	1.0
Method detection limit		Median	0.5
TOTAL	10	Min.	0.023
		Max.	3.1

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

Normal distribution?
r-squared is: 0.773

UCL (Land's method) is 10.4

Indeno(1,2,3-cd)pyrene 95% UCL Calculation

DATA	ID
0.17	J12R02
0.072	J12R03
0.25	J12R04
0.42	J12R05
0.14	J12R06
1.1	J12R07
0.17	J12R08
0.50	J12R09/J12R14
0.50	J12R10
0.054	J12R11

Number of samples		Uncensored values	
Uncensored	10	Mean	0.3
Censored		Lognormal mean	0.4
Detection limit or PQL		Std. devn.	0.32
Method detection limit		Median	0.2
TOTAL	10	Min.	0.054
		Max.	1.1

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

Normal distribution?
r-squared is: 0.799

UCL (Land's method) is 0.9

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron *JMC* Date 09/20/06 Calc. No. 0100B-CA-V0290 Rev. No. 0

Project 100-B/C Remaining Pipes and Sewers Field Remediation Job No. 14655 Checked T. M. Blakley *TMB* Date *9/21/06*

Subject 100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations Sheet No. 17 of 17

Ecology Software (MTCAStat) Results

DATA	ID	Phenanthrene 95% UCL Calculation			
0.17	J12R02				
0.035	J12R03				
0.74	J12R04	Number of samples		Uncensored values	
1.6	J12R05	Uncensored	10	Mean	0.6
0.27	J12R06	Censored		Lognormal mean	0.8
1.9	J12R07	Detection limit or PQL		Std. devn.	0.63
0.17	J12R08	Method detection limit		Median	0.5
0.50	J12R09/J12R14	TOTAL	10	Min.	0.035
0.50	J12R10			Max.	1.9
0.50	J12R11				
		Lognormal distribution?		Normal distribution?	
		r-squared is: 0.936		r-squared is: 0.813	
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is		3.0	

DATA	ID	Pyrene 95% UCL Calculation			
0.17	J12R02				
0.13	J12R03				
0.92	J12R04	Number of samples		Uncensored values	
1.5	J12R05	Uncensored	10	Mean	0.8
0.40	J12R06	Censored		Lognormal mean	1.0
3.4	J12R07	Detection limit or PQL		Std. devn.	1.0
0.020	J12R08	Method detection limit		Median	0.5
0.50	J12R09/J12R14	TOTAL	10	Min.	0.020
0.50	J12R10			Max.	3.4
0.067	J12R11				
		Lognormal distribution?		Normal distribution?	
		r-squared is: 0.981		r-squared is: 0.702	
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is		9.1	

PQL = practical quantitation limit

UCL = upper confidence limit

Attachment 1. 100-B-14:2 Area 4 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Americium-241			Cesium-137			Cobalt-60			Europium-152			Europium-154		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J12R02	7/6/06	0.28	U	0.28	0.078	U	0.078	0.085	U	0.085	0.20	U	0.20	0.26	U	0.26
2	J12R03	7/6/06	0.23	U	0.23	0.063	U	0.063	0.072	U	0.072	0.16	U	0.16	0.21	U	0.21
3	J12R04	7/6/06	0.23	U	0.23	0.092	U	0.092	0.073	U	0.073	0.16	U	0.16	0.19	U	0.19
4	J12R05	7/6/06	0.042	U	0.042	0.047	U	0.047	0.053	U	0.053	0.11	U	0.11	0.15	U	0.15
5	J12R06	7/6/06	0.045	U	0.045	0.048	U	0.048	0.044	U	0.044	0.12	U	0.12	0.17	U	0.17
6	J12R07	7/6/06	0.052	U	0.052	0.046	U	0.046	0.065	U	0.065	0.15	U	0.15	0.17	U	0.17
7	J12R08	7/6/06	0.25	U	0.25	0.069	U	0.069	0.084	U	0.084	0.16	U	0.16	0.24	U	0.24
8	J12R09	7/6/06	0.22	U	0.22	0.068	U	0.068	0.079	U	0.079	0.16	U	0.16	0.21	U	0.21
Duplicate of J12R09	J12R14	7/6/06	0.052	U	0.052	0.053	U	0.053	0.067	U	0.067	0.14	U	0.14	0.19	U	0.19
9	J12R10	7/6/06	0.096	U	0.096	0.026	U	0.026	0.028	U	0.028	0.064	U	0.064	0.087	U	0.087
10	J12R11	7/6/06	0.091	U	0.091	0.099	U	0.099	0.15	U	0.15	0.15	U	0.15	0.39	U	0.39
East overburden	J12R12	7/6/06	0.093	U	0.093	0.059	U	0.059	0.032	U	0.032	0.066	U	0.066	0.084	U	0.084
West overburden	J12R13	7/6/06	0.019	U	0.019	0.017	U	0.017	0.023	U	0.023	0.051	U	0.051	0.066	U	0.066

Note: The following abbreviations apply to all Attachment 1 tables.

Note: Data qualified with C, D, I and/or J are considered acceptable values.

C = method blank contamination (inorganic constituents)
D = diluted
I = interference on one analytical column
J = estimated

MDA = minimum detectable activity
PQL = practical quantitation limit
Q = qualifier
U = undetected

Attachment	1	Sheet No.	1 of 13
Originator	J. M. Capron	Date	09/20/06
Checked	T. M. Blakley	Date	9/21/06
Calc. No.	0100B-CA-V0290	Rev. No.	0

Attachment 1. 100-B-14:2 Area 4 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Europium-155			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
1	J12R02	7/6/06	0.24	U	0.24	10.2		0.75	0.364	J	0.15	0.796		0.31	0.470		0.090
2	J12R03	7/6/06	0.18	U	0.18	9.38		0.46	0.316	J	0.12	0.342		0.28	0.398		0.077
3	J12R04	7/6/06	0.18	U	0.18	9.70		0.63	0.300	J	0.12	0.678		0.29	0.393		0.078
4	J12R05	7/6/06	0.088	U	0.088	10.7		0.37	0.294	J	0.093	0.407		0.19	0.438		0.051
5	J12R06	7/6/06	0.10	U	0.10	9.40		0.46	0.320	J	0.091	0.576		0.20	0.377		0.055
6	J12R07	7/6/06	0.12	U	0.12	9.12		0.64	0.337	J	0.099	0.531		0.23	0.529		0.092
7	J12R08	7/6/06	0.19	U	0.19	7.01		0.65	0.277	J	0.14	0.372		0.29	0.344		0.081
8	J12R09	7/6/06	0.17	U	0.17	7.56		0.63	0.304	J	0.12	0.346		0.26	0.371		0.11
Duplicate of J12R09	J12R14	7/6/06	0.12	U	0.12	9.75		0.56	0.391	J	0.096	0.500		0.27	0.400		0.071
9	J12R10	7/6/06	0.076	U	0.076	8.78		0.29	0.320	J	0.050	0.429		0.11	0.360		0.031
10	J12R11	7/6/06	0.095	U	0.095	10.6		1.3	0.725	J	0.17	0.84	U	0.84	0.263		0.084
East overburden	J12R12	7/6/06	0.073	U	0.073	8.27		0.31	0.292	J	0.046	0.485		0.11	0.376		0.032
West overburden	J12R13	7/6/06	0.043	U	0.043	8.96		0.20	0.390	J	0.042	0.508		0.081	0.396		0.024

Sample Location	Sample Number	Sample Date	Thorium-232			Uranium-235			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J12R02	7/6/06	0.796		0.31	0.28	U	0.28	9.7	U	9.7
2	J12R03	7/6/06	0.342		0.28	0.22	U	0.22	7.4	U	7.4
3	J12R04	7/6/06	0.678		0.29	0.22	U	0.22	7.8	U	7.8
4	J12R05	7/6/06	0.407		0.19	0.14	U	0.14	5.7	U	5.7
5	J12R06	7/6/06	0.576		0.20	0.15	U	0.15	6.0	U	6.0
6	J12R07	7/6/06	0.531		0.23	0.17	U	0.17	7.5	U	7.5
7	J12R08	7/6/06	0.372		0.29	0.24	U	0.24	7.7	U	7.7
8	J12R09	7/6/06	0.346		0.26	0.22	U	0.22	8.2	U	8.2
Duplicate of J12R09	J12R14	7/6/06	0.500		0.27	0.17	U	0.17	7.8	U	7.8
9	J12R10	7/6/06	0.429		0.11	0.095	U	0.095	3.2	U	3.2
10	J12R11	7/6/06	0.84	U	0.84	0.14	U	0.14	15	U	15
East overburden	J12R12	7/6/06	0.485		0.11	0.093	U	0.093	3.3	U	3.3
West overburden	J12R13	7/6/06	0.508		0.081	0.065	U	0.065	2.5	U	2.5

Attachment	1	Sheet No.	2 of 13
Originator	J. M. Capron	Date	09/20/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0290	Rev. No.	0

Attachment 1. 100-B-14:2 Area 4 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
1	J12R02	7/6/06	6970		2.3	0.42	UJ	0.42	4.9		0.59	103		0.02	0.51	C	0.02	3.6	C	0.23
2	J12R03	7/6/06	5520		2.3	0.43	UJ	0.43	3.2		0.59	56.2		0.02	0.49	C	0.02	2.1	UJ	0.23
3	J12R04	7/6/06	4290		2.3	0.43	UJ	0.43	2.4		0.60	54.3		0.02	0.32	C	0.02	1.4	UJ	0.23
4	J12R05	7/6/06	5030		2.3	0.42	UJ	0.42	2.6		0.59	64.5		0.02	0.39	C	0.02	2.2	UJ	0.23
5	J12R06	7/6/06	4450		2.2	0.42	UJ	0.42	2.7		0.58	51.2		0.02	0.33	C	0.02	1.8	UJ	0.23
6	J12R07	7/6/06	5650		2.3	0.64	J	0.42	4.5		0.58	71.8		0.02	0.51	C	0.02	3.3	C	0.23
7	J12R08	7/6/06	5630		2.3	0.42	UJ	0.42	3.6		0.59	61.7		0.02	0.56	C	0.02	1.5	UJ	0.23
8	J12R09	7/6/06	5230		2.3	0.47	J	0.42	3.3		0.59	63.0		0.02	0.46	C	0.02	2.1	UJ	0.23
Duplicate of J12R09	J12R14	7/6/06	5760		2.2	0.42	UJ	0.42	3.9		0.58	65.7		0.02	0.53	C	0.02	2.3	UJ	0.23
9	J12R10	7/6/06	5610		2.3	0.52	J	0.42	3.4		0.59	59.7		0.02	0.46	C	0.02	2.1	UJ	0.23
10	J12R11	7/6/06	6320		2.3	0.42	UJ	0.42	4.6		0.58	72.2		0.02	0.49	C	0.02	2.5	C	0.23
East overburden	J12R12	7/6/06	6190		2.2	0.42	UJ	0.42	3.3		0.58	72.1		0.02	0.52	C	0.02	1.8	UJ	0.23
West overburden	J12R13	7/6/06	5460		2.3	0.42	UJ	0.42	3.8		0.58	68.6		0.02	0.55	C	0.02	1.9	UJ	0.23
Equipment blank	J12R15	7/6/06	41.8		2.2	0.42	UJ	0.42	0.58	U	0.58	1.1		0.02	0.04	UJ	0.02	0.41	UJ	0.23

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
1	J12R02	7/6/06	0.07	U	0.07	8420	C	1.6	12.5		0.12	8.8		0.13	19.8		0.12	0.20	U	0.20
2	J12R03	7/6/06	0.07	U	0.07	8640	C	1.6	7.7		0.13	9.1		0.14	17.4		0.12	0.20	U	0.20
3	J12R04	7/6/06	0.07	U	0.07	5110	C	1.6	6.8		0.13	5.4		0.14	14.0		0.12	0.28		0.20
4	J12R05	7/6/06	0.07		0.07	9200	C	1.6	8.2		0.13	6.4		0.13	17.8		0.12	0.24		0.20
5	J12R06	7/6/06	0.26		0.07	7690	C	1.6	9.4		0.12	6.0		0.13	26.4		0.11	0.28		0.20
6	J12R07	7/6/06	0.28		0.07	11500	C	1.6	11.7		0.12	8.1		0.13	30.8		0.11	0.20	U	0.20
7	J12R08	7/6/06	0.07	U	0.07	6890	C	1.6	8.5		0.13	8.9		0.13	20.1		0.12	0.20	U	0.20
8	J12R09	7/6/06	0.31		0.07	9810	C	1.6	11.2		0.12	7.3		0.13	18.2		0.12	0.20	U	0.20
Duplicate of J12R09	J12R14	7/6/06	0.28		0.07	10700	C	1.6	11.9		0.12	8.0		0.13	24.7		0.11	0.20	U	0.20
9	J12R10	7/6/06	0.09		0.07	8380	C	1.6	10.5		0.12	6.7		0.13	19.0		0.12	0.74		0.20
10	J12R11	7/6/06	0.09		0.07	13700	C	1.6	11.2		0.12	7.9		0.13	20.1		0.12	0.20	U	0.20
East overburden	J12R12	7/6/06	0.07	U	0.07	7250	C	1.5	10.7		0.12	7.7		0.13	16.9		0.11	0.98		0.20
West overburden	J12R13	7/6/06	0.10		0.07	9200	C	1.6	9.1		0.12	7.6		0.13	18.1		0.11	0.22		0.20
Equipment blank	J12R15	7/6/06	0.07	U	0.07	22.8	C	1.6	0.17		0.12	0.13	U	0.13	0.11	U	0.11			

Attachment	1	Sheet No.	3 of 13
Originator	J. M. Capron	Date	09/20/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0290	Rev. No.	0

Attachment 1. 100-B-14:2 Area 4 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Iron			Lead			Lithium			Magnesium			Manganese			Mercury		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J12R02	7/6/06	20900		0.52	11.9		0.30	8.1	C	0.03	4830		0.93	371		0.03	0.02	UJ	0.02
2	J12R03	7/6/06	21400		0.52	5.2		0.30	6.2	C	0.03	4710		0.94	354		0.03	0.02	UJ	0.02
3	J12R04	7/6/06	12400		0.53	6.9		0.30	4.8	C	0.03	3150		0.95	248		0.03	0.08	J	0.02
4	J12R05	7/6/06	16500		0.52	11.5		0.30	6.0	C	0.03	3890		0.93	279		0.03	0.02	J	0.01
5	J12R06	7/6/06	15300		0.51	11.6		0.29	5.4	C	0.03	3700		0.92	252		0.03	0.04	J	0.01
6	J12R07	7/6/06	25900		0.52	20.3		0.30	6.3	C	0.03	4140		0.93	346		0.03	0.14	J	0.01
7	J12R08	7/6/06	20800		0.52	27.2		0.30	6.4	C	0.03	4740		0.93	349		0.03	0.01	UJ	0.01
8	J12R09	7/6/06	16400		0.52	17.5		0.30	5.6	C	0.03	3960		0.93	287		0.03	0.09	J	0.01
Duplicate of J12R09	J12R14	7/6/06	19400		0.51	71.8		0.29	6.2	C	0.03	4360		0.92	338		0.03	0.06	J	0.02
9	J12R10	7/6/06	16700		0.52	9.3		0.30	6.2	C	0.03	4080		0.93	298		0.03	0.19	J	0.02
10	J12R11	7/6/06	17700		0.52	12.1		0.30	7.2	C	0.03	4740		0.93	329		0.03	0.15	J	0.02
East overburden	J12R12	7/6/06	18300		0.51	7.6		0.29	7.0	C	0.03	4460		0.92	329		0.03	0.11	J	0.01
West overburden	J12R13	7/6/06	18100		0.52	17.0		0.30	5.6	C	0.03	3830		0.93	335		0.03	0.47	J	0.02
Equipment blank	J12R15	7/6/06	88.6		0.51	0.30	U	0.30	0.06	UJ	0.03	6.2		0.92	4.7		0.03	0.01	UJ	0.01

Sample Location	Sample Number	Sample Date	Molybdenum			Nickel			Phosphorus			Potassium			Selenium			Silicon		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J12R02	7/6/06	0.87		0.28	22.1		0.23	937		0.86	1190		2.2	0.45	U	0.45	421	J	2.2
2	J12R03	7/6/06	0.53		0.28	10.7		0.23	1140		0.87	972		2.2	0.46	U	0.46	386	J	2.2
3	J12R04	7/6/06	0.43		0.28	8.3		0.23	687		0.88	812		2.2	0.46	U	0.46	383	J	2.2
4	J12R05	7/6/06	0.62		0.28	9.5		0.23	806		0.87	806		2.2	0.45	U	0.45	395	J	2.2
5	J12R06	7/6/06	0.51		0.27	10.7		0.23	744		0.85	710		2.2	0.45	U	0.45	377	J	2.2
6	J12R07	7/6/06	1.2		0.28	18.4		0.23	861		0.86	1120		2.2	0.45	U	0.45	380	J	2.2
7	J12R08	7/6/06	0.66		0.28	13.3		0.23	1140		0.87	974		2.2	0.45	U	0.45	362	J	2.2
8	J12R09	7/6/06	0.61		0.28	11.1		0.23	846		0.86	958		2.2	0.45	U	0.45	409	J	2.2
Duplicate of J12R09	J12R14	7/6/06	0.69		0.28	12.5		0.23	1050		0.86	1030		2.2	0.45	U	0.45	389	J	2.2
9	J12R10	7/6/06	0.44		0.28	11.1		0.23	848		0.86	899		2.2	0.45	U	0.45	384	J	2.2
10	J12R11	7/6/06	0.53		0.28	13.6		0.23	913		0.86	1130		2.2	0.45	U	0.45	424	J	2.2
East overburden	J12R12	7/6/06	0.50		0.27	12.2		0.23	883		0.85	1150		2.1	0.44	U	0.44	352	J	2.1
West overburden	J12R13	7/6/06	0.60		0.28	9.9		0.23	858		0.86	908		2.2	0.45	U	0.45	332	J	2.2
Equipment blank	J12R15	7/6/06	0.28	U	0.28	0.23	U	0.23	4.5		0.86	16.4		2.2	0.45	U	0.45	32.8	J	2.2

Attachment	1	Sheet No.	4 of 13
Originator	J. M. Capron	Date	09/20/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0290	Rev. No.	0

Attachment 1. 100-B-14:2 Area 4 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Silver			Sodium			Strontium			Thallium			Tin			Titanium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J12R02	7/6/06	0.07	U	0.07	216		0.73	43.7	C	0.01	0.67	U	0.67	1.0	U	1.0	1320		0.03
2	J12R03	7/6/06	0.07	U	0.07	164		0.74	30.4	C	0.01	0.68	U	0.68	1.0	U	1.0	1570		0.03
3	J12R04	7/6/06	0.07	U	0.07	110		0.74	21.8	C	0.01	0.68	U	0.68	1.0	U	1.0	871		0.03
4	J12R05	7/6/06	0.07	U	0.07	159		0.73	32.4	C	0.01	0.67	U	0.67	1.0	U	1.0	1250		0.03
5	J12R06	7/6/06	0.07	U	0.07	147		0.72	29.3	C	0.009	0.66	U	0.66	1.0	U	1.0	1180		0.03
6	J12R07	7/6/06	0.07	U	0.07	202		0.73	33.6	C	0.01	0.67	U	0.67	1.1		1.0	1430		0.03
7	J12R08	7/6/06	0.07	U	0.07	243		0.73	24.5	C	0.01	0.67	U	0.67	1.0	U	1.0	1490		0.03
8	J12R09	7/6/06	0.07	U	0.07	186		0.73	31.6	C	0.01	0.67	U	0.67	1.0	U	1.0	1180		0.03
Duplicate of J12R09	J12R14	7/6/06	0.07	U	0.07	190		0.72	33.3	C	0.01	0.67	U	0.67	1.0	U	1.0	1330		0.03
9	J12R10	7/6/06	0.07	U	0.07	165		0.73	34.0	C	0.01	0.67	U	0.67	1.0	U	1.0	1100		0.03
10	J12R11	7/6/06	0.07	U	0.07	210		0.73	37.1	C	0.01	0.67	U	0.67	1.0	U	1.0	1230		0.03
East overburden	J12R12	7/6/06	0.07	U	0.07	166		0.72	28.1	C	0.009	0.66	U	0.66	1.0	U	1.0	1380		0.03
West overburden	J12R13	7/6/06	0.07	U	0.07	182		0.73	31.1	C	0.01	0.67	U	0.67	1.0	U	1.0	1480		0.03
Equipment blank	J12R15	7/6/06	0.07	U	0.07	7.7		0.72	0.22	C	0.01	0.67	U	0.67	1.0	U	1.0	1.6		0.03

Sample Location	Sample Number	Sample Date	Uranium			Vanadium			Zinc			Zirconium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J12R02	7/6/06	0.85	U	0.85	45.6		0.09	43.5		0.15	18.3		1.0
2	J12R03	7/6/06	0.85	U	0.85	50.7		0.09	42.8		0.16	21.2		1.0
3	J12R04	7/6/06	0.86	U	0.86	29.5		0.09	34.6		0.16	13.0		1.0
4	J12R05	7/6/06	0.85	U	0.85	41.7		0.09	48.6		0.15	14.2		1.0
5	J12R06	7/6/06	0.83	U	0.83	40.2		0.09	138		0.15	12.3		1.0
6	J12R07	7/6/06	0.84	U	0.84	45.5		0.09	110		0.15	19.5		1.0
7	J12R08	7/6/06	0.85	U	0.85	48.1		0.09	46.7		0.15	20.8		1.0
8	J12R09	7/6/06	0.84	U	0.84	39.5		0.09	46.1		0.15	16.8		1.0
Duplicate of J12R09	J12R14	7/6/06	0.84	U	0.84	46.1		0.09	50.4		0.15	17.5		1.0
9	J12R10	7/6/06	0.84	U	0.84	39.7		0.09	44.1		0.15	13.6		1.0
10	J12R11	7/6/06	0.84	U	0.84	42.0		0.09	85.6		0.15	16.7		1.0
East overburden	J12R12	7/6/06	0.83	U	0.83	47.4		0.09	47.6		0.15	19.0		1.0
West overburden	J12R13	7/6/06	0.84	U	0.84	47.4		0.09	48.8		0.15	18.3		1.0
Equipment blank	J12R15	7/6/06	0.84	U	0.84	0.1		0.09	0.58		0.15	1.0	U	1.0

Attachment	1	Sheet No.	5 of 13
Originator	J. M. Capron	Date	09/20/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0290	Rev. No.	0

Attachment 1. 100-B-14:2 Area 4 Verification Sampling Results.

Constituents	J12R02 Location 1 Sample Date 7/6/06			J12R03 Location 2 Sample Date 7/6/06			J12R04 Location 3 Sample Date 7/6/06			J12R05 Location 4 Sample Date 7/6/06		
	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	14	U	14	13	U	13
Aroclor-1221	13	U	13	14	U	14	14	U	14	13	U	13
Aroclor-1232	13	U	13	14	U	14	14	U	14	13	U	13
Aroclor-1242	13	U	13	14	U	14	14	U	14	13	U	13
Aroclor-1248	13	U	13	14	U	14	14	U	14	13	U	13
Aroclor-1254	5.7	J	13	14	U	14	14	U	14	14		13
Aroclor-1260	13	U	13	14	U	14	5.3	J	14	13	U	13
Pesticides												
Aldrin	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
alpha-BHC	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
alpha-Chlordane	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
beta-BHC	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
delta-BHC	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
Dichlorodiphenyldichloroethane	1.3	UJD	1.3	1.4	UJD	1.4	2.1	JD	1.4	1.3	UJD	1.3
Dichlorodiphenyldichloroethylene	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
Dichlorodiphenyltrichloroethane	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
Dieldrin	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
Endosulfan I	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
Endosulfan II	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
Endosulfan sulfate	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
Endrin	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
Endrin aldehyde	1.3	UJD	1.3	1.4	UJD	1.4	1.8	JDI	1.4	0.67	JD	1.3
Endrin ketone	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
gamma-BHC (Lindane)	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
gamma-Chlordane	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
Heptachlor	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
Heptachlor epoxide	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
Methoxychlor	1.3	UJD	1.3	1.4	UJD	1.4	1.4	UJD	1.4	1.3	UJD	1.3
Toxaphene	13	UJD	13	14	UJD	14	14	UJD	14	13	UJD	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
1,2-Dichlorobenzene	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
1,3-Dichlorobenzene	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
1,4-Dichlorobenzene	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
2,4,5-Trichlorophenol	840	UJ	840	850	UJ	850	850	UJ	850	840	UJ	840
2,4,6-Trichlorophenol	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
2,4-Dichlorophenol	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
2,4-Dimethylphenol	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
2,4-Dinitrophenol	840	UJ	840	850	UJ	850	850	UJ	850	840	UJ	840
2,4-Dinitrotoluene	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
2,6-Dinitrotoluene	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
2-Chloronaphthalene	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
2-Chlorophenol	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
2-Methylnaphthalene	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
2-Methylphenol (cresol, o-)	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
2-Nitroaniline	840	UJ	840	850	UJ	850	850	UJ	850	840	UJ	840
2-Nitrophenol	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340

Attachment	1	Sheet No.	6 of 13
Originator	J. M. Capron	Date	09/20/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0290	Rev. No.	0

Attachment 1. 100-B-14:2 Area 4 Verification Sampling Results.

Constituents	J12R02 Location 1 Sample Date 7/6/06			J12R03 Location 2 Sample Date 7/6/06			J12R04 Location 3 Sample Date 7/6/06			J12R05 Location 4 Sample Date 7/6/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
3-Nitroaniline	840	UJ	840	850	UJ	850	850	UJ	850	840	UJ	840
4,6-Dinitro-2-methylphenol	840	UJ	840	850	UJ	850	850	UJ	850	840	UJ	840
4-Bromophenyl-phenylether	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
4-Chloro-3-methylphenol	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
4-Chloroaniline	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
4-Chlorophenyl-phenylether	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
4-Methylphenol (p-cresol)	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
4-Nitroaniline	840	UJ	840	850	UJ	850	850	UJ	850	840	UJ	840
4-Nitrophenol	840	UJ	840	850	UJ	850	850	UJ	850	840	UJ	840
Acenaphthene	340	UJ	340	340	UJ	340	68	J	340	170	J	340
Acenaphthylene	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Anthracene	340	UJ	340	340	UJ	340	160	J	340	330	J	340
Benzo(a)anthracene	340	UJ	340	83	J	340	460	J	340	750	J	340
Benzo(a)pyrene	340	UJ	340	110	J	340	440	J	340	640	J	340
Benzo(b)fluoranthene	340	UJ	340	120	J	340	330	J	340	420	J	340
Benzo(g,h,i)perylene	340	UJ	340	81	J	340	280	J	340	430	J	340
Benzo(k)fluoranthene	340	UJ	340	110	J	340	360	J	340	540	J	340
bis(2-Chloro-1-methylethyl)ether	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
bis(2-Chloroethoxy)methane	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
bis(2-Chloroethyl)ether	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
bis(2-Ethylhexyl)phthalate	660	UJ	340	660	UJ	340	660	UJ	340	660	UJ	340
Butylbenzylphthalate	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Carbazole	340	UJ	340	340	UJ	340	70	J	340	150	J	340
Chrysene	340	UJ	340	150	J	340	550	J	340	880	J	340
Di-n-butylphthalate	340	UJ	340	30	J	340	24	J	340	340	UJ	340
Di-n-octylphthalate	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Dibenz(a,h)anthracene	340	UJ	340	55	J	340	140	J	340	160	J	340
Dibenzofuran	340	UJ	340	340	UJ	340	20	J	340	59	J	340
Diethylphthalate	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Dimethylphthalate	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Fluoranthene	340	UJ	340	100	J	340	1200	J	340	1900	J	340
Fluorene	340	UJ	340	340	UJ	340	45	J	340	120	J	340
Hexachlorobenzene	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Hexachlorobutadiene	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Hexachlorocyclopentadiene	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Hexachloroethane	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Indeno(1,2,3-cd)pyrene	340	UJ	340	72	J	340	250	J	340	420	J	340
Isophorone	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
N-Nitroso-di-n-dipropylamine	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
N-Nitrosodiphenylamine	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Naphthalene	340	UJ	340	340	UJ	340	340	UJ	340	27	J	340
Nitrobenzene	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Pentachlorophenol	840	UJ	840	850	UJ	850	850	UJ	850	840	UJ	840
Phenanthrene	340	UJ	340	35	J	340	740	J	340	1600	J	340
Phenol	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Pyrene	340	UJ	340	130	J	340	920	J	340	1500	J	340

Attachment	1	Sheet No.	7 of 13
Originator	J. M. Capron	Date	09/20/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0290	Rev. No.	0

Attachment 1. 100-B-14:2 Area 4 Verification Sampling Results.

Constituents	J12R06 Location 5 Sample Date 7/6/06			J12R07 Location 6 Sample Date 7/6/06			J12R08 Location 7 Sample Date 7/6/06			J12R09 Location 8 Sample Date 7/6/06		
	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	95		13	84		13	13	U	13	63		13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Pesticides												
Aldrin	0.74	JD	1.3	2.4	JD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
alpha-BHC	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
alpha-Chlordane	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
beta-BHC	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
delta-BHC	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Dichlorodiphenyldichloroethane	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Dichlorodiphenyldichloroethylene	3.9	JD	1.3	7.6	JD	1.3	1.3	UJD	1.3	2.0	JD	1.3
Dichlorodiphenyltrichloroethane	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Dieldrin	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Endosulfan I	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Endosulfan II	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Endosulfan sulfate	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	2.0	JD	1.3
Endrin	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Endrin aldehyde	1.8	JDI	1.3	2.8	JD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Endrin ketone	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
gamma-BHC (Lindane)	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
gamma-Chlordane	1.1	JD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	0.74	JDI	1.3
Heptachlor	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Heptachlor epoxide	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Methoxychlor	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Toxaphene	13	UJD	13	13	UJD	13	13	UJD	13	13	UJD	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
1,2-Dichlorobenzene	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
1,3-Dichlorobenzene	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
1,4-Dichlorobenzene	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
2,4,5-Trichlorophenol	840	UJ	840	2500	UJD	2500	840	UJ	840	2500	UJD	2500
2,4,6-Trichlorophenol	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
2,4-Dichlorophenol	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
2,4-Dimethylphenol	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
2,4-Dinitrophenol	840	UJ	840	2500	UJD	2500	840	UJ	840	2500	UJD	2500
2,4-Dinitrotoluene	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
2,6-Dinitrotoluene	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
2-Chloronaphthalene	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
2-Chlorophenol	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
2-Methylnaphthalene	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
2-Methylphenol (cresol, o-)	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
2-Nitroaniline	840	UJ	840	2500	UJD	2500	840	UJ	840	2500	UJD	2500
2-Nitrophenol	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000

Attachment	1	Sheet No.	8 of 13
Originator	J. M. Capron	Date	09/20/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0290	Rev. No.	0

Attachment 1. 100-B-14:2 Area 4 Verification Sampling Results.

Constituents	J12R06 Location 5 Sample Date 7/6/06			J12R07 Location 6 Sample Date 7/6/06			J12R08 Location 7 Sample Date 7/6/06			J12R09 Location 8 Sample Date 7/6/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
3-Nitroaniline	840	UJ	840	2500	UJD	2500	840	UJ	840	2500	UJD	2500
4,6-Dinitro-2-methylphenol	840	UJ	840	2500	UJD	2500	840	UJ	840	2500	UJD	2500
4-Bromophenyl-phenylether	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
4-Chloro-3-methylphenol	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
4-Chloroaniline	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
4-Chlorophenyl-phenylether	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
4-Methylphenol (p-cresol)	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
4-Nitroaniline	840	UJ	840	2500	UJD	2500	840	UJ	840	2500	UJD	2500
4-Nitrophenol	840	UJ	840	2500	UJD	2500	840	UJ	840	2500	UJD	2500
Acenaphthene	26	J	340	210	JD	1000	340	UJ	340	1000	UJD	1000
Acenaphthylene	340	UJ	340	1000	UJD	2500	340	UJ	340	1000	UJD	1000
Anthracene	49	J	340	390	JD	1000	340	UJ	340	1000	UJD	1000
Benzo(a)anthracene	230	J	340	1600	JD	1000	340	UJ	340	1000	UJD	1000
Benzo(a)pyrene	240	J	340	1500	JD	1000	340	UJ	340	1000	UJD	1000
Benzo(b)fluoranthene	210	J	340	1300	JD	1000	340	UJ	340	1000	UJD	1000
Benzo(g,h,i)perylene	170	J	340	1200	JD	1000	340	UJ	340	1000	UJD	1000
Benzo(k)fluoranthene	200	J	340	1300	JD	1000	340	UJ	340	1000	UJD	1000
bis(2-Chloro-1-methylethyl)ether	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
bis(2-Chloroethoxy)methane	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
bis(2-Chloroethyl)ether	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
bis(2-Ethylhexyl)phthalate	660	UJ	340	660	UJD	1000	660	UJ	21	1000	UJD	1000
Butylbenzylphthalate	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
Carbazole	37	J	340	250	JD	1000	340	UJ	340	1000	UJD	1000
Chrysene	310	J	340	1800	JD	1000	340	UJ	340	1000	UJD	1000
Di-n-butylphthalate	24	J	340	1000	UJD	1000	19	J	340	1000	UJD	1000
Di-n-octylphthalate	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
Dibenz(a,h)anthracene	89	J	340	600	JD	1000	340	UJ	340	1000	UJD	1000
Dibenzofuran	340	UJ	340	82	JD	1000	340	UJ	340	1000	UJD	1000
Diethylphthalate	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
Dimethylphthalate	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
Fluoranthene	410	J	340	3100	JD	1000	23	J	340	1000	UJD	1000
Fluorene	340	UJ	340	130	JD	1000	340	UJ	340	1000	UJD	1000
Hexachlorobenzene	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
Hexachlorobutadiene	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
Hexachlorocyclopentadiene	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
Hexachloroethane	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
Indeno(1,2,3-cd)pyrene	140	J	340	1100	JD	1000	340	UJ	340	1000	UJD	1000
Isophorone	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
N-Nitroso-di-n-dipropylamine	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
N-Nitrosodiphenylamine	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
Naphthalene	340	UJ	340	55	JD	1000	340	UJ	340	1000	UJD	1000
Nitrobenzene	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
Pentachlorophenol	840	UJ	840	2500	UJD	2500	840	UJ	840	2500	UJD	2500
Phenanthrene	270	J	340	1900	JD	1000	340	UJ	340	1000	UJD	1000
Phenol	340	UJ	340	1000	UJD	1000	340	UJ	340	1000	UJD	1000
Pyrene	400	J	340	3400	JD	1000	20	J	340	1000	UJD	1000

Attachment	1	Sheet No.	9 of 13
Originator	J. M. Capron	Date	09/20/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0290	Rev. No.	0

Attachment 1. 100-B-14:2 Area 4 Verification Sampling Results.

Constituents	J12R14 Duplicate of J12R09 Sample Date 7/6/06			J12R10 Location 9 Sample Date 7/6/06			J12R11 Location 10 Sample Date 7/6/06			J12R12 East Overburden Sample Date 7/6/06		
	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	78		13	13	U	13	13	U	13	13	U	13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Pesticides												
Aldrin	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
alpha-BHC	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
alpha-Chlordane	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
beta-BHC	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
delta-BHC	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Dichlorodiphenyldichloroethane	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Dichlorodiphenyldichloroethylene	2.3	JD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Dichlorodiphenyltrichloroethane	6.7	JD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Dieldrin	3.6	JD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Endosulfan I	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Endosulfan II	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Endosulfan sulfate	3.3	JD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Endrin	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Endrin aldehyde	1.1	JDI	1.3	1.5	JD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Endrin ketone	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
gamma-BHC (Lindane)	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
gamma-Chlordane	1.3	JDI	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Heptachlor	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Heptachlor epoxide	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Methoxychlor	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3	1.3	UJD	1.3
Toxaphene	13	UJD	13	13	UJD	13	13	UJD	13	13	UJD	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
1,2-Dichlorobenzene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
1,3-Dichlorobenzene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
1,4-Dichlorobenzene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
2,4,5-Trichlorophenol	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500
2,4,6-Trichlorophenol	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
2,4-Dichlorophenol	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
2,4-Dimethylphenol	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
2,4-Dinitrophenol	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500
2,4-Dinitrotoluene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
2,6-Dinitrotoluene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
2-Chloronaphthalene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
2-Chlorophenol	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
2-Methylnaphthalene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
2-Methylphenol (cresol, o-)	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
2-Nitroaniline	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500
2-Nitrophenol	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000

Attachment	1	Sheet No.	10 of 13
Originator	J. M. Capron	Date	09/20/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0290	Rev. No.	0

Attachment 1. 100-B-14:2 Area 4 Verification Sampling Results.

Constituents	J12R14 Duplicate of J12R09 Sample Date 7/6/06			J12R10 Location 9 Sample Date 7/6/06			J12R11 Location 10 Sample Date 7/6/06			J12R12 East Overburden Sample Date 7/6/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
3-Nitroaniline	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500
4,6-Dinitro-2-methylphenol	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500
4-Bromophenyl-phenylether	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
4-Chloro-3-methylphenol	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
4-Chloroaniline	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
4-Chlorophenyl-phenylether	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
4-Methylphenol (p-cresol)	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
4-Nitroaniline	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500
4-Nitrophenol	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500	2500	UJD	2500
Acenaphthene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Acenaphthylene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Anthracene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	86	JD	1000
Benzo(a)anthracene	1000	UJD	1000	1000	UJD	1000	89	JD	1000	210	JD	1000
Benzo(a)pyrene	1000	UJD	1000	1000	UJD	1000	78	JD	1000	170	JD	1000
Benzo(b)fluoranthene	1000	UJD	1000	1000	UJD	1000	110	JD	1000	140	JD	1000
Benzo(g,h,i)perylene	1000	UJD	1000	1000	UJD	1000	100	JD	1000	96	JD	1000
Benzo(k)fluoranthene	1000	UJD	1000	1000	UJD	1000	98	JD	1000	160	JD	1000
bis(2-Chloro-1-methylethyl)ether	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
bis(2-Chloroethoxy)methane	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
bis(2-Chloroethyl)ether	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
bis(2-Ethylhexyl)phthalate	1000	UJD	1000	1000	UJD	1000	660	UJD	1000	1000	UJD	1000
Butylbenzylphthalate	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Carbazole	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Chrysene	1000	UJD	1000	1000	UJD	1000	190	JD	1000	260	JD	1000
Di-n-butylphthalate	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Di-n-octylphthalate	1000	UJD	1000	1000	UJD	1000	95	JD	1000	1000	UJD	1000
Dibenz(a,h)anthracene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Dibenzofuran	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Diethylphthalate	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Dimethylphthalate	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Fluoranthene	1000	UJD	1000	1000	UJD	1000	68	JD	1000	440	JD	1000
Fluorene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Hexachlorobenzene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Hexachlorobutadiene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Hexachlorocyclopentadiene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Hexachloroethane	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Indeno(1,2,3-cd)pyrene	1000	UJD	1000	1000	UJD	1000	54	JD	1000	87	JD	1000
Isophorone	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
N-Nitroso-di-n-dipropylamine	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
N-Nitrosodiphenylamine	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Naphthalene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Nitrobenzene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Pentachlorophenol	2500	UJD	2500	2500	UJD	2500	1900	JD	2500	2500	UJD	2500
Phenanthrene	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	420	JD	1000
Phenol	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000	1000	UJD	1000
Pyrene	1000	UJD	1000	1000	UJD	1000	67	JD	1000	710	JD	1000

Attachment	1	Sheet No.	11 of 13
Originator	J. M. Capron	Date	09/20/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0290	Rev. No.	0

Attachment 1. 100-B-14:2 Area 4 Verification Sampling Results.

Constituents	J12R13 West Overburden Sample Date 7/6/06			J12R15 Equipment Blank Sample Date 7/6/06		
	μg/kg	Q	PQL	μg/kg	Q	PQL
Polychlorinated Biphenyls						
Aroclor-1016	13	U	13			
Aroclor-1221	13	U	13			
Aroclor-1232	13	U	13			
Aroclor-1242	13	U	13			
Aroclor-1248	13	U	13			
Aroclor-1254	15		13			
Aroclor-1260	13	U	13			
Pesticides						
Aldrin	1.3	UJD	1.3			
alpha-BHC	2.0	JD	1.3			
alpha-Chlordane	1.3	UJD	1.3			
beta-BHC	1.3	UJD	1.3			
delta-BHC	1.3	UJD	1.3			
Dichlorodiphenyldichloroethane	1.3	UJD	1.3			
Dichlorodiphenyldichloroethylene	1.3	UJD	1.3			
Dichlorodiphenyltrichloroethane	1.3	UJD	1.3			
Dieldrin	0.70	JD	1.3			
Endosulfan I	1.3	UJD	1.3			
Endosulfan II	1.3	UJD	1.3			
Endosulfan sulfate	1.3	UJD	1.3			
Endrin	1.3	UJD	1.3			
Endrin aldehyde	1.3	UJD	1.3			
Endrin ketone	1.3	UJD	1.3			
gamma-BHC (Lindane)	1.3	UJD	1.3			
gamma-Chlordane	1.3	UJD	1.3			
Heptachlor	1.3	UJD	1.3			
Heptachlor epoxide	1.3	UJD	1.3			
Methoxychlor	1.3	UJD	1.3			
Toxaphene	13	UJD	13			
Semivolatile Organic Compounds						
1,2,4-Trichlorobenzene	1000	UJD	1000	330	UJ	330
1,2-Dichlorobenzene	1000	UJD	1000	330	UJ	330
1,3-Dichlorobenzene	1000	UJD	1000	330	UJ	330
1,4-Dichlorobenzene	1000	UJD	1000	330	UJ	330
2,4,5-Trichlorophenol	2500	UJD	2500	830	UJ	830
2,4,6-Trichlorophenol	1000	UJD	1000	330	UJ	330
2,4-Dichlorophenol	1000	UJD	1000	330	UJ	330
2,4-Dimethylphenol	1000	UJD	1000	330	UJ	330
2,4-Dinitrophenol	2500	UJD	2500	830	UJ	830
2,4-Dinitrotoluene	1000	UJD	1000	330	UJ	330
2,6-Dinitrotoluene	1000	UJD	1000	330	UJ	330
2-Chloronaphthalene	1000	UJD	1000	330	UJ	330
2-Chlorophenol	1000	UJD	1000	330	UJ	330
2-Methylnaphthalene	1000	UJD	1000	330	UJ	330
2-Methylphenol (cresol, o-)	1000	UJD	1000	330	UJ	330
2-Nitroaniline	2500	UJD	2500	830	UJ	830
2-Nitrophenol	1000	UJD	1000	330	UJ	330

Attachment	1	Sheet No.	12 of 13
Originator	J. M. Capron	Date	09/20/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0290	Rev. No.	0

Attachment 1. 100-B-14:2 Area 4 Verification Sampling Results.

Constituents	J12R13 West Overburden Sample Date 7/6/06			J12R15 Equipment Blank Sample Date 7/6/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)						
3,3'-Dichlorobenzidine	1000	UJD	1000	330	UJ	330
3-Nitroaniline	2500	UJD	2500	830	UJ	830
4,6-Dinitro-2-methylphenol	2500	UJD	2500	830	UJ	830
4-Bromophenyl-phenylether	1000	UJD	1000	330	UJ	330
4-Chloro-3-methylphenol	1000	UJD	1000	330	UJ	330
4-Chloroaniline	1000	UJD	1000	330	UJ	330
4-Chlorophenyl-phenylether	1000	UJD	1000	330	UJ	330
4-Methylphenol (p-cresol)	1000	UJD	1000	330	UJ	330
4-Nitroaniline	2500	UJD	2500	830	UJ	830
4-Nitrophenol	2500	UJD	2500	830	UJ	830
Acenaphthene	1000	UJD	1000	330	UJ	330
Acenaphthylene	1000	UJD	1000	330	UJ	330
Anthracene	1000	UJD	1000	330	UJ	330
Benzo(a)anthracene	1000	UJD	1000	330	UJ	330
Benzo(a)pyrene	1000	UJD	1000	330	UJ	330
Benzo(b)fluoranthene	1000	UJD	1000	330	UJ	330
Benzo(g,h,i)perylene	1000	UJD	1000	330	UJ	330
Benzo(k)fluoranthene	1000	UJD	1000	330	UJ	330
bis(2-Chloro-1-methylethyl)ether	1000	UJD	1000	330	UJ	330
bis(2-Chloroethoxy)methane	1000	UJD	1000	330	UJ	330
bis(2-Chloroethyl)ether	1000	UJD	1000	330	UJ	330
bis(2-Ethylhexyl)phthalate	1000	UJD	1000	660	UJ	330
Butylbenzylphthalate	1000	UJD	1000	330	UJ	330
Carbazole	1000	UJD	1000	330	UJ	330
Chrysene	1000	UJD	1000	330	UJ	330
Di-n-butylphthalate	1000	UJD	1000	230	J	330
Di-n-octylphthalate	1000	UJD	1000	330	UJ	330
Dibenz(a,h)anthracene	1000	UJD	1000	330	UJ	330
Dibenzofuran	1000	UJD	1000	330	UJ	330
Diethylphthalate	1000	UJD	1000	36	J	330
Dimethylphthalate	1000	UJD	1000	330	UJ	330
Fluoranthene	1000	UJD	1000	330	UJ	330
Fluorene	1000	UJD	1000	330	UJ	330
Hexachlorobenzene	1000	UJD	1000	330	UJ	330
Hexachlorobutadiene	1000	UJD	1000	330	UJ	330
Hexachlorocyclopentadiene	1000	UJD	1000	330	UJ	330
Hexachloroethane	1000	UJD	1000	330	UJ	330
Indeno(1,2,3-cd)pyrene	1000	UJD	1000	330	UJ	330
Isophorone	1000	UJD	1000	330	UJ	330
N-Nitroso-di-n-dipropylamine	1000	UJD	1000	330	UJ	330
N-Nitrosodiphenylamine	1000	UJD	1000	330	UJ	330
Naphthalene	1000	UJD	1000	330	UJ	330
Nitrobenzene	1000	UJD	1000	330	UJ	330
Pentachlorophenol	2500	UJD	2500	830	UJ	830
Phenanthrene	1000	UJD	1000	330	UJ	330
Phenol	1000	UJD	1000	330	UJ	330
Pyrene	59	JD	1000	330	UJ	330

Attachment	1	Sheet No.	13 of 13
Originator	J. M. Capron	Date	09/20/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0290	Rev. No.	0

CALCULATION COVER SHEET

Project Title 100-B/C Remaining Pipes and Sewers Field Remediation **Job No.** 14655
Area 100-B/C
Discipline Environmental *__Calc. No.__ 0100B-CA-V0291
Subject 100-B-14:2 (Area 4) Waste Site 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 *Approved 9/20/06*	T. M. Blakley *Approved 9/21/06*	L. M. Dittmer *Approved 9/25/06*	D. N. Strom *Approved 9/25/06*	9/25/06
1	Cover = 1 Summary = 4 Total = 5	J. M. Capron JM Capron 11/16/06	S. W. Clark S.W. Clark 11/16/06	N/A	D. N. Strom [signature] 11-21-06	11-21-06

SUMMARY OF REVISION

1	Cover page replaced for convenience. Sheet 1, line 21, EPA reference removed due to changes in lead calculations. Sheet 2, lines 8 to 10, discussion of lead exclusion included for consistency with other portions of the sewer system. Sheet 2, line 31, cumulative hazard quotient values corrected per changes to individual calculations. Sheet 3, lines 14 and 42, value, calculations, and footnote for lead removed. Sheet 4, line3, site designation corrected.

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	Date:	11/16/06	Calc. No.:	0100B-CA-V0291	Rev.:	1
Project:	100-B/C RPAS Field Remediation	Job No:	14655	Checked:	S. W. Clark	Date:	11/16/06
Subject:	100-B-14:2 (Area 4) Waste Site Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 1 of 4	

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and excess carcinogenic risk values for the 100-B-14:2, area 4 (previously known as the 100-B-14:8 subsite) remediation verification sampling results. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2005), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess carcinogenic risk of $<1 \times 10^{-6}$ for individual carcinogens
4) A cumulative excess carcinogenic risk of $<1 \times 10^{-5}$ for carcinogens.

GIVEN/REFERENCES:

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

2) WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, 2004.

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

4) WAC 173-350, "Solid Waste Handling Standards," *Washington Administrative Code*, 2005.

5) WCH, 2006, *100-B-14:2 (Area 4) Waste Site Cleanup Verification 95% UCL Calculations*, Calculation No. 0100B-CA-V0290, Washington Closure Hanford, Richland, Washington.

SOLUTION:

1) Calculate an HQ for each noncarcinogenic constituent detected above background and compare to the individual HQ of <1.0 (DOE-RL 2005).

2) Sum the HQs and compare to the cumulative HQ criterion of <1.0.

3) Calculate an excess carcinogenic risk value for each carcinogenic constituent detected above background and compare to the individual excess carcinogenic risk criterion of $<1 \times 10^{-6}$ (DOE-RL 2005).

4) Sum the excess carcinogenic risk values and compare to the cumulative excess carcinogenic risk criterion of $<1 \times 10^{-5}$.

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron JMC	Date:	11/16/06	Calc. No.:	0100B-CA-V0291	Rev.:	1
Project:	100-B/C RPAS Field Remediation	Job No:	14655	Checked:	S. W. Clark SWC	Date:	11/16/06
Subject:	100-B-14:2 (Area 4) Waste Site Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 2 of 4	

METHODOLOGY:

Hazard quotient and carcinogenic risk calculations were performed for the 100-B-14:2 (area 4) subsite using the higher of the remediation footprint statistical value and overburden material maximum value for each analyte detected above background. Of the contaminants of concern (COCs) and contaminants of potential concern (COPCs) for the site, boron, molybdenum, strontium, and tin require the HQ calculations because they were detected and Washington State or Hanford Site background values are not available. Copper, lead, mercury, and zinc are included because they were quantified above their respective Hanford Site background values. Hexavalent chromium, aroclor-1254, aroclor-1260, and multiple chlorinated pesticides 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. Lead does not have a reference dose for calculation of a hazard quotient because toxic effects of lead are correlated with blood-lead levels rather than exposure levels or daily intake. As a result, the maximum lead concentration is reported but not included in the hazard quotient calculation. Polycyclic aromatic hydrocarbons (PAHs) detected in the verification samples 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). 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 statistical value for boron is 3.6 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 2.3×10^{-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 7.3×10^{-2}. 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 0.98 mg/kg; divided by 2.1 mg/kg and multiplied as indicated is 4.7×10^{-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 9.2×10^{-7}. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron JMC	Date:	11/16/06	Calc. No.:	0100B-CA-V0291	Rev.:	1
Project:	100-B/C RPAS Field Remediation	Job No:	14655	Checked:	S. W. Clark SWC	Date:	11/16/06
Subject:	100-B-14:2 (Area 4) Waste Site Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 3 of 4	

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None

3) List individual carcinogens and corresponding excess cancer risk >1 x 10^{-6}: None
4) List the cumulative excess cancer risk for carcinogens >1 x 10^{-5}: None.

Table 1 shows the results of the calculations for the 100-B-14:2 (area 4) subsite.

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					
Boron	3.6	16,000	2.3E-04	--	--
Chromium, hexavalent[c]	0.98	240	4.1E-03	2.1	4.7E-07
Copper	23.8	2,960	8.0E-03	--	--
Lead	27.1	--	--	--	--
Mercury	0.47	24	2.0E-02	--	--
Molybdenum	0.8	400	2.0E-03	--	--
Strontium	36.2	48,000	7.5E-04	--	--
Tin	1.1	48,000	2.3E-05	--	--
Zinc	82	24,000	3.4E-03	--	--
Semivolatiles					
Dibenzofuran	0.082	160	5.1E-04	--	--
Di-n-butylphthalate	0.030	8,000	3.8E-06	--	--
Di-n-octylphthalate	0.095	1,600	5.9E-05	--	--
Pentachlorophenol	1.9	2,400	7.9E-04	8.33	2.3E-07
Pesticides					
Aldrin	0.0024	2.40	1.0E-03	0.0588	4.1E-08
BHC, alpha	0.0020	--	--	0.159	1.3E-08
Chlordane (alpha and gamma)	0.0013	40	3.3E-05	2.86	4.5E-10
DDD, 4,4'-	0.0021	--	--	4.17	5.0E-10
DDE, 4,4'-	0.0076	--	--	2.94	2.6E-09
DDT, 4,4'-	0.0067	40	1.7E-04	2.94	2.3E-09
Dieldrin	0.0036	4	9.0E-04	0.0625	5.8E-08
Endosulfan (I, II, sulfate)	0.0033	480	6.9E-06	--	--
Endrin (and ketone, aldehyde)	0.0016	24	6.7E-05	--	--
Polychlorinated Biphenyls					
Aroclor-1254	0.050	1.6	3.1E-02	0.5	1.0E-07
Aroclor-1260	0.0053	--	--	0.5	1.1E-08
Totals					
Cumulative Hazard Quotient:			**7.3E-02**		
Cumulative Excess Cancer Risk:					**9.2E-07**

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.
-- = not applicable
RAG = remedial action goal

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron JMC	Date:	11/16/06	Calc. No.:	0100B-CA-V0291	Rev.:	1
Project:	100-B/C RPAS Field Remediation	Job No:	14655	Checked:	S. W. Clark SWC	Date:	11/16/06
Subject:	100-B-14:2 (Area 4) Waste Site Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	4 of 4

CONCLUSION:

This calculation demonstrates that the 100-B-14:2 (area 4) subsite meets the requirements for hazard quotient and excess carcinogenic risk as identified in the RDR/RAWP (DOE-RL 2005).

CALCULATION COVER SHEET

Project Title:	100-B/C Area Field Remediation	**Job No.**	14655
Area	100-B/C		
Discipline	Environmental	***Calc. No.**	0100B-CA-V0264
Subject	1607-B2:1 Drain Field 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 documents 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 = 9 Attm. 1 = 14 Total = 24	[signature] 12/20/05 S.W. Clark ~~J. M. Capron~~	12/20/05 KE Cook for T. M. Blakley	RaCailer for 12/21/05 L. M. Dittmer	[signature] D. N. Strom	12-28-05

SUMMARY OF REVISIONS

* Obtain calc no. from DIS

DE01437.03 (12/09/2004)

Washington Closure Hanford CALCULATION SHEET

Originator ~~J. M. Capron~~ S.W. Clark
Date 12/20/05
Calc. No. 0100B-CA-V0264
Rev. No. 0

Project 100-B/C Area Field Remediation
Job No. 14655
Checked T. M. Blakley for
Date 12/20/05

Subject 1607-B2:1 Drain Field Cleanup Verification 95% UCL Calculations
Sheet No. 1 of 9

Summary

Purpose:

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

Table of Contents:

Sheets 1 to 2 - Calculation Sheet Summary
Sheets 3 to 4 - Calculation Sheet Shallow Zone Verification Data - Excavated Area
Sheet 5 - Calculation Sheet Duplicate Analysis
Sheets 6 to 10 - Ecology Software (MTCAStat) Results 14 BAC 12/21/05
Attachment 1 - 1607-B2:1 Verification Sampling Results (17 sheets)

Given/References:

1) Sample Results (Attachment 1).
2) Lookup values, background values, and remedial action goals (RAGs) are taken from DOE-RL (2005b), DOE-RL (2001), and Ecology (1996).
3) DOE-RL, 2001, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) DOE-RL, 2005a, *100 Area Remedial Action Sampling and Analysis Plan* (SAP), DOE/RL-96-22, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
5) DOE-RL, 2005b, *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, 1996, *Model Toxic Control Act Cleanup Levels and Risk Calculations (CLARC II),* Publication #94-145, Washington State Department of Ecology, Olympia, Washington.
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 for each COPC. The hazard quotient and carcinogenic risk calculations are located in a separate calculation brief as an appendix to the Remaining Sites Verification Package (RSVP).

Calculation Description:

The subject calculations were performed on 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 RPD results are used in evaluation of data quality within the RSVP for this site.

Methodology:

For nonradioactive analytes with <50% of the data below detection limits and all 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 evaluation of the portion of the data set below detection limits was based on direct examination of the attached data; no radionuclide COPCs were identified for this site. All nonradionuclide data reported as being undetected are set to ½ the detection limit value for calculation of the statistics (Ecology 1993).

For the statistical evaluation of duplicate sample pairs, the samples are averaged before being included in the data set, after adjustments for censored data as described above.

For 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, as for the subject site, distributional testing is done using Ecology's MTCAStat software (Ecology 1993).

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,
2) greater than 10% of the raw data exceed the most stringent cleanup limit for each COPC,
3) the maximum value of the raw data set exceeds two times the most stringent cleanup limit for each COPC.

The RPD is calculated when both the primary value and the duplicate 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. No regulatory split samples were collected for cleanup verification of the subject site. Additional discussion as necessary is provided in the data quality assessment section of the applicable RSVP.

Washington Closure Hanford S.W. Clark

CALCULATION SHEET

Originator ~~J. M. Capron~~ SWC Date 12/20/05 Calc. No. 0100B-CA-V0264 Rev. No. 0

Project 100-B/C Area Field Remediation Job No. 14655 Checked T. M. Blakley KEC for Date 12/20/05 KEC

Subject 1607-B2:1 Drain Field Cleanup Verification 95% UCL Calculations Sheet No. 2 of 9

Summary (continued)

Results:
The results presented in the summary tables that follow are for use in risk analysis and the RSVP for this site.

Results Summary - Excavated Area			
Analyte	**95% UCL[a]**	**Maximum[b]**	**Units**
Antimony		5.8E-01	mg/kg
Arsenic	7.2E+00		mg/kg
Barium	2.58E+02		mg/kg
Beryllium	8.E-01		mg/kg
Boron	8.3E+00		mg/kg
Cadmium		1.3E-01	mg/kg
Chromium (total)	1.98E+01		mg/kg
Hexavalent Chromium		3.3E-01	mg/kg
Cobalt	1.29E+01		mg/kg
Copper	2.96E+01		mg/kg
Lead	1.02E+01		mg/kg
Manganese	5.88E+02		mg/kg
Mercury		2.E-02	mg/kg
Molybdenum	1.2E+00		mg/kg
Nickel	2.12E+01		mg/kg
Silver		2.0E-01	mg/kg
Vanadium	5.49E+01		mg/kg
Zinc	6.9E+01		mg/kg
4,4'-DDD		1.7E-03	mg/kg
Dieldrin		1.7E-03	mg/kg
Endrin Aldehyde		2.2E-03	mg/kg
2-Methylnaphthalene		1.5E-01	mg/kg
Dibenzofuran		3.4E-02	mg/kg
Diethylphthalate		2.6E-02	mg/kg
Di-n-butylphthalate		2.1E-02	mg/kg
Indeno(1,2,3-cd)pyrene		2.4E-02	mg/kg
Naphthalene		1.1E-01	mg/kg
Phenanthrene		3.7E-02	mg/kg
Acetone	1.0E-02		mg/kg
2,4-D		1.1E-01	mg/kg
2,4-DB		2.5E-01	mg/kg
2,4,5-T	4.1E-02		mg/kg
2,4,5-TP		2.3E-02	mg/kg
Dinoseb		2.7E-02	mg/kg

WAC 173-340-740(7)(e) Evaluation

WAC 3-Part Test for most stringent cleanup limit:		
95% UCL > Cleanup Limit?	YES	Because of the "yes" answers to the MTCA 3-part test for multiple contaminants, a detailed assessment using RESRAD will be performed for these contaminants.
> 10% above Cleanup Limit?	YES	
Any sample > 2x Cleanup Limit?	YES	

Note: All data sets meet the 3-part test criteria when compared to direct exposure cleanup limits.

[a]For nonradionuclides, where ≤ 50% of a data set is censored (below detection limits), the 95% UCL value is used for a given analyte.
[b]For nonradionuclides, where > 50% of a data set is censored, the statistical value defaults to the maximum detected value in the data set.
MTCA = *Model Toxic Control Act*
RESRAD = RESidual RADioactivity
UCL = upper confidence level
WAC = *Washington Adminstrative Code*

Relative Percent Difference Results[a] - QA/QC Analysis	
Analyte	**Duplicate Analysis**
Barium	12%
Chromium (total)	15%
Copper	8.2%
Manganese	13%
Vanadium	10%
Zinc	11%

[a]RPD evaluation was not required for analytes not included in these tables
QA/QC = quality assurance/quality control
RPD = relative percent difference

CALCULATION SHEET

Washington Closure Hanford

Originator ~~J. M. Capron~~ S. W. Clark

Project 100-B/C Area Field Remediation

Subject 1607-B2:1 Drain Field Cleanup Verification 95% UCL Calculations

Date 12/20/05
Job No. 14655

Calc. No. 0100B-CA-V0264
Checked T. M. Blakley for

Rev. No. 0
Date 12/20/05
Sheet No. 3 of 9

Shallow Zone Verification Data - Excavated Area

Sampling Area	HEIS 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
2	J03VB9	8/19/2005	5.1E+00		4.2E-01	8.87E+01		9.E-03	3.2E-01		9.E-03	1.4E+00		2.1E-01	1.25E+01		6.E-02	7.5E+00		6.E-02	1.75E+01		1.2E-01
Duplicate of J03VB9	J03VD2	8/19/2005	5.6E+00		4.2E-01	9.98E+01		9.E-03	4.1E-01		9.E-03	1.7E+00		2.1E-01	1.46E+01		6.E-02	8.3E+00		6.E-02	1.90E+01		1.3E-01
1	J03VB8	8/19/2005	4.6E+00		4.3E-01	1.01E+02		9.E-03	3.6E-01		9.E-03	1.1E+00		2.1E-01	1.23E+01		6.E-02	1.07E+01		6.E-02	2.53E+01		1.2E-01
3	J03VC0	8/19/2005	6.6E+00		4.4E-01	1.86E+02		9.E-03	4.3E-01		9.E-03	1.42E+01		2.1E-01	1.64E+01		7.E-02	8.1E+00		7.E-02	2.08E+01		1.2E-01
4	J03VC1	8/19/2005	4.1E+00		4.2E-01	1.00E+02		9.E-03	5.7E-01		9.E-03	6.2E-01	U	6.2E-01	1.30E+01		6.E-02	9.4E+00		6.E-02	2.18E+01		1.2E-01
5	J03VC2	8/19/2005	5.3E+00		4.2E-01	1.55E+02		9.E-03	8.2E-01		9.E-03	7.4E-01		6.2E-01	1.46E+01		6.E-02	1.30E+01		6.E-02	2.78E+01		1.2E-01
6	J03VC3	8/19/2005	4.1E+00		4.2E-01	6.42E+02		9.E-03	7.8E-01		9.E-03	2.54E+01		6.2E-01	7.9E+00		6.E-02	5.3E+00		6.E-02	2.09E+01		1.2E-01
7	J03VC4	8/19/2005	6.3E+00		4.3E-01	1.15E+02		9.E-03	6.6E-01		9.E-03	8.8E-01		6.3E-01	1.84E+01		6.E-02	9.8E+00		6.E-02	2.52E+01		1.2E-01
8	J03VC5	8/19/2005	6.0E+00		4.3E-01	1.39E+02		9.E-03	7.2E-01		9.E-03	6.3E-01	U	6.3E-01	1.62E+01		6.E-02	1.07E+01		6.E-02	2.56E+01		1.2E-01
9	J03VC6	8/19/2005	1.06E+01		4.3E-01	1.91E+02		9.E-03	1.1E+00		9.E-03	6.3E-01	U	6.3E-01	2.85E+01		6.E-02	1.91E+01		6.E-02	4.65E+01		1.2E-01
10	J03VC7	8/19/2005	7.7E+00		4.2E-01	1.62E+02		9.E-03	7.0E-01		9.E-03	2.0E+00		6.2E-01	2.15E+01		6.E-02	1.28E+01		6.E-02	3.15E+01		1.2E-01
11	J03VC8	8/19/2005	6.3E+00		4.3E-01	9.45E+01		9.E-03	4.8E-01		9.E-03	6.3E-01	U	6.3E-01	1.46E+01		6.E-02	8.2E+00		6.E-02	1.83E+01		1.2E-01

Statistical Computation Input Data

Sampling Area	HEIS Number	Sample Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg
2	J03VB9/J03VD2	8/19/2005	5.4E+00	9.43E+01	3.7E-01	1.6E+00	1.36E+01	7.9E+00	1.83E+01
1	J03VB8	8/19/2005	4.6E+00	1.01E+02	3.6E-01	1.1E+00	1.23E+01	1.07E+01	2.53E+01
3	J03VC0	8/19/2005	6.6E+00	1.86E+02	4.3E-01	1.42E+01	1.64E+01	8.1E+00	2.08E+01
4	J03VC1	8/19/2005	4.1E+00	1.00E+02	5.7E-01	3.1E-01	1.30E+01	9.4E+00	2.18E+01
5	J03VC2	8/19/2005	5.3E+00	1.55E+02	8.2E-01	7.4E-01	1.46E+01	1.30E+01	2.78E+01
6	J03VC3	8/19/2005	4.1E+00	6.42E+02	7.8E-01	2.54E+01	7.9E+00	5.3E+00	2.09E+01
7	J03VC4	8/19/2005	6.3E+00	1.15E+02	6.6E-01	8.8E-01	1.84E+01	9.8E+00	2.52E+01
8	J03VC5	8/19/2005	6.0E+00	1.39E+02	7.2E-01	3.2E-01	1.62E+01	1.07E+01	2.56E+01
9	J03VC6	8/19/2005	1.06E+01	1.91E+02	1.1E+00	3.2E-01	2.85E+01	1.91E+01	4.65E+01
10	J03VC7	8/19/2005	7.7E+00	1.62E+02	7.0E-01	2.0E+00	2.15E+01	1.28E+01	3.15E+01
11	J03VC8	8/19/2005	6.3E+00	9.45E+01	4.8E-01	3.2E-01	1.46E+01	8.2E+00	1.83E+01

Statistical Computations

	Arsenic		Barium		Beryllium		Boron		Chromium		Cobalt		Copper	
Statistical 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.	
N	11		11		11		11		11		11		11	
% < Detection limit	0%		0%		0%		36%		0%		0%		0%	
mean	6.1E+00		1.80E+02		6.E-01		4.3E+00		1.61E+01		1.05E+01		2.56E+01	
standard deviation	1.9E+00		1.57E+02		2.E-01		8.1E+00		5.4E+00		3.6E+00		8.0E+00	
95% UCL on mean	7.2E+00		2.58E+02		8.E-01		8.3E+00		1.98E+01		1.29E+01		2.96E+01	
maximum value	1.06E+01		6.42E+02		1.1E+00		2.54E+01		2.85E+01		1.91E+01		4.65E+01	
Statistical value	7.2E+00		2.58E+02		8.E-01		8.3E+00		1.98E+01		1.29E+01		2.96E+01	
Most Stringent Cleanup Limit for nonradionuclide and RAG type	20	BG/Direct Exposure/GW & River Protection	132	GW Protection	1.51	BG/GW & River Protection	320	GW Protection	18.5	GW & River Protection	32	GW Protection	22.0	River Protection
WAC 173-340 3-PART TEST														
95% UCL > Cleanup Limit?	NA		YES		NA		NO		YES		NO		YES	
> 10% above Cleanup Limit?	NA		YES		NA		NO		YES		NO		YES	
Any sample > 2X Cleanup Limit?	NA		YES		NA		NO		NO		NO		YES	
WAC 173-340 Compliance? Further assessment required	Because all values are below background (20 mg/kg), the MTCA 3-part test is not required.		Because of the "yes" answers to the MTCA 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to direct exposure cleanup levels.		Because all values are below background (1.51 mg/kg), the MTCA 3-part test is not required.		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		Because of the "yes" answers to the MTCA 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to direct exposure cleanup levels.		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		Because of the "yes" answers to the MTCA 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to direct exposure cleanup levels.	

BG = background
GW = groundwater
HEIS = Hanford Environmental Information System
MTCA = *Model Toxic Control Act*
NA = not applicable
PQL = practical quantitation limit
Q = qualifier
RAG = remedial action goal
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator ~~J. M. Capron~~ S. W. Clark

Project 100-B/C Area Field Remediation

Subject 1607-B2:1 Drain Field Cleanup Verification 95% UCL Calculations

Date 12/20/05
Job No. 14655

Calc. No. 0100B-CA-V0264
Checked T. M. Blakley KEC for

Rev. No. 0
Date 12/20/05 KEC
Sheet No. 4 of 9

Shallow Zone Verification Data - Excavated Area

Sampling Area	HEIS Number	Sample Date	Lead mg/kg	Lead Q	Lead PQL	Manganese mg/kg	Manganese Q	Manganese PQL	Molybdenum mg/kg	Molybdenum Q	Molybdenum PQL	Nickel mg/kg	Nickel Q	Nickel PQL	Vanadium mg/kg	Vanadium Q	Vanadium PQL	Zinc mg/kg	Zinc Q	Zinc PQL	Acetone mg/kg	Acetone Q	Acetone PQL	2,4,5-T mg/kg	2,4,5-T Q	2,4,5-T PQL
2	J03VB9	8/19/2005	6.1E+00		2.6E-01	4.30E+02		2.E-02	4.1E-01		1.6E-01	1.38E+01		1.2E-01	3.38E+01		5.E-02	4.05E+01		6.E-02	5.E-03	J	1.0E-02	3.1E-02	J	8.4E-02
Duplicate of J03VB9	J03VD2	8/19/2005	5.9E+00		2.6E-01	4.88E+02		2.E-02	5.6E-01		1.6E-01	1.58E+01		1.2E-01	3.74E+01		5.E-02	4.50E+01		6.E-02	7.E-03	J	1.0E-02	8.4E-02	UJ	8.4E-02
1	J03VB8	8/19/2005	6.3E+00		2.7E-01	4.34E+02		2.E-02	4.7E-01		1.7E-01	1.38E+01		1.2E-01	6.14E+01		6.E-02	6.02E+01		6.E-02	6.E-03	J	1.1E-02	5.8E-02	J	5.8E-02
3	J03VC0	8/19/2005	6.9E+00		2.7E-01	3.88E+02		2.E-02	1.7E+00		1.7E-01	1.67E+01		1.2E-01	3.79E+01		6.E-02	4.48E+01		7.E-02	1.E-02	U	1.1E-02	2.4E-02	J	8.6E-02
4	J03VC1	8/19/2005	7.4E+00		7.8E-01	4.32E+02		2.E-02	6.8E-01		1.6E-01	1.44E+01		1.2E-01	4.14E+01		5.E-02	5.10E+01		6.E-02	5.E-03	J	1.1E-02	8.4E-02	UJ	8.4E-02
5	J03VC2	8/19/2005	9.2E+00		7.8E-01	5.75E+02		2.E-02	6.7E-01		1.6E-01	1.75E+01		1.2E-01	5.75E+01		5.E-02	6.59E+01		6.E-02	3.E-03	J	1.0E-02	3.1E-02	J	8.5E-02
6	J03VC3	8/19/2005	4.4E+00		7.8E-01	2.89E+02		2.E-02	1.1E+00		1.6E-01	1.02E+01		1.2E-01	3.12E+01		5.E-02	3.44E+01		6.E-02	5.E-03	J	1.0E-02	2.0E-02	J	8.4E-02
7	J03VC4	8/19/2005	8.5E+00		7.9E-01	4.68E+02		2.E-02	9.1E-01		1.6E-01	1.84E+01		1.2E-01	4.62E+01		5.E-02	5.76E+01		6.E-02	1.4E-02	J	9.E-03	3.2E-02	J	8.4E-02
8	J03VC5	8/19/2005	9.9E+00		8.0E-01	5.28E+02		2.E-02	7.6E-01		1.7E-01	1.79E+01		1.2E-01	4.47E+01		6.E-02	5.97E+01		6.E-02	7.E-03	J	1.0E-02	2.9E-02	J	8.4E-02
9	J03VC6	8/19/2005	1.50E+01		7.9E-01	8.56E+02		2.E-02	8.7E-01		1.6E-01	3.19E+01		1.2E-01	7.39E+01		5.E-02	1.01E+02		6.E-02	7.E-03	J	1.1E-02	3.0E-02	J	8.5E-02
10	J03VC7	8/19/2005	1.04E+01		7.9E-01	6.03E+02		2.E-02	9.1E-01		1.6E-01	2.28E+01		1.2E-01	4.78E+01		5.E-02	7.03E+01		6.E-02	6.E-03	J	1.1E-02	8.4E-02	UJ	8.4E-02
11	J03VC8	8/19/2005	6.6E+00		8.0E-01	4.03E+02		2.E-02	1.3E+00		1.7E-01	1.60E+01		1.2E-01	3.98E+01		6.E-02	4.48E+01		6.E-02	5.E-03	J	1.0E-02	3.0E-02	J	8.4E-02

Statistical Computation Input Data

Sampling Area	HEIS Number	Sample Date	Lead mg/kg	Manganese mg/kg	Molybdenum mg/kg	Nickel mg/kg	Vanadium mg/kg	Zinc mg/kg	Acetone mg/kg	2,4,5-T mg/kg
2	J03VB9/J03VD2	8/19/2005	6.0E+00	4.59E+02	4.9E-01	1.48E+01	3.56E+01	4.28E+01	6.E-03	3.7E-02
1	J03VB8	8/19/2005	6.3E+00	4.34E+02	4.7E-01	1.38E+01	6.14E+01	6.02E+01	6.E-03	5.8E-02
3	J03VC0	8/19/2005	6.9E+00	3.88E+02	1.7E+00	1.67E+01	3.79E+01	4.48E+01	6.E-03	2.4E-02
4	J03VC1	8/19/2005	7.4E+00	4.32E+02	6.8E-01	1.44E+01	4.14E+01	5.10E+01	5.E-03	4.2E-02
5	J03VC2	8/19/2005	9.2E+00	5.75E+02	6.7E-01	1.75E+01	5.75E+01	6.59E+01	3.E-03	3.1E-02
6	J03VC3	8/19/2005	4.4E+00	2.89E+02	1.1E+00	1.02E+01	3.12E+01	3.44E+01	5.E-03	2.0E-02
7	J03VC4	8/19/2005	8.5E+00	4.68E+02	9.1E-01	1.84E+01	4.62E+01	5.76E+01	1.4E-02	3.2E-02
8	J03VC5	8/19/2005	9.9E+00	5.28E+02	7.6E-01	1.79E+01	4.47E+01	5.97E+01	7.E-03	2.9E-02
9	J03VC6	8/19/2005	1.50E+01	8.56E+02	8.7E-01	3.19E+01	7.39E+01	1.01E+02	7.E-03	3.0E-02
10	J03VC7	8/19/2005	1.04E+01	6.03E+02	9.1E-01	2.28E+01	4.78E+01	7.03E+01	6.0E-03	4.2E-02
11	J03VC8	8/19/2005	6.6E+00	4.03E+02	1.3E+00	1.60E+01	3.98E+01	4.48E+01	5.E-03	3.0E-02

Statistical Computations

	Lead	Manganese	Molybdenum	Nickel	Vanadium	Zinc	Acetone	2,4,5-T
Statistical value based on	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), 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.
N	11	11	11	11	11	11	11	11
% < Detection limit	0%	0%	0%	0%	0%	0%	9%	18%
mean	8.2E+00	4.94E+02	9.E-01	1.77E+01	4.70E+01	5.7E+01	6.E-03	3.4E-02
standard deviation	2.9E+00	1.49E+02	4.E-01	5.7E+00	1.26E+01	1.8E+01	3.E-03	1.0E-02
95% UCL on mean	1.02E+01	5.88E+02	1.2E+00	2.12E+01	5.49E+01	6.9E+01	1.0E-02	4.1E-02
maximum value	1.50E+01	8.56E+02	1.7E+00	3.19E+01	7.39E+01	1.01E+02	1.4E-02	5.8E-02
Statistical value	1.02E+01	5.88E+02	1.2E+00	2.12E+01	5.49E+01	6.9E+01	1.0E-02	4.1E-02
Most Stringent Cleanup Limit for nonradionuclide and RAG type	10.2 GW & River Protection	512 BG/GW Protection	8 GW Protection	19.1 BG/GW Protection	85.1 BG/GW Protection	67.8 BG/River Protection	720 GW Protection	16 GW Protection
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?	NO	YES	NO	YES	NA	YES	NO	NO
> 10% above Cleanup Limit?	YES	YES	NO	YES	NA	YES	NO	NO
Any sample > 2X Cleanup Limit?	NO	NO	NO	NO	NA	NO	NO	NO
WAC 173-340 Compliance? Further assessment required	Because of the "yes" answer to the MTCA 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to direct exposure cleanup levels.	Because of the "yes" answers to the MTCA 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to direct exposure cleanup levels.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	Because of the "yes" answers to the MTCA 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to direct exposure cleanup levels.	Because all values are below background (85.1 mg/kg), the MTCA 3-part test is not required.	Because of the "yes" answers to the MTCA 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to direct exposure cleanup levels.	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 = blank contamination
BG = background
GW = groundwater
HEIS = Hanford Environmental Information System
J = estimated
MTCA = *Model Toxic Control Act*

NA = not applicable
PQL = practical quantitation limit
Q = qualifier
RAG = remedial action goal
WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford	Originator ~~J. M. Capron~~ S. W. Clark	Date 12/20/05	Calc. No. ~~0100~~0100B-CA-V0264
	Project 100-B/C Area Field Remediation	Job No. 14655	Checked T. M. Blakley RLC for
	Subject 1607-B2:1 Drain Field Cleanup Verification 95% UCL Calculations		Rev. No. 0
			Date 12/20/05
			Sheet No. 5 of 9

Duplicate Analysis

Sampling Area	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium (total)		
			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
2	J03VB9	8/19/2005	0.27	U	0.27	5.1E+00		4.2E-01	8.87E+01		9.E-03	3.2E-01		9.E-03	1.4E+00		2.1E-01	4.E-02	U	4.E-02	1.25E+01		6.E-02
Duplicate of J03VB9	J03VD2	8/19/2005	0.27	U	0.27	5.6E+00		4.2E-01	9.98E+01		9.E-03	4.1E-01		9.E-03	1.7E+00		2.1E-01	1.3E-01		4.E-02	1.46E+01		6.E-02

Analysis:

		Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium (total)
	(TDL)	0.6	10	2	0.5	2	0.2	1
Duplicate Analysis	Both > PQL?	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)
	Both >5xTDL?		No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)		Yes (calc RPD)
	RPD			12%				15%

Sampling Area	HEIS Number	Sample Date	Hexavalent Chromium			Cobalt			Copper			Lead			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	mg/kg	Q	PQL
2	J03VB9	8/19/2005	2.4E-01		2.0E-01	7.5E+00		6.E-02	1.75E+01		1.2E-01	6.1E+00		2.6E-01	4.30E+02		2.E-02	2.E-02	U	2.E-02	4.1E-01		1.6E-01
Duplicate of J03VB9	J03VD2	8/19/2005	2.0E-01	U	2.0E-01	8.3E+00		6.E-02	1.90E+01		1.3E-01	5.9E+00		2.6E-01	4.88E+02		2.E-02	1.E-02	U	1.E-02	5.6E-01		1.6E-01

Analysis:

		Hexavalent Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum
	(TDL)	0.5	2	1	5	5	0.2	2
Duplicate Analysis	Both > PQL/MDA?	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)
	Both >5xTDL?		No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)		No-Stop (acceptable)
	RPD			8.2%		13%		

Sampling Area	HEIS Number	Sample Date	Nickel			Silver			Vanadium			Zinc			4,4'-DDD			Dieldrin			Endrin Aldehyde		
			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
2	J03VB9	8/19/2005	1.38E+01		1.2E-01	7.E-02	U	7.E-02	3.38E+01		5.E-02	4.05E+01		6.E-02	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	3.4E+00	U	3.4E+00
Duplicate of J03VB9	J03VD2	8/19/2005	1.58E+01		1.2E-01	2.0E-01		7.E-02	3.74E+01		5.E-02	4.50E+01		6.E-02	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	3.4E+00	U	3.4E+00

Analysis:

		Nickel	Silver	Vanadium	Zinc	4,4'-DDD	Dieldrin	Endrin Aldehyde
	(TDL)	4	0.2	2.5	1	3.3	3	3
Duplicate Analysis	Both > PQL/MDA?	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?	No-Stop (acceptable)		Yes (calc RPD)	Yes (calc RPD)			
	RPD			10%	11%			

Sampling Area	HEIS Number	Sample Date	2-Methylnaphthalene			Bis(2-ethylhexyl)phthalate			Dibenzofuran			Diethylphthalate			Di-n-butylphthalate			Indeno(1,2,3-cd)pyrene			Naphthalene		
			µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
2	J03VB9	8/19/2005	3.4E+02	U	3.4E+02	7.4E+01	JB	3.4E+02	3.4E+02	U	3.4E+02	3.4E+02	U	3.4E+02	3.4E+02	U	3.4E+02	2.4E+01	U	3.4E+02	3.4E+02	U	3.4E+02
Duplicate of J03VB9	J03VD2	8/19/2005	3.4E+02	U	3.4E+02	6.6E+01	JB	3.4E+02	3.4E+02	U	3.4E+02	3.4E+02	U	3.4E+02	3.4E+02	U	3.4E+02	3.4E+02	U	3.4E+02	3.4E+02	U	3.4E+02

Analysis:

		2-Methylnaphthalene	Bis(2-ethylhexyl)phthalate	Dibenzofuran	Diethylphthalate	Di-n-butylphthalate	Indeno(1,2,3-cd)pyrene	Naphthalene
	(TDL)	330	330	330	330	330	330	330
Duplicate Analysis	Both > PQL/MDA?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?							
	RPD							

Sampling Area	HEIS Number	Sample Date	Phenanthrene			Acetone			Methylene chloride			2,4-D			2,4-DB			2,4,5-T			2,4,5-TP		
			µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
2	J03VB9	8/19/2005	3.4E+02	U	3.4E+02	5.E+00	J	1.0E+01	7.E+00	B	5.E+00	1.7E+02	U	1.7E+02	8.4E+02	U	8.4E+02	8.4E+01	U	8.4E+01	8.4E+01	U	8.4E+01
Duplicate of J03VB9	J03VD2	8/19/2005	3.4E+02	U	3.4E+02	7.E+00	J	1.0E+01	1.0E+01	B	5.E+00	1.1E+02		1.7E+02	8.4E+02	U	8.4E+02	5.8E+01	I	5.8E+01	8.4E+01	U	8.4E+01

Analysis:

		Phenanthrene	Acetone	Methylene chloride	2,4-D	2,4-DB	2,4,5-T	2,4,5-TP
	(TDL)	330	10	10	100	100	100	100
Duplicate Analysis	Both > PQL/MDA?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?		Yes (calc RPD)	Yes (calc RPD)				
	RPD							

Sampling Area	HEIS Number	Sample Date	Dinoseb		
			µg/kg	Q	PQL
2	J03VB9	8/19/2005	8.4E+01	U	8.4E+01
Duplicate of J03VB9	J03VD2	8/19/2005	2.7E+01	U	8.4E+01

Analysis:

		Dinoseb
	(TDL)	100
Duplicate Analysis	Both > PQL/MDA?	No-Stop (acceptable)
	Both >5xTDL?	
	RPD	

B = blank contamination
DDE = dichlorodiphenyldichloroethylene
HEIS = Hanford Environmental Information System
I = interference
J = estimated
MDA = minimum detectable activity
PQL = practical quantitation limit
Q = qualifier
RPD = relative percent difference
TDL = target detection limit

Washington Closure Hanford

CALCULATION SHEET

Originator ~~J. M. Capron~~ S.W. Clark SWC
Project 100-B/C Area Field Remediation
Subject 1607-B2:1 Drain Field Cleanup Verification 95% UCL Calculations

Date 12/20/05
Job No. 14655

Calc. No. 0100B-CA-V0264
Checked T. M. Blakley KBC for

Rev. No. 0
Date 12/20/05 KBC
Sheet No. 6 of 9

Ecology Software (MTCAStat) Results

Arsenic 95% UCL Calculation

DATA	ID
5.4E+00	J03VB9/J03VD2
4.6E+00	J03VB8
6.6E+00	J03VC0
4.1E+00	J03VC1
5.3E+00	J03VC2
4.1E+00	J03VC3
6.3E+00	J03VC4
6.0E+00	J03VC5
1.06E+01	J03VC6
7.7E+00	J03VC7
6.3E+00	J03VC8

Number of samples		Uncensored values	
Uncensored	11	Mean	6.1
Censored		Lognormal mean	6.1
Detection limit or PQL		Std. devn.	1.9
Method detection limit		Median	6.0
TOTAL	11	Min.	4.1
		Max.	10.6

Lognormal distribution? r-squared is: 0.940
Normal distribution? r-squared is: 0.862
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 7.2

Barium 95% UCL Calculation

DATA	ID
9.43E+01	J03VB9/J03VD2
1.01E+02	J03VB8
1.86E+02	J03VC0
1.00E+02	J03VC1
1.55E+02	J03VC2
6.42E+02	J03VC3
1.15E+02	J03VC4
1.39E+02	J03VC5
1.91E+02	J03VC6
1.62E+02	J03VC7
9.45E+01	J03VC8

Number of samples		Uncensored values	
Uncensored	11	Mean	180
Censored		Lognormal mean	174
Detection limit or PQL		Std. devn.	157
Method detection limit		Median	139
TOTAL	11	Min.	94.3
		Max.	642

Lognormal distribution? r-squared is: 0.758
Normal distribution? r-squared is: 0.523
Recommendations:
Reject BOTH lognormal and normal distributions. See Statistics Guidance.

UCL (based on Z-statistic) is 258

Beryllium 95% UCL Calculation

DATA	ID
3.7E-01	J03VB9/J03VD2
3.6E-01	J03VB8
4.3E-01	J03VC0
5.7E-01	J03VC1
8.2E-01	J03VC2
7.8E-01	J03VC3
6.6E-01	J03VC4
7.2E-01	J03VC5
1.1E+00	J03VC6
7.0E-01	J03VC7
4.8E-01	J03VC8

Number of samples		Uncensored values	
Uncensored	11	Mean	0.6
Censored		Lognormal mean	0.6
Detection limit or PQL		Std. devn.	0.2
Method detection limit		Median	0.7
TOTAL	11	Min.	0.36
		Max.	1.1

Lognormal distribution? r-squared is: 0.964
Normal distribution? r-squared is: 0.944
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.8

Boron 95% UCL Calculation

DATA	ID
1.6E+00	J03VB9/J03VD2
1.1E+00	J03VB8
1.42E+01	J03VC0
3.1E-01	J03VC1
7.4E-01	J03VC2
2.54E+01	J03VC3
8.8E-01	J03VC4
3.2E-01	J03VC5
3.2E-01	J03VC6
2.0E+00	J03VC7
3.2E-01	J03VC8

Number of samples		Uncensored values	
Uncensored	11	Mean	4.3
Censored		Lognormal mean	3.9
Detection limit or PQL		Std. devn.	8.1
Method detection limit		Median	0.9
TOTAL	11	Min.	0.31
		Max.	25.4

Lognormal distribution? r-squared is: 0.843
Normal distribution? r-squared is: 0.549
Recommendations:
Reject BOTH lognormal and normal distributions. See Statistics Guidance.

UCL (based on Z-statistic) is 8.3

Washington Closure Hanford

CALCULATION SHEET

Originator ~~J. M. Capron~~ S. W. Clark SWC

Project 100-B/C Area Field Remediation

Subject 1607-B2:1 Drain Field Cleanup Verification 95% UCL Calculations

Date 12/20/05

Job No. 14655

Calc. No. 0100B-CA-V0264

Checked T. M. Blakley KEC for

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Date 12/20/05 KEC

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Ecology Software (MTCAStat) Results

Chromium 95% UCL Calculation

DATA	ID
1.36E+01	J03VB9/J03VD2
1.23E+01	J03VB8
1.64E+01	J03VC0
1.30E+01	J03VC1
1.46E+01	J03VC2
7.9E+00	J03VC3
1.84E+01	J03VC4
1.62E+01	J03VC5
2.85E+01	J03VC6
2.15E+01	J03VC7
1.46E+01	J03VC8

Number of samples		Uncensored values	
Uncensored	11	Mean	16.1
Censored		Lognormal mean	16.2
Detection limit or PQL		Std. devn.	5.4
Method detection limit		Median	14.6
TOTAL	11	Min.	7.9
		Max.	28.5

Lognormal distribution? r-squared is: 0.940

Normal distribution? r-squared is: 0.896

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 19.8

Cobalt 95% UCL Calculation

DATA	ID
7.9E+00	J03VB9/J03VD2
1.07E+01	J03VB8
8.1E+00	J03VC0
9.4E+00	J03VC1
1.30E+01	J03VC2
5.3E+00	J03VC3
9.8E+00	J03VC4
1.07E+01	J03VC5
1.91E+01	J03VC6
1.28E+01	J03VC7
8.2E+00	J03VC8

Number of samples		Uncensored values	
Uncensored	11	Mean	10.5
Censored		Lognormal mean	10.5
Detection limit or PQL		Std. devn.	3.6
Method detection limit		Median	9.8
TOTAL	11	Min.	5.3
		Max.	19.1

Lognormal distribution? r-squared is: 0.949

Normal distribution? r-squared is: 0.884

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 12.9

Copper 95% UCL Calculation

DATA	ID
1.83E+01	J03VB9/J03VD2
2.53E+01	J03VB8
2.08E+01	J03VC0
2.18E+01	J03VC1
2.78E+01	J03VC2
2.09E+01	J03VC3
2.52E+01	J03VC4
2.56E+01	J03VC5
4.65E+01	J03VC6
3.15E+01	J03VC7
1.83E+01	J03VC8

Number of samples		Uncensored values	
Uncensored	11	Mean	25.6
Censored		Lognormal mean	25.6
Detection limit or PQL		Std. devn.	8.0
Method detection limit		Median	25.2
TOTAL	11	Min.	18.3
		Max.	46.5

Lognormal distribution? r-squared is: 0.888

Normal distribution? r-squared is: 0.784

Recommendations:
Reject BOTH lognormal and normal distributions. See Statistics Guidance.

UCL (based on Z-statistic) is 29.6

Lead 95% UCL Calculation

DATA	ID
6.0E+00	J03VB9/J03VD2
6.3E+00	J03VB8
6.9E+00	J03VC0
7.4E+00	J03VC1
9.2E+00	J03VC2
4.4E+00	J03VC3
8.5E+00	J03VC4
9.9E+00	J03VC5
1.50E+01	J03VC6
1.04E+01	J03VC7
6.6E+00	J03VC8

Number of samples		Uncensored values	
Uncensored	11	Mean	8.2
Censored		Lognormal mean	8.3
Detection limit or PQL		Std. devn.	2.9
Method detection limit		Median	7.4
TOTAL	11	Min.	4.4
		Max.	15.0

Lognormal distribution? r-squared is: 0.968

Normal distribution? r-squared is: 0.897

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 10.2

Washington Closure Hanford

CALCULATION SHEET

Originator ~~J. M. Capron~~ S.W. Clark SWC
Date 12/20/05
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Project 100-B/C Area Field Remediation
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Subject 1607-B2:1 Drain Field Cleanup Verification 95% UCL Calculations
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Ecology Software (MTCAStat) Results

Manganese 95% UCL Calculation

DATA	ID				
4.59E+02	J03VB9/J03VD2				
4.34E+02	J03VB8				
3.88E+02	J03VC0	Number of samples		Uncensored values	
4.32E+02	J03VC1	Uncensored	11	Mean	494
5.75E+02	J03VC2	Censored		Lognormal mean	495
2.89E+02	J03VC3	Detection limit or PQL		Std. devn.	149
4.68E+02	J03VC4	Method detection limit		Median	459
5.28E+02	J03VC5	TOTAL	11	Min.	289
8.56E+02	J03VC6			Max.	856
6.03E+02	J03VC7				
4.03E+02	J03VC8	Lognormal distribution?		Normal distribution?	
		r-squared is:	0.941	r-squared is:	0.867
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is	588		

Molybdenum 95% UCL Calculation

DATA	ID				
4.9E-01	J03VB9/J03VD2				
4.7E-01	J03VB8				
1.7E+00	J03VC0	Number of samples		Uncensored values	
6.8E-01	J03VC1	Uncensored	11	Mean	0.9
6.7E-01	J03VC2	Censored		Lognormal mean	0.9
1.1E+00	J03VC3	Detection limit or PQL		Std. devn.	0.4
9.1E-01	J03VC4	Method detection limit		Median	0.9
7.6E-01	J03VC5	TOTAL	11	Min.	0.47
8.7E-01	J03VC6			Max.	1.7
9.1E-01	J03VC7				
1.3E+00	J03VC8	Lognormal distribution?		Normal distribution?	
		r-squared is:	0.973	r-squared is:	0.913
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is	1.2		

Nickel 95% UCL Calculation

DATA	ID				
1.48E+01	J03VB9/J03VD2				
1.38E+01	J03VB8				
1.67E+01	J03VC0	Number of samples		Uncensored values	
1.44E+01	J03VC1	Uncensored	11	Mean	17.7
1.75E+01	J03VC2	Censored		Lognormal mean	17.7
1.02E+01	J03VC3	Detection limit or PQL		Std. devn.	5.7
1.84E+01	J03VC4	Method detection limit		Median	16.7
1.79E+01	J03VC5	TOTAL	11	Min.	10.2
3.19E+01	J03VC6			Max.	31.9
2.28E+01	J03VC7				
1.60E+01	J03VC8	Lognormal distribution?		Normal distribution?	
		r-squared is:	0.920	r-squared is:	0.827
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is	21.2		

Vanadium 95% UCL Calculation

DATA	ID				
3.56E+01	J03VB9/J03VD2				
6.14E+01	J03VB8				
3.79E+01	J03VC0	Number of samples		Uncensored values	
4.14E+01	J03VC1	Uncensored	11	Mean	47.0
5.75E+01	J03VC2	Censored		Lognormal mean	47.1
3.12E+01	J03VC3	Detection limit or PQL		Std. devn.	12.6
4.62E+01	J03VC4	Method detection limit		Median	44.7
4.47E+01	J03VC5	TOTAL	11	Min.	31.2
7.39E+01	J03VC6			Max.	73.9
4.78E+01	J03VC7				
3.98E+01	J03VC8	Lognormal distribution?		Normal distribution?	
		r-squared is:	0.972	r-squared is:	0.922
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is	54.9		

Washington Closure Hanford

CALCULATION SHEET

Originator ~~J. M. Capron~~ S.W. Clark **Date** 12/20/05 **Calc. No.** 0100B-CA-V0264 **Rev. No.** 0
Project 100-B/C Area Field Remediation **Job No.** 14655 **Checked** T. M. Blakley **Date** 12/20/05
Subject 1607-B2:1 Drain Field Cleanup Verification 95% UCL Calculations **Sheet No.** 9 of 9

Ecology Software (MTCAStat) Results

Zinc 95% UCL Calculation

DATA	ID
4.28E+01	J03VB9/J03VD2
6.02E+01	J03VB8
4.48E+01	J03VC0
5.10E+01	J03VC1
6.59E+01	J03VC2
3.44E+01	J03VC3
5.76E+01	J03VC4
5.97E+01	J03VC5
1.01E+02	J03VC6
7.03E+01	J03VC7
4.48E+01	J03VC8

Number of samples		Uncensored values	
Uncensored	11	Mean	57
Censored		Lognormal mean	58
Detection limit or PQL		Std. devn.	18
Method detection limit		Median	58
TOTAL	11	Min.	34.4
		Max.	101

Lognormal distribution? r-squared is: 0.956
Normal distribution? r-squared is: 0.880
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 69

Acetone 95% UCL Calculation

DATA	ID
6.E-03	J03VB9/J03VD2
6.E-03	J03VB8
6.E-03	J03VC0
5.E-03	J03VC1
3.E-03	J03VC2
5.E-03	J03VC3
1.4E-02	J03VC4
7.E-03	J03VC5
7.E-03	J03VC6
2.2E-02	J03VC7
5.E-03	J03VC8

Number of samples		Uncensored values	
Uncensored	11	Mean	0.008
Censored		Lognormal mean	0.008
Detection limit or PQL		Std. devn.	0.005
Method detection limit		Median	0.006
TOTAL	11	Min.	0.003
		Max.	0.022

Lognormal distribution? r-squared is: 0.842
Normal distribution? r-squared is: 0.670
Recommendations:
Reject BOTH lognormal and normal distributions. See Statistics Guidance.

UCL (based on Z-statistic) is 0.010

2,4,5-T 95% UCL Calculation

DATA	ID
3.7E-02	J03VB9/J03VD2
5.8E-02	J03VB8
2.4E-02	J03VC0
4.2E-02	J03VC1
3.1E-02	J03VC2
2.0E-02	J03VC3
3.2E-02	J03VC4
2.9E-02	J03VC5
3.0E-02	J03VC6
4.2E-02	J03VC7
3.0E-02	J03VC8

Number of samples		Uncensored values	
Uncensored	11	Mean	0.034
Censored		Lognormal mean	0.034
Detection limit or PQL		Std. devn.	0.010
Method detection limit		Median	0.031
TOTAL	11	Min.	0.020
		Max.	0.058

Lognormal distribution? r-squared is: 0.953
Normal distribution? r-squared is: 0.893
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.041

Attachment 1. 1607-B2 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J03VB8	8/19/05	0.28	UJ	0.28	4.6		0.43	101		0.009	0.36		0.009	1.1		0.21	0.04	U	0.04
2	J03VB9	8/19/05	0.27	UJ	0.27	5.1		0.42	88.7		0.009	0.32		0.009	1.4		0.21	0.04	U	0.04
Duplicate of J03VB9	J03VD2	8/19/05	0.27	UJ	0.27	5.6		0.42	99.8		0.009	0.41		0.009	1.7		0.21	0.13		0.04
3	J03VC0	8/19/05	0.28	UJ	0.28	6.6		0.44	186		0.009	0.43		0.009	14.2		0.21	0.04	U	0.04
4	J03VC1	8/19/05	0.27	UJ	0.27	4.1		0.42	100		0.009	0.57		0.009	0.62	U	0.62	0.11	U	0.11
5	J03VC2	8/19/05	0.37	J	0.27	5.3		0.42	155		0.009	0.82		0.009	0.74		0.62	0.11	U	0.11
6	J03VC3	8/19/05	0.27	UJ	0.27	4.1		0.42	642		0.009	0.78		0.009	25.4		0.62	0.11	U	0.11
7	J03VC4	8/19/05	0.27	UJ	0.27	6.3		0.43	115		0.009	0.66		0.009	0.88		0.63	0.11	U	0.11
8	J03VC5	8/19/05	0.39	J	0.28	6.0		0.43	139		0.009	0.72		0.009	0.63	U	0.63	0.11	U	0.11
9	J03VC6	8/19/05	0.58	J	0.27	10.6		0.43	191		0.009	1.1		0.009	0.63	U	0.63	0.11	U	0.11
10	J03VC7	8/19/05	0.43	J	0.27	7.7		0.42	162		0.009	0.70		0.009	2.0		0.62	0.11	U	0.11
11	J03VC8	8/19/05	0.28	UJ	0.28	6.3		0.43	94.5		0.009	0.48		0.009	0.63	U	0.63	0.11	U	0.11
Overburden	J03VC9	8/19/05	0.42	J	0.27	5.3		0.43	101		0.009	0.47		0.009	2.3		0.63	0.11	U	0.11
Overburden	J03VD0	8/19/05	0.49	J	0.27	4.4		0.42	68.9		0.009	0.36		0.009	0.61	U	0.61	0.11	U	0.11
Overburden	J03VD1	8/19/05	0.42	J	0.27	4.9		0.42	75.1		0.009	0.33		0.009	1.4		0.21	0.13		0.04
Equipment Blank	J03WW6	8/19/05	0.27	UJ	0.27	0.42	U	0.42	0.93		0.009	0.009	U	0.009	0.50		0.21	0.04	U	0.04

Sample Location	HEIS Number	Sample Date	Chromium (Total)			Hexavalent Chromium			Cobalt			Copper			Lead			Manganese		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J03VB8	8/19/05	12.3		0.06	0.20	U	0.20	10.7		0.06	25.3		0.12	6.3		0.27	434		0.02
2	J03VB9	8/19/05	12.5		0.06	0.24		0.20	7.5		0.06	17.5		0.12	6.1		0.26	430		0.02
Duplicate of J03VB9	J03VD2	8/19/05	14.6		0.06	0.20	U	0.20	8.3		0.06	19.0		0.13	5.9		0.26	488		0.02
3	J03VC0	8/19/05	16.4		0.07	0.21		0.21	8.1		0.07	20.8		0.12	6.9		0.27	388		0.02
4	J03VC1	8/19/05	13.0		0.06	0.20	U	0.20	9.4		0.06	21.8		0.12	7.4		0.78	432		0.02
5	J03VC2	8/19/05	14.6		0.06	0.24		0.20	13.0		0.06	27.8		0.12	9.2		0.78	575		0.02
6	J03VC3	8/19/05	7.9		0.06	0.32		0.20	5.3		0.06	20.9		0.12	4.4		0.78	289		0.02
7	J03VC4	8/19/05	18.4		0.06	0.20	U	0.20	9.8		0.06	25.2		0.12	8.5		0.79	468		0.02
8	J03VC5	8/19/05	16.2		0.06	0.20	U	0.20	10.7		0.06	25.6		0.12	9.9		0.80	528		0.02
9	J03VC6	8/19/05	28.5		0.06	0.20	U	0.20	19.1		0.06	46.5		0.12	15.0		0.79	856		0.02
10	J03VC7	8/19/05	21.5		0.06	0.33		0.20	12.8		0.06	31.5		0.12	10.4		0.79	603		0.02
11	J03VC8	8/19/05	14.6		0.06	0.20	U	0.20	8.2		0.06	18.3		0.12	6.6		0.80	403		0.02
Overburden	J03VC9	8/19/05	14.6		0.06	0.20	U	0.20	8.0		0.06	17.5		0.12	6.6		0.80	357		0.02
Overburden	J03VD0	8/19/05	12.4		0.06	0.20	U	0.20	6.9		0.06	14.8		0.12	5.4		0.77	301		0.02
Overburden	J03VD1	8/19/05	12.3		0.06	0.24		0.20	6.8		0.06	15.3		0.12	4.8		0.26	312		0.02
Equipment Blank	J03WW6	8/19/05	0.13	UJ	0.13				0.06	U	0.06	0.12	U	0.12	0.26	U	0.26	2.2		0.02

Note: Data qualified with B, and/or J, are considered acceptable values.
B = blank contamination
BHC = hexachlorocyclohexane
HEIS = Hanford Environmental Information System
J = estimate
PQL = practical quantitation limit
Q = qualifier
U = undetected

Attachment	1	Sheet No.	1 of 14
Originator	~~J. M. Capron~~ S. W. Clark	Date	12/20/05
Checked	T. M. Blakley KEC	Date	12/20/05 KEC
Calc. No.	0100B-CA-V0264	Rev. No.	0

Attachment 1. 1607-B2 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Mercury			Molybdenum			Nickel			Selenium			Silver			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J03VB8	8/19/05	0.02	U	0.02	0.47		0.17	13.8		0.12	0.39	U	0.39	0.07	U	0.07	61.4		0.06
2	J03VB9	8/19/05	0.02	U	0.02	0.41		0.16	13.8		0.12	0.39	U	0.39	0.07	U	0.07	33.8		0.05
Duplicate of J03VB9	J03VD2	8/19/05	0.01	U	0.01	0.56		0.16	15.8		0.12	0.39	U	0.39	0.20		0.07	37.4		0.05
3	J03VC0	8/19/05	0.01	U	0.01	1.7		0.17	16.7		0.12	0.40	U	0.40	0.11		0.07	37.9		0.06
4	J03VC1	8/19/05	0.02	U	0.02	0.68		0.16	14.4		0.12	0.39	U	0.39	0.07	U	0.07	41.4		0.05
5	J03VC2	8/19/05	0.02	U	0.02	0.67		0.16	17.5		0.12	0.39	U	0.39	0.07	U	0.07	57.5		0.05
6	J03VC3	8/19/05	0.01	U	0.01	1.1		0.16	10.2		0.12	0.39	U	0.39	0.07	U	0.07	31.2		0.05
7	J03VC4	8/19/05	0.01	U	0.01	0.91		0.16	18.4		0.12	0.39	U	0.39	0.07	U	0.07	46.2		0.05
8	J03VC5	8/19/05	0.01	U	0.01	0.76		0.17	17.9		0.12	0.39	U	0.39	0.07	U	0.07	44.7		0.06
9	J03VC6	8/19/05	0.01	U	0.01	0.87		0.16	31.9		0.12	0.39	U	0.39	0.07	U	0.07	73.9		0.05
10	J03VC7	8/19/05	0.02		0.01	0.91		0.16	22.8		0.12	0.39	U	0.39	0.07	U	0.07	47.8		0.05
11	J03VC8	8/19/05	0.01	U	0.01	1.3		0.17	16.0		0.12	0.39	U	0.39	0.07	U	0.07	39.8		0.06
% < Detection limit			*91%*			*0%*			*0%*			*100%*			*82%*			*0%*		
Maximum value			*0.02*			*1.7*			*31.9*			*0.4*			*0.20*			*73.9*		
Overburden	J03VC9	8/19/05	0.01	U	0.01	0.57		0.16	14.4		0.12	0.39	U	0.39	0.07	U	0.07	40.0		0.05
Overburden	J03VD0	8/19/05	0.02	U	0.02	0.60		0.16	12.8		0.12	0.38	U	0.38	0.07	U	0.07	34.9		0.05
Overburden	J03VD1	8/19/05	0.02	U	0.02	0.61		0.16	13.1		0.12	0.39	U	0.39	0.09		0.07	31.7		0.05
Equipment Blank	J03WW6	8/19/05	0.02	U	0.02	0.16	U	0.16	0.12	U	0.12	0.39	U	0.39	0.07	U	0.07	0.09		0.05

Sample Location	HEIS Number	Sample Date	Zinc		
			mg/kg	Q	PQL
1	J03VB8	8/19/05	60.2		0.06
2	J03VB9	8/19/05	40.5		0.06
Duplicate of J03VB9	J03VD2	8/19/05	45.0		0.06
3	J03VC0	8/19/05	44.8		0.07
4	J03VC1	8/19/05	51.0		0.06
5	J03VC2	8/19/05	65.9		0.06
6	J03VC3	8/19/05	34.4		0.06
7	J03VC4	8/19/05	57.6		0.06
8	J03VC5	8/19/05	59.7		0.06
9	J03VC6	8/19/05	101		0.06
10	J03VC7	8/19/05	70.3		0.06
11	J03VC8	8/19/05	44.8		0.06
% < Detection limit			*0%*		
Maximum value			*101*		
Overburden	J03VC9	8/19/05	42.5		0.06
Overburden	J03VD0	8/19/05	36.1		0.06
Overburden	J03VD1	8/19/05	36.2		0.06
Equipment Blank	J03WW6	8/19/05	1.1		0.06

Attachment	1	Sheet No.	2 of 14
Originator	~~J. M. Capron~~ S. W. Clark	Date	12/20/05
Checked	T. M. Blakley	Date	12/20/05
Calc. No.	0100B-CA-V0264	Rev. No.	0

Attachment 1. 1607-B2:1 Verification Sampling Results.

Constituent	J03WW6 Equipment Blank Sample Date 8/19/05			J03VB8 Sample Location 1 Sample Date 8/19/05			J03VB9 Sample Location 2 Sample Date 8/19/05			J03VD2 Duplicate of J03VB9 Sample Date 8/19/05		
	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
Aroclor-1221				13	U	13	13	U	13	13	U	13
Aroclor-1232				13	U	13	13	U	13	13	U	13
Aroclor-1242				13	U	13	13	U	13	13	U	13
Aroclor-1248				13	U	13	13	U	13	13	U	13
Aroclor-1254				13	U	13	13	U	13	13	U	13
Aroclor-1260				13	U	13	13	U	13	13	U	13
Pesticides												
Aldrin				1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Alpha-BHC				1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
alpha-Chlordane				1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Beta-BHC				1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Delta-BHC				1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Dichlorodiphenyldichloroethane				3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Dichlorodiphenyldichloroethylene				3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Dichlorodiphenyltrichloroethane				3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Dieldrin				1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Endosulfan I				1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Endosulfan II				3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Endosulfan sulfate				3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Endrin				3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Endrin aldehyde				3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Endrin ketone				3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Gamma-BHC (Lindane)				1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
gamma-Chlordane				1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Heptachlor				1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Heptachlor epoxide				1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Methoxychlor				17	UJ	17	17	UJ	17	17	UJ	17
Toxaphene				170	UJ	170	170	UJ	170	170	UJ	170
Semivolatile Organic Analytes												
1,2,4-Trichlorobenzene	330	U	330	340	U	340	340	U	340	340	U	340
1,2-Dichlorobenzene	330	U	330	340	U	340	340	U	340	340	U	340
1,3-Dichlorobenzene	330	U	330	340	U	340	340	U	340	340	U	340
1,4-Dichlorobenzene	330	U	330	340	U	340	340	U	340	340	U	340
2,4,5-Trichlorophenol	830	U	830	840	U	840	840	U	840	840	U	840
2,4,6-Trichlorophenol	330	U	330	340	U	340	340	U	340	340	U	340
2,4-Dichlorophenol	330	U	330	340	U	340	340	U	340	340	U	340
2,4-Dimethylphenol	330	U	330	340	U	340	340	U	340	340	U	340
2,4-Dinitrophenol	830	U	830	840	U	840	840	U	840	840	U	840
2,4-Dinitrotoluene	330	U	330	340	U	340	340	U	340	340	U	340
2,6-Dinitrotoluene	330	U	330	340	U	340	340	U	340	340	U	340
2-Chloronaphthalene	330	U	330	340	U	340	340	U	340	340	U	340
2-Chlorophenol	330	U	330	340	U	340	340	U	340	340	U	340
2-Methylnaphthalene	330	U	330	340	U	340	340	U	340	340	U	340
2-Methylphenol (cresol, o-)	330	U	330	340	U	340	340	U	340	340	U	340
2-Nitroaniline	830	U	830	840	U	840	840	U	840	840	U	840
2-Nitrophenol	330	U	330	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	3 of 14
Originator	~~J. M. Capron~~ S. W. C[illegible]	Date	12/20/05
Checked	T. M. Blakley	Date	12/20/05
Calc. No.	0100B-CA-V0264	Rev. No.	0

Attachment 1. 1607-B2:1 Verification Sampling Results.

Constituent	J03WW6 Equipment Blank Sample Date 8/19/05			J03VB8 Sample Location 1 Sample Date 8/19/05			J03VB9 Sample Location 2 Sample Date 8/19/05			J03VD2 Duplicate of J03VB9 Sample Date 8/19/05		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Analytes (continued)												
3,3'-Dichlorobenzidine	330	U	330	340	U	340	340	U	340	340	U	340
3+4 Methylphenol (cresol, m+p)	330	U	330	340	U	340	340	U	340	340	U	340
3-Nitroaniline	830	UJ	830	840	UJ	840	840	UJ	840	840	UJ	840
4,6-Dinitro-2-methylphenol	830	U	830	840	U	840	840	U	840	840	U	840
4-Bromophenyl-phenylether	330	U	330	340	U	340	340	U	340	340	U	340
4-Chloro-3-methylphenol	330	U	330	340	U	340	340	U	340	340	U	340
4-Chloroaniline	330	U	330	340	U	340	340	U	340	340	U	340
4-Chlorophenyl-phenylether	330	U	330	340	U	340	340	U	340	340	U	340
4-Nitroaniline	830	UJ	830	840	UJ	840	840	UJ	840	840	UJ	840
4-Nitrophenol	830	UJ	830	840	UJ	840	840	UJ	840	840	UJ	840
Acenaphthene	330	U	330	340	U	340	340	U	340	340	U	340
Acenaphthylene	330	U	330	340	U	340	340	U	340	340	U	340
Anthracene	330	U	330	340	U	340	340	U	340	340	U	340
Benzo(a)anthracene	330	U	330	340	U	340	340	U	340	340	U	340
Benzo(a)pyrene	330	U	330	340	U	340	340	U	340	340	U	340
Benzo(b)fluoranthene	330	U	330	340	U	340	340	U	340	340	U	340
Benzo(ghi)perylene	330	U	330	340	U	340	340	U	340	340	U	340
Benzo(k)fluoranthene	330	U	330	340	U	340	340	U	340	340	U	340
Bis(2-chloro-1-methylethyl)ether	330	U	330	340	U	340	340	U	340	340	U	340
Bis(2-chloroethoxy)methane	330	U	330	340	U	340	340	U	340	340	U	340
Bis(2-chloroethyl) ether	330	U	330	340	U	340	340	U	340	340	U	340
Bis(2-ethylhexyl) phthalate	660	U	660	660	U	660	660	U	660	660	U	660
Butylbenzylphthalate	330	U	330	340	U	340	340	U	340	340	U	340
Carbazole	330	U	330	340	U	340	340	U	340	340	U	340
Chrysene	330	U	330	340	U	340	340	U	340	340	U	340
Dibenz(a,h)anthracene	330	U	330	340	U	340	340	U	340	340	U	340
Dibenzofuran	330	U	330	340	U	340	340	U	340	340	U	340
Diethylphthalate	330	U	330	340	U	340	340	U	340	340	U	340
Dimethylphthalate	330	U	330	340	U	340	340	U	340	340	U	340
Di-n-butylphthalate	72	J	330	340	U	340	340	U	340	340	U	340
Di-n-octylphthalate	330	U	330	340	U	340	340	U	340	340	U	340
Fluoranthene	330	U	330	340	U	340	340	U	340	340	U	340
Fluorene	330	U	330	340	U	340	340	U	340	340	U	340
Hexachlorobenzene	330	U	330	340	U	340	340	U	340	340	U	340
Hexachlorobutadiene	330	U	330	340	U	340	340	U	340	340	U	340
Hexachlorocyclopentadiene	330	U	330	340	U	340	340	U	340	340	U	340
Hexachloroethane	330	U	330	340	U	340	340	U	340	340	U	340
Indeno(1,2,3-cd)pyrene	330	U	330	340	U	340	24	JB	340	340	U	340
Isophorone	330	U	330	340	U	340	340	U	340	340	U	340
Naphthalene	330	U	330	340	U	340	340	U	340	340	U	340
Nitrobenzene	330	U	330	340	U	340	340	U	340	340	U	340
N-Nitroso-di-n-dipropylamine	330	U	330	340	U	340	340	U	340	340	U	340
N-Nitrosodiphenylamine	330	U	330	340	U	340	340	U	340	340	U	340
Pentachlorophenol	830	U	830	840	U	840	840	U	840	840	U	840
Phenanthrene	330	U	330	340	U	340	340	U	340	340	U	340
Phenol	330	U	330	340	U	340	340	U	340	340	U	340
Pyrene	330	U	330	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	4 of 14
Originator	~~J. M. Capron~~ S. W. Clark	Date	12/20/05
Checked	T. M. Blakley	Date	12/20/05
Calc. No.	0100B-CA-V0264	Rev. No.	0

Attachment 1. 1607-B2:1 Verification Sampling Results.

Constituent	J03WW6 Equipment Blank Sample Date 8/19/05			J03VB8 Sample Location 1 Sample Date 8/19/05			J03VB9 Sample Location 2 Sample Date 8/19/05			J03VD2 Duplicate of J03VB9 Sample Date 8/19/05		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Analytes												
1,1,1-Trichloroethane				6	UJ	6	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane				6	UJ	6	5	U	5	5	U	5
1,1,2-Trichloroethane				6	UJ	6	5	U	5	5	U	5
1,1-Dichloroethane				6	UJ	6	5	U	5	5	U	5
1,1-Dichloroethene				6	UJ	6	5	U	5	5	U	5
1,2-Dichloroethane				6	UJ	6	5	U	5	5	U	5
1,2-Dichloropropane				6	UJ	6	5	U	5	5	U	5
2-Butanone				11	UJ	11	10	U	10	10	U	10
2-Hexanone				11	UJ	11	10	U	10	10	U	10
4-Methyl-2-Pentanone				11	UJ	11	10	U	10	10	U	10
Acetone				6	J	11	5	J	10	7	J	10
Benzene				6	UJ	6	5	U	5	5	U	5
Bromodichloromethane				6	UJ	6	5	U	5	5	U	5
Bromoform				6	UJ	6	5	U	5	5	U	5
Bromomethane				11	UJ	11	10	U	10	10	U	10
Carbon disulfide				6	UJ	6	5	U	5	5	U	5
Carbon tetrachloride				6	UJ	6	5	U	5	5	U	5
Chlorobenzene				6	UJ	6	5	U	5	5	U	5
Chloroethane				11	UJ	11	10	U	10	10	U	10
Chloroform				6	UJ	6	5	U	5	5	U	5
Chloromethane				11	UJ	11	10	U	10	10	U	10
cis-1,2-Dichloroethylene				6	UJ	6	5	U	5	5	U	5
cis-1,3-Dichloropropene				6	UJ	6	5	U	5	5	U	5
Dibromochloromethane				6	UJ	6	5	U	5	5	U	5
Ethylbenzene				6	UJ	6	5	U	5	5	U	5
Methylene chloride				10	UJ	10	10	U	10	10	U	10
Styrene				6	UJ	6	5	U	5	5	U	5
Tetrachloroethene				6	UJ	6	5	U	5	5	U	5
Toluene				6	UJ	6	5	U	5	5	U	5
trans-1,2-Dichloroethylene				6	UJ	6	5	U	5	5	U	5
trans-1,3-Dichloropropene				6	UJ	6	5	U	5	5	U	5
Trichloroethene				6	UJ	6	5	U	5	5	U	5
Vinyl chloride				11	UJ	11	10	U	10	10	U	10
Xylenes (total)				6	UJ	6	5	U	5	5	U	5
Herbicides												
2,4-D				170	U	170	170	U	170	110		170
2,4-DB				840	U	840	840	U	840	840	U	840
2,4,5-T				31	J	84	84	UJ	84	58	J	84
2,4,5-TP (Silvex)				84	UJ	84	84	UJ	84	84	UJ	84
Dalapon				840	U	840	840	U	840	840	U	840
Dicamba				340	UJ	340	340	UJ	340	340	UJ	340
Dichloroprop				840	UJ	840	840	UJ	840	840	UJ	840
Dinoseb				84	U	84	84	U	84	27		84

Attachment	1	Sheet No.	5 of 14
Originator	~~J. M. Capron~~ S. W. C[illegible]	Date	12/20/05
Checked	T. M. Blakley	Date	12/20/05
Calc. No.	0100B-CA-V0264	Rev. No.	0

Attachment 1. 1607-B2:1 Verification Sampling Results.

Constituent	J03VC0 Sample Location 3 Sample Date 8/19/05			J03VC1 Sample Location 4 Sample Date 8/19/05			J03VC2 Sample Location 5 Sample Date 8/19/05			J03VC3 Sample Location 6 Sample Date 8/19/05		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	13	U	13	14	U	14	13	U	13
Aroclor-1221	14	U	14	13	U	13	14	U	14	13	U	13
Aroclor-1232	14	U	14	13	U	13	14	U	14	13	U	13
Aroclor-1242	14	U	14	13	U	13	14	U	14	13	U	13
Aroclor-1248	14	U	14	13	U	13	14	U	14	13	U	13
Aroclor-1254	14	U	14	13	U	13	14	U	14	13	U	13
Aroclor-1260	14	U	14	13	U	13	14	U	14	13	U	13
Pesticides												
Aldrin	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Alpha-BHC	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
alpha-Chlordane	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Beta-BHC	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Delta-BHC	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Dichlorodiphenyldichloroethane	3.5	UJ	3.5	3.4	UJ	3.4	3.4	UJ	3.4	1.7	J	3.4
Dichlorodiphenyldichloroethylene	3.5	UJ	3.5	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Dichlorodiphenyltrichloroethane	3.5	UJ	3.5	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Dieldrin	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	J	1.7
Endosulfan I	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Endosulfan II	3.5	UJ	3.5	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Endosulfan sulfate	3.5	UJ	3.5	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Endrin	3.5	UJ	3.5	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Endrin aldehyde	3.5	UJ	3.5	3.4	UJ	3.4	3.4	UJ	3.4	2.2	J	3.4
Endrin ketone	3.5	UJ	3.5	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Gamma-BHC (Lindane)	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
gamma-Chlordane	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Heptachlor	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Heptachlor epoxide	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Methoxychlor	17	UJ	17	17	UJ	17	17	UJ	17	17	UJ	17
Toxaphene	170	UJ	170	170	UJ	170	170	UJ	170	170	UJ	170
Semivolatile Organic Analytes												
1,2,4-Trichlorobenzene	350	U	350	340	UJ	340	340	U	340	340	U	340
1,2-Dichlorobenzene	350	U	350	340	UJ	340	340	U	340	340	U	340
1,3-Dichlorobenzene	350	U	350	340	UJ	340	340	U	340	340	U	340
1,4-Dichlorobenzene	350	U	350	340	UJ	340	340	U	340	340	U	340
2,4,5-Trichlorophenol	860	U	860	840	UJ	840	850	U	850	840	U	840
2,4,6-Trichlorophenol	350	U	350	340	UJ	340	340	U	340	340	U	340
2,4-Dichlorophenol	350	U	350	340	UJ	340	340	U	340	340	U	340
2,4-Dimethylphenol	350	U	350	340	UJ	340	340	U	340	340	U	340
2,4-Dinitrophenol	860	U	860	840	UJ	840	850	U	850	840	U	840
2,4-Dinitrotoluene	350	U	350	340	UJ	340	340	U	340	340	U	340
2,6-Dinitrotoluene	350	U	350	340	UJ	340	340	U	340	340	U	340
2-Chloronaphthalene	350	U	350	340	UJ	340	340	U	340	340	U	340
2-Chlorophenol	350	U	350	340	UJ	340	340	U	340	340	U	340
2-Methylnaphthalene	350	U	350	340	UJ	340	340	U	340	150	J	340
2-Methylphenol (cresol, o-)	350	U	350	340	UJ	340	340	U	340	340	U	340
2-Nitroaniline	860	U	860	840	UJ	840	850	U	850	840	U	840
2-Nitrophenol	350	U	350	340	UJ	340	340	U	340	340	U	340

Attachment	1	Sheet No.	6 of 14
Originator	~~J. M. Capron~~ S. W. Clark	Date	12/20/05
Checked	T. M. Blakley	Date	12/20/05
Calc. No.	0100B-CA-V0264	Rev. No.	0

Attachment 1. 1607-B2:1 Verification Sampling Results.

Constituent	J03VC0 Sample Location 3 Sample Date 8/19/05			J03VC1 Sample Location 4 Sample Date 8/19/05			J03VC2 Sample Location 5 Sample Date 8/19/05			J03VC3 Sample Location 6 Sample Date 8/19/05		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Analytes (continued)												
3,3'-Dichlorobenzidine	350	U	350	340	UJ	340	340	U	340	340	U	340
3+4 Methylphenol (cresol, m+p)	350	U	350	340	UJ	340	340	U	340	340	U	340
3-Nitroaniline	860	UJ	860	840	UJ	840	850	UJ	850	840	UJ	840
4,6-Dinitro-2-methylphenol	860	U	860	840	UJ	840	850	U	850	840	U	840
4-Bromophenyl-phenylether	350	U	350	340	UJ	340	340	U	340	340	U	340
4-Chloro-3-methylphenol	350	U	350	340	UJ	340	340	U	340	340	U	340
4-Chloroaniline	350	U	350	340	UJ	340	340	U	340	340	U	340
4-Chlorophenyl-phenylether	350	U	350	340	UJ	340	340	U	340	340	U	340
4-Nitroaniline	860	UJ	860	840	UJ	840	850	UJ	850	840	UJ	840
4-Nitrophenol	860	UJ	860	840	UJ	840	850	UJ	850	840	UJ	840
Acenaphthene	350	U	350	340	UJ	340	340	U	340	340	U	340
Acenaphthylene	350	U	350	340	UJ	340	340	U	340	340	U	340
Anthracene	350	U	350	340	UJ	340	340	U	340	340	U	340
Benzo(a)anthracene	350	U	350	340	UJ	340	340	U	340	340	U	340
Benzo(a)pyrene	350	U	350	340	UJ	340	340	U	340	340	U	340
Benzo(b)fluoranthene	350	U	350	340	UJ	340	340	U	340	340	U	340
Benzo(ghi)perylene	350	U	350	340	UJ	340	340	U	340	340	U	340
Benzo(k)fluoranthene	350	U	350	340	UJ	340	340	U	340	340	U	340
Bis(2-chloro-1-methylethyl)ether	350	U	350	340	UJ	340	340	U	340	340	U	340
Bis(2-Chloroethoxy)methane	350	U	350	340	UJ	340	340	U	340	340	U	340
Bis(2-chloroethyl) ether	350	U	350	340	UJ	340	340	U	340	340	U	340
Bis(2-ethylhexyl) phthalate	660	U	660	660	UJ	660	660	U	660	660	U	660
Butylbenzylphthalate	350	U	350	340	UJ	340	340	U	340	340	U	340
Carbazole	350	U	350	340	UJ	340	340	U	340	340	U	340
Chrysene	350	U	350	340	UJ	340	340	U	340	340	U	340
Dibenz(a,h)anthracene	350	U	350	340	UJ	340	340	U	340	340	U	340
Dibenzofuran	350	U	350	340	UJ	340	340	U	340	34	J	340
Diethylphthalate	350	U	350	340	UJ	340	340	U	340	340	U	340
Dimethyl phthalate	350	U	350	340	UJ	340	340	U	340	340	U	340
Di-n-butylphthalate	350	U	350	340	UJ	340	340	U	340	21	J	340
Di-n-octylphthalate	350	U	350	340	UJ	340	340	U	340	340	U	340
Fluoranthene	350	U	350	340	UJ	340	340	U	340	340	U	340
Fluorene	350	U	350	340	UJ	340	340	U	340	340	U	340
Hexachlorobenzene	350	U	350	340	UJ	340	340	U	340	340	U	340
Hexachlorobutadiene	350	U	350	340	UJ	340	340	U	340	340	U	340
Hexachlorocyclopentadiene	350	U	350	340	UJ	340	340	U	340	340	U	340
Hexachloroethane	350	U	350	340	UJ	340	340	U	340	340	U	340
Indeno(1,2,3-cd)pyrene	350	U	350	340	UJ	340	340	U	340	340	U	340
Isophorone	350	U	350	340	UJ	340	340	U	340	340	U	340
Naphthalene	350	U	350	340	UJ	340	340	U	340	110	J	340
Nitrobenzene	350	U	350	340	UJ	340	340	U	340	340	U	340
N-Nitroso-di-n-dipropylamine	350	U	350	340	UJ	340	340	U	340	340	U	340
N-Nitrosodiphenylamine	350	U	350	340	UJ	340	340	U	340	340	U	340
Pentachlorophenol	860	U	860	840	UJ	840	850	U	850	840	U	840
Phenanthrene	350	U	350	340	UJ	340	340	U	340	37	J	340
Phenol	350	U	350	340	UJ	340	340	U	340	340	U	340
Pyrene	350	U	350	340	UJ	340	340	U	340	340	U	340

Attachment	1	Sheet No.	7 of 14
Originator	~~J. M. Capron~~ S. W. Clark	Date	12/20/05
Checked	T. M. Blakley	Date	12/20/05
Calc. No.	0100B-CA-V0264	Rev. No.	0

Attachment 1. 1607-B2:1 Verification Sampling Results.

Constituent	J03VC0 Sample Location 3 Sample Date 8/19/05			J03VC1 Sample Location 4 Sample Date 8/19/05			J03VC2 Sample Location 5 Sample Date 8/19/05			J03VC3 Sample Location 6 Sample Date 8/19/05		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Analytes												
1,1,1-Trichloroethane	6	U	6	6	UJ	6	5	U	5	5	U	5
1,1,2,2-Tetrachloroethane	6	U	6	6	UJ	6	5	U	5	5	U	5
1,1,2-Trichloroethane	6	U	6	6	UJ	6	5	U	5	5	U	5
1,1-Dichloroethane	6	U	6	6	UJ	6	5	U	5	5	U	5
1,1-Dichloroethene	6	U	6	6	UJ	6	5	U	5	5	U	5
1,2-Dichloroethane	6	U	6	6	UJ	6	5	U	5	5	U	5
1,2-Dichloropropane	6	U	6	6	UJ	6	5	U	5	5	U	5
2-Butanone	11	U	11	11	UJ	11	10	U	10	10	U	10
2-Hexanone	11	U	11	11	UJ	11	10	U	10	10	U	10
4-Methyl-2-Pentanone	11	U	11	11	UJ	11	10	U	10	10	U	10
Acetone	11	U	11	5	J	11	3	J	10	5	J	10
Benzene	6	U	6	6	UJ	6	5	U	5	5	U	5
Bromodichloromethane	6	U	6	6	UJ	6	5	U	5	5	U	5
Bromoform	6	U	6	6	UJ	6	5	U	5	5	U	5
Bromomethane	11	U	11	11	UJ	11	10	U	10	10	U	10
Carbon disulfide	6	U	6	6	UJ	6	5	U	5	5	U	5
Carbon tetrachloride	6	U	6	6	UJ	6	5	U	5	5	U	5
Chlorobenzene	6	U	6	6	UJ	6	5	U	5	5	U	5
Chloroethane	11	U	11	11	UJ	11	10	U	10	10	U	10
Chloroform	6	U	6	6	UJ	6	5	U	5	5	U	5
Chloromethane	11	U	11	11	UJ	11	10	U	10	10	U	10
cis-1,2-Dichloroethylene	6	U	6	6	UJ	6	5	U	5	5	U	5
cis-1,3-Dichloropropene	6	U	6	6	UJ	6	5	U	5	5	U	5
Dibromochloromethane	6	U	6	6	UJ	6	5	U	5	5	U	5
Ethylbenzene	6	U	6	6	UJ	6	5	U	5	5	U	5
Methylene chloride	10	U	10	10	UJ	10	10	U	10	10	U	10
Styrene	6	U	6	6	UJ	6	5	U	5	5	U	5
Tetrachloroethene	6	U	6	6	UJ	6	5	U	5	5	U	5
Toluene	6	U	6	6	UJ	6	5	U	5	5	U	5
trans-1,2-Dichloroethylene	6	U	6	6	UJ	6	5	U	5	5	U	5
trans-1,3-Dichloropropene	6	U	6	6	UJ	6	5	U	5	5	U	5
Trichloroethene	6	U	6	6	UJ	6	5	U	5	5	U	5
Vinyl chloride	11	U	11	11	UJ	11	10	U	10	10	U	10
Xylenes (total)	6	U	6	6	UJ	6	5	U	5	5	U	5
Herbicides												
2,4-D	170	U	170	170	U	170	170	U	170	170	U	170
2,4-DB	860	U	860	840	U	840	850	U	850	840	U	840
2,4,5-T	24	J	86	84	UJ	84	31	J	85	20	J	84
2,4,5-TP (Silvex)	86	UJ	86	84	UJ	84	85	UJ	85	84	UJ	84
Dalapon	860	U	860	840	U	840	850	U	850	840	U	840
Dicamba	350	UJ	350	340	UJ	340	340	UJ	340	340	UJ	340
Dichloroprop	860	UJ	860	840	UJ	840	850	UJ	850	840	UJ	840
Dinoseb	86	U	86	84	U	84	85	U	85	84	U	84

Attachment	1	Sheet No.	8 of 14
Originator	~~J. M. Capron~~ S. W. Clark	Date	12/20/05
Checked	T. M. Blakley	Date	12/20/05
Calc. No.	0100B-CA-V0264	Rev. No.	0

Attachment 1. 1607-B2:1 Verification Sampling Results.

Constituent	J03VC4 Sample Location 7 Sample Date 8/19/05			J03VC5 Sample Location 8 Sample Date 8/19/05			J03VC6 Sample Location 9 Sample Date 8/19/05			J03VC7 Sample Location 10 Sample Date 8/19/05		
	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	14	U	14	13	U	13
Aroclor-1221	13	U	13	13	U	13	14	U	14	13	U	13
Aroclor-1232	13	U	13	13	U	13	14	U	14	13	U	13
Aroclor-1242	13	U	13	13	U	13	14	U	14	13	U	13
Aroclor-1248	13	U	13	13	U	13	14	U	14	13	U	13
Aroclor-1254	13	U	13	13	U	13	14	U	14	13	U	13
Aroclor-1260	13	U	13	13	U	13	14	U	14	13	U	13
Pesticides												
Aldrin	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Alpha-BHC	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
alpha-Chlordane	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Beta-BHC	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Delta-BHC	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Dichlorodiphenyldichloroethane	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Dichlorodiphenyldichloroethylene	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Dichlorodiphenyltrichloroethane	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Dieldrin	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Endosulfan I	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Endosulfan II	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Endosulfan sulfate	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Endrin	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Endrin aldehyde	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Endrin ketone	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4	3.4	UJ	3.4
Gamma-BHC (Lindane)	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
gamma-Chlordane	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Heptachlor	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Heptachlor epoxide	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Methoxychlor	17	UJ	17	17	UJ	17	17	UJ	17	17	UJ	17
Toxaphene	170	UJ	170	170	UJ	170	170	UJ	170	170	UJ	170
Semivolatile Organic Analytes												
1,2,4-Trichlorobenzene	340	U	340	340	U	340	340	U	340	340	U	340
1,2-Dichlorobenzene	340	U	340	340	U	340	340	U	340	340	U	340
1,3-Dichlorobenzene	340	U	340	340	U	340	340	U	340	340	U	340
1,4-Dichlorobenzene	340	U	340	340	U	340	340	U	340	340	U	340
2,4,5-Trichlorophenol	840	U	840	840	U	840	850	U	850	840	U	840
2,4,6-Trichlorophenol	340	U	340	340	U	340	340	U	340	340	U	340
2,4-Dichlorophenol	340	UJ	340	340	U	340	340	U	340	340	U	340
2,4-Dimethylphenol	340	U	340	340	U	340	340	U	340	340	U	340
2,4-Dinitrophenol	840	U	840	840	U	840	850	U	850	840	U	840
2,4-Dinitrotoluene	340	U	340	340	U	340	340	U	340	340	U	340
2,6-Dinitrotoluene	340	U	340	340	U	340	340	U	340	340	U	340
2-Chloronaphthalene	340	U	340	340	U	340	340	U	340	340	U	340
2-Chlorophenol	340	UJ	340	340	U	340	340	U	340	340	U	340
2-Methylnaphthalene	340	U	340	340	U	340	340	U	340	340	U	340
2-Methylphenol (cresol, o-)	340	U	340	340	U	340	340	U	340	340	U	340
2-Nitroaniline	840	U	840	840	U	840	850	U	850	840	U	840
2-Nitrophenol	340	U	340	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	9 of 14
Originator	~~J. M. Capron~~ S. W. Clark	Date	12/20/05
Checked	T. M. Blakley	Date	12/20/05
Calc. No.	0100B-CA-V0264	Rev. No.	0

Attachment 1. 1607-B2:1 Verification Sampling Results.

Constituent	J03VC4 Sample Location 7 Sample Date 8/19/05			J03VC5 Sample Location 8 Sample Date 8/19/05			J03VC6 Sample Location 9 Sample Date 8/19/05			J03VC7 Sample Location 10 Sample Date 8/19/05		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Analytes (continued)												
3,3'-Dichlorobenzidine	340	U	340	340	U	340	340	U	340	340	U	340
3+4 Methylphenol (cresol, m+p)	340	U	340	340	U	340	340	U	340	340	U	340
3-Nitroaniline	840	UJ	840	840	UJ	840	850	UJ	850	840	UJ	840
4,6-Dinitro-2-methylphenol	840	U	840	840	U	840	850	U	850	840	U	840
4-Bromophenyl-phenylether	340	U	340	340	U	340	340	U	340	340	U	340
4-Chloro-3-methylphenol	340	UJ	340	340	U	340	340	U	340	340	U	340
4-Chloroaniline	340	U	340	340	U	340	340	U	340	340	U	340
4-Chlorophenyl-phenylether	340	U	340	340	U	340	340	U	340	340	U	340
4-Nitroaniline	840	UJ	840	840	UJ	840	850	UJ	850	840	UJ	840
4-Nitrophenol	840	UJ	840	840	UJ	840	850	UJ	850	840	UJ	840
Acenaphthene	340	U	340	340	U	340	340	U	340	340	U	340
Acenaphthylene	340	U	340	340	U	340	340	U	340	340	U	340
Anthracene	340	U	340	340	U	340	340	U	340	340	U	340
Benzo(a)anthracene	340	U	340	340	U	340	340	U	340	340	U	340
Benzo(a)pyrene	340	U	340	340	U	340	340	U	340	340	U	340
Benzo(b)fluoranthene	340	U	340	340	U	340	340	U	340	340	U	340
Benzo(ghi)perylene	340	U	340	340	U	340	340	U	340	340	U	340
Benzo(k)fluoranthene	340	U	340	340	U	340	340	U	340	340	U	340
Bis(2-chloro-1-methylethyl)ether	340	U	340	340	U	340	340	U	340	340	U	340
Bis(2-Chloroethoxy)methane	340	U	340	340	U	340	340	U	340	340	U	340
Bis(2-chloroethyl) ether	340	U	340	340	U	340	340	U	340	340	U	340
Bis(2-ethylhexyl) phthalate	660	U	660	660	U	660	660	U	660	660	U	660
Butylbenzylphthalate	340	U	340	340	U	340	340	U	340	340	U	340
Carbazole	340	U	340	340	U	340	340	U	340	340	U	340
Chrysene	340	U	340	340	U	340	340	U	340	340	U	340
Dibenz(a,h)anthracene	340	U	340	340	U	340	340	U	340	340	U	340
Dibenzofuran	340	U	340	340	U	340	340	U	340	340	U	340
Diethylphthalate	340	U	340	340	U	340	340	U	340	26	J	340
Dimethyl phthalate	340	U	340	340	U	340	340	U	340	340	U	340
Di-n-butylphthalate	340	U	340	340	U	340	340	U	340	340	U	340
Di-n-octylphthalate	340	U	340	340	U	340	340	U	340	340	U	340
Fluoranthene	340	U	340	340	U	340	340	U	340	340	U	340
Fluorene	340	U	340	340	U	340	340	U	340	340	U	340
Hexachlorobenzene	340	U	340	340	U	340	340	U	340	340	U	340
Hexachlorobutadiene	340	U	340	340	U	340	340	U	340	340	U	340
Hexachlorocyclopentadiene	340	U	340	340	U	340	340	U	340	340	U	340
Hexachloroethane	340	U	340	340	U	340	340	U	340	340	U	340
Indeno(1,2,3-cd)pyrene	340	U	340	340	U	340	340	U	340	340	U	340
Isophorone	340	U	340	340	U	340	340	U	340	340	U	340
Naphthalene	340	U	340	340	U	340	340	U	340	340	U	340
Nitrobenzene	340	U	340	340	U	340	340	U	340	340	U	340
N-Nitroso-di-n-dipropylamine	340	U	340	340	U	340	340	U	340	340	U	340
N-Nitrosodiphenylamine	340	U	340	340	U	340	340	U	340	340	U	340
Pentachlorophenol	840	U	840	840	U	840	850	U	850	840	U	840
Phenanthrene	340	U	340	340	U	340	340	U	340	340	U	340
Phenol	340	U	340	340	U	340	340	U	340	340	U	340
Pyrene	340	U	340	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	10 of 14
Originator	~~J. M. Capron~~ D. J. Clark	Date	12/20/05
Checked	T. M. Blakley	Date	12/20/05
Calc. No.	0100B-CA-V0264	Rev. No.	0

Attachment 1. 1607-B2:1 Verification Sampling Results.

Constituent	J03VC4 Sample Location 7 Sample Date 8/19/05			J03VC5 Sample Location 8 Sample Date 8/19/05			J03VC6 Sample Location 9 Sample Date 8/19/05			J03VC7 Sample Location 10 Sample Date 8/19/05		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Analytes												
1,1,1-Trichloroethane	4	UJ	4	5	U	5	6	U	6	6	UJ	6
1,1,2,2-Tetrachloroethane	4	UJ	4	5	U	5	6	U	6	6	UJ	6
1,1,2-Trichloroethane	4	UJ	4	5	U	5	6	U	6	6	UJ	6
1,1-Dichloroethane	4	UJ	4	5	U	5	6	U	6	6	UJ	6
1,1-Dichloroethene	4	UJ	4	5	U	5	6	U	6	6	UJ	6
1,2-Dichloroethane	4	UJ	4	5	U	5	6	U	6	6	UJ	6
1,2-Dichloropropane	4	UJ	4	5	U	5	6	U	6	6	UJ	6
2-Butanone	9	UJ	9	10	U	10	11	U	11	11	UJ	11
2-Hexanone	9	UJ	9	10	U	10	11	U	11	11	UJ	11
4-Methyl-2-Pentanone	9	UJ	9	10	U	10	11	U	11	11	UJ	11
Acetone	14	J	9	7	J	10	7	J	11	6	J	11
Benzene	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Bromodichloromethane	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Bromoform	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Bromomethane	9	UJ	9	10	U	10	11	U	11	11	UJ	11
Carbon disulfide	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Carbon tetrachloride	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Chlorobenzene	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Chloroethane	9	UJ	9	10	U	10	11	U	11	11	UJ	11
Chloroform	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Chloromethane	9	UJ	9	10	U	10	11	U	11	11	UJ	11
cis-1,2-Dichloroethylene	4	UJ	4	5	U	5	6	U	6	6	UJ	6
cis-1,3-Dichloropropene	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Dibromochloromethane	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Ethylbenzene	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Methylene chloride	10	UJ	10	11	U	11	10	U	10	13	UJ	13
Styrene	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Tetrachloroethene	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Toluene	4	UJ	4	5	U	5	6	U	6	6	UJ	6
trans-1,2-Dichloroethylene	4	UJ	4	5	U	5	6	U	6	6	UJ	6
trans-1,3-Dichloropropene	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Trichloroethene	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Vinyl chloride	9	UJ	9	10	U	10	11	U	11	11	UJ	11
Xylenes (total)	4	UJ	4	5	U	5	6	U	6	6	UJ	6
Herbicides												
2,4-D	170	U	170	170	U	170	170	U	170	170	U	170
2,4-DB	840	U	840	840	U	840	850	U	850	250		840
2,4,5-T	32	J	84	29	J	84	30	J	85	84	UJ	84
2,4,5-TP (Silvex)	84	UJ	84	84	UJ	84	23	J	85	84	UJ	84
Dalapon	840	U	840	840	U	840	850	U	850	840	U	840
Dicamba	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Dichloroprop	840	UJ	840	840	UJ	840	850	UJ	850	840	UJ	840
Dinoseb	84	U	84	84	U	84	18		85	21		84

Attachment	1	Sheet No.	11 of 14
Originator	~~J. M. Capron~~ S. W. Clark	Date	12/20/05
Checked	T. M. Blakley	Date	12/20/05
Calc. No.	0100B-CA-V0264	Rev. No.	0

Attachment 1. 1607-B2:1 Verification Sampling Results.

Constituent	J03VC8 Sample Location 11 Sample Date 8/19/05			J03VC9 SW Overburden Sample Date 8/19/05			J03VD0 NW Overburden Sample Date 8/19/05			J03VD1 NE Overburden Sample Date 8/19/05		
	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	U	13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Pesticides												
Aldrin	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Alpha-BHC	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
alpha-Chlordane	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Beta-BHC	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Delta-BHC	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Dichlorodiphenyldichloroethane	3.4	UJ	3.4	3.4	UJ	3.4	3.3	UJ	3.3	3.3	UJ	3.3
Dichlorodiphenyldichloroethylene	3.4	UJ	3.4	3.4	UJ	3.4	3.3	UJ	3.3	3.3	UJ	3.3
Dichlorodiphenyltrichloroethane	3.4	UJ	3.4	3.4	UJ	3.4	3.3	UJ	3.3	3.3	UJ	3.3
Dieldrin	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Endosulfan I	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Endosulfan II	3.4	UJ	3.4	3.4	UJ	3.4	3.3	UJ	3.3	3.3	UJ	3.3
Endosulfan sulfate	3.4	UJ	3.4	3.4	UJ	3.4	3.3	UJ	3.3	3.3	UJ	3.3
Endrin	3.4	UJ	3.4	3.4	UJ	3.4	3.3	UJ	3.3	3.3	UJ	3.3
Endrin aldehyde	3.4	UJ	3.4	3.4	UJ	3.4	3.3	UJ	3.3	3.3	UJ	3.3
Endrin ketone	3.4	UJ	3.4	3.4	UJ	3.4	3.3	UJ	3.3	3.3	UJ	3.3
Gamma-BHC (Lindane)	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
gamma-Chlordane	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Heptachlor	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Heptachlor epoxide	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7	1.7	UJ	1.7
Methoxychlor	17	UJ	17	17	UJ	17	17	UJ	17	17	UJ	17
Toxaphene	170	UJ	170	170	UJ	170	170	UJ	170	170	UJ	170
Semivolatile Organic Analytes												
1,2,4-Trichlorobenzene	340	U	340	340	U	340	340	U	340	340	U	340
1,2-Dichlorobenzene	340	U	340	340	U	340	340	U	340	340	U	340
1,3-Dichlorobenzene	340	U	340	340	U	340	340	U	340	340	U	340
1,4-Dichlorobenzene	340	U	340	340	U	340	340	U	340	340	U	340
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	340	U	340	340	U	340
2,4-Dichlorophenol	340	U	340	340	U	340	340	U	340	340	U	340
2,4-Dimethylphenol	340	U	340	340	U	340	340	U	340	340	U	340
2,4-Dinitrophenol	840	U	840	840	U	840	840	U	840	840	U	840
2,4-Dinitrotoluene	340	U	340	340	U	340	340	U	340	340	U	340
2,6-Dinitrotoluene	340	U	340	340	U	340	340	U	340	340	U	340
2-Chloronaphthalene	340	U	340	340	U	340	340	U	340	340	U	340
2-Chlorophenol	340	U	340	340	U	340	340	U	340	340	U	340
2-Methylnaphthalene	340	U	340	340	U	340	340	U	340	340	U	340
2-Methylphenol (cresol, o-)	340	U	340	340	U	340	340	U	340	340	U	340
2-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
2-Nitrophenol	340	U	340	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	12 of 14
Originator	~~J. M. Capron~~ S. W. Clark	Date	12/20/05
Checked	T. M. Blakley	Date	12/20/05
Calc. No.	0100B-CA-V0264	Rev. No.	0

Attachment 1. 1607-B2:1 Verification Sampling Results.

Constituent	J03VC8 Sample Location 11 Sample Date 8/19/05			J03VC9 SW Overburden Sample Date 8/19/05			J03VD0 NW Overburden Sample Date 8/19/05			J03VD1 NE Overburden Sample Date 8/19/05		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Analytes (continued)												
3,3'-Dichlorobenzidine	340	U	340	340	U	340	340	U	340	340	U	340
3+4 Methylphenol (cresol, m+p)	340	U	340	340	U	340	340	U	340	340	U	340
3-Nitroaniline	840	UJ	840	840	UJ	840	840	UJ	840	840	UJ	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	340	U	340	340	U	340
4-Chloro-3-methylphenol	340	U	340	340	U	340	340	U	340	340	U	340
4-Chloroaniline	340	U	340	340	U	340	340	U	340	340	U	340
4-Chlorophenyl-phenylether	340	U	340	340	U	340	340	U	340	340	U	340
4-Nitroaniline	840	UJ	840	840	UJ	840	840	UJ	840	840	UJ	840
4-Nitrophenol	840	UJ	840	840	UJ	840	840	UJ	840	840	UJ	840
Acenaphthene	340	U	340	340	U	340	340	U	340	340	U	340
Acenaphthylene	340	U	340	340	U	340	340	U	340	340	U	340
Anthracene	340	U	340	340	U	340	340	U	340	340	U	340
Benzo(a)anthracene	340	U	340	340	U	340	340	U	340	340	U	340
Benzo(a)pyrene	340	U	340	340	U	340	340	U	340	340	U	340
Benzo(b)fluoranthene	340	U	340	340	U	340	340	U	340	340	U	340
Benzo(ghi)perylene	340	U	340	340	U	340	340	U	340	340	U	340
Benzo(k)fluoranthene	340	U	340	340	U	340	340	U	340	340	U	340
Bis(2-chloro-1-methylethyl)ether	340	U	340	340	U	340	340	U	340	340	U	340
Bis(2-Chloroethoxy)methane	340	U	340	340	U	340	340	U	340	340	U	340
Bis(2-chloroethyl) ether	340	U	340	340	U	340	340	U	340	340	U	340
Bis(2-ethylhexyl) phthalate	660	U	660	660	U	660	340	U	340	660	U	660
Butylbenzylphthalate	340	U	340	340	U	340	340	U	340	340	U	340
Carbazole	340	U	340	340	U	340	340	U	340	340	U	340
Chrysene	340	U	340	340	U	340	340	U	340	340	U	340
Dibenz(a,h)anthracene	340	U	340	340	U	340	340	U	340	340	U	340
Dibenzofuran	340	U	340	340	U	340	340	U	340	340	U	340
Diethylphthalate	340	U	340	340	U	340	340	U	340	340	U	340
Dimethyl phthalate	340	U	340	340	U	340	340	U	340	340	U	340
Di-n-butylphthalate	340	U	340	340	U	340	340	U	340	340	U	340
Di-n-octylphthalate	340	U	340	340	U	340	340	U	340	340	U	340
Fluoranthene	340	U	340	340	U	340	340	U	340	340	U	340
Fluorene	340	U	340	340	U	340	340	U	340	340	U	340
Hexachlorobenzene	340	U	340	340	U	340	340	U	340	340	U	340
Hexachlorobutadiene	340	U	340	340	U	340	340	U	340	340	U	340
Hexachlorocyclopentadiene	340	U	340	340	U	340	340	U	340	340	U	340
Hexachloroethane	340	U	340	340	U	340	340	U	340	340	U	340
Indeno(1,2,3-cd)pyrene	340	U	340	340	U	340	340	U	340	340	U	340
Isophorone	340	U	340	340	U	340	340	U	340	340	U	340
Naphthalene	340	U	340	340	U	340	340	U	340	340	U	340
Nitrobenzene	340	U	340	340	U	340	340	U	340	340	U	340
N-Nitroso-di-n-dipropylamine	340	U	340	340	U	340	340	U	340	340	U	340
N-Nitrosodiphenylamine	340	U	340	340	U	340	340	U	340	340	U	340
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	340	U	340	340	U	340	340	U	340	340	U	340
Phenol	340	U	340	340	U	340	340	U	340	340	U	340
Pyrene	340	U	340	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	13 of 14
Originator	~~J. M. Capron~~ S. W. Clark	Date	12/20/05
Checked	T. M. Blakley	Date	12/20/05
Calc. No.	0100B-CA-V0264	Rev. No.	0

Attachment 1. 1607-B2:1 Verification Sampling Results.

Constituent	J03VC8 Sample Location 11 Sample Date 8/19/05			J03VC9 SW Overburden Sample Date 8/19/05			J03VD0 NW Overburden Sample Date 8/19/05			J03VD1 NE Overburden Sample Date 8/19/05		
	μg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL
Volatile Organic Analytes												
1,1,1-Trichloroethane	5	UJ	5	5	U	5	5	U	5	6	U	6
1,1,2,2-Tetrachloroethane	5	UJ	5	5	U	5	5	U	5	6	U	6
1,1,2-Trichloroethane	5	UJ	5	5	U	5	5	U	5	6	U	6
1,1-Dichloroethane	5	UJ	5	5	U	5	5	U	5	6	U	6
1,1-Dichloroethene	5	UJ	5	5	U	5	5	U	5	6	U	6
1,2-Dichloroethane	5	UJ	5	5	U	5	5	U	5	6	U	6
1,2-Dichloropropane	5	UJ	5	5	U	5	5	U	5	6	U	6
2-Butanone	10	UJ	10	10	U	10	10	U	10	11	U	11
2-Hexanone	10	UJ	10	10	U	10	10	U	10	11	U	11
4-Methyl-2-Pentanone	10	UJ	10	10	U	10	10	U	10	11	U	11
Acetone	5	J	10	9	J	10	6	J	10	6	J	11
Benzene	5	UJ	5	5	U	5	5	U	5	6	U	6
Bromodichloromethane	5	UJ	5	5	U	5	5	U	5	6	U	6
Bromoform	5	UJ	5	5	U	5	5	U	5	6	U	6
Bromomethane	10	UJ	10	10	U	10	10	U	10	11	U	11
Carbon disulfide	5	UJ	5	5	U	5	5	U	5	6	U	6
Carbon tetrachloride	5	UJ	5	5	U	5	5	U	5	6	U	6
Chlorobenzene	5	UJ	5	5	U	5	5	U	5	6	U	6
Chloroethane	10	UJ	10	10	U	10	10	U	10	11	U	11
Chloroform	5	UJ	5	5	U	5	5	U	5	6	U	6
Chloromethane	10	UJ	10	10	U	10	10	U	10	11	U	11
cis-1,2-Dichloroethylene	5	UJ	5	5	U	5	5	U	5	6	U	6
cis-1,3-Dichloropropene	5	UJ	5	5	U	5	5	U	5	6	U	6
Dibromochloromethane	5	UJ	5	5	U	5	5	U	5	6	U	6
Ethylbenzene	5	UJ	5	5	U	5	5	U	5	6	U	6
Methylene chloride	10	UJ	10	11	U	11	10	U	10	10	U	10
Styrene	5	UJ	5	5	U	5	5	U	5	6	U	6
Tetrachloroethene	5	UJ	5	5	U	5	5	U	5	6	U	6
Toluene	5	UJ	5	5	U	5	5	U	5	6	U	6
trans-1,2-Dichloroethylene	5	UJ	5	5	U	5	5	U	5	6	U	6
trans-1,3-Dichloropropene	5	UJ	5	5	U	5	5	U	5	6	U	6
Trichloroethene	5	UJ	5	5	U	5	5	U	5	6	U	6
Vinyl chloride	10	UJ	10	10	U	10	10	U	10	11	U	11
Xylenes (total)	5	UJ	5	5	U	5	5	U	5	6	U	6
Herbicides												
2,4-D	170	U	170	170	U	170	170	U	170	170	U	170
2,4-DB	840	U	840	840	U	840	840	U	840	840	U	840
2,4,5-T	30	J	84	49	J	84	84	UJ	84	30	J	84
2,4,5-TP (Silvex)	84	UJ	84	84	UJ	84	84	UJ	84	84	UJ	84
Dalapon	840	U	840	840	U	840	840	U	840	840	U	840
Dicamba	340	UJ	340	340	UJ	340	340	UJ	340	340	UJ	340
Dichloroprop	840	UJ	840	840	UJ	840	840	UJ	840	840	UJ	840
Dinoseb	84	U	84	84	U	84	84	U	84	84	U	84

Attachment	1 S.W.Clark	Sheet No.	14 of 14
Originator	~~J. M. Capron~~	Date	12/20/05
Checked	T. M. Blakley	Date	12/20/05
Calc. No.	0100B-CA-V0264	Rev. No.	0

CALCULATION COVER SHEET

Project Title 100-B/C Field Remediation Project **Job No.** 14655
Area 100-B/C
Discipline Environmental ***Calc. No.** 0100B-CA-V0265
Subject 1607-B2:1 Drain Field 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 documents 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	S. W. Clark *Approved 12/20/05*	K. E. Cook for T. M. Blakley *Approved 12/20/05*	R. A. Carlson for L. M. Dittmer *Approved 12/21/05*	D. N. Strom *Approved 12/28/05*	*12/28/05*
1	Cover = 1 Summary = 4 Total = 5	J. M. Capron J.M. Capron 11/16/06	S. W. Clark S.W. Clark 11/16/06	N/A	D. N. Strom D.N. Strom 11-21-06	11-21-06

SUMMARY OF REVISION	
1	Cover page replaced for convenience. Sheet 1, line 20, EPA reference removed due to changes in lead calculations. Sheet 2, lines 3 to 5, text revised to describe combination of calculations for the excavated area and overburden. Sheet 2, lines 12 to 18, discussion of lead and arsenic included. Sheet 2, lines 28 to 29 and 40, cumulative values corrected per combination of sampling areas and exclusion of lead. Sheet 3, Table 1 replaced in entirety. Sheet 4, Table 2 removed per combination of Table 1 and Table 2 results.

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:	11/16/06	Calc. No.:	0100B-CA-V0265	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	S. W. Clark SWC	Date:	11/16/06
Subject:	1607-B2:1 Drain Field Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	1 of 4

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and carcinogenic (excess cancer) risk values for the 1607-B2:1 drain field remedial action. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2005), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess cancer risk of <1 x 10^{-6} for individual carcinogens
4) A cumulative excess cancer risk of <1 x 10^{-5} for carcinogens.

GIVEN/REFERENCES:

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

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

3) WCH, 2005, *1607-B2:1 Drain Field Cleanup Verification 95% UCL Calculations*, 0100B-CA-V0264, Rev. 0, Washington Closure Hanford, Richland, Washington.

SOLUTION:

1) Calculate an HQ for each noncarcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the individual HQ of <1.0 (DOE-RL 2005).

2) Sum the HQs and compare to the cumulative HQ criterion of <1.0.

3) Calculate an excess cancer risk value for each carcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the individual excess cancer risk criterion of <1 x 10^{-6} (DOE-RL 2005).

4) Sum the excess cancer risk values and compare to the cumulative cancer risk criterion of <1 x 10^{-5}.

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron JMC	Date:	11/16/06	Calc. No.:	0100B-CA-V0265	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	S. W. Clark SWC	Date:	11/16/06
Subject:	1607-B2:1 Drain Field Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 2 of 4	

METHODOLOGY:

Hazard quotient and carcinogenic risk calculations were computed for the 1607-B2:1 site using the higher of the remediation footprint statistical value and overburden material maximum value for each analyte detected above background using the data from WCH (2005). Of the contaminants of potential concern for the site, boron and molybdenum require the HQ and risk calculations because these analytes were detected and a Washington State or Hanford Site background value is not available. Multiple additional metals are included for the excavated area (as shown in Table 1) because the statistical values for these constituents were above their respective Washington State or Hanford Site background values within those sampling areas. Hexavalent chromium, acetone, multiple pesticides, herbicides, and semivolatile organic analytes (as shown in Tables 1 and 2, below) are included because they were detected by laboratory analysis and cannot be attributed to natural occurrence. Lead does not have a reference dose for calculation of a hazard quotient because toxic effects of lead are correlated with blood-lead levels rather than exposure levels or daily intake. As a result, the maximum lead concentration is reported but not included in the hazard quotient calculation. Arsenic was detected above the Hanford Site Background value but below the WAC 173-340 Method A cleanup level. Due to the intent of Method A cleanup values and the allowance to use such values for arsenic (DOE-RL 2005), arsenic has been excluded from the Method B individual analyte and cumulative risk requirements. An example of the HQ and risk calculations is presented below:

1) For example, the statistical value for boron in the excavation sampling area is 8.3 mg/kg, divided by the noncarcinogenic RAG value of 16,000 mg/kg (boron is identified as a noncarcinogen in WAC 173-340-740[3]), is 5.2×10^{-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 sums of the HQ values is 1.3×10^{-1}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the statistical or maximum value is divided by the carcinogenic RAG value, then multiplied by 1×10^{-6}. For example, the maximum value for hexavalent chromium in the excavation sampling area is 0.33 mg/kg; divided by 2.1 mg/kg and multiplied as indicated is 1.6×10^{-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 cancer risk can be obtained by summing the individual values. (To avoid errors due to intermediate rounding, the individual excess carcinogenic risk values prior to rounding are used for this calculation.) The sum of the excess cancer risk values is 2.0×10^{-7}. 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
2) List the cumulative noncarcinogenic HQ >1.0: None

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron	Date:	11/16/06	Calc. No.:	0100B-CA-V0265	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	S. W. Clark	Date:	11/16/06
Subject:	1607-B2:1 Drain Field Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 3 of 4	

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 1607-B2:1 subsite.

Table 1. Hazard Quotient and Excess Cancer Risk Results for the 1607-B2:1 Subsite.

Contaminants of Potential Concern	Statistical or Maximum Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Barium	258	5,600	4.6E-02	--	--
Boron	8.3	16,000	5.2E-04	--	--
Chromium, total	19.8	80,000	2.5E-04		
Chromium, hexavalent[c]	0.33	240	1.4E-03	2.1	1.6E-07
Copper	29.6	2,960	1.0E-02	--	--
Lead	10.2	--	--	--	--
Manganese	588	11,200	5.3E-02	--	--
Molybdenum	1.2	400	3.0E-03	--	--
Nickel	21.2	1,600	1.3E-02	--	--
Zinc	69	24,000	2.9E-03	--	--
Semivolatiles					
Dibenzofuran	0.034	160	2.1E-04	--	--
Diethylphthalate	0.026	64,000	4.1E-07	--	--
Di-n-butylphthalate	0.021	8,000	2.6E-06	--	--
Indeno(1,2,3-cd) pyrene	0.024	--	--	1.37	1.8E-08
Methylnapthalene; 2-	0.15	320	4.7E-04	--	--
Naphthalene	0.11	1,600	6.9E-05	--	--
Phenanthrene[d]	0.037	24,000	1.5E-06	--	--
Pesticides					
DDD, 4,4'-	0.0017	--	--	4.17	4.1E-10
Dieldrin	0.0017	4	4.3E-04	0.0625	2.7E-08
Endrin (and ketone, aldehyde)	0.0022	24	9.2E-05	--	--
Volatiles					
Acetone	0.010	72,000	1.4E-07	--	--
Herbicides					
2,4-D	0.11	800	1.4E-04	--	--
2,4-DB	0.25	640	3.9E-04	--	--
2,4,5-T	0.049	800	6.1E-05	--	--
2,4,5-TP	0.023	640	3.6E-05	--	--
Dinoseb	0.027	80	3.4E-04	--	--
Totals					
Cumulative Hazard Quotient:			**1.3E-01**		
Cumulative Excess Cancer Risk:					**2.0E-07**

Notes:
RAG = remedial action goal
-- = not applicable
[a] = From WCH 2005.
[b] = Value obtained from *Washington Administrative Code* (WAC) 173-340-740(3), Method B, 1996, unless otherwise noted.
[c] = Value for the carcinogen RAG calculated based on the inhalation exposure pathway (WAC) 173-340-750(3), 1996.
[d]= Toxicity data are not available for phenanthrene; RAG based on the surrogate chemical anthracene.

Washington Closure Hanford CALCULATION SHEET

Originator:	J. M. Capron	Date:	11/16/06	Calc. No.:	0100B-CA-V0265	Rev.:	1
Project:	100-B/C Field Remediation	Job No:	14655	Checked:	S. W. Clark	Date:	11/16/06
Subject:	1607-B2:1 Drain Field Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 4 of 4	

CONCLUSION:

This calculation demonstrates that the 1607-B2:1 drain field waste site meets the requirements for the hazard quotients and carcinogenic (excess cancer) risk as identified in the RDR/RAWP (DOE-RL 2005).

CALCULATION COVER SHEET

Project Title:	100-B/C Remaining Pipes and Sewers Field Remediation	**Job No.**	14655
Area	100-B/C		
Discipline	Environmental	***Calc. No.**	0100B-CA-V0292
Subject	1607-B2:2 Waste Site 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 = 13 Attm. 1 = 20 Total = 34	JM Capron 9/14/06 J. M. Capron	T.M. Blakley 9/18/06 T. M. Blakley	LM Dittmer 9/19/06 L. M. Dittmer	DN Strom 9-19-06 D. N. Strom	9-19-06

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 *JMC*	**Date**	09/14/06	**Calc. No.**	0100B-CA-V0292	**Rev. No.**	0
Project	100-B/C Remaining Pipes and Sewers Field Remediation	**Job No.**	14655	**Checked**	T. M. Blakley *TMB*	**Date**	7/18/06
Subject	1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations					**Sheet No.**	1 of 13

Summary

Purpose:
Calculate the 95% upper confidence limit (UCL) values to evaluate compliance with cleanup standards for the remediation footprint of the 1607-B2:2 subsite. 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 sample pairs, as necessary.

Table of Contents:

Sheets 1 to 4 - Calculation Sheet Summary
Sheets 5 to 7 - Calculation Sheet 1607-B2:2 Remediation Footprint Verification Data
Sheet 8 - Calculation Sheet Duplicate Analysis
Sheets 9 to 13 - Ecology Software (MTCAStat) Results
Attachment 1 - 1607-B2:2 Verification Sampling Results (20 sheets)

Given/References:

1) Sample Results (Attachment 1).
2) Background values and remedial action goals (RAGs) are taken from DOE-RL (2005b), DOE-RL (2001), Ecology (1994), and Ecology (2005).
3) DOE-RL, 2001, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) DOE-RL, 2005a, *100 Area Remedial Action Sampling and Analysis Plan* (SAP), DOE/RL-96-22, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
5) DOE-RL, 2005b, *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, 1994, *Natural Background Soil Metals Concentrations in Washington State*, Publication No. 94-115, Washington State Department of Ecology, Olympia, Washington.
9) Ecology, 2005, *Cleanup Levels and Risk Calculations (CLARC) Database*, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
10) 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.
11) 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 Remaining Sites Verification Package (RSVP).

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 RPD results are used in evaluation of data quality within the RSVP for this site.

Methodology:
For nonradioactive analytes with ≤50% of the data below detection limits and 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 nonradionuclide data sets where >50% of the data was below detection limits or radionuclide data sets with no reported detections. The 95% UCL values were not calculated for aluminum, calcium, iron, magnesium, phosphate, potassium, silicon, sodium, and zirconium, as no cleanup values are available in Ecology (2005) under WAC 173-340-740(3), and these constituents are thus

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC **Date** 09/14/06 **Calc. No.** 0100B-CA-V0292 **Rev. No.** 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation **Job No.** 14655 **Checked** T. M. Blakley TMB **Date** 9/18/06
Subject 1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations **Sheet No.** 2 of 13

Summary (continued)

not considered site COPCs (results for total phosphorus are attributed to phosphorus in phosphate). The 95% UCL values were also not calculated for potassium-40, radium-226, radium-228, thorium-228, and thorium-232, as these radionuclides are not related to the site history and are excluded from consideration as COCs/COPCs (DOE-RL 2005a).

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 was done on 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, as for the subject site, 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 RSVP) is used as the compliance basis.

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). Where direct evaluation of the attached sample data showed that a given analyte was not detected in the primary and duplicate sample, further evaluation of the RPD value was not performed. The RPD calculations use the following formula:

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

where, M = main sample value S = split (or duplicate) sample value

For quality assurance/quality control (QA/QC) 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. No split samples were collected for cleanup verification of the subject site. As a matter of good practice, when an analyte is detected in the primary or duplicate sample, but was quantified at less than 5 times the TDL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate results exceeds a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed. No split samples were collected for cleanup verification of the subject site. Additional discussion is provided in the data quality assessment section of the applicable RSVP, as necessary.

In addition to the statistical samples collected from the remediation footprint at the subject site, multi-aliquot samples were collected from stockpiles of overburden and other material assumed to be below cleanup levels. Statistical methodology is not applicable to non-statistical sampling, and direct evaluation of maximum detected values within these decision units will be used as the compliance basis. These maximum detected values are presented in the results summary for use in the RSVP.

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC **Date** 09/14/06 **Job No.** 14655 **Calc. No.** 0100B-CA-V0292 **Rev. No.** 0

Project 100-B/C Remaining Pipes and Sewers Field Remediation **Checked** T. M. Blakley TMB **Date** 9/18/06

Subject 1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations **Sheet No.** 3 of 13

Summary (continued)

Results:
The results presented in the summary tables that follow are for use in risk analysis and the RSVP for this site.

Results Summary - Remediation Footprint			
Analyte	**95% UCL[a]**	**Maximum[b]**	**Units**
Cesium-137	0.107		pCi/g
Strontium-90	0.181		pCi/g
Antimony		0.51	mg/kg
Arsenic	4.1		mg/kg
Barium	112		mg/kg
Beryllium	0.44		mg/kg
Boron	4.7		mg/kg
Cadmium		0.43	mg/kg
Chromium	10.5		mg/kg
Cobalt	8.5		mg/kg
Copper	34		mg/kg
Hexavalent Chromium	0.35		mg/kg
Lead	10.1		mg/kg
Lithium	8.3		mg/kg
Manganese	362		mg/kg
Mercury		0.92	mg/kg
Molybdenum	0.37		mg/kg
Nickel	12.5		mg/kg
Strontium	48.2		mg/kg
Titanium	1509		mg/kg
Vanadium	46.4		mg/kg
Zinc	51.5		mg/kg
Aroclor-1254		0.33	mg/kg
Aroclor-1260		0.0067	mg/kg
alpha-Chlordane		0.00087	mg/kg
beta-BHC		0.0019	mg/kg
4,4'-DDE		0.018	mg/kg
4,4'-DDT		0.017	mg/kg
Endosulfan I		0.0069	mg/kg
Endosulfan II		0.0034	mg/kg
Endosulfan sulfate		0.00050	mg/kg
Endrin aldehyde		0.0074	mg/kg
Endrin ketone		0.0011	mg/kg
gamma-Chlordane		0.00043	mg/kg
Heptachlor epoxide		0.00060	mg/kg
Methoxychlor		0.015	mg/kg
2-Methylnaphthalene		0.019	mg/kg
Benzo(a)anthracene		0.041	mg/kg
Benzo(a)pyrene		0.033	mg/kg
Benzo(b)fluoranthene		0.041	mg/kg
Benzo(g,h,i)perylene		0.030	mg/kg
Benzo(k)fluoranthene		0.035	mg/kg
bis(2-Ethylhexyl)phthalate	1.6		mg/kg
Chrysene		0.064	mg/kg
Di-n-butylphthalate	0.07		mg/kg
Dibenz(a,h)anthracene		0.022	mg/kg
Fluoranthene		0.079	mg/kg
Indeno(1,2,3-cd)pyrene		0.028	mg/kg
Naphthalene		0.017	mg/kg
Phenanthrene		0.046	mg/kg
Phenol		0.017	mg/kg
Pyrene		0.066	mg/kg

Results Summary - BCL Stockpiles		
Analyte	**Maximum[a]**	**Units**
Strontium-90	2.10	pCi/g
Antimony	0.47	mg/kg
Arsenic	3.6	mg/kg
Barium	91.0	mg/kg
Beryllium	0.39	mg/kg
Boron	2.8	mg/kg
Cadmium	0.1	mg/kg
Chromium	12.8	mg/kg
Cobalt	8.2	mg/kg
Copper	16.0	mg/kg
Hexavalent chromium	0.28	mg/kg
Lead	8.9	mg/kg
Lithium	7.7	mg/kg
Manganese	340	mg/kg
Mercury	0.14	mg/kg
Molybdenum	0.36	mg/kg
Nickel	12.5	mg/kg
Strontium	31.0	mg/kg
Titanium	1330	mg/kg
Vanadium	46.6	mg/kg
Zinc	49.6	mg/kg
Aroclor-1254	0.0062	mg/kg
Aroclor-1260	0.011	mg/kg
4,4'-DDE	0.00044	mg/kg
4,4'-DDT	0.016	mg/kg
Endrin aldehyde	0.0	mg/kg
Benzo(b)fluoranthene	0.018	mg/kg
bis(2-Ethylhexyl)phthalate	1.1	mg/kg
Di-n-butylphthalate	0.080	mg/kg
Diethylphthalate	0.018	mg/kg
Fluoranthene	0.032	mg/kg
Phenol	0.027	mg/kg
Pyrene	0.026	mg/kg

[a]Verification sampling of the BCL stockpiles was based on multi-aliquot, rather than statistical, sampling.
BCL = below cleanup levels

WAC 173-340-740(7)(e) Evaluation

WAC 173-340 3-Part Test for most stringent RAG:

95% UCL > Cleanup Limit?	YES
> 10% above Cleanup Limit?	NO
Any sample > 2x Cleanup Limit?	YES

Because of the "yes" answers to the WAC 173-340 3-part test, additional evaluation of the attainment of cleanup criteria will be performed.

[a]For nonradionuclides, where ≤ 50% of a data set is censored (below detection limits), the 95% UCL value is used for a given analyte.
[b]For nonradionuclides, where > 50% of a data set is censored, the statistical value defaults to the maximum detected value in the data set (Attachment 1).
RAG = remedial action goal UCL = upper confidence level WAC = *Washington Adminstrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron JMC **Date** 09/14/06 **Job No.** 14655 **Calc. No.** 0100B-CA-V0292 **Rev. No.** 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation **Checked** T. M. Blakley TMB **Date** 9/18/06
Subject 1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations **Sheet No.** 4 of 13

Summary (continued)

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

Analyte	Duplicate Analysis[b]	Analyte	Duplicate Analysis[b]
Potassium-40	58%	Manganese	12%
Aluminum	0.75%	Phosphorus	8.5%
Barium	14%	Silicon	19%
Calcium	3.6%	Strontium	10%
Chromium	4.1%	Titanium	16%
Copper	3.6%	Vanadium	14%
Iron	3.0%	Zinc	2.6%
Magnesium	5.2%	Zirconium	2.7%
Quantitated results for radium-226 and radium-228 in both the primary and duplicate field samples 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 RSVP for the subject site.
QA/QC = quality assurance/quality control
RSVP = remaining sites verification package
TDL = target detection limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron *JMC*
Project 100-B/C Remaining Pipes and Sewers Field Remediation
Subject 1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations

Date 09/14/06
Job No. 14655

Calc. No. 0100B-CA-V0292
Checked T. M. Blakley *TMB*

Rev. No. 0
Date *9/18/06*
Sheet No. 5 of 13

1607-B2:2 Remediation Footprint Verification Data

Sampling Area	Sample Number	Sample Date	Cesium-137 pCi/g	Q	MDA	Strontium-90 pCi/g	Q	MDA	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
1	J12NX9	6/27/2006	0.079	U	0.079	-0.067	U	0.23	7.3		0.59	77.1		0.02	0.59		0.02	1.9		0.23	16.6		0.13
2	J12NY0	6/27/2006	0.031	U	0.031	-0.024	U	0.23	4.1		0.58	91.9		0.02	0.42		0.02	3.3		0.23	8.5		0.12
3	J12NY1	6/27/2006	0.020	U	0.020	0.904		0.19	3.1		0.59	58.0		0.02	0.37		0.02	1.5		0.23	8.2		0.12
4	J12NY2	6/27/2006	0.067	U	0.067	0.088	U	0.24	3.1		0.58	92.1		0.02	0.39		0.02	4.5		0.23	8.4		0.12
5	J12NY3	6/27/2006	0.011	U	0.011	-0.036	U	0.23	2.4		0.58	67.5		0.02	0.35		0.02	1.6		0.23	7.5		0.12
Duplicate of J12NY3	J12NY4	6/27/2006	0.035	U	0.035	-0.020	U	0.23	2.4		0.57	58.6		0.02	0.36		0.02	1.7		0.23	7.2		0.12
6	J12NY5	6/27/2006	0.415		0.039	0.093	U	0.24	2.7		0.58	202		0.02	0.42		0.02	13.2		0.23	8.8		0.12
7	J12NY6	6/27/2006	0.010	U	0.010	-0.049	U	0.18	2.4		0.57	42.3		0.02	0.39		0.02	1.3		0.23	4.6		0.12
8	J12NY7	6/27/2006	0.083		0.028	0.009	U	0.22	2.5		0.58	90.1		0.02	0.37		0.02	4.1		0.23	8.1		0.12
9	J12NY8	6/27/2006	0.044		0.026	0.089	U	0.22	3.2		0.58	81.9		0.02	0.40		0.02	3.5		0.23	8.8		0.12
10	J12NY9	6/27/2006	0.095	U	0.095	-0.023	U	0.23	3.4		0.57	83.8		0.02	0.35		0.02	3.0		0.23	10.0		0.12
11	J12PW5	6/29/2006	0.032	U	0.032	0.033	U	0.31	2.6		0.58	69.2		0.02	0.38		0.02	1.2		0.23	9.6		0.12
12	J12PW6	6/29/2006	0.13	U	0.13	-0.028	U	0.36	5.2		0.59	175		0.02	0.50		0.02	2.2		0.23	11.4		0.13
13	J12PW7	6/29/2006	0.11	U	0.11	-0.034	U	0.30	3.6		0.58	94.4		0.02	0.47		0.02	2.7		0.23	8.7		0.12
14	J12PW8	6/29/2006	0.042	U	0.042	0.056	U	0.28	3.0		0.58	80.2		0.02	0.36		0.02	1.9		0.23	11.2		0.12

Statistical Computation Input Data

Sampling Area	Sample Number	Sample Date	Cesium-137 pCi/g	Strontium-90 pCi/g	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Chromium mg/kg
1	J12NX9	6/27/2006	0.040	-0.067	7.3	77.1	0.59	1.9	16.6
2	J12NY0	6/27/2006	0.016	-0.024	4.1	91.9	0.42	3.3	8.5
3	J12NY1	6/27/2006	0.010	0.904	3.1	58.0	0.37	1.5	8.2
4	J12NY2	6/27/2006	0.034	0.088	3.1	92.1	0.39	4.5	8.4
5	J12NY3/J12NY4	6/27/2006	0.012	-0.028	2.4	63.1	0.36	1.7	7.4
6	J12NY5	6/27/2006	0.415	0.093	2.7	202	0.42	13.2	8.8
7	J12NY6	6/27/2006	0.005	-0.049	2.4	42.3	0.39	1.3	4.6
8	J12NY7	6/27/2006	0.083	0.009	2.5	90.1	0.37	4.1	8.1
9	J12NY8	6/27/2006	0.044	0.089	3.2	81.9	0.40	3.5	8.8
10	J12NY9	6/27/2006	0.048	-0.023	3.4	83.8	0.35	3.0	10.0
11	J12PW5	6/29/2006	0.016	0.033	2.6	69.2	0.38	1.2	9.6
12	J12PW6	6/29/2006	0.065	-0.028	5.2	175	0.50	2.2	11.4
13	J12PW7	6/29/2006	0.055	-0.034	3.6	94.4	0.47	2.7	8.7
14	J12PW8	6/29/2006	0.021	0.056	3.0	80.2	0.36	1.9	11.2

Statistical Computations

	Cesium-137	Strontium-90	Arsenic	Barium	Beryllium	Boron	Chromium
95% UCL based on	Radionuclide data set. Use nonparametric z-statistic.	Radionuclide data set. Use nonparametric 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.
N	14	14	14	14	14	14	14
% < Detection limit	79%	93%	0%	0%	0%	0%	0%
Mean	0.062	0.073	3.5	93	0.41	3.3	9.3
Standard deviation	0.104	0.245	1.3	43	0.07	3.0	2.7
Z-statistic	1.645	1.645	NA*	NA*	NA*	NA*	NA*
95% UCL on mean	0.107	0.181	4.1	112	0.44	4.7	10.5
Maximum detected value	0.415	0.904	7.3	202	0.59	13.2	16.6
Statistical value	0.107	0.181	4.1	112	0.44	4.7	10.5
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
WAC 173-340 3-PART TEST							
95% UCL > Cleanup Limit?			NO	NO	NA	NO	NA
> 10% above Cleanup Limit?			NO	YES	NA	NO	NA
Any sample > 2X Cleanup Limit?			NO	NO	NA	NO	NA
WAC 173-340 Compliance? **Further assessment required**			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, 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.

*Calculation of 95% UCL for nonradionuclides performed using MTCAStat software.

BG = background
GW = groundwater
MDA = minimum detectable activity
NA = not applicable
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 Remaining Pipes and Sewers Field Remediation
Subject 1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations

Date 09/14/06
Job No. 14655

Calc. No. 0100B-CA-V0292
Checked T. M. Blakley *TMB*

Rev. No. 0
Date 9/18/06
Sheet No. 6 of 13

1607-B2:2 Remediation Footprint Verification Data (continued)

Sampling Area	Sample Number	Sample Date	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL	Hexavalent Chromium mg/kg	Q	PQL	Lead mg/kg	Q	PQL	Lithium mg/kg	Q	PQL	Manganese mg/kg	Q	PQL	Molybdenum mg/kg	Q	PQL
1	J12NX9	6/27/2006	11.2		0.13	23.0		0.21	0.20	U	0.20	10.0		0.30	16.1	C	0.03	513		0.03	0.28	U	0.28
2	J12NY0	6/27/2006	8.3		0.13	16.3		0.21	0.50		0.20	8.2		0.30	6.7	C	0.03	323		0.03	0.44		0.28
3	J12NY1	6/27/2006	7.8		0.13	16.1		0.21	0.20	U	0.20	5.9		0.30	6.1	C	0.03	317		0.03	0.32		0.28
4	J12NY2	6/27/2006	8.3		0.13	15.6		0.21	0.23		0.20	5.2		0.29	6.3	C	0.03	352		0.03	0.43		0.27
5	J12NY3	6/27/2006	8.3		0.13	13.5		0.21	0.25		0.20	4.7		0.29	5.3	C	0.03	390		0.03	0.28		0.27
Duplicate of J12NY3	J12NY4	6/27/2006	8.0		0.13	14.0		0.21	0.20	U	0.20	4.7		0.29	5.2	C	0.03	347		0.03	0.33		0.27
6	J12NY5	6/27/2006	7.0		0.13	107		0.21	0.81		0.20	25.3		0.30	5.4	C	0.03	301		0.03	0.57		0.28
7	J12NY6	6/27/2006	7.6		0.13	15.0		0.21	0.20	U	0.20	4.1		0.29	3.4	C	0.03	295		0.03	0.32		0.27
8	J12NY7	6/27/2006	7.5		0.13	17.3		0.21	0.47		0.20	9.2		0.29	5.7	C	0.03	317		0.03	0.30		0.27
9	J12NY8	6/27/2006	7.6		0.13	15.5		0.21	0.38		0.20	5.7		0.29	6.4	C	0.03	320		0.03	0.28	U	0.28
10	J12NY9	6/27/2006	6.3		0.13	13.2		0.21	0.32		0.20	5.6		0.29	6.7	C	0.03	292		0.03	0.27	U	0.27
11	J12PW5	6/29/2006	7.2		0.13	14.3		0.12	0.20	U	0.20	4.3		0.30	6.8	C	0.03	301		0.03	0.28	U	0.28
12	J12PW6	6/29/2006	8.9		0.13	24.3		0.12	0.20	U	0.20	9.6		0.30	10.1	C	0.03	382		0.03	0.33		0.28
13	J12PW7	6/29/2006	8.5		0.13	17.9		0.11	0.20	U	0.20	5.4		0.30	7.0	C	0.03	350		0.03	0.40		0.28
14	J12PW8	6/29/2006	6.0		0.13	13.7		0.11	0.20	U	0.20	4.4		0.29	6.3	C	0.03	271		0.03	0.35		0.27

Statistical Computation Input Data

Sampling Area	Sample Number	Sample Date	Cobalt mg/kg	Copper mg/kg	Hexavalent Chromium mg/kg	Lead mg/kg	Lithium mg/kg	Manganese mg/kg	Molybdenum mg/kg
1	J12NX9	6/27/2006	11.2	23.0	0.10	10.0	16.1	513	0.14
2	J12NY0	6/27/2006	8.3	16.3	0.50	8.2	6.7	323	0.44
3	J12NY1	6/27/2006	7.8	16.1	0.10	5.9	6.1	317	0.32
4	J12NY2	6/27/2006	8.3	15.6	0.23	5.2	6.3	352	0.43
5	J12NY3/J12NY4	6/27/2006	8.2	13.8	0.18	4.7	5.3	369	0.31
6	J12NY5	6/27/2006	7.0	107	0.81	25.3	5.4	301	0.57
7	J12NY6	6/27/2006	7.6	15.0	0.10	4.1	3.4	295	0.32
8	J12NY7	6/27/2006	7.5	17.3	0.47	9.2	5.7	317	0.30
9	J12NY8	6/27/2006	7.6	15.5	0.38	5.7	6.4	320	0.14
10	J12NY9	6/27/2006	6.3	13.2	0.32	5.6	6.7	292	0.14
11	J12PW5	6/29/2006	7.2	14.3	0.10	4.3	6.8	301	0.14
12	J12PW6	6/29/2006	8.9	24.3	0.10	9.6	10.1	382	0.33
13	J12PW7	6/29/2006	8.5	17.9	0.10	5.4	7.0	350	0.40
14	J12PW8	6/29/2006	6.0	13.7	0.10	4.4	6.3	271	0.35

Statistical Computations

	Cobalt	Copper	Hexavalent Chromium	Lead	Lithium	Manganese	Molybdenum
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	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 normal distribution.
N	14	14	14	14	14	14	14
% < Detection limit	0%	0%	50%	0%	0%	0%	29%
Mean	7.9	23	0.26	7.7	7.0	336	0.31
Standard deviation	1.3	24	0.22	5.5	3.0	60	0.13
95% UCL on mean	8.5	34	0.35	10.1	8.3	362	0.37
Maximum detected value	11.2	107	0.81	25.3	16.1	513	0.57
Statistical value	8.5	34	0.35	10.1	8.3	362	0.37
Most Stringent Cleanup Limit for nonradionuclide and RAG type	32 GW Protection	22.0 BG/River Protection	2 River Protection	10.2 BG/GW & River Protection	33.5 BG/GW Protection	512 BG/GW & River Protection	8 GW Protection
WAC 173-340 3-PART TEST							
95% UCL > Cleanup Limit?	NA	YES	NO	NO	NA	NO	NO
> 10% above Cleanup Limit?	NA	YES	NO	NO	NA	NO	NO
Any sample > 2X Cleanup Limit?	NA	YES	NO	YES	NA	NO	NO
WAC 173-340 Compliance? Further assessment 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.	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 (33.5 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.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

BG = background
C = method blank contamination
GW = groundwater
NA = not applicable
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*

Washington Closure Hanford

CALCULATION SHEET

Originator J. M. Capron JMC
Project 100-B/C Remaining Pipes and Sewers Field Remediation
Subject 1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations

Date 09/14/06
Job No. 14655

Calc. No. 0100B-CA-V0292
Checked T. M. Blakley TMB

Rev. No. 0
Date 9/18/06
Sheet No. 7 of 13

1 **1607-B2:2 Remediation Footprint Verification Data (continued)**

#	Sampling Area	Sample Number	Sample Date	Nickel mg/kg	Q	PQL	Strontium mg/kg	Q	PQL	Titanium mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL	bis(2-Ethylhexyl)phthalate mg/kg	Q	PQL	Di-n-butylphthalate mg/kg	Q	PQL
4	1	J12NX9	6/27/2006	19.2		0.23	36.9		0.01	1530		0.03	53.0		0.09	63.6		0.15	0.97	B	0.34	0.019	JB	0.34
5	2	J12NY0	6/27/2006	10.8		0.23	37.4		0.01	1640		0.03	48.1		0.09	46.3		0.15	0.083	JB	0.34	0.023	JB	0.34
6	3	J12NY1	6/27/2006	10.2		0.23	25.2		0.01	1470		0.03	46.4		0.09	41.7		0.15	0.076	JB	0.34	0.034	JB	0.34
7	4	J12NY2	6/27/2006	12.1		0.23	40.5		0.009	1530		0.03	48.4		0.09	44.1		0.15	0.061	JB	0.33	0.031	JB	0.33
8	5	J12NY3	6/27/2006	10.4		0.23	20.3		0.009	1590		0.03	46.8		0.09	39.5		0.15	0.020	JB	0.33	0.024	JB	0.33
9	Duplicate of J12NY3	J12NY4	6/27/2006	10.7		0.23	22.5		0.009	1350		0.03	40.6		0.08	38.5		0.15	0.038	JB	0.34	0.024	JB	0.34
10	6	J12NY5	6/27/2006	10.3		0.23	73.3		0.01	1250		0.03	39.5		0.09	70.6		0.15	0.23	JB	0.34	0.045	JB	0.34
11	7	J12NY6	6/27/2006	9.2		0.23	18.7		0.009	1770		0.03	46.0		0.08	36.2		0.15	0.071	JB	0.34	0.023	JB	0.34
12	8	J12NY7	6/27/2006	11.9		0.23	44.3		0.009	1480		0.03	49.9		0.09	43.5		0.15	0.032	JB	0.33	0.048	JB	0.33
13	9	J12NY8	6/27/2006	11.0		0.23	32.7		0.009	1370		0.03	43.7		0.09	43.4		0.15	0.45	B	0.34	0.34	U	0.34
14	10	J12NY9	6/27/2006	11.6		0.23	30.4		0.009	871		0.03	31.0		0.08	39.6		0.15	3.2	BD	0.33	0.022	JB	0.33
15	11	J12PW5	6/29/2006	10.9		0.23	26.0	C	0.01	967		0.03	36.7		0.09	37.2		0.15	0.66	U	0.66	0.019	J	0.34
16	12	J12PW6	6/29/2006	11.7		0.23	86.2	C	0.01	1170		0.03	41.4		0.09	67.0		0.15	0.66	U	0.66	0.34	U	0.34
17	13	J12PW7	6/29/2006	10.6		0.23	33.4	C	0.01	1100		0.03	39.8		0.09	40.2		0.15	0.66	U	0.66	0.029	J	0.33
18	14	J12PW8	6/29/2006	10.6		0.23	25.7	C	0.009	697		0.03	32.3		0.09	37.2		0.15	0.66	U	0.66	0.024	J	0.33

19 **Statistical Computation Input Data**

#	Sampling Area	Sample Number	Sample Date	Nickel mg/kg	Strontium mg/kg	Titanium mg/kg	Vanadium mg/kg	Zinc mg/kg	bis(2-Ethylhexyl)phthalate mg/kg	Di-n-butylphthalate mg/kg
22	1	J12NX9	6/27/2006	19.2	36.9	1530	53.0	63.6	0.97	0.019
23	2	J12NY0	6/27/2006	10.8	37.4	1640	48.1	46.3	0.083	0.023
24	3	J12NY1	6/27/2006	10.2	25.2	1470	46.4	41.7	0.076	0.034
25	4	J12NY2	6/27/2006	12.1	40.5	1530	48.4	44.1	0.061	0.031
26	5	J12NY3/J12NY4	6/27/2006	10.6	21.4	1470	43.7	39.0	0.029	0.024
27	6	J12NY5	6/27/2006	10.3	73.3	1250	39.5	70.6	0.23	0.045
28	7	J12NY6	6/27/2006	9.2	18.7	1770	46.0	36.2	0.071	0.023
29	8	J12NY7	6/27/2006	11.9	44.3	1480	49.9	43.5	0.032	0.048
30	9	J12NY8	6/27/2006	11.0	32.7	1370	43.7	43.4	0.45	0.17
31	10	J12NY9	6/27/2006	11.6	30.4	871	31.0	39.6	3.2	0.022
32	11	J12PW5	6/29/2006	10.9	26.0	967	36.7	37.2	0.33	0.019
33	12	J12PW6	6/29/2006	11.7	86.2	1170	41.4	67.0	0.33	0.17
34	13	J12PW7	6/29/2006	10.6	33.4	1100	39.8	40.2	0.33	0.029
35	14	J12PW8	6/29/2006	10.6	25.7	697	32.3	37.2	0.33	0.024

36 **Statistical Computations**

#		Nickel	Strontium	Titanium	Vanadium	Zinc	bis(2-Ethylhexyl)phthalate	Di-n-butylphthalate
38	95% UCL based on	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
39	N	14	14	14	14	14	14	14
40	% < Detection limit	0%	0%	0%	0%	0%	29%	14%
41	Mean	11.5	38.0	1308	42.9	46.4	0.5	0.05
42	Standard deviation	2.4	19.3	311	6.5	11.6	0.83	0.052
43	95% UCL on mean	12.5	48.2	1509	46.4	51.5	1.6	0.07
44	Maximum detected value	19.2	86.2	1770	53.0	70.6	3.2	0.048
45	Statistical value	12.5	48.2	1509	46.4	51.5	1.6	0.07
46	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	19.1 BG/GW Protection	960 GW Protection	6400 GW Protection	85.1 BG/GW Protection	67.8 BG/River Protection	0.36 River Protection	160 GW Protection
47	**WAC 173-340 3-PART TEST**							
48	95% UCL > Cleanup Limit?	NO	NO	NA	NA	NO	YES	NO
49	> 10% above Cleanup Limit?	NO	NO	NA	NA	NO	YES	NO
50	Any sample > 2X Cleanup Limit?	NO	NO	NA	NA	NO	YES	NO
51	**WAC 173-340 Compliance?** **Further assessment required**	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.	Because all values are below background (2570 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg), the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	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.

52 B = method blank contamination (organic constituents)
53 BG = background
54 C = method blank contamination (inorganic constituents)
55 D = diluted
56 GW = groundwater

J = estimated
NA = not applicable
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* Date 09/14/06 Calc. No. 0100B-CA-V0292 Rev. No. 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation Job No. 14655 Checked T. M. Blakley *TMB* Date 9/18/06
Subject 1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations Sheet No. 8 of 13

Duplicate Analysis

Sampling Area	Sample Number	Sample Date	Potassium-40			Radium-226			Radium-228			Thorium-228			Thorium-232			Aluminum			Arsenic			Barium			Beryllium		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	J12NY3	6/27/2006	11.9		0.12	0.493		0.022	0.730		0.050	0.631		0.015	0.730		0.050	5340		2.7	2.4		0.58	67.5		0.02	0.35		0.02
Duplicate of J12NY3	J12NY4	6/27/2006	21.6		0.38	0.826		0.064	1.29		0.16	1.13		0.052	1.29		0.16	5300		2.7	2.4		0.57	58.6		0.02	0.36		0.02

Analysis:

		Potassium-40	Radium-226	Radium-228	Thorium-228	Thorium-232	Aluminum	Arsenic	Barium	Beryllium
	TDL	0.5	0.1	0.2	1	1	5	10	2	0.5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference	No - evaluate difference	No - evaluate difference	**Yes (calc RPD)**	No - evaluate difference	**Yes (calc RPD)**	No - evaluate difference
	RPD	*58%*					0.75%		14%	
	Difference >2xTDL?	Not applicable	Yes - assess further	Yes - assess further	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	No - acceptable

Sampling Area	Sample Number	Sample Date	Boron			Calcium			Chromium			Cobalt			Copper			Hexavalent Chromium			Iron			Lead			Lithium		
			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	J12NY3	6/27/2006	1.6		0.23	4070		2.1	7.5		0.12	8.3		0.13	13.5		0.21	0.25		0.20	20000		3.3	4.7		0.29	5.3	C	0.03
Duplicate of J12NY3	J12NY4	6/27/2006	1.7		0.23	4220		2.1	7.2		0.12	8.0		0.13	14.0		0.21	0.20	U	0.20	19400		3.3	4.7		0.29	5.2	C	0.03

Analysis:

		Boron	Calcium	Chromium	Cobalt	Copper	Hexavalent Chromium	Iron	Lead	Lithium
	TDL	2	100	1	2	1	0.5	5	5	2.5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No - evaluate difference	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	**Yes (calc RPD)**		**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference
	RPD		3.6%	4.1%		3.6%		3.0%		
	Difference >2xTDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable

Sampling Area	Sample Number	Sample Date	Magnesium			Manganese			Molybdenum			Nickel			Phosphorus			Potassium			Silicon			Sodium			Strontium		
			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	J12NY3	6/27/2006	4140		0.92	390		0.03	0.28		0.27	10.4		0.23	867		0.85	1070	C	2.1	436		2.1	144		0.72	20.3		0.009
Duplicate of J12NY3	J12NY4	6/27/2006	4360		0.91	347		0.03	0.33		0.27	10.7		0.23	944		0.85	1090	C	2.1	360		2.1	153		0.72	22.5		0.009

Analysis:

		Magnesium	Manganese	Molybdenum	Nickel	Phosphorus	Potassium	Silicon	Sodium	Strontium
	TDL	75	5	2	4	1.3	400	2	50	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference	**Yes (calc RPD)**	No - evaluate difference	**Yes (calc RPD)**	No - evaluate difference	**Yes (calc RPD)**
	RPD	5.2%	12%			8.5%		19%		10%
	Difference >2xTDL?	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable

Sampling Area	Sample Number	Sample Date	Titanium			Vanadium			Zinc			Zirconium			bis(2-Ethylhexyl) phthalate			Di-n-butylphthalate		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
5	J12NY3	6/27/2006	1590		0.03	46.8		0.09	39.5		0.15	22.5		1.0	20	JB	330	24	JB	330
Duplicate of J12NY3	J12NY4	6/27/2006	1350		0.03	40.6		0.08	38.5		0.15	21.9		1.0	38	JB	340	24	JB	340

Analysis:

		Titanium	Vanadium	Zinc	Zirconium	bis(2-Ethylhexyl) phthalate	Di-n-butylphthalate
	TDL	0.5	2.5	1	2.5	660	660
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No - evaluate difference	No - evaluate difference
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**		
	RPD	16%	14%	2.6%	2.7%		
	Difference >2xTDL?	Not applicable	Not applicable	Not applicable	Not applicable	No - acceptable	No - acceptable

B = method blank contamination (organic constituents)
C = method blank contamination (inorganic constituents)
J = estimated
MDA = minimum detectable activity
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* — Date 09/14/06 — Calc. No. 0100B-CA-V0292 — Rev. No. 0

Project 100-B/C Remaining Pipes and Sewers Field Remediation — Job No. 14655 — Checked T. M. Blakley *TMB* — Date 9/18/06

Subject 1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations — Sheet No. 9 of 13

Ecology Software (MTCAStat) Results

DATA	ID	Arsenic 95% UCL Calculation			
7.3	J12NX9				
4.1	J12NY0				
3.1	J12NY1	Number of samples		Uncensored values	
3.1	J12NY2	Uncensored	14	Mean	3.5
2.4	J12NY3/J12NY4	Censored		Lognormal mean	3.5
2.7	J12NY5	Detection limit or PQL		Std. devn.	1.3
2.4	J12NY6	Method detection limit		Median	3.1
2.5	J12NY7	TOTAL	14	Min.	2.4
3.2	J12NY8			Max.	7.3
3.4	J12NY9				
2.6	J12PW5				
5.2	J12PW6	Lognormal distribution?		Normal distribution?	
3.6	J12PW7	r-squared is:	0.859	r-squared is:	0.737
3.0	J12PW8	Recommendations:			
		Reject BOTH lognormal and normal distributions.			
		UCL (based on Z-statistic) is	4.1		

DATA	ID	Barium 95% UCL Calculation			
77.1	J12NX9				
91.9	J12NY0				
58.0	J12NY1	Number of samples		Uncensored values	
92.1	J12NY2	Uncensored	14	Mean	93
63.1	J12NY3/J12NY4	Censored		Lognormal mean	93
202	J12NY5	Detection limit or PQL		Std. devn.	43
42.3	J12NY6	Method detection limit		Median	83
90.1	J12NY7	TOTAL	14	Min.	42.3
81.9	J12NY8			Max.	202
83.8	J12NY9				
69.2	J12PW5				
175	J12PW6	Lognormal distribution?		Normal distribution?	
94.4	J12PW7	r-squared is:	0.889	r-squared is:	0.753
80.2	J12PW8	Recommendations:			
		Reject BOTH lognormal and normal distributions.			
		UCL (based on Z-statistic) is	112		

DATA	ID	Beryllium 95% UCL Calculation			
0.59	J12NX9				
0.42	J12NY0				
0.37	J12NY1	Number of samples		Uncensored values	
0.39	J12NY2	Uncensored	14	Mean	0.41
0.36	J12NY3/J12NY4	Censored		Lognormal mean	0.41
0.42	J12NY5	Detection limit or PQL		Std. devn.	0.07
0.39	J12NY6	Method detection limit		Median	0.39
0.37	J12NY7	TOTAL	14	Min.	0.35
0.40	J12NY8			Max.	0.59
0.35	J12NY9				
0.38	J12PW5				
0.50	J12PW6	Lognormal distribution?		Normal distribution?	
0.47	J12PW7	r-squared is:	0.855	r-squared is:	0.805
0.36	J12PW8	Recommendations:			
		Reject BOTH lognormal and normal distributions.			
		UCL (based on Z-statistic) is	0.44		

DATA	ID	Boron 95% UCL Calculation			
1.9	J12NX9				
3.3	J12NY0				
1.5	J12NY1	Number of samples		Uncensored values	
4.5	J12NY2	Uncensored	14	Mean	3.3
1.7	J12NY3/J12NY4	Censored		Lognormal mean	3.2
13.2	J12NY5	Detection limit or PQL		Std. devn.	3.0
1.3	J12NY6	Method detection limit		Median	2.5
4.1	J12NY7	TOTAL	14	Min.	1.2
3.5	J12NY8			Max.	13.2
3.0	J12NY9				
1.2	J12PW5				
2.2	J12PW6	Lognormal distribution?		Normal distribution?	
2.7	J12PW7	r-squared is:	0.901	r-squared is:	0.589
1.9	J12PW8	Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is	4.7		

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator	J. M. Capron *JMC*	Date	09/14/06	Calc. No.	0100B-CA-V0292
Project	100-B/C Remaining Pipes and Sewers Field Remediation	Job No.	14655	Checked	T. M. Blakley *TMB*
Subject	1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations	Rev. No.	0	Date	9/18/06
		Sheet No.	10 of 13		

Ecology Software (MTCAStat) Results

Chromium 95% UCL Calculation

DATA	ID				
16.6	J12NX9				
8.5	J12NY0				
8.2	J12NY1	Number of samples		Uncensored values	
8.4	J12NY2	Uncensored	14	Mean	9.3
7.4	J12NY3/J12NY4	Censored		Lognormal mean	9.3
8.8	J12NY5	Detection limit or PQL		Std. devn.	2.7
4.6	J12NY6	Method detection limit		Median	8.8
8.1	J12NY7	TOTAL	14	Min.	4.6
8.8	J12NY8			Max.	16.6
10.0	J12NY9				
9.6	J12PW5				
11.4	J12PW6	Lognormal distribution?		Normal distribution?	
8.7	J12PW7	r-squared is:	0.862	r-squared is:	0.822
11.2	J12PW8	Recommendations:			

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 10.5

Cobalt 95% UCL Calculation

DATA	ID				
11.2	J12NX9				
8.3	J12NY0				
7.8	J12NY1	Number of samples		Uncensored values	
8.3	J12NY2	Uncensored	14	Mean	7.9
8.2	J12NY3/J12NY4	Censored		Lognormal mean	7.9
7.0	J12NY5	Detection limit or PQL		Std. devn.	1.3
7.6	J12NY6	Method detection limit		Median	7.7
7.5	J12NY7	TOTAL	14	Min.	6.0
7.6	J12NY8			Max.	11.2
6.3	J12NY9				
7.2	J12PW5				
8.9	J12PW6	Lognormal distribution?		Normal distribution?	
8.5	J12PW7	r-squared is:	0.931	r-squared is:	0.886
6.0	J12PW8	Recommendations:			

Use lognormal distribution.

UCL (Land's method) is 8.5

Copper 95% UCL Calculation

DATA	ID				
23.0	J12NX9				
16.3	J12NY0				
16.1	J12NY1	Number of samples		Uncensored values	
15.6	J12NY2	Uncensored	14	Mean	23
13.8	J12NY3/J12NY4	Censored		Lognormal mean	22
107	J12NY5	Detection limit or PQL		Std. devn.	24
15.0	J12NY6	Method detection limit		Median	16
17.3	J12NY7	TOTAL	14	Min.	13.2
15.5	J12NY8			Max.	107
13.2	J12NY9				
14.3	J12PW5				
24.3	J12PW6	Lognormal distribution?		Normal distribution?	
17.9	J12PW7	r-squared is:	0.562	r-squared is:	0.375
13.7	J12PW8	Recommendations:			

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 34

Hexavalent Chromium 95% UCL Calculation

DATA	ID				
0.10	J12NX9				
0.50	J12NY0				
0.10	J12NY1	Number of samples		Uncensored values	
0.23	J12NY2	Uncensored	14	Mean	0.26
0.18	J12NY3/J12NY4	Censored		Lognormal mean	0.26
0.81	J12NY5	Detection limit or PQL		Std. devn.	0.22
0.10	J12NY6	Method detection limit		Median	0.14
0.47	J12NY7	TOTAL	14	Min.	0.10
0.38	J12NY8			Max.	0.81
0.32	J12NY9				
0.10	J12PW5				
0.10	J12PW6	Lognormal distribution?		Normal distribution?	
0.10	J12PW7	r-squared is:	0.829	r-squared is:	0.770
0.10	J12PW8	Recommendations:			

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.35

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator	J. M. Capron *JMC*	Date	09/14/06	Calc. No.	0100B-CA-V0292
Project	100-B/C Remaining Pipes and Sewers Field Remediation	Job No.	14655	Checked	T. M. Blakley *TMB*
Subject	1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations				

Rev. No. 0
Date *9/18/06*
Sheet No. 11 of 13

Ecology Software (MTCAStat) Results

Lead 95% UCL Calculation

DATA	ID				
10.0	J12NX9				
8.2	J12NY0				
5.9	J12NY1	Number of samples		Uncensored values	
5.2	J12NY2	Uncensored	14	Mean	7.7
4.7	J12NY3/J12NY4	Censored		Lognormal mean	7.5
25.3	J12NY5	Detection limit or PQL		Std. devn.	5.5
4.1	J12NY6	Method detection limit		Median	5.7
9.2	J12NY7	TOTAL	14	Min.	4.1
5.7	J12NY8			Max.	25.3
5.6	J12NY9				
4.3	J12PW5				
9.6	J12PW6	Lognormal distribution?		Normal distribution?	
5.4	J12PW7	r-squared is:	0.822	r-squared is:	0.595
4.4	J12PW8	Recommendations:			
		Reject BOTH lognormal and normal distributions.			
		UCL (based on Z-statistic) is	10.1		

Lithium 95% UCL Calculation

DATA	ID				
16.1	J12NX9				
6.7	J12NY0				
6.1	J12NY1	Number of samples		Uncensored values	
6.3	J12NY2	Uncensored	14	Mean	7.0
5.3	J12NY3/J12NY4	Censored		Lognormal mean	7.0
5.4	J12NY5	Detection limit or PQL		Std. devn.	3.0
3.4	J12NY6	Method detection limit		Median	6.4
5.7	J12NY7	TOTAL	14	Min.	3.4
6.4	J12NY8			Max.	16.1
6.7	J12NY9				
6.8	J12PW5				
10.1	J12PW6	Lognormal distribution?		Normal distribution?	
7.0	J12PW7	r-squared is:	0.814	r-squared is:	0.667
6.3	J12PW8	Recommendations:			
		Reject BOTH lognormal and normal distributions.			
		UCL (based on Z-statistic) is	8.3		

Manganese 95% UCL Calculation

DATA	ID				
513	J12NX9				
323	J12NY0				
317	J12NY1	Number of samples		Uncensored values	
352	J12NY2	Uncensored	14	Mean	336
369	J12NY3/J12NY4	Censored		Lognormal mean	336
301	J12NY5	Detection limit or PQL		Std. devn.	60
295	J12NY6	Method detection limit		Median	319
317	J12NY7	TOTAL	14	Min.	271
320	J12NY8			Max.	513
292	J12NY9				
301	J12PW5				
382	J12PW6	Lognormal distribution?		Normal distribution?	
350	J12PW7	r-squared is:	0.841	r-squared is:	0.762
271	J12PW8	Recommendations:			
		Reject BOTH lognormal and normal distributions.			
		UCL (based on Z-statistic) is	362		

Molybdenum 95% UCL Calculation

DATA	ID				
0.14	J12NX9				
0.44	J12NY0				
0.32	J12NY1	Number of samples		Uncensored values	
0.43	J12NY2	Uncensored	14	Mean	0.31
0.31	J12NY3/J12NY4	Censored		Lognormal mean	0.31
0.57	J12NY5	Detection limit or PQL		Std. devn.	0.13
0.32	J12NY6	Method detection limit		Median	0.32
0.30	J12NY7	TOTAL	14	Min.	0.14
0.14	J12NY8			Max.	0.57
0.14	J12NY9				
0.14	J12PW5				
0.33	J12PW6	Lognormal distribution?		Normal distribution?	
0.40	J12PW7	r-squared is:	0.862	r-squared is:	0.918
0.35	J12PW8	Recommendations:			
		Use normal distribution.			
		UCL (based on t-statistic) is	0.37		

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator J. M. Capron *JMC* Date 09/14/06 Calc. No. 0100B-CA-V0292 Rev. No. 0
Project 100-B/C Remaining Pipes and Sewers Field Remediation Job No. 14655 Checked T. M. Blakley *TMB* Date 9/18/06
Subject 1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations Sheet No. 12 of 13

Ecology Software (MTCAStat) Results

Nickel 95% UCL Calculation

DATA	ID	Number of samples		Uncensored values	
19.2	J12NX9				
10.8	J12NY0				
10.2	J12NY1				
12.1	J12NY2	Uncensored	14	Mean	11.5
10.6	J12NY3/J12NY4	Censored		Lognormal mean	11.5
10.3	J12NY5	Detection limit or PQL		Std. devn.	2.4
9.2	J12NY6	Method detection limit		Median	10.9
11.9	J12NY7	TOTAL	14	Min.	9.2
11.0	J12NY8			Max.	19.2
11.6	J12NY9				
10.9	J12PW5				
11.7	J12PW6				
10.6	J12PW7				
10.6	J12PW8				

Lognormal distribution? r-squared is: 0.674
Normal distribution? r-squared is: 0.578
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 12.5

Strontium 95% UCL Calculation

DATA	ID	Number of samples		Uncensored values	
36.9	J12NX9				
37.4	J12NY0				
25.2	J12NY1				
40.5	J12NY2	Uncensored	14	Mean	38.0
21.4	J12NY3/J12NY4	Censored		Lognormal mean	37.9
73.3	J12NY5	Detection limit or PQL		Std. devn.	19.3
18.7	J12NY6	Method detection limit		Median	33.1
44.3	J12NY7	TOTAL	14	Min.	18.7
32.7	J12NY8			Max.	86.2
30.4	J12NY9				
26.0	J12PW5				
86.2	J12PW6				
33.4	J12PW7				
25.7	J12PW8				

Lognormal distribution? r-squared is: 0.928
Normal distribution? r-squared is: 0.787
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 48.2

Titanium 95% UCL Calculation

DATA	ID	Number of samples		Uncensored values	
1530	J12NX9				
1640	J12NY0				
1470	J12NY1				
1530	J12NY2	Uncensored	14	Mean	1308
1470	J12NY3/J12NY4	Censored		Lognormal mean	1315
1250	J12NY5	Detection limit or PQL		Std. devn.	311
1770	J12NY6	Method detection limit		Median	1420
1480	J12NY7	TOTAL	14	Min.	697
1370	J12NY8			Max.	1770
871	J12NY9				
967	J12PW5				
1170	J12PW6				
1100	J12PW7				
697	J12PW8				

Lognormal distribution? r-squared is: 0.908
Normal distribution? r-squared is: 0.954
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1509

Vanadium 95% UCL Calculation

DATA	ID	Number of samples		Uncensored values	
53.0	J12NX9				
48.1	J12NY0				
46.4	J12NY1				
48.4	J12NY2	Uncensored	14	Mean	42.9
43.7	J12NY3/J12NY4	Censored		Lognormal mean	42.9
39.5	J12NY5	Detection limit or PQL		Std. devn.	6.5
46.0	J12NY6	Method detection limit		Median	43.7
49.9	J12NY7	TOTAL	14	Min.	31.0
43.7	J12NY8			Max.	53.0
31.0	J12NY9				
36.7	J12PW5				
41.4	J12PW6				
39.8	J12PW7				
32.3	J12PW8				

Lognormal distribution? r-squared is: 0.947
Normal distribution? r-squared is: 0.972
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 46.4

PQL = practical quantitation limit
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator	J. M. Capron *JMC*	Date	09/14/06	Calc. No.	0100B-CA-V0292	Rev. No.	0
Project	100-B/C Remaining Pipes and Sewers Field Remediation	Job No.	14655	Checked	T. M. Blakley *TMB*	Date	9/18/06
Subject	1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations					Sheet No.	13 of 13

Ecology Software (MTCAStat) Results

Zinc 95% UCL Calculation

DATA	ID				
63.6	J12NX9				
46.3	J12NY0				
41.7	J12NY1	Number of samples		Uncensored values	
44.1	J12NY2	Uncensored	14	Mean	46.4
39.0	J12NY3/J12NY4	Censored		Lognormal mean	46.4
70.6	J12NY5	Detection limit or PQL		Std. devn.	11.6
36.2	J12NY6	Method detection limit		Median	42.6
43.5	J12NY7	TOTAL	14	Min.	36.2
43.4	J12NY8			Max.	70.6
39.6	J12NY9				
37.2	J12PW5				
67.0	J12PW6	Lognormal distribution?		Normal distribution?	
40.2	J12PW7	r-squared is: 0.816		r-squared is: 0.767	
37.2	J12PW8	Recommendations:			
		Reject BOTH lognormal and normal distributions.			
		UCL (based on Z-statistic) is	51.5		

bis(2-Ethylhexyl)phthalate 95% UCL Calculation

DATA	ID				
0.97	J12NX9				
0.083	J12NY0				
0.076	J12NY1	Number of samples		Uncensored values	
0.061	J12NY2	Uncensored	14	Mean	0.5
0.029	J12NY3/J12NY4	Censored		Lognormal mean	0.5
0.23	J12NY5	Detection limit or PQL		Std. devn.	0.83
0.071	J12NY6	Method detection limit		Median	0.3
0.032	J12NY7	TOTAL	14	Min.	0.029
0.45	J12NY8			Max.	3.2
3.2	J12NY9				
0.33	J12PW5				
0.33	J12PW6	Lognormal distribution?		Normal distribution?	
0.33	J12PW7	r-squared is: 0.941		r-squared is: 0.504	
0.33	J12PW8	Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is	1.6		

Di-n-butylphthalate 95% UCL Calculation

DATA	ID				
0.019	J12NX9				
0.023	J12NY0				
0.034	J12NY1	Number of samples		Uncensored values	
0.031	J12NY2	Uncensored	14	Mean	0.05
0.024	J12NY3/J12NY4	Censored		Lognormal mean	0.05
0.045	J12NY5	Detection limit or PQL		Std. devn.	0.052
0.023	J12NY6	Method detection limit		Median	0.03
0.048	J12NY7	TOTAL	14	Min.	0.019
0.17	J12NY8			Max.	0.17
0.022	J12NY9				
0.019	J12PW5				
0.17	J12PW6	Lognormal distribution?		Normal distribution?	
0.029	J12PW7	r-squared is: 0.756		r-squared is: 0.564	
0.024	J12PW8	Recommendations:			
		Reject BOTH lognormal and normal distributions.			
		UCL (based on Z-statistic) is	0.07		

PQL = practical quantitation limit
UCL = upper confidence limit

Attachment 1. 1607-B2:2 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Americium-241			Cesium-137			Cobalt-60			Europium-152			Europium-154		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J12NX9	6/27/06	0.29	U	0.29	0.079	U	0.079	0.093	U	0.093	0.19	U	0.19	0.25	U	0.25
2	J12NY0	6/27/06	0.22	U	0.22	0.031	U	0.031	0.030	U	0.030	0.069	U	0.069	0.11	U	0.11
3	J12NY1	6/27/06	0.11	U	0.11	0.020	U	0.020	0.021	U	0.021	0.051	U	0.051	0.069	U	0.069
4	J12NY2	6/27/06	0.30	U	0.30	0.067	U	0.067	0.074	U	0.074	0.16	U	0.16	0.23	U	0.23
5	J12NY3	6/27/06	0.084	U	0.084	0.011	U	0.011	0.011	U	0.011	0.027	U	0.027	0.040	U	0.040
Duplicate of J12NY3	J12NY4	6/27/06	0.37	U	0.37	0.035	U	0.035	0.041	U	0.041	0.10	U	0.10	0.12	U	0.12
6	J12NY5	6/27/06	0.15	U	0.15	0.415		0.039	0.033	U	0.033	0.079	U	0.079	0.11	U	0.11
7	J12NY6	6/27/06	0.041	U	0.041	0.010	U	0.010	0.008	U	0.008	0.018	U	0.018	0.024	U	0.024
8	J12NY7	6/27/06	0.032	U	0.032	0.083		0.028	0.033	U	0.033	0.066	U	0.066	0.094	U	0.094
9	J12NY8	6/27/06	0.14	U	0.14	0.044		0.026	0.026	U	0.026	0.063	U	0.063	0.091	U	0.091
10	J12NY9	6/27/06	0.41	U	0.41	0.095	U	0.095	0.097	U	0.097	0.21	U	0.21	0.33	U	0.33
11	J12PW5	6/29/06	0.029	U	0.029	0.032	U	0.032	0.038	U	0.038	0.048	U	0.048	0.12	U	0.12
12	J12PW6	6/29/06	0.10	U	0.10	0.13	U	0.13	0.15	U	0.15	0.17	U	0.17	0.55	U	0.55
13	J12PW7	6/29/06	0.095	U	0.095	0.11	U	0.11	0.13	U	0.13	0.14	U	0.14	0.39	U	0.39
14	J12PW8	6/29/06	0.30	U	0.30	0.042	U	0.042	0.044	U	0.044	0.093	U	0.093	0.14	U	0.14
North BCL stockpile (north)	J12NX4	6/27/06	0.48	U	0.48	0.048	U	0.048	0.051	U	0.051	0.13	U	0.13	0.16	U	0.16
North BCL stockpile (middle)	J12NX5	6/27/06	0.40	U	0.40	0.095	U	0.095	0.094	U	0.094	0.21	U	0.21	0.30	U	0.30
North BCL stockpile (south)	J12NX6	6/27/06	0.45	U	0.45	0.11	U	0.11	0.11	U	0.11	0.24	U	0.24	0.33	U	0.33
Southeastern BCL stockpile	J12NX7	6/27/06	0.27	U	0.27	0.038	U	0.038	0.034	U	0.034	0.085	U	0.085	0.13	U	0.13
Small BCL stockpiles	J12NX8	6/27/06	0.023	U	0.023	0.018	U	0.018	0.024	U	0.024	0.049	U	0.049	0.069	U	0.069

Note: The following abbreviations apply to all Attachment 1 tables.

Note: Data qualified with B, C, D, I and/or J are considered acceptable values.

B = method blank contamination (organic constituents)
BCL = below cleanup levels
C = method blank contamination (inorganic constituents)
D = diluted
I = interference on one analytical column
J = estimated
MDA = minimum detectable activity
PQL = practical quantitation limit
Q = qualifier
U = undetected

Attachment	1	Sheet No.	1 of 20
Originator	J. M. Capron JMC	Date	09/14/06
Checked	T. M. Blakley TMB	Date	9/18/06
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Europium-155			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
1	J12NX9	6/27/06	0.22	U	0.22	11.4		0.79	0.363		0.13	0.678		0.31	0.552		0.15
2	J12NY0	6/27/06	0.096	U	0.096	12.3		0.36	0.526		0.058	0.782		0.13	0.646		0.035
3	J12NY1	6/27/06	0.068	U	0.068	12.9		0.19	0.497		0.040	0.766		0.088	0.635		0.025
4	J12NY2	6/27/06	0.18	U	0.18	27.5		0.72	1.04		0.14	1.70		0.28	1.57		0.10
5	J12NY3	6/27/06	0.039	U	0.039	11.9		0.12	0.493		0.022	0.730		0.050	0.631		0.015
Duplicate of J12NY3	J12NY4	6/27/06	0.14	U	0.14	21.6		0.38	0.826		0.064	1.29		0.16	1.13		0.052
6	J12NY5	6/27/06	0.086	U	0.086	26.9		0.39	1.25		0.065	1.62		0.14	1.69		0.053
7	J12NY6	6/27/06	0.037	U	0.037	9.66		0.072	0.370		0.013	0.563		0.032	0.473		0.009
8	J12NY7	6/27/06	0.063	U	0.063	13.4		0.23	0.568		0.051	0.746		0.11	0.637		0.032
9	J12NY8	6/27/06	0.085	U	0.085	13.0		0.28	0.509		0.042	0.740		0.10	0.625		0.031
10	J12NY9	6/27/06	0.24	U	0.24	34.8		0.97	1.17		0.16	1.63		0.43	1.95		0.14
11	J12PW5	6/29/06	0.032	U	0.032	10.1		0.41	0.333		0.053	0.622		0.15	0.305		0.027
12	J12PW6	6/29/06	0.11	U	0.11	10.8		1.6	0.458		0.22	0.721		0.64	0.385		0.087
13	J12PW7	6/29/06	0.098	U	0.098	8.38		2.0	0.377		0.18	0.879		0.56	0.341		0.079
14	J12PW8	6/29/06	0.13	U	0.13	15.0		0.40	0.660		0.073	0.928		0.17	1.12		0.076
North BCL stockpile (north)	J12NX4	6/27/06	0.19	U	0.19	25.7		0.49	1.06		0.094	1.54		0.24	1.60		0.067
North BCL stockpile (middle)	J12NX5	6/27/06	0.24	U	0.24	31.9		0.88	1.32		0.17	2.04		0.41	1.87		0.14
North BCL stockpile (south)	J12NX6	6/27/06	0.27	U	0.27	32.6		1.2	1.24		0.19	1.68		0.43	2.04		0.17
Southeastern BCL stockpile	J12NX7	6/27/06	0.12	U	0.12	12.1		0.38	0.648		0.077	0.946		0.14	0.837		0.046
Small BCL stockpiles	J12NX8	6/27/06	0.069	U	0.069	13.4		0.20	0.527		0.035	0.760		0.086	0.055	U	0.055

Attachment	1	Sheet No.	2 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Thorium-232			Total Beta Radiostrontium			Tritium			Uranium-235			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
1	J12NX9	6/27/06	0.678		0.31	-0.067	U	0.23	-2.36	U	5.7	0.31	U	0.31	9.7	U	9.7
2	J12NY0	6/27/06	0.782		0.13	-0.024	U	0.23	-1.13	U	5.0	0.14	U	0.14	3.9	U	3.9
3	J12NY1	6/27/06	0.766		0.088	0.904		0.19	-2.36	U	4.8	0.089	U	0.089	2.4	U	2.4
4	J12NY2	6/27/06	1.70		0.28	0.088	U	0.24	-1.92	U	4.9	0.25	U	0.25	8.5	U	8.5
5	J12NY3	6/27/06	0.730		0.050	-0.036	U	0.23	1.50	U	5.0	0.053	U	0.053	1.5	U	1.5
Duplicate of J12NY3	J12NY4	6/27/06	1.29		0.16	-0.020	U	0.23	-1.32	U	5.8	0.19	U	0.19	4.4	U	4.4
6	J12NY5	6/27/06	1.62		0.14	0.093	U	0.24	-2.44	U	5.7	0.12	U	0.12	4.0	U	4.0
7	J12NY6	6/27/06	0.563		0.032	-0.049	U	0.18	-2.81	U	4.6	0.032	U	0.032	1.8	U	1.8
8	J12NY7	6/27/06	0.746		0.11	0.009	U	0.22	-1.16	U	5.4	0.090	U	0.090	3.3	U	3.3
9	J12NY8	6/27/06	0.740		0.10	0.089	U	0.22	-1.58	U	5.0	0.11	U	0.11	2.9	U	2.9
10	J12NY9	6/27/06	1.63		0.43	-0.023	U	0.23	-1.69	U	5.2	0.34	U	0.34	11	U	11
11	J12PW5	6/29/06	0.622		0.15	0.033	U	0.31	0.902	U	3.2	0.049	U	0.049	4.7	U	4.7
12	J12PW6	6/29/06	0.721		0.64	-0.028	U	0.36	2.03	U	3.8	0.17	U	0.17	15	U	15
13	J12PW7	6/29/06	0.879		0.56	-0.034	U	0.30	0.379	U	3.0	0.15	U	0.15	16	U	16
14	J12PW8	6/29/06	0.928		0.17	0.056	U	0.28	1.30	U	3.1	0.16	U	0.16	5.4	U	5.4
North BCL stockpile (north)	J12NX4	6/27/06	1.54		0.24	0.100	U	0.25	-1.34	U	5.9	0.24	U	0.24	13	U	13
North BCL stockpile (middle)	J12NX5	6/27/06	2.04		0.41	0.268	U	0.30	-1.58	U	4.8	0.34	U	0.34	12	U	12
North BCL stockpile (south)	J12NX6	6/27/06	1.68		0.43	-0.043	U	0.25	-1.78	U	4.7	0.39	U	0.39	12	U	12
Southeastern BCL stockpile	J12NX7	6/27/06	0.946		0.14	2.10		0.23	-1.67	U	4.9	0.17	U	0.17	4.6	U	4.6
Small BCL stockpiles	J12NX8	6/27/06	0.760		0.086	0.294		0.23	-1.66	U	4.5	0.067	U	0.067	2.4	U	2.4

Attachment	1	Sheet No.	3 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 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
1	J12NX9	6/27/06	11500		2.8	0.42	U	0.42	7.3		0.59	77.1		0.02	0.59		0.02	1.9		0.23
2	J12NY0	6/27/06	5540		2.7	0.42		0.42	4.1		0.58	91.9		0.02	0.42		0.02	3.3		0.23
3	J12NY1	6/27/06	5470		2.8	0.42	U	0.42	3.1		0.59	58.0		0.02	0.37		0.02	1.5		0.23
4	J12NY2	6/27/06	5840		2.7	0.42	U	0.42	3.1		0.58	92.1		0.02	0.39		0.02	4.5		0.23
5	J12NY3	6/27/06	5340		2.7	0.42	U	0.42	2.4		0.58	67.5		0.02	0.35		0.02	1.6		0.23
Duplicate of J12NY3	J12NY4	6/27/06	5300		2.7	0.41	U	0.41	2.4		0.57	58.6		0.02	0.36		0.02	1.7		0.23
6	J12NY5	6/27/06	5540		2.8	0.46		0.42	2.7		0.58	202		0.02	0.42		0.02	13.2		0.23
7	J12NY6	6/27/06	3870		2.7	0.41	U	0.41	2.4		0.57	42.3		0.02	0.39		0.02	1.3		0.23
8	J12NY7	6/27/06	5280		2.7	0.42	U	0.41	2.5		0.58	90.1		0.02	0.37		0.02	4.1		0.23
9	J12NY8	6/27/06	5910		2.7	0.51		0.42	3.2		0.58	81.9		0.02	0.40		0.02	3.5		0.23
10	J12NY9	6/27/06	5650		2.7	0.41	U	0.41	3.4		0.57	83.8		0.02	0.35		0.02	3.0		0.23
11	J12PW5	6/29/06	5980	C	2.3	0.42	UJ	0.42	2.6		0.58	69.2		0.02	0.38		0.02	1.2		0.23
12	J12PW6	6/29/06	7540	C	2.3	0.42	UJ	0.42	5.2		0.59	175		0.02	0.50		0.02	2.2		0.23
13	J12PW7	6/29/06	6310	C	2.3	0.42	UJ	0.42	3.6		0.58	94.4		0.02	0.47		0.02	2.7		0.23
14	J12PW8	6/29/06	5870	C	2.2	0.42	UJ	0.42	3.0		0.58	80.2		0.02	0.36		0.02	1.9		0.23
North BCL stockpile (north)	J12NX4	6/27/06	6820		2.7	0.42	U	0.42	3.6		0.58	78.5		0.02	0.36		0.02	2.1		0.23
North BCL stockpile (middle)	J12NX5	6/27/06	6390		2.7	0.42	U	0.42	3.2		0.58	91.0		0.02	0.39		0.02	2.8		0.23
North BCL stockpile (south)	J12NX6	6/27/06	6060		2.8	0.42	U	0.42	2.9		0.58	77.8		0.02	0.35		0.02	2.6		0.23
Southeastern BCL stockpile	J12NX7	6/27/06	4940		2.7	0.41	U	0.42	3.2		0.58	75.0		0.02	0.33		0.02	2.1		0.23
Small BCL stockpiles	J12NX8	6/27/06	5490		2.7	0.47		0.42	3.3		0.58	75.9		0.02	0.31		0.02	2.0		0.23
Equipment blank	J12P04	6/27/06	31.9		2.7	0.41	U	0.41	0.57	U	0.57	1.0		0.02	0.02	U	0.02	0.22	U	0.22

Attachment	1	Sheet No.	4 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 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
1	J12NX9	6/27/06	0.07	U	0.07	10900		2.1	16.6		0.13	11.2		0.13	23.0		0.21	0.20	U	0.20
2	J12NY0	6/27/06	0.07	U	0.07	9500		2.1	8.5		0.12	8.3		0.13	16.3		0.21	0.50		0.20
3	J12NY1	6/27/06	0.07	U	0.07	6390		2.1	8.2		0.12	7.8		0.13	16.1		0.21	0.20	U	0.20
4	J12NY2	6/27/06	0.07	U	0.07	5580		2.1	8.4		0.12	8.3		0.13	15.6		0.21	0.23		0.20
5	J12NY3	6/27/06	0.07	U	0.07	4070		2.1	7.5		0.12	8.3		0.13	13.5		0.21	0.25		0.20
Duplicate of J12NY3	J12NY4	6/27/06	0.07	U	0.07	4220		2.1	7.2		0.12	8.0		0.13	14.0		0.21	0.20	U	0.20
6	J12NY5	6/27/06	0.19		0.07	6600		2.1	8.8		0.12	7.0		0.13	107		0.21	0.81		0.20
7	J12NY6	6/27/06	0.07	U	0.07	4140		2.1	4.6		0.12	7.6		0.13	15.0		0.21	0.20	U	0.20
8	J12NY7	6/27/06	0.07	U	0.07	5870		2.1	8.1		0.12	7.5		0.13	17.3		0.21	0.47		0.20
9	J12NY8	6/27/06	0.07	U	0.07	4910		2.1	8.8		0.12	7.6		0.13	15.5		0.21	0.38		0.20
10	J12NY9	6/27/06	0.07	U	0.07	4290		2.1	10.0		0.12	6.3		0.13	13.2		0.21	0.32		0.20
11	J12PW5	6/29/06	0.07	U	0.07	4050	C	1.6	9.6		0.12	7.2		0.13	14.3		0.12	0.20	U	0.20
12	J12PW6	6/29/06	0.43		0.07	31200	C	1.6	11.4		0.13	8.9		0.13	24.3		0.12	0.20	U	0.20
13	J12PW7	6/29/06	0.07	U	0.07	5010	C	1.6	8.7		0.12	8.5		0.13	17.9		0.11	0.20	U	0.20
14	J12PW8	6/29/06	0.07	U	0.07	3260	C	1.5	11.2		0.12	6.0		0.13	13.7		0.11	0.20	U	0.20
North BCL stockpile (north)	J12NX4	6/27/06	0.11		0.07	4120		2.1	11.6		0.12	7.8		0.13	16.0		0.21	0.28		0.20
North BCL stockpile (middle)	J12NX5	6/27/06	0.10		0.07	5490		2.1	10.3		0.12	8.2		0.13	15.7		0.21	0.26		0.20
North BCL stockpile (south)	J12NX6	6/27/06	0.13		0.07	5100		2.1	10.7		0.12	7.4		0.13	14.9		0.21	0.20	U	0.20
Southeastern BCL stockpile	J12NX7	6/27/06	0.08		0.07	5550		2.1	7.9		0.12	6.8		0.13	14.6		0.21	0.22		0.20
Small BCL stockpiles	J12NX8	6/27/06	0.1		0.07	6310		2.1	12.8		0.12	7.1		0.13	15.1		0.21	0.20	U	0.20
Equipment blank	J12P04	6/27/06	0.07	U	0.07	14.9		2.0	0.16		0.12	0.13	U	0.13	0.21	U	0.21			

Attachment	1	Sheet No.	5 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Iron			Lead			Lithium			Magnesium			Manganese			Mercury		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J12NX9	6/27/06	26900		3.4	10.0		0.30	16.1	C	0.03	8580		0.94	513		0.03	0.02	U	0.02
2	J12NY0	6/27/06	20400		3.3	8.2		0.30	6.7	C	0.03	4630		0.92	323		0.03	0.04		0.01
3	J12NY1	6/27/06	20400		3.4	5.9		0.30	6.1	C	0.03	4330		0.93	317		0.03	0.01	U	0.01
4	J12NY2	6/27/06	21100		3.3	5.2		0.29	6.3	C	0.03	4700		0.92	352		0.03	0.02	U	0.02
5	J12NY3	6/27/06	20000		3.3	4.7		0.29	5.3	C	0.03	4140		0.92	390		0.03	0.02	U	0.02
Duplicate of J12NY3	J12NY4	6/27/06	19400		3.3	4.7		0.29	5.2	C	0.03	4360		0.91	347		0.03	0.02	U	0.02
6	J12NY5	6/27/06	17400		3.3	25.3		0.30	5.4	C	0.03	4080		0.93	301		0.03	0.12		0.02
7	J12NY6	6/27/06	19900		3.3	4.1		0.29	3.4	C	0.03	3800		0.91	295		0.03	0.02	U	0.02
8	J12NY7	6/27/06	19800		3.3	9.2		0.29	5.7	C	0.03	4590		0.92	317		0.03	0.02	U	0.02
9	J12NY8	6/27/06	18900		3.3	5.7		0.29	6.4	C	0.03	4520		0.92	320		0.03	0.01	U	0.01
10	J12NY9	6/27/06	14600		3.3	5.6		0.29	6.7	C	0.03	4120		0.91	292		0.03	0.02	U	0.02
11	J12PW5	6/29/06	15900	C	0.52	4.3		0.30	6.8	C	0.03	4030		0.93	301		0.03	0.02	U	0.02
12	J12PW6	6/29/06	18700	C	0.52	9.6		0.30	10.1	C	0.03	5240		0.94	382		0.03	0.92		0.02
13	J12PW7	6/29/06	17400	C	0.52	5.4		0.30	7.0	C	0.03	4190		0.93	350		0.03	0.01	U	0.01
14	J12PW8	6/29/06	13700	C	0.51	4.4		0.29	6.3	C	0.03	3440		0.92	271		0.03	0.01	U	0.01
North BCL stockpile (north)	J12NX4	6/27/06	20200		3.3	8.0		0.29	7.7	C	0.03	4390		0.92	338		0.03	0.01	U	0.01
North BCL stockpile (middle)	J12NX5	6/27/06	20100		3.3	7.0		0.29	6.8	C	0.03	4610		0.92	340		0.03	0.01	U	0.01
North BCL stockpile (south)	J12NX6	6/27/06	18200		3.3	6.0		0.30	6.7	C	0.03	4230		0.93	336		0.03	0.02	U	0.02
Southeastern BCL stockpile	J12NX7	6/27/06	15700		3.3	7.1		0.29	5.7	C	0.03	3770		0.91	294		0.03	0.11		0.02
Small BCL stockpiles	J12NX8	6/27/06	18900		3.3	8.9		0.30	6.2	C	0.03	4100		0.92	338		0.03	0.14		0.01
Equipment blank	J12P04	6/27/06	85.1		3.3	0.29	U	0.29	0.07	C	0.03	4.9		0.91	3.2		0.03	0.02	U	0.02

Attachment	1	Sheet No.	6 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Molybdenum			Nickel			Phosphorus			Potassium			Selenium			Silicon		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J12NX9	6/27/06	0.28	U	0.28	19.2		0.23	847		0.87	2580	C	2.2	0.45	U	0.45	419		2.2
2	J12NY0	6/27/06	0.44		0.28	10.8		0.23	1010		0.86	1080	C	2.2	0.45	U	0.45	384		2.2
3	J12NY1	6/27/06	0.32		0.28	10.2		0.23	1060		0.86	1080	C	2.2	0.45	U	0.45	422		2.2
4	J12NY2	6/27/06	0.43		0.27	12.1		0.23	1050		0.85	996	C	2.1	0.45	U	0.45	464		2.1
5	J12NY3	6/27/06	0.28		0.27	10.4		0.23	867		0.85	1070	C	2.1	0.45	U	0.45	436		2.1
Duplicate of J12NY3	J12NY4	6/27/06	0.33		0.27	10.7		0.23	944		0.85	1090	C	2.1	0.44	U	0.44	360		2.1
6	J12NY5	6/27/06	0.57		0.28	10.3		0.23	982		0.86	1440	C	2.2	0.45	U	0.45	515		2.2
7	J12NY6	6/27/06	0.32		0.27	9.2		0.23	1140		0.85	635	C	2.1	0.44	U	0.44	429		2.1
8	J12NY7	6/27/06	0.30		0.27	11.9		0.23	960		0.85	946	C	2.1	0.44	U	0.44	396		2.1
9	J12NY8	6/27/06	0.28	U	0.28	11.0		0.23	874		0.85	1360	C	2.2	0.45	U	0.45	402		2.1
10	J12NY9	6/27/06	0.27	U	0.27	11.6		0.23	716		0.84	1250	C	2.1	0.44	U	0.44	597		2.1
11	J12PW5	6/29/06	0.28	U	0.28	10.9		0.23	849		0.86	1370		2.2	0.45	U	0.45	396	J	2.2
12	J12PW6	6/29/06	0.33		0.28	11.7		0.23	926		0.87	1990		2.2	0.45	U	0.45	584	J	2.2
13	J12PW7	6/29/06	0.40		0.28	10.6		0.23	932		0.86	1360		2.2	0.45	U	0.45	377	J	2.2
14	J12PW8	6/29/06	0.35		0.27	10.6		0.23	684		0.85	1450		2.1	0.44	U	0.44	473	J	2.1
North BCL stockpile (north)	J12NX4	6/27/06	0.27	U	0.27	12.5		0.23	880		0.85	1310	C	2.1	0.45	U	0.45	500		2.1
North BCL stockpile (middle)	J12NX5	6/27/06	0.27	U	0.27	11.6		0.23	967		0.85	1310	C	2.1	0.45	U	0.45	499		2.1
North BCL stockpile (south)	J12NX6	6/27/06	0.36		0.28	11.7		0.23	821		0.86	1320	C	2.2	0.45	U	0.45	531		2.2
Southeastern BCL stockpile	J12NX7	6/27/06	0.27	U	0.27	8.9		0.23	783		0.85	1020	C	2.1	0.44	U	0.44	534		2.1
Small BCL stockpiles	J12NX8	6/27/06	0.28	U	0.28	9.7		0.23	880		0.86	1030	C	2.2	0.45	U	0.45	430		2.2
Equipment blank	J12P04	6/27/06	0.27	U	0.27	0.22	U	0.22	2.8		0.84	19.9	C	2.1	0.44	U	0.44	27.2		2.1

Attachment	1	Sheet No.	7 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Silver			Sodium			Strontium			Thallium			Tin			Titanium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J12NX9	6/27/06	0.07	U	0.07	578		0.73	36.9		0.01	0.67	U	0.67	1.0	U	1.0	1530		0.03
2	J12NY0	6/27/06	0.07	U	0.07	205		0.72	37.4		0.01	0.67	U	0.67	1.0	U	1.0	1640		0.03
3	J12NY1	6/27/06	0.07	U	0.07	180		0.73	25.2		0.01	0.67	U	0.67	1.0	U	1.0	1470		0.03
4	J12NY2	6/27/06	0.07	U	0.07	215		0.72	40.5		0.009	0.66	U	0.66	1.0	U	1.0	1530		0.03
5	J12NY3	6/27/06	0.07	U	0.07	144		0.72	20.3		0.009	0.66	U	0.66	1.0	U	1.0	1590		0.03
Duplicate of J12NY3	J12NY4	6/27/06	0.07	U	0.07	153		0.72	22.5		0.009	0.66	U	0.66	1.0	U	1.0	1350		0.03
6	J12NY5	6/27/06	0.07	U	0.07	254		0.73	73.3		0.01	0.67	U	0.67	1.0	U	1.0	1250		0.03
7	J12NY6	6/27/06	0.07	U	0.07	134		0.71	18.7		0.009	0.66	U	0.66	1.0	U	1.0	1770		0.03
8	J12NY7	6/27/06	0.07	U	0.07	172		0.72	44.3		0.009	0.66	U	0.66	1.0	U	1.0	1480		0.03
9	J12NY8	6/27/06	0.07	U	0.07	145		0.72	32.7		0.009	0.66	U	0.66	1.0	U	1.0	1370		0.03
10	J12NY9	6/27/06	0.07	U	0.07	125		0.71	30.4		0.009	0.66	U	0.66	1.0	U	1.0	871		0.03
11	J12PW5	6/29/06	0.07	U	0.07	151		0.73	26.0	C	0.01	0.67	U	0.67	1.0	U	1.0	967		0.03
12	J12PW6	6/29/06	0.07	U	0.07	390		0.73	86.2	C	0.01	0.67	U	0.67	1.0	U	1.0	1170		0.03
13	J12PW7	6/29/06	0.07	U	0.07	216		0.73	33.4	C	0.01	0.67	U	0.67	1.0	U	1.0	1100		0.03
14	J12PW8	6/29/06	0.07	U	0.07	159		0.72	25.7	C	0.009	0.66	U	0.66	1.0	U	1.0	697		0.03
North BCL stockpile (north)	J12NX4	6/27/06	0.07	U	0.07	138		0.72	27.6		0.009	0.66	U	0.66	1.0	U	1.0	1330		0.03
North BCL stockpile (middle)	J12NX5	6/27/06	0.07	U	0.07	150		0.72	30.1		0.009	0.66	U	0.66	1.0	U	1.0	1330		0.03
North BCL stockpile (south)	J12NX6	6/27/06	0.07	U	0.07	154		0.73	28.5		0.01	0.67	U	0.67	1.0	U	1.0	1190		0.03
Southeastern BCL stockpile	J12NX7	6/27/06	0.07	U	0.07	134		0.72	31.0		0.009	0.66	U	0.66	1.0	U	1.0	1020		0.03
Small BCL stockpiles	J12NX8	6/27/06	0.07	U	0.07	157		0.72	28.9		0.01	0.67	U	0.67	1.0	U	1.0	1330		0.03
Equipment blank	J12P04	6/27/06	0.07	U	0.07	7.5		0.71	0.19		0.009	0.66	U	0.66	1.0	U	1.0	1.4		0.03

Attachment	1	Sheet No.	8 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Sample Location	Sample Number	Sample Date	Uranium			Vanadium			Zinc			Zirconium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1	J12NX9	6/27/06	0.85	U	0.85	53.0		0.09	63.6		0.15	22.8		1.0
2	J12NY0	6/27/06	0.84	U	0.84	48.1		0.09	46.3		0.15	19.2		1.0
3	J12NY1	6/27/06	0.84	U	0.84	46.4		0.09	41.7		0.15	18.8		1.0
4	J12NY2	6/27/06	0.83	U	0.83	48.4		0.09	44.1		0.15	19.6		1.0
5	J12NY3	6/27/06	0.83	U	0.83	46.8		0.09	39.5		0.15	22.5		1.0
Duplicate of J12NY3	J12NY4	6/27/06	0.83	U	0.83	40.6		0.08	38.5		0.15	21.9		1.0
6	J12NY5	6/27/06	0.84	U	0.84	39.5		0.09	70.6		0.15	17.0		1.0
7	J12NY6	6/27/06	0.83	U	0.83	46.0		0.08	36.2		0.15	22.7		1.0
8	J12NY7	6/27/06	0.83	U	0.83	49.9		0.09	43.5		0.15	16.8		1.0
9	J12NY8	6/27/06	0.84	U	0.83	43.7		0.09	43.4		0.15	19.0		1.0
10	J12NY9	6/27/06	0.83	U	0.83	31.0		0.08	39.6		0.15	11.4		0.99
11	J12PW5	6/29/06	0.84	U	0.84	36.7		0.09	37.2		0.15	18.0		1.0
12	J12PW6	6/29/06	0.85	U	0.85	41.4		0.09	67.0		0.15	22.0		1.0
13	J12PW7	6/29/06	0.84	U	0.84	39.8		0.09	40.2		0.15	22.2		1.0
14	J12PW8	6/29/06	0.83	U	0.83	32.3		0.09	37.2		0.15	11.8		1.0
North BCL stockpile (north)	J12NX4	6/27/06	0.83	U	0.83	46.6		0.09	45.5		0.15	16.7		1.0
North BCL stockpile (middle)	J12NX5	6/27/06	0.83	U	0.83	44.7		0.09	44.2		0.15	19.0		1.0
North BCL stockpile (south)	J12NX6	6/27/06	0.84	U	0.84	42.9		0.09	40.1		0.15	17.0		1.0
Southeastern BCL stockpile	J12NX7	6/27/06	0.83	U	0.83	32.3		0.08	35.9		0.15	14.7		1.0
Small BCL stockpiles	J12NX8	6/27/06	0.84	U	0.84	44.2		0.09	49.6		0.15	16.2		1.0
Equipment blank	J12P04	6/27/06	0.82	U	0.82	0.08	U	0.08	0.70		0.15	0.99	U	0.99

Attachment	1	Sheet No.	9 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Constituents	J12NX9 Location 1 Sample Date 6/27/06			J12NY0 Location 2 Sample Date 6/27/06			J12NY1 Location 3 Sample Date 6/27/06			J12NY2 Location 4 Sample Date 6/27/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	13	U	13	13	U	13	13	U	13
Aroclor-1221	14	U	14	13	U	13	13	U	13	13	U	13
Aroclor-1232	14	U	14	13	U	13	13	U	13	13	U	13
Aroclor-1242	14	U	14	13	U	13	13	U	13	13	U	13
Aroclor-1248	14	U	14	13	U	13	13	U	13	13	U	13
Aroclor-1254	14	U	14	13	U	13	13	U	13	13	U	13
Aroclor-1260	14	U	14	13	U	13	13	U	13	13	U	13
Pesticides												
Aldrin	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
alpha-BHC	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
alpha-Chlordane	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
beta-BHC	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
delta-BHC	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dichlorodiphenyldichloroethane	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dichlorodiphenyldichloroethylene	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dichlorodiphenyltrichloroethane	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dieldrin	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endosulfan I	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endosulfan II	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endosulfan sulfate	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endrin	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endrin aldehyde	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endrin ketone	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
gamma-BHC (Lindane)	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
gamma-Chlordane	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Heptachlor	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Heptachlor epoxide	1.4	UD	1.4	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Methoxychlor	1.2	JID	1.4	1.6	JID	1.3	1.3	UD	1.3	1.3	UD	1.3
Toxaphene	14	UD	14	13	UD	13	13	UD	13	13	UD	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	340	U	340	340	U	340	340	U	340	330	U	330
1,2-Dichlorobenzene	340	U	340	340	U	340	340	U	340	330	U	330
1,3-Dichlorobenzene	340	U	340	340	U	340	340	U	340	330	U	330
1,4-Dichlorobenzene	340	U	340	340	U	340	340	U	340	330	U	330
2,4,5-Trichlorophenol	850	U	850	840	U	840	840	U	840	840	U	840
2,4,6-Trichlorophenol	340	U	340	340	U	340	340	U	340	330	U	330
2,4-Dichlorophenol	340	U	340	340	U	340	340	U	340	330	U	330
2,4-Dimethylphenol	340	U	340	340	U	340	340	U	340	330	U	330
2,4-Dinitrophenol	850	U	850	840	U	840	840	U	840	840	U	840
2,4-Dinitrotoluene	340	U	340	340	U	340	340	U	340	330	U	330
2,6-Dinitrotoluene	340	U	340	340	U	340	340	U	340	330	U	330
2-Chloronaphthalene	340	U	340	340	U	340	340	U	340	330	U	330
2-Chlorophenol	340	U	340	340	U	340	340	U	340	330	U	330
2-Methylnaphthalene	340	U	340	340	U	340	340	U	340	330	U	330
2-Methylphenol (cresol, o-)	340	U	340	340	U	340	340	U	340	330	U	330
2-Nitroaniline	850	U	850	840	U	840	840	U	840	840	U	840
2-Nitrophenol	340	U	340	340	U	340	340	U	340	330	U	330

Attachment	1	Sheet No.	10 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Constituents	J12NX9 Location 1 Sample Date 6/27/06			J12NY0 Location 2 Sample Date 6/27/06			J12NY1 Location 3 Sample Date 6/27/06			J12NY2 Location 4 Sample Date 6/27/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	340	U	340	340	U	340	340	U	340	330	U	330
3-Nitroaniline	850	U	850	840	U	840	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	850	U	850	840	U	840	840	U	840	840	U	840
4-Bromophenyl-phenylether	340	U	340	340	U	340	340	U	340	330	U	330
4-Chloro-3-methylphenol	340	U	340	340	U	340	340	U	340	330	U	330
4-Chloroaniline	340	U	340	340	U	340	340	U	340	330	U	330
4-Chlorophenyl-phenylether	340	U	340	340	U	340	340	U	340	330	U	330
4-Methylphenol (p-cresol)	340	U	340	340	U	340	340	U	340	330	U	330
4-Nitroaniline	850	U	850	840	U	840	840	U	840	840	U	840
4-Nitrophenol	850	U	850	840	U	840	840	U	840	840	U	840
Acenaphthene	340	U	340	340	U	340	340	U	340	330	U	330
Acenaphthylene	340	U	340	340	U	340	340	U	340	330	U	330
Anthracene	340	U	340	340	U	340	340	U	340	330	U	330
Benzo(a)anthracene	340	U	340	340	U	340	22	J	340	330	U	330
Benzo(a)pyrene	340	U	340	18	J	340	340	U	340	330	U	330
Benzo(b)fluoranthene	340	U	340	340	U	340	340	U	340	330	U	330
Benzo(g,h,i)perylene	340	U	340	23	J	340	21	J	340	330	U	330
Benzo(k)fluoranthene	340	U	340	340	U	340	20	J	340	330	U	330
bis(2-Chloro-1-methylethyl)ether	340	U	340	340	U	340	340	U	340	330	U	330
bis(2-Chloroethoxy)methane	340	U	340	340	U	340	340	U	340	330	U	330
bis(2-Chloroethyl)ether	340	U	340	340	U	340	340	U	340	330	U	330
bis(2-Ethylhexyl)phthalate	970	B	340	83	JB	340	76	JB	340	61	JB	330
Butylbenzylphthalate	340	U	340	340	U	340	340	U	340	330	U	330
Carbazole	340	U	340	340	U	340	340	U	340	330	U	330
Chrysene	340	U	340	340	U	340	27	J	340	330	U	330
Di-n-butylphthalate	19	JB	340	23	JB	340	34	JB	340	31	JB	330
Di-n-octylphthalate	340	U	340	340	U	340	340	U	340	330	U	330
Dibenz(a,h)anthracene	340	U	340	340	U	340	22	J	340	330	U	330
Dibenzofuran	340	U	340	340	U	340	340	U	340	330	U	330
Diethylphthalate	340	U	340	340	U	340	340	U	340	330	U	330
Dimethylphthalate	340	U	340	340	U	340	340	U	340	330	U	330
Fluoranthene	340	U	340	340	U	340	30	J	340	330	U	330
Fluorene	340	U	340	340	U	340	340	U	340	330	U	330
Hexachlorobenzene	340	U	340	340	U	340	340	U	340	330	U	330
Hexachlorobutadiene	340	U	340	340	U	340	340	U	340	330	U	330
Hexachlorocyclopentadiene	340	U	340	340	U	340	340	U	340	330	U	330
Hexachloroethane	340	U	340	340	U	340	340	U	340	330	U	330
Indeno(1,2,3-cd)pyrene	340	U	340	20	J	340	19	J	340	330	U	330
Isophorone	340	U	340	340	U	340	340	U	340	330	U	330
N-Nitroso-di-n-dipropylamine	340	U	340	340	U	340	340	U	340	330	U	330
N-Nitrosodiphenylamine	340	U	340	340	U	340	340	U	340	330	U	330
Naphthalene	340	U	340	340	U	340	340	U	340	330	U	330
Nitrobenzene	340	U	340	340	U	340	340	U	340	330	U	330
Pentachlorophenol	850	U	850	840	U	840	840	U	840	840	U	840
Phenanthrene	340	U	340	340	U	340	29	J	340	330	U	330
Phenol	340	U	340	340	U	340	340	U	340	330	U	330
Pyrene	340	U	340	340	U	340	55	J	340	330	U	330

Attachment	1	Sheet No.	11 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Constituents	J12NY3 Location 5 Sample Date 6/27/06			J12NY4 Duplicate of J12NY3 Sample Date 6/27/06			J12NY5 Location 6 Sample Date 6/27/06			J12NY6 Location 7 Sample Date 6/27/06		
	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	330		13	13	U	13
Aroclor-1260	13	U	13	13	U	13	13	U	13	13	U	13
Pesticides												
Aldrin	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
alpha-BHC	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
alpha-Chlordane	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
beta-BHC	1.3	UD	1.3	1.3	UD	1.3	1.9	D	1.3	1.3	UD	1.3
delta-BHC	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dichlorodiphenyldichloroethane	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dichlorodiphenyldichloroethylene	1.3	UD	1.3	1.3	UD	1.3	18	D	1.3	1.3	UD	1.3
Dichlorodiphenyltrichloroethane	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dieldrin	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endosulfan I	1.3	UD	1.3	1.3	UD	1.3	6.9	D	1.3	1.3	UD	1.3
Endosulfan II	1.3	UD	1.3	1.3	UD	1.3	3.4	ID	1.3	1.3	UD	1.3
Endosulfan sulfate	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endrin	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endrin aldehyde	1.3	UD	1.3	1.3	UD	1.3	7.4	D	1.3	1.3	UD	1.3
Endrin ketone	1.3	UD	1.3	1.3	UD	1.3	1.1	JID	1.3	1.3	UD	1.3
gamma-BHC (Lindane)	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
gamma-Chlordane	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Heptachlor	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Heptachlor epoxide	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Methoxychlor	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Toxaphene	13	UD	13	13	UD	13	13	UD	13	13	UD	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	U	330	340	U	340	340	U	340	340	U	340
1,2-Dichlorobenzene	330	U	330	340	U	340	340	U	340	340	U	340
1,3-Dichlorobenzene	330	U	330	340	U	340	340	U	340	340	U	340
1,4-Dichlorobenzene	330	U	330	340	U	340	340	U	340	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	340	U	340	340	U	340	340	U	340
2,4-Dichlorophenol	330	U	330	340	U	340	340	U	340	340	U	340
2,4-Dimethylphenol	330	U	330	340	U	340	340	U	340	340	U	340
2,4-Dinitrophenol	840	U	840	840	U	840	840	U	840	840	U	840
2,4-Dinitrotoluene	330	U	330	340	U	340	340	U	340	340	U	340
2,6-Dinitrotoluene	330	U	330	340	U	340	340	U	340	340	U	340
2-Chloronaphthalene	330	U	330	340	U	340	340	U	340	340	U	340
2-Chlorophenol	330	U	330	340	U	340	340	U	340	340	U	340
2-Methylnaphthalene	330	U	330	340	U	340	19	J	340	340	U	340
2-Methylphenol (cresol, o-)	330	U	330	340	U	340	340	U	340	340	U	340
2-Nitroaniline	840	U	840	840	U	840	840	U	840	840	U	840
2-Nitrophenol	330	U	330	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	12 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Constituents	J12NY3 Location 5 Sample Date 6/27/06			J12NY4 Duplicate of J12NY3 Sample Date 6/27/06			J12NY5 Location 6 Sample Date 6/27/06			J12NY6 Location 7 Sample Date 6/27/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	330	U	330	340	U	340	340	U	340	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	340	U	340	340	U	340	340	U	340
4-Chloro-3-methylphenol	330	U	330	340	U	340	340	U	340	340	U	340
4-Chloroaniline	330	U	330	340	U	340	340	U	340	340	U	340
4-Chlorophenyl-phenylether	330	U	330	340	U	340	340	U	340	340	U	340
4-Methylphenol (p-cresol)	330	U	330	340	U	340	340	U	340	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	340	U	340	340	U	340	340	U	340
Acenaphthylene	330	U	330	340	U	340	340	U	340	340	U	340
Anthracene	330	U	330	340	U	340	340	U	340	340	U	340
Benzo(a)anthracene	330	U	330	340	U	340	41	J	340	340	U	340
Benzo(a)pyrene	330	U	330	340	U	340	33	J	340	340	U	340
Benzo(b)fluoranthene	330	U	330	340	U	340	41	J	340	340	U	340
Benzo(g,h,i)perylene	330	U	330	340	U	340	30	J	340	340	U	340
Benzo(k)fluoranthene	330	U	330	340	U	340	35	J	340	340	U	340
bis(2-Chloro-1-methylethyl)ether	330	U	330	340	U	340	340	U	340	340	U	340
bis(2-Chloroethoxy)methane	330	U	330	340	U	340	340	U	340	340	U	340
bis(2-Chloroethyl)ether	330	U	330	340	U	340	340	U	340	340	U	340
bis(2-Ethylhexyl)phthalate	20	JB	330	38	JB	340	230	JB	340	71	JB	340
Butylbenzylphthalate	330	U	330	340	U	340	340	U	340	340	U	340
Carbazole	330	U	330	340	U	340	340	U	340	340	U	340
Chrysene	330	U	330	340	U	340	64	J	340	340	U	340
Di-n-butylphthalate	24	JB	330	24	JB	340	45	JB	340	23	JB	340
Di-n-octylphthalate	330	U	330	340	U	340	340	U	340	340	U	340
Dibenz(a,h)anthracene	330	U	330	340	U	340	340	U	340	340	U	340
Dibenzofuran	330	U	330	340	U	340	340	U	340	340	U	340
Diethylphthalate	330	U	330	340	U	340	340	U	340	340	U	340
Dimethylphthalate	330	U	330	340	U	340	340	U	340	340	U	340
Fluoranthene	330	U	330	340	U	340	79	J	340	340	U	340
Fluorene	330	U	330	340	U	340	340	U	340	340	U	340
Hexachlorobenzene	330	U	330	340	U	340	340	U	340	340	U	340
Hexachlorobutadiene	330	U	330	340	U	340	340	U	340	340	U	340
Hexachlorocyclopentadiene	330	U	330	340	U	340	340	U	340	340	U	340
Hexachloroethane	330	U	330	340	U	340	340	U	340	340	U	340
Indeno(1,2,3-cd)pyrene	330	U	330	340	U	340	28	J	340	340	U	340
Isophorone	330	U	330	340	U	340	340	U	340	340	U	340
N-Nitroso-di-n-dipropylamine	330	U	330	340	U	340	340	U	340	340	U	340
N-Nitrosodiphenylamine	330	U	330	340	U	340	340	U	340	340	U	340
Naphthalene	330	U	330	340	U	340	17	J	340	340	U	340
Nitrobenzene	330	U	330	340	U	340	340	U	340	340	U	340
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	330	U	330	340	U	340	46	J	340	340	U	340
Phenol	330	U	330	340	U	340	17	J	340	340	U	340
Pyrene	330	U	330	340	U	340	66	J	340	340	U	340

Attachment	1	Sheet No.	13 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Constituents	J12NY7 Location 8 Sample Date 6/27/06			J12NY8 Location 9 Sample Date 6/27/06			J12NY9 Location 10 Sample Date 6/27/06			J12PW5 Location 11 Sample Date 6/29/06		
	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	38		13	13	U	13	4.4		13	13	U	13
Aroclor-1260	6.7	J	13	13	U	13	13	U	13	13	U	13
Pesticides												
Aldrin	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
alpha-BHC	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
alpha-Chlordane	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
beta-BHC	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
delta-BHC	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dichlorodiphenyldichloroethane	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dichlorodiphenyldichloroethylene	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dichlorodiphenyltrichloroethane	17	D	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dieldrin	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endosulfan I	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endosulfan II	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endosulfan sulfate	1.3	UD	1.3	1.3	UD	1.3	0.50	JD	1.3	1.3	UD	1.3
Endrin	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endrin aldehyde	1.3	UD	1.3	1.3	UD	1.3	0.77	JID	1.3	1.3	UD	1.3
Endrin ketone	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
gamma-BHC (Lindane)	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
gamma-Chlordane	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Heptachlor	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Heptachlor epoxide	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Methoxychlor	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Toxaphene	13	UD	13	13	UD	13	13	UD	13	13	UDJ	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	U	330	340	U	340	330	U	330	340	U	340
1,2-Dichlorobenzene	330	U	330	340	U	340	330	U	330	340	U	340
1,3-Dichlorobenzene	330	U	330	340	U	340	330	U	330	340	U	340
1,4-Dichlorobenzene	330	U	330	340	U	340	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	340	U	340	330	U	330	340	U	340
2,4-Dichlorophenol	330	U	330	340	U	340	330	U	330	340	U	340
2,4-Dimethylphenol	330	U	330	340	U	340	330	U	330	340	U	340
2,4-Dinitrophenol	840	U	840	840	U	840	840	U	840	840	UJ	840
2,4-Dinitrotoluene	330	U	330	340	U	340	330	U	330	340	U	340
2,6-Dinitrotoluene	330	U	330	340	U	340	330	U	330	340	U	340
2-Chloronaphthalene	330	U	330	340	U	340	330	U	330	340	U	340
2-Chlorophenol	330	U	330	340	U	340	330	U	330	340	U	340
2-Methylnaphthalene	330	U	330	340	U	340	330	U	330	340	U	340
2-Methylphenol (cresol, o-)	330	U	330	340	U	340	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	340	U	340	330	U	330	340	U	340

Attachment	1	Sheet No.	14 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Constituents	J12NY7 Location 8 Sample Date 6/27/06			J12NY8 Location 9 Sample Date 6/27/06			J12NY9 Location 10 Sample Date 6/27/06			J12PW5 Location 11 Sample Date 6/29/06		
	μg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL	μg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	330	U	330	340	U	340	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	340	U	340	330	U	330	340	U	340
4-Chloro-3-methylphenol	330	U	330	340	U	340	330	U	330	340	U	340
4-Chloroaniline	330	U	330	340	U	340	330	U	330	340	U	340
4-Chlorophenyl-phenylether	330	U	330	340	U	340	330	U	330	340	U	340
4-Methylphenol (p-cresol)	330	U	330	340	U	340	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	340	U	340	330	U	330	340	U	340
Acenaphthylene	330	U	330	340	U	340	330	U	330	340	U	340
Anthracene	330	U	330	340	U	340	330	U	330	340	U	340
Benzo(a)anthracene	330	U	330	340	U	340	330	U	330	340	U	340
Benzo(a)pyrene	330	U	330	340	U	340	330	U	330	340	U	340
Benzo(b)fluoranthene	330	U	330	340	U	340	330	U	330	340	U	340
Benzo(g,h,i)perylene	330	U	330	340	U	340	330	U	330	340	U	340
Benzo(k)fluoranthene	330	U	330	340	U	340	330	U	330	340	U	340
bis(2-Chloro-1-methylethyl)ether	330	U	330	340	U	340	330	U	330	340	U	340
bis(2-Chloroethoxy)methane	330	U	330	340	U	340	330	U	330	340	U	340
bis(2-Chloroethyl)ether	330	U	330	340	U	340	330	U	330	340	U	340
bis(2-Ethylhexyl)phthalate	32	JB	330	450	B	340	3200	BD	330	660	U	660
Butylbenzylphthalate	330	U	330	340	U	340	330	U	330	340	U	340
Carbazole	330	U	330	340	U	340	330	U	330	340	U	340
Chrysene	330	U	330	340	U	340	330	U	330	340	U	340
Di-n-butylphthalate	48	JB	330	340	U	340	22	JB	330	19	J	340
Di-n-octylphthalate	330	U	330	340	U	340	330	U	330	340	U	340
Dibenz(a,h)anthracene	330	U	330	340	U	340	330	U	330	340	U	340
Dibenzofuran	330	U	330	340	U	340	330	U	330	340	U	340
Diethylphthalate	330	U	330	340	U	340	330	U	330	340	U	340
Dimethylphthalate	330	U	330	340	U	340	330	U	330	340	U	340
Fluoranthene	330	U	330	340	U	340	330	U	330	340	U	340
Fluorene	330	U	330	340	U	340	330	U	330	340	U	340
Hexachlorobenzene	330	U	330	340	U	340	330	U	330	340	U	340
Hexachlorobutadiene	330	U	330	340	U	340	330	U	330	340	U	340
Hexachlorocyclopentadiene	330	U	330	340	U	340	330	U	330	340	U	340
Hexachloroethane	330	U	330	340	U	340	330	U	330	340	U	340
Indeno(1,2,3-cd)pyrene	330	U	330	340	U	340	330	U	330	340	U	340
Isophorone	330	U	330	340	U	340	330	U	330	340	U	340
N-Nitroso-di-n-dipropylamine	330	U	330	340	U	340	330	U	330	340	U	340
N-Nitrosodiphenylamine	330	U	330	340	U	340	330	U	330	340	U	340
Naphthalene	330	U	330	340	U	340	330	U	330	340	U	340
Nitrobenzene	330	U	330	340	U	340	330	U	330	340	U	340
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	330	U	330	340	U	340	330	U	330	340	U	340
Phenol	330	U	330	340	U	340	330	U	330	340	U	340
Pyrene	330	U	330	340	U	340	330	U	330	340	U	340

Attachment	1	Sheet No.	15 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Constituents	J12PW6 Location 12 Sample Date 6/29/06			J12PW7 Location 13 Sample Date 6/29/06			J12PW8 Location 14 Sample Date 6/29/06			J12NX4 North BCL (North) Sample Date 6/27/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	13	U	13	13	U	13	13	U	13
Aroclor-1221	14	U	14	13	U	13	13	U	13	13	U	13
Aroclor-1232	14	U	14	13	U	13	13	U	13	13	U	13
Aroclor-1242	14	U	14	13	U	13	13	U	13	13	U	13
Aroclor-1248	14	U	14	13	U	13	13	U	13	13	U	13
Aroclor-1254	14	U	14	13	U	13	13	U	13	13	U	13
Aroclor-1260	14	U	14	13	U	13	13	U	13	13	U	13
Pesticides												
Aldrin	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
alpha-BHC	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
alpha-Chlordane	1.3	UD	1.3	1.3	UD	1.3	0.87	JID	1.3	1.3	UD	1.3
beta-BHC	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
delta-BHC	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dichlorodiphenyldichloroethane	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dichlorodiphenyldichloroethylene	2.2	D	1.3	1.3	UD	1.3	1.3	UD	1.3	0.44	J	1.3
Dichlorodiphenyltrichloroethane	1.3	UD	1.3	1.3	UD	1.3	11	D	1.3	1.3	UD	1.3
Dieldrin	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endosulfan I	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endosulfan II	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endosulfan sulfate	0.40	JD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endrin	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endrin aldehyde	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endrin ketone	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
gamma-BHC (Lindane)	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
gamma-Chlordane	1.3	UD	1.3	1.3	UD	1.3	0.43	JID	1.3	1.3	UD	1.3
Heptachlor	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Heptachlor epoxide	1.3	UD	1.3	0.33	JID	1.3	0.60	JD	1.3	1.3	UD	1.3
Methoxychlor	1.3	UD	1.3	1.3	UD	1.3	15	ID	1.3	1.3	UD	1.3
Toxaphene	13	UDJ	13	13	UDJ	13	13	UDJ	13	13	UD	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	850	U	850	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	U	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	850	U	850	840	U	840	840	U	840	840	U	840
2-Nitrophenol	340	U	340	330	U	330	330	U	330	330	U	330

Attachment	1	Sheet No.	16 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Constituents	J12PW6 Location 12 Sample Date 6/29/06			J12PW7 Location 13 Sample Date 6/29/06			J12PW8 Location 14 Sample Date 6/29/06			J12NX4 North BCL (North) Sample Date 6/27/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	340	U	340	330	U	330	330	U	330	330	U	330
3-Nitroaniline	850	U	850	840	U	840	840	U	840	840	U	840
4,6-Dinitro-2-methylphenol	850	U	850	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	850	U	850	840	U	840	840	U	840	840	U	840
4-Nitrophenol	850	U	850	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	330	U	330
Benzo(a)pyrene	340	U	340	330	U	330	330	U	330	330	U	330
Benzo(b)fluoranthene	340	U	340	330	U	330	330	U	330	330	U	330
Benzo(g,h,i)perylene	340	U	340	330	U	330	21	J	330	330	U	330
Benzo(k)fluoranthene	340	U	340	330	U	330	330	U	330	330	U	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	660	U	660	660	U	660	660	U	660	1100	B	330
Butylbenzylphthalate	340	U	340	330	U	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	330	U	330
Di-n-butylphthalate	340	U	340	29	J	330	24	J	330	80	JB	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	18	J	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	18	J	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	U	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	19	J	330	330	U	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	850	U	850	840	U	840	840	U	840	840	U	840
Phenanthrene	340	U	340	330	U	330	330	U	330	330	U	330
Phenol	340	U	340	330	U	330	330	U	330	27	J	330
Pyrene	340	U	340	330	U	330	330	U	330	330	U	330

Attachment	1	Sheet No.	17 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Constituents	J12NX5 North BCL (Middle) Sample Date 6/27/06			J12NX6 North BCL (South) Sample Date 6/27/06			J12NX7 Southeastern BCL Sample Date 6/27/06			J12NX8 Small BCL Piles Sample Date 6/27/06		
	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	6.2		13	13	U	13	13	U	13	13	U	13
Aroclor-1260	13	U	13	13	U	13	13	U	13	11		13
Pesticides												
Aldrin	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
alpha-BHC	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
alpha-Chlordane	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
beta-BHC	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
delta-BHC	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dichlorodiphenyldichloroethane	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dichlorodiphenyldichloroethylene	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Dichlorodiphenyltrichloroethane	1.3	UD	1.3	1.3	UD	1.3	16	D	1.3	1.3	UD	1.3
Dieldrin	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endosulfan I	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endosulfan II	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endosulfan sulfate	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endrin	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Endrin aldehyde	1.3	UD	1.3	2.2	ID	1.3	1.3	UD	1.3	1.3	UD	1.3
Endrin ketone	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
gamma-BHC (Lindane)	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
gamma-Chlordane	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Heptachlor	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Heptachlor epoxide	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Methoxychlor	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3	1.3	UD	1.3
Toxaphene	13	UD	13	13	UD	13	13	UD	13	13	UD	13
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	330	U	330	330	U	330	340	U	340	340	U	340
1,2-Dichlorobenzene	330	U	330	330	U	330	340	U	340	340	U	340
1,3-Dichlorobenzene	330	U	330	330	U	330	340	U	340	340	U	340
1,4-Dichlorobenzene	330	U	330	330	U	330	340	U	340	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	340	U	340	340	U	340
2,4-Dichlorophenol	330	U	330	330	U	330	340	U	340	340	U	340
2,4-Dimethylphenol	330	U	330	330	U	330	340	U	340	340	U	340
2,4-Dinitrophenol	840	U	840	840	U	840	840	U	840	840	U	840
2,4-Dinitrotoluene	330	U	330	330	U	330	340	U	340	340	U	340
2,6-Dinitrotoluene	330	U	330	330	U	330	340	U	340	340	U	340
2-Chloronaphthalene	330	U	330	330	U	330	340	U	340	340	U	340
2-Chlorophenol	330	U	330	330	U	330	340	U	340	340	U	340
2-Methylnaphthalene	330	U	330	330	U	330	340	U	340	340	U	340
2-Methylphenol (cresol, o-)	330	U	330	330	U	330	340	U	340	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	340	U	340	340	U	340

Attachment	1	Sheet No.	18 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Constituents	J12NX5 North BCL (Middle) Sample Date 6/27/06			J12NX6 North BCL (South) Sample Date 6/27/06			J12NX7 Southeastern BCL Sample Date 6/27/06			J12NX8 Small BCL Piles Sample Date 6/27/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
3,3'-Dichlorobenzidine	330	U	330	330	U	330	340	U	340	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	340	U	340	340	U	340
4-Chloro-3-methylphenol	330	U	330	330	U	330	340	U	340	340	U	340
4-Chloroaniline	330	U	330	330	U	330	340	U	340	340	U	340
4-Chlorophenyl-phenylether	330	U	330	330	U	330	340	U	340	340	U	340
4-Methylphenol (p-cresol)	330	U	330	330	U	330	340	U	340	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	340	U	340	340	U	340
Acenaphthylene	330	U	330	330	U	330	340	U	340	340	U	340
Anthracene	330	U	330	330	U	330	340	U	340	340	U	340
Benzo(a)anthracene	330	U	330	330	U	330	340	U	340	340	U	340
Benzo(a)pyrene	330	U	330	330	U	330	340	U	340	340	U	340
Benzo(b)fluoranthene	18	J	330	330	U	330	340	U	340	340	U	340
Benzo(g,h,i)perylene	330	U	330	330	U	330	340	U	340	340	U	340
Benzo(k)fluoranthene	330	U	330	330	U	330	340	U	340	340	U	340
bis(2-Chloro-1-methylethyl)ether	330	U	330	330	U	330	340	U	340	340	U	340
bis(2-Chloroethoxy)methane	330	U	330	330	U	330	340	U	340	340	U	340
bis(2-Chloroethyl)ether	330	U	330	330	U	330	340	U	340	340	U	340
bis(2-Ethylhexyl)phthalate	26	JB	330	25	JB	330	540	B	340	160	JB	340
Butylbenzylphthalate	330	U	330	330	U	330	340	U	340	340	U	340
Carbazole	330	U	330	330	U	330	340	U	340	340	U	340
Chrysene	330	U	330	330	U	330	340	U	340	340	U	340
Di-n-butylphthalate	23	JB	330	330	U	330	23	JB	340	36	JB	340
Di-n-octylphthalate	330	U	330	330	U	330	340	U	340	340	U	340
Dibenz(a,h)anthracene	330	U	330	330	U	330	340	U	340	340	U	340
Dibenzofuran	330	U	330	330	U	330	340	U	340	340	U	340
Diethylphthalate	330	U	330	330	U	330	340	U	340	340	U	340
Dimethylphthalate	330	U	330	330	U	330	340	U	340	340	U	340
Fluoranthene	32	J	330	330	U	330	340	U	340	340	U	340
Fluorene	330	U	330	330	U	330	340	U	340	340	U	340
Hexachlorobenzene	330	U	330	330	U	330	340	U	340	340	U	340
Hexachlorobutadiene	330	U	330	330	U	330	340	U	340	340	U	340
Hexachlorocyclopentadiene	330	U	330	330	U	330	340	U	340	340	U	340
Hexachloroethane	330	U	330	330	U	330	340	U	340	340	U	340
Indeno(1,2,3-cd)pyrene	330	U	330	330	U	330	340	U	340	340	U	340
Isophorone	330	U	330	330	U	330	340	U	340	340	U	340
N-Nitroso-di-n-dipropylamine	330	U	330	330	U	330	340	U	340	340	U	340
N-Nitrosodiphenylamine	330	U	330	330	U	330	340	U	340	340	U	340
Naphthalene	330	U	330	330	U	330	340	U	340	340	U	340
Nitrobenzene	330	U	330	330	U	330	340	U	340	340	U	340
Pentachlorophenol	840	U	840	840	U	840	840	U	840	840	U	840
Phenanthrene	330	U	330	330	U	330	340	U	340	340	U	340
Phenol	330	U	330	330	U	330	340	U	340	340	U	340
Pyrene	26	J	330	330	U	330	17	J	340	340	U	340

Attachment	1	Sheet No.	19 of 20
Originator	J. M. Capron	Date	09/14/06
Checked	T. M. Blakley	Date	
Calc. No.	0100B-CA-V0292	Rev. No.	0

Attachment 1. 1607-B2:2 Verification Sampling Results.

Constituents	J12P04 Equipment Blank Sample Date 6/27/06		
	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	830	U	830
2,4,6-Trichlorophenol	330	U	330
2,4-Dichlorophenol	330	U	330
2,4-Dimethylphenol	330	U	330
2,4-Dinitrophenol	830	U	830
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	830	U	830
2-Nitrophenol	330	U	330
3,3'-Dichlorobenzidine	330	U	330
3-Nitroaniline	830	U	830
4,6-Dinitro-2-methylphenol	830	U	830
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	830	U	830
4-Nitrophenol	830	U	830
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	4400	BD	330
Butylbenzylphthalate	330	U	330
Carbazole	330	U	330
Chrysene	330	U	330
Di-n-butylphthalate	45	JB	330

Constituents	J12P04 Equipment Blank Sample Date 6/27/06		
	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)			
Di-n-octylphthalate	330	U	330
Dibenz(a,h)anthracene	330	U	330
Dibenzofuran	330	U	330
Diethylphthalate	330	U	330
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	830	U	830
Phenanthrene	330	U	330
Phenol	330	U	330
Pyrene	330	U	330

Attachment 1
Originator J. M. Capron
Checked T. M. Blakley
Calc. No. 0100B-CA-V0292

Sheet No. 20 of 20
Date 09/14/06
Date
Rev. No. 0

CALCULATION COVER SHEET

Project Title 100-B/C Remaining Pipes and Sewers Field Remediation **Job No.** 14655
Area 100-B/C
Discipline Environmental ***Calc. No.** 0100B-CA-V0293
Subject 1607-B2:2 Waste Site 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 = 3 Total = 4	J. M. Capron JMC 9/18/06	T. M. Blakley T.M. Blakley 9/19/06	L. M. Dittmer LM Dittmer 9/19/06	D. N. Strom DN Strom	9-19-06

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	Date:	09/18/06	Calc. No.:	0100B-CA-V0293	Rev.:	0
Project:	100-B/C RPAS Field Remediation	Job No:	14655	Checked:	T. M. Blakley	Date:	9/19/06
Subject:	1607-B2:2 Waste Site Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 1 of 3	

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and excess carcinogenic risk values for the 1607-B2:2 remediation verification sampling results. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2005), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess carcinogenic risk of $<1 \times 10^{-6}$ for individual carcinogens
4) A cumulative excess carcinogenic risk of $<1 \times 10^{-5}$ for carcinogens.

GIVEN/REFERENCES:

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

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

3) WCH, 2006, *1607-B2:2 Waste Site Cleanup Verification 95% UCL Calculations*, Calculation No. 0100B-CA-V0292, Washington Closure Hanford, Richland, Washington.

SOLUTION:

1) Calculate an HQ for each noncarcinogenic constituent detected above background and compare to the individual HQ of <1.0 (DOE-RL 2005).

2) Sum the HQs and compare to the cumulative HQ criterion of <1.0.

3) Calculate an excess carcinogenic risk value for each carcinogenic constituent detected above background and compare to the individual excess carcinogenic risk criterion of $<1 \times 10^{-6}$ (DOE-RL 2005).

4) Sum the excess carcinogenic risk values and compare to the cumulative excess carcinogenic risk criterion of $<1 \times 10^{-5}$.

METHODOLOGY:

Hazard quotient and carcinogenic risk calculations were performed for the 1607-B2:2 subsite using the higher of the remediation footprint statistical value and overburden material maximum value for each analyte detected above background. Of the contaminants of concern (COCs) and contaminants of potential concern (COPCs) for the site, boron, molybdenum, and strontium require the HQ calculations because they were detected and Washington State or Hanford Site background values are not available.

Washington Closure Hanford		CALCULATION SHEET					
Originator:	J. M. Capron *JMC*	Date:	09/18/06	Calc. No.:	0100B-CA-V0293	Rev.:	0
Project:	100-B/C RPAS Field Remediation	Job No:	14655	Checked:	T. M. Blakley *TMB*	Date:	9/19/06
Subject:	1607-B2:2 Waste Site Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 2 of 3	

Copper and mercury are included because they were quantified above their respective Hanford Site background values. Hexavalent chromium, aroclor-1254, aroclor-1260, and multiple chlorinated pesticides 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. 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 statistical value for boron is 4.7 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 2.9 x 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 2.6 x 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 x 10^{-6}. For example, the 95% upper confidence limit value for hexavalent chromium is 0.35 mg/kg; divided by 2.1 mg/kg and multiplied as indicated is 1.7 x 10^{-7}. Comparing this value, and all other individual values, to the requirement of <1 x 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 1.4 x 10^{-6}. Comparing this value to the requirement of <1 x 10^{-5}, this criterion is met.

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None
3) List individual carcinogens and corresponding excess cancer risk >1 x 10^{-6}: None
4) List the cumulative excess cancer risk for carcinogens >1 x 10^{-5}: None.

Table 1 shows the results of the calculations for the 1607-B2:2 subsite.

CONCLUSION:

This calculation demonstrates that the 1607-B2:2 subsite 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	Date:	09/18/06	Calc. No.:	0100B-CA-V0293	Rev.:	0
Project:	100-B/C RPAS Field Remediation	Job No:	14655	Checked:	T. M. Blakley	Date:	9/19/06
Subject:	1607-B2:2 Waste Site Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	3 of 3

Table 1. Hazard Quotient and Excess Cancer Risk Results for the 1607-B2:2 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					
Boron	4.7	16,000	2.9E-04	--	--
Chromium, hexavalent[c]	0.35	240	1.5E-03	2.1	1.7E-07
Copper	34.0	2,960	1.1E-02	--	--
Mercury	0.92	24	3.8E-02	--	--
Molybdenum	0.37	400	9.3E-04	--	--
Strontium	48.2	48,000	1.0E-03	--	--
Semivolatiles					
Benzo(a)anthracene	0.041	--	--	1.37	3.0E-08
Benzo(a)pyrene	0.033	--	--	0.137	2.4E-07
Benzo(b)fluoranthene	0.041	--	--	1.37	3.0E-08
Benzo(k)fluoranthene	0.035	--	--	13.7	2.6E-09
Benzo(g,h,i)perylene[d]	0.030	2,400	1.3E-05	--	--
Bis(2-ethylhexyl) phthalate	1.6	1,600	1.0E-03	71.4	2.2E-08
Chrysene	0.064	--	--	137	4.7E-10
Dibenz(a,h)anthracene	0.022	--	--	0.137	1.6E-07
Diethylphthalate	0.018	64,000	2.8E-07	--	--
Di-n-butylphthalate	0.080	8,000	1.0E-05	--	--
Fluoranthene	0.079	3,200	2.5E-05	--	--
Indeno(1,2,3-cd) pyrene	0.028	--	--	1.37	2.0E-08
Methylnaphthalene; 2-	0.019	320	5.9E-05	--	--
Naphthalene	0.017	1,600	1.1E-05	--	--
Phenanthrene[d]	0.046	24,000	1.9E-06	--	--
Phenol	0.027	24,000	1.1E-06	--	--
Pyrene	0.066	2,400	2.8E-05	--	--
Pesticides					
BHC, beta-	0.0019	--	--	0.556	3.4E-09
Chlordane (alpha and gamma)	0.00130	40	3.3E-05	2.86	4.5E-10
DDE, 4,4'-	0.018	--	--	2.94	6.1E-09
DDT, 4,4'-	0.017	40	4.3E-04	2.94	5.8E-09
Endosulfan (I, II, sulfate)	0.0108	480	2.3E-05	--	--
Endrin (and ketone, aldehyde)	0.0085	24	3.5E-04	--	--
Heptachlor epoxide	0.00060	1.04	5.8E-04	0.11	5.5E-09
Methoxychlor	0.015	400	3.8E-05	--	--
Polychlorinated Biphenyls					
Aroclor-1254	0.33	1.6	2.1E-01	0.5	6.6E-07
Aroclor-1260	0.011	--	--	0.5	2.2E-08
Totals					
Cumulative Hazard Quotient:			**2.6E-01**		
Cumulative Excess Cancer Risk:					**1.4E-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] = 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

APPENDIX C

SITE PHOTOGRAPHY

Photograph C-1. Typical Concrete-Encased Vitrified Clay Pipe Segment.

Photograph C-2. Excavation of the 100-B-14:2 (Area 4) Sewer Lines.

APPENDIX D

100 AREA ANALOGOUS SITES RESRAD CALCULATIONS

DISCLAIMER FOR CALCULATIONS

The calculation provided in this appendix has been generated to document compliance with established cleanup levels. This calculation brief should be used in conjunction with other relevant documents in the administrative record.

CALCULATION COVER SHEET

Project Title 100 Area Remedial Action
Job No. 22192 **Area** 100 Area
Discipline Environmental ***Calc. No.** 0100X-CA-V0050
Subject 100 Area Analogous Sites RESRAD Calculations
Computer Program RESRAD **Program No.** Version 6.22

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

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

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover – 1 pg Summary – 3 pg Attm. 1 - 32 pg Total – 36 pages	S. W. Clark S.W. Clark 1/14/~~04~~ 05	M.T. Stankovich MTS 1/16/~~04~~ 05	W. J. Adam W.J. Adam 1/18/~~04~~ 05	R. A. Carlson RACarlson	1/20/05

SUMMARY OF REVISION	

*Obtain Calc. No. from DIS

December 2002

DE01-437.03

Bechtel Hanford, Inc. CALCULATION SHEET

Originator:	S. W. Clark	Date:	1/14/04	Calc. No.:	0100X-CA-V0050	Rev.:	0
Project:	100 Area Remedial Action	Job No:	22192	Checked:	M. T. Stankovich	Date:	1/18/04
Subject:	100 Area Analogous Sites RESRAD Calculations					Sheet No. 1 of 3	

PURPOSE:

Provide lookup values of contaminant distribution coefficients (Kd values) that will be protective of groundwater as a function of uncontaminated vadose zone thickness for contaminants at 100 Area remaining sites. The RESRAD model was used with input parameters from the 100 Area RDR/RAWP to determine contaminant Kd values protective of groundwater as a function of the thickness of the unsaturated/ uncontaminated vadose zone over a period of 1,000 years.

GIVEN/REFERENCES:

1) RESidual RADioactivity (RESRAD) computer code, version 6.22, February 2004, 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.
2) RESRAD input parameters from Table B-1 of the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP), DOE/RL-96-17, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

SOLUTION:

1) RESRAD modeling runs were performed to determine the minimum (lowest) contaminant Kd value that would be protective of groundwater at several unsaturated/uncontaminated vadose zone thicknesses. This was done by simultaneously running different Kd values for the long-lived surrogate radionuclides listed in Table 1 at each unsaturated/uncontaminated vadose zone thickness and determining the lowest Kd value that showed no concentration in the groundwater over a time period of 1,000 years.

2) Input parameters from Table B-1 of the 100 Area RDR/RAWP were used for RESRAD modeling. Thickness of the unsaturated/uncontaminated vadose zone was varied over a range of values from zero meters to 25 meters. Waste site area was varied from 10,000 square meters to 100 square meters to determine if waste site area affected the Kd value that would be calculated to be protective of groundwater (it did not). Surrogate radionuclide concentration was varied from 100 to 1,000 pCi/g to determine if soil concentration affected the Kd determined to be protective of groundwater (it did not). Typical input factors for modeling are shown in the "Summary" section of the RESRAD "Mixture Sums and Single Radionuclide Guidelines" printout in Attachment 1 to this Calculation Summary.

Bechtel Hanford, Inc. CALCULATION SHEET

Originator:	S. W. Clark	Date:	1/14/04	Calc. No.:	0100X-CA-V0050	Rev.:	0
Project:	100 Area Remedial Action	Job No:	22192	Checked:	M. T. Stankovich	Date:	1/18/04
Subject:	100 Area Analogous Sites RESRAD Calculations					Sheet No. 2 of 3	

Table 1. Long-Lived Surrogate Radionuclides for RESRAD Modeling

No.	Radionuclide	Half Life, (yr)	No.	Radionuclide	Half Life, (yr)
1	Al-26	7.16E+05	9	Pu-242	3.76E+05
2	Cl-36	3.01E+05	10	Pu-244	8.26E+08
3	Cm-248	3.39E+05	11	Sm-147	1.06E+11
4	Cs-135	3.00E+06	12	Th-232	1.41E+10
5	Gd-152	1.08E+14	13	U-235	7.04E+08
6	I-129	1.60E+07	14	U-236	2.34E+06
7	K-40	1.28E+09	15	U-238	4.47E+09
8	Np-237	2.14E+06			

METHODOLOGY:

1) Input parameters from Table B-1 of the 100 Area RDR/RAWP were entered into the RESRAD model with the all of the long-lived surrogate radionuclides from Table 1 at a concentration of 100 pCi/g. The surrogate radionuclides were given a range of Kd values from 5 mL/g to 100 mL/g. A thickness of zero meters for the unsaturated/uncontaminated vadose zone between the contaminated zone and groundwater was used for the first RESRAD modeling run.

2) The RESRAD model was run and the graphical output for drinking water concentration was examined for each of the surrogate radionuclides. The lowest Kd value at which the drinking water concentration was zero for 1,000 years was noted (80 mL/g). The RESRAD model was rerun, this time using a range of Kd values for the surrogate radionuclides by increments of one from 70 mL/g to 80 mL/g. The graphical output for drinking water concentration was examined for each of the surrogate radionuclides and the lowest Kd value at which the drinking water concentration was zero for 1,000 years was determined (80 mL/g) and recorded in a table of Kd values versus unsaturated/uncontaminated vadose zone thickness.

3) This procedure was repeated for a series of uncontaminated/unsaturated vadose zone thicknesses from 1 meter to 25 meters. The lowest Kd values at which the drinking water concentration was zero for 1,000 years was determined at increments of 1 mL/g for each unsaturated/ uncontaminated vadose zone thickness and recorded in Table 2.

RESULTS:

1) Table 2 and Figure 1 show the results of the series of determinations of the lowest Kd values at which the drinking water concentration was zero for 1,000 years at each unsaturated/ uncontaminated vadose zone thickness. It should be noted that the Kd values determined were not affected by the waste site area, the waste site length parallel to groundwater flow, or the concentration of the surrogate radionuclides.

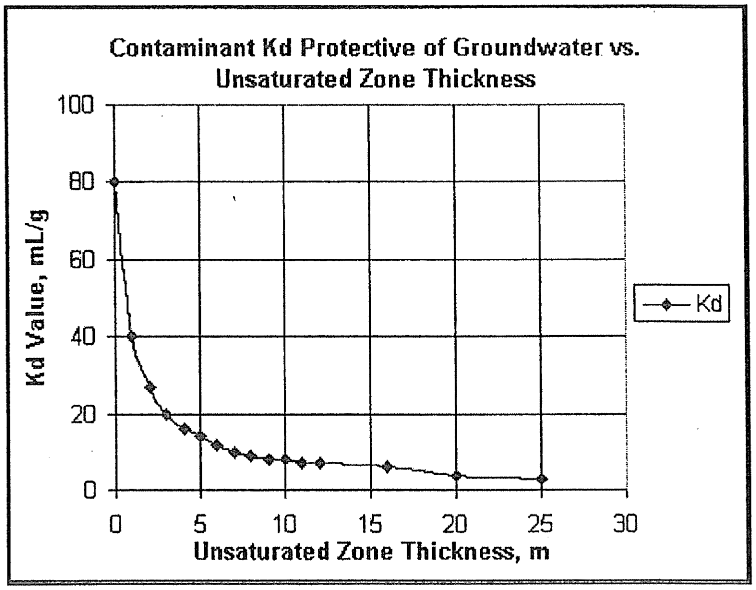
Bechtel Hanford, Inc. CALCULATION SHEET

Originator:	S. W. Clark	Date:	1/14/04	Calc. No.:	0100X-CA-V0050	Rev.:	0
Project:	100 Area Remedial Action	Job No:	22192	Checked:	M. T. Stankovich	Date:	1/18/04
Subject:	100 Area Analogous Sites RESRAD Calculations					Sheet No. 3 of 3	

Table 2:

Unsaturated Zone Thickness, (meters)	Distribution Coefficient, (mL/g)
	Kd
0	80
1	40
2	27
3	20
4	16
5	14
6	12
7	10
8	9
9	8
10	8
11	7
12	7
16	6
20	4
25	3

Figure 1:



CONCLUSIONS:

- Table 2 and Figure 1 shows the results of the series of determinations of the lowest Kd values at which the drinking water concentration was zero for 1,000 years at each unsaturated/uncontaminated vadose zone thickness.

- The Kd values determined were not affected by:
  - The area of the waste site,
  - The waste site length parallel to groundwater flow, or
  - The concentration of the surrogate radionuclides.

ATTACHMENTS:

1. RESRAD Output: Mixture Sums and Single Radionuclide Guidelines (32 pages)

ATTACHMENT 1

```
1RESRAD, Version 6.21     T« Limit = 0.5 year       11/15/2004  08:25  Page    1
 Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
 File    : Kd_vs_VZ_100rdr_Rev4.RAD
```

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Site-Specific Parameter Summary 7
Summary of Pathway Selections 15
Contaminated Zone and Total Dose Summary 16
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Time = 1.000E+00 19
Time = 3.000E+00 20
Time = 1.000E+01 21
Time = 3.000E+01 22
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Attachment 1	Sheet No. 1 of 32
Originator S. W. Clark SWC	Date 1/14/05
Chk'd By M.T. Stankovich MS	Date 1/18/05
Calc. No. 0100X-CA-V0050	Rev. No. 0

ATTACHMENT 1

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1RESRAD, Version 6.21     T« Limit = 0.5 year       11/15/2004  08:25  Page    2
 Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
 File    : Kd_vs_VZ_100rdr_Rev4.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	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Al-26	7.960E-05	7.960E-05	DCF2(2)
B-1	Cl-36	2.190E-05	2.190E-05	DCF2(3)
B-1	Cm-248	1.650E+00	1.650E+00	DCF2(4)
B-1	Cs-135	4.550E-06	4.550E-06	DCF2(5)
B-1	Gd-152	2.430E-01	2.430E-01	DCF2(6)
B-1	I-129	1.740E-04	1.740E-04	DCF2(7)
B-1	K-40	1.240E-05	1.240E-05	DCF2(8)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2(9)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(10)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(11)
B-1	Pu-240	4.290E-01	4.290E-01	DCF2(12)
B-1	Pu-242	4.110E-01	4.110E-01	DCF2(13)
B-1	Pu-244+D	4.030E-01	4.030E-01	DCF2(14)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(15)
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(16)
B-1	Sm-147	7.470E-02	7.470E-02	DCF2(17)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(18)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2(19)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(20)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(21)
B-1	U-233	1.350E-01	1.350E-01	DCF2(22)
B-1	U-234	1.320E-01	1.320E-01	DCF2(23)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(24)
B-1	U-236	1.250E-01	1.250E-01	DCF2(25)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(26)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Al-26	1.460E-05	1.460E-05	DCF3(2)
D-1	Cl-36	3.030E-06	3.030E-06	DCF3(3)
D-1	Cm-248	1.360E-02	1.360E-02	DCF3(4)
D-1	Cs-135	7.070E-06	7.070E-06	DCF3(5)
D-1	Gd-152	1.610E-04	1.610E-04	DCF3(6)
D-1	I-129	2.760E-04	2.760E-04	DCF3(7)
D-1	K-40	1.860E-05	1.860E-05	DCF3(8)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3(9)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(10)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(11)
D-1	Pu-240	3.540E-03	3.540E-03	DCF3(12)
D-1	Pu-242	3.360E-03	3.360E-03	DCF3(13)
D-1	Pu-244+D	3.320E-03	3.320E-03	DCF3(14)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(15)
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(16)
D-1	Sm-147	1.850E-04	1.850E-04	DCF3(17)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(18)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3(19)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(20)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(21)

Attachment 1 Sheet No. 2 of 32
Originator S. W. Clark Date
Chk'd By M.T. Stankovich Date
Calc. No. 0100X-CA-V0050 Rev. No. 0

ATTACHMENT 1

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1RESRAD, Version 6.21     T« Limit = 0.5 year        11/15/2004  08:25  Page   3
 Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
 File    : Kd_vs_VZ_100rdr_Rev4.RAD
```

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

Menu	Parameter	Current Value	Default	Parameter Name
D-1	U-233	2.890E-04	2.890E-04	DCF3(22)
D-1	U-234	2.830E-04	2.830E-04	DCF3(23)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(24)
D-1	U-236	2.690E-04	2.690E-04	DCF3(25)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(26)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Al-26 , plant/soil concentration ratio, dimensionless	4.000E-03	4.000E-03	RTF(2,1)
D-34	Al-26 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-04	5.000E-04	RTF(2,2)
D-34	Al-26 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-04	2.000E-04	RTF(2,3)
D-34				
D-34	Cl-36 , plant/soil concentration ratio, dimensionless	2.000E+01	2.000E+01	RTF(3,1)
D-34	Cl-36 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	6.000E-02	6.000E-02	RTF(3,2)
D-34	Cl-36 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-02	2.000E-02	RTF(3,3)
D-34				
D-34	Cm-248 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Cm-248 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(4,2)
D-34	Cm-248 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(4,3)
D-34				
D-34	Cs-135 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(5,1)
D-34	Cs-135 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(5,2)
D-34	Cs-135 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(5,3)
D-34				
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				
D-34	I-129 , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(7,1)
D-34	I-129 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	7.000E-03	7.000E-03	RTF(7,2)
D-34	I-129 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-02	1.000E-02	RTF(7,3)
D-34				
D-34	K-40 , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(8,1)
D-34	K-40 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(8,2)
D-34	K-40 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	7.000E-03	7.000E-03	RTF(8,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(9,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(9,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(9,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(10,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(10,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(10,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(11,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(11,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(11,3)

Attachment 1 Sheet No. 3 of 32
Originator S. W. Clark Date
Chk'd By M.T. Stankovich Date
Calc. No. 0100X-CA-V0050 Rev. No. 0

ATTACHMENT 1

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1RESRAD, Version 6.21      T« Limit = 0.5 year        11/15/2004  08:25  Page   4
 Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
 File    : Kd_vs_VZ_100rdr_Rev4.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
ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 D-34 ³ Pu-240    , plant/soil concentration ratio, dimensionless    ³ 1.000E-03 ³ 1.000E-03 ³ RTF(12,1)
 D-34 ³ Pu-240    , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    ³ 1.000E-04 ³ 1.000E-04 ³ RTF(12,2)
 D-34 ³ Pu-240    , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     ³ 1.000E-06 ³ 1.000E-06 ³ RTF(12,3)
 D-34 ³                                                              ³           ³           ³
 D-34 ³ Pu-242    , plant/soil concentration ratio, dimensionless    ³ 1.000E-03 ³ 1.000E-03 ³ RTF(13,1)
 D-34 ³ Pu-242    , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    ³ 1.000E-04 ³ 1.000E-04 ³ RTF(13,2)
 D-34 ³ Pu-242    , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     ³ 1.000E-06 ³ 1.000E-06 ³ RTF(13,3)
 D-34 ³                                                              ³           ³           ³
 D-34 ³ Pu-244+D  , plant/soil concentration ratio, dimensionless    ³ 1.000E-03 ³ 1.000E-03 ³ RTF(14,1)
 D-34 ³ Pu-244+D  , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    ³ 1.000E-04 ³ 1.000E-04 ³ RTF(14,2)
 D-34 ³ Pu-244+D  , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     ³ 1.000E-06 ³ 1.000E-06 ³ RTF(14,3)
 D-34 ³                                                              ³           ³           ³
 D-34 ³ Ra-226+D  , plant/soil concentration ratio, dimensionless    ³ 4.000E-02 ³ 4.000E-02 ³ RTF(15,1)
 D-34 ³ Ra-226+D  , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    ³ 1.000E-03 ³ 1.000E-03 ³ RTF(15,2)
 D-34 ³ Ra-226+D  , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     ³ 1.000E-03 ³ 1.000E-03 ³ RTF(15,3)
 D-34 ³                                                              ³           ³           ³
 D-34 ³ Ra-228+D  , plant/soil concentration ratio, dimensionless    ³ 4.000E-02 ³ 4.000E-02 ³ RTF(16,1)
 D-34 ³ Ra-228+D  , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    ³ 1.000E-03 ³ 1.000E-03 ³ RTF(16,2)
 D-34 ³ Ra-228+D  , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     ³ 1.000E-03 ³ 1.000E-03 ³ RTF(16,3)
 D-34 ³                                                              ³           ³           ³
 D-34 ³ Sm-147    , plant/soil concentration ratio, dimensionless    ³ 2.500E-03 ³ 2.500E-03 ³ RTF(17,1)
 D-34 ³ Sm-147    , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    ³ 2.000E-03 ³ 2.000E-03 ³ RTF(17,2)
 D-34 ³ Sm-147    , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     ³ 2.000E-05 ³ 2.000E-05 ³ RTF(17,3)
 D-34 ³                                                              ³           ³           ³
 D-34 ³ Th-228+D  , plant/soil concentration ratio, dimensionless    ³ 1.000E-03 ³ 1.000E-03 ³ RTF(18,1)
 D-34 ³ Th-228+D  , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    ³ 1.000E-04 ³ 1.000E-04 ³ RTF(18,2)
 D-34 ³ Th-228+D  , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     ³ 5.000E-06 ³ 5.000E-06 ³ RTF(18,3)
 D-34 ³                                                              ³           ³           ³
 D-34 ³ Th-229+D  , plant/soil concentration ratio, dimensionless    ³ 1.000E-03 ³ 1.000E-03 ³ RTF(19,1)
 D-34 ³ Th-229+D  , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    ³ 1.000E-04 ³ 1.000E-04 ³ RTF(19,2)
 D-34 ³ Th-229+D  , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     ³ 5.000E-06 ³ 5.000E-06 ³ RTF(19,3)
 D-34 ³                                                              ³           ³           ³
 D-34 ³ Th-230    , plant/soil concentration ratio, dimensionless    ³ 1.000E-03 ³ 1.000E-03 ³ RTF(20,1)
 D-34 ³ Th-230    , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    ³ 1.000E-04 ³ 1.000E-04 ³ RTF(20,2)
 D-34 ³ Th-230    , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     ³ 5.000E-06 ³ 5.000E-06 ³ RTF(20,3)
 D-34 ³                                                              ³           ³           ³
 D-34 ³ Th-232    , plant/soil concentration ratio, dimensionless    ³ 1.000E-03 ³ 1.000E-03 ³ RTF(21,1)
 D-34 ³ Th-232    , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    ³ 1.000E-04 ³ 1.000E-04 ³ RTF(21,2)
 D-34 ³ Th-232    , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     ³ 5.000E-06 ³ 5.000E-06 ³ RTF(21,3)
 D-34 ³                                                              ³           ³           ³
 D-34 ³ U-233     , plant/soil concentration ratio, dimensionless    ³ 2.500E-03 ³ 2.500E-03 ³ RTF(22,1)
 D-34 ³ U-233     , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    ³ 3.400E-04 ³ 3.400E-04 ³ RTF(22,2)
 D-34 ³ U-233     , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     ³ 6.000E-04 ³ 6.000E-04 ³ RTF(22,3)
 D-34 ³                                                              ³           ³           ³
 D-34 ³ U-234     , plant/soil concentration ratio, dimensionless    ³ 2.500E-03 ³ 2.500E-03 ³ RTF(23,1)
 D-34 ³ U-234     , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    ³ 3.400E-04 ³ 3.400E-04 ³ RTF(23,2)
 D-34 ³ U-234     , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     ³ 6.000E-04 ³ 6.000E-04 ³ RTF(23,3)
 D-34 ³                                                              ³           ³           ³
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Attachment 1	Sheet No. 4 of 32
Originator S. W. Clark	Date
Chk'd By M.T. Stankovich	Date
Calc. No. 0100X-CA-V0050	Rev. No. 0

ATTACHMENT 1

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1RESRAD, Version 6.21    T« Limit = 0.5 year       11/15/2004  08:25  Page   5
 Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
 File    : Kd_vs_VZ_100rdr_Rev4.RAD

                    Dose Conversion Factor (and Related) Parameter Summary (continued)
                                          File: HEAST 2001 Morbidity
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Menu	Parameter	Current Value	Default	Parameter Name
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(24,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(24,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(24,3)
D-34				
D-34	U-236 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(25,1)
D-34	U-236 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(25,2)
D-34	U-236 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(25,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(26,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(26,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(26,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Al-26 , fish	5.000E+02	5.000E+02	BIOFAC(2,1)
D-5	Al-26 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Cl-36 , fish	1.000E+03	1.000E+03	BIOFAC(3,1)
D-5	Cl-36 , crustacea and mollusks	1.900E+02	1.900E+02	BIOFAC(3,2)
D-5				
D-5	Cm-248 , fish	3.000E+01	3.000E+01	BIOFAC(4,1)
D-5	Cm-248 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(4,2)
D-5				
D-5	Cs-135 , fish	2.000E+03	2.000E+03	BIOFAC(5,1)
D-5	Cs-135 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(5,2)
D-5				
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				
D-5	I-129 , fish	4.000E+01	4.000E+01	BIOFAC(7,1)
D-5	I-129 , crustacea and mollusks	5.000E+00	5.000E+00	BIOFAC(7,2)
D-5				
D-5	K-40 , fish	1.000E+03	1.000E+03	BIOFAC(8,1)
D-5	K-40 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(8,2)
D-5				
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(9,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(10,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(10,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(11,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(11,2)
D-5				
D-5	Pu-240 , fish	3.000E+01	3.000E+01	BIOFAC(12,1)
D-5	Pu-240 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(12,2)
D-5				

Attachment 1 Sheet No. 5 of 32
Originator S. W. Clark Date
Chk'd By M.T. Stankovich Date
Calc. No. 0100X-CA-V0050 Rev. No. 0

ATTACHMENT 1

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1RESRAD, Version 6.21     T« Limit = 0.5 year        11/15/2004  08:25  Page    6
 Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
 File    : Kd_vs_VZ_100rdr_Rev4.RAD

                   Dose Conversion Factor (and Related) Parameter Summary (continued)
                                         File: HEAST 2001 Morbidity
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Menu	Parameter	Current Value	Default	Parameter Name
D-5	Pu-242 , fish	3.000E+01	3.000E+01	BIOFAC(13,1)
D-5	Pu-242 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(13,2)
D-5				
D-5	Pu-244+D , fish	3.000E+01	3.000E+01	BIOFAC(14,1)
D-5	Pu-244+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(14,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(15,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(15,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(16,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(16,2)
D-5				
D-5	Sm-147 , fish	2.500E+01	2.500E+01	BIOFAC(17,1)
D-5	Sm-147 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(17,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(18,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(18,2)
D-5				
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(19,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(19,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(20,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(20,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(21,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(21,2)
D-5				
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(22,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(22,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(23,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(23,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(24,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(24,2)
D-5				
D-5	U-236 , fish	1.000E+01	1.000E+01	BIOFAC(25,1)
D-5	U-236 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(25,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(26,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(26,2)

Attachment	1	Sheet No.	6 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 7
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.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)	1.000E+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)	1.000E+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)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Al-26	1.000E+02	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Cl-36	1.000E+02	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Cm-248	1.000E+02	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Cs-135	1.000E+02	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Gd-152	1.000E+02	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): I-129	1.000E+02	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): K-40	1.000E+02	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Np-237	1.000E+02	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): Pu-242	1.000E+02	0.000E+00	---	S1(13)
R012	Initial principal radionuclide (pCi/g): Pu-244	1.000E+02	0.000E+00	---	S1(14)
R012	Initial principal radionuclide (pCi/g): Sm-147	1.000E+02	0.000E+00	---	S1(17)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E+02	0.000E+00	---	S1(21)
R012	Initial principal radionuclide (pCi/g): U-235	1.000E+02	0.000E+00	---	S1(24)
R012	Initial principal radionuclide (pCi/g): U-236	1.000E+02	0.000E+00	---	S1(25)
R012	Initial principal radionuclide (pCi/g): U-238	1.000E+02	0.000E+00	---	S1(26)
R012	Concentration in groundwater (pCi/L): Al-26	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Cl-36	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Cm-248	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Cs-135	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Gd-152	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): I-129	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): K-40	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Np-237	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): Pu-242	not used	0.000E+00	---	W1(13)
R012	Concentration in groundwater (pCi/L): Pu-244	not used	0.000E+00	---	W1(14)
R012	Concentration in groundwater (pCi/L): Sm-147	not used	0.000E+00	---	W1(17)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(21)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(24)
R012	Concentration in groundwater (pCi/L): U-236	not used	0.000E+00	---	W1(25)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(26)
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

Attachment	1	Sheet No.	7 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 8
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	1.000E+00	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 Al-26				
R016	Contaminated zone (cm**3/g)	5.000E+00	0.000E+00	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+00	0.000E+00	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	5.000E+00	0.000E+00	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.120E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Cl-36				
R016	Contaminated zone (cm**3/g)	1.000E+01	1.000E-01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+01	1.000E-01	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	1.000E+01	1.000E-01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.073E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)

Attachment 1 Sheet No. 8 of 32
Originator S. W. Clark Date
Chk'd By M.T. Stankovich Date
Calc. No. 0100X-CA-V0050 Rev. No. 0

ATTACHMENT 1

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1RESRAD, Version 6.21      T« Limit = 0.5 year       11/15/2004  08:25  Page    9
 Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
 File    : Kd_vs_VZ_100rdr_Rev4.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 Cm-248				
R016	Contaminated zone (cm**3/g)	1.500E+01	-1.000E+00	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	-1.000E+00	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	1.500E+01	-1.000E+00	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.181E-04	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for Cs-135				
R016	Contaminated zone (cm**3/g)	2.000E+01	1.000E+03	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	1.000E+03	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	2.000E+01	1.000E+03	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.397E-04	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Gd-152				
R016	Contaminated zone (cm**3/g)	2.500E+01	-1.000E+00	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	2.500E+01	-1.000E+00	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	2.500E+01	-1.000E+00	---	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 I-129				
R016	Contaminated zone (cm**3/g)	3.000E+01	1.000E-01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+01	1.000E-01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	3.000E+01	1.000E-01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.605E-04	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for K-40				
R016	Contaminated zone (cm**3/g)	3.500E+01	5.500E+00	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	3.500E+01	5.500E+00	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	3.500E+01	5.500E+00	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.092E-04	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for Np-237				
R016	Contaminated zone (cm**3/g)	4.000E+01	-1.000E+00	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	4.000E+01	-1.000E+00	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	4.000E+01	-1.000E+00	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.706E-04	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for Pu-242				
R016	Contaminated zone (cm**3/g)	4.500E+01	2.000E+03	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	4.500E+01	2.000E+03	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	4.500E+01	2.000E+03	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.407E-04	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)

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Originator S. W. Clark Date
Chk'd By M.T. Stankovich Date
Calc. No. 0100X-CA-V0050 Rev. No. 0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 10
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.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 Pu-244				
R016	Contaminated zone (cm**3/g)	5.000E+01	2.000E+03	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	2.000E+03	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	5.000E+01	2.000E+03	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.166E-04	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(14)
R016	Distribution coefficients for Sm-147				
R016	Contaminated zone (cm**3/g)	5.500E+01	-1.000E+00	---	DCNUCC(17)
R016	Unsaturated zone 1 (cm**3/g)	5.500E+01	-1.000E+00	---	DCNUCU(17,1)
R016	Saturated zone (cm**3/g)	5.500E+01	-1.000E+00	---	DCNUCS(17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.970E-04	ALEACH(17)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(17)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+01	6.000E+04	---	DCNUCC(21)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+01	6.000E+04	---	DCNUCU(21,1)
R016	Saturated zone (cm**3/g)	6.000E+01	6.000E+04	---	DCNUCS(21)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.806E-04	ALEACH(21)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(21)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	6.500E+01	5.000E+01	---	DCNUCC(24)
R016	Unsaturated zone 1 (cm**3/g)	6.500E+01	5.000E+01	---	DCNUCU(24,1)
R016	Saturated zone (cm**3/g)	6.500E+01	5.000E+01	---	DCNUCS(24)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.667E-04	ALEACH(24)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(24)
R016	Distribution coefficients for U-236				
R016	Contaminated zone (cm**3/g)	7.000E+01	5.000E+01	---	DCNUCC(25)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	5.000E+01	---	DCNUCU(25,1)
R016	Saturated zone (cm**3/g)	7.000E+01	5.000E+01	---	DCNUCS(25)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.549E-04	ALEACH(25)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(25)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	7.500E+01	5.000E+01	---	DCNUCC(26)
R016	Unsaturated zone 1 (cm**3/g)	7.500E+01	5.000E+01	---	DCNUCU(26,1)
R016	Saturated zone (cm**3/g)	7.500E+01	5.000E+01	---	DCNUCS(26)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.445E-04	ALEACH(26)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(26)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.397E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)

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Originator S. W. Clark Date
Chk'd By M.T. Stankovich Date
Calc. No. 0100X-CA-V0050 Rev. No. 0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 11
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.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 daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.166E-04	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	3.000E+01	1.000E+02	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+01	1.000E+02	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	3.000E+01	1.000E+02	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.605E-04	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R016	Distribution coefficients for daughter Pu-240				
R016	Contaminated zone (cm**3/g)	2.000E+02	2.000E+03	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+02	2.000E+03	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	2.000E+02	2.000E+03	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.426E-05	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	2.000E+02	7.000E+01	---	DCNUCC(15)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+02	7.000E+01	---	DCNUCU(15,1)
R016	Saturated zone (cm**3/g)	2.000E+02	7.000E+01	---	DCNUCS(15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.426E-05	ALEACH(15)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(15)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	2.000E+02	7.000E+01	---	DCNUCC(16)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+02	7.000E+01	---	DCNUCU(16,1)
R016	Saturated zone (cm**3/g)	2.000E+02	7.000E+01	---	DCNUCS(16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.426E-05	ALEACH(16)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(16)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	2.000E+02	6.000E+04	---	DCNUCC(18)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+02	6.000E+04	---	DCNUCU(18,1)
R016	Saturated zone (cm**3/g)	2.000E+02	6.000E+04	---	DCNUCS(18)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.426E-05	ALEACH(18)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(18)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	2.000E+02	6.000E+04	---	DCNUCC(19)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+02	6.000E+04	---	DCNUCU(19,1)
R016	Saturated zone (cm**3/g)	2.000E+02	6.000E+04	---	DCNUCS(19)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.426E-05	ALEACH(19)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(19)

Attachment	1	Sheet No.	11 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 12
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.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 daughter Th-230				
R016	Contaminated zone (cm**3/g)	2.000E+02	6.000E+04	---	DCNUCC(20)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+02	6.000E+04	---	DCNUCU(20,1)
R016	Saturated zone (cm**3/g)	2.000E+02	6.000E+04	---	DCNUCS(20)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.426E-05	ALEACH(20)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(20)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	2.000E+00	5.000E+01	---	DCNUCC(22)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+00	5.000E+01	---	DCNUCU(22,1)
R016	Saturated zone (cm**3/g)	2.000E+00	5.000E+01	---	DCNUCS(22)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.119E-03	ALEACH(22)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(22)
R016	Distribution coefficients for daughter U-234				
R016	Contaminated zone (cm**3/g)	2.000E+00	5.000E+01	---	DCNUCC(23)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+00	5.000E+01	---	DCNUCU(23,1)
R016	Saturated zone (cm**3/g)	2.000E+00	5.000E+01	---	DCNUCS(23)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.119E-03	ALEACH(23)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(23)
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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Originator S. W. Clark Date
Chk'd By M.T. Stankovich Date
Calc. No. 0100X-CA-V0050 Rev. No. 0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 13
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.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	0.500E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.500E+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 1	Sheet No. 13 of 32
Originator S. W. Clark	Date
Chk'd By M.T. Stankovich	Date
Calc. No. 0100X-CA-V0050	Rev. No. 0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 14
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Site-Specific Parameter Summary (continued)

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 1 Sheet No. 14 of 32
Originator S. W. Clark Date
Chk'd By M.T. Stankovich Date
Calc. No. 0100X-CA-V0050 Rev. No. 0

ATTACHMENT 1

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1RESRAD, Version 6.21      T« Limit = 0.5 year       11/15/2004  08:25  Page  15
 Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
 File    : Kd_vs_VZ_100rdr_Rev4.RAD
```

Site-Specific Parameter Summary (continued)

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	suppressed

Attachment	1	Sheet No.	15 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 16
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Contaminated Zone Dimensions	
Area:	10000.00 square meters
Thickness:	4.60 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g	
Al-26	1.000E+02
Cl-36	1.000E+02
Cm-248	1.000E+02
Cs-135	1.000E+02
Gd-152	1.000E+02
I-129	1.000E+02
K-40	1.000E+02
Np-237	1.000E+02
Pu-242	1.000E+02
Pu-244	1.000E+02
Sm-147	1.000E+02
Th-232	1.000E+02
U-235	1.000E+02
U-236	1.000E+02
U-238	1.000E+02

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)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	3.898E+03	3.990E+03	4.193E+03	4.753E+03	5.136E+03	4.940E+03	8.886E+03	1.497E+04
M(t):	2.599E+02	2.660E+02	2.796E+02	3.169E+02	3.424E+02	3.293E+02	5.924E+02	9.977E+02

0Maximum TDOSE(t): 2.099E+04 mrem/yr at t = 505 ñ 1 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 = 5.054E+02 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
Al-26	3.809E+02	0.0182	1.100E-04	0.0000	0.000E+00	0.0000	1.127E-01	0.0000	3.474E-03	0.0000	3.600E-03	0.0000	2.919E-02	0.0000
Cl-36	8.844E-02	0.0000	5.136E-05	0.0000	0.000E+00	0.0000	1.983E+02	0.0095	2.586E+02	0.0123	1.937E+02	0.0092	1.028E-02	0.0000
Cm-248	5.585E-03	0.0000	4.630E+00	0.0002	0.000E+00	0.0000	5.330E+01	0.0025	1.933E-01	0.0000	5.247E-02	0.0000	5.519E+01	0.0026
Cs-135	1.913E-03	0.0000	1.399E-05	0.0000	0.000E+00	0.0000	1.213E+00	0.0001	9.359E-01	0.0000	5.813E-01	0.0000	3.143E-02	0.0000
Gd-152	0.000E+00	0.0000	7.887E-01	0.0000	0.000E+00	0.0000	1.824E+00	0.0001	3.123E-01	0.0000	8.252E-03	0.0000	7.557E-01	0.0000
I-129	7.260E-01	0.0000	5.856E-04	0.0000	0.000E+00	0.0000	2.593E+01	0.0012	5.398E+00	0.0003	1.843E+01	0.0009	1.343E+00	0.0001
K-40	5.692E+01	0.0027	4.283E-05	0.0000	0.000E+00	0.0000	2.690E+01	0.0013	1.197E+01	0.0006	9.467E+00	0.0005	9.291E-02	0.0000
Np-237	6.180E+01	0.0029	1.902E+00	0.0001	0.000E+00	0.0000	4.364E+02	0.0208	1.297E+01	0.0006	1.553E-01	0.0000	2.261E+01	0.0011
Pu-242	7.608E-03	0.0000	1.468E+00	0.0001	0.000E+00	0.0000	1.676E+01	0.0008	3.040E-01	0.0000	8.252E-03	0.0000	1.736E+01	0.0008
Pu-244	4.410E+02	0.0210	1.543E+00	0.0001	0.000E+00	0.0000	1.775E+01	0.0008	3.220E-01	0.0000	8.739E-03	0.0000	1.838E+01	0.0009
Sm-147	0.000E+00	0.0000	2.731E-01	0.0000	0.000E+00	0.0000	2.360E+00	0.0001	4.041E-01	0.0000	1.068E-02	0.0000	9.780E-01	0.0000
Th-232	9.475E+02	0.0452	7.337E+00	0.0003	0.000E+00	0.0000	3.157E+02	0.0150	7.912E+00	0.0004	1.761E+01	0.0008	2.655E+01	0.0013
U-235	4.633E+01	0.0022	7.497E-01	0.0000	0.000E+00	0.0000	1.110E+01	0.0005	1.193E+00	0.0001	4.807E-01	0.0000	2.806E+00	0.0001
U-236	1.319E-02	0.0000	4.668E-01	0.0000	0.000E+00	0.0000	3.505E+00	0.0002	1.020E-01	0.0000	4.759E-01	0.0000	1.453E+00	0.0001
U-238	9.061E+00	0.0004	4.432E-01	0.0000	0.000E+00	0.0000	3.526E+00	0.0002	1.026E-01	0.0000	4.786E-01	0.0000	1.461E+00	0.0001
Total	1.944E+03	0.0927	1.960E+01	0.0009	0.000E+00	0.0000	1.115E+03	0.0531	3.007E+02	0.0143	2.415E+02	0.0115	1.491E+02	0.0071

Attachment	1	Sheet No.	16 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 17
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.054E+02 years

0 Water Dependent Pathways

Radio- Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* fract.
Al-26	2.191E+01	0.0010	6.419E+00	0.0003	0.000E+00	0.0000	2.424E+00	0.0001	1.402E-01	0.0000	1.619E-01	0.0000	4.121E+02	0.0196
Cl-36	4.022E+00	0.0002	2.178E+00	0.0001	0.000E+00	0.0000	3.149E+00	0.0002	4.727E+00	0.0002	4.199E+00	0.0002	6.690E+02	0.0319
Cm-248	1.489E+04	0.7094	6.049E+02	0.0288	0.000E+00	0.0000	1.645E+03	0.0784	3.808E+00	0.0002	1.100E+00	0.0001	1.726E+04	0.8223
Cs-135	2.655E+00	0.0001	2.857E+00	0.0001	0.000E+00	0.0000	2.968E-01	0.0000	1.018E+00	0.0000	7.843E-01	0.0000	1.037E+01	0.0005
Gd-152	1.031E+01	0.0005	3.910E-01	0.0000	0.000E+00	0.0000	1.138E+00	0.0001	2.624E-01	0.0000	7.592E-03	0.0000	1.580E+01	0.0008
I-129	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	5.183E+01	0.0025
K-40	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	1.053E+02	0.0050
Np-237	1.852E+00	0.0001	1.316E-02	0.0000	0.000E+00	0.0000	2.047E-01	0.0000	8.027E-03	0.0000	4.084E-02	0.0000	5.379E+02	0.0256
Pu-242	5.194E-08	0.0000	3.960E-10	0.0000	0.000E+00	0.0000	5.740E-09	0.0000	2.274E-10	0.0000	1.149E-09	0.0000	3.591E+01	0.0017
Pu-244	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	4.790E+02	0.0228
Sm-147	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	4.026E+00	0.0002
Th-232	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	1.323E+03	0.0630
U-235	1.457E-04	0.0000	4.741E-06	0.0000	0.000E+00	0.0000	1.607E-05	0.0000	3.689E-08	0.0000	1.070E-07	0.0000	6.266E+01	0.0030
U-236	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	6.016E+00	0.0003
U-238	1.137E+00	0.0001	7.843E-03	0.0000	0.000E+00	0.0000	1.257E-01	0.0000	4.947E-03	0.0000	2.519E-02	0.0000	1.637E+01	0.0008
Total	1.493E+04	0.7114	6.168E+02	0.0294	0.000E+00	0.0000	1.653E+03	0.0787	9.969E+00	0.0005	6.318E+00	0.0003	2.099E+04	1.0000

0*Sum of all water independent and dependent pathways.

Attachment	1	Sheet No.	17 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21   T« Limit = 0.5 year   11/15/2004 08:25 Page 18
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File   : Kd_vs_VZ_100rdr_Rev4.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	1.113E+03	0.2855	3.214E-04	0.0000	0.000E+00	0.0000	3.291E-01	0.0001	1.015E-02	0.0000	1.051E-02	0.0000	8.526E-02	0.0000
Cl-36	1.523E-01	0.0000	8.843E-05	0.0000	0.000E+00	0.0000	3.415E+02	0.0876	4.452E+02	0.1142	3.335E+02	0.0855	1.770E-02	0.0000
Cm-248	5.857E-03	0.0000	6.663E+00	0.0017	0.000E+00	0.0000	7.669E+01	0.0197	2.782E-01	0.0001	7.551E-02	0.0000	7.942E+01	0.0204
Cs-135	2.513E-03	0.0000	1.837E-05	0.0000	0.000E+00	0.0000	1.594E+00	0.0004	1.229E+00	0.0003	7.636E-01	0.0002	4.129E-02	0.0000
Gd-152	0.000E+00	0.0000	9.812E-01	0.0003	0.000E+00	0.0000	2.269E+00	0.0006	3.885E-01	0.0001	1.027E-02	0.0000	9.402E-01	0.0002
I-129	8.711E-01	0.0002	7.026E-04	0.0000	0.000E+00	0.0000	3.112E+01	0.0080	6.477E+00	0.0017	2.211E+01	0.0057	1.612E+00	0.0004
K-40	6.655E+01	0.0171	5.007E-05	0.0000	0.000E+00	0.0000	3.144E+01	0.0081	1.399E+01	0.0036	1.107E+01	0.0028	1.086E-01	0.0000
Np-237	7.086E+01	0.0182	2.181E+00	0.0006	0.000E+00	0.0000	5.004E+02	0.1284	1.487E+01	0.0038	1.776E-01	0.0000	2.593E+01	0.0067
Pu-242	8.599E-03	0.0000	1.660E+00	0.0004	0.000E+00	0.0000	1.895E+01	0.0049	3.437E-01	0.0001	9.327E-03	0.0000	1.962E+01	0.0050
Pu-244	4.920E+02	0.1262	1.627E+00	0.0004	0.000E+00	0.0000	1.872E+01	0.0048	3.396E-01	0.0001	9.216E-03	0.0000	1.939E+01	0.0050
Sm-147	0.000E+00	0.0000	3.016E-01	0.0001	0.000E+00	0.0000	2.607E+00	0.0007	4.464E-01	0.0001	1.180E-02	0.0000	1.080E+00	0.0003
Th-232	3.425E-02	0.0000	6.622E+00	0.0017	0.000E+00	0.0000	1.540E+01	0.0039	2.792E-01	0.0001	3.789E-02	0.0000	1.594E+01	0.0041
U-235	4.901E+01	0.0126	4.967E-01	0.0001	0.000E+00	0.0000	3.762E+00	0.0010	1.095E-01	0.0000	5.108E-01	0.0001	1.559E+00	0.0004
U-236	1.424E-02	0.0000	5.048E-01	0.0001	0.000E+00	0.0000	3.791E+00	0.0010	1.103E-01	0.0000	5.146E-01	0.0001	1.571E+00	0.0004
U-238	9.748E+00	0.0025	4.765E-01	0.0001	0.000E+00	0.0000	3.791E+00	0.0010	1.103E-01	0.0000	5.146E-01	0.0001	1.571E+00	0.0004
Total	1.802E+03	0.4623	2.151E+01	0.0055	0.000E+00	0.0000	1.052E+03	0.2700	4.842E+02	0.1242	3.693E+02	0.0947	1.689E+02	0.0433

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 = 0.000E+00 years
0 Water Dependent Pathways

0 Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	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	1.113E+03	0.2856
Cl-36	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	1.120E+03	0.2874
Cm-248	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	1.631E+02	0.0418
Cs-135	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	3.630E+00	0.0009
Gd-152	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	4.589E+00	0.0012
I-129	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	6.218E+01	0.0160
K-40	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	1.232E+02	0.0316
Np-237	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	6.144E+02	0.1576
Pu-242	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	4.059E+01	0.0104
Pu-244	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	5.321E+02	0.1365
Sm-147	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	4.447E+00	0.0011
Th-232	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	3.831E+01	0.0098
U-235	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	5.545E+01	0.0142
U-236	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	6.506E+00	0.0017
U-238	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	1.621E+01	0.0042
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	3.898E+03	1.0000

0*Sum of all water independent and dependent pathways.

Attachment	1	Sheet No.	18 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 19
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	1.110E+03	0.2783	3.207E-04	0.0000	0.000E+00	0.0000	3.285E-01	0.0001	1.013E-02	0.0000	1.049E-02	0.0000	8.508E-02	0.0000
Cl-36	1.521E-01	0.0000	8.834E-05	0.0000	0.000E+00	0.0000	3.411E+02	0.0855	4.448E+02	0.1115	3.331E+02	0.0835	1.768E-02	0.0000
Cm-248	5.857E-03	0.0000	6.658E+00	0.0017	0.000E+00	0.0000	7.664E+01	0.0192	2.780E-01	0.0001	7.545E-02	0.0000	7.937E+01	0.0199
Cs-135	2.512E-03	0.0000	1.836E-05	0.0000	0.000E+00	0.0000	1.593E+00	0.0004	1.229E+00	0.0003	7.632E-01	0.0002	4.127E-02	0.0000
Gd-152	0.000E+00	0.0000	9.808E-01	0.0002	0.000E+00	0.0000	2.268E+00	0.0006	3.883E-01	0.0001	1.026E-02	0.0000	9.398E-01	0.0002
I-129	8.707E-01	0.0002	7.024E-04	0.0000	0.000E+00	0.0000	3.111E+01	0.0078	6.475E+00	0.0016	2.210E+01	0.0055	1.611E+00	0.0004
K-40	6.653E+01	0.0167	5.006E-05	0.0000	0.000E+00	0.0000	3.143E+01	0.0079	1.399E+01	0.0035	1.106E+01	0.0028	1.086E-01	0.0000
Np-237	7.085E+01	0.0178	2.180E+00	0.0005	0.000E+00	0.0000	5.003E+02	0.1254	1.486E+01	0.0037	1.776E-01	0.0000	2.592E+01	0.0065
Pu-242	8.597E-03	0.0000	1.659E+00	0.0004	0.000E+00	0.0000	1.894E+01	0.0047	3.436E-01	0.0001	9.325E-03	0.0000	1.962E+01	0.0049
Pu-244	4.919E+02	0.1233	1.627E+00	0.0004	0.000E+00	0.0000	1.872E+01	0.0047	3.396E-01	0.0001	9.215E-03	0.0000	1.939E+01	0.0049
Sm-147	0.000E+00	0.0000	3.016E-01	0.0001	0.000E+00	0.0000	2.606E+00	0.0007	4.463E-01	0.0001	1.180E-02	0.0000	1.080E+00	0.0003
Th-232	5.570E+01	0.0140	6.649E+00	0.0017	0.000E+00	0.0000	5.117E+01	0.0128	1.084E+00	0.0003	2.013E+00	0.0005	1.698E+01	0.0043
U-235	4.900E+01	0.0123	4.967E-01	0.0001	0.000E+00	0.0000	3.774E+00	0.0009	1.116E-01	0.0000	5.107E-01	0.0001	1.560E+00	0.0004
U-236	1.424E-02	0.0000	5.047E-01	0.0001	0.000E+00	0.0000	3.790E+00	0.0009	1.103E-01	0.0000	5.145E-01	0.0001	1.571E+00	0.0004
U-238	9.746E+00	0.0024	4.764E-01	0.0001	0.000E+00	0.0000	3.790E+00	0.0009	1.103E-01	0.0000	5.146E-01	0.0001	1.571E+00	0.0004
Total	1.855E+03	0.4650	2.154E+01	0.0054	0.000E+00	0.0000	1.088E+03	0.2726	4.846E+02	0.1215	3.709E+02	0.0930	1.699E+02	0.0426

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 = 1.000E+00 years
0 Water Dependent Pathways

0 Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	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	1.111E+03	0.2784
Cl-36	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	1.119E+03	0.2805
Cm-248	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	1.630E+02	0.0409
Cs-135	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	3.629E+00	0.0009
Gd-152	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	4.587E+00	0.0011
I-129	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	6.216E+01	0.0156
K-40	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	1.231E+02	0.0309
Np-237	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	6.143E+02	0.1540
Pu-242	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	4.058E+01	0.0102
Pu-244	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	5.320E+02	0.1333
Sm-147	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	4.446E+00	0.0011
Th-232	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	1.336E+02	0.0335
U-235	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	5.545E+01	0.0139
U-236	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	6.505E+00	0.0016
U-238	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	1.621E+01	0.0041
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	3.990E+03	1.0000

0*Sum of all water independent and dependent pathways.

Attachment	1	Sheet No.	19 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 20
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
Al-26	1.106E+03	0.2637	3.194E-04	0.0000	0.000E+00	0.0000	3.271E-01	0.0001	1.009E-02	0.0000	1.045E-02	0.0000	8.472E-02	0.0000
Cl-36	1.518E-01	0.0000	8.815E-05	0.0000	0.000E+00	0.0000	3.404E+02	0.0812	4.439E+02	0.1058	3.324E+02	0.0793	1.764E-02	0.0000
Cm-248	5.856E-03	0.0000	6.648E+00	0.0016	0.000E+00	0.0000	7.653E+01	0.0182	2.776E-01	0.0001	7.534E-02	0.0000	7.925E+01	0.0189
Cs-135	2.509E-03	0.0000	1.834E-05	0.0000	0.000E+00	0.0000	1.591E+00	0.0004	1.228E+00	0.0003	7.624E-01	0.0002	4.122E-02	0.0000
Gd-152	0.000E+00	0.0000	9.800E-01	0.0002	0.000E+00	0.0000	2.266E+00	0.0005	3.880E-01	0.0001	1.025E-02	0.0000	9.390E-01	0.0002
I-129	8.701E-01	0.0002	7.019E-04	0.0000	0.000E+00	0.0000	3.108E+01	0.0074	6.470E+00	0.0015	2.208E+01	0.0053	1.610E+00	0.0004
K-40	6.649E+01	0.0159	5.003E-05	0.0000	0.000E+00	0.0000	3.141E+01	0.0075	1.398E+01	0.0033	1.106E+01	0.0026	1.085E-01	0.0000
Np-237	7.081E+01	0.0169	2.179E+00	0.0005	0.000E+00	0.0000	5.000E+02	0.1192	1.486E+01	0.0035	1.775E-01	0.0000	2.591E+01	0.0062
Pu-242	8.593E-03	0.0000	1.658E+00	0.0004	0.000E+00	0.0000	1.893E+01	0.0045	3.434E-01	0.0001	9.321E-03	0.0000	1.961E+01	0.0047
Pu-244	4.917E+02	0.1173	1.627E+00	0.0004	0.000E+00	0.0000	1.872E+01	0.0045	3.395E-01	0.0001	9.213E-03	0.0000	1.938E+01	0.0046
Sm-147	0.000E+00	0.0000	3.015E-01	0.0001	0.000E+00	0.0000	2.605E+00	0.0006	4.461E-01	0.0001	1.179E-02	0.0000	1.080E+00	0.0003
Th-232	1.974E+02	0.0471	6.798E+00	0.0016	0.000E+00	0.0000	1.137E+02	0.0271	2.697E+00	0.0006	5.707E+00	0.0014	1.907E+01	0.0045
U-235	4.898E+01	0.0117	4.968E-01	0.0001	0.000E+00	0.0000	3.799E+00	0.0009	1.164E-01	0.0000	5.106E-01	0.0001	1.563E+00	0.0004
U-236	1.423E-02	0.0000	5.045E-01	0.0001	0.000E+00	0.0000	3.789E+00	0.0009	1.103E-01	0.0000	5.144E-01	0.0001	1.570E+00	0.0004
U-238	9.743E+00	0.0023	4.763E-01	0.0001	0.000E+00	0.0000	3.789E+00	0.0009	1.103E-01	0.0000	5.144E-01	0.0001	1.570E+00	0.0004
Total	1.992E+03	0.4750	2.167E+01	0.0052	0.000E+00	0.0000	1.149E+03	0.2740	4.852E+02	0.1157	3.739E+02	0.0892	1.718E+02	0.0410

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 = 3.000E+00 years
0 Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* fract.
Al-26	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	1.106E+03	0.2638
Cl-36	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	1.117E+03	0.2663
Cm-248	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	1.628E+02	0.0388
Cs-135	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	3.625E+00	0.0009
Gd-152	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	4.583E+00	0.0011
I-129	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	6.212E+01	0.0148
K-40	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	1.230E+02	0.0293
Np-237	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	6.139E+02	0.1464
Pu-242	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	4.056E+01	0.0097
Pu-244	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	5.318E+02	0.1268
Sm-147	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	4.445E+00	0.0011
Th-232	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	3.454E+02	0.0824
U-235	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	5.547E+01	0.0132
U-236	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	6.503E+00	0.0016
U-238	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	1.620E+01	0.0039
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	4.193E+03	1.0000

0*Sum of all water independent and dependent pathways.

Attachment	1	Sheet No.	20 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 21
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
0 Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	1.089E+03	0.2292	3.147E-04	0.0000	0.000E+00	0.0000	3.223E-01	0.0001	9.936E-03	0.0000	1.030E-02	0.0000	8.347E-02	0.0000
Cl-36	1.507E-01	0.0000	8.749E-05	0.0000	0.000E+00	0.0000	3.378E+02	0.0711	4.405E+02	0.0927	3.299E+02	0.0694	1.751E-02	0.0000
Cm-248	5.853E-03	0.0000	6.615E+00	0.0014	0.000E+00	0.0000	7.615E+01	0.0160	2.762E-01	0.0001	7.497E-02	0.0000	7.885E+01	0.0166
Cs-135	2.500E-03	0.0000	1.827E-05	0.0000	0.000E+00	0.0000	1.585E+00	0.0003	1.223E+00	0.0003	7.595E-01	0.0002	4.107E-02	0.0000
Gd-152	0.000E+00	0.0000	9.770E-01	0.0002	0.000E+00	0.0000	2.259E+00	0.0005	3.868E-01	0.0001	1.022E-02	0.0000	9.362E-01	0.0002
I-129	8.679E-01	0.0002	7.001E-04	0.0000	0.000E+00	0.0000	3.101E+01	0.0065	6.454E+00	0.0014	2.203E+01	0.0046	1.606E+00	0.0003
K-40	6.634E+01	0.0140	4.992E-05	0.0000	0.000E+00	0.0000	3.135E+01	0.0066	1.395E+01	0.0029	1.103E+01	0.0023	1.083E-01	0.0000
Np-237	7.067E+01	0.0149	2.175E+00	0.0005	0.000E+00	0.0000	4.991E+02	0.1050	1.483E+01	0.0031	1.772E-01	0.0000	2.586E+01	0.0054
Pu-242	8.578E-03	0.0000	1.656E+00	0.0003	0.000E+00	0.0000	1.890E+01	0.0040	3.428E-01	0.0001	9.305E-03	0.0000	1.957E+01	0.0041
Pu-244	4.909E+02	0.1033	1.626E+00	0.0003	0.000E+00	0.0000	1.870E+01	0.0039	3.392E-01	0.0001	9.207E-03	0.0000	1.937E+01	0.0041
Sm-147	0.000E+00	0.0000	3.010E-01	0.0001	0.000E+00	0.0000	2.602E+00	0.0005	4.455E-01	0.0001	1.177E-02	0.0000	1.078E+00	0.0002
Th-232	6.365E+02	0.1339	7.410E+00	0.0016	0.000E+00	0.0000	2.452E+02	0.0516	6.083E+00	0.0013	1.342E+01	0.0028	2.446E+01	0.0051
U-235	4.893E+01	0.0103	4.978E-01	0.0001	0.000E+00	0.0000	3.888E+00	0.0008	1.329E-01	0.0000	5.100E-01	0.0001	1.572E+00	0.0003
U-236	1.422E-02	0.0000	5.040E-01	0.0001	0.000E+00	0.0000	3.785E+00	0.0008	1.102E-01	0.0000	5.138E-01	0.0001	1.569E+00	0.0003
U-238	9.734E+00	0.0020	4.758E-01	0.0001	0.000E+00	0.0000	3.785E+00	0.0008	1.102E-01	0.0000	5.139E-01	0.0001	1.569E+00	0.0003
Total	2.414E+03	0.5078	2.224E+01	0.0047	0.000E+00	0.0000	1.276E+03	0.2685	4.852E+02	0.1021	3.790E+02	0.0797	1.767E+02	0.0372

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 = 1.000E+01 years
0 Water Dependent Pathways

0 Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	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	1.090E+03	0.2293
Cl-36	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	1.108E+03	0.2332
Cm-248	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	1.620E+02	0.0341
Cs-135	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	3.611E+00	0.0008
Gd-152	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	4.569E+00	0.0010
I-129	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	6.196E+01	0.0130
K-40	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	1.228E+02	0.0258
Np-237	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	6.128E+02	0.1289
Pu-242	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	4.049E+01	0.0085
Pu-244	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	5.310E+02	0.1117
Sm-147	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	4.438E+00	0.0009
Th-232	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	9.331E+02	0.1963
U-235	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	5.553E+01	0.0117
U-236	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	6.496E+00	0.0014
U-238	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	1.619E+01	0.0034
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	4.753E+03	1.0000

0*Sum of all water independent and dependent pathways.

Attachment 1 Sheet No. 21 of 32
Originator S. W. Clark Date
Chk'd By M.T. Stankovich Date
Calc. No. 0100X-CA-V0050 Rev. No. 0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 22
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio- Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
Al-26	1.044E+03	0.2033	3.016E-04	0.0000	0.000E+00	0.0000	3.089E-01	0.0001	9.524E-03	0.0000	9.867E-03	0.0000	8.001E-02	0.0000
Cl-36	1.474E-01	0.0000	8.563E-05	0.0000	0.000E+00	0.0000	3.307E+02	0.0644	4.312E+02	0.0839	3.229E+02	0.0629	1.713E-02	0.0000
Cm-248	5.844E-03	0.0000	6.520E+00	0.0013	0.000E+00	0.0000	7.506E+01	0.0146	2.723E-01	0.0001	7.389E-02	0.0000	7.773E+01	0.0151
Cs-135	2.473E-03	0.0000	1.808E-05	0.0000	0.000E+00	0.0000	1.568E+00	0.0003	1.210E+00	0.0002	7.514E-01	0.0001	4.063E-02	0.0000
Gd-152	0.000E+00	0.0000	9.686E-01	0.0002	0.000E+00	0.0000	2.240E+00	0.0004	3.835E-01	0.0001	1.013E-02	0.0000	9.281E-01	0.0002
I-129	8.617E-01	0.0002	6.951E-04	0.0000	0.000E+00	0.0000	3.078E+01	0.0060	6.408E+00	0.0012	2.187E+01	0.0043	1.594E+00	0.0003
K-40	6.593E+01	0.0128	4.961E-05	0.0000	0.000E+00	0.0000	3.115E+01	0.0061	1.387E+01	0.0027	1.097E+01	0.0021	1.076E-01	0.0000
Np-237	7.029E+01	0.0137	2.163E+00	0.0004	0.000E+00	0.0000	4.964E+02	0.0966	1.475E+01	0.0029	1.763E-01	0.0000	2.572E+01	0.0050
Pu-242	8.537E-03	0.0000	1.648E+00	0.0003	0.000E+00	0.0000	1.881E+01	0.0037	3.412E-01	0.0001	9.260E-03	0.0000	1.948E+01	0.0038
Pu-244	4.888E+02	0.0952	1.622E+00	0.0003	0.000E+00	0.0000	1.866E+01	0.0036	3.385E-01	0.0001	9.188E-03	0.0000	1.933E+01	0.0038
Sm-147	0.000E+00	0.0000	2.999E-01	0.0001	0.000E+00	0.0000	2.592E+00	0.0005	4.438E-01	0.0001	1.173E-02	0.0000	1.074E+00	0.0002
Th-232	9.959E+02	0.1939	7.938E+00	0.0015	0.000E+00	0.0000	3.350E+02	0.0652	8.391E+00	0.0016	1.866E+01	0.0036	2.851E+01	0.0056
U-235	4.880E+01	0.0095	5.035E-01	0.0001	0.000E+00	0.0000	4.167E+00	0.0008	1.800E-01	0.0000	5.086E-01	0.0001	1.610E+00	0.0003
U-236	1.417E-02	0.0000	5.024E-01	0.0001	0.000E+00	0.0000	3.773E+00	0.0007	1.098E-01	0.0000	5.122E-01	0.0001	1.564E+00	0.0003
U-238	9.705E+00	0.0019	4.745E-01	0.0001	0.000E+00	0.0000	3.775E+00	0.0007	1.099E-01	0.0000	5.124E-01	0.0001	1.564E+00	0.0003
Total	2.725E+03	0.5304	2.264E+01	0.0044	0.000E+00	0.0000	1.355E+03	0.2638	4.780E+02	0.0931	3.770E+02	0.0734	1.793E+02	0.0349

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 = 3.000E+01 years
0 Water Dependent Pathways
0

Radio- Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* fract.
Al-26	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	1.045E+03	0.2034
Cl-36	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	1.085E+03	0.2112
Cm-248	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	1.597E+02	0.0311
Cs-135	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	3.572E+00	0.0007
Gd-152	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	4.530E+00	0.0009
I-129	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	6.152E+01	0.0120
K-40	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	1.220E+02	0.0238
Np-237	1.259E-03	0.0000	8.509E-06	0.0000	0.000E+00	0.0000	1.356E-04	0.0000	4.819E-06	0.0000	2.608E-05	0.0000	6.095E+02	0.1187
Pu-242	5.276E-11	0.0000	6.650E-12	0.0000	0.000E+00	0.0000	6.761E-12	0.0000	4.551E-13	0.0000	5.464E-13	0.0000	4.030E+01	0.0078
Pu-244	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	5.288E+02	0.1029
Sm-147	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	4.421E+00	0.0009
Th-232	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	1.394E+03	0.2715
U-235	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	5.577E+01	0.0109
U-236	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	6.475E+00	0.0013
U-238	7.790E-04	0.0000	5.272E-06	0.0000	0.000E+00	0.0000	8.391E-05	0.0000	2.982E-06	0.0000	1.613E-05	0.0000	1.614E+01	0.0031
Total	2.038E-03	0.0000	1.378E-05	0.0000	0.000E+00	0.0000	2.196E-04	0.0000	7.801E-06	0.0000	4.221E-05	0.0000	5.136E+03	1.0000

0*Sum of all water independent and dependent pathways.

Attachment	1	Sheet No.	22 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 23
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	9.001E+02	0.1822	2.600E-04	0.0000	0.000E+00	0.0000	2.663E-01	0.0001	8.209E-03	0.0000	8.506E-03	0.0000	6.897E-02	0.0000
Cl-36	1.368E-01	0.0000	7.942E-05	0.0000	0.000E+00	0.0000	3.067E+02	0.0621	3.999E+02	0.0810	2.995E+02	0.0606	1.589E-02	0.0000
Cm-248	5.811E-03	0.0000	6.200E+00	0.0013	0.000E+00	0.0000	7.137E+01	0.0144	2.589E-01	0.0001	7.026E-02	0.0000	7.391E+01	0.0150
Cs-135	2.381E-03	0.0000	1.741E-05	0.0000	0.000E+00	0.0000	1.510E+00	0.0003	1.165E+00	0.0002	7.235E-01	0.0001	3.912E-02	0.0000
Gd-152	0.000E+00	0.0000	9.397E-01	0.0002	0.000E+00	0.0000	2.173E+00	0.0004	3.721E-01	0.0001	9.833E-03	0.0000	9.005E-01	0.0002
I-129	8.402E-01	0.0002	6.777E-04	0.0000	0.000E+00	0.0000	3.002E+01	0.0061	6.248E+00	0.0013	2.133E+01	0.0043	1.555E+00	0.0003
K-40	6.452E+01	0.0131	4.855E-05	0.0000	0.000E+00	0.0000	3.049E+01	0.0062	1.357E+01	0.0027	1.073E+01	0.0022	1.053E-01	0.0000
Np-237	6.897E+01	0.0140	2.122E+00	0.0004	0.000E+00	0.0000	4.870E+02	0.0986	1.447E+01	0.0029	1.731E-01	0.0000	2.524E+01	0.0051
Pu-242	8.393E-03	0.0000	1.620E+00	0.0003	0.000E+00	0.0000	1.849E+01	0.0037	3.354E-01	0.0001	9.104E-03	0.0000	1.915E+01	0.0039
Pu-244	4.815E+02	0.0975	1.610E+00	0.0003	0.000E+00	0.0000	1.853E+01	0.0038	3.361E-01	0.0001	9.121E-03	0.0000	1.919E+01	0.0039
Sm-147	0.000E+00	0.0000	2.958E-01	0.0001	0.000E+00	0.0000	2.556E+00	0.0005	4.377E-01	0.0001	1.157E-02	0.0000	1.059E+00	0.0002
Th-232	1.019E+03	0.2064	7.894E+00	0.0016	0.000E+00	0.0000	3.397E+02	0.0688	8.513E+00	0.0017	1.894E+01	0.0038	2.857E+01	0.0058
U-235	4.841E+01	0.0098	5.382E-01	0.0001	0.000E+00	0.0000	5.240E+00	0.0011	3.420E-01	0.0001	5.043E-01	0.0001	1.786E+00	0.0004
U-236	1.402E-02	0.0000	4.970E-01	0.0001	0.000E+00	0.0000	3.732E+00	0.0008	1.086E-01	0.0000	5.067E-01	0.0001	1.547E+00	0.0003
U-238	9.608E+00	0.0019	4.698E-01	0.0001	0.000E+00	0.0000	3.737E+00	0.0008	1.088E-01	0.0000	5.074E-01	0.0001	1.549E+00	0.0003
Total	2.594E+03	0.5250	2.219E+01	0.0045	0.000E+00	0.0000	1.321E+03	0.2675	4.462E+02	0.0903	3.530E+02	0.0715	1.747E+02	0.0354

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 = 1.000E+02 years
0 Water Dependent Pathways
0

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	1.966E+01	0.0040	5.756E+00	0.0012	0.000E+00	0.0000	2.172E+00	0.0004	1.251E-01	0.0000	1.448E-01	0.0000	9.283E+02	0.1879
Cl-36	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	1.006E+03	0.2037
Cm-248	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	1.518E+02	0.0307
Cs-135	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	3.440E+00	0.0007
Gd-152	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	4.395E+00	0.0009
I-129	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	5.998E+01	0.0121
K-40	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	1.194E+02	0.0242
Np-237	5.412E-01	0.0001	3.714E-03	0.0000	0.000E+00	0.0000	5.980E-02	0.0000	2.347E-03	0.0000	1.197E-02	0.0000	5.986E+02	0.1212
Pu-242	2.246E-09	0.0000	1.022E-10	0.0000	0.000E+00	0.0000	2.635E-10	0.0000	1.059E-11	0.0000	4.209E-11	0.0000	3.962E+01	0.0080
Pu-244	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	5.211E+02	0.1055
Sm-147	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	4.360E+00	0.0009
Th-232	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	1.423E+03	0.2881
U-235	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	5.682E+01	0.0115
U-236	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	6.406E+00	0.0013
U-238	3.346E-01	0.0001	2.289E-03	0.0000	0.000E+00	0.0000	3.698E-02	0.0000	1.452E-03	0.0000	7.404E-03	0.0000	1.636E+01	0.0033
Total	2.054E+01	0.0042	5.762E+00	0.0012	0.000E+00	0.0000	2.269E+00	0.0005	1.289E-01	0.0000	1.642E-01	0.0000	4.940E+03	1.0000

0*Sum of all water independent and dependent pathways.

Attachment 1 Sheet No. 23 of 32
Originator S. W. Clark Date
Chk'd By M.T. Stankovich Date
Calc. No. 0100X-CA-V0050 Rev. No. 0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 24
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	5.889E+02	0.0663	1.701E-04	0.0000	0.000E+00	0.0000	1.742E-01	0.0000	5.371E-03	0.0000	5.565E-03	0.0000	4.512E-02	0.0000
Cl-36	1.103E-01	0.0000	6.405E-05	0.0000	0.000E+00	0.0000	2.473E+02	0.0278	3.225E+02	0.0363	2.416E+02	0.0272	1.282E-02	0.0000
Cm-248	5.707E-03	0.0000	5.368E+00	0.0006	0.000E+00	0.0000	6.179E+01	0.0070	2.242E-01	0.0000	6.084E-02	0.0000	6.399E+01	0.0072
Cs-135	2.137E-03	0.0000	1.563E-05	0.0000	0.000E+00	0.0000	1.355E+00	0.0002	1.046E+00	0.0001	6.495E-01	0.0001	3.511E-02	0.0000
Gd-152	0.000E+00	0.0000	8.619E-01	0.0001	0.000E+00	0.0000	1.993E+00	0.0002	3.412E-01	0.0000	9.018E-03	0.0000	8.259E-01	0.0001
I-129	7.818E-01	0.0001	6.306E-04	0.0000	0.000E+00	0.0000	2.793E+01	0.0031	5.813E+00	0.0007	1.984E+01	0.0022	1.447E+00	0.0002
K-40	6.065E+01	0.0068	4.564E-05	0.0000	0.000E+00	0.0000	2.866E+01	0.0032	1.276E+01	0.0014	1.009E+01	0.0011	9.900E-02	0.0000
Np-237	6.533E+01	0.0074	2.011E+00	0.0002	0.000E+00	0.0000	4.613E+02	0.0519	1.371E+01	0.0015	1.641E-01	0.0000	2.391E+01	0.0027
Pu-242	7.996E-03	0.0000	1.543E+00	0.0002	0.000E+00	0.0000	1.762E+01	0.0020	3.196E-01	0.0000	8.673E-03	0.0000	1.825E+01	0.0021
Pu-244	4.610E+02	0.0519	1.577E+00	0.0002	0.000E+00	0.0000	1.814E+01	0.0020	3.291E-01	0.0000	8.931E-03	0.0000	1.879E+01	0.0021
Sm-147	0.000E+00	0.0000	2.843E-01	0.0000	0.000E+00	0.0000	2.457E+00	0.0003	4.208E-01	0.0000	1.112E-02	0.0000	1.018E+00	0.0001
Th-232	9.833E+02	0.1107	7.614E+00	0.0009	0.000E+00	0.0000	3.276E+02	0.0369	8.211E+00	0.0009	1.827E+01	0.0021	2.755E+01	0.0031
U-235	4.738E+01	0.0053	6.471E-01	0.0001	0.000E+00	0.0000	8.257E+00	0.0009	7.801E-01	0.0001	4.926E-01	0.0001	2.311E+00	0.0003
U-236	1.361E-02	0.0000	4.818E-01	0.0001	0.000E+00	0.0000	3.619E+00	0.0004	1.053E-01	0.0000	4.913E-01	0.0001	1.500E+00	0.0002
U-238	9.334E+00	0.0011	4.565E-01	0.0001	0.000E+00	0.0000	3.632E+00	0.0004	1.057E-01	0.0000	4.930E-01	0.0001	1.505E+00	0.0002
Total	2.217E+03	0.2495	2.085E+01	0.0023	0.000E+00	0.0000	1.212E+03	0.1364	3.667E+02	0.0413	2.921E+02	0.0329	1.613E+02	0.0182

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 = 3.000E+02 years
0 Water Dependent Pathways

0	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	3.444E+01	0.0039	1.009E+01	0.0011	0.000E+00	0.0000	3.810E+00	0.0004	2.204E-01	0.0000	2.544E-01	0.0000	6.379E+02	0.0718
Cl-36	4.600E+00	0.0005	2.491E+00	0.0003	0.000E+00	0.0000	3.600E+00	0.0004	5.400E+00	0.0006	4.799E+00	0.0005	8.324E+02	0.0937
Cm-248	3.946E+03	0.4441	1.603E+02	0.0180	0.000E+00	0.0000	4.358E+02	0.0490	1.006E+00	0.0001	2.910E-01	0.0000	4.675E+03	0.5261
Cs-135	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	3.088E+00	0.0003
Gd-152	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	4.031E+00	0.0005
I-129	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	5.581E+01	0.0063
K-40	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	1.123E+02	0.0126
Np-237	1.543E+00	0.0002	1.075E-02	0.0000	0.000E+00	0.0000	1.706E-01	0.0000	6.699E-03	0.0000	3.411E-02	0.0000	5.682E+02	0.0639
Pu-242	2.177E-08	0.0000	1.739E-10	0.0000	0.000E+00	0.0000	2.445E-09	0.0000	9.727E-11	0.0000	4.864E-10	0.0000	3.774E+01	0.0042
Pu-244	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	4.999E+02	0.0563
Sm-147	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	4.192E+00	0.0005
Th-232	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	1.373E+03	0.1545
U-235	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	5.986E+01	0.0067
U-236	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	6.210E+00	0.0007
U-238	9.518E-01	0.0001	6.523E-03	0.0000	0.000E+00	0.0000	1.052E-01	0.0000	4.138E-03	0.0000	2.108E-02	0.0000	1.661E+01	0.0019
Total	3.988E+03	0.4488	1.729E+02	0.0195	0.000E+00	0.0000	4.435E+02	0.0499	6.638E+00	0.0007	5.399E+00	0.0006	8.886E+03	1.0000

0*Sum of all water independent and dependent pathways.

Attachment 1 Sheet No. 24 of 32
Originator S. W. Clark Date
Chk'd By M.T. Stankovich Date
Calc. No. 0100X-CA-V0050 Rev. No. 0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 25
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
Al-26	1.334E+02	0.0089	3.853E-05	0.0000	0.000E+00	0.0000	3.946E-02	0.0000	1.217E-03	0.0000	1.261E-03	0.0000	1.022E-02	0.0000
Cl-36	5.196E-02	0.0000	3.018E-05	0.0000	0.000E+00	0.0000	1.165E+02	0.0078	1.520E+02	0.0102	1.138E+02	0.0076	6.038E-03	0.0000
Cm-248	5.247E-03	0.0000	3.243E+00	0.0002	0.000E+00	0.0000	3.733E+01	0.0025	1.354E-01	0.0000	3.675E-02	0.0000	3.865E+01	0.0026
Cs-135	1.465E-03	0.0000	1.071E-05	0.0000	0.000E+00	0.0000	9.287E-01	0.0001	7.165E-01	0.0000	4.450E-01	0.0000	2.406E-02	0.0000
Gd-152	0.000E+00	0.0000	6.369E-01	0.0000	0.000E+00	0.0000	1.473E+00	0.0001	2.521E-01	0.0000	6.664E-03	0.0000	6.103E-01	0.0000
I-129	6.074E-01	0.0000	4.899E-04	0.0000	0.000E+00	0.0000	2.170E+01	0.0014	4.517E+00	0.0003	1.542E+01	0.0010	1.124E+00	0.0001
K-40	4.885E+01	0.0033	3.676E-05	0.0000	0.000E+00	0.0000	2.308E+01	0.0015	1.027E+01	0.0007	8.124E+00	0.0005	7.974E-02	0.0000
Np-237	5.405E+01	0.0036	1.664E+00	0.0001	0.000E+00	0.0000	3.816E+02	0.0255	1.134E+01	0.0008	1.358E-01	0.0000	1.978E+01	0.0013
Pu-242	6.749E-03	0.0000	1.302E+00	0.0001	0.000E+00	0.0000	1.487E+01	0.0010	2.697E-01	0.0000	7.319E-03	0.0000	1.540E+01	0.0010
Pu-244	3.962E+02	0.0265	1.462E+00	0.0001	0.000E+00	0.0000	1.683E+01	0.0011	3.052E-01	0.0000	8.284E-03	0.0000	1.743E+01	0.0012
Sm-147	0.000E+00	0.0000	2.477E-01	0.0000	0.000E+00	0.0000	2.141E+00	0.0001	3.666E-01	0.0000	9.688E-03	0.0000	8.872E-01	0.0001
Th-232	8.665E+02	0.0579	6.710E+00	0.0004	0.000E+00	0.0000	2.887E+02	0.0193	7.236E+00	0.0005	1.610E+01	0.0011	2.428E+01	0.0016
U-235	4.384E+01	0.0029	9.595E-01	0.0001	0.000E+00	0.0000	1.698E+01	0.0011	2.050E+00	0.0001	4.528E-01	0.0000	3.822E+00	0.0003
U-236	1.224E-02	0.0000	4.323E-01	0.0000	0.000E+00	0.0000	3.247E+00	0.0002	9.451E-02	0.0000	4.408E-01	0.0000	1.346E+00	0.0001
U-238	8.436E+00	0.0006	4.126E-01	0.0000	0.000E+00	0.0000	3.283E+00	0.0002	9.556E-02	0.0000	4.456E-01	0.0000	1.360E+00	0.0001
Total	1.552E+03	0.1037	1.707E+01	0.0011	0.000E+00	0.0000	9.288E+02	0.0621	1.896E+02	0.0127	1.554E+02	0.0104	1.248E+02	0.0083

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 = 1.000E+03 years
0 Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* fract.
Al-26	7.305E+00	0.0005	2.140E+00	0.0001	0.000E+00	0.0000	8.081E-01	0.0001	4.674E-02	0.0000	5.397E-02	0.0000	1.438E+02	0.0096
Cl-36	2.276E+00	0.0002	1.233E+00	0.0001	0.000E+00	0.0000	1.782E+00	0.0001	2.676E+00	0.0002	2.377E+00	0.0002	3.927E+02	0.0262
Cm-248	1.015E+04	0.6785	4.126E+02	0.0276	0.000E+00	0.0000	1.122E+03	0.0750	2.598E+00	0.0002	7.500E-01	0.0001	1.177E+04	0.7866
Cs-135	4.938E+00	0.0003	5.314E+00	0.0004	0.000E+00	0.0000	5.522E-01	0.0000	1.897E+00	0.0001	1.460E+00	0.0001	1.628E+01	0.0011
Gd-152	1.041E+02	0.0070	3.952E+00	0.0003	0.000E+00	0.0000	1.151E+01	0.0008	2.664E+00	0.0002	7.691E-02	0.0000	1.253E+02	0.0084
I-129	8.824E+01	0.0059	1.906E+00	0.0001	0.000E+00	0.0000	9.806E+00	0.0007	7.899E+00	0.0005	3.258E+01	0.0022	1.838E+02	0.0123
K-40	2.241E+00	0.0001	1.214E+00	0.0001	0.000E+00	0.0000	2.701E-01	0.0000	5.771E-01	0.0000	5.825E-01	0.0000	9.529E+01	0.0064
Np-237	1.854E+00	0.0001	1.389E-02	0.0000	0.000E+00	0.0000	2.050E-01	0.0000	8.000E-03	0.0000	4.062E-02	0.0000	4.707E+02	0.0315
Pu-242	2.068E-07	0.0000	8.824E-09	0.0000	0.000E+00	0.0000	2.288E-08	0.0000	1.183E-09	0.0000	4.069E-09	0.0000	3.185E+01	0.0021
Pu-244	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	4.322E+02	0.0289
Sm-147	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	3.652E+00	0.0002
Th-232	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	1.210E+03	0.0808
U-235	1.572E-02	0.0000	5.118E-04	0.0000	0.000E+00	0.0000	1.735E-03	0.0000	3.986E-06	0.0000	1.156E-05	0.0000	6.812E+01	0.0046
U-236	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	5.572E+00	0.0004
U-238	1.123E+00	0.0001	8.053E-03	0.0000	0.000E+00	0.0000	1.242E-01	0.0000	4.898E-03	0.0000	2.485E-02	0.0000	1.532E+01	0.0010
Total	1.037E+04	0.6927	4.284E+02	0.0286	0.000E+00	0.0000	1.147E+03	0.0767	1.837E+01	0.0012	3.795E+01	0.0025	1.497E+04	1.0000

0*Sum of all water independent and dependent pathways.

Attachment 1 Sheet No. 25 of 32
Originator S. W. Clark Date
Chk'd By M.T. Stankovich Date
Calc. No. 0100X-CA-V0050 Rev. No. 0

ATTACHMENT 1

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1RESRAD, Version 6.21     T« Limit = 0.5 year        11/15/2004  08:25  Page  26
 Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
 File    : Kd_vs_VZ_100rdr_Rev4.RAD

                          Dose/Source Ratios Summed Over All Pathways
                   Parent and Progeny Principal Radionuclide Contributions Indicated
0Parent  Product  Branch                         DSR(j,t)  (mrem/yr)/(pCi/g)
  (i)      (j)    Fraction* t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ    ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ
 Al-26   Al-26   1.000E+00    1.113E+01 1.111E+01 1.106E+01 1.090E+01 1.045E+01 9.283E+00 6.379E+00 1.438E+00
0Cl-36   Cl-36   1.000E+00    1.120E+01 1.119E+01 1.117E+01 1.108E+01 1.085E+01 1.006E+01 8.324E+00 3.927E+00
0Cm-248  Cm-248  1.000E+00    1.631E+00 1.630E+00 1.628E+00 1.620E+00 1.597E+00 1.518E+00 4.675E+01 1.177E+02
 Cm-248  Pu-244  9.174E-01    0.000E+00 4.095E-08 1.227E-07 4.077E-07 1.212E-06 3.909E-06 1.177E-05 9.273E-05
 Cm-248  Pu-240  9.163E-01    0.000E+00 1.742E-13 1.567E-12 1.736E-11 1.551E-10 1.680E-09 1.467E-08 6.848E-07
 Cm-248  U-236   9.163E-01    0.000E+00 2.501E-22 6.951E-21 2.597E-19 6.989E-18 2.535E-16 7.677E-13 2.239E-11
 Cm-248  Th-232  9.163E-01    0.000E+00 2.065E-32 1.586E-30 1.913E-28 1.531E-26 1.849E-24 8.108E-15 5.810E-15
 Cm-248  Ra-228  9.163E-01    0.000E+00 7.929E-33 1.966E-30 7.268E-28 1.299E-25 2.642E-23 1.299E-15 9.587E-16
 Cm-248  Th-228  9.163E-01    0.000E+00 4.721E-34 2.932E-31 2.644E-28 8.075E-26 2.123E-23 7.214E-16 5.172E-16
 Cm-248  äDSR(j)              1.631E+00 1.630E+00 1.628E+00 1.620E+00 1.597E+00 1.518E+00 4.675E+01 1.177E+02
0Cs-135  Cs-135  1.000E+00    3.630E-02 3.629E-02 3.625E-02 3.611E-02 3.572E-02 3.440E-02 3.088E-02 1.628E-01
0Gd-152  Gd-152  1.000E+00    4.589E-02 4.587E-02 4.583E-02 4.569E-02 4.530E-02 4.395E-02 4.031E-02 1.253E+00
0I-129   I-129   1.000E+00    6.218E-01 6.216E-01 6.212E-01 6.196E-01 6.152E-01 5.998E-01 5.581E-01 1.838E+00
0K-40    K-40    1.000E+00    1.232E+00 1.231E+00 1.230E+00 1.228E+00 1.220E+00 1.194E+00 1.123E+00 9.529E-01
0Np-237  Np-237  1.000E+00    6.144E+00 6.143E+00 6.139E+00 6.128E+00 6.095E+00 5.980E+00 5.665E+00 4.686E+00
 Np-237  U-233   1.000E+00    0.000E+00 3.626E-07 9.741E-07 3.063E-06 2.295E-05 6.211E-03 1.766E-02 2.102E-02
 Np-237  Th-229  1.000E+00    0.000E+00 3.334E-10 2.946E-09 3.217E-08 2.793E-07 5.507E-06 5.793E-05 3.276E-04
 Np-237  äDSR(j)              6.144E+00 6.143E+00 6.139E+00 6.128E+00 6.095E+00 5.986E+00 5.682E+00 4.707E+00
0Pu-242  Pu-242  1.000E+00    4.059E-01 4.058E-01 4.056E-01 4.049E-01 4.030E-01 3.962E-01 3.774E-01 3.185E-01
 Pu-242  U-238   1.000E+00    0.000E+00 2.499E-11 7.525E-11 2.508E-10 7.499E-10 2.467E-09 7.119E-09 2.073E-08
 Pu-242  U-234   1.000E+00    0.000E+00 1.504E-17 1.350E-16 1.481E-15 1.922E-13 2.000E-11 2.497E-10 1.813E-09
 Pu-242  Th-230  1.000E+00    0.000E+00 5.463E-23 1.408E-21 5.079E-20 4.891E-15 6.711E-14 1.243E-14 6.342E-12
 Pu-242  Ra-226  1.000E+00    0.000E+00 7.138E-25 5.955E-23 7.378E-21 1.195E-14 1.636E-13 2.325E-14 1.563E-11
 Pu-242  Pb-210  1.000E+00    0.000E+00 3.028E-27 5.922E-25 2.103E-22 4.755E-13 6.536E-12 8.160E-13 6.076E-10
 Pu-242  äDSR(j)              4.059E-01 4.058E-01 4.056E-01 4.049E-01 4.030E-01 3.962E-01 3.774E-01 3.185E-01
0Pu-244  Pu-244  1.000E+00    5.321E+00 5.320E+00 5.318E+00 5.309E+00 5.286E+00 5.207E+00 4.986E+00 4.284E+00
 Pu-244  Pu-240  9.987E-01    0.000E+00 4.527E-05 1.357E-04 4.519E-04 1.351E-03 4.443E-03 1.284E-02 3.750E-02
 Pu-244  U-236   9.987E-01    0.000E+00 9.887E-14 9.078E-13 1.015E-11 9.120E-11 1.002E-09 8.702E-09 8.541E-08
 Pu-244  Th-232  9.987E-01    0.000E+00 1.054E-23 2.728E-22 9.930E-21 2.659E-19 9.708E-18 2.528E-16 8.266E-15
 Pu-244  Ra-228  9.987E-01    0.000E+00 5.217E-24 4.236E-22 4.569E-20 2.593E-18 1.482E-16 4.514E-15 1.563E-13
 Pu-244  Th-228  9.987E-01    0.000E+00 3.616E-25 7.355E-23 1.879E-20 1.731E-18 1.223E-16 3.948E-15 1.394E-13
 Pu-244  äDSR(j)              5.321E+00 5.320E+00 5.318E+00 5.310E+00 5.288E+00 5.211E+00 4.999E+00 4.322E+00
0Sm-147  Sm-147  1.000E+00    4.447E-02 4.446E-02 4.445E-02 4.438E-02 4.421E-02 4.360E-02 4.192E-02 3.652E-02
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Attachment	1	Sheet No.	26 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 27
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0Parent (i)	Product (j)	Branch Fraction*	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
			DSR(j,t) (mrem/yr)/(pCi/g)							
Th-232	Th-232	1.000E+00	3.831E-01	3.831E-01	3.829E-01	3.824E-01	3.811E-01	3.763E-01	3.629E-01	3.198E-01
Th-232	Ra-228	1.000E+00	0.000E+00	8.263E-01	2.238E+00	5.184E+00	7.187E+00	7.294E+00	7.035E+00	6.199E+00
Th-232	Th-228	1.000E+00	0.000E+00	1.266E-01	8.335E-01	3.764E+00	6.376E+00	6.561E+00	6.328E+00	5.576E+00
Th-232	äDSR(j)		3.831E-01	1.336E+00	3.454E+00	9.331E+00	1.394E+01	1.423E+01	1.373E+01	1.210E+01
0U-235	U-235	1.000E+00	5.545E-01	5.544E-01	5.542E-01	5.535E-01	5.517E-01	5.453E-01	5.274E-01	4.693E-01
U-235	Pa-231	1.000E+00	0.000E+00	1.610E-04	4.949E-04	1.661E-03	4.976E-03	1.637E-02	4.717E-02	1.365E-01
U-235	Ac-227	1.000E+00	0.000E+00	1.713E-06	1.392E-05	1.393E-04	1.020E-03	6.540E-03	2.406E-02	7.541E-02
U-235	äDSR(j)		5.545E-01	5.545E-01	5.547E-01	5.553E-01	5.577E-01	5.682E-01	5.986E-01	6.812E-01
0U-236	U-236	1.000E+00	6.506E-02	6.505E-02	6.503E-02	6.496E-02	6.475E-02	6.406E-02	6.210E-02	5.572E-02
U-236	Th-232	1.000E+00	0.000E+00	1.936E-11	5.713E-11	1.892E-10	5.646E-10	1.859E-09	5.392E-09	1.598E-08
U-236	Ra-228	1.000E+00	0.000E+00	2.038E-11	1.743E-10	1.526E-09	7.983E-09	3.303E-08	1.016E-07	3.072E-07
U-236	Th-228	1.000E+00	0.000E+00	2.185E-12	4.628E-11	8.669E-10	6.322E-09	2.882E-08	9.054E-08	2.756E-07
U-236	äDSR(j)		6.506E-02	6.505E-02	6.503E-02	6.496E-02	6.475E-02	6.406E-02	6.210E-02	5.572E-02
0U-238	U-238	1.000E+00	1.621E-01	1.621E-01	1.620E-01	1.619E-01	1.614E-01	1.598E-01	1.552E-01	1.403E-01
U-238	U-234	1.000E+00	0.000E+00	1.939E-07	5.787E-07	1.894E-06	1.427E-05	3.843E-03	1.091E-02	1.285E-02
U-238	Th-230	1.000E+00	0.000E+00	1.034E-12	8.994E-12	9.762E-11	8.582E-10	3.068E-08	3.858E-07	2.327E-06
U-238	Ra-226	1.000E+00	0.000E+00	1.861E-14	5.136E-13	1.900E-11	5.251E-10	1.766E-08	3.830E-07	7.178E-06
U-238	Pb-210	1.000E+00	0.000E+00	9.292E-17	6.169E-15	6.632E-13	1.002E-09	2.563E-08	1.063E-06	3.242E-05
U-238	äDSR(j)		1.621E-01	1.621E-01	1.620E-01	1.619E-01	1.614E-01	1.636E-01	1.661E-01	1.532E-01

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life ó 0.5 yr) daughters.

Attachment	1	Sheet No. 27 of 32	
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 28
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 1.500E+01 mrem/yr

0Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Al-26	1.347E+00	1.350E+00	1.356E+00	1.376E+00	1.436E+00	1.616E+00	2.351E+00	1.043E+01
Cl-36	1.339E+00	1.340E+00	1.343E+00	1.353E+00	1.383E+00	1.491E+00	1.802E+00	3.820E+00
Cm-248	9.195E+00	9.201E+00	9.214E+00	9.261E+00	9.395E+00	9.881E+00	3.209E-01	1.274E-01
Cs-135	4.132E+02	4.134E+02	4.138E+02	4.154E+02	4.199E+02	4.361E+02	4.858E+02	9.215E+01
Gd-152	*2.178E+01	*2.178E+01	*2.178E+01	*2.178E+01	*2.178E+01	*2.178E+01	*2.178E+01	1.197E+01
I-129	2.412E+01	2.413E+01	2.415E+01	2.421E+01	2.438E+01	2.501E+01	2.688E+01	8.161E+00
K-40	1.218E+01	1.218E+01	1.219E+01	1.222E+01	1.229E+01	1.256E+01	1.336E+01	1.574E+01
Np-237	2.441E+00	2.442E+00	2.443E+00	2.448E+00	2.461E+00	2.506E+00	2.640E+00	3.187E+00
Pu-242	3.695E+01	3.696E+01	3.698E+01	3.704E+01	3.722E+01	3.786E+01	3.974E+01	4.709E+01
Pu-244	2.819E+00	2.820E+00	2.821E+00	2.825E+00	2.837E+00	2.878E+00	3.001E+00	3.471E+00
Sm-147	3.373E+02	3.374E+02	3.375E+02	3.380E+02	3.393E+02	3.440E+02	3.578E+02	4.107E+02
Th-232	3.915E+01	1.123E+01	4.342E+00	1.608E+00	1.076E+00	1.054E+00	1.093E+00	1.240E+00
U-235	2.705E+01	2.705E+01	2.704E+01	2.701E+01	2.690E+01	2.640E+01	2.506E+01	2.202E+01
U-236	2.306E+02	2.306E+02	2.307E+02	2.309E+02	2.316E+02	2.342E+02	2.415E+02	2.692E+02
U-238	9.253E+01	9.254E+01	9.257E+01	9.266E+01	9.293E+01	9.167E+01	9.028E+01	9.792E+01

*At specific activity limit

0

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 505 ñ 1 years

0Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Al-26	1.000E+02	0.000E+00	1.113E+01	1.347E+00	4.121E+00	3.640E+00
Cl-36	1.000E+02	0.000E+00	1.120E+01	1.339E+00	6.690E+00	2.242E+00
Cm-248	1.000E+02	506 ñ 1	1.725E+02	8.694E-02	1.726E+02	8.692E-02
Cs-135	1.000E+02	728 ñ 1	1.901E-01	7.889E+01	1.037E-01	1.446E+02
Gd-152	1.000E+02	1.000E+03	1.253E+00	1.197E+01	1.580E-01	*2.178E+01
I-129	1.000E+02	1.000E+03	1.838E+00	8.161E+00	5.183E-01	2.894E+01
K-40	1.000E+02	0.000E+00	1.232E+00	1.218E+01	1.053E+00	1.424E+01
Np-237	1.000E+02	0.000E+00	6.144E+00	2.441E+00	5.379E+00	2.788E+00
Pu-242	1.000E+02	0.000E+00	4.059E-01	3.695E+01	3.591E-01	4.177E+01
Pu-244	1.000E+02	0.000E+00	5.321E+00	2.819E+00	4.790E+00	3.132E+00
Sm-147	1.000E+02	0.000E+00	4.447E-02	3.373E+02	4.026E-02	3.726E+02
Th-232	1.000E+02	55.5 ñ 0.1	1.432E+01	1.047E+00	1.323E+01	1.134E+00
U-235	1.000E+02	1.000E+03	6.812E-01	2.202E+01	6.266E-01	2.394E+01
U-236	1.000E+02	0.000E+00	6.506E-02	2.306E+02	6.016E-02	2.493E+02
U-238	1.000E+02	269.4 ñ 0.5	1.662E-01	9.025E+01	1.637E-01	9.161E+01

*At specific activity limit

Attachment	1	Sheet No.	28 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 29
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated
DOSE(j,t), mrem/yr

0Nuclide (j)	Parent (i)	BRF(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Al-26	Al-26	1.000E+00	1.113E+03	1.111E+03	1.106E+03	1.090E+03	1.045E+03	9.283E+02	6.379E+02	1.438E+02
0Cl-36	Cl-36	1.000E+00	1.120E+03	1.119E+03	1.117E+03	1.108E+03	1.085E+03	1.006E+03	8.324E+02	3.927E+02
0Cm-248	Cm-248	9.174E-01	1.631E+02	1.630E+02	1.628E+02	1.620E+02	1.597E+02	1.518E+02	4.675E+03	1.177E+04
0Pu-244	Cm-248	9.174E-01	0.000E+00	4.095E-06	1.227E-05	4.077E-05	1.212E-04	3.909E-04	1.177E-03	9.273E-03
Pu-244	Pu-244	9.987E-01	5.321E+02	5.320E+02	5.318E+02	5.309E+02	5.286E+02	5.207E+02	4.986E+02	4.284E+02
Pu-244	äDOSE(j)		5.321E+02	5.320E+02	5.318E+02	5.309E+02	5.286E+02	5.207E+02	4.986E+02	4.285E+02
0Pu-240	Cm-248	9.174E-01	0.000E+00	1.742E-11	1.567E-10	1.736E-09	1.551E-08	1.680E-07	1.467E-06	6.848E-05
Pu-240	Pu-244	9.987E-01	0.000E+00	4.527E-03	1.357E-02	4.519E-02	1.351E-01	4.443E-01	1.284E+00	3.750E+00
Pu-240	äDOSE(j)		0.000E+00	4.527E-03	1.357E-02	4.519E-02	1.351E-01	4.443E-01	1.284E+00	3.750E+00
0U-236	Cm-248	9.174E-01	0.000E+00	2.501E-20	6.951E-19	2.597E-17	6.989E-16	2.535E-14	7.677E-11	2.239E-09
U-236	Pu-244	9.987E-01	0.000E+00	9.887E-12	9.078E-11	1.015E-09	9.120E-09	1.002E-07	8.702E-07	8.541E-06
U-236	U-236	1.000E+00	6.506E+00	6.505E+00	6.503E+00	6.496E+00	6.475E+00	6.406E+00	6.210E+00	5.572E+00
U-236	äDOSE(j)		6.506E+00	6.505E+00	6.503E+00	6.496E+00	6.475E+00	6.406E+00	6.210E+00	5.572E+00
0Th-232	Cm-248	9.174E-01	0.000E+00	0.000E+00	0.000E+00	1.910E-26	1.531E-24	1.849E-22	8.108E-13	5.810E-13
Th-232	Pu-244	9.987E-01	0.000E+00	1.054E-21	2.728E-20	9.930E-19	2.659E-17	9.708E-16	2.528E-14	8.266E-13
Th-232	Th-232	1.000E+00	3.831E+01	3.831E+01	3.829E+01	3.824E+01	3.811E+01	3.763E+01	3.629E+01	3.198E+01
Th-232	U-236	1.000E+00	0.000E+00	1.936E-09	5.713E-09	1.892E-08	5.646E-08	1.859E-07	5.392E-07	1.598E-06
Th-232	äDOSE(j)		3.831E+01	3.831E+01	3.829E+01	3.824E+01	3.811E+01	3.763E+01	3.629E+01	3.198E+01
0Ra-228	Cm-248	9.174E-01	0.000E+00	0.000E+00	1.048E-28	7.268E-26	1.299E-23	2.642E-21	1.299E-13	9.587E-14
Ra-228	Pu-244	9.987E-01	0.000E+00	5.217E-22	4.236E-20	4.569E-18	2.593E-16	1.482E-14	4.514E-13	1.563E-11
Ra-228	Th-232	1.000E+00	0.000E+00	8.263E+01	2.238E+02	5.184E+02	7.187E+02	7.294E+02	7.035E+02	6.199E+02
Ra-228	U-236	1.000E+00	0.000E+00	2.038E-09	1.743E-08	1.526E-07	7.983E-07	3.303E-06	1.016E-05	3.072E-05
Ra-228	äDOSE(j)		0.000E+00	8.263E+01	2.238E+02	5.184E+02	7.187E+02	7.294E+02	7.035E+02	6.199E+02
0Th-228	Cm-248	9.174E-01	0.000E+00	0.000E+00	0.000E+00	2.637E-26	8.075E-24	2.123E-21	7.214E-14	5.172E-14
Th-228	Pu-244	9.987E-01	0.000E+00	3.616E-23	7.355E-21	1.879E-18	1.731E-16	1.223E-14	3.948E-13	1.394E-11
Th-228	Th-232	1.000E+00	0.000E+00	1.266E+01	8.335E+01	3.764E+02	6.376E+02	6.561E+02	6.328E+02	5.576E+02
Th-228	U-236	1.000E+00	0.000E+00	2.185E-10	4.628E-09	8.669E-08	6.322E-07	2.882E-06	9.054E-06	2.756E-05
Th-228	äDOSE(j)		0.000E+00	1.266E+01	8.335E+01	3.764E+02	6.376E+02	6.561E+02	6.328E+02	5.576E+02
0Cs-135	Cs-135	1.000E+00	3.630E+00	3.629E+00	3.625E+00	3.611E+00	3.572E+00	3.440E+00	3.088E+00	1.628E+01
0Gd-152	Gd-152	1.000E+00	4.589E+00	4.587E+00	4.583E+00	4.569E+00	4.530E+00	4.395E+00	4.031E+00	1.253E+02
0I-129	I-129	1.000E+00	6.218E+01	6.216E+01	6.212E+01	6.196E+01	6.152E+01	5.998E+01	5.581E+01	1.838E+02
0K-40	K-40	1.000E+00	1.232E+02	1.231E+02	1.230E+02	1.228E+02	1.220E+02	1.194E+02	1.123E+02	9.529E+01
0Np-237	Np-237	1.000E+00	6.144E+02	6.143E+02	6.139E+02	6.128E+02	6.095E+02	5.980E+02	5.665E+02	4.686E+02
0U-233	Np-237	1.000E+00	0.000E+00	3.626E-05	9.741E-05	3.063E-04	2.295E-03	6.211E-01	1.766E+00	2.102E+00

Attachment	1	Sheet No.	29 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 30
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-229	Np-237	1.000E+00	0.000E+00	3.334E-08	2.946E-07	3.217E-06	2.793E-05	5.507E-04	5.793E-03	3.276E-02
0Pu-242	Pu-242	1.000E+00	4.059E+01	4.058E+01	4.056E+01	4.049E+01	4.030E+01	3.962E+01	3.774E+01	3.185E+01
0U-238	Pu-242	1.000E+00	0.000E+00	2.499E-09	7.525E-09	2.508E-08	7.499E-08	2.467E-07	7.119E-07	2.073E-06
U-238	U-238	1.000E+00	1.621E+01	1.621E+01	1.620E+01	1.619E+01	1.614E+01	1.598E+01	1.552E+01	1.403E+01
U-238	äDOSE(j)		1.621E+01	1.621E+01	1.620E+01	1.619E+01	1.614E+01	1.598E+01	1.552E+01	1.403E+01
0U-234	Pu-242	1.000E+00	0.000E+00	1.504E-15	1.350E-14	1.481E-13	1.922E-11	2.000E-09	2.497E-08	1.813E-07
U-234	U-238	1.000E+00	0.000E+00	1.939E-05	5.787E-05	1.894E-04	1.427E-03	3.843E-01	1.091E+00	1.285E+00
U-234	äDOSE(j)		0.000E+00	1.939E-05	5.787E-05	1.894E-04	1.427E-03	3.843E-01	1.091E+00	1.285E+00
0Th-230	Pu-242	1.000E+00	0.000E+00	5.463E-21	1.408E-19	5.079E-18	4.891E-13	6.711E-12	1.243E-12	6.342E-10
Th-230	U-238	1.000E+00	0.000E+00	1.034E-10	8.994E-10	9.762E-09	8.582E-08	3.068E-06	3.858E-05	2.327E-04
Th-230	äDOSE(j)		0.000E+00	1.034E-10	8.994E-10	9.762E-09	8.582E-08	3.068E-06	3.858E-05	2.327E-04
0Ra-226	Pu-242	1.000E+00	0.000E+00	7.138E-23	5.955E-21	7.378E-19	1.195E-12	1.636E-11	2.325E-12	1.563E-09
Ra-226	U-238	1.000E+00	0.000E+00	1.861E-12	5.136E-11	1.900E-09	5.251E-08	1.766E-06	3.830E-05	7.178E-04
Ra-226	äDOSE(j)		0.000E+00	1.861E-12	5.136E-11	1.900E-09	5.251E-08	1.766E-06	3.830E-05	7.178E-04
0Pb-210	Pu-242	1.000E+00	0.000E+00	3.028E-25	5.922E-23	2.103E-20	4.755E-11	6.536E-10	8.160E-11	6.076E-08
Pb-210	U-238	1.000E+00	0.000E+00	9.292E-15	6.169E-13	6.632E-11	1.002E-07	2.563E-06	1.063E-04	3.242E-03
Pb-210	äDOSE(j)		0.000E+00	9.292E-15	6.169E-13	6.632E-11	1.003E-07	2.563E-06	1.063E-04	3.242E-03
0Sm-147	Sm-147	1.000E+00	4.447E+00	4.446E+00	4.445E+00	4.438E+00	4.421E+00	4.360E+00	4.192E+00	3.652E+00
0U-235	U-235	1.000E+00	5.545E+01	5.544E+01	5.542E+01	5.535E+01	5.517E+01	5.453E+01	5.274E+01	4.693E+01
0Pa-231	U-235	1.000E+00	0.000E+00	1.610E-02	4.949E-02	1.661E-01	4.976E-01	1.637E+00	4.717E+00	1.365E+01
0Ac-227	U-235	1.000E+00	0.000E+00	1.713E-04	1.392E-03	1.393E-02	1.020E-01	6.540E-01	2.406E+00	7.541E+00

BRF(i) is the branch fraction of the parent nuclide.

Attachment	1	Sheet No.	30 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

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1RESRAD, Version 6.21     T« Limit = 0.5 year       11/15/2004  08:25  Page  31
 Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
 File    : Kd_vs_VZ_100rdr_Rev4.RAD

                                  Individual Nuclide Soil Concentration
                               Parent Nuclide and Branch Fraction Indicated
ONuclide Parent   BRF(i)                                 S(j,t), pCi/g
  (j)     (i)             t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03
ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ    ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ
 Al-26   Al-26   1.000E+00    1.000E+02 9.979E+01 9.937E+01 9.790E+01 9.383E+01 8.089E+01 5.292E+01 1.199E+01
OCl-36   Cl-36   1.000E+00    1.000E+02 9.989E+01 9.968E+01 9.893E+01 9.683E+01 8.981E+01 7.243E+01 3.412E+01
OCm-248  Cm-248  9.174E-01    1.000E+02 9.993E+01 9.978E+01 9.928E+01 9.786E+01 9.305E+01 8.057E+01 4.867E+01
OPu-244  Cm-248  9.174E-01    0.000E+00 7.695E-07 2.306E-06 7.662E-06 2.277E-05 7.347E-05 2.009E-04 4.870E-04
 Pu-244  Pu-244  9.987E-01    1.000E+02 9.998E+01 9.994E+01 9.978E+01 9.935E+01 9.786E+01 9.371E+01 8.052E+01
 Pu-244  äS(j):               1.000E+02 9.998E+01 9.994E+01 9.978E+01 9.935E+01 9.786E+01 9.371E+01 8.052E+01
OPu-240  Cm-248  9.174E-01    0.000E+00 4.075E-11 3.665E-10 4.062E-09 3.629E-08 3.930E-07 3.290E-06 2.850E-05
 Pu-240  Pu-244  9.987E-01    0.000E+00 1.059E-02 3.175E-02 1.057E-01 3.159E-01 1.039E+00 3.002E+00 8.772E+00
 Pu-240  äS(j):               0.000E+00 1.059E-02 3.175E-02 1.057E-01 3.159E-01 1.039E+00 3.002E+00 8.772E+00
OU-236   Cm-248  9.174E-01    0.000E+00 4.021E-19 1.085E-17 4.010E-16 1.076E-14 3.899E-13 9.892E-12 2.957E-10
 U-236   Pu-244  9.987E-01    0.000E+00 1.567E-10 1.410E-09 1.565E-08 1.403E-07 1.540E-06 1.338E-05 1.313E-04
 U-236   U-236   1.000E+00    1.000E+02 9.998E+01 9.995E+01 9.985E+01 9.954E+01 9.846E+01 9.546E+01 8.565E+01
 U-236   äS(j):               1.000E+02 9.998E+01 9.995E+01 9.985E+01 9.954E+01 9.846E+01 9.546E+01 8.565E+01
OTh-232  Cm-248  9.174E-01    0.000E+00 4.960E-30 4.015E-28 4.947E-26 3.984E-24 4.821E-22 3.689E-20 3.739E-18
 Th-232  Pu-244  9.987E-01    0.000E+00 2.577E-21 6.956E-20 2.573E-18 6.923E-17 2.532E-15 6.598E-14 2.157E-12
 Th-232  Th-232  1.000E+00    1.000E+02 9.998E+01 9.995E+01 9.982E+01 9.946E+01 9.821E+01 9.473E+01 8.348E+01
 Th-232  U-236   1.000E+00    0.000E+00 4.933E-09 1.479E-08 4.925E-08 1.473E-07 4.851E-07 1.407E-06 4.172E-06
 Th-232  äS(j):               1.000E+02 9.998E+01 9.995E+01 9.982E+01 9.946E+01 9.821E+01 9.473E+01 8.348E+01
ORa-228  Cm-248  9.174E-01    0.000E+00 1.172E-31 2.738E-29 9.892E-27 1.757E-24 3.564E-22 3.318E-20 3.625E-18
 Ra-228  Pu-244  9.987E-01    0.000E+00 7.584E-23 5.861E-21 6.206E-19 3.503E-17 1.999E-15 6.086E-14 2.107E-12
 Ra-228  Th-232  1.000E+00    0.000E+00 1.136E+01 3.034E+01 6.995E+01 9.688E+01 9.831E+01 9.483E+01 8.356E+01
 Ra-228  U-236   1.000E+00    0.000E+00 2.857E-10 2.380E-09 2.064E-08 1.077E-07 4.453E-07 1.370E-06 4.141E-06
 Ra-228  äS(j):               0.000E+00 1.136E+01 3.034E+01 6.995E+01 9.688E+01 9.831E+01 9.483E+01 8.356E+01
OTh-228  Cm-248  9.174E-01    0.000E+00 6.746E-33 4.315E-30 3.942E-27 1.208E-24 3.180E-22 3.199E-20 3.587E-18
 Th-228  Pu-244  9.987E-01    0.000E+00 5.200E-24 1.086E-21 2.804E-19 2.591E-17 1.832E-15 5.918E-14 2.090E-12
 Th-228  Th-232  1.000E+00    0.000E+00 1.864E+00 1.243E+01 5.638E+01 9.557E+01 9.835E+01 9.486E+01 8.359E+01
 Th-228  U-236   1.000E+00    0.000E+00 3.189E-11 6.877E-10 1.297E-08 9.472E-08 4.320E-07 1.357E-06 4.131E-06
 Th-228  äS(j):               0.000E+00 1.864E+00 1.243E+01 5.638E+01 9.557E+01 9.835E+01 9.486E+01 8.359E+01
OCs-135  Cs-135  1.000E+00    1.000E+02 9.995E+01 9.984E+01 9.946E+01 9.839E+01 9.474E+01 8.504E+01 5.828E+01
OGd-152  Gd-152  1.000E+00    1.000E+02 9.996E+01 9.987E+01 9.957E+01 9.871E+01 9.577E+01 8.784E+01 6.490E+01
OI-129   I-129   1.000E+00    1.000E+02 9.996E+01 9.989E+01 9.964E+01 9.892E+01 9.646E+01 8.975E+01 6.973E+01
OK-40    K-40    1.000E+00    1.000E+02 9.997E+01 9.991E+01 9.969E+01 9.908E+01 9.696E+01 9.114E+01 7.340E+01
ONp-237  Np-237  1.000E+00    1.000E+02 9.997E+01 9.992E+01 9.973E+01 9.919E+01 9.733E+01 9.219E+01 7.626E+01
OU-233   Np-237  1.000E+00    0.000E+00 4.361E-04 1.301E-03 4.257E-03 1.211E-02 3.372E-02 6.371E-02 6.819E-02
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Attachment	1	Sheet No.	31 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 11/15/2004 08:25 Page 32
Summary : Calculation of Kd versus Uncontaminated Vadose Zone Thickness
File : Kd_vs_VZ_100rdr_Rev4.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

ONuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Th-229	Np-237	1.000E+00	0.000E+00	2.061E-08	1.848E-07	2.027E-06	1.759E-05	1.728E-04	1.129E-03	5.440E-03
OPu-242	Pu-242	1.000E+00	1.000E+02	9.998E+01	9.993E+01	9.976E+01	9.928E+01	9.760E+01	9.298E+01	7.847E+01
OU-238	Pu-242	1.000E+00	0.000E+00	1.551E-08	4.651E-08	1.548E-07	4.627E-07	1.522E-06	4.392E-06	1.279E-05
U-238	U-238	1.000E+00	1.000E+02	9.999E+01	9.996E+01	9.986E+01	9.957E+01	9.856E+01	9.576E+01	8.654E+01
U-238	äS(j):		1.000E+02	9.999E+01	9.996E+01	9.986E+01	9.957E+01	9.856E+01	9.576E+01	8.654E+01
OU-234	Pu-242	1.000E+00	0.000E+00	2.195E-14	1.968E-13	2.159E-12	1.874E-11	1.842E-10	1.207E-09	5.874E-09
U-234	U-238	1.000E+00	0.000E+00	2.828E-04	8.438E-04	2.762E-03	7.866E-03	2.201E-02	4.229E-02	4.895E-02
U-234	äS(j):		0.000E+00	2.828E-04	8.438E-04	2.762E-03	7.866E-03	2.201E-02	4.229E-02	4.895E-02
OTh-230	Pu-242	1.000E+00	0.000E+00	6.589E-20	1.774E-18	6.507E-17	1.709E-15	5.766E-14	1.219E-12	2.325E-11
Th-230	U-238	1.000E+00	0.000E+00	1.274E-09	1.142E-08	1.254E-07	1.089E-06	1.076E-05	7.145E-05	3.677E-04
Th-230	äS(j):		0.000E+00	1.274E-09	1.142E-08	1.254E-07	1.089E-06	1.076E-05	7.145E-05	3.677E-04
ORa-226	Pu-242	1.000E+00	0.000E+00	7.138E-24	5.768E-22	7.061E-20	5.583E-18	6.350E-16	4.132E-14	2.718E-12
Ra-226	U-238	1.000E+00	0.000E+00	1.840E-13	4.953E-12	1.816E-10	4.765E-09	1.600E-07	3.338E-06	6.062E-05
Ra-226	äS(j):		0.000E+00	1.840E-13	4.953E-12	1.816E-10	4.765E-09	1.600E-07	3.338E-06	6.062E-05
OPb-210	Pu-242	1.000E+00	0.000E+00	4.415E-26	1.060E-23	4.177E-21	9.021E-19	2.575E-16	2.863E-14	2.430E-12
Pb-210	U-238	1.000E+00	0.000E+00	1.421E-15	1.134E-13	1.331E-11	9.373E-10	7.545E-08	2.521E-06	5.597E-05
Pb-210	äS(j):		0.000E+00	1.421E-15	1.134E-13	1.331E-11	9.373E-10	7.545E-08	2.521E-06	5.597E-05
OSm-147	Sm-147	1.000E+00	1.000E+02	9.998E+01	9.994E+01	9.980E+01	9.941E+01	9.805E+01	9.426E+01	8.212E+01
OU-235	U-235	1.000E+00	1.000E+02	9.998E+01	9.995E+01	9.983E+01	9.950E+01	9.835E+01	9.512E+01	8.464E+01
OPa-231	U-235	1.000E+00	0.000E+00	2.115E-03	6.344E-03	2.112E-02	6.309E-02	2.073E-01	5.974E-01	1.729E+00
OAc-227	U-235	1.000E+00	0.000E+00	3.331E-05	2.934E-04	3.028E-03	2.239E-02	1.440E-01	5.299E-01	1.657E+00
¡¡¡¡¡¡¡	¡¡¡¡¡¡¡	¡¡¡¡¡¡¡¡¡	¡¡¡¡¡¡¡¡¡	¡¡¡¡¡¡¡¡¡	¡¡¡¡¡¡¡¡¡	¡¡¡¡¡¡¡¡¡	¡¡¡¡¡¡¡¡¡	¡¡¡¡¡¡¡¡¡	¡¡¡¡¡¡¡¡¡	¡¡¡¡¡¡¡¡¡

BRF(i) is the branch fraction of the parent nuclide.
ORESCALC.EXE execution time = 10.19 seconds

Attachment	1	Sheet No.	32 of 32
Originator	S. W. Clark	Date	
Chk'd By	M.T. Stankovich	Date	
Calc. No.	0100X-CA-V0050	Rev. No.	0