0100050

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

12-AMRC-0026

NOV 03 2011

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

Dear Ms. Hedges:

TRANSMITTAL OF APPROVED WASTE SITE RECLASSIFICATION FORM AND SUPPORTING DOCUMENTATION FOR THE 600-151, DUMPING AREAS 50 YARDS AND 200 YARDS DOWNSTREAM OF RIVER MILE 14 WASTE SITE, REVISION 0

Attached for your use is the approved Waste Site Reclassification Form No. 2011-053 and supporting "Remaining Sites Verification Package for the 600-151, Dumping Areas 50 Yards and 200 Yards Downstream of River Mile 14 Waste Site ," Revision 0. If you have questions, please contact me or your staff may contact Joanne Chance, of my staff, at (509) 376-0811.

Sincerely,

Mark S. French

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

AMRC:JCC

Attachment

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

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

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REMAINING SITES VERIFICATION PACKAGE FOR THE 600-151, DUMPING AREAS 50 YARDS AND 200 YARDS DOWNSTREAM OF RIVER MILE 14 WASTE SITE

Attachment to Waste Site Reclassification Form 2011-053

August 2011

Date Submitted: 08/18/11 Originator: M. L. Proctor Phone: 372-9227	**WASTE SITE RECLASSIFICATION FORM** Operable Unit(s): 100-HR-2 Waste Site Code: 600-151 Type of Reclassification Action: Closed Out ☐ Interim Closed Out ☒ No Action ☐ RCRA Postclosure ☐ Rejected ☐ Consolidated ☐	Control Number: 2011-053

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 600-151, Dumping Areas 50 Yards and 200 Yards Downstream of River Mile 14 waste site consists of scattered debris remaining from a military installation that was located northwest of the 100-H Area. The site is located within historic pre-Hanford orchard areas and lead and arsenic contamination due to the use of lead arsenate pesticide prior to the Manhattan Project is present in concentrations exceeding soil cleanup criteria. However, as agreed by the Tri-Parties Federal Facility Agreement and Consent Change Control Form, TPA-CN-401, Modify *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE/RL-96-17, Rev. 6) to add Section 3.6.10, Residual Pesticides from Agricultural Use, U.S. Department of Energy, Richland Operations Office, Richland, Washington (DOE-RL 2010), lead and arsenic contamination that resulted from pesticide use before the Manhattan Project are excluded as contaminants of concern and will be discussed in a future *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) document. Remediation, verification sampling, and comparison of residual contaminant concentrations against cleanup levels have been performed in accordance with the remedial action objectives (RAOs) and remedial action goals (RAGs) established by the *Remedial Design Report/Remedial Action Work Plan for the 100 Area*, DOE/RL-96-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington 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), U.S. Environmental Protection Agency, Region 10, Seattle, Washington. The selected remedy involved (1) excavation and removal of debris and stained soil, (2) disposing of contaminated excavation materials at the Environmental Restoration Disposal Facility at the 200 Area of the Hanford Site, (3) demonstrating through verification sampling that cleanup goals have been achieved, and (4) proposing the site for reclassification as Interim Closed Out.

Basis for reclassification:
In accordance with this evaluation, the verification sampling results support a reclassification of this site to Interim Closed Out. With the exception of lead and arsenic concentrations, the current site conditions achieve the RAOs and the corresponding RAGs established in the Remaining Sites ROD (EPA 1999). As agreed by the Tri-Parties (TPA-CN-401), lead and arsenic contamination that resulted from pesticide use prior to the Manhattan Project are excluded as contaminants of concern and will be discussed in a future CERCLA document. The results of verification sampling show that residual contaminant concentrations (with the exception of lead and arsenic) 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 (with the exception of arsenic) also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. However, because arsenic and lead contamination is present in surface soil, an administrative control will be documented in the Hanford Waste Information Data System until a final decision concerning historic orchard pesticide use is made. Additionally, the results of verification sampling indicate that residual waste site contamination originating from Hanford Site or Manhattan Project activities does not extend into deep-zone soils (below 4.6 m [15 ft] deep); therefore, institutional controls to prevent uncontrolled drilling into the deep zone are not required. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 600-151, Dumping Areas 50 Yards and 200 Yards Downstream of River Mile 14 Waste Site* (attached).

Regulator Comments:
Approval of this WSRF documents regulator agreement that the 600-151 waste site qualifies for "Interim Closed Out" under this Interim Action ROD. In addition, Ecology has evaluated the data for this site against WAC 173-340 (2007) clean-up levels for direct contact, groundwater protection, and river protection. This evaluation is documented in the letter transmitting Ecology's approval of the site's interim reclassification to "Interim Closed Out."

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

M. S. French DOE Federal Project Director (printed)	MS French Signature	10/26/11 Date
N. Menard Ecology Project Manager (printed)	FOR Signature	10/27/11 Date
N/A EPA Project Manager (printed)	Signature	Date

REMAINING SITES VERIFICATION PACKAGE FOR THE 600-151, DUMPING AREAS 50 YARDS AND 200 YARDS DOWNSTREAM OF RIVER MILE 14 WASTE SITE

EXECUTIVE SUMMARY

The 600-151, Dumping Areas 50 Yards and 200 Yards Downstream of River Mile 14 waste site is located in the 100-HR-2 Operable Unit of the Hanford Site, approximately 1.3 km (0.8 mi) northwest of the 105-H Reactor Building. The 600-151 waste site consisted of scattered debris remaining from a military installation that was located northwest of the 100-H Area in the 100-HR-2 Operable Unit. Debris included a partially buried washtub, tin cans, a stove pipe, empty fuel and solvent cans painted "army green", broken concrete and transite, an old stove, wire fencing material, and a large pile of steel posts. Several small open pits were scattered across the site. Areas of stained soil and stressed vegetation were also observed present at the site and have subsequently been determined to be due to the use of lead arsenate pesticide applications on historic Hanford orchards.

Remediation of the 600-151 waste site was initiated on April 12, 2010, and consisted of manually removing debris from the ground surface as identified in the remediation design drawings approved by the Washington State Department of Ecology (Ecology). Areas of stained soil and stressed vegetation were scraped and removed to a minimum depth of 0.31 m (1 ft). In addition, two water valves and a water box associated with the former septic system (the 600-152 waste site) were removed. Approximately 1,524 bank cubic meters (1,993 bank cubic yards) of material was removed for disposal at the Environmental Restoration Disposal Facility.

During remediation, it was noted that a pattern of circular shaped stained soil areas were present beyond the areas identified for remediation in the remedial design. Field personnel suspected that these areas might be associated with historic agricultural pesticide applications and were not from Hanford waste disposal activities. Furthermore, in-process soil samples collected on April 27, 2010, to support waste characterization identified high concentrations of arsenic (up to 229 mg/kg) and lead (up to 1,750 mg/kg) suspected to be associated with historic lead arsenate pesticide use. Subsequent discussions with the U.S. Environmental Protection Agency, Ecology, and the U.S. Department of Energy, Richland Operations Office led to a Tri-Party Agreement Change Notice (TPA-CN-401) dated December 6, 2010 (DOE-RL 2010), that conditionally excludes lead and arsenic as contaminants of potential concern for sites demonstrated to have been located within pre-Hanford orchards.

Following remediation, verification sampling was conducted April 26 through 28, 2011. The results indicated that the waste removal action achieved compliance with the remedial action objectives (RAOs) and remedial action goals (RAGs) for the 600-151 waste site, with acknowledgment that residual lead and arsenic contamination that resulted form pesticide use previous to the Manhattan Project are excluded from the contaminants of concern (COCs) and will instead be discussed in a future *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) document. A summary of the cleanup evaluation for the sample 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 600-151 waste site in accordance with the TPA-MP-14 procedure in the *Tri-Party Agreement Handbook Management Procedures* (DOE-RL 2007).

Table ES-1. Summary of Remedial Action Goals for the 600-151 Waste Site. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain dose rate of less than 15-mrem/yr dose rate above background over 1,000 years.	Radionuclides are not COPCs.	NA
Direct Exposure – Nonradionuclides	Attain individual COPCRAGs.	All individual COPC concentrations are below the direct exposure RAGs with the exception of arsenic and lead. As agreed by the Tri-Party Project managers, arsenic and lead associated with pesticide use in pre-Hanford historic orchards are not COCs (DOE-RL 2010).	Yes
Risk Requirements – Nonradionuclides	Attain a hazard quotient of <1 for all individual noncarcinogens.	All hazard quotients are less than 1.	Yes
	Attain a cumulative hazard quotient of <1 for noncarcinogens.	The cumulative hazard quotient (3.9×10^{-2}) is less than 1.	
	Attain an excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	The excess cancer risk value for individual carcinogens is less than 1×10^{-6}.	
	Attain a cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	The total excess cancer risk (1.1×10^{-6}) is less than 1×10^{-5}.	
Groundwater/River Protection – Radionuclides	Attain single-COPC groundwater and river protection RAGs.	Radionuclides are not COPCs.	NA
	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].		
	Meet total uranium standard of 30 µg/L (21.2 pCi/L) [c].		

Table ES-1. Summary of Remedial Action Goals for the 600-151 Waste Site. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and river cleanup requirements.	Arsenic, copper, lead, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and 4,4'-DDE are present at concentrations exceeding soil RAGs for groundwater and/or Columbia River protection. However, an evaluation based upon RESRAD modeling discussed in Appendix C of the RDR/RAWP (DOE-RL 2009b) shows that with the exception of arsenic, residual concentrations of these constituents are predicted to be protective of groundwater and the river [d]. As agreed by the Tri-Party Project managers, arsenic and lead associated with pesticide use in pre-Hanford historic orchards are not COCs (DOE-RL 2010).	Yes

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

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

[c] Based on the isotopic distribution of uranium in the 100 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).

[d] Based on RESRAD modeling discussed in Appendix C of the RDR/RAWP (DOE-RL 2009b), the residual concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthracene, benzo(k)fluoranthracene, chrysene, 4,4'-DDE, copper, and lead are not expected to migrate more than 3 m (9.9 ft) vertically in 1,000 years (based on the contaminant with the lowest distribution coefficient, copperd, with a K_d value of 22 mL/g). The vadose zone underlying the soil below the site is approximately 9 m (30 ft). Therefore, residual concentrations of these COPCs are predicted to be protective of groundwater and the Columbia River. Arsenic and lead contamination that resulted from pesticide use previous to the Manhattan Project will be excluded as COCs and will instead be discussed in a future CERCLA document (DOE-RL 2010).

CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
COC = contaminant of concern
COPC = contaminant of potential concern
DOE = U.S. Department of Energy
NA = not applicable
RAG = remedial action goal
RESRAD = RESidual RADioactivity (dose model)
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*

In accordance with this evaluation, the verification sampling results support a reclassification of this site to Interim Closed Out. With the exception of lead and arsenic, the current site conditions achieve the RAOs and the corresponding RAGs established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE-RL 2009b) 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 (with the exception of lead and arsenic) 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 (with the exception of lead and arsenic) are protective of groundwater and the Columbia River. As agreed by the Tri-Parties in TPA-CN-401 (DOE-RL 2010), lead and arsenic contamination that resulted from pesticide use prior to the Manhattan Project are excluded as COCs and will be discussed in a future CERCLA document. However, since this contamination is present in surface soil, an administrative control

will be documented in the Hanford Waste Information Data System until a final decision concerning historic pesticide use is made. The results of the verification sampling also indicate that residual waste site contamination originating from Hanford Site or Manhattan Project activities does not extend into deep-zone soils. Therefore, institutional controls to prevent uncontrolled drilling into the deep zone are not 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 ROD, a comparison against ecological risk screening levels has been made for the site contaminants of potential concern and other constituents. Those constituents exceeding the ecological screening level in the 2001 *Washington Administrative Code* (WAC), Chapter 173-340, Table 749-3 (WAC 173-340) were arsenic, barium, boron, lead, selenium, and vanadium. The U.S. Environmental Protection Agency ecological soil screening levels were exceeded for arsenic, cadmium, lead, manganese, selenium, vanadium, and zinc. A table comparing concentrations of these constituents to ecological screening levels and background levels is provided in Appendix A. Exceeding screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because concentrations of cadmium, manganese, vanadium, and zinc are below Hanford Site background values or Washington State background values (note that state background values are only used when Hanford Site background values are not available), it is believed that the presence of these constituents does not pose a risk to ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for ecological effects as a part of the final closeout decision for the Columbia River corridor portion of the Hanford Site. Arsenic and lead concentrations associated with historic pesticide use previous to the Manhattan Project will be excluded from the COCs and will instead be discussed in a future CERCLA document (DOE-RL 2010).

REMAINING SITES VERIFICATION PACKAGE FOR THE 600-151, DUMPING AREAS 50 YARDS AND 200 YARDS DOWNSTREAM OF RIVER MILE 14 WASTE SITE

STATEMENT OF PROTECTIVENESS

This report demonstrates that the 600-151, Dumping Areas 50 Yards and 200 Yards Downstream of River Mile 14 waste site meets the objectives for Interim Closed Out as established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (100 Area RDR/RAWP) (DOE-RL 2009b) 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). With the exception of lead and arsenic, 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 with the exception of lead and arsenic, residual contaminant concentrations are protective of groundwater and the Columbia River and institutional controls to prevent uncontrolled drilling are not required. As agreed by the Tri-Parties in TPA-CN-401 (DOE-RL 2010), lead and arsenic contamination that resulted from pesticide use prior to the Manhattan Project are excluded as contaminants of concern (COCs) and will be discussed in a future *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) document. However, since lead and arsenic contamination is present in surface soil above direct exposure cleanup levels, the Hanford Waste Information Data System (WIDS) will be updated in accordance with the *Sitewide Institutional Controls Plan for Hanford CERCLA Response Actions* (DOE/RL 2009c) to provide documentation of an administrative control until a final decision concerning historic pesticide use is made.

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based on a limited ecological risk assessment. Although not required by the ROD, a comparison against ecological risk screening levels has been made for the site contaminants of potential concern and other constituents. Those constituents exceeding the ecological screening level in the 2001 *Washington Administrative Code* (WAC), Chapter 173-340, Table 749-3 were arsenic, barium, boron, lead, selenium, and vanadium. The U.S. Environmental Protection Agency (EPA) ecological soil screening levels were exceeded for arsenic, cadmium, lead, manganese, selenium, vanadium, and zinc. A table comparing concentrations of these constituents to ecological screening levels and background levels is provided in Appendix A. Exceeding screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because concentrations of cadmium, manganese, vanadium, and zinc are below Hanford Site background values or Washington State background values (note that state background values are only used when Hanford Site background values are not available), it is believed that the presence of these constituents does not pose a risk to ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for ecological effects as a part of the final closeout decision for the Columbia River corridor portion of the Hanford Site. Arsenic and lead concentrations associated with historic pesticide use previous to the Manhattan Project will be excluded as COCs and will instead be discussed in a future CERCLA document (DOE-RL 2010).

GENERAL SITE INFORMATION AND BACKGROUND

The 600-151, Dumping Areas 50 Yards and 200 Yards Downstream of River Mile 14 waste site, part of the 100-HR-2 Operable Unit, is located approximately 1.3 km (0.8 mi) north of the 105-H Reactor Building. The WIDS identifies the site as having 13 geographical locations (consisting of areas and points) as shown in Figure 1. The 600-151 waste site consisted of scattered debris from U.S. Army Base Camp 130 (BC-130), a military camp covering approximately 162,000 m^2 (40 acres) near the Columbia River, which was occupied from approximately 1950 to 1954. The remains of BC-130 have been identified as an historic-archaeological site. Records and historic maps indicate that BC-130 was a forward position that did not have gun emplacements. Base camps of this nature generally contained water storage, cisterns, fuel and oil tanks, barracks, drain fields, and refuse dumps. The camp was demolished when it was closed in 1954 and all that appeared to remain in 2009, prior to field remediation, were some domestic military debris, several pits (some with wood lining), and shallow trenches where communication lines were thought to be located (Fletcher 2009).

Pre-Hanford Agriculture History

Prior to use by the Hanford Site Manhattan Project, the 600-151 waste site location was part of an historic agricultural site occupying some 202,000 m^2 (50 acres) consisting of five tracts of land used circa 1938 to 1943. The 600-151 waste site is located within this historic-archaeological site and contains the remnants of a farmstead intentionally demolished by Hanford-related activities. It was noted during the cultural review (Fletcher 2009) that remnants of previous occupation at this farmstead had little interpretive or diagnostic potential and that the features and landscape that once defined this area as a working farm no longer existed. Figure 2 is a 1948 photograph showing the location of the farmstead prior to construction of the 100-H Reactor.

The 600-151 waste site is located in an area that was occupied by orchards prior to the Hanford Site Manhattan Project. A 1943 Benton County Land Plat Map (Figure 3) as presented in *Pre-Hanford Agricultural History: 1900-1943* (BHI 1999) identifies the orchard areas that were created and recorded in the county record. The map shows the plats and tracts that were created for orchards, with the First Addition to Klondike Point Orchards coinciding with the location of the 600-151 waste site. Figure 4 is a 1941 aerial photograph showing the orchard plats with the boundaries of the 600-151 waste site overlain on the photograph. Two of the small "point" locations in the northeast portion of the 600-151 waste site are only about 1.5 m (5 ft) apart in distance and therefore cannot be seen as distinct locations at the scale of the map shown in Figure 4. As can be seen in the photograph, orchards were present in the area coincident with the 600-151 waste site.

During the growing season, orchards were sprayed with lead arsenate from the time the trees bloomed until they were harvested (BHI 1999). Orchard sprays were reported to have contained about 0.5 kg (1 lb) of arsenate or lead to 189 L (50 gal) of water for the first brood of coddling moths and 2.7 kg (6 lb) of lead arsenate paste or 1.4 kg (3 lb) of powder to 757 L (200 gal) of water for the second brood of codling moths. Following the second spraying, Winesaps required a spraying every 30 days and Rome Beauties, Spitz, Delicious, and Jonathan's required spraying every 20 days for the remainder of the season. Historic photographs (Figures 5 and 6) show two methods used for application of orchard pesticides.

Figure 1. The 600-151 Waste Site Location Map.

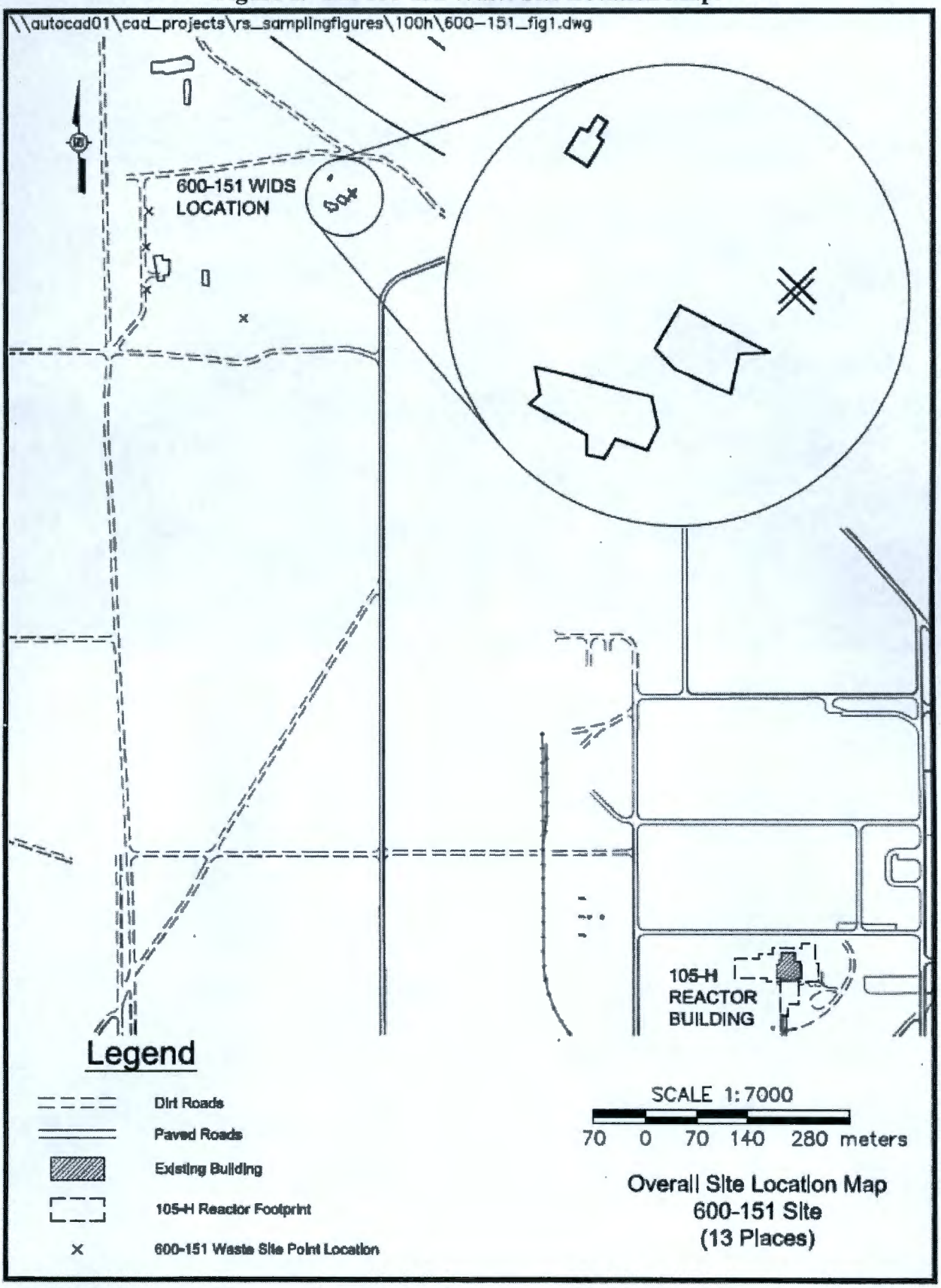

Figure 2. Photograph of the 100-H Area Prior to Reactor Construction (1948).

Figure 3. 1943 Benton County Plat Map (BHI 1999).

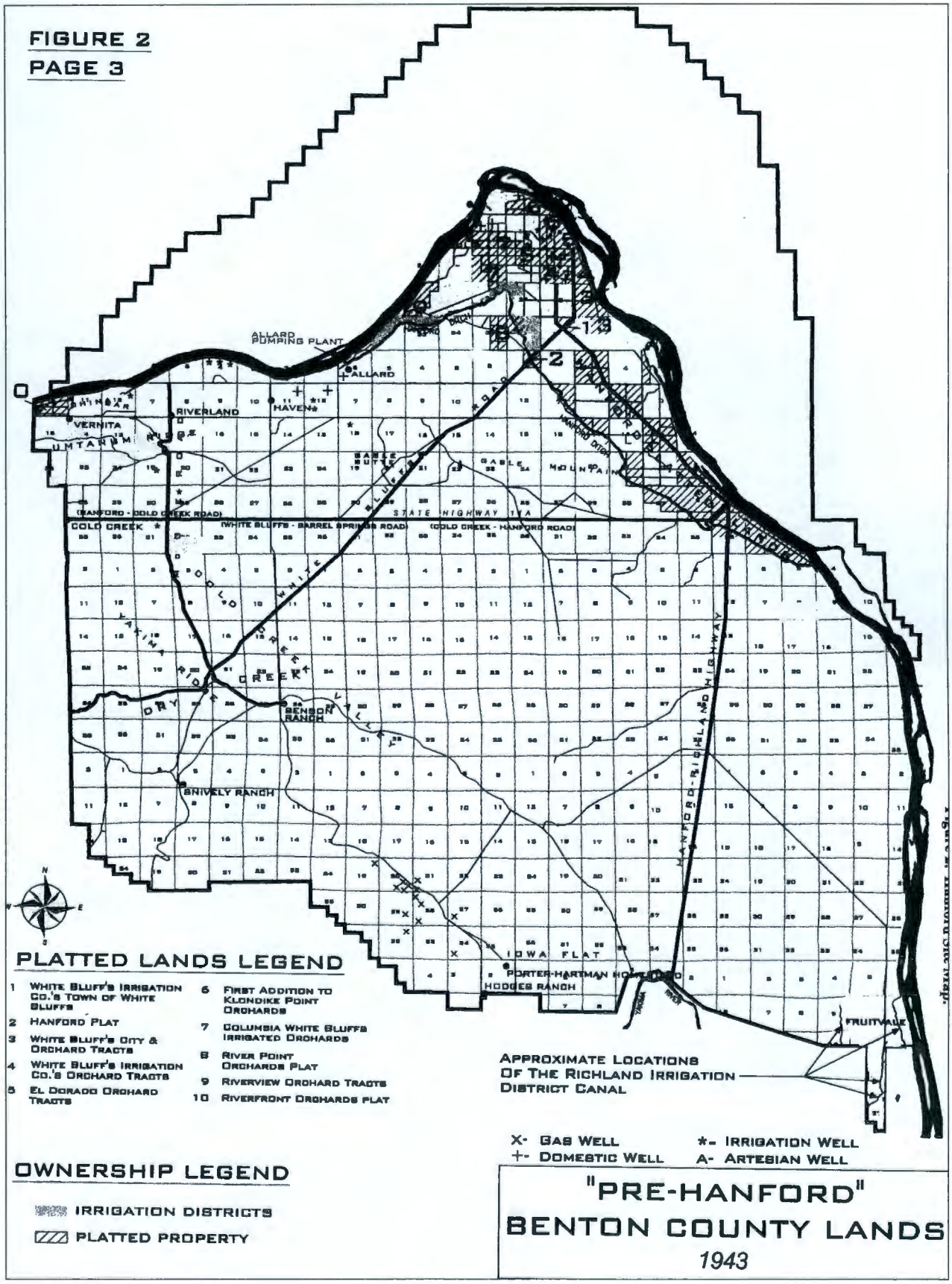

Figure 4. 1941 Aerial Photograph of Orchard Tracts Showing the 600-151 Waste Site Boundaries.

Figure 5. Hand Sprayer used for Application of Pesticides (1932).

Figure 6. Mobile Orchard Spraying Equipment (1932).

Frost protection to protect fruit trees from damage began to appear in the area about 1923. Early orchard heating systems were designed to burn coal in the form of briquettes. Early smudge pots were cone-shaped with the pointed end stuck into the ground. Heating systems often raised the temperature enough to reduce crop loss from the cold; however, if the frost was severe enough, even smudging did not help (BHI 1999).

Additional discussion of the agricultural history, including practices for orchard crops, is provided in BHI (1999). By 1943, the area was suffering from serious economic problems and many orchards were abandoned, as can be seen in the 1948 photograph (Figure 2).

SUMMARY OF REMEDIAL ACTIVITIES

Prior to initiating remediation, an archeological investigation was performed with the excavation of three trenches to assure no items of cultural or historical interest were present. The trenches were excavated on April 12, 2010 with no items of interest identified during the investigation.

Remediation of the 600-151 waste site was initiated on April 12, 2010, and consisted of manually removing debris from the ground surface as identified in the remediation design drawings approved by the Washington State Department of Ecology (Ecology). Areas of stained soil and stressed vegetation were scraped and removed to a minimum depth of 0.31 m (1 ft). In addition, two water valves and a water box associated with the former septic system (the 600-152 waste site) were removed. Approximately 1,524 bank cubic meters (BCM) (1,993 bank cubic yards [BCY]) of material was removed for disposal at the Environmental Restoration Disposal Facility.

The remediation design as identified in the engineering design drawings (WCH 2009a, 2009b, and 2009c) specified removal of stained soil/dead vegetation to a depth of 0.31 m (1 ft) or as directed by the contractor. Additionally, the design drawings identified areas of concentrated debris and scattered debris. The remediation techniques were performed using an observational approach and in a manner to be sensitive to historic-archaeological concerns at the site; therefore, mechanical excavation was used to remove concentrated debris, while scattered surface debris was manually removed (hand picked). This methodology is reflected in the post-excavation civil survey drawings that only show the areas where the elevation has changed due to soil removal. Areas identified in the design drawings where surface debris was manually removed are not indicated in the post-excavation civil survey, since no elevation change has occurred. Figures 7, 8, and 9 provide photographs of some of the areas where stained soil was mechanically removed as provided in the design and using the observational approach to limit the extent of remediation and site disturbance.

During remediation, it was noted that a pattern of circular shaped stained soil areas were present beyond the areas identified for remediation in the remedial design. Field personnel suspected that these areas might be associated with historic agricultural pesticide applications and were not from Hanford waste disposal activities. Furthermore, in-process soil samples (Appendix B) collected on April 27, 2010 to support waste characterization identified high concentrations of arsenic (up to 229 mg/kg) and lead (up to 1,750 mg/kg) suspected to be associated with historic lead arsenate pesticide use.

Soil samples collected in former orchard areas have been shown to contain concentrations of lead and arsenic exceeding remedial action goals (RAGs). Delistraty and Yokel (2002) report concentrations ranging from 2.9 to 270 mg/kg arsenic and 6.5 to 1,900 mg/kg lead in samples collected from historic orchard soils for the Hanford 100 Areas, with a mean concentration of 30 mg/kg arsenic and 220 mg/kg lead.

Figure 7. Photograph of One of the Excavation Areas at 600-151 (September 2010).

Figure 8. Photograph of One of the Excavation Areas at 600-151 (September 2010).

Figure 9. Photograph of One of the Excavation Areas at 600-151 (September 2010).

To support further evaluation of the premise that elevated arsenic and lead concentrations were associated with pre-Hanford orchard lands, field x-ray fluorescence (XRF) measurements were collected on May 25, 2010. Lead and arsenic were measured both inside and outside of the excavated waste boundaries with concentrations exceeding RAGs (Figure 10). A summary of these field XRF measurements is provided in Table 1. This information was provided to Ecology on June 17, 2010, with a request for assistance in determining a path forward for the site, since lead and arsenic contamination were found within and outside the remediated areas and were not believed to be associated with the military camp, but were present due to historical orchard lead arsenate applications. Subsequent discussions with the EPA, Ecology, and the U.S. Department of Energy led to a Tri-Party Agreement Change Notice TPA-CN-401 (DOE-RL 2010) dated December 6, 2010, that conditionally excludes lead and arsenic as COCs for sites demonstrated to have been located within orchards.

Figure 10. Map of the 600-151 Waste Site Field XRF Measurement Locations.

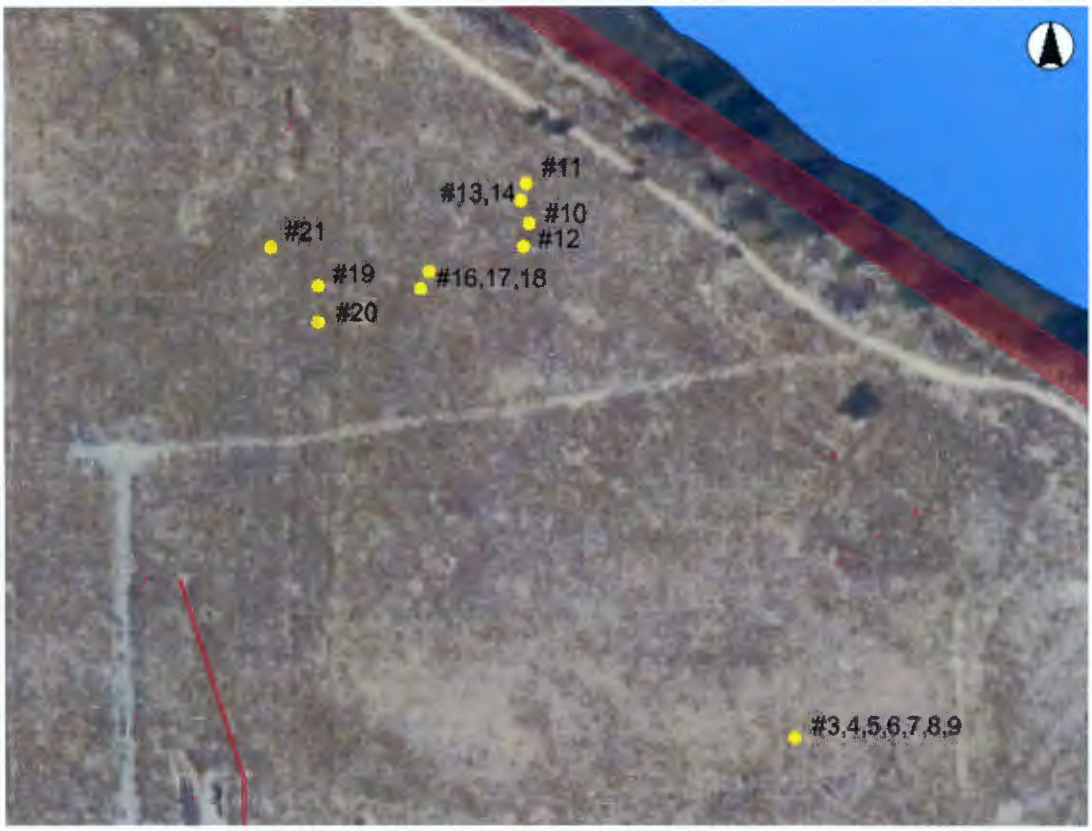

Table 1. Field XRF Data Summary (mg/kg).

Location	Date	As	As +/-	Pb	Pb +/-	Location Description
Measurements Outside Excavation Boundaries						
6	5/25/10	49	9	360	10	2 Meters West of Area # 3, N 153516, E 577142
7	5/25/10	53	11	644	13	2 Meters South of Area # 3, N 153516, E 577142
8	5/25/10	<LOD	31	633	13	1 Meter East of Area # 3, N 153516, E 577142
9	5/25/10	67	9	489	11	5 Meters North of Area # 3, N 153516, E 577142
13	5/25/10	<LOD	19	166	7	3 Meters West of Area #6, N 153691, E 577045
14	5/25/10	<LOD	27	397	10	3 Meters West of Area #4 and #5, N 153708, E 577043
15	5/25/10	<LOD	15	108	6	Coordinates unavailable, this area is Southwest of Area #6 ~10 Meters, undisturbed
18	5/25/10	<LOD	15	110	6	2 Meters North of Scrape area N 153683, E 577011
21	5/25/10	<LOD	9	29	4	Area is undisturbed, has normal vegetation for the area N 153692, E 576953
Measurements Inside Excavation Boundaries						
3	5/25/10	65	4	12	3	Area # 3, N 153516, E 577142 East end of Scrape area
4	5/25/10	44	4	16	3	Area # 3, N 153516, E 577142 Middle of Scrape area
5	5/25/10	169	16	1239	22	Area # 3, N 153516, E 577142 West end of Scrape area
10	5/25/10	46	4	12	3	Area #5, N 153700, E 577046 Scrape area
11	5/25/10	27	5	70	5	Area #4, N 153714, E 577046 Scrape area
12	5/25/10	32	3	16	3	Area #6, N 153691, E 577045 Scrape area
16	5/25/10	56	7	194	8	Scrape area N153677, E 577008
17	5/25/10	57	5	60	4	Scrape area N153683, E 577011
19	5/25/10	66	7	162	7	Scrape area N 153678, E 576971
20	5/25/10	11	3	15	3	Scrape area N 153665, E 576971

LOD = limit of detection

VERIFICATION SAMPLING ACTIVITIES

Verification sampling was conducted at the 600-151 waste site April 26 through 28, 2011, to support a determination that residual contaminant concentrations in the soil meet cleanup criteria specified in the 100 Area RDR/RAWP (DOE-RL 2009b) and the Remaining Sites ROD (EPA 1999). A statistical sampling design was used to collect verification soil samples from within the excavated areas (WCH 2011b). The following 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 site.

Contaminants of Potential Concern

The contaminant of potential concern (COPC) list identified for the 600-151 waste site in the *100 Area Remedial Action Sampling and Analysis Plan* (DOE-RL 2009a) includes polychlorinated biphenyls (PCBs), pesticides, semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), asbestos, silver, cadmium, barium, chromium (total), hexavalent chromium, mercury, lead, and selenium. The results of the in-process soil sampling (Appendix B) were used to revise the COPC list to include polycyclic aromatic hydrocarbons (PAH) (detected in the SVOC analysis) and eliminate SVOCs. Volatile organic compounds were not detected with field screening instrumentation during remediation; however, VOCs were retained as a COPC. Total petroleum hydrocarbons (TPH) were added as a COPC due to historical information indicating oil tanks may have been present and associated with use as a military camp.

In-process soil samples (Appendix B) and XRF measurements (Table 1) detected high concentrations of lead and arsenic. These constituents are associated with historic orchards and the use of lead arsenate as an orchard pesticide; they are eliminated as COPCs for verification sampling as agreed to by the regulatory agencies and documented in TPA-CN-401 (DOE-RL 2010). Although not COPCs for site closeout, lead and arsenic were evaluated in the verification samples to support assessment of the distribution of these constituents in a future CERCLA decision document. Historical review of agricultural practices associated with orchards (BHI 1999) indicated that smudge pots were used for freeze protection. Therefore, it is possible that the PAH detected in the in-process soil samples (Appendix B) were related to the use of orchard smudge pots that burned coal briquettes or oil.

Although not COPCs, antimony, beryllium, boron, cobalt, copper, manganese, molybdenum, nickel, vanadium, and zinc were also evaluated by performing the expanded inductively coupled plasma (ICP) metals analytical list.

Verification Sample Design

This section describes the basis for selection of the sample design and determination of the number of verification samples for the 600-151 waste site. As previously stated, the observational approach was used to implement the remedial design with mechanical removal of areas of concentrated debris and stained soil and manual removal (hand picking) of scattered surface debris. As a result, the post-excavation civil survey only identified areas where an elevation change had occurred due to the mechanical removal of concentrated debris or stained soil. Using this logic, only the footprints of the areas where stained soil and concentrated debris

were removed (as identified in the post-excavation civil survey) were identified for verification soil sampling. These excavation footprints for the remediated 600-151 waste site were delineated in Visual Sample Plan[1] (VSP) and used as the basis for location of verification samples as shown in Figure 11 (WCH 2011b). Since these areas are scattered over a large area, they were grouped into three sampling areas to provide adequate verification sample coverage. Area A consisted of remediated locations in the northwest portion of the site; area B consisted of those located in the approximate central portion of the site; and area C contained remediated areas in the southeast portion of the waste site. Four of the excavated areas located in area A did not have a statistical sample fall within the excavation. Therefore, for each of these excavated areas, since no staining or soil discoloration was observed to bias sample collection, one soil sample was collected at the approximate center of each of the four locations. A total of 43 verification sample locations were identified. Figures 12, 13, and 14 provide the sample location maps for areas A, B, and C, respectively. Discrete soil samples were collected on a random-start, triangular grid from each of these three areas. A triangular grid was used based on studies that indicate triangular grids are superior to square grids (Gilbert 1987). Additional details concerning the use of VSP to develop the statistical sampling design and derive the number of verification samples to collect are discussed in the verification work instruction (WCH 2011b).

Additional information related to verification sampling can be found in the field sampling logbook (WCH 2011a). Table 2 provides a summary of the verification samples that were collected.

Verification Sampling Results

All verification samples were analyzed using analytical methods approved by the EPA (DOE-RL 2009b). The laboratory reported data results from the verification sampling were used in the statistical calculation.

The primary statistical calculation to evaluate compliance with cleanup standards is the 95% upper confidence limit (UCL) on the arithmetic mean of the data. The 95% UCL values for each COPC are computed for each of the 600-151 waste site decision units, as specified by the 100 Area RDR/RAWP (DOE-RL 2009b). The calculations are provided in Appendix C. When a nonradionuclide COPC was detected in fewer than 50% of the verification samples collected for a decision unit, the maximum detected value was used for comparison to RAGs. If no detections for a given COPC were reported in the data set, then no statistical calculation or evaluation was performed for that COPC.

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

Figure 11. Sample Areas Identified at the 600-151 Waste Site.

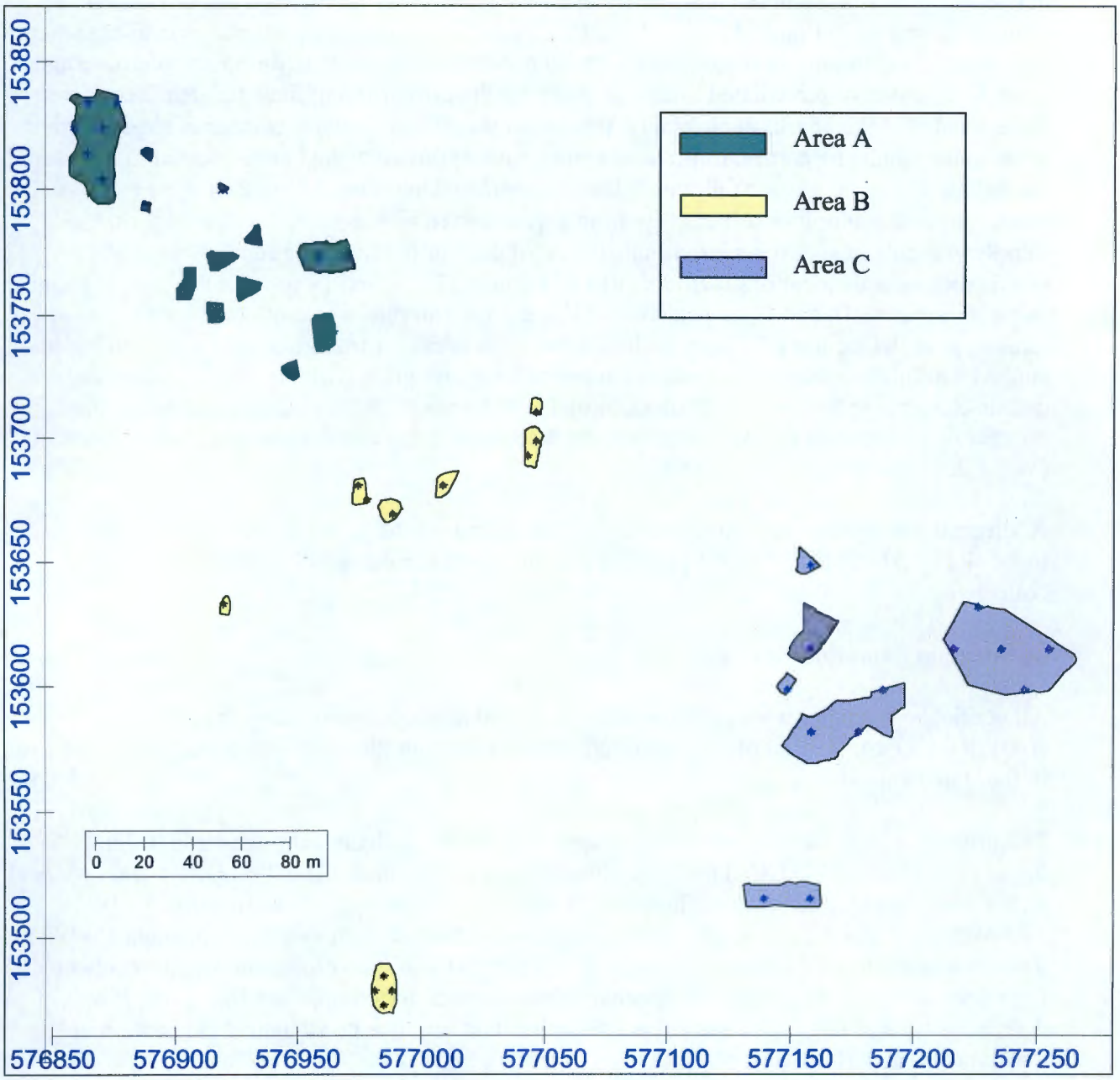

Figure 12. Area A Verification Sample Locations.

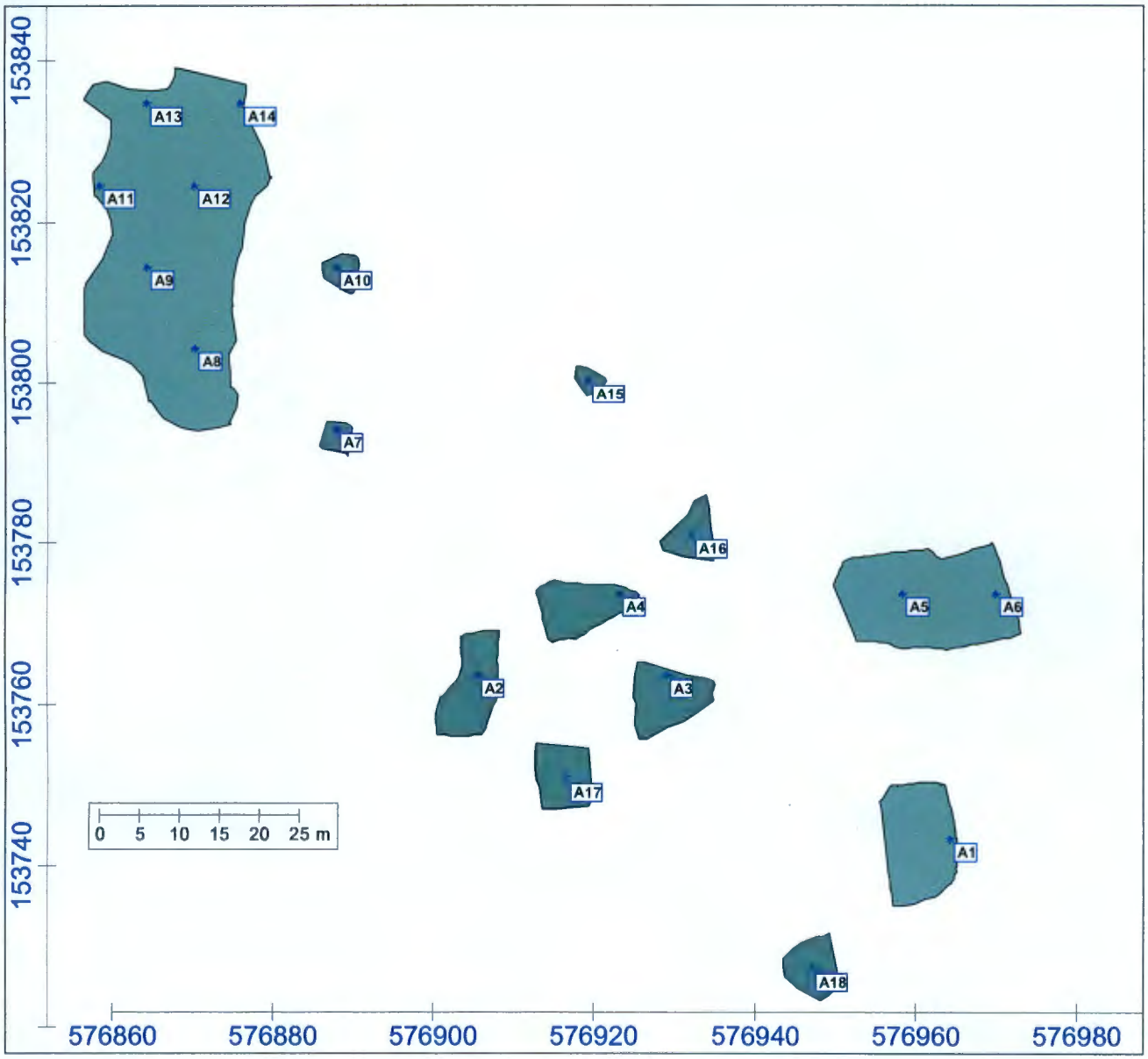

Figure 13. Area B Verification Sample Locations.

Figure 14. Area C Verification Sample Locations.

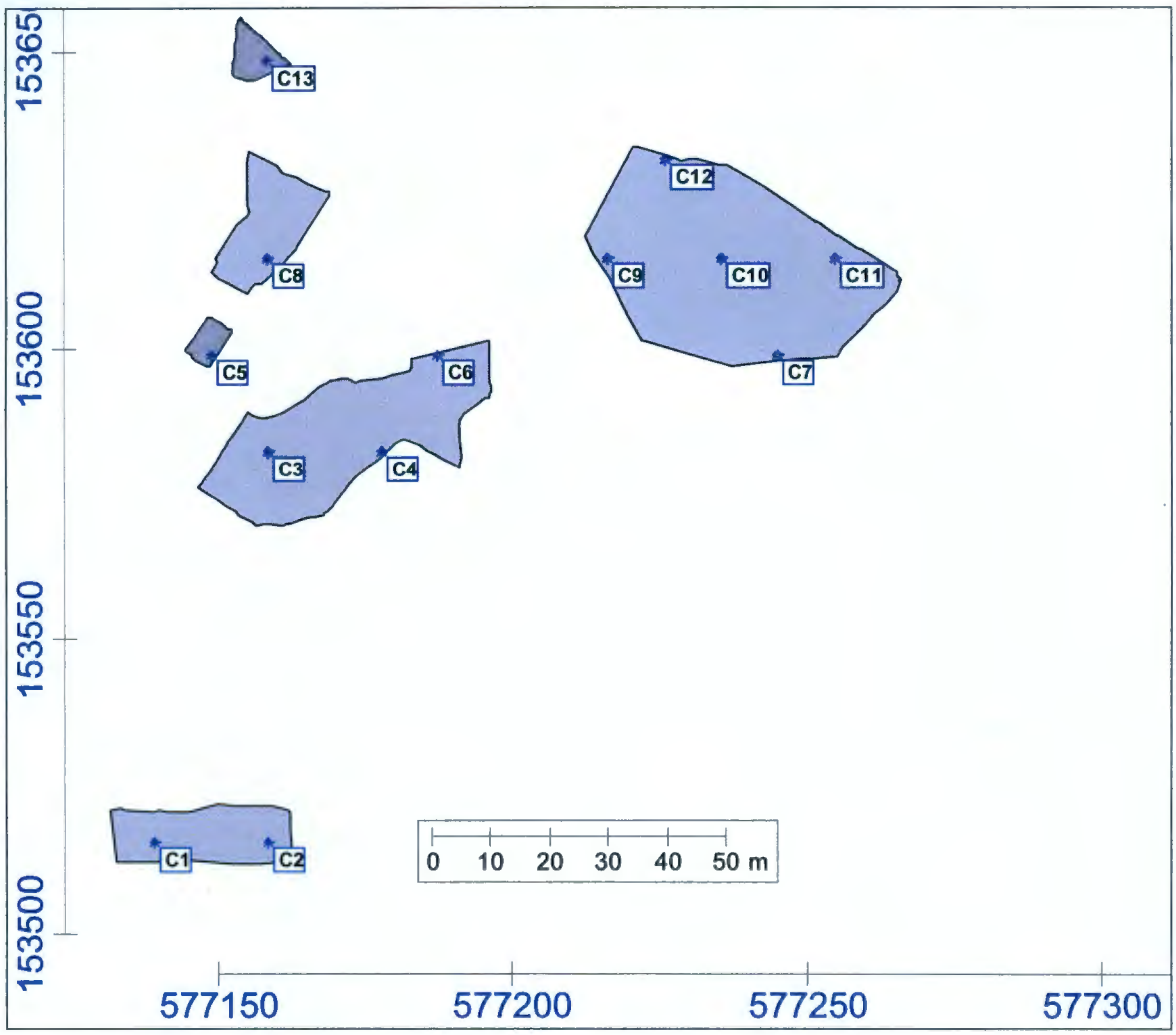

Table 2. 600-151 Verification Sample Summary Table. (5 Pages)

Sample Location	Sample Date	HEIS Sample Number	Washington State Plane Coordinates		Depth (m/ft)	Sample Analysis
			Easting	Northing		
A-1	4/26/11	J1HJV7	576964.2	153743.2	0.5 m (1.64 ft)	Asbestos
		J1HK23				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-2	4/26/11	J1HJV8	576905.5	153763.6	<0.65 m (<2.0 ft)	Asbestos
		J1HK24				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-3	4/26/11	J1HJV9	576929.0	153763.6	< 0.1 m (< 0.33 ft)	Asbestos
		J1HK25				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel

Table 2. 600-151 Verification Sample Summary Table. (5 Pages)

Sample Location	Sample Date	HEIS Sample Number	Washington State Plane Coordinates		Depth (m/ft)	Sample Analysis
			Easting	Northing		
A-4	4/26/11	J1HJW0	576923.1	153773.7	< 0.1 m (< 0.33 ft)	Asbestos
		J1HK26				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-5	4/26/11	J1HJW1	576958.4	153773.7	0.3 m (0.98 ft)	Asbestos
		J1HK27				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-6	4/26/11	J1HJW2	576970.1	153773.7	0.3 m (0.98 ft)	Asbestos
		J1HK28				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-7	4/26/11	J1HJW3	576887.9	153794.1	0.3 m (0.98 ft)	Asbestos
		J1HK29				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-8	4/26/11	J1HJW4	576870.3	153804.2	1.0 m (3.28 ft)	Asbestos
		J1HK30				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-9	4/26/11	J1HJW5	576864.4	153814.4	< 0.1 m (< 0.33 ft)	Asbestos
		J1HK31				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-10	4/26/11	J1HJW6	576887.9	153814.4	0.14 m (0.46 ft)	Asbestos
		J1HK32				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-11	4/26/11	J1HJW7	576858.6	153824.6	0.5 m (1.64 ft)	Asbestos
		J1HK33				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-12	4/26/11	J1HJW8	576870.3	153824.6	0.5 m (1.64 ft)	Asbestos
		J1HK34				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-13	4/26/11	J1HJW9	576864.4	153834.7	0.2 m (0.66 ft)	Asbestos
		J1HK35				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-14	4/26/11	J1HJX0	576876.2	153834.7	0.2 m (0.66 ft)	Asbestos
		J1HK36				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-15 [b]	4/26/11	J1HJX1	576919.3	153800.3	0.2 m (0.66 ft)	Asbestos
		J1HK37				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-16 [b]	4/26/11	J1HJX2	576932.2	153781.0	0.3 m (0.98 ft)	Asbestos
		J1HK38				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel

Table 2. 600-151 Verification Sample Summary Table. (5 Pages)

Sample Location	Sample Date	HEIS Sample Number	Washington State Plane Coordinates		Depth (m/ft)	Sample Analysis
			Easting	Northing		
A-17[b]	4/26/11	J1HJX3	576916.5	153750.6	0.5 m (1.64 ft)	Asbestos
		J1HK39				ICP metals[a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-18[b]	4/26/11	J1HJX4	576947.0	153727.2	< 0.1 m (< 0.33 ft)	Asbestos
		J1HK40				ICP metals[a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-3 (Duplicate)	4/26/11	J1HJX5	576929.0	153763.6	< 0.1 m (< 0.33 ft)	Asbestos
		J1HK41				ICP metals[a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
B-1	4/27/11	J1HJX6	576984.8	153472.5	1.0 m (3.28 ft)	Asbestos
		J1HK42				ICP metals[a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
B-2	4/27/11	J1HJX7	576981.4	153478.5	1.0 m (3.28 ft)	Asbestos
		J1HK43				ICP metals[a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
B-3	4/27/11	J1HJX8	576988.3	153478.5	1.0 m (3.28 ft)	Asbestos
		J1HK44				ICP metals[a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
B-4	4/27/11	J1HJX9	576984.8	153484.5	1.0 m (3.28 ft)	Asbestos
		J1HK45				ICP metals[a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
B-5	4/27/11	J1HK00	576919.5	153633.3	0.28 m (0.92 ft)	Asbestos
		J1HK46				ICP metals[a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
B-6	4/27/11	J1HK01	576988.3	153669.1	< 0.1 m (< 0.33 ft)	Asbestos
		J1HK47				ICP metals[a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
B-7	4/27/11	J1HK02	576978.0	153675.0	< 0.1 m (< 0.33 ft)	Asbestos
		J1HK48				ICP metals[a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
B-8	4/27/11	J1HK03	576974.5	153681.0	0.25 m (0.8 ft)	Asbestos
		J1HK49				ICP metals[a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
B-9	4/27/11	J1HK04	577008.9	153681.0	0.1 m (0.33 ft)	Asbestos
		J1HK50				ICP metals[a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
B-10	4/27/11	J1HK05	577043.3	153692.9	0.37 m (1.21 ft)	Asbestos
		J1HK51				ICP metals[a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel

Table 2. 600-151 Verification Sample Summary Table. (5 Pages)

Sample Location	Sample Date	HEIS Sample Number	Washington State Plane Coordinates		Depth (m/ft)	Sample Analysis
			Easting	Northing		
B-11	4/27/11	J1HK06	577046.7	153698.8	0.37 m (1.21 ft)	Asbestos
		J1HK52				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
B-12	4/27/11	J1HK07	577046.7	153710.8	0.3 m (0.98 ft)	Asbestos
		J1HK53				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
B-6 (Duplicate)	4/27/11	J1HK08	576988.3	153669.1	< 0.1 m (< 0.33 ft)	Asbestos
		J1HK54				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
C-1	4/28/11	J1HK09	577139.4	153515.6	0.5 m (1.64 ft)	Asbestos
		J1HK55				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
C-2	4/28/11	J1HK10	577158.6	153515.6	0.5 m (1.64 ft)	Asbestos
		J1HK56				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
C-3	4/28/11	J1HK11	577158.6	153582.2	0.88 m (2.89 ft)	Asbestos
		J1HK57				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
C-4	4/28/11	J1HK12	577177.8	153582.2	0.88 m (2.89 ft)	Asbestos
		J1HK58				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
C-5	4/28/11	J1HK13	577149.0	153598.8	1.0 m (3.28 ft)	Asbestos
		J1HK59				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
C-6	4/28/11	J1HK14	577187.4	153598.8	0.88 m (2.89 ft)	Asbestos
		J1HK60				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
C-7	4/28/11	J1HK15	577245.1	153598.8	<1.0 m (<3.28 ft)	Asbestos
		J1HK61				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
C-8	4/28/11	J1HK16	577158.6	153615.5	<1.0 m (<3.28 ft)	Asbestos
		J1HK62				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
C-9	4/28/11	J1HK17	577216.3	153615.5	<1.0 m (<3.28 ft)	Asbestos
		J1HK63				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
C-10	4/28/11	J1HK18	577235.5	153615.5	<1.0 m (<3.28 ft)	Asbestos
		J1HK64				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel

Table 2. 600-151 Verification Sample Summary Table. (5 Pages)

Sample Location	Sample Date	HEIS Sample Number	Washington State Plane Coordinates		Depth (m/ft)	Sample Analysis
			Easting	Northing		
C-11	4/28/11	J1HK19	577254.7	153615.5	<1.0 m (<3.28 ft)	Asbestos
		J1HK65				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
C-12	4/28/11	J1HK20	577225.9	153632.1	<1.0 m (<3.28 ft)	Asbestos
		J1HK66				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
C-13	4/28/11	J1HK21	577158.6	153648.8	0.2 m (0.66 ft)	Asbestos
		J1HK67				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
C-1 (Duplicate)	4/28/11	J1HK22	577139.4	153515.6	0.5 m (1.64 ft)	Asbestos
		J1HK68				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
Equipment blank	4/28/11	J1HK69	NA	NA	NA	ICP metals [a], mercury, and PAH
Trip blank	4/26/11	J1HKF5	NA	NA	NA	VOA
Trip blank	4/27/11	J1HKF6	NA	NA	NA	VOA
Trip blank	4/28/11	J1HKF7	NA	NA	NA	VOA

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

[b] Sample location was manually selected due to VSP not locating a statistical sample. Visual observations were used to adjust sample location to area of soil staining or discoloration, if present.

HEIS = Hanford Environmental Information System
ICP = inductively coupled plasma
NA = not applicable
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
TPH = total petroleum hydrocarbons
VOA = volatile organic analysis
VSP = Visual Sample Plan

A review of the April 2011 verification sampling results indicated that additional soil removal was necessary in area A (sample locations A-2, A-4, A-5, A-6, A-9, A-18) and area B (sample location B-11) due to the residual concentrations of benzo(a)pyrene and petroleum contamination exceeding soil cleanup criteria for direct exposure. In June 2011, an additional 1 m (3 ft) of soil was removed at these locations, and then the verification sampling for these locations was repeated (Table 3) on June 7, 2011. The results of this second round of sampling indicated the locations were adequately remediated, with the exception of sample location B-11, which still contained benzo(a)pryene contamination exceeding the cleanup criteria for direct exposure. Therefore, on June 22, 2011, an additional 1 m (3 ft) of soil was removed at this location and a third verification sample collected (Table 3).

Table 3. 600-151 Verification Re-sample Summary Table.

Sample Location	Sample Date	HEIS Sample Number	Washington State Plane Coordinates		Depth (m/ft)	Sample Analysis
			Easting	Northing		
Second Resample Event						
A-2	6/7/11	J1JDW1	576905.5	153763.6	1.0 m (3.28 ft)	Asbestos
		J1JDW8				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-4	6/7/11	J1JDW2	576923.1	153773.7	2.0 m (6.56 ft)	Asbestos
		J1JDW9				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-5	6/7/11	J1JDW3	576958.4	153773.7	1.5 m (4.92 ft)	Asbestos
		J1JDX0				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-6	6/7/11	J1JDW4	576970.1	153773.7	1.5 m (4.92 ft)	Asbestos
		J1JDX1				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-9	6/7/11	J1JDW5	576864.4	153814.4	1.5 m (4.92 ft)	Asbestos
		J1JDX2				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
A-18 [b]	6/7/11	J1JDW6	576947.0	153727.2	1.5 m (4.92 ft)	Asbestos
		J1JDX3				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
B-11	6/7/11	J1JDW7	577046.7	153698.8	1.0 m (3.28 ft)	Asbestos
		J1JDX4				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel
Third Resample Event						
B-11	6/22/11	J1JW47	577046.7	153698.8	2.0 m (6.56 ft)	Asbestos
		J1JW46				ICP metals [a], mercury, hexavalent chromium, pesticides, PAH, VOA, PCB, and TPH diesel

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

[b] Sample location was manually selected due to VSP not locating a statistical sample. Visual observations were used to adjust sample location to area of soil staining or discoloration, if present.

HEIS = Hanford Environmental Information System
ICP = inductively coupled plasma
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
TPH = total petroleum hydrocarbons
VOA = volatile organic analysis
VSP = Visual Sample Plan

Table 4. Comparison of Statistical or Maximum Detected Contaminant Concentrations to Action Levels for the 600-151 Verification Samples – Area A. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Statistical or Maximum Result Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Arsenic	20.2	20 [c]	20 [c]	20 [c]	Yes [d]	-- [d]
Barium	102 (<BG)	5,600	200	400	No	--
Beryllium	0.18 (<BG)	10.4 [e]	1.51 [c]	1.51 [c]	No	--
Boron [f]	5.0	7,200	320	-- [g]	No	--
Cadmium [h]	0.28 (<BG)	13.9 [e]	0.81 [c]	0.81 [c]	No	--
Chromium	13.1 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	7.9 (<BG)	24	15.7 [c]	-- [g]	No	--
Copper	22.0	2,960	59.2	22.0 [c]	Yes	Yes [i]
Hexavalent Chromium	0.306	2.1	4.8	2	No	--
Lead	133	353	10.2 [c]	10.2 [c]	Yes [d]	Yes [d]
Manganese	352 (<BG)	3,760	512 [c]	512 [c]	No	--
Mercury	0.014 (<BG)	24	0.33 [c]	0.33 [c]	No	--
Molybdenum [f]	0.47	400	8	-- [g]	No	--
Nickel	12.9 (<BG)	1,600	19.1 [c]	27.4	No	--
Selenium	0.94	400	5	1	No	--
Vanadium	41.0 (<BG)	560	85.1 [c]	-- [g]	No	--
Zinc	64.5 (<BG)	24,000	480	67.8 [c]	No	--
DDE, 4,4'-	0.0012	2.94	0.0257	0.0033 [j]	No	--
DDT, 4,4'-	0.00089	2.94	0.0257	0.0033 [j]	No	--
Acetone	0.0068	72,000	720	--	No	--
Methylene chloride	0.0061	133	0.5	0.94	No	--
Anthracene	0.0074	24,000	240	1,920	No	--
Benzo(a)anthracene	0.097	1.37	0.015 [j]	0.015 [j]	Yes	Yes [i]
Benzo(a)pyrene	0.100	0.137	0.015 [j]	0.015 [j]	Yes	Yes [i]
Benzo(b)fluoranthene	0.071	1.37	0.015 [j]	0.015 [j]	Yes	Yes [i]
Benzo(g,h,i)perylene [k]	0.039	2,400	48	192	No	--
Benzo(k)fluoranthene	0.037	1.37	0.015 [j]	0.015 [j]	Yes	Yes [i]
Chrysene	0.092	13.7	0.12	0.1 [h]	No	--
Dibenz(a,h)anthracene	0.023	1.37	0.03 [h]	0.03 [h]	No	--
Fluoranthene	0.128	3,200	64	18.0	No	--
Fluorene	0.0067	3,200	64	260	No	--
Indeno(1,2,3-cd)pyrene	0.036	1.37	0.33 [j]	0.33 [j]	No	--
Phenanthrene [k]	0.063	24,000	240	1,920	No	--
Pyrene	0.179	2,400	48	192	No	--
TPH-diesel range	11.084	200	200	200	No	--

Table 4. Comparison of Statistical or Maximum Detected Contaminant Concentrations to Action Levels for the 600-151 Verification Samples – Area A. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Statistical or Maximum Result Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
TPH-diesel range extended	20.733	200	200	200	No	--

[a] RAGs obtained from the RDR/RAWP (DOE-RL 2009b) unless otherwise noted.

[b] 95% upper confidence limit or maximum value, depending on data censorship, as described in Appendix C.

[c] Where cleanup levels are less than background, cleanup levels default to background (WAC 173-340-700[4][d], 1996). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement Project Managers as discussed in Section 2.1.2.1 of the RDR/RAWP (DOE-RL 2009b).

[d] Lead and arsenic associated with the use of pesticides previous to the Manhattan Project have been excluded as COCs for the 600-151 waste site using the process described in the Tri-party Agreement Project Manager's change notice (TPA-CN-401) (DOE-RL 2010). An administrative control identifying the presence of concentrations of lead and arsenic exceeding direct exposure criteria will be established in WIDS until a decision concerning pre-Hanford historic orchard land is made in a future CERCLA decision document.

[e] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).

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

[g] No parameters are available from the Cleanup Levels and Risk Calculations Database (Ecology 2011) or other databases to calculate cleanup levels.

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

[i] Based on RESRAD modeling discussed in Appendix C of the RDR/RAWP (DOE-RL 2009b), the residual concentrations of copper, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthracene, and benzo(k)fluoranthracene are not predicted to migrate more than 3 m (9.9 ft) vertically in 1,000 years (based on the contaminant with the lowest distribution coefficient [K_d], copper, with a K_d value of 22 mL/g). The vadose zone soil underlying the deepest portion of the excavation is approximately 9 m (29.5 ft) thick. Therefore, residual concentrations of these constituents are predicted to be protective of groundwater and the Columbia River.

[j] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996). The cited RDLs are based on EPA-approved analytical methods that may not be available for rapid turnaround analyses. Prior notification and concurrence with the laboratory may be necessary to analyze to meet this RDL. Actual detection limits may differ from any RDL.

[k] Toxicity data for this chemical are not available. Cleanup levels are based on surrogate chemicals: contaminant: benzo(g,h,i)perylene; surrogate: pyrene; contaminant: phenathrene; surrogate: anthracene.

-- = not applicable
BG = background
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
COC = contaminant of concern
COPC = contaminant of potential concern
EPA = U.S. Environmental Protection Agency
RAG = remedial action goal
RDL = required detection limit
ROD = record of decision
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
RESRAD = RESidual RADioactivity (dose model)
TPH = total petroleum hydrocarbons
WAC = *Washington Administrative Code*
WIDS = waste information data system

Table 5. Comparison of Statistical or Maximum Detected Contaminant Concentrations to Action Levels for the 600-151 Verification Samples – Area B. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Statistical or Maximum Result Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Arsenic	83.4	20 [c]	20 [c]	20 [c]	Yes [d]	-- [d]
Barium	90.0 (<BG)	5,600	200	400	No	--
Beryllium	0.13 (<BG)	10.4 [e]	1.51 [c]	1.51 [c]	No	--
Boron [f]	2.2	7,200	320	-- [g]	No	--
Cadmium [h]	0.73 (<BG)	13.9 [e]	0.81 [c]	0.81 [c]	No	--
Chromium	12.2 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	7.4 (<BG)	24	15.7 [c]	-- [g]	No	--
Copper	14.3 (<BG)	2,960	59.2	22.0 [c]	No	--
Lead	679	353	10.2 [c]	10.2 [c]	Yes [d]	Yes [d,i]
Manganese	361 (<BG)	3,760	512 [c]	512 [c]	No	--
Mercury	0.013 (<BG)	24	0.33 [c]	0.33 [c]	No	--
Molybdenum [f]	0.33	400	8	-- [g]	No	--
Nickel	11.5 (<BG)	1,600	19.1 [c]	27.4	No	--
Vanadium	38.1 (<BG)	560	85.1 [c]	-- [g]	No	--
Zinc	46.4 (<BG)	24,000	480	67.8 [c]	No	--
DDE, 4,4'-	0.00047	2.94	0.0257	0.0033 [j]	No	--
2-butanone	0.0069	48,000	480	-- [g]	No	--
Acetone	0.030	72,000	720	-- [g]	No	--
Methylene chloride	0.011	133	0.5	0.94	No	--
Benzo(a)anthracene	0.018	1.37	0.015 [j]	0.015 [j]	Yes	Yes [i]
Benzo(a)pyrene	0.045	0.137	0.015 [j]	0.015 [j]	Yes	Yes [i]
Benzo(b)fluoranthene	0.019	1.37	0.015 [j]	0.015 [j]	Yes	Yes [i]
Benzo(g,h,i)perylene [k]	0.035	2,400	48	192	No	--
Benzo(k)fluoranthene	0.021	1.37	0.015 [j]	0.015 [j]	Yes	Yes [i]
Chrysene	0.024	13.7	0.12	0.1 [j]	No	--
Fluoranthene	0.093	3,200	64	18.0	No	--
Phenanthrene [k]	0.046	24,000	240	1,920	No	--
Pyrene	0.100	2,400	48	192	No	--
TPH-diesel range	2.120	200	200	200	No	--

Table 5. Comparison of Statistical or Maximum Detected Contaminant Concentrations to Action Levels for the 600-151 Verification Samples – Area B. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Statistical or Maximum Result Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
TPH-diesel range extended	7.854	200	200	200	No	--

[a] RAGs obtained from the RDR/RAWP (DOE-RL 2009b) unless otherwise noted.
[b] 95% upper confidence limit or maximum value, depending on data censorship, as described in Appendix C.
[c] Where cleanup levels are less than background, cleanup levels default to background (WAC 173-340-700[4][d], 1996). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement Project Managers as discussed in Section 2.1.2.1 of the RDR/RAWP (DOE-RL 2009b).
[d] Lead and arsenic associated with the use of pesticides previous to the Manhattan Project have been excluded as COCs for the 600-151 waste site using the process described in the Tri-party Agreement Project Manager's change notice (TPA-CN-401) (DOE-RL 2010). An administrative control identifying the presence of concentrations of lead and arsenic exceeding direct exposure criteria will be established in WIDS until a decision concerning pre-Hanford historic orchard land is made in a future CERCLA document.
[e] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[f] No Hanford Site-specific or Washington State background value available.
[g] No parameters are available from the Cleanup Levels and Risk Calculations Database (Ecology 2011) or other databases to calculate cleanup levels.
[h] Hanford Site-specific background value is not available; it was not evaluated during background study. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).
[i] Based on RESRAD modeling discussed in Appendix C of the RDR/RAWP (DOE-RL 2009b), the residual concentrations of lead, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthracene, and benzo(k)fluoranthracene are not predicted to migrate more than 2 m (6.6 ft) vertically in 1,000 years (based on the contaminant with the lowest distribution coefficient [K_d], lead, with a K_d value of 30 mL/g). The vadose zone soil underlying the deepest portion of the excavation is approximately 9 m (29.5 ft) thick. Therefore, residual concentrations of these constituents are predicted to be protective of groundwater and the Columbia River.
[j] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996). The cited RDLs are based on EPA-approved analytical methods that may not be available for rapid turnaround analyses. Prior notification and concurrence with the laboratory may be necessary to analyze to meet this RDL. Actual detection limits may differ from any RDL.
[k] Toxicity data for this chemical are not available. Cleanup levels are based on surrogate chemicals: contaminant: benzo(g,h,i)perylene; surrogate: pyrene; contaminant: phenathrene; surrogate: anthracene.

-- = not applicable
BG = background
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
COC = contaminant of concern
COPC = contaminant of potential concern
EPA = U.S. Environmental Protection Agency
RAG = remedial action goal
RDL = required detection limit
ROD = record of decision
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
RESRAD = RESidual RADioactivity (dose model)
TPH = total petroleum hydrocarbons
WAC = *Washington Administrative Code*
WIDS = waste information data system

Table 6. Comparison of Statistical or Maximum Detected Contaminant Concentrations to Action Levels for the 600-151 Verification Samples – Area C. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Statistical or Maximum Result Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Arsenic	67.4	20 [c]	20 [c]	20 [c]	Yes [d]	-- [d]
Barium	147	5,600	200	400	No	--
Beryllium	0.14 (<BG)	10.4 [e]	1.51 [c]	1.51 [c]	No	--
Boron [f]	2.8	7,200	320	-- [g]	No	--
Cadmium [h]	0.56 (<BG)	13.9 [e]	0.81 [c]	0.81 [c]	No	--
Chromium	13.1 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	7.7 (<BG)	24	15.7 [c]	-- [g]	No	--
Copper	16.1 (<BG)	2,960	59.2	22.0 [c]	No	--
Lead	712	353	10.2 [c]	10.2 [c]	Yes [d]	Yes [d, i]
Manganese	322 (<BG)	3,760	512 [c]	512 [c]	No	--
Mercury	0.023 (<BG)	24	0.33 [c]	0.33 [c]	No	--
Molybdenum [f]	0.37	400	8	-- [g]	No	--
Nickel	12.4 (<BG)	1,600	19.1 [c]	27.4	No	--
Vanadium	38.5 (<BG)	560	85.1 [c]	-- [g]	No	--
Zinc	64.3 (<BG)	24,000	480	67.8 [c]	No	--
DDE, 4,4'-	0.0034	2.94	0.0257	0.0033 [j]	Yes	Yes [i]
DDT, 4,4'-	0.00091	2.94	0.0257	0.0033 [j]	No	--
Methylene chloride	0.0034	133	0.5	0.94	No	--
Anthracene	0.0067	24,000	240	1,920	No	--
Benzo(a)anthracene	0.034	1.37	0.015 [j]	0.015 [j]	Yes	Yes [i]
Benzo(a)pyrene	0.035	0.137	0.015 [j]	0.015 [j]	Yes	Yes [i]
Benzo(b)fluoranthene	0.077	1.37	0.015 [j]	0.015 [j]	Yes	Yes [i]
Benzo(g,h,i)perylene [k]	0.024	2,400	48	192	No	--
Benzo(k)fluoranthene	0.014	1.37	0.015 [j]	0.015 [j]	No	--
Chrysene	0.129	13.7	0.12	0.1 [j]	Yes	Yes [i]
Fluoranthene	0.063	3,200	64	18.0	No	--
Fluorene	0.009	3,200	64	260	No	--
Indeno(1,2,3-cd)pyrene	0.027	1.37	0.33 [j]	0.33 [j]	No	--
Naphthalene	0.018	1,600	16.0	988	No	--
Phenanthrene [k]	0.056	24,000	240	1,920	No	--
Pyrene	0.083	2,400	48	192	No	--
TPH-diesel range	9.123	200	200	200	No	--

Table 6. Comparison of Statistical or Maximum Detected Contaminant Concentrations to Action Levels for the 600-151 Verification Samples – Area C. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Statistical or Maximum Result Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
TPH-diesel range extended	22.089	200	200	200	No	--

[a] RAGs obtained from the RDR/RAWP (DOE-RL 2009b) unless otherwise noted.
[b] 95% upper confidence limit or maximum value, depending on data censorship, as described in Appendix C.
[c] Where cleanup levels are less than background, cleanup levels default to background (WAC 173-340-700[4][d], 1996). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement Project Managers as discussed in Section 2.1.2.1 of the RDR/RAWP (2009b).
[d] Lead and arsenic associated with the use of pesticides previous to the Manhattan Project have been excluded as COCs for the 600-151 waste site using the process described in the Tri-party Agreement Project Manager's change notice (TPA-CN-401) (DOE-RL 2010). An administrative control identifying the presence of concentrations of lead and arsenic exceeding direct exposure criteria will be established in WIDS until a decision concerning pre-Hanford historic orchard land is made in a future CERCLA document.
[e] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[f] No Hanford Site-specific or Washington State background value available.
[g] No parameters are available from the Cleanup Levels and Risk Calculations Database (Ecology 2011) or other databases to calculate cleanup levels.
[h] Hanford Site-specific background value is not available; it was not evaluated during background study. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).
[i] Based on RESRAD modeling discussed in Appendix C of the RDR/RAWP (DOE-RL 2009b), the residual concentrations of lead, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthracene, chrysene and 4,4'-DDE are not predicted to migrate more than 2 m (6.6 ft) vertically in 1,000 years (based on the contaminant with the lowest distribution coefficient [K_d], lead, with a K_d value of 30 mL/g). The vadose zone soil underlying the deepest portion of the excavation is approximately 9 m (29.5 ft) thick. Therefore, residual concentrations of these constituents are predicted to be protective of groundwater and the Columbia River.
[j] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996). The cited RDLs are based on EPA-approved analytical methods that may not be available for rapid turnaround analyses. Prior notification and concurrence with the laboratory may be necessary to analyze to meet this RDL. Actual detection limits may differ from any RDL.
[k] Toxicity data for this chemical are not available. Cleanup levels are based on surrogate chemicals: contaminant: benzo(g,h,i)perylene; surrogate: pyrene; contaminant: phenathrene; surrogate: anthracene.

-- = not applicable
BG = background
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
COC = contaminant of concern
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Comparisons of the results for each COPC for the 600-151 waste site against the soil RAGs for sample areas A, B, and C are summarized in Tables 4, 5, and 6, respectively. Contaminants that were not detected by laboratory analysis are excluded from these tables. Calculated cleanup levels are not available in Ecology Cleanup Levels and Risk Calculations (CLARC) Database (Ecology 2011) under WAC 173-340-740(3) for calcium, magnesium, potassium, silicon, and sodium. The EPA's *Risk Assessment Guidance for Superfund* (EPA 1989) recommends that aluminum and iron not be considered in site risk evaluations. Therefore, aluminum, calcium, iron, magnesium, potassium, silicon, and sodium are not considered site COPCs and are not included in these tables. The complete laboratory results are stored in the ENvironmental REstoration (ENRE) project-specific database prior to submitting to the Hanford Environmental Information System (HEIS) for archiving and are provided in Appendix C. Asbestos was not detected in any of the verification samples; the asbestos results for verification samples are provided in Appendix D.

DATA EVALUATION

This section demonstrates that remedial actions at the 600-151 waste site have achieved the applicable RAGs developed to support unrestricted land use at the 100 Area as established in the Remaining Sites ROD (EPA 1999) and documented in the 100 Area RDR/RAWP (DOE-RL 2009b). As agreed by the Tri-Parties in TPA-CN-401 (DOE-RL 2010), lead and arsenic contamination that resulted from pesticide use prior to the Manhattan Project have been excluded as contaminants of concern (COCs) and will be discussed in a future *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) document. However, since lead and arsenic contamination is present in surface soil above direct exposure cleanup levels, the Hanford Waste Information Data System (WIDS) will be updated in accordance with the *Sitewide Institutional Controls Plan for Hanford CERCLA Response Actions* (DOE/RL 2009c) to provide documentation of an administrative control until a final decision concerning historic pesticide use is made.

Nonradionuclide Soil RAGs for Direct Exposure and Groundwater and River Protection Attained

Evaluation of the verification sampling results as presented in Tables 4, 5, and 6, show that all COPCs were quantified below their respective soil RAGs, with the exception of arsenic, copper, lead, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene,chrysene, and 4,4'-DDE. Of these, arsenic and lead were measured at concentrations exceeding cleanup criteria for direct exposure and protection of groundwater and the Columbia River. However, since arsenic and lead contamination is associated with historic lead arsenate pesticide use at pre-Hanford orchard land, they are excluded as COCs (DOE-RL 2010) and are not evaluated further. Based on the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005) and modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), residual concentrations of copper, lead, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and 4,4'-DDE (having K_d values exceeding 7.9 mL/g) are predicted to not migrate more than 3 m (9.9 ft) vertically in 1,000 years. The thickness of the

vadose zone below the waste site excavation is approximately 9 m (29.5 ft) thick. All other COPCs were either not detected or were quantified below the RAGs.

Three-Part Test for Nonradionuclides

When using a statistical sampling approach, a RAG requirement for nonradionuclides is the WAC 173-340-740(7)(e) three-part test. The WAC 173-340 three-part test consists of the following criteria: (1) the cleanup verification 95% UCL value must be less than the cleanup level, (2) no single detection can exceed two times the cleanup criteria, and (3) the percentage of samples exceeding the cleanup criteria must be less than 10% of the data set. The application of the three-part test for the 600-151 waste site is included in the statistical calculations (Appendix C). The results of this evaluation indicate that all residual COC/COPC concentrations pass the three-part test in comparison against applicable RAGs, with the exception of arsenic, barium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, cadmium, chrysene, copper, lead, and zinc in comparison with soil RAGs for groundwater and river protection. As described previously, with the exception of arsenic that is excluded as a COC, RESRAD modeling (BHI 2005) predicts that these constituents will not reach groundwater (and, therefore, the river) within 1,000 years.

An additional application of the three-part test is included for the statistical data sets that default to the maximum because less than half of the data set was detected. The results of this evaluation indicate that all residual COPC concentrations pass the three-part test in comparison against applicable RAGs, except for benz(a)pyrene, benzo(k)fluoranthene, and 4,4'-DDE in comparison against the soil RAGs for groundwater and/or river protection. However, as described above RESRAD modeling (BHI 2005) predicts that these constituents will not reach groundwater (and, therefore, the river) within 1,000 years.

Nonradionuclide Direct Contact Hazard Quotient and Carcinogenic Risk RAGs Attained

Assessment of the risk requirements for the 600-151 waste site is determined by calculation of the direct contact hazard quotient and carcinogenic (excess cancer) risk values for nonradionuclides. These calculations are located in Appendix C. The 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 excess carcinogenic risk of less than 1×10^{-5}. These risk values were conservatively calculated using the 95% UCL or maximum values (Appendix C) from the samples collected at the 600-151 waste site. Risk values are not calculated for constituents that were not detected or were detected at concentrations below Hanford Site or Washington State background values. The calculations indicate that all individual hazard quotients for noncarcinogenic constituents are less than 1.0. The cumulative hazard quotient for the 600-151 waste site is 3.9×10^{-2}. All individual cumulative carcinogenic risk values are less than 1×10^{-6}. The cumulative carcinogenic risk value is 1.1×10^{-6}. Therefore, nonradionuclide risk requirements are met.

Nonradionuclide Groundwater Hazard Quotient and Carcinogenic Risk RAGs Attained

Assessment of the risk requirements for the 600-151waste site included calculation of the hazard quotient and carcinogenic (excess cancer) risk values for groundwater protection for nonradionuclides in Appendix C. The requirements include an individual and cumulative hazard quotient of less than 1.0, an individual excess carcinogenic risk of less than 1×10^{-6}, and a

cumulative excess carcinogenic risk of less than 1×10^{-5}. These risk values were conservatively calculated for the entire waste site using the highest value for each COPC from each of the decision units. Risk values were calculated for constituents that were detected at concentrations above Hanford Site or Washington State background values or for which there is no background value. In addition, the distribution coefficients for these contaminants are less than that necessary to show no migration to groundwater in 1,000 years based on RESRAD modeling, discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b).

All individual hazard quotients for noncarcinogenic constituents are less than 1.0. The cumulative hazard quotient for the 600-151 waste site is 1.9×10^{-1}, which is less than 1.0. The individual excess carcinogenic risk for methylene chloride, the only carcinogen, was 1.9×10^{-8}; therefore, the cumulative excess cancer risk is also 1.9×10^{-8}. All other site nonradionuclide COPCs were not detected, or quantified below background levels. Therefore, residual concentrations of these constituents are predicted to be protective of groundwater and the Columbia River. Nonradionuclide risk requirements related to groundwater are met.

DATA QUALITY ASSESSMENT

A data quality assessment (DQA) was performed to compare the verification sampling approach, the field logbook (WCH 2011a), and resulting analytical data with the sampling and data quality requirements specified by the project objectives and performance specifications. The DQA for the 600-151 waste site established that the data are of the right type, quality, and quantity to support site verification decisions within specified error tolerances. The evaluation verified that the sample design was sufficient for the purpose of clean site verification. The cleanup verification sample analytical data are stored in the ENRE project-specific database for data evaluation prior to its archival in the HEIS and are summarized in Appendix C. The detailed DQA is presented in Appendix E.

SUMMARY FOR INTERIM CLOSURE

The 600-151 waste site has been evaluated in accordance with the Remaining Sites ROD (EPA 1999) and the 100 Area RDR/RAWP (DOE-RL 2009b). Verification sampling was performed, and the analytical results indicate that with the exception of arsenic and lead, the residual concentrations of COPCs at this site meet the RAOs for direct exposure, groundwater protection, and river protection. However, as agreed by the Tri-Parties in TPA-CN-401 (DOE-RL 2010), lead and arsenic contamination that resulted from pesticide use prior to the Manhattan Project have been excluded as COCs for the 600-151 waste site using the process described in the TPA change notice and will be discussed in a future CERCLA document. An administrative control will be documented in WIDS until a final decision concerning historic pesticide contamination is made. The results of verification sampling indicate that residual waste site contamination originating from Hanford Site or Manhattan Project activities does not extend into deep-zone soils. Therefore, institutional controls to prevent uncontrolled drilling into the deep zone (below 4.6 m [15 ft]) are not required. In accordance with this evaluation, the verification sampling results support a reclassification of the 600-151 waste site to Interim Closed Out.

REFERENCES

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

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APPENDIX A

ECOLOGICAL RISK COMPARISON TABLE

Table A-1. Contaminants Exceeding Ecological Screening Levels for the 600-151 Waste Site [a]

Hazardous Substance		2007 WAC 173-340 Table 749-3			EPA Ecological Soil Screening Levels [b]				Waste Site Analyses
		Plants	Soil Biota	Wildlife	Plants	Soil Biota	Avian [c]	Mammalian [c]	
Metals (mg/kg):									
	Background								
Arsenic III	6.5 [d]			7	18		43	46	83.4
Arsenic V	6.5 [d]	10	60	132					
Barium	132	500	--	102	--	330	--	2,000	147
Boron [e]		0.5							5.0
Cadmium	0.81	4	20	14	32	140	0.77	0.36	0.73 (<BG)
Lead	10.2	50	500	118	120	1,700	11	56	712
Manganese	512	1,100 [f]		1,500	220	450	4,300	4,000	361 (<BG)
Selenium	0.78	1	70	0.3	0.52	4.1	1.2	0.63	0.94
Vanadium	85.1	2					7.8	280	41.0 (<BG)
Zinc	67.8	86 [f]	200	360	160	120	46	79	64.5 (<BG)

Note: Shaded cells are exceeded by the maximum or the statistical result.
Blank cells = Values not available.

[a] Exceedance of screening values does not necessarily indicate the existence of risk to ecological receptors. All exceedances must be evaluated in the context of additional lines of evidence for ecological effects following a baseline risk assessment for the river corridor portion of the Hanford Site which will include a more complete quantitative ecological risk assessment.

[b] Available on the internet at <www.epa.gov/ecotox/ecossl.>

[c] Wildlife.

[d] The Hanford Site background for arsenic is 6.5 mg/kg. An arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement Project Managers as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP, DOE/RL-96-17, Rev. 6.

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

[f] Benchmark replaced by Washington State natural background concentration from *Natural Background Soil Metals Concentrations in Washington State*, Publication 94-115, Washington State Department of Ecology, Olympia, Washington (Ecology 1994).

BG = background
EPA = U.S. Environmental Protection Agency
RDR/RAWP = *Remedial Design Report/Remedial Action Work Plan for the 100 Area*
WAC = *Washington Administrative Code*

APPENDIX B

SUMMARY OF WASTE CHARACTERIZATION SAMPLING RESULTS

Table B-1. 600-151 Sample Results - Inorganics. (3 Pages)

Sample Location	Sample Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Soil-waste profile (N153601, E 577225)	J19Y29	4/27/10	8300		4.03	0.34	B	0.48	10.9		0.81	69		0.4	0.224		0.16
Soil-waste profile (N153575, E 577156)	J19Y30	4/27/10	9610		4.16	0.5	U	0.5	3.49		0.83	71		0.42	0.319		0.17
Soil-waste profile (N153516, E 577142)	J19Y31	4/27/10	11000		3.21	0.586		0.39	206		0.64	88.9		0.32	0.387		0.13
Soil-waste profile (N153714, E 577046)	J19Y32	4/27/10	8590		4.48	0.862		0.54	286		0.9	85		0.45	0.293		0.18
Soil-waste profile (N153700, E 577046)	J19Y33	4/27/10	8120		3.77	0.38	B	0.45	45.2		0.75	72.6		0.38	0.272		0.15
Soil-waste profile (N153691, E 577045)	J19Y34	4/27/10	7840		4.18	0.651		0.5	178		0.84	71.6		0.42	0.268		0.17
Soil-waste profile (N153668, E 577986)	J19Y35	4/27/10	10100		3.77	0.704		0.45	229		0.76	93.2		0.38	0.331		0.15
Soil-waste profile (N153726, E 576948)	J19Y36	4/27/10	9110		3.82	0.292	B	0.46	7.48		0.76	77.8		0.38	0.3		0.15
Soil-waste profile (N153752, E 576916)	J19Y37	4/27/10	2800		3.58	0.43	U	0.43	3.07		0.72	45.6		0.36	0.143	U	0.14
Soil-waste profile (N153822, E 576871)	J19Y38	4/27/10	2690		5.52	1.58		0.66	2.78		1.1	249		0.55	0.446		0.22

Sample Location	Sample Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Soil-waste profile (N153601, E 577225)	J19Y29	4/27/10	2.8		1.61	0.048	B	0.16	4650		80.6	14.5		0.16	3.55		1.61
Soil-waste profile (N153575, E 577156)	J19Y30	4/27/10	9.1		1.67	0.067	B	0.17	3200		83.3	12.8		0.17	4.86		1.67
Soil-waste profile (N153516, E 577142)	J19Y31	4/27/10	2.27		1.28	0.177		0.13	3480		64.2	13.8		0.13	6.26		1.28
Soil-waste profile (N153714, E 577046)	J19Y32	4/27/10	2.22		1.79	0.596		0.18	3360		89.5	12.5		0.18	5.62		1.79
Soil-waste profile (N153700, E 577046)	J19Y33	4/27/10	2.44		1.51	0.281		0.15	2850		75.4	11.8		0.15	5.53		1.51
Soil-waste profile (N153691, E 577045)	J19Y34	4/27/10	2.18		1.67	0.276		0.17	3070		83.6	12.5		0.17	5.52		1.67
Soil-waste profile (N153668, E 577986)	J19Y35	4/27/10	2.52		1.51	0.338		0.15	3930		75.5	14.5		0.15	6.53		1.51
Soil-waste profile (N153726, E 576948)	J19Y36	4/27/10	1.94		1.53	0.156		0.15	3140		76.4	13.5		0.15	6.17		1.53
Soil-waste profile (N153752, E 576916)	J19Y37	4/27/10	23.7		1.43	0.611		0.14	147000		430	4.47		0.14	1.56		1.43
Soil-waste profile (N153822, E 576871)	J19Y38	4/27/10	72.1		2.21	0.154	B	0.22	1860		110	4.87		0.22	1.62	B	2.21

B = Detected below PQL
D = diluted
J = estimate
PQL = practical quantitation limit
Q = qualifier
TCLP = toxicity characteristic leaching procedure
U = undetected

Table B-1. 600-151 Sample Results - Inorganics. (3 Pages)

Sample Location	Sample Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Soil-waste profile (N153601, E 577225)	J19Y29	4/27/10	13.7		0.81	0.42	U	0.42	19800		16.1	42.1		0.4	2410		60.5
Soil-waste profile (N153575, E 577156)	J19Y30	4/27/10	11		0.83	0.41	U	0.41	19900		16.7	8.79		0.42	3970		62.4
Soil-waste profile (N153516, E 577142)	J19Y31	4/27/10	13.6		0.64	0.41	U	0.41	20000		12.8	345		0.32	3600		48.1
Soil-waste profile (N153714, E 577046)	J19Y32	4/27/10	13.1		0.9	0.42	U	0.42	17900		17.9	1750		0.45	3590		67.1
Soil-waste profile (N153700, E 577046)	J19Y33	4/27/10	12.3		0.75	1.26	D	0.82	17000		15.1	393		0.38	3510		56.6
Soil-waste profile (N153691, E 577045)	J19Y34	4/27/10	12.7		0.84	0.79	D	0.41	16300		16.7	751		0.42	3390		62.7
Soil-waste profile (N153668, E 577986)	J19Y35	4/27/10	13.4		0.76	0.41	U	0.41	20000		15.1	932		0.38	4300		56.6
Soil-waste profile (N153726, E 576948)	J19Y36	4/27/10	12.8		0.76	0.41	U	0.41	18800		15.3	34.1		0.38	3860		57.3
Soil-waste profile (N153752, E 576916)	J19Y37	4/27/10	6.99		0.72	0.46	U	0.46	5440		14.3	15.3		0.36	1620		53.7
Soil-waste profile (N153822, E 576871)	J19Y38	4/27/10	22.3		1.1	22.1	U	22.1	6990		22.1	20.3		0.55	1050		82.8

Sample Location	Sample Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Soil-waste profile (N153601, E 577225)	J19Y29	4/27/10	131		4.03	0.026	U	0.03	0.461	B	1.61	7.03		3.22	2520		322
Soil-waste profile (N153575, E 577156)	J19Y30	4/27/10	292		4.16	0.024	U	0.02	0.492	B	1.67	9.18		3.33	3980		333
Soil-waste profile (N153516, E 577142)	J19Y31	4/27/10	270		3.21	0.023	U	0.02	0.34	B	1.28	11.1		2.57	2160		257
Soil-waste profile (N153714, E 577046)	J19Y32	4/27/10	383		4.48	0.01	B	0.03	0.346	B	1.79	9.47		3.58	2030		358
Soil-waste profile (N153700, E 577046)	J19Y33	4/27/10	309		3.77	0.027	U	0.03	0.377	B	1.51	9.37		3.02	1930		302
Soil-waste profile (N153691, E 577045)	J19Y34	4/27/10	314		4.18	0.023	U	0.02	0.333	B	1.67	9.3		3.34	1930		334
Soil-waste profile (N153668, E 577986)	J19Y35	4/27/10	402		3.77	0.028	U	0.03	0.345	B	1.51	11.4		3.02	2410		302
Soil-waste profile (N153726, E 576948)	J19Y36	4/27/10	307		3.82	0.014	B	0.03	0.374	B	1.53	10.2		3.06	2090		306
Soil-waste profile (N153752, E 576916)	J19Y37	4/27/10	84.5		3.58	0.03	U	0.03	0.342	B	1.43	3.12		2.87	1240		287
Soil-waste profile (N153822, E 576871)	J19Y38	4/27/10	59.9		5.52	0.022	B	0.03	1.09	B	2.21	3.45	B	4.42	937		442

Table B-1. 600-151 Sample Results - Inorganics. (3 Pages)

Sample Location	Sample Number	Sample Date	Selenium			Silicon			Silver			Sodium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Soil-waste profile (N153601, E 577225)	J19Y29	4/27/10	0.806	U	0.81	451		1.61	0.161	U	0.16	462		40.3	44.9		2.02
Soil-waste profile (N153575, E 577156)	J19Y30	4/27/10	0.833	U	0.83	440		1.67	0.167	U	0.17	167		41.6	42.9		2.08
Soil-waste profile (N153516, E 577142)	J19Y31	4/27/10	0.642	U	0.64	361		1.28	0.128	U	0.13	222		32.1	44.4		1.6
Soil-waste profile (N153714, E 577046)	J19Y32	4/27/10	0.895	U	0.9	530		1.79	0.179	U	0.18	153		44.8	40.4		2.24
Soil-waste profile (N153700, E 577046)	J19Y33	4/27/10	0.754	U	0.75	509		1.51	0.151	U	0.15	158		37.7	41.3		1.89
Soil-waste profile (N153691, E 577045)	J19Y34	4/27/10	0.836	U	0.84	444		1.67	0.167	U	0.17	143		41.8	38.6		2.09
Soil-waste profile (N153668, E 577986)	J19Y35	4/27/10	0.755	U	0.76	497		1.51	0.151	U	0.15	172		37.7	46.7		1.89
Soil-waste profile (N153726, E 576948)	J19Y36	4/27/10	0.764	U	0.76	471		1.53	0.153	U	0.15	151		38.2	45.7		1.91
Soil-waste profile (N153752, E 576916)	J19Y37	4/27/10	0.716	U	0.72	454		1.43	0.143	U	0.14	173		35.8	13.3		1.79
Soil-waste profile (N153822, E 576871)	J19Y38	4/27/10	2.27		1.1	635		2.21	0.221	U	0.22	120		55.2	19.2		2.76

Sample Location	Sample Number	Sample Date	Zinc			TCLP Arsenic			TCLP Barium			TCLP Cadmium			TCLP Chromium		
			mg/kg	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
Soil-waste profile (N153601, E 577225)	J19Y29	4/27/10	43.9		8.06	Not analyzed											
Soil-waste profile (N153575, E 577156)	J19Y30	4/27/10	42.8		8.33												
Soil-waste profile (N153516, E 577142)	J19Y31	4/27/10	50.1		6.42	0.239		0.09	0.044		0.01	0.006	B	0.02	0.03	U	0.03
Soil-waste profile (N153714, E 577046)	J19Y32	4/27/10	84.9		8.95	2.81		0.09	0.545		0.01	0.009	B	0.02	0.03	U	0.03
Soil-waste profile (N153700, E 577046)	J19Y33	4/27/10	58.3		7.54	0.189		0.09	0.303		0.01	0.003	B	0.02	0.03	U	0.03
Soil-waste profile (N153691, E 577045)	J19Y34	4/27/10	51.2		8.36	3.24		0.09	0.522		0.01	0.008	B	0.02	0.03	U	0.03
Soil-waste profile (N153668, E 577986)	J19Y35	4/27/10	58.6		7.55	0.134		0.09	0.391		0.01	0.018	U	0.02	0.03	U	0.03
Soil-waste profile (N153726, E 576948)	J19Y36	4/27/10	47.9		7.64	Not analyzed											
Soil-waste profile (N153752, E 576916)	J19Y37	4/27/10	36.3		7.16												
Soil-waste profile (N153822, E 576871)	J19Y38	4/27/10	29.3		11												

Sample Location	Sample Number	Sample Date	TCLP Lead			TCLP Mercury			TCLP Selenium			TCLP Silver		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
Soil-waste profile (N153516, E 577142)	J19Y31	4/27/10	0.661		0.06	0.0002	U	0.0002	0.12	U	0.12	0.036	U	0.04
Soil-waste profile (N153714, E 577046)	J19Y32	4/27/10	1.96		0.06	0.0002	U	0.0002	0.12	U	0.12	0.036	U	0.04
Soil-waste profile (N153700, E 577046)	J19Y33	4/27/10	0.422		0.06	0.0001	B	0.0002	0.12	U	0.12	0.036	U	0.04
Soil-waste profile (N153691, E 577045)	J19Y34	4/27/10	1.18		0.06	0.0002	U	0.0002	0.12	U	0.12	0.036	U	0.04
Soil-waste profile (N153668, E 577986)	J19Y35	4/27/10	0.077		0.06	0.0002	U	0.0002	0.12	U	0.12	0.036	U	0.04

Table B-2. 600-151 Organic Sample Results - Organics. (10 Pages)

Constituent	J19Y29			J19Y30			J19Y31			J19Y32		
	4/27/2010			4/27/2010			4/27/2010			4/27/2010		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
PCBs												
Aroclor-1016	13.9	U	13.9	13.4	U	13.4	13.5	U	13.5	14	U	14
Aroclor-1221	13.9	U	13.9	13.4	U	13.4	13.5	U	13.5	14	U	14
Aroclor-1232	13.9	U	13.9	13.4	U	13.4	13.5	U	13.5	14	U	14
Aroclor-1242	13.9	U	13.9	13.4	U	13.4	13.5	U	13.5	14	U	14
Aroclor-1248	13.9	U	13.9	13.4	U	13.4	13.5	U	13.5	14	U	14
Aroclor-1254	13.9	U	13.9	13.4	U	13.4	13.5	U	13.5	14	U	14
Aroclor-1260	13.9	U	13.9	13.4	U	13.4	13.5	U	13.5	14	U	14
Pesticides												
Aldrin	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Alpha-BHC	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
alpha-Chlordane	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
beta-1,2,3,4,5,6-Hexachlorocyclohexane	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Delta-BHC	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Dichlorodiphenyldichloroethane	3.48	JD	1.39	1.34	U	1.34	1.36	U	1.36	7.34	D	1.4
Dichlorodiphenyldichloroethylene	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Dichlorodiphenyltrichloroethane	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Dieldrin	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Endosulfan I	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Endosulfan II	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Endosulfan sulfate	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Endrin	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Endrin aldehyde	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Endrin ketone	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	2.45	D	1.4
Gamma-BHC (Lindane)	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
gamma-Chlordane	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Heptachlor	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Heptachlor epoxide	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Methoxychlor	1.39	UD	1.39	1.34	U	1.34	1.36	U	1.36	1.4	UD	1.4
Toxaphene	20.9	UD	20.9	20.1	U	20.1	20.4	U	20.4	21	UD	21
SVOAs												
1,2,4-Trichlorobenzene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
1,2-Dichlorobenzene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
1,3-Dichlorobenzene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
1,4-Dichlorobenzene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
2,4,5-Trichlorophenol	691	UD	691	327	U	327	336	U	336	1030	UD	1030
2,4,6-Trichlorophenol	691	UD	691	327	U	327	336	U	336	1030	UD	1030
2,4-Dichlorophenol	691	UD	691	327	U	327	336	U	336	1030	UD	1030
2,4-Dimethylphenol	691	UD	691	327	U	327	336	U	336	1030	UD	1030
2,4-Dinitrophenol	3450	UD	3450	1630	U	1630	1680	U	1680	5140	UD	5140
2,4-Dinitrotoluene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
2,6-Dinitrotoluene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
2-Chloronaphthalene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
2-Chlorophenol	691	UD	691	327	U	327	336	U	336	1030	UD	1030
2-Methylnaphthalene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
2-Methylphenol (cresol, o-)	691	UD	691	327	U	327	336	U	336	1030	UD	1030
2-Nitroaniline	3450	UD	3450	1630	U	1630	1680	U	1680	5140	UD	5140
2-Nitrophenol	691	UD	691	327	U	327	336	U	336	1030	UD	1030
3+4 Methylphenol (cresol, m+p)	1380	UD	1380	653	U	653	673	U	673	2050	UD	2050
3,3'-Dichlorobenzidine	691	UD	691	327	U	327	336	U	336	1030	UD	1030
3-Nitroaniline	3450	UD	3450	1630	U	1630	1680	U	1680	5140	UD	5140

Table B-2. 600-151 Organic Sample Results - Organics. (10 Pages)

Constituent	J19Y29			J19Y30			J19Y31			J19Y32		
	4/27/2010			4/27/2010			4/27/2010			4/27/2010		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
4,6-Dinitro-2-methylphenol	691	UD	691	327	U	327	336	U	336	1030	UD	1030
4-Bromophenylphenyl ether	691	UD	691	327	U	327	336	U	336	1030	UD	1030
4-Chloro-3-methylphenol	691	UD	691	327	U	327	336	U	336	1030	UD	1030
4-Chloroaniline	691	UD	691	327	U	327	336	U	336	1030	UD	1030
4-Chlorophenylphenyl ether	691	UD	691	327	U	327	336	U	336	1030	UD	1030
4-Nitroaniline	3450	UD	3450	1630	U	1630	1680	U	1680	5140	UD	5140
4-Nitrophenol	3450	UD	3450	1630	U	1630	1680	U	1680	5140	UD	5140
Acenaphthene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Acenaphthylene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Anthracene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Benzo(a)anthracene	691	UD	691	327	U	327	336	U	336	644	JD	1030
Benzo(a)pyrene	691	UD	691	327	U	327	336	U	336	795	JD	1000
Benzo(b)fluoranthene	691	UD	691	327	U	327	336	U	336	726	JD	664
Benzo(ghi)perylene	691	UD	691	327	U	327	336	U	336	505	JD	1030
Benzo(k)fluoranthene	691	UD	691	327	U	327	336	U	336	727	JD	1030
Bis(2-chloro-1-methylethyl)ether	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Bis(2-Chloroethoxy)methane	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Bis(2-chloroethyl) ether	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Bis(2-ethylhexyl) phthalate	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Butylbenzylphthalate	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Carbazole	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Chrysene	691	UD	691	327	U	327	336	U	336	701	JD	1030
Di-n-butylphthalate	691	UD	691	327	U	327	336	U	336	221	JD	1030
Di-n-octylphthalate	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Dibenz[a,h]anthracene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Dibenzofuran	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Diethyl phthalate	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Dimethyl phthalate	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Fluoranthene	122	JD	691	327	U	327	336	U	336	1430	D	1030
Fluorene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Hexachlorobenzene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Hexachlorobutadiene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Hexachlorocyclopentadiene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Hexachloroethane	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Indeno(1,2,3-cd)pyrene	691	UD	691	327	U	327	336	U	336	463	JD	1030
Isophorone	691	UD	691	327	U	327	336	U	336	1030	UD	1030
N-Nitroso-di-n-dipropylamine	691	UD	691	327	U	327	336	U	336	1030	UD	1030
N-Nitrosodiphenylamine	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Naphthalene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Nitrobenzene	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Pentachlorophenol	3450	UD	3450	1630	U	1630	1680	U	1680	5140	UD	5140
Phenanthrene	691	UD	691	327	U	327	336	U	336	933	JD	1030
Phenol	691	UD	691	327	U	327	336	U	336	1030	UD	1030
Pyrene	134	JD	691	327	U	327	336	U	336	1800	D	1030

Table B-2. 600-151 Organic Sample Results - Organics. (10 Pages)

Constituent	J19Y29			J19Y30			J19Y31			J19Y32		
	4/27/2010			4/27/2010			4/27/2010			4/27/2010		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
VOAs												
1,1,1-Trichloroethane	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
1,1,2,2-Tetrachloroethane	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
1,1,2-Trichloroethane	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
1,1-Dichloroethane	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
1,1-Dichloroethene	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
1,2-Dichloroethane	6.55	U	6.55	5.98	U	5.98	6.16	U	6.16	6.6	U	6.6
1,2-Dichloroethene(Total)	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
1,2-Dichloropropane	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
2-Butanone	13.1	U	13.1	12	U	12	12.3	U	12.3	13.2	U	13.2
2-Hexanone	13.1	U	13.1	12	U	12	12.3	U	12.3	13.2	U	13.2
4-Methyl-2-Pentanone	13.1	U	13.1	12	U	12	12.3	U	12.3	13.2	U	13.2
Acetone	13.1	U	13.1	12	U	12	12.3	U	12.3	13.2	U	13.2
Benzene	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
Bromodichloromethane	6.55	U	6.55	5.98	U	5.98	6.16	U	6.16	6.6	U	6.6
Bromoform	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
Bromomethane	10.9	U	10.9	9.96	U	9.96	10.3	U	10.3	11	U	11
Carbon disulfide	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
Carbon tetrachloride	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
Chlorobenzene	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
Chloroethane	10.9	U	10.9	9.96	U	9.96	10.3	U	10.3	11	U	11
Chloroform	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
Chloromethane	10.9	U	10.9	9.96	U	9.96	10.3	U	10.3	11	U	11
cis-1,2-Dichloroethylene	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
cis-1,3-Dichloropropene	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
Dibromochloromethane	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
Ethylbenzene	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
Methylenechloride	6.83		6.55	5.02	J	5.98	2.81	J	6.16	3.06	J	6.6
Styrene	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
Tetrachloroethene	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
Toluene	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
trans-1,2-Dichloroethylene	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
trans-1,3-Dichloropropene	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
Trichloroethene	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5
Vinyl chloride	10.9	U	10.9	9.96	U	9.96	10.3	U	10.3	11	U	11
Xylenes (total)	5.46	U	5.46	4.98	U	4.98	5.13	U	5.13	5.5	U	5.5

Table B-2. 600-151 Organic Sample Results - Organics. (10 Pages)

Constituent	J19Y33			J19Y34			J19Y35			J19Y36		
	4/27/2010			4/27/2010			4/27/2010			4/27/2010		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
PCBs												
Aroclor-1016	13.6	U	13.6	13.2	U	13.2	13.6	U	13.6	13.6	U	13.6
Aroclor-1221	13.6	U	13.6	13.2	U	13.2	13.6	U	13.6	13.6	U	13.6
Aroclor-1232	13.6	U	13.6	13.2	U	13.2	13.6	U	13.6	13.6	U	13.6
Aroclor-1242	13.6	U	13.6	13.2	U	13.2	13.6	U	13.6	13.6	U	13.6
Aroclor-1248	13.6	U	13.6	13.2	U	13.2	13.6	U	13.6	13.6	U	13.6
Aroclor-1254	13.6	U	13.6	13.2	U	13.2	13.6	U	13.6	13.6	U	13.6
Aroclor-1260	13.6	U	13.6	13.2	U	13.2	13.6	U	13.6	13.6	U	13.6
Pesticides												
Aldrin	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Alpha-BHC	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
alpha-Chlordane	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
beta-1,2,3,4,5,6-Hexachlorocyclohexane	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Delta-BHC	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Dichlorodiphenyldichloroethane	17.7	D	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Dichlorodiphenyldichloroethylene	1.36	UD	1.36	1.32	UD	1.32	1.7	JD	1.36	1.36	UD	1.36
Dichlorodiphenyltrichloroethane	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Dieldrin	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Endosulfan I	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Endosulfan II	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Endosulfan sulfate	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Endrin	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Endrin aldehyde	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Endrin ketone	4.78	JD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Gamma-BHC (Lindane)	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
gamma-Chlordane	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Heptachlor	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Heptachlor epoxide	1.36	UD	1.36	1.32	UD	1.32	1.36	UD	1.36	1.36	UD	1.36
Methoxychlor	1.36	UD	1.36	1.32	UD	1.32	4.08	JD	1.36	1.36	UD	1.36
Toxaphene	20.5	UD	20.5	19.9	UD	19.9	20.4	UD	20.4	20.4	UD	20.4
SVOAs												
1,2,4-Trichlorobenzene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
1,2-Dichlorobenzene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
1,3-Dichlorobenzene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
1,4-Dichlorobenzene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
2,4,5-Trichlorophenol	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
2,4,6-Trichlorophenol	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
2,4-Dichlorophenol	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
2,4-Dimethylphenol	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
2,4-Dinitrophenol	5020	UD	5020	3320	UD	3320	3320	UD	3320	1650	U	1650
2,4-Dinitrotoluene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
2,6-Dinitrotoluene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
2-Chloronaphthalene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
2-Chlorophenol	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
2-Methylnaphthalene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
2-Methylphenol (cresol, o-)	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
2-Nitroaniline	5020	UD	5020	3320	UD	3320	3320	UD	3320	1650	U	1650
2-Nitrophenol	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
3+4 Methylphenol (cresol, m+p)	2010	UD	2010	1330	UD	1330	1330	UD	1330	662	U	662
3,3'-Dichlorobenzidine	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
3-Nitroaniline	5020	UD	5020	3320	UD	3320	3320	UD	3320	1650	U	1650

Table B-2. 600-151 Organic Sample Results - Organics. (10 Pages)

Constituent	J19Y33			J19Y34			J19Y35			J19Y36		
	4/27/2010			4/27/2010			4/27/2010			4/27/2010		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
4,6-Dinitro-2-methylphenol	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
4-Bromophenylphenyl ether	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
4-Chloro-3-methylphenol	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
4-Chloroaniline	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
4-Chlorophenylphenyl ether	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
4-Nitroaniline	5020	UD	5020	3320	UD	3320	3320	UD	3320	1650	U	1650
4-Nitrophenol	5020	UD	5020	3320	UD	3320	3320	UD	3320	1650	U	1650
Acenaphthene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Acenaphthylene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Anthracene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Benzo(a)anthracene	1090	D	1030	227	JD	1030	664	UD	664	331	U	331
Benzo(a)pyrene	1520	D	1000	284	JD	1000	664	UD	664	331	U	331
Benzo(b)fluoranthene	1560	D	664	451	JD	664	664	UD	664	331	U	331
Benzo(ghi)perylene	945	JD	1000	182	JD	664	664	UD	664	331	U	331
Benzo(k)fluoranthene	1180	D	1000	664	UD	664	664	UD	664	331	U	331
Bis(2-chloro-1-methylethyl)ether	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Bis(2-Chloroethoxy)methane	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Bis(2-chloroethyl) ether	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Bis(2-ethylhexyl) phthalate	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Butylbenzylphthalate	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Carbazole	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Chrysene	1230	D	1000	249	JD	664	664	UD	664	331	U	331
Di-n-butylphthalate	383	JD	1000	664	UD	664	664	UD	664	331	U	331
Di-n-octylphthalate	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Dibenz[a,h]anthracene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Dibenzofuran	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Diethyl phthalate	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Dimethyl phthalate	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Fluoranthene	1600	D	1000	361	JD	664	664	UD	664	331	U	331
Fluorene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Hexachlorobenzene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Hexachlorobutadiene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Hexachlorocyclopentadiene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Hexachloroethane	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Indeno(1,2,3-cd)pyrene	890	JD	1000	176	JD	664	664	UD	664	331	U	331
Isophorone	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
N-Nitroso-di-n-dipropylamine	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
N-Nitrosodiphenylamine	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Naphthalene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Nitrobenzene	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Pentachlorophenol	5020	UD	5020	3320	UD	3320	3320	UD	3320	1650	U	1650
Phenanthrene	471	JD	1000	109	JD	664	664	UD	664	331	U	331
Phenol	1000	UD	1000	664	UD	664	664	UD	664	331	U	331
Pyrene	2620	D	1000	519	JD	664	101	JD	664	331	U	331

Table B-2. 600-151 Organic Sample Results - Organics. (10 Pages)

Constituent	J19Y33			J19Y34			J19Y35			J19Y36		
	4/27/2010			4/27/2010			4/27/2010			4/27/2010		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
VOAs												
1,1,1-Trichloroethane	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
1,1,2,2-Tetrachloroethane	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
1,1,2-Trichloroethane	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
1,1-Dichloroethane	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
1,1-Dichloroethene	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
1,2-Dichloroethane	6.41	U	6.41	6.51	U	6.51	6.29	U	6.29	6.27	U	6.27
1,2-Dichloroethene(Total)	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
1,2-Dichloropropane	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
2-Butanone	12.8	U	12.8	13	U	13	12.6	U	12.6	12.5	U	12.5
2-Hexanone	12.8	U	12.8	13	U	13	12.6	U	12.6	12.5	U	12.5
4-Methyl-2-Pentanone	12.8	U	12.8	13	U	13	12.6	U	12.6	12.5	U	12.5
Acetone	12.8	U	12.8	13	U	13	12.6	U	12.6	12.5	U	12.5
Benzene	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
Bromodichloromethane	6.41	U	6.41	6.51	U	6.51	6.29	U	6.29	6.27	U	6.27
Bromoform	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
Bromomethane	10.7	U	10.7	10.8	U	10.8	10.5	U	10.5	10.5	U	10.5
Carbon disulfide	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
Carbon tetrachloride	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
Chlorobenzene	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
Chloroethane	10.7	U	10.7	10.8	U	10.8	10.5	U	10.5	10.5	U	10.5
Chloroform	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
Chloromethane	10.7	U	10.7	10.8	U	10.8	10.5	U	10.5	10.5	U	10.5
cis-1,2-Dichloroethylene	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
cis-1,3-Dichloropropene	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
Dibromochloromethane	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
Ethylbenzene	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
Methylenechloride	3.54	J	6.41	4.75	J	6.51	3.77	J	6.29	4.98	J	6.27
Styrene	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
Tetrachloroethene	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
Toluene	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
trans-1,2-Dichloroethylene	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
trans-1,3-Dichloropropene	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
Trichloroethene	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23
Vinyl chloride	10.7	U	10.7	10.8	U	10.8	10.5	U	10.5	10.5	U	10.5
Xylenes (total)	5.34	U	5.34	5.42	U	5.42	5.24	U	5.24	5.23	U	5.23

Table B-2. 600-151 Organic Sample Results - Organics. (10 Pages)

Constituent	J19Y37			J19Y38		
	4/27/2010			4/27/2010		
	µg/kg	Q	PQL	µg/kg	Q	PQL
PCBs						
Aroclor-1016	15.2	U	15.2	14.7	U	14.7
Aroclor-1221	15.2	U	15.2	14.7	U	14.7
Aroclor-1232	15.2	U	15.2	14.7	U	14.7
Aroclor-1242	15.2	U	15.2	14.7	U	14.7
Aroclor-1248	15.2	U	15.2	14.7	U	14.7
Aroclor-1254	15.2	U	15.2	14.7	U	14.7
Aroclor-1260	15.2	U	15.2	14.7	U	14.7
Pesticides						
Aldrin	1.52	UD	1.52	3.67	UD	3.67
Alpha-BHC	1.52	UD	1.52	3.67	UD	3.67
alpha-Chlordane	1.52	UD	1.52	3.67	UD	3.67
beta-1,2,3,4,5,6-Hexachlorocyclohexane	1.52	UD	1.52	3.67	UD	3.67
Delta-BHC	1.52	UD	1.52	3.67	UD	3.67
Dichlorodiphenyldichloroethane	4.57	JD	1.52	3.68	UD	3.68
Dichlorodiphenyldichloroethylene	1.52	UD	1.52	4.9	JD	3.68
Dichlorodiphenyltrichloroethane	1.52	UD	1.52	6.4	JD	3.68
Dieldrin	1.52	UD	1.52	3.67	UD	3.67
Endosulfan I	1.52	UD	1.52	3.68	UD	3.68
Endosulfan II	1.52	UD	1.52	3.67	UD	3.67
Endosulfan sulfate	1.52	UD	1.52	3.67	UD	3.67
Endrin	1.52	UD	1.52	3.67	UD	3.67
Endrin aldehyde	1.52	UD	1.52	3.67	UD	3.67
Endrin ketone	1.52	JD	1.52	3.67	UD	3.67
Gamma-BHC (Lindane)	1.52	UD	1.52	3.67	UD	3.67
gamma-Chlordane	1.52	UD	1.52	3.67	UD	3.67
Heptachlor	1.52	UD	1.52	3.67	UD	3.67
Heptachlor epoxide	1.52	UD	1.52	3.67	UD	3.67
Methoxychlor	1.52	UD	1.52	3.67	UD	3.67
Toxaphene	22.9	UD	22.9	55.1	UD	55.1
SVOAs						
1,2,4-Trichlorobenzene	747	UD	747	7210	UD	7210
1,2-Dichlorobenzene	747	UD	747	7210	UD	7210
1,3-Dichlorobenzene	747	UD	747	7210	UD	7210
1,4-Dichlorobenzene	747	UD	747	7210	UD	7210
2,4,5-Trichlorophenol	747	UD	747	7210	UD	7210
2,4,6-Trichlorophenol	747	UD	747	7210	UD	7210
2,4-Dichlorophenol	747	UD	747	7210	UD	7210
2,4-Dimethylphenol	747	UD	747	7210	UD	7210
2,4-Dinitrophenol	3730	UD	3730	36000	UD	36000
2,4-Dinitrotoluene	747	UD	747	7210	UD	7210
2,6-Dinitrotoluene	747	UD	747	7210	UD	7210
2-Chloronaphthalene	747	UD	747	7210	UD	7210
2-Chlorophenol	747	UD	747	7210	UD	7210
2-Methylnaphthalene	747	UD	747	7210	UD	7210
2-Methylphenol (cresol, o-)	747	UD	747	7210	UD	7210
2-Nitroaniline	3730	UD	3730	36000	UD	36000
2-Nitrophenol	747	UD	747	7210	UD	7210
3+4 Methylphenol (cresol, m+p)	1490	UD	1490	14400	UD	14400
3,3'-Dichlorobenzidine	747	UD	747	7210	UD	7210
3-Nitroaniline	3730	UD	3730	36000	UD	36000

Table B-2. 600-151 Organic Sample Results - Organics. (10 Pages)

Constituent	J19Y37			J19Y38		
	4/27/2010			4/27/2010		
	µg/kg	Q	PQL	µg/kg	Q	PQL
4,6-Dinitro-2-methylphenol	747	UD	747	7210	UD	7210
4-Bromophenylphenyl ether	747	UD	747	7210	UD	7210
4-Chloro-3-methylphenol	747	UD	747	7210	UD	7210
4-Chloroaniline	747	UD	747	7210	UD	7210
4-Chlorophenylphenyl ether	747	UD	747	7210	UD	7210
4-Nitroaniline	3730	UD	3730	36000	UD	36000
4-Nitrophenol	3730	UD	3730	36000	UD	36000
Acenaphthene	747	UD	747	7210	UD	7210
Acenaphthylene	747	UD	747	7210	UD	7210
Anthracene	747	UD	747	7210	UD	7210
Benzo(a)anthracene	138	JD	1030	7210	UD	7210
Benzo(a)pyrene	170	JD	1000	7210	UD	7210
Benzo(b)fluoranthene	152	JD	664	7210	UD	7210
Benzo(ghi)perylene	125	JD	747	7210	UD	7210
Benzo(k)fluoranthene	151	JD	747	7210	UD	7210
Bis(2-chloro-1-methylethyl)ether	747	UD	747	7210	UD	7210
Bis(2-Chloroethoxy)methane	747	UD	747	7210	UD	7210
Bis(2-chloroethyl) ether	747	UD	747	7210	UD	7210
Bis(2-ethylhexyl) phthalate	747	UD	747	7210	UD	7210
Butylbenzylphthalate	747	UD	747	7210	UD	7210
Carbazole	747	UD	747	7210	UD	7210
Chrysene	154	JD	154	7210	UD	7210
Di-n-butylphthalate	747	UD	747	7210	UD	7210
Di-n-octylphthalate	747	UD	747	7210	UD	7210
Dibenz[a,h]anthracene	747	UD	747	7210	UD	7210
Dibenzofuran	747	UD	747	7210	UD	7210
Diethyl phthalate	747	UD	747	7210	UD	7210
Dimethyl phthalate	747	UD	747	7210	UD	7210
Fluoranthene	228	JD	747	7210	UD	7210
Fluorene	747	UD	747	7210	UD	7210
Hexachlorobenzene	747	UD	747	7210	UD	7210
Hexachlorobutadiene	747	UD	747	7210	UD	7210
Hexachlorocyclopentadiene	747	UD	747	7210	UD	7210
Hexachloroethane	747	UD	747	7210	UD	7210
Indeno(1,2,3-cd)pyrene	747	UD	747	7210	UD	7210
Isophorone	747	UD	747	7210	UD	7210
N-Nitroso-di-n-dipropylamine	747	UD	747	7210	UD	7210
N-Nitrosodiphenylamine	747	UD	747	7210	UD	7210
Naphthalene	747	UD	747	7210	UD	7210
Nitrobenzene	747	UD	747	7210	UD	7210
Pentachlorophenol	3730	UD	3730	36000	UD	36000
Phenanthrene	747	UD	747	7210	UD	7210
Phenol	747	UD	747	7210	UD	7210
Pyrene	334	JD	747	1130	JD	7210

Table B-2. 600-151 Organic Sample Results - Organics. (10 Pages)

Constituent	J19Y37			J19Y38		
	4/27/2010			4/27/2010		
	µg/kg	Q	PQL	µg/kg	Q	PQL
VOAs						
1,1,1-Trichloroethane	5.97	U	5.97	5.63	U	5.63
1,1,2,2-Tetrachloroethane	5.97	U	5.97	5.63	U	5.63
1,1,2-Trichloroethane	5.97	U	5.97	5.63	U	5.63
1,1-Dichloroethane	5.97	U	5.97	5.63	U	5.63
1,1-Dichloroethene	5.97	U	5.97	5.63	U	5.63
1,2-Dichloroethane	7.16	U	7.16	6.76	U	6.76
1,2-Dichloroethene(Total)	5.97	U	5.97	5.63	U	5.63
1,2-Dichloropropane	5.97	U	5.97	5.63	U	5.63
2-Butanone	14.3	U	14.3	13.5	U	13.5
2-Hexanone	14.3	U	14.3	13.5	U	13.5
4-Methyl-2-Pentanone	14.3	U	14.3	13.5	U	13.5
Acetone	14.3	U	14.3	13.5	U	13.5
Benzene	5.97	U	5.97	5.63	U	5.63
Bromodichloromethane	7.16	U	7.16	6.76	U	6.76
Bromoform	5.97	U	5.97	5.63	U	5.63
Bromomethane	11.9	U	11.9	11.3	U	11.3
Carbon disulfide	5.97	U	5.97	5.63	U	5.63
Carbon tetrachloride	5.97	U	5.97	5.63	U	5.63
Chlorobenzene	5.97	U	5.97	5.63	U	5.63
Chloroethane	11.9	U	11.9	11.3	U	11.3
Chloroform	5.97	U	5.97	5.63	U	5.63
Chloromethane	11.9	U	11.9	11.3	U	11.3
cis-1,2-Dichloroethylene	5.97	U	5.97	5.63	U	5.63
cis-1,3-Dichloropropene	5.97	U	5.97	5.63	U	5.63
Dibromochloromethane	5.97	U	5.97	5.63	U	5.63
Ethylbenzene	5.97	U	5.97	5.63	U	5.63
Methylenechloride	3.82	J	7.16	3.07	J	6.76
Styrene	5.97	U	5.97	5.63	U	5.63
Tetrachloroethene	5.97	U	5.97	5.63	U	5.63
Toluene	5.97	U	5.97	5.63	U	5.63
trans-1,2-Dichloroethylene	5.97	U	5.97	5.63	U	5.63
trans-1,3-Dichloropropene	5.97	U	5.97	5.63	U	5.63
Trichloroethene	5.97	U	5.97	5.63	U	5.63
Vinyl chloride	11.9	U	11.9	11.3	U	11.3
Xylenes (total)	5.97	U	5.97	5.63	U	5.63

Table B-2. 600-151 Sample Results - TCLP Organics. (10 Pages)

Sample Location	Sample Number	Sample Date	TCLP 1,4-Dichlorobenzene			TCLP 2,4,5-Trichlorophenol			TCLP 2,4,6-Trichlorophenol			TCLP Dinotrotoluene			TCLP Methylphenol (cresol, o-)		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
Soil-waste profile (N153822, E 576871)	J19Y38	4/27/10	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	TCLP Methylphenol (cresol, m+p)			TCLP Hexachlorobenzene			TCLP Hexachlorobutadiene			TCLP Hexachloroethane			TCLP Nitrobenzene		
			mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL	mg/L	Q	PQL
Soil-waste profile (N153822, E 576871)	J19Y38	4/27/10	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	TCLP Penta-chlorophenol			TCLP Pyridine		
			mg/L	Q	PQL	mg/L	Q	PQL
Soil-waste profile (N153822, E 576871)	J19Y38	4/27/10	0.13	U	0.13	0.05	U	0.05

APPENDIX C

95% UPPER CONFIDENCE LIMIT CALCULATIONS AND VERIFICATION SAMPLING RESULTS

DIRECT CONTACT HAZARD QUOTIENT AND CARCINOGENIC RISK CALCULATION FOR THE WASTE SITE

PROTECTION OF GROUNDWATER HAZARD QUOTIENT AND CARCINOGENIC RISK CALCULATIONS

APPENDIX C

CALCULATIONS

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

600-151 Waste Site Cleanup Verification 95% UCL Calculations, 0100X-CA-V0062, Rev. 0, Washington Closure Hanford, Richland, Washington.

600-151 Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculation, 0100X-CA-V0063, Rev. 0, Washington Closure Hanford, Richland, Washington.

600-151 Waste Site Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater, 0100H-CA-V0179, Rev. 0, Washington Closure Hanford, Richland, Washington.

DISCLAIMER FOR CALCULATIONS

The calculations 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.

CALCULATION COVER SHEET

Project Title:	100-HR-2 Field Remediation	**Job No.**	14655
Area	100-HR-2		
Discipline	Environmental	***Calc. No.**	0100X-CA-V0062
Subject	600-151 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 documents should be used in conjunction with other relevant documents in the administrative record.

Committed Calculation X **Preliminary** O **Superseded** O **Voided** O

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 29 Attm. 1 = 27 Total = 57	J. D. Skoglie	T. E. Queen	B. L. Vedder	D. F. Obenauer	8/8/11

SUMMARY OF REVISIONS	

* Obtain calc no. from DIS

DE01437.03 (12/09/2004)

Washington Closure Hanford **CALCULATION SHEET**

Originator J. D. Skoglie	**Date** 07/13/11	**Calc. No.** 0100X-CA-V0062	**Rev. No.** 0
Project 100-HR-2 Field Remediation	**Job No.** 14655	**Checked** T. E. Queen	**Date** 07/13/11
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations			**Sheet No.** 1 of 29

Summary

Purpose:
Calculate the 95% upper confidence limit (UCL) values to evaluate compliance with cleanup standards for the subject site. Also, perform the *Washington Administrative Code* (WAC) 173-340-740(7)(e) 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 concern (COC) and contaminant of potential concern (COPC), as necessary.

Table of Contents:
Sheets 1 to 5 - Calculation Sheet Summary
Sheet 6 to 9 - Calculation Sheet Verification Data - Area A
Sheet 10 to 13 - Calculation Sheet Verification Data - Area B
Sheet 14 to 17 - Calculation Sheet Verification Data - Area C
Sheet 18 to 26 - Ecology Software (MTCAStat) Results
Sheet 27 to 29 - Calculation Sheet Duplicate Analysis
Attachment 1 - 600-151, Verification Sampling Results (27 sheets)

Given/References:
1) Sample Results (Attachment 1).
2) Background values and remedial action goals (RAGs) are taken from DOE-RL (2009b), 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, 2009a, *100 Area Remedial Action Sampling and Analysis Plan* (SAP), DOE/RL-96-22, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
5) DOE-RL, 2009b, *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP), DOE/RL-96-17, Rev. 6, 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) Ecology, 2011, Cleanup Levels and Risk Calculations (CLARC) Database, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
10) EPA, 1989, *Risk Assessment Guidance for Superfund: Volume 1, Human Health Evaluation Manual*, Part A; Interim Final, EPA/540/1-89/002, 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 for each COC/COPC. The direct contact 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 statistical data from soil verification samples (Attachment 1) from the 600-151 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 2009b) is documented by this calculation. Duplicate RPD results are used in evaluation of data quality within the RSVP for this site.

Methodology:
The 600-151 waste site consisted of 3 decision units for verification sampling consisting of the A, B, and C excavated areas.

Analytical results for all sampling locations are summarized in the tables provided on sheets 3, 4 , and 5. Further information of the sample data quality is presented in the data quality assessment section of the associated RSVP.

Summary (continued)

Methodology, continued:

For nonradioactive analytes with ≤50% of the data below detection limits, 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, as determined by direct inspection of the sample results (Attachment 1), the maximum detected value for the data set (which includes primary and duplicate samples) is used instead of the 95% UCL, and no further calculations are performed for those data sets. For convenience, these maximum detected values are included in the summary tables that follow. The 95% UCL was not calculated for data sets with no reported detections. Calculated cleanup levels are not available in Ecology (2011) under WAC 173-340-740(3) for calcium, magnesium, potassium, silicon, and sodium. The EPA's Risk Assessment Guidance for Superfund (EPA 1989) recommends that aluminum and iron not be considered in site risk evaluations. Therefore, aluminum, calcium, iron, magnesium, potassium, silicon, and sodium are not considered site COCs/COPCs and are also not included in these calculations. The 95% UCL values were not calculated for potassium-40, radium-226, radium-228, thorium-228, and thorium-232 based on natural occurence at the Hanford 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 radionuclide data, calculation of the statistics is done using the reported value. In cases where the laboratory does not report a value below the minimum detectable activity (MDA), half of the MDA is used in the calculation. For the statistical evaluation of duplicate sample pairs, the samples are averaged before being included in the data set, after adjustments for censored data as described above.

For nonradionuclides, the WAC 173-340 statistical guidance suggests that a test for distributional form be performed on the data and the 95% UCL calculated on the appropriate distribution using Ecology software. For nonradionuclide small data sets (n < 10), 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). Due to differences in addressing censored data between the RDR/RAWP (DOE-RL 2009b) 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 data 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 RPD is calculated when both the primary value and the duplicate value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The TDL is a laboratory detection limit pre-determined for each analytical method and is listed in Table II-1 of the SAP (DOE-RL 2009a) for certain constituents with cleanup levels. All other constituents will have their own pre-determined TDL's based on laboratory and method used. Where direct evaluation of the attached sample data showed that a given analyte was not detected in the primary and/or duplicate sample, further evaluation of the RPD value was not performed. The RPD calculations use the following formula:

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

where, M = Main Sample Value S = Split (or duplicate) Sample Value

For quality assurance/quality control (QA/QC) duplicate RPD calculations, a value less than 30% indicates the data compare favorably. If the RPD is greater than 30% further investigation regarding the usability of the data is performed. To assist in the identification of anomalous sample pairs, 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 as necessary is provided in the data quality assessment section of the applicable RSVP.

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Subject	600-151 Waste Site Cleanup Verification 95% UCL Calculations				

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Summary (continued)

Results:
The results presented in the tables that follow include the summary of the results of the 95% UCL calculations for the A, B, and C excavations, the WAC 173-340-740(7)(e) 3-part test evaluation, the RPD calculations, and are for use in risk analysis and the RSVP for this site.

Results Summary - A Excavation Area*

Analyte	95% UCL Result	Maximum Result	Units
Arsenic	20.2	–	mg/kg
Barium	102	–	mg/kg
Beryllium	0.18	–	mg/kg
Boron	5.0	–	mg/kg
Cadmium	0.28	–	mg/kg
Chromium	13.1	–	mg/kg
Cobalt	7.9	–	mg/kg
Copper	22.0	–	mg/kg
Hexavalent chromium	–	0.306	mg/kg
Lead	133	–	mg/kg
Manganese	352	–	mg/kg
Mercury	0.014	–	mg/kg
Molybdenum	–	0.47	mg/kg
Nickel	12.9	–	mg/kg
Selenium	–	0.94	mg/kg
Vanadium	41.0	–	mg/kg
Zinc	64.5	–	mg/kg
4,4'-DDE	–	1.2	ug/kg
4,4'-DDT	–	0.89	ug/kg
Acetone	–	6.8	ug/kg
Methylene chloride	–	6.1	ug/kg
Anthracene	–	7.4	ug/kg
Benzo(a)anthracene	97	–	ug/kg
Benzo(a)pyrene	100	–	ug/kg
Benzo(b)fluoranthene	71	–	ug/kg
Benzo(ghi)perylene	39	–	ug/kg
Benzo(k)fluoranthene	37	–	ug/kg
Chrysene	92	–	ug/kg
Dibenz[a,h]anthracene	–	23	ug/kg
Fluoranthene	128	–	ug/kg
Fluorene	–	6.7	ug/kg
Indeno(1,2,3-cd)pyrene	36	–	ug/kg
Phenanthrene	63	–	ug/kg
Pyrene	179	–	ug/kg
TPH - diesel range	11084	–	ug/kg
TPH - diesel range EXT	20733	–	ug/kg
3-Part Test Evaluation			
95% UCL > Cleanup Limit?	YES	NO	
> 10% above Cleanup Limit?	YES	NO	
Any sample > 2x Cleanup Limit?	YES	NO	

*The 95% UCL result or maximum value, depending on data censorship, as described in the methodology section.

Results Summary - B Excavation Area*

Analyte	95% UCL Result	Maximum Result	Units
Arsenic	83.4	–	mg/kg
Barium	90.0	–	mg/kg
Beryllium	0.13	–	mg/kg
Boron	2.2	–	mg/kg
Cadmium	0.73	–	mg/kg
Chromium	12.2	–	mg/kg
Cobalt	7.4	–	mg/kg
Copper	14.3	–	mg/kg
Lead	679	–	mg/kg
Manganese	361	–	mg/kg
Mercury	0.013	–	mg/kg
Molybdenum	–	0.33	mg/kg
Nickel	11.5	–	mg/kg
Vanadium	38.1	–	mg/kg
Zinc	46.4	–	mg/kg
2-butanone	–	6.9	ug/kg
4,4'-DDE	–	0.47	ug/kg
Acetone	–	30	ug/kg
Methylene chloride	–	11	ug/kg
Benzo(a)anthracene	18	–	ug/kg
Benzo(a)pyrene	–	45	ug/kg
Benzo(b)fluoranthene	19	–	ug/kg
Benzo(ghi)perylene	–	35	ug/kg
Benzo(k)fluoranthene	–	21	ug/kg
Chrysene	24	–	ug/kg
Fluoranthene	–	93	ug/kg
Phenanthrene	–	46	ug/kg
Pyrene	–	100	ug/kg
TPH - diesel range	2120	–	ug/kg
TPH - diesel range EXT	7854	–	ug/kg
3-Part Test Evaluation			
95% UCL > Cleanup Limit?	YES	YES	
> 10% above Cleanup Limit?	YES	YES	
Any sample > 2x Cleanup Limit?	YES	YES	

*The 95% UCL result or maximum value, depending on data censorship, as described in the methodology section.

– = not applicable
B = blank contamination (inorganic constituents)
CA = contaminated area
D = analyte reported from a dilution
DE = direct exposure
EEX = east excavation
GW = groundwater
J = estimate
LA = lead area
LSPA = lead waste staging pile area
MTCA = *Model Toxics Control Act*
PA = paint area
PQL = practical quantitation limit
Q = qualifier
QA/QC = quality assurance/quality control

RAG = remedial action goal
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
RM = rusted metal, debris, tar/residue burning area.
RPD = relative percent difference
RSVP = remaining sites verification package
SAP = sampling and analysis plan
SPA = staging pile area
TDL = target detection limit
U = undetected
UCL = upper confidence limit
WAC = Washington Administrative Code
WEX = west excavation

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Summary (continued)

Results:
The results presented in the tables that follow include the summary of the results of the 95% UCL calculations for the A, B, and C excavations, the WAC 173-340-740(7)(e) 3-part test evaluation, the RPD calculations, and are for use in risk analysis and the RSVP for this site.

Results Summary - C Excavation Area[a]

Analyte	95% UCL Result	Maximum Result	Units
Arsenic	67.4	–	mg/kg
Barium	147	–	mg/kg
Beryllium	0.14	–	mg/kg
Boron	2.8	–	mg/kg
Cadmium	0.56	–	mg/kg
Chromium	13.1	–	mg/kg
Cobalt	7.7	–	mg/kg
Copper	16.1	–	mg/kg
Lead	712	–	mg/kg
Manganese	322	–	mg/kg
Mercury	0.023	–	mg/kg
Molybdenum	–	0.37	mg/kg
Nickel	12.4	–	mg/kg
Vanadium	38.5	–	mg/kg
Zinc	64.3	–	mg/kg
4,4'-DDE	–	3.4	ug/kg
4,4'-DDT	–	0.91	ug/kg
Methylene chloride	–	3.4	ug/kg
Anthracene	–	6.7	ug/kg
Benzo(a)anthracene	34	–	ug/kg
Benzo(a)pyrene	35	–	ug/kg
Benzo(b)fluoranthene	77	–	ug/kg
Benzo(ghi)perylene	24	–	ug/kg
Benzo(k)fluoranthene	14	–	ug/kg
Chrysene	129	–	ug/kg
Fluoranthene	63	–	ug/kg
Fluorene	–	9.0	ug/kg
Indeno(1,2,3-cd)pyrene	27	–	ug/kg
Naphthalene	–	18	ug/kg
Phenanthrene	56	–	ug/kg
Pyrene	83	–	ug/kg
TPH - diesel range	9123	–	ug/kg
TPH - diesel range EXT	22089	–	ug/kg
3-Part Test Evaluation:			
95% UCL > Cleanup Limit?	YES	YES	
> 10% above Cleanup Limit?	YES	NO	
Any sample > 2x Cleanup Limit?	YES	NO	

[a]The 95% UCL result or maximum value, depending on data censorship, as described in the methodology section.

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Originator J. D. Skoglie	**Date** 07/13/11	**Calc. No.** 0100X-CA-V0062	**Rev. No.** 0
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Summary (continued)

Results:
The results presented in the tables that follow include the summary of the results of the 95% UCL calculations for the A, B, and C excavations, the WAC 173-340-740(7)(e) 3-part test evaluation, the RPD calculations, and are for use in risk analysis and the RSVP for this site.

Relative Percent Difference Results and QA/QC Analysis[a]

Duplicate Analysis

Analyte	Excavation A	Excavation B	Excavation C
Aluminum	6.1%	14.2%	3.4%
Barium	8.4%	15.9%	0.1%
Calcium	9.8%	11.2%	1.8%
Chromium	0.7%	15.0%	10.6%
Copper	7.0%	17.7%	3.0%
Iron	6.8%	16.5%	0.0%
Lead	–	18.5%	1.5%
Magnesium	8.1%	14.4%	4.6%
Manganese	14.7%	15.7%	0.7%
Potassium	1.7%	15.0%	–
Silicon	***30.6%***	***52.4%***	8.5%
Vanadium	8.8%	20.2%	3.4%
Zinc	6.6%	16.4%	1.4%

[a]RPD listed where result produced, based on criteria. If RPD not required, no value is listed. The significance of the reported RPD values, including values greater than 30%, is addressed in the data quality assessment section of the RSVP.

CALCULATION SHEET

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1 **600-151 Statistical Calculations**

2 **Verification Data - A Excavation**

3	Sample	Sample	Sample	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	A-3	J1HK25	4/26/11	3.9		0.68	101	X	0.078	0.18	B	0.034	3.8		1.0	0.13	B	0.036	13.9		0.060	7.8	X	0.10	14.8		0.22	6.8	X	0.28
6	Duplicate of J1HK25	J1HK41	4/26/11	4.2		0.66	92.9		0.075	0.23		0.033	3.7		0.97	0.14	B	0.041	13.8		0.058	7.2	X	0.099	13.8		0.22	6.6	X	0.27
7	A-1	J1HK23	4/26/11	74.4		0.61	101	X	0.070	0.15	B	0.030	2.6		0.90	0.45		0.038	13.0		0.053	8.2	X	0.092	15.2		0.20	682	X	0.25
8	A-2 re-sample	J1JDW8	6/7/11	3.2		0.68	59.0		0.078	0.087	B	0.034	1.9	B	1.0	0.11	B	0.0421	11.8		0.060	6.9		0.10	16.1	X	0.22	8.1		0.28
9	A-4 re-sample	J1JDW9	6/7/11	5.0		0.71	92.5		0.081	0.19	B	0.035	2.5		1.0	0.12	B	0.0438	14.0		0.062	8.6		0.11	17.7	X	0.23	16.1		0.29
10	A-5 re-sample	J1JDX0	6/7/11	9.7		0.65	53.9		0.074	0.063	B	0.032	1.2	B	0.96	0.12	B	0.0402	11.6		0.057	6.4		0.098	15.2	X	0.21	23.5		0.26
11	A-6 re-sample	J1JDX1	6/7/11	37.5		0.61	75.9		0.070	0.14	B	0.030	1.5	B	0.90	0.11	B	0.0377	12.3		0.053	7.5		0.092	16.8	X	0.20	85.9		0.25
12	A-7	J1HK29	4/26/11	7.1		0.70	135	X	0.080	0.14	B	0.035	3.5		1.0	0.27		0.038	13.3		0.061	7.6	X	0.11	20.6		0.23	49.3	X	0.29
13	A-8	J1HK30	4/26/11	4.1		0.66	98.0	X	0.076	0.036	B	0.033	2.8		0.98	0.20	B	0.042	11.9		0.058	7.9	X	0.10	18.8		0.22	108	X	0.27
14	A-9 re-sample	J1JDX2	6/7/11	3.3		0.73	77.0		0.084	0.16	B	0.037	1.6	B	1.1	0.15	B	0.0455	12.3		0.064	7.2		0.11	14.4	X	0.24	12.3		0.30
15	A-10	J1HK32	4/26/11	5.3		0.66	112	X	0.076	0.25		0.033	6.1		0.98	0.66		0.040	13.7		0.058	8.3	X	0.10	54.6		0.22	56.8	X	0.27
16	A-11	J1HK33	4/26/11	4.9		0.64	105	X	0.073	0.15	B	0.032	3.1		0.94	0.23		0.041	13.8		0.056	8.0	X	0.096	16.4		0.21	20.2	X	0.26
17	A-12	J1HK34	4/26/11	4.2		0.61	90.3	X	0.070	0.12	B	0.030	16.4		0.90	0.11	B	0.040	12.1		0.053	7.7	X	0.092	18.2		0.20	10.0	X	0.25
18	A-13	J1HK35	4/26/11	4.8		0.67	96.4	X	0.077	0.16	B	0.033	3.0		0.99	0.22		0.043	13.1		0.059	8.0	X	0.10	17.2		0.22	24.1	X	0.27
19	A-14	J1HK36	4/26/11	5.8		0.67	115	X	0.077	0.20		0.033	7.2		0.99	0.31		0.039	12.9		0.059	7.7	X	0.10	15.7		0.22	40.7	X	0.27
20	A-15	J1HK37	4/26/11	21.6		0.66	90.7	X	0.076	0.15	B	0.033	2.0		0.98	0.23		0.040	12.1		0.058	7.8	X	0.10	14.0		0.22	33.2	X	0.27
21	A-16	J1HK38	4/26/11	30.0		0.67	100		0.078	0.21		0.034	2.4		1.0	0.36		0.042	13.2		0.059	7.9	X	0.10	15.4		0.22	80.2	X	0.28
22	A-17	J1HK39	4/26/11	6.4		0.61	90.5		0.071	0.21		0.031	2.1		0.91	0.12	B	0.038	13.3		0.054	7.9	X	0.093	15.7		0.20	7.9	X	0.25
23	A-18 re-sample	J1JDX3	6/7/11	5.0		0.65	74.5		0.075	0.14	B	0.033	1.6	B	0.97	0.11	B	0.0407	12.2		0.058	7.4		0.099	16.0	X	0.22	11.5		0.27

24 **Statistical Computation Input Data**

25	Sample	Sample	Sample	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead
26	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
27	A-3	J1HK25/ J1HK41	4/26/11	4.1	97.0	0.21	3.8	0.14	13.9	7.5	14.3	6.7
28	A-1	J1HK23	4/26/11	74.4	101	0.15	2.6	0.45	13.0	8.2	15.2	682
29	A-2 re-sample	J1JDW8	6/7/11	3.2	59.0	0.087	1.9	0.11	11.8	6.9	16.1	8.1
30	A-4 re-sample	J1JDW9	6/7/11	5.0	92.5	0.19	2.5	0.12	14.0	8.6	17.7	16.1
31	A-5 re-sample	J1JDX0	6/7/11	9.7	53.9	0.063	1.2	0.12	11.6	6.4	15.2	23.5
32	A-6 re-sample	J1JDX1	6/7/11	37.5	75.9	0.14	1.5	0.11	12.3	7.5	16.8	85.9
33	A-7	J1HK29	4/26/11	7.1	135	0.14	3.5	0.27	13.3	7.6	20.6	49.3
34	A-8	J1HK30	4/26/11	4.1	98.0	0.036	2.8	0.20	11.9	7.9	18.8	108
35	A-9 re-sample	J1JDX2	6/7/11	3.3	77.0	0.16	1.6	0.15	12.3	7.2	14.4	12.3
36	A-10	J1HK32	4/26/11	5.3	112	0.25	6.1	0.66	13.7	8.3	54.6	56.8
37	A-11	J1HK33	4/26/11	4.9	105	0.15	3.1	0.23	13.8	8.0	16.4	20.2
38	A-12	J1HK34	4/26/11	4.2	90.3	0.12	16.4	0.11	12.1	7.7	18.2	10.0
39	A-13	J1HK35	4/26/11	4.8	96.4	0.16	3.0	0.22	13.1	8.0	17.2	24.1
40	A-14	J1HK36	4/26/11	5.8	115	0.20	7.2	0.31	12.9	7.7	15.7	40.7
41	A-15	J1HK37	4/26/11	21.6	90.7	0.15	2.0	0.23	12.1	7.8	14.0	33.2
42	A-16	J1HK38	4/26/11	30.0	100	0.21	2.4	0.36	13.2	7.9	15.4	80.2
43	A-17	J1HK39	4/26/11	6.4	90.5	0.21	2.1	0.12	13.3	7.9	15.7	7.9
44	A-18 re-sample	J1JDX3	6/7/11	5.0	74.5	0.14	1.6	0.11	12.2	7.4	16.0	11.5

45 **Statistical Computations**

46		Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead
47	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 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), 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.
48	N	18	18	18	18	18	18	18	18	18
49	% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%	0%
50	Mean	13.1	92.4	0.15	3.6	0.22	12.8	7.7	18.5	70.9
51	Standard deviation	18.2	19.6	0.054	3.5	0.15	0.78	0.51	9.2	155
52	95% UCL on mean	20.2	102	0.18	5.0	0.28	13.1	7.9	22.0	133
53	Maximum value	74.4	135	0.25	16.4	0.66	14.0	8.6	54.6	682
54	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	20 DE, GW & River Protection	200 GW Protection	1.51 GW and River Protection	320 GW Protection	0.81 GW and River Protection	18.5 GW and River Protection	15.7 GW Protection	22.0 River Protection	10.2 GW and River Protection
55	**WAC 173-340 3-PART TEST**									
56	95% UCL > Cleanup Limit?	YES	NO	NA	NO	NA	NA	NA	YES	YES
57	> 10% above Cleanup Limit?	YES	NO	NA	NO	NA	NA	NA	NO	YES
58	Any sample > 2X Cleanup Limit?	YES	NO	NA	NO	NA	NA	NA	YES	YES
59	**WAC 173-340 Compliance?**	A detailed assessment will be performed.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (1.51 mg/kg) the 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (0.81 mg/kg) the 3-part test is not required.	Because all values are below background (18.5 mg/kg) the 3-part test is not required.	Because all values are below background (15.7 mg/kg) the 3-part test is not required.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

Rev. No. 0
Date 07/13/11
Sheet No. 7 of 29

1 **600-151 Statistical Calculations**
2 **Verification Data - A Excavation**

	Sample Area	Sample Number	Sample Date	Manganese mg/kg	Q	PQL	Mercury mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL	Benzo(a)anthracene ug/kg	Q	PQL	Benzo(a)pyrene ug/kg	Q	PQL	Benzo(b)fluoranthene ug/kg	Q	PQL	Benzo(ghi)perylene ug/kg	Q	PQL
3																														
5	A-3	J1HK25	4/26/11	386	X	0.10	0.0069	B	0.0054	12.2	X	0.13	44.0		0.097	49.9		0.41	31	X	3.2	64		6.5	46		4.2	45		7.3
6	Duplicate of J1HK25	J1HK41	4/26/11	333	X	0.099	0.0090	B	0.0059	11.8	X	0.12	40.3		0.093	46.7		0.36	32		3.1	44		6.3	36		4.1	42		7.0
7	A-1	J1HK23	4/26/11	400	X	0.092	0.013	B	0.0057	12.3	X	0.11	40.5		0.086	55.9		0.37	27	X	3.3	43		6.6	31		4.3	25	J	7.4
8	A-2 re-sample	J1JDW8	6/7/11	275		0.10	0.010	BM	0.0052	11.5		0.13	41.0		0.097	47.0		0.41	130		3.2	110		6.4	73		4.2	75		7.2
9	A-4 re-sample	J1JDW9	6/7/11	352		0.11	0.010	B	0.0059	13.7		0.13	44.4		0.10	48.1		0.43	11	JX	3.5	30		7.0	21		4.6	20	J	7.9
10	A-5 re-sample	J1JDX0	6/7/11	263		0.098	0.010	B	0.0051	11.8		0.12	40.0		0.092	39.3		0.39	53	X	3.2	74		6.4	48		4.2	52		7.2
11	A-6 re-sample	J1JDX1	6/7/11	310		0.092	0.012	B	0.0051	12.1		0.11	40.9		0.086	40.4		0.37	40		3.3	43		6.7	26		4.4	24	J	7.5
12	A-7	J1HK29	4/26/11	359	X	0.11	0.022		0.0054	12.0	X	0.13	38.3		0.099	113		0.42	54		3.1	68		6.3	54		4.1	7.1	U	7.1
13	A-8	J1HK30	4/26/11	343	X	0.10	0.018		0.0059	11.6	X	0.12	43.4		0.094	68.3		0.40	25		3.2	31		6.5	22		4.3	14	J	7.3
14	A-9 re-sample	J1JDX2	6/7/11	302		0.11	0.0083	B	0.0062	11.9		0.14	36.2		0.10	42.1		0.44	11	J	3.9	14	J	7.9	13	J	5.2	8.9	U	8.9
15	A-10	J1HK32	4/26/11	364	X	0.10	0.014	B	0.0053	16.9	X	0.12	41.3		0.094	99.8		0.40	38	X	3.3	35		6.7	27		4.4	24	J	7.5
16	A-11	J1HK33	4/26/11	357	X	0.096	0.014	B	0.0056	12.4	X	0.12	41.5		0.091	63.0		0.38	91		3.4	120		6.9	86		4.5	73		7.7
17	A-12	J1HK34	4/26/11	350	X	0.092	0.0054	U	0.0054	12.6	X	0.11	38.4		0.086	41.5		0.37	3.2	U	3.2	6.4	U	6.4	4.2	U	4.2	7.1	U	7.1
18	A-13	J1HK35	4/26/11	361	X	0.10	0.016	B	0.0057	12.4	X	0.12	39.7		0.095	55.4		0.40	7.4	JX	3.4	14	J	6.8	8.2	J	4.4	7.6	U	7.6
19	A-14	J1HK36	4/26/11	350	X	0.10	0.019		0.0053	11.8	X	0.12	39.6		0.095	61.1		0.40	25		3.3	25		6.5	19		4.3	19	J	7.3
20	A-15	J1HK37	4/26/11	343	X	0.10	0.0096	B	0.0058	11.7	X	0.12	38.4		0.094	44.0		0.40	9.5	J	3.3	11	J	6.6	8.3	JX	4.3	7.4	U	7.4
21	A-16	J1HK38	4/26/11	339	X	0.10	0.017		0.0055	12.2	X	0.13	38.6		0.096	65.4		0.37	86		3.4	6.7	U	6.7	82		4.4	71		7.6
22	A-17	J1HK39	4/26/11	317	X	0.093	0.010	B	0.0055	13.3	X	0.11	39.0		0.087	46.5		0.36	39	X	3.3	38		6.6	30		4.3	25	J	7.4
23	A-18 re-sample	J1JDX3	6/7/11	309		0.099	0.013	B	0.0055	11.8		0.12	40.3		0.093	40.2		0.39	48		3.2	62		6.5	42		4.3	39		7.3

24 **Statistical Computation Input Data**

25	Sample Area	Sample Number	Sample Date	Manganese mg/kg	Mercury mg/kg	Nickel mg/kg	Vanadium mg/kg	Zinc mg/kg	Benzo(a)anthracene ug/kg	Benzo(a)pyrene ug/kg	Benzo(b)fluoranthene ug/kg	Benzo(ghi)perylene ug/kg
26												
27	A-3	J1HK25/ J1HK41	4/26/11	360	0.0080	12.0	42.2	48.3	32	54	41	44
28	A-1	J1HK23	4/26/11	400	0.013	12.3	40.5	55.9	27	43	31	25
29	A-2 re-sample	J1JDW8	6/7/11	275	0.010	11.5	41.0	47.0	130	110	73	75
30	A-4 re-sample	J1JDW9	6/7/11	352	0.010	13.7	44.4	48.1	11	30	21	20
31	A-5 re-sample	J1JDX0	6/7/11	263	0.010	11.8	40.0	39.3	53	74	48	52
32	A-6 re-sample	J1JDX1	6/7/11	310	0.012	12.1	40.9	40.4	40	43	26	24
33	A-7	J1HK29	4/26/11	359	0.022	12.0	38.3	113	54	68	54	3.6
34	A-8	J1HK30	4/26/11	343	0.018	11.6	43.4	68.3	25	31	22	14
35	A-9 re-sample	J1JDX2	6/7/11	302	0.0083	11.9	36.2	42.1	11	14	13	4.5
36	A-10	J1HK32	4/26/11	364	0.014	16.9	41.3	99.8	38	35	27	24
37	A-11	J1HK33	4/26/11	357	0.014	12.4	41.5	63.0	91	120	86	73
38	A-12	J1HK34	4/26/11	350	0.0027	12.6	38.4	41.5	1.6	3.2	2.1	3.6
39	A-13	J1HK35	4/26/11	361	0.016	12.4	39.7	55.4	7.4	14	8.2	3.8
40	A-14	J1HK36	4/26/11	350	0.019	11.8	39.6	61.1	25	25	19	19
41	A-15	J1HK37	4/26/11	343	0.0096	11.7	38.4	44.0	10	11	8.3	3.7
42	A-16	J1HK38	4/26/11	339	0.017	12.2	38.6	65.4	86	3.4	82	71
43	A-17	J1HK39	4/26/11	317	0.010	13.3	39.0	46.5	39	38	30	25
44	A-18 re-sample	J1JDX3	6/7/11	309	0.013	11.8	40.3	40.2	48	62	42	39

45 **Statistical Computations**

46		Manganese	Mercury	Nickel	Vanadium	Zinc	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene
47	95% UCL based on	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), 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), use MTCAStat lognormal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use z-statistic.
48	N	18	18	18	18	18	18	18	18	18
49	% < Detection limit	0%	6%	0%	0%	0%	6%	11%	6%	28%
50	Mean	336	0.013	12.4	40.2	56.6	40	43	35	29
51	Standard deviation	34.1	0.0047	1.25	1.98	20.4	34	33	25	25
52	95% UCL on mean	352	0.014	12.9	41.0	64.5	97	100	71	39
53	Maximum value	400	0.022	16.9	44.4	113	130	120	86	75
54	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted**	512 GW & River Protection	0.33 GW & River Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	15 ug/kg GW & River Protection	15 ug/kg GW & River Protection	15 ug/kg GW & River Protection	48000 ug/kg GW & River Protection
55	**WAC 173-340 3-PART TEST**									
56	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NO	YES	YES	YES	NO
57	> 10% above Cleanup Limit?	NA	NA	NA	NA	YES	YES	YES	YES	NO
58	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NO	YES	YES	YES	NO
59	**WAC 173-340 Compliance?**	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.33 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

60

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

Rev. No. 0
Date 07/13/11
Sheet No. 8 of 29

1 **600-151 Statistical Calculations**

2 **Verification Data - A Excavation**

	Sample Area	Sample Number	Sample Date	Benzo(k)fluoranthene ug/kg	Q	PQL	Chrysene ug/kg	Q	PQL	Fluoranthene ug/kg	Q	PQL	Indeno(1,2,3-cd)pyrene ug/kg	Q	PQL	Phenanthrene ug/kg	Q	PQL	Pyrene ug/kg	Q	PQL	TPH-diesel range ug/kg	Q	PQL	TPH-diesel range EXT ug/kg	Q	PQL
5	A-3	J1HK25	4/26/11	23	X	4.0	39	J	4.9	43	X	13	56		12	15	J	12	58		12	1500	J	700	4800	J	1000
6	Duplicate of J1HK25	J1HK41	4/26/11	15		3.9	38	J	4.7	59		13	44		12	23	J	12	75		12	3600	J	720	7600	J	1100
7	A-1	J1HK23	4/26/11	20		4.1	38	J	5.0	66		13	35		12	25	J	12	78		12	4300	J	720	11000	J	1100
8	A-2 re-sample	J1JDW8	6/7/11	33		3.9	90		4.8	160		13	77		12	79		12	200		12	19000		670	31000		980
9	A-4 re-sample	J1JDW9	6/7/11	9.3	J	4.3	22	J	5.3	40	J	14	25	J	13	19	J	13	55		13	4000	J	730	7200		1100
10	A-5 re-sample	J1JDX0	6/7/11	32		3.9	62		4.8	100		13	47		12	55		12	140		12	5000	N	650	9100	N	950
11	A-6 re-sample	J1JDX1	6/7/11	13	J	4.1	35	J	5.0	56		13	27	J	12	20	J	12	85		12	4000		670	7700		980
12	A-7	J1HK29	4/26/11	22		3.9	67		4.8	110		13	12	U	12	51		12	140		12	6600	J	710	18000	J	1000
13	A-8	J1HK30	4/26/11	9.3	J	4.0	32	J	4.9	40	J	13	12	U	12	18	J	12	62		12	6300	J	710	26000	J	1000
14	A-9 re-sample	J1JDX2	6/7/11	4.8	U	4.8	14	J	6.0	23	J	16	15	U	15	15	U	15	25	J	15	3300	J	840	5700		1200
15	A-10	J1HK32	4/26/11	12	J	4.1	42		5.0	52		14	12	U	12	23	J	12	69		12	7000	J	680	17000	J	1000
16	A-11	J1HK33	4/26/11	51		4.2	120		5.2	170		14	13	U	13	85		13	220		13	5300	J	720	13000	J	1100
17	A-12	J1HK34	4/26/11	3.9	U	3.9	4.8	U	4.8	13	U	13	12	U	12	12	U	12	12	U	12	2000	J	700	5600	J	1000
18	A-13	J1HK35	4/26/11	4.5	J	4.2	13	J	5.1	16	J	14	13	U	13	13	U	13	22	J	13	4000	J	740	12000	J	1100
19	A-14	J1HK36	4/26/11	7.9	J	4.0	27	J	4.9	36	J	13	12	U	12	12	U	12	51		12	2900	J	700	11000	J	1000
20	A-15	J1HK37	4/26/11	4.0	U	4.0	12	J	5.0	25	J	13	12	U	12	19	J	12	28	J	12	3100	J	720	6700	J	1100
21	A-16	J1HK38	4/26/11	37		4.1	110		5.1	160		14	83		13	63		13	200		13	44000	J	730	66000	J	1100
22	A-17	J1HK39	4/26/11	12	J	4.1	36	J	5.0	34	J	13	32		12	12	U	12	54		12	3000	J	660	7800	J	980
23	A-18 re-sample	J1JDX3	6/7/11	24		4.0	55		4.9	120		13	42		12	78		12	140		12	4000	J	710	11000		1000

24 **Statistical Computation Input Data**

	Sample Area	Sample Number	Sample Date	Benzo(k)fluoranthene ug/kg	Chrysene ug/kg	Fluoranthene ug/kg	Indeno(1,2,3-cd)pyrene ug/kg	Phenanthrene ug/kg	Pyrene ug/kg	TPH-diesel range ug/kg	TPH-diesel range EXT ug/kg
27	A-3	J1HK25/ J1HK41	4/26/11	19	39	51	50	19	67	2550	6200
28	A-1	J1HK23	4/26/11	20	38	66	35	25	78	4300	11000
29	A-2 re-sample	J1JDW8	6/7/11	33	90	160	77	79	200	19000	31000
30	A-4 re-sample	J1JDW9	6/7/11	9.3	22	40	25	19	55	4000	7200
31	A-5 re-sample	J1JDX0	6/7/11	32	62	100	47	55	140	5000	9100
32	A-6 re-sample	J1JDX1	6/7/11	13	35	56	27	20	85	4000	7700
33	A-7	J1HK29	4/26/11	22	67	110	6.0	51	140	6600	18000
34	A-8	J1HK30	4/26/11	9.3	32	40	6.0	18	62	6300	26000
35	A-9 re-sample	J1JDX2	6/7/11	2.4	14	23	7.5	7.5	25	3300	5700
36	A-10	J1HK32	4/26/11	12	42	52	6.0	23	69	7000	17000
37	A-11	J1HK33	4/26/11	51	120	170	6.5	85	220	5300	13000
38	A-12	J1HK34	4/26/11	2.0	2.4	6.5	6.0	6.0	6.0	2000	5600
39	A-13	J1HK35	4/26/11	4.5	13	16	6.5	6.5	22	4000	12000
40	A-14	J1HK36	4/26/11	7.9	27	36	6.0	6.0	51	2900	11000
41	A-15	J1HK37	4/26/11	2.0	12	25	6.0	19	28	3100	6700
42	A-16	J1HK38	4/26/11	37	110	160	83	63	200	44000	66000
43	A-17	J1HK39	4/26/11	12	36	34	32	6.0	54	3000	7800
44	A-18 re-sample	J1JDX3	6/7/11	24	55	120	42	78	140	4000	11000

45 **Statistical Computations**

		Benzo(k)fluoranthene	Chrysene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	TPH-diesel range	TPH-diesel range EXT
47	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), 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.
48	N	18	18	18	18	18	18	18	18
49	% < Detection limit	17%	6%	6%	50%	28%	6%	0%	0%
50	Mean	17	45	70	26	33	91	7242	15111
51	Standard deviation	14	33	53	25	28	66	9909	14499
52	95% UCL on mean	37	92	128	36	63	179	11084	20733
53	Maximum value	51	120	170	83	85	220	44000	66000
54	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted**	15 ug/kg GW & River Protection	100 ug/kg GW & River Protection	18000 ug/kg River Protection	330 ug/kg GW & River Protection	240000 ug/kg GW Protection	48000 ug/kg GW Protection	200000 ug/kg DE, GW, and River Protection	200000 ug/kg DE, GW, and River Protection
55	**WAC 173-340 3-PART TEST**								
56	95% UCL > Cleanup Limit?	YES	NO	NO	NO	NO	NO	NO	NO
57	> 10% above Cleanup Limit?	YES	YES	NO	NO	NO	NO	NO	NO
58	Any sample > 2X Cleanup Limit?	YES	NO	NO	NO	NO	NO	NO	NO
59	**WAC 173-340 Compliance?**	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

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MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/14/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

Rev. No. 0
Date 07/14/11
Sheet No. 9 of 29

1 **600-151 Maximum Calculations**
2 **Verification Data -Excavation A**

3	Sample	Sample	Sample	Hexavalent Chromium			Molybdenum			Selenium			Anthracene			Dibenz[a,h]anthracene			Fluorene			4,4'DDE			4,4'DDT			Acetone			Methylene chloride		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
5	A-3	J1HK25	4/26/11	0.153	UJ	0.153	0.27	U	0.27	0.88	U	0.88	3.1	U	3.1	23	JX	11	5.3	U	5.3	0.23	U	0.23	0.56	UJ	0.56	7.0	U	7.0	0.97	UJ	0.97
6	Duplicate of J1HK25	J1HK41	4/26/11	0.153	UJ	0.153	0.26	U	0.26	0.85	U	0.85	3.0	U	3.0	11	U	11	5.2	U	5.2	0.25	U	0.25	0.61	UJ	0.61	5.4	U	5.4	0.76	UJ	0.76
7	A-1	J1HK23	4/26/11	0.153	J	0.153	0.37	B	0.24	0.79	U	0.79	3.1	U	3.1	11	U	11	5.4	U	5.4	0.25	U	0.25	0.89	J	0.62	6.4	U	6.4	0.89	UJ	0.89
8	A-2 re-sample	J1JDW8	6/7/11	0.202		0.155	0.47	B	0.27	0.94	BM	0.88	7.4	JX	3.0	22	J	11	5.3	U	5.3	0.24	U	0.24	0.59	U	0.59	5.2	U	5.2	6.1	B	0.72
9	A-4 re-sample	J1JDW9	6/7/11	0.259		0.155	0.28	U	0.28	0.92	U	0.92	3.3	U	3.3	12	U	12	5.8	U	5.8	0.26	U	0.26	0.64	U	0.64	6.0	U	6.0	1.2	JB	0.83
10	A-5 re-sample	J1JDX0	6/7/11	0.306		0.155	0.25	U	0.25	0.84	U	0.84		U	3.1	11	U	11	5.3	U	5.3	0.22	U	0.22	0.56	U	0.56	5.6	U	5.6	1.2	JB	0.78
11	A-6 re-sample	J1JDX1	6/7/11	0.155	U	0.155	0.24	U	0.24	0.79	U	0.79	3.2	U	3.2	11	U	11	5.5	U	5.5	0.23	U	0.23	0.58	U	0.58	5.7	U	5.7	1.0	JB	0.79
12	A-7	J1HK29	4/26/11	0.155	UJ	0.155	0.27	U	0.27	0.91	U	0.91	3.0	U	3.0	11	U	11	5.2	U	5.2	0.25	U	0.25	0.61	UJ	0.61	6.7	U	6.7	0.93	UJ	0.93
13	A-8	J1HK30	4/26/11	0.153	UJ	0.153	0.26	U	0.26	0.86	U	0.86	3.1	U	3.1	11	U	11	5.4	U	5.4	1.2	J	0.26	0.88	J	0.65	6.9	U	6.9	0.96	UJ	0.96
14	A-9 re-sample	J1JDX2	6/7/11	0.155	U	0.155	0.29	U	0.29	0.95	U	0.95	3.8	U	3.8	14	U	14	6.5	U	6.5	0.28	U	0.28	0.69	U	0.69	5.8	U	5.8	1.9	JB	0.8
15	A-10	J1HK32	4/26/11	0.153	UJ	0.153	0.26	U	0.26	0.86	U	0.86	3.2	U	3.2	11	U	11	5.5	U	5.5	0.76	JX	0.25	0.63	UJ	0.63	6.0	U	6.0	0.84	UJ	0.84
16	A-11	J1HK33	4/26/11	0.154	UJ	0.154	0.25	U	0.25	0.83	U	0.83	3.3	U	3.3	12	U	12	6.7	J	5.7	0.63	JX	0.25	0.62	UJ	0.62	5.5	U	5.5	0.77	UJ	0.77
17	A-12	J1HK34	4/26/11	0.154	UJ	0.154	0.24	U	0.24	0.79	U	0.79	3.0	U	3.0	11	U	11	5.2	U	5.2	0.25	U	0.25	0.62	UJ	0.62	6.8	U	6.8	0.95	UJ	0.95
18	A-13	J1HK35	4/26/11	0.154	UJ	0.154	0.26	U	0.26	0.87	U	0.87	3.2	U	3.2	12	U	12	5.6	U	5.6	0.25	U	0.25	0.61	UJ	0.61	6.1	U	6.1	0.85	UJ	0.85
19	A-14	J1HK36	4/26/11	0.153	UJ	0.153	0.26	U	0.26	0.87	U	0.87	3.1	U	3.1	11	U	11	5.4	U	5.4	0.31	JX	0.24	0.60	UJ	0.60	8.0	U	8.0	1.1	UJ	1.1
20	A-15	J1HK37	4/26/11	0.154	UJ	0.154	0.26	U	0.26	0.86	U	0.86	3.1	U	3.1	11	U	11	5.4	U	5.4	0.25	U	0.25	0.62	UJ	0.62	6.8	J	6.4	0.89	UJ	0.89
21	A-16	J1HK38	4/26/11	0.153	UJ	0.153	0.27	U	0.27	0.88	U	0.88	4.7	JX	3.2	12	U	12	5.6	U	5.6	0.26	JX	0.26	0.65	UJ	0.65	5.9	U	5.9	0.82	UJ	0.82
22	A-17	J1HK39	4/26/11	0.154	UJ	0.154	0.24	U	0.24	0.80	U	0.80	3.1	U	3.1	11	U	11	5.4	U	5.4	0.24	U	0.24	0.59	UJ	0.59	5.5	U	5.5	0.77	UJ	0.77
23	A-18 re-sample	J1JDX3	6/7/11	0.155	U	0.155	0.26	U	0.26	0.85	U	0.85	6.9	JX	3.1	11	U	11	5.4	U	5.4	0.24	U	0.24	0.60	U	0.60	6.2	U	6.2	1.3	JB	0.87

24 **Statistical Computations**

25		Hexavalent Chromium	Molybdenum	Selenium	Anthracene	Dibenz[a,h]anthracene	Fluorene	4,4'DDE	4,4'DDT	Acetone	Methylene chloride
26	% < Detection limit	78%	89%	94%	83%	89%	94%	72%	89%	94%	67%
27	Maximum value	0.306	0.47	0.94	7.4	23	6.7	1.2	0.89	6.8	6.1
28	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted**	2 River Protection	8 GW Protection	1 River Protection	240000 ug/kg GW Protection	30 ug/kg GW & River Protection	64000 ug/kg GW Protection	3.3 ug/kg GW & River Protection	3.3 ug/kg GW & River Protection	720000 ug/kg GW Protection	500 ug/kg GW Protection
29	**3-PART TEST**										
30	Maximum > Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
31	> 10% above Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
32	Any sample > 2X Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
33	**3-Part Test Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

Rev. No. 0
Date 07/13/11
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600-151 Statistical Calculations

Verification Data - B Excavation

Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Boron mg/kg	Q	PQL	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
B-6	J1HK47	4/27/11	41.0		0.61	85.3		0.071	0.13	B	0.031	2.2		0.91	0.45		0.038	11.1		0.054	6.7	X	0.093	12.9		0.20	181	X	0.25
Duplicate of J1HK47	J1HK54	4/27/11	47.9		0.67	100		0.078	0.14	B	0.034	2.5		1.0	0.55		0.042	12.9		0.059	8.0	X	0.10	15.4		0.22	218	X	0.28
B-1	J1HK42	4/27/11	22.4		0.59	82.8		0.068	0.12	B	0.030	2.4		0.88	0.34		0.037	10.9		0.052	6.3	X	0.09	12.0		0.19	122	X	0.24
B-2	J1HK43	4/27/11	23.5		0.60	77.6		0.069	0.12	B	0.030	1.8		0.89	0.28		0.037	10.9		0.053	6.5	X	0.091	11.8		0.20	53.4	X	0.25
B-3	J1HK44	4/27/11	55.9		0.65	83.8		0.075	0.13	B	0.033	1.7	B	0.97	0.52		0.041	11.4		0.057	6.9	X	0.099	12.6		0.21	198	X	0.27
B-4	J1HK45	4/27/11	15.9		0.60	72.3		0.069	0.082	B	0.030	2.5		0.90	0.29		0.037	10.5		0.053	6.2	X	0.091	13.9		0.20	182	X	0.25
B-5	J1HK46	4/27/11	7.0		0.59	88.6		0.068	0.14	B	0.029	2.4		0.87	0.15	B	0.036	11.6		0.052	7.1	X	0.089	14.7		0.19	20.4	X	0.24
B-7	J1HK48	4/27/11	32.0		0.68	95.3		0.078	0.13	B	0.034	2.1		1.0	0.39		0.042	12.2		0.060	7.7	X	0.1	14.0		0.22	131	X	0.28
B-8	J1HK49	4/27/11	32.4		0.60	86.0		0.069	0.11	B	0.030	1.8		0.89	0.35		0.037	12.1		0.052	7.5	X	0.09	14.1		0.20	87.0	X	0.24
B-9	J1HK50	4/27/11	85.0		0.62	94.1		0.071	0.12	B	0.031	2.3		0.91	0.82		0.038	12.8		0.054	7.8	X	0.093	14.4		0.20	518	X	0.25
B-10	J1HK51	4/27/11	77.5		0.63	94.5		0.072	0.12	B	0.031	2.2		0.93	0.75		0.039	12.9		0.055	7.7	X	0.095	14.8		0.21	286	X	0.26
B-11 re-sample 2	J1JW46	6/22/11	19.9		0.61	47.2		0.070	0.069	B	0.031	1.0	B	0.91	0.12	B	0.038	9.4		0.054	6.1	X	0.093	14.7		0.20	12.0		0.25
B-12	J1HK53	4/27/11	104		0.60	88.8		0.069	0.13	B	0.030	1.8		0.88	0.95		0.037	12.3		0.052	7.8	X	0.09	14.1		0.20	410	X	0.24

Statistical Computation Input Data

Sample 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	Lead mg/kg
B-6	J1HK47/ J1HK54	4/27/11	44.5	92.7	0.14	2.4	0.50	12.0	7.4	14.2	200
B-1	J1HK42	4/27/11	22.4	82.8	0.12	2.4	0.34	10.9	6.3	12.0	122
B-2	J1HK43	4/27/11	23.5	77.6	0.12	1.8	0.28	10.9	6.5	11.8	53.4
B-3	J1HK44	4/27/11	55.9	83.8	0.13	1.7	0.52	11.4	6.9	12.6	198
B-4	J1HK45	4/27/11	15.9	72.3	0.082	2.5	0.29	10.5	6.2	13.9	182
B-5	J1HK46	4/27/11	7.0	88.6	0.14	2.4	0.15	11.6	7.1	14.7	20.4
B-7	J1HK48	4/27/11	32.0	95.3	0.13	2.1	0.39	12.2	7.7	14.0	131
B-8	J1HK49	4/27/11	32.4	86.0	0.11	1.8	0.35	12.1	7.5	14.1	87.0
B-9	J1HK50	4/27/11	85.0	94.1	0.12	2.3	0.82	12.8	7.8	14.4	518
B-10	J1HK51	4/27/11	77.5	94.5	0.12	2.2	0.75	12.9	7.7	14.8	286
B-11 re-sample 2	J1JW46	6/22/11	19.9	47.2	0.069	1.0	0.12	9.4	6.1	14.7	12.0
B-12	J1HK53	4/27/11	104	88.8	0.13	1.8	0.95	12.3	7.8	14.1	410

Statistical Computations

	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead
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), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥10), use MTCAStat lognormal distribution.
N	12	12	12	12	12	12	12	12	12
% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mean	43.3	83.6	0.12	2.0	0.46	11.6	7.1	13.8	185
Standard deviation	30.8	13.5	0.021	0.43	0.26	1.02	0.66	1.04	155
95% UCL on mean	83.4	90.0	0.13	2.2	0.73	12.2	7.4	14.3	679
Maximum value	104	100	0.14	2.5	0.95	12.9	8.0	15.4	518
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	20 DE, GW & River Protection	200 GW Protection	1.51 GW and River Protection	320 GW Protection	0.81 GW and River Protection	18.5 GW and River Protection	15.7 GW Protection	22.0 River Protection	10.2 GW and River Protection
WAC 173-340 3-PART TEST									
95% UCL > Cleanup Limit?	YES	NA	NA	NO	NO	NA	NA	NA	YES
> 10% above Cleanup Limit?	YES	NA	NA	NO	YES	NA	NA	NA	YES
Any sample > 2X Cleanup Limit?	YES	NA	NA	NO	NO	NA	NA	NA	YES
WAC 173-340 Compliance?	A detailed assessment will be performed.	Because all values are below background (132 mg/kg) the 3-part test is not required.	Because all values are below background (1.51 mg/kg) the 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (18.5 mg/kg) the 3-part test is not required.	Because all values are below background (15.7 mg/kg) the 3-part test is not required.	Because all values are below background (22.0 mg/kg) the 3-part test is not required.	A detailed assessment will be performed.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
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Checked T. E. Queen

Rev. No. 0
Date 07/13/11
Sheet No. 11 of 29

1 **600-151 Statistical Calculations**

2 **Verification Data - B Excavation**

	Sample Area	Sample Number	Sample Date	Manganese mg/kg	Q	PQL	Mercury mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL	Benzo(a)anthracene ug/kg	Q	PQL	Benzo(b)fluoranthene ug/kg	Q	PQL	Chrysene ug/kg	Q	PQL	TPH-diesel range ug/kg	Q	PQL
5	B-6	J1HK47	4/27/11	318		0.093	0.012	B	0.0053	10.4		0.11	33.3		0.088	43.2		0.37	17		3.3	12	J	4.4	19	J	5.0	1400	J	700
6	Duplicate of J1HK47	J1HK54	4/27/11	372		0.10	0.013	B	0.0058	12.0		0.13	40.8		0.096	50.9		0.41	5.2	JX	3.4	11	J	4.5	9.8	JX	5.2	1300	J	730
7	B-1	J1HK42	4/27/11	297		0.090	0.011	B	0.0054	10.1		0.11	32.3		0.084	44.3		0.36	8.2	J	3.2	11	J	4.2	13	J	4.9	1500	J	710
8	B-2	J1HK43	4/27/11	304		0.091	0.0082	B	0.0051	10.6		0.11	32.1		0.085	39.6		0.36	3.3	U	3.3	4.3	U	4.3	4.9	U	4.9	700	U	700
9	B-3	J1HK44	4/27/11	337		0.099	0.0089	B	0.0049	10.5		0.12	34.1		0.093	41.8		0.39	3.2	U	3.2	4.2	U	4.2	4.9	U	4.9	680	U	680
10	B-4	J1HK45	4/27/11	294		0.091	0.011	B	0.0050	9.9		0.11	34.0		0.086	44.9		0.36	37		3.1	38		4.1	49		4.7	2300	J	670
11	B-5	J1HK46	4/27/11	331		0.089	0.014	B	0.0053	10.8		0.11	36.6		0.084	44.9		0.35	3.3	U	3.3	4.3	U	4.3	5.0	U	5.0	940	J	690
12	B-7	J1HK48	4/27/11	357		0.10	0.011	B	0.0053	11.6		0.13	37.6		0.097	45.6		0.41	4.4	JX	3.2	4.8	J	4.2	7.3	J	4.8	690	U	690
13	B-8	J1HK49	4/27/11	334		0.090	0.0099	B	0.0057	11.8		0.11	38.8		0.085	42.1		0.36	3.3	U	3.3	4.3	U	4.3	5.0	U	5.0	670	U	670
14	B-9	J1HK50	4/27/11	394		0.093	0.014	B	0.0053	12.0		0.11	40.0		0.088	48.1		0.37	3.0	U	3.0	4.0	U	4.0	4.6	U	4.6	720	J	700
15	B-10	J1HK51	4/27/11	382		0.095	0.012	B	0.0055	12.1		0.12	39.2		0.090	50.8		0.38	28		3.3	29		4.3	33	J	5.0	900	J	680
16	B-11 re-sample 2	J1JW46	6/22/11	231		0.093	0.0055	U	0.0055	10.0	X	0.11	38.0		0.087	30.7		0.37	3.4	U	3.4	4.5	U	4.5	5.2	U	5.2	1300	JB	720
17	B-12	J1HK53	4/27/11	384		0.090	0.019		0.0053	11.7		0.11	38.7		0.085	47.9		0.36	38		3.3	40		4.3	49		5.0	3100	J	680

18 **Statistical Computation Input Data**

	Sample Area	Sample Number	Sample Date	Manganese mg/kg	Mercury mg/kg	Nickel mg/kg	Vanadium mg/kg	Zinc mg/kg	Benzo(a)anthracene ug/kg	Benzo(b)fluoranthene ug/kg	Chrysene ug/kg	TPH-diesel range ug/kg
21	B-6	J1HK47/ J1HK54	4/27/11	345	0.013	11.2	37.1	47.1	11	12	14	1350
22	B-1	J1HK42	4/27/11	297	0.011	10.1	32.3	44.3	8.2	11	13	1500
23	B-2	J1HK43	4/27/11	304	0.0082	10.6	32.1	39.6	1.7	2.2	2.5	350
24	B-3	J1HK44	4/27/11	337	0.0089	10.5	34.1	41.8	1.6	2.1	2.5	340
25	B-4	J1HK45	4/27/11	294	0.011	9.9	34.0	44.9	37	38	49	2300
26	B-5	J1HK46	4/27/11	331	0.014	10.8	36.6	44.9	1.7	2.2	2.5	940
27	B-7	J1HK48	4/27/11	357	0.011	11.6	37.6	45.6	4.4	4.8	7.3	345
28	B-8	J1HK49	4/27/11	334	0.010	11.8	38.8	42.1	1.7	2.2	2.5	335
29	B-9	J1HK50	4/27/11	394	0.014	12.0	40.0	48.1	1.5	2.0	2.3	720
30	B-10	J1HK51	4/27/11	382	0.012	12.1	39.2	50.8	28	29	33	900
31	B-11 re-sample 2	J1JW46	6/22/11	231	0.0028	10.0	38.0	30.7	1.7	2.3	2.6	1300
32	B-12	J1HK53	4/27/11	384	0.019	11.7	38.7	47.9	38	40	49	3100

33 **Statistical Computations**

		Manganese	Mercury	Nickel	Vanadium	Zinc	Benzo(a)anthracene	Benzo(b)fluoranthene	Chrysene	TPH-diesel range
35	95% UCL based on	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat normal 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.	Large data set (n ≥10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥10), use MTCAStat lognormal distribution.
36	N	12	12	12	12	12	12	12	12	12
37	% < Detection limit	0%	8%	0%	0%	0%	50%	50%	50%	33%
38	Mean	333	0.011	11.0	36.5	44.0	11	12	15	1123
39	Standard deviation	46	0.0039	0.81	2.74	5.2	14	15	18	863
40	95% UCL on mean	361	0.013	11.5	38.1	46.4	18	19	24	2120
41	Maximum value	394	0.019	12.1	40.8	50.9	38	40	49	3100
42	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted**	512 GW & River Protection	0.33 GW & River Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	15 ug/kg GW & River Protection	15 ug/kg GW & River Protection	100 ug/kg GW & River Protection	200000 ug/kg DE, GW, and River Protection
43	**WAC 173-340 3-PART TEST**									
44	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	YES	YES	NO	NO
45	> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	YES	YES	NO	NO
46	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA	YES	YES	NO	NO
47	**WAC 173-340 Compliance?**	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.33 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655
Calc. No. 0100X-CA-V0062
Checked T. E. Queen

Rev. No. 0
Date 07/13/11
Sheet No. 12 of 29

1 **600-151 Statistical Calculations**

2 **Verification Data - B Excavation**

3	Sample Area	Sample Number	Sample Date	TPH-diesel range EXT ug/kg	Q	PQL
5	B-6	J1HK47	4/27/11	8700		1000
6	Duplicate of J1HK47	J1HK54	4/27/11	8900		1100
7	B-1	J1HK42	4/27/11	12000		1000
8	B-2	J1HK43	4/27/11	1400	J	1000
9	B-3	J1HK44	4/27/11	2400	J	1000
10	B-4	J1HK45	4/27/11	6200		990
11	B-5	J1HK46	4/27/11	5500		1000
12	B-7	J1HK48	4/27/11	3200	J	1000
13	B-8	J1HK49	4/27/11	3200	J	980
14	B-9	J1HK50	4/27/11	4500		1000
15	B-10	J1HK51	4/27/11	3900	J	1000
16	B-11 re-sample 2	J1JW46	6/22/11	2400	JB	1100
17	B-12	J1HK53	4/27/11	7000		1000

18 **Statistical Computation Input Data**

19 20	Sample Area	Sample Number	Sample Date	TPH-diesel range EXT ug/kg		
21	B-6	J1HK47/ J1HK54	4/27/11	8800		
22	B-1	J1HK42	4/27/11	12000		
23	B-2	J1HK43	4/27/11	1400		
24	B-3	J1HK44	4/27/11	2400		
25	B-4	J1HK45	4/27/11	6200		
26	B-5	J1HK46	4/27/11	5500		
27	B-7	J1HK48	4/27/11	3200		
28	B-8	J1HK49	4/27/11	3200		
29	B-9	J1HK50	4/27/11	4500		
30	B-10	J1HK51	4/27/11	3900		
31	B-11 re-sample 2	J1JW46	6/22/11	2400		
32	B-12	J1HK53	4/27/11	7000		

33 **Statistical Computations**

34		TPH-diesel range EXT		
35	95% UCL based on	Large data set (n ≥10), use MTCAStat lognormal distribution.		
36	N	12		
37	% < Detection limit	0%		
38	Mean	5042		
39	Standard deviation	3068		
40	95% UCL on mean	7854		
41	Maximum value	12000		
42	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted**	200000 ug/kg	DE, GW, and River Protection	
43	**WAC 173-340 3-PART TEST**			
44	95% UCL > Cleanup Limit?	NO		
45	> 10% above Cleanup Limit?	NO		
46	Any sample > 2X Cleanup Limit?	NO		
47	**WAC 173-340 Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent RAG.		

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

Rev. No. 0
Date 07/13/11
Sheet No. 13 of 29

1 600-151 Maximum Calculations
2 Verification Data -Excavation B

3	Sample	Sample	Sample	Molybdenum			Benzo(a)pyrene			Benzo(ghi)perylene			Benzo(k)fluoranthene			Fluoranthene			Phenanthrene			Pyrene			4,4'DDE			2-Butanone			Acetone			Methylene chloride		
4	Area	Number	Date	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
5	B-6	J1HK47	4/27/11	0.24	U	0.24	15	JX	6.7	7.5	U	7.5	5.6	J	4.1	24	J	14	12	U	12	25	JX	12	0.25	UN	0.25	2.0	U	2.0	11	J	6.0	0.83	U	0.83
6	Duplicate of J1HK47	J1HK54	4/27/11	0.27	U	0.27	16		6.8	7.7	U	7.7	4.6	JX	4.2	19	J	14	13	U	13	25	J	13	0.33	JX N	0.26	6.9	J	2.2	30		6.4	0.89	U	0.89
7	B-1	J1HK42	4/27/11	0.33	B	0.23	12	J	6.5	7.3	U	7.3	4.0	U	4.0	18	J	13	12	U	12	21	J	12	0.47	JN	0.25	2.8	U	2.8	8.3	U	8.3	1.2	U	1.2
8	B-2	J1HK43	4/27/11	0.24	U	0.24	6.5	U	6.5	7.3	U	7.3	4.0	U	4.0	13	U	13	12	U	12	12	U	12	0.24	UN	0.24	2.1	U	2.1	6.1	U	6.1	0.85	U	0.85
9	B-3	J1HK44	4/27/11	0.26	U	0.26	6.5	U	6.5	7.3	U	7.3	4.0	U	4.0	13	U	13	12	U	12	12	U	12	0.24	UN	0.24	1.9	U	1.9	5.5	U	5.5	0.77	U	0.77
10	B-4	J1HK45	4/27/11	0.24	U	0.24	6.2	U	6.2	7.0	U	7.0	21		3.8	93		13	46		12	100		12	0.23	UN	0.23	2.1	U	2.1	6.3	U	6.3	0.88	U	0.88
11	B-5	J1HK46	4/27/11	0.23	U	0.23	6.6	U	6.6	7.4	U	7.4	4.1	U	4.1	13	U	13	12	U	12	12	U	12	0.25	UN	0.25	2.4	U	2.4	7.1	U	7.1	0.99	U	0.99
12	B-7	J1HK48	4/27/11	0.27	U	0.27	9.6	J	6.4	7.2	U	7.2	4.2	J	3.9	13	U	13	12	U	12	12	U	12	0.25	UN	0.25	2.0	U	2.0	5.9	U	5.9	0.82	U	0.82
13	B-8	J1HK49	4/27/11	0.24	U	0.24	6.6	U	6.6	7.4	U	7.4	4.1	U	4.1	13	U	13	12	U	12	12	U	12	0.25	UN	0.25	2.0	U	2.0	6.0	U	6.0	0.83	U	0.83
14	B-9	J1HK50	4/27/11	0.24	U	0.24	6.1	U	6.1	6.9	U	6.9	3.8	U	3.8	12	U	12	11	U	11	11	U	11	0.25	UN	0.25	2.2	U	2.2	6.4	U	6.4	0.89	U	0.89
15	B-10	J1HK51	4/27/11	0.25	U	0.25	32		6.6	22	J	7.4	14	J	4.1	50		13	16	J	12	63		12	0.24	UN	0.24	2.1	U	2.1	6.2	U	6.2	0.86	U	0.86
16	B-11 re-sample 2	J1JW46	6/22/11	0.24	U	0.24	8.9	U	6.9	7.7	U	7.7	4.2	U	4.2	14	U	14	13	U	13	13	U	13	0.25	U	0.25	1.8	U	1.8	5.4	U	5.4	11	T	0.75
17	B-12	J1HK53	4/27/11	0.23	U	0.23	45		6.6	35		7.4	19		4.1	87		13	46		12	100		12	0.24	UN	0.24	1.9	U	1.9	5.7	U	5.7	0.79	U	0.79

18 Statistical Computations

19		Molybdenum			Benzo(a)pyrene			Benzo(ghi)perylene			Benzo(k)fluoranthene			Fluoranthene			Phenanthrene			Pyrene			4,4'DDE			2-Butanone			Acetone			Methylene chloride		
20	% < Detection limit	92%			58%			83%			58%			58%			75%			58%			83%			92%			92%			92%					
21	Maximum value	0.33			45			35			21			93			46			100			0.47			6.9			30			11					
22	Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted	8	GW Protection		15 ug/kg	GW & River Protection		48000 ug/kg	GW Protection		15 ug/kg	GW & River Protection		18000 ug/kg	GW Protection		240000 ug/kg	GW Protection		48000 ug/kg	GW Protection		3.3 ug/kg	GW & River Protection		480000 ug/kg	GW Protection		720000 ug/kg	GW Protection		500 ug/kg	GW Protection	
23	3-PART TEST																																			
24	Maximum > Cleanup Limit?	NO			YES			NO			YES			NO			NO			NO			NO			NO			NO			NO					
25	> 10% above Cleanup Limit?	NO			YES			NO			YES			NO			NO			NO			NO			NO			NO			NO					
26	Any sample > 2X Cleanup Limit?	NO			YES			NO			NO			NO			NO			NO			NO			NO			NO			NO					
27	3-Part Test Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.			A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.			A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.		

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CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

Rev. No. 0
Date 07/13/11
Sheet No. 14 of 29

1 **600-151 Statistical Calculations**

2 **Verification Data - C Excavation**

3	Sample	Sample	Sample	Arsenic			Barium			Beryllium			Boron			Cadmium			Chromium			Cobalt			Copper			Lead		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	C-1	J1HK55	4/28/11	38.3		0.65	66.9	X	0.075	0.098	B	0.033	1.5	B	0.97	0.36		0.040	13.9		0.057	7.5	X	0.099	16.8		0.21	34.6	X	0.27
6	Duplicate of J1HK55	J1HK68	4/28/11	39.8		0.63	67.0	X	0.072	0.11	B	0.031	1.3	B	0.93	0.35		0.039	12.5		0.055	7.5	X	0.095	16.3		0.21	34.1	X	0.26
7	C-2	J1HK56	4/28/11	56.5		0.61	71.4	X	0.070	0.13	B	0.030	1.6	B	0.9	0.48		0.038	14.1		0.053	9.4	X	0.092	17.7		0.20	23.3	X	0.25
8	C-3	J1HK57	4/28/11	29.6		0.65	91.2	X	0.074	0.13	B	0.032	3.0		0.96	0.45		0.040	13.3		0.057	7.3	X	0.098	15.0		0.21	140	X	0.26
9	C-4	J1HK58	4/28/11	15.0		0.65	95.1	X	0.074	0.14	B	0.032	3.5		0.96	0.27		0.040	12.8		0.057	7.0	X	0.098	14.2		0.21	144	X	0.26
10	C-5	J1HK59	4/28/11	14.4		0.69	90.7	X	0.079	0.16	B	0.034	2.6		1.0	0.22		0.043	13.5		0.060	7.8	X	0.10	14.7		0.23	21.4	X	0.28
11	C-6	J1HK60	4/28/11	8.7		0.68	88.0	X	0.078	0.15	B	0.034	2.6		1.0	0.23		0.042	12.4		0.059	7.7	X	0.10	13.2		0.22	6.7	X	0.28
12	C-7	J1HK61	4/28/11	64.2		0.61	69.8	X	0.070	0.081	B	0.031	1.4	B	0.91	0.66		0.038	10.6		0.054	5.6	X	0.093	12.1		0.20	641	X	0.25
13	C-8	J1HK62	4/28/11	8.9		0.66	92.2	X	0.076	0.16	B	0.033	2.5		0.98	0.21		0.041	13.2		0.058	7.9	X	0.10	14.6		0.22	27.4	X	0.27
14	C-9	J1HK63	4/28/11	65.9		0.60	405	X	0.069	0.10	B	0.030	2.0		0.88	0.69		0.037	11.7		0.052	6.7	X	0.09	11.9		0.20	123	X	0.24
15	C-10	J1HK64	4/28/11	68.3		0.66	69.8	X	0.076	0.11	B	0.033	1.9	B	0.98	0.59		0.041	12.1		0.058	7.3	X	0.10	19.7		0.22	112	X	0.27
16	C-11	J1HK65	4/28/11	62.4		0.60	41.0	X	0.069	0.042	B	0.030	1.0	B	0.89	0.51		0.037	11.4		0.052	5.7	X	0.091	14.2		0.20	114	X	0.24
17	C-12	J1HK66	4/28/11	26.0		0.66	106	X	0.076	0.12	B	0.033	3.5		0.98	0.58		0.041	13.4		0.058	6.3	X	0.10	17.0		0.22	408	X	0.27
18	C-13	J1HK67	4/28/11	20.0		0.65	78.8	X	0.075	0.13	B	0.033	1.7	B	0.97	0.26		0.041	12.2		0.057	7.3	X	0.099	12.5		0.21	8.6	X	0.27

19 **Statistical Computation Input Data**

20	Sample	Sample	Sample	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead
21	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
22	C-1	J1HK55/ J1HK68	3/1/11	39.1	67.0	0.10	1.4	0.36	13.2	7.5	16.6	34.4
23	C-2	J1HK56	4/28/11	56.5	71.4	0.13	1.6	0.48	14.1	9.4	17.7	23.3
24	C-3	J1HK57	4/28/11	29.6	91.2	0.13	3.0	0.45	13.3	7.3	15.0	140
25	C-4	J1HK58	4/28/11	15.0	95.1	0.14	3.5	0.27	12.8	7.0	14.2	144
26	C-5	J1HK59	4/28/11	14.4	90.7	0.16	2.6	0.22	13.5	7.8	14.7	21.4
27	C-6	J1HK60	4/28/11	8.7	88.0	0.15	2.6	0.23	12.4	7.7	13.2	6.7
28	C-7	J1HK61	4/28/11	64.2	69.8	0.081	1.4	0.66	10.6	5.6	12.1	641
29	C-8	J1HK62	4/28/11	8.9	92.2	0.16	2.5	0.21	13.2	7.9	14.6	27.4
30	C-9	J1HK63	4/28/11	65.9	405	0.10	2.0	0.69	11.7	6.7	11.9	123
31	C-10	J1HK64	4/28/11	68.3	69.8	0.11	1.9	0.59	12.1	7.3	19.7	112
32	C-11	J1HK65	4/28/11	62.4	41.0	0.042	1.0	0.51	11.4	5.7	14.2	114
33	C-12	J1HK66	4/28/11	26.0	106	0.12	3.5	0.58	13.4	6.3	17.0	408
34	C-13	J1HK67	4/28/11	20.0	78.8	0.13	1.7	0.26	12.2	7.3	12.5	8.6

35 **Statistical Computations**

36		Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead
37	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), use MTCAStat normal 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.
38	N	13	13	13	13	13	13	13	13	13
39	% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%	0%
40	Mean	36.8	105	0.12	2.2	0.42	12.6	7.2	14.9	139
41	Standard deviation	23.5	91.6	0.033	0.81	0.18	0.99	1.0	2.32	185
42	95% UCL on mean	67.4	147	0.14	2.8	0.56	13.1	7.7	16.1	712
43	Maximum value	68.3	405	0.16	3.5	0.69	14.1	9.4	19.7	641
44	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	20 DE, GW & River Protection	200 GW Protection	1.51 GW and River Protection	320 GW Protection	0.81 GW and River Protection	18.5 GW and River Protection	15.7 GW Protection	22.0 River Protection	10.2 GW and River Protection
45	**WAC 173-340 3-PART TEST**									
46	95% UCL > Cleanup Limit?	YES	NO	NA	NO	NA	NA	NA	NA	YES
47	> 10% above Cleanup Limit?	YES	NO	NA	NO	NA	NA	NA	NA	YES
48	Any sample > 2X Cleanup Limit?	YES	YES	NA	NO	NA	NA	NA	NA	YES
49	**WAC 173-340 Compliance?**	A detailed assessment will be performed.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	Because all values are below background (1.51 mg/kg) the 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (0.81 mg/kg) the 3-part test is not required.	Because all values are below background (18.5 mg/kg) the 3-part test is not required.	Because all values are below background (15.7 mg/kg) the 3-part test is not required.	Because all values are below background (22.0 mg/kg) the 3-part test is not required.	A detailed assessment will be performed.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

Rev. No. 0
Date 07/13/11
Sheet No. 15 of 29

1 **600-151 Statistical Calculations**

2 **Verification Data - C Excavation**

3	Sample	Sample	Sample	Manganese			Mercury			Nickel			Vanadium			Zinc			Benzo(a)anthracene			Benzo(a)pyrene			Benzo(b)fluoranthene			Benzo(ghi)perylene		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
5	C-1	J1HK55	4/28/11	294	X	0.099	0.011	BM	0.0053	12.8		0.12	38.7	X	0.093	36.5	X	0.39	3.2	U	3.2	6.4	U	6.4	4.2	U	4.2	7.2	U	7.2
6	Duplicate of J1HK55	J1HK68	4/28/11	296	X	0.095	0.0073	B	0.0053	12.6		0.12	37.4	X	0.089	36.0	X	0.38	3.3	U	3.3	6.6	U	6.6	4.3	U	4.3	7.4	U	7.4
7	C-2	J1HK56	4/28/11	316	X	0.092	0.0079	B	0.0055	13.3		0.11	38.8	X	0.087	39.6	X	0.37	3.3	U	3.3	6.6	U	6.6	4.3	U	4.3	7.4	U	7.4
8	C-3	J1HK57	4/28/11	327	X	0.098	0.013	B	0.0055	12.0		0.12	38.8	X	0.092	61.0	X	0.39	37		3.2	46		6.4	40		4.2	37		7.2
9	C-4	J1HK58	4/28/11	348	X	0.098	0.0052	U	0.0052	11.1		0.12	40.7	X	0.092	50.2	X	0.39	30		3.2	25		6.4	18		4.2	15	J	7.2
10	C-5	J1HK59	4/28/11	342	X	0.10	0.012	B	0.0055	12.6		0.13	38.8	X	0.098	48.8	X	0.41	3.1	U	3.1	6.3	U	6.3	4.1	U	4.1	7.1	U	7.1
11	C-6	J1HK60	4/28/11	328	X	0.10	0.0054	U	0.0054	11.4		0.13	37.8	X	0.096	76.1	X	0.41	4.2	JX	3.2	8.2	J	6.4	11	J	4.2	7.7	J	7.2
12	C-7	J1HK61	4/28/11	278	X	0.093	0.012	B	0.0050	9.3		0.11	34.3	X	0.087	48.2	X	0.37	13	J	3.2	28		6.4	18		4.2	17	J	7.2
13	C-8	J1HK62	4/28/11	342	X	0.10	0.0091	B	0.0056	12.9		0.12	39.2	X	0.094	46.7	X	0.40	3.2	U	3.2	6.4	U	6.4	4.2	U	4.2	7.2	U	7.2
14	C-9	J1HK63	4/28/11	291	X	0.09	0.0087	B	0.0051	11.1		0.11	35.8	X	0.085	94.8	X	0.36	24	X	3.2	28		6.3	20		4.1	17	J	7.1
15	C-10	J1HK64	4/28/11	297	X	0.10	0.055		0.0051	13.0		0.12	37.8	X	0.094	44.3	X	0.40	43	X	3.2	43		6.5	31		4.3	22	J	7.3
16	C-11	J1HK65	4/28/11	223	X	0.091	0.015		0.0048	11.2		0.11	32.7	X	0.085	31.5	X	0.36	27	X	3.1	23		6.3	21		4.1	14	J	7
17	C-12	J1HK66	4/28/11	304	X	0.10	0.016		0.0051	10.4		0.12	34.7	X	0.094	78.7	X	0.40	96		3.1	88		6.3	75		4.1	64		7.1
18	C-13	J1HK67	4/28/11	301	X	0.099	0.0057	B	0.0056	11.5		0.12	37.0	X	0.093	39.2	X	0.39	3.2	U	3.2	6.4	U	6.4	5.2	JX	4.2	7.2	U	7.2

19 **Statistical Computation Input Data**

20	Sample	Sample	Sample	Manganese	Mercury	Nickel	Vanadium	Zinc	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene
21	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg
22	C-1	J1HK55/ J1HK68	3/1/11	295	0.0092	12.7	38.1	36.3	1.6	3.3	2.1	3.7
23	C-2	J1HK56	4/28/11	316	0.0079	13.3	38.8	39.6	1.7	3.3	2.2	3.7
24	C-3	J1HK57	4/28/11	327	0.013	12.0	38.8	61.0	37	46	40	37
25	C-4	J1HK58	4/28/11	348	0.0026	11.1	40.7	50.2	30	25	18	15
26	C-5	J1HK59	4/28/11	342	0.012	12.6	38.8	48.8	1.6	3.2	2.1	3.6
27	C-6	J1HK60	4/28/11	328	0.0027	11.4	37.8	76.1	4.2	8.2	11	7.7
28	C-7	J1HK61	4/28/11	278	0.012	9.3	34.3	48.2	13	28	18	17
29	C-8	J1HK62	4/28/11	342	0.0091	12.9	39.2	46.7	1.6	3.2	2.1	3.6
30	C-9	J1HK63	4/28/11	291	0.0087	-11.1	35.8	94.8	24	28	20	17
31	C-10	J1HK64	4/28/11	297	0.055	13.0	37.8	44.3	43	43	31	22
32	C-11	J1HK65	4/28/11	223	0.015	11.2	32.7	31.5	27	23	21	14
33	C-12	J1HK66	4/28/11	304	0.016	10.4	34.7	78.7	96	88	75	64
34	C-13	J1HK67	4/28/11	301	0.0057	11.5	37.0	39.2	1.6	3.2	5.2	3.6

35 **Statistical Computations**

36		Manganese	Mercury	Nickel	Vanadium	Zinc	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene
37	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), 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.
38	N	13	13	13	13	13	13	13	13	13
39	% < Detection limit	0%	15%	0%	0%	0%	38%	38%	31%	38%
40	Mean	307	0.013	11.7	37.3	53.5	22	23	19	16
41	Standard deviation	34	0.013	1.16	2.28	18.9	27	25	21	17
42	95% UCL on mean	322	0.023	12.4	38.5	64.3	34	35	77	24
43	Maximum value	348	0.055	13.3	40.7	94.8	96	88	75	64
44	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted**	512 GW & River Protection	0.33 GW & River Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	15 ug/kg GW & River Protection	15 ug/kg GW & River Protection	15 ug/kg GW & River Protection	48000 ug/kg GW & River Protection
45	**WAC 173-340 3-PART TEST**									
46	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NO	YES	YES	YES	NO
47	> 10% above Cleanup Limit?	NA	NA	NA	NA	YES	YES	YES	YES	NO
48	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NO	YES	YES	YES	NO
49	**WAC 173-340 Compliance?**	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.33 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/14/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

Rev. No. 0
Date 07/14/11
Sheet No. 16 of 29

1 **600-151 Statistical Calculations**
2 **Verification Data - C Excavation**

3	Sample	Sample	Sample	Benzo(k)fluoranthene			Chrysene			Fluoranthene			Indeno(1,2,3-cd)pyrene			Phenanthrene			Pyrene			TPH-diesel range			TPH-diesel range EXT		
4	Area	Number	Date	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
5	C-1	J1HK55	4/28/11	4.0	U	4.0	4.9	U	4.9	13	U	13	12	U	12	12	U	12	12	U	12	790	J	690	3700	J	1000
6	Duplicate of J1HK55	J1HK68	4/28/11	4.1	U	4.1	5.0	U	5.0	13	U	13	12	U	12	12	U	12	12	U	12	980	J	690	4300		1000
7	C-2	J1HK56	4/28/11	4.0	U	4.0	5.0	U	5.0	13	U	13	12	U	12	12	U	12	12	U	12	700	U	700	2700	J	1000
8	C-3	J1HK57	4/28/11	17		4.0	45		4.9	70		13	40		12	41		12	90		12	5300		700	15000		1000
9	C-4	J1HK58	4/28/11	8.3	J	4.0	28	J	4.9	45		13	18	J	12	32	J	12	66		12	1400	J	690	8000		1000
10	C-5	J1HK59	4/28/11	3.9	U	3.9	4.7	U	4.7	13	U	13	12	U	12	12	U	12	12	U	12	1300	J	690	5100		1000
11	C-6	J1HK60	4/28/11	5.2	J	3.9	9.4	J	4.8	13	U	13	12	U	12	12	U	12	12	U	12	680	U	680	2500	J	1000
12	C-7	J1HK61	4/28/11	13	J	3.9	21	J	4.8	36	J	13	20	J	12	14	J	12	29	JX	12	5600		680	26000		1000
13	C-8	J1HK62	4/28/11	3.9	U	3.9	4.8	U	4.8	13	U	13	12	U	12	12	U	12	12	U	12	1700	J	700	9200		1000
14	C-9	J1HK63	4/28/11	9.6	J	3.9	28	J	4.8	31	J	13	22	J	12	18	J	12	44		12	750	J	670	3900		980
15	C-10	J1HK64	4/28/11	13	J	4.0	41		4.9	74		13	18	JX	12	73		12	110		12	8900		670	20000		990
16	C-11	J1HK65	4/28/11	15		3.8	36	J	4.7	66		13	18	J	12	120		12	86		12	6100		680	12000		1000
17	C-12	J1HK66	4/28/11	36		3.9	120		4.8	170		13	68		12	130		12	230		12	5500		670	29000		980
18	C-13	J1HK67	4/28/11	3.9	U	3.9	5.5	JX	4.8	13	J	13	12	U	12	12	U	12	13	J	12	860	J	690	2700	J	1000

19 **Statistical Computation Input Data**

20	Sample	Sample	Sample	Benzo(k)fluoranthene	Chrysene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	TPH-diesel range	TPH-diesel range EXT
21	Area	Number	Date	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
22	C-1	J1HK55/ J1HK68	3/1/11	2.0	2.5	6.5	6.0	6.0	6.0	885	4000
23	C-2	J1HK56	4/28/11	2.0	2.5	6.5	6.0	6.0	6.0	350	2700
24	C-3	J1HK57	4/28/11	17	45	70	40	41	90	5300	15000
25	C-4	J1HK58	4/28/11	8.3	28	45	18	32	66	1400	8000
26	C-5	J1HK59	4/28/11	2.0	2.4	6.5	6.0	6.0	6.0	1300	5100
27	C-6	J1HK60	4/28/11	5.2	9.4	6.5	6.0	6.0	6.0	340	2500
28	C-7	J1HK61	4/28/11	13	21	36	20	14	29	5600	26000
29	C-8	J1HK62	4/28/11	2.0	2.4	6.5	6.0	6.0	6.0	1700	9200
30	C-9	J1HK63	4/28/11	9.6	28	31	22	18	44	750	3900
31	C-10	J1HK64	4/28/11	13	41	74	18	73	110	8900	20000
32	C-11	J1HK65	4/28/11	15	36	66	18	120	86	6100	12000
33	C-12	J1HK66	4/28/11	36	120	170	68	130	230	5500	29000
34	C-13	J1HK67	4/28/11	2.0	5.5	13	6.0	6.0	13	860	2700

35 **Statistical Computations**

36		Benzo(k)fluoranthene	Chrysene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	TPH-diesel range	TPH-diesel range EXT
37	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), 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.
38	N	13	13	13	13	13	13	13	13
39	% < Detection limit	38%	31%	38%	46%	46%	38%	15%	0%
40	Mean	9.8	26	41	18	36	54	2999	10777
41	Standard deviation	9.6	32	47	18	44	65	2859	9142
42	95% UCL on mean	14	129	63	27	56	83	9123	22089
43	Maximum value	36	120	170	68	130	230	8900	29000
44	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted**	15 ug/kg GW & River Protection	100 ug/kg GW & River Protection	18000 ug/kg River Protection	330 ug/kg GW & River Protection	240000 ug/kg GW Protection	48000 ug/kg GW Protection	200000 ug/kg DE, GW, and River Protection	200000 ug/kg DE, GW, and River Protection
45	**WAC 173-340 3-PART TEST**								
46	95% UCL > Cleanup Limit?	NO	YES	NO	NO	NO	NO	NO	NO
47	> 10% above Cleanup Limit?	YES	NO	NO	NO	NO	NO	NO	NO
48	Any sample > 2X Cleanup Limit?	YES	NO	NO	NO	NO	NO	NO	NO
49	**WAC 173-340 Compliance?**	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

50

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie **Date** 07/13/11 **Calc. No.** 0100X-CA-V0062 **Rev. No.** 0
Project 100-HR-2 Field Remediation **Job No.** 14655 **Checked** T. E. Queen **Date** 07/13/11
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations **Sheet No.** 17 of 29

1 **600-151 Maximum Calculations**
2 **Verification Data -Excavation C**

3	Sample	Sample	Sample	Molybdenum			Anthracene			Fluorene			Naphthalene			4,4-'DDE			4,4-'DDT			Methylene chloride		
4	Area	Number	Date	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
5	C-1	J1HK55	4/28/11	0.37	B	0.26	3.1	U	3.1	5.3	U	5.3	12	U	12	0.24	U	0.24	0.59	U	0.59	0.76	U	0.76
6	Duplicate of J1HK55	J1HK68	4/28/11	0.25	U	0.25	3.1	U	3.1	9.0	J	5.4	12	U	12	0.24	U	0.24	0.59	U	0.59	1.0	JB	0.81
7	C-2	J1HK56	4/28/11	0.36	B	0.24	3.1	U	3.1	5.4	U	5.4	12	U	12	0.24	U	0.24	0.59	U	0.59	0.71	U	0.71
8	C-3	J1HK57	4/28/11	0.25	U	0.25	3.1	U	3.1	5.3	U	5.3	12	U	12	0.25	U	0.25	0.61	U	0.61	0.71	U	0.71
9	C-4	J1HK58	4/28/11	0.25	U	0.25	3.1	U	3.1	5.3	U	5.3	12	U	12	0.55	JX	0.24	0.60	U	0.60	1.1	U	1.1
10	C-5	J1HK59	4/28/11	0.27	U	0.27	3.0	U	3.0	5.2	U	5.2	12	U	12	0.24	U	0.24	0.60	U	0.60	0.82	U	0.82
11	C-6	J1HK60	4/28/11	0.27	U	0.27	3.0	U	3.0	5.3	U	5.3	12	U	12	0.24	U	0.24	0.60	U	0.60	0.79	U	0.79
12	C-7	J1HK61	4/28/11	0.24	U	0.24	3.0	U	3.0	5.3	U	5.3	12	U	12	0.26	JX	0.23	0.57	U	0.57	0.45	U	0.45
13	C-8	J1HK62	4/28/11	0.26	U	0.26	3.1	U	3.1	5.3	U	5.3	12	U	12	0.24	U	0.24	0.60	U	0.60	0.88	U	0.88
14	C-9	J1HK63	4/28/11	0.23	U	0.23	3.0	U	3.0	5.2	U	5.2	12	U	12	0.23	U	0.23	0.56	U	0.56	0.87	U	0.87
15	C-10	J1HK64	4/28/11	0.26	U	0.26	6.7	JX	3.1	5.3	U	5.3	12	U	12	0.24	U	0.24	0.60	U	0.60	0.80	U	0.80
16	C-11	J1HK65	4/28/11	0.24	U	0.24	3.0	U	3.0	6.7	J	5.2	18	JX	12	0.23	UN	0.23	0.58	U	0.58	3.4	JB	0.89
17	C-12	J1HK66	4/28/11	0.26	U	0.26	3.0	U	3.0	5.2	U	5.2	12	U	12	3.4	X	0.25	0.91	J	0.61	0.90	U	0.90
18	C-13	J1HK67	4/28/11	0.26	U	0.26	3.0	U	3.0	5.3	U	5.3	12	U	12	0.24	U	0.24	0.61	U	0.61	1.8	JB	0.86

19 **Statistical Computations**

20		Molybdenum			Anthracene			Fluorene			Naphthalene			4,4-'DDE			4,4-'DDT			Methylene chloride		
21	% < Detection limit	85%			92%			85%			92%			77%			92%			77%		
22	Maximum value	0.37			6.7			9.0			18			3.4			0.91			3.4		
23	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted**	8	GW Protection		240000 ug/kg	GW Protection		64000 ug/kg	GW Protection		16000 ug/kg	GW Protection		3.3 ug/kg	GW & River Protection		3.3 ug/kg	GW & River Protection		500 ug/kg	GW Protection	
24	**3-PART TEST**																					
25	Maximum > Cleanup Limit?	NO			NO			NO			NO			YES			NO			NO		
26	> 10% above Cleanup Limit?	NO			NO			NO			NO			NO			NO			NO		
27	Any sample > 2X Cleanup Limit?	NO			NO			NO			NO			NO			NO			NO		
28	**3-Part Test Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.			A detailed assessment will be performed.The data set meets the 3-part test criteria when compared to the direct exposure RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.			The data set meets the 3-part test criteria when compared to the most stringent RAG.		

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30

CALCULATION SHEET

Washington Closure Hanford

Originator	J. D. Skoglie	Date 07/13/11	Calc. No. 0100X-CA-V0062	Rev. No. 0
Project	100-HR-2 Field Remediation	Job No. 14655	Checked T. E. Queen	Date 07/13/11
Subject	600-151 Waste Site Cleanup Verification 95% UCL Calculations			Sheet No. 18 of 29

Ecology Software (MTCAStat) Results, 600-151 Waste Site A Excavation

	DATA	ID	Arsenic 95% UCL Calculation			
1		J1HK25/				
2	4.1	J1HK41				
3	74.4	J1HK23				
4	3.2	J1JDW8	Number of samples		Uncensored values	
5	5.0	J1JDW9	Uncensored	18	Mean	13.1
6	9.7	J1JDX0	Censored		Lognormal mean	11.8
7	37.5	J1JDX1	Detection limit or PQL		Std. devn.	18.2
8	7.1	J1HK29	Method detection limit		Median	5.2
9	4.1	J1HK30	TOTAL	18	Min.	3.2
10	3.3	J1JDX2			Max.	74.4
11	5.3	J1HK32				
12	4.9	J1HK33				
13	4.2	J1HK34				
14	4.8	J1HK35	Lognormal distribution?		Normal distribution?	
15	5.8	J1HK36	r-squared is: 0.801		r-squared is: 0.568	
16	21.6	J1HK37	Recommendations:			
17	30.0	J1HK38	Reject BOTH lognormal and normal distributions.			
18	6.4	J1HK39				
19	5.0	J1JDX3	UCL (based on Z-statistic) is		20.2	
20						

DATA	ID	Barium 95% UCL Calculation			
	J1HK25/				
97.0	J1HK41				
101	J1HK23				
59.0	J1JDW8	Number of samples		Uncensored values	
92.5	J1JDW9	Uncensored	18	Mean	92.4
53.9	J1JDX0	Censored		Lognormal mean	92.7
75.9	J1JDX1	Detection limit or PQL		Std. devn.	19.6
135	J1HK29	Method detection limit		Median	94.5
98.0	J1HK30	TOTAL	18	Min.	53.9
77.0	J1JDX2			Max.	135
112	J1HK32				
105	J1HK33				
90.3	J1HK34				
96.4	J1HK35	Lognormal distribution?		Normal distribution?	
115	J1HK36	r-squared is: 0.928		r-squared is: 0.958	
90.7	J1HK37	Recommendations:			
100	J1HK38	Use lognormal distribution.			
90.5	J1HK39				
74.5	J1JDX3	UCL (Land's method) is		102	

DATA	ID	Beryllium 95% UCL Calculation			
	J1HK25/				
0.21	J1HK41				
0.15	J1HK23				
0.087	J1JDW8	Number of samples		Uncensored values	
0.19	J1JDW9	Uncensored	18	Mean	0.15
0.063	J1JDX0	Censored		Lognormal mean	0.16
0.14	J1JDX1	Detection limit or PQL		Std. devn.	0.054
0.14	J1HK29	Method detection limit		Median	0.15
0.036	J1HK30	TOTAL	18	Min.	0.036
0.16	J1JDX2			Max.	0.25
0.25	J1HK32				
0.15	J1HK33				
0.12	J1HK34				
0.16	J1HK35	Lognormal distribution?		Normal distribution?	
0.20	J1HK36	r-squared is: 0.818		r-squared is: 0.952	
0.15	J1HK37	Recommendations:			
0.21	J1HK38	Use normal distribution.			
0.21	J1HK39				
0.14	J1JDX3	UCL (based on t-statistic) is		0.18	

DATA	ID	Boron 95% UCL Calculation			
	J1HK25/				
3.8	J1HK41				
2.6	J1HK23				
1.9	J1JDW8	Number of samples		Uncensored values	
2.5	J1JDW9	Uncensored	18	Mean	3.6
1.2	J1JDX0	Censored		Lognormal mean	3.5
1.5	J1JDX1	Detection limit or PQL		Std. devn.	3.5
3.5	J1HK29	Method detection limit		Median	2.6
2.8	J1HK30	TOTAL	18	Min.	1.2
1.6	J1JDX2			Max.	16.4
6.1	J1HK32				
3.1	J1HK33				
16.4	J1HK34				
3.0	J1HK35	Lognormal distribution?		Normal distribution?	
7.2	J1HK36	r-squared is: 0.889		r-squared is: 0.577	
2.0	J1HK37	Recommendations:			
2.4	J1HK38	Reject BOTH lognormal and normal distributions.			
2.1	J1HK39				
1.6	J1JDX3	UCL (based on Z-statistic) is		5.0	

DATA	ID	Cadmium 95% UCL Calculation			
	J1HK25/				
0.14	J1HK41				
0.45	J1HK23				
0.11	J1JDW8	Number of samples		Uncensored values	
0.12	J1JDW9	Uncensored	18	Mean	0.22
0.12	J1JDX0	Censored		Lognormal mean	0.22
0.11	J1JDX1	Detection limit or PQL		Std. devn.	0.15
0.27	J1HK29	Method detection limit		Median	0.18
0.20	J1HK30	TOTAL	18	Min.	0.11
0.15	J1JDX2			Max.	0.66
0.66	J1HK32				
0.23	J1HK33				
0.11	J1HK34				
0.22	J1HK35	Lognormal distribution?		Normal distribution?	
0.31	J1HK36	r-squared is: 0.895		r-squared is: 0.772	
0.23	J1HK37	Recommendations:			
0.36	J1HK38	Reject BOTH lognormal and normal distributions.			
0.12	J1HK39				
0.11	J1JDX3	UCL (based on Z-statistic) is		0.28	

DATA	ID	Chromium 95% UCL Calculation			
	J1HK25/				
13.9	J1HK41				
13.0	J1HK23				
11.8	J1JDW8	Number of samples		Uncensored values	
14.0	J1JDW9	Uncensored	18	Mean	12.8
11.6	J1JDX0	Censored		Lognormal mean	12.8
12.3	J1JDX1	Detection limit or PQL		Std. devn.	0.78
13.3	J1HK29	Method detection limit		Median	13.0
11.9	J1HK30	TOTAL	18	Min.	11.6
12.3	J1JDX2			Max.	14.0
13.7	J1HK32				
13.8	J1HK33				
12.1	J1HK34				
13.1	J1HK35	Lognormal distribution?		Normal distribution?	
12.9	J1HK36	r-squared is: 0.949		r-squared is: 0.948	
12.1	J1HK37	Recommendations:			
13.2	J1HK38	Use lognormal distribution.			
13.3	J1HK39				
12.2	J1JDX3	UCL (Land's method) is		13.1	

DATA	ID	Cobalt 95% UCL Calculation			
	J1HK25/				
7.5	J1HK41				
8.2	J1HK23				
6.9	J1JDW8	Number of samples		Uncensored values	
8.6	J1JDW9	Uncensored	18	Mean	7.7
6.4	J1JDX0	Censored		Lognormal mean	7.7
7.5	J1JDX1	Detection limit or PQL		Std. devn.	0.51
7.6	J1HK29	Method detection limit		Median	7.8
7.9	J1HK30	TOTAL	18	Min.	6.4
7.2	J1JDX2			Max.	8.6
8.3	J1HK32				
8.0	J1HK33				
7.7	J1HK34				
8.0	J1HK35	Lognormal distribution?		Normal distribution?	
7.7	J1HK36	r-squared is: 0.923		r-squared is: 0.943	
7.8	J1HK37	Recommendations:			
7.9	J1HK38	Use lognormal distribution.			
7.9	J1HK39				
7.4	J1JDX3	UCL (Land's method) is		7.9	

DATA	ID	Copper 95% UCL Calculation			
	J1HK25/				
14.3	J1HK41				
15.2	J1HK23				
16.1	J1JDW8	Number of samples		Uncensored values	
17.7	J1JDW9	Uncensored	18	Mean	18.5
15.2	J1JDX0	Censored		Lognormal mean	18.2
16.8	J1JDX1	Detection limit or PQL		Std. devn.	9.18
20.6	J1HK29	Method detection limit		Median	16.1
18.8	J1HK30	TOTAL	18	Min.	14.0
14.4	J1JDX2			Max.	54.6
54.6	J1HK32				
16.4	J1HK33				
18.2	J1HK34				
17.2	J1HK35	Lognormal distribution?		Normal distribution?	
15.7	J1HK36	r-squared is: 0.530		r-squared is: 0.383	
14.0	J1HK37	Recommendations:			
15.4	J1HK38	Reject BOTH lognormal and normal distributions.			
15.7	J1HK39				
16.0	J1JDX3	UCL (based on Z-statistic) is		22.0	

DATA	ID	Lead 95% UCL Calculation			
	J1HK25/				
6.7	J1HK41				
682	J1HK23				
8.1	J1JDW8	Number of samples		Uncensored values	
16.1	J1JDW9	Uncensored	18	Mean	70.9
23.5	J1JDX0	Censored		Lognormal mean	58.0
85.9	J1JDX1	Detection limit or PQL		Std. devn.	155
49.3	J1HK29	Method detection limit		Median	23.8
108	J1HK30	TOTAL	18	Min.	6.7
12.3	J1JDX2			Max.	682
56.8	J1HK32				
20.2	J1HK33				
10.0	J1HK34				
24.1	J1HK35	Lognormal distribution?		Normal distribution?	
40.7	J1HK36	r-squared is: 0.918		r-squared is: 0.381	
33.2	J1HK37	Recommendations:			
80.2	J1HK38	Use lognormal distribution.			
7.9	J1HK39				
11.5	J1JDX3	UCL (Land's method) is		133	

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

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Date 07/13/11
Sheet No. 19 of 29

Ecology Software (MTCAStat) Results, 600-151 Waste Site A Excavation

Manganese 95% UCL Calculation

DATA	ID
360	J1HK25/ J1HK41
400	J1HK23
275	J1JDW8
352	J1JDW9
263	J1JDX0
310	J1JDX1
359	J1HK29
343	J1HK30
302	J1JDX2
364	J1HK32
357	J1HK33
350	J1HK34
361	J1HK35
350	J1HK36
343	J1HK37
339	J1HK38
317	J1HK39
309	J1JDX3

Number of samples		Uncensored values	
Uncensored	18	Mean	336
Censored		Lognormal mean	336
Detection limit or PQL		Std. devn.	34
Method detection limit		Median	347
TOTAL	18	Min.	263
		Max.	400

Lognormal distribution? r-squared is: 0.901
Normal distribution? r-squared is: 0.920
Recommendations:
Use lognormal distribution.
UCL (Land's method) is 352

Mercury 95% UCL Calculation

DATA	ID
0.0080	J1HK25/ J1HK41
0.013	J1HK23
0.010	J1JDW8
0.010	J1JDW9
0.010	J1JDX0
0.012	J1JDX1
0.022	J1HK29
0.018	J1HK30
0.0083	J1JDX2
0.014	J1HK32
0.014	J1HK33
0.0027	J1HK34
0.016	J1HK35
0.019	J1HK36
0.010	J1HK37
0.017	J1HK38
0.010	J1HK39
0.013	J1JDX3

Number of samples		Uncensored values	
Uncensored	18	Mean	0.013
Censored		Lognormal mean	0.013
Detection limit or PQL		Std. devn.	0.0047
Method detection limit		Median	0.013
TOTAL	18	Min.	0.0027
		Max.	0.022

Lognormal distribution? r-squared is: 0.835
Normal distribution? r-squared is: 0.966
Recommendations:
Use normal distribution.
UCL (based on t-statistic) is 0.014

Nickel 95% UCL Calculation

DATA	ID
12.0	J1HK25/ J1HK41
12.3	J1HK23
11.5	J1JDW8
13.7	J1JDW9
11.8	J1JDX0
12.1	J1JDX1
12.0	J1HK29
11.6	J1HK30
11.9	J1JDX2
16.9	J1HK32
12.4	J1HK33
12.6	J1HK34
12.4	J1HK35
11.8	J1HK36
11.7	J1HK37
12.2	J1HK38
13.3	J1HK39
11.8	J1JDX3

Number of samples		Uncensored values	
Uncensored	18	Mean	12.4
Censored		Lognormal mean	12.4
Detection limit or PQL		Std. devn.	1.25
Method detection limit		Median	12.1
TOTAL	18	Min.	11.5
		Max.	16.9

Lognormal distribution? r-squared is: 0.662
Normal distribution? r-squared is: 0.611
Recommendations:
Reject BOTH lognormal and normal distributions.
UCL (based on Z-statistic) is 12.9

Vanadium 95% UCL Calculation

DATA	ID
42.2	J1HK25/ J1HK41
40.5	J1HK23
41.0	J1JDW8
44.4	J1JDW9
40.0	J1JDX0
40.9	J1JDX1
38.3	J1HK29
43.4	J1HK30
36.2	J1JDX2
41.3	J1HK32
41.5	J1HK33
38.4	J1HK34
39.7	J1HK35
39.6	J1HK36
38.4	J1HK37
38.6	J1HK38
39.0	J1HK39
40.3	J1JDX3

Number of samples		Uncensored values	
Uncensored	18	Mean	40.2
Censored		Lognormal mean	40.2
Detection limit or PQL		Std. devn.	1.98
Method detection limit		Median	40.2
TOTAL	18	Min.	36.2
		Max.	44.4

Lognormal distribution? r-squared is: 0.974
Normal distribution? r-squared is: 0.972
Recommendations:
Use lognormal distribution.
UCL (Land's method) is 41.0

Zinc 95% UCL Calculation

DATA	ID
48.3	J1HK25/ J1HK41
55.9	J1HK23
47.0	J1JDW8
48.1	J1JDW9
39.3	J1JDX0
40.4	J1JDX1
113	J1HK29
68.3	J1HK30
42.1	J1JDX2
99.8	J1HK32
63.0	J1HK33
41.5	J1HK34
55.4	J1HK35
61.1	J1HK36
44.0	J1HK37
65.4	J1HK38
46.5	J1HK39
40.2	J1JDX3

Number of samples		Uncensored values	
Uncensored	18	Mean	56.6
Censored		Lognormal mean	56.5
Detection limit or PQL		Std. devn.	20.4
Method detection limit		Median	48.2
TOTAL	18	Min.	39.3
		Max.	113

Lognormal distribution? r-squared is: 0.869
Normal distribution? r-squared is: 0.767
Recommendations:
Reject BOTH lognormal and normal distributions.
UCL (based on Z-statistic) is 64.5

Benzo(a)anthracene 95% UCL Calculation

DATA	ID
32	J1HK25/ J1HK41
27	J1HK23
130	J1JDW8
11	J1JDW9
53	J1JDX0
40	J1JDX1
54	J1HK29
25	J1HK30
11	J1JDX2
38	J1HK32
91	J1HK33
1.6	J1HK34
7.4	J1HK35
25	J1HK36
10	J1HK37
86	J1HK38
39	J1HK39
48	J1JDX3

Number of samples		Uncensored values	
Uncensored	18	Mean	40
Censored		Lognormal mean	48
Detection limit or PQL		Std. devn.	34
Method detection limit		Median	35
TOTAL	18	Min.	1.6
		Max.	130

Lognormal distribution? r-squared is: 0.919
Normal distribution? r-squared is: 0.875
Recommendations:
Use lognormal distribution.
UCL (Land's method) is 97

Benzo(a)pyrene 95% UCL Calculation

DATA	ID
54	J1HK25/ J1HK41
43	J1HK23
110	J1JDW8
30	J1JDW9
74	J1JDX0
43	J1JDX1
68	J1HK29
31	J1HK30
14	J1JDX2
35	J1HK32
120	J1HK33
3.2	J1HK34
14	J1HK35
25	J1HK36
11	J1HK37
3.4	J1HK38
38	J1HK39
62	J1JDX3

Number of samples		Uncensored values	
Uncensored	18	Mean	43
Censored		Lognormal mean	51
Detection limit or PQL		Std. devn.	33
Method detection limit		Median	37
TOTAL	18	Min.	3.2
		Max.	120

Lognormal distribution? r-squared is: 0.918
Normal distribution? r-squared is: 0.914
Recommendations:
Use lognormal distribution.
UCL (Land's method) is 100

Benzo(b)fluoranthene 95% UCL Calculation

DATA	ID
41	J1HK25/ J1HK41
31	J1HK23
73	J1JDW8
21	J1JDW9
48	J1JDX0
26	J1JDX1
54	J1HK29
22	J1HK30
13	J1JDX2
27	J1HK32
86	J1HK33
2.1	J1HK34
8.2	J1HK35
19	J1HK36
8.3	J1HK37
82	J1HK38
30	J1HK39
42	J1JDX3

Number of samples		Uncensored values	
Uncensored	18	Mean	35
Censored		Lognormal mean	40
Detection limit or PQL		Std. devn.	25
Method detection limit		Median	29
TOTAL	18	Min.	2.1
		Max.	86

Lognormal distribution? r-squared is: 0.917
Normal distribution? r-squared is: 0.925
Recommendations:
Use lognormal distribution.
UCL (Land's method) is 71

Benzo(ghi)perylene 95% UCL Calculation

DATA	ID
44	J1HK25/ J1HK41
25	J1HK23
75	J1JDW8
20	J1JDW9
52	J1JDX0
24	J1JDX1
3.6	J1HK29
14	J1HK30
4.5	J1JDX2
24	J1HK32
73	J1HK33
3.6	J1HK34
3.8	J1HK35
19	J1HK36
3.7	J1HK37
71	J1HK38
25	J1HK39
39	J1JDX3

Number of samples		Uncensored values	
Uncensored	18	Mean	29
Censored		Lognormal mean	34
Detection limit or PQL		Std. devn.	25
Method detection limit		Median	24
TOTAL	18	Min.	3.6
		Max.	75

Lognormal distribution? r-squared is: 0.894
Normal distribution? r-squared is: 0.881
Recommendations:
Reject BOTH lognormal and normal distributions.
UCL (based on Z-statistic) is 39

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

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DATA	ID	Benzo(k)fluoranthene 95% UCL Calculation			
	J1HK25/				
19	J1HK41				
20	J1HK23				
33	J1JDW8	Number of samples		Uncensored values	
9.3	J1JDW9	Uncensored	18	Mean	17
32	J1JDX0	Censored		Lognormal mean	20
13	J1JDX1	Detection limit or PQL		Std. devn.	14
22	J1HK29	Method detection limit		Median	13
9.3	J1HK30	TOTAL	18	Min.	2.0
2.4	J1JDX2			Max.	51
12	J1HK32				
51	J1HK33				
2.0	J1HK34				
4.5	J1HK35	Lognormal distribution?		Normal distribution?	
7.9	J1HK36	r-squared is: 0.941		r-squared is: 0.915	
2.0	J1HK37	Recommendations:			
37	J1HK38	Use lognormal distribution.			
12	J1HK39				
24	J1JDX3	UCL (Land's method) is		37	

DATA	ID	Chrysene 95% UCL Calculation			
	J1HK25/				
39	J1HK41				
38	J1HK23				
90	J1JDW8	Number of samples		Uncensored values	
22	J1JDW9	Uncensored	18	Mean	45
62	J1JDX0	Censored		Lognormal mean	51
35	J1JDX1	Detection limit or PQL		Std. devn.	33
67	J1HK29	Method detection limit		Median	37
32	J1HK30	TOTAL	18	Min.	2.4
14	J1JDX2			Max.	120
42	J1HK32				
120	J1HK33				
2.4	J1HK34				
13	J1HK35	Lognormal distribution?		Normal distribution?	
27	J1HK36	r-squared is: 0.907		r-squared is: 0.903	
12	J1HK37	Recommendations:			
110	J1HK38	Use lognormal distribution.			
36	J1HK39				
55	J1JDX3	UCL (Land's method) is		92	

DATA	ID	Fluoranthene 95% UCL Calculation			
	J1HK25/				
51	J1HK41				
66	J1HK23				
160	J1JDW8	Number of samples		Uncensored values	
40	J1JDW9	Uncensored	18	Mean	70
100	J1JDX0	Censored		Lognormal mean	76
56	J1JDX1	Detection limit or PQL		Std. devn.	53
110	J1HK29	Method detection limit		Median	52
40	J1HK30	TOTAL	18	Min.	6.5
23	J1JDX2			Max.	170
52	J1HK32				
170	J1HK33				
6.5	J1HK34				
16	J1HK35	Lognormal distribution?		Normal distribution?	
36	J1HK36	r-squared is: 0.954		r-squared is: 0.886	
25	J1HK37	Recommendations:			
160	J1HK38	Use lognormal distribution.			
34	J1HK39				
120	J1JDX3	UCL (Land's method) is		128	

DATA	ID	Indeno(1,2,3-cd)pyrene 95% UCL Calculation			
	J1HK25/				
50	J1HK41				
35	J1HK23				
77	J1JDW8	Number of samples		Uncensored values	
25	J1JDW9	Uncensored	18	Mean	26
47	J1JDX0	Censored		Lognormal mean	28
27	J1JDX1	Detection limit or PQL		Std. devn.	25
6.0	J1HK29	Method detection limit		Median	16
6.0	J1HK30	TOTAL	18	Min.	6.0
7.5	J1JDX2			Max.	83
6.0	J1HK32				
6.5	J1HK33				
6.0	J1HK34				
6.5	J1HK35	Lognormal distribution?		Normal distribution?	
6.0	J1HK36	r-squared is: 0.828		r-squared is: 0.813	
6.0	J1HK37	Recommendations:			
83	J1HK38	Reject BOTH lognormal and normal distributions.			
32	J1HK39				
42	J1JDX3	UCL (based on Z-statistic) is		36	

DATA	ID	Phenanthrene 95% UCL Calculation			
	J1HK25/				
19	J1HK41				
25	J1HK23				
79	J1JDW8	Number of samples		Uncensored values	
19	J1JDW9	Uncensored	18	Mean	33
55	J1JDX0	Censored		Lognormal mean	35
20	J1JDX1	Detection limit or PQL		Std. devn.	28
51	J1HK29	Method detection limit		Median	20
18	J1HK30	TOTAL	18	Min.	6.0
7.5	J1JDX2			Max.	85
23	J1HK32				
85	J1HK33				
6.0	J1HK34				
6.5	J1HK35	Lognormal distribution?		Normal distribution?	
6.0	J1HK36	r-squared is: 0.914		r-squared is: 0.840	
19	J1HK37	Recommendations:			
63	J1HK38	Use lognormal distribution.			
6.0	J1HK39				
78	J1JDX3	UCL (Land's method) is		63	

DATA	ID	Pyrene 95% UCL Calculation			
	J1HK25/				
67	J1HK41				
78	J1HK23				
200	J1JDW8	Number of samples		Uncensored values	
55	J1JDW9	Uncensored	18	Mean	91
140	J1JDX0	Censored		Lognormal mean	102
85	J1JDX1	Detection limit or PQL		Std. devn.	66
140	J1HK29	Method detection limit		Median	68
62	J1HK30	TOTAL	18	Min.	6.0
25	J1JDX2			Max.	220
69	J1HK32				
220	J1HK33				
6.0	J1HK34				
22	J1HK35	Lognormal distribution?		Normal distribution?	
51	J1HK36	r-squared is: 0.921		r-squared is: 0.904	
28	J1HK37	Recommendations:			
200	J1HK38	Use lognormal distribution.			
54	J1HK39				
140	J1JDX3	UCL (Land's method) is		179	

DATA	ID	TPH-diesel range 95% UCL Calculation			
	J1HK25/				
2550	J1HK41				
4300	J1HK23				
19000	J1JDW8	Number of samples		Uncensored values	
4000	J1JDW9	Uncensored	18	Mean	7242
5000	J1JDX0	Censored		Lognormal mean	6498
4000	J1JDX1	Detection limit or PQL		Std. devn.	9909
6600	J1HK29	Method detection limit		Median	4000
6300	J1HK30	TOTAL	18	Min.	2000
3300	J1JDX2			Max.	44000
7000	J1HK32				
5300	J1HK33				
2000	J1HK34				
4000	J1HK35	Lognormal distribution?		Normal distribution?	
2900	J1HK36	r-squared is: 0.797		r-squared is: 0.459	
3100	J1HK37	Recommendations:			
44000	J1HK38	Reject BOTH lognormal and normal distributions.			
3000	J1HK39				
4000	J1JDX3	UCL (based on Z-statistic) is		11084	

DATA	ID	TPH-diesel range EXT 95% UCL Calculation			
	J1HK25/				
6200	J1HK41				
11000	J1HK23				
31000	J1JDW8	Number of samples		Uncensored values	
7200	J1JDW9	Uncensored	18	Mean	15111
9100	J1JDX0	Censored		Lognormal mean	14555
7700	J1JDX1	Detection limit or PQL		Std. devn.	14499
18000	J1HK29	Method detection limit		Median	11000
26000	J1HK30	TOTAL	18	Min.	5600
5700	J1JDX2			Max.	66000
17000	J1HK32				
13000	J1HK33				
5600	J1HK34				
12000	J1HK35	Lognormal distribution?		Normal distribution?	
11000	J1HK36	r-squared is: 0.896		r-squared is: 0.616	
6700	J1HK37	Recommendations:			
66000	J1HK38	Reject BOTH lognormal and normal distributions.			
7800	J1HK39				
11000	J1JDX3	UCL (based on Z-statistic) is		20733	

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Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

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Arsenic 95% UCL Calculation

DATA	ID
	J1HK47/
44.5	J1HK54
22.4	J1HK42
23.5	J1HK43
55.9	J1HK44
15.9	J1HK45
7.0	J1HK46
32.0	J1HK48
32.4	J1HK49
85.0	J1HK50
77.5	J1HK51
19.9	J1JDX4
104	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	43.3
Censored		Lognormal mean	45.7
Detection limit or PQL		Std. devn.	30.8
Method detection limit		Median	32.2
TOTAL	12	Min.	7.0
		Max.	104

Lognormal distribution? r-squared is: 0.969
Normal distribution? r-squared is: 0.906
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 83.4

Barium 95% UCL Calculation

DATA	ID
	J1HK47/
92.7	J1HK54
82.8	J1HK42
77.6	J1HK43
83.8	J1HK44
72.3	J1HK45
88.6	J1HK46
95.3	J1HK48
86.0	J1HK49
94.1	J1HK50
94.5	J1HK51
47.2	J1JDX4
88.8	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	83.6
Censored		Lognormal mean	83.9
Detection limit or PQL		Std. devn.	13.5
Method detection limit		Median	87.3
TOTAL	12	Min.	47.2
		Max.	95.3

Lognormal distribution? r-squared is: 0.689
Normal distribution? r-squared is: 0.775
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 90.0

Beryllium 95% UCL Calculation

DATA	ID
	J1HK47/
0.14	J1HK54
0.12	J1HK42
0.12	J1HK43
0.13	J1HK44
0.082	J1HK45
0.14	J1HK46
0.13	J1HK48
0.11	J1HK49
0.12	J1HK50
0.12	J1HK51
0.069	J1JDX4
0.13	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	0.12
Censored		Lognormal mean	0.12
Detection limit or PQL		Std. devn.	0.021
Method detection limit		Median	0.12
TOTAL	12	Min.	0.069
		Max.	0.14

Lognormal distribution? r-squared is: 0.750
Normal distribution? r-squared is: 0.810
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.13

Boron 95% UCL Calculation

DATA	ID
	J1HK47/
2.4	J1HK54
2.4	J1HK42
1.8	J1HK43
1.7	J1HK44
2.5	J1HK45
2.4	J1HK46
2.1	J1HK48
1.8	J1HK49
2.3	J1HK50
2.2	J1HK51
1.0	J1JDX4
1.8	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	2.0
Censored		Lognormal mean	2.0
Detection limit or PQL		Std. devn.	0.43
Method detection limit		Median	2.2
TOTAL	12	Min.	1.0
		Max.	2.5

Lognormal distribution? r-squared is: 0.775
Normal distribution? r-squared is: 0.866
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 2.2

Cadmium 95% UCL Calculation

DATA	ID
	J1HK47/
0.50	J1HK54
0.34	J1HK42
0.28	J1HK43
0.52	J1HK44
0.29	J1HK45
0.15	J1HK46
0.39	J1HK48
0.35	J1HK49
0.82	J1HK50
0.75	J1HK51
0.12	J1JDX4
0.95	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	0.46
Censored		Lognormal mean	0.47
Detection limit or PQL		Std. devn.	0.26
Method detection limit		Median	0.37
TOTAL	12	Min.	0.12
		Max.	0.95

Lognormal distribution? r-squared is: 0.963
Normal distribution? r-squared is: 0.934
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.73

Chromium 95% UCL Calculation

DATA	ID
	J1HK47/
12.0	J1HK54
10.9	J1HK42
10.9	J1HK43
11.4	J1HK44
10.5	J1HK45
11.6	J1HK46
12.2	J1HK48
12.1	J1HK49
12.8	J1HK50
12.9	J1HK51
9.4	J1JDX4
12.3	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	11.6
Censored		Lognormal mean	11.6
Detection limit or PQL		Std. devn.	1.02
Method detection limit		Median	11.8
TOTAL	12	Min.	9.40
		Max.	12.9

Lognormal distribution? r-squared is: 0.927
Normal distribution? r-squared is: 0.947
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 12.2

Cobalt 95% UCL Calculation

DATA	ID
	J1HK47/
7.4	J1HK54
6.3	J1HK42
6.5	J1HK43
6.9	J1HK44
6.2	J1HK45
7.1	J1HK46
7.7	J1HK48
7.5	J1HK49
7.8	J1HK50
7.7	J1HK51
6.1	J1JDX4
7.8	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	7.1
Censored		Lognormal mean	7.1
Detection limit or PQL		Std. devn.	0.7
Method detection limit		Median	7.2
TOTAL	12	Min.	6.1
		Max.	7.8

Lognormal distribution? r-squared is: 0.900
Normal distribution? r-squared is: 0.905
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 7.4

Copper 95% UCL Calculation

DATA	ID
	J1HK47/
14.2	J1HK54
12.0	J1HK42
11.8	J1HK43
12.6	J1HK44
13.9	J1HK45
14.7	J1HK46
14.0	J1HK48
14.1	J1HK49
14.4	J1HK50
14.8	J1HK51
14.7	J1JDX4
14.1	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	13.8
Censored		Lognormal mean	13.8
Detection limit or PQL		Std. devn.	1.04
Method detection limit		Median	14.1
TOTAL	12	Min.	11.8
		Max.	14.8

Lognormal distribution? r-squared is: 0.811
Normal distribution? r-squared is: 0.825
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 14.3

Lead 95% UCL Calculation

DATA	ID
	J1HK47/
200	J1HK54
122	J1HK42
53.4	J1HK43
198	J1HK44
182	J1HK45
20.4	J1HK46
131	J1HK48
87.0	J1HK49
518	J1HK50
286	J1HK51
12	J1JDX4
410	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	185
Censored		Lognormal mean	228
Detection limit or PQL		Std. devn.	155
Method detection limit		Median	157
TOTAL	12	Min.	12.0
		Max.	518

Lognormal distribution? r-squared is: 0.930
Normal distribution? r-squared is: 0.907
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 679

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Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

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Manganese 95% UCL Calculation

DATA	ID
345	J1HK47/ J1HK54
297	J1HK42
304	J1HK43
337	J1HK44
294	J1HK45
331	J1HK46
357	J1HK48
334	J1HK49
394	J1HK50
382	J1HK51
231	J1JDX4
384	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	333
Censored		Lognormal mean	333
Detection limit or PQL		Std. devn.	46.2
Method detection limit		Median	336
TOTAL	12	Min.	231
		Max.	394

Lognormal distribution? r-squared is: 0.901
Normal distribution? r-squared is: 0.940
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 361

Mercury 95% UCL Calculation

DATA	ID
0.013	J1HK47/ J1HK54
0.011	J1HK42
0.0082	J1HK43
0.0089	J1HK44
0.011	J1HK45
0.014	J1HK46
0.011	J1HK48
0.010	J1HK49
0.014	J1HK50
0.012	J1HK51
0.0028	J1JDX4
0.019	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	0.011
Censored		Lognormal mean	0.012
Detection limit or PQL		Std. devn.	0.0039
Method detection limit		Median	0.011
TOTAL	12	Min.	0.0028
		Max.	0.019

Lognormal distribution? r-squared is: 0.751
Normal distribution? r-squared is: 0.915
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.013

Nickel 95% UCL Calculation

DATA	ID
11.2	J1HK47/ J1HK54
10.1	J1HK42
10.6	J1HK43
10.5	J1HK44
9.9	J1HK45
10.8	J1HK46
11.6	J1HK48
11.8	J1HK49
12.0	J1HK50
12.1	J1HK51
10.0	J1JDX4
11.7	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	11.0
Censored		Lognormal mean	11.0
Detection limit or PQL		Std. devn.	0.81
Method detection limit		Median	11.0
TOTAL	12	Min.	9.9
		Max.	12.1

Lognormal distribution? r-squared is: 0.937
Normal distribution? r-squared is: 0.938
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 11.5

Vanadium 95% UCL Calculation

DATA	ID
37.1	J1HK47/ J1HK54
32.3	J1HK42
32.1	J1HK43
34.1	J1HK44
34.0	J1HK45
36.6	J1HK46
37.6	J1HK48
38.8	J1HK49
40.0	J1HK50
39.2	J1HK51
38.0	J1JDX4
38.7	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	36.5
Censored		Lognormal mean	36.5
Detection limit or PQL		Std. devn.	2.74
Method detection limit		Median	37.3
TOTAL	12	Min.	32.1
		Max.	40.0

Lognormal distribution? r-squared is: 0.910
Normal distribution? r-squared is: 0.920
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 38.1

Zinc 95% UCL Calculation

DATA	ID
47.1	J1HK47/ J1HK54
44.3	J1HK42
39.6	J1HK43
41.8	J1HK44
44.9	J1HK45
44.9	J1HK46
45.6	J1HK48
42.1	J1HK49
48.1	J1HK50
50.8	J1HK51
30.7	J1JDX4
47.9	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	44.0
Censored		Lognormal mean	44.0
Detection limit or PQL		Std. devn.	5.19
Method detection limit		Median	44.9
TOTAL	12	Min.	30.7
		Max.	50.8

Lognormal distribution? r-squared is: 0.802
Normal distribution? r-squared is: 0.862
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 46.4

Benzo(a)anthracene 95% UCL Calculation

DATA	ID
11.1	J1HK47/ J1HK54
8.2	J1HK42
1.7	J1HK43
1.6	J1HK44
37	J1HK45
1.7	J1HK46
4.4	J1HK48
1.7	J1HK49
1.5	J1HK50
28	J1HK51
1.7	J1JDX4
38	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	11
Censored		Lognormal mean	12
Detection limit or PQL		Std. devn.	14
Method detection limit		Median	3.1
TOTAL	12	Min.	1.5
		Max.	38

Lognormal distribution? r-squared is: 0.827
Normal distribution? r-squared is: 0.723
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 18

Benzo(b)fluoranthene 95% UCL Calculation

DATA	ID
12	J1HK47/ J1HK54
11	J1HK42
2.2	J1HK43
2.1	J1HK44
38	J1HK45
2.2	J1HK46
4.8	J1HK48
2.2	J1HK49
2.0	J1HK50
29	J1HK51
2.3	J1JDX4
40	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	12
Censored		Lognormal mean	13
Detection limit or PQL		Std. devn.	15
Method detection limit		Median	3.5
TOTAL	12	Min.	2.0
		Max.	40

Lognormal distribution? r-squared is: 0.823
Normal distribution? r-squared is: 0.733
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 19

Chrysene 95% UCL Calculation

DATA	ID
14	J1HK47/ J1HK54
13	J1HK42
2.5	J1HK43
2.5	J1HK44
49	J1HK45
2.5	J1HK46
7.3	J1HK48
2.5	J1HK49
2.3	J1HK50
33	J1HK51
2.6	J1JDX4
49	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	15
Censored		Lognormal mean	16
Detection limit or PQL		Std. devn.	18
Method detection limit		Median	5.0
TOTAL	12	Min.	2.3
		Max.	49

Lognormal distribution? r-squared is: 0.832
Normal distribution? r-squared is: 0.735
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 24

TPH-diesel range 95% UCL Calculation

DATA	ID
1350	J1HK47/ J1HK54
1500	J1HK42
350	J1HK43
340	J1HK44
2300	J1HK45
940	J1HK46
345	J1HK48
335	J1HK49
720	J1HK50
900	J1HK51
1300	J1JDX4
3100	J1HK53

Number of samples		Uncensored values	
Uncensored	12	Mean	1123
Censored		Lognormal mean	1164
Detection limit or PQL		Std. devn.	863
Method detection limit		Median	920
TOTAL	12	Min.	335
		Max.	3100

Lognormal distribution? r-squared is: 0.926
Normal distribution? r-squared is: 0.859
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 2120

CALCULATION SHEET

Washington Closure Hanford

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Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

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Arsenic 95% UCL Calculation

DATA	ID
	J1HK55/
39.1	J1HK68
56.5	J1HK56
29.6	J1HK57
15.0	J1HK58
14.4	J1HK59
8.7	J1HK60
64.2	J1HK61
8.9	J1HK62
65.9	J1HK63
68.3	J1HK64
62.4	J1HK65
26.0	J1HK66
20.0	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	36.8
Censored		Lognormal mean	38.9
Detection limit or PQL		Std. devn.	23.5
Method detection limit		Median	29.6
TOTAL	13	Min.	8.7
		Max.	68.3

Lognormal distribution? r-squared is: 0.915
Normal distribution? r-squared is: 0.893
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 67.4

Barium 95% UCL Calculation

DATA	ID
	J1HK55/
67.0	J1HK68
71.4	J1HK56
91.2	J1HK57
95.1	J1HK58
90.7	J1HK59
88.0	J1HK60
69.8	J1HK61
92.2	J1HK62
405	J1HK63
69.8	J1HK64
41.0	J1HK65
106	J1HK66
78.8	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	105
Censored		Lognormal mean	101
Detection limit or PQL		Std. devn.	91.6
Method detection limit		Median	88.0
TOTAL	13	Min.	41.0
		Max.	405

Lognormal distribution? r-squared is: 0.698
Normal distribution? r-squared is: 0.448
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 147

Beryllium 95% UCL Calculation

DATA	ID
	J1HK55/
0.10	J1HK68
0.13	J1HK56
0.13	J1HK57
0.14	J1HK58
0.16	J1HK59
0.15	J1HK60
0.081	J1HK61
0.16	J1HK62
0.10	J1HK63
0.11	J1HK64
0.042	J1HK65
0.12	J1HK66
0.13	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	0.12
Censored		Lognormal mean	0.12
Detection limit or PQL		Std. devn.	0.033
Method detection limit		Median	0.130
TOTAL	13	Min.	0.042
		Max.	0.16

Lognormal distribution? r-squared is: 0.789
Normal distribution? r-squared is: 0.924
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.14

Boron 95% UCL Calculation

DATA	ID
	J1HK55/
1.4	J1HK68
1.6	J1HK56
3.0	J1HK57
3.5	J1HK58
2.6	J1HK59
2.6	J1HK60
1.4	J1HK61
2.5	J1HK62
2.0	J1HK63
1.9	J1HK64
1.0	J1HK65
3.5	J1HK66
1.7	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	2.2
Censored		Lognormal mean	2.2
Detection limit or PQL		Std. devn.	0.81
Method detection limit		Median	2.0
TOTAL	13	Min.	1.0
		Max.	3.5

Lognormal distribution? r-squared is: 0.967
Normal distribution? r-squared is: 0.957
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 2.8

Cadmium 95% UCL Calculation

DATA	ID
	J1HK55/
0.36	J1HK68
0.48	J1HK56
0.45	J1HK57
0.27	J1HK58
0.22	J1HK59
0.23	J1HK60
0.66	J1HK61
0.21	J1HK62
0.69	J1HK63
0.59	J1HK64
0.51	J1HK65
0.58	J1HK66
0.26	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	0.42
Censored		Lognormal mean	0.43
Detection limit or PQL		Std. devn.	0.18
Method detection limit		Median	0.45
TOTAL	13	Min.	0.21
		Max.	0.69

Lognormal distribution? r-squared is: 0.919
Normal distribution? r-squared is: 0.928
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.56

Chromium 95% UCL Calculation

DATA	ID
	J1HK55/
13.2	J1HK68
14.1	J1HK56
13.3	J1HK57
12.8	J1HK58
13.5	J1HK59
12.4	J1HK60
10.6	J1HK61
13.2	J1HK62
11.7	J1HK63
12.1	J1HK64
11.4	J1HK65
13.4	J1HK66
12.2	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	12.6
Censored		Lognormal mean	12.6
Detection limit or PQL		Std. devn.	0.99
Method detection limit		Median	12.8
TOTAL	13	Min.	10.6
		Max.	14.1

Lognormal distribution? r-squared is: 0.946
Normal distribution? r-squared is: 0.959
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 13.1

Cobalt 95% UCL Calculation

DATA	ID
	J1HK55/
7.5	J1HK68
9.4	J1HK56
7.3	J1HK57
7.0	J1HK58
7.8	J1HK59
7.7	J1HK60
5.6	J1HK61
7.9	J1HK62
6.7	J1HK63
7.3	J1HK64
5.7	J1HK65
6.3	J1HK66
7.3	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	7.2
Censored		Lognormal mean	7.2
Detection limit or PQL		Std. devn.	1.0
Method detection limit		Median	7.3
TOTAL	13	Min.	5.6
		Max.	9.4

Lognormal distribution? r-squared is: 0.936
Normal distribution? r-squared is: 0.930
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 7.7

Copper 95% UCL Calculation

DATA	ID
	J1HK55/
16.6	J1HK68
17.7	J1HK56
15.0	J1HK57
14.2	J1HK58
14.7	J1HK59
13.2	J1HK60
12.1	J1HK61
14.6	J1HK62
11.9	J1HK63
19.7	J1HK64
14.2	J1HK65
17.0	J1HK66
12.5	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	14.9
Censored		Lognormal mean	14.9
Detection limit or PQL		Std. devn.	2.32
Method detection limit		Median	14.6
TOTAL	13	Min.	11.9
		Max.	19.7

Lognormal distribution? r-squared is: 0.969
Normal distribution? r-squared is: 0.950
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 16.1

Lead 95% UCL Calculation

DATA	ID
	J1HK55/
34.4	J1HK68
23.3	J1HK56
140	J1HK57
144	J1HK58
21.4	J1HK59
6.7	J1HK60
641	J1HK61
27.4	J1HK62
123	J1HK63
112	J1HK64
114	J1HK65
408	J1HK66
8.6	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	139
Censored		Lognormal mean	167
Detection limit or PQL		Std. devn.	185
Method detection limit		Median	112
TOTAL	13	Min.	6.7
		Max.	641

Lognormal distribution? r-squared is: 0.957
Normal distribution? r-squared is: 0.689
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 712

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Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

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Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

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Manganese 95% UCL Calculation

DATA	ID
295	J1HK55/ J1HK68
316	J1HK56
327	J1HK57
348	J1HK58
342	J1HK59
328	J1HK60
278	J1HK61
342	J1HK62
291	J1HK63
297	J1HK64
223	J1HK65
304	J1HK66
301	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	307
Censored		Lognormal mean	307
Detection limit or PQL		Std. devn.	33.5
Method detection limit		Median	304
TOTAL	13	Min.	223
		Max.	348

Lognormal distribution? r-squared is: 0.846
Normal distribution? r-squared is: 0.892
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 322

Mercury 95% UCL Calculation

DATA	ID
0.0092	J1HK55/ J1HK68
0.0079	J1HK56
0.013	J1HK57
0.0026	J1HK58
0.012	J1HK59
0.0027	J1HK60
0.012	J1HK61
0.0091	J1HK62
0.0087	J1HK63
0.055	J1HK64
0.015	J1HK65
0.016	J1HK66
0.0057	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	0.013
Censored		Lognormal mean	0.013
Detection limit or PQL		Std. devn.	0.013
Method detection limit		Median	0.0092
TOTAL	13	Min.	0.0026
		Max.	0.055

Lognormal distribution? r-squared is: 0.902
Normal distribution? r-squared is: 0.585
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.023

Nickel 95% UCL Calculation

DATA	ID
12.7	J1HK55/ J1HK68
13.3	J1HK56
12.0	J1HK57
11.1	J1HK58
12.6	J1HK59
11.4	J1HK60
9.3	J1HK61
12.9	J1HK62
11.1	J1HK63
13.0	J1HK64
11.2	J1HK65
10.4	J1HK66
11.5	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	11.7
Censored		Lognormal mean	11.7
Detection limit or PQL		Std. devn.	1.16
Method detection limit		Median	11.5
TOTAL	13	Min.	9.30
		Max.	13.3

Lognormal distribution? r-squared is: 0.930
Normal distribution? r-squared is: 0.946
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 12.4

Vanadium 95% UCL Calculation

DATA	ID
38.1	J1HK55/ J1HK68
38.8	J1HK56
38.8	J1HK57
40.7	J1HK58
38.8	J1HK59
37.8	J1HK60
34.3	J1HK61
39.2	J1HK62
35.8	J1HK63
37.8	J1HK64
32.7	J1HK65
34.7	J1HK66
37.0	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	37.3
Censored		Lognormal mean	37.3
Detection limit or PQL		Std. devn.	2.28
Method detection limit		Median	37.8
TOTAL	13	Min.	32.7
		Max.	40.7

Lognormal distribution? r-squared is: 0.925
Normal distribution? r-squared is: 0.935
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 38.5

Zinc 95% UCL Calculation

DATA	ID
36.3	J1HK55/ J1HK68
39.6	J1HK56
61.0	J1HK57
50.2	J1HK58
48.8	J1HK59
76.1	J1HK60
48.2	J1HK61
46.7	J1HK62
94.8	J1HK63
44.3	J1HK64
31.5	J1HK65
78.7	J1HK66
39.2	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	53.5
Censored		Lognormal mean	53.6
Detection limit or PQL		Std. devn.	18.9
Method detection limit		Median	48.2
TOTAL	13	Min.	31.5
		Max.	94.8

Lognormal distribution? r-squared is: 0.947
Normal distribution? r-squared is: 0.881
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 64.3

Benzo(a)anthracene 95% UCL Calculation

DATA	ID
1.6	J1HK55/ J1HK68
1.7	J1HK56
37	J1HK57
30	J1HK58
1.6	J1HK59
4.2	J1HK60
13	J1HK61
1.6	J1HK62
24	J1HK63
43	J1HK64
27	J1HK65
96	J1HK66
1.6	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	22
Censored		Lognormal mean	30
Detection limit or PQL		Std. devn.	27
Method detection limit		Median	13
TOTAL	13	Min.	1.6
		Max.	96

Lognormal distribution? r-squared is: 0.866
Normal distribution? r-squared is: 0.754
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 34

Benzo(a)pyrene 95% UCL Calculation

DATA	ID
3.3	J1HK55/ J1HK68
3.3	J1HK56
46	J1HK57
25	J1HK58
3.2	J1HK59
8.2	J1HK60
28	J1HK61
3.2	J1HK62
28	J1HK63
43	J1HK64
23	J1HK65
88	J1HK66
3.2	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	23
Censored		Lognormal mean	28
Detection limit or PQL		Std. devn.	25
Method detection limit		Median	23
TOTAL	13	Min.	3.2
		Max.	88

Lognormal distribution? r-squared is: 0.868
Normal distribution? r-squared is: 0.801
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 35

Benzo(b)fluoranthene 95% UCL Calculation

DATA	ID
2.1	J1HK55/ J1HK68
2.2	J1HK56
40	J1HK57
18	J1HK58
2.1	J1HK59
11	J1HK60
18	J1HK61
2.1	J1HK62
20	J1HK63
31	J1HK64
21	J1HK65
75	J1HK66
5.2	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	19
Censored		Lognormal mean	23
Detection limit or PQL		Std. devn.	21
Method detection limit		Median	18
TOTAL	13	Min.	2.1
		Max.	75

Lognormal distribution? r-squared is: 0.907
Normal distribution? r-squared is: 0.787
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 77

Benzo(ghi)perylene 95% UCL Calculation

DATA	ID
3.7	J1HK55/ J1HK68
3.7	J1HK56
37	J1HK57
15	J1HK58
3.6	J1HK59
7.7	J1HK60
17	J1HK61
3.6	J1HK62
17	J1HK63
22	J1HK64
14	J1HK65
64	J1HK66
3.6	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	16
Censored		Lognormal mean	17
Detection limit or PQL		Std. devn.	17
Method detection limit		Median	14
TOTAL	13	Min.	3.6
		Max.	64

Lognormal distribution? r-squared is: 0.897
Normal distribution? r-squared is: 0.738
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 24

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Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

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Job No. 14655

Calc. No. 0100X-CA-V0062
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Benzo(k)fluoranthene 95% UCL Calculation

DATA	ID
	J1HK55/
2.0	J1HK68
2.0	J1HK56
17	J1HK57
8.3	J1HK58
2.0	J1HK59
5.2	J1HK60
13	J1HK61
2.0	J1HK62
9.6	J1HK63
13	J1HK64
15	J1HK65
36	J1HK66
2.0	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	10
Censored		Lognormal mean	11
Detection limit or PQL		Std. devn.	10
Method detection limit		Median	8.3
TOTAL	13	Min.	2.0
		Max.	36

Lognormal distribution? r-squared is: 0.884
Normal distribution? r-squared is: 0.782
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 14

Chrysene 95% UCL Calculation

DATA	ID
	J1HK55/
2.5	J1HK68
2.5	J1HK56
45	J1HK57
28	J1HK58
2.4	J1HK59
9.4	J1HK60
21	J1HK61
2.4	J1HK62
28	J1HK63
41	J1HK64
36	J1HK65
120	J1HK66
5.5	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	26
Censored		Lognormal mean	32
Detection limit or PQL		Std. devn.	32
Method detection limit		Median	21
TOTAL	13	Min.	2.4
		Max.	120

Lognormal distribution? r-squared is: 0.907
Normal distribution? r-squared is: 0.718
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 129

Fluoranthene 95% UCL Calculation

DATA	ID
	J1HK55/
6.5	J1HK68
6.5	J1HK56
70	J1HK57
45	J1HK58
6.5	J1HK59
6.5	J1HK60
36	J1HK61
6.5	J1HK62
31	J1HK63
74	J1HK64
66	J1HK65
170	J1HK66
13	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	41
Censored		Lognormal mean	46
Detection limit or PQL		Std. devn.	47
Method detection limit		Median	31
TOTAL	13	Min.	6.5
		Max.	170

Lognormal distribution? r-squared is: 0.880
Normal distribution? r-squared is: 0.752
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 63

Indeno(1,2,3-cd)pyrene 95% UCL Calculation

DATA	ID
	J1HK55/
6.0	J1HK68
6.0	J1HK56
40	J1HK57
18	J1HK58
6.0	J1HK59
6.0	J1HK60
20	J1HK61
6.0	J1HK62
22	J1HK63
18	J1HK64
18	J1HK65
68	J1HK66
6.0	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	18
Censored		Lognormal mean	19
Detection limit or PQL		Std. devn.	18
Method detection limit		Median	18
TOTAL	13	Min.	6.0
		Max.	68

Lognormal distribution? r-squared is: 0.840
Normal distribution? r-squared is: 0.708
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 27

Phenanthrene 95% UCL Calculation

DATA	ID
	J1HK55/
6.0	J1HK68
6.0	J1HK56
41	J1HK57
32	J1HK58
6.0	J1HK59
6.0	J1HK60
14	J1HK61
6.0	J1HK62
18	J1HK63
73	J1HK64
120	J1HK65
130	J1HK66
6.0	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	36
Censored		Lognormal mean	37
Detection limit or PQL		Std. devn.	44
Method detection limit		Median	14
TOTAL	13	Min.	6.0
		Max.	130

Lognormal distribution? r-squared is: 0.845
Normal distribution? r-squared is: 0.727
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 56

Pyrene 95% UCL Calculation

DATA	ID
	J1HK55/
6.0	J1HK68
6.0	J1HK56
90	J1HK57
66	J1HK58
6.0	J1HK59
6.0	J1HK60
29	J1HK61
6.0	J1HK62
44	J1HK63
110	J1HK64
86	J1HK65
230	J1HK66
13	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	54
Censored		Lognormal mean	64
Detection limit or PQL		Std. devn.	65
Method detection limit		Median	29
TOTAL	13	Min.	6.0
		Max.	230

Lognormal distribution? r-squared is: 0.880
Normal distribution? r-squared is: 0.758
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 83

TPH-diesel range 95% UCL Calculation

DATA	ID
	J1HK55/
885	J1HK68
350	J1HK56
5300	J1HK57
1400	J1HK58
1300	J1HK59
340	J1HK60
5600	J1HK61
1700	J1HK62
750	J1HK63
8900	J1HK64
6100	J1HK65
5500	J1HK66
860	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	2999
Censored		Lognormal mean	3361
Detection limit or PQL		Std. devn.	2859
Method detection limit		Median	1400
TOTAL	13	Min.	340
		Max.	8900

Lognormal distribution? r-squared is: 0.927
Normal distribution? r-squared is: 0.830
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 9123

TPH-diesel range EXT 95% UCL Calculation

DATA	ID
	J1HK55/
4000	J1HK68
2700	J1HK56
15000	J1HK57
8000	J1HK58
5100	J1HK59
2500	J1HK60
26000	J1HK61
9200	J1HK62
3900	J1HK63
20000	J1HK64
12000	J1HK65
29000	J1HK66
2700	J1HK67

Number of samples		Uncensored values	
Uncensored	13	Mean	10777
Censored		Lognormal mean	11241
Detection limit or PQL		Std. devn.	9142
Method detection limit		Median	8000
TOTAL	13	Min.	2500
		Max.	29000

Lognormal distribution? r-squared is: 0.944
Normal distribution? r-squared is: 0.860
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 22089

CALCULATION SHEET

Washington Closure Hanford

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Date 07/13/11
Job No. 14655

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Checked T. E. Queen

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Duplicate Analysis - 600-151 A Excavation

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			Chromium			Cobalt			Copper		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
A-3	J1HK25	4/26/11	11900	X	1.6	3.9		0.68	101	X	0.078	0.18	B	0.034	3.8		1.0	0.13	B	0.036	4490	X	14.5	13.9		0.060	7.8	X	0.10	14.8		0.22
Duplicate of J1HK25	J1HK41	4/26/11	11200	X	1.4	4.2		0.66	92.9		0.075	0.23		0.033	3.7		0.97	0.14	B	0.041	4070		14.0	13.8		0.058	7.2	X	0.099	13.8		0.22

Analysis:

	TDL	5	10	2	0.2	2	0.2	100	1	2	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	6.1%		8.4%				9.8%	0.7%		7.0%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable

Duplicate Analysis - 600-151 A Excavation

Sampling Area	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Mercury			Nickel			Potassium			Silicon			Sodium			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
A-3	J1HK25	4/26/11	22800	X	3.9	6.8	X	0.28	5120		3.8	386	X	0.10	0.0069	B	0.0054	12.2	X	0.13	4630		42.1	299	JX	5.8	235		60.7	44.0		0.097
Duplicate of J1HK25	J1HK41	4/26/11	21300	X	3.5	6.6	X	0.27	4720		3.4	333	X	0.099	0.0090	B	0.0059	11.8	X	0.12	4710		40.7	407	J	5.6	182		58.6	40.3		0.093

Analysis:

	TDL	5	5	75	5	0.2	4	400	2	50	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?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	6.8%		8.1%	14.7%			1.7%	30.6%		8.8%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable

Duplicate Analysis - 600-151 A Excavation

Sampling Area	HEIS Number	Sample Date	Zinc			Benzo(a)anthracene			Benzo(a)pyrene			Benzo(b)fluoranthene			Benzo(ghi)perylene			Benzo(k)fluoranthene			Chrysene			Fluoranthene			Indeno(1,2,3-cd)pyrene			Phenanthrene		
			mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
A-3	J1HK25	4/26/11	49.9		0.41	31	X	3.2	64		6.5	46		4.2	45		7.3	23	X	4.0	39	J	4.9	43	X	13	56		12	15	J	12
Duplicate of J1HK25	J1HK41	4/26/11	46.7		0.36	32		3.1	44		6.3	36		4.1	42		7.0	15		3.9	38	J	4.7	59		13	44		12	23	J	12

Analysis:

	TDL	1	15	15	15	15	15	15	15	15	15
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?	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	6.6%									
	Difference > 2 TDL?	Not applicable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 600-151 A Excavation

Sampling Area	HEIS Number	Sample Date	Pyrene			TPH-diesel range			TPH-diesel range EXT		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
A-3	J1HK25	4/26/11	58		12	1500	J	700	4800	J	1000
Duplicate of J1HK25	J1HK41	4/26/11	75		12	3600	J	720	7600	J	1100

Analysis:

	TDL	15	5000	5000
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD			
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

Rev. No. 0
Date 07/13/11
Sheet No. 28 of 29

Duplicate Analysis - 600-151 B Excavation

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			Chromium			Cobalt			Copper		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
B-6	J1HK47	4/27/11	9280		1.4	41.0		0.61	85.3		0.071	0.13	B	0.031	2.2		0.91	0.45		0.038	3780		13.1	11.1		0.054	6.7	X	0.093	12.9		0.20
Duplicate of J1HK47	J1HK54	4/27/11	10700		1.6	47.9		0.67	100		0.078	0.14	B	0.034	2.5		1.0	0.55		0.042	4230		14.4	12.9		0.059	8.0	X	0.10	15.4		0.22

Analysis:

	TDL	5	10	2	0.2	2	0.2	100	1	2	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	14.2%		15.9%				11.2%	15.0%		17.7%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable

Duplicate Analysis - 600-151 B Excavation

Sampling Area	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Mercury			Nickel			Potassium			Silicon			Sodium			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
B-6	J1HK47	4/27/11	17200		3.5	181	X	0.25	3930		3.4	318		0.093	0.012	B	0.0053	10.4		0.11	2090		38.2	214		5.3	192		55.0	33.3		0.088
Duplicate of J1HK47	J1HK54	4/27/11	20300		3.9	218	X	0.28	4540		3.8	372		0.10	0.013	B	0.0058	12.0		0.13	2430		41.9	366		5.8	232		60.3	40.8		0.096

Analysis:

	TDL	5	5	75	5	0.2	4	400	2	50	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?	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	16.5%	18.5%	14.4%	15.7%			15.0%	52.4%		20.2%
	Difference > 2 TDL?	Not applicable	Not applicable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable

Duplicate Analysis - 600-151 B Excavation

Sampling Area	HEIS Number	Sample Date	Zinc			Benzo(a)anthracene			Benzo(a)pyrene			Benzo(b)fluoranthene			Benzo(k)fluoranthene			Chrysene			Fluoranthene			Pyrene			Acetone			TPH-diesel range		
			mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
B-6	J1HK47	4/27/11	43.2		0.37	17		3.3	15	JX	6.7	12	J	4.4	5.6	J	4.1	19	J	5.0	24	J	14	25	JX	12	11	J	6.0	1400	J	700
Duplicate of J1HK47	J1HK54	4/27/11	50.9		0.41	5.2	JX	3.4	16		6.8	11	J	4.5	4.6	JX	4.2	9.8	JX	5.2	19	J	14	25	J	13	30		6.4	1300	J	730

Analysis:

	TDL	1	15	15	15	15	15	15	15	10	5000
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?	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	16.4%									
	Difference > 2 TDL?	Not applicable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable

Duplicate Analysis - 600-151 B Excavation

Sampling Area	HEIS Number	Sample Date	TPH-diesel range EXT		
			ug/kg	Q	PQL
B-6	J1HK47	4/27/11	8700		1000
Duplicate of J1HK47	J1HK54	4/27/11	8900		1100

Analysis:

	TDL	5000
Duplicate Analysis	Both > PQL?	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)
	RPD	
	Difference > 2 TDL?	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator J. D. Skoglie
Project 100-HR-2 Field Remediation
Subject 600-151 Waste Site Cleanup Verification 95% UCL Calculations

Date 07/13/11
Job No. 14655

Calc. No. 0100X-CA-V0062
Checked T. E. Queen

Rev. No. 0
Date 07/13/11
Sheet No. 29 of 29

Duplicate Analysis - 600-151 C Excavation

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			Chromium			Cobalt			Copper		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
C-1	J1HK55	4/28/11	9770	X	1.5	38.3		0.65	66.9	X	0.075	0.098	B	0.033	1.5	B	0.97	0.36		0.040	3830	X	13.9	13.9		0.057	7.5	X	0.099	16.8		0.21
Duplicate of J1HK55	J1HK68	4/28/11	9440	X	1.5	39.8		0.63	67.0	X	0.072	0.11	B	0.031	1.3	B	0.93	0.35		0.039	3760	X	13.4	12.5		0.055	7.5	X	0.095	16.3		0.21

Analysis:

	TDL	5	10	2	0.2	2	0.2	100	1	2	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	3.4%		0.1%				1.8%	10.6%		3.0%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable

Duplicate Analysis - 600-151 C Excavation

Sampling Area	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Mercury			Nickel			Potassium			Silicon			Sodium			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
C-1	J1HK55	4/28/11	19300	X	3.7	34.6	X	0.27	4480		3.6	294	X	0.099	0.011	BM	0.0053	12.8		0.12	1430		40.4	307	XN	5.6	208		58.1	38.7	X	0.093
Duplicate of J1HK55	J1HK68	4/28/11	19300	X	3.6	34.1	X	0.26	4280		3.5	296	X	0.095	0.0073	B	0.0053	12.6		0.12	1420		38.9	282	X	5.4	176		55.9	37.4	X	0.089

Analysis:

	TDL	5	5	75	5	0.2	4	400	2	50	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?	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	0.0%	1.5%	4.6%	0.7%				8.5%		3.4%
	Difference > 2 TDL?	Not applicable	Not applicable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable

Duplicate Analysis - 600-151 C Excavation

Sampling Area	HEIS Number	Sample Date	Zinc			TPH-diesel range			TPH-diesel range EXT		
			mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
C-1	J1HK55	4/28/11	36.5	X	0.39	790	J	690	3700	J	1000
Duplicate of J1HK55	J1HK68	4/28/11	36.0	X	0.38	980	J	690	4300		1000

Analysis:

	TDL	1	5000	5000
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD	1.4%		
	Difference > 2 TDL?	Not applicable	No - acceptable	No - acceptable

Attachment 1. 600-151 Waste Site Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
A-3	J1HK25	4/26/11	11900	X	1.6	0.39	UJ	0.39	3.9		0.68	101	X	0.078	0.18	B	0.034
Duplicate of J1HK25	J1HK41	4/26/11	11200	X	1.4	0.38	UJ	0.38	4.2		0.66	92.9		0.075	0.23		0.033
A-1	J1HK23	4/26/11	11100	X	1.4	0.35	UJ	0.35	74.4		0.61	101	X	0.070	0.15	B	0.030
A-2 re-sample	J1JDW8	6/7/11	7140		1.6	0.39	U	0.39	3.2		0.68	59.0		0.078	0.087	B	0.034
A-4 re-sample	J1JDW9	6/7/11	9820		1.7	0.41	U	0.41	5.0		0.71	92.5		0.081	0.19	B	0.035
A-5 re-sample	J1JDX0	6/7/11	6410		1.5	0.37	U	0.37	9.7		0.65	53.9		0.074	0.063	B	0.032
A-6 re-sample	J1JDX1	6/7/11	8440		1.4	0.35	U	0.35	37.5		0.61	75.9		0.070	0.14	B	0.030
A-7	J1HK29	4/26/11	9980	X	1.6	0.40	UJ	0.40	7.1		0.70	135	X	0.080	0.14	B	0.035
A-8	J1HK30	4/26/11	9490	X	1.5	0.38	UJ	0.38	4.1		0.66	98	X	0.076	0.036	B	0.033
A-9 re-sample	J1JDX2	6/7/11	8230		1.7	0.42	U	0.42	3.3		0.73	77.0		0.084	0.16	B	0.037
A-10	J1HK32	4/26/11	11200	X	1.6	0.38	UJ	0.38	5.3		0.66	112	X	0.076	0.25		0.033
A-11	J1HK33	4/26/11	11000	X	1.5	0.37	UJ	0.37	4.9		0.64	105	X	0.073	0.15	B	0.032
A-12	J1HK34	4/26/11	8880	X	1.4	0.35	UJ	0.35	4.2		0.61	90.3	X	0.070	0.12	B	0.030
A-13	J1HK35	4/26/11	10500	X	1.6	0.39	UJ	0.39	4.8		0.67	96.4	X	0.077	0.16	B	0.033
A-14	J1HK36	4/26/11	10400	X	1.6	0.38	UJ	0.38	5.8		0.67	115	X	0.077	0.20		0.033
A-15	J1HK37	4/26/11	10300	X	1.5	0.38	UJ	0.38	21.6		0.66	90.7	X	0.076	0.15	B	0.033
A-16	J1HK38	4/26/11	11100	X	1.5	0.39	UJ	0.39	30.0		0.67	100		0.078	0.21		0.034
A-17	J1HK39	4/26/11	11500	X	1.4	0.35	UJ	0.35	6.4		0.61	90.5		0.071	0.21		0.031
A-18 re-sample	J1JDX3	6/7/11	8400		1.5	0.38	U	0.38	5.0		0.65	74.5		0.075	0.14	B	0.033
A-2 *	J1HK24	4/26/11	9690	X	1.4	0.35	UJ	0.35	4.9		0.61	111	X	0.071	0.14	B	0.031
A-4 *	J1HK26	4/26/11	9750	X	1.5	0.37	UJ	0.37	7.8		0.65	86.9	X	0.075	0.13	B	0.033
A-5 *	J1HK27	4/26/11	10700	X	1.6	0.38	UJ	0.38	109		0.67	109	X	0.077	0.15	B	0.033
A-6 *	J1HK28	4/26/11	10600	X	1.5	0.37	UJ	0.37	111		0.64	114	X	0.074	0.15	B	0.032
A-9 *	J1HK31	4/26/11	11300	X	1.6	0.39	UJ	0.39	5.3		0.67	130	X	0.077	0.21		0.033
A-18 *	J1HK40	4/26/11	10300	X	1.4	0.36	UJ	0.36	8.1		0.62	90.9		0.071	0.20		0.031
B-6	J1HK47	4/27/11	9280		1.4	0.35	U	0.35	41.0		0.61	85.3		0.071	0.13	B	0.031
Duplicate of J1HK47	J1HK54	4/27/11	10700		1.6	0.39	U	0.39	47.9		0.67	100		0.078	0.14	B	0.034
B-1	J1HK42	4/27/11	8390		1.4	0.34	U	0.34	22.4		0.59	82.8		0.068	0.12	B	0.030
B-2	J1HK43	4/27/11	8910		1.4	0.35	U	0.35	23.5		0.60	77.6		0.069	0.12	B	0.030
B-3	J1HK44	4/27/11	9230		1.5	0.38	U	0.38	55.9		0.65	83.8		0.075	0.13	B	0.033
B-4	J1HK45	4/27/11	7850		1.4	0.35	U	0.35	15.9		0.60	72.3		0.069	0.082	B	0.030
B-5	J1HK46	4/27/11	9700		1.4	0.34	U	0.34	7.0		0.59	88.6		0.068	0.14	B	0.029
B-7	J1HK48	4/27/11	10200		1.6	0.39	U	0.39	32.0		0.68	95.3		0.078	0.13	B	0.034
B-8	J1HK49	4/27/11	10100		1.4	0.34	U	0.34	32.4		0.60	86.0		0.069	0.11	B	0.030
B-9	J1HK50	4/27/11	10400		1.4	0.35	U	0.35	85.0		0.62	94.1		0.071	0.12	B	0.031
B-10	J1HK51	4/27/11	10200		1.5	0.36	U	0.36	77.5		0.63	94.5		0.072	0.12	B	0.031
B-11 re-sample 2	J1JW46	6/22/11	6640		1.4	0.35	U	0.35	19.9		0.61	47.2		0.070	0.069	B	0.031
B-12	J1HK53	4/27/11	10000		1.4	0.34	U	0.34	104		0.60	88.8		0.069	0.13	B	0.030
B-11 *	J1HK52	4/27/11	10400		1.5	0.36	U	0.36	72.9		0.63	93.3		0.072	0.13	B	0.031
B-11 re-sample 1 *	J1JDX4	6/7/11	9500		1.6	0.39	U	0.39	66.2		0.67	92.1		0.077	0.19	B	0.033
C-1	J1HK55	4/28/11	9770	X	1.5	0.37	U	0.37	38.3		0.65	66.9	X	0.075	0.098	B	0.033
Duplicate of J1HK55	J1HK68	4/28/11	9440	X	1.5	0.36	U	0.36	39.8		0.63	67.0	X	0.072	0.11	B	0.031
C-2	J1HK56	4/28/11	10300	X	1.4	0.35	U	0.35	56.5		0.61	71.4	X	0.070	0.13	B	0.030
C-3	J1HK57	4/28/11	10400	X	1.5	0.37	U	0.37	29.6		0.65	91.2	X	0.074	0.13	B	0.032
C-4	J1HK58	4/28/11	11100	X	1.5	0.37	U	0.37	15.0		0.65	95.1	X	0.074	0.14	B	0.032
C-5	J1HK59	4/28/11	11300	X	1.6	0.40	U	0.40	14.4		0.69	90.7	X	0.079	0.16	B	0.034
C-6	J1HK60	4/28/11	10600	X	1.6	0.39	U	0.39	8.7		0.68	88.0	X	0.078	0.15	B	0.034
C-7	J1HK61	4/28/11	7900	X	1.4	0.35	U	0.35	64.2		0.61	69.8	X	0.070	0.081	B	0.031
C-8	J1HK62	4/28/11	11300	X	1.6	0.38	U	0.38	8.9		0.66	92.2	X	0.076	0.16	B	0.033
C-9	J1HK63	4/28/11	9250	X	1.4	0.34	U	0.34	65.9		0.60	405	X	0.069	0.10	B	0.030
C-10	J1HK64	4/28/11	10000	X	1.6	0.38	U	0.38	68.3		0.66	69.8	X	0.076	0.11	B	0.033
C-11	J1HK65	4/28/11	6870	X	1.4	0.34	U	0.34	62.4		0.60	41.0	X	0.069	0.042	B	0.030
C-12	J1HK66	4/28/11	8820	X	1.5	0.38	U	0.38	26.0		0.66	106	X	0.076	0.12	B	0.033
C-13	J1HK67	4/28/11	9820	X	1.5	0.38	U	0.38	20.0		0.65	78.8	X	0.075	0.13	B	0.033
Equipment Blank	J1HK69	4/28/11	208	X	1.3	0.32	U	0.32	0.55	U	0.55	2.3	X	0.064	0.07	B	0.028

* Due to RAG exceedances these locations were re-sampled.

Note: Gray cells indicate not applicable.

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

HEIS = Hanford Environmental Information System

J = estimated result

M = sample duplicate precision not met

N = recovery is outside control limits

PQL = practical quantitation limit

Q = qualifier

T = spike and/or spike duplicate is outside control limits.

U = undetected

X = >40% difference between primary and confirmation detector results.

Attachment	1	Sheet No.	1 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
A-3	J1HK25	4/26/11	3.8		1.0	0.13	B	0.036	4490	X	14.5	13.9		0.060	7.8	X	0.10
Duplicate of J1HK25	J1HK41	4/26/11	3.7		0.97	0.14	B	0.041	4070		14.0	13.8		0.058	7.2	X	0.099
A-1	J1HK23	4/26/11	2.6		0.90	0.45		0.038	4270	X	13.0	13.0		0.053	8.2	X	0.092
A-2 re-sample	J1JDW8	6/7/11	1.9	B	1.0	0.11	B	0.0421	3950		14.5	11.8		0.060	6.9		0.10
A-4 re-sample	J1JDW9	6/7/11	2.5		1.0	0.12	B	0.0438	3560		15.1	14.0		0.062	8.6		0.11
A-5 re-sample	J1JDX0	6/7/11	1.2	B	0.96	0.12	B	0.0402	3680		13.8	11.6		0.057	6.4		0.098
A-6 re-sample	J1JDX1	6/7/11	1.5	B	0.90	0.11	B	0.0377	3800		12.9	12.3		0.053	7.5		0.092
A-7	J1HK29	4/26/11	3.5		1.0	0.27		0.038	5910	X	14.9	13.3		0.061	7.6	X	0.11
A-8	J1HK30	4/26/11	2.8		0.98	0.20	B	0.042	5550	X	14.1	11.9		0.058	7.9	X	0.10
A-9 re-sample	J1JDX2	6/7/11	1.6	B	1.1	0.15	B	0.0455	3810		15.6	12.3		0.064	7.2		0.11
A-10	J1HK32	4/26/11	6.1		0.98	0.66		0.040	4980	X	14.2	13.7		0.058	8.3	X	0.10
A-11	J1HK33	4/26/11	3.1		0.94	0.23		0.041	4610	X	13.6	13.8		0.056	8.0	X	0.096
A-12	J1HK34	4/26/11	16.4		0.90	0.11	B	0.040	6000	X	12.9	12.1		0.053	7.7	X	0.092
A-13	J1HK35	4/26/11	3.0		0.99	0.22		0.043	4630	X	14.3	13.1		0.059	8.0	X	0.10
A-14	J1HK36	4/26/11	7.2		0.99	0.31		0.039	4520	X	14.3	12.9		0.059	7.7	X	0.10
A-15	J1HK37	4/26/11	2.0		0.98	0.23		0.040	3900	X	14.1	12.1		0.058	7.8	X	0.10
A-16	J1HK38	4/26/11	2.4		1.0	0.36		0.042	3920		14.4	13.2		0.059	7.9	X	0.10
A-17	J1HK39	4/26/11	2.1		0.91	0.12	B	0.038	4250		13.1	13.3		0.054	7.9	X	0.093
A-18 re-sample	J1JDX3	6/7/11	1.6	B	0.97	0.11	B	0.0407	3960		14.0	12.2		0.058	7.4		0.099
A-2*	J1HK24	4/26/11	4.2		0.91	0.32		0.039	5620	X	13.1	13.5		0.054	7.2	X	0.093
A-4*	J1HK26	4/26/11	3.2		0.97	0.22		0.044	4410	X	13.9	11.8		0.057	6.5	X	0.099
A-5*	J1HK27	4/26/11	3.0		0.99	0.70		0.038	5600	X	14.3	13.5		0.059	8.3	X	0.10
A-6*	J1HK28	4/26/11	3.4		0.96	0.83		0.043	4690	X	13.8	13.6		0.057	7.9	X	0.098
A-9*	J1HK31	4/26/11	6.4		0.99	0.28		0.042	4930	X	14.3	13.6		0.059	7.9	X	0.10
A-18*	J1HK40	4/26/11	2.9		0.92	0.25		0.039	7850		13.3	13.0		0.055	7.3	X	0.094
B-6	J1HK47	4/27/11	2.2		0.91	0.45		0.038	3780		13.1	11.1		0.054	6.7	X	0.093
Duplicate of J1HK47	J1HK54	4/27/11	2.5		1.0	0.55		0.042	4230		14.4	12.9		0.059	8.0	X	0.10
B-1	J1HK42	4/27/11	2.4		0.88	0.34		0.037	3550		12.6	10.9		0.052	6.3	X	0.09
B-2	J1HK43	4/27/11	1.8		0.89	0.28		0.037	3370		12.8	10.9		0.053	6.5	X	0.091
B-3	J1HK44	4/27/11	1.7	B	0.97	0.52		0.041	3720		13.9	11.4		0.057	6.9	X	0.099
B-4	J1HK45	4/27/11	2.5		0.90	0.29		0.037	3530		12.9	10.5		0.053	6.2	X	0.091
B-5	J1HK46	4/27/11	2.4		0.87	0.15	B	0.036	3890		12.5	11.6		0.052	7.1	X	0.089
B-7	J1HK48	4/27/11	2.1		1.0	0.39		0.042	3910		14.6	12.2		0.060	7.7	X	0.1
B-8	J1HK49	4/27/11	1.8		0.89	0.35		0.037	4020		12.7	12.1		0.052	7.5	X	0.09
B-9	J1HK50	4/27/11	2.3		0.91	0.82		0.038	3970		13.2	12.8		0.054	7.8	X	0.093
B-10	J1HK51	4/27/11	2.2		0.93	0.75		0.039	4140		13.4	12.9		0.055	7.7	X	0.095
B-11 re-sample 2	J1JW46	6/22/11	1.0	B	0.91	0.12	B	0.038	3540		13.1	9.4		0.054	6.1	X	0.093
B-12	J1HK53	4/27/11	1.8		0.88	0.95		0.037	3840		12.7	12.3		0.052	7.8	X	0.09
B-11*	J1HK52	4/27/11	1.9		0.93	0.73		0.039	4070		13.4	12.8		0.055	8.1	X	0.095
B-11 re-sample 1*	J1JDX4	6/7/11	2.1		0.99	0.21		0.0416	3510		14.3	13.1		0.059	7.9		0.10
C-1	J1HK55	4/28/11	1.5	B	0.97	0.36		0.040	3830	X	13.9	13.9		0.057	7.5	X	0.099
Duplicate of J1HK55	J1HK68	4/28/11	1.3	B	0.93	0.35		0.039	3760	X	13.4	12.5		0.055	7.5	X	0.095
C-2	J1HK56	4/28/11	1.6	B	0.9	0.48		0.038	3830	X	13.0	14.1		0.053	9.4	X	0.092
C-3	J1HK57	4/28/11	3.0		0.96	0.45		0.040	4380	X	13.8	13.3		0.057	7.3	X	0.098
C-4	J1HK58	4/28/11	3.5		0.96	0.27		0.040	3710	X	13.8	12.8		0.057	7.0	X	0.098
C-5	J1HK59	4/28/11	2.6		1.0	0.22		0.043	4350	X	14.7	13.5		0.060	7.8	X	0.10
C-6	J1HK60	4/28/11	2.6		1.0	0.23		0.042	3970	X	14.4	12.4		0.059	7.7	X	0.10
C-7	J1HK61	4/28/11	1.4	B	0.91	0.66		0.038	3650	X	13.1	10.6		0.054	5.6	X	0.093
C-8	J1HK62	4/28/11	2.5		0.98	0.21		0.041	3930	X	14.2	13.2		0.058	7.9	X	0.10
C-9	J1HK63	4/28/11	2.0		0.88	0.69		0.037	4350	X	12.7	11.7		0.052	6.7	X	0.09
C-10	J1HK64	4/28/11	1.9	B	0.98	0.59		0.041	6920	X	14.1	12.1		0.058	7.3	X	0.10
C-11	J1HK65	4/28/11	1.0	B	0.89	0.51		0.037	3380	X	12.8	11.4		0.052	5.7	X	0.091
C-12	J1HK66	4/28/11	3.5		0.98	0.58		0.041	4330	X	14.0	13.4		0.058	6.3	X	0.10
C-13	J1HK67	4/28/11	1.7	B	0.97	0.26		0.041	3640	X	14.0	12.2		0.057	7.3	X	0.099
Equipment Blank	J1HK69	4/28/11	0.82	U	0.82	0.034	U	0.034	47.6	X	11.8	0.13	B	0.049	0.22	BX	0.084

Attachment	1	Sheet No.	2 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
A-3	J1HK25	4/26/11	14.8		0.22	0.153	UJ	0.153	22800	X	3.9	6.8	X	0.28	5120		3.8
Duplicate of J1HK25	J1HK41	4/26/11	13.8		0.22	0.153	UJ	0.153	21300	X	3.5	6.6	X	0.27	4720		3.4
A-1	J1HK23	4/26/11	15.2		0.20	0.153	J	0.153	20800	X	3.5	682	X	0.25	4720		3.4
A-2 re-sample	J1JDW8	6/7/11	16.1	X	0.22	0.202		0.155	16500		3.9	8.1		0.28	4320		3.8
A-4 re-sample	J1JDW9	6/7/11	17.7	X	0.23	0.259		0.155	19500		4.1	16.1		0.29	4820		4.0
A-5 re-sample	J1JDX0	6/7/11	15.2	X	0.21	0.306		0.155	15200		3.7	23.5		0.26	4050		3.6
A-6 re-sample	J1JDX1	6/7/11	16.8	X	0.20	0.155	U	0.155	16900		3.5	85.9		0.25	4490		3.4
A-7	J1HK29	4/26/11	20.6		0.23	0.155	UJ	0.155	20100	X	4.0	49.3	X	0.29	4600		3.9
A-8	J1HK30	4/26/11	18.8		0.22	0.153	UJ	0.153	19900	X	3.8	108	X	0.27	5010		3.7
A-9 re-sample	J1JDX2	6/7/11	14.4	X	0.24	0.155	U	0.155	16200		4.2	12.3		0.30	4340		4.1
A-10	J1HK32	4/26/11	54.6		0.22	0.153	UJ	0.153	21100	X	3.8	56.8	X	0.27	4910		3.7
A-11	J1HK33	4/26/11	16.4		0.21	0.154	UJ	0.154	20800	X	3.7	20.2	X	0.26	4870		3.6
A-12	J1HK34	4/26/11	18.2		0.20	0.154	UJ	0.154	18600	X	3.5	10	X	0.25	4840		3.4
A-13	J1HK35	4/26/11	17.2		0.22	0.154	UJ	0.154	20300	X	3.9	24.1	X	0.27	4770		3.8
A-14	J1HK36	4/26/11	15.7		0.22	0.153	UJ	0.153	19600	X	3.8	40.7	X	0.27	4540		3.7
A-15	J1HK37	4/26/11	14.0		0.22	0.154	UJ	0.154	19500	X	3.8	33.2	X	0.27	4480		3.7
A-16	J1HK38	4/26/11	15.4		0.22	0.153	UJ	0.153	20900	X	3.6	80.2	X	0.28	4630		3.5
A-17	J1HK39	4/26/11	15.7		0.20	0.154	UJ	0.154	22100	X	3.5	7.9	X	0.25	4890		3.4
A-18 re-sample	J1JDX3	6/7/11	16.0	X	0.22	0.155	U	0.155	17400		3.8	11.5		0.27	4400		3.7
A-2*	J1HK24	4/26/11	19.6		0.20	0.155	UJ	0.155	19400	X	3.5	47.7	X	0.25	4470		3.4
A-4*	J1HK26	4/26/11	15.5		0.21	0.193	J	0.153	19500	X	3.7	26.2	X	0.27	4300		3.7
A-5*	J1HK27	4/26/11	18.6		0.22	0.154	UJ	0.154	21500	X	3.8	468	X	0.27	4650		3.7
A-6*	J1HK28	4/26/11	16.9		0.21	0.154	UJ	0.154	20300	X	3.7	1240	X	0.26	4710		3.6
A-9*	J1HK31	4/26/11	17.5		0.22	0.154	UJ	0.154	20600	X	3.9	69	X	0.27	4660		3.7
A-18*	J1HK40	4/26/11	15.7		0.20	0.319	J	0.153	19900	X	3.4	27.6	X	0.25	4360		3.3
B-6	J1HK47	4/27/11	12.9		0.20	0.153	U	0.153	17200		3.5	181	X	0.25	3930		3.4
Duplicate of J1HK47	J1HK54	4/27/11	15.4		0.22	0.154	U	0.154	20300		3.9	218	X	0.28	4540		3.8
B-1	J1HK42	4/27/11	12.0		0.19	0.155	U	0.155	16100		3.4	122	X	0.24	3670		3.3
B-2	J1HK43	4/27/11	11.8		0.20	0.154	U	0.154	16600		3.5	53.4	X	0.25	3740		3.4
B-3	J1HK44	4/27/11	12.6		0.21	0.154	U	0.154	17400		3.8	198	X	0.27	3870		3.7
B-4	J1HK45	4/27/11	13.9		0.20	0.154	U	0.154	15700		3.5	182	X	0.25	3790		3.4
B-5	J1HK46	4/27/11	14.7		0.19	0.154	U	0.154	18500		3.4	20.4	X	0.24	4140		3.3
B-7	J1HK48	4/27/11	14		0.22	0.154	U	0.154	19400		3.9	131	X	0.28	4340		3.8
B-8	J1HK49	4/27/11	14.1		0.20	0.155	U	0.155	19000		3.4	87	X	0.24	4360		3.3
B-9	J1HK50	4/27/11	14.4		0.20	0.154	U	0.154	19600		3.5	518	X	0.25	4420		3.5
B-10	J1HK51	4/27/11	14.8		0.21	0.155	U	0.155	19700		3.6	286	X	0.26	4430		3.5
B-11 re-sample 2	J1JW46	6/22/11	14.7		0.20	0.154	U	0.154	14800		3.5	12.0		0.25	3790		3.4
B-12	J1HK53	4/27/11	14.1		0.20	0.154	U	0.154	19500		3.4	410	X	0.24	4310		3.3
B-11*	J1HK52	4/27/11	15.4		0.21	0.154	U	0.154	20200		3.6	245	X	0.26	4620		3.5
B-11 re-sample 1*	J1JDX4	6/7/11	15.6	X	0.22	0.155	U	0.155	18400		3.9	219		0.27	4450		3.8
C-1	J1HK55	4/28/11	16.8		0.21	0.154	U	0.154	19300	X	3.7	34.6	X	0.27	4480		3.6
Duplicate of J1HK55	J1HK68	4/28/11	16.3		0.21	0.155	U	0.155	19300	X	3.6	34.1	X	0.26	4280		3.5
C-2	J1HK56	4/28/11	17.7		0.20	0.154	U	0.154	20200	X	3.5	23.3	X	0.25	4550		3.4
C-3	J1HK57	4/28/11	15.0		0.21	0.155	U	0.155	20100	X	3.7	140	X	0.26	4160		3.6
C-4	J1HK58	4/28/11	14.2		0.21	0.154	U	0.154	21100	X	3.7	144	X	0.26	4210		3.6
C-5	J1HK59	4/28/11	14.7		0.23	0.155	U	0.155	21000	X	4.0	21.4	X	0.28	4490		3.9
C-6	J1HK60	4/28/11	13.2		0.22	0.154	U	0.154	20500	X	3.9	6.7	X	0.28	4160		3.8
C-7	J1HK61	4/28/11	12.1		0.20	0.155	U	0.155	16300	X	3.5	641	X	0.25	3380		3.4
C-8	J1HK62	4/28/11	14.6		0.22	0.154	U	0.154	21300	X	3.8	27.4	X	0.27	4460		3.7
C-9	J1HK63	4/28/11	11.9		0.20	0.154	U	0.154	18400	X	3.4	123	X	0.24	3690		3.3
C-10	J1HK64	4/28/11	19.7		0.22	0.154	U	0.154	19600	X	3.8	112	X	0.27	4250		3.7
C-11	J1HK65	4/28/11	14.2		0.20	0.154	U	0.154	19700	X	3.4	114	X	0.24	3580		3.3
C-12	J1HK66	4/28/11	17.0		0.22	0.154	U	0.154	17300	X	3.8	408	X	0.27	3620		3.7
C-13	J1HK67	4/28/11	12.5		0.21	0.154	U	0.154	19400	X	3.8	8.6	X	0.27	3980		3.7
Equipment Blank	J1HK69	4/28/11	0.18	B	0.18				1220	X	3.2	0.55	X	0.23	27		3.1

Attachment	1	Sheet No.	3 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
A-3	J1HK25	4/26/11	386	X	0.10	0.0069	B	0.0054	0.27	U	0.27	12.2	X	0.13	4630		42.1
Duplicate of J1HK25	J1HK41	4/26/11	333	X	0.099	0.0090	B	0.0059	0.26	U	0.26	11.8	X	0.12	4710		40.7
A-1	J1HK23	4/26/11	400	X	0.092	0.013	B	0.0057	0.37	B	0.24	12.3	X	0.11	2400		37.7
A-2 re-sample	J1JDW8	6/7/11	275		0.10	0.010	BM	0.0052	0.47	B	0.27	11.5		0.13	1540		42.1
A-4 re-sample	J1JDW9	6/7/11	352		0.11	0.010	B	0.0059	0.28	U	0.28	13.7		0.13	2650		43.8
A-5 re-sample	J1JDX0	6/7/11	263		0.098	0.010	B	0.0051	0.25	U	0.25	11.8		0.12	1090		40.2
A-6 re-sample	J1JDX1	6/7/11	310		0.092	0.012	B	0.0051	0.24	U	0.24	12.1		0.11	1390		37.7
A-7	J1HK29	4/26/11	359	X	0.11	0.022		0.0054	0.27	U	0.27	12.0	X	0.13	2390		43.3
A-8	J1HK30	4/26/11	343	X	0.10	0.018		0.0059	0.26	U	0.26	11.6	X	0.12	1950		40.9
A-9 re-sample	J1JDX2	6/7/11	302		0.11	0.0083	B	0.0062	0.29	U	0.29	11.9		0.14	1630		45.5
A-10	J1HK32	4/26/11	364	X	0.10	0.014	B	0.0053	0.26	U	0.26	16.9	X	0.12	2500		41.2
A-11	J1HK33	4/26/11	357	X	0.096	0.014	B	0.0056	0.25	U	0.25	12.4	X	0.12	2550		39.5
A-12	J1HK34	4/26/11	350	X	0.092	0.0054	U	0.0054	0.24	U	0.24	12.6	X	0.11	1740		37.6
A-13	J1HK35	4/26/11	361	X	0.10	0.016	B	0.0057	0.26	U	0.26	12.4	X	0.12	2500		41.6
A-14	J1HK36	4/26/11	350	X	0.10	0.019		0.0053	0.26	U	0.26	11.8	X	0.12	2290		41.5
A-15	J1HK37	4/26/11	343	X	0.10	0.0096	B	0.0058	0.26	U	0.26	11.7	X	0.12	2280		41.0
A-16	J1HK38	4/26/11	339	X	0.10	0.017		0.0055	0.27	U	0.27	12.2	X	0.13	2460		41.8
A-17	J1HK39	4/26/11	317	X	0.093	0.010	B	0.0055	0.24	U	0.24	13.3	X	0.11	2490		38.1
A-18 re-sample	J1JDX3	6/7/11	309		0.099	0.013	B	0.0055	0.26	U	0.26	11.8		0.12	1490		40.7
A-2 *	J1HK24	4/26/11	340	X	0.093	0.017	B	0.0058	0.24	U	0.24	11.5	X	0.11	2610		38.2
A-4 *	J1HK26	4/26/11	241	X	0.099	0.014	B	0.0058	0.26	U	0.26	10.5	X	0.12	2810		40.5
A-5 *	J1HK27	4/26/11	416	X	0.10	0.017		0.0055	0.26	U	0.26	12.7	X	0.12	2550		41.5
A-6 *	J1HK28	4/26/11	442	X	0.098	0.022		0.0056	0.25	U	0.25	12.0	X	0.12	2680		40.1
A-9 *	J1HK31	4/26/11	366	X	0.10	0.029		0.0059	0.26	U	0.26	12.0	X	0.12	2710		41.6
A-18 *	J1HK40	4/26/11	308	X	0.094	0.018		0.0056	0.24	U	0.24	11.9	X	0.12	2460		38.6
B-6	J1HK47	4/27/11	318		0.093	0.012	B	0.0053	0.24	U	0.24	10.4		0.11	2090		38.2
Duplicate of J1HK47	J1HK54	4/27/11	372		0.10	0.013	B	0.0058	0.27	U	0.27	12.0		0.13	2430		41.9
B-1	J1HK42	4/27/11	297		0.090	0.011	B	0.0054	0.33	B	0.23	10.1		0.11	2120		36.8
B-2	J1HK43	4/27/11	304		0.091	0.0082	B	0.0051	0.24	U	0.24	10.6		0.11	1860		37.3
B-3	J1HK44	4/27/11	337		0.099	0.0089	B	0.0049	0.26	U	0.26	10.5		0.12	1820		40.6
B-4	J1HK45	4/27/11	294		0.091	0.011	B	0.0050	0.24	U	0.24	9.9		0.11	1770		37.5
B-5	J1HK46	4/27/11	331		0.089	0.014	B	0.0053	0.23	U	0.23	10.8		0.11	2190		36.4
B-7	J1HK48	4/27/11	357		0.10	0.011	B	0.0053	0.27	U	0.27	11.6		0.13	2300		42.3
B-8	J1HK49	4/27/11	334		0.090	0.0099	B	0.0057	0.24	U	0.24	11.8		0.11	1990		37.1
B-9	J1HK50	4/27/11	394		0.093	0.014	B	0.0053	0.24	U	0.24	12.0		0.11	2460		38.2
B-10	J1HK51	4/27/11	382		0.095	0.012	B	0.0055	0.25	U	0.25	12.1		0.12	2320		39.1
B-11 re-sample 2	J1JW46	6/22/11	231		0.093	0.0055	U	0.0055	0.24	U	0.24	10.0	X	0.11	899		38.0
B-12	J1HK53	4/27/11	384		0.090	0.019		0.0053	0.23	U	0.23	11.7		0.11	2310		37.0
B-11 *	J1HK52	4/27/11	366		0.095	0.011	B	0.0052	0.25	U	0.25	12.1		0.12	2220		38.9
B-11 re-sample 1 *	J1JDX4	6/7/11	354		0.10	0.011	B	0.0056	0.26	U	0.26	12.1		0.12	2050		41.6
C-1	J1HK55	4/28/11	294	X	0.099	0.011	BM	0.0053	0.37	B	0.26	12.8		0.12	1430		40.4
Duplicate of J1HK55	J1HK68	4/28/11	296	X	0.095	0.0073	B	0.0053	0.25	U	0.25	12.6		0.12	1420		38.9
C-2	J1HK56	4/28/11	316	X	0.092	0.0079	B	0.0055	0.36	B	0.24	13.3		0.11	1640		37.8
C-3	J1HK57	4/28/11	327	X	0.098	0.013	B	0.0055	0.25	U	0.25	12.0		0.12	2440		40.2
C-4	J1HK58	4/28/11	348	X	0.098	0.0052	U	0.0052	0.25	U	0.25	11.1		0.12	2940		40.1
C-5	J1HK59	4/28/11	342	X	0.10	0.012	B	0.0055	0.27	U	0.27	12.6		0.13	2510		42.7
C-6	J1HK60	4/28/11	328	X	0.10	0.0054	U	0.0054	0.27	U	0.27	11.4		0.13	2840		42.0
C-7	J1HK61	4/28/11	278	X	0.093	0.012	B	0.0050	0.24	U	0.24	9.3		0.11	1410		38.0
C-8	J1HK62	4/28/11	342	X	0.10	0.0091	B	0.0056	0.26	U	0.26	12.9		0.12	2590		41.2
C-9	J1HK63	4/28/11	291	X	0.09	0.0087	B	0.0051	0.23	U	0.23	11.1		0.11	1730		37.0
C-10	J1HK64	4/28/11	297	X	0.10	0.055		0.0051	0.26	U	0.26	13.0		0.12	1620		41.1
C-11	J1HK65	4/28/11	223	X	0.091	0.015		0.0048	0.24	U	0.24	11.2		0.11	921		37.1
C-12	J1HK66	4/28/11	304	X	0.10	0.016		0.0051	0.26	U	0.26	10.4		0.12	1690		40.8
C-13	J1HK67	4/28/11	301	X	0.099	0.0057	B	0.0056	0.26	U	0.26	11.5		0.12	2020		40.6
Equipment Blank	J1HK69	4/28/11	17	X	0.084	0.0050	U	0.0050	0.22	U	0.22	0.35	B	0.10	57	B	34.5

Attachment	1	Sheet No.	4 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Selenium			Silicon			Silver			Sodium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
A-3	J1HK25	4/26/11	0.88	U	0.88	299	JX	5.8	0.16	U	0.16	235		60.7	44.0		0.097
Duplicate of J1HK25	J1HK41	4/26/11	0.85	U	0.85	407	J	5.6	0.16	U	0.16	182		58.6	40.3		0.093
A-1	J1HK23	4/26/11	0.79	U	0.79	278	JNX	5.2	0.15	U	0.15	244		54.3	40.5		0.086
A-2 re-sample	J1JDW8	6/7/11	0.94	BM	0.88	261	N	5.8	0.16	U	0.16	214		60.6	41.0		0.097
A-4 re-sample	J1JDW9	6/7/11	0.92	U	0.92	305		6.1	0.17	U	0.17	221		63.1	44.4		0.10
A-5 re-sample	J1JDX0	6/7/11	0.84	U	0.84	208		5.5	0.16	U	0.16	198		57.8	40.0		0.092
A-6 re-sample	J1JDX1	6/7/11	0.79	U	0.79	313		5.2	0.15	U	0.15	219		54.2	40.9		0.086
A-7	J1HK29	4/26/11	0.91	U	0.91	358	JX	6.0	0.17	U	0.17	248		62.3	38.3		0.099
A-8	J1HK30	4/26/11	0.86	U	0.86	318	JX	5.7	0.16	U	0.16	294		58.9	43.4		0.094
A-9 re-sample	J1JDX2	6/7/11	0.95	U	0.95	307		6.3	0.18	U	0.18	208		65.4	36.2		0.10
A-10	J1HK32	4/26/11	0.86	U	0.86	324	JX	5.7	0.16	U	0.16	257		59.2	41.3		0.094
A-11	J1HK33	4/26/11	0.83	U	0.83	322	JX	5.5	0.15	U	0.15	238		56.9	41.5		0.091
A-12	J1HK34	4/26/11	0.79	U	0.79	286	JX	5.2	0.15	U	0.15	285		54.1	38.4		0.086
A-13	J1HK35	4/26/11	0.87	U	0.87	280	JX	5.7	0.16	U	0.16	225		59.9	39.7		0.095
A-14	J1HK36	4/26/11	0.87	U	0.87	309	JX	5.7	0.16	U	0.16	227		59.7	39.6		0.095
A-15	J1HK37	4/26/11	0.86	U	0.86	275	JX	5.7	0.16	U	0.16	238		59.0	38.4		0.094
A-16	J1HK38	4/26/11	0.88	U	0.88	313	J	5.8	0.16	U	0.16	195		60.2	38.6		0.096
A-17	J1HK39	4/26/11	0.80	U	0.80	358	J	5.3	0.15	U	0.15	190		54.8	39.0		0.087
A-18 re-sample	J1JDX3	6/7/11	0.85	U	0.85	272		5.6	0.16	U	0.16	210		58.6	40.3		0.093
A-2*	J1HK24	4/26/11	0.80	U	0.80	249	JX	5.3	0.21		0.15	275		55.0	37.5		0.088
A-4*	J1HK26	4/26/11	0.85	U	0.85	263	JX	5.6	0.16	U	0.16	210		58.2	37.5		0.093
A-5*	J1HK27	4/26/11	0.87	U	0.87	318	JX	5.7	0.16	U	0.16	240		59.7	41.0		0.095
A-6*	J1HK28	4/26/11	0.84	U	0.84	285	JX	5.5	0.16	U	0.16	236		57.6	40.5		0.092
A-9*	J1HK31	4/26/11	0.87	U	0.87	235	JX	5.7	0.16	U	0.16	270		59.8	41.1		0.095
A-18*	J1HK40	4/26/11	0.81	U	0.81	361	J	5.3	0.15	U	0.15	214		55.5	37.9		0.088
B-6	J1HK47	4/27/11	0.80	U	0.80	214		5.3	0.15	U	0.15	192		55.0	33.3		0.088
Duplicate of J1HK47	J1HK54	4/27/11	0.88	U	0.88	366		5.8	0.16	U	0.16	232		60.3	40.8		0.096
B-1	J1HK42	4/27/11	0.77	U	0.77	241		5.1	0.14	U	0.14	204		52.9	32.3		0.084
B-2	J1HK43	4/27/11	0.78	U	0.78	303		5.1	0.15	U	0.15	188		53.6	32.1		0.085
B-3	J1HK44	4/27/11	0.85	U	0.85	299		5.6	0.16	U	0.16	195		58.4	34.1		0.093
B-4	J1HK45	4/27/11	0.79	U	0.79	262		5.2	0.15	U	0.15	204		53.9	34.0		0.086
B-5	J1HK46	4/27/11	0.76	U	0.76	274		5.0	0.14	U	0.14	202		52.4	36.6		0.084
B-7	J1HK48	4/27/11	0.89	U	0.89	343		5.8	0.17	U	0.17	214		60.9	37.6		0.097
B-8	J1HK49	4/27/11	0.78	U	0.78	331		5.1	0.14	U	0.14	225		53.3	38.8		0.085
B-9	J1HK50	4/27/11	0.80	U	0.80	365		5.3	0.15	U	0.15	213		55.0	40.0		0.088
B-10	J1HK51	4/27/11	0.82	U	0.82	384		5.4	0.15	U	0.15	217		56.3	39.2		0.090
B-11 re-sample 2	J1JW46	6/22/11	0.80	U	0.80	230	N	5.2	0.15	U	0.15	222		54.7	38.0		0.087
B-12	J1HK53	4/27/11	0.78	U	0.78	322		5.1	0.14	U	0.14	201		53.2	38.7		0.085
B-11*	J1HK52	4/27/11	0.82	U	0.82	324		5.4	0.15	U	0.15	230		56.0	40.6		0.089
B-11 re-sample 1*	J1JDX4	6/7/11	0.87	U	0.87	258		5.7	0.16	U	0.16	211		59.8	41.3		0.095
C-1	J1HK55	4/28/11	0.85	U	0.85	307	XN	5.6	0.16	U	0.16	208		58.1	38.7	X	0.093
Duplicate of J1HK55	J1HK68	4/28/11	0.82	U	0.82	282	X	5.4	0.15	U	0.15	176		55.9	37.4	X	0.089
C-2	J1HK56	4/28/11	0.79	U	0.79	318	X	5.2	0.15	U	0.15	185		54.3	38.8	X	0.087
C-3	J1HK57	4/28/11	0.84	U	0.84	339	X	5.5	0.16	U	0.16	197		57.8	38.8	X	0.092
C-4	J1HK58	4/28/11	0.84	U	0.84	356	X	5.5	0.16	U	0.16	200		57.7	40.7	X	0.092
C-5	J1HK59	4/28/11	0.90	U	0.90	484	X	5.9	0.17	U	0.17	193		61.4	38.8	X	0.098
C-6	J1HK60	4/28/11	0.88	U	0.88	465	X	5.8	0.16	U	0.16	179		60.4	37.8	X	0.096
C-7	J1HK61	4/28/11	0.80	U	0.80	329	X	5.2	0.15	U	0.15	235		54.6	34.3	X	0.087
C-8	J1HK62	4/28/11	0.86	U	0.86	537	X	5.7	0.16	U	0.16	206		59.3	39.2	X	0.094
C-9	J1HK63	4/28/11	0.78	U	0.78	288	X	5.1	0.14	U	0.14	191		53.3	35.8	X	0.085
C-10	J1HK64	4/28/11	0.86	U	0.86	278	X	5.7	0.16	U	0.16	201		59.1	37.8	X	0.094
C-11	J1HK65	4/28/11	0.78	U	0.78	208	X	5.1	0.14	U	0.14	221		53.4	32.7	X	0.085
C-12	J1HK66	4/28/11	0.86	U	0.86	400	X	5.6	0.16	U	0.16	252		58.8	34.7	X	0.094
C-13	J1HK67	4/28/11	0.85	U	0.85	312	X	5.6	0.16	U	0.16	179		58.4	37.0	X	0.093
Equipment Blank	J1HK69	4/28/11	0.72	U	0.72	113	X	4.8	0.13	U	0.13	49.6	U	49.6	0.62	BX	0.079

Attachment	1	Sheet No.	5 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Zinc		
			mg/kg	Q	PQL
A-3	J1HK25	4/26/11	49.9		0.41
Duplicate of J1HK25	J1HK41	4/26/11	46.7		0.36
A-1	J1HK23	4/26/11	55.9		0.37
A-2 re-sample	J1JDW8	6/7/11	47.0		0.41
A-4 re-sample	J1JDW9	6/7/11	48.1		0.43
A-5 re-sample	J1JDX0	6/7/11	39.3		0.39
A-6 re-sample	J1JDX1	6/7/11	40.4		0.37
A-7	J1HK29	4/26/11	113		0.42
A-8	J1HK30	4/26/11	68.3		0.40
A-9 re-sample	J1JDX2	6/7/11	42.1		0.44
A-10	J1HK32	4/26/11	99.8		0.40
A-11	J1HK33	4/26/11	63.0		0.38
A-12	J1HK34	4/26/11	41.5		0.37
A-13	J1HK35	4/26/11	55.4		0.40
A-14	J1HK36	4/26/11	61.1		0.40
A-15	J1HK37	4/26/11	44.0		0.40
A-16	J1HK38	4/26/11	65.4		0.37
A-17	J1HK39	4/26/11	46.5		0.36
A-18 re-sample	J1JDX3	6/7/11	40.2		0.39
A-2 *	J1HK24	4/26/11	101		0.37
A-4 *	J1HK26	4/26/11	65.9		0.39
A-5 *	J1HK27	4/26/11	135		0.40
A-6 *	J1HK28	4/26/11	103		0.39
A-9 *	J1HK31	4/26/11	73.3		0.40
A-18 *	J1HK40	4/26/11	56.8		0.36
B-6	J1HK47	4/27/11	43.2		0.37
Duplicate of J1HK47	J1HK54	4/27/11	50.9		0.41
B-1	J1HK42	4/27/11	44.3		0.36
B-2	J1HK43	4/27/11	39.6		0.36
B-3	J1HK44	4/27/11	41.8		0.39
B-4	J1HK45	4/27/11	44.9		0.36
B-5	J1HK46	4/27/11	44.9		0.35
B-7	J1HK48	4/27/11	45.6		0.41
B-8	J1HK49	4/27/11	42.1		0.36
B-9	J1HK50	4/27/11	48.1		0.37
B-10	J1HK51	4/27/11	50.8		0.38
B-11 re-sample 2	J1JW46	6/22/11	30.7		0.37
B-12	J1HK53	4/27/11	47.9		0.36
B-11 *	J1HK52	4/27/11	52.2		0.38
B-11 re-sample 1 *	J1JDX4	6/7/11	49.6		0.40
C-1	J1HK55	4/28/11	36.5	X	0.39
Duplicate of J1HK55	J1HK68	4/28/11	36.0	X	0.38
C-2	J1HK56	4/28/11	39.6	X	0.37
C-3	J1HK57	4/28/11	61.0	X	0.39
C-4	J1HK58	4/28/11	50.2	X	0.39
C-5	J1HK59	4/28/11	48.8	X	0.41
C-6	J1HK60	4/28/11	76.1	X	0.41
C-7	J1HK61	4/28/11	48.2	X	0.37
C-8	J1HK62	4/28/11	46.7	X	0.40
C-9	J1HK63	4/28/11	94.8	X	0.36
C-10	J1HK64	4/28/11	44.3	X	0.40
C-11	J1HK65	4/28/11	31.5	X	0.36
C-12	J1HK66	4/28/11	78.7	X	0.40
C-13	J1HK67	4/28/11	39.2	X	0.39
Equipment Blank	J1HK69	4/28/11	3.0	X	0.33

Attachment	1	Sheet No.	6 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
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Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	A-3 - J1HK25			Duplicate of J1HK25 - J1HK41			A-1 - J1HK23			A-2 re-sample - J1JDW8			A-4 re-sample - J1JDW9			A-5 re-sample - J1JDX0		
		4/26/11			4/26/11			4/26/11			6/7/11			6/7/11			6/7/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	10	U	10	9.8	U	9.8	10	U	10	10	U	10	11	U	11	10	U	10
Acenaphthylene	PAH	9.1	U	9.1	8.8	U	8.8	9.3	U	9.3	9.0	U	9.0	9.9	U	9.9	9.0	U	9.0
Anthracene	PAH	3.1	U	3.1	3.0	U	3.0	3.1	U	3.1	7.4	JX	3.0	3.3	U	3.3	3.1	U	3.1
Benzo(a)anthracene	PAH	31	X	3.2	32		3.1	27	X	3.3	130		3.2	11	JX	3.5	53	X	3.2
Benzo(a)pyrene	PAH	64		6.5	44		6.3	43		6.6	110		6.4	30		7.0	74		6.4
Benzo(b)fluoranthene	PAH	46		4.2	36		4.1	31		4.3	73		4.2	21		4.6	48		4.2
Benzo(ghi)perylene	PAH	45		7.3	42		7.0	25	J	7.4	75		7.2	20	J	7.9	52		7.2
Benzo(k)fluoranthene	PAH	23	X	4.0	15		3.9	20		4.1	33		3.9	9.3	J	4.3	32		3.9
Chrysene	PAH	39	J	4.9	38	J	4.7	38	J	5.0	90		4.8	22	J	5.3	62		4.8
Dibenz[a,h]anthracene	PAH	23	JX	11	11	U	11	11	U	11	22	J	11	12	U	12	11	U	11
Fluoranthene	PAH	43	X	13	59		13	66		13	160		13	40	J	14	100		13
Fluorene	PAH	5.3	U	5.3	5.2	U	5.2	5.4	U	5.4	5.3	U	5.3	5.8	U	5.8	5.3	U	5.3
Indeno(1,2,3-cd)pyrene	PAH	56		12	44		12	35		12	77		12	25	J	13	47		12
Naphthalene	PAH	12	U	12	12	U	12	12	U	12	12	U	12	13	U	13	12	U	12
Phenanthrene	PAH	15	J	12	23	J	12	25	J	12	79		12	19	J	13	55		12
Pyrene	PAH	58		12	75		12	78		12	200		12	55		13	140		12
Aldrin	PEST	0.24	U	0.24	0.26	U	0.26	0.27	U	0.27	0.25	U	0.25	0.27	U	0.27	0.24	U	0.24
Alpha-BHC	PEST	0.20	U	0.20	0.22	U	0.22	0.23	U	0.23	0.21	U	0.21	0.23	U	0.23	0.20	U	0.20
alpha-Chlordane	PEST	0.31	U	0.31	0.33	U	0.33	0.34	U	0.34	0.32	U	0.32	0.35	U	0.35	0.30	U	0.30
Beta-BHC	PEST	0.63	U	0.63	0.69	U	0.69	0.70	U	0.70	0.66	U	0.66	0.72	U	0.72	0.63	U	0.63
Delta-BHC	PEST	0.38	U	0.38	0.41	U	0.41	0.42	U	0.42	0.40	U	0.40	0.43	U	0.43	0.38	U	0.38
4,4'-DDD	PEST	0.52	U	0.52	0.57	U	0.57	0.58	U	0.58	0.54	U	0.54	0.59	U	0.59	0.52	U	0.52
4,4'-DDE	PEST	0.23	U	0.23	0.25	U	0.25	0.25	U	0.25	0.24	U	0.24	0.26	U	0.26	0.22	U	0.22
4,4'-DDT	PEST	0.56	U	0.56	0.61	U	0.61	0.89	J	0.62	0.59	U	0.59	0.64	U	0.64	0.56	U	0.56
Dieldrin	PEST	0.20	U	0.20	0.22	U	0.22	0.22	U	0.22	0.21	U	0.21	0.23	U	0.23	0.20	U	0.20
Endosulfan I	PEST	0.17	U	0.17	0.18	U	0.18	0.19	U	0.19	0.18	U	0.18	0.19	U	0.19	0.17	U	0.17
Endosulfan II	PEST	0.27	U	0.27	0.30	UJ	0.30	0.30	UJ	0.30	0.29	U	0.29	0.31	U	0.31	0.27	U	0.27
Endosulfan sulfate	PEST	0.26	U	0.26	0.29	UJ	0.29	0.29	UJ	0.29	0.27	U	0.27	0.30	U	0.30	0.26	U	0.26
Endrin	PEST	0.29	U	0.29	0.32	U	0.32	0.32	U	0.32	0.30	U	0.30	0.33	U	0.33	0.29	U	0.29
Endrin aldehyde	PEST	0.16	UN	0.16	0.18	U	0.18	0.18	U	0.18	0.17	U	0.17	0.19	U	0.19	0.16	U	0.16
Endrin ketone	PEST	0.47	UJ	0.47	0.51	U	0.51	0.52	U	0.52	0.49	U	0.49	0.53	U	0.53	0.46	U	0.46
Gamma-BHC (Lindane)	PEST	0.44	U	0.44	0.48	U	0.48	0.49	U	0.49	0.46	U	0.46	0.50	U	0.50	0.44	U	0.44
gamma-Chlordane	PEST	0.25	U	0.25	0.28	U	0.28	0.28	U	0.28	0.26	U	0.26	0.29	U	0.29	0.25	U	0.25
Heptachlor	PEST	0.20	U	0.20	0.22	U	0.22	0.23	U	0.23	0.21	U	0.21	0.23	U	0.23	0.20	U	0.20
Heptachlor epoxide	PEST	0.41	U	0.41	0.44	U	0.44	0.45	U	0.45	0.42	U	0.42	0.46	U	0.46	0.40	U	0.40
Methoxychlor	PEST	0.43	U	0.43	0.47	U	0.47	0.48	U	0.48	0.45	U	0.45	0.49	U	0.49	0.42	U	0.42
Toxaphene	PEST	15	UJ	15	16	UJ	16	17	UJ	17	16	U	16	17	U	17	15	U	15

* Due to RAG exceedances these locations were re-sampled.

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Checked	T. E. Queen	Date	7/13/11
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Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	A-6 re-sample - J1JDX1			A-7 - J1HK29			A-8 - J1HK30			A-9 re-sample - J1JDX2			A-10 - J1HK32			A-11 - J1HK33		
		6/7/11			4/26/11			4/26/11			6/7/11			4/26/11			4/26/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	10	U	10	9.8	U	9.8	10	U	10	12	U	12	10	U	10	11	U	11
Acenaphthylene	PAH	9.3	U	9.3	8.8	U	8.8	9.2	U	9.2	11	U	11	9.4	U	9.4	9.7	U	9.7
Anthracene	PAH	3.2	U	3.2	3.0	U	3.0	3.1	U	3.1	3.8	U	3.8	3.2	U	3.2	3.3	U	3.3
Benzo(a)anthracene	PAH	40		3.3	54		3.1	25		3.2	11	J	3.9	38	X	3.3	91		3.4
Benzo(a)pyrene	PAH	43		6.7	68		6.3	31		6.5	14	J	7.9	35		6.7	120		6.9
Benzo(b)fluoranthene	PAH	26		4.4	54		4.1	22		4.3	13	J	5.2	27		4.4	86		4.5
Benzo(ghi)perylene	PAH	24	J	7.5	7.1	U	7.1	14	J	7.3	8.9	U	8.9	24	J	7.5	73		7.7
Benzo(k)fluoranthene	PAH	13	J	4.1	22		3.9	9.3	J	4.0	4.8	U	4.8	12	J	4.1	51		4.2
Chrysene	PAH	35	J	5.0	67		4.8	32	J	4.9	14	J	6.0	42		5.0	120		5.2
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	11	U	11	14	U	14	11	U	11	12	U	12
Fluoranthene	PAH	56		13	110		13	40	J	13	23	J	16	52		14	170		14
Fluorene	PAH	5.5	U	5.5	5.2	U	5.2	5.4	U	5.4	6.5	U	6.5	5.5	U	5.5	6.7	J	5.7
Indeno(1,2,3-cd)pyrene	PAH	27	J	12	12	U	12	12	U	12	15	U	15	12	U	12	13	U	13
Naphthalene	PAH	12	U	12	12	U	12	12	U	12	15	U	15	12	U	12	13	U	13
Phenanthrene	PAH	20	J	12	51		12	18	J	12	15	U	15	23	J	12	85		13
Pyrene	PAH	85		12	140		12	62		12	25	J	15	69		12	220		13
Aldrin	PEST	0.25	U	0.25	0.26	U	0.26	0.27	U	0.27	0.29	U	0.29	0.27	U	0.27	0.26	U	0.26
Alpha-BHC	PEST	0.21	U	0.21	0.22	U	0.22	0.23	U	0.23	0.25	U	0.25	0.23	U	0.23	0.22	U	0.22
alpha-Chlordane	PEST	0.32	U	0.32	0.33	U	0.33	0.35	U	0.35	0.38	U	0.38	0.34	U	0.34	0.34	U	0.34
Beta-BHC	PEST	0.65	U	0.65	0.69	U	0.69	0.73	U	0.73	0.78	U	0.78	0.71	U	0.71	0.70	U	0.70
Delta-BHC	PEST	0.39	U	0.39	0.42	U	0.42	0.44	U	0.44	0.47	U	0.47	0.43	U	0.43	0.42	U	0.42
4,4'-DDD	PEST	0.54	U	0.54	0.57	U	0.57	0.60	U	0.60	0.64	U	0.64	0.58	U	0.58	0.57	U	0.57
4,4'-DDE	PEST	0.23	U	0.23	0.25	U	0.25	1.2	J	0.26	0.28	U	0.28	0.76	JX	0.25	0.63	JX	0.25
4,4'-DDT	PEST	0.58	U	0.58	0.61	U	0.61	0.88	J	0.65	0.69	U	0.69	0.63	U	0.63	0.62	U	0.62
Dieldrin	PEST	0.21	U	0.21	0.22	U	0.22	0.23	U	0.23	0.25	U	0.25	0.22	U	0.22	0.22	U	0.22
Endosulfan I	PEST	0.17	U	0.17	0.18	U	0.18	0.19	U	0.19	0.21	U	0.21	0.19	U	0.19	0.18	U	0.18
Endosulfan II	PEST	0.28	U	0.28	0.30	UJ	0.30	0.31	UJ	0.31	0.34	U	0.34	0.31	UJ	0.31	0.30	UJ	0.30
Endosulfan sulfate	PEST	0.27	U	0.27	0.29	UJ	0.29	0.30	UJ	0.30	0.32	U	0.32	0.29	UJ	0.29	0.29	UJ	0.29
Endrin	PEST	0.30	U	0.30	0.32	U	0.32	0.33	U	0.33	0.36	U	0.36	0.33	U	0.33	0.32	U	0.32
Endrin aldehyde	PEST	0.17	U	0.17	0.18	U	0.18	0.19	U	0.19	0.20	U	0.20	0.18	U	0.18	0.18	U	0.18
Endrin ketone	PEST	0.48	U	0.48	0.51	U	0.51	0.53	U	0.53	0.57	U	0.57	0.52	U	0.52	0.51	U	0.51
Gamma-BHC (Lindane)	PEST	0.46	U	0.46	0.48	U	0.48	0.51	U	0.51	0.54	U	0.54	0.49	U	0.49	0.49	U	0.49
gamma-Chlordane	PEST	0.26	U	0.26	0.28	U	0.28	0.29	U	0.29	0.31	U	0.31	0.28	U	0.28	0.28	U	0.28
Heptachlor	PEST	0.21	U	0.21	0.22	U	0.22	0.23	U	0.23	0.25	U	0.25	0.23	U	0.23	0.22	U	0.22
Heptachlor epoxide	PEST	0.42	U	0.42	0.44	U	0.44	0.47	U	0.47	0.50	U	0.50	0.45	U	0.45	0.45	U	0.45
Methoxychlor	PEST	0.44	U	0.44	0.47	U	0.47	0.49	U	0.49	0.53	U	0.53	0.48	U	0.48	0.47	U	0.47
Toxaphene	PEST	16	U	16	16	UJ	16	17	UJ	17	18	U	18	17	UJ	17	17	UJ	17

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Checked	T. E. Queen	Date	7/13/11
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Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	A-12 - J1HK34			A-13 - J1HK35			A-14 - J1HK36			A-15 - J1HK37			A-16 - J1HK38			A-17 - J1HK39		
		4/26/11			4/26/11			4/26/11			4/26/11			4/26/11			4/26/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	9.9	U	9.9	11	U	11	10	U	10	10	U	10	11	U	11	10	U	10
Acenaphthylene	PAH	8.9	U	8.9	9.5	U	9.5	9.2	U	9.2	9.3	U	9.3	9.5	U	9.5	9.3	U	9.3
Anthracene	PAH	3.0	U	3.0	3.2	U	3.2	3.1	U	3.1	3.1	U	3.1	4.7	JX	3.2	3.1	U	3.1
Benzo(a)anthracene	PAH	3.2	U	3.2	7.4	JX	3.4	25		3.3	9.5	J	3.3	86		3.4	39	X	3.3
Benzo(a)pyrene	PAH	6.4	U	6.4	14	J	6.8	25		6.5	11	J	6.6	6.7	U	6.7	38		6.6
Benzo(b)fluoranthene	PAH	4.2	U	4.2	8.2	J	4.4	19		4.3	8.3	JX	4.3	82		4.4	30		4.3
Benzo(ghi)perylene	PAH	7.1	U	7.1	7.6	U	7.6	19	J	7.3	7.4	U	7.4	71		7.6	25	J	7.4
Benzo(k)fluoranthene	PAH	3.9	U	3.9	4.5	J	4.2	7.9	J	4.0	4.0	U	4.0	37		4.1	12	J	4.1
Chrysene	PAH	4.8	U	4.8	13	J	5.1	27	J	4.9	12	J	5.0	110		5.1	36	J	5.0
Dibenz[a,h]anthracene	PAH	11	U	11	12	U	12	11	U	11	11	U	11	12	U	12	11	U	11
Fluoranthene	PAH	13	U	13	16	J	14	36	J	13	25	J	13	160		14	34	J	13
Fluorene	PAH	5.2	U	5.2	5.6	U	5.6	5.4	U	5.4	5.4	U	5.4	5.6	U	5.6	5.4	U	5.4
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	13	U	13	12	U	12	12	U	12	83		13	32		12
Naphthalene	PAH	12	U	12	13	U	13	12	U	12	12	U	12	13	U	13	12	U	12
Phenanthrene	PAH	12	U	12	13	U	13	12	U	12	19	J	12	63		13	12	U	12
Pyrene	PAH	12	U	12	22	J	13	51		12	28	J	12	200		13	54		12
Aldrin	PEST	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.27	U	0.27	0.25	U	0.25
Alpha-BHC	PEST	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.23	U	0.23	0.23	U	0.23	0.21	U	0.21
alpha-Chlordane	PEST	0.34	U	0.34	0.34	U	0.34	0.33	U	0.33	0.34	U	0.34	0.35	U	0.35	0.32	U	0.32
Beta-BHC	PEST	0.69	U	0.69	0.69	U	0.69	0.68	U	0.68	0.70	U	0.70	0.73	U	0.73	0.66	U	0.66
Delta-BHC	PEST	0.42	U	0.42	0.42	U	0.42	0.41	U	0.41	0.42	U	0.42	0.44	U	0.44	0.4	U	0.4
4,4'-DDD	PEST	0.57	U	0.57	0.57	U	0.57	0.56	U	0.56	0.58	U	0.58	0.60	U	0.60	0.54	U	0.54
4,4'-DDE	PEST	0.25	U	0.25	0.25	U	0.25	0.31	JX	0.24	0.25	U	0.25	0.26	JX	0.26	0.24	U	0.24
4,4'-DDT	PEST	0.62	U	0.62	0.61	U	0.61	0.60	U	0.60	0.62	U	0.62	0.65	U	0.65	0.59	U	0.59
Dieldrin	PEST	0.22	U	0.22	0.22	U	0.22	0.21	U	0.21	0.22	U	0.22	0.23	U	0.23	0.21	U	0.21
Endosulfan I	PEST	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.19	U	0.19	0.19	U	0.19	0.17	U	0.17
Endosulfan II	PEST	0.30	UJ	0.30	0.30	UJ	0.30	0.29	UJ	0.29	0.30	UJ	0.30	0.31	UJ	0.31	0.28	UJ	0.28
Endosulfan sulfate	PEST	0.29	UJ	0.29	0.29	UJ	0.29	0.28	UJ	0.28	0.29	UJ	0.29	0.30	UJ	0.30	0.27	UJ	0.27
Endrin	PEST	0.32	U	0.32	0.32	U	0.32	0.31	U	0.31	0.32	U	0.32	0.33	U	0.33	0.30	U	0.30
Endrin aldehyde	PEST	0.18	U	0.18	0.18	U	0.18	0.17	U	0.17	0.18	U	0.18	0.19	U	0.19	0.17	U	0.17
Endrin ketone	PEST	0.51	U	0.51	0.51	U	0.51	0.50	U	0.50	0.52	U	0.52	0.53	U	0.53	0.49	U	0.49
Gamma-BHC (Lindane)	PEST	0.49	U	0.49	0.48	U	0.48	0.47	U	0.47	0.49	U	0.49	0.51	U	0.51	0.46	U	0.46
gamma-Chlordane	PEST	0.28	U	0.28	0.28	U	0.28	0.27	U	0.27	0.28	U	0.28	0.29	U	0.29	0.26	U	0.26
Heptachlor	PEST	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.23	U	0.23	0.23	U	0.23	0.21	U	0.21
Heptachlor epoxide	PEST	0.45	U	0.45	0.44	U	0.44	0.44	U	0.44	0.45	U	0.45	0.47	U	0.47	0.42	U	0.42
Methoxychlor	PEST	0.47	U	0.47	0.47	U	0.47	0.46	U	0.46	0.47	U	0.47	0.49	U	0.49	0.45	U	0.45
Toxaphene	PEST	17	UJ	17	16	UJ	16	16	UJ	16	17	UJ	17	17	UJ	17	16	UJ	16

Attachment	1	Sheet No.	9 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	A-18 re-sample - J1JDX3			A-2 - J1HK24 *			A-4 - J1HK26 *			A-5 - J1HK27 *			A-6 - J1HK28 *			A-9 - J1HK31 */		
		6/7/11			4/26/11			4/26/11			4/26/11			4/26/11			4/26/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	10	U	10	9.8	U	9.8	11	U	11	11	U	11	11	U	11	10	U	10
Acenaphthylene	PAH	9.1	U	9.1	8.8	U	8.8	9.6	U	9.6	9.5	U	9.5	18	JX	9.5	9.2	U	9.2
Anthracene	PAH	6.9	JX	3.1	3.0	U	3.0	110	JX	3.3	3.2	U	3.2	3.2	U	3.2	3.1	U	3.1
Benzo(a)anthracene	PAH	48		3.2	410		3.1	1200	J	3.4	340		3.4	340	X	3.4	170		3.3
Benzo(a)pyrene	PAH	62		6.5	520		6.3	1400	J	6.8	460		6.8	320		6.8	230		6.5
Benzo(b)fluoranthene	PAH	42		4.3	410		4.1	1000	J	4.5	360	X	4.4	230		4.4	170		4.3
Benzo(ghi)perylene	PAH	39		7.3	340		7.1	960	J	7.7	310		7.6	240	X	7.6	150		7.3
Benzo(k)fluoranthene	PAH	24		4.0	220		3.9	560	J	4.2	200		4.2	130		4.2	97		4.0
Chrysene	PAH	55		4.9	530		4.8	1300	J	5.2	470		5.1	300		5.1	220		4.9
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	190	JX	12	99	X	12	12	U	12	20	JX	11
Fluoranthene	PAH	120		13	740		13	2800	J	14	690		14	520		14	420		13
Fluorene	PAH	5.4	U	5.4	15	JX	5.2	170	J	5.6	46		5.6	5.6	U	5.6	5.4	U	5.4
Indeno(1,2,3-cd)pyrene	PAH	42		12	390		12	990	J	13	440		13	210		13	160		12
Naphthalene	PAH	12	U	12	12	U	12	13	U	13	13	U	13	13	U	13	12	U	12
Phenanthrene	PAH	78		12	300		12	1300	J	13	340		13	230		13	220		12
Pyrene	PAH	140		12	940		12	3000	J	13	800		13	630		13	470		12
Aldrin	PEST	0.26	U	0.26	0.25	U	0.25	0.26	U	0.26	0.26	U	0.26	0.28	U	0.28	0.26	U	0.26
Alpha-BHC	PEST	0.22	U	0.22	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22	0.24	U	0.24	0.22	U	0.22
alpha-Chlordane	PEST	0.33	U	0.33	0.32	U	0.32	0.34	U	0.34	0.34	U	0.34	0.36	U	0.36	0.34	U	0.34
Beta-BHC	PEST	0.68	U	0.68	0.66	U	0.66	0.69	U	0.69	0.70	U	0.70	0.74	U	0.74	0.69	U	0.69
Delta-BHC	PEST	0.41	U	0.41	0.40	U	0.40	0.42	U	0.42	0.42	U	0.42	0.45	U	0.45	0.42	U	0.42
4,4'-DDD	PEST	0.56	U	0.56	0.54	U	0.54	0.57	U	0.57	0.57	U	0.57	0.61	U	0.61	0.57	U	0.57
4,4'-DDE	PEST	0.24	U	0.24	0.24	U	0.24	0.25	U	0.25	0.25	U	0.25	1.6	JX	0.27	1.8	X	0.25
4,4'-DDT	PEST	0.60	U	0.60	1.2	J	0.58	1.1	JX	0.61	1.2	J	0.62	0.88	J	0.66	0.67	J	0.61
Dieldrin	PEST	0.21	U	0.21	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22	0.23	U	0.23	0.22	U	0.22
Endosulfan I	PEST	0.18	U	0.18	0.17	U	0.17	0.18	U	0.18	0.18	U	0.18	0.20	U	0.20	0.18	U	0.18
Endosulfan II	PEST	0.29	U	0.29	0.28	UJ	0.28	0.30	UJ	0.30	0.30	UJ	0.30	0.32	UJ	0.32	0.3	UJ	0.3
Endosulfan sulfate	PEST	0.28	U	0.28	0.27	UJ	0.27	0.29	UJ	0.29	0.29	UJ	0.29	0.31	UJ	0.31	0.29	UJ	0.29
Endrin	PEST	0.31	U	0.31	0.30	U	0.30	0.32	U	0.32	0.32	U	0.32	0.34	U	0.34	0.32	U	0.32
Endrin aldehyde	PEST	0.17	U	0.17	0.17	U	0.17	0.18	U	0.18	0.18	U	0.18	0.19	U	0.19	0.18	U	0.18
Endrin ketone	PEST	0.50	U	0.50	0.48	U	0.48	0.51	U	0.51	0.51	U	0.51	0.55	U	0.55	0.51	U	0.51
Gamma-BHC (Lindane)	PEST	0.47	U	0.47	0.46	U	0.46	0.48	U	0.48	0.49	U	0.49	0.52	U	0.52	0.48	U	0.48
gamma-Chlordane	PEST	0.27	U	0.27	0.26	U	0.26	0.28	U	0.28	0.28	U	0.28	0.30	U	0.30	0.28	U	0.28
Heptachlor	PEST	0.22	U	0.22	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22	0.24	U	0.24	0.22	U	0.22
Heptachlor epoxide	PEST	0.43	U	0.43	0.42	U	0.42	0.44	U	0.44	0.45	U	0.45	0.48	U	0.48	0.44	U	0.44
Methoxychlor	PEST	0.46	U	0.46	0.45	U	0.45	0.47	U	0.47	0.47	U	0.47	0.50	U	0.50	0.47	U	0.47
Toxaphene	PEST	16	U	16	16	UJ	16	16	UJ	16	17	UJ	17	18	UJ	18	16	UJ	16

Attachment	1	Sheet No.	10 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	A-18 - J1HK40 *			B-6 - J1HK47			Duplicate of J1HK47 - J1HK54			B-1 - J1HK42			B-2 - J1HK43			B-3 - J1HK44		
		4/26/11			4/27/11			4/27/11			4/27/11			4/27/11			4/27/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	10	U	10	10	U	10	11	U	11	10	U	10	10	U	10	10	U	10
Acenaphthylene	PAH	9.3	U	9.3	9.4	U	9.4	9.6	U	9.6	9.1	U	9.1	9.2	U	9.2	9.1	U	9.1
Anthracene	PAH	3.2	U	3.2	3.2	U	3.2	3.3	U	3.3	3.1	U	3.1	3.1	U	3.1	3.1	U	3.1
Benzo(a)anthracene	PAH	150		3.3	17		3.3	5.2	JX	3.4	8.2	J	3.2	3.3	U	3.3	3.2	U	3.2
Benzo(a)pyrene	PAH	210		6.6	15	JX	6.7	16		6.8	12	J	6.5	6.5	U	6.5	6.5	U	6.5
Benzo(b)fluoranthene	PAH	150		4.3	12	J	4.4	11	J	4.5	11	J	4.2	4.3	U	4.3	4.2	U	4.2
Benzo(ghi)perylene	PAH	140		7.5	7.5	U	7.5	7.7	U	7.7	7.3	U	7.3	7.3	U	7.3	7.3	U	7.3
Benzo(k)fluoranthene	PAH	94		4.1	5.6	J	4.1	4.6	JX	4.2	4.0	U	4.0	4.0	U	4.0	4.0	U	4.0
Chrysene	PAH	190		5.0	19	J	5.0	9.8	JX	5.2	13	J	4.9	4.9	U	4.9	4.9	U	4.9
Dibenz[a,h]anthracene	PAH	22	JX	11	11	U	11	12	U	12	11	U	11	11	U	11	11	U	11
Fluoranthene	PAH	250		13	24	J	14	19	J	14	18	J	13	13	U	13	13	U	13
Fluorene	PAH	5.5	U	5.5	5.5	U	5.5	5.6	U	5.6	5.3	U	5.3	5.4	U	5.4	5.3	U	5.3
Indeno(1,2,3-cd)pyrene	PAH	160		12	12	U	12	13	U	13	12	U	12	12	U	12	12	U	12
Naphthalene	PAH	12	U	12	12	U	12	13	U	13	12	U	12	12	U	12	12	U	12
Phenanthrene	PAH	100		12	12	U	12	13	U	13	12	U	12	12	U	12	12	U	12
Pyrene	PAH	360		12	25	JX	12	25	J	13	21	J	12	12	U	12	12	U	12
Aldrin	PEST	0.26	U	0.26	0.26	U	0.26	0.27	U	0.27	0.26	U	0.26	0.26	U	0.26	0.25	U	0.25
Alpha-BHC	PEST	0.23	U	0.23	0.22	U	0.22	0.23	U	0.23	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
alpha-Chlordane	PEST	0.34	U	0.34	0.34	U	0.34	0.35	U	0.35	0.34	U	0.34	0.33	U	0.33	0.33	U	0.33
Beta-BHC	PEST	0.70	U	0.70	0.69	U	0.69	0.72	U	0.72	0.69	U	0.69	0.68	U	0.68	0.67	U	0.67
Delta-BHC	PEST	0.42	U	0.42	0.42	U	0.42	0.43	U	0.43	0.42	U	0.42	0.41	U	0.41	0.41	U	0.41
4,4'-DDD	PEST	0.58	U	0.58	0.57	U	0.57	0.59	U	0.59	0.57	U	0.57	0.56	U	0.56	0.55	U	0.55
4,4'-DDE	PEST	0.25	U	0.25	0.25	UN	0.25	0.33	JXN	0.26	0.47	JN	0.25	0.24	UN	0.24	0.24	UN	0.24
4,4'-DDT	PEST	0.62	U	0.62	0.61	U	0.61	0.64	U	0.64	0.61	U	0.61	0.60	U	0.60	0.60	U	0.60
Dieldrin	PEST	0.22	U	0.22	0.22	U	0.22	0.23	U	0.23	0.22	U	0.22	0.21	U	0.21	0.21	U	0.21
Endosulfan I	PEST	0.19	U	0.19	0.18	U	0.18	0.19	U	0.19	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18
Endosulfan II	PEST	0.30	UJ	0.30	0.30	U	0.30	0.31	U	0.31	0.30	U	0.30	0.29	U	0.29	0.29	U	0.29
Endosulfan sulfate	PEST	0.29	UJ	0.29	0.29	U	0.29	0.30	U	0.30	0.29	U	0.29	0.28	U	0.28	0.28	U	0.28
Endrin	PEST	0.32	U	0.32	0.32	U	0.32	0.33	U	0.33	0.32	U	0.32	0.31	U	0.31	0.31	U	0.31
Endrin aldehyde	PEST	0.18	U	0.18	0.18	U	0.18	0.19	U	0.19	0.18	U	0.18	0.17	UN	0.17	0.17	U	0.17
Endrin ketone	PEST	0.52	U	0.52	0.51	U	0.51	0.53	U	0.53	0.51	U	0.51	0.5	U	0.5	0.50	U	0.50
Gamma-BHC (Lindane)	PEST	0.49	U	0.49	0.48	U	0.48	0.50	U	0.50	0.48	U	0.48	0.47	U	0.47	0.47	U	0.47
gamma-Chlordane	PEST	0.28	U	0.28	0.28	U	0.28	0.29	U	0.29	0.28	U	0.28	0.27	U	0.27	0.27	U	0.27
Heptachlor	PEST	0.23	U	0.23	0.22	U	0.22	0.23	U	0.23	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Heptachlor epoxide	PEST	0.45	U	0.45	0.44	U	0.44	0.46	U	0.46	0.44	U	0.44	0.43	U	0.43	0.43	U	0.43
Methoxychlor	PEST	0.47	U	0.47	0.47	U	0.47	0.49	U	0.49	0.47	U	0.47	0.46	U	0.46	0.46	U	0.46
Toxaphene	PEST	17	UJ	17	16	U	16	17	U	17	16	U	16	16	U	16	16	U	16

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Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	B-4 - J1HK45			B-5 - J1HK46			B-7 - J1HK48			B-8 - J1HK49			B-9 - J1HK50			B-10 - J1HK51		
		4/27/11			4/27/11			4/27/11			4/27/11			4/27/11			4/27/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	9.7	U	9.7	10	U	10	10	U	10	10	U	10	9.5	U	9.5	10	U	10
Acenaphthylene	PAH	8.7	U	8.7	9.3	U	9.3	9.0	U	9.0	9.3	U	9.3	8.6	U	8.6	9.3	U	9.3
Anthracene	PAH	2.9	U	2.9	3.2	U	3.2	3.0	U	3.0	3.2	U	3.2	2.9	U	2.9	3.1	U	3.1
Benzo(a)anthracene	PAH	37		3.1	3.3	U	3.3	4.4	JX	3.2	3.3	U	3.3	3.0	U	3.0	28		3.3
Benzo(a)pyrene	PAH	6.2	U	6.2	6.6	U	6.6	9.6	J	6.4	6.6	U	6.6	6.1	U	6.1	32		6.6
Benzo(b)fluoranthene	PAH	38		4.1	4.3	U	4.3	4.8	J	4.2	4.3	U	4.3	4.0	U	4.0	29		4.3
Benzo(ghi)perylene	PAH	7.0	U	7.0	7.4	U	7.4	7.2	U	7.2	7.4	U	7.4	6.9	U	6.9	22	J	7.4
Benzo(k)fluoranthene	PAH	21		3.8	4.1	U	4.1	4.2	J	3.9	4.1	U	4.1	3.8	U	3.8	14	J	4.1
Chrysene	PAH	49		4.7	5.0	U	5.0	7.3	J	4.8	5.0	U	5.0	4.6	U	4.6	33	J	5.0
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	11	U	11	11	U	11	10	U	10	11	U	11
Fluoranthene	PAH	93		13	13	U	13	13	U	13	13	U	13	12	U	12	50		13
Fluorene	PAH	5.1	U	5.1	5.5	U	5.5	5.3	U	5.3	5.5	U	5.5	5.0	U	5.0	5.4	U	5.4
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	12	U	12	12	U	12	12	U	12	11	U	11	12	U	12
Naphthalene	PAH	12	U	12	12	U	12	12	U	12	12	U	12	11	U	11	12	U	12
Phenanthrene	PAH	46		12	12	U	12	12	U	12	12	U	12	11	U	11	16	J	12
Pyrene	PAH	100		12	12	U	12	12	U	12	12	U	12	11	U	11	63		12
Aldrin	PEST	0.25	U	0.25	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26
Alpha-BHC	PEST	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
alpha-Chlordane	PEST	0.32	U	0.32	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.34	U	0.34	0.33	U	0.33
Beta-BHC	PEST	0.65	U	0.65	0.69	U	0.69	0.69	U	0.69	0.68	U	0.68	0.69	U	0.69	0.68	U	0.68
Delta-BHC	PEST	0.39	U	0.39	0.41	U	0.41	0.42	U	0.42	0.41	U	0.41	0.42	U	0.42	0.41	U	0.41
4,4'-DDD	PEST	0.54	U	0.54	0.56	U	0.56	0.57	U	0.57	0.56	U	0.56	0.57	U	0.57	0.56	U	0.56
4,4'-DDE	PEST	0.23	UN	0.23	0.25	UN	0.25	0.25	UN	0.25	0.25	UN	0.25	0.25	UN	0.25	0.24	UN	0.24
4,4'-DDT	PEST	0.58	U	0.58	0.61	U	0.61	0.61	U	0.61	0.61	U	0.61	0.61	U	0.61	0.60	U	0.60
Dieldrin	PEST	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.21	U	0.21
Endosulfan I	PEST	0.17	U	0.17	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18
Endosulfan II	PEST	0.28	U	0.28	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.29	U	0.29
Endosulfan sulfate	PEST	0.27	U	0.27	0.29	U	0.29	0.29	U	0.29	0.28	U	0.28	0.29	U	0.29	0.28	U	0.28
Endrin	PEST	0.30	U	0.30	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.31	U	0.31
Endrin aldehyde	PEST	0.17	U	0.17	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.17	U	0.17
Endrin ketone	PEST	0.48	U	0.48	0.51	U	0.51	0.51	U	0.51	0.50	U	0.50	0.51	U	0.51	0.50	U	0.50
Gamma-BHC (Lindane)	PEST	0.46	U	0.46	0.48	U	0.48	0.48	U	0.48	0.48	U	0.48	0.48	U	0.48	0.47	U	0.47
gamma-Chlordane	PEST	0.26	U	0.26	0.27	U	0.27	0.28	U	0.28	0.27	U	0.27	0.28	U	0.28	0.27	U	0.27
Heptachlor	PEST	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Heptachlor epoxide	PEST	0.42	U	0.42	0.44	U	0.44	0.44	U	0.44	0.44	U	0.44	0.44	U	0.44	0.43	U	0.43
Methoxychlor	PEST	0.44	U	0.44	0.46	U	0.46	0.47	U	0.47	0.46	U	0.46	0.47	U	0.47	0.46	U	0.46
Toxaphene	PEST	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16

Attachment	1	Sheet No.	12 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	B-11 re-sample 2 - J1JW46			B-12 - J1HK53			B-11 - J1HK52 *			B-11 re-sample - J1JDX4			C-1 - J1HK55			Duplicate of J1HK55 - J1HK68		
		6/22/11			4/27/11			4/27/11			6/7/11			4/28/11			4/28/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	11	U	11	10	U	10	10	U	10	11	U	11	10	U	10	10	U	10
Acenaphthylene	PAH	9.7	U	9.7	9.3	U	9.3	9.3	U	9.3	28	JX	9.9	9.0	U	9.0	9.3	U	9.3
Anthracene	PAH	3.3	U	3.3	3.1	U	3.1	43	X	3.2	48	X	3.4	3.1	U	3.1	3.1	U	3.1
Benzo(a)anthracene	PAH	3.4	U	3.4	38		3.3	410		3.3	440		3.5	3.2	U	3.2	3.3	U	3.3
Benzo(a)pyrene	PAH	6.9	U	6.9	45		6.6	460		6.7	560		7.1	6.4	U	6.4	6.6	U	6.6
Benzo(b)fluoranthene	PAH	4.5	U	4.5	40		4.3	360		4.4	570		4.6	4.2	U	4.2	4.3	U	4.3
Benzo(ghi)perylene	PAH	7.7	U	7.7	35		7.4	7.5	U	7.5	330		8.0	7.2	U	7.2	7.4	U	7.4
Benzo(k)fluoranthene	PAH	4.2	U	4.2	19		4.1	190		4.1	210		4.4	4.0	U	4.0	4.1	U	4.1
Chrysene	PAH	5.2	U	5.2	49		5.0	460		5.0	500		5.3	4.9	U	4.9	5.0	U	5.0
Dibenz[a,h]anthracene	PAH	12	U	12	11	U	11	11	U	11	57	X	12	11	U	11	11	U	11
Fluoranthene	PAH	14	U	14	87		13	930		13	1000		14	13	U	13	13	U	13
Fluorene	PAH	5.7	U	5.7	5.5	U	5.5	5.5	U	5.5	42	X	5.8	5.3	U	5.3	9.0	J	5.4
Indeno(1,2,3-cd)pyrene	PAH	13	U	13	12	U	12	12	U	12	340		13	12	U	12	12	U	12
Naphthalene	PAH	13	U	13	12	U	12	12	U	12	13	U	13	12	U	12	12	U	12
Phenanthrene	PAH	13	U	13	46		12	470		12	550		13	12	U	12	12	U	12
Pyrene	PAH	13	U	13	100		12	1100		12	1200		13	12	U	12	12	U	12
Aldrin	PEST	0.27	U	0.27	0.26	U	0.26	0.27	U	0.27	0.27	U	0.27	0.25	U	0.25	0.25	U	0.25
Alpha-BHC	PEST	0.23	U	0.23	0.22	U	0.22	0.23	U	0.23	0.23	U	0.23	0.21	U	0.21	0.21	U	0.21
alpha-Chlordane	PEST	0.34	U	0.34	0.33	U	0.33	0.35	U	0.35	0.35	U	0.35	0.32	U	0.32	0.32	U	0.32
Beta-BHC	PEST	0.71	U	0.71	0.68	U	0.68	0.71	U	0.71	0.72	U	0.72	0.66	U	0.66	0.66	U	0.66
Delta-BHC	PEST	0.43	U	0.43	0.41	U	0.41	0.43	U	0.43	0.44	U	0.44	0.40	U	0.40	0.40	U	0.40
4,4'-DDD	PEST	0.58	U	0.58	0.56	U	0.56	0.58	U	0.58	0.59	U	0.59	0.55	U	0.55	0.54	U	0.54
4,4'-DDE	PEST	0.25	U	0.25	0.24	UN	0.24	0.25	UN	0.25	0.26	U	0.26	0.24	U	0.24	0.24	U	0.24
4,4'-DDT	PEST	0.63	U	0.63	0.60	U	0.60	0.63	U	0.63	0.64	U	0.64	0.59	U	0.59	0.59	U	0.59
Dieldrin	PEST	0.22	U	0.22	0.21	U	0.21	0.22	U	0.22	0.23	U	0.23	0.21	U	0.21	0.21	U	0.21
Endosulfan I	PEST	0.19	U	0.19	0.18	U	0.18	0.19	U	0.19	0.19	U	0.19	0.18	U	0.18	0.17	U	0.17
Endosulfan II	PEST	0.31	U	0.31	0.29	U	0.29	0.31	U	0.31	0.31	U	0.31	0.29	U	0.29	0.29	U	0.29
Endosulfan sulfate	PEST	0.29	U	0.29	0.28	U	0.28	0.30	U	0.30	0.30	U	0.30	0.28	U	0.28	0.27	U	0.27
Endrin	PEST	0.33	U	0.33	0.31	U	0.31	0.33	U	0.33	0.33	U	0.33	0.31	U	0.31	0.30	U	0.30
Endrin aldehyde	PEST	0.18	UN	0.18	0.17	U	0.17	0.18	U	0.18	0.19	U	0.19	0.17	U	0.17	0.17	U	0.17
Endrin ketone	PEST	0.52	U	0.52	0.50	U	0.50	0.52	U	0.52	0.53	U	0.53	0.49	U	0.49	0.49	U	0.49
Gamma-BHC (Lindane)	PEST	0.49	U	0.49	0.47	U	0.47	0.50	U	0.50	0.50	U	0.50	0.46	U	0.46	0.46	U	0.46
gamma-Chlordane	PEST	0.28	U	0.28	0.27	U	0.27	0.28	U	0.28	0.29	U	0.29	0.27	U	0.27	0.26	U	0.26
Heptachlor	PEST	0.23	U	0.23	0.22	U	0.22	0.23	U	0.23	0.23	U	0.23	0.21	U	0.21	0.21	U	0.21
Heptachlor epoxide	PEST	0.45	U	0.45	0.43	U	0.43	0.46	U	0.46	0.46	U	0.46	0.43	U	0.43	0.42	U	0.42
Methoxychlor	PEST	0.48	U	0.48	0.46	U	0.46	0.48	U	0.48	0.49	U	0.49	0.45	U	0.45	0.45	U	0.45
Toxaphene	PEST	17	U	17	16	U	16	17	U	17	17	U	17	16	U	16	16	U	16

Attachment	1	Sheet No.	13 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	C-2 - J1HK56			C-3 - J1HK57			C-4 - J1HK58			C-5 - J1HK59			C-6 - J1HK60			C-7 - J1HK61		
		4/28/11			4/28/11			4/28/11			4/28/11			4/28/11			4/28/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	10	U	10	10	U	10	10	U	10	9.8	U	9.8	10	U	10	10	U	10
Acenaphthylene	PAH	9.2	U	9.2	9.0	U	9.0	9.0	U	9.0	8.8	U	8.8	9.0	U	9.0	9.0	U	9.0
Anthracene	PAH	3.1	U	3.1	3.1	U	3.1	3.1	U	3.1	3.0	U	3.0	3.0	U	3.0	3.0	U	3.0
Benzo(a)anthracene	PAH	3.3	U	3.3	37		3.2	30		3.2	3.1	U	3.1	4.2	JX	3.2	13	J	3.2
Benzo(a)pyrene	PAH	6.6	U	6.6	46		6.4	25		6.4	6.3	U	6.3	8.2	J	6.4	28		6.4
Benzo(b)fluoranthene	PAH	4.3	U	4.3	40		4.2	18		4.2	4.1	U	4.1	11	J	4.2	18		4.2
Benzo(ghi)perylene	PAH	7.4	U	7.4	37		7.2	15	J	7.2	7.1	U	7.1	7.7	J	7.2	17	J	7.2
Benzo(k)fluoranthene	PAH	4.0	U	4.0	17		4.0	8.3	J	4.0	3.9	U	3.9	5.2	J	3.9	13	J	3.9
Chrysene	PAH	5.0	U	5.0	45		4.9	28	J	4.9	4.7	U	4.7	9.4	J	4.8	21	J	4.8
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	11	U	11	11	U	11	11	U	11	11	U	11
Fluoranthene	PAH	13	U	13	70		13	45		13	13	U	13	13	U	13	36	J	13
Fluorene	PAH	5.4	U	5.4	5.3	U	5.3	5.3	U	5.3	5.2	U	5.2	5.3	U	5.3	5.3	U	5.3
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	40		12	18	J	12	12	U	12	12	U	12	20	J	12
Naphthalene	PAH	12	U	12	12	U	12	12	U	12	12	U	12	12	U	12	12	U	12
Phenanthrene	PAH	12	U	12	41		12	32	J	12	12	U	12	12	U	12	14	J	12
Pyrene	PAH	12	U	12	90		12	66		12	12	U	12	12	U	12	29	JX	12
Aldrin	PEST	0.25	U	0.25	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.24	U	0.24
Alpha-BHC	PEST	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.21	U	0.21
alpha-Chlordane	PEST	0.32	U	0.32	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.31	U	0.31
Beta-BHC	PEST	0.66	U	0.66	0.68	U	0.68	0.68	U	0.68	0.68	U	0.68	0.68	U	0.68	0.65	U	0.65
Delta-BHC	PEST	0.40	U	0.40	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.39	U	0.39
4,4'-DDD	PEST	0.55	U	0.55	0.56	U	0.56	0.56	U	0.56	0.56	U	0.56	0.56	U	0.56	0.53	U	0.53
4,4'-DDE	PEST	0.24	U	0.24	0.25	U	0.25	0.55	JX	0.24	0.24	U	0.24	0.24	U	0.24	0.26	JX	0.23
4,4'-DDT	PEST	0.59	U	0.59	0.61	U	0.61	0.60	U	0.60	0.60	U	0.60	0.60	U	0.60	0.57	U	0.57
Dieldrin	PEST	0.21	U	0.21	0.22	U	0.22	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.20	U	0.20
Endosulfan I	PEST	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.17	U	0.17
Endosulfan II	PEST	0.29	U	0.29	0.30	U	0.30	0.29	U	0.29	0.29	U	0.29	0.29	U	0.29	0.28	U	0.28
Endosulfan sulfate	PEST	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.27	U	0.27
Endrin	PEST	0.31	U	0.31	0.32	U	0.32	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.30	U	0.30
Endrin aldehyde	PEST	0.17	U	0.17	0.18	U	0.18	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17
Endrin ketone	PEST	0.49	U	0.49	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.48	U	0.48
Gamma-BHC (Lindane)	PEST	0.46	U	0.46	0.48	U	0.48	0.47	U	0.47	0.47	U	0.47	0.47	U	0.47	0.45	U	0.45
gamma-Chlordane	PEST	0.27	U	0.27	0.27	U	0.27	0.27	U	0.27	0.27	U	0.27	0.27	U	0.27	0.26	U	0.26
Heptachlor	PEST	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.21	U	0.21
Heptachlor epoxide	PEST	0.43	U	0.43	0.44	U	0.44	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.41	U	0.41
Methoxychlor	PEST	0.45	U	0.45	0.46	U	0.46	0.46	U	0.46	0.46	U	0.46	0.46	U	0.46	0.44	U	0.44
Toxaphene	PEST	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16	15	U	15

Attachment	1	Sheet No.	14 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	C-8 - J1HK62			C-9 - J1HK63			C-10 - J1HK64			C-11 - J1HK65			C-12 - J1HK66			C-13 - J1HK67		
		4/28/11			4/28/11			4/28/11			4/28/11			4/28/11			4/28/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	10	U	10	9.9	U	9.9	10	U	10	9.8	U	9.8	9.8	U	9.8	10	U	10
Acenaphthylene	PAH	9.0	U	9.0	8.9	U	8.9	9.1	U	9.1	8.8	U	8.8	8.9	U	8.9	9.0	U	9.0
Anthracene	PAH	3.1	U	3.1	3.0	U	3.0	6.7	JX	3.1	3.0	U	3.0	3.0	U	3.0	3.0	U	3.0
Benzo(a)anthracene	PAH	3.2	U	3.2	24	X	3.2	43	X	3.2	27	X	3.1	96		3.1	3.2	U	3.2
Benzo(a)pyrene	PAH	6.4	U	6.4	28		6.3	43		6.5	23		6.3	88		6.3	6.4	U	6.4
Benzo(b)fluoranthene	PAH	4.2	U	4.2	20		4.1	31		4.3	21		4.1	75		4.1	5.2	JX	4.2
Benzo(ghi)perylene	PAH	7.2	U	7.2	17	J	7.1	22	J	7.3	14	J	7	64		7.1	7.2	U	7.2
Benzo(k)fluoranthene	PAH	3.9	U	3.9	9.6	J	3.9	13	J	4.0	15		3.8	36		3.9	3.9	U	3.9
Chrysene	PAH	4.8	U	4.8	28	J	4.8	41		4.9	36	J	4.7	120		4.8	5.5	JX	4.8
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	11	U	11	11	U	11	11	U	11	11	U	11
Fluoranthene	PAH	13	U	13	31	J	13	74		13	66		13	170		13	13	J	13
Fluorene	PAH	5.3	U	5.3	5.2	U	5.2	5.3	U	5.3	6.7	J	5.2	5.2	U	5.2	5.3	U	5.3
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	22	J	12	18	JX	12	18	J	12	68		12	12	U	12
Naphthalene	PAH	12	U	12	12	U	12	12	U	12	18	JX	12	12	U	12	12	U	12
Phenanthrene	PAH	12	U	12	18	J	12	73		12	120		12	130		12	12	U	12
Pyrene	PAH	12	U	12	44		12	110		12	86		12	230		12	13	J	12
Aldrin	PEST	0.26	U	0.26	0.24	U	0.24	0.25	U	0.25	0.25	U	0.25	0.26	U	0.26	0.26	U	0.26
Alpha-BHC	PEST	0.22	U	0.22	0.20	U	0.20	0.22	U	0.22	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22
alpha-Chlordane	PEST	0.33	U	0.33	0.31	U	0.31	0.33	U	0.33	0.32	U	0.32	0.33	U	0.33	0.33	U	0.33
Beta-BHC	PEST	0.68	U	0.68	0.63	U	0.63	0.67	U	0.67	0.65	U	0.65	0.69	U	0.69	0.68	U	0.68
Delta-BHC	PEST	0.41	U	0.41	0.38	U	0.38	0.41	U	0.41	0.39	U	0.39	0.42	U	0.42	0.41	U	0.41
4,4'-DDD	PEST	0.56	U	0.56	0.52	U	0.52	0.55	U	0.55	0.53	UN	0.53	0.57	U	0.57	0.56	U	0.56
4,4'-DDE	PEST	0.24	U	0.24	0.23	U	0.23	0.24	U	0.24	0.23	UN	0.23	3.4	X	0.25	0.24	U	0.24
4,4'-DDT	PEST	0.60	U	0.60	0.56	U	0.56	0.60	U	0.60	0.58	U	0.58	0.91	J	0.61	0.61	U	0.61
Dieldrin	PEST	0.21	U	0.21	0.20	U	0.20	0.21	U	0.21	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22
Endosulfan I	PEST	0.18	U	0.18	0.17	U	0.17	0.18	U	0.18	0.17	U	0.17	0.18	U	0.18	0.18	U	0.18
Endosulfan II	PEST	0.29	U	0.29	0.27	U	0.27	0.29	U	0.29	0.28	U	0.28	0.30	U	0.30	0.29	U	0.29
Endosulfan sulfate	PEST	0.28	U	0.28	0.26	U	0.26	0.28	U	0.28	0.27	U	0.27	0.29	U	0.29	0.28	U	0.28
Endrin	PEST	0.31	U	0.31	0.29	U	0.29	0.31	U	0.31	0.30	U	0.30	0.32	U	0.32	0.31	U	0.31
Endrin aldehyde	PEST	0.17	U	0.17	0.16	U	0.16	0.17	U	0.17	0.17	U	0.17	0.18	U	0.18	0.18	U	0.18
Endrin ketone	PEST	0.50	U	0.50	0.47	U	0.47	0.49	U	0.49	0.48	U	0.48	0.51	U	0.51	0.50	U	0.50
Gamma-BHC (Lindane)	PEST	0.47	U	0.47	0.44	U	0.44	0.47	U	0.47	0.45	U	0.45	0.48	U	0.48	0.48	U	0.48
gamma-Chlordane	PEST	0.27	U	0.27	0.25	U	0.25	0.27	U	0.27	0.26	U	0.26	0.28	U	0.28	0.27	U	0.27
Heptachlor	PEST	0.22	U	0.22	0.20	U	0.20	0.22	U	0.22	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22
Heptachlor epoxide	PEST	0.43	U	0.43	0.41	U	0.41	0.43	U	0.43	0.42	U	0.42	0.44	U	0.44	0.44	U	0.44
Methoxychlor	PEST	0.46	U	0.46	0.43	U	0.43	0.46	U	0.46	0.44	U	0.44	0.47	U	0.47	0.46	U	0.46
Toxaphene	PEST	16	U	16	15	U	15	16	U	16	15	U	15	16	U	16	16	U	16

Attachment	1	Sheet No.	15 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	Equipment Blank - J1HK69 4/28/11		
		ug/kg	Q	PQL
Acenaphthene	PAH	9.5	U	9.5
Acenaphthylene	PAH	8.6	U	8.6
Anthracene	PAH	2.9	U	2.9
Benzo(a)anthracene	PAH	3.0	U	3.0
Benzo(a)pyrene	PAH	6.1	U	6.1
Benzo(b)fluoranthene	PAH	4.0	U	4.0
Benzo(ghi)perylene	PAH	6.9	U	6.9
Benzo(k)fluoranthene	PAH	3.8	U	3.8
Chrysene	PAH	4.6	U	4.6
Dibenz[a,h]anthracene	PAH	10	U	10
Fluoranthene	PAH	12	U	12
Fluorene	PAH	5.0	U	5.0
Indeno(1,2,3-cd)pyrene	PAH	11	U	11
Naphthalene	PAH	11	U	11
Phenanthrene	PAH	11	U	11
Pyrene	PAH	11	U	11
Aldrin	PEST			
Alpha-BHC	PEST			
alpha-Chlordane	PEST			
Beta-BHC	PEST			
Delta-BHC	PEST			
4,4'-DDD	PEST			
4,4'-DDE	PEST			
4,4'-DDT	PEST			
Dieldrin	PEST			
Endosulfan I	PEST			
Endosulfan II	PEST			
Endosulfan sulfate	PEST			
Endrin	PEST			
Endrin aldehyde	PEST			
Endrin ketone	PEST			
Gamma-BHC (Lindane)	PEST			
gamma-Chlordane	PEST			
Heptachlor	PEST			
Heptachlor epoxide	PEST			
Methoxychlor	PEST			
Toxaphene	PEST			

Attachment	1	Sheet No.	16 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	A-3 - J1HK25			Duplicate of J1HK25 - J1HK41			A-1 - J1HK23			A-2 re-sample - J1JDW8			A-4 re-sample - J1JDW9			A-5 re-sample - J1JDX0		
		4/26/11			4/26/11			4/26/11			6/7/11			6/7/11			6/7/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.8	U	2.8	2.7	U	2.7	2.8	U	2.8	2.8	U	2.8	2.9	U	2.9	2.8	U	2.8
Aroclor-1221	PCB	8.2	U	8.2	7.8	U	7.8	8.2	U	8.2	8.2	U	8.2	8.4	U	8.4	8.1	U	8.1
Aroclor-1232	PCB	2.0	U	2.0	1.9	U	1.9	2.1	U	2.1	2.0	U	2.0	2.1	U	2.1	2.0	U	2.0
Aroclor-1242	PCB	4.8	U	4.8	4.5	U	4.5	4.8	U	4.8	4.7	U	4.7	4.9	U	4.9	4.7	U	4.7
Aroclor-1248	PCB	4.8	U	4.8	4.5	U	4.5	4.8	U	4.8	4.7	U	4.7	4.9	U	4.9	4.7	U	4.7
Aroclor-1254	PCB	2.7	U	2.7	2.5	U	2.5	2.7	U	2.7	2.6	U	2.6	2.7	U	2.7	2.6	U	2.6
Aroclor-1260	PCB	2.7	U	2.7	2.5	U	2.5	2.7	U	2.7	2.6	U	2.6	2.7	U	2.7	2.6	U	2.6
1,1,1-Trichloroethane	VOA	0.68	UJ	0.68	0.53	UJ	0.53	0.62	UJ	0.62	0.50	U	0.50	0.58	U	0.58	0.54	U	0.54
1,1,2,2-Tetrachloroethane	VOA	0.79	U	0.79	0.62	U	0.62	0.73	U	0.73	0.59	U	0.59	0.68	U	0.68	0.64	U	0.64
1,1,2-Trichloroethane	VOA	1.1	U	1.1	0.89	U	0.89	1.0	U	1.0	0.85	U	0.85	0.98	U	0.98	0.92	U	0.92
1,1-Dichloroethane	VOA	0.27	UJ	0.27	0.21	UJ	0.21	0.25	UJ	0.25	0.20	U	0.20	0.23	U	0.23	0.22	U	0.22
1,1-Dichloroethene	VOA	0.77	UJ	0.77	0.6	UJ	0.6	0.70	UJ	0.70	0.57	U	0.57	0.66	U	0.66	0.62	U	0.62
1,2-Dichloroethane	VOA	0.91	U	0.91	0.71	U	0.71	0.83	U	0.83	0.68	U	0.68	0.78	U	0.78	0.73	U	0.73
1,2-Dichloroethene(Total)	VOA	0.51	UJ	0.51	0.39	UJ	0.39	0.46	UJ	0.46	0.38	U	0.38	0.43	U	0.43	0.41	U	0.41
1,2-Dichloropropane	VOA	0.71	U	0.71	0.56	U	0.56	0.65	U	0.65	0.53	U	0.53	0.61	U	0.61	0.58	U	0.58
2-Butanone	VOA	2.4	U	2.4	1.8	U	1.8	2.2	U	2.2	1.8	U	1.8	2.0	U	2.0	1.9	U	1.9
2-Hexanone	VOA	6.4	U	6.4	4.9	U	4.9	5.8	U	5.8	4.7	U	4.7	5.4	U	5.4	5.1	U	5.1
4-Methyl-2-Pentanone	VOA	5.7	U	5.7	4.4	U	4.4	5.2	U	5.2	4.2	U	4.2	4.8	U	4.8	4.6	U	4.6
Acetone	VOA	7.0	U	7.0	5.4	U	5.4	6.4	U	6.4	5.2	U	5.2	6.0	U	6.0	5.6	U	5.6
Benzene	VOA	0.61	U	0.61	0.47	U	0.47	0.56	U	0.56	0.45	U	0.45	0.52	U	0.52	0.49	U	0.49
Bromodichloromethane	VOA	0.29	U	0.29	0.22	U	0.22	0.26	U	0.26	0.21	U	0.21	0.24	U	0.24	0.23	U	0.23
Bromoform	VOA	0.30	U	0.30	0.23	U	0.23	0.27	U	0.27	0.22	U	0.22	0.26	U	0.26	0.24	U	0.24
Bromomethane	VOA	0.65	U	0.65	0.5	U	0.5	0.59	U	0.59	0.48	U	0.48	0.56	U	0.56	0.52	U	0.52
Carbon disulfide	VOA	0.55	U	0.55	0.42	U	0.42	0.50	U	0.50	0.41	U	0.41	0.47	U	0.47	0.44	U	0.44
Carbon tetrachloride	VOA	0.82	UJ	0.82	0.64	UJ	0.64	0.75	UJ	0.75	0.61	U	0.61	0.70	U	0.70	0.66	U	0.66
Chlorobenzene	VOA	0.70	U	0.70	0.55	U	0.55	0.64	U	0.64	0.52	U	0.52	0.60	U	0.60	0.57	U	0.57
Chloroethane	VOA	1.2	U	1.2	0.9	U	0.9	1.1	U	1.1	0.86	U	0.86	0.99	U	0.99	0.93	U	0.93
Chloroform	VOA	0.38	U	0.38	0.29	U	0.29	0.34	U	0.34	0.28	U	0.28	0.32	U	0.32	0.30	U	0.30
Chloromethane	VOA	1.0	U	1.0	0.78	U	0.78	0.92	U	0.92	0.74	U	0.74	0.86	U	0.86	0.81	U	0.81
cis-1,3-Dichloropropene	VOA	1.7	U	1.7	1.3	U	1.3	1.5	U	1.5	1.2	U	1.2	1.4	U	1.4	1.4	U	1.4
Dibromochloromethane	VOA	0.74	U	0.74	0.58	U	0.58	0.68	U	0.68	0.55	U	0.55	0.63	U	0.63	0.60	U	0.60
Ethylbenzene	VOA	0.87	U	0.87	0.68	U	0.68	0.80	U	0.80	0.65	U	0.65	0.74	U	0.74	0.70	U	0.70
Methylenechloride	VOA	0.97	UJ	0.97	0.76	UJ	0.76	0.89	UJ	0.89	6.1	B	0.72	1.2	JB	0.83	1.2	JB	0.78
Styrene	VOA	0.82	U	0.82	0.64	U	0.64	0.75	U	0.75	0.61	U	0.61	0.70	U	0.70	0.66	U	0.66
Tetrachloroethene	VOA	0.77	UJ	0.77	0.60	UJ	0.60	0.70	UJ	0.70	0.57	U	0.57	0.66	U	0.66	0.62	U	0.62
Toluene	VOA	0.90	U	0.90	0.70	U	0.70	0.82	U	0.82	0.67	U	0.67	0.77	U	0.77	0.72	U	0.72
trans-1,3-Dichloropropene	VOA	0.87	U	0.87	0.68	U	0.68	0.80	U	0.80	0.65	U	0.65	0.74	U	0.74	0.70	U	0.70
Trichloroethene	VOA	0.30	UJ	0.30	0.23	UJ	0.23	0.27	UJ	0.27	0.22	U	0.22	0.26	U	0.26	0.24	U	0.24
Vinyl chloride	VOA	1.7	U	1.7	1.4	U	1.4	1.6	U	1.6	1.3	U	1.3	1.5	U	1.5	1.4	U	1.4
Xylenes (total)	VOA	0.79	U	0.79	0.62	U	0.62	0.73	U	0.73	0.59	U	0.59	0.68	U	0.68	0.64	U	0.64

Attachment	1	Sheet No.	17 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	A-6 re-sample - J1JDX1			A-7 - J1HK29			A-8 - J1HK30			A-9 re-sample - J1JDX2			A-10 - J1HK32			A-11 - J1HK33		
		6/7/11			4/26/11			4/26/11			6/7/11			4/26/11			4/26/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.8	U	2.8	2.9	U	2.9	3.0	U	3.0	3.1	U	3.1	2.9	U	2.9	2.8	U	2.8
Aroclor-1221	PCB	8.1	U	8.1	8.3	U	8.3	8.7	U	8.7	9.1	U	9.1	8.5	U	8.5	8.1	U	8.1
Aroclor-1232	PCB	2.0	U	2.0	2.1	U	2.1	2.2	U	2.2	2.3	U	2.3	2.1	U	2.1	2.0	U	2.0
Aroclor-1242	PCB	4.7	U	4.7	4.8	U	4.8	5.0	U	5.0	5.3	U	5.3	4.9	U	4.9	4.7	U	4.7
Aroclor-1248	PCB	4.7	U	4.7	4.8	U	4.8	5.0	U	5.0	5.3	U	5.3	4.9	U	4.9	4.7	U	4.7
Aroclor-1254	PCB	2.6	U	2.6	2.7	U	2.7	2.8	U	2.8	2.9	U	2.9	2.8	U	2.8	2.6	U	2.6
Aroclor-1260	PCB	2.6	U	2.6	2.7	U	2.7	2.8	U	2.8	2.9	U	2.9	2.8	U	2.8	2.6	U	2.6
1,1,1-Trichloroethane	VOA	0.55	U	0.55	0.64	UJ	0.64	0.67	UJ	0.67	0.56	U	0.56	0.58	UJ	0.58	0.53	UJ	0.53
1,1,2,2-Tetrachloroethane	VOA	0.64	U	0.64	0.76	U	0.76	0.78	U	0.78	0.65	U	0.65	0.68	U	0.68	0.62	U	0.62
1,1,2-Trichloroethane	VOA	0.93	U	0.93	1.1	U	1.1	1.1	U	1.1	0.94	U	0.94	0.98	U	0.98	0.90	U	0.90
1,1-Dichloroethane	VOA	0.22	U	0.22	0.26	UJ	0.26	0.27	UJ	0.27	0.22	U	0.22	0.23	UJ	0.23	0.21	UJ	0.21
1,1-Dichloroethene	VOA	0.62	U	0.62	0.73	UJ	0.73	0.76	UJ	0.76	0.63	U	0.63	0.66	UJX	0.66	0.60	UJ	0.60
1,2-Dichloroethane	VOA	0.74	U	0.74	0.87	U	0.87	0.90	U	0.90	0.75	U	0.75	0.78	U	0.78	0.72	U	0.72
1,2-Dichloroethene(Total)	VOA	0.41	U	0.41	0.48	UJ	0.48	0.50	UJ	0.50	0.42	U	0.42	0.44	UJX	0.44	0.40	UJ	0.40
1,2-Dichloropropane	VOA	0.58	U	0.58	0.68	U	0.68	0.70	U	0.70	0.59	U	0.59	0.61	U	0.61	0.56	U	0.56
2-Butanone	VOA	1.9	U	1.9	2.3	U	2.3	2.3	U	2.3	2.0	U	2.0	2.0	U	2.0	1.9	U	1.9
2-Hexanone	VOA	5.2	U	5.2	6.1	U	6.1	6.3	U	6.3	5.2	U	5.2	5.5	U	5.5	5.0	U	5.0
4-Methyl-2-Pentanone	VOA	4.6	U	4.6	5.4	U	5.4	5.6	U	5.6	4.7	U	4.7	4.9	U	4.9	4.5	U	4.5
Acetone	VOA	5.7	U	5.7	6.7	U	6.7	6.9	U	6.9	5.8	U	5.8	6.0	U	6.0	5.5	U	5.5
Benzene	VOA	0.50	U	0.50	0.58	U	0.58	0.60	U	0.60	0.50	U	0.50	0.52	U	0.52	0.48	U	0.48
Bromodichloromethane	VOA	0.23	U	0.23	0.27	U	0.27	0.28	U	0.28	0.24	U	0.24	0.25	U	0.25	0.23	U	0.23
Bromoform	VOA	0.24	U	0.24	0.29	U	0.29	0.29	U	0.29	0.25	U	0.25	0.26	U	0.26	0.24	U	0.24
Bromomethane	VOA	0.53	U	0.53	0.62	U	0.62	0.64	U	0.64	0.54	U	0.54	0.56	U	0.56	0.51	U	0.51
Carbon disulfide	VOA	0.44	U	0.44	0.52	U	0.52	0.54	U	0.54	0.45	U	0.45	0.47	U	0.47	0.43	U	0.43
Carbon tetrachloride	VOA	0.66	U	0.66	0.78	UJ	0.78	0.81	UJ	0.81	0.67	U	0.67	0.70	UJX	0.70	0.64	UJ	0.64
Chlorobenzene	VOA	0.57	U	0.57	0.67	U	0.67	0.69	U	0.69	0.58	U	0.58	0.60	U	0.60	0.55	U	0.55
Chloroethane	VOA	0.94	U	0.94	1.1	U	1.1	1.1	U	1.1	0.95	U	0.95	0.99	U	0.99	0.91	U	0.91
Chloroform	VOA	0.31	U	0.31	0.36	U	0.36	0.37	U	0.37	0.31	U	0.31	0.32	U	0.32	0.30	U	0.30
Chloromethane	VOA	0.81	U	0.81	0.95	U	0.95	0.99	U	0.99	0.82	U	0.82	0.86	U	0.86	0.79	U	0.79
cis-1,3-Dichloropropene	VOA	1.4	U	1.4	1.6	U	1.6	1.7	U	1.7	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3
Dibromochloromethane	VOA	0.60	U	0.60	0.71	U	0.71	0.73	U	0.73	0.61	U	0.61	0.64	U	0.64	0.58	U	0.58
Ethylbenzene	VOA	0.71	U	0.71	0.83	U	0.83	0.86	U	0.86	0.72	U	0.72	0.75	UX	0.75	0.69	U	0.69
Methylenechloride	VOA	1.0	JB	0.79	0.93	UJ	0.93	0.96	UJ	0.96	1.9	JB	0.8	0.84	UJ	0.84	0.77	UJ	0.77
Styrene	VOA	0.66	U	0.66	0.78	U	0.78	0.81	U	0.81	0.67	U	0.67	0.70	U	0.70	0.64	U	0.64
Tetrachloroethene	VOA	0.62	U	0.62	0.73	UJ	0.73	0.76	UJ	0.76	0.63	U	0.63	0.66	UJX	0.66	0.60	UJ	0.60
Toluene	VOA	0.73	U	0.73	0.86	U	0.86	0.88	U	0.88	0.74	U	0.74	0.77	U	0.77	0.71	U	0.71
trans-1,3-Dichloropropene	VOA	0.71	U	0.71	0.83	U	0.83	0.86	U	0.86	0.72	U	0.72	0.75	U	0.75	0.69	U	0.69
Trichloroethene	VOA	0.24	U	0.24	0.29	UJ	0.29	0.29	UJ	0.29	0.25	U	0.25	0.26	UJX	0.26	0.24	UJ	0.24
Vinyl chloride	VOA	1.4	U	1.4	1.7	U	1.7	1.7	U	1.7	1.4	U	1.4	1.5	U	1.5	1.4	U	1.4
Xylenes (total)	VOA	0.64	U	0.64	0.76	U	0.76	0.78	U	0.78	0.65	U	0.65	0.68	U	0.68	0.62	U	0.62

Attachment	1	Sheet No.	18 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	A-12 - J1HK34			A-13 - J1HK35			A-14 - J1HK36			A-15 - J1HK37			A-16 - J1HK38			A-17 - J1HK39		
		4/26/11			4/26/11			4/26/11			4/26/11			4/26/11			4/26/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.9	U	2.9	2.9	U	2.9	2.8	U	2.8	2.7	U	2.7	2.8	UJ	2.8	2.7	U	2.7
Aroclor-1221	PCB	8.5	U	8.5	8.3	U	8.3	8.0	U	8.0	7.9	U	7.9	8.2	UJ	8.2	7.9	U	7.9
Aroclor-1232	PCB	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0	2.0	U	2.0	2.0	UJ	2.0	2.0	U	2.0
Aroclor-1242	PCB	4.9	U	4.9	4.8	U	4.8	4.6	U	4.6	4.6	U	4.6	4.8	UJ	4.8	4.6	U	4.6
Aroclor-1248	PCB	4.9	U	4.9	4.8	U	4.8	4.6	U	4.6	4.6	U	4.6	4.8	UJ	4.8	4.6	U	4.6
Aroclor-1254	PCB	2.8	U	2.8	2.7	U	2.7	2.6	U	2.6	2.6	U	2.6	2.7	UJ	2.7	2.6	U	2.6
Aroclor-1260	PCB	2.8	U	2.8	2.7	U	2.7	2.6	U	2.6	2.6	U	2.6	2.7	UJ	2.7	2.6	U	2.6
1,1,1-Trichloroethane	VOA	0.66	UJ	0.66	0.59	UJ	0.59	0.77	UJ	0.77	0.62	UJ	0.62	0.57	UJ	0.57	0.53	UJ	0.53
1,1,2,2-Tetrachloroethane	VOA	0.77	U	0.77	0.69	U	0.69	0.91	U	0.91	0.72	U	0.72	0.67	U	0.67	0.63	U	0.63
1,1,2-Trichloroethane	VOA	1.1	U	1.1	0.99	U	0.99	1.3	U	1.3	1.0	U	1.0	0.97	U	0.97	0.90	U	0.90
1,1-Dichloroethane	VOA	0.27	UJ	0.27	0.24	UJ	0.24	0.31	UJ	0.31	0.25	UJ	0.25	0.23	UJ	0.23	0.22	UJ	0.22
1,1-Dichloroethene	VOA	0.75	UJ	0.75	0.67	UJ	0.67	0.88	UJ	0.88	0.70	UJ	0.70	0.65	UJ	0.65	0.60	UJ	0.60
1,2-Dichloroethane	VOA	0.89	U	0.89	0.79	U	0.79	1.0	U	1.0	0.83	U	0.83	0.77	U	0.77	0.72	U	0.72
1,2-Dichloroethene(Total)	VOA	0.49	UJ	0.49	0.44	UJ	0.44	0.58	UJ	0.58	0.46	UJ	0.46	0.43	UJX	0.43	0.40	UJ	0.40
1,2-Dichloropropane	VOA	0.70	U	0.70	0.62	U	0.62	0.82	U	0.82	0.65	U	0.65	0.60	U	0.60	0.56	U	0.56
2-Butanone	VOA	2.3	U	2.3	2.1	U	2.1	2.7	U	2.7	2.2	U	2.2	2.0	U	2.0	1.9	U	1.9
2-Hexanone	VOA	6.2	U	6.2	5.5	U	5.5	7.3	U	7.3	5.8	U	5.8	5.4	U	5.4	5.0	U	5.0
4-Methyl-2-Pentanone	VOA	5.5	U	5.5	4.9	U	4.9	6.5	U	6.5	5.2	U	5.2	4.8	U	4.8	4.5	U	4.5
Acetone	VOA	6.8	U	6.8	6.1	U	6.1	8.0	U	8.0	6.8	J	6.4	5.9	U	5.9	5.5	U	5.5
Benzene	VOA	0.60	U	0.60	0.53	U	0.53	0.70	U	0.70	0.56	U	0.56	0.52	U	0.52	0.48	U	0.48
Bromodichloromethane	VOA	0.28	U	0.28	0.25	U	0.25	0.33	U	0.33	0.26	U	0.26	0.24	U	0.24	0.23	U	0.23
Bromoform	VOA	0.29	U	0.29	0.26	U	0.26	0.34	U	0.34	0.27	U	0.27	0.25	U	0.25	0.24	U	0.24
Bromomethane	VOA	0.63	U	0.63	0.56	U	0.56	0.74	U	0.74	0.59	U	0.59	0.55	U	0.55	0.51	U	0.51
Carbon disulfide	VOA	0.53	U	0.53	0.47	U	0.47	0.62	U	0.62	0.50	U	0.50	0.46	U	0.46	0.43	U	0.43
Carbon tetrachloride	VOA	0.80	UJ	0.80	0.71	UJ	0.71	0.94	UJ	0.94	0.75	UJ	0.75	0.69	UJ	0.69	0.65	UJ	0.65
Chlorobenzene	VOA	0.68	U	0.68	0.61	U	0.61	0.80	U	0.80	0.64	U	0.64	0.59	U	0.59	0.55	U	0.55
Chloroethane	VOA	1.1	U	1.1	1.0	U	1.0	1.3	U	1.3	1.1	U	1.1	0.98	U	0.98	0.91	U	0.91
Chloroform	VOA	0.37	U	0.37	0.33	U	0.33	0.43	U	0.43	0.34	U	0.34	0.32	U	0.32	0.30	U	0.30
Chloromethane	VOA	0.97	U	0.97	0.87	U	0.87	1.1	U	1.1	0.91	U	0.91	0.85	U	0.85	0.79	U	0.79
cis-1,3-Dichloropropene	VOA	1.6	U	1.6	1.5	U	1.5	1.9	U	1.9	1.5	U	1.5	1.4	U	1.4	1.3	U	1.3
Dibromochloromethane	VOA	0.72	U	0.72	0.64	U	0.64	0.85	U	0.85	0.68	U	0.68	0.63	U	0.63	0.58	U	0.58
Ethylbenzene	VOA	0.85	U	0.85	0.76	U	0.76	1.0	U	1.0	0.80	U	0.80	0.74	U	0.74	0.69	U	0.69
Methylenechloride	VOA	0.95	UJ	0.95	0.85	UJ	0.85	1.1	UJ	1.1	0.89	UJ	0.89	0.82	UJ	0.82	0.77	UJ	0.77
Styrene	VOA	0.80	U	0.80	0.71	U	0.71	0.94	U	0.94	0.75	U	0.75	0.69	U	0.69	0.65	U	0.65
Tetrachloroethene	VOA	0.75	UJ	0.75	0.67	UJ	0.67	0.88	UJ	0.88	0.70	UJ	0.70	0.65	UJ	0.65	0.60	UJ	0.60
Toluene	VOA	0.87	U	0.87	0.78	U	0.78	1.0	U	1.0	0.82	U	0.82	0.76	U	0.76	0.71	U	0.71
trans-1,3-Dichloropropene	VOA	0.85	U	0.85	0.76	U	0.76	1.0	U	1.0	0.80	U	0.80	0.74	U	0.74	0.69	U	0.69
Trichloroethene	VOA	0.29	UJ	0.29	0.26	UJ	0.26	0.34	UJ	0.34	0.27	UJ	0.27	0.25	UJ	0.25	0.24	UJ	0.24
Vinyl chloride	VOA	1.7	U	1.7	1.5	U	1.5	2.0	U	2.0	1.6	U	1.6	1.5	U	1.5	1.4	U	1.4
Xylenes (total)	VOA	0.77	U	0.77	0.69	U	0.69	0.91	U	0.91	0.72	U	0.72	0.67	U	0.67	0.63	U	0.63

Attachment	1	Sheet No.	19 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	A-18 re-sample - J1JDX3			A-2 - J1HK24*			A-4 - J1HK26*			A-5 - J1HK27*			A-6 - J1HK28*			A-9 - J1HK31*		
		6/7/11			4/26/11			4/26/11			4/26/11			4/26/11			4/26/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.8	U	2.8	2.8	U	2.8	2.8	U	2.8	3.0	U	3.0	3.1	U	3.1	3.0	U	3.0
Aroclor-1221	PCB	8.1	U	8.1	8.1	U	8.1	8.1	U	8.1	8.6	U	8.6	8.9	U	8.9	8.7	U	8.7
Aroclor-1232	PCB	2.0	U	2.0	2.0	U	2.0	2.0	U	2.0	2.1	U	2.1	2.2	U	2.2	2.2	U	2.2
Aroclor-1242	PCB	4.7	U	4.7	4.7	U	4.7	4.7	U	4.7	5.0	U	5.0	5.2	U	5.2	5.1	U	5.1
Aroclor-1248	PCB	4.7	U	4.7	4.7	U	4.7	4.7	U	4.7	5.0	U	5.0	5.2	U	5.2	5.1	U	5.1
Aroclor-1254	PCB	2.6	U	2.6	2.6	U	2.6	2.6	U	2.6	4.2	JP	2.8	2.9	U	2.9	2.8	U	2.8
Aroclor-1260	PCB	2.6	U	2.6	2.6	U	2.6	2.6	U	2.6	2.8	U	2.8	2.9	U	2.9	2.8	U	2.8
1,1,1-Trichloroethane	VOA	0.60	U	0.60	0.65	UJ	0.65	0.65	UJ	0.65	0.67	UJ	0.67	1.0	UJ	1.0	0.70	UJ	0.70
1,1,2,2-Tetrachloroethane	VOA	0.71	U	0.71	0.76	U	0.76	0.76	U	0.76	0.79	U	0.79	1.2	U	1.2	0.82	U	0.82
1,1,2-Trichloroethane	VOA	1.0	U	1.0	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.7	U	1.7	1.2	U	1.2
1,1-Dichloroethane	VOA	0.24	U	0.24	0.26	UJ	0.26	0.26	UJ	0.26	0.27	UJ	0.27	0.41	UJ	0.41	0.28	UJ	0.28
1,1-Dichloroethene	VOA	0.68	U	0.68	0.74	UJ	0.74	0.74	UJ	0.74	0.76	UJ	0.76	1.2	UJ	1.2	0.79	UJ	0.79
1,2-Dichloroethane	VOA	0.81	U	0.81	0.88	U	0.88	0.88	U	0.88	0.90	U	0.90	1.4	U	1.4	0.94	U	0.94
1,2-Dichloroethene(Total)	VOA	0.45	U	0.45	0.49	UJ	0.49	0.49	UJ	0.49	0.50	UJ	0.50	0.76	UJ	0.76	0.52	UJ	0.52
1,2-Dichloropropane	VOA	0.64	U	0.64	0.69	U	0.69	0.69	U	0.69	0.71	U	0.71	1.1	U	1.1	0.74	U	0.74
2-Butanone	VOA	2.1	U	2.1	2.3	U	2.3	2.3	U	2.3	2.4	U	2.4	3.6	U	3.6	2.5	U	2.5
2-Hexanone	VOA	5.7	U	5.7	6.1	U	6.1	6.1	U	6.1	6.3	U	6.3	9.5	U	9.5	6.6	U	6.6
4-Methyl-2-Pentanone	VOA	5.1	U	5.1	5.5	U	5.5	5.5	U	5.5	5.6	U	5.6	8.5	U	8.5	5.9	U	5.9
Acetone	VOA	6.2	U	6.2	13	J	6.7	6.7	U	6.7	7.0	U	7.0	11	U	11	7.2	U	7.2
Benzene	VOA	0.54	U	0.54	0.59	U	0.59	0.59	U	0.59	0.61	U	0.61	0.92	U	0.92	0.63	U	0.63
Bromodichloromethane	VOA	0.25	U	0.25	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.43	U	0.43	0.30	U	0.30
Bromoform	VOA	0.27	U	0.27	0.29	U	0.29	0.29	U	0.29	0.30	U	0.30	0.45	U	0.45	0.31	U	0.31
Bromomethane	VOA	0.58	U	0.58	0.63	U	0.63	0.63	U	0.63	0.65	U	0.65	0.98	U	0.98	0.67	U	0.67
Carbon disulfide	VOA	0.49	U	0.49	0.53	U	0.53	0.53	U	0.53	0.54	U	0.54	0.82	U	0.82	0.56	U	0.56
Carbon tetrachloride	VOA	0.73	U	0.73	0.79	UJ	0.79	0.79	UJ	0.79	0.81	UJ	0.81	1.2	UJ	1.2	0.85	UJ	0.85
Chlorobenzene	VOA	0.63	U	0.63	0.68	U	0.68	0.68	U	0.68	0.70	U	0.70	1.1	U	1.1	0.73	U	0.73
Chloroethane	VOA	1.0	U	1.0	1.1	U	1.1	1.1	U	1.1	1.2	U	1.2	1.7	U	1.7	1.2	U	1.2
Chloroform	VOA	0.34	U	0.34	0.36	U	0.36	0.36	U	0.36	0.37	U	0.37	0.57	U	0.57	0.39	U	0.39
Chloromethane	VOA	0.89	U	0.89	0.96	U	0.96	0.96	U	0.96	1.0	U	1.0	1.5	U	1.5	1.0	U	1.0
cis-1,3-Dichloropropene	VOA	1.5	U	1.5	1.6	U	1.6	1.6	U	1.6	1.7	U	1.7	2.5	U	2.5	1.7	U	1.7
Dibromochloromethane	VOA	0.66	U	0.66	0.71	U	0.71	0.71	U	0.71	0.74	U	0.74	1.1	U	1.1	0.77	U	0.77
Ethylbenzene	VOA	0.78	U	0.78	0.84	U	0.84	0.84	U	0.84	0.87	U	0.87	1.3	U	1.3	0.90	U	0.90
Methylenechloride	VOA	1.3	JB	0.87	0.94	UJ	0.94	0.94	UJ	0.94	0.97	UJ	0.97	1.5	UJ	1.5	1.0	UJ	1.0
Styrene	VOA	0.73	U	0.73	0.79	U	0.79	0.79	U	0.79	0.81	U	0.81	1.2	U	1.2	0.85	U	0.85
Tetrachloroethene	VOA	0.68	U	0.68	0.74	UJ	0.74	0.74	UJ	0.74	0.76	UJ	0.76	1.2	UJ	1.2	0.79	UJ	0.79
Toluene	VOA	0.80	U	0.80	0.86	U	0.86	0.86	U	0.86	0.89	U	0.89	1.3	U	1.3	0.93	U	0.93
trans-1,3-Dichloropropene	VOA	0.78	U	0.78	0.84	U	0.84	0.84	U	0.84	0.87	U	0.87	1.3	U	1.3	0.90	U	0.90
Trichloroethene	VOA	0.27	U	0.27	0.29	UJ	0.29	0.29	UJ	0.29	0.30	UJ	0.30	0.45	UJ	0.45	0.31	UJ	0.31
Vinyl chloride	VOA	1.6	U	1.6	1.7	U	1.7	1.7	U	1.7	1.7	U	1.7	2.6	U	2.6	1.8	U	1.8
Xylenes (total)	VOA	0.71	U	0.71	0.76	U	0.76	0.76	U	0.76	0.79	U	0.79	1.2	U	1.2	0.82	U	0.82

Attachment	1	Sheet No.	20 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	A-18 - J1HK40 *			B-6 - J1HK47			Duplicate of J1HK47 - J1HK54			B-1 - J1HK42			B-2 - J1HK43			B-3 - J1HK44		
		4/26/11			4/27/11			4/27/11			4/27/11			4/27/11			4/27/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.7	U	2.7	2.7	U	2.7	3.0	U	3.0	2.9	U	2.9	2.7	U	2.7	2.8	U	2.8
Aroclor-1221	PCB	7.9	U	7.9	7.8	U	7.8	8.8	U	8.8	8.3	U	8.3	7.9	U	7.9	8.2	U	8.2
Aroclor-1232	PCB	2.0	U	2.0	2.0	U	2.0	2.2	U	2.2	2.1	U	2.1	2.0	U	2.0	2.1	U	2.1
Aroclor-1242	PCB	4.6	U	4.6	4.6	U	4.6	5.1	U	5.1	4.8	U	4.8	4.6	U	4.6	4.8	U	4.8
Aroclor-1248	PCB	4.6	U	4.6	4.6	U	4.6	5.1	U	5.1	4.8	U	4.8	4.6	U	4.6	4.8	U	4.8
Aroclor-1254	PCB	2.6	U	2.6	2.5	U	2.5	2.8	U	2.8	2.7	U	2.7	2.6	U	2.6	2.7	U	2.7
Aroclor-1260	PCB	2.6	U	2.6	2.5	U	2.5	2.8	U	2.8	2.7	U	2.7	2.6	U	2.6	2.7	U	2.7
1,1,1-Trichloroethane	VOA	0.55	UJ	0.55	0.58	U	0.58	0.62	U	0.62	0.80	U	0.80	0.59	U	0.59	0.53	U	0.53
1,1,2,2-Tetrachloroethane	VOA	0.64	U	0.64	0.67	U	0.67	0.73	U	0.73	0.94	U	0.94	0.69	U	0.69	0.62	U	0.62
1,1,2-Trichloroethane	VOA	0.93	U	0.93	0.97	U	0.97	1.0	U	1.0	1.4	U	1.4	1.0	U	1.0	0.90	U	0.90
1,1-Dichloroethane	VOA	0.22	UJ	0.22	0.23	U	0.23	0.25	U	0.25	0.33	U	0.33	0.24	U	0.24	0.22	U	0.22
1,1-Dichloroethene	VOA	0.62	UJ	0.62	0.65	U	0.65	0.70	U	0.70	0.91	U	0.91	0.67	U	0.67	0.60	U	0.60
1,2-Dichloroethane	VOA	0.74	U	0.74	0.77	U	0.77	0.83	U	0.83	1.1	U	1.1	0.80	U	0.80	0.72	U	0.72
1,2-Dichloroethene(Total)	VOA	0.41	UJ	0.41	0.43	U	0.43	0.47	U	0.47	0.60	U	0.60	0.44	U	0.44	0.40	U	0.40
1,2-Dichloropropane	VOA	0.58	U	0.58	0.61	U	0.61	0.66	U	0.66	0.85	U	0.85	0.63	U	0.63	0.56	U	0.56
2-Butanone	VOA	1.9	U	1.9	2.0	U	2.0	6.9	J	2.2	2.8	U	2.8	2.1	U	2.1	1.9	U	1.9
2-Hexanone	VOA	5.2	U	5.2	5.4	U	5.4	5.8	U	5.8	7.6	U	7.6	5.6	U	5.6	5.0	U	5.0
4-Methyl-2-Pentanone	VOA	4.6	U	4.6	4.8	U	4.8	5.2	U	5.2	6.7	U	6.7	5.0	U	5.0	4.5	U	4.5
Acetone	VOA	5.7	U	5.7	11	J	6.0	30		6.4	8.3	U	8.3	6.1	U	6.1	5.5	U	5.5
Benzene	VOA	0.50	U	0.50	0.52	U	0.52	0.56	U	0.56	0.73	U	0.73	0.53	U	0.53	0.48	U	0.48
Bromodichloromethane	VOA	0.23	U	0.23	0.24	U	0.24	0.26	U	0.26	0.34	U	0.34	0.25	U	0.25	0.23	U	0.23
Bromoform	VOA	0.24	U	0.24	0.25	U	0.25	0.27	U	0.27	0.36	U	0.36	0.26	U	0.26	0.24	U	0.24
Bromomethane	VOA	0.53	U	0.53	0.55	U	0.55	0.60	U	0.60	0.77	U	0.77	0.57	U	0.57	0.51	U	0.51
Carbon disulfide	VOA	0.44	U	0.44	0.46	U	0.46	0.50	U	0.50	0.65	U	0.65	0.48	U	0.48	0.43	U	0.43
Carbon tetrachloride	VOA	0.66	UJ	0.66	0.70	U	0.70	0.75	U	0.75	0.98	U	0.98	0.72	U	0.72	0.65	U	0.65
Chlorobenzene	VOA	0.57	U	0.57	0.60	U	0.60	0.64	U	0.64	0.84	U	0.84	0.61	U	0.61	0.55	U	0.55
Chloroethane	VOA	0.94	U	0.94	0.98	U	0.98	1.1	U	1.1	1.4	U	1.4	1.0	U	1.0	0.91	U	0.91
Chloroform	VOA	0.31	U	0.31	0.32	U	0.32	0.35	U	0.35	0.45	U	0.45	0.33	U	0.33	0.30	U	0.30
Chloromethane	VOA	0.81	U	0.81	0.85	U	0.85	0.92	U	0.92	1.2	U	1.2	0.88	U	0.88	0.79	U	0.79
cis-1,3-Dichloropropene	VOA	1.4	U	1.4	1.4	U	1.4	1.5	U	1.5	2.0	U	2.0	1.5	U	1.5	1.3	U	1.3
Dibromochloromethane	VOA	0.60	U	0.60	0.63	U	0.63	0.68	U	0.68	0.88	U	0.88	0.65	U	0.65	0.58	U	0.58
Ethylbenzene	VOA	0.71	U	0.71	0.74	U	0.74	0.80	U	0.80	1.0	U	1.0	0.76	U	0.76	0.69	U	0.69
Methylenechloride	VOA	0.79	UJ	0.79	0.83	U	0.83	0.89	U	0.89	1.2	U	1.2	0.85	U	0.85	0.77	U	0.77
Styrene	VOA	0.66	U	0.66	0.70	U	0.70	0.75	U	0.75	0.98	U	0.98	0.72	U	0.72	0.65	U	0.65
Tetrachloroethene	VOA	0.62	UJ	0.62	0.65	U	0.65	0.70	U	0.70	0.91	U	0.91	0.67	U	0.67	0.60	U	0.60
Toluene	VOA	0.73	U	0.73	0.76	U	0.76	0.82	U	0.82	1.1	U	1.1	0.78	U	0.78	0.71	U	0.71
trans-1,3-Dichloropropene	VOA	0.71	U	0.71	0.74	U	0.74	0.80	U	0.80	1.0	U	1.0	0.76	U	0.76	0.69	U	0.69
Trichloroethene	VOA	0.24	UJ	0.24	0.25	U	0.25	0.27	U	0.27	0.36	U	0.36	0.26	U	0.26	0.24	U	0.24
Vinyl chloride	VOA	1.4	U	1.4	1.5	U	1.5	1.6	U	1.6	2.1	U	2.1	1.5	U	1.5	1.4	U	1.4
Xylenes (total)	VOA	0.64	U	0.64	0.67	U	0.67	0.73	U	0.73	0.94	U	0.94	0.69	U	0.69	0.62	U	0.62

Attachment	1	Sheet No.	21 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	B-4 - J1HK45			B-5 - J1HK46			B-7 - J1HK48			B-8 - J1HK49			B-9 - J1HK50			B-10 - J1HK51		
		4/27/11			4/27/11			4/27/11			4/27/11			4/27/11			4/27/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.8	U	2.8	2.8	U	2.8	2.8	U	2.8	2.8	U	2.8	2.7	U	2.7	2.8	U	2.8
Aroclor-1221	PCB	8.2	U	8.2	8.1	U	8.1	8.0	U	8.0	8.0	U	8.0	7.9	U	7.9	8.2	U	8.2
Aroclor-1232	PCB	2.0	U	2.0	2.0	U	2.0	2.0	U	2.0	2.0	U	2.0	2.0	U	2.0	2.1	U	2.1
Aroclor-1242	PCB	4.7	U	4.7	4.7	U	4.7	4.7	U	4.7	4.6	U	4.6	4.6	U	4.6	4.8	U	4.8
Aroclor-1248	PCB	4.7	U	4.7	4.7	U	4.7	4.7	U	4.7	4.6	U	4.6	4.6	U	4.6	4.8	U	4.8
Aroclor-1254	PCB	2.6	U	2.6	2.6	U	2.6	2.6	U	2.6	2.6	U	2.6	2.6	U	2.6	2.7	U	2.7
Aroclor-1260	PCB	2.6	U	2.6	2.6	U	2.6	2.6	U	2.6	2.6	U	2.6	2.6	U	2.6	2.7	U	2.7
1,1,1-Trichloroethane	VOA	0.61	U	0.61	0.69	U	0.69	0.57	U	0.57	0.58	U	0.58	0.62	U	0.62	0.59	U	0.59
1,1,2,2-Tetrachloroethane	VOA	0.72	U	0.72	0.81	U	0.81	0.67	U	0.67	0.68	U	0.68	0.73	U	0.73	0.70	U	0.70
1,1,2-Trichloroethane	VOA	1.0	U	1.0	1.2	U	1.2	0.96	U	0.96	0.98	U	0.98	1.0	U	1.0	1.0	U	1.0
1,1-Dichloroethane	VOA	0.25	U	0.25	0.28	U	0.28	0.23	U	0.23	0.23	U	0.23	0.25	U	0.25	0.24	U	0.24
1,1-Dichloroethene	VOA	0.69	U	0.69	0.78	U	0.78	0.64	U	0.64	0.66	U	0.66	0.70	U	0.70	0.67	U	0.67
1,2-Dichloroethane	VOA	0.82	U	0.82	0.93	U	0.93	0.76	U	0.76	0.78	U	0.78	0.83	U	0.83	0.80	U	0.80
1,2-Dichloroethene(Total)	VOA	0.46	U	0.46	0.52	U	0.52	0.43	U	0.43	0.43	U	0.43	0.46	U	0.46	0.45	U	0.45
1,2-Dichloropropane	VOA	0.65	U	0.65	0.73	U	0.73	0.60	U	0.60	0.61	U	0.61	0.66	U	0.66	0.63	U	0.63
2-Butanone	VOA	2.1	U	2.1	2.4	U	2.4	2.0	U	2.0	2.0	U	2.0	2.2	U	2.2	2.1	U	2.1
2-Hexanone	VOA	5.7	U	5.7	6.5	U	6.5	5.3	U	5.3	5.4	U	5.4	5.8	U	5.8	5.6	U	5.6
4-Methyl-2-Pentanone	VOA	5.1	U	5.1	5.8	U	5.8	4.8	U	4.8	4.8	U	4.8	5.2	U	5.2	5.0	U	5.0
Acetone	VOA	6.3	U	6.3	7.1	U	7.1	5.9	U	5.9	6.0	U	6.0	6.4	U	6.4	6.2	U	6.2
Benzene	VOA	0.55	U	0.55	0.62	U	0.62	0.51	U	0.51	0.52	U	0.52	0.56	U	0.56	0.54	U	0.54
Bromodichloromethane	VOA	0.26	U	0.26	0.29	U	0.29	0.24	U	0.24	0.24	U	0.24	0.26	U	0.26	0.25	U	0.25
Bromoform	VOA	0.27	U	0.27	0.30	U	0.30	0.25	U	0.25	0.26	U	0.26	0.27	U	0.27	0.26	U	0.26
Bromomethane	VOA	0.59	U	0.59	0.66	U	0.66	0.55	U	0.55	0.56	U	0.56	0.60	U	0.60	0.57	U	0.57
Carbon disulfide	VOA	0.49	U	0.49	0.56	U	0.56	0.46	U	0.46	0.47	U	0.47	0.50	U	0.50	0.48	U	0.48
Carbon tetrachloride	VOA	0.74	U	0.74	0.83	U	0.83	0.69	U	0.69	0.70	U	0.70	0.75	U	0.75	0.72	U	0.72
Chlorobenzene	VOA	0.63	U	0.63	0.72	U	0.72	0.59	U	0.59	0.60	U	0.60	0.64	U	0.64	0.62	U	0.62
Chloroethane	VOA	1	U	1	1.2	U	1.2	0.97	U	0.97	0.99	U	0.99	1.1	U	1.1	1.0	U	1.0
Chloroform	VOA	0.34	U	0.34	0.38	U	0.38	0.32	U	0.32	0.32	U	0.32	0.35	U	0.35	0.33	U	0.33
Chloromethane	VOA	0.90	U	0.90	1	U	1	0.84	U	0.84	0.86	U	0.86	0.92	U	0.92	0.88	U	0.88
cis-1,3-Dichloropropene	VOA	1.5	U	1.5	1.7	U	1.7	1.4	U	1.4	1.4	U	1.4	1.5	U	1.5	1.5	U	1.5
Dibromochloromethane	VOA	0.67	U	0.67	0.76	U	0.76	0.62	U	0.62	0.63	U	0.63	0.68	U	0.68	0.65	U	0.65
Ethylbenzene	VOA	0.79	U	0.79	0.89	U	0.89	0.73	U	0.73	0.74	U	0.74	0.80	UX	0.80	0.77	U	0.77
Methylenechloride	VOA	0.88	U	0.88	0.99	U	0.99	0.82	U	0.82	0.83	U	0.83	0.89	U	0.89	0.86	U	0.86
Styrene	VOA	0.74	U	0.74	0.83	U	0.83	0.69	U	0.69	0.70	U	0.70	0.75	U	0.75	0.72	U	0.72
Tetrachloroethene	VOA	0.69	U	0.69	0.78	U	0.78	0.64	U	0.64	0.66	U	0.66	0.70	U	0.70	0.67	U	0.67
Toluene	VOA	0.81	U	0.81	0.91	U	0.91	0.75	U	0.75	0.77	U	0.77	0.82	U	0.82	0.79	U	0.79
trans-1,3-Dichloropropene	VOA	0.79	U	0.79	0.89	U	0.89	0.73	U	0.73	0.74	U	0.74	0.80	U	0.80	0.77	U	0.77
Trichloroethene	VOA	0.27	U	0.27	0.30	U	0.30	0.25	U	0.25	0.26	U	0.26	0.27	UX	0.27	0.26	U	0.26
Vinyl chloride	VOA	1.6	U	1.6	1.8	U	1.8	1.5	U	1.5	1.5	U	1.5	1.6	U	1.6	1.5	U	1.5
Xylenes (total)	VOA	0.72	U	0.72	0.81	U	0.81	0.67	U	0.67	0.68	U	0.68	0.73	U	0.73	0.70	U	0.70

Attachment	1	Sheet No.	22 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	B-11 re-sample 2 - J1JW46			B-12 - J1HK53			B-11 - J1HK52 *			B-11 re-sample - J1JDX4			C-1 - J1HK55			Duplicate of J1HK55 - J1HK68		
		6/22/11			4/27/11			4/27/11			6/7/11			4/28/11			4/28/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.9	U	2.9	2.7	U	2.7	2.9	U	2.9	3.0	U	3.0	2.8	U	2.8	2.8	U	2.8
Aroclor-1221	PCB	8.5	U	8.5	7.9	U	7.9	8.3	U	8.3	8.7	U	8.7	8.1	U	8.1	8.2	U	8.2
Aroclor-1232	PCB	2.1	U	2.1	2.0	U	2.0	2.1	U	2.1	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1
Aroclor-1242	PCB	5.0	U	5.0	4.6	U	4.6	4.8	U	4.8	5.0	U	5.0	4.7	U	4.7	4.8	U	4.8
Aroclor-1248	PCB	5.0	U	5.0	4.6	U	4.6	4.8	U	4.8	5.0	U	5.0	4.7	U	4.7	4.8	U	4.8
Aroclor-1254	PCB	2.8	U	2.8	2.6	U	2.6	2.7	U	2.7	2.8	U	2.8	2.6	U	2.6	2.7	U	2.7
Aroclor-1260	PCB	2.8	U	2.8	2.6	U	2.6	2.7	U	2.7	2.8	U	2.8	2.6	U	2.6	2.7	U	2.7
1,1,1-Trichloroethane	VOA	0.52	U	0.52	0.55	U	0.55	0.55	U	0.55	0.81	U	0.81	0.52	U	0.52	0.56	U	0.56
1,1,2,2-Tetrachloroethane	VOA	0.61	U	0.61	0.64	U	0.64	0.65	U	0.65	0.95	U	0.95	0.62	U	0.62	0.66	U	0.66
1,1,2-Trichloroethane	VOA	0.88	U	0.88	0.93	U	0.93	0.94	U	0.94	1.4	U	1.4	0.89	U	0.89	0.95	U	0.95
1,1-Dichloroethane	VOA	0.21	U	0.21	0.22	U	0.22	0.22	U	0.22	0.33	U	0.33	0.21	U	0.21	0.23	U	0.23
1,1-Dichloroethene	VOA	0.59	U	0.59	0.62	U	0.62	0.63	U	0.63	0.92	U	0.92	0.60	U	0.60	0.64	U	0.64
1,2-Dichloroethane	VOA	0.70	U	0.70	0.74	U	0.74	0.74	U	0.74	1.1	U	1.1	0.71	U	0.71	0.76	U	0.76
1,2-Dichloroethene(Total)	VOA	0.39	U	0.39	0.41	U	0.41	0.41	U	0.41	0.61	U	0.61	0.39	U	0.39	0.42	U	0.42
1,2-Dichloropropane	VOA	0.55	U	0.55	0.58	U	0.58	0.58	U	0.58	0.86	U	0.86	0.56	U	0.56	0.60	U	0.60
2-Butanone	VOA	1.8	U	1.8	1.9	U	1.9	1.9	U	1.9	2.9	U	2.9	1.8	U	1.8	2.0	U	2.0
2-Hexanone	VOA	4.9	U	4.9	5.2	U	5.2	5.2	U	5.2	7.6	U	7.6	4.9	U	4.9	5.3	U	5.3
4-Methyl-2-Pentanone	VOA	4.4	U	4.4	4.6	U	4.6	4.6	U	4.6	6.8	U	6.8	4.4	U	4.4	4.7	U	4.7
Acetone	VOA	5.4	U	5.4	5.7	U	5.7	5.7	U	5.7	8.4	U	8.4	5.4	U	5.4	5.8	U	5.8
Benzene	VOA	0.47	U	0.47	0.50	U	0.50	0.50	U	0.50	0.73	U	0.73	0.47	U	0.47	0.51	U	0.51
Bromodichloromethane	VOA	0.22	U	0.22	0.23	U	0.23	0.23	U	0.23	0.34	U	0.34	0.22	U	0.22	0.24	U	0.24
Bromoform	VOA	0.23	U	0.23	0.24	U	0.24	0.24	U	0.24	0.36	U	0.36	0.23	U	0.23	0.25	U	0.25
Bromomethane	VOA	0.50	U	0.50	0.53	U	0.53	0.53	U	0.53	0.78	U	0.78	0.50	U	0.50	0.54	U	0.54
Carbon disulfide	VOA	0.42	U	0.42	0.44	U	0.44	0.45	U	0.45	0.65	U	0.65	0.42	U	0.42	0.45	U	0.45
Carbon tetrachloride	VOA	0.63	U	0.63	0.66	U	0.66	0.67	U	0.67	0.98	U	0.98	0.64	U	0.64	0.68	U	0.68
Chlorobenzene	VOA	0.54	U	0.54	0.57	U	0.57	0.57	U	0.57	0.84	U	0.84	0.55	U	0.55	0.58	U	0.58
Chloroethane	VOA	0.89	U	0.89	0.94	U	0.94	0.95	U	0.95	1.4	U	1.4	0.9	U	0.9	0.96	U	0.96
Chloroform	VOA	0.29	U	0.29	0.31	U	0.31	0.31	U	0.31	0.45	U	0.45	0.29	U	0.29	0.31	U	0.31
Chloromethane	VOA	0.77	U	0.77	0.81	U	0.81	0.82	U	0.82	1.2	U	1.2	0.78	U	0.78	0.83	U	0.83
cis-1,3-Dichloropropene	VOA	1.3	U	1.3	1.4	U	1.4	1.4	U	1.4	2.0	U	2.0	1.3	U	1.3	1.4	U	1.4
Dibromochloromethane	VOA	0.57	U	0.57	0.60	U	0.60	0.61	U	0.61	0.89	U	0.89	0.58	U	0.58	0.62	U	0.62
Ethylbenzene	VOA	0.67	U	0.67	0.71	U	0.71	0.71	U	0.71	1.0	U	1.0	0.68	U	0.68	0.73	U	0.73
Methylenechloride	VOA	11	T	0.75	0.79	U	0.79	0.80	U	0.80	1.2	JB	1.2	0.76	U	0.76	1.0	JB	0.81
Styrene	VOA	0.63	U	0.63	0.66	U	0.66	0.67	U	0.67	0.98	U	0.98	0.64	U	0.64	0.68	U	0.68
Tetrachloroethene	VOA	0.59	U	0.59	0.62	U	0.62	0.63	U	0.63	0.92	U	0.92	0.60	U	0.60	0.64	U	0.64
Toluene	VOA	0.69	U	0.69	0.73	U	0.73	0.73	U	0.73	1.1	U	1.1	0.70	U	0.70	0.75	U	0.75
trans-1,3-Dichloropropene	VOA	0.67	U	0.67	0.71	U	0.71	0.71	U	0.71	1.0	U	1.0	0.68	U	0.68	0.73	U	0.73
Trichloroethene	VOA	0.23	U	0.23	0.24	U	0.24	0.24	U	0.24	0.36	U	0.36	0.23	U	0.23	0.25	U	0.25
Vinyl chloride	VOA	1.3	U	1.3	1.4	U	1.4	1.4	U	1.4	2.1	U	2.1	1.4	U	1.4	1.5	U	1.5
Xylenes (total)	VOA	0.61	U	0.61	0.64	U	0.64	0.65	U	0.65	0.95	U	0.95	0.62	U	0.62	0.66	U	0.66

Attachment	1	Sheet No.	23 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	C-2 - J1HK56			C-3 - J1HK57			C-4 - J1HK58			C-5 - J1HK59			C-6 - J1HK60			C-7 - J1HK61		
		4/28/11			4/28/11			4/28/11			4/28/11			4/28/11			4/28/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.9	U	2.9	2.9	U	2.9	2.8	U	2.8	2.9	U	2.9	2.9	U	2.9	2.7	U	2.7
Aroclor-1221	PCB	8.3	U	8.3	8.4	U	8.4	8.1	U	8.1	8.3	U	8.3	8.3	U	8.3	7.8	U	7.8
Aroclor-1232	PCB	2.1	U	2.1	2.1	U	2.1	2.00	U	2.00	2.1	U	2.1	2.1	U	2.1	1.9	U	1.9
Aroclor-1242	PCB	4.8	U	4.8	4.9	U	4.9	4.7	U	4.7	4.8	U	4.8	4.8	U	4.8	4.5	U	4.5
Aroclor-1248	PCB	4.8	U	4.8	4.9	U	4.9	4.7	U	4.7	4.8	U	4.8	4.8	U	4.8	4.5	U	4.5
Aroclor-1254	PCB	2.7	U	2.7	2.7	U	2.7	2.6	U	2.6	2.7	U	2.7	2.7	U	2.7	2.5	U	2.5
Aroclor-1260	PCB	2.7	U	2.7	2.7	U	2.7	2.6	U	2.6	2.7	U	2.7	2.7	U	2.7	2.5	U	2.5
1,1,1-Trichloroethane	VOA	0.50	U	0.50	0.63	U	0.63	0.74	U	0.74	0.57	U	0.57	0.55	U	0.55	0.31	U	0.31
1,1,2,2-Tetrachloroethane	VOA	0.58	U	0.58	0.74	U	0.74	0.87	U	0.87	0.67	U	0.67	0.65	U	0.65	0.36	U	0.36
1,1,2-Trichloroethane	VOA	0.84	U	0.84	1.1	U	1.1	1.3	U	1.3	0.96	U	0.96	0.93	U	0.93	0.52	U	0.52
1,1-Dichloroethane	VOA	0.20	U	0.20	0.25	U	0.25	0.30	U	0.30	0.23	U	0.23	0.22	U	0.22	0.13	U	0.13
1,1-Dichloroethene	VOA	0.56	U	0.56	0.72	U	0.72	0.84	U	0.84	0.65	U	0.65	0.62	U	0.62	0.35	U	0.35
1,2-Dichloroethane	VOA	0.67	U	0.67	0.85	U	0.85	1.0	U	1.0	0.77	U	0.77	0.74	U	0.74	0.42	U	0.42
1,2-Dichloroethene(Total)	VOA	0.37	U	0.37	0.47	U	0.47	0.56	U	0.56	0.43	U	0.43	0.41	U	0.41	0.23	U	0.23
1,2-Dichloropropane	VOA	0.52	U	0.52	0.67	U	0.67	0.79	U	0.79	0.6	U	0.6	0.58	U	0.58	0.33	U	0.33
2-Butanone	VOA	1.7	U	1.7	2.2	U	2.2	2.6	U	2.6	2.0	U	2.0	1.9	U	1.9	1.1	U	1.1
2-Hexanone	VOA	4.7	U	4.7	5.9	U	5.9	7.0	U	7.0	5.4	U	5.4	5.2	U	5.2	2.9	U	2.9
4-Methyl-2-Pentanone	VOA	4.2	U	4.2	5.3	U	5.3	6.2	U	6.2	4.8	U	4.8	4.6	U	4.6	2.6	U	2.6
Acetone	VOA	5.1	U	5.1	6.5	U	6.5	7.7	U	7.7	5.9	U	5.9	5.7	U	5.7	3.2	U	3.2
Benzene	VOA	0.45	U	0.45	0.57	U	0.57	0.67	U	0.67	0.52	U	0.52	0.50	U	0.50	0.28	U	0.28
Bromodichloromethane	VOA	0.21	U	0.21	0.27	U	0.27	0.31	U	0.31	0.24	U	0.24	0.23	U	0.23	0.13	U	0.13
Bromoform	VOA	0.22	U	0.22	0.28	U	0.28	0.33	U	0.33	0.25	U	0.25	0.24	U	0.24	0.14	U	0.14
Bromomethane	VOA	0.48	U	0.48	0.61	U	0.61	0.71	U	0.71	0.55	U	0.55	0.53	U	0.53	0.30	U	0.30
Carbon disulfide	VOA	0.40	U	0.40	0.51	U	0.51	0.60	U	0.60	0.46	U	0.46	0.44	U	0.44	0.25	U	0.25
Carbon tetrachloride	VOA	0.60	U	0.60	0.76	U	0.76	0.90	U	0.90	0.69	U	0.69	0.67	U	0.67	0.38	U	0.38
Chlorobenzene	VOA	0.51	U	0.51	0.66	U	0.66	0.77	U	0.77	0.59	U	0.59	0.57	U	0.57	0.32	U	0.32
Chloroethane	VOA	0.85	U	0.85	1.1	U	1.1	1.3	U	1.3	0.98	U	0.98	0.94	U	0.94	0.53	U	0.53
Chloroform	VOA	0.28	U	0.28	0.35	U	0.35	0.41	U	0.41	0.32	U	0.32	0.31	U	0.31	0.17	U	0.17
Chloromethane	VOA	0.73	U	0.73	0.93	U	0.93	1.1	U	1.1	0.84	U	0.84	0.81	U	0.81	0.46	U	0.46
cis-1,3-Dichloropropene	VOA	1.2	U	1.2	1.6	U	1.6	1.8	U	1.8	1.4	U	1.4	1.4	U	1.4	0.77	U	0.77
Dibromochloromethane	VOA	0.54	U	0.54	0.69	U	0.69	0.81	U	0.81	0.63	U	0.63	0.60	U	0.60	0.34	U	0.34
Ethylbenzene	VOA	0.64	U	0.64	0.81	U	0.81	0.96	U	0.96	0.73	U	0.73	0.71	U	0.71	0.40	U	0.40
Methylenechloride	VOA	0.71	U	0.71	0.71	U	0.71	1.1	U	1.1	0.82	U	0.82	0.79	U	0.79	0.45	U	0.45
Styrene	VOA	0.6	U	0.6	0.76	U	0.76	0.9	U	0.9	0.69	U	0.69	0.67	U	0.67	0.38	U	0.38
Tetrachloroethene	VOA	0.56	U	0.56	0.72	U	0.72	0.84	U	0.84	0.65	U	0.65	0.62	U	0.62	0.35	U	0.35
Toluene	VOA	0.66	U	0.66	0.84	U	0.84	0.99	U	0.99	0.76	U	0.76	0.73	U	0.73	0.41	U	0.41
trans-1,3-Dichloropropene	VOA	0.64	U	0.64	0.81	U	0.81	0.96	U	0.96	0.73	U	0.73	0.71	U	0.71	0.40	U	0.40
Trichloroethene	VOA	0.22	U	0.22	0.28	U	0.28	0.33	U	0.33	0.25	U	0.25	0.24	U	0.24	0.14	U	0.14
Vinyl chloride	VOA	1.3	U	1.3	1.6	U	1.6	1.9	U	1.9	1.5	U	1.5	1.4	U	1.4	0.80	U	0.80
Xylenes (total)	VOA	0.58	U	0.58	0.74	U	0.74	0.87	U	0.87	0.67	U	0.67	0.65	U	0.65	0.36	U	0.36

Attachment	1	Sheet No.	24 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	C-8 - J1HK62			C-9 - J1HK63			C-10 - J1HK64			C-11 - J1HK65			C-12 - J1HK66			C-13 - J1HK67		
		4/28/11			4/28/11			4/28/11			4/28/11			4/28/11			4/28/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.9	U	2.9	2.7	U	2.7	2.9	U	2.9	2.7	U	2.7	2.8	U	2.8	2.8	U	2.8
Aroclor-1221	PCB	8.4	U	8.4	7.9	U	7.9	8.3	U	8.3	7.9	U	7.9	8.2	U	8.2	8.0	U	8.0
Aroclor-1232	PCB	2.1	U	2.1	2	U	2	2.1	U	2.1	2.0	U	2.0	2.0	U	2.0	2.0	U	2.0
Aroclor-1242	PCB	4.9	U	4.9	4.6	U	4.6	4.8	U	4.8	4.6	U	4.6	4.8	U	4.8	4.7	U	4.7
Aroclor-1248	PCB	4.9	U	4.9	4.6	U	4.6	4.8	U	4.8	4.6	U	4.6	4.8	U	4.8	4.7	U	4.7
Aroclor-1254	PCB	2.7	U	2.7	2.6	U	2.6	2.7	U	2.7	2.6	U	2.6	2.7	U	2.7	2.6	U	2.6
Aroclor-1260	PCB	2.7	U	2.7	2.6	U	2.6	2.7	U	2.7	2.6	U	2.6	2.7	U	2.7	2.6	U	2.6
1,1,1-Trichloroethane	VOA	0.61	U	0.61	0.60	U	0.60	0.55	U	0.55	0.62	U	0.62	0.62	U	0.62	0.6	U	0.6
1,1,2,2-Tetrachloroethane	VOA	0.71	U	0.71	0.71	U	0.71	0.65	U	0.65	0.72	U	0.72	0.73	U	0.73	0.7	U	0.7
1,1,2-Trichloroethane	VOA	1.0	U	1.0	1.0	U	1.0	0.94	U	0.94	1.0	U	1.0	1.1	U	1.1	1.0	U	1.0
1,1-Dichloroethane	VOA	0.25	U	0.25	0.24	UX	0.24	0.22	U	0.22	0.25	U	0.25	0.25	U	0.25	0.24	U	0.24
1,1-Dichloroethene	VOA	0.69	U	0.69	0.68	U	0.68	0.63	U	0.63	0.70	U	0.70	0.71	U	0.71	0.68	U	0.68
1,2-Dichloroethane	VOA	0.82	U	0.82	0.81	U	0.81	0.75	U	0.75	0.83	U	0.83	0.84	U	0.84	0.80	U	0.80
1,2-Dichloroethene(Total)	VOA	0.46	U	0.46	0.45	UX	0.45	0.42	U	0.42	0.46	U	0.46	0.47	U	0.47	0.45	U	0.45
1,2-Dichloropropane	VOA	0.64	U	0.64	0.64	U	0.64	0.59	U	0.59	0.65	U	0.65	0.66	U	0.66	0.63	U	0.63
2-Butanone	VOA	2.1	U	2.1	2.1	U	2.1	1.9	U	1.9	2.2	U	2.2	2.2	U	2.2	2.1	U	2.1
2-Hexanone	VOA	5.7	U	5.7	5.7	U	5.7	5.2	U	5.2	5.8	U	5.8	5.9	U	5.9	5.6	U	5.6
4-Methyl-2-Pentanone	VOA	5.1	U	5.1	5.1	U	5.1	4.6	U	4.6	5.2	U	5.2	5.2	U	5.2	5.0	U	5.0
Acetone	VOA	6.3	U	6.3	6.2	U	6.2	5.7	U	5.7	6.4	U	6.4	6.5	U	6.5	6.2	U	6.2
Benzene	VOA	0.55	U	0.55	0.54	UX	0.54	0.50	U	0.50	0.56	U	0.56	0.56	U	0.56	0.54	U	0.54
Bromodichloromethane	VOA	0.26	U	0.26	0.25	UX	0.25	0.23	U	0.23	0.26	U	0.26	0.26	U	0.26	0.25	U	0.25
Bromoform	VOA	0.27	U	0.27	0.27	U	0.27	0.25	U	0.25	0.27	U	0.27	0.28	U	0.28	0.26	U	0.26
Bromomethane	VOA	0.59	U	0.59	0.58	U	0.58	0.53	U	0.53	0.59	U	0.59	0.60	U	0.60	0.57	U	0.57
Carbon disulfide	VOA	0.49	U	0.49	0.49	U	0.49	0.45	U	0.45	0.50	U	0.50	0.50	U	0.50	0.48	U	0.48
Carbon tetrachloride	VOA	0.74	U	0.74	0.73	UX	0.73	0.67	U	0.67	0.75	U	0.75	0.76	U	0.76	0.72	U	0.72
Chlorobenzene	VOA	0.63	U	0.63	0.63	U	0.63	0.58	U	0.58	0.64	U	0.64	0.65	U	0.65	0.62	U	0.62
Chloroethane	VOA	1.0	U	1.0	1.0	U	1.0	0.95	U	0.95	1.1	U	1.1	1.1	U	1.1	1.0	U	1.0
Chloroform	VOA	0.34	U	0.34	0.34	UX	0.34	0.31	U	0.31	0.34	U	0.34	0.35	U	0.35	0.33	U	0.33
Chloromethane	VOA	0.90	U	0.90	0.89	U	0.89	0.82	U	0.82	0.91	U	0.91	0.92	U	0.92	0.88	U	0.88
cis-1,3-Dichloropropene	VOA	1.5	U	1.5	1.5	U	1.5	1.4	U	1.4	1.5	U	1.5	1.5	U	1.5	1.5	U	1.5
Dibromochloromethane	VOA	0.67	U	0.67	0.66	U	0.66	0.61	U	0.61	0.68	U	0.68	0.68	U	0.68	0.65	U	0.65
Ethylbenzene	VOA	0.78	U	0.78	0.78	UX	0.78	0.71	U	0.71	0.79	U	0.79	0.8	U	0.8	0.77	U	0.77
Methylenechloride	VOA	0.88	U	0.88	0.87	U	0.87	0.80	U	0.80	3.4	JB	0.89	0.90	U	0.90	1.8	JB	0.86
Styrene	VOA	0.74	U	0.74	0.73	U	0.73	0.67	U	0.67	0.75	U	0.75	0.76	U	0.76	0.72	U	0.72
Tetrachloroethene	VOA	0.69	U	0.69	0.68	UX	0.68	0.63	U	0.63	0.70	U	0.70	0.71	U	0.71	0.68	U	0.68
Toluene	VOA	0.81	U	0.81	0.80	U	0.80	0.74	U	0.74	0.82	U	0.82	0.83	U	0.83	0.79	U	0.79
trans-1,3-Dichloropropene	VOA	0.78	U	0.78	0.78	U	0.78	0.71	U	0.71	0.79	U	0.79	0.80	U	0.80	0.77	U	0.77
Trichloroethene	VOA	0.27	U	0.27	0.27	UX	0.27	0.25	U	0.25	0.27	U	0.27	0.28	U	0.28	0.26	U	0.26
Vinyl chloride	VOA	1.6	U	1.6	1.6	U	1.6	1.4	U	1.4	1.6	U	1.6	1.6	U	1.6	1.5	U	1.5
Xylenes (total)	VOA	0.71	U	0.71	0.71	U	0.71	0.65	U	0.65	0.72	U	0.72	0.73	U	0.73	0.70	U	0.70

Attachment	1	Sheet No.	25 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	Trip Blank - J1HKF5			Trip Blank - J1HKF6			Trip Blank - J1HKF7			Trip Blank - J1JDX5		
		4/26/11			4/27/11			4/28/11			6/7/11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB												
Aroclor-1221	PCB												
Aroclor-1232	PCB												
Aroclor-1242	PCB												
Aroclor-1248	PCB												
Aroclor-1254	PCB												
Aroclor-1260	PCB												
1,1,1-Trichloroethane	VOA	0.68	U	0.68	0.64	U	0.64	0.59	U	0.59	0.62	U	0.62
1,1,2,2-Tetrachloroethane	VOA	0.80	U	0.80	0.75	U	0.75	0.70	U	0.70	0.73	U	0.73
1,1,2-Trichloroethane	VOA	1.2	U	1.2	1.1	U	1.1	1.0	U	1.0	1.1	U	1.1
1,1-Dichloroethane	VOA	0.28	U	0.28	0.26	U	0.26	0.24	U	0.24	0.25	U	0.25
1,1-Dichloroethene	VOA	0.77	U	0.77	0.72	U	0.72	0.67	U	0.67	0.70	U	0.70
1,2-Dichloroethane	VOA	0.92	U	0.92	0.86	U	0.86	0.80	U	0.80	0.84	U	0.84
1,2-Dichloroethene(Total)	VOA	0.51	U	0.51	0.48	U	0.48	0.45	U	0.45	0.47	U	0.47
1,2-Dichloropropane	VOA	0.72	U	0.72	0.68	U	0.68	0.63	U	0.63	0.66	U	0.66
2-Butanone	VOA	9.0	J	2.4	8.2	J	2.2	6.7	J	2.1	12		2.2
2-Hexanone	VOA	6.4	U	6.4	6.0	U	6	5.6	U	5.6	5.8	U	5.8
4-Methyl-2-Pentanone	VOA	5.7	U	5.7	5.4	U	5.4	5.0	U	5.0	5.2	U	5.2
Acetone	VOA	41		7.1	28		6.6	32		6.1	9.9	J	6.4
Benzene	VOA	0.62	U	0.62	0.58	U	0.58	0.54	U	0.54	0.56	U	0.56
Bromodichloromethane	VOA	0.29	U	0.29	0.27	U	0.27	0.25	U	0.25	0.26	U	0.26
Bromoform	VOA	0.3	U	0.3	0.28	U	0.28	0.26	U	0.26	0.27	U	0.27
Bromomethane	VOA	0.66	U	0.66	0.61	U	0.61	0.57	U	0.57	0.60	U	0.60
Carbon disulfide	VOA	0.55	U	0.55	0.52	U	0.52	0.48	U	0.48	0.50	U	0.50
Carbon tetrachloride	VOA	0.83	U	0.83	0.77	U	0.77	0.72	U	0.72	0.75	U	0.75
Chlorobenzene	VOA	0.71	U	0.71	0.66	U	0.66	0.62	U	0.62	0.64	U	0.64
Chloroethane	VOA	1.2	U	1.2	1.1	U	1.1	1.0	U	1.0	1.1	U	1.1
Chloroform	VOA	0.38	U	0.38	0.36	U	0.36	0.33	U	0.33	0.35	U	0.35
Chloromethane	VOA	1.0	U	1.0	0.95	U	0.95	0.88	U	0.88	0.92	U	0.92
cis-1,3-Dichloropropene	VOA	1.7	U	1.7	1.6	U	1.6	1.5	U	1.5	1.5	U	1.5
Dibromochloromethane	VOA	0.75	U	0.75	0.7	U	0.7	0.65	U	0.65	0.68	U	0.68
Ethylbenzene	VOA	0.88	U	0.88	0.82	U	0.82	0.77	U	0.77	0.80	U	0.80
Methylenechloride	VOA	0.98	U	0.98	0.92	U	0.92	2.6	JB	0.86	4.1	JB	0.90
Styrene	VOA	0.83	U	0.83	0.77	U	0.77	0.72	U	0.72	0.75	U	0.75
Tetrachloroethene	VOA	0.77	U	0.77	0.72	U	0.72	0.67	U	0.67	0.70	U	0.70
Toluene	VOA	0.9	U	0.9	0.85	U	0.85	0.79	U	0.79	0.82	U	0.82
trans-1,3-Dichloropropene	VOA	0.88	U	0.88	0.82	U	0.82	0.77	U	0.77	0.80	U	0.80
Trichloroethene	VOA	0.30	U	0.30	0.28	U	0.28	0.26	U	0.26	0.27	U	0.27
Vinyl chloride	VOA	1.8	U	1.8	1.6	U	1.6	1.5	U	1.5	1.6	U	1.6
Xylenes (total)	VOA	0.80	U	0.80	0.75	U	0.75	0.70	U	0.70	0.73	U	0.73

Attachment	1	Sheet No.	26 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Attachment 1. 600-151 Waste Site Verification Sample Results (Organics).

Sample Location	HEIS Number	Sample Date	TPH - diesel range			TPH diesel range EXT			Percent moisture (wet sample)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	%	Q	PQL
A-3	J1HK25	4/26/11	1500	J	700	4800	J	1000	4.6		0
Duplicate of J1HK25	J1HK41	4/26/11	3600	J	720	7600	J	1100	5.9		0
A-1	J1HK23	4/26/11	4300	J	720	11000	J	1100	6.2		0
A-2 re-sample	J1JDW8	6/7/11	19000		670	31000		980	4.6		0
A-4 re-sample	J1JDW9	6/7/11	4000	J	730	7200		1100	10		0
A-5 re-sample	J1JDX0	6/7/11	5000	N	650	9100	N	950	2.8		0
A-6 re-sample	J1JDX1	6/7/11	4000		670	7700		980	3.6		0
A-7	J1HK29	4/26/11	6600	J	710	18000	J	1000	6.3		0
A-8	J1HK30	4/26/11	6300	J	710	26000	J	1000	9.8		0
A-9 re-sample	J1JDX2	6/7/11	3300	J	840	5700		1200	19.5		0
A-10	J1HK32	4/26/11	7000	J	680	17000	J	1000	7.8		0
A-11	J1HK33	4/26/11	5300	J	720	13000	J	1100	8.2		0
A-12	J1HK34	4/26/11	2000	J	700	5600	J	1000	6.9		0
A-13	J1HK35	4/26/11	4000	J	740	12000	J	1100	8.8		0
A-14	J1HK36	4/26/11	2900	J	700	11000	J	1000	5		0
A-15	J1HK37	4/26/11	3100	J	720	6700	J	1100	7.3		0
A-16	J1HK38	4/26/11	44000	J	730	66000	J	1100	9.2		0
A-17	J1HK39	4/26/11	3000	J	660	7800	J	980	4.7		0
A-18 re-sample	J1JDX3	6/7/11	4000	J	710	11000		1000	5.8		0
A-2[a]	J1HK24	4/26/11	310000	JN	700	690000	JN	1000	7.5		0
A-4[a]	J1HK26	4/26/11	49000	J	700	77000	J	1000	8.7		0
A-5[a]	J1HK27	4/26/11	21000	J	720	42000	J	1100	6.8		0
A-6[a]	J1HK28	4/26/11	13000	J	740	40000	J	1100	11		0
A-9[a]	J1HK31	4/26/11	8900	J	720	33000	J	1100	10.3		0
A-18[a]	J1HK40	4/26/11	20000	J	720	46000	J	1100	5.9		0
B-6	J1HK47	4/27/11	1400	J	700	8700		1000	4.2		0
Duplicate of J1HK47	J1HK54	4/27/11	1300	J	730	8900		1100	8.5		0
B-1	J1HK42	4/27/11	1500	J	710	12000		1000	3.9	M	0
B-2	J1HK43	4/27/11	700	U	700	1400	J	1000	2.6		0
B-3	J1HK44	4/27/11	680	U	680	2400	J	1000	2.8		0
B-4	J1HK45	4/27/11	2300	J	670	6200		990	2.3		0
B-5	J1HK46	4/27/11	940	J	690	5500		1000	3.9		0
B-7	J1HK48	4/27/11	690	U	690	3200	J	1000	4.1		0
B-8	J1HK49	4/27/11	670	U	670	3200	J	980	3.8		0
B-9	J1HK50	4/27/11	720	J	700	4500		1000	4.3		0
B-10	J1HK51	4/27/11	900	J	680	3900	J	1000	2.9		0
B-11 re-sample 2	J1JW46	6/22/11	1300	JB	720	2400	JB	1100			
B-12	J1HK53	4/27/11	3100	J	680	7000		1000	4.4		0
B-11[a]	J1HK52	4/27/11	5900		710	12000		1000	6.8		0
B-11 re-sample	J1JDX4	6/7/11	21000		740	32000		1100	12.7		0
C-1	J1HK55	4/28/11	790	J	690	3700	J	1000	3.3	M	0
Duplicate of J1HK55	J1HK68	4/28/11	980	J	690	4300		1000	3.2		0
C-2	J1HK56	4/28/11	700	U	700	2700	J	1000	3.9		0
C-3	J1HK57	4/28/11	5300		700	15000		1000	4.6		0
C-4	J1HK58	4/28/11	1400	J	690	8000		1000	2.7		0
C-5	J1HK59	4/28/11	1300	J	690	5100		1000	4		0
C-6	J1HK60	4/28/11	680	U	680	2500	J	1000	3.3		0
C-7	J1HK61	4/28/11	5600		680	26000		1000	0.89		0
C-8	J1HK62	4/28/11	1700	J	700	9200		1000	5.2		0
C-9	J1HK63	4/28/11	750	J	670	3900		980	1.1		0
C-10	J1HK64	4/28/11	8900		670	20000		990	3.1		0
C-11	J1HK65	4/28/11	6100		680	12000		1000	0.46		0
C-12	J1HK66	4/28/11	5500		670	29000		980	3.5		0
C-13	J1HK67	4/28/11	860	J	690	2700	J	1000	2.9		0
Equipment Blank	J1HK69	4/28/11							0.1	U	0
Trip Blank	J1HKF5	4/26/11							0.1	U	0
Trip Blank	J1HKF6	4/27/11							0.1	U	0
Trip Blank	J1HKF7	4/28/11							0.12		0
Trip Blank	J1JDX5	6/7/11							0.1	U	0

[a] Due to RAG exceedances these locations were re-sampled.

Attachment	1	Sheet No.	27 of 27
Originator	J. D. Skoglie	Date	7/13/11
Checked	T. E. Queen	Date	7/13/11
Calc. No.	0100X-CA-V0062	Rev. No.	0

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 100-HR-2 Field Remediation **Job No. 14655**

Area: 100-H

Discipline: Environmental Calculation No: 0100X-CA-V0063

Subject: 600-151 Waste Site Direct Contact 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. D. Skoglie	T. E. Queen	I. B. Berezovskiy	D. F. Obenauer	8/8/11

SUMMARY OF REVISION

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

DE01-437.03

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	7/14/2011	Calc. No.:	0100X-CA-V0063	Rev.:	0
Project:	100-HR-2 Field Remediation	Job No:	14655	Checked:	T. E. Queen	Date:	7/14/2011
Subject:	600-151 Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	1 of 4

PURPOSE:

Provide documentation to support the calculation of the direct contact hazard quotient (HQ) and excess carcinogenic risk for the 600-151 waste site. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2009a), the following criteria must be met:

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

GIVEN/REFERENCES:

1) DOE-RL, 2009a, *Remedial Design Report/Remedial Action Work Plan for the 100 Area,* DOE/RL-96-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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

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

4) WCH, 2011, *Remaining Sites Verification Package for the 600-151, Dumping Areas 50 Yards and 200 Yards Downstream of River Mile 14 Waste Site*, Attachment to Waste Site Reclassification Form 2011-053, Washington Closure Hanford, Inc., Richland, Washington.

SOLUTION:

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

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

3) Generate an excess cancer risk value for each carcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the excess cancer risk of $<1 \times 10^{-6}$ (DOE-RL 2009a).

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

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	7/14/2011	Calc. No.:	0100X-CA-V0063	Rev.:	0
Project:	100-HR-2 Field Remediation	Job No:	14655	Checked:	T. E. Queen	Date:	7/14/2011
Subject:	600-151 Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 2 of 4	

METHODOLOGY:

The 600-151 waste site is comprised of three decision units for verification sampling, consisting of the A, B, and C excavated areas. The direct contact hazard quotient and carcinogenic risk calculations for the 600-151 waste site were conservatively calculated for the entire waste site using the statistical verification soil sample results (WCH 2011). Of the contaminants of potential concern (COPCs) for this site, barium, copper, and selenium require HQ and risk calculations because these analytes were detected above background values. Boron, hexavalent chromium, molybdenum, the detected polycyclic aromatic hydrocarbons, pesticides, and volatiles require HQ and risk calculations because these analytes were detected and a Washington State or Hanford Site background value is not available. Lead was detected above background; however, 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. Although total petroleum hydrocarbons (diesel range extended) were detected and no background value is available, the risk associated with total petroleum hydrocarbons do not contribute to the cumulative toxicity calculation. Additionally, arsenic was detected above background; however, the arsenic standard is not toxicity based. All other site nonradionuclide COPCs were not detected or were quantified below background levels. An example of the HQ and risk calculations is presented below:

1) For example, the maximum value for boron is 5.0 mg/kg, divided by the noncarcinogenic RAG value of 7,200 mg/kg (calculated in accordance with the noncarcinogenic toxics effects formula in WAC 173-340-740[3]), is 6.9×10^{-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 can be obtained by summing the individual values. To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation. The sum of the HQ values is 3.9×10^{-2}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, then multiplied by 1.0×10^{-6}. For example, the maximum value for hexavalent chromium is 0.306 mg/kg, divided by 2.1 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.

4) After these calculations are completed for the carcinogenic analytes, the cumulative excess cancer risk can be obtained by summing the individual values. To avoid errors due to intermediate rounding, the individual cancer risk values prior to rounding are used for this calculation. The sum of the excess cancer risk values is 1.1×10^{-6}. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
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, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	7/14/2011	Calc. No.:	0100X-CA-V0063	Rev.:	0
Project:	100-HR-2 Field Remediation	Job No:	14655	Checked:	T. E. Queen	Date:	7/14/2011
Subject:	600-151 Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 3 of 4	

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

Table 1. Direct Contact Hazard Quotient and Excess Cancer Risk Results for the 600-151 Waste Site (2 Pages).

Contaminants of Potential Concern	Statistical Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Arsenic[c]	83.4	24	--	0.667	--
Barium	147	5,600	2.6E-02	--	--
Boron	5.0	7,200	6.9E-04	--	--
Chromium, hexavalent[d]	0.306	240	1.3E-03	2.1	1.5E-07
Copper	22.0	2,960	7.4E-03	--	--
Lead[e]	712	353	--	--	--
Molybdenum	0.47	400	1.2E-03	--	--
Selenium	0.94	400	2.4E-03	--	--
Polycyclic aromatic Hydrocarbons					
Anthracene	0.0074	24,000	3.1E-07	--	--
Benzo(a)anthracene	0.097	--	--	1.37	7.1E-08
Benzo(a)pyrene	0.100	--	--	0.137	7.3E-07
Benzo(b)fluoranthene	0.077	--	--	1.37	5.6E-08
Benzo(ghi)perylene[f]	0.039	2,400	1.6E-05	--	--
Benzo(k)fluoranthene	0.037	--	--	1.37	2.7E-08
Chrysene	0.129	--	--	13.7	9.4E-09
Dibenz(a,h)anthracene	0.023	--	--	1.37	1.7E-08
Fluoranthene	0.128	3,200	4.0E-05	--	--
Fluorene	0.00900	3,200	2.8E-06	--	--
Indeno(1,2,3-cd)pyrene	0.036	--	--	1.37	2.6E-08
Naphthalene	0.018	1,600	1.1E-05	--	--
Phenanthrene[f]	0.063	24,000	2.6E-06	--	--
Pyrene	0.179	2,400	7.5E-05	--	--
Pesticides					
DDE, 4,4'-	0.0034	--	--	2.94	1.2E-09
DDT, 4,4'-	0.00091	40	2.3E-05	2.94	3.1E-10

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	7/14/2011	Calc. No.:	0100X-CA-V0063	Rev.:	0
Project:	100-HR-2 Field Remediation	Job No:	14655	Checked:	T. E. Queen	Date:	7/14/2011
Subject:	600-151 Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 4 of 4	

Table 1. Direct Contact Hazard Quotient and Excess Cancer Risk Results for the 600-151 Waste Site (2 Pages).

Contaminants of Potential Concern	Statistical Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Volatiles					
2-Butanone	0.0069	48,000	1.4E-07	--	--
Acetone	0.030	72,000	4.2E-07	--	--
Methylene chloride	0.011	4,800	2.3E-06	133	8.3E-11
Total Petroleum Hydrocarbons					
Diesel range Extended[g]	22.1				
Totals					
Cumulative Hazard Quotient:			**3.9E-02**		
Cumulative Excess Cancer Risk:					**1.1E-06**

[a] = From WCH (2011).

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

[c] = The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement Project Managers as discussed in Section 2.1.2.1 of the RDR/RAWP (DOE-RL 2009a).

[d] = Value for the carcinogen RAG calculated based on the inhalation exposure pathway (WAC) 173-340-750(3), 1996.

[e] = Value for the noncarcinogenic RAG calculated using Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children, EPA/540/R 93/081, Publication No. 9285.7, U.S. Environmental Protection Agency, Washington, D.C.

[f] = Toxicity data for benzo(ghi)perylene and phenanthrene are not available. The cleanup level is based on use of surrogate chemicals.

benzo(ghi)perylene surrogate: pyrene; phenanthrene surrogate: anthracene

[g] = The risk associated with total petroleum hydrocarbons do not contribute to the cumulative toxicity calculation.

-- = not applicable RAG = remedial action goal

CONCLUSION:

The calculations in Table 1 demonstrates that the 600-151 waste site meets the requirements for the direct contact hazard quotients and carcinogenic (excess cancer) risk, respectively, as identified in the RDR/RAWP (DOE-RL 2009a) and SAP (DOE-RL 2009b). The direct contact hazard quotients and carcinogenic (excess cancer) risk calculations are for use in the RSVP for this site.

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 100-H Area Field Remediation **Job No. 14655**

Area: 100-H

Discipline: Environmental *Calculation No: 0100H-CA-V0179

Subject: 600-151 Waste Site Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater

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 = 3 Total = 4	W. S. Thompson WS Thompson	T. E. Queen TE Queen	B. L. Vedder BL Vedder	D. F. Obenauer D. F. Obenauer	7/18/11

SUMMARY OF REVISION

WCH-DE-018 (05/08/2007) *Obtain Calc. No. from Document Control and Form from Intranet

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	W. S. Thompson	Date:	7/18/2011	Calc. No.:	0100H-CA-V0179	Rev.:	0
Project:	100-H Area Field Remediation	Job No:	14655	Checked:	T. E. Queen	Date:	7/18/2011
Subject:	600-151 Waste Site Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater					Sheet No. 1 of 3	

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and excess carcinogenic risk associated with soil contaminant levels compared to soil cleanup levels for protection of groundwater for the 600-151 waste site. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2009), the following criteria must be met:

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

GIVEN/REFERENCES:

1) BHI, 2005, *100 Area Analogous Sites RESRAD Evaluation*, Calculation No. 0100X-CA-V0050 Rev 0, Bechtel Hanford, Inc., Richland, Washington.

2) DOE-RL, 2009, *Remedial Design Report/Remedial Action Work Plan for the 100 Areas*, DOE/RL-96-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

3) DOE-RL, 2010, Tri-Party Agreement Change Control Form, TPA-CN-401, dated December 6, 2010, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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

5) WCH, 2011, *600-151 Waste Site Cleanup Verification 95% UCL Calculations*, 0100X-CA-V0062, Rev. 0, Washington Closure Hanford, Inc., Richland, Washington.

SOLUTION:

1) Generate a HQ for each noncarcinogenic constituent detected above background in soil and with a K_d less than that required to show no migration to groundwater in 1,000 years using the RESRAD generic site model (BHI 2005).

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

3) Generate an excess cancer risk value for each carcinogenic constituent detected above background in soil and with a K_d less than that required to show no migration to groundwater in 1,000 years using the RESRAD generic site model (BHI 2005).

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

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	W. S. Thompson	Date:	7/18/2011	Calc. No.:	0100H-CA-V0179	Rev.:	0
Project:	100-H Area Field Remediation	Job No:	14655	Checked:	T. E. Queen	Date:	7/18/2011
Subject:	600-151 Waste Site Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater					Sheet No. 2 of 3	

METHODOLOGY:

The 600-151 waste site was divided into three decision units for verification sampling, consisting of the A, B, and C excavated areas. Hazard quotient and carcinogenic risk calculations for potential impact to groundwater at the 600-151 waste site were conservatively calculated for the entire waste site using the statistical or maximum value for each analyte in all decision units from the 95% UCL calculation (WCH 2011). Of the contaminants of potential concern (COPCs) for this site, boron and hexavalent chromium are included because no Hanford background value has been established. Acetone, boron, 2-butanone, hexavalent chromium, fluorene, methylene chloride, naphthalene, and selenium are included because their respective soil distribution coefficient (K_d) is less than that necessary to show no migration to groundwater in 1,000 years using the generic site RESRAD model (BHI 2005). Based on this model and a vadose zone of approximately 9 m (30 ft) thickness, a K_d of 7.9 or greater is required to show no predicted migration to groundwater in 1,000 years. With the exception of arsenic, all other site nonradionuclide COPCs were not detected, quantified below background levels, or have a K_d greater than or equal to 7.9. Arsenic, having a K_d value of 3, is excluded from the HQ calculation because it is associated with historic pesticide use at pre-Hanford orchards and will be evaluated as part of the final remedy for pre-Hanford orchard land (DOE-RL 2010). An example of the HQ and risk calculations for soil constituents with a potential impact to groundwater is presented below:

1) The hazard quotient is defined as the ratio of the dose of a substance obtained over a specified time (mg/kg/day) to a reference dose for the same substance derived over the same specified time (mg/kg/day). The hazard quotient can also be calculated as the ratio of the concentration in soil (maximum or statistical value) (mg/kg) to the soil RAG (mg/kg) for protection of groundwater, where the RAG is the groundwater cleanup level (mg/L) (calculated with, and related to the hazard quotient through, WAC 173-340-720(3)(a)(ii)(A), 1996) x 100 x 1 mg/1000 mg (conversion factor). This is based on the "100 times rule" of WAC 173-340-740(3)(a)(ii)(A) (1996). For example, the maximum value for boron of 5.0 mg/kg, divided by the noncarcinogenic RAG value of 320 mg/kg is 1.6×10^{-2}. Comparing this value to the requirement of <1.0, this criterion is met.

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ can be obtained by summing the individual values. (To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation.) The cumulative HQ for the 600-151 waste site is 1.9×10^{-1}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, and then multiplied by 1×10^{-6}. For example, the maximum value for methylene chloride is 0.011 mg/kg, divided by 0.583 mg/kg, and multiplied as indicated, is 1.9×10^{-8}. Comparing this value to the requirement of $<1 \times 10^{-6}$, this criterion is met.

4) After the excess cancer risk calculation is completed for the appropriate analytes, the cumulative HQ can be obtained by summing the individual values. (To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation.) The cumulative excess cancer risk for methylene chloride, the only constituent subject to the groundwater protection evaluation for the 600-151 waste site is 1.9×10^{-8}. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	W. S. Thompson	Date:	7/18/2011	Calc. No.:	0100H-CA-V0179	Rev.:	0
Project:	100-H Area Field Remediation	Job No:	14655	Checked:	T. E. Queen	Date:	7/18/2011
Subject:	600-151 Waste Site Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater					Sheet No.	3 of 3

5) The soil cleanup RAGs for protection of groundwater are based on the "100 times" provision in WAC 173-340-740(3)(a)(ii)(A). WAC 173-340-740(3)(a)(ii)(A) (1996) provides the "100 times rule" but also states "unless it can be demonstrated that a higher soil concentration is protective of ground water at the site." When the "100 times rule" values are exceeded, RESRAD was used to demonstrate that higher soil concentrations may be protective of groundwater.

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.

Table 1. Hazard Quotient and Excess Cancer Risk Results for the 600-151 Waste Site.

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					
Boron	5.0	320	1.6E-02	--	--
Chromium, hexavalent	0.306	4.8	5.2E-02	--	--
Selenium	0.94	8	1.2E-01	--	--
Semivolatiles					
Fluorene	0.009	64	1.4E-04	--	--
Napthalene	0.018	16	1.1E-03	--	--
Volatiles					
Acetone	0.030	720	4.2E-05	--	--
2-Butanone	0.0069	480	1.4E-05	--	--
Methylene chloride	0.011	48	2.3E-04	0.583	1.9E-08
Totals					
Cumulative Hazard Quotient:			**1.9E-01**		
Cumulative Excess Cancer Risk:					**1.9E-08**

Notes:
[a] = From WCH (2011).
[b] = Value obtained from the Cleanup Levels and Risk Calculations (CLARC) database using Groundwater, Method B, results and "100 times" model unless otherwise noted.
-- = not applicable

CONCLUSION:

This calculation demonstrates that the 600-151 site meets the requirements for the hazard quotients and excess carcinogenic risk as identified in the RDR/RAWP (DOE-RL 2009).

APPENDIX D

ASBESTOS VERIFICATION SAMPLE RESULTS

600-151 Waste Site Verification Sample Results For Asbestos.

Sample Location	HEIS Number	Sample Date	% Total Asbestos	Sample Location	HEIS Number	Sample Date	% Total Asbestos
A-3	J1HJV9	4/26/11	ND	B-1	J1HJX6	4/27/11	ND
Duplicate of J1HJV9	J1HJX5	4/26/11	ND	B-2	J1HJX7	4/27/11	ND
A-1	J1HJV7	4/26/11	ND	B-3	J1HJX8	4/27/11	ND
A-2 re-sample	J1JDW1	6/7/11	ND	B-4	J1HJX9	4/27/11	ND
A-4 re-sample	J1JDW2	6/7/11	ND	B-5	J1HK00	4/27/11	ND
A-5 re-sample	J1JDW3	6/7/11	ND	B-7	J1HK02	4/27/11	ND
A-6 re-sample	J1JDW4	6/7/11	ND	B-8	J1HK03	4/27/11	ND
A-7	J1HJW3	4/26/11	ND	B-9	J1HK04	4/27/11	ND
A-8	J1HJW4	4/26/11	ND	B-10	J1HK05	4/27/11	ND
A-9 re-sample	J1JDW5	6/7/11	ND	B-11 re-sample 2	J1JW47	6/22/11	ND
A-10	J1HJW6	4/26/11	ND	B-12	J1HK07	4/27/11	ND
A-11	J1HJW7	4/26/11	ND	B-11 [a]	J1HK06	4/27/11	ND
A-12	J1HJW8	4/26/11	ND	B-11 re-sample 1 [a]	J1JDW7	6/7/11	ND
A-13	J1HJW9	4/26/11	ND	C-1	J1HK09	4/28/11	ND
A-14	J1HJX0	4/26/11	ND	Duplicate of J1HK09	J1HK22	4/28/11	ND
A-15	J1HJX1	4/26/11	ND	C-2	J1HK10	4/28/11	ND
A-16	J1HJX2	4/26/11	ND	C-3	J1HK11	4/28/11	ND
A-17	J1HJX3	4/26/11	ND	C-4	J1HK12	4/28/11	ND
A-18 re-sample	J1JDW6	6/7/11	ND	C-5	J1HK13	4/28/11	ND
A-2 [a]	J1HJV8	4/26/11	ND	C-6	J1HK14	4/28/11	ND
A-4 [a]	J1HJW0	4/26/11	ND	C-7	J1HK15	4/28/11	ND
A-5 [a]	J1HJW1	4/26/11	ND	C-8	J1HK16	4/28/11	ND
A-6 [a]	J1HJW2	4/26/11	ND	C-9	J1HK17	4/28/11	ND
A-9 [a]	J1HJW5	4/26/11	ND	C-10	J1HK18	4/28/11	ND
A-18 [a]	J1HJX4	4/26/11	ND	C-11	J1HK19	4/28/11	ND
B-6	J1HK01	4/27/11	ND	C-12	J1HK20	4/28/11	ND
Duplicate of J1HK01	J1HK08	4/27/11	ND	C-13	J1HK21	4/28/11	ND

[a] Due to RAG exceedances these locations were resampled after additional excavation.

Note: Gray cells indicate not applicable.

HEIS = Hanford Environmental Information System

ND = not detected

APPENDIX E

DATA QUALITY ASSESSMENT

APPENDIX E

DATA QUALITY ASSESSMENT

VERIFICATION SAMPLING

A data quality assessment (DQA) was performed to compare the verification sampling approach and resulting analytical data with the sampling and data requirements specified in the site-specific sample design (WCH 2011b). This DQA was performed in accordance with site specific data quality objectives found in the *100 Area Remedial Action Sampling and Analysis Plan* (SAP) (DOE-RL 2009).

A review of the sample design (WCH 2010b), the field logbook (WCH 2011a), and applicable analytical data packages has been performed as part of this DQA. All samples were collected and analyzed per the sample design. To ensure quality data, the SAP data assurance requirements and the data validation procedures for chemical analysis (BHI 2000) are used as appropriate. This review involves evaluation of the data to determine if they are of the right type, quality, and quantity to support the intended use (i.e., closeout decisions). The DQA completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data quality objectives process (EPA 2006).

Verification sample data collected at the 600-151 waste site were provided by the laboratories in 10 sample delivery groups (SDGs): SDG JP0171, SDG JP0174, SDG JP0175, SDG JP0196, SDG JP0209, SDG D1112201, SDG D1112202, SDG D1112421, SDG MA02607, and SDG MA02737. SDG JP0171 was submitted for third-party validation. No major deficiencies were identified for the data set. Minor deficiencies are discussed for the 600-151 data set, as follows below. If no comments are made about a specific analysis, it should be assumed that no deficiencies affecting the quality of the data were found.

SDG JP0171

This SDG comprises 19 soil samples (J1HK23-J1HK41) from the 600-151 area A verification sample locations. This SDG includes a field duplicate pair (J1HK25/J1HK41). These samples were analyzed for inductively coupled plasma (ICP) metals, mercury, hexavalent chromium, pesticides, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH), and volatile organic compounds (VOCs). In addition, one trip blank (J1HKF5) was analyzed for VOCs. SDG JP0171 was submitted for third-party validation. Minor deficiencies are as follows:

In the pesticides analysis, all of the toxaphene data in SDG JP0171 were qualified by third-party validation as estimated with "J" flags, due to lack of a matrix spike (MS), matrix spike duplicate (MSD), and laboratory control sample (LCS) analysis. Estimated, or "J"-flagged, data are acceptable for decision-making purposes.

In the pesticides analysis, the MSD recoveries for endosulfan II (46%) and endosulfan sulfate

(26%) associated with all samples in SDG JP0171 (except J1HK25) were below quality control (QC) limits. In addition, the MS/MSD relative percent differences (RPDs) for endosulfan II (59%) and endosulfan sulfate (99%) were above the QC limits. The results associated these MSD recoveries and MS/MSD RPDs were qualified as estimates and flagged "J" by third-party validation. The data are acceptable for decision-making purposes.

In the pesticides analysis, the endrin aldehyde result for sample J1HK25 was qualified as an estimate and flagged "J" by third-party validation due to an MSD recovery of 7%. In addition, the MS/MSD RPD for endrin aldehyde (164%) was above the QC limits. The data are acceptable for decision-making purposes.

In the pesticides analysis, the surrogate recovery for sample J1HK24 was outside QC limits, and the 4,4-DDT result was qualified as an estimate and flagged "J" by third-party validation. The data are acceptable for decision-making purposes.

In the PCB analysis, the surrogate recovery for sample J1HK38 was outside QC limits, and all PCB results for that sample were qualified as an estimate and flagged "J" by third-party validation. The data are acceptable for decision-making purposes.

In the TPH analysis, the MS recoveries (460% and 235%) and MSD recoveries (-158% and 11%) are outside the QC limits. In addition, the MS/MSD RPDs were above the QC limit at 54% and 39%. All TPH results were qualified as estimates and flagged "J" by third-party validation. The data are acceptable for decision-making purposes.

In the hexavalent chromium analysis, the MS recovery was below the QC criteria, at 56%. All hexavalent chromium results were qualified as estimates and flagged "J" by third-party validation. The data are acceptable for decision-making purposes.

In the PAH analysis, a surrogate recovery for sample J1HK26 was above QC limits at 147%, and all detected PAH results for that sample were qualified as an estimate and flagged "J" by third-party validation. The data are acceptable for decision-making purposes.

In the VOA analysis, the MS/MSD RPD was above the QC limit for carbon tetrachloride (45%), 1,1-dichloroethane (32%), 1,2-dichloroethene (37%), 1,1-dichloroethene (45%), methylene chloride (33%), tetrachloroethene (33%), 1,1,1-trichloroethane (55%), and trichloroethene (34%). The results for these analytes were qualified as estimates and flagged "J" by third-party validation. The data are acceptable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum, iron, lead, antimony, and silicon). For aluminum, iron, and lead the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony were 34% and 45%, and for silicon were 16% and 12%. All antimony and silicon data for SDG JP0171 were considered estimated and flagged "J" by third-

party validation due to the MS recoveries outside the limits. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, all silicon results were qualified as estimated and flagged "J" by third-party validation due to LCS recoveries below QC limits at 12% and 15%. Estimated data are acceptable for decision-making purposes.

SDG JP0174

This SDG comprises 13 soil samples (J1HK42-J1HK54) from the 600-151 area B verification sample locations. This SDG includes a field duplicate pair (J1HK47/J1HK54). These samples were analyzed for ICP metals, mercury, hexavalent chromium, pesticides, PCBs, PAH, TPH, and VOCs. In addition, one trip blank (J1HKF6) was analyzed for VOCs. Minor deficiencies are as follows:

In the hexavalent chromium analysis, the MS recovery was below the QC criteria, at 52%. All hexavalent chromium results may be considered estimated. The data are acceptable for decision-making purposes.

In the pesticides analysis, all of the toxaphene data in may be considered estimated due to lack of an MS, MSD, and LCS analysis. Estimated data are acceptable for decision-making purposes.

In the pesticides analysis, the endrin aldehyde results may be considered estimated due to MS and MSD recoveries of 33% and 0%, respectively. The data are acceptable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum, iron, manganese, antimony, and silicon). For most of these analytes the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony and silicon were 43% and 20%, respectively. All antimony and silicon data for SDG JP0174 may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, all silicon results may be considered estimated due to an LCS below quality control limits at 18%. Estimated data are acceptable for decision-making purposes.

SDG JP0175

This SDG comprises 14 soil samples (J1HK55-J1HK68) from the 600-151 area C verification sample locations. This SDG includes a field duplicate pair (J1HK55/J1HK68). These samples were analyzed for ICP metals, mercury, hexavalent chromium, pesticides, PCBs, PAH, TPH, and VOCs. In addition, one equipment blank (J1HK69) was analyzed for ICP metals, mercury,

PAH, and VOCs, and one trip blank (J1HKF7) was analyzed for VOCs. Minor deficiencies are as follows:

In the hexavalent chromium analysis, the MS recovery was below the QC criteria, at 65%. All hexavalent chromium results may be considered estimated. The data are acceptable for decision-making purposes.

In the pesticides analysis, all of the toxaphene data in may be considered estimated due to lack of an MS, MSD, and LCS analysis. Estimated data are acceptable for decision-making purposes.

In the VOC analysis, the methylene chloride results for samples J1HK65, J1HK68, and J1HKF7 (the trip blank) are of similar magnitude as the method blank result. The methylene chloride results for these samples may be considered estimated due to method blank contamination. The data are acceptable for decision-making purposes.

In the VOC analysis, the MSD recoveries were lower than the MS recoveries for all analytes, but still within QC limits. However, the MS/MSD RPDs for all analytes were above the acceptance criteria, ranging between 43% and 73%. The results for these analytes may be considered estimated. The data are acceptable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for four analytes (aluminum, iron, antimony, and silicon). For aluminum and iron the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony and silicon were 43% and 11%. All antimony and silicon data for SDG JP0175 may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, all silicon results may be considered estimated due to an LCS below quality control limits at 11%. Estimated data are acceptable for decision-making purposes.

SDG JP0196

This SDG comprises six soil samples (J1JDW8-J1JDW9, J1JDX0-J1JDX3) from the 600-151 area A verification sample locations and one soil sample (J1JDX4) from the 600-151 area B verification sample locations. These samples were taken to replace samples results from SDG JP0171 and SDG JP0174 following further excavation at the sample locations. These samples were analyzed for ICP metals, mercury, hexavalent chromium, pesticides, PCBs, PAH, TPH, and VOCs. In addition, one trip blank (J1JDX5) was analyzed for VOCs. Minor deficiencies are as follows:

In the VOC analysis, the methylene chloride results for all samples are of similar magnitude as the method blank result. The methylene chloride results may be considered estimated due to method blank contamination. The data are acceptable for decision-making purposes.

In the pesticides analysis, all of the toxaphene data in may be considered estimated due to lack of an MS, MSD, and LCS analysis. Estimated data are acceptable for decision-making purposes.

In the TPH analysis, all of the diesel range results may be considered estimated due to an MS/MSD RPD above the QC criteria at 33%. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, all silicon results may be considered estimated due to an LCS below quality control limits at 20%. Estimated data are useable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for four analytes (aluminum, iron, antimony, and silicon). For aluminum and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony and silicon were 57% and 14%, respectively. All antimony and silicon data for SDG JP0196 may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, all selenium results may be considered estimated due to an RPD above the QC limit at 35%. Estimated data are acceptable for decision-making purposes.

SDG JP0208

This SDG comprises one soil sample (J1JW46) from a 600-151 verification sample location. The sample was taken to replace the J1JDX4 results from SDG JP0196 and was analyzed for ICP metals, mercury, hexavalent chromium, PCBs, PAH, TPH, and VOCs. Minor deficiencies are as follows:

In the pesticides analysis, all of the toxaphene data in may be considered estimated due to lack of an MS, MSD, and LCS analysis. Estimated data are acceptable for decision-making purposes.

In the pesticides analysis, the MS recovery for endrin aldehyde (37%) was below the acceptance criteria. In addition, the MS/MSD RPD for endrin aldehyde was above the QC limit at 49%. The sample result for endrin aldehyde may be considered estimated. The data are acceptable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for five analytes (aluminum, iron, manganese, antimony, and silicon). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. 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. Antimony and silicon did not have mismatched spike and native concentrations in the original MS. The original MS recoveries for antimony and silicon were 51% and 13%,

respectively. All antimony and silicon data for SDG JP0208 may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, the silicon result may be considered estimated due to an LCS below quality control limits at 16%. Estimated data are useable for decision-making purposes.

SDG D1112201

This SDG comprises 19 soil samples (J1HJV7-J1HJV9, J1HJW0-J1HJW9, and J1HJX0-J1HJX5) from the 600-151 area A verification sample locations. This SDG includes a field duplicate pair (J1HJV9/J1HJX5). These samples were analyzed for bulk asbestos. No major or minor deficiencies were found in SDG D1112201. The data are acceptable for decision making purposes.

SDG D1112202

This SDG comprises 13 soil samples (J1HJX6-J1HJX9, J1HK00-J1HK08) from the 600-151 area B verification sample locations. This SDG includes a field duplicate pair (J1HK01/J1HK08). These samples were analyzed for bulk asbestos. No major or minor deficiencies were found in SDG D1112202. The data are acceptable for decision making purposes.

SDG D1112421

This SDG comprises 14 soil samples (J1HK09-J1HK22) from the 600-151 area C verification sample locations. This SDG includes a field duplicate pair (J1HK09/J1HK22). These samples were analyzed for bulk asbestos. No major or minor deficiencies were found in SDG D1112421. The data are acceptable for decision making purposes.

SDG MA02607

This SDG comprises six soil samples (J1JDW1-J1JDW6) from the 600-151 area A verification sample locations and one soil sample (J1JDW7) from the 600-151 area B verification sample locations. These samples were analyzed for bulk asbestos. No major or minor deficiencies were found in SDG MA02607. The data are acceptable for decision-making purposes.

SDG MA02737

This SDG comprises one soil sample (J1JW47) from a 600-151 verification sample location. This sample was analyzed for bulk asbestos. No major or minor deficiencies were found in SDG MA02737. The data are acceptable for decision-making purposes.

FIELD QUALITY ASSURANCE/QUALITY CONTROL

Relative percent difference evaluations of main sample(s) versus the laboratory duplicate(s) are routinely performed and reported by the laboratory. Any deficiencies in those calculations are reported by SDG in the previous sections.

Field quality assurance (QA)/QC measures are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples, listed in the field logbook (WCH 2011a), are shown in Table E-1. The main and QA/QC sample results are presented in Appendix C.

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

Sample Area	Main Sample	Duplicate Sample
Excavation Area A	J1HK25	J1HK41
Excavation Area B	J1HK47	J1HK54
Excavation Area C	J1HK55	J1HK68

Field duplicate samples are collected to provide a relative measure of the degree of local heterogeneity in the sampling medium, unlike laboratory duplicates that are used to evaluate precision in the analytical process. The field duplicates are evaluated by computing the RPD of the sample/duplicate pair(s) for each contaminant of potential concern (COPC). RPDs are not calculated for analytes that are not detected in both the main and duplicate sample at more than 5 times the target detection limit (TDL). RPDs of analytes detected at low concentrations (less than 5 times the detection limit) are not considered to be indicative of the analytical system performance. The calculation brief in Appendix C provides details on duplicate pair evaluation and RPD calculation.

The RPDs for silicon in the excavation area A (30.6%) and excavation area B (52.4%) duplicate samples are above the acceptance criteria of 30%. A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) is less than 5 times the TDL, including undetected analytes. In these cases, a control limit of ± 2 times the TDL is used (Appendix C) to indicate that a visual check of the data is required by the reviewer. No sample results required this check. A visual inspection of all of the data is also performed. No additional major or minor deficiencies are noted. The data are useable for decision-making purposes.

Summary

Limited, random, or sample matrix-specific influenced batch QC issues such as those discussed above, are a potential for any analysis. The number and types seen in these data sets are within expectations for the matrix types and analyses performed. The DQA review of the 600-151 waste site verification sampling data found that the analytical results are accurate within the

standard errors associated with the analytical methods, sampling, and sample handling. The DQA review for 600-151 waste site concludes that the reviewed data are of the right type, quality, and quantity to support the intended use. The analytical data were found acceptable for decision-making purposes. The verification sample analytical data are stored in the Environmental Restoration (ENRE) project-specific database prior to being submitted for inclusion in the Hanford Environmental Information System (HEIS) database. The verification sample analytical data are also summarized in Appendix C.

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